WJEC GCSE MATHEMATICS (UNITISED)

MATHS



EXAM QUESTION PACK

UNIT 2 HIGHER TIER 4352 PAPERS

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Surname	Centre Number	Candidate Number
Other Names		0

GCSE

4352/02

S16-4352-02

MATHEMATICS (UNITISED SCHEME)

UNIT 2: Non-calculator Mathematics

HIGHER TIER

A.M. THURSDAY, 9 June 2016

1 hour 15 minutes

CALCULATORS ARE NOT TO BE USED FOR THIS PAPER

ADDITIONAL MATERIALS

A ruler, a protractor and a pair of compasses may be required.

INSTRUCTIONS TO CANDIDATES

Use black ink or black ball-point pen. Do not use gel pen or correction fluid.

Write your name, centre number and candidate number in the spaces at the top of this page.

Answer **all** the questions in the spaces provided.

If you run out of space, use the continuation page at the back of the booklet, taking care to number the question(s) correctly.

Take π as 3·14.

INFORMATION FOR CANDIDATES

You should give details of your method of solution when appropriate.

Unless stated, diagrams are not drawn to scale.

Scale drawing solutions will not be acceptable where you are asked to calculate.

The number of marks is given in brackets at the end of each question or part-question.

You are reminded that assessment will take into account the quality of written communication (including mathematical communication) used in your answer to question **2**.

For Examiner's use only		
Question	**Maximum Mark**	**Mark Awarded**
1.	**3**	
2.	**8**	
3.	**3**	
4.	**3**	
5.	**3**	
6.	**5**	
7.	**5**	
8.	**6**	
9.	**3**	
10.	**2**	
11.	**4**	
12.	**5**	
13.	**3**	
14.	**7**	
15.	**2**	
16.	**3**	
Total	**65**	

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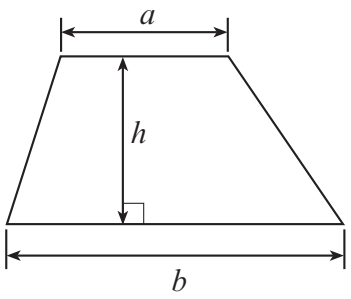
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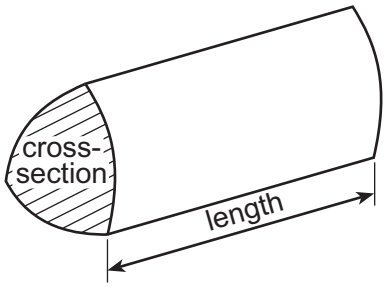
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Formula List

Area of trapezium = $\frac{1}{2}(a + b)h$

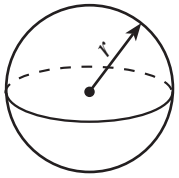


Volume of prism = area of cross-section × length



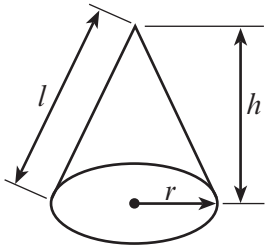
Volume of sphere = $\frac{4}{3}\pi r^3$

Surface area of sphere = $4\pi r^2$



Volume of cone = $\frac{1}{3}\pi r^2 h$

Curved surface area of cone = $\pi r l$

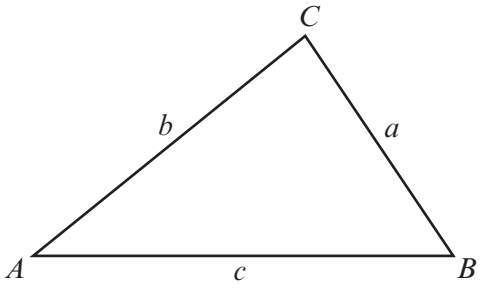


In any triangle ABC

Sine rule $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

Cosine rule $a^2 = b^2 + c^2 - 2bc\cos A$

Area of triangle = $\frac{1}{2}ab\sin C$



The Quadratic Equation

The solutions of $ax^2 + bx + c = 0$

where $a \neq 0$ are given by

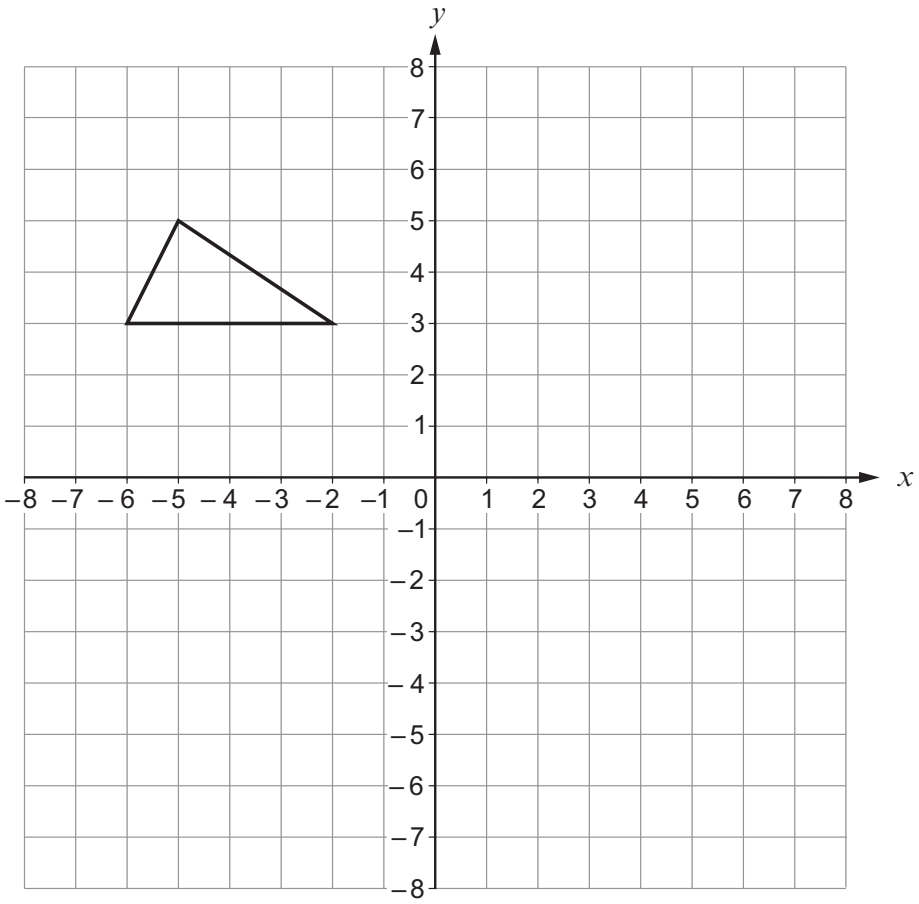
$$x = \frac{-b \pm \sqrt{(b^2 - 4ac)}}{2a}$$

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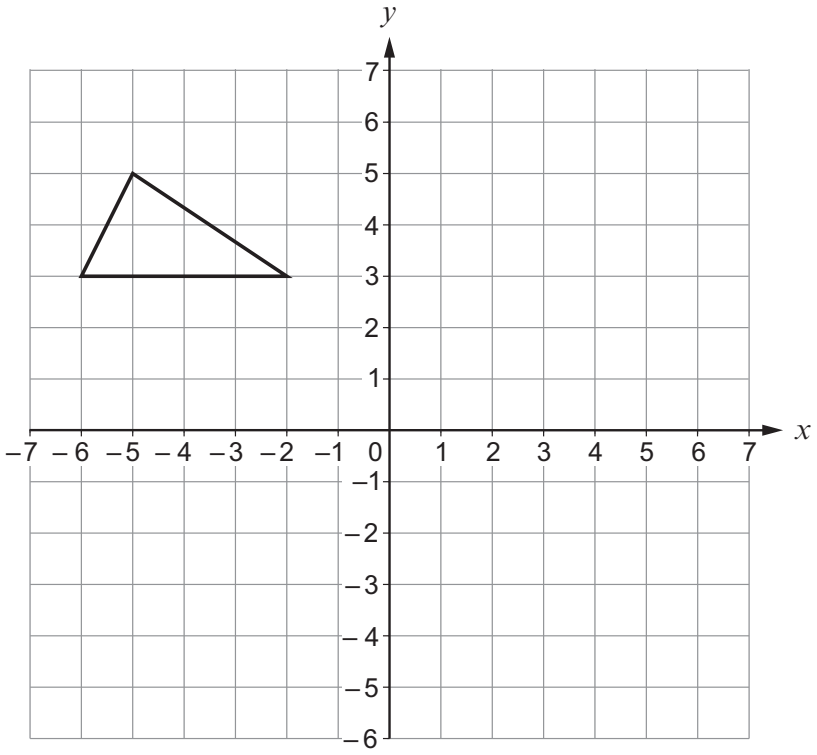
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1. *(a)* Rotate the triangle shown through 90° anticlockwise about the point (0, 2). [2]



(b) Translate the triangle shown 5 units to the right and 2 units down. [1]



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Turn over.

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2. *You will be assessed on the quality of your written communication in this question.*

Eddie wants to buy each of his **two** sisters an identical necklace.



The particular type of necklace he would like to buy is advertised as being for sale on two different websites. He would like to have the two necklaces delivered to his home.

Jewellery Boutique

Silver charm necklace
£36 + VAT at 20%

Postage and packing £6.95 for orders up to £100, otherwise no charge

Gems and Co

Silver charm necklace £55
BUY ONE, GET SECOND FOR HALF PRICE!

Free delivery

Which website is cheaper, and by how much?
You must show all your working. [8]

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3. In the following diagram, lines *DB* and *EA* are parallel and *CDF* is an isosceles triangle. Find the size of angle y. [3]

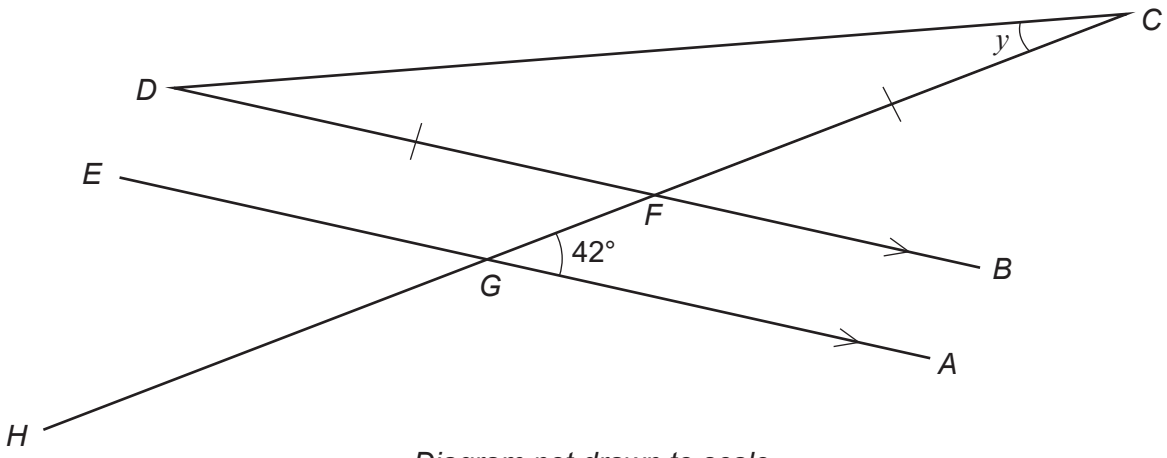


Diagram not drawn to scale

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y = ... °

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4. Solve the following equation.

$$11x - 1 = 4(2x + 5)$$ [3]

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5. If n is an integer and $-5 < 2n \leqslant 2$, list the possible values of n. [3]

6. A box contains 400 beads of the same size and shape.

35% of the beads are green.

$\frac{2}{5}$ of the **remaining** beads are blue.

The only other colour of bead is white.

One bead is picked at random from the box.

Find the probability that a white bead is picked. [5]

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7. *(a)* Write down an expression for the nth term of the following sequence.

8, 17, 26, 35, 44, ... [2]

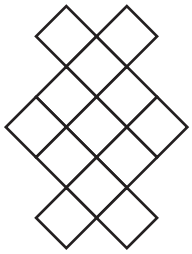
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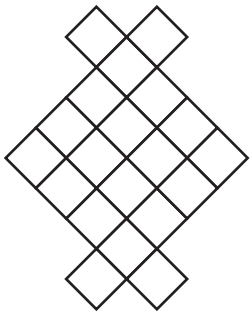
nth term .....

(b) The following patterns are made using small squares.

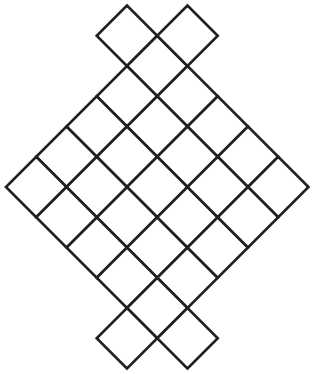
Pattern 1



Pattern 2



Pattern 3



Write an expression for the number of small squares in pattern n. [3]

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8. Katie is a netball player. She claims that, if she stands a distance of 2 metres from the goal post, there is a probability of at least 70% that she will score a goal with any throw.

Lloyd, her brother, challenges her to prove this by throwing 6 sets of 10 balls from this distance. Katie's results are given in the following table.

Number of throws	10	10	10	10	10	10
Number of goals	5	7	6	10	8	9

Lloyd then creates a table to show the cumulative number of goals and to calculate the relative frequencies.

Total number of throws	10	20	30	40	50	60
Total number of goals	5	12	18			
Relative frequency of scoring a goal	$\frac{5}{10}$	$\frac{12}{20}$	$\frac{18}{30}$			
	0·5	0·6	0·6			

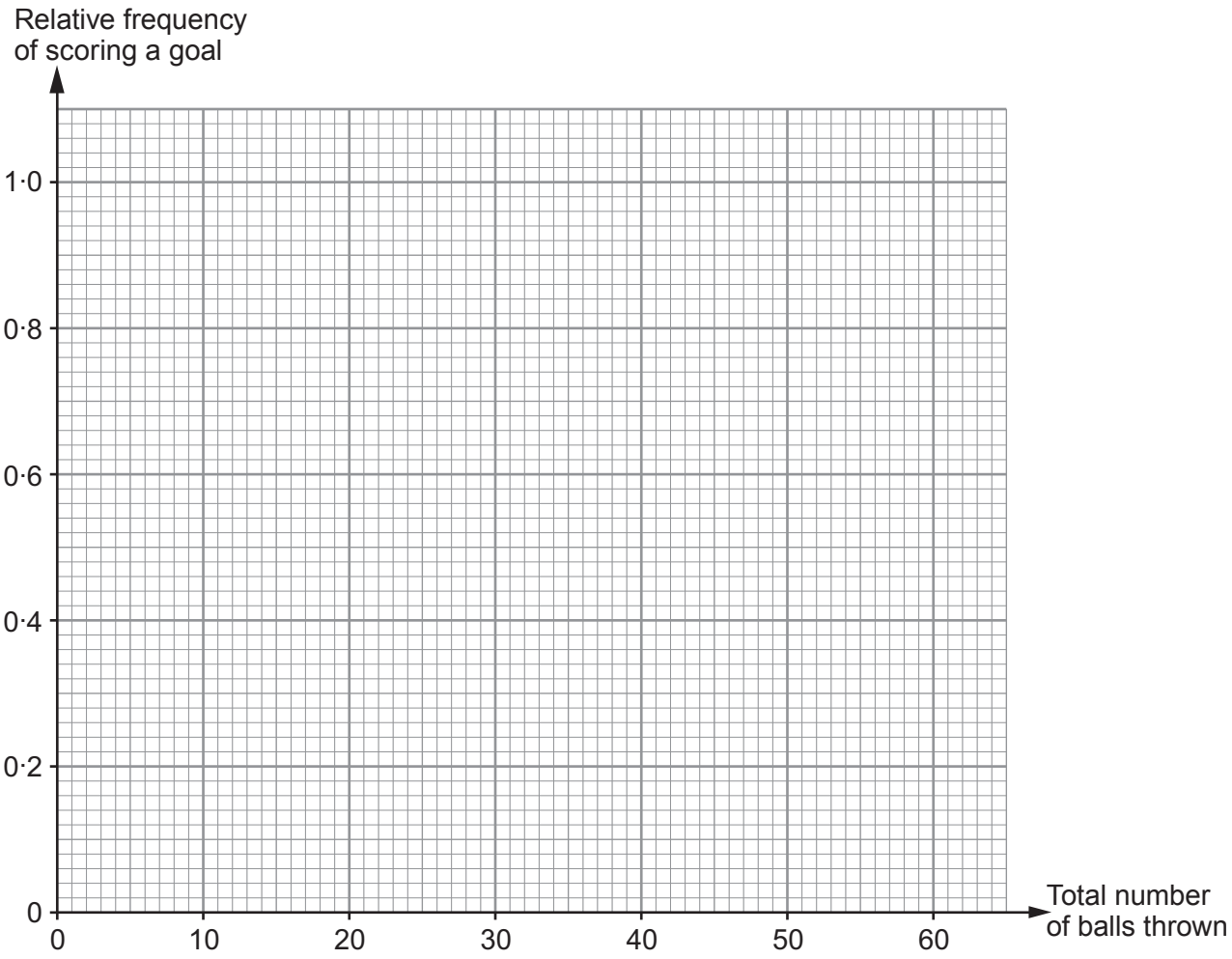
(a) Complete the table above. [3]

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(b) Draw a graph to show the relative frequency of scoring a goal. [2]



(c) Is Katie correct to claim that the probability that she scores a goal from this distance is at least 70%?
Explain your answer. [1]

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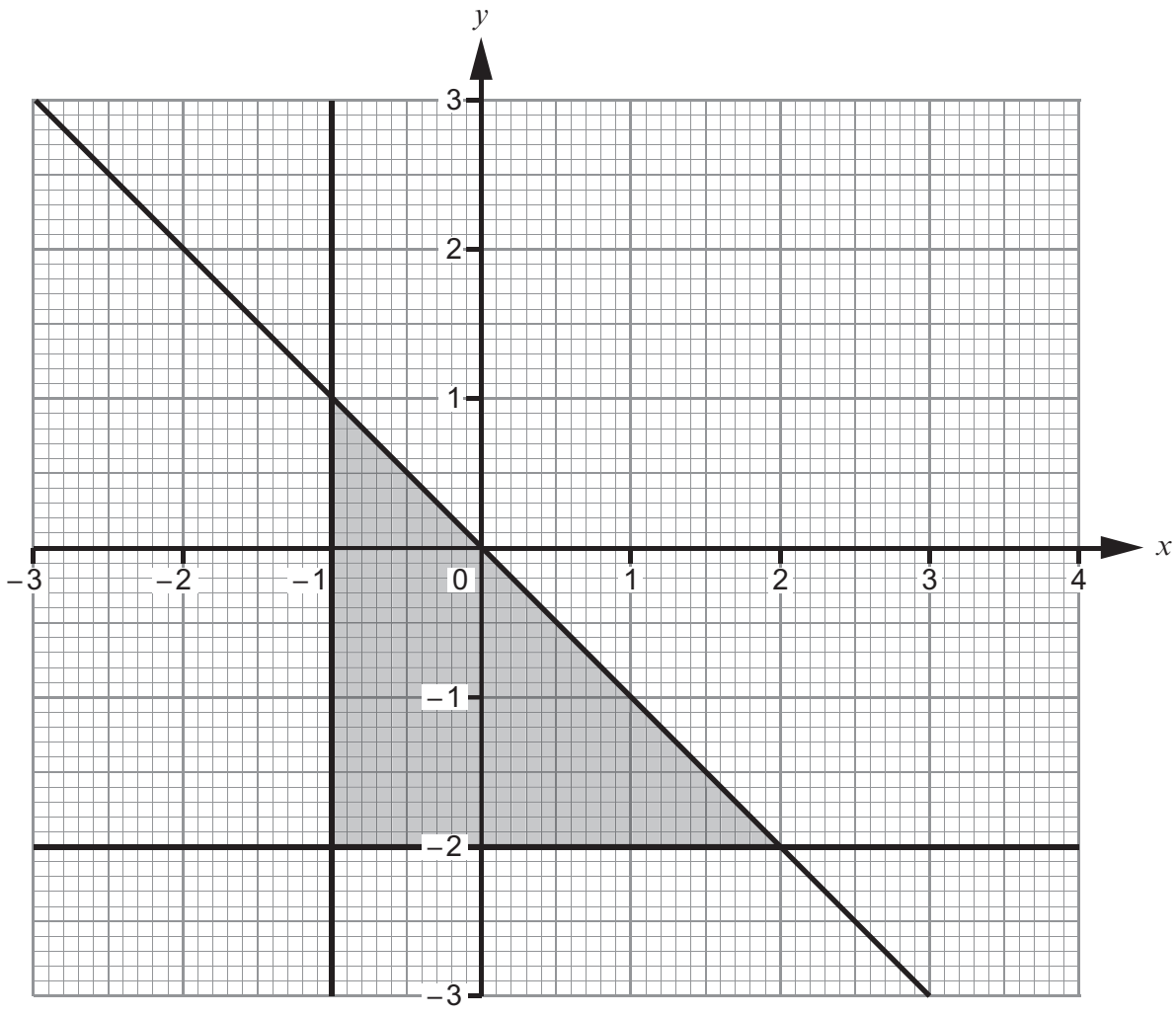
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9.



Complete the following table to give the set of inequalities that describes the shaded region above. [3]

.....

.....

$y \geqslant -2$

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10. Write the following numbers in standard form.

(a) 0·000 000 053 [1]

(b) 6 190 000 000 000 [1]

11. Solve the following simultaneous equations using an algebraic (not graphical) method. You must show all your working. [4]

$$4x - 3y = 11$$

$$6x - 2y = 9$$

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12. The points *A*, *B* and *C* lie on the circumference of a circle, centre *O*. *AD* is a tangent to the circle. *DCB* is a straight line.

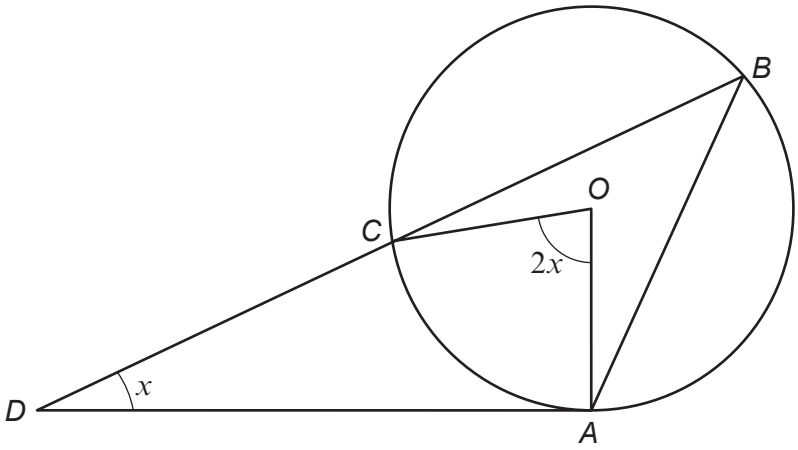


Diagram not drawn to scale

Find the size of each of the following angles, in terms of x.
Write your answers in their simplest form.

(a) $O\hat{C}D$, [2]

(b) $O\hat{A}B$. [3]

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13. Rearrange the following formula to make c the subject.

$$4c - d = 2a + bc$$ [3]

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14. *(a)* Evaluate $\frac{1}{3} + 0\cdot0\dot{4}$, expressing your answer as a fraction. [3]

(b) Evaluate $16^{-\frac{1}{2}}$. [2]

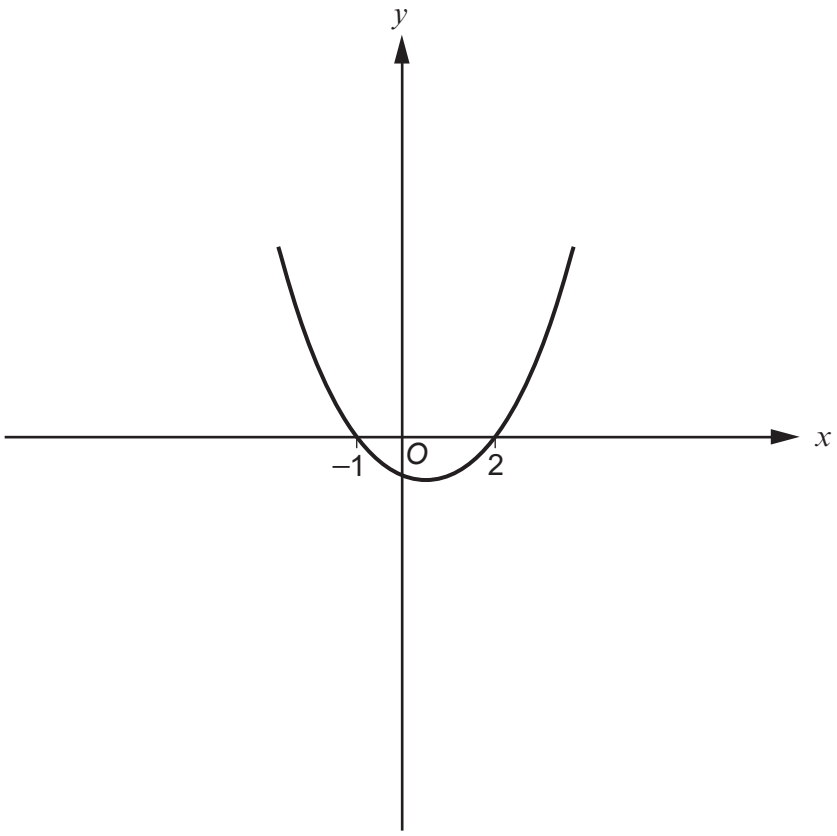
(c) Simplify $(3-\sqrt{5})^2$. [2]

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15. The graph below shows a sketch of the curve $y = f(x)$.
On the same diagram, sketch the curve $y = f(x + 4)$.
You must show clearly where the curve crosses the x-axis. [2]



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16. A box contains 5 red balls and 3 yellow balls.
Three balls are to be picked at random, without replacement.

Find the probability that the three balls are not all the same colour. [3]

END OF PAPER

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Question number	Additional page, if required. Write the question number(s) in the left-hand margin.

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GCSE MARKING SCHEME

SUMMER 2016

GCSE MATHEMATICS UNITISED UNIT 2
HIGHER TIER

4352/02

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INTRODUCTION

This marking scheme was used by WJEC for the 2016 examination. It was finalised after detailed discussion at examiners' conferences by all the examiners involved in the assessment. The conference was held shortly after the paper was taken so that reference could be made to the full range of candidates' responses, with photocopied scripts forming the basis of discussion. The aim of the conference was to ensure that the marking scheme was interpreted and applied in the same way by all examiners.

It is hoped that this information will be of assistance to centres but it is recognised at the same time that, without the benefit of participation in the examiners' conference, teachers may have different views on certain matters of detail or interpretation.

WJEC regrets that it cannot enter into any discussion or correspondence about this marking scheme.

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GCSE Mathematics - Unitised Unit 2 Higher Tier
Summer 2016 Mark Scheme

Summer 2016 Unitised Unit 2 Higher Tier	Mark	Comment
1. *(a)* Correct rotation.	B2	B1 for clockwise rotation about (0, 2) OR anticlockwise rotation about (2, 0) OR 2 correct vertices.
(b) Correct translation	B1 3	
2. <u>Jewellery Boutique:</u> (Cost including VAT =) [36 + 36 × 20/100] × 2 or [72 + 72 × 20/100] × 2 or equivalent (Total cost including P & P =) (£)86.40 (+ (£)6.95) = (£)93.35	 M1 A1 B1	 A complete correct method for increasing by 20%. Accept sight of 2 × (£)43.20 or (£)72 + (£)14.40 FT 'their £86.40' + £6.95 If M0A0, award SC1 for sight of (£)7.20 or (£)14.40 or (£)43.20. If M1A1 have been awarded, B1 can only be awarded for a fully correct total.
<u>Gems and Co:</u> (Total cost =) (£)55 + 1/2 × (£)55 or equivalent = (£)82.50	 M1 A1	 A complete correct method. Correct total.
Conclusion that 'Gems and Co' is cheaper AND by (£)10.85	B1	FT only if both M1 marks are awarded.
Look for • relevance • spelling in at least 1 statement/sentence • clarity of text explanations, • the use of notation (watch for the use of '=', £, % being appropriate) A clear conclusion statement must be made before QWC2 can be awarded. QWC: Candidates would be expected to • clearly show how they arrived at their solution • have few errors in mathematical form, spelling, punctuation and grammar Count incorrect use of '=' in situations such as '36 × 20/100 = 7.20 + 36' within the 'errors in mathematical form'. QWC2: Candidates will be expected to • present work clearly, with words explaining process or steps AND • make few if any mistakes in mathematical form, spelling, punctuation and grammar and include units (£) in their final answer QWC1: Candidates will be expected to • present work clearly, with words explaining process or steps OR • make few if any mistakes in mathematical form, spelling, punctuation and grammar and include units (£) in their final answer	QWC2 8	QWC2 Presents relevant material in a coherent and logical manner, using acceptable mathematical form, and with few if any errors in spelling, punctuation and grammar. QWC1 Presents relevant material in a coherent and logical manner but with some errors in use of mathematical form, spelling, punctuation or grammar OR evident weaknesses in organisation of material but using acceptable mathematical form, with few if any errors in spelling, punctuation and grammar. QWC0 Evident weaknesses in organisation of material, and errors in use of mathematical form, spelling, punctuation or grammar. A final unsupported statement only gets QWC0

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Summer 2016 Unitised Unit 2 **HigherTier**	**Mark**	**Comment**
3. Angle *BFC* or Angle *DFG* = 42(^{0}) OR Angle *CFD* or Angle *BFG* = 138(^{0}) (*y* =) (180 – 138)/2 or (*y* =) (180 – [180 – 42])/2 (=) 21(^{0})	B1 M1 A1 3	May be implied. Check diagram. Or 'Exterior Angle *BFC*' / 2 FT 'their 42(^{0})' or 'their 138(^{0})'
4. 11*x* – 1 = 8*x* + 20 3*x* = 21 *x* = 7	B1 B1 B1 3	FT until 2nd error. Mark final answer.
5. –2, –1, 0, 1	B3 3	B2 for a list with one omission or one extra number. B1 for 2 correct integers (and no incorrect integers). If an incorrect inequality is given, FT for B2 provided –2·5 or 1 seen and equivalent difficulty. If no integers are listed, B1 for $-2{\cdot}5 < n \leq 1$ or for $-2{\cdot}5 < n$ and $n \leq 1$ (or equivalent). Award B0 for a list arising from $-5 < n \leq 2$ (i.e. disregarding the factor of 2).
6. 400 – 0·35 × 400 or equivalent OR 0·65 × 400 (No. of non-green beads =) 260 (260 – no. of blue beads OR no. of white beads =) 260 – 260 ÷ 5 × 2 OR 260 ÷ 5 × 3 = 156 (Probability of picking a white bead =) 156/400 (= 39/100 or equivalent)	M1 A1 M1 A1 A1 5	Complete method for finding the number of non-green beads. FT 'their number of non-green beads'. FT their answers provided both M1 marks awarded. ISW *Alternative method:* *2/5 × 65% B1* *(Probability of picking white =)* *100% – 35% – 2/5×65% (FT 'their 65%') M2* *100% – 35% – 26% (FT 'their 26%') M1* *= 39% (= 0·39) A1* *Alternative method:* *3/5× 65%* *(= 195/500) = 39%* If M0A0, award SC1 for sight of 140 OR if M0A0 and the word 'remaining' has been ignored, award SC2 for a final answer of ¼ or equivalent, SC1 for 140 green beads or 100 white beads.

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Summer 2016 Unitised Unit 2 Higher Tier	Mark	Comment
7. *(a)* $9n - 1$	B2	B1 for sight of $9n$ or equivalent.
(b) $(n + 2)^2 + 4$ or equivalent	B3 5	B2 for $(n + 2)^2 + a$ or for omitting brackets. B1 for $(n + k)^2 + 4$ OR B1 for each correct term in $n^2 + 4n + 8$, within a quadratic with more than one term OR B1 for listing the terms of the sequence and finding a 2nd difference of 2. Look out for alternative ways of considering the spatial arrangements leading to e.g. $n^2 + 4(n + 3) - 4$
8. *(a)* (40) (50) (60) **28** **36** **45** **28/40** **36/50** **45/60** **0·7** **0·72** **0·75**	 B1 B1 B1	 CAO FT from 1 error, this error may have an impact on further cumulative values, but this counts only as 1 error FT their fractions as decimals, provided between 0 and 1 (not inclusive), accuracy to 2 d.p. if appropriate.
(b) All 6 points plotted correctly	P2	Plotting must be correct to within half a square on the grid. FT for their cumulative decimals. Ignore joining points. P1 for 4 or 5 points plotted accurately, must be from cumulative results. Do not award if bars are drawn (unless with points plotted).
(c) (Statement that Katie's claim is supported with) reason e.g. best estimate of the probability is 0·75, or final relative frequency value is 0•75.	E1 6	FT their final column entry in (a), provided clear reference is made to final value.
9. $x \geq -1$ or equivalent $y \leq -x$ or equivalent	B1 B2 3	Accept '>' Accept '<'. B1 for $y = -x$, $y > -x$, $y \geq -x$ or B1 for $y \leq -kx$ $(+ 0)$, with $k > 0$ or B1 for $y \leq x$.
10. *(a)* $5{\cdot}3 \times 10^{-8}$	B1	
(b) $6{\cdot}19 \times 10^{12}$	B1 2	
11. Method to find the first variable Correct first variable Method to find the second variable Correct second variable	M1 A1 m1 A1 4	Allow one slip (but not in the equated variable). $x = 0{\cdot}5$, $y = -3$

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Summer 2016 Unitised Unit 2 Higher Tier	Mark	Comment
12. *(a)* $360 - 90 - x - 2x$ $270(^0) - 3x$	M1 A1	Using quadrilateral *OADC* e.g. Angle *OCD* + *x* + 90 + 2*x* = 360
(b) Angle *ABC* = *x* Angle *DAB* = 180 – 2*x* (Angle *DAB* – Angle *DAO* =) $90(^0) - 2x$	B1 M1 A1 5	Using the angle in the centre Using triangle *DAB* e.g. Angle *OAB* + *x* + *x* + 90 = 180
13. $4c - bc = 2a + d$ $c(4 - b) = 2a + d$ $c = (2a + d) / (4 - b)$ or equivalent	B1 B1 B1 3	FT until 2nd error. Mark final answer.
14. *(a)* *x* = 0·04444..... 10*x* = 0·4444..... with an attempt to subtract (1/3 +) 4/90 OR (1/3 +) 2/45 34/90 (= 17/45)	M1 A1 A1	Or 10*x* and 100*x*, or equivalent. Or an alternative method. An answer of 0·4/9 gains M1 only. FT 'their 4/90' provided equivalent difficulty. Mark final answer. Do not ignore incorrect cancelling. *Alternative solution* *x = 0·37777.....* *B1* *10x = 3·7777..... with an attempt to subtract* *M1* *x = 34 / 90 (= 17/45)* *A1* If no marks awarded, SC1 for a final answer of 34/99 (resulting from using 0·343434……) OR SC1 for a final answer of 37/99 (resulting from using 0·373737……)
(b) 1/4 or 0·25	B2	B1 for 4^{-1} or $1/\sqrt{16}$ or $1/16^{1/2}$ or $(1/16)^{1/2}$ Allow ±1/4 or ±0·25 for B2 OR –1/4 or –0·25 for B1
(c) $9 - 3\sqrt{5} - 3\sqrt{5} + 5$ $14 - 6\sqrt{5}$	M1 A1 7	3 or 4 terms correct. Mark final answer.
15. Translation horizontally to the left (–5, 0) and (– 2, 0) indicated correctly on the *x*-axis with the correct translation.	B1 B1 2	Clear intention SC1 for right shift with (3, 0) and (6, 0) indicated.
16. 1 – [P(3 red balls) + P(3 yellow balls)] OR other complete method = 1 – [5/8 × 4/7 × 3/6 + 3/8 × 2/7 × 1/6] (= 1 – [60/336 + 6/336]) = 270/336 (= 45/56) ISW	S1 M1 A1 3	P(RYY) + P(YRY) + P(YYR) + P(YRR) + P(RYR) + P(RRY) or 3 × P(RYY) + 3 × P(YRR) Calculations showing correct sum of products of probabilities (without replacement). Allow one numerical error for M1A0. If no marks awarded, SC1 for sight of 4 or 5 correctly calculated products.

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Surname	Centre Number	Candidate Number
Other Names		0

GCSE

4352/02

W16-4352-02

MATHEMATICS (UNITISED SCHEME)

UNIT 2: Non-Calculator Mathematics

HIGHER TIER

A.M. WEDNESDAY, 13 January 2016

1 hour 15 minutes

CALCULATORS ARE NOT TO BE USED FOR THIS PAPER

ADDITIONAL MATERIALS

A ruler, a protractor and a pair of compasses may be required.

INSTRUCTIONS TO CANDIDATES

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Write your name, centre number and candidate number in the spaces at the top of this page.

Answer **all** the questions in the spaces provided.

Take π as 3·14.

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Scale drawing solutions will not be acceptable where you are asked to calculate.

The number of marks is given in brackets at the end of each question or part-question.

You are reminded that assessment will take into account the quality of written communication (including mathematical communication) used in your answer to question **2**.

For Examiner's use only		
Question	**Maximum Mark**	**Mark Awarded**
1.	**3**	
2.	**7**	
3.	**3**	
4.	**5**	
5.	**4**	
6.	**2**	
7.	**4**	
8.	**5**	
9.	**3**	
10.	**3**	
11.	**3**	
12.	**4**	
13.	**3**	
14.	**6**	
15.	**6**	
16.	**4**	
Total	**65**	

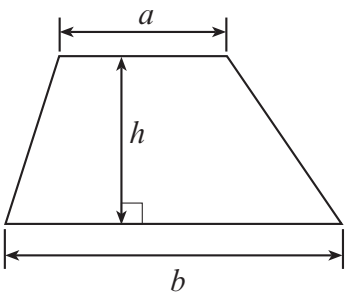
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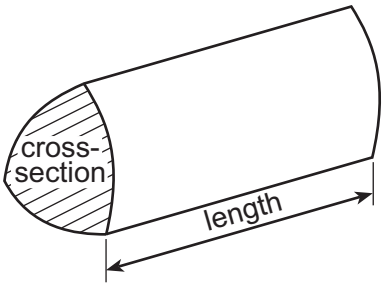
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Formula List

Area of trapezium $= \frac{1}{2}(a + b)h$

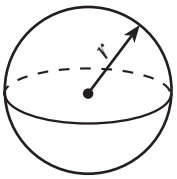


Volume of prism = area of cross-section × length



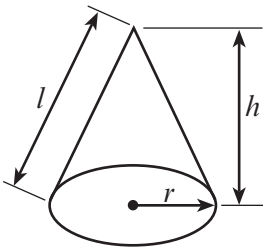
Volume of sphere $= \frac{4}{3}\pi r^3$

Surface area of sphere $= 4\pi r^2$



Volume of cone $= \frac{1}{3}\pi r^2 h$

Curved surface area of cone $= \pi rl$

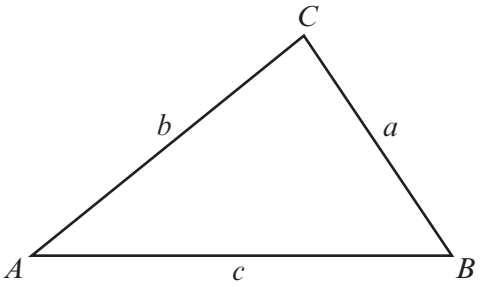


In any triangle ABC

Sine rule $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

Cosine rule $a^2 = b^2 + c^2 - 2bc\cos A$

Area of triangle $= \frac{1}{2}ab\sin C$



The Quadratic Equation

The solutions of $ax^2 + bx + c = 0$

where a, b and c are given by $x = \frac{-b \pm \sqrt{(b^2 - 4ac)}}{2a}$

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1. Solve the equation

$$2(2x - 3) = 1.$$ [3]

3

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2. *You will be assessed on the quality of your written communication in this question.*

Dewi makes candles to sell on a stall at the Saturday market.

One week, he makes 60 small candles and 20 large candles.
A small candle costs £2.50 to make and is sold for £6.
A large candle costs £5 to make and is sold for £11.

The market manager charges Dewi £40 for use of the stall at the market.

At the end of the day, Dewi has 12 small candles and 8 large candles left.

Calculate the overall profit that Dewi has made from making and selling candles that week.

You must show all your working. [7]

7

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3. Sarita's hair grows at an approximate rate of 12·5 mm per month.
Assuming her hair continues to grow at this rate, what length of hair will Sarita grow in 10 years?
Give your answer in metres. [3]

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4. All the angles in the diagram below are measured in degrees.

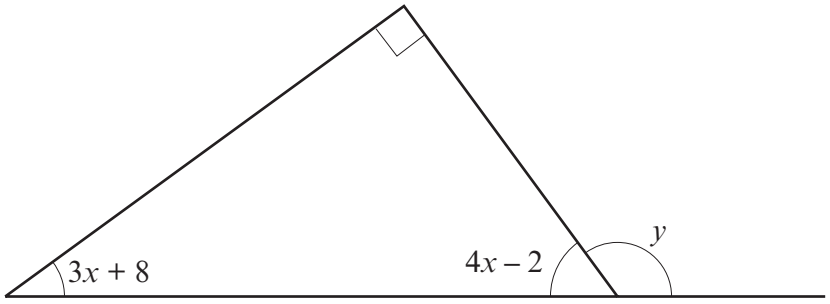


Diagram not drawn to scale

Find the value of x and the size of angle y.
You must show all your working. [5]

x = ... y = ...

5

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5. Megan and Carys were running the 1500 m race in their school sports day.

Megan recorded a time of 5 minutes and 20 seconds.
Carys recorded a time of 6 minutes and 4 seconds.

Megan claimed that Carys took 15% longer than she did.

Was Megan correct?
You must show all your working. [4]

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6. Write down an expression for the nth term of the following sequence.

$$-9, -4, 1, 6, 11, 16, ...$$ [2]

.....

.....

nth term .....

2

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7. Charlie's school is organising a Summer Fayre.

Charlie is making a spinner for his stall.
A sketch of his spinner is shown below.

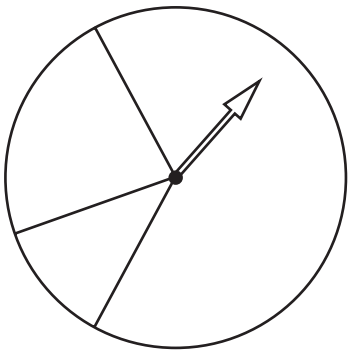


Diagram not drawn to scale

The spinner has three sectors, each to be painted a different colour: purple, orange or white.
The sectors are **not** of equal size.

- The angle made by the white sector at the centre of the circle is 234°.
- The probability that the spinner lands on the white sector is three times the probability that the spinner lands on the orange sector.

Calculate the probability that the spinner lands on the purple sector.
Express your answer as a fraction in its lowest terms. [4]

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8. *(a)* Express 350 as a product of its prime factors in index form. [3]

(b) As a product of its prime factors, 12 800 can be expressed as $2^9 \times 5^2$.
How do you know that 12 800 is not a square number? [1]

(c) Write the number 0·000 007 23 in standard form. [1]

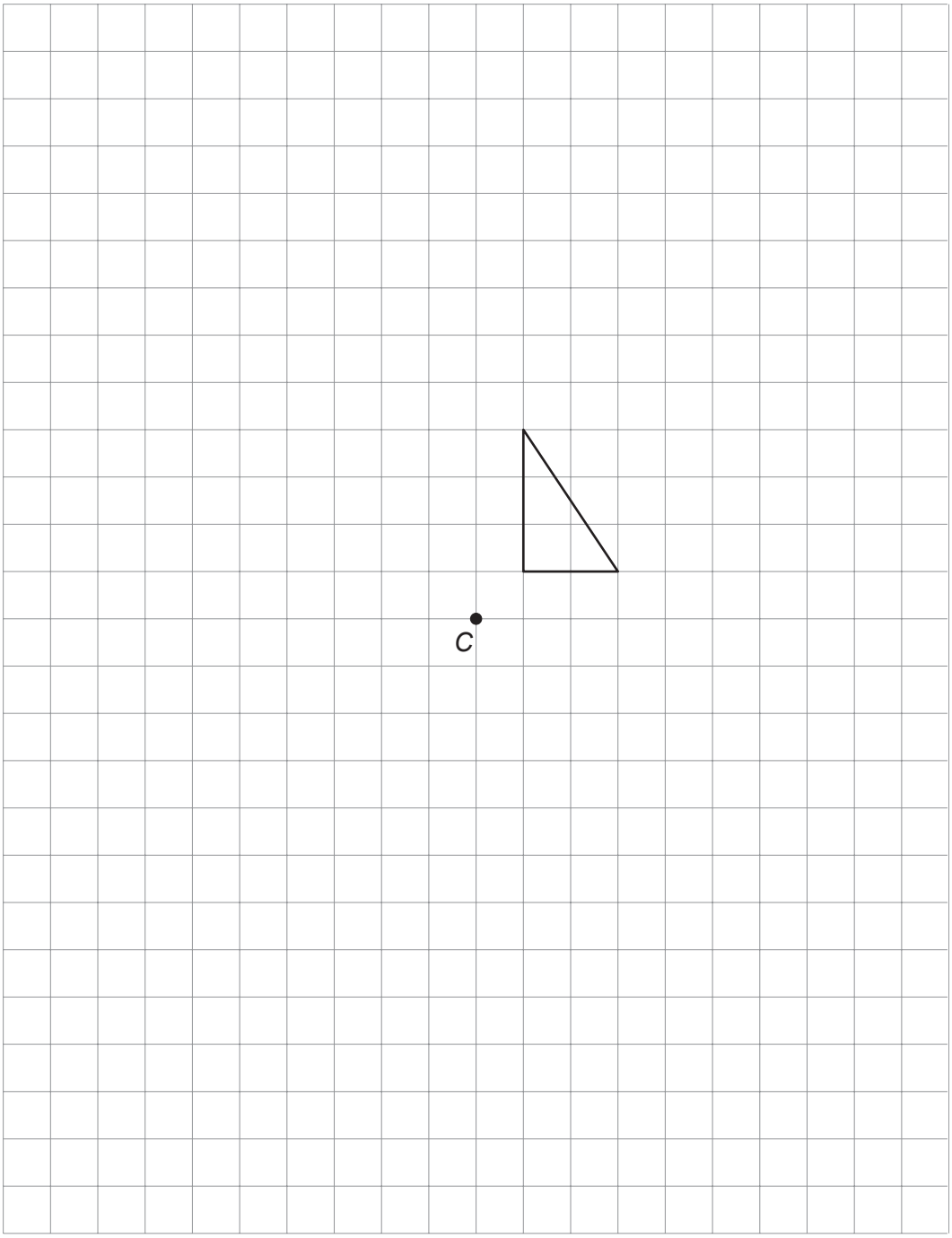
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9. Enlarge the given triangle, using scale factor –2 and centre *C*. [3]



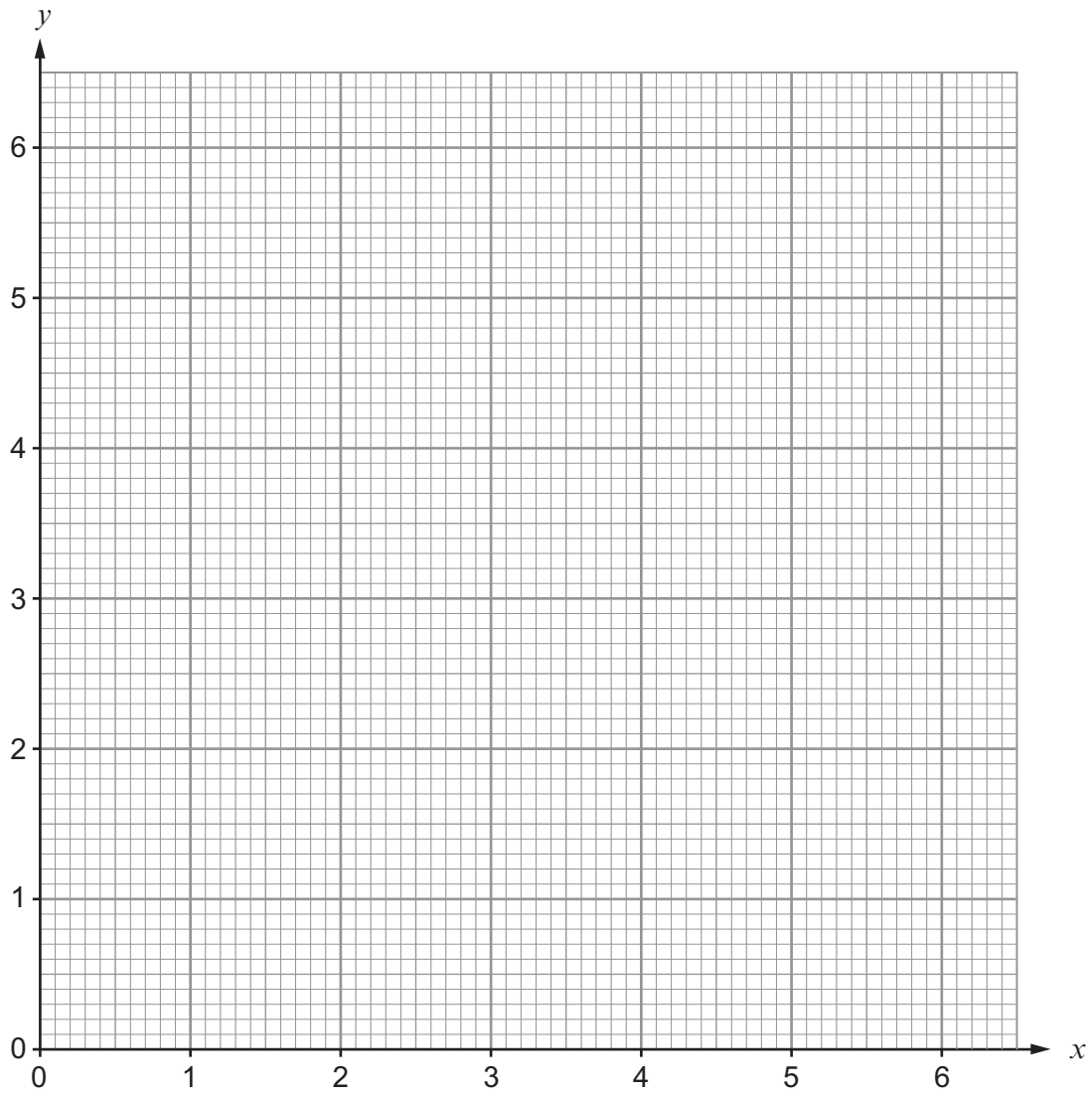
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10. *(a)* Use the axes below to draw the line with equation $x + 3y = 6$ for values of x from 0 to 6. [2]



(b) Write down the equation of **another** line which is parallel to the line with equation $x + 3y = 6$. [1]

3

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11. Make w the subject of the following formula.

$$9w^2 + x^2 = 1$$ [3]

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Turn over.

Examiner only

12. Mathew is playing with toy cars and lorries.

He arranges 4 cars and 1 lorry in a straight line. The line is 35 cm long.
He then arranges 2 cars and 3 lorries in a straight line. This line is 40 cm long.

All the cars are the same length and all the lorries are the same length.

Find the length of each car and each lorry.
You must use an algebraic method. [4]

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Length of a toy car = ... cm

Length of a toy lorry = ... cm

4

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13. The points *A*, *B*, *C* and *D* lie on the circumference of a circle, centre *O*.

BD is a diameter of the circle and $C\hat{A}D = 27°$.

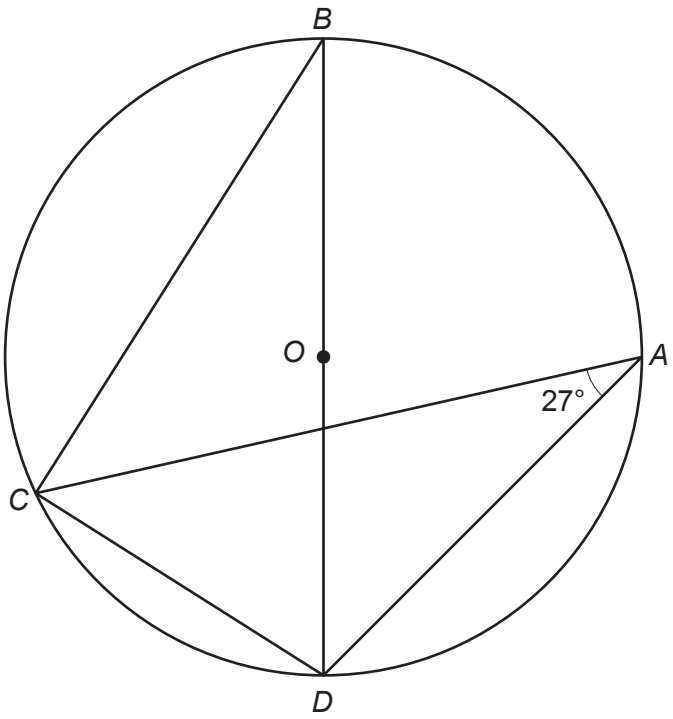


Diagram not drawn to scale

Find the size of $B\hat{D}C$. [3]

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14. *(a)* Express $0\cdot\dot{0}6\dot{2}$ as a fraction. [2]

(b) Simplify $\sqrt{5}\left(4+3\sqrt{5}\right)-\sqrt{5}\left(2+\sqrt{5}\right)$. [2]

(c) Evaluate $\left(\frac{25}{9}\right)^{-\frac{1}{2}}$. [2]

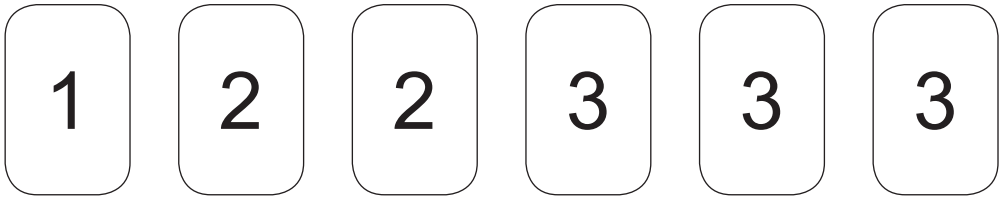
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15. Each of the numbers 1, 2, 2, 3, 3, 3 is written on a card.



Two of the cards are selected at random, without being replaced.

(a) Find the probability that the product of the numbers selected is a square number. [3]

(b) Find the probability that the sum of the numbers selected is 3. [3]

6

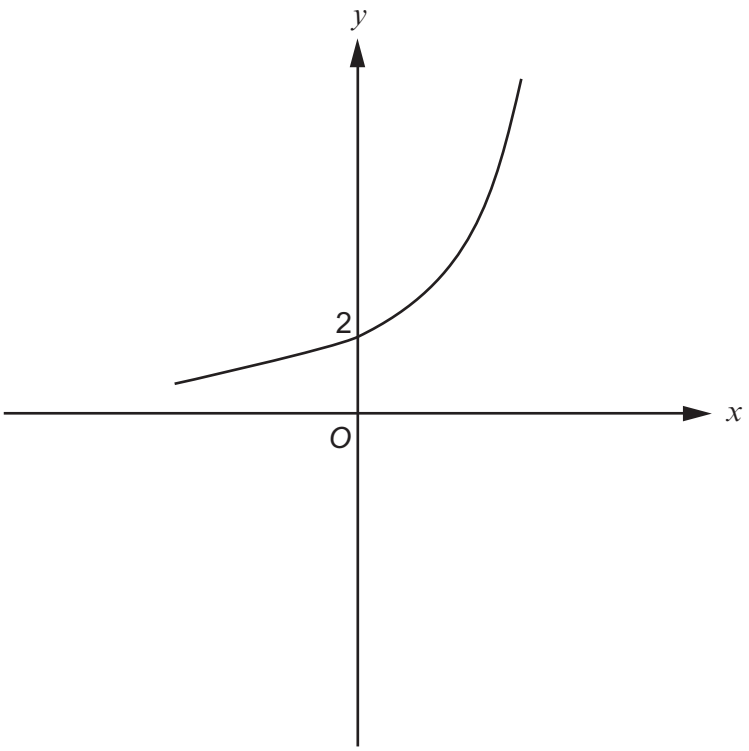
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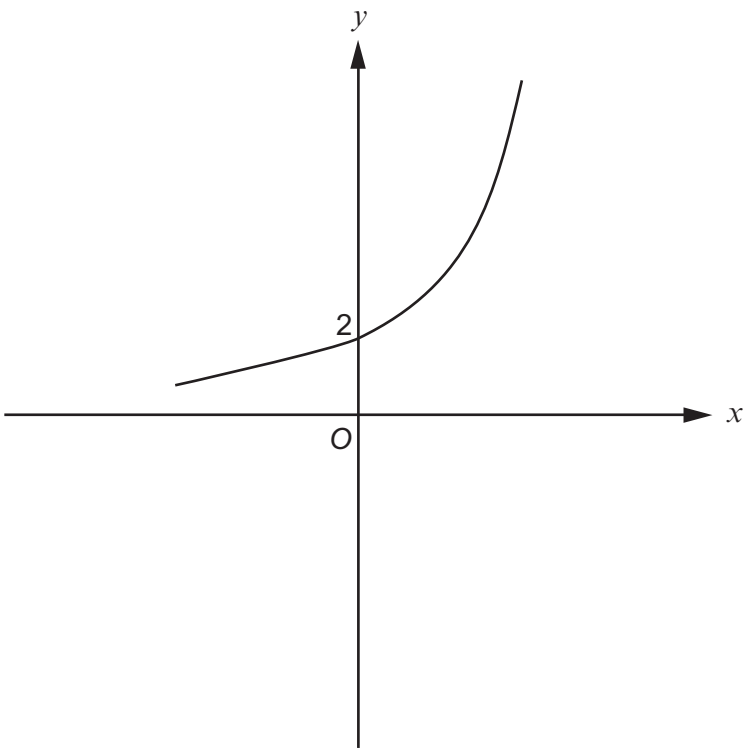
Turn over.

Examiner only

16. *(a)* The diagram shows a sketch of $y = f(x)$.
On the same diagram, sketch the curve $y = f(x) - 6$.
Show clearly the value of y at the point where this curve crosses the y-axis. [2]



(b) This diagram again shows a sketch of $y = f(x)$.
On this same diagram, sketch the curve $y = -f(x)$. [1]

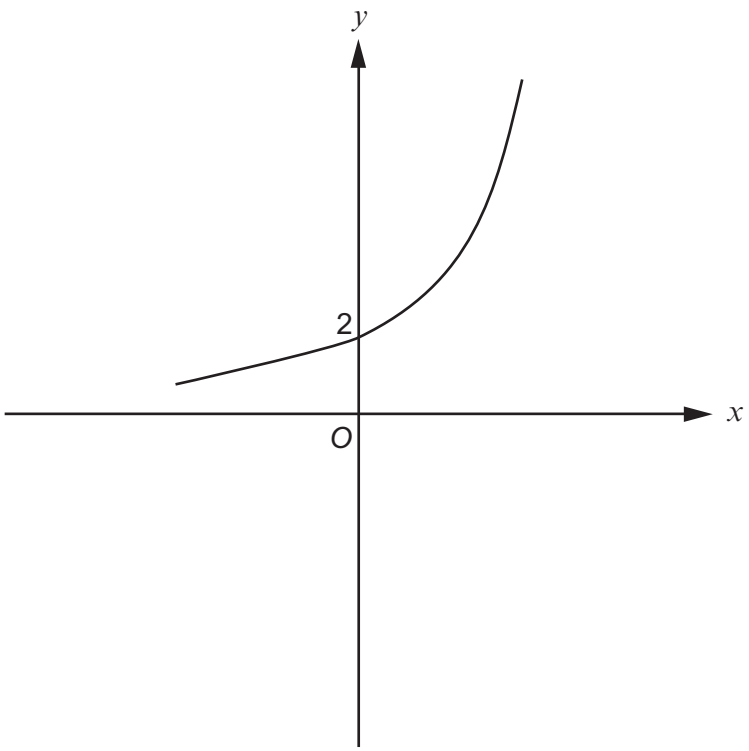


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(c) This diagram again shows a sketch of $y = f(x)$.
On this same diagram, sketch the curve $y = f(-x)$. [1]



4

END OF PAPER

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GCSE MARKING SCHEME

JANUARY 2016

MATHEMATICS UNITISED - UNIT 2
HIGHER TIER
4352/02

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INTRODUCTION

This marking scheme was used by WJEC for the 2016 examination. It was finalised after detailed discussion at examiners' conferences by all the examiners involved in the assessment. The conference was held shortly after the paper was taken so that reference could be made to the full range of candidates' responses, with photocopied scripts forming the basis of discussion. The aim of the conference was to ensure that the marking scheme was interpreted and applied in the same way by all examiners.

It is hoped that this information will be of assistance to centres but it is recognised at the same time that, without the benefit of participation in the examiners' conference, teachers may have different views on certain matters of detail or interpretation.

WJEC regrets that it cannot enter into any discussion or correspondence about this marking scheme.

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Unit 2 GCSE Maths January 2016 Higher Tier Markscheme	MARK	Comment
1. $4x - 6 = 1$ $4x = 7$ (x =) 7/4 or 1 ¾ or 1·75	B1 B1 B1 3	FT until 2nd error. Mark final answer *Alternative solution:* *$2x - 3 = ½$* *B1* *$2x = 3·5$* *B1* *(x =) 7/4 or 1 ¾ or 1·75* *B1*
2. <u>Method 1 (total profit = total selling price – total cost price)</u> (Cost of making candles =) 60 × (£)2.50 + 20 × (£)5 (= £150 + £100 = £250) (Money taken from selling candles =) [60 – 12] × (£)6 + [20 – 8] × (£)11 (= £288 + £132 = £420) (£)250 AND (£)420 (Profit =) (£)420 – (£)250 – (£)40 = (£) 130 OR <u>Method 2 (total profit = large candle profit + small candle profit – £40)</u> (Large candle profit =) [20 – 8] × (£)11 – 20 × (£)5 (= £132 – £100 = £32) (Small candle profit =) [60 – 12] × (£)6 – 60 × (£)2.50 (= £288 – £150 = £138) (£)32 AND (£)138 (Total profit =) (£) [32 + 138 – 40] = (£) 130	 M1 M1 A1 m1 A1 OR M1 M1 A1 m1 A1	 FT 'their £250' and 'their £420' provided M1 awarded FT 'their £32' or 'their £138' provided at least one correct and M1 awarded If first 3 marks are not gained, award M1 M0 A0 for a method which disregards the fact that there were unsold candles (and the remaining m1A1 can then be followed through),

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Unit 2 GCSE Maths January 2016 Higher Tier Markscheme	MARK	Comment
		e.g. (Cost of making candles =) 60 × (£)2.50 + 20 × (£)5 (= £150 + £100 = £250) (Money taken from selling candles =) 60 × (£)6 + 20 × (£)11 (= £360 + £220 = £580) or e.g. (Large candle profit + small candle profit =) 20 × [(£)11 – (£)5] + 60 × [(£)6 – (£)2.50] (= £120 + £210 = £330) OR If first 3 marks are not gained, award M1 M0 A0 for a method which does not include the production costs of the unsold candles (and the remaining m1A1 can then be followed through), e.g. (Cost of making candles =) 48 × (£)2.50 + 12 × (£)5 (= £120 + £60 = £180) (Money taken from selling candles =) 48 × (£)6 + 12 × (£)11 (= £288 + £132 = £420) or e.g. (Large candle profit + small candle profit =) 12 × [(£)11 – (£)5] + 48 × [(£)6 – (£)2.50] (= £72 + £168 = £240)
QWC: Candidates would be expected to • clearly show how they arrived at their solution • have few errors in mathematical form, spelling, punctuation and grammar QWC2: Candidates will be expected to • present work clearly, with words explaining process or steps AND • make few if any mistakes in mathematical form, spelling, punctuation and grammar and include units (£) in their final answer QWC1: Candidates will be expected to • present work clearly, with words explaining process or steps OR • make few if any mistakes in mathematical form, spelling, punctuation and grammar and include units (£) in their final answer	QWC2 7	QWC2 Presents relevant material in a coherent and logical manner, using acceptable mathematical form, and with few if any errors in spelling, punctuation and grammar. QWC1 Presents relevant material in a coherent and logical manner but with some errors in use of mathematical form, spelling, punctuation or grammar OR evident weaknesses in organisation of material but using acceptable mathematical form, with few if any errors in spelling, punctuation and grammar. QWC0 Evident weaknesses in organisation of material, and errors in use of mathematical form, spelling, punctuation or grammar. A final unsupported statement only gets QWC0

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Unit 2 GCSE Maths January 2016 Higher Tier Markscheme	MARK	Comment
3. $12{\cdot}5 \times 12 \times 10$ (mm) or equivalent 1500 (mm) $1{\cdot}5$ (m)	M1 A1 B1 3	 FT 'their derived length'. Penalise if derived from incorrect working. Unsupported $1{\cdot}5$ (m) gains 3 marks.
4. $3x + 8 + 4x - 2 + 90 = 180$ or equivalent $7x = 84$ OR $7x + 96 = 180$ OR $7x + 6 = 90$ $x = 12(°)$ $(4 \times 12 - 2 =)\ 46(°)$ $(y = 180 - 46 =)\ 134(°)$ 5	 M1 A1 A1 B1 B1	Check diagram CAO FT 'their $ax = b$', $a \neq 1$ *Alternative method (for first 3 marks), using trial and improvement to equate the sum of the base angles to 90:* *2 appropriate trials* *M1* *Trials of 11 and 13 or trials of 11 and 12 or trials of 12 and 13* *A1* *$x = 12(°)$* *A1* Unsupported $x = 12(°)$ gains M1A1A1. FT 'their x' (provided $x < 23(°)$) FT 'their 46(°)' *Alternative method (for final 2 marks):* *$(y =)\ 3 \times 12 + 8 + 90$* *B1* *$(=)\ 134(°)$* *B1* Unsupported $x = 12(°)$ AND $y = 134(°)$ gains 5 marks

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Unit 2 GCSE Maths January 2016 Higher Tier Markscheme	MARK	Comment
5. 320 (seconds) OR 364 (seconds) Complete method for finding 15% of 320 48(seconds) 368 (seconds) or 6 minutes (and) 8 (seconds) AND correct conclusion 'No, because .....'	 B1 M1 A1 A1 4	 FT from 'their times' in seconds. Accept 364 ÷ 1.15 (= 316.52.... [seconds]). CAO *Alternative method:* *320 (seconds) OR 364 (seconds) B1* *Difference in times = 44(seconds) M1* *% difference=(364 – 320)/320 ×100(%) M1* *13.75% or 14% AND 'No' A1* *Alternative method:* *320 (seconds) OR 364 (seconds) B1* *Difference in times = 44 (seconds) M1* *Complete method for finding 15% of 320 M1* *48(seconds) AND correct conclusion A1*
6. $5n - 14$	B2 2	B1 for sight of $5n$ (± …..)
7. (Angle of orange sector = 234(°) / 3 =) 78 (°) (Angle of purple sector =) 360(°) – 234 (°) – 78(°) = (= 48(°)) (Probability of landing on the purple sector =) 48/360 = 2/15	 B1 M1 A1 A1 4	 FT 'their 78°' FT 'their 48' CAO
8. (a) Method that produces at least 2 correct prime factors Sight of correct factors (2, 5, 5, 7) in any order $2 \times 5^2 \times 7$ (b) Valid explanation e.g. not all powers are even (c) $7{\cdot}23 \times 10^{-6}$	 M1 A1 B1 B1 B1 5	 FT until 2nd error Ignore 1s seen FT their (prime) factors (with at least 1 index >1 used). Do not ignore 1s within the product. B0 for a sum or list. Accept any order, provided indices are correctly used.

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Unit 2 GCSE Maths January 2016 Higher Tier Markscheme	MARK	Comment
9. Correct enlargement	B3 3	B2 for any 2 correct vertices OR for correct enlarged (and INVERTED) shape in incorrect position OR scale factor –3 consistently used B1 for scale factor of +2 or –1 consistently used
10. (a) Correct line drawn for $x + 3y = 6$	B2	B1 for a line with correct gradient drawn (= –1/3) OR correct y-intercept plotted (0, 2) OR correct x-intercept plotted (6, 0) If no line drawn, B1 for any two points calculated or plotted correctly (with no more than 2 incorrect points)
(b) $x + 3y = k$ OR $y = -1/3\,x + c$ or equivalent	B1 3	$k \neq 6$, $c \neq 2$
11. $9w^2 = 1 - x^2$ $w^2 = (1 - x^2)/9$ or $3w = (\pm)\sqrt{(1 - x^2)}$ $w = (\pm)\sqrt{[(1 - x^2)/9]}$ or $(\pm)\sqrt{(1 - x^2)} / 3$	B1 B1 B1 3	FT until 2nd error (for equivalent difficulty) Square root must clearly be over complete expression (or correct use of brackets) if denominator is 9 OR clearly over numerator only if denominator is 3 FT 'their w^2' (provided the expression has more than one term) Mark final answer e.g. $\sqrt{(1 - x^2)} = 1 - x$ gets B0
12. $4c + l = 35$, $2c + 3l = 40$ Method to find the first variable Correct first variable Correct second variable	S1 M1 A1 A1 4	Strategy of forming a pair of equations. (Do not penalise for not defining variables.) Allow one slip (but not in equated variable). FT 'their equations' (provided equivalent difficulty) FT their first variable $c = 6.5$(cm), $l = 9$(cm) Unsupported answers get 0 marks.

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Unit 2 GCSE Maths January 2016 Higher Tier Markscheme	MARK	Comment
13. Angle BCD or BAD = 90( ) Angle CBD = 27( ) or BAC= 63( ) Angle BDC = 63( )	 B1 B1 B1 3	Check diagram throughout. First B1 may be implied. Do not award if 63 is derived from incorrect working. Where applicable, annotations on the diagram must correspond to working.
14. (a) $x = 0{\cdot}06262.....$ $100x = 6{\cdot}26262.....$ with an attempt to subtract 62/990 (= 31/495) (b) $4\sqrt{5} + 15 - 2\sqrt{5} - 5$ $= 2\sqrt{5} + 10$ (c) 3/5 or 0·6	M1 A1 B1 B1 B2 6	Or $10x$ and $1000x$, or equivalent. Or an alternative method. CAO (6·2/99 gets M1 A0) FT from one incorrect term *Alternative method:* $\sqrt{5}(2 + 2\sqrt{5})$ *B1* $2\sqrt{5} + 10$ *B1* B1 for $(5/3)^{-1}$ or $1/(5/3)$ or $(9/25)^{1/2}$ or $\sqrt{9}/\sqrt{25}$ or $\sqrt{(9/25)}$ or $\sqrt{0{\cdot}36}$ B0 for $9/25^{1/2}$ or $9^{1/2}/25$
15. (a) $2/6 \times 1/5 + 3/6 \times 2/5$ 8/30 (= 4/15) (b) $1/6 \times 2/5 + 2/6 \times 1/5$ 4/30 (= 2/15)	M2 A1 M2 A1 6	M1 for one correct product CAO If no marks awarded, SC1 for an answer of 13/36 resulting from a calculation 'with replacement'. M1 for one correct product CAO If no marks awarded, SC1 for an answer of 4/36 (= 1/9) resulting from a calculation 'with replacement'.
16. (a) Sketch with downwards shift – 4 indicated on *y*-axis or (0, – 4) given (b) Reflection in *x*-axis, passing through (0, –2) (coordinates need not be labelled) (c) Reflection in *y*-axis, passing through (0, 2)	B1 B1 B1 B1 4	Clear intention to draw same curve. Depends on first B1. Clear intention to reflect same curve. Clear intention to reflect same curve.

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Surname	Centre Number	Candidate Number
Other Names		0

GCSE

4352/02

S15-4352-02

MATHEMATICS (UNITISED SCHEME)
UNIT 2: Non-calculator Mathematics
HIGHER TIER

A.M. THURSDAY, 4 June 2015

1 hour 15 minutes

CALCULATORS ARE NOT TO BE USED FOR THIS PAPER

ADDITIONAL MATERIALS

A ruler, a protractor and a pair of compasses may be required.

INSTRUCTIONS TO CANDIDATES

Use black ink or black ball-point pen. Do not use gel pen or correction fluid.

Write your name, centre number and candidate number in the spaces at the top of this page.

Answer **all** the questions in the spaces provided.

If you run out of space, use the continuation page at the back of the booklet, taking care to number the question(s) correctly.

Take π as 3·14.

INFORMATION FOR CANDIDATES

You should give details of your method of solution when appropriate.

Unless stated, diagrams are not drawn to scale.

Scale drawing solutions will not be acceptable where you are asked to calculate.

The number of marks is given in brackets at the end of each question or part-question.

You are reminded that assessment will take into account the quality of written communication (including mathematical communication) used in your answer to question **2**.

For Examiner's use only		
Question	**Maximum Mark**	**Mark Awarded**
1.	**2**	
2.	**8**	
3.	**4**	
4.	**5**	
5.	**5**	
6.	**2**	
7.	**2**	
8.	**6**	
9.	**4**	
10.	**4**	
11.	**3**	
12.	**6**	
13.	**4**	
14.	**6**	
15.	**4**	
Total	**65**	

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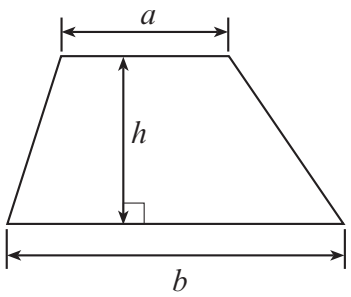
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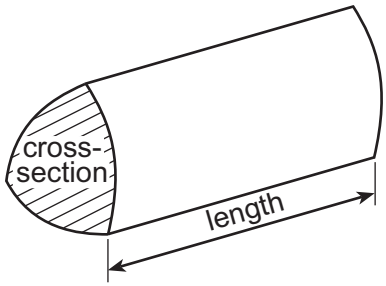
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Formula List

Area of trapezium $= \frac{1}{2}(a + b)h$

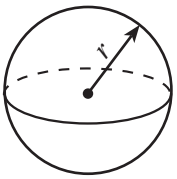


Volume of prism = area of cross-section × length



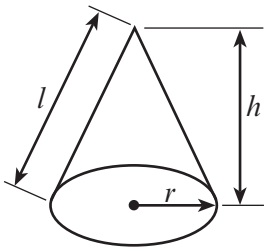
Volume of sphere $= \frac{4}{3}\pi r^3$

Surface area of sphere $= 4\pi r^2$



Volume of cone $= \frac{1}{3}\pi r^2 h$

Curved surface area of cone $= \pi rl$

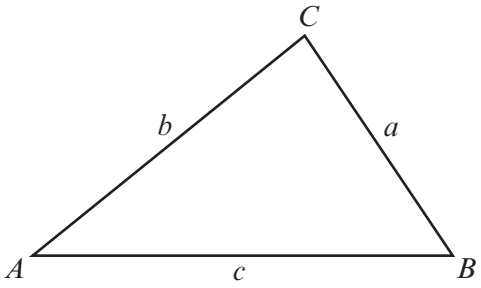


In any triangle ABC

Sine rule $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

Cosine rule $a^2 = b^2 + c^2 - 2bc\cos A$

Area of triangle $= \frac{1}{2}ab\sin C$



The Quadratic Equation

The solutions of $ax^2 + bx + c = 0$

where a, b and c are given by

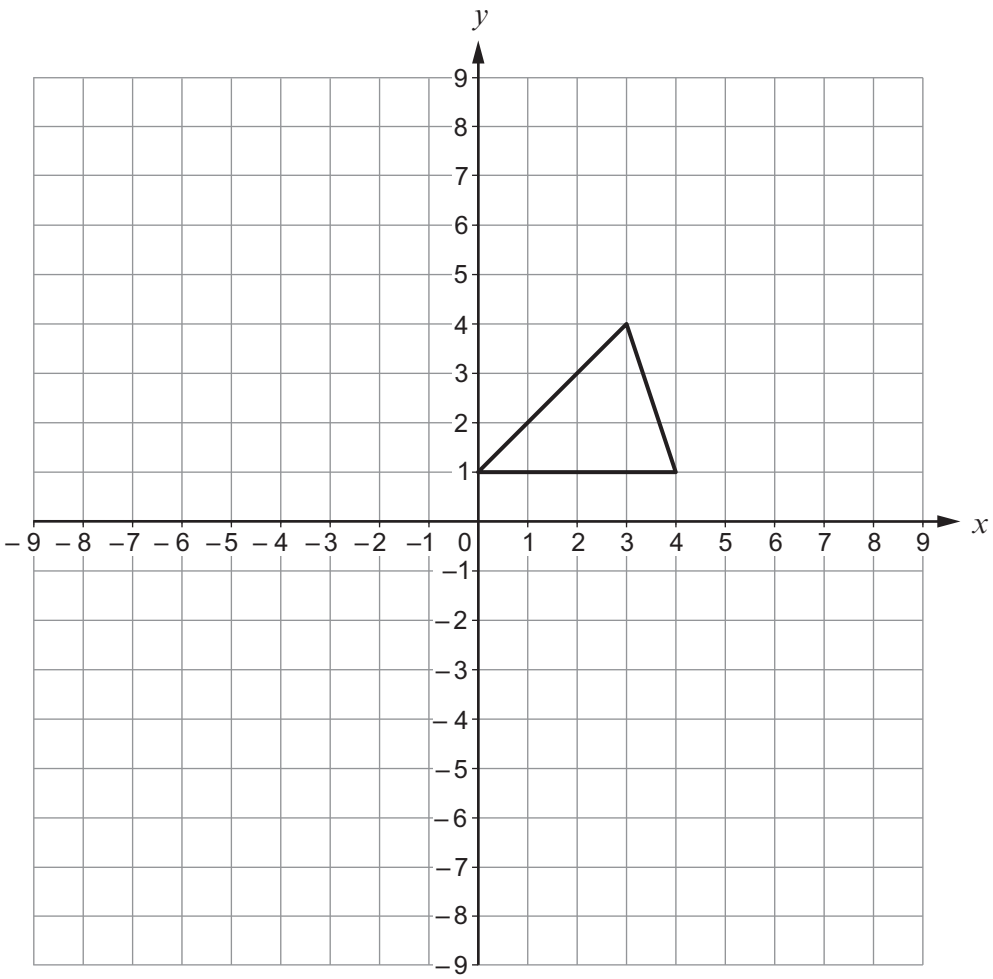
$$x = \frac{-b \pm \sqrt{(b^2 - 4ac)}}{2a}$$

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1. Reflect the given triangle in the line $y = -2$. [2]



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2. *You will be assessed on the quality of your written communication in this question.*

Miriam wants to book a holiday in Portugal. She sees the following advertisement in a travel agent's shop window.



Miriam has already saved £280 for her holiday.
Her weekly wage is £300.
Each week she saves 35% of her wage to go towards her holiday.

Will Miriam be able to pay for the holiday in time to get the 20% reduction? [8]

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3. Sumston School has a total of 600 pupils.
They each travel to school in only one of four ways: by bus, by car, cycle or walk.

On a given day, when all pupils attended school, the probability that a randomly chosen pupil travelled by bus was 0·6 and the probability that the pupil travelled by car was 0·1.

How many pupils cycled or walked to Sumston School on that day? [4]

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4. The diagram shows an isosceles triangle ABC where $AB = AC$.

All angles are measured in degrees.

Calculate the size of $B\hat{A}C$. [5]

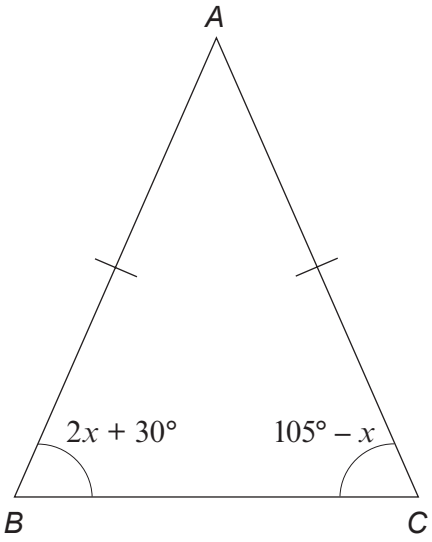


Diagram not drawn to scale

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5. *(a)* Express 80 as a product of prime factors. [2]

(b) Find the lowest common multiple of 80 and 24. [2]

(c) Find the highest common factor of 80 and 24. [1]

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6. Write down an expression for the nth term of the following sequence. [2]

10, 21, 32, 43, 54, ...

.....

.....

nth term .....

7. Find the coordinates of the mid-point of the straight line joining the points (–3, –6) and (5, 6). [2]

.....

.....

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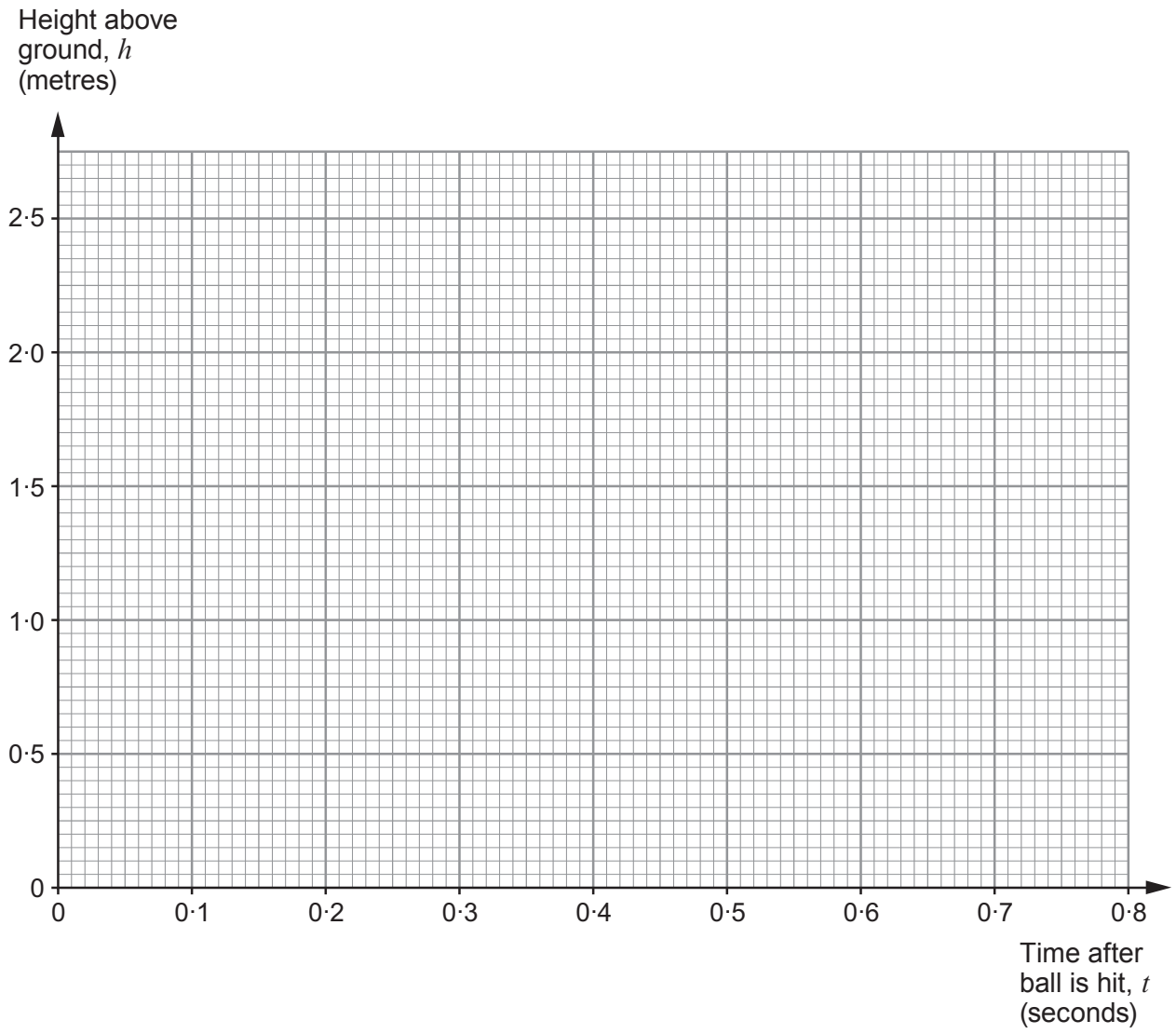
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8. Stefan is practising tennis.

After a ball is hit, a camera records its height at different times.
The results are given in the following table.

Time after ball is hit, t (seconds)	0	0·1	0·2	0·3	0·4	0·5	0·6	0·7
Height above ground, h (metres)	2·2	2·25	2·2	2·05	1·8	1·45	1·0	0·45

(a) On the axes below, draw a graph to show the heights of the ball for values of t between 0 and 0·7 seconds. [3]



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(b) What is the ball's height above the ground when it is hit? [1]

.....

(c) Use your graph to estimate for how much time the ball is more than 1·3 m above the ground after being hit. [1]

.....

(d) Which of the following equations is a possible formula to give the height of the ball in terms of time? [1]

$h = 2{\cdot}2 + t + 5t^3$ $\quad$ $h = 2{\cdot}2 - 5t$ $\quad$ $h = 2{\cdot}2t - 5t^2$

$h = 2{\cdot}2 + t - 5t^2$ $\quad$ $h = 2{\cdot}2 + 5t^2$

The possible formula is .....

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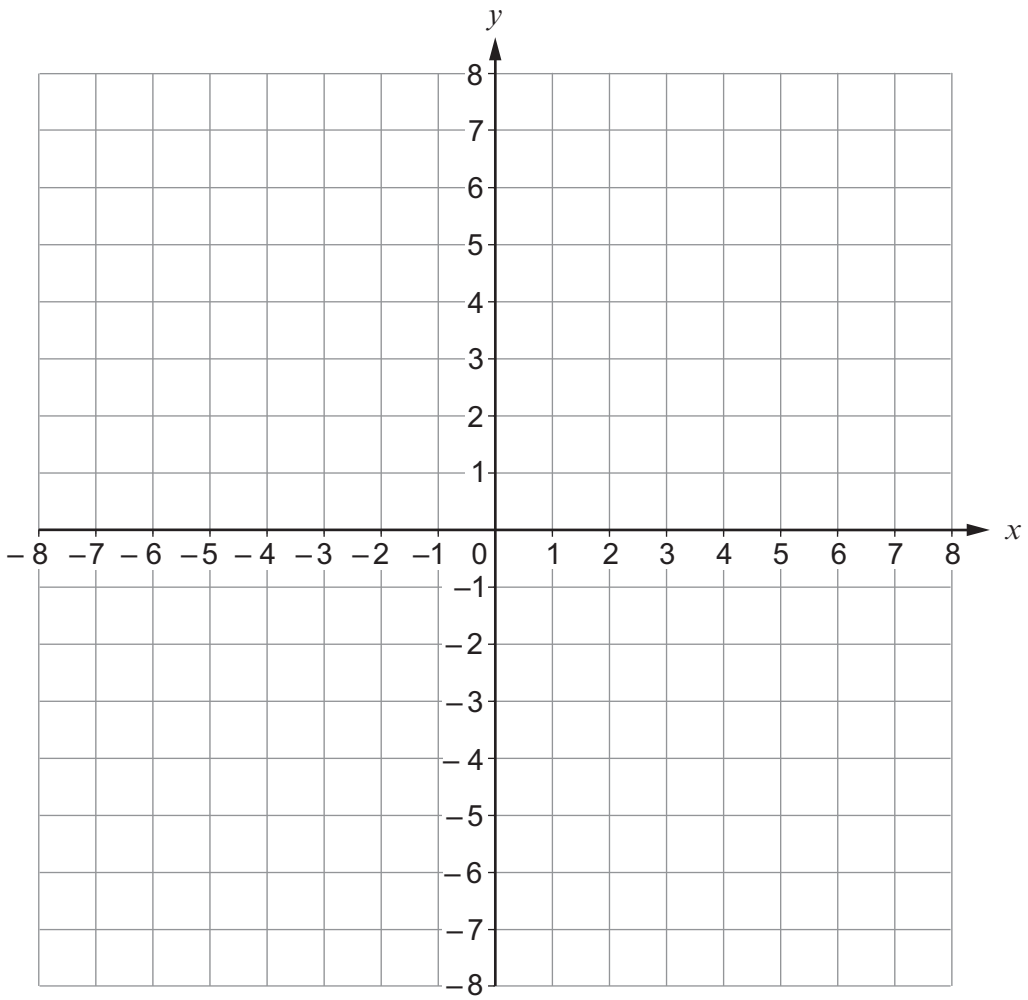
9. On the grid below, draw the region which satisfies all of the following inequalities.

$$x \geqslant -5$$

$$y \leqslant 3$$

$$y - x + 2 \geqslant 0$$

You must clearly indicate the region that represents your answer. [4]



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10. Solve the following simultaneous equations using an algebraic method.
You must show all your working. [4]

$$3x + 5y = 6{\cdot}5$$

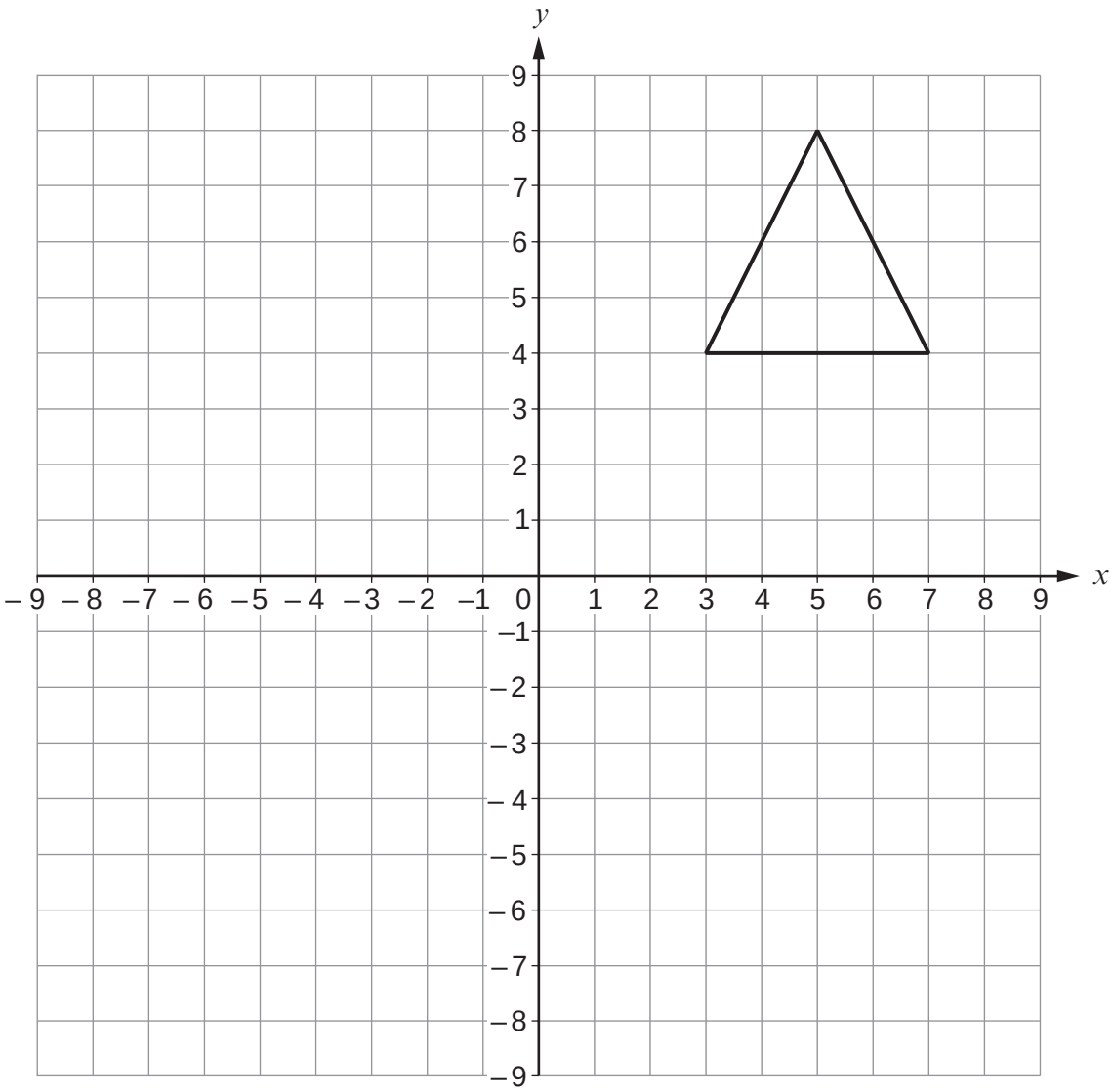
$$2x - 2y = -9$$

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11. Enlarge the given triangle, using scale factor $-\frac{1}{2}$ and centre (3, −2). [3]



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12. *(a)* Express $0\dot{7}\dot{4}$ as a fraction. [2]

(b) Simplify $(\sqrt{18} + \sqrt{2})^2$. [2]

(c) Evaluate $25^{-\frac{3}{2}}$. [2]

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13. The points *A*, *B*, *C* and *D* lie on the circumference of a circle with centre *O*.
All the angles are measured in degrees.

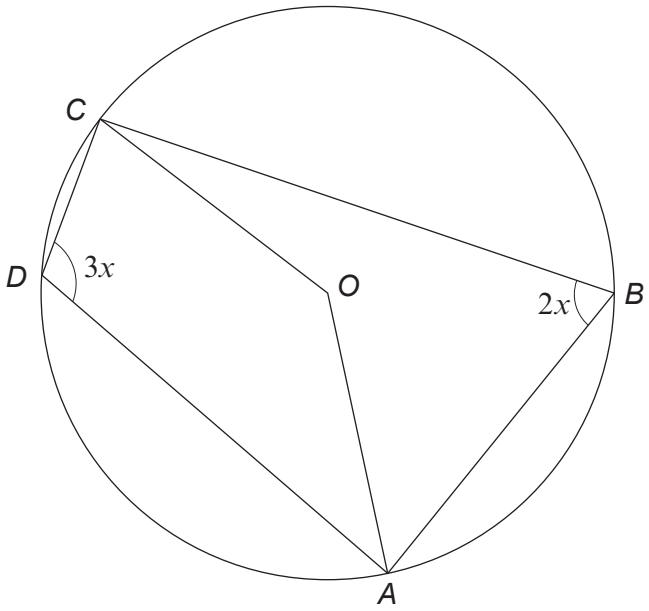


Diagram not drawn to scale

Find the size of the **obtuse** angle $A\hat{O}C$. [4]

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14. A bag contains 5 yellow cards, 9 red cards and 1 black card.
Two cards are to be picked at random, without replacement.

(a) Find the probability of picking 2 yellow cards. [2]

(b) Find the probability that the two cards picked will not be the same colour. [4]

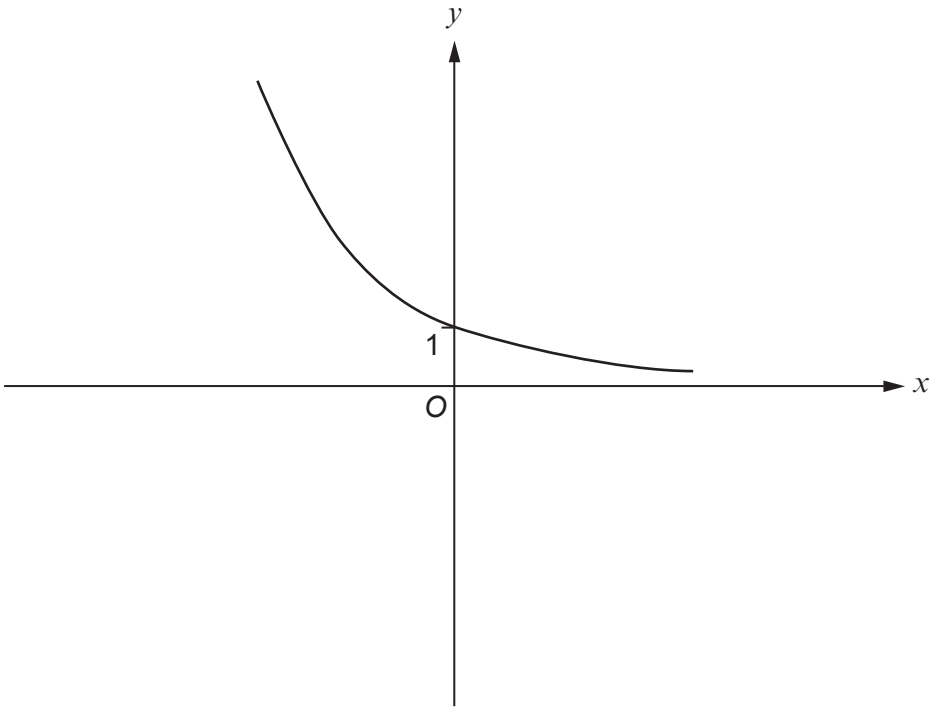
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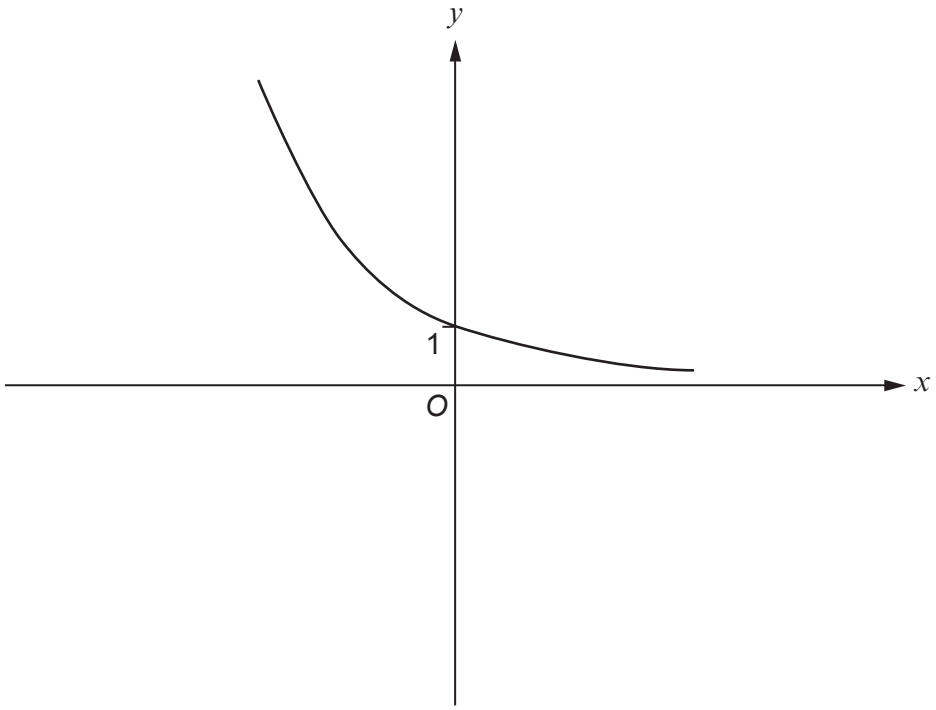
Turn over.

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15. *(a)* The diagram shows a sketch of $y = f(x)$.
On the same diagram, sketch the curve $y = f(x) - 5$.
Mark clearly the value of y at the point where your curve crosses the y-axis. [2]



(b) This diagram again shows a sketch of $y = f(x)$.
On this diagram, sketch the curve $y = -f(x)$.
Mark clearly the value of y at the point where your curve crosses the y-axis. [2]



END OF PAPER

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PLEASE DO NOT WRITE ON THIS PAGE

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Question number	Additional page, if required. Write the question number(s) in the left-hand margin.

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GCSE MARKING SCHEME

MATHEMATICS - UNITISED

SUMMER 2015

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INTRODUCTION

The marking schemes which follow were those used by WJEC for the Summer 2015 examination in GCSE MATHEMATICS - UNITISED. They were finalised after detailed discussion at examiners' conferences by all the examiners involved in the assessment. The conferences were held shortly after the papers were taken so that reference could be made to the full range of candidates' responses, with photocopied scripts forming the basis of discussion. The aim of the conferences was to ensure that the marking schemes were interpreted and applied in the same way by all examiners.

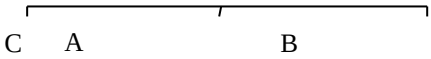
It is hoped that this information will be of assistance to centres but it is recognised at the same time that, without the benefit of participation in the examiners' conferences, teachers may have different views on certain matters of detail or interpretation.

WJEC regrets that it cannot enter into any discussion or correspondence about these marking schemes.

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Unit 2 - Higher Tier	14
Unit 3 - Foundation Tier	20
Unit 3 - Higher Tier	24

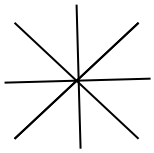
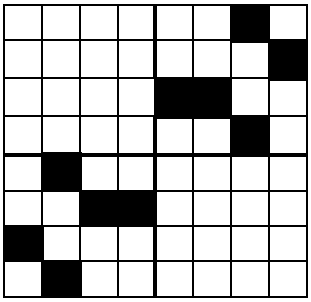
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2015 June Unit 2 (non calculator) Foundation Tier	✓	Marks	Comments
1.(a) 566		B1	
1.(b) 253		B1	
1.(c) 54		B1	
1.(d) 50(%)		B1	
1.(e) 3 064 000		B1	
1.(f) (£)110		B1	
1.(g) 4600		B1	
2.(a) likely		B1	
2.(b)  		B1 B1 B1	Allow 2/10 and 7/10 to represent A and B respectively. A should be between 0·1 and 0·3 inclusive. B should be between 0·6 and 0·8 inclusive. C should be at 0.
3. ml or cm^3 or cl km tonne or t m		B1 B1 B1 B1	Do not accept 'ton'
4.(a) 72		B1	
4.(b) (i) (x =) 20		B1	Accept embedded answers
4.(b) (ii) (y =) 7		B1	Accept embedded answers
4.(c) 3p		B1	
4.(d) – 2		B1	
5. Strategy e.g. 3×20(p) + 1 × 10(p) (= 70(p)) 280(p) ÷ 70(p) (= 4) (Number of 20p coins= 4× 3 =) 12		M1 M1 A1	Allow M1 for at least two attempts at 'trial and improvement' method using both 20p and 10p coins; i.e. finding two of 70(p), 140(p), 210(p), 280(p) or equivalent. Sight of 240(p) + 40(p) or equivalent [i.e.4 lots of each of 60(p) and 10(p)]. Award 3 marks if answer of 12 given with no working. Accept sight of 12 × 20(p).
6. ¼ l = 250 ml 250 ÷ 5 50		B1 M1 A1	Can be seen in calculation FT 'their 250' ÷ 5 (but not ¼ of 250) CAO

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2015 June Unit 2 (non calculator) Foundation Tier	✓	Marks	Comments
7. 1500 (kg) ÷ 20 (=) 75(kg) 50 × 75 (=) 3750 (kg)	✓ ✓ ✓ ✓	M1 A1 M1 A1	FT 'their 75' Award M2 for 50/20 × 1500 or equivalent *Alternative method:* *1500 ÷ 2 M1* *(=) 750(kg) A1* *750 × 5 M1* *(=) 3750(kg) A1* *OR: 3000(kg) ≡ 40 (people) B1* *750 (kg) ≡ 10 (people) B1* *3000 + 750 (kg) M1* *(=) 3750(kg) A1*
8.(a) 		B2	B1 for 2 or 3 lines correct and no incorrect lines
8.(b) reflex		B1	
8. (c) 		B2	B1 for each quadrant

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2015 June Unit 2 (non calculator) Foundation Tier	✓	Marks	Comments
9. (Loss =) 6/100 × (£) 150 (= £) 9 (Selling price = £150 – £9 = £) 141	✓ ✓ ✓	M1 A1 B1	Any correct method for finding 6% of £150 FT 'their £9' if M1 awarded *Alternative method:* (Selling price =) 94(%) (of original price) B1 (Selling price =) 94/100 × (£) 150 M1 (£)141 A1
QWC: Look for • relevance of work shown • generally correct spelling • clarity of text explanation (equivalent statements to those in brackets) • correct use of notation for money (full use of £ or p as appropriate)	✓ ✓	Q W C2	QWC2 Presents relevant material in a coherent and logical manner, using acceptable mathematical form, and with few if any errors in spelling, punctuation and grammar.
QWC2: Candidates will be expected to • present work clearly, with words explaining process or steps AND • make few if any mistakes in mathematical form, spelling, punctuation and grammar and include units in their working.			QWC1 Presents relevant material in a coherent and logical manner but with some errors in use of mathematical form, spelling, punctuation or grammar OR evident weaknesses in organisation of material but using acceptable mathematical form, with few if any errors in spelling, punctuation and grammar.
QWC1: Candidates will be expected to • present work clearly, with words explaining process or steps OR • make few if any mistakes in mathematical form, spelling, punctuation and grammar, and include units in their working			QWC0 Evident weaknesses in organisation of material, and errors in use of mathematical form, spelling, punctuation or grammar. Final unsupported statement only gets QWC0

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2015 June Unit 2 (non calculator) Foundation Tier	✓	Marks	Comments
10.(a) 7 **9** 13 **14** **13** 15 **19** 20 16 **18** 22 **23** **19** 21 **25** 26		B2	B1 for at least 4 correct entries
10.(b) 5/16		B2	FT their list. B1 for a numerator of 5 in a fraction less than 1. B1 for a denominator of 16 in a fraction less than 1. Do not penalise incorrect reduction of fractions from a FT. **NB** Penalise –1 for use of words such as '5 out of 16', '5 in 16'. or '5:16'. When both fraction and wrong notation seen, DO NOT penalise wrong notation
11. $2x + 30 = 105 - x$ $3x = 75$ $x = 25$	✓ ✓ ✓	M1 A1 A1	Strategy of equating appropriate angles FT until 2nd error (for equivalent difficulty) FT $ax = b$, with $a \neq 1$ Sight of (x =) 25 gains M1A1A1. Otherwise, for an attempt at trial and improvement to equate the base angles, award M1A1 for 2 appropriate trials.
(Angle *ABC* or Angle *BCA* =) 80(°) (180(°) – 80(°) – 80(°) =) 20(°)	✓ ✓	B1 B1	FT 'their derived x'. Check diagram. FT 180 – 'their *ABC*' – 'their *ACB*' OR 180 – 2 × 'their *ABC*' OR 180 – 2 × 'their *ACB*' provided the base angles are obtained by substituting 'their x' and provided the sum of the base angles is less than 180. If no other marks awarded, SC2 for $45 - x$ SC1 for $180 - (2x + 30 + 105 - x)$ OR e.g. $2x + 30 + 105 - x + A = 180$

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2015 June Unit 2 (non calculator) Foundation Tier	✓	Marks	Comments
12. (0·6 + 0·1) (0·7) × 600 (= 420) 600 – 420 180 (pupils)	✓ ✓ ✓ ✓	M1 M1 M1 A1	Or M2 for equivalent working e.g. 0·6 × 600 + 0·1 × 600 If neither M1 awarded, award M1 for 0·6 × 600 or 0·1 × 600 or 360 or 60 FT 600 – 'their 420' provided at least M1 already awarded AND 'their 420' is derived from the total travelling by bus or by car CAO Do not accept 180/600 (written as a fraction) *Alternative method:* 0·6 + 0·1 M1 1 – (0·6 + 0·1) M1 (= 0·3) 0·3 × 600 M1 FT 'their 0·3' 180 (pupils) A1
13. (1, 0)		B2	Accept (x =) 1, (y =) 0 provided it is clear which co-ordinate belongs to which variable. B1 for either $x = 1$ or $y = 0$ OR B1 for a sketch which includes a clear indication of the midpoint OR B1 for $(\frac{-3+5}{2}, \frac{-6+6}{2})$ or equivalent OR B1 for sight of 4 or 6 within appropriate working e.g. 5 – (– 3) = 8, 8 / 2 = 4

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2015 June Unit 2 (non calculator) Foundation Tier	✓	Marks	Comments
14.(a) Method that produces at least 2 correct prime factors $2 \times 2 \times 2 \times 2 \times 5$ OR $2^4 \times 5$		M1 A1	 Do not ignore 1s within the product. A0 for sum or list
14. (b) $16 \times 5 \times 3$ or equivalent OR listing multiples of <u>both</u> 80 and 24 (LCM is) 240		M1 A1	FT 'their (a)' Attempt to add 80s and 24s, with at least 2 correct additions seen for each CAO
14.(c) 8		B1	Accept $2 \times 2 \times 2$ or 2^3
15. (a) Use overlay. Plots Curve		 P2 C1	 Accurate to within one 'small' square. P1 for 5, 6 or 7 correct plots. Clear intention. C1 is dependent on at least P1 being awarded. C0 for a polygon.
(b) 2·2 (metres)		B1	
(c) 0·53 to 0·54 (seconds)		B1	Accurate to within one 'small' square. FT from 'their curve'. Do not accept 0.55 unless followed through from 'their curve'.

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Unit 2 GCSE Maths June 2015 Higher Tier	**TICK**	**MARK**	**Comment**
1. Correct reflection		B2	B1 for a reflection in any horizontal line or in $x = -2$ or for sight of the line $y = -2$
2. (Reduced cost of holiday =) 840 – 840 × 0.2(0) OR 840 × 0.8(0) (= £)672	✓ ✓	M1 A1	Or equivalent full method
(Amount saved each week = 300 × 0.35 =) (£)105	✓	B1	Or sight of (4 × 105 or 1200 × 0.35 =) 420
Considers the time period of saving money e.g. 4 × 105 (= 420), 392 / 105 (< 4) or e.g. 4 × 300	✓	S1	FT 4 × 'their 105' Allow use of 3 weeks (interpreted as 'within 4 weeks')
Considers £280 already saved in an appropriate calculation	✓	S1	e.g. 'their 672' – 280 (= 392) or 280 + 'their 420' (= 700)
Interpretation: e.g. 'Yes , enough time to save' 'Yes, with £28 left over' Look for • relevance • spelling in at least 1 statement/sentence • clarity of text explanations, • the use of notation (watch for the use of '=', £, % being appropriate)	✓	E1	(700 > 672 or 420 > 392) Do not FT for answers stating 'No' (unless using 3 weeks rather than 4). Allow FT from A0 or B0. Award of E1 depends on M1 and S2 and correct relevant calculations. ISW e.g. for an incorrect calculation of money left over.
A clear conclusion statement must be made before QWC2 can be awarded. Count incorrect use of '=' in situations such as '840 × 0·2 = 168 – 840' within the 'errors in mathematical form' QWC2: Candidates will be expected to • present work clearly, with words explaining process or steps AND • make few if any mistakes in mathematical form, spelling, punctuation and grammar and include units in their final answer QWC1: Candidates will be expected to • present work clearly, with words explaining process or steps OR • make few if any mistakes in mathematical form, spelling, punctuation and grammar and include units (£) in their final answer	✓ ✓	QWC2	QWC2 Presents relevant material in a coherent and logical manner, using acceptable mathematical form, and with few if any errors in spelling, punctuation and grammar. QWC1 Presents relevant material in a coherent and logical manner but with some errors in use of mathematical form, spelling, punctuation or grammar OR evident weaknesses in organisation of material but using acceptable mathematical form, with few if any errors in spelling, punctuation and grammar. QWC0 Evident weaknesses in organisation of material, and errors in use of mathematical form, spelling, punctuation or grammar.

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Unit 2 GCSE Maths June 2015 Higher Tier	TICK	MARK	Comment
3. (0·6 + 0·1) (0·7) × 600 (= 420)	✓ ✓	M1 M1	Or M2 for equivalent working e.g. 0·6 × 600 + 0·1 × 600 If neither M1 awarded, award M1 for 0·6 × 600 or 0·1 × 600 or 360 or 60
600 – 420	✓	M1	FT 600 – 'their 420' provided at least M1 already awarded AND 'their 420' is derived from the total travelling by bus or by car
180 (pupils)	✓	A1	CAO Do not accept 180/600 (written as a fraction) *Alternative method:* 0·6 + 0·1 M1 1 – (0·6 + 0·1) M1 (= 0·3) 0·3 × 600 M1 FT 'their 0·3' 180 (pupils) A1
4. TO BE VIEWED WITH DIAGRAM $2x + 30 = 105 - x$ $3x = 75$ $x = 25$	 ✓ ✓ ✓	 M1 A1 A1	 Strategy of equating appropriate angles FT until 2nd error (for equivalent difficulty) FT $ax = b$, with $a \neq 1$ Sight of (x =) 25 gains M1A1A1. Otherwise, for an attempt at trial and improvement to equate the base angles, award M1A1 for 2 appropriate trials.
(Angle *ABC* or Angle *BCA* =) 80(º) (180(º) – 80(º) – 80(º) =) 20(º)	✓ ✓	B1 B1	FT 'their derived x'. Check diagram. FT 180 – 'their *ABC*' – 'their *ACB*' OR 180 – 2 × 'their *ABC*' OR 180 – 2 × 'their *ACB*' provided the base angles are obtained by substituting 'their x' and provided the sum of the base angles used is less than 180. If no other marks awarded, SC2 for 45 – x SC1 for 180 – ($2x$ + 30 + 105 – x) OR e.g. $2x$ + 30 + 105 – x + A = 180

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Unit 2 GCSE Maths June 2015 Higher Tier	TICK	MARK	Comment
5. RIBBON-MARKING FOR PARTS (a) TO (c) (a) Method that produces at least 2 correct prime factors $2 \times 2 \times 2 \times 2 \times 5$ OR $2^4 \times 5$		M1 A1	 Do not ignore 1s within the product. A0 for a sum or list.
(b) $16 \times 5 \times 3$ or equivalent OR listing multiples of 80 and multiples of 24 (LCM is) 240		M1 A1	FT 'their (a)' Attempt to add 80s and 24s, with at least 2 correct additions seen for each CAO
(c) 8		B1	Accept $2 \times 2 \times 2$ or 2^3
6. $11n - 1$		B2	B1 for sight of $11n$ or $11 \times n$ or equivalent
7. (1, 0)		B2	Accept (x =) 1, (y =) 0 provided it is clear which co-ordinate belongs to which variable. B1 for either $x = 1$ or $y = 0$ OR B1 for a sketch which includes a clear indication of the midpoint OR B1 for $\left(\frac{-3+5}{2}, \frac{-6+6}{2}\right)$ or equivalent OR B1 for sight of 4 or 6 within appropriate working e.g. $5 - (-3) = 8$, $8 / 2 = 4$
8. RIBBON MARKING (a) TO (c) (NOT (d)) (a) Use overlay. Plots Curve		 P2 C1	 Accurate to within one 'small' square. P1 for 5, 6 or 7 correct plots. Clear intention. C1 is dependent on at least P1 being awarded. C0 for a polygon.
(b) 2·2 (metres)		B1	
(c) 0·53 to 0·54 (seconds)		B1	Accurate to within one 'small' square FT from 'their curve'. Do not accept 0·55 unless followed through from 'their curve'.
(d) $h = 2{\cdot}2 + t - 5t^2$		B1	Accept any unambiguous indication e.g. circled formula.
9. Sight of line for either $x = -5$ or $y = 3$ Correct line drawn for $y - x + 2 = 0$ ($y = x - 2$) Correct region clearly identified		B1 B2 B1	Accept an unlabelled correct line provided unambiguous (e.g. the only vertical or horizontal line). Accept dotted lines throughout question. B1 for correct gradient (= 1) OR correct y-intercept plotted (0, –2) OR correct x-intercept plotted (2, 0) OR any two other points calculated or plotted correctly (with no incorrect points) FT for their lines (for equivalent difficulty)

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Unit 2 GCSE Maths June 2015 Higher Tier	TICK	MARK	Comment
10. Method to find the first variable Correct first variable Method to find the second variable Correct second variable	✓ ✓ ✓ ✓	M1 A1 m1 A1	Allow one slip (but not in the equated variable) FT 'their first variable' $x = -2$, $y = 2{\cdot}5$
11. Use overlay. Correct enlargement		B3	Otherwise B2 for 2 correct points (within an inverted triangle) OR inverted triangle of correct size in incorrect position OR consistent use of an incorrect **negative** fractional scale factor (in correct position) B1 for 1 correct point (within an inverted triangle) OR any 2 correct points (not within an inverted triangle) OR consistent use of scale factor + ½ (in correct position) OR consistent use of an incorrect **negative** fractional scale factor in incorrect position
12. (a) $x = 0{\cdot}74444.....$ $10x = 7{\cdot}4444.....$ with an attempt to subtract 67/90 or equivalent e.g. 737/990		M1 A1	Or $10x$ and $100x$, or equivalent. Or an alternative method. An answer of 6·7/9 gains M1 only. Mark final answer. Do not ignore incorrect cancelling.
(b) $18 + \sqrt{36} + \sqrt{36} + 2$ or $\sqrt{324} + \sqrt{36} + \sqrt{36} + \sqrt{4}$ or equivalent = 32		M1 A1	3 of the 4 terms correct. $\sqrt{18}\sqrt{2}$ is insufficient for $\sqrt{36}$. Do not ignore subsequent working *Alternative method:* $(3\sqrt{2} + \sqrt{2})^2$ M1 = 32 A1
(c) 1/125 or 0·008 or equivalent		B2	B1 for 125^{-1} or $1/5^3$ or $(1/5)^3$ or $1/\sqrt{15625}$ or $1/15625^{1/2}$ or $(1/15625)^{1/2}$

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Unit 2 GCSE Maths June 2015 Higher Tier	TICK	MARK	Comment
13. TO BE VIEWED WITH DIAGRAM $2x(^o) + 3x(^o) = 180(^o)$ or equivalent $x(^o) = 36(^o)$ OR Angle ABC = $72(^o)$ (Angle AOC =) $2 \times 72(^o)$ $144(^o)$	✓ ✓ ✓ ✓	M1 A1 M1 A1	Use of cyclic quadrilateral FT $4 \times$ 'their x' Check diagram for answers. If a final answer of $216(^o)$ is given, with or without sight of $144(^o)$, award SC1 in place of final 2 marks *Alternative method:* Reflex angle AOC = $6x$ OR Obtuse angle AOC = $4x$ M1 $360(^o) - 6x = 4x$ or equivalent M1 $x(^o) = 36(^o)$ A1 AOC = $144(^o)$ A1

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Unit 2 GCSE Maths June 2015 Higher Tier	TICK	MARK	Comment
14. RIBBON MARKING PARTS (a) AND (b) (a) 5/15 × 4/14 = 20/210 (= 2/21) or equivalent		M1 A1	Complete correct method ISW Method <u>with</u> replacement gets 0 marks
(b) 1 – P(both the same colour) = 1 – [5/15 × 4/14 + 9/15 × 8/14] (= 1 – 92/210) = 118/210 (= 59/105)	✓ ✓ ✓	M1 M2 A1	 <u>Complete</u> correct method. M1 for 1 error. FT 'their (a)' if used ISW Penalise once only (throughout whole question) for a repeated incorrect denominator. If no marks awarded, SC1 for sight of 92/210 (probability of both the same colour) *Alternative method:* P(YR or RY or RB or BR or BY or YB) M1 = 5/15×9/14 + 9/15×5/14 + 9/15×1/14 + 1/15×9/14 + 1/15×5/14 + 5/15×1/14 or equivalent M2 = 118/210 (= 59/105) A1 If no marks awarded, SC2 for this method and related answer, having omitted one product (out of 6) SC1 for this method, having omitted one product, with no related correct answer SC1 for this method and related answer, having omitted two products *Alternative method:* P(YY' or RR' or BB') M1 = 5/15×10/14 + 9/15×6/14 + 1/15(×14/14) M2 = 118/210 (= 59/105) A1 If no marks awarded, SC1 for this method and related answer, having omitted one product (out of 3) SC2 for method <u>with</u> replacement in part (b), leading to an answer of 118/225 SC1 for method <u>with</u> replacement in part (b), without a related answer
15. (a) Sketch with downwards shift - 4 indicated on *y*-axis or (0, -4) given		B1 B1	Clear intention to draw same curve. Depends on correct shape of first curve.
(b) Reflection in *x* axis - 1 indicated on *y*-axis or (0, -1) given		B1 B1	Clear intention to reflect same curve. Depends on first B1.

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Surname	Centre Number	Candidate Number
Other Names		0

GCSE

4352/02

W15-4352-02

MATHEMATICS (UNITISED SCHEME)

UNIT 2: Non-Calculator Mathematics

HIGHER TIER

A.M. WEDNESDAY, 14 January 2015

1 hour 15 minutes

CALCULATORS ARE NOT TO BE USED FOR THIS PAPER

ADDITIONAL MATERIALS

A ruler, a protractor and a pair of compasses may be required.

INSTRUCTIONS TO CANDIDATES

Use black ink or black ball-point pen.

Write your name, centre number and candidate number in the spaces at the top of this page.

Answer **all** the questions in the spaces provided.

Take π as 3·14.

INFORMATION FOR CANDIDATES

You should give details of your method of solution when appropriate.

Unless stated, diagrams are not drawn to scale.

Scale drawing solutions will not be acceptable where you are asked to calculate.

The number of marks is given in brackets at the end of each question or part-question.

You are reminded that assessment will take into account the quality of written communication (including mathematical communication) used in your answer to question **2**.

For Examiner's use only		
Question	**Maximum Mark**	**Mark Awarded**
1.	**3**	
2.	**8**	
3.	**3**	
4.	**4**	
5.	**6**	
6.	**6**	
7.	**3**	
8.	**2**	
9.	**2**	
10.	**5**	
11.	**5**	
12.	**4**	
13.	**5**	
14.	**7**	
15.	**2**	
Total	**65**	

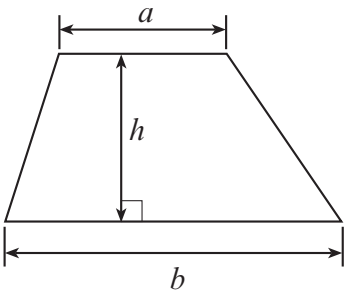
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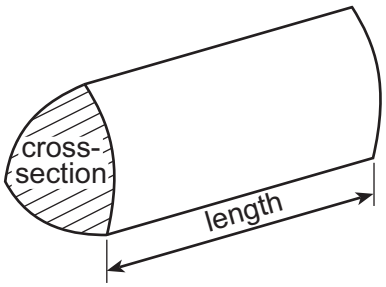
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Formula List

Area of trapezium $= \frac{1}{2}(a + b)h$

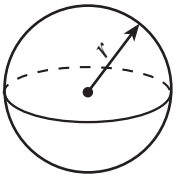


Volume of prism = area of cross-section × length



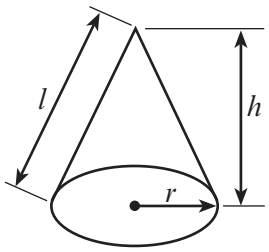
Volume of sphere $= \frac{4}{3}\pi r^3$

Surface area of sphere $= 4\pi r^2$



Volume of cone $= \frac{1}{3}\pi r^2 h$

Curved surface area of cone $= \pi rl$

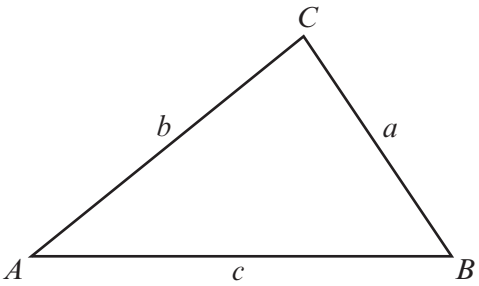


In any triangle ABC

Sine rule $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

Cosine rule $a^2 = b^2 + c^2 - 2bc\cos A$

Area of triangle $= \frac{1}{2}ab\sin C$



The Quadratic Equation

The solutions of $ax^2 + bx + c = 0$

where a, b and c are given by

$$x = \frac{-b \pm \sqrt{(b^2 - 4ac)}}{2a}$$

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1. Solve the equation $4(x + 1) = 3$. [3]

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2. *You will be assessed on the quality of your written communication in this question.*

Adrian wanted to rent a holiday cottage in Scotland for his family.

He saw the following advertisement.

> **Rent a Scottish cottage!**
>
> £620 per week in August.
>
> Pay now and get 15% off.
>
> If you cancel, any money paid will be returned to you, less £60.

Adrian booked the cottage immediately and paid for one week in August.

The next day, Adrian saw an advertisement for a different Scottish cottage.

This cost £69 **per night** in August.

Would Adrian have saved any money if he had cancelled the booking for the first cottage and then rented the second cottage?

You must show all your working. [8]

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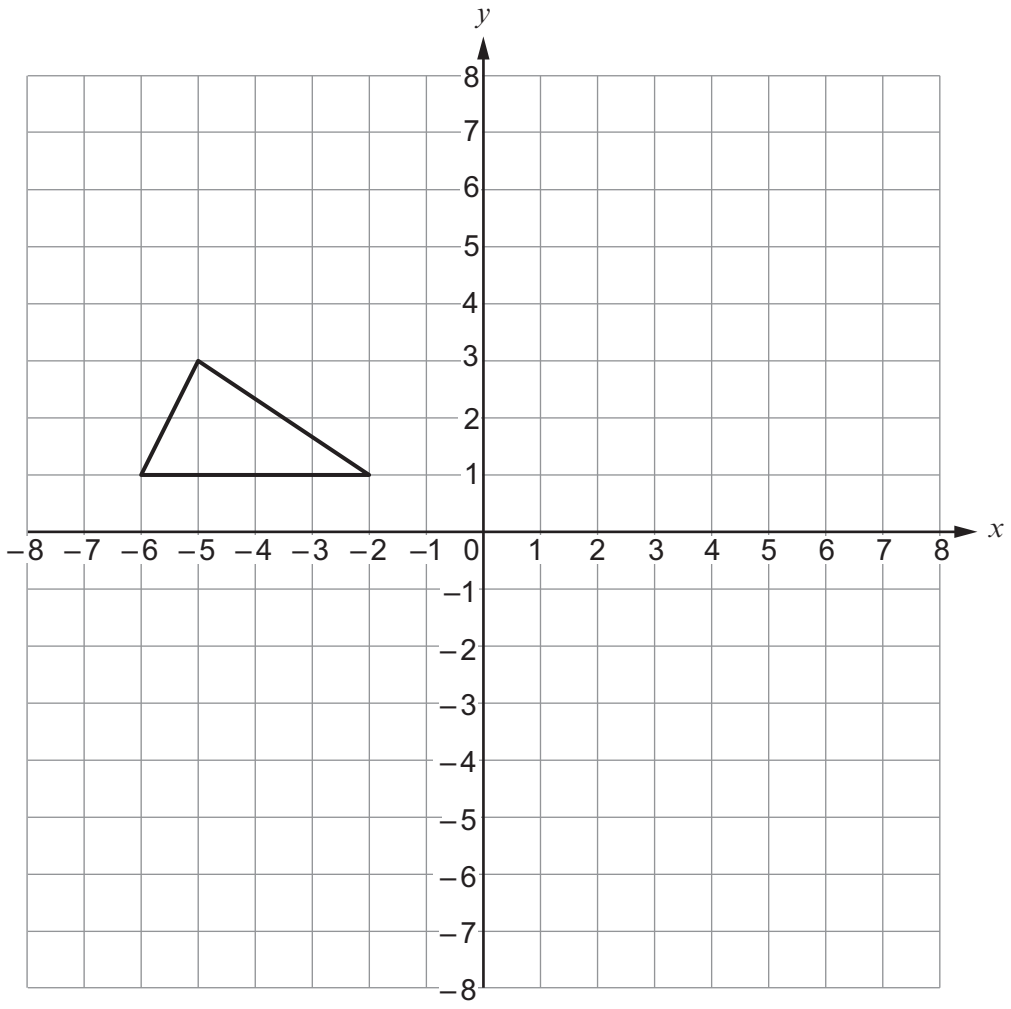
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3. *(a)* Rotate the given triangle through 90° clockwise about the point (1, 0). [2]

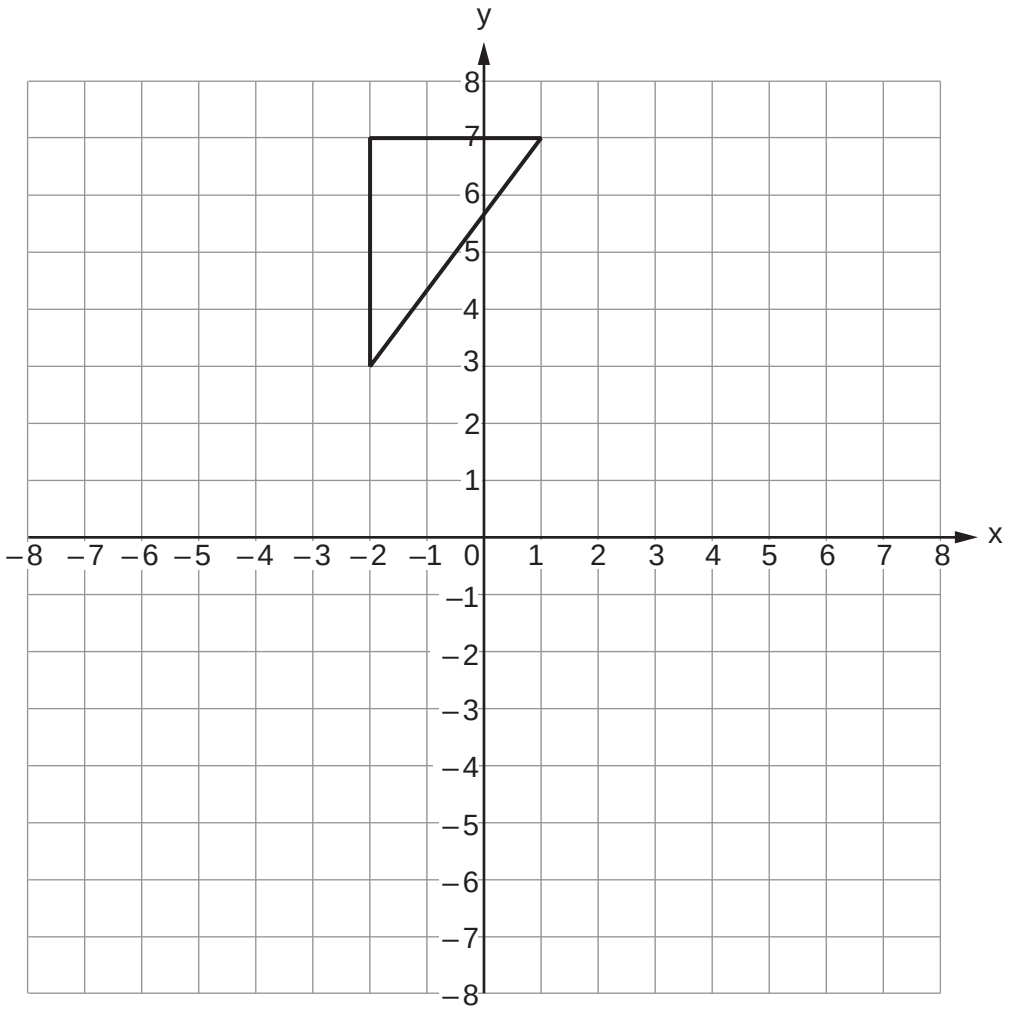


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(b) Translate the given triangle 3 units to the right and 2 units down. [1]



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4.

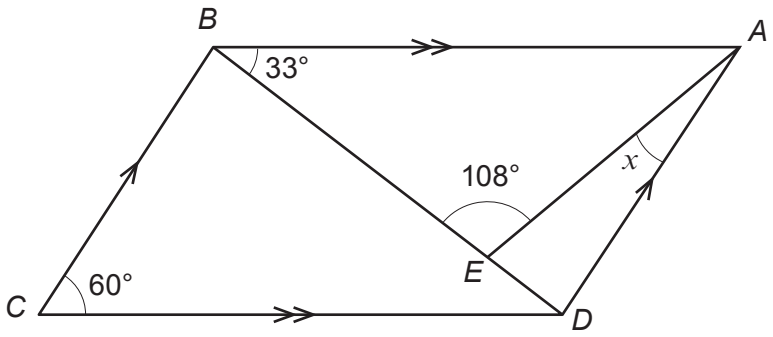


Diagram not drawn to scale

ABCD is a parallelogram.

$B\hat{C}D$ = 60°.
$A\hat{E}B$ = 108°.
$A\hat{B}E$ = 33°.

Calculate the size of angle x. [4]

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5. *(a)* Simplify $4(2x + 3) - 3(x + 2)$. [2]

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(b) Write down an expression for the nth term of the following sequence. [2]

3, 13, 23, 33, 43, ...

.....

.....

nth term .....

(c) Solve the following inequality. [2]

$4x + 7 > 9$

.....

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6. Alan is a professional darts player. He claims that, with any throw, he can hit the bull's-eye (in the centre of the board) with a probability of 50%.

Ffion challenges him to prove this by throwing 5 sets of 10 darts.

Alan's results are given in the following table.

Number of throws	10	10	10	10	10
Number of throws hitting the bull's-eye	4	8	3	3	2

Ffion then creates a table to show the cumulative number of bull's-eyes and to calculate the relative frequencies.

Total number of throws	10	20	30	40	50
Total number of throws hitting the bull's-eye	4	12			
Relative frequency of hitting a bull's-eye	$\frac{4}{10}$	$\frac{12}{20}$			
	0·4	0·6			

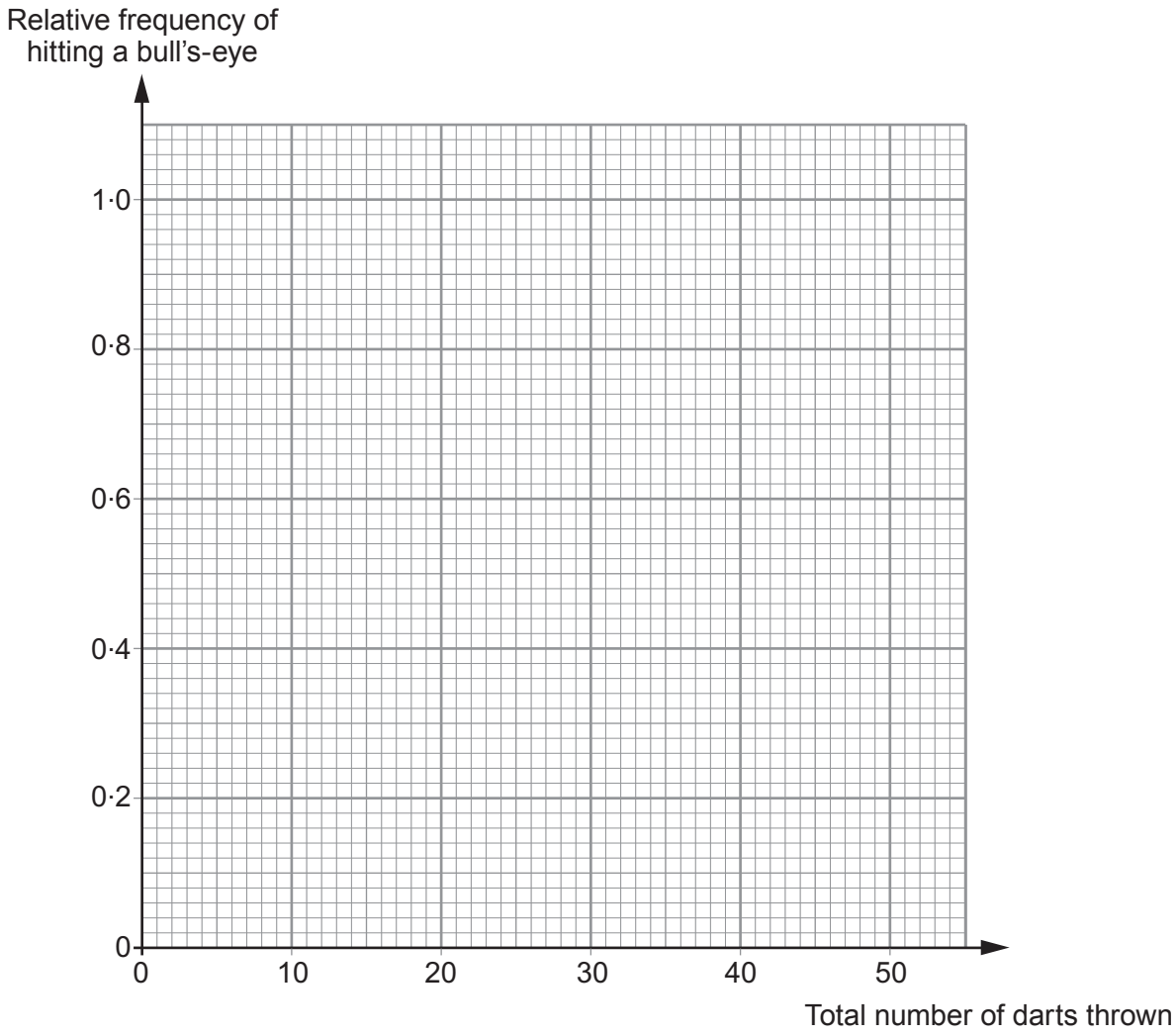
(a) Complete the table above. [3]

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(b) Draw a graph to show the relative frequency of hitting a bull's-eye. [2]



(c) Is Alan correct to claim that he has a probability of 50% of hitting the bull's-eye? Explain your answer. [1]

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7. When she was in Year 7, Yasmin could run 800 metres in 3 minutes and 20 seconds.

Four years later, when she was in Year 11, she could run 800 metres in 2 minutes and 48 seconds.

Find the percentage improvement in her time. [3]

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8. Write the following numbers in standard form.

(a) 0·000097 [1]

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(b) 4 780 000 000 [1]

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9. Two different straight lines have the equations

$$y = 4x + 3 \quad \text{and} \quad 2y - 8x = 10.$$

Are these lines parallel? You must explain your answer. [2]

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10. The Davies family want to buy some garden furniture. Their local garden centre stocks the particular brand they would like.

The price of one garden bench and four chairs is £310.
The price of two garden benches and three chairs is £345.

The Davies family have £450 available to spend.

Do they have enough money to buy two garden benches and five chairs?

You must show all your working. [5]

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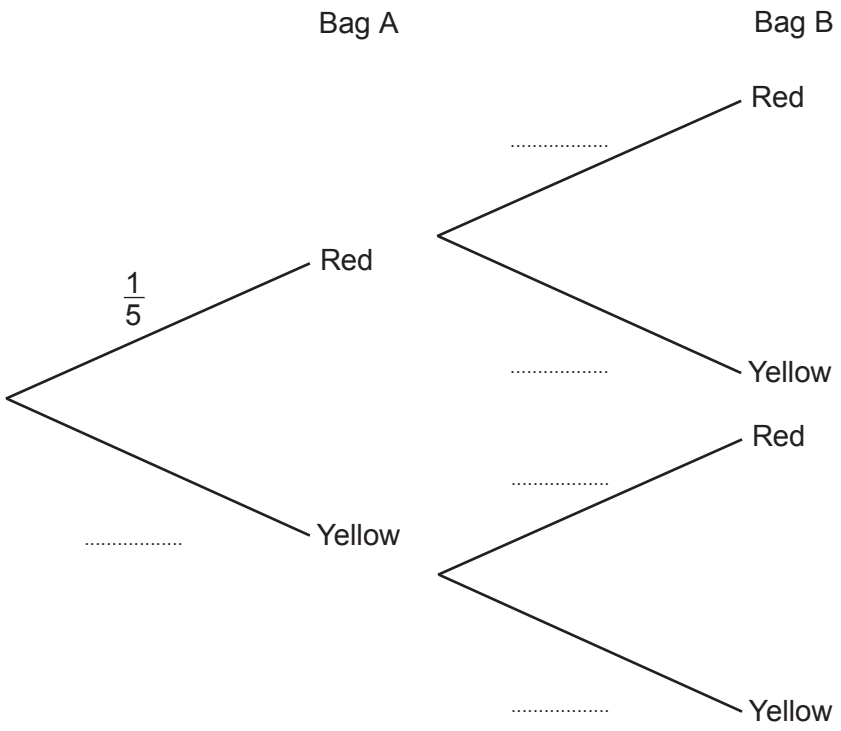
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11. A game involves two bags, each containing coloured balls.

Bag A contains 1 red ball and 4 yellow balls.
Bag B contains 2 red balls and 1 yellow ball.

A player picks one ball at random from each bag.

(a) Complete the following tree diagram. [2]



(b) Find the probability of picking one ball of each colour. [3]

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12. Rearrange the following formula to make h the subject. [4]

$$\frac{5h + 3k}{h + 4} = 2$$

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13. *(a)* The points *A*, *B* and *C* lie on the circumference of a circle, centre *O*.

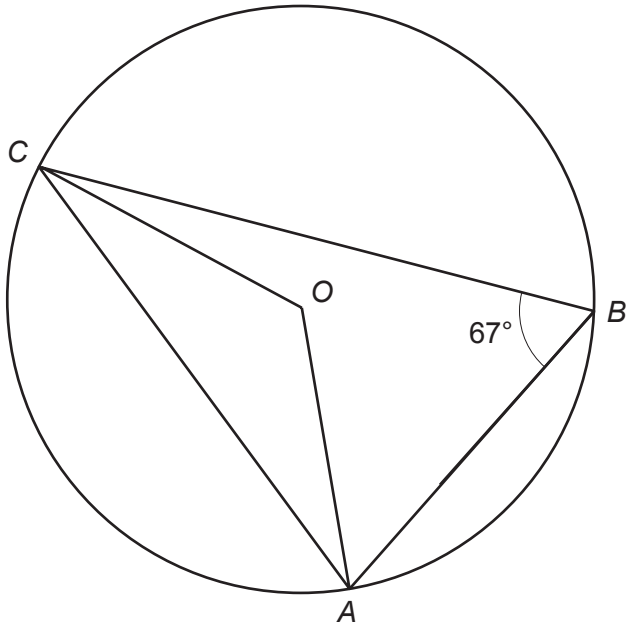


Diagram not drawn to scale

Find the size of $O\hat{A}C$. [3]

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(b) The points *D*, *E* and *F* lie on the circumference of another circle. *GH* is a tangent to the circle at *F.*

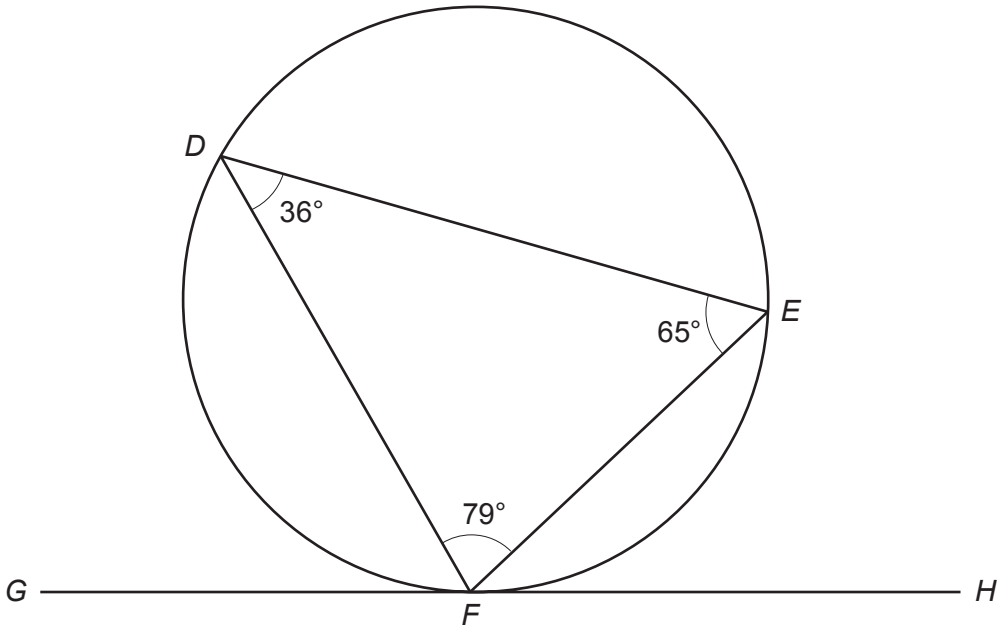


Diagram not drawn to scale

Write down the size of $E\hat{F}H$, giving a reason for your answer. [2]

$E\hat{F}H$ = ... °

Reason: .....

.....

.....

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14. *(a)* Express $0\cdot\dot{2}\dot{7}\dot{4}$ as a fraction. [2]

(b) Evaluate

(i) $7\cdot3^0$ [1]

(ii) $27^{-\frac{2}{3}}$ [2]

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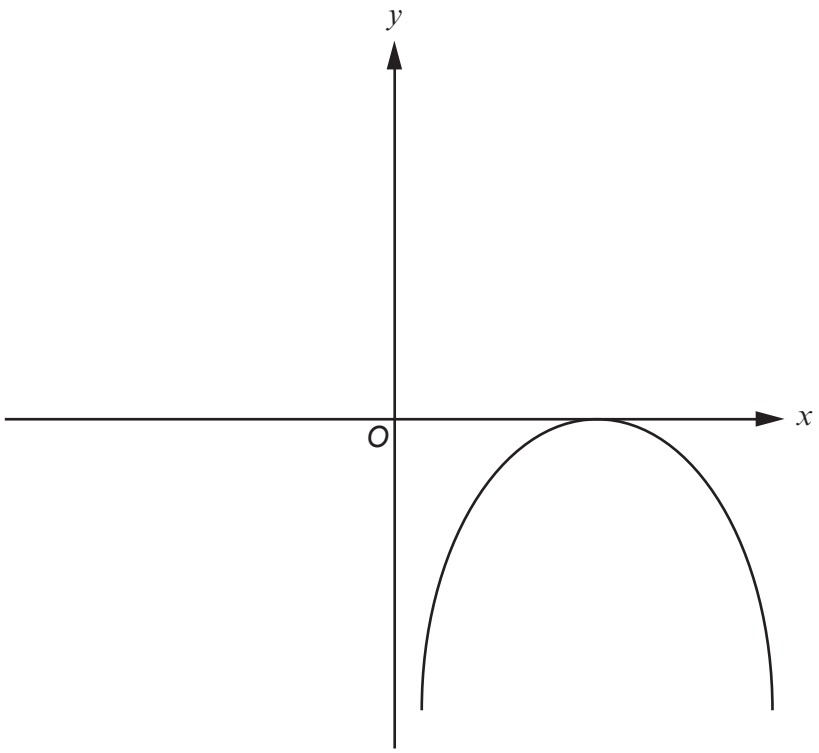
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(c) Simplify $(5 - 3\sqrt{2})(5 + 3\sqrt{2})$. [2]

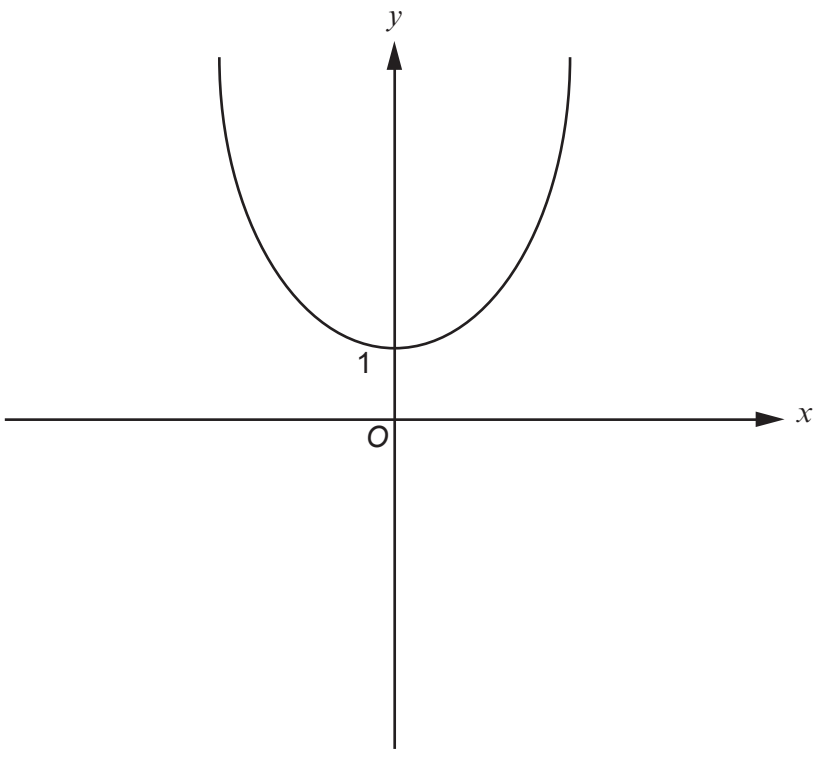
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15. *(a)* This diagram shows a sketch of the curve $y = f(x)$.
On the same diagram, sketch the curve $y = -f(x)$. [1]



(b) This diagram shows a sketch of the curve $y = g(x)$.
On the same diagram, sketch the curve $y = g(2x)$. [1]



END OF PAPER

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GCSE MARKING SCHEME

MATHEMATICS - UNITISED

JANUARY 2015

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INTRODUCTION

The marking schemes which follow were those used by WJEC for the January 2015 examination in GCSE MATHEMATICS - UNITISED. They were finalised after detailed discussion at examiners' conferences by all the examiners involved in the assessment. The conferences were held shortly after the papers were taken so that reference could be made to the full range of candidates' responses, with photocopied scripts forming the basis of discussion. The aim of the conferences was to ensure that the marking schemes were interpreted and applied in the same way by all examiners.

It is hoped that this information will be of assistance to centres but it is recognised at the same time that, without the benefit of participation in the examiners' conferences, teachers may have different views on certain matters of detail or interpretation.

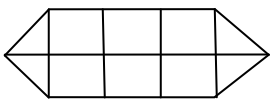
WJEC regrets that it cannot enter into any discussion or correspondence about these marking schemes.

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Unit 2 - Higher Tier	11
Unit 3 - Foundation Tier	14
Unit 3 - Higher Tier	18

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UNIT 2 - FOUNDATION TIER

2015 January UNIT 2 (non-calculator) Foundation Tier	Mark	Final Mark Scheme Comments
1. (a)(i) 27 (ii) 64 (iii) 26 and 52 (iv) 54 (v) 62 (b) (£) 72 (c) 2796 (d) 4 thousand(s), 4000 (e) 38·3	B1 B1 B1 B1 B1 B1 B1 B1 B1 9	Accept thousand(s). B0 for 1000.
2. X pentagon hexagon X scalene triangle X kite X equilateral triangle trapezium X circle	B4 4	B1 for each correct pair. More than one line from any shape gets B0 for that pair.
3. cricket 6 football 12 tennis 2	B1 B1 B1 3	Penalty – 1 if three correct sets of tally marks given only. If B0 then SC2 for 6/20, 12/20, 2/20. If B0 then SC1 for 3/10, 6/10, 1/10 or SC1 for 0·3, 0·6, 0·1.
4.(a)  (b) (i) (£) $12g$ (ii) $h - 3$ (c) (i) (x =) 60 (ii) (x =) 8 (d) $10k - 7m$	B1 B1 B1 B1 B1 B2 7	Accept $12 \times g$, $g \times 12$ Accept embedded answers. Must be an expression for B2 B1 for $10k + -7m$ B1 for either $10k$ or $-7m$ seen
5. 180(°) – 47(°) – 39(°) 94(°)	M1 A1 2	

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2015 January UNIT 2 (non-calculator) Foundation Tier	Mark	Final Mark Scheme Comments
6. Suitable method for comparison, such as: (Using £1 for 170g) 4 × 170 (g) 680 (g) OR (Using £4 per kg) 1000 (g) ÷ 4 250 (g) Statement equivalent to 680 (g) ≠ 1000 (g) OR 170(g) ≠ 250 (g) Look for • relevance of work shown • generally correct spelling • clarity of text explanation • use of notation (appropriate use of '=', '×', '÷', £, g, kg) QWC2: Candidates will be expected to • present work clearly, with words explaining process or steps e.g. state clearly which quantities are being compared AND • make few if any mistakes in mathematical form, spelling, punctuation and grammar and include units in their working QWC1: Candidates will be expected to • present work clearly, with words explaining process or steps OR • make few if any mistakes in mathematical form, spelling, punctuation and grammar, and include units in their working.	M1 A1 E1 QWC2 5	For a correct method to compare two quantities For a numerically correct answer to their calculation Accept approximations for all marks e.g. £6 buys 6 x 170g = 1020g So £6 buys about 1 kg, not £4 QWC2 Presents relevant material in a coherent and logical manner, using acceptable mathematical form, and with few if any errors in spelling, punctuation and grammar. QWC1 Presents relevant material in a coherent and logical manner but with some errors in use of mathematical form, spelling, punctuation or grammar OR evident weaknesses in organisation of material but using acceptable mathematical form, with few if any errors in spelling, punctuation and grammar. QWC0 Evident weaknesses in organisation of material, and errors in use of mathematical form, spelling, punctuation or grammar. A final unsupported statement only gets QWC0
7. Angle of 35° drawn in correct place AT drawn 7 cm long OR a point T marked 7 cm from A	B1 B1 2	Use overlay ± 2° ± 2 mm
8. 32.8 ÷ 8 (= 4.1) (4.1) × 3 12.3 (g)	M1 M1 A1 3	OR 32.8 × 3 (= 98.4) (98.4) ÷ 8 CAO

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2015 January UNIT 2 (non-calculator) Foundation Tier	Mark	Final Mark Scheme Comments
9. 1 – (0·3 + 0·15) 0·55	M1 A1 2	If M0A0 then SC1 for (1 – 0·18 =) 0·82
10. Enlargement scale factor 3	B2 2	B1 for at least 3 lines correct B1 for consistent use of wrong scale factor
11. (a) 5x = 45 x = 9 (b) (i) – 1 and 7 (ii) Suitable axes drawn and labelled with *x*, *y* and numbers 2 or 3 points plotted correctly, with no incorrect points plotted Correct straight line drawn	 B1 B1 B1 B1 P1 L1 6	Accept embedded answer. FT 'their 5x = a'. Integer answers must be expressed as integers. FT 'their table' CAO. L1 implies P1.
12. (∠ *BAE* =) 180(°) – 108(°) – 33(°) or equivalent = 39(°) (*x* =) 60(°) – 39(°) = 21(°)	 M1 A1 M1 A1 4	 Check diagram for sight of 39(°) FT 'their angle *BAE*' (provided < 60°) ALTERNATIVE SOLUTION e.g. Angle *CBA* = 120(°) (interior angles) Angle *CBD* = 120(°) – 33(°) = 87(°) M1 Angle *BDA* = 87(°) (alternate angles) A1 Angle *AED* = 72(°) (straight line) (*x* =) 180(°) – 72(°) – 87(°) M1 = 21(°) A1
13. Correct translation	B1 1	
14. (Reduced cost of first cottage =) 620×0.85 OR 620 – 620×0.15 OR 620 – 93 (= £)527 (Cost of second cottage =) (=£)69× 7 (= £)483 Considers £60 cancellation charge in an appropriate calculation Interpretation: e.g. 'No, more expensive to pay for the second cottage'	 M1 A1 M1 A1 S1 E1 6	 Or equivalent full method Complete method for finding 69 × 7 CAO e.g. 'their 527' – 60 (= 467) or 'their 483' + 60 (= 543) (either 483 > 467 or 543 > 527) FT for a correct conclusion from 'their numbers'. Award of E1 depends on at least M1 and S1, no error in adding or subtracting 60, and no error in finding a price difference.

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2015 January UNIT 2 (non-calculator) Foundation Tier	Mark	Final Mark Scheme Comments
15(a) (30) (40) (50) **15 18 20** **15 18 20** **30 40 50** **0.5 0.45 0.4**	B1 B1 B1	CAO FT their cumulative 1st line, provided fractions are < 1, and denominators are 30, 40, 50. FT their cumulative fractions as decimals, provided< 1, with accuracy to 2 d.p. where appropriate.
(b) All 5 points plotted correctly	P2	FT for their decimals (provided < 1). Ignore joining points, tolerance should show intention to be on grid lines. P1 for 3 or 4 points plotted accurately, must be from cumulative results. Do not award if bars are drawn (unless with points plotted).
(c) 'No' with reason e.g. best estimate of the probability is 0•4, or final relative frequency value is 0.4	E1 6	FT their final column entry in (a), fraction or decimal, provided final entry < 1. E0 for e.g. only 2 of the 5 trials gives a result less than 0·5.
16. 200 (seconds) AND 168 (seconds) OR sight of 32 (seconds)	B1	Both times correct OR correct time difference.
[200 – 168] ÷ 200 (× 100%) OR [1 – 168/200] (× 100%) OR equivalent method.	M1	FT from 'their times' (with at least one correct).
16%	A1 3	

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UNIT 2 - HIGHER TIER

January 2015 Unit 2 Higher Tier	Mark	Final Mark Scheme Comment
1. $4x + 4 = 3$ $4x = -1$ $x = -1/4$ or $-0{\cdot}25$	B1 B1 B1 3	Correctly expanding brackets (FT until 2nd error). Collecting terms. Do not accept 1/−4. Mark final answer. Accept embedded answer.
2. (Reduced cost of first cottage =) 620×0.85 OR $620 - 620 \times 0.15$ OR $620 - 93$ (= £)527 (Cost of second cottage =) (= £)69×7 (= £)483 Considers £60 cancellation charge in an appropriate calculation. Interpretation: e.g. 'No, more expensive to pay for the second cottage'. Look for: • accuracy of spelling • clarity of labels • correct units shown (£) • the use of notation (appropriate use of "=", "+", "−", "x"). QWC2: Candidates will be expected to • present work clearly, with words explaining process or steps AND • make few if any mistakes in mathematical form, spelling, punctuation and grammar and include units in their final answer. QWC1: Candidates will be expected to • present work clearly, with words explaining process or steps OR • make few if any mistakes in mathematical form, spelling, punctuation and grammar and include units (£) in their final answer.	M1 A1 M1 A1 S1 E1 QWC 2 8	Or equivalent full method. Complete method for finding 69×7. CAO e.g. 'their 527' − 60 (= 467) or 'their 483' + 60 (= 543) (either 483 > 467 or 543 > 527) FT for a correct conclusion from 'their numbers'. Award of E1 depends on at least M1 and S1, no error in adding or subtracting 60, and no error in finding a price difference. QWC2 Presents relevant material in a coherent and logical manner, using acceptable mathematical form, and with few if any errors in spelling, punctuation and grammar. QWC1 Presents relevant material in a coherent and logical manner but with some errors in use of mathematical form, spelling, punctuation or grammar OR evident weaknesses in organisation of material but using acceptable mathematical form, with few if any errors in spelling, punctuation and grammar. QWC0 Evident weaknesses in organisation of material, and errors in use of mathematical form, spelling, punctuation or grammar.
3. (a) Correct rotation. (b) Correct translation.	B2 B1 3	B1 for clockwise rotation about (0, 1) OR anticlockwise rotation about (1, 0) OR 2 correct vertices. Clear intention shown.

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January 2015 Unit 2 Higher Tier	Mark	Final Mark Scheme Comment
4. (Angle *BAE* =) 180(°) – 108(°) – 33(°) or equivalent = 39(°) (*x* =) 60(°) – 39(°) = 21(°)	M1 A1 M1 A1 4	Check diagram for sight of 39(°). FT 'their angle *BAE*' (provided < 60°) ALTERNATIVE SOLUTION e.g. Angle *CBA* = 120(°) (interior angles) Angle *CBD* = 120(°) – 33(°) = 87(°) M1 Angle *BDA* = 87(°) (alternate angles) A1 Angle *AED* = 72(°) (straight line) (*x* =) 180(°) – 72(°) – 87(°) M1 = 21(°) A1
5. (a) $8x + 12 – 3x – 6$ $= 5x + 6$ (b) $10n – 7$ (c) $4x > 2$ $x > ½$ (or $x > 2/4$)	B1 B1 B2 B1 B1 6	Correctly removing brackets. Collecting terms. FT for one error only. Mark final answer. B1 for sight of $10n$ FT from $4x > a$. Mark final answer. B0 for use of = sign, unless replaced in final answer.
6. (a) (30) (40) (50) **15 18 20** **15/30 18/40 20/50** **0·5 0·45 0·4** (c) All 5 points plotted correctly. (d) 'No' with reason e.g. best estimate of the probability is 0·4, or final relative frequency value is 0·4.	 B1 B1 B1 P2 E1 6	 CAO FT their cumulative 1st line, provided fractions are < 1, and denominators are 30, 40, 50. FT their cumulative fractions as decimals, provided < 1, with accuracy to 2 d.p. where appropriate. FT for their decimals (provided < 1). Ignore joining points, tolerance should show intention to be on grid lines. P1 for 3 or 4 points plotted accurately, must be from cumulative results. Do not award if bars are drawn (unless with points plotted). FT their final column entry in (a), fraction or decimal, provided final entry < 1. E0 for e.g. only 2 of the 5 trials gives a result less than 0·5.
7. 200 (seconds) AND 168 (seconds) OR sight of 32 (seconds) [200 – 168] ÷ 200 (× 100%) OR [1 – 168/200] (× 100%) OR equivalent method. 16%	B1 M1 A1 3	Both times correct OR correct time difference. FT from 'their times' (with at least one correct).
8. (a) $9·7 \times 10^{-5}$ (b) $4·78 \times 10^{9}$	B1 B1 2	
9. Sight of $y = 4x + 5$ for 2nd line OR finding both gradients Statement that 'gradient = 4' for both AND 'Yes'.	B1 B1 2	Equations must be correctly re-arranged. Allow statement that 'gradients are equal' provided 4 already seen. Allow second B1 after 1 error in re-arranging (provided no error in finding coefficient of *x*). (Award B0 for an unsupported statement of 'equal gradients'.)

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January 2015 Unit 2 Higher Tier	Mark	Final Mark Scheme Comment
10. b + 4c = 310, 2b + 3c = 345 Method to find first variable Correct first variable Correct second variable (£)455 AND 'No'	B1 M1 A1 A1 B1 5	Strategy of forming a pair of equations. (Do not penalise for not defining variables.) FT for equations of equivalent difficulty. b = (£)90, c = (£)55 OR (£)345 + 2×(£)55. FT 'their first variable' for second A1. FT 'their derived b anc c'. An unsupported answer gets 0 marks.
11. (a) All correct entries. (b) Sight of $\frac{1}{5} \times \frac{1}{3}$ or $\frac{4}{5} \times \frac{2}{3}$ $\frac{1}{5} \times \frac{1}{3} + \frac{4}{5} \times \frac{2}{3}$ = 9/15 (= 3/5)	B2 B1 M1 A1 5	B1 for three correct entries. FT from their tree, probabilities must be < 1 but not equal to ½ .
12. $5h + 3k = 2h + 8$ $5h - 2h = 8 - 3k$ $3h = 8 - 3k$ $h = (8 - 3k)/3$ or equivalent	B1 B1 B1 B1 4	Includes correct expansion. FT until 2nd error. Mark final answer.
13. (a) (Angle *COA* =) 2 × 67(°) (= 134°) [180(°) – 134(°)] / 2 or equivalent (Angle *OAC* =) 23(°) (b) 36(°) Alternate segment theorem	M1 M1 A1 B1 E1 5	Check diagram. FT 'their angle *COA*'. Accept a correctly worded equivalent e.g. 'the angle between a tangent and a chord is equal to the angle in the alternate segment'. E1 is dependent on B1 having been awarded.
14. (a) $x = 0{\cdot}2747474.....$ $100x = 27{\cdot}47474.....$ with an attempt to subtract 272/990 or 136/495 (b) (i) 1 (ii) 1/9 or $0{\cdot}111\ldots$ (c) $25 + 15\sqrt{2} - 15\sqrt{2} - 18$ or equivalent = 7	M1 A1 B1 B2 M1 A1 7	Or 10*x* and 1000*x*, or equivalent. Or an alternative method. An answer of 27·2/99 gains M1 only. Mark final answer. Do not ignore incorrect cancelling. B1 for 9^{-1} or $1/3^2$ or $1/_3\sqrt{729}$or $1/729^{1/3}$ or $(1/729)^{1/3}$ or $_3\sqrt{(1/729)}$ Mark final answer. Do not ignore subsequent working. If no marks awarded, SC1 for 3 of the 4 terms correct. NB $25 + \sqrt{30} - \sqrt{30} - 18 = 7$ counts as 2 errors and gets 0 marks.
15. (a) Sketch with reflection in *x*-axis. Vertex must touch the *x* axis. (b) Sketch with horizontal compression towards y-axis. Must pass through (0,1).	B1 B1 2	Clear intention shown (to draw curve of same size and shape). Must be a convex curve. Clear intention shown. Must be a convex curve.

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Surname	Centre Number	Candidate Number
Other Names		0

GCSE

4352/02

A14-4352-02

MATHEMATICS (UNITISED SCHEME)
UNIT 2: Non-Calculator Mathematics
HIGHER TIER

A.M. FRIDAY, 7 November 2014

1 hour 15 minutes

CALCULATORS ARE NOT TO BE USED FOR THIS PAPER

ADDITIONAL MATERIALS

A ruler, a protractor and a pair of compasses may be required.

INSTRUCTIONS TO CANDIDATES

Use black ink or black ball-point pen.

Write your name, centre number and candidate number in the spaces at the top of this page.

Answer **all** the questions in the spaces provided.

Take π as 3·14.

INFORMATION FOR CANDIDATES

You should give details of your method of solution when appropriate.

Unless stated, diagrams are not drawn to scale.

Scale drawing solutions will not be acceptable where you are asked to calculate.

The number of marks is given in brackets at the end of each question or part-question.

You are reminded that assessment will take into account the quality of written communication (including mathematical communication) used in your answer to question **2**.

For Examiner's use only		
Question	**Maximum Mark**	**Mark Awarded**
1.	**2**	
2.	**7**	
3.	**2**	
4.	**3**	
5.	**5**	
6.	**6**	
7.	**5**	
8.	**5**	
9.	**4**	
10.	**3**	
11.	**6**	
12.	**3**	
13.	**6**	
14.	**6**	
15.	**2**	
Total	**65**	

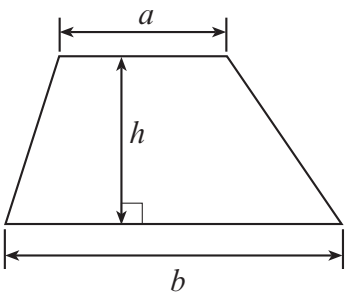
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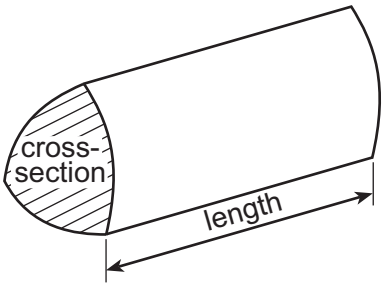
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Formula List

Area of trapezium $= \frac{1}{2}(a + b)h$

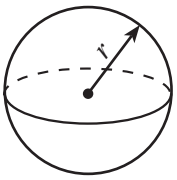


Volume of prism = area of cross-section × length



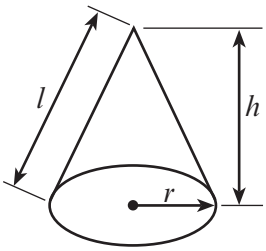
Volume of sphere $= \frac{4}{3}\pi r^3$

Surface area of sphere $= 4\pi r^2$



Volume of cone $= \frac{1}{3}\pi r^2 h$

Curved surface area of cone $= \pi rl$

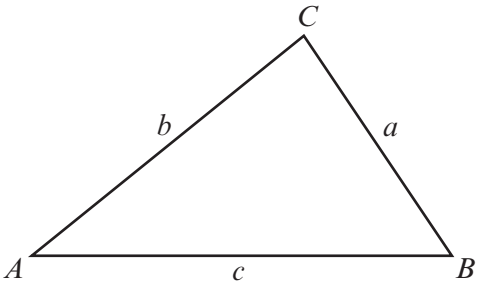


In any triangle ABC

Sine rule $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

Cosine rule $a^2 = b^2 + c^2 - 2bc\cos A$

Area of triangle $= \frac{1}{2}ab\sin C$



The Quadratic Equation

The solutions of $ax^2 + bx + c = 0$

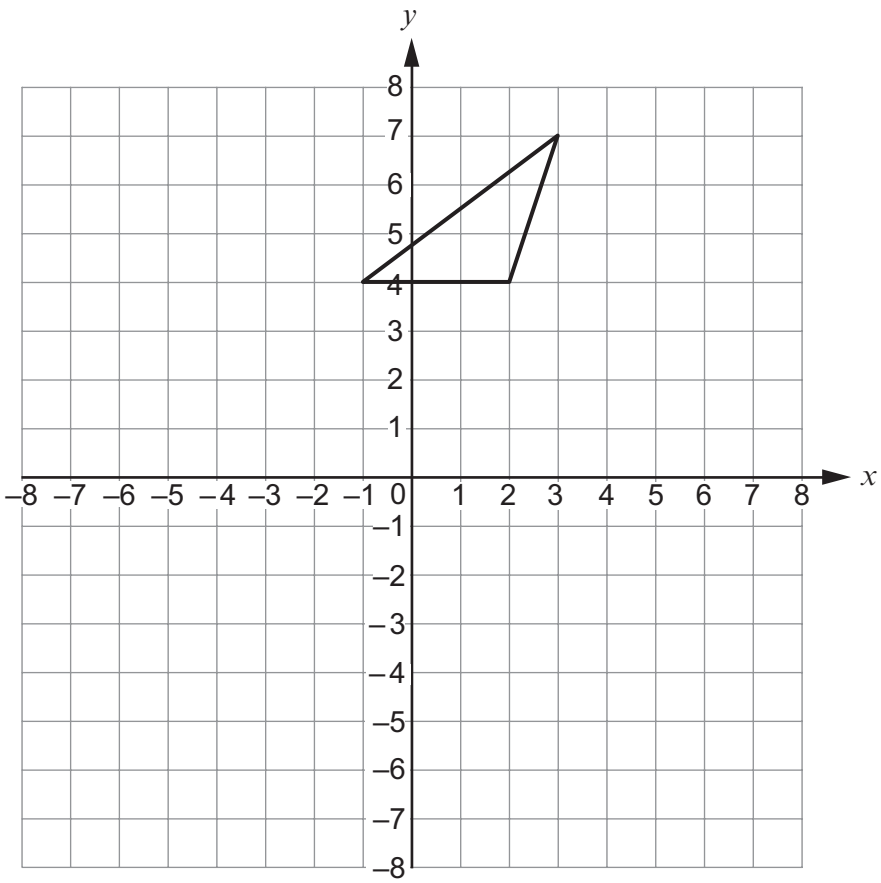
where a, b and c are given by $x = \frac{-b \pm \sqrt{(b^2 - 4ac)}}{2a}$

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Examiner only

1. Reflect the given triangle in the line $y = 3$. [2]

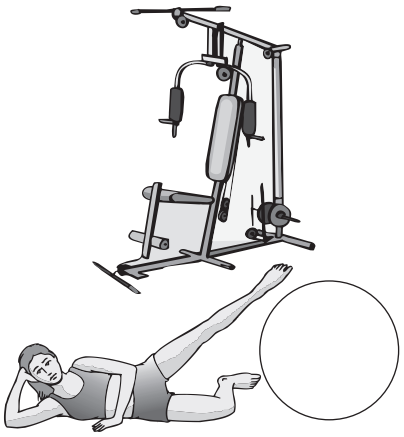


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2. *You will be assessed on the quality of your written communication in this question.*



Sadie wants to join a fitness club for one year.
Two types of membership are available.

Basic Membership	**Elite Membership**
£32 per month	£60 per month
Special offer: Pay for 10 months in a single payment and get membership for a whole year	Special offer: 10% off when you pay for a whole year in a single payment
Exercise class: £4 per class	All classes included

Sadie wants to take part in two exercise classes per week for the 52 weeks of the year.

Sadie decides to pay for a whole year's membership in a single payment.
Which type of membership is cheaper?
By how much is it cheaper?
You must show **all** your working. [7]

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3. Find the size of each of the angles x and y in the diagram below. [2]

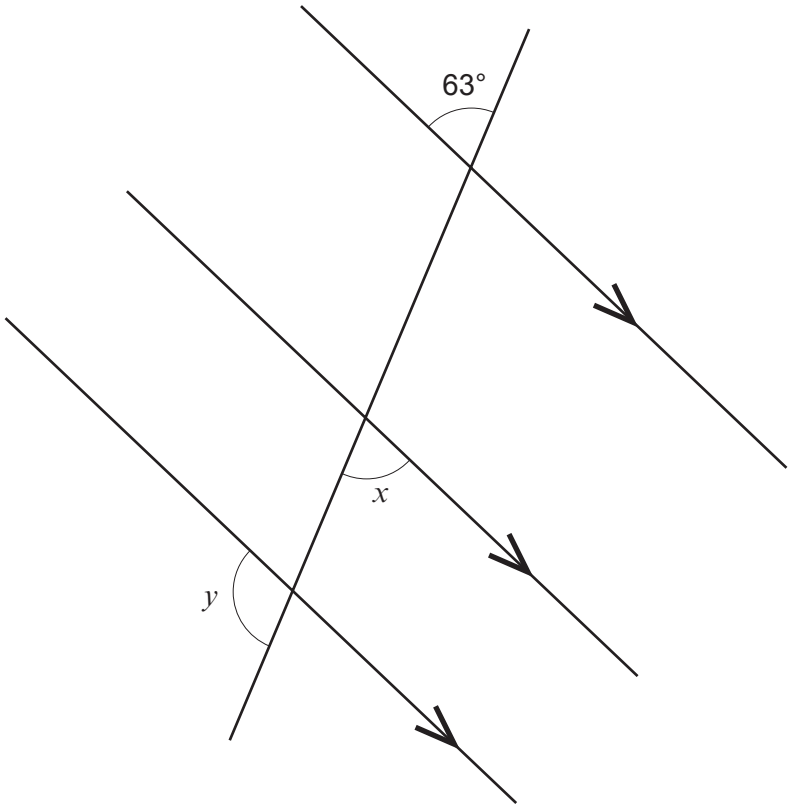


Diagram not drawn to scale

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x = ... ° y = ... °

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4.

DOG FOOD

$\frac{1}{2}$ kg tin for £1.70

1 kg tin for £3.30

2 kg tin for £5.20

Alun is looking after 6 large dogs for one day.

They each need $\frac{3}{4}$ kg of tinned dog food every day.

Alun needs to buy food for them and wants to spend as little as possible.

How much will he need to spend on dog food for the day?

You must show **all** your working. [3]

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5. All the angles in the following quadrilateral are measured in degrees.
Find the size of the largest angle. [5]

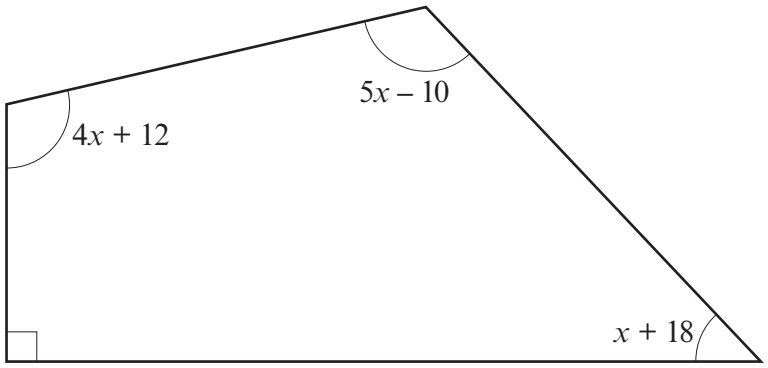


Diagram not drawn to scale

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6. *(a)* (i) Solve the inequality. [2]

$$6p < 4p - 7$$

(ii) An integer p satisfies the above inequality.
Write down the greatest possible value of p. [1]

(b) Simplify $5(3x + 2) - 4(2x - 5)$. [2]

(c) Write down the value of the reciprocal of 0·01. [1]

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Turn over.

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7. A children's game uses a circular spinner, which is coloured black and white.
A diagram of the spinner is shown below.

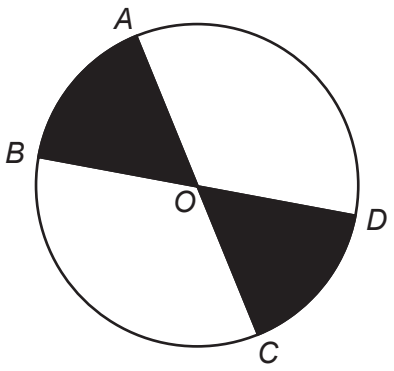


Diagram not drawn to scale

AC and *BD* are diameters of the circle. $A\hat{O}B = 54°$.

(a) Find the probability that the spinner lands on a **black** sector. [2]

(b) The spinner is spun 720 times. How many times would you expect the spinner to land on a **white** sector? [3]

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8. *(a)* Write down an expression for the nth term of the following sequence. [2]

5, 12, 19, 26, 33, ...

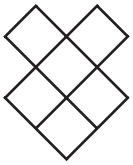
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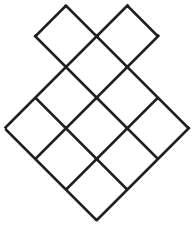
nth term .....

(b) The following patterns are made using small squares.

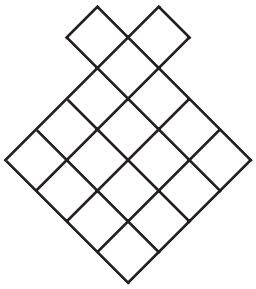
Pattern 1



Pattern 2



Pattern 3



Find the number of small squares in pattern n. [3]

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Turn over.

Examiner only

9. Solve the following simultaneous equations using an algebraic method.
You must show all your working. [4]

$$6x - 3y = 21$$
$$4x + 5y = 7$$

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10. A giant crane on a construction site can carry a maximum load of $1{\cdot}32 \times 10^6$ kg.
The crane is required to lift concrete blocks, each weighing 400 kg.
What is the greatest number of concrete blocks that the crane can lift each time?
Give your answer in standard form. [3]

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11. *(a)* Expand and simplify $(2x + y)(5x - 2y)$. [2]

(b) Solve the following equation. [4]

$$\frac{2x - 1}{3} + \frac{1}{2} = \frac{x - 5}{6}$$

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12. The points *A*, *B*, *C* and *D* lie on the circumference of a circle, centre *O*, and *AB* = *AD*.

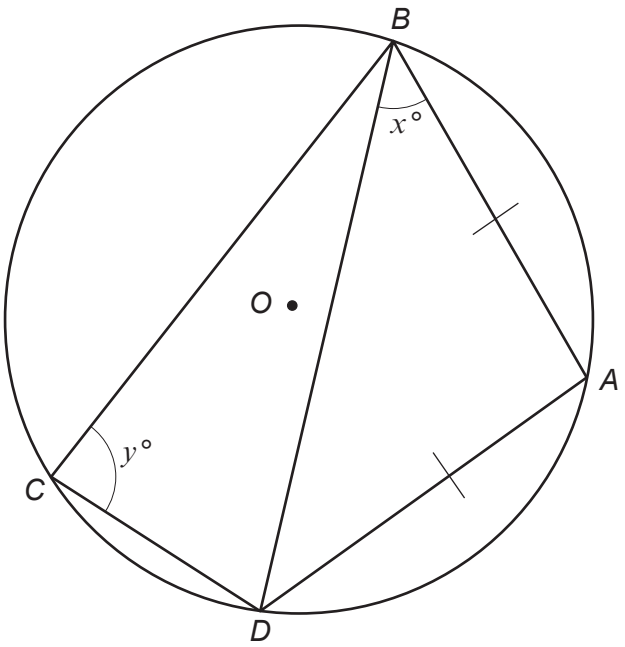


Diagram not drawn to scale

Prove that $y = 2x$.
You must include written reasons in your answer. [3]

Examiner only

13. *(a)* Evaluate $4^0 + \left(\frac{1}{25}\right)^{\frac{1}{2}}$. [3]

(b) Evaluate $\left(\sqrt{32} - \sqrt{2}\right)^2$ and state whether your answer is rational or irrational. [3]

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14. A box contains 5 red balls, 1 green ball and 6 pink balls.
Two balls are to be picked at random, without replacement.

(a) Find the probability of picking 1 red ball and 1 green ball. [3]

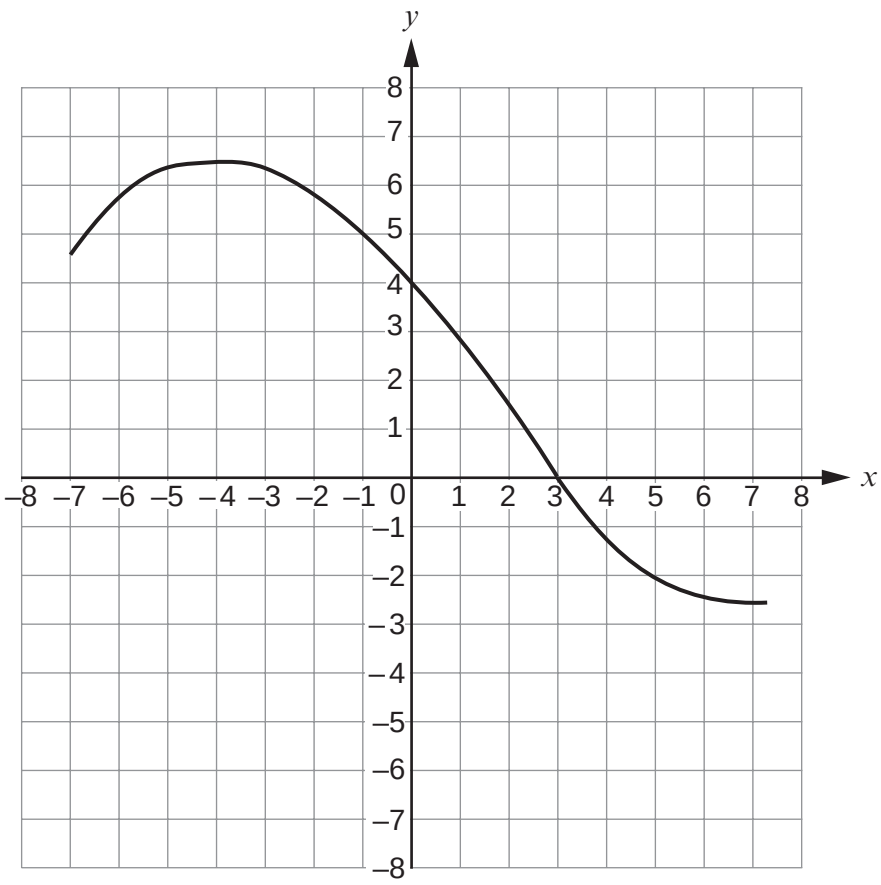
(b) Find the probability of picking at least one red ball. [3]

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15. The graph below shows a sketch of the curve $y = f(x)$.
On the same diagram, sketch the curve $y = f(-x)$.
You must show clearly where the curve crosses each axis. [2]



END OF PAPER

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GCSE MARKING SCHEME

MATHEMATICS - UNITISED

NOVEMBER 2014

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INTRODUCTION

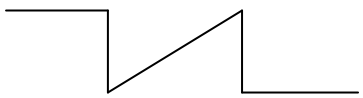
The marking schemes which follow were those used by WJEC for the November 2014 examination in GCSE MATHEMATICS - UNITISED. They were finalised after detailed discussion at examiners' conferences by all the examiners involved in the assessment. The conferences were held shortly after the papers were taken so that reference could be made to the full range of candidates' responses, with photocopied scripts forming the basis of discussion. The aim of the conferences was to ensure that the marking schemes were interpreted and applied in the same way by all examiners.

It is hoped that this information will be of assistance to centres but it is recognised at the same time that, without the benefit of participation in the examiners' conferences, teachers may have different views on certain matters of detail or interpretation.

WJEC regrets that it cannot enter into any discussion or correspondence about these marking schemes.

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UNIT 2 - FOUNDATION TIER

GCSE Mathematics - Unitised Unit 2 (non calculator) Foundation Tier November 2014	Mark	Final Mark Scheme Comments
1. (a) (i) three hundred and forty six thousand, one hundred	B1	
(ii) 42604	B1	
(b) 1122	B1	
(c) 32 (p)	B1	
(d) 57	B1	
(e) 1, 3, 5, 15	B2	B1 for any 2 correct and no incorrect factors OR 3 correct and no more than 1 incorrect OR all 4 correct and 1 incorrect
(f) 56	B1	
(g) 6 ³ 20	M1	Accept 6 ³ 21 or 6 ³ 22
(=) 120	A1	126, 132 M0 A0 for 6 ³ 21Ø = 130.8
	10	
2. (a) perpendicular	B1	
(b) (i) straight line drawn joining 2 points on circumference passing through centre	B1	
(ii) straight line touching circumference	B1	
(c) 	B1	Intention of one horizontal line of the correct length in the correct position
	4	
3.(a) 38	B1	
(b) - 15	B1	
(c) (i) (x =) 33	B1	Accept embedded answers
(ii) (x=) 100	B1	
(iii) 4x = 36	B1	
(x =) 9	B1	FT x = 'their 36'/4 Do not accept a final answer of 36/4.
	6	
4.(a) likely	B1	
(b) 10/127	B1	
(c) 6 triangles shaded	B1	
	3	
5. (1000 · 200) 5 (packets)	B1	
5 ³ (£)3.50	M1	FT 'their 5' if 1000· 200 or equivalent seen.
(£) 17.50	A1	
	3	

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GCSE Mathematics - Unitised Unit 2 (non calculator) Foundation Tier November 2014	Mark	Final Mark Scheme Comments
6. 6:38 (pm. Put in oven.) 7:13 (pm. Remove from oven and stir. Replace in oven.) 7:28 (pm. Remove from oven.) (7:30 pm. Serve)	B1 B1 B1	Do not penalise additional time added for removing from oven, stirring etc *Alternative method:* *Times given with gaps of* *35 minutes B1* *15 minutes B1* *2 minutes AND finish at 7:30 pm B1*
QWC: Look for ¶ relevance of work shown ¶ generally correct spelling ¶ clarity of text explanation ¶ correct use of notation for time QWC2: Candidates will be expected to ¶ present work clearly, with words explaining process or steps e.g. show calculations with times given in the question AND ¶ make few if any mistakes in mathematical form, spelling, punctuation and grammar and include units in their working (include p.m. and = when appropriate) QWC1: Candidates will be expected to ¶ present work clearly, with words explaining process or steps OR ¶ make few if any mistakes in mathematical form, spelling, punctuation and grammar, and include units in their working.	QWC 2 5	QWC2 Presents relevant material in a coherent and logical manner, using acceptable mathematical form, and with few if any errors in spelling, punctuation and grammar. QWC1 Presents relevant material in a coherent and logical manner but with some errors in use of mathematical form, spelling, punctuation or grammar OR evident weaknesses in organisation of material but using acceptable mathematical form, with few if any errors in spelling, punctuation and grammar. QWC0 Evident weaknesses in organisation of material, and errors in use of mathematical form, spelling, punctuation or grammar. Final unsupported statements only gets QWC0

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GCSE Mathematics - Unitised Unit 2 (non calculator) Foundation Tier November 2014	Mark	Final Mark Scheme Comments
7. Pencil 40p or (£)(0).40 Biro 60p or (£)(0).60 Ruler 80p or (£)(0).80 Rubber 25p or (£)(0).25	B1 B1 B1 B1 4	 FT 'their pencil' FT 'their pencil and biro' FT 'their pencil and biro and ruler'
8. Attempt to set up list of all ordered pairs, possibly given as a list or in a table. 3 | 3 | 5 | 7 3 | 9 | 15 | 21 5 | 15 | 25 | 35 7 | 21 | 35 | 49 All nine possible correct scores, including repeated values OR all nine ordered pairs with no incorrect scores (P(16 < score < 36) =) 5/9	M1 A1 A2 4	At least 4 ordered pairs needed. Ordered pairs: 3,3 3,5 3,7 5,3 5,5 5,7 7,3 7,5 7,7 FT 'their table or list of 9 scores' for possible A2. Otherwise, FT for maximum of: A1 for a numerator of 5 in a fraction less than 1. A1 for a denominator of 9 in a fraction less than 1. Do not penalise incorrect reduction of fractions from a FT. **NB** Penalise - 1 for use of words such as '5 out of 9', '5 in 9' or '5:9'. When both fraction and wrong notation seen, DO NOT penalise wrong notation.
9. (Ï ACB = 180 - 136 =) 44(¯) (x =) 180 - 2 ³ 44 OR (x =) 136 – 44 (x =) 92 (¯)	B1 M1 A1 3	FT 'their 44'
10. (£)5.10 - 2 ½ ³ (£)1.20 (£)2.10 210 · 30 OR 2.1(0) · 0.3(0) 7 (oranges)	M1 A1 M1 A1 4	Complete method FT 'their (£)2.10'
(a) 11. Correct reflection	B2 2	B1 for a reflection in any horizontal line or in $x = 3$ or sight of the line $y = 3$

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GCSE Mathematics - Unitised Unit 2 (non calculator) Foundation Tier November 2014	Mark	Final Mark Scheme Comments
12. Basic Membership (Total cost for basic membership =) 10 × (£)32 + (£)4 × 2 × 52 or equivalent (Total cost for basic membership =) (£)736	 M1 A1	 A complete correct method Correct total for basic membership If no marks for 'basic membership calculation', award for SC1 for sight of (12 × (£)32 + (£)4 × 2 × 52 =) (£)800 OR award SC1 for (10 × (£)32 + (£)4 × 52 =) (£)528
Elite Membership (Total cost for elite membership =) 12 ×[(£)60 – 0·1 × (£)60] or equivalent (Total cost for elite membership =) (£)648	 M1 A1	 A complete correct method Correct total for elite membership SC1 for sight of (£)54 or (£)72 if 2nd M0A0
Conclusion that Elite Membership is cheaper AND by (£)88	B1 5	FT only if both M marks were awarded OR if first SC and second M marks were awarded.
13. 6 × ¾ (= 18/4) 4 ½ (kg) (Requires 2 × 2(kg) tins and 1× ½ (kg) tin) (2 × (£)5.20 + 1 × (£)1.70) (£)12.10	M1 A1 A1 3	Accept ¾ + ¾ + ¾ + ¾ + ¾ + ¾. FT 'their 4½' provided of equivalent difficulty If no marks, award SC1 for at least two correct costings of combinations (with at least 1 involving 2 or 3 sizes of tin and at least 1 involving a multiple).
14. (a) $7n$ - 2 (b) $20x^5$	B2 B2 4	B1 for $7n \pm$ ..... or equivalent. B1 for $20x^m$ or nx^5 where m is an integer and m ¸ 0 or 1; n is an integer and n ¸ 0.
15. (a) 108/360 or equivalent (e.g. 3/10)	B2	B1 for numerator of 108 or denominator of 360 in a fraction < 1 Mark final answer.
(b) Sight of 1 - 3/10 (= 7/10) or equivalent 7/10 ³ 720 504	M1 m1 A1	FT 'their 3/10' (but not for an answer of 1/2). If 0 marks, SC1 for sight of 216. *Alternative method:* *3/10 ³ 720 (=216) M1 FT 'their 3/10'* *720 - 216 m1* *504 A1*
	5	

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UNIT 2 - HIGHER TIER

GCSE Mathematics - Unitised Unit 2 Higher Tier November 2014	Mark	Final Mark Scheme Comments
(b) 1. Correct reflection	B2 2	B1 for a reflection in any horizontal line or in $x = 3$ or sight of the line $y = 3$
2. <u>Basic Membership</u> (Total cost for basic membership =) 10 × (£)32 + (£)4 × 2 × 52 or equivalent (Total cost for basic membership =) (£)736	 M1 A1	 A complete correct method. Correct total for basic membership. If no marks for 'basic membership calculation', award for SC1 for sight of (12 × (£)32 + (£)4 × 2 × 52 =) (£)800 OR award SC1 for (10 × (£)32 + (£)4 × 52 =) (£)528
<u>Elite Membership</u> (Total cost for elite membership =) 12 ×[(£)60 – 0·1 × (£)60] or equivalent (Total cost for elite membership =) (£)648	 M1 A1	 A complete correct method. Correct total for elite membership. SC1 for sight of (£)54 or (£)72 if 2nd M0A0.
Conclusion that Elite Membership is cheaper AND by (£)88	B1	FT only if both M marks were awarded OR if first SC and second M marks were awarded.
Look for ¶ relevance ¶ spelling in at least 1 statement/sentence ¶ clarity of text explanations, ¶ the use of notation (watch for the use of '=', £, % being appropriate) A clear conclusion statement must be made before QWC2 can be awarded. Count incorrect use of '=' in situations such as '4 × 2 × 52 = 416 + 320' within the 'few errors in mathematical form' QWC2: Candidates will be expected to ¶ present work clearly, with words explaining process or steps AND ¶ make few if any mistakes in mathematical form, spelling, punctuation and grammar and include units (£) in their final answer QWC1: Candidates will be expected to ¶ present work clearly, with words explaining process or steps OR ¶ make few if any mistakes in mathematical form, spelling, punctuation and grammar and include units (£) in their final answer 7	Q W C 2	QWC2 Presents relevant material in a coherent and logical manner, using acceptable mathematical form, and with few if any errors in spelling, punctuation and grammar. QWC1 Presents relevant material in a coherent and logical manner but with some errors in use of mathematical form, spelling, punctuation or grammar OR evident weaknesses in organisation of material but using acceptable mathematical form, with few if any errors in spelling, punctuation and grammar. QWC0 Evident weaknesses in organisation of material, and errors in use of mathematical form, spelling, punctuation or grammar. A final unsupported statement only gets QWC0.
(c) 3. (a =) 63 (°) (b =) 117 (°)	B1 B1 2	FT 180 - 'their a'.

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GCSE Mathematics - Unitised Unit 2 Higher Tier November 2014	Mark	Final Mark Scheme Comments
4. $6 \times \frac{3}{4}$ (= 18/4) 4 ½ (kg) (Requires 2 × 2 (kg) tins and 1 × ½ (kg) tin) (2 × (£)5.20 + 1 × (£)1.70 =) (£)12.10	M1 A1 A1 3	Accept ¾ + ¾ + ¾ + ¾ + ¾ + ¾. FT 'their 4 ½' provided of equivalent difficulty. If no marks, award SC1 for at least two correct costings of combinations (with at least 1 involving 2 or 3 sizes of tin and at least 1 involving a multiple).
5. $[4x + 12 + 5x - 10 + x + 18 + 90](°) = 360(°)$ OR $[4x + 12 + 5x - 10 + x + 18](°) = 270(°)$ $10x = 250(°)$ $x = 25(°)$ Attempt to substitute into either $4x + 12$ or $5x - 10$ (Largest angle =) 115(°)	M1 A1 A1 M1 A1 5	Using the angle sum of a quadrilateral. Accept informal notation throughout. FT until 2nd error provided M1 awarded. If M0, award SC1 for $x = 7(°)$ (from equating angle total to 180º) or for $x = 34(°)$ (from omitting 90º from angle total). Either appropriate substitution attempted. FT 'their x'. All substitutions must be correctly evaluated for the final mark.
6. (a) (i) $2p < -7$ $p < -7/2$ or $p < -3\frac{1}{2}$ or $p < -3.5$ (ii) -4 (b) $15x + 10 - 8x + 20$ $7x + 30$ (c) 100	M1 A1 B1 B1 B1 B1 6	Collecting terms. M0A0 for use of = sign, unless replaced by < ISW FT 'their (i)' (for a negative answer only). Correctly expanding both brackets. FT from 3 correct terms. Mark final answer. Accept 100/1
7. (a) 108/360 or equivalent (e.g. 3/10) (b) Sight of 1 - 3/10 (= 7/10) or equivalent 7/10 ³ 720 504	B2 M1 m1 A1 5	B1 for numerator of 108 or denominator of 360 (or 180) in a fraction < 1. Mark final answer. FT 'their 3/10' (but not for an answer of 1/2). Do not accept 504/720. If no marks, SC1 for sight of 216. *Alternative method:* *3/10 ³ 720 (=216) M1 FT 'their 3/10'* *720 - 216 m1* *504 A1*
8. (a) $7n - 2$ (b) $(n + 1)^2 + 2$ or equivalent	B2 B3 5	B1 for $7n$ (± .....) or equivalent. B2 for $(n + 1)^2 + \ldots$ OR for $(n + k)^2 + 2$, $k \neq 0$ B1 for $(n + k)^2$, $k \neq 0$ OR for $n^2 + 2$ (or B1 for each correct term in $n^2 + 2n + 3$, within a quadratic with more than one term)
9. Method to find the first variable Correct first variable Method to find the second variable Correct second variable	M1 A1 m1 A1 4	Allow one slip but not in equated variable. FT their first variable. ($x = 3$, $y = -1$) An unsupported answer gets 0 marks.
10. 1 320 000 ÷ 400 $3{\cdot}3 \times 10^3$	M1 A2 3	Or equivalent. A1 for equivalent correct answer, not given in standard form, e.g. 3300 or 0.33×10^4 OR A1 for $a \times 10^n$ (with $3 < a < 4$ and n a positive integer) following through from 'their 3300'.

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GCSE Mathematics - Unitised Unit 2 Higher Tier November 2014	Mark	Final Mark Scheme Comments
11. (a) $10x^2 + 5xy - 4xy - 2y^2$ $10x^2 + xy - 2y^2$ or equivalent (b) $2(2x - 1) + 3 = x - 5$ $3x = -6$ $x = -2$	B1 B1 M2 A1 A1 6	 FT from 3 correct terms. M1 for correctly cleared fractions by a valid method for any 2 terms. Collecting terms. FT provided at least M1 awarded.
12. Angle BAD = 180(º) – 2x(º) (angles in an isosceles triangle) Angle BCD = 180(º) – Angle BAD OR 180(º) – [180(º) – 2x(º)] (y) = 2x(º) (opposite angles in a cyclic quadrilateral add up to 180(º))	 B1 B1 B1 3	Check diagram. Allow first B1 without a full reason. Second B1 is for clear use of cyclic quadrilateral. Indication of correct circle theorem in words.
13. (a) 6 (b) (√16 − √2)^2 or $32 - \sqrt{32}\sqrt{2} - \sqrt{32}\sqrt{2} + 2$ $(3\sqrt{2})^2$ or middle term $= \pm 8 \pm 8$ 18 **and** rational	B3 M1 M1 A1 6	B2 for $((1/25)^{-\frac{1}{2}} =)$ 5 OR B2 for $1 + (1/5)^{-1}$ or $1 + 25^{\frac{1}{2}}$ or $1 + \sqrt{25}$ or $1 + 1/0{\cdot}2$ B1 for $(4^0 =)$ 1 OR for $(1/5)^{-1}$ or $25^{\frac{1}{2}}$ or $\sqrt{25}$ RHS method needs 3 of 4 terms correct; accept $\sqrt{64}$ as $\sqrt{32}\sqrt{2}$
14. (a) sight of 5/12 × 1/11 OR 1/12 × 5/11 5/12 × 1/11 + 1/12 × 5/11 OR 5/12 × 1/11 × 2 = 10/132 (= 5/66) (b) 1 – P(no red ball) OR other complete method = 1 – 7/12 × 6/11 (= 1 – 42/132) = 90/132 (= 15/22)	M1 M1 A1 S1 M1 A1 6	 Complete correct method. ISW P(RR) + P(RR') + P(R'R) or P(RR) + P(RW) + P(WR) + P(RG) + P(GR) or correct numerical equivalent. Calculations showing correct sum of products of probabilities (without replacement). ISW
15. Reflection in y axis Curve passes through (0, 4) AND (-3, 0)	B1 B1 2	Clear intention shown. Co-ordinates need not be stated.

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Surname	Centre Number	Candidate Number
Other Names		0

GCSE

4352/02

MATHEMATICS (UNITISED SCHEME)
UNIT 2: Non-calculator Mathematics
HIGHER TIER

A.M. FRIDAY, 13 June 2014

1 hour 15 minutes

CALCULATORS ARE NOT TO BE USED FOR THIS PAPER

ADDITIONAL MATERIALS

A ruler, a protractor and a pair of compasses may be required.

INSTRUCTIONS TO CANDIDATES

Use black ink or black ball-point pen. Do not use gel pen or correction fluid.

Write your name, centre number and candidate number in the spaces at the top of this page.

Answer **all** the questions in the spaces provided.

If you run out of space, use the continuation page at the back of the booklet, taking care to number the question(s) correctly.

Take π as 3·14.

INFORMATION FOR CANDIDATES

You should give details of your method of solution when appropriate.

Unless stated, diagrams are not drawn to scale.

Scale drawing solutions will not be acceptable where you are asked to calculate.

The number of marks is given in brackets at the end of each question or part-question.

You are reminded that assessment will take into account the quality of written communication (including mathematical communication) used in your answer to question **2***(a)*.

For Examiner's use only		
Question	**Maximum Mark**	**Mark Awarded**
1.	**2**	
2.	**8**	
3.	**2**	
4.	**5**	
5.	**3**	
6.	**2**	
7.	**4**	
8.	**6**	
9.	**4**	
10.	**3**	
11.	**4**	
12.	**5**	
13.	**4**	
14.	**6**	
15.	**5**	
16.	**2**	
Total	**65**	

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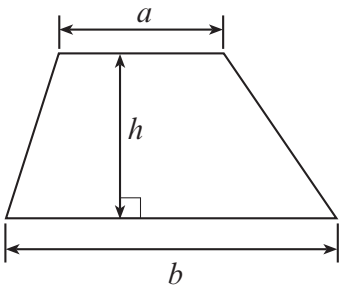
J U N 1 4 4 3 5 2 0 2 0 1

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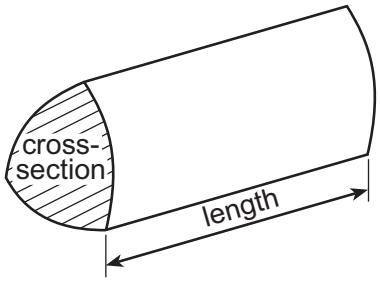
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Formula List

Area of trapezium $\frac{1}{2}(a+b)h$

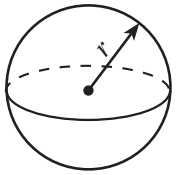


Volume of prism = area of cross-section × length



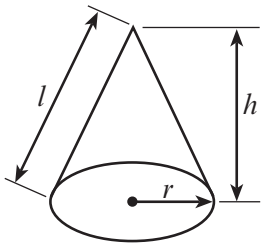
Volume of sphere $\frac{4}{3}\pi r^3$

Surface area of sphere $4\pi r^2$



Volume of cone $\frac{1}{3}\pi r^2 h$

Curved surface area of cone πrl

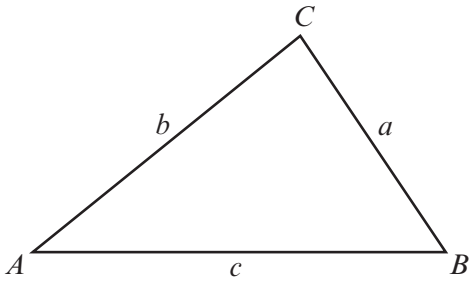


In any triangle ABC

Sine rule $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

Cosine rule $a^2 = b^2 + c^2 - 2bc\cos A$

Area of triangle $\frac{1}{2}ab\sin C$



The Quadratic Equation

The solutions of $ax^2 + bx + c = 0$

where a, b and c are given by

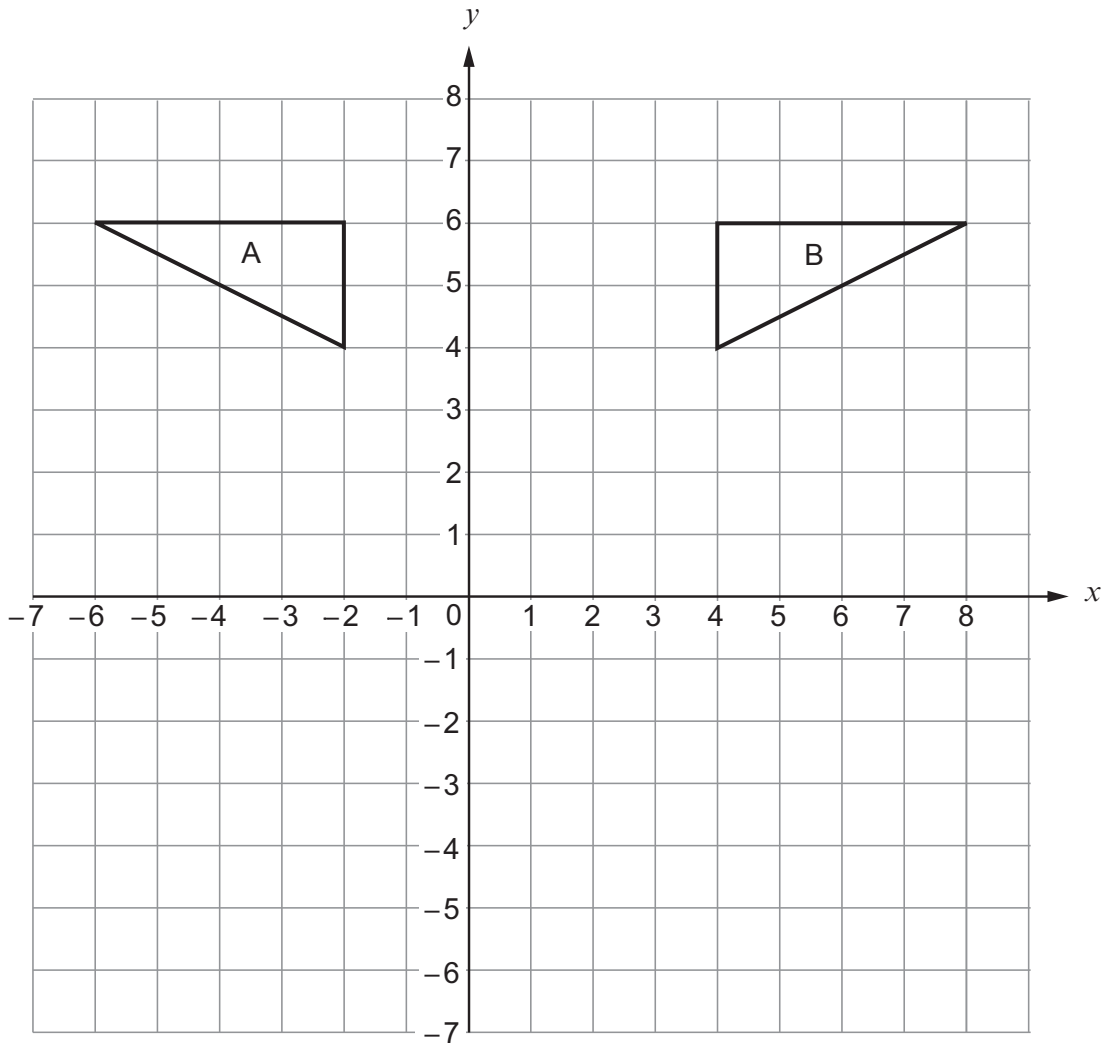
$$x = \frac{-b \pm \sqrt{(b^2 - 4ac)}}{2a}$$

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1. Describe **fully** the transformation which maps triangle A onto triangle B. [2]



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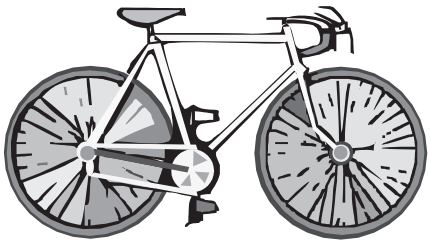
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2. Daniel wants to buy a new bicycle. It is priced at £480.



Daniel can either

- pay £480 immediately, or
- pay a 15% deposit, followed by 24 monthly payments of £22.

(a) *You will be assessed on the quality of your written communication in this part of the question.*

Calculate the total amount Daniel would pay using the deposit and monthly payments method. [5]
You must show all your working.

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(b) Find the percentage increase in the cost of the bicycle when Daniel pays using the deposit and monthly payments method. [3]

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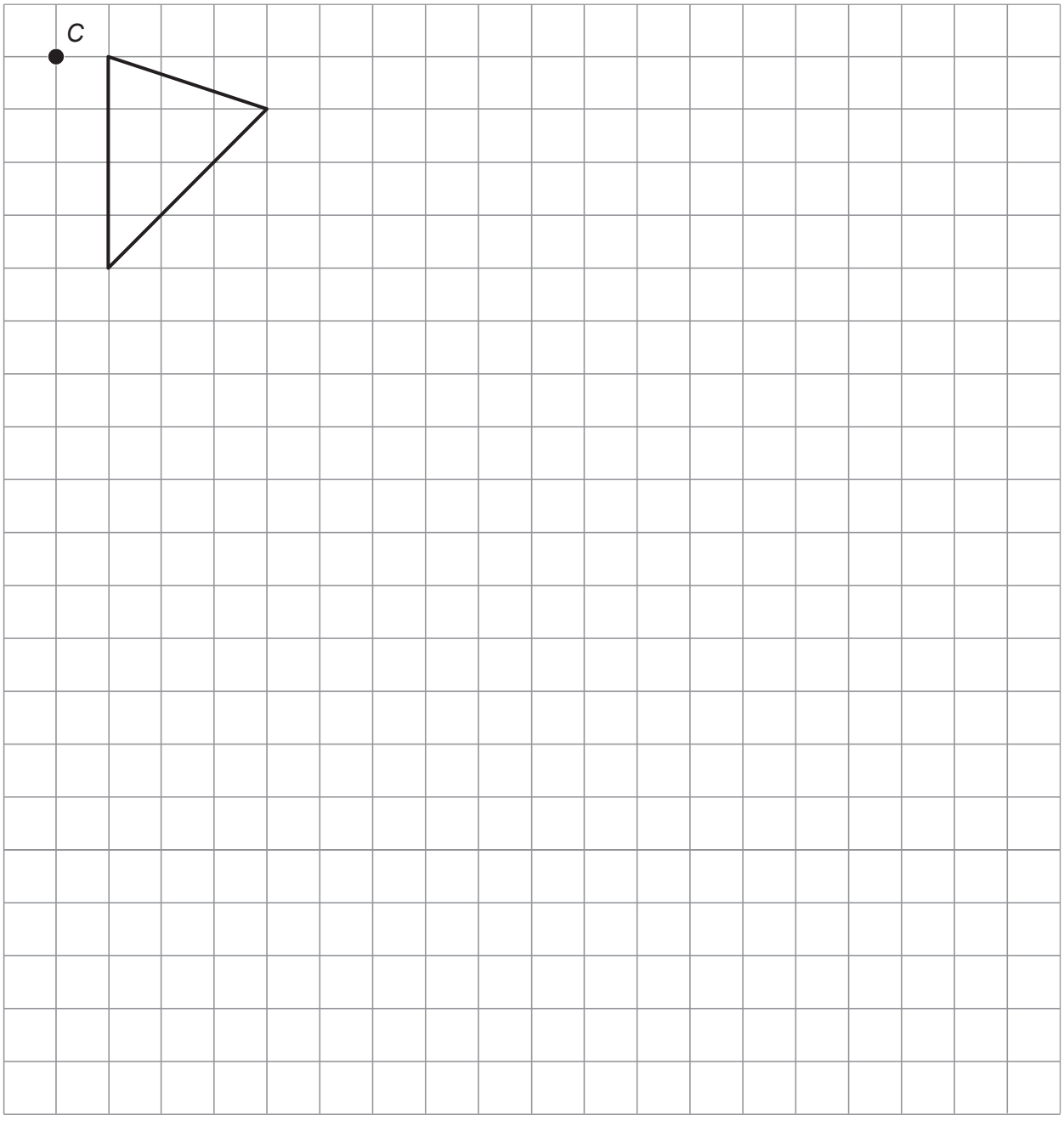
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Turn over.

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3. Enlarge the given triangle, using scale factor 3 and centre *C*. [2]



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4. *ABCD* is a parallelogram. All the angles are measured in degrees.

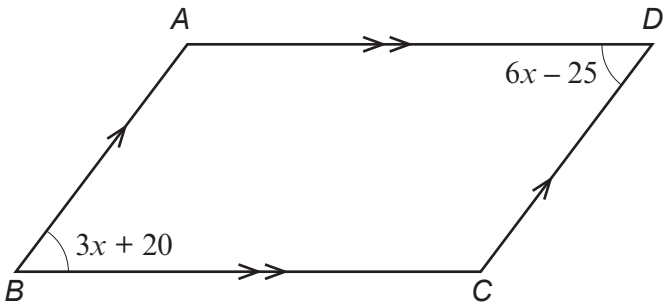


Diagram not drawn to scale

Find the size of $B\hat{C}D$. [5]

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5. Express 126 as a product of prime numbers in index form. [3]

6. Solve the inequality $3 - x < 7$. [2]

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7. Fracton School is organising a Summer Fayre.
Carys is making a spinner for her stall.
A sketch of her spinner is shown below.

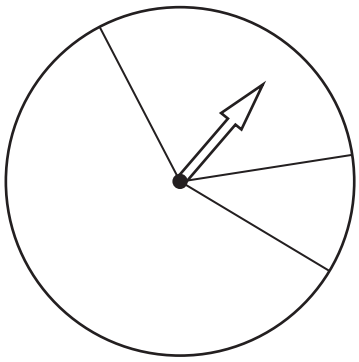


Diagram not drawn to scale

The spinner has three sectors, each to be painted a different colour: red, green or yellow.
The sectors are **not** of equal size.

- The probability that the spinner lands on the green sector is $\frac{1}{10}$.
- The probability that the spinner lands on the yellow sector is twice the probability that the spinner lands on the red sector.

Calculate the angle that the yellow sector makes at the centre of the circle. [4]

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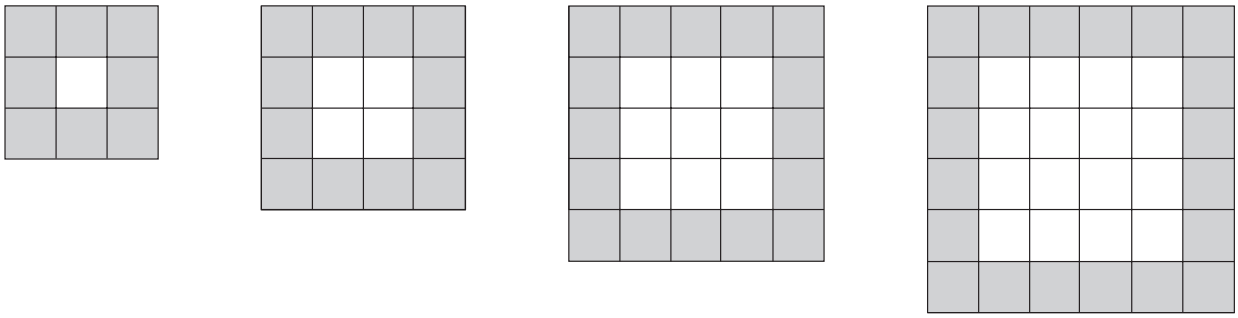
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8. Grey tiles and white tiles are used to form patterns as follows.

Pattern 1 Pattern 2 Pattern 3 Pattern 4



(a) How many **grey** tiles are needed to form pattern n? [3]

(b) A pattern is constructed using exactly 164 **grey** tiles.
Find the number of **white** tiles used in this pattern. [3]

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9. The Evans and Smith families go to the cinema.
The Evans family buys two adult tickets and three child tickets for £31.60.
The Smith family buys one adult ticket and two child tickets for £18.60.

Find the cost of an adult ticket and the cost of a child ticket.
You must use an algebraic method. [4]

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Turn over.

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10. Gethin's blood contains $5{\cdot}97 \times 10^6$ red blood cells per millilitre.
He has 4·02 litres of blood in his body.

Estimate the total number of red blood cells Gethin has in his blood.
Give your answer in standard form. [3]

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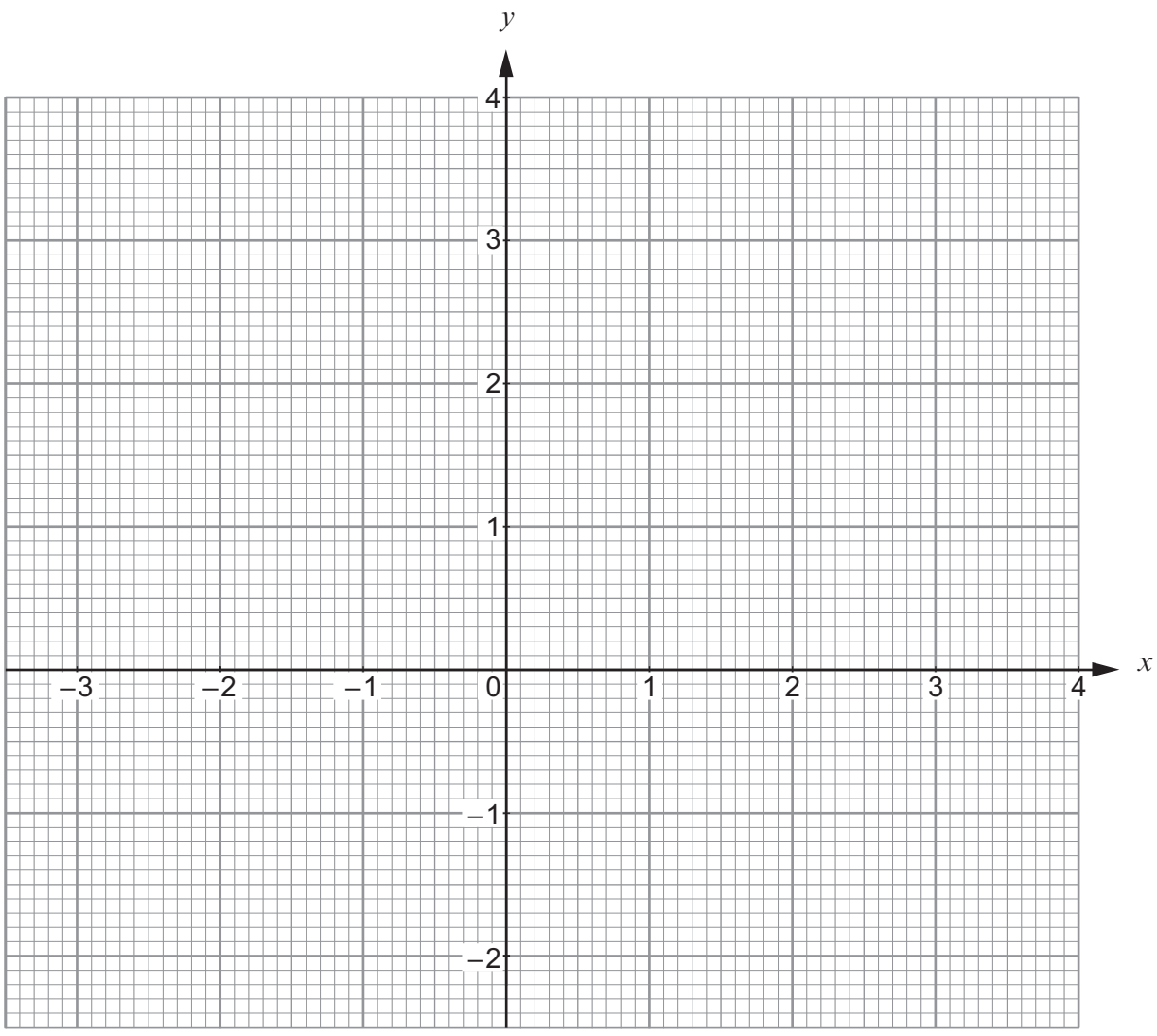
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11. Using the axes below, find the region defined by the following inequalities. [4]

$$x \geqslant -2$$
$$y \geqslant 1$$
$$x + 2y \leqslant 4$$

Make sure that you clearly indicate the region that represents your answer.



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12. *(a)* Expand and simplify $(c + 3)(2c - 5)$. [2]

(b) Make w the subject of the following formula. [3]

$$\frac{w^2 + x^2}{4} = 1$$

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13. The points A, B, C and D lie on the circumference of a circle, centre O.
EF is a tangent to the circle at C.
$AB = AC$.
$B\hat{C}E = 38°$ and $A\hat{C}D = 41°$.

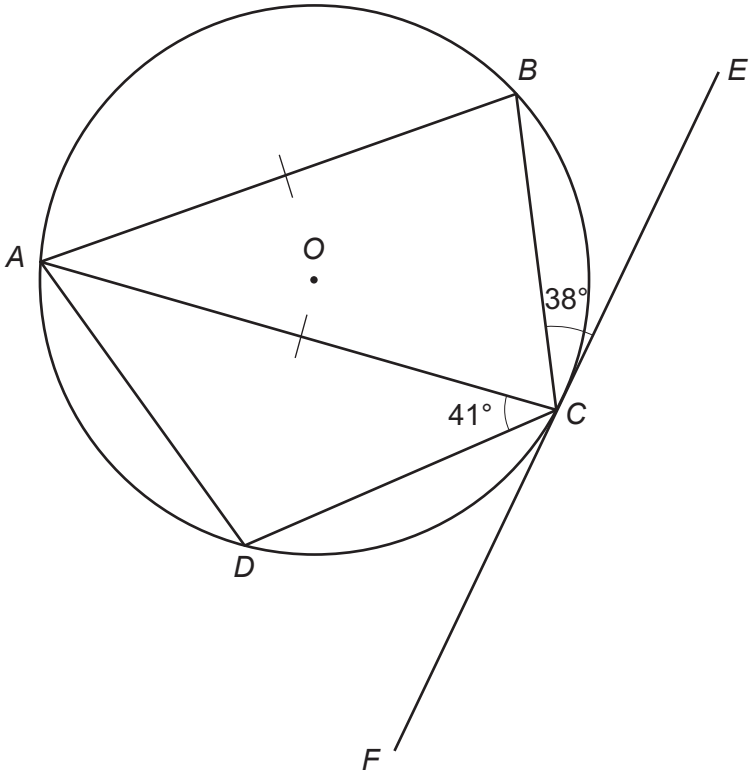


Diagram not drawn to scale

Write down the size of

(a) $B\hat{A}C$ [1]

.....

.....

(b) $A\hat{B}C$ [1]

.....

.....

(c) $A\hat{D}C$ [1]

.....

.....

(d) $C\hat{O}B$ [1]

.....

.....

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14. *(a)* Express $0\cdot\dot{3}\dot{6}$ as a fraction. [2]

(b) Evaluate $\left[\frac{27}{8}\right]^{-\frac{1}{3}}$. [2]

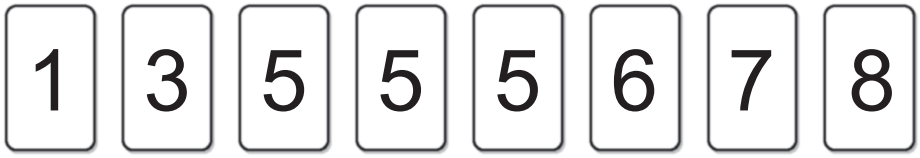
(c) Simplify $\sqrt{3}\ 5 + \sqrt{3}\ - \sqrt{3}\ 5 - 2\sqrt{3}$. [2]

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15. Each of the numbers 1, 3, 5, 5, 5, 6, 7, 8 is written on a card.



Two of the eight cards are selected at random, without being replaced.

Find the probability that

(a) the product of the numbers on the two cards selected is 25, [2]

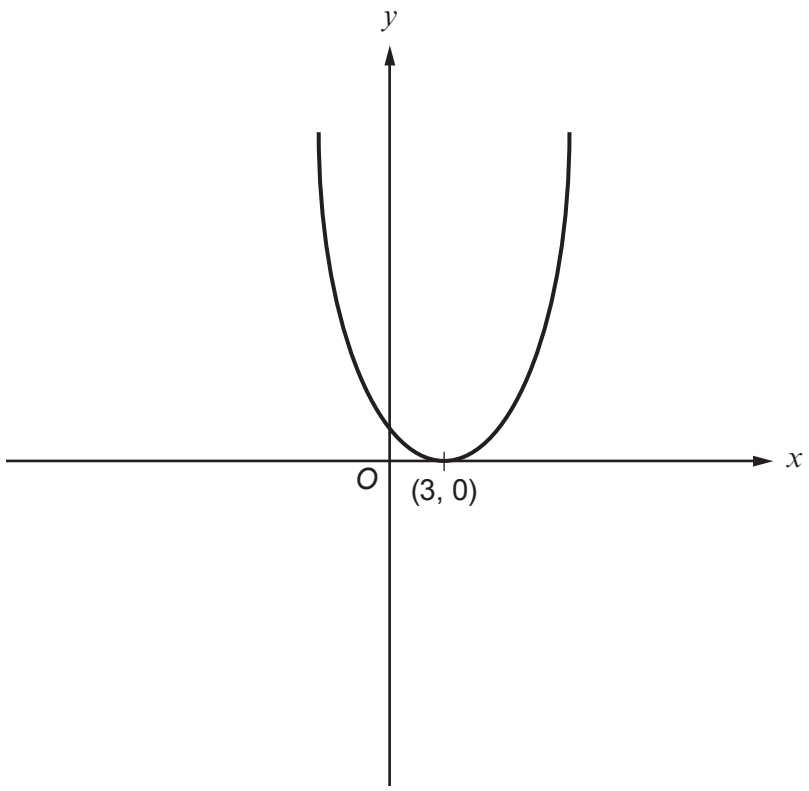
(b) the sum of the numbers on the two cards selected is less than 15. [3]

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16. The graph shows a sketch of the curve with equation $y = x^2 - 6x + 9$.
The lowest point of the curve has coordinates (3, 0).



On the same axes, sketch the graph of the curve with equation $y = (x - 5)^2 - 6(x - 5) + 9$.
Indicate clearly the coordinates of the lowest point on the new curve. [2]

END OF PAPER

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Question number	Additional page, if required. Write the question number(s) in the left-hand margin.

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GCSE MARKING SCHEME

MATHEMATICS - UNITISED

SUMMER 2014

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INTRODUCTION

The marking schemes which follow were those used by WJEC for the Summer 2014 examination in GCSE MATHEMATICS - UNITISED. They were finalised after detailed discussion at examiners' conferences by all the examiners involved in the assessment. The conferences were held shortly after the papers were taken so that reference could be made to the full range of candidates' responses, with photocopied scripts forming the basis of discussion. The aim of the conferences was to ensure that the marking schemes were interpreted and applied in the same way by all examiners.

It is hoped that this information will be of assistance to centres but it is recognised at the same time that, without the benefit of participation in the examiners' conferences, teachers may have different views on certain matters of detail or interpretation.

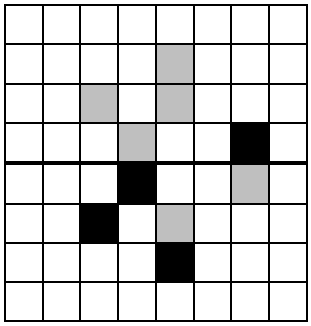
WJEC regrets that it cannot enter into any discussion or correspondence about these marking schemes.

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Unit 2 - Foundation Tier	7
Unit 2 - Higher Tier	10
Unit 3 - Foundation Tier	12
Unit 3 - Higher Tier	15

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UNIT 2 - FOUNDATION TIER

June 2014 UNIT 2 (non calculator) Foundation Tier	V	Mark	Comments
1. (a) (i) 328		B1	
1. (a) (ii) 388		B1	
1. (b) (i) 33, 54		B1	
1.(b) (ii) 18		B1	
1. (b) (iii) 42		B1	
1. (b) (iv) 36		B1	
1. (c) 23689		B1	
1. (d) 5000		B1	
1.(e) 4 thousand(s), 4000		B1	Accept thousand(s). B0 for 1000.
2. chord radius tangent		B1 B1 B1	
3. (a) unlikely		B1	
3. (b) an even chance		B1	
4. **Use overlay** 		B2	**Use overlay** B1 for all 4 squares and one extra OR B1 for 2 or 3 correct squares and no incorrect squares
5. (a) $11h$		B1	Accept $11 \times h$
5. (b) (i) (5, 7) plotted correctly (ii) line $y = 4$ drawn correctly		B1 B1	At least 3 squares long

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June 2014 Unit 2 (non calculator) Foundation Tier	V	Mark	Comments
6. (a)An attempt to find values that can be directly compared. Finding (Zac) 60/100(oe) (Josh) 62/100 (oe) (Lowri) 58/100 (oe) OR (Zac) 60% (Josh) 62% (Lowri) 58% OR (Zac) 0·6 (Josh) 0·62 (Lowri) 0·58 OR (Zac) 3/5 = 60% = 0.6 Most: Josh AND least: Lowri		M1 A1 A1	All %, OR all fractions with common denominator, OR all decimals, OR a valid combination e.g. Zac 3/5 = 60% = 0.6 All fractions must have the same denominator If only one error made, then FT. SC1 if most: Josh, AND least: Lowri with no supporting work.
6. (b) (48 ÷ 6 =) 8 (8 + 9 =) 17		B1 B1	*Alternative:* FT their 8 *6n – 54 = 48* *6n = 102 B1* *n = 17 B1 FT 'their 102'*
6. (c) (i) 45		B1	Accept embedded answer
6. (c) (ii) 13		B1	Accept embedded answer
6. (d) 4 – 6		B1 B1	FT 'their 4' – 10 provided 'their 4' < 10

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June 2014 Unit 2 (non calculator) Foundation Tier	V	Mark	Comments
7. (2 × adult one-day tickets 2 × £21.50 = £) 43 AND (2 × child one-day tickets 2× £17.50 = £) 35	V	B1	Accept a sight of 78
(2 × 6 adult individual rides 2 ×6 × £2.50 = £) 30 (2 × 8 child individual rides 2 × 8 × £2.50 = £) 40	V V	B1 B1	Accept sight of 70 for 2nd and 3rd B1s.
(Tickets are)2 child one-day tickets and 12 (adult) individual ride tickets (Cost = £30 + 35 = £) 65	V V	B1 B1	May be implied by answer of 65. FT their prices for the cheapest option. SC1 B0 if sight of (£)78 and (£)70 AND conclusion to buy individual ride tickets *Alternative:* *(adult individual rides* *6*× (£)2.50=*) 15 (or ×2=) 30 B1* *(child individual rides* *8* × (£)2.50=) *20 (or×2=) 40 B1* *Adult: indication that 15<21.50 or **30**<43 AND used B1* *Child: indication that 17.50<20 or **35**<40 AND used B1* *(Cost = £)65 B1*
Look for • relevance of work shown • generally correct spelling • clarity of text explanation • use of notation (appropriate use of '=', '×', '+', £) QWC2: Candidates will be expected to • present work clearly, with words explaining process or steps AND • make few if any mistakes in mathematical form, spelling, punctuation and grammar and include units in their working QWC1: Candidates will be expected to • present work clearly, with words explaining process or steps OR • make few if any mistakes in mathematical form, spelling, punctuation and grammar, and include units in their working.	V V	QWC2	QWC2 Presents relevant material in a coherent and logical manner, using acceptable mathematical form, and with few if any e spelling, punctuation and grammar. QWC1 Presents relevant material in a coherent and logical manner but with some errors in use of mathematical form, spelling, punctuation or grammar OR evident weaknesses in organisation of material but using acceptable mathematical form, with few if any errors in spelling, punctuation and grammar. QWC0 Evident weaknesses in organisation of material, and errors in use of mathematical form, spelling, punctuation or grammar. <u>A final unsupported statement is QWC0</u>

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June 2014 Unit 2 (non calculator) Foundation Tier	V	Mark	Comments
8. 7/10 + 2/10 or equivalent 9/10 or equivalent 1/10		M1 A1 B1	Fractions must have a common denominator FT 'their derived 9/10' *Alternative – using a length:* *Finding 7/10 and 1/5 of a length AND adding them M1* *Correct answer to addition A1* *Final answer of 1/10 B1*
9. **Use overlay** 2 rectangles 6cm by 3cm 1 rectangle 6cm by 4cm 2 rectangles 4cm by 3cm Makes a correct net		 B1 B1 B1 B1	**Use overlay** (± 2mm) To gain each B1, each pair of rectangles must not be disjointed Penalise – 1 only, if height of 1 cm used.
10. **Ribbon marking for 10(a) and (b)** (a) 13 **23** **33** **17** **31** 45 **21** **39** **57** (b) 4/9		 B2 B2	 B1 for 4 correct entries FT their table. B1 for a numerator of 4 in a fraction less than 1. B1 for a denominator of 9 in a fraction less than 1. Do not penalise incorrect reduction of fractions from a FT. **NB** Penalise –1 for use of words such as '4 out of 9', '4 in 9'. or '4:9'. When both fraction and wrong notation seen, DO NOT penalise wrong notation.
11. **Use overlay** Correct enlargement in correct position		 B2	**Use overlay** B1 for any 2 correct vertices OR for correct enlarged shape in incorrect position OR for wrong scale factor consistently used.
12. **Ribbon marking for 12(a) and (b)** (a) 0·15 × (£)480 or equivalent OR an attempt to calculate 24 × (£)22 (Total cost =) 0·15 × (£)480 + 24 × (£)22 or equivalent (£72 + £528 =) (£)600 (b) (Difference in price =) (£)600 – (£)480 OR (£)120 (Percentage increase =) 120/480 × 100% or equivalent 25%		 M1 M1 A1 B1 M1 A1	 Valid method for finding either 15% of (£)480 OR 24 × (£)22 (implied by sight of (£)72 or (£) 528 respectively) A complete correct method CAO Attempt to find difference in price. FT 'their (a)' A complete correct method *OR 600/480 × 100(%) (= 125%) B1* *600/480 × 100(%) – 100(%) M1* *25(%) A1*

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June 2014 Unit 2 (non calculator) Foundation Tier	V	Mark	Comments
13. $3x + 20 = 6x - 25$ OR (BCD=)$180 - (3x + 20) = 180 - (6x - 25)$ $3x = 45$ (or $-3x = -45$) (x =) 15 65 (°) seen or implied (Angle BCD =) 115(°)	V V V V V	M1 A1 A1 B1 B1	Strategy of equating opposite angles or other equivalent equations CAO FT their $kx = a$, where $k \neq 1$ Alternative: A trial and improvement method with an attempted first trial (for both relevant angles) M1 Two appropriate trials completed (both angles) A1 (x =) 15 CAO A1 FT 'their 15' i.e. correct substitution in either expression FT 180 – 'their 65', but not 180 – 'their 15'
14. $-x < 7 - 3$ OR $3 - 7 < x$ OR equivalent $x > -4$ OR $-4 < x$		M1 A1	Accept $-3 + x > -7$ as a valid first step. Mark final answer. Solving an equation gets M0A0 unless the 'equals' sign is correctly replaced by an inequality sign.
15. **To be viewed with diagram** (1/10 × 360(°)) = 36(°) seen or implied 360(°) – 1/10 × 360(°) (=324(°)) 2/3 × 324(°) OR at least two appropriate trials to split 324 into 2 parts, one being twice the other 216(°)	 V V V V	 B1 B1 M1 A1	*OR 2/3 × 9/10* *M1* *6/10 or equivalent* *A1* *6/10 × 360(°)* *M1* FT 'their derived 324(°) *216(°)* *A1* *FT 'their 6/10'* CAO Award B1B1SC1 or M1A1SC1 for a final answer of 108(°) if 'red' and 'yellow' have clearly been reversed

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UNIT 2 - HIGHER TIER

June 2014 UNIT 2 Higher Tier	V	Mark	Comments
1. **To be viewed with diagram** Reflection (in the line with equation) $x = 1$		B1 B1	Check diagram for line with its equation $x = 1$
2. **Ribbon-marking for parts (a) and (b)** (a) 0•15 × (£)480 or equivalent OR an attempt to calculate 24 × (£)22 (Total cost =) 0•15 × (£)480 + 24 × (£)22 or equivalent (£72 + £528 =) (£)600 Look for • relevance • spelling in at least 1 statement/sentence • clarity of text explanations, • the use of notation (watch for the use of '=', £, % being appropriate) QWC: Candidates would be expected to • clearly show how they arrived at their solution • have few errors in mathematical form, spelling, punctuation and grammar Count incorrect use of '=' in situations such as '24 × (£)22 = 528 + 72' within the 'few errors in mathematical form' QWC2: Candidates will be expected to • present work clearly, with words explaining process or steps AND • make few if any mistakes in mathematical form, spelling, punctuation and grammar and include units (£) in their final answer QWC1: Candidates will be expected to • present work clearly, with words explaining process or steps OR • make few if any mistakes in mathematical form, spelling, punctuation and grammar and include units (£) in their final answer (b) (Difference in price =) (£)600 – (£)480 OR (£)120 (Percentage increase =) 120/480 × 100(%) or equivalent 25(%)	P P P P P C 2 <

June 2014 UNIT 2 Higher Tier	V	Mark	Comments
5. Method that produces at least 2 correct prime factors Sight of correct factors (2, 3, 3, 7) in any order $2 \times 3^2 \times 7$		M1 A1 B1	FT until 2nd error Ignore 1s seen FT their factors (with at least 1 index >1 used). Do not ignore 1s within the product. B0 for a sum or list.
6. $-x < 7 - 3$ OR $3 - 7 < x$ or equivalent $x > -4$ OR $-4 < x$		M1 A1	Accept $-3 + x > -7$ as a valid first step Mark final answer. Solving an equation gets M0A0 unless the 'equals' sign is correctly replaced by an inequality sign.
7. **To be viewed with diagram** $(1/10 \times 360(°) =)$ 36(°) seen or implied $360(°) - 1/10 \times 360(°)$ $(= 324(°))$ $2/3 \times 324(°)$ OR at least two appropriate trials to split 324 into 2 parts, one being twice the other 216(°)		 B1 B1 M1 A1	 *OR 2/3 × 9/10 M1* *6/10 or equivalent A1* FT 2/3 of 'their derived 324' *6/10 × 360(°) M1* *216(°) A1* CAO *FT 'their 6/10'* Award B1B1SC1 or M1A1SC1 for a final answer of 108(°) if 'red' and 'yellow' have clearly been reversed.
8. **Ribbon-marking for parts (a) and (b)** (a) $4n + 4$ OR $(n + 2)^2 - n^2$ or equivalent		B3	B2 for $4n + ...$ OR $n + 2^2 - n^2$ (brackets missing) B1 for sight of 8, 12, 16, 20 (check diagrams) $n + 4$ OR $n^2 + 4 - n^2$ gets B0 If B3 awarded, penalise – 1 for subsequent incorrect working
(b) $4n + 4 = 164$ OR appropriate inverse operations $n = 40$ (number of white tiles =) 1600		B1 B1 B1	Setting up appropriate equation. FT their expression. FT their equation (for equivalent difficulty). FT their integer n.
9. 2a + 3c = 31.60, a + 2c = 18.60 (or equivalent in pence) Method to find the first variable Correct first variable Correct second variable		S1 M1 A1 A1	Strategy of forming a pair of equations. (Do not penalise for not defining variables.) Allow one slip (but not in equated variable). FT 'their equations' (provided equivalent difficulty) FT their first variable a = (£) 7.4(0), c = (£) 5.6(0) (or equivalent in pence) Award 0 marks for an unsupported answer
10. $(6 \times 10^6) \times 4$ (× .....) 'their $(6 \times 10^6) \times 4$' × 1000 $2{\cdot}4 \times 10^{10}$ OR $2{\cdot}388 \times 10^{10}$ OR $2{\cdot}412 \times 10^{10}$		M1 M1 A1	At least one number must be rounded. Must be within a product. Metric conversion. Allow unrounded numbers.
11. **Overlay required** Sight of line for either $x = -2$ or $y = 1$ Correct line drawn for $x + 2y = 4$ Correct region clearly identified		 B1 B2 B1	 Accept an unlabelled correct line provided unambiguous. Accept dotted lines throughout question. B1 for correct gradient $(= -½)$ OR correct y-intercept plotted (0, 2) OR correct x-intercept plotted (4, 0) OR any two other points calculated or plotted correctly (with no incorrect points) FT for their lines (for equivalent difficulty)
12. (a) $2c^2 - 5c + 6c - 15$ $2c^2 + c - 15$		B1 B1	FT until 2nd error (and equivalent difficulty) Mark final answer.
(b) Sight of $w^2 + x^2 = 4$ $w^2 = 4 - x^2$ $w = (\pm)\sqrt{(4 - x^2)}$ or $(\pm)\, 2\sqrt{(1 - x^2/4)}$		B1 B1 B1	FT until 2nd error (for equivalent difficulty) Accept a correct alternative approach e.g. $w^2/4 = 1 - x^2/4$ Isolating w^2 Square root must clearly be over complete expression (or correct use of brackets is required). Do not ISW e.g. $(\pm)\sqrt{(4 - x^2)} = 2 - x$ gets B0

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June 2014 UNIT 2 Higher Tier	V	Mark	Comments
13. **Ribbon-marking required for parts (a) to (d)** **To be viewed with diagram** (a) 38(°) (b) 71(°) (c) 109(°) (d) 76(°)		 B1 B1 B1 B1	 FT (180 – 'their a')/2' FT 180 – 'their b' FT 2 × 'their a'
14. (a) $x = 0{\cdot}36666.....$ $10x = 3{\cdot}6666.....$ with an attempt to subtract 33/90 (=11/30) or 363/990 or equivalent		M1 A1	Or $10x$ and $100x$, or equivalent. Or an alternative method. CAO (3·3/9 gets M1 A0)
(b) 2/3		B2	B1 for $(3/2)^{-1}$ or 1/(3/2) or 1/1·5 or $(8/27)^{1/3}$ or $(\sqrt[3]{8}/\sqrt[3]{27})$ or $\sqrt[3]{(8/27)}$ B0 for $8/27^{1/3}$ or $8^{1/3}/27$
(c) $5\sqrt{3} + 3 - 5\sqrt{3} + 2\times3$ = 9		B1 B1	 FT from one incorrect term
15. (a) 3/8 × 2/7 6/56 (= 3/28)		M1 A1	 Do not ignore incorrect cancelling *OR two-way table drawn, with 8 × 8 – 8 spaces M1* *6/56 (= 3/28) A1* If M0A0, award SC1 for method 'with replacement' (3/8 × 3/8 =) 9/64
(b) 1 – P(7 and 8) 1/8 × 1/7 + 1/8 × 1/7 OR 2 × 1/8 × 1/7 (1 – 2/56 =) 54/56 (= 27/28)		S1 M1 A1	Award even if 7,8 and 8,7 are not both considered Must have considered both 7,8 and 8,7 Do not ignore incorrect cancelling *OR two-way table drawn, with 8 × 8 – 8 spaces M1* *1 – P(7 and 8) S1* *(1 – 2/56 =) 54/56 (= 27/28) A1* If M0A0, award SC1 for method 'with replacement' (1 – 2 × 1/8 × 1/8 – 1/8 × 1/8 =) 61/64
16. Translation horizontally to the right (8, 0) indicated correctly on the *x*-axis **with** the correct translation.		B1 B1	 Accept labelling of 8 on the *x*-axis. SC1 for left shift with (-2, 0) or -2 indicated on the *x*-axis.

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Surname	Centre Number	Candidate Number
Other Names		0

GCSE

4352/02

MATHEMATICS (UNITISED SCHEME)

UNIT 2: Non-Calculator Mathematics
HIGHER TIER

A.M. WEDNESDAY, 15 January 2014

1 hour 15 minutes

CALCULATORS ARE NOT TO BE USED FOR THIS PAPER

ADDITIONAL MATERIALS

A ruler, a protractor and a pair of compasses may be required.

INSTRUCTIONS TO CANDIDATES

Use black ink or black ball-point pen.

Write your name, centre number and candidate number in the spaces at the top of this page.

Answer **all** the questions in the spaces provided.

Take π as 3·14.

INFORMATION FOR CANDIDATES

You should give details of your method of solution when appropriate.

Unless stated, diagrams are not drawn to scale.

Scale drawing solutions will not be acceptable where you are asked to calculate.

The number of marks is given in brackets at the end of each question or part-question.

You are reminded that assessment will take into account the quality of written communication (including mathematical communication) used in your answer to question **3**.

For Examiner's use only		
Question	**Maximum Mark**	**Mark Awarded**
1.	**3**	
2.	**4**	
3.	**8**	
4.	**4**	
5.	**3**	
6.	**6**	
7.	**3**	
8.	**4**	
9.	**3**	
10.	**3**	
11.	**5**	
12.	**4**	
13.	**3**	
14.	**6**	
15.	**3**	
16.	**3**	
Total	**65**	

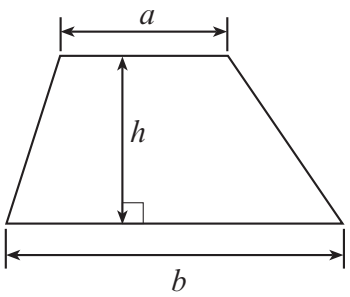
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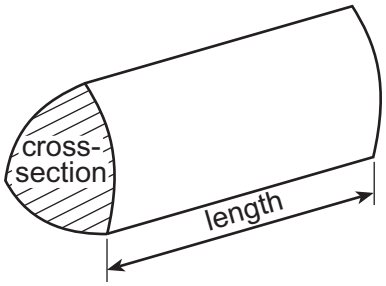
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Formula List

Area of trapezium $= \frac{1}{2}(a + b)h$

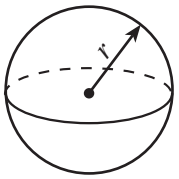


Volume of prism = area of cross-section × length



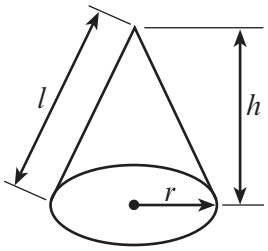
Volume of sphere $= \frac{4}{3}\pi r^3$

Surface area of sphere $= 4\pi r^2$



Volume of cone $= \frac{1}{3}\pi r^2 h$

Curved surface area of cone $= \pi rl$

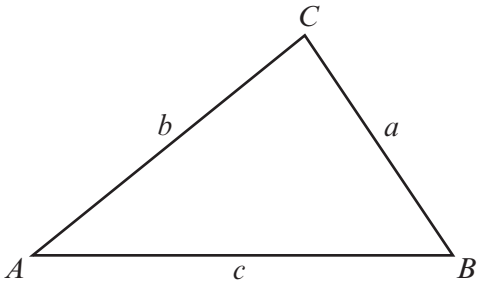


In any triangle ABC

Sine rule $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

Cosine rule $a^2 = b^2 + c^2 - 2bc\cos A$

Area of triangle $= \frac{1}{2}ab\sin C$



The Quadratic Equation

The solutions of $ax^2 + bx + c = 0$

where a, b and c are given by $x = \frac{-b \pm \sqrt{(b^2 - 4ac)}}{2a}$

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1.

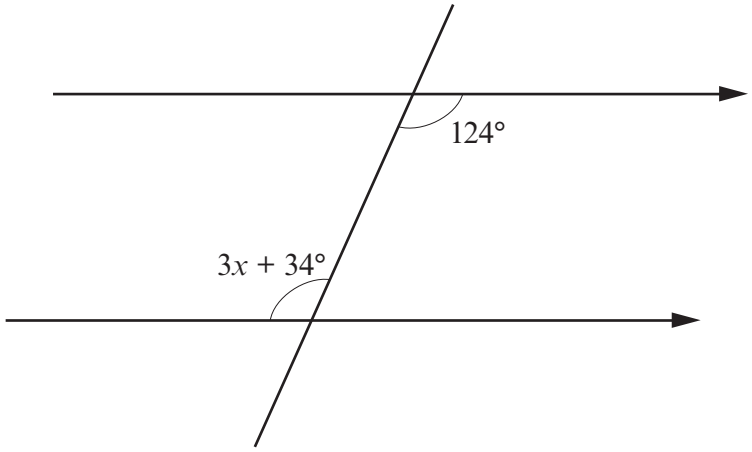


Diagram not drawn to scale

Use the information in the diagram above to find the value of x. [3]

.....

.....

.....

.....

x = ... °

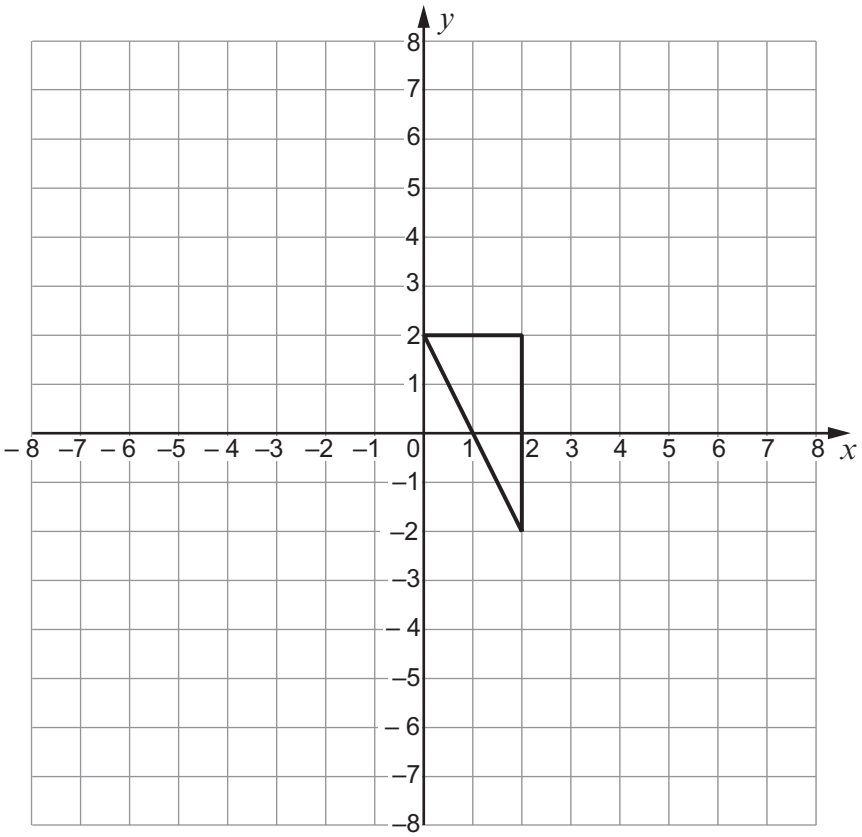
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Turn over.

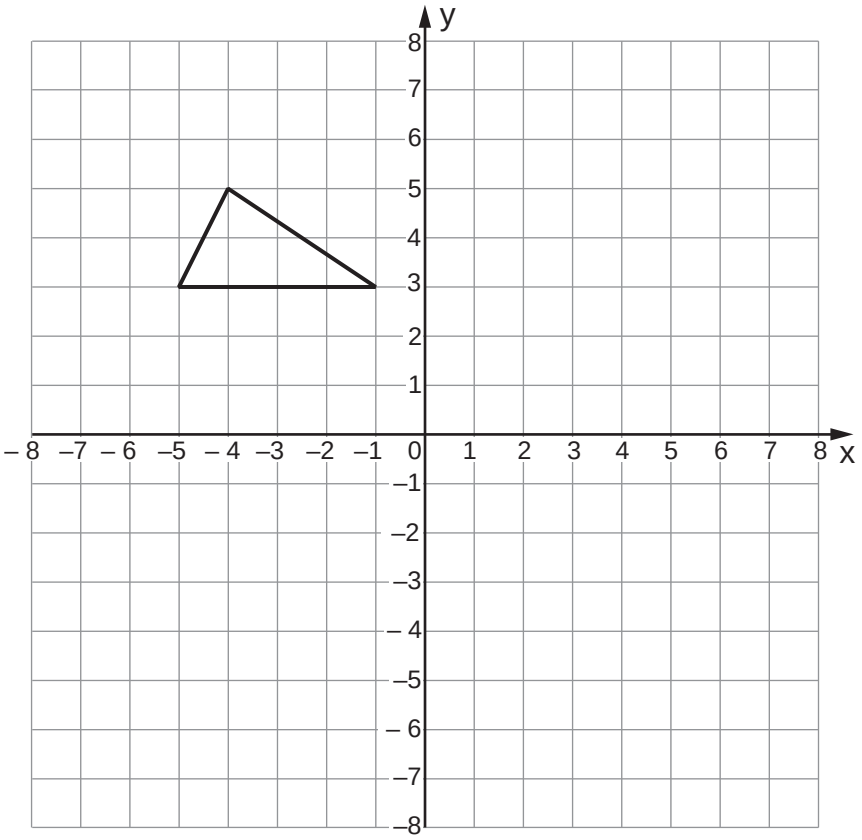
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2. *(a)* Reflect the triangle in the line $x = -2$. [2]



(b) Rotate the triangle clockwise through 90° about the point with coordinates (0, 2). [2]



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3. *You will be assessed on the quality of your written communication in this question.*

Jenny runs a stall at the local Farmers' Market.

One week, she made 20 fruit cakes and 15 chocolate cakes to sell on the stall.

She planned to sell the fruit cakes at £6 each and the chocolate cakes at £2 each.

The cost of making each type of cake was half of the normal selling price.

She sold $\frac{3}{4}$ of the fruit cakes at full price and decided to sell the rest of them at 70% of the normal selling price.

She sold 13 of the chocolate cakes at full price and the rest at half price.

How much profit did Jenny make?

You must show all your working. [8]

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Turn over.

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4.

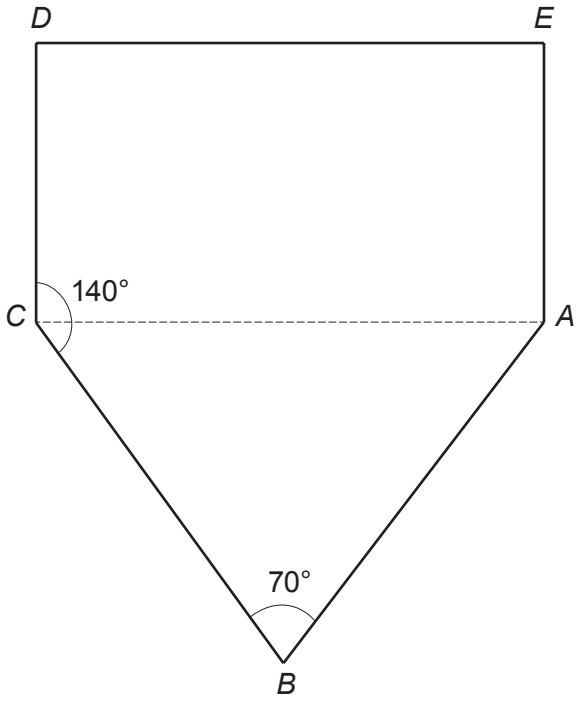


Diagram not drawn to scale

In this diagram, *ACDE* is a rectangle, $A\hat{B}C = 70°$ and $B\hat{C}D = 140°$.
Using the given information, explain why the length of *AB* is **not** equal to the length of *BC*.
You must show all your working. [4]

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5. Yellow, blue and green tickets are sold in a raffle to raise money for charity.
The probability of the winning ticket being a particular colour is given in the following table.

Colour of ticket	Yellow	Blue	Green
Probability	$2a$	$0{\cdot}4$	$3a$

Find the probability that the winning ticket is green. [3]

.....

.....

.....

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6. The table shows values of $y = x^3 + 1$ for values of x from -3 to 3.

x	-3	-2	-1	0	1	2	3
$y = x^3 + 1$	-26	-7		1	2		28

(a) Complete the table above. [2]

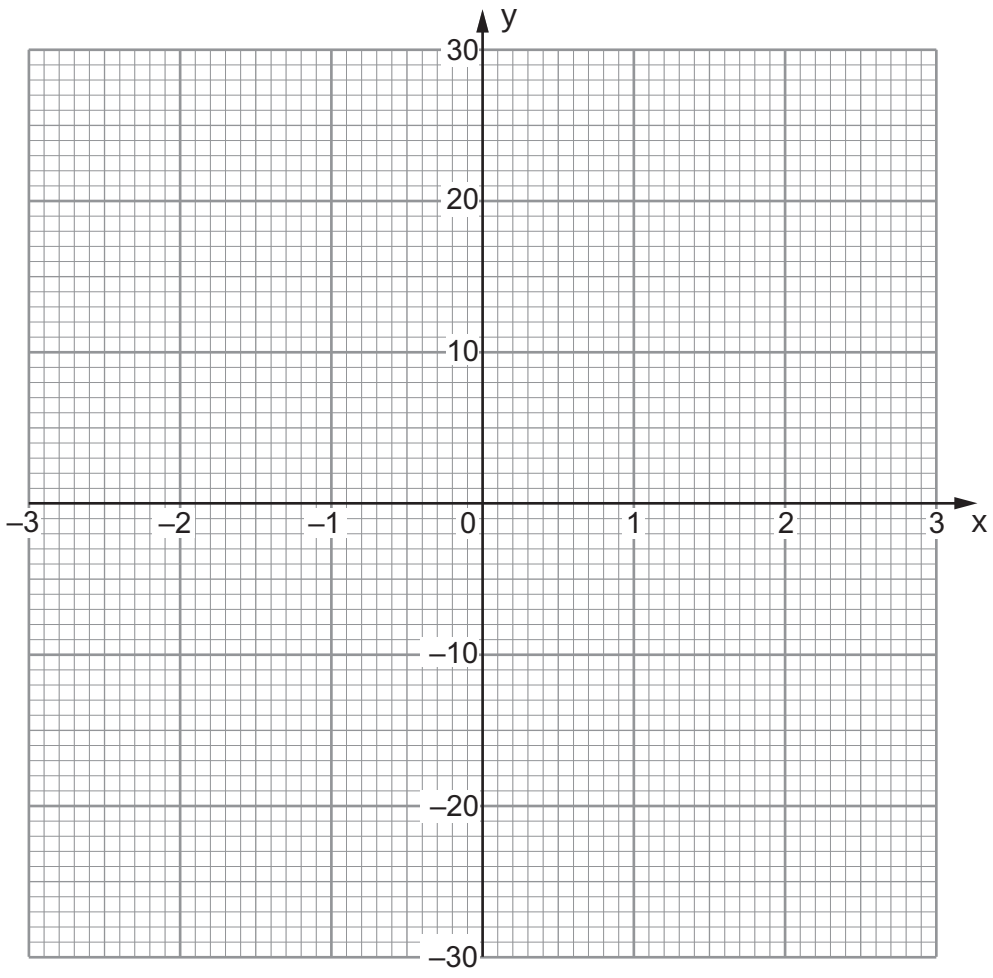
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(b) On the graph paper below, draw the graph of $y = x^3 + 1$ for the values of x from -3 to 3. [2]



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(c) Draw the line $y = -10$ on your graph paper and write down the x-coordinate of the point where this line intersects the curve $y = x^3 + 1$. [2]

.....

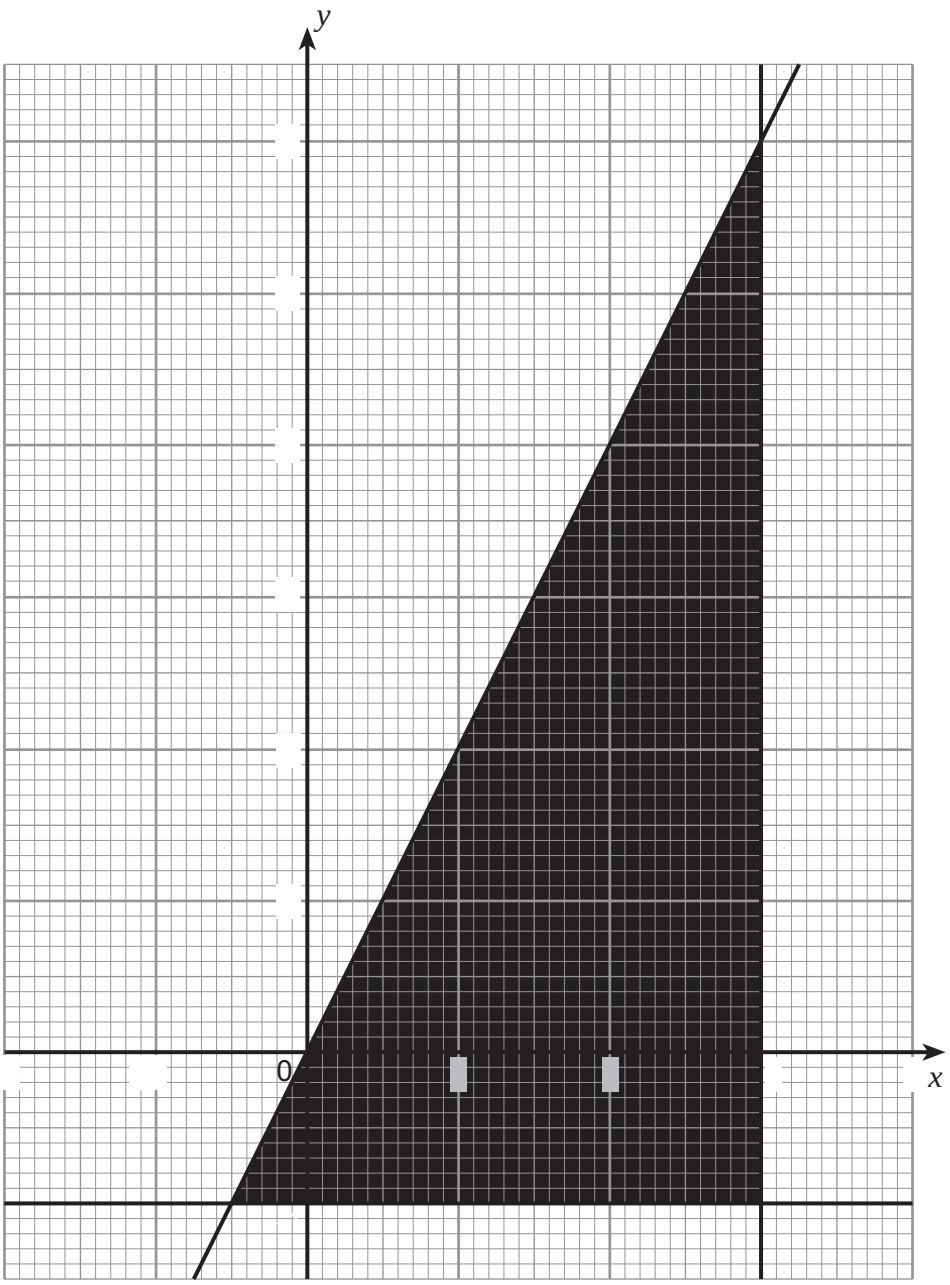
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7.



Complete the following table to give the set of inequalities that describes the shaded region drawn above. [3]

.....

.....

.....

.....

$x \leqslant 3$

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8. When dropped onto the floor, a drawing pin will either land on its side or on its head (with the pin pointing upwards).

Three friends, Ahmed, Maxine and Dewi, are conducting an experiment to determine the probability that a drawing pin lands on its head when dropped onto the floor. They each drop a drawing pin a number of times. Their results are given in the following table.

Name	Ahmed	Maxine	Dewi
Number of drops	90	35	75
Number of heads	52	19	57

(a) The three friends decide to combine their results to estimate the probability that a drawing pin lands on its head.
Show clearly how they should reach their answer.
Give the final answer **as a decimal**. [3]

.....

.....

.....

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.....

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.....

(b) Suggest a way in which they could improve their estimate. [1]

.....

.....

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9. Solve the following equation. [3]

$$\frac{5x-1}{2} - x = \frac{1}{2}$$

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10. The mass of the planet Jupiter is $1{\cdot}9 \times 10^{27}$ kg.

The mass of the planet Venus is $4{\cdot}87 \times 10^{24}$ kg.

Approximately how many times bigger is the mass of Jupiter than the mass of Venus? [3]

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11. Simon and Syra are on holiday in Devon.
They buy some holiday souvenirs for their friends.
Simon pays £2.05 for 2 key rings and 3 pencils.
Syra pays £3.20 for 3 key rings and 5 pencils.
All the key rings are the same price and all the pencils are the same price.

Find the individual prices of a key ring and a pencil.
You must use an algebraic method. [5]

Price of a key ring = ...

Price of a pencil = ...

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12. The diagram shows a circle with centre O.
The straight lines AC and CE are tangents to the circle at B and D respectively.
$B\hat{F}D = 78°$.

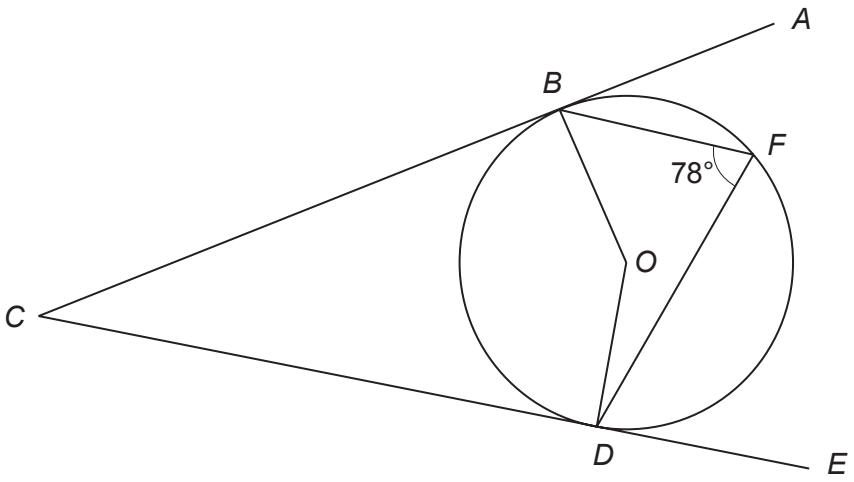


Diagram not drawn to scale

Find the size of $B\hat{C}D$. You **must** give reasons in your solution. [4]

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13. Make p the subject of the following formula. [3]

$$t + 6p = 5 - pq$$

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14. *(a)* Evaluate $8^{-\frac{2}{3}}$. [2]

(b) Express $0{\cdot}00\dot{4}$ as a fraction. [2]

(c) Simplify $(4+\sqrt{3})^2$. [2]

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15. A bag contains four red counters and four yellow counters.
Three counters are picked from the bag at random, **without** being replaced.

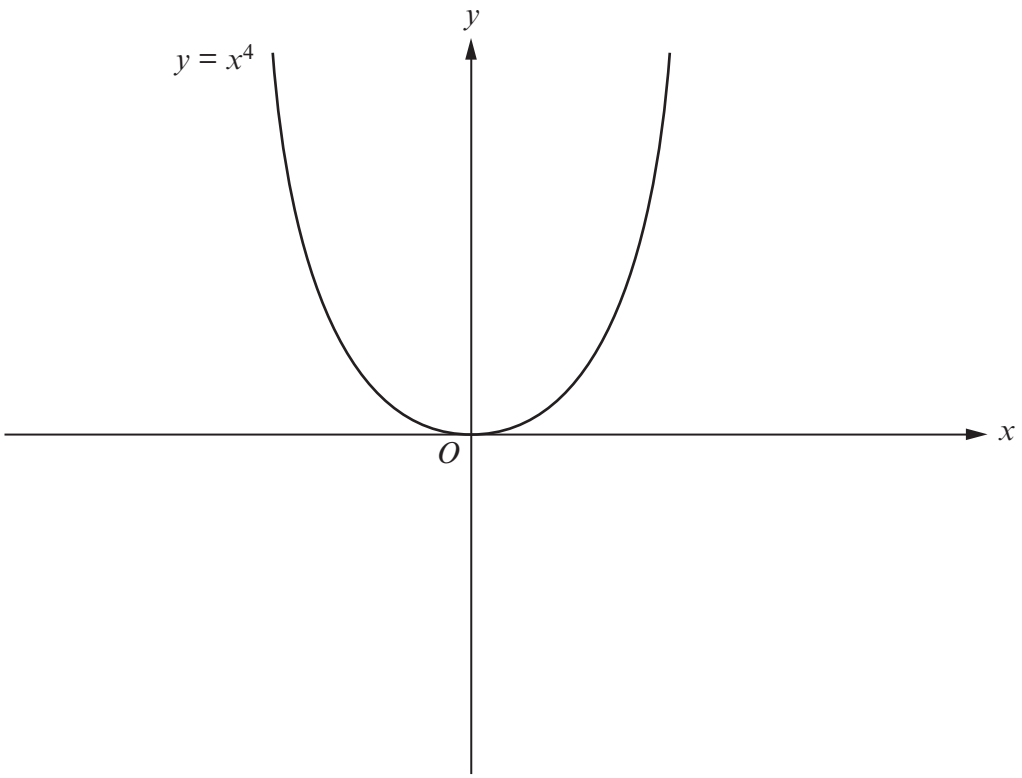
Find the probability that the three counters picked are of the same colour. [3]

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16. The diagram shows a sketch of $y = x^4$.
On the same diagram, sketch the curves $y = -x^4$ and $y = -x^4 - 3$.
Clearly label each graph with its equation, and indicate the coordinates of any point where a curve crosses an axis. [3]



END OF PAPER

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GCSE MARKING SCHEME

MATHEMATICS - UNITISED

JANUARY 2014

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INTRODUCTION

The marking schemes which follow were those used by WJEC for the January 2014 examination in GCSE MATHEMATICS - UNITISED. They were finalised after detailed discussion at examiners' conferences by all the examiners involved in the assessment. The conferences were held shortly after the papers were taken so that reference could be made to the full range of candidates' responses, with photocopied scripts forming the basis of discussion. The aim of the conferences was to ensure that the marking schemes were interpreted and applied in the same way by all examiners.

It is hoped that this information will be of assistance to centres but it is recognised at the same time that, without the benefit of participation in the examiners' conferences, teachers may have different views on certain matters of detail or interpretation.

WJEC regrets that it cannot enter into any discussion or correspondence about these marking schemes.

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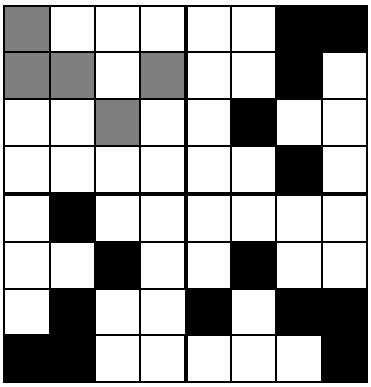
UNIT 2 - FOUNDATION TIER

UNIT 2 (non calculator) Foundation Tier	Marks	FINAL MARK SCHEME Comments
1. (a) 12 756 (km) (b) (i) 4670 (ii) 5000 (c) 1067 (d) 1,5,7,35 (e) 5 hundred OR 500	B1 B1 B1 B1 B2 B1 7	 B1 for 3 or 4 correct factors and no more than1wrong factor Accept hundred(s)
2. cm centimetres km kilometres g grams m^3 or l cubic metres or litres	B1 B1 B1 B1 4	 Accept kl
3. (a) 5(p) (b) C B A	B1 B1 B1 B1 4	 Allow 7/10 and 2/10 to represent A and B respectively. Use overlay. A should be between 0·6 and 0·8 inclusive. B should be between 0·1 and 0·3 inclusive. C should be at 0.
4. (a) $2g$ (b) 11 (c) (i) (x =) 4 (ii) (x =) 36	B1 B2 B1 B1 5	 B1 for $7\times 5 - 4\times 6$ OR $35 - 24$ OR $35 - \ldots$ OR $\ldots - 24$ OR sight of both 35 and (–)24 Accept embedded answers Accept embedded answers

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UNIT 2 (non calculator) Foundation Tier		FINAL MARK SCHEME Comments
5. (a) (5 × 1 pint costs 5 × £0.50=£) 2.5(0) or 250(p) (3 × 1 + 1 × 2 pints cost £1.50 + £0.85 = £) 2.35 or 235(p) (1 × 1 + 2 × 2 pints cost £ 0.50 + 1.70 = £) 2.2(0) or 220(p) (1 × 1 + 1 × 4 pints cost £0.50 + 1.75 = £) 2.25 or 225(p) QWC: Look for • relevance of work shown • generally correct spelling • clarity of text explanation • use of notation (appropriate use of '=', £, p, pints) QWC2: Candidates will be expected to • present work clearly, with words explaining process or steps (equivalent statements to those in brackets in (a) are needed) AND • make few if any mistakes in mathematical form, spelling, punctuation and grammar and include units in their working (correct use of = and £) QWC1: Candidates will be expected to • present work clearly, with words explaining process or steps OR • make few if any mistakes in mathematical form, spelling, punctuation and grammar, and include units in their working (b) Identifying cheapest option: (2 × 2 + 1 = £) 2.2(0) or 220(p) (Skimmed milk 2 + 1 pints = £) 1.55 or 155(p) (Total = (£) 2.20 +£1.55 =)(£) 3.75 or 375(p)	B1 B1 B1 B1 QWC 2 <

UNIT 2 (non calculator) Foundation Tier		FINAL MARK SCHEME Comments
6. (a) 163 + 285 (=448) ÷ 2 (=224) 61 CAO (b) 33 (c) 0·8 o.e.	M1 m1 A1 B2 B1 6	Alternative: 285 – 163 (= 122) M1 ÷ 2 m1 61 CAO A1 Trial and improvement method: Strategy to add and subtract the same numbers M1 Full method which would lead to correct answer with one arithmetical mistake m1 61 CAO A1 B1 for sight of 8 and 25 OR 8 + …. OR …. + 25
7. Correct rotational symmetry in each quadrant. 	B3 3	B1 for each correct quadrant, but B0 if complete set of reflections only.
8. Correct cuboid drawn on isometric grid. Only cuboids can score.	B2 2	B1 for two different pairs of correct parallel edges or a correct cuboid with vertices not drawn on isometric paper.. For B2 their cuboid must have sides along or parallel to the 3 directions usually associated with isometric paper i.e. the two diagonals and the vertical. Ignore how they treat hidden lines.

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UNIT 2 (non calculator) Foundation Tier		FINAL MARK SCHEME Comments
9. (a) 32 34 36 38 52 54 56 58	B2	B2 for 8 correct entries and no extra B1 for 8 correct entries and extra wrong values B1 for between 4 and 7 correct entries
(b) (i) 5/12	B2	FT their list provided at least one number greater than 37 B1 for a numerator of 5 in a fraction less than 1. B1 for a denominator of 12 in a fraction less than 1. Do not penalise incorrect reduction of fractions from a FT. **NB** Penalise –1 for use of words such as '5 out of 12', '5 in 12'. or '5:12'. When both fraction and wrong notation seen, DO NOT penalise wrong notation.
(b) (ii) 1 or 100%	B1	Accept 12/12 o.e.
(c) Yes **and** statement saying all numbers on the second (square) spinner are even	E1 6	Accept 'all the numbers in (a) are even' There must be reference to (a) OR the 2nd spinner OR the units digits in their answers to (a)
10. $A\hat{C}D = 90(°)$	B1	Angles marked in correct places on diagram are awarded appropriate marks. Accept method using sum of angles of a polygon.
$A\hat{C}B = 140(°) - 90(°) = 50(°)$	B1	If 90(°) was not seen, awarding the second B1 mark implies the first B1.
$C\hat{A}B = (180(°) - 70(°) - 50(°)) = 60(°)$ OR converse explanation that, for the triangle *ABC* to be isosceles, its 'base angles' need to be 55(°)	B1	FT from 'their $A\hat{C}B$' Be aware of alternative arguments e.g. showing that an isosceles triangle *ABC* contradicts the condition that *ACDE* is a rectangle.
Statement 'Since $A\hat{C}B \neq$ (or $D\hat{C}B \neq E\hat{A}B$) then AB ≠ BC' or equivalent	E1 4	E1 is dependent on at least 2 B1 marks being awarded Accept 'triangle ABC is not isosceles' or 'diagram is not symmetrical' if B3

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UNIT 2 (non calculator) Foundation Tier		FINAL MARK SCHEME Comments
11. <u>Method 1 (total profit = total selling price – total cost price)</u> (Money taken for full-price fruit cakes =) ¾ × 20 × (£)6 (= (£)90) (Money taken for reduced-price fruit cakes =) 5 × 0.7 × (£)6 (= (£)21) (Total money taken for chocolate cakes =) 13 × (£) 2 + 2 × (£)1 (= (£)28) (Total cost =) 20 × (£)3 + 15 × (£)1 (= (£)75) (Profit =) (£) [90 + 21+ 28] – (£)75 = (£) 64 OR <u>Method 2 (total profit = fruit cake profit + chocolate cake profit)</u> (Full-price fruit cake profit =) ¾ × 20 × (£)6 – ¾ × 20 × (£)3 OR ¾ × 20 × (£)(6 – 3) (= (£)45) (Reduced-price fruit cake profit =) 5 × 0.7 × (£)6 – 5 × (£)3 OR 5 × (0.7 × (£)6 – (£)3) (=(£)6) (Full-price chocolate cake profit =) 13 × (£)2 – 13 × (£)1 OR 13 × (£)(2 – 1) (=(£)13) (Reduced-price chocolate cake profit = 0) (Total profit =) (£) [45 + 6 + 13 (+0)] = (£) 64	B1 B1 B1 B1 M1 A1 OR B1 B2 B1 M1 A1 6	 Or equivalent e.g. (£) 0.60 × 5 × 7. FT from 'their ¾ × 20' Consideration of '+ 2 × (£)1' can be implicit FT provided at least B2 awarded CAO B1 for sight of 5 × 0.7 × (£)6 or (£)1.20 FT from 'their ¾ × 20' FT provided at least B2 CAO
12. $6x + 10 + 145 – 2x + 4x – 15 + 3x$ $= 360$ (°) $11x = 220$ (°) (x =) 20 (°)	B1 M1 A1 A1 4	Or equivalent statement for the sum of the 4 angles Allow provided the sum of at least 3 of the given angles is equated to 360° FT FT $ax = b$ if $a \neq 1$ If M0, then allow SC1 and possible B1 for 40/11 or 400/11 (for 180° or 540°) 4 marks for correct answer of 20° with no working or from trial and improvement method
13. (a) 0 (b) At least 5 correct plots All 7 points correctly plotted and joined with curve (c) Line drawn correctly x-coordinate	B1 P1 C1 P1 B1 5	 Plots should be accurate to within one small square FT 'their table'. C0 for a polygon FT 'their curve' for point of intersection B1 does NOT imply P1

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UNIT 2 - HIGHER TIER

UNIT 2 Higher Tier	Mark	FINAL MARK SCHEME Comments
1. $3x + 34(^o) = 124(^o)$ $3x = 90(^o)$ $x = 30(^o)$	M1 A1 A1 3	Using alternate angles. Correct method to solve equation. FT for $3x = k$, provided M1 awarded
2. (a) Correct reflection (b) Correct rotation	B2 B2 4	B1 for a reflection in any vertical line or in $y = -2$ or sight of the line $x = -2$ B1 for anticlockwise rotation through 90^o OR clockwise rotation through 90^o about (2, 0)
3. Method 1 (total profit = total selling price – total cost price) (Money taken for full-price fruit cakes =) ¾ × 20 × (£)6 (= (£)90) (Money taken for reduced-price fruit cakes =) 5 × 0.7 × (£)6 (= (£)21) (Total money taken for chocolate cakes =) 13 × (£) 2 + 2 × (£)1 (= (£)28) (Total cost =) 20 × (£)3 + 15 × (£)1 (=(£)75) (Profit =) (£) [90 + 21+ 28] – (£)75 = (£) 64 OR Method 2 (total profit = fruit cake profit + chocolate cake profit) (Full-price fruit cake profit =) ¾ × 20 × (£)6 – ¾ × 20 × (£)3 OR ¾ × 20 × (£)(6 – 3) (= (£)45) (Reduced-price fruit cake profit =) 5 × 0.7 × (£)6 – 5 × (£)3 OR 5 × (0.7 × (£)6 – (£)3) (=(£)6) (Full-price chocolate cake profit =) 13 × (£)2 – 13 × (£)1 OR 13 × (£)(2 – 1) (=(£)13) (Reduced-price chocolate cake profit = 0) (Total profit =) (£) [45 + 6 + 13 (+0)] = (£) 64 Look for • relevance • spelling in at least 1 statement/sentence • clarity of text explanations • the use of notation (watch for the use of '=', £, % being appropriate). QWC: Candidates would be expected to • clearly show how they arrived at their solution • have few errors in mathematical form, spelling, punctuation and grammar Count incorrect use of '=' in situations such as '0.7 × (£)6 = (£)4.20 × 5' within the 'few errors in mathematical form' QWC2: Candidates will be expected to • present work clearly, with words explaining process or steps AND • make few if any mistakes in mathematical form, spelling, punctuation and grammar and include units (£) in their final answer QWC1: Candidates will be expected to • present work clearly, with words explaining process or steps OR • make few if any mistakes in mathematical form, spelling, punctuation and grammar and include units (£) in their final answer	B1 B1 B1 B1 M1 A1 OR B1 B2 B1 M1 A1 Q W C 2 8	Or equivalent e.g. (£) 0.60 × 5 × 7 FT from 'their ¾ × 20' Consideration of '+ 2 × (£)1' can be implicit FT provided at least B2 awarded C.A.O. B1 for sight of 5 × 0.7 × (£)6 or (£)1.20 FT from 'their ¾ × 20' FT provided at least B2 awarded C.A.O. QWC2 Presents relevant material in a coherent and logical manner, using acceptable mathematical form, and with few if any errors in spelling, punctuation and grammar. QWC1 Presents relevant material in a coherent and logical manner but with some errors in use of mathematical form, spelling, punctuation or grammar OR evident weaknesses in organisation of material but using acceptable mathematical form, with few if any errors in spelling, punctuation and grammar. QWC0 Evident weaknesses in organisation of material, and errors in use of mathematical form, spelling, punctuation or grammar. A final unsupported statement only gets QWC0

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UNIT 2 Higher Tier	Mark	FINAL MARK SCHEME Comments
4. $A\hat{C}D = 90(°)$ $A\hat{C}B = 140(°) - 90(°) = 50(°)$ $C\hat{A}B = (180(°) - 70(°) - 50(°)) = 60(°)$ OR converse explanation that, for the triangle *ABC* to be isosceles, its 'base angles' need to be 55(°) Statement 'Since $A\hat{C}B \neq$ (or $D\hat{C}B \neq E\hat{A}B$) then AB ≠ BC' or equivalent	B1 B1 B1 E1 4	Angles marked in correct places on diagram are awarded appropriate marks. Accept method using sum of angles of a polygon. If 90(°) was not seen, awarding the second B1 mark implies the first B1. FT from 'their $A\hat{C}B$' Be aware of alternative arguments e.g. showing that an isosceles triangle *ABC* contradicts the condition that *ACDE* is a rectangle. E1 is dependent on at least 2 B1 marks being awarded Accept 'triangle ABC is not isosceles' or 'diagram is not symmetrical' if B3
5. $2a + 0{\cdot}4 + 3a = 1$ OR $(5a =) 0{\cdot}6$ $(a =) 0{\cdot}6/5$ or $0{\cdot}12$ (Required probability =) 0·36	M1 A1 A1 3	Use of 'total probability = 1' If first 2 marks were M1A0, then FT 3 × 'their *a*', provided $3a < 1$.
6. (a) 0 and 9 (b) At least 5 correct plots All 7 points correctly plotted and joined with curve (c) Line drawn correctly *x*-coordinate	B2 P1 C1 P1 B1 6	B1 for either correct Plots should be accurate to within one small square FT 'their table'. C0 for a polygon FT 'their curve' for point of intersection B1 does NOT imply P1
7. $y \geq -1$ or equivalent $y \leq 2x$	B1 B2 3	Accept '>' Accept '<'. B1 for $y = 2x$, $y > 2x$, $y \geq 2x$ B1 for $y \leq kx$ (+ 0), with $k > 0$
8. (a) Attempting to sum both totals, with at least one correct 128/200 (= 64/100) or equivalent 0.64 (b) Increase number of throws / Repeat process	M1 m1 A1 E1 4	128, 200 FT from their totals provided one was correct C.A.O. Any convincing suggestion
9. $5x - 1 - 2x = 1$ $3x = 2$ $x = 2/3$ or equivalent	B1 B1 B1 3	Clearing fractions. FT until 2nd error. Collecting terms. FT $ax = b$, with $a \neq 1$
10. (2×10^{27}) (5×10^{24}) $(2 \times 10^{27}) \div (5 \times 10^{24})$ 400 or 4×10^{2}	B1 M1 A1 3	Suitable rounding of both numbers Correct division attempted. FT their rounded numbers. Allow $0{\cdot}4 \times 10^{3}$. ISW An answer of $2{\cdot}5 \times 10^{-3}$ implies the B1 only.
11. 2k + 3p = 2.05 and 3k + 5p = 3.20 (or 2k + 3p = 205 and 3k + 5p = 320) Method to find the first variable Correct first variable Method to find the second variable Correct second variable	S1 M1 A1 m1 A1 5	Strategy of forming a pair of equations. (Do not penalise for not defining variables.) Allow one slip. Do NOT accept a trial and improvement method. FT their first variable. k = (£) 0.65 or 65(p), p = (£) 0.25 or 25(p) If incorrect units are given, penalise –1 once only.
12. Angle BOD = 156° Angle at the centre is twice the angle at the circumference Angle BCD = 24° Tangent and radius are perpendicular (and angle sum of quadrilateral is 360°)	B1 E1 B1 E1 4	Accept correct alternative methods. Check for answers on diagram. Angle sum of quadrilateral alone is insufficient

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UNIT 2 Higher Tier	Mark	FINAL MARK SCHEME Comments
13. $6p + pq = 5 - t$ $p(6 + q) = 5 - t$ $p = \frac{5 - t}{6 + q}$ or equivalent	B1 B1 B1 3	Collecting terms. FT until 2nd error (for equivalent difficulty). Factorising Quotient Mark final answer.
14. (a) ¼ or 0.25 (b) $x = 0{\cdot}004444.....$ $10x = 0{\cdot}04444.....$ with an attempt to subtract 4/900 or 2/450 or 1/225 or equivalent (c) $16 + 4\sqrt{3} + 4\sqrt{3} + 3$ $19 + 8\sqrt{3}$	B2 M1 A1 M1 A1 6	B1 for 4^{-1} or $1/2^2$ or $1/_3\sqrt{64}$ or $1/64^{1/3}$ or $(1/64)^{1/3}$ Or $10x$ and $100x$, or equivalent. Or an alternative method. An answer of $0{\cdot}04/9$ gains M1 only. Mark final answer. Do not ignore incorrect cancelling. 3 of the 4 terms correct Do not ignore subsequent working
15. $4/8 \times 3/7 \times 2/6$ $4/8 \times 3/7 \times 2/6 \times 2$ or $4/8 \times 3/7 \times 2/6 + 4/8 \times 3/7 \times 2/6$ 48/336 (=1/7)	B1 M1 A1 3	 Do not ignore incorrect cancelling If no other marks awarded, SC1 for method 'with replacement' $4/8 \times 4/8 \times 4/8 \times 2$ or $4/8 \times 4/8 \times 4/8 + 4/8 \times 4/8 \times 4/8$ (=1/4)
16. Inverted curve (no vertical or horizontal stretch) with vertex at the origin Vertical translation down Point (0, –3) indicated in relation to 2nd curve.	B1 B1 B1 3	Clear intention FT their curve Accept –3 indicated on *y*-axis

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Surname	Centre Number	Candidate Number
Other Names		0

GCSE

4352/02

MATHEMATICS (UNITISED SCHEME)

UNIT 2: Non-Calculator Mathematics

HIGHER TIER

A.M. FRIDAY, 8 November 2013

1 hour 15 minutes

CALCULATORS ARE NOT TO BE USED FOR THIS PAPER

ADDITIONAL MATERIALS

A ruler, a protractor and a pair of compasses may be required.

INSTRUCTIONS TO CANDIDATES

Use black ink or black ball-point pen.

Write your name, centre number and candidate number in the spaces at the top of this page.

Answer **all** the questions in the spaces provided.

Take π as 3·14.

INFORMATION FOR CANDIDATES

You should give details of your method of solution when appropriate.

Unless stated, diagrams are not drawn to scale.

Scale drawing solutions will not be acceptable where you are asked to calculate.

The number of marks is given in brackets at the end of each question or part-question.

You are reminded that assessment will take into account the quality of written communication (including mathematical communication) used in your answer to question **1**.

For Examiner's use only		
Question	**Maximum Mark**	**Mark Awarded**
1.	**7**	
2.	**3**	
3.	**4**	
4.	**4**	
5.	**4**	
6.	**3**	
7.	**3**	
8.	**3**	
9.	**7**	
10.	**3**	
11.	**5**	
12.	**5**	
13.	**7**	
14.	**2**	
15.	**5**	
Total	**65**	

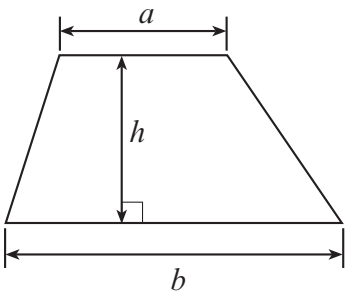
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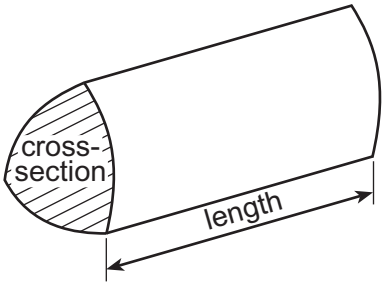
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Formula List

Area of trapezium $= \frac{1}{2}(a + b)h$

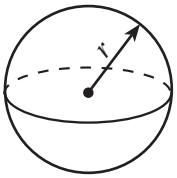


Volume of prism = area of cross-section × length



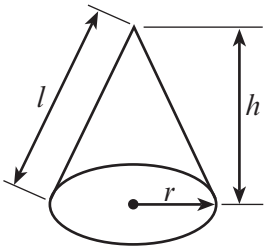
Volume of sphere $= \frac{4}{3}\pi r^3$

Surface area of sphere $= 4\pi r^2$



Volume of cone $= \frac{1}{3}\pi r^2 h$

Curved surface area of cone $= \pi rl$

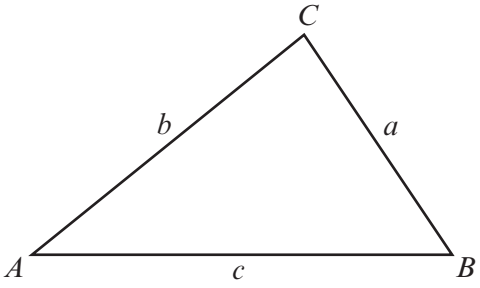


In any triangle ABC

Sine rule $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

Cosine rule $a^2 = b^2 + c^2 - 2bc\cos A$

Area of triangle $= \frac{1}{2}ab\sin C$



The Quadratic Equation

The solutions of $ax^2 + bx + c = 0$

where a, b, c are given by

$$x = \frac{-b \pm \sqrt{(b^2 - 4ac)}}{2a}$$

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1. *You will be assessed on the quality of your written communication in this question.*

Omar wants to buy a television from an online electrical store.

He can choose from two different payment options.

Option A: £580 + VAT at 20%
Option B: a deposit of £120, followed by twelve equal monthly payments of £49.50

Which option is cheaper, and by how much?
You must explain your reasoning and show all your working. [7]

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2.

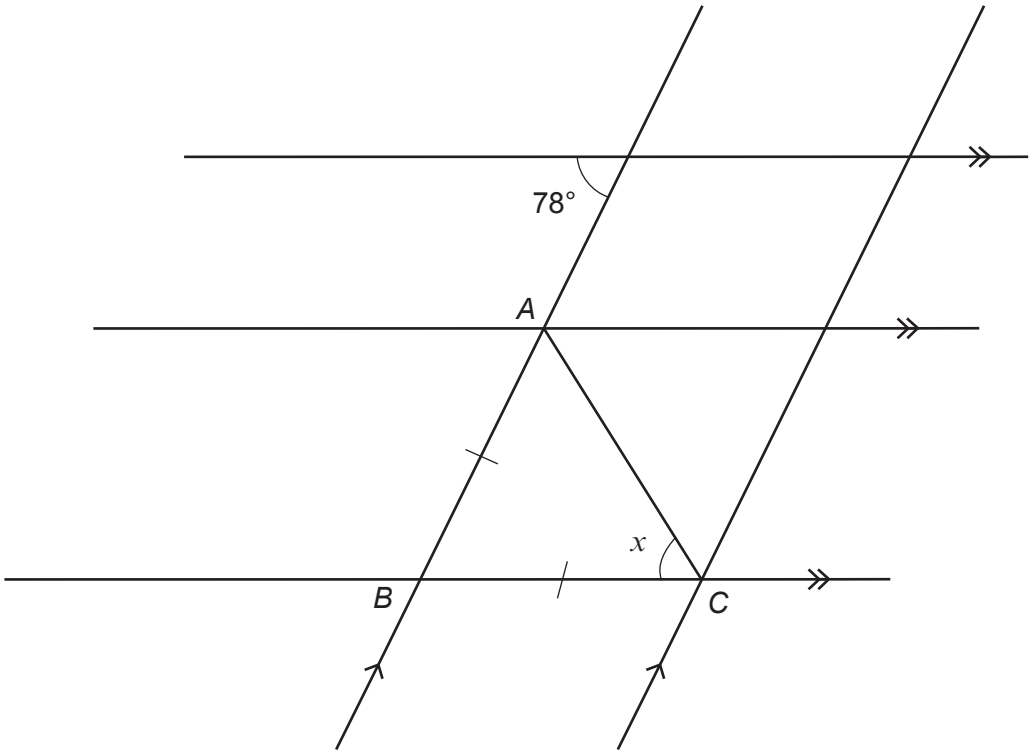


Diagram not drawn to scale

In the diagram above, $AB = BC$.

Find the value of x.

You must show all the steps of your working. [3]

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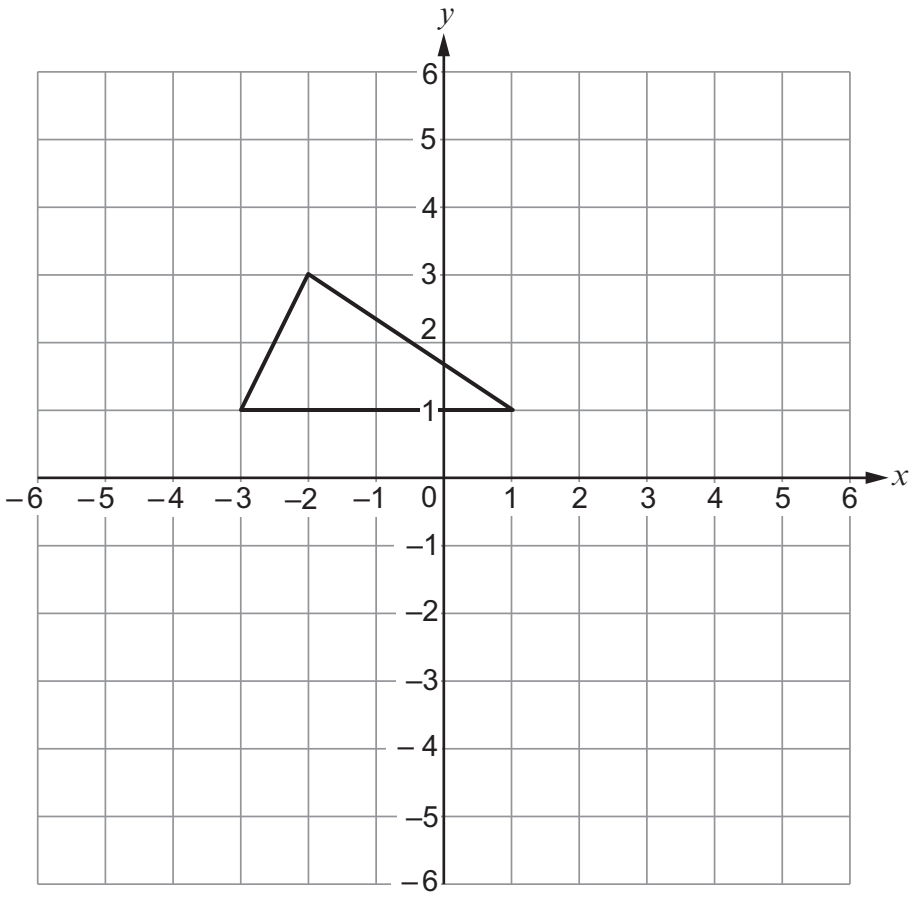
.....

$x =$ ..... °

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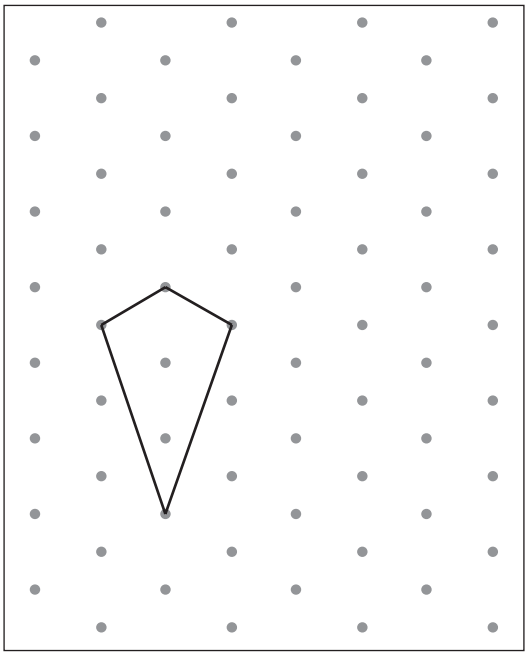
Examiner only

3. *(a)* Reflect the triangle in the line $y = -1$. [2]



(b) Elin has bought a box of kite-shaped tiles to decorate part of her bathroom wall. She does not intend to use tiles of any other shape on this part of the wall.

A scale drawing of one of the tiles has been drawn on the isometric grid below. Show how it is possible to tessellate the tiles. You should draw at least **seven** additional shapes. [2]



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4. *(a)* Simplify

(i) $3t^2 \times 4t^7$, [1]

.....

.....

(ii) $\dfrac{p^8}{p^2}$. [1]

.....

.....

(b) Solve the inequality $7x < 72 - x$. [2]

.....

.....

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5. *(a)* Express 396 as a product of prime numbers in index form. [3]

(b) Write down the smallest positive integer which should be **divided** into 396 to produce a perfect square. [1]

6. Showing all your working, **estimate** the value of

$$\frac{895{\cdot}7 \times 0{\cdot}108}{0{\cdot}315^2}$$ [3]

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7. The village of Sumston is organising a Spring Fayre to raise money for the local community centre.

(a) In the 'lucky dip', everyone wins either a toy, a pen or a pencil.
The probabilities of winning the different prizes are given in the following table.

Prize	Toy	Pen	Pencil
Probability	x	$3x$	$16x$

Find the value of x. [2]

(b) To promote the sale of raffle tickets at the Spring Fayre, a free second ticket is given with every ticket bought.



Stephen thinks this offer will double his chance of winning a prize.
Is Stephen correct?
You must explain your answer. [1]

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8. *(a)* Find the gradient of the line with equation $4y = 3x - 5$. [1]

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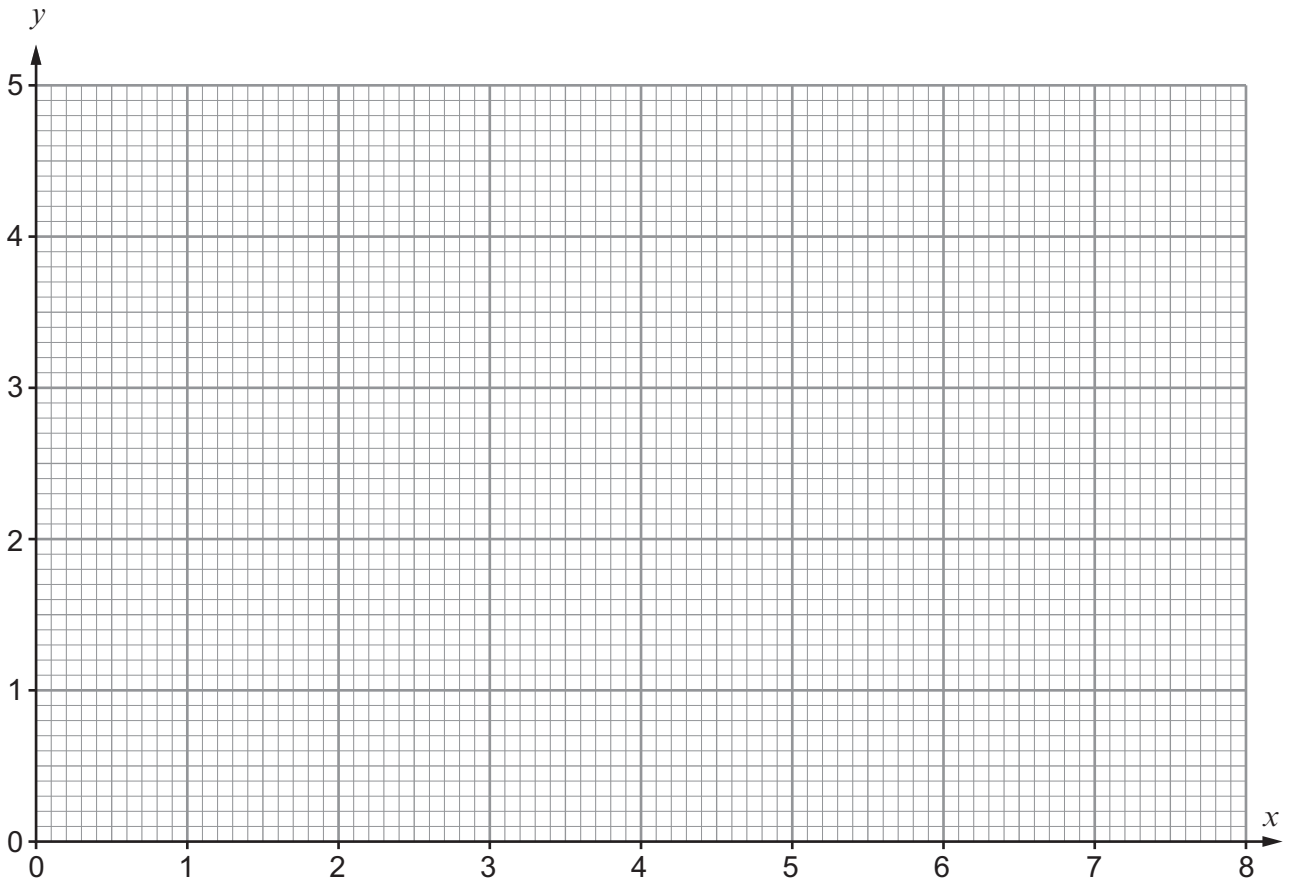
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(b) On the graph paper below, draw the straight line with equation $x + 2y = 6$. [2]

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9. *(a)* Write down an expression for the nth term of each of the following sequences.

(i) 5, 13, 21, 29, 37, … [2]

.....

.....

nth term .....

(ii) 0, 1, 4, 9, 16, 25, … [2]

.....

.....

nth term .....

(b) Here are the first five terms of a descending sequence of numbers.

126, 122, 118, 114, 110, …

The nth term is given by $130 - 4n$.

Without listing any further terms of the sequence, find the value of n that gives the first negative term.

You must show your working. [3]

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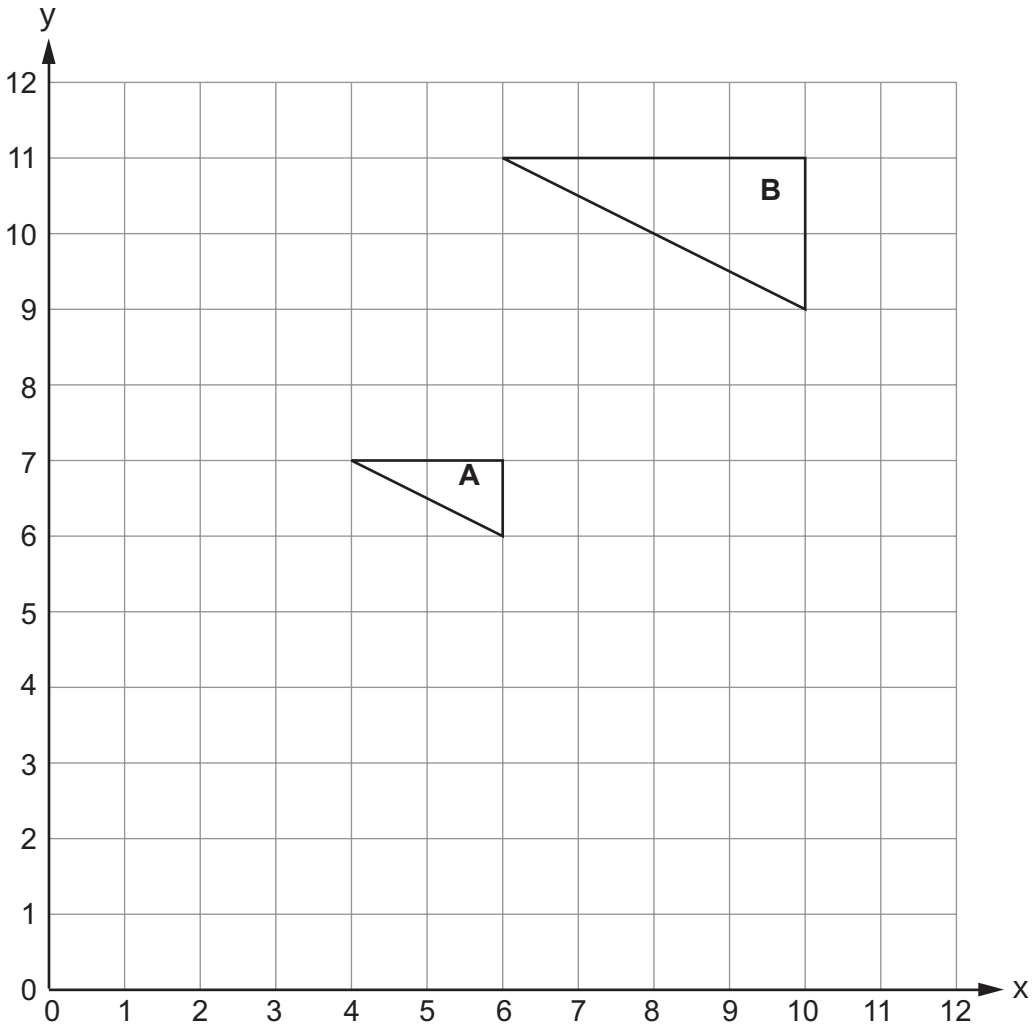
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10. Describe **fully** the transformation which maps **triangle A onto triangle B**. [3]



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11. The Barrett family want to buy new seating for their living room.
Their local Sofa Bargain Centre sells the sofas and armchairs they have chosen.

The price of two large sofas and three armchairs is £2550.
The price of one large sofa and five armchairs is £2500.

How much would two large sofas and one armchair cost?
You must use an algebraic method and you must show all your working. [5]

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12. The points, A, B, C and D lie on the circumference of a circle with centre O and $A\hat{D}C = 109°$.

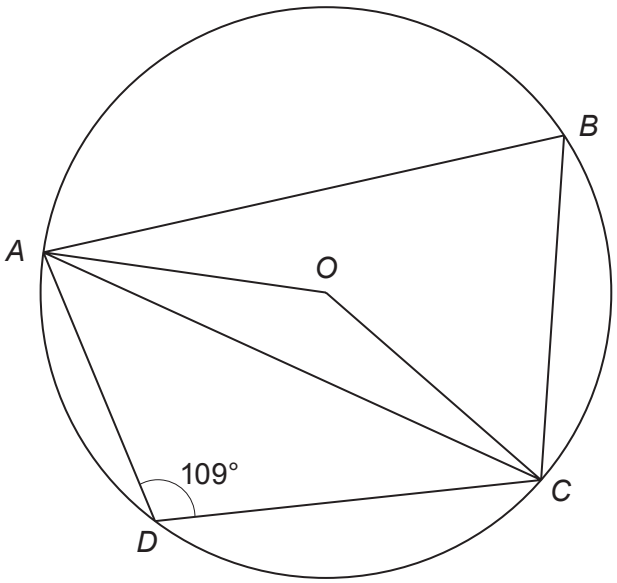


Diagram not drawn to scale

Giving reasons for your answers, calculate

(a) the size of $A\hat{B}C$, [2]

(b) the size of $A\hat{C}O$. [3]

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13. *(a)* Express $0\cdot\dot{0}\dot{8}$ as a fraction. [2]

(b) Evaluate $16^{-\frac{1}{2}}$. [2]

(c) Evaluate $(\sqrt{20} - \sqrt{5})^2$ and state whether your answer is rational or irrational. [3]

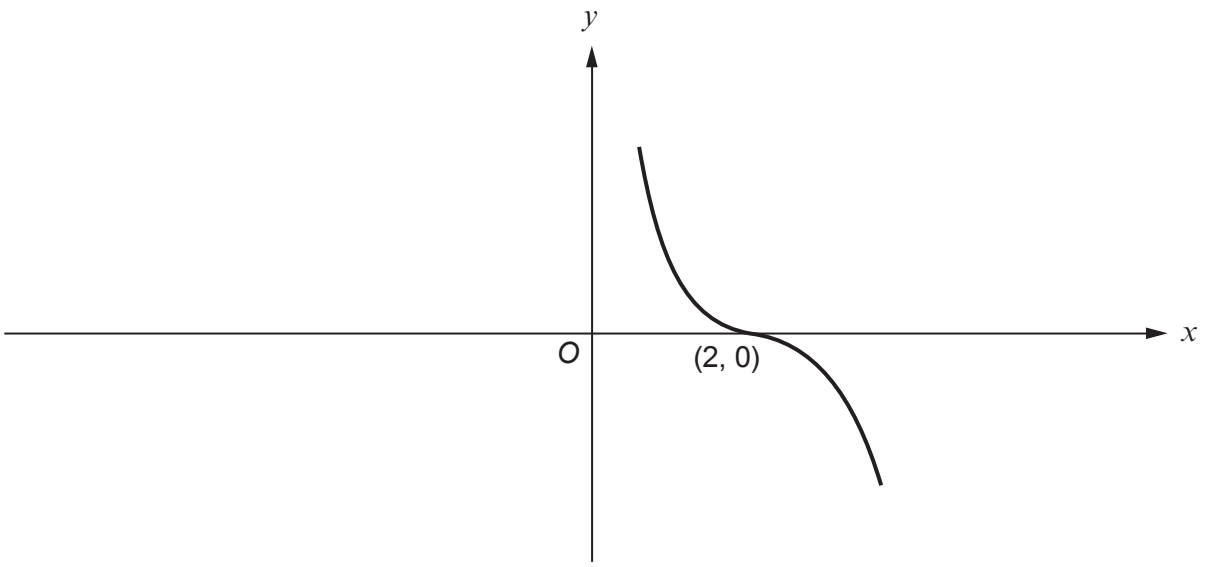
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14. The diagram shows a sketch of $y = f(x)$.

On the same diagram, sketch the curve $y = f(x - 3)$.
Mark clearly the coordinates of a point where this curve crosses an axis. [2]



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15. At a children's party, the winner of each game picks a sweet at random out of a box. At the start of the party, the box contains 6 strawberry sweets, 3 lemon sweets and 1 blackcurrant sweet.

Assuming that no child returns a sweet to the box, find the probability that

(a) the winners of the first two games pick sweets of the same flavour, [3]

(b) the blackcurrant sweet is still in the box **after** the winners of the first three games have picked their sweets. [2]

END OF PAPER

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GCSE MARKING SCHEME

MATHEMATICS UNITISED

NOVEMBER 2013

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INTRODUCTION

The marking schemes which follow were those used by WJEC for the November 2013 examination in GCSE Mathematics Unitised. They were finalised after detailed discussion at examiners' conferences by all the examiners involved in the assessment. The conferences were held shortly after the papers were taken so that reference could be made to the full range of candidates' responses, with photocopied scripts forming the basis of discussion. The aim of the conferences was to ensure that the marking schemes were interpreted and applied in the same way by all examiners.

It is hoped that this information will be of assistance to centres but it is recognised at the same time that, without the benefit of participation in the examiners' conferences, teachers may have different views on certain matters of detail or interpretation.

WJEC regrets that it cannot enter into any discussion or correspondence about these marking schemes.

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2013 November Unit 2 (non calculator) Foundation Tier	Marks	Mark Scheme (14.11.13) (FINAL VERSION) Comments (Page 1)
1. (a) Three hundred and eighty four thousand, (and) four hundred (km) (b) 960 (c) 517 (d) (i) 29 (ii) 36 (iii) 56 (iv) 8 (e) (Number of girls =) 6 (Total number of pupils = 18 + 6) (=) 24	B1 B1 B1 B1 B1 B1 B1 B1 B1 9	 FT 'their 6' if 18 ÷ 3 o.e. is seen
2. hexagon cube rhombus cylinder	B1 B1 B1 B1 4	
3. (a) impossible (b) likely	B1 B1 2	
4. (a) (i) multiply the previous term by 3 (ii) subtract 8 from the previous term (b) 20/100 × (£) 60 OR 10% of (£)60 = (£)6 and 2 × (£)6 (£) 12	B1 B1 M1 A1 4	Accept × 3 Accept – 8 Any correct method for finding 20% Ignore further working. A0 for 12% SC1 for 48 provided M0.
5. (a) 10/18 I.S.W. (= 5/9) (b) 0 or 0/18	B2 B1 3	B1 for a numerator of 10 in a fraction less than 1. B1 for a denominator of 18 in a fraction less than 1. **NB** Penalise –1 once only for use of words such as '10 out of 18', '10 in 18'. or '10:18'. When both fraction and wrong notation seen, DO NOT penalise wrong notation. SC1 for an answer of 13/21. Do not accept 'impossible'. FT 0/21 from (a) if denominator of 21 used in (a)
6. (a) $13a - 2b$ as an expression (b) (i) (£) $7n$ (ii) $x - 4$ (m)	B2 B1 B1 4	**In all parts, mark final answer.** B1 for ka + mb where k = 13 or m = –2 B1 for 13a + – 2b B1 for both 13a and – 2b given separately but not as $13a - 2b$ Ignore units. Allow 7×n or n×7 or n7. Ignore units.
7. (a) 78 (cm) (b) (0)·585 (litres) 585/1000 o.e.	B1 B1 2	
8. Sight of 3/5 3/5 × (£)180 (12 × 9 = £) 108	B1 M1 A1 3	Alternative methods: (£)180 – 2/5 × 180 M1 (180 – £) 72 B1 (£) 108 A1 OR 2/5 × (£)20 (= 8) M1 (20 – 8 = £) 12 B1 (12 × 9 = £) 108 A1

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2013 November Unit 2 (non calculator) Foundation Tier	Marks	Mark Scheme (14.11.13) (FINAL VERSION) Comments (Page 2)
9 If x = number of cartridges, correct evaluation for x≥3 for Offer A correct evaluation for x≥ 3 for Offer B for x = 3, correct evaluation for A **and** B OR working or a statement implying that at least 4 cartridges must be bought for Offer B for x = 4, correct evaluation for A **and** B OR implied correct evaluation for A and B e.g. a comparison between costs for x = 4 implied by correct extra amount of £4 for 4th cartridge for Offer B (rather than £7 for A) Conclusion that x = 4. QWC: Candidates would be expected to • show clearly how they arrived at their solution • have few errors in mathematical form, spelling, punctuation and grammar QWC2: Candidates will be expected to • present work clearly, with words explaining process or steps AND • make few if any mistakes in mathematical form, spelling, punctuation and grammar and include units (£) in their working QWC1: Candidates will be expected to • present work clearly, with words explaining process or steps OR • make few if any mistakes in mathematical form, spelling, punctuation and grammar, and include units (£) in their working	B1 B1 B1 B1 B1 QWC2 7	Offer A: £14 **and** Offer B: £21 Offer A: £21 **and** Offer B: £18 SC2 for answer of 4 with no working QWC2 Presents relevant material in a coherent and logical manner, using acceptable mathematical form, and with few if any errors in spelling, punctuation and grammar. QWC1 Presents relevant material in a coherent and logical manner but with some errors in use of mathematical form, spelling, punctuation or grammar OR evident weaknesses in organisation of material but using acceptable mathematical form, with few if any errors in spelling, punctuation and grammar. QWC0 Evident weaknesses in organisation of material, and errors in use of mathematical form, spelling, punctuation or grammar. A final unsupported statement only gets QWC0
10. Given points correctly plotted on suitable axes Coordinates are (– 4, – 3) OR (6, – 7) OR (4, 11)	B2 B1 3	B2 for 3 correct plots, B1 for 2 correct plots, B0 if all coordinates reversed. Penalty – 1 for unsuitable labelling of axes FT 'their plots', if parallelogram drawn, for final B1 only. Allow B3 if coordinates of 4th vertex given as (–4, –3) or (6, – 7) or (4, 11) with no drawing shown.

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2013 November Unit 2 (non calculator) Foundation Tier	Marks	Mark Scheme (14.11.13) (FINAL VERSION) Comments (Page 3)
11. (a) (11) 14 16 17 20 22 21 24 (26) (b) (i) 4/9 (ii) $4/9 \times 54$ $= 24$	B2 M1 A1 6	B1 for at least 4 correct entries FT their table if complete B1 for a numerator of 4 in a fraction less than 1. B1 for a denominator of 9 in a fraction less than 1. **NB** Penalise –1 for use of words such as '4 out of 9', '4 in 9'. or '4:9'. When both fraction and wrong notation seen, DO NOT penalise wrong notation. FT their (b)(i) if positive fraction less than 1.
12. Angle ABC = 78 (°) OR sight of correct obtuse angle at B of 102(°) (x =) [180 –78] ÷ 2 (x =) 51(°)	B1 M1 A1 3	Check for answers written on diagram Implies B1 FT 'their 102' ÷ 2
13. (a) Correct reflection (b) Correct tessellation of at least 7 additional interlocking kites (not all in one row in one direction)	B2 B2 4	B1 for a reflection in any horizontal line or in x = –1 or sight of the line y = –1 B1 for 3 additional correct interlocking kites (each sharing at least one common side).
14. (a) $x + 3x + 16x = 1$ $x = 1/20$ or 0.05 or equivalent ISW (b) (Statement that Stephen is incorrect **and)** a correct explanation e.g. fraction (proportion) of tickets bought would be the same.	M1 A1 E1 3	Use of 'total probability = 1' Accept 5% only if specified as a **percentage**. Accept alternative explanations; e.g. 'It may decrease his chance of winning a prize as more people may be tempted to buy tickets'.
15. (a) (i) $12t^9$ (ii) p^6 (b) (x – 2 =) $8x + 12$ $7x = -14$ or $-7x = 14$ $x = -2$ c) Method that produces at least 2 correct prime factors. Sight of correct factors (2, 2, 3, 3, 11) in any order $2^2 \times 3^2 \times 11$	B1 B1 B1 B1 B1 M1 A1 B1 8	Accept $12 \times t^9$ or $t^9 \times 12$ FT until 2nd error Correct clearing of bracket Collecting terms correctly FT $ax = b$ where $a \neq 1$and answer must be expressed as integer if fraction can be cancelled to an integer FT until 2nd error. Ignore 1s seen. FT their factors (with at least one index > 1 used). Do not ignore 1s within this product. B0 for list or sum.

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UNIT 2 - HIGHER TIER

Unit 2 GCSE Maths November 2013 Higher Tier Markscheme 14.11.13	Mark	Comment
1. <u>Option A:</u> (Total cost using option A =) 580 + 580 × 20/100 or equivalent (Total cost using option A =) (£)696 <u>Option B:</u> (Total cost using option B =) (£)120 + 12 × (£)49.50 or equivalent (Total cost using option B =) (£)714 Conclusion that Option A is cheaper AND by (£)18 Look for • relevance • spelling in at least 1 statement/sentence • clarity of text explanations, • the use of notation (watch for the use of '=', £, % being appropriate) A clear conclusion statement must be made before QWC2 can be awarded. QWC: Candidates would be expected to • clearly show how they arrived at their solution • have few errors in mathematical form, spelling, punctuation and grammar Count incorrect use of '=' in situations such as '580 × 20/100 = 116 + 580' within the 'few errors in mathematical form' QWC2: Candidates will be expected to • present work clearly, with words explaining process or steps AND • make few if any mistakes in mathematical form, spelling, punctuation and grammar and include units (£) in their final answer QWC1: Candidates will be expected to • present work clearly, with words explaining process or steps OR • make few if any mistakes in mathematical form, spelling, punctuation and grammar and include units (£) in their final answer	 M1 A1 M1 A1 B1 Q W C 2 <

Unit 2 GCSE Maths November 2013 Higher Tier Markscheme 14.11.13	Mark	Comment
4. (a) (i) $12t^9$ (ii) p^6 (b) $8x < 72$ or $-72 < -8x$ $x < 9$	B1 B1 B1 B1 4	Accept $12 \times t^9$ or $t^9 \times 12$ FT until second error B0 for use of = sign, unless replaced for final answer.
5. (a) Method that produces at least 2 correct prime factors Sight of correct factors (2, 2, 3, 3, 11) in any order $2^2 \times 3^2 \times 11$ (b) 11	M1 A1 B1 B1 4	FT until 2nd error Ignore 1s seen FT their factors (with at least 1 index >1 used) (provided 'their factors' arise from an attempt to *divide*). Do not ignore 1s within the product. B0 for a sum or list. FT from (a)
6. (Numerator is) $900 \times 0{\cdot}1$ or appropriate approximations (Denominator is) $0{\cdot}09$ or $0{\cdot}1$ 1000	B1 B1 B1 3	Accept 1000 and $0{\cdot}108$ respectively. Accept 9 or 10 if an attempt has been made to multiply numerator by 100. FT for answers from 900 to 1100 inclusive. Unsupported 900 or 1000 gets 3 marks, but do not ignore incorrect working.
7. (a) $x + 3x + 16x = 1$ $x = 1/20$ or 0.05 or equivalent ISW (b) (Statement that Stephen is incorrect **and**) a correct explanation e.g. fraction (proportion) of tickets bought would be the same.	M1 A1 E1 3	Use of 'total probability = 1' Accept 5% only if specified as a **percentage.** Accept alternative explanations such as 'It may decrease his chance of winning a prize as more people may be tempted to buy tickets'
8. (a) ¾ (b) Correct gradient (= – ½) OR correct *y*-intercept plotted (0, 3) OR any two other points calculated or plotted correctly (with no incorrect points) Points joined by one correct straight line, no stray points	B1 B1 B1 3	$y = ¾\,x - 5/4$ is insufficient, unless ¾ indicated (e.g. circled). e.g. (1, 2·5) (2, 2) (3, 1·5) (4, 1) (5, 0·5) (6, 0) Single straight line, do not ignore incorrect points joined. CAO. Line should be of 'reasonable' sufficient length (halfway across grid)
9. (a) (i) $8n - 3$ (ii) $(n-1)^2$ OR $n^2 - 2n + 1$ (b) Strategy of solving an appropriate equation or inequality $130 - 4n < 0$ or $130 - 4n = 0$ or equivalent $130 / 4$ or equivalent (position number of) 33	B2 B2 S1 M1 A1 7	B1 for $8n$ B1 for $an^2 + b$, with $a \neq 0$ OR $(an + b)^2$, with $a \neq 0$ OR $n^2 - 2n + k$ Accept a 'trial and improvement' approach provided at least two trials (one above and one below 33) Trial and improvement gives rise to –2 SC2 for unsupported '33'. O marks for unsupported –2 with no reference to position number.
10. Enlargement Scale factor of 2 Centre of enlargement at (2,3)	B1 B1 B1 3	 Accept alternative terminology e.g. 'multiplier is 2' Do not accept an incorrect statement e.g. 'shape B is twice the size of shape A' SC1 for 2 or more 'rays' correctly drawn, intersecting at (2, 3) if B0, B0, B0.

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Unit 2 GCSE Maths November 2013 Higher Tier Markscheme 14.11.13	Mark	Comment
11. $2s + 3a = 2550$, $s + 5a = 2500$	S1	Strategy of forming a pair of equations. (Do not penalise for not defining variables.)
Method to find the first variable	M1	Allow 1 slip in multiplication, but not in equated variable.
Correct first variable	A1	
Correct second variable	A1	FT 'their 1st variable' s = (£) 750, a = (£) 350
(£) 1850	A1 5	FT their values (provided S1, M1 awarded)
12. (a) Angle ABC = 71(°)	B1	Check for answers written on diagram.
Opposite angles in a cyclic quadrilateral add to 180(°)	E1	E marks depend on B marks having been awarded. Accept an alternative circle theorem quotation if it has been used appropriately.
(b) (obtuse) Angle AOC = 142(°)	B1	FT twice 'their angle ABC' (OR reflex angle AOC = 218° and 360° – 218°= 142° Angle at the centre is twice the angle at the circumference)
Angle at the centre is twice the angle at the circumference	E1	Stating the use of an isosceles triangle is not enough (must quote correct circle theorem)
Angle ACO = 19(°)	B1 5	FT 'their angle AOC'
13. (a) $x = 0{\cdot}0888.....$ $10x = 0{\cdot}8888.....$ with an attempt to subtract	M1	Or an alternative method.
8/90 or 4/45 or equivalent e.g. 88/990	A1	An answer of e.g. 0·8/9 or 8·8/99 gains M1 only. Mark final answer. Do not ignore incorrect cancelling.
(b) ¼ or 0·25	B2	B1 for 4^{-1} or $1/\sqrt{16}$ or $1/16^{1/2}$ or $(1/16)^{1/2}$
(c) $(\sqrt{(4 í 5)} - \sqrt{5})^2$ or $20 - \sqrt{20}\sqrt{5} - \sqrt{20}\sqrt{5} + 5$ $(\sqrt{5})^2$ middle term (+) 20 5 **and** rational	M1 M1 A1 7	RHS method needs 3 of 4 terms correct; accept $\sqrt{100}$ as $\sqrt{20}\sqrt{5}$
14. Translation horizontally to the right	B1	
(5, 0) indicated correctly on the *x*-axis with the correct translation.	B1 2	Accept labelling of 5 on the *x*-axis. SC1 for left shift with (-1, 0) or -1 indicated on the *x*-axis.
15. (a) either $6/10 \times 5/9$ or $3/10 \times 2/9$	B1	Must indicate 'no replacement'
$6/10 \times 5/9 + 3/10 \times 2/9$ with no incorrect additional terms	M1	
36/90 (=2/5)	A1	Do not ignore incorrect cancelling MR –1 for whole question for consistent use of incorrect total number of sweets (e.g. 9)
(b) $9/10 \times 8/9 \times 7/8$	M1	Or P(SSS) + 3P(SSL) + 3P(SLL) +P(LLL) (or its numerical equivalent)
= 7/10 OR 504/720 or equivalent	A1 5	ISW

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Surname	Centre Number	Candidate Number
Other Names		0

GCSE

4352/02

MATHEMATICS (UNITISED SCHEME)

UNIT 2: Non-Calculator Mathematics
HIGHER TIER

A.M. FRIDAY, 14 June 2013

$1\frac{1}{4}$ hours

CALCULATORS ARE NOT TO BE USED FOR THIS PAPER

ADDITIONAL MATERIALS

A ruler, a protractor and a pair of compasses may be required.

INSTRUCTIONS TO CANDIDATES

Use black ink or black ball-point pen. Do not use gel pen or correction fluid.

Write your name, centre number and candidate number in the spaces at the top of this page.

Answer **all** the questions in the spaces provided.

If you run out of space, use the continuation page at the back of the booklet, taking care to number the question(s) correctly.

Take π as 3·14.

INFORMATION FOR CANDIDATES

You should give details of your method of solution when appropriate.

Unless stated, diagrams are not drawn to scale.

Scale drawing solutions will not be acceptable where you are asked to calculate.

The number of marks is given in brackets at the end of each question or part-question.

You are reminded that assessment will take into account the quality of written communication (including mathematical communication) used in your answer to question **3**.

For Examiner's use only		
Question	**Maximum Mark**	**Mark Awarded**
1	**2**	
2	**7**	
3	**8**	
4	**6**	
5	**10**	
6	**6**	
7	**6**	
8	**7**	
9	**6**	
10	**4**	
11	**3**	
TOTAL MARK		

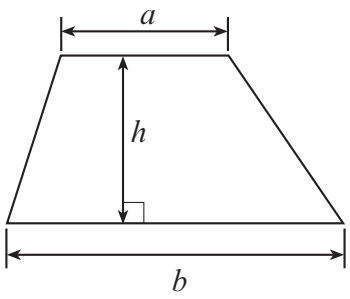
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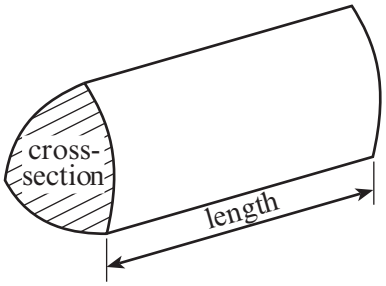
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Formula List

Area of trapezium = $\frac{1}{2}(a + b)h$

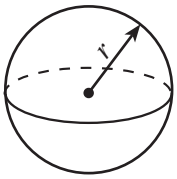


Volume of prism = area of cross-section × length



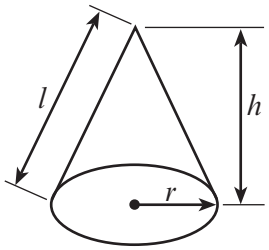
Volume of sphere = $\frac{4}{3}\pi r^3$

Surface area of sphere = $4\pi r^2$



Volume of cone = $\frac{1}{3}\pi r^2 h$

Curved surface area of cone = $\pi r l$

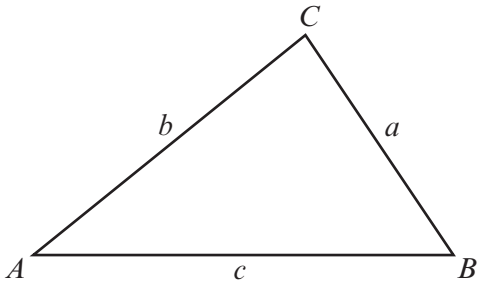


In any triangle ABC

Sine rule $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

Cosine rule $a^2 = b^2 + c^2 - 2bc\cos A$

Area of triangle = $\frac{1}{2}ab\sin C$



The Quadratic Equation

The solutions of $ax^2 + bx + c = 0$

where $a \neq 0$ are given by

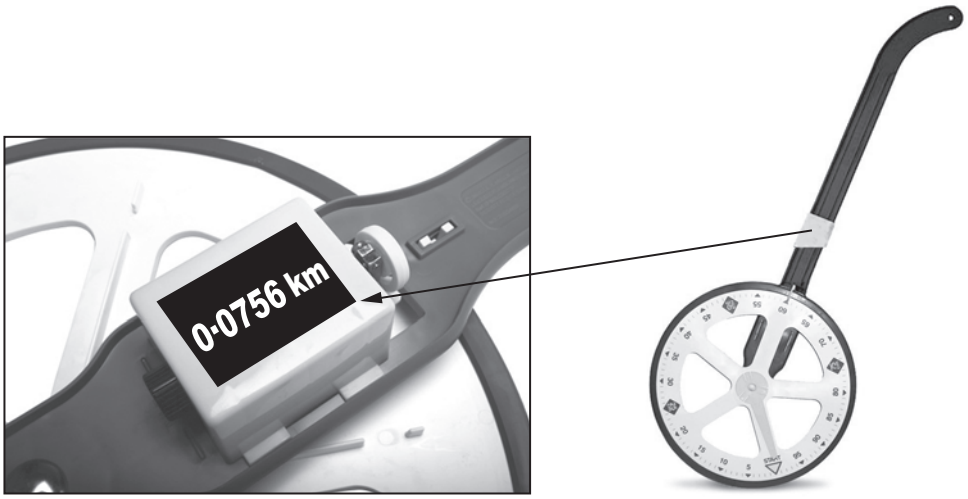
$$x = \frac{-b \pm \sqrt{(b^2 - 4ac)}}{2a}$$

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1. Sioned's trundle wheel display reads 0·0756 km.



What is this measurement in centimetres?

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[2]

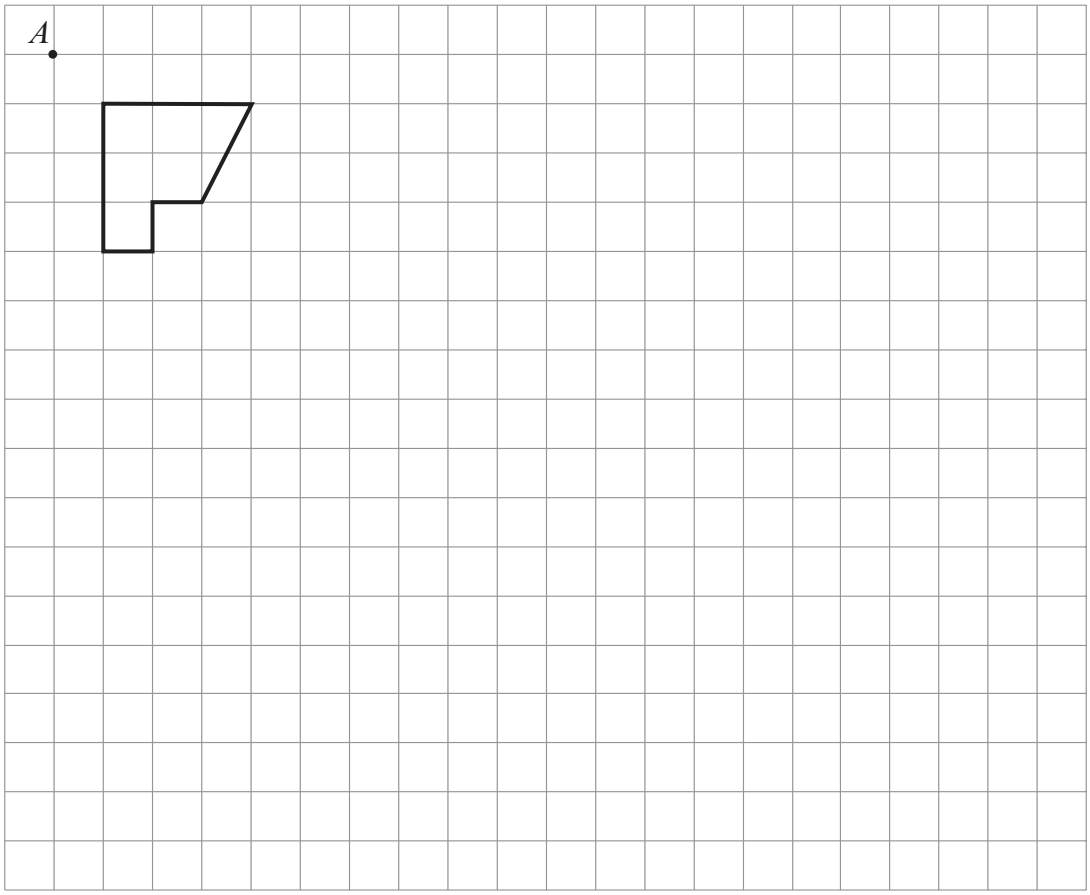
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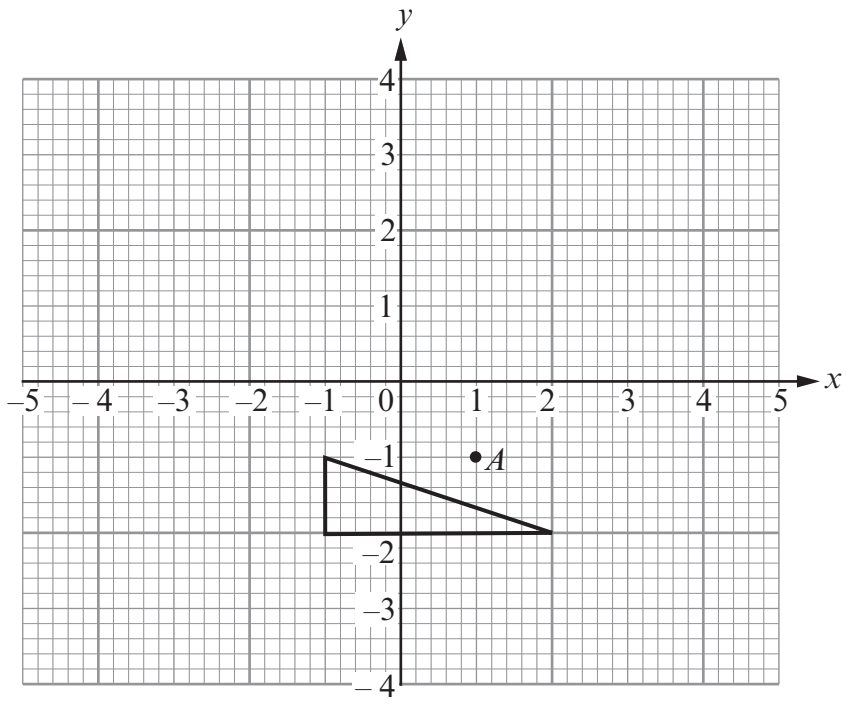
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2. *(a)* On the grid below, draw the enlargement of the given shape, using a scale factor of 3 and centre A. [3]



(b) Rotate the triangle through 90° anticlockwise about the point $A(1, -1)$. [2]

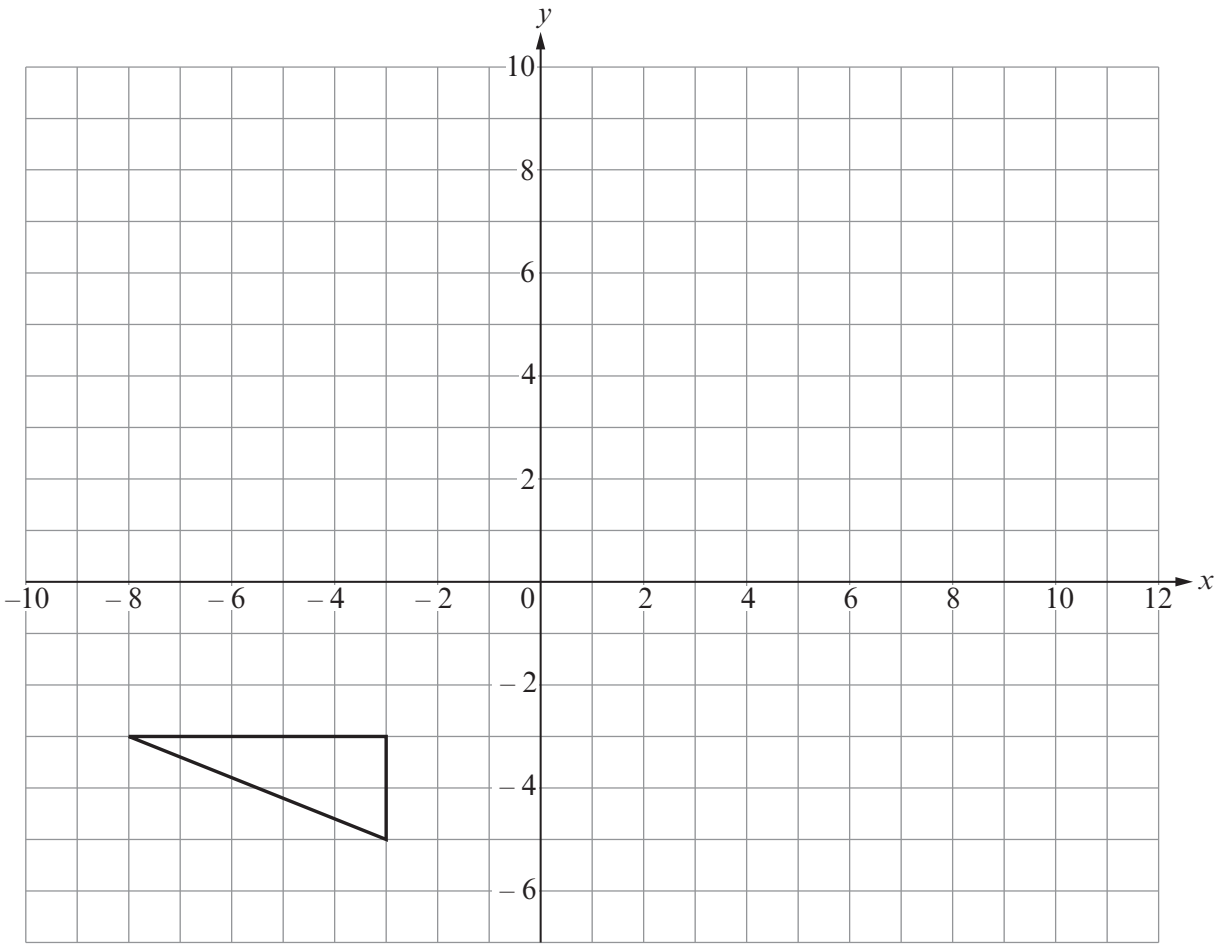


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(c) Draw the reflection of the triangle in the line $y = 2$. [2]



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3. *You will be assessed on the quality of your written communication in this question.*

Harley has saved £210 towards the cost of buying a laptop computer.
She earns £140 per week from a part-time job.
Harley can only afford to save 12% of the amount she earns each week.
She sees an advertisement, shown below, for the laptop computer she wants to buy.



Will Harley be able to buy the laptop computer at the reduced price?
You must show all your working and give a reason for your answer.

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[8]

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4. *(a)* (i) Express 3969 as a product of prime numbers in index form.

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[3]

(ii) Explain how you know that 3969 is a perfect square.

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[1]

(b) Find the *n*th term of the following sequence of numbers.

8, 20, 32, 44, 56, ...

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.....

.....

[2]

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5. *(a)* Mel is designing a new logo for her company.
She starts with an x-axis and a y-axis.
She sketches two straight lines and shades a region.
This shape will become a part of the company logo.

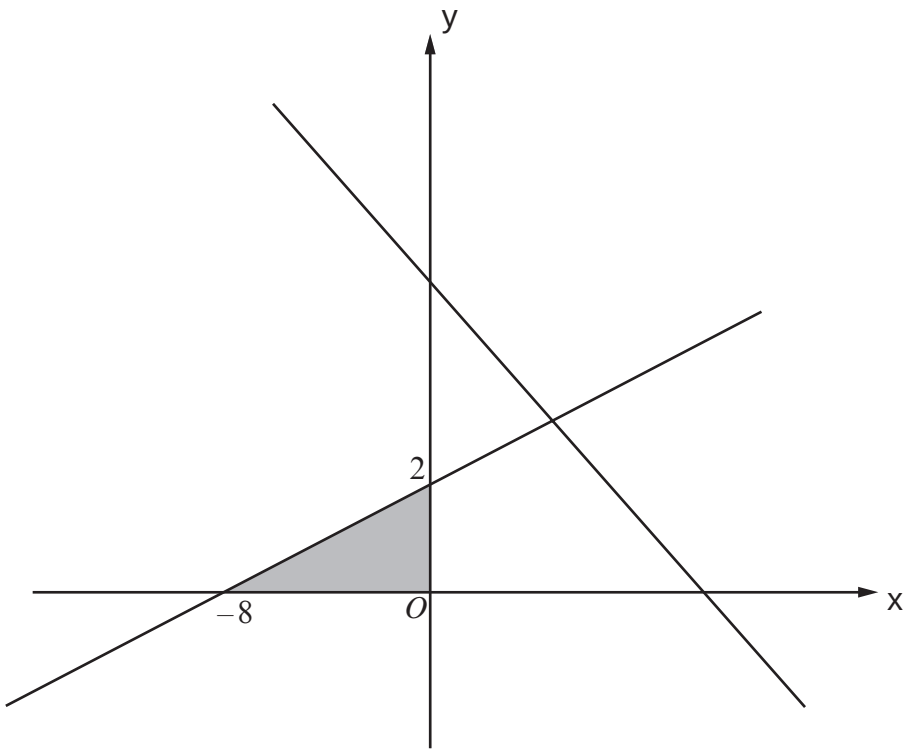


Diagram not drawn to scale

Find the three inequalities that define the shaded region.

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[6]

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(b) Solve the following simultaneous equations using an algebraic method.

$$2x + 6y = 7$$
$$5x - 4y = 8$$

[4]

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6. Yasmin carried out an experiment.
In the experiment, she shot 10 balls at a target and recorded the number of shots hitting the target.
She carried out this experiment 6 times.
The results are shown in the following table.

Experiment	1st	2nd	3rd	4th	5th	6th
Number of shots hitting the target	3	5	4	4	2	2

Yasmin decided to draw a graph showing the relative frequency of 'shots hitting the target' after 10 shots, 20 shots, 30 shots, 40 shots, 50 shots, 60 shots.

(a) Use the graph paper opposite to draw the graph of the relative frequencies.

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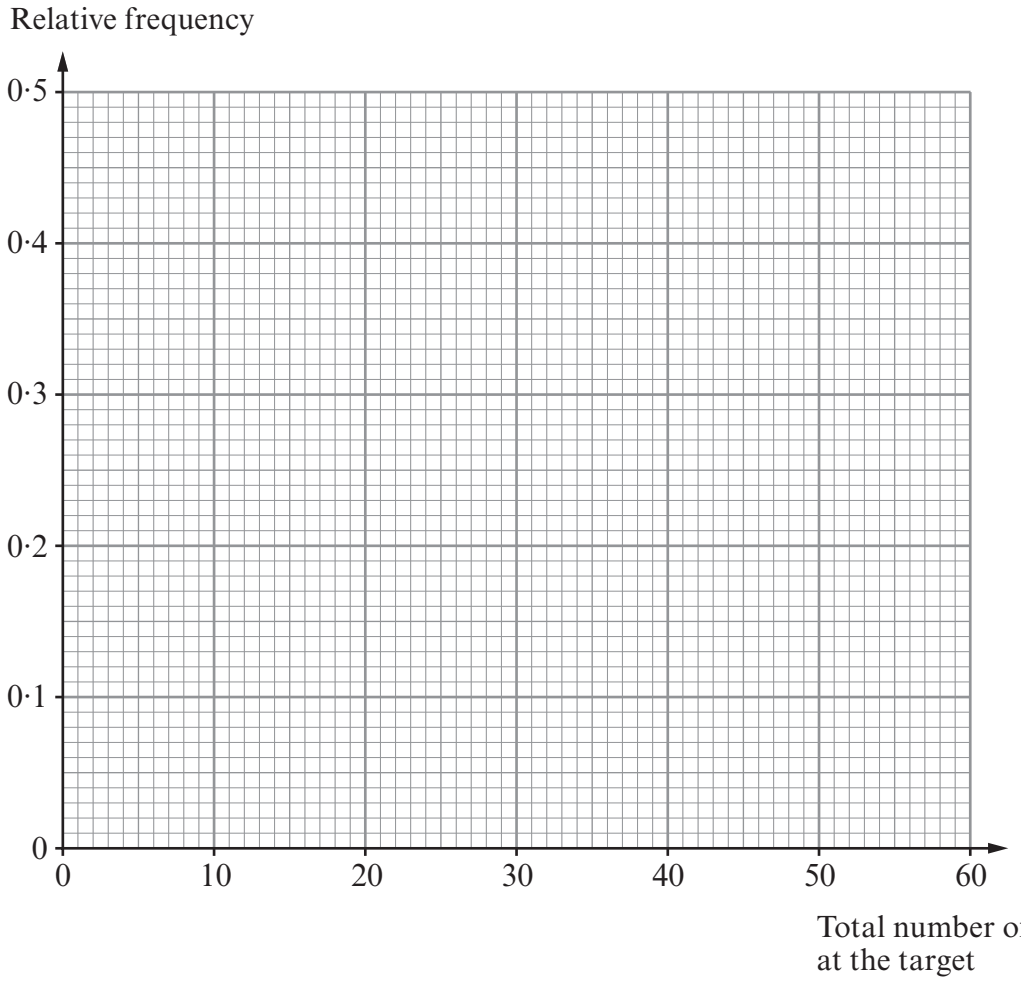
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[5]

(b) Do you consider that the experiment has been carried out enough times to give a good estimate for the probability of a shot hitting the target?
You must give a reason for your answer.

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[1]

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7. *(a)* Kirra needs to write a formula in a spreadsheet.
She needs a formula for g in terms of f.

Kirra knows that $f = 5 + 3g^2$.

Rearrange to make g the subject of the formula.

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[3]

(b) Expand and simplify $(2x + 5y)(4x - 3y)$.

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[3]

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8. *(a)* Express $0\cdot\dot{7}\dot{5}\dot{2}$ as a fraction.

[2]

(b) Simplify $\left(\pi\sqrt{20} - \pi\sqrt{5}\right)^2$, leaving your answer in terms of U

[3]

(c) Simplify $400^{-\frac{3}{2}}$.

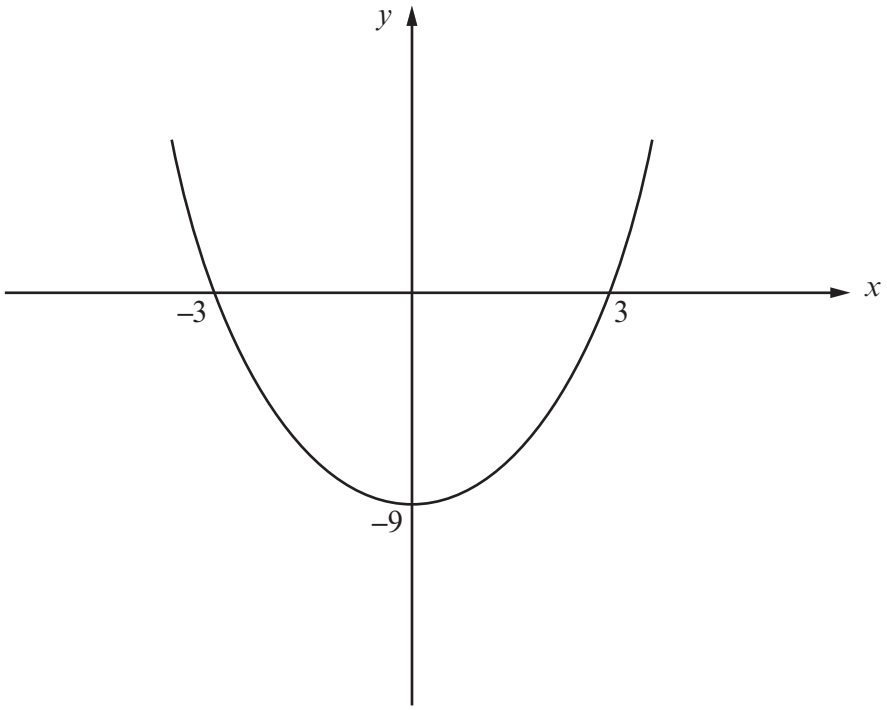
[2]

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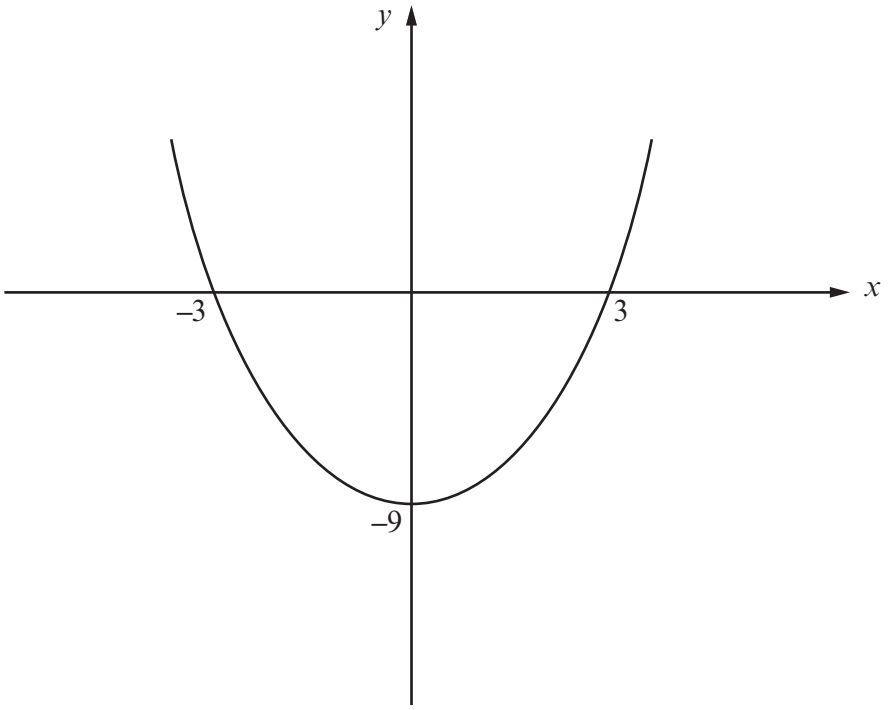
9. *(a)* The diagram shows a sketch of $y = f(x)$.
On the same diagram, sketch the curve $y = f(x) - 3$.
Mark clearly the coordinates of the point where the curve crosses the y-axis.



[2]

(b) The diagram shows another sketch of $y = f(x)$.

(i) On the same diagram, sketch the curve $y = f(x + 3)$.
Mark clearly the coordinates of any points where the curve crosses the x-axis.



[2]

(ii) State the minimum value of $y = f(x + 3)$.

Minimum value is .....

[1]

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(c) The function $y = f(x)$, as shown in the original sketches, represents one of the following equations.
State which of the following equations it is.

$y = 3x - 9$ $\quad$ $y = x^2 + 9$ $\quad$ $y = x^3$ $\quad$ $y = x^2 - 9$

$y = 3x^2$ $\quad$ $y = -x^2 - 9$ $\quad$ $y = x^3 + 9$ $\quad$ $y = -x^2 + 9$

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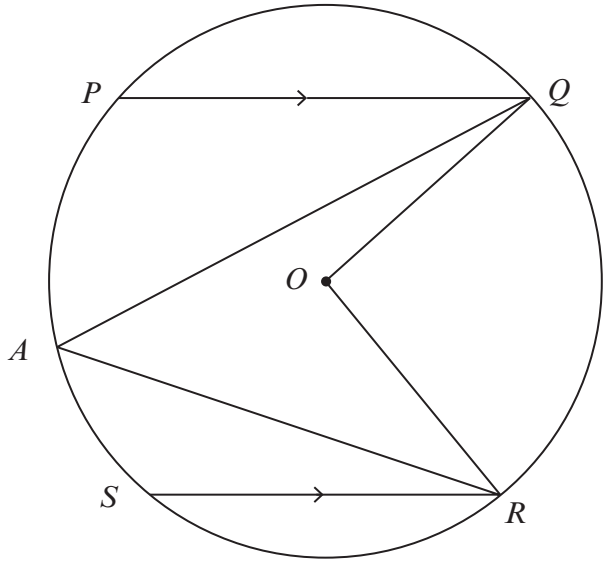
[1]

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10. The points P, Q, R, S and A lie on the circumference of the circle with centre O.
The lines PQ and SR are parallel.



You are given that $P\hat{Q}O = x^\circ$ and $O\hat{R}S = y^\circ$.
Express $Q\hat{A}R$ in terms of x and y.
You must give reasons in your answer.

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[4]

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11. A bag contains 21 raffle tickets, 16 of which are white, 4 are yellow and 1 is purple.
Two raffle tickets are drawn at random without replacement from the bag.
Calculate the probability that at least one white raffle ticket is drawn.
You **must** give your answer as a fraction in its simplest form.

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[3]

END OF PAPER

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Question number	**Additional page, if required. Write the question numbers in the left-hand margin.**

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GCSE MARKING SCHEME

MATHEMATICS - UNITISED

SUMMER 2013

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INTRODUCTION

The marking schemes which follow were those used by WJEC for the Summer 2013 examination in GCSE MATHEMATICS - UNITISED. They were finalised after detailed discussion at examiners' conferences by all the examiners involved in the assessment. The conferences were held shortly after the papers were taken so that reference could be made to the full range of candidates' responses, with photocopied scripts forming the basis of discussion. The aim of the conferences was to ensure that the marking schemes were interpreted and applied in the same way by all examiners.

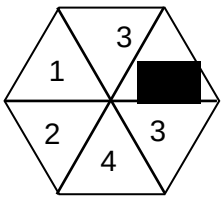
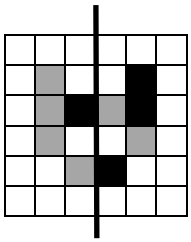
It is hoped that this information will be of assistance to centres but it is recognised at the same time that, without the benefit of participation in the examiners' conferences, teachers may have different views on certain matters of detail or interpretation.

WJEC regrets that it cannot enter into any discussion or correspondence about these marking schemes.

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Unit 1 - Higher Tier	4
Unit 2 - Foundation Tier	7
Unit 2 - Higher Tier	10
Unit 3 - Foundation Tier	12
Unit 3 - Higher Tier	15

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2013 June UNIT 2 (Non calculator) Foundation Tier	Marks	FINAL MARK SCHEME Comments
1.(a)(i) Sixty seven thousand (and) five hundred and thirty	B1	
1.(a)(ii) 8034	B1	
1.(b) (i) 31, 49 OR 40, 40	B1	Do not accept 40 on its own.
1.(b) (ii) 11	B1	
1.(b) (iii) 42	B1	
1.(b) (iv) 25	B1	
1.(b) (v) 64	B1	B0 for 8^2
1.(b) (vi) 39	B1	
1. (c) (i) 6800	B1	
1. (c)(ii) 7000	B1	
2. Weight of male (65kg) 650mg 65g 65mg Vol. of a bucket 450 litres 45ml 4.5 cm^3 (4.5litres) Cardiff to London 240cm 24km 240mm (240km) Height of woman 170m 1700cm (170cm) 170mm	✓ B4	B1 for each correct answer
3. 1,2,3,3,3,4 arranged in any sectors, but 1 per sector.  	✓ B4	B1 for only one each of 1 and 2 B2 for three 3s B1 for one 4 B0 for 1, 2, 3, 4 and 2 blank sections B0 for 1, 2, 3, 4, 5, 6.
4. (a) (i) Subtract 4 from the previous term (ii) Divide the previous term by 3	B1 B1	Accept −4. B0 for '4 numbers more'. B0 for n – 4 Accept ÷3. B0 for n/3.
4. (b) (x=) 11	B1	Accept embedded answers, 11 + 3 = 14
Parts (i) – (ii) marked at the same time 4. (c) (i) 18 (ii) e.g. difference go up by 1 (each time) add one more each time add 1 extra on each time	 B1 B1	
5. (a) Rhombus Rectangle Kite	B1 B1 B1	Note that shapes are removed.
5. (b) 	B2	B1 for 2 correct and up to 2 incorrect

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2013 June UNIT 2 (Non calculator) Foundation Tier	Marks	FINAL MARK SCHEME Comments
6.	✓	
Reading at the end of the period: 65197		
Reading at the beginning of the period: 64947		
Number of units used: 250	B1	
Cost of the units in £: 75.00	B2	F.T. their number of units in £. B1 for answer in pence.
Standing charge for the 3 months: 25.34		
Total cost: 100.34	B1	F.T. their cost of units + 25.34 If any entry is blank, look in the work area.
7. (a) $6x = 12$ $x = 2$	B1 B1	Accept embedded answers, $6\times2 - 5 = 7$ F.T. $6x$ = constant.
7. (b) $a - b$	B2	B1 for either in an expression. B2 for $1a - 1b$ B1 for $a + -b$ B1 for a and $-b$ given separately but not as $a-b$.
7. (c) 4	B1	B0 for $4\times4\times4$ OR 4^3.
7. (d) $7/8 - 2/8$ $= 5/8$	M1 A1	OR equivalent, e.g. 20/32. A0 for incorrect reductions. Allow decimals or %s, e.g. (0).875 – (0).25 = (0).625
7. (e) -1	B1	C.A.O. B0 for $-6/6$ etc
8.(a) Enlargement scale factor 3 Correct position	B2 B1	B1 for at least 3 lines correct
8.(b) Correct reflection	B2	B1 Reflect in any horizontal line or in x=2, OR the line y=2 seen
9. Saving 5.50, 5.50, 5.50 5.50 5.50, 5.50, 5.50 5.50 5.50, 3.60, 3.60 3.60 3.60, 3.60, 2.40 2.40 2.40, 2.40, 2.40 2.40 Saves 19.40	✓ B2 B1 B1 B1 B1	First correct example and the saving Final two examples F.T. for 1 error.
Look for • Spelling • Clarity of text explanations • The use of notation – watch for '=','£', 'p' being used appropriately.	QWC 2	
QWC2: Candidates will be expected to • present work clearly, with words explaining their processes or steps AND • make few if any mistakes in mathematical form, spelling, punctuation and grammar and include units in their final answer QWC1: Candidates will be expected to • present work clearly, with words explaining their processes or steps OR • make few if any mistakes in mathematical form, spelling, punctuation and grammar and include units in their final answer		QWC2 Presents material in a coherent and logical manner, using acceptable mathematical form, and with few if any errors in spelling, punctuation and grammar. QWC1 Presents material in a coherent and logical manner but with some errors in use of mathematical form, spelling, punctuation or grammar OR evident weaknesses in organisation of material but using acceptable mathematical form, with few if any errors in spelling, punctuation and grammar. QWC0 Evident weaknesses in organisation of material, and errors in use of mathematical form, spelling, punctuation or grammar.

SC2 for finding total cost
7×£5.50 = (£)38.50
4×£3.60 = (£)14.40
4×£2.40 = (£) 9.60
Total = (£)62.50
(£62.50) and subtracting the cost of at least one bottle.
SC1 for same but incorrect total cost.

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2013 June UNIT 2 (Non calculator) Foundation Tier	Marks	FINAL MARK SCHEME Comments
	✓	
10. (Saves each week = 0.12×140) (£)16.8(0) (Reduced computer cost =) 340×0.85 OR 340 - 340×0.15 (£)289	B1 M1 A1	or (6×16.80 =) 100.8(0) Or equivalent full method
Considers £210 already saved in an appropriate calculation	S1	e.g. 'their 289' – 210 (=79), or 340 – 210 (=130), or 210 + 'their 100.8(0)'
Considers the time period of savings, may be with the extra money needed e.g. 6×16.80 (=100.80), 6×17 (=102), 5×17 (= 85), 5×16.80 (=84), 79÷6 (=13…), 79 ÷16.80 (about 4.7), 79÷17 (about 4.6), or equivalent methods including estimation(s)	S1	FT their evaluations of '0.12×140' and '340×0.85'
Interpretation: e.g. 'Yes, enough time to save', 'Harley is able to save enough in the time'	E1	Do not FT for answers stating 'No' Award of E1 depends on M1 and S2 and sight of either 16.8(0) **or** 289
11.(a) Sight of (3), 8, 12, 16, 18, 20 OR 10, 20, 30, 40, 50, 60	B1	Cumulative totals FT both their cumulative totals for shots on target
3/10, 8/20, 12/30, 16/40, 18/50, 20/60 0.3, 0.4, 0.4, 0.4, 0.36, 0.33 (not 0.3)	M1 A2	Expressed as fractions, from both cumulative Conversion to decimals. A1 for any 4 correct conversions
All their 6 points plotted accurately	P1	FT their cumulative decimals Do not award if 'bars' are drawn
11.(b) 'Yes' with reason, e.g. 'all around the same' or ' between 0.3 and 0.4' or '0.3(3..)' stated as an estimate, **OR** 'No' with reason, e.g. 'still swing in results', 'results still changing'	E1	Must FT as an interpretation of stability from cumulative totals used to create the graph in (a)

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Unit 2 Higher Tier June 2013	Marks	FINAL MARK SCHEME Comments
1. Indication 100cm = 1m AND 1000m = 1km with intention to multiply, hence sight of digits 756 in a number >0.0756 7560 (cm)	M1 A1	 If units are given they must be correct
2.(a) Enlargement scale factor 3 Correct position	B2 B1	B1 for at least 3 lines correct
2.(b) Correct rotation	B2	B1 for clockwise through 90°
2.(c) Correct reflection	B2	B1 Reflect in any horizontal (line) or in x=2, OR the line y=2 seen
3. (Saves each week = 0.12×140) (£)16.8(0) (Reduced computer cost =) 340×0.85 OR 340 - 340×0.15 (£)289 Considers £210 already saved in an appropriate calculation Considers the time period of savings, may be with the extra money needed e.g. 6×16.80 (=100.80), 6×17 (=102), 5×17 (= 85), 5×16.80 (=84), 79÷6 (=13…), 79 ÷16.80 (about 4.7), 79÷17 (about 4.6), or equivalent methods including estimation(s) Interpretation: e.g. 'Yes, enough time to save', 'Harley is able to save enough in the time' QWC2: Candidates will be expected to • present work clearly, with words explaining process or steps AND • make few if any mistakes in mathematical form, spelling, punctuation and grammar and include units in their final answer QWC1: Candidates will be expected to • present work clearly, with words explaining process or steps OR • make few if any mistakes in mathematical form, spelling, punctuation and grammar and include units in their final answer	B1 M1 A1 S1 S1 E1 QWC 2	or (6×16.80 =) 100.8(0) Or equivalent full method e.g. 'their 289' – 210 (=79), or 340 – 210 (=130), or 210 + 'their 100.8(0)' FT their evaluations of '0.12×140' and '340×0.85' Do not FT for answers stating 'No' Award of E1 depends on M1 and S2 and sight of either 16.8(0) **or** 289 QWC2 Presents relevant material in a coherent and logical manner, using acceptable mathematical form, and with few if any errors in spelling, punctuation and grammar. QWC1 Presents relevant material in a coherent and logical manner but with some errors in use of mathematical form, spelling, punctuation or grammar OR evident weaknesses in organisation of material but using acceptable mathematical form, with few if any errors in spelling, punctuation and grammar. QWC0 Evident weaknesses in organisation of material, and errors in use of mathematical form, spelling, punctuation or grammar.
4.(a)(i) Method that produces at least 2 correct prime factors Sight of correct factors (3, 3, 3, 3, 7, 7) $3^4 \times 7^2$ (ISW)	M1 A1 B1	Before 2nd error Ignore 1s seen FT their factors (with at least 1 index >1 used). Do not ignore ones within the product
4.(a) (ii) Explanation, e.g. all even powers, 63^2	E1	Do not accept general definitions of square numbers
4(b) 12n - 4	B2	B1 for sight of 12n

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Unit 2 Higher Tier June 2013	Marks	FINAL MARK SCHEME Comments
5.(a) $y \geq 0$ or $y > 0$ $x \leq 0$ or $x < 0$ For straight line: c = 2 Gradient is 2/8 (= ¼) $y \leq x/4 + 2$ or $y < x/4 + 2$ or equivalent	B1 B1 B1 B1 B2	 Do not ISW, but then FT gradients of – ¼ , 4 and -4 Accept unsimplified gradient for B2 or B1 FT their gradient (± ¼, ±4) for m, do not FT c B1 for y… x/4 + 2 or equivalent, with >, ≥ or =
5.(b) Method to solve to eliminate one variable One variable correct Method to find the second variable Second variable correct	M1 A1 m1 A1	Allow 1 error but not in the equated variable FT their 1st variable provided M1 awarded **x = 2** **y = ½** Unsupported answer only is no marks.
6.(a) Sight of (3), 8, 12, 16, 18, 20 OR 10, 20, 30, 40, 50, 60 3/10, 8/20, 12/30, 16/40, 18/50, 20/60 0.3, 0.4, 0.4, 0.4, 0.36, 0.33 All their 6 points plotted accurately	B1 M1 A2 P1	Cumulative totals FT both their cumulative totals for shots on target Expressed as fractions, from both cumulative Conversion to decimals. A1 for any 4 correct conversions FT their cumulative decimals Do not award if 'bars' are drawn
6.(b) 'Yes' with reason, e.g. 'all around the same' or ' between 0.3 and 0.4' or '0.3(3..)' stated as an estimate, **OR** 'No' with reason, e.g. 'still swing in results', 'results still changing'	E1	Must FT as an interpretation of stability from cumulative totals used to create the graph in (a)
7.(a) $f - 5 = 3g^2$ $g^2 = (f - 5)/3$ $g = (\pm)\sqrt{\{(f - 5)/3\}}$	 B1 B1 B1	Accept appropriate negative equivalents FT until 2nd error Quotient all divided by 3 Square root must be clearly over complete quotient
7.(b) $8x^2 + 20xy - 6xy - 15y^2$ $8x^2 + 14xy - 15y^2$ (ISW)	B2 B1	B1 for any 2 of the 3 or 4 terms correct FT from B1 for equivalent level of difficulty
8.(a)10x =7.5252.. and 1000x= 752.52…with attempt to subtract 745/990 (ISW)	M1 A1	Or equivalent Watch for slips in the denominator! A final answer of 74.5/99 is M1, A0
8.(b) $\pi^2(\sqrt{(4\times5)} - \sqrt{5})^2$ OR $20\pi^2 - 2\pi^2\sqrt{20}\sqrt{5} + 5\pi^2$ $\pi^2(\sqrt{5})^2$ middle term (±) $20\pi^2$ $5\pi^2$	M1 M1 A1	 If error is not considering π^2 correctly, leading to answers of 5π or 5, then award SC1
8.(c)$1/20^3$or 20^{-3} or 8000^{-1} or $1/\sqrt{64\ 000\ 000}$ or $1/ 64\ 000\ 000^{1/2}$ 1/8000 (ISW)	M1 A1	
9.(a) Correct sketch (shift down) (0, -12) indicated on the correct sketch	B1 B1	 Accept -12 appropriately indicated. Depends on the first B1
9.(b)(i) Sketch with shift to the left Passes through (0,0) and(-6,0) with (-6,0) indicated on the correct sketch (ii) -9	B1 B1 B1	 Depends on the first B1 Accept -6 appropriately indicated Accept FT from their last sketch, but do not accept spurious values. If given in coordinate notation mark the y value.
9.(c) $y = x^2 - 9$ selected	B1	
10. Sight of a parallel line from the centre OR perpendicular line through the centre to each of the parallel lines <QOR = x+y Statement: Angle and the centre is twice the angle at the circumference **AND** <QAR = (x+y)/2 or equivalent	S1 B1 B2	S1 for statement of doing this, OR statement 'alternate angles' May be indicated on the diagram May be indicated on the diagram B1 for <QAR = (x+y)/2 or equivalent *An unsupported answer of <QAR = (x+y)/2 or equivalent is awarded B3*
11. Use of 1 – P(no white) OR other **complete** method = 1 – 5/21 x 4/20 = 20/21	S1 M1 A1	P(WW') + P(W'W) + P(WW) Calculations showing correct sum of products of probabilities without replacement CAO. Must be in its simplest form

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Surname	Centre Number	Candidate Number
Other Names		0

GCSE

4352/02

MATHEMATICS (UNITISED SCHEME)

UNIT 2: Non-Calculator Mathematics
HIGHER TIER

P.M. TUESDAY, 15 January 2013

$1\frac{1}{4}$ hours

CALCULATORS ARE NOT TO BE USED FOR THIS PAPER

INSTRUCTIONS TO CANDIDATES

Use black ink or black ball-point pen. Do not use gel pen or correction fluid.

Write your name, centre number and candidate number in the spaces at the top of this page.

Answer **all** the questions in the spaces provided.

If you run out of space, use the continuation page at the back of the booklet, taking care to number the question(s) correctly.

Take π as 3·14.

INFORMATION FOR CANDIDATES

You should give details of your method of solution when appropriate.

Unless stated, diagrams are not drawn to scale.

Scale drawing solutions will not be acceptable where you are asked to calculate.

The number of marks is given in brackets at the end of each question or part-question.

You are reminded that assessment will take into account the quality of written communication (including mathematical communication) used in your answer to question **1**.

For Examiner's use only		
Question	**Maximum Mark**	**Mark Awarded**
1	**7**	
2	**3**	
3	**4**	
4	**4**	
5	**4**	
6	**5**	
7	**7**	
8	**4**	
9	**6**	
10	**4**	
11	**4**	
12	**8**	
13	**5**	
TOTAL MARK		

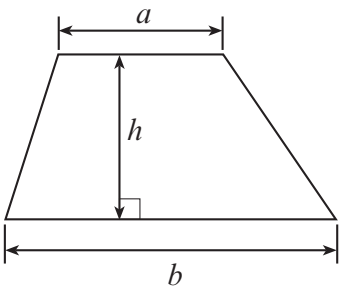
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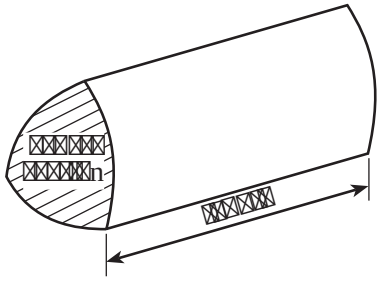
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Formula List

Area of trapezium $= \frac{1}{2}(a + b)h$

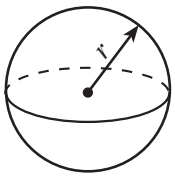


Volume of prism = area of cross-section × length



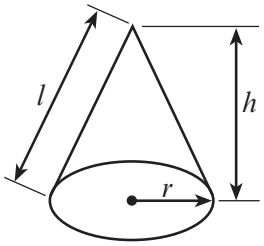
Volume of sphere $= \frac{4}{3}\pi r^3$

Surface area of sphere $= 4\pi r^2$



Volume of cone $= \frac{1}{3}\pi r^2 h$

Curved surface area of cone $= \pi rl$

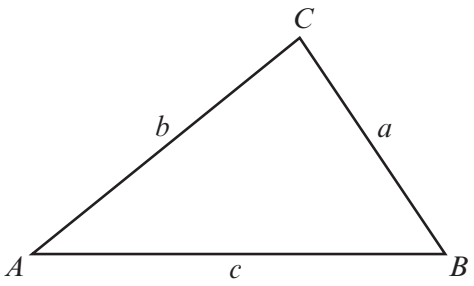


In any triangle ABC

Sine rule $\dfrac{a}{\sin A} = \dfrac{b}{\sin B} = \dfrac{c}{\sin C}$

Cosine rule $a^2 = b^2 + c^2 - 2bc\cos A$

Area of triangle $= \frac{1}{2}ab\sin C$



The Quadratic Equation

The solutions of $ax^2 + bx + c = 0$ where $a \neq 0$ are given by

$$x = \frac{-b \pm \sqrt{(b^2 - 4ac)}}{2a}$$

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1. *You will be assessed on the quality of your written communication in this question.*

Ms Franks needs a total of £1340 to buy a car.
She already has £584 in a savings account.
Ms Franks earns £1260 per month.
She adds 15% of her salary each month to her savings account.
How many months will it take Ms Franks to save enough to buy the car?
You must show all your working.

[7]

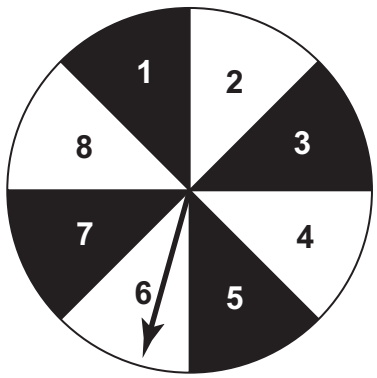
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2. Graham is thinking of setting up a 'spinner and dice stall' at his school's open evening to raise funds for a trip.
He needs to know some probabilities so that he can decide on the prizes.

He intends to spin the spinner and throw the dice shown below at the same time.



The score on the spinner is added to the score on the dice to obtain the total score.
Find the probability that the total score will be 14.

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[3]

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Examiner only

3. *(a)* Make q the subject of the following formula.

$$3q + h^2 = m$$

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[2]

(b) Solve $\frac{3x}{2} = 15$.

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[2]

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Turn over.

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4. The table shows values of $y = 3x^2 + 2x - 10$ for values of x from -4 to 3.

x	-4	-3	-2	-1	0	1	2	3
$y = 3x^2 + 2x - 10$	30		-2	-9	-10	-5	6	23

(a) Complete the table above.

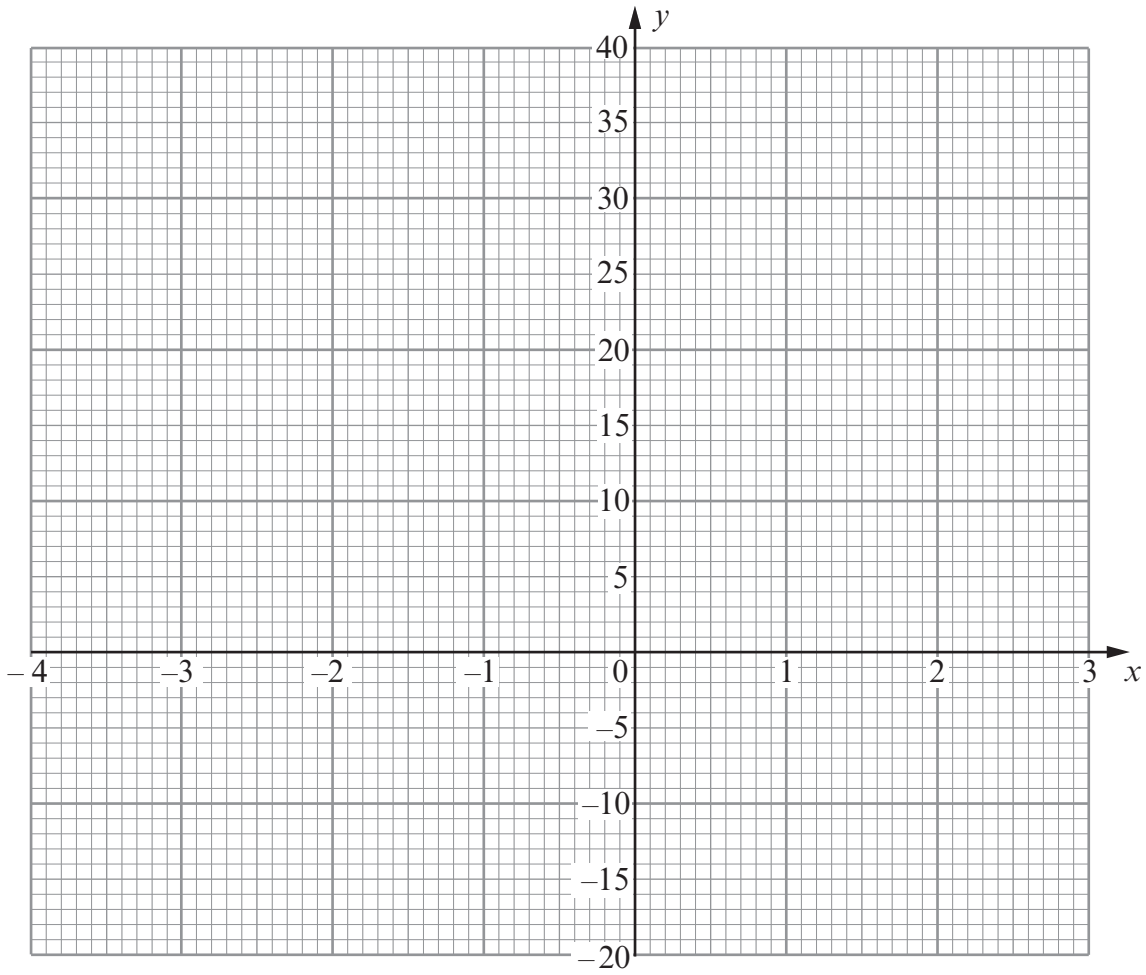
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[1]

(b) On the graph paper below, draw the graph of $y = 3x^2 + 2x - 10$ for values of x from -4 to 3. [2]



(c) Write down the x-coordinates of the points where the graph of $y = 3x^2 + 2x - 10$ intersects the x-axis.

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[1]

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5. *(a)* Find the *n*th term for the following sequence.

12, 9, 6, 3, 0, –3, ...

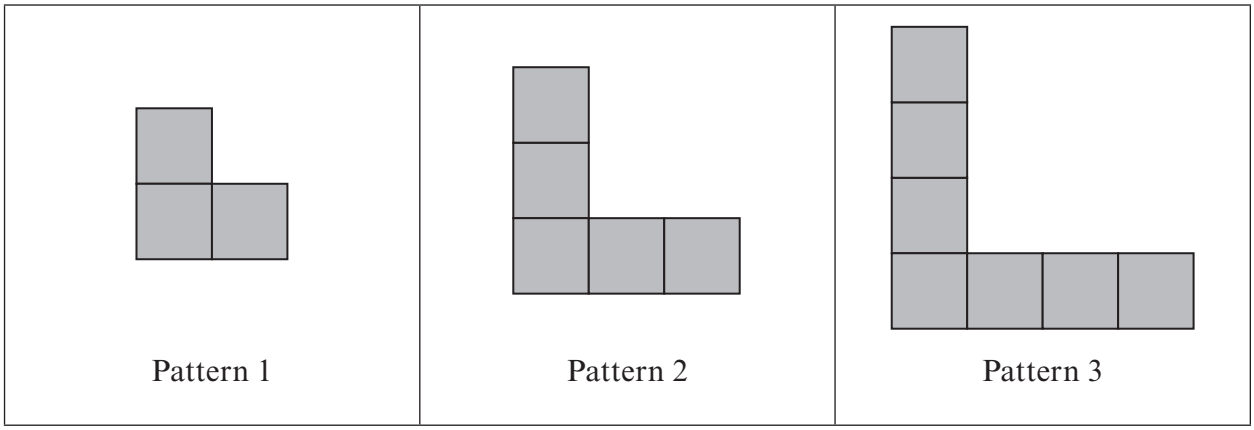
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[2]

(b) Patterns are made using small squares.



Pattern 1 | Pattern 2 | Pattern 3

Find an expression for the number of squares in Pattern *n*.

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[2]

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6. *(a)* Rafi has been asked to paint a region on a coordinate grid.
He is given the following criteria.
The region must be such that

- $y \leqslant x$
- $x \leqslant 1$
- $y \geqslant -2$

Use the grid below to show the region that Rafi needs to paint.

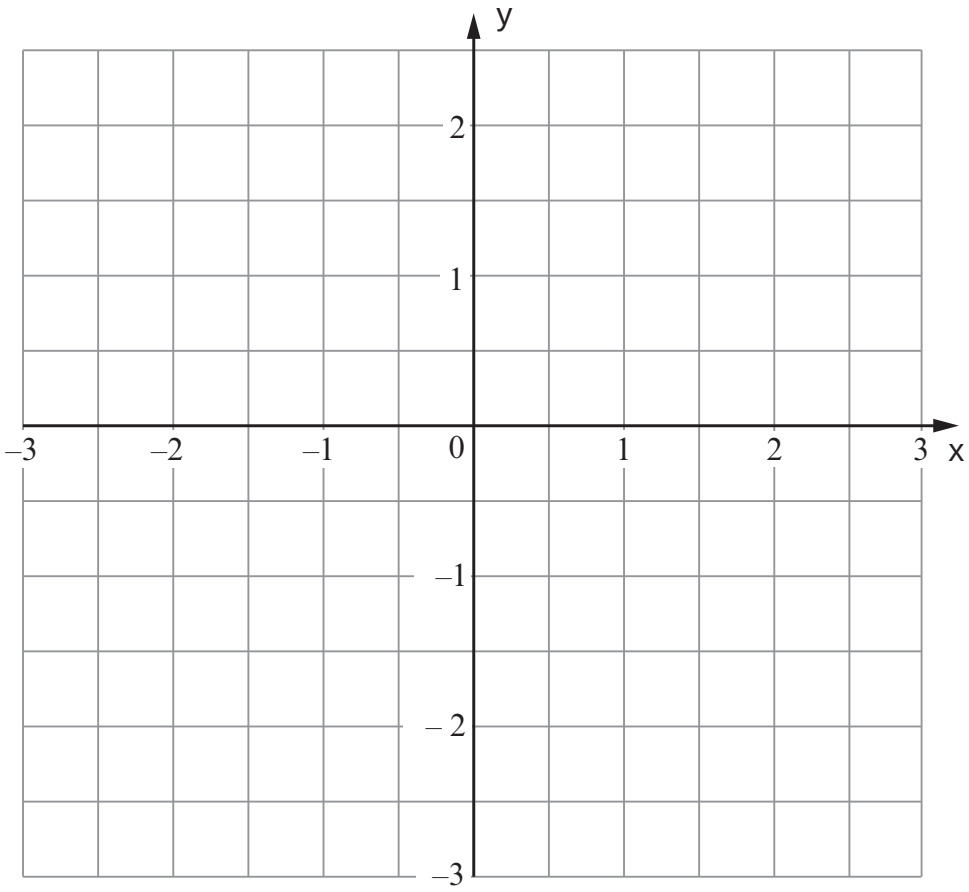
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[3]

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(b) Solve $8x < 3x + 40$.

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[2]

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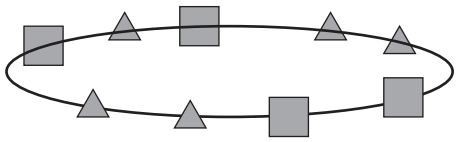
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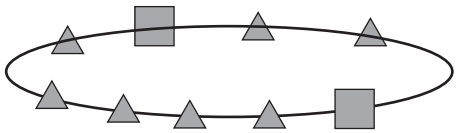
Examiner only

7. Catrin and Susie both have necklaces with chunky beads.
They notice that they have the same types of beads, but different numbers of each bead.
The beads are either cubes or square based pyramids.
All the cubes are identical.
All the square based pyramids are identical.

Catrin's necklace

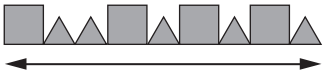


Susie's necklace

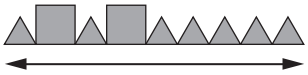


The girls both take the beads off their necklaces and place them in straight lines.

Catrin's beads



Susie's beads



Diagrams not drawn to scale

(a) Calculate the length of an edge of the base of a pyramid and the length of an edge of a cube.
You must use an algebraic method.

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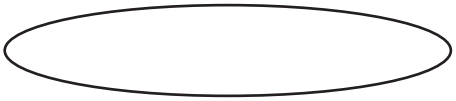
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[5]

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(b) Catrin's necklace string is 80 cm long.



How many extra cubic beads can Catrin place on her necklace?

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[2]

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8. *(a)* Arrange the following numbers in ascending order.

2100 $2{\cdot}4 \times 10^{-3}$ $2{\cdot}4 \times 10^{3}$ 10^{3}

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Smallest .... Largest

[2]

(b) Evaluate $6 \times 10^{13} + 9 \times 10^{13}$, giving your answer in standard form.

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[2]

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9. Use the following to find the equation of a straight line.

- The point that is halfway between (3, 20) and (–3, 16) lies on the straight line.
- When (–1, 10) is reflected in the y-axis, it gives another point on the straight line.

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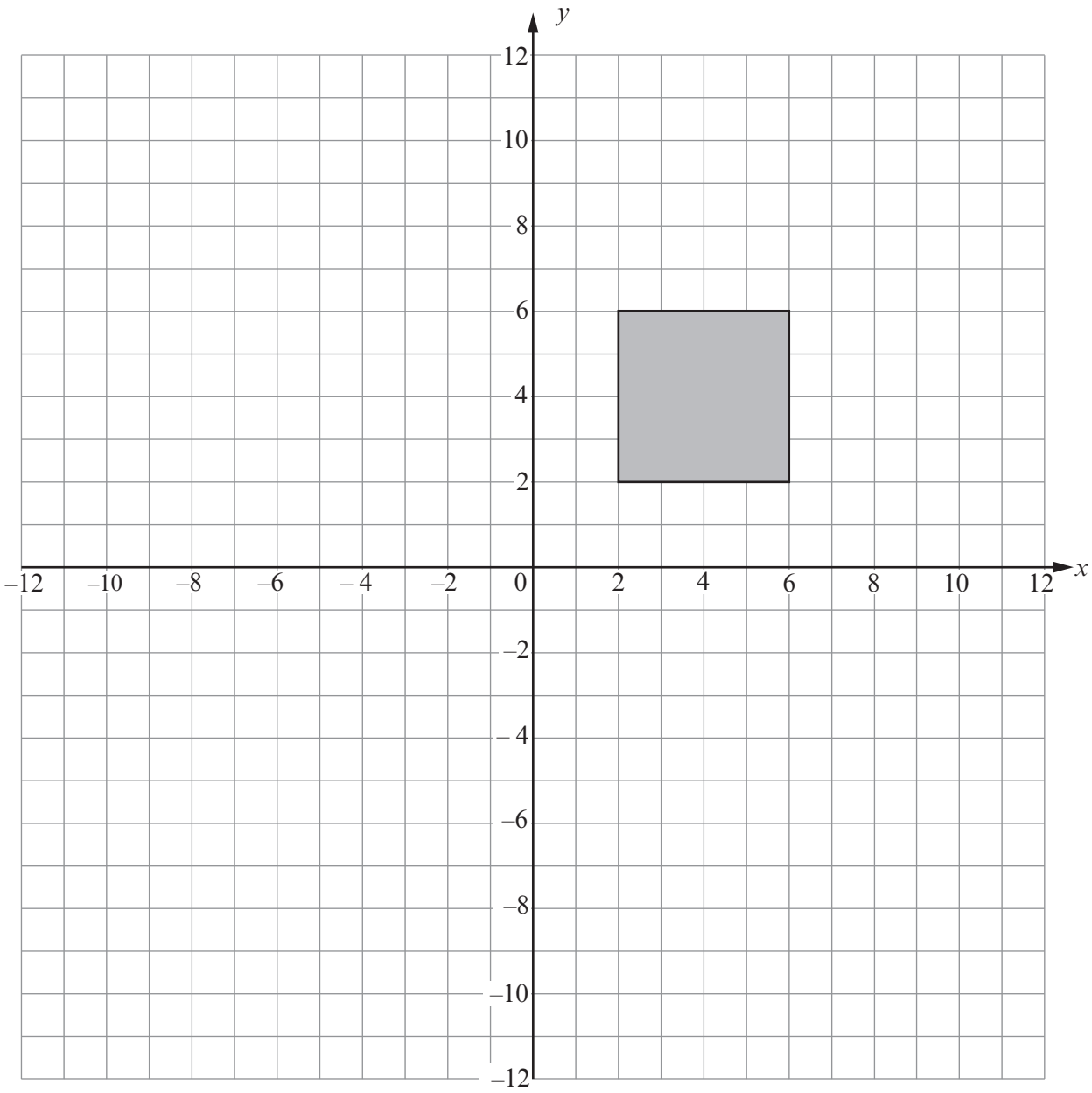
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[6]

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10. *(a)* Rotate the square through 90° clockwise about the point (2, 1).



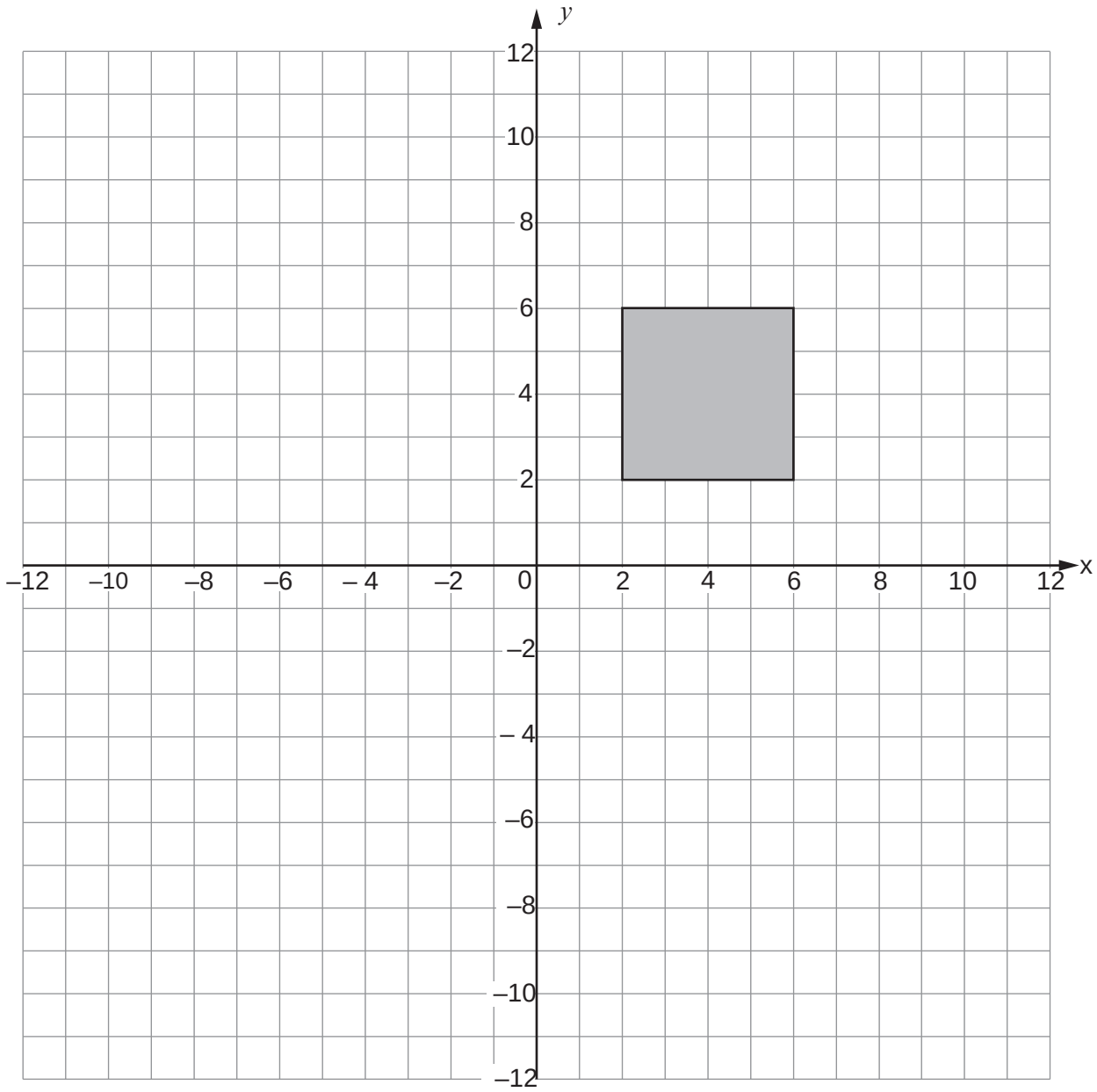
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(b) Enlarge the square shown on the grid below by a scale factor of $-\frac{1}{2}$ using (0, 0) as the centre of enlargement.



[2]

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11. The diagram shows a circle with centre O.
The straight lines RT and ST are tangents to the circle, meeting the circle at B and C respectively.

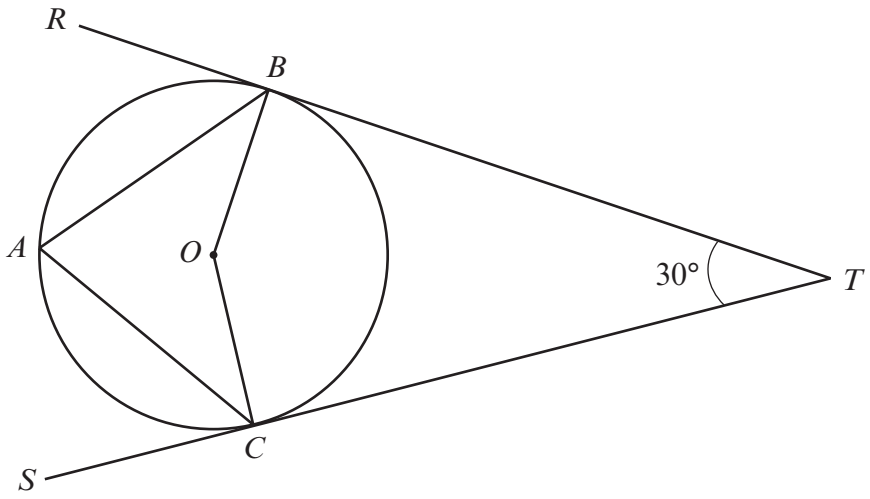


Diagram not drawn to scale

Given that $B\hat{T}C = 30^{\circ}$, calculate the size of $B\hat{A}C$.
You must give reasons in your solution.

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[4]

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12. *(a)* Evaluate 19^0.

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[1]

(b) Find the value of $(\sqrt{80} - \sqrt{5})^2$.

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[3]

(c) Express $0{\cdot}4\dot{2}\dot{8}$ as a fraction.

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[2]

(d) Simplify $(U + 3)(U - 3)$.
Give your answer in terms of U

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13. A bowl contains 25 beans.
There are 6 kidney beans, 9 pinto beans and 10 black-eyed beans.
Two beans are selected at random from the bowl, without replacement.

(a) Calculate the probability that both of the beans are black-eyed beans.

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[2]

(b) Calculate the probability that at least one pinto bean is selected.

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[3]

END OF PAPER

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Question number	Additional page, if required. Write the question numbers in the left-hand margin.

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Question number	**Additional page, if required. Write the question numbers in the left-hand margin.**

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GCSE MARKING SCHEME

MATHEMATICS - UNITISED

JANUARY 2013

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INTRODUCTION

The marking schemes which follow were those used by WJEC for the January 2013 examination in GCSE MATHEMATICS - UNITISED. They were finalised after detailed discussion at examiners' conferences by all the examiners involved in the assessment. The conferences were held shortly after the papers were taken so that reference could be made to the full range of candidates' responses, with photocopied scripts forming the basis of discussion. The aim of the conferences was to ensure that the marking schemes were interpreted and applied in the same way by all examiners.

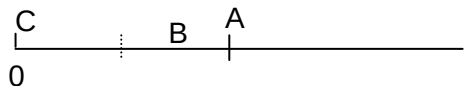
It is hoped that this information will be of assistance to centres but it is recognised at the same time that, without the benefit of participation in the examiners' conferences, teachers may have different views on certain matters of detail or interpretation.

WJEC regrets that it cannot enter into any discussion or correspondence about these marking schemes.

	Page
Unit 1 – Foundation Tier	1
Unit 1 – Higher Tier	4
Unit 2 – Foundation Tier	7
Unit 2 – Higher Tier	10
Unit 3 – Foundation Tier	14
Unit 3 – Higher Tier	17

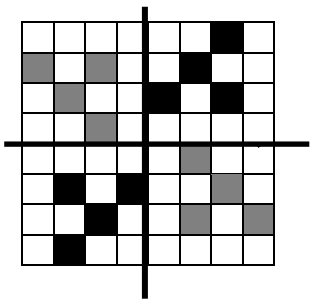
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UNIT 2 - FOUNDATION TIER

UNIT 2 (Non calculator) Foundation Tier	Marks	Final Mark Scheme Comments
1. (a) (i) 19526	B1	
1. (a) (ii) Thirty thousand and fifty four	B1	Ignore extra words such as 'pounds. Ignore slight misspellings.
1. (b) (i) 32, 38	B1	
1. (b) (ii) 57	B1	
1. (b) (iii) 35	B1	
1. (c) (i) 36800	B1	
1. (c) (ii) 36830	B1	
1. (d) (i) 42, 48	B1, B1	–1 for each extra incorrect number.
1. (d) (ii) 49	B1	B1 for 7×7 OR 7^2, but B0 for 7×7=wrong number. B0 for 7.
2. mm OR cm OR m g km l(itres)	B1 B1 B1 B1	
3. (a) 9	B1	
3. (b) 	B1 B1 B1	A should be at the half way mark. B should be between 1/4 and 1/2 exclusive (Between the c and h of 'Rachel') C should be at 0.
4. (a) (i) Subtract 9 from the previous term (ii) Multiply the previous term by 4	B1 B1	Accept − 9 Accept × 4
4. (b) (0).15	B1	
4. (c) 40/100 × 70 = 28	M1 A1	Any correct method for finding 40% M1, A0 for incorrect units, e.g. 28% or £28
4. (d) For the '8' sequence (+ 3) For the '12' sequence (+ 3) 27	B1 B1 B1	8, 16, 24, (32), ... OR 11, 19, 27, (35), ... 12, 24, ... OR 15, 27, ... Award B3 for an answer of 27. SC1 for 24.

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UNIT 2 (Non calculator) Foundation Tier	Marks	Final Mark Scheme Comments
Indirect marking - Tick marked 5. Cost of entrance fee for children = (£)8×5×9 OR 8×45 = (£) 360 Total cost of adult tickets = (£) 523 – 360 – 115 = (£)48 Number of adults = 48/12 = 4 Look for • spelling • clarity of text explanations, • the use of notation (watch for the units (£, p) QWC2: Candidates will be expected to • present work clearly, with words explaining process or steps AND • make few if any mistakes in mathematical form, spelling, punctuation and grammar in their final answer QWC1: Candidates will be expected to • present work clearly, with words explaining process or steps OR make few if any mistakes in mathematical form, spelling, punctuation and grammar in their final answer.	P M1 A1 M1 A1 M1 A1 QWC 2	 F.T. 'their 360' F.T. 'their 48' QWC2 Presents relevant material in a coherent and logical manner, using acceptable mathematical form, and with few if any errors in spelling, punctuation and grammar. QWC1 Presents relevant material in a coherent and logical manner but with some errors in use of mathematical form, spelling, punctuation or grammar. OR Evident weaknesses in organisation of material but using acceptable mathematical form, with few if any errors in spelling, punctuation and grammar. QWC0 Evident weaknesses in organisation of material, and errors in use of mathematical form, spelling, punctuation and grammar.
Indirect marking - Tick marked 6. Either ¼ of £600 = (£)150 1/5 of £600 = (£)120 Remainder = (£) 330 Fraction = 330/600 = 11/20. If 'their 330/600 cannot be reduced then A0 OR ¼ + 1/5 = 9/20 Remainder = 1 – 9/20 =11/20	P B1 B1 M1 A1	 Any incorrect method for adding fractions, e.g. 2/9 gets M0 C.A.O. F.T. their first part. .55 OR 55% get M1, A0
7. 	B2	B1 for each quadrant
8. (a) 4x – 2y	B2	B1 for either in an expression of the form af(x) ± bg(y) Allow B1 for 4–2y OR 4x–2 etc 4x and –2y separated gets B1 4x+–2y gets B1
8. (b) (i) (y=) 72	B1	Accept embedded answers such as 72/6 = 12
8. (b) (ii) 7x = 28 x = 4	B1 B1	Isolate the x term F.T. ax = b (a≠1) B0 for 28/7 Accept embedded answers such as 7×4 – 8 = 20
8. (c) 5(n + 4) OR (n + 4)5 OR 5n + 20	B2	B1 for 5 × n+4 OR n+4 × 5. B0 for 5n + 4

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UNIT 2 (Non calculator) Foundation Tier	Marks	Final Mark Scheme Comments
Indirect marking - Tick marked	P	
9.(Monthly saving =) 0.15×1260	M1	An answer of 18.9(0) implies M0
(£)189	A1	
(Needs to save £1340 - £584 = £)756 (more)	B1	
(Number of months =) 756/189 or equivalent	m1	FT 'their 189' provided M1 awarded or if place value error in digits 1890 And FT 'their 756' Or repeat addition, with 189, 378, 567 shown , or any 3 correct terms in an appropriate summation series with no more than 1 incorrect, or 2×378 seen
4 (months)	A1	As a final answer. If units are given they must be correct Depends on M1 and m1 and must FT for their values including rounding up if necessary Alternative: Memo 0.15×1260 M1 584 = (£)189 A1 773 584 + 189 + 189 m1 (no extra) 962 + 189 + 189 = 1340 A1 1151 OR reverse calculation working back from 1340 1340 4 (months) A1 Unsupported 4 gets 0
10. (a) Realising only 1 way to score 14, i.e. 8+6 OR '8 and 6'	B1	Do not accept ⅙ + ⅛ as evidence Accept sight of 6 + 8 = 14
Number of possible outcomes 6×8 (=48)	B1	Accept sight of ../48 or ../8 × ../6 Sight of ⅛×⅙ is awarded B1, B1 with no other ways
1/48	B1	CAO *An answer of 1:48 gets B2*
(b) 1	B1	Accept fractions equivalent to 1 and 100% B0 for 'certain' B0 for incorrect notation such as 14 out of 14, 14:14 etc
Indirect marking - Tick marked	P	Watch out for work on the DIAGRAM, but work given on the dotted lines takes precedence in any conflict.
11. $A\hat{D}C$ = 90(º)	B1	Any angle in the square
$F\hat{D}E$ = 60(º)	B1	Any angle in the equilateral triangle
$F\hat{D}A$ = 30(º)	B1	C.A.O.
$A\hat{F}D$ = 30(º)	B1	F.T. their $F\hat{D}A$
$D\hat{F}E$ = 60(º)		
Therefore $A\hat{F}E$ = 90(º) OR 270(º)	B1	F.T. 60 + their $D\hat{F}A$ Unsupported answer of 90º gets 0.
All parts (a) – (c) marked at the same time		
12. (a) 11	B1	
Use overlay		
12. (b) Plots	P1	Allow one error. FT 'their (a)' or 11
All correct plots joined with a curve	C1	FT 'their (a)' or 11. If (a) blank then FT points given, otherwise must included plot at x=-3
12. (c) From their graph (approximately -2.2 and 1.6)	B1	FT their graph. x-values, coordinates are not required

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UNIT 2 - HIGHER TIER

UNIT 2 Higher Tier	Mark	Final Mark Scheme Comments
1.(Monthly saving =) 0.15×1260 (£)189 (Needs to save £1340 - £584 = £)756 (more) (Number of months =) 756/189 or equivalent	M1 A1 B1 m1	An unsupported answer of 18.9(0) implies M0 FT 'their 189' provided M1 awarded OR if place value error in digits 1890 and FT 'their 756' Or repeat addition, with 189, 378, 567 shown , or any 3 correct terms in an appropriate summation series with no more than 1 incorrect, or 2×378 seen
4 (months)	A1	As a final answer. If units are given they must be correct Depends on M1 and m1 and must FT for their values including rounding up if necessary Award no marks for an unsupported answer of 4(months) Alternative: 0.15×1260 M1 = (£)189 A1 584 + 189 + 189 m1 (no extra) + 189 + 189 = 1340 A1 *OR reverse calculation working back from 1340* 4 (months) A1
Look for • spelling • clarity of text explanations, • the use of notation (watch for the units 'months' and £) Needs to have sufficient stages of working processed for QWC2 QWC2: Candidates will be expected to • present work clearly, with words explaining process or steps AND • make few if any mistakes in mathematical form, spelling, punctuation and grammar in their final answer QWC1: Candidates will be expected to • present work clearly, with words explaining process or steps OR • make few if any mistakes in mathematical form, spelling, punctuation and grammar in their final answer	QWC 2	(For information: 584, 773, 962,1151,1340 QWC2 Presents relevant material in a coherent and logical manner, using acceptable mathematical form, and with few if any errors in spelling, punctuation and grammar. QWC1 Presents relevant material in a coherent and logical manner but with some errors in use of mathematical form, spelling, punctuation or grammar. OR Evident weaknesses in organisation of material but using acceptable mathematical form, with few if any errors in spelling, punctuation and grammar. QWC0 Evident weaknesses in organisation of material, and errors in use of mathematical form, spelling, punctuation and grammar.
2. Realising only 1 way to score 14, i.e. '8+6' OR '8 and 6' Number of possible outcomes 6×8 (=48) 1/48	B1 B1 B1	Do not accept ⅙ + ⅛ or 1/14 Accept sight of 6 + 8 = 14 Accept sight of ../48 or ../8 × ../6 Sight of ⅛×⅙ is awarded B1, B1 with no other ways CAO *An answer of 1:48 gets B2*
3(a) $3q = m - h^2$ $q = (m - h^2)/3$ or equivalent	B1 B1	 FT from $3q = m + h^2$ or $3q = h^2 - m$ *Allow SC1 provided no other marks awarded for missing brackets:* *$q = m - h^2 \div 3$ OR $q = m - h^2/3$ provided no previous incorrect working*
3(b) 3x = 15× 2 or x/2 = 15/3 x = 10	M1 A1	 x = 30/3 gets M1 A0

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UNIT 2 Higher Tier	Mark	Final Mark Scheme Comments
4(a) 11	B1	
4(b) Plots All correct plots joined with a curve	P1 C1	Allow one error. FT 'their (a)' or 11 FT 'their (a)' if reasonable or 11. If (a) blank then FT points given, otherwise must include plot at x=-3
4(c) From their graph (approximately -2.2 and 1.6)	B1	FT their graph. x-values, coordinates are not required
5(a) -3n + 15 or equivalent	B2	B1 for sight of '-3n'
5(b) 2n + 1 or equivalent	B2	B1 for '2n + …', OR for sight of 3, 5, 7 showing difference of 2, NOT for 'n+2'
6(a) Any 2 lines drawn correctly Correct region identified	B2 B1	B1 for any 1 line drawn correctly Allow where ambiguous x or y as 1 or -2 unless incorrect line uniquely selected. Allow any line as correct if selected as a side of the region CAO
6(b) $5x < 40$ or $x < 40/5$ $x < 8$	M1 A1	No marks for use of =, unless replaced to give $x<8$, then allow both marks SC1 for $x<40/11$
7 (a) $4c + 5p = 38.8$ and $2c + 7p = 35.6$ or equivalent Equating one variable One correct solution Method to find the other variable, e.g. substitution Other correct variable	B1 M1 A1 m1 A1	<u>FT from 1 slip in setting up equations</u> Allow 1 slip but not in the equated variable *Any change of unit must be consistent* FT their solution provided M1 awarded Solutions p= 3.6 (cm) and c = 5.2 (cm) *No marks for trial and improvement, apart from maybe the first B1.* *Answer only gets no marks*
7 (b) (80 – 38.8)/c (= 41.2/ 'their c') OR attempt 'c × value = 80 – 38.8' OR alternative full method working with 80, 38.8 and c 7 (beads)	 M1 A1	<u>Must strictly FT from c=5.2 or 'their c'</u> FT number of (whole) (80-38.8)/ 'their c' Do not accept use of 'p' (as problem to solve requires thinking to use 'c') FT response must be rounded down to nearest whole Answer must be from correct working (if seen), e.g 7×5.2=36.4 compared with 41.2, or attempt 41.2/c Do not accept an answer of 8, however do accept answers (whole numbers) <7 if working is shown and a reason given based on fitting on the necklace
8(a) 2.4×10^{-3} 10^3 2100 2.4×10^3 or equivalent	B2	Mark answer space, unless blank B1 for a run of 3 in the correct order ignoring the incorrect one (i.e. blank out 1 value to find 3 in the appropriate order ignoring the gap made by the incorrect value, placing on the answer spaces thus incorrect) For incorrect value written in answer space for 2400, 1000 or 0.0024 in the answer space penalise -1 only
8(b) 1.5×10^{14}	B2	B1 for 15×10^{13}

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UNIT 2 Higher Tier	Mark	Final Mark Scheme Comments
9. (3+-3)/2 or (20 +16)/2	M1	Or suitable sketch with indication of points and idea to locate mid-way (e.g. showing step triangles), or look at number pattern
First point found to be (0,18)	A1	Notation not required, e.g. accept without brackets
Reflection to give (1,10)	B1	Notation not required, e.g. accept without brackets FT provided at least one of (0, 18), (1, 10) correct
Method to find gradient, e.g. sketch with points plotted with horizontal and vertical lines drawn to give an appropriate triangle	M1	Or (18 – 10)/(0 – 1)
Gradient = -8	A1	Gradient given as '8' gets M1 A0
Conclusion y = -8x + 18	A1	If first M1, A1 award but final M0, A0, A0 then award SC1 for their answer with y=mx **+ 18**, m≠0 If no marks, then SC2 for their answer with y=mx **+ 18**, m≠0
10(a) Correct rotation	B2	B1 for anticlockwise rotation about (2,1), OR For clockwise rotation about (1,2)
10(b) Enlarge scale factor (±)1/2	B1	Any placement
Correct position	B1	For their 'enlargement', i.e working with '-' and using (0,0) as the centre
11. (BÂC =) 75(°)	B2	B1 for sight of BÔC = 150(°) E marks **depend on appropriate B mark awarded** and **must be stated** (90° indicated on diagram is insufficient)
Reason: Tangent meet radius 90°	E1	Angle sum of quadrilateral is **insufficient**
Reason: Angle at the centre is twice angle at circumference	E1	*Alternative:* *Equal tangents (leading to isosceles triangle), CBT= BĈT = 75° followed by alternate segment theorem and BÂC = 75°* *respectively E1, B1, E1 and B1 with E marks depending on B marks.*
12(a) 1	B1	
12(b) $\sqrt{80} = \sqrt{(16 \times 5)}$ or $\sqrt{(4\times4\times5)}$ or $4\sqrt{5}$ $\{ (\sqrt{80} - \sqrt{5})^2 \} = (4\sqrt{5} - \sqrt{5})^2$ $(= (3\sqrt{5})^2)$ $= 45$	M1 M1 A1	CAO *Alternative method:* *M2 for $80 - 2\sqrt{80}\sqrt{5} + 5$ $(=80 - \sqrt{80}\sqrt{5} - \sqrt{80}\sqrt{5} + 5)$ or M1 for 80 …. + 5 or 80 - $\sqrt{80}\sqrt{5}$ - $\sqrt{80}\sqrt{5}$ …* *or … - $\sqrt{80}\sqrt{5}$ - $\sqrt{80}\sqrt{5}$ + 5* *A1 45 CAO* *Method may be shown in stages* *$-\sqrt{80}\sqrt{5}$ may be written $-\sqrt{400}$ or -20*
12(c) x = 0.42828… **and** 100x = 42.828… with an attempt to subtract	M1	Or 10x **and** 1000x, or equivalent. Or alternative method
424/990 (=212/495)	A1	An answer of 42.4/99 gains M1 only. Mark final answer, do not ignore incorrect cancelling
12(d) $3\pi + \pi^2 - 9 - 3\pi$	M1	Must have 3 of the 4 terms correct
$= \pi^2 - 9$	A1	CAO. Mark final answer
13(a) 10/25 í 9/24	M1	
90/600 (= 9/60 = 0.15) ISW	A1	*ISW means ignore incorrect final cancelling throughout*

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UNIT 2 Higher Tier	Mark	Final Mark Scheme Comments
13(b) 1 – P(no pinto beans)	M1	Or other **full** method showing intended operations In terms of beans, so may be replacement
1 - 16/25 í 15/24	M1	Overall **full** method showing intention of operations with correct values substituted
= 360/600 (=36/60 = 0.6) ISW	A1	*ISW means ignore incorrect final cancelling throughout* *Alternatives:* *2×P(pk) = 2×9/25 ×6/24,* *2×P(pb) = 2×9/25 ×10/24,* *P(pp) = 9/25 × 8/24* *OR P(pinto, not pinto) = 2× 9/25 ×16/24, with* *P(pp) = 9/25 × 8/24*

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Surname	Centre Number	Candidate Number
Other Names		0

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GCSE

4352/02

MATHEMATICS (UNITISED SCHEME)
UNIT 2: Non-Calculator Mathematics
HIGHER TIER

P.M. THURSDAY, 8 November 2012

$1\frac{1}{4}$ hours

CALCULATORS ARE NOT TO BE USED FOR THIS PAPER

4352 020001

INSTRUCTIONS TO CANDIDATES

Use black ink or black ball-point pen.

Write your name, centre number and candidate number in the spaces at the top of this page.

Answer **all** the questions in the spaces provided.

Take π as 3·14.

INFORMATION FOR CANDIDATES

You should give details of your method of solution when appropriate.

Unless stated, diagrams are not drawn to scale.

Scale drawing solutions will not be acceptable where you are asked to calculate.

The number of marks is given in brackets at the end of each question or part-question.

You are reminded that assessment will take into account the quality of written communication (including mathematical communication) used in your answer to question **4***(b)*.

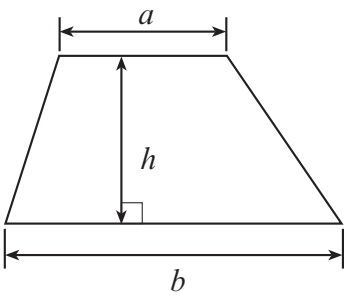
For Examiner's use only		
Question	**Maximum Mark**	**Mark Awarded**
1	**5**	
2	**6**	
3	**4**	
4	**8**	
5	**8**	
6	**2**	
7	**3**	
8	**6**	
9	**3**	
10	**5**	
11	**4**	
12	**7**	
13	**4**	
TOTAL MARK		

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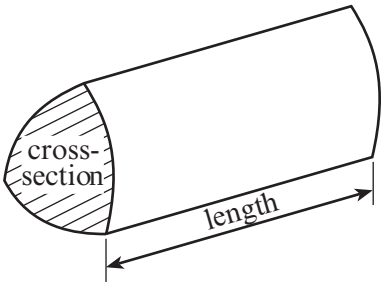
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Formula List

Area of trapezium $= \frac{1}{2}(a + b)h$

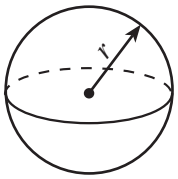


Volume of prism = area of cross-section × length



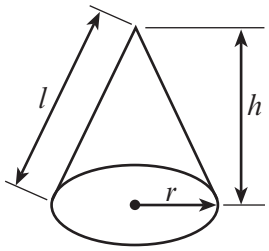
Volume of sphere $= \frac{4}{3}\pi r^3$

Surface area of sphere $= 4\pi r^2$



Volume of cone $= \frac{1}{3}\pi r^2 h$

Curved surface area of cone $= \pi rl$

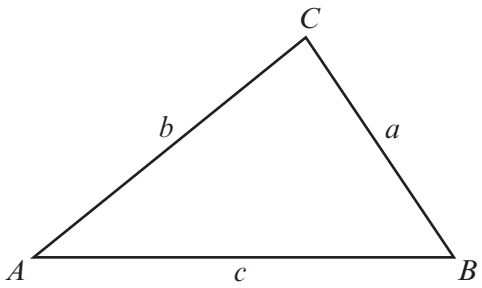


In any triangle ABC

Sine rule $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

Cosine rule $a^2 = b^2 + c^2 - 2bc\cos A$

Area of triangle $= \frac{1}{2}ab\sin C$



The Quadratic Equation

The solutions of $ax^2 + bx + c = 0$ where $a \neq 0$ are given by

$$x = \frac{-b \pm \sqrt{(b^2 - 4ac)}}{2a}$$

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1. Five children each threw the same dice 12 times.
They recorded how many sixes they each threw with this dice.
The results are shown below.

Name	Abbi	Sasha	Meinir	Samad	Jenny
Number of sixes	5	3	2	4	6

(a) Use Abbi's result to estimate the probability of **not** throwing a six on any single throw of the dice.

.....

.....

[2]

(b) Do you think the dice thrown was fair or biased?
You must show your working and give a reason for your answer.

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[3]

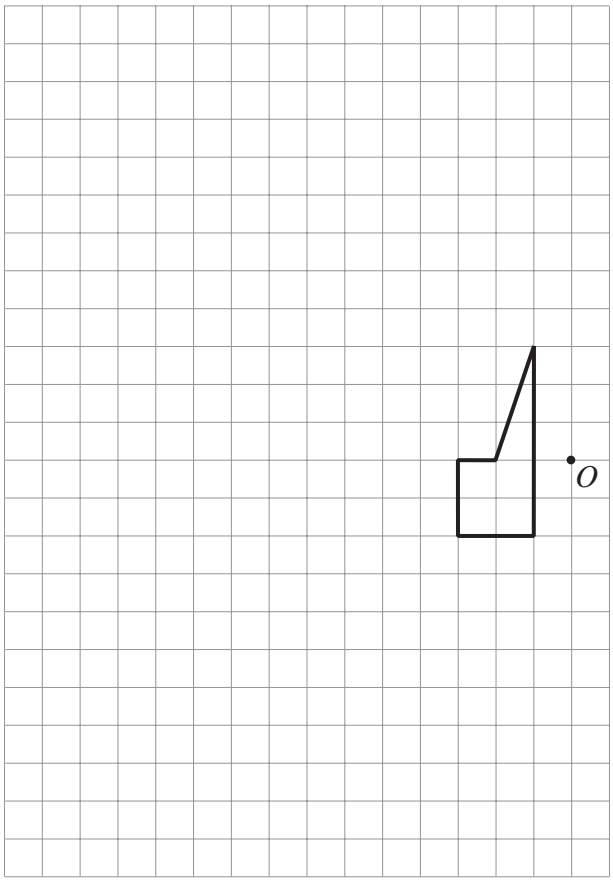
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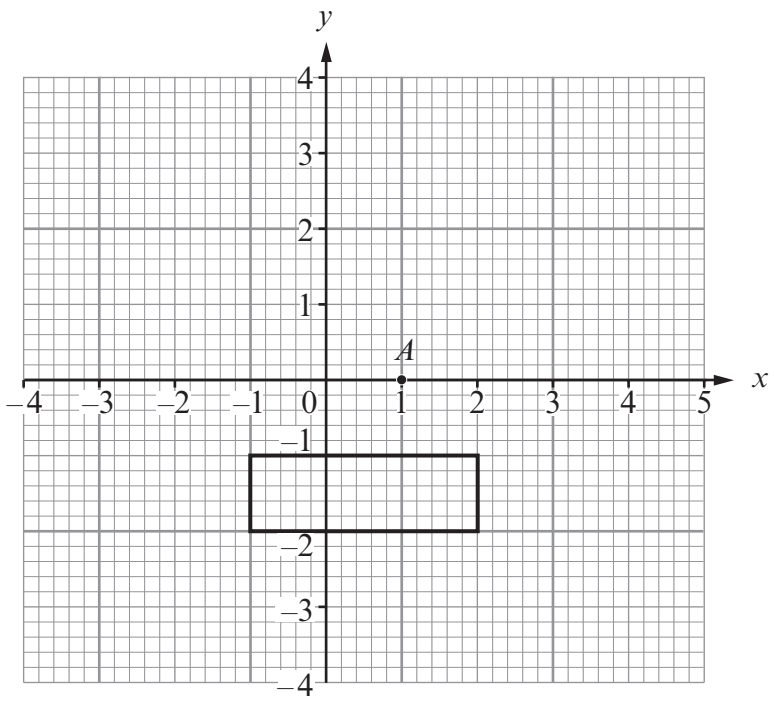
2. *(a)* On the grid below, draw the enlargement of the given shape using a scale factor of 3 and centre *O*.

[3]



(b) Rotate the rectangle through 180° about the point *A*(1, 0).

[1]



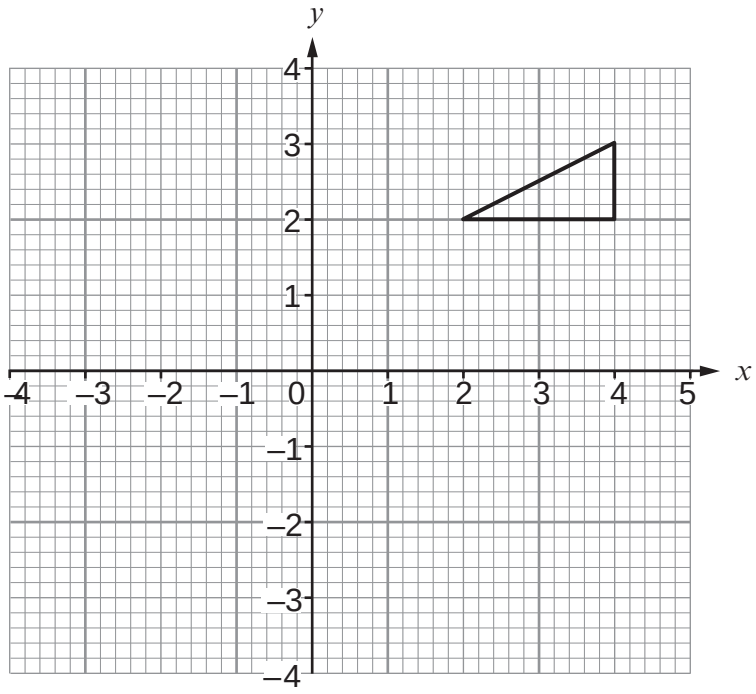
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(c) Draw the reflection of the shape in the line $x = 1$.

[2]



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3.

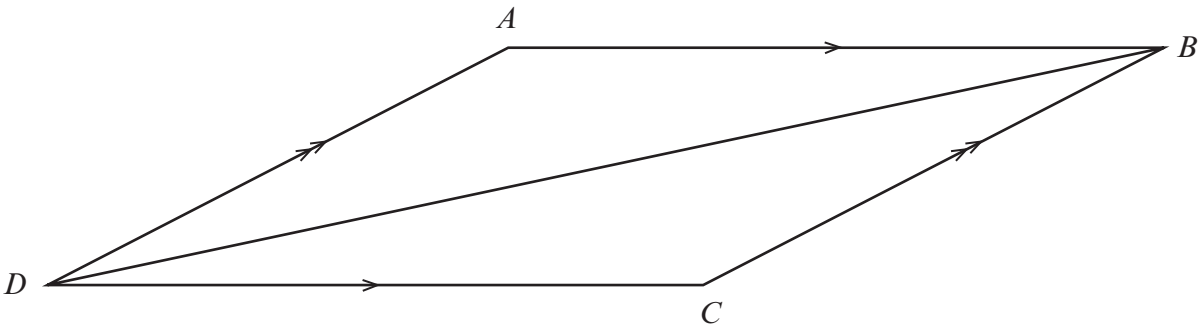


Diagram not drawn to scale

The diagram shows a parallelogram $ABCD$ with $A\hat{D}B = 17°$ and $A\hat{B}C = 40°$.
Calculate the size of each of the following angles.

(a) $A\hat{D}C$

.....

[1]

(b) $D\hat{B}C$

.....

[1]

(c) $B\hat{C}D$

.....

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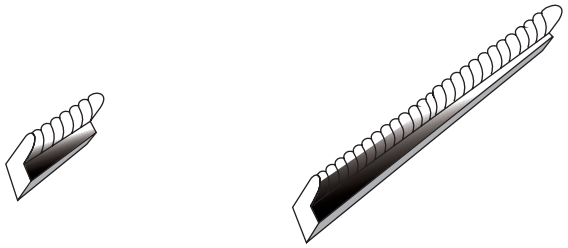
[2]

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4. Path edging strips come in two different lengths.



Size A Size B

Diagram not drawn to scale

Size A is x cm long and size B is four times as long as size A.

(a) Robbie uses 3 size A and 6 size B strips to edge one side of the length of his path.
Write down and simplify an expression, in terms of x, for the length of Robbie's path in centimetres.

.....

.....

.....

[2]

(b) *You will be assessed on the quality of your written communication in this part of the question.*
Sammy's path is twice as long as Robbie's path.
Sammy decides to use the edging strips along one side of the length of his path.
He wants to use as many size B strips as possible, with as few size A strips as possible.
How can he do this?
You must state the number of each size strip he should use.

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[6]

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5. *(a)* Expand $y^2(y^3 - 2)$.

.....

.....

[2]

(b) Factorise $8x^3 + 16$.

.....

.....

[2]

(c) Solve $7x < 2x + 30$.

.....

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.....

[2]

(d) Write down the nth term of the sequence 9, 13, 17, 21, 25 ...

.....

.....

[2]

6. Express each of the following numbers in standard form.

(a) 0·00083

.....

[1]

(b) 460000

.....

[1]

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7. Make b the subject of the following formula

$$bc = bd + e$$

.....

.....

.....

.....

.....

.....

.....

[3]

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8.

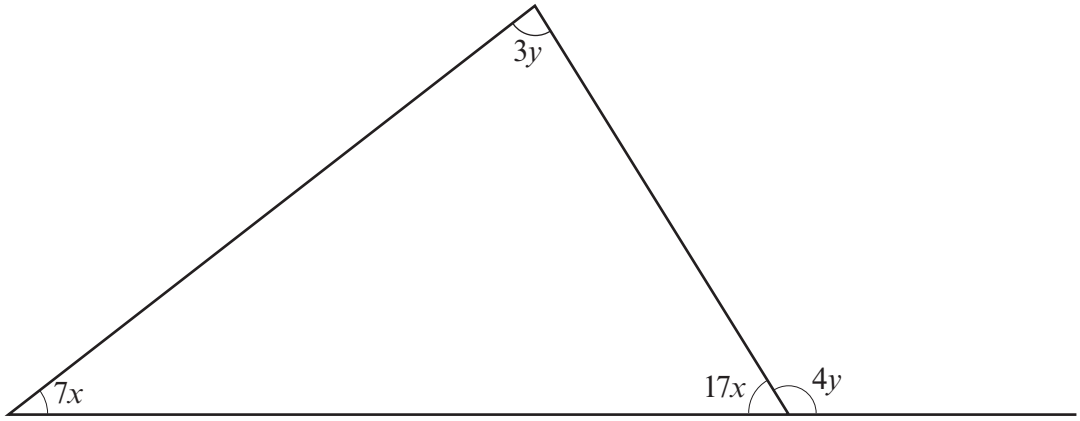


Diagram not drawn to scale

Calculate the values of x and y.

$x =$ ..... ° $y =$ ..... °

[6]

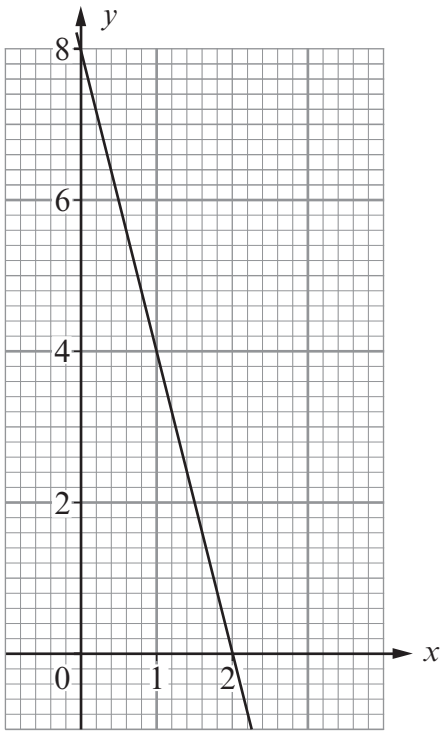
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9. Gareth was asked to use the following clues to find the equation of a mystery straight line.

Clue 1: The mystery straight line is parallel to the one shown in the diagram below.



Clue 2: The mystery straight line passes through the point with coordinates (0, 5).

Use these clues to find the equation of the mystery straight line.

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.....

Equation of the mystery straight line is .....

[3]

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10. The circle shown has a centre O.
The lines PR and TR are tangents to the circle.

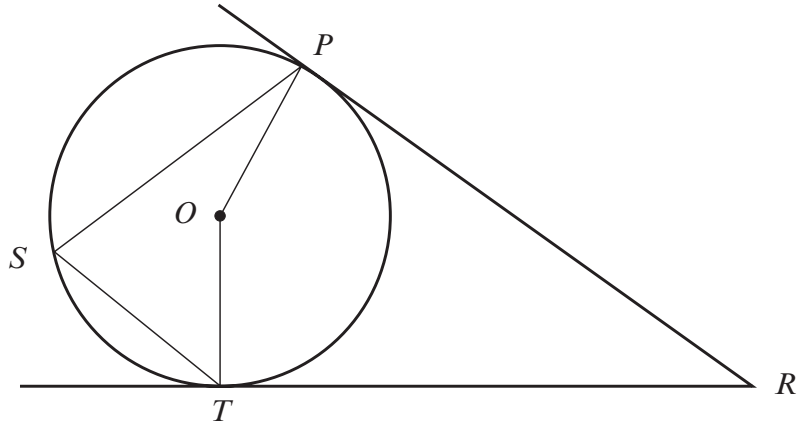


Diagram not drawn to scale

(a) Write down the size of $\hat{OPR}$ and give a reason for your answer.

.....

.....

[1]

(b) Which line in the diagram is equal in length to PR? Give a reason for your answer.

$PR =$ .....

.....

.....

[1]

(c) Given that $\hat{PRT} = 42°$, find the size of $\hat{PST}$.

.....

.....

.....

.....

$\hat{PST} =$ ..... °

[3]

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11. *(a)* Express $0\dot{4}\dot{7}$ as a fraction.

[2]

(b) Simplify $8000^{-\frac{2}{3}}$.

[2]

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12. *(a)* A bag contains 5 red balls, 4 blue balls and one yellow ball.
Two balls are selected at random, without replacement, from the bag.
Calculate the probability that the two balls selected are **not** the same colour.

[4]

(b) A bag contains a very large number of ball bearings.
65% of the ball bearings are made of steel. The other ball bearings are made of cast iron.
Two ball bearings are selected at random from the bag.
Calculate the probability that they are both made of cast iron.
Give your answer as a percentage.

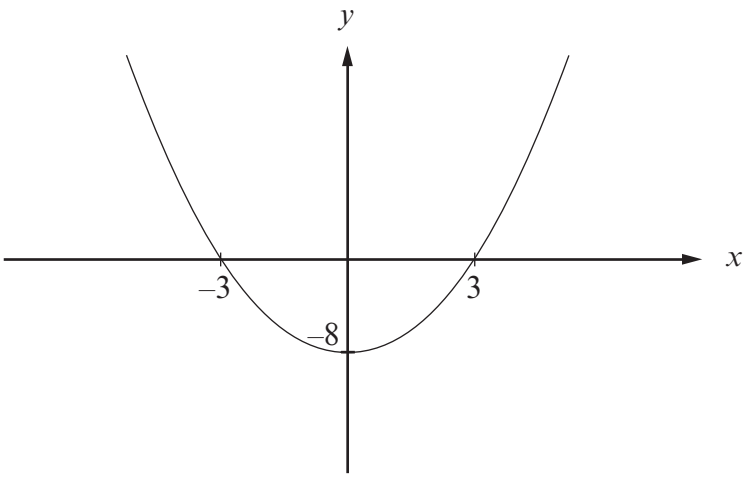
[3]

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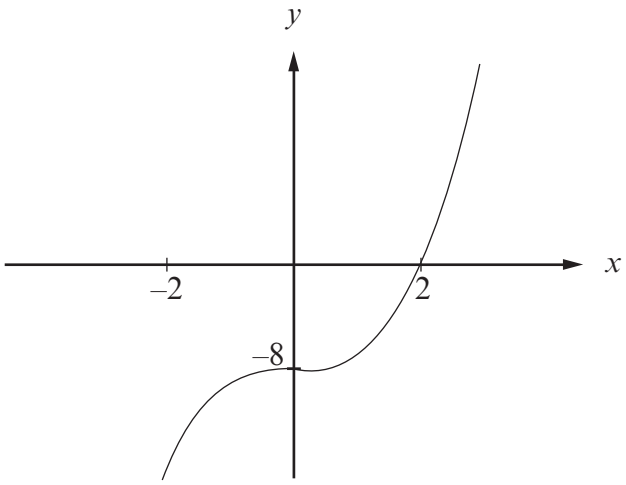
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13. *(a)* The diagram shows a sketch of $y = f(x)$.
On the same diagram, sketch the curve $y = f(x) - 5$.
Mark clearly the value of y at the point where this curve crosses the y-axis.



[2]

(b) The diagram shows a sketch of $y = g(x)$.
On the same diagram, sketch the curve $y = -g(x)$.
Mark clearly the value of y at the point where this curve crosses the y-axis.



[2]

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GCSE MARKING SCHEME

MATHEMATICS - UNITISED

NOVEMBER 2012

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INTRODUCTION

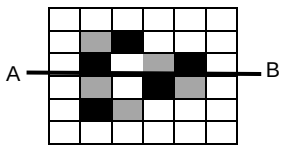
The marking schemes which follow were those used by WJEC for the November 2012 examination in GCSE MATHEMATICS - UNITISED. They were finalised after detailed discussion at examiners' conferences by all the examiners involved in the assessment. The conferences were held shortly after the papers were taken so that reference could be made to the full range of candidates' responses, with photocopied scripts forming the basis of discussion. The aim of the conferences was to ensure that the marking schemes were interpreted and applied in the same way by all examiners.

It is hoped that this information will be of assistance to centres but it is recognised at the same time that, without the benefit of participation in the examiners' conferences, teachers may have different views on certain matters of detail or interpretation.

WJEC regrets that it cannot enter into any discussion or correspondence about these marking schemes.

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UNIT 2 - FOUNDATION TIER

UNIT 2 (Non calculator) Foundation Tier	Mark	FINAL MARK SCHEME Comments
1. (a) (i) 34205 (ii) Three million (b) (i) 37, 43 (ii) 45 (iii) 48 (c) (i) 2650 (ii) 3000 (d) (i) 35 (ii) 36 (iii) 31 or 37	B1 B1 B1 B1 B1 B1 B1 B1 B1 B1 10	 Accept 6^2
2. km g m ml OR cm^3 OR cl	B1 B1 B1 B1 4	**Kilo(s) gets B0**
3. (a) 6, 6, 6, 6, 6 (b) 3 or 4 6s with 2 or 1 non 6s (c) Any 5 numbers other than 6 (d) Either two 5s and two 6s and another different number OR one 5 and one 6 and 3 different numbers OR 5 numbers all of which are not 5 or 6.	B1 B1 B1 B1 4	
4. (a) (i) Subtract 7 (from the previous term) (ii) Divide (the previous term) by 4 (b) (0).04 (c) 30/100 × 80 = 24 (d) For the '24' sequence For the '32' sequence 72	B1 B1 B1 M1 A1 B1 B1 B1 8	Accept − 7. Do not accept n – 7 Accept ÷4. Do not accept n ÷ 4 **.04% gets B0** Any correct method for finding 30% **24% gets M1, A0** 24, 48, (72) 32, 52, (72) OR 20, 40, 60
5. (a) Kite (b)  	B1 B2 3	 B1 for at least 3 correct and no more than 2 incorrect.
6. (a) A(3, -2), B(-4, -3) (b) (i) 4 (ii) 2	B1 B1 B1 B1 4	Reverse coordinates get 0.
7. (a) 450 − 150 = 300 300/75 = 4 5 days (b) (£) 90	M1 A1 B1 B1 4	**For subtracting 150 and dividing by 75** **OR for (£)540**
8. (a) 9a + 2b (b) (x =) 100 (c) 1, − 8	B2 B1 B1, B1 5	B1 for either in an expression of the form xa + yb **OR B1 for both 9a and 2b not in an expression** F.T. 'their 1' – 9 if answer negative

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UNIT 2 (Non calculator) Foundation Tier	Mark	FINAL MARK SCHEME Comments
9. Cost of apples = £13.80 – 1·80 × 5 = (£) 4.8(0) Cost of 1kg of apples = 4.80/3 = (£) 1.6(0) QWC Look for • Spelling • Clarity of text explanations • The use of notation – watch for '=',kg,'£', 'p' being used appropriately. QWC2: Candidates will be expected to • present work clearly, with words explaining their processes or steps. Use £ and p correctly. AND • make few if any mistakes in mathematical form, spelling, punctuation and grammar and include units in their final answer QWC1: Candidates will be expected to • present work clearly, with words explaining their processes or steps. Use £ and p correctly. OR • make few if any mistakes in mathematical form, spelling, punctuation and grammar and include units in their final answer	M1 A1 M1 A1 QWC 2 6	F.T. 'their 4.80' but NOT (£)13.80 Accept rounding, truncating or more than 2 d.p. 160p gets this A1, but 160 gets A0. QWC2 Presents relevant material in a coherent and logical manner, using acceptable mathematical form, and with few if any errors in spelling, punctuation and grammar. QWC1 Presents relevant material in a coherent and logical manner but with some errors in use of mathematical form, spelling, punctuation or grammar. OR Evident weaknesses in organisation of material but using acceptable mathematical form, with few if any errors in spelling, punctuation and grammar. QWC0 Evident weaknesses in organisation of material, and errors in use of mathematical form, spelling, punctuation and grammar.
10.(a) 7/12 (b) Use of all results to inform response, e.g. '60 throws altogether used' 20 sixes or 20/60 (=1/3)(or equivalent) throws sixes Conclusion based on correct working: biased with reason that fair dice would expect fewer sixes recorded or equivalent statement, e.g. 'biased, because should expect 10 sixes and there are 20' **H1**	B2 M1 M1 A1 5	B1 for idea of 12-5 (=7), or for sight of 5/12 Idea of using all data available OR mentions 'results of all children', or 'each person' OR should be 10 sixes for fair dice, or 2 sixes each time Do not award for fact 'fair dice probability is ⅙', unless compared with dice used (P(six) = ⅓) or to give number of 6s expected (2 in 12 throws, or 2/12) OR similar in reverse statement. Must be based on correct working *If all results not referred to then max M0 M1 A1* *If no marks in (b), SC1 in (b) sight of 20/60 in (a)*
11. (a) Enlargement scale factor 3 Correct position (b) Correct rotation (c) Correct reflection **H2**	 B2 B1 B1 B2 6	**If consistent incorrect scale used in (a) then penalise MR-1** B1 for at least 4 vertices correct **(0, 1) , (0, 2), (3, 2), (3, 1)** B1 Reflect in any vertical line or in y=1, OR x=1 seen
12.(a) 27*x* (b) Sight of 54*x* or 54 Attempt 54/4 or similar appropriate strategy 2 size A AND 13 size B Accept an embedded answers **H4**	B2 B1 S1 B2 6	B1 for correct but unsimplified expression, e.g. 3x+6×4x If B2, penalise further working -1 FT for twice the coefficient of *x* or twice the term given in (a) FT their '54*x*'÷4 Similar strategy e.g., a multiple of 4 close to 54 divided by 4 ('52÷4') FT for their '54*x*' B1 for suitable numbers of A and B for their '54x', OR B1 for 13 size B from correct working, OR B1 for a correct method towards maximising the number of size B but 1 error in working Award SC2 (with no other marks) for an answer of 6 size A and 12 size B An answer of 2 size A and 13 size B is awarded all 4 marks.

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UNIT 2 - HIGHER

UNIT 2 Higher Tier	Mark	FINAL MARK SCHEME Comments
1.(a) 7/12	B2	B1 for idea of 12-5 (=7), or for sight of 5/12
(b) Use of all results to inform response, e.g. '60 throws altogether used'	M1	Idea of using all data available OR mentions 'results of all children', or 'each person'
20 sixes or 20/60 (=1/3)(or equivalent) throws sixes	M1	OR should be 10 sixes for fair dice, or 2 sixes each time Do not award for fact 'fair dice probability is ⅙', unless compared with dice used (P(six) = ⅓) or to give number of 6s expected (2 in 12 throws, or 2/12)
Conclusion based on correct working: biased with reason that fair dice would expect fewer sixes recorded or equivalent statement, e.g. 'biased, because should expect 10 sixes and there are 20'	A1 5	OR similar in reverse statement. Must be based on correct working *If all results not referred to then max M0 M1 A1* *If no marks in (b), SC1 in (b) sight of 20/60 in (a)*
2.(a) Enlargement scale factor 3 Correct position (b) Correct rotation (c) Correct reflection	 B2 B1 B1 B2 6	*If consistent incorrect scale used in (a) then penalise MR-1* B1 for at least 4 vertices correct. B1 Reflection in any vertical line or in y=1, OR x=1 seen
3.(a) $40^{(0)}$ (b) $17^{(0)}$ (c) 180 – 40 or equivalent calculation $140^{(0)}$	B1 B1 M1 A1 4	 e.g. (360 – 80)/2
4.(a) $27x$	B2	B1 for correct but unsimplified expression, e.g. 3x+6×4x If B2, penalise further working -1
(b) Sight of $54x$ or 54 Attempt 54/4 or similar appropriate strategy towards use of as many size B as possible	B1 S1	FT for twice the coefficient of x or twice the term given in (a) FT their '$54x$'÷4 Similar strategy e.g., a multiple of 4 close to 54 divided by 4 ('52÷4')
2 size A AND 13 size B Accept embedded answers	B2	FT for their '$54x$' B1 for suitable numbers of A and B for their '54x', OR B1 for 13 size B from correct working, OR B1 for a correct method towards maximising the number of size B but 1 error in working
For QWC2 the process steps leading to any answer need to be clear Allow QWC if working with a value, rather than an expression in (b)	 Q W C	 Award SC2 (with no other marks) for an answer of 6 size A and 12 size B An answer of 2 size A and 13 size B is awarded all 4 marks.
QWC2: Candidates will be expected to • present work clearly, with words explaining process or steps AND • make few if any mistakes in mathematical form, spelling, punctuation and grammar and include units in their final answer QWC1: Candidates will be expected to • present work clearly, with words explaining process or steps OR • make few if any mistakes in mathematical form, spelling, punctuation and grammar and include units in their final answer	2 8	QWC2 Presents relevant material in a coherent and logical manner, using acceptable mathematical form, and with few if any errors in spelling, punctuation and grammar. QWC1 Presents relevant material in a coherent and logical manner but with some errors in use of mathematical form, spelling, punctuation or grammar. OR Evident weaknesses in organisation of material but using acceptable mathematical form, with few if any errors in spelling, punctuation and grammar. QWC0 Evident weaknesses in organisation of material, and errors in use of mathematical form, spelling, punctuation and grammar.
5.(a) $y^5 - 2y^2$ (b) $8(x^3 + 2)$	B2 B2	B1 for each term. If B2, penalise further incorrect working -1 B1 for correct partially factorised expression,
(c) $5x < 30$ or $x < 30/5$ $x < 6$	B1 B1	OR B1 for 8(.. + 2) OR $8(x^3 + ..)$ SC1 for $x < 3\frac{1}{3}$ or $x < 3.3(33\ldots)$ or $x<3\frac{3}{9}$
(d) $4n + 5$	B2 8	(Not for $x<30/9$ nor $x<10/3$) B1 for $4n$. (B0 for n+4)
6.(a) 8.3×10^{-4} (b) 4.6×10^5	B1 B1 2	Penalise incorrect notation -1 only

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UNIT 2 Higher Tier	Mark	FINAL MARK SCHEME Comments
7. $bc - bd = e$ $b(c - d) = e$ $b = e/(c - d)$	B1 B1 B1 3	Collect like terms FT until 2nd error Factorise Isolate
8. Any two statements equivalent to the equations: 17x + 4y = 180, 7x+17x+3y = 180, 7x+3y=4y Method to equate 1 coefficient (accept 1 slip) First variable correct Method to find second variable Second variable correct	S2 M1 A1 m1 A1 6	Accept informal notation (e.g. when trial & improvement used). S1 for any one statement **FT** provided 1 equation correct and same level of difficulty Or alternative method leading to evaluation of variable Depends on first M1 being awarded FT provided M1 and m1 awarded **x = 4 and y = 28** *If correct answers are seen, award all 6 marks*
9. Gradient = (-)8/2 = - 4 $y = -4x + 5$	M1 A1 A1 3	Or equivalent Award M1 A0 for gradient of 4 FT gradient of 4 provided M1 awarded *If no other marks then SC1 for $y = ...x + 5$ or $y=5x - 4$*
10.(a) 90(°) AND reason (b) TR or RT AND reason (c) 360 – 90 – 90 – 42 or equivalent /2 69(°)	B1 B1 M1 m1 A1 5	e.g. 'radius meets tangent', allow a description but must include reference to either the 'radius' or the 'tangent' e.g. 'meeting of tangents to circle', 'tangents from same point (to the circle)', allow a description Method to find angle in quadrilateral (138°)
11.(a)x =0.4747… & 100x= 47.47…with attempt to subtract 47/99 (b) $1/20^2$ or 20^{-2} 1/400 ISW	M1 A1 M1 A1 4	 $1/64000000^{1/3}$ or equivalent *If no marks allow SC1 for sight of 400*
12.(a) Strategy: Idea 1 – P(RR) – P(BB) – P(YY), OR equivalent P(RR) = 5/10 × 4/9 or P(BB) = 4/10 × 3/9 or P(YY) = 1/10 × 0/9 or other non replacement product 1 – {5/10 × 4/9 + 4/10 × 3/9 + (1/10 × 0/9)} 29/45 (= 58/90) (b) 35/100 × 35/100 1225/10000 or 0.1225 or 49/400 12(.25%)	S1 M1 A1 A1 M1 A1 A1 7	For the idea, not notation. Accept missing brackets *YY may be omitted as P(YY)=0* Or alternative full calculation shown Allow missing brackets if intention clear ISW. Ignore incorrect cancelling *An answer of 32/90 or 29/90 gets the M1 as implied, no other marks* OR for intention (100-65)/100 × (100-65)/100 Allow 35%×35%, do not allow 35×35 Do not FT from error in miscalculation of '100-65' FT provided M1 awarded If no marks SC1 for an answer of 6.25(%) or 20.25(%)
13.(a) Sketch (shift down) **Correct** sketch with (0, -13) indicated (b) Intention to show reflection in *x*-axis passing through (2,0) Correct reflection and (0, 8) indicated	B1 B1 B1 B1 4	Allow passing through (-3,0) and/or (3,0) Accept -13 on the y-axis. Do not allow if passing through (-3,0) and/or (3,0) *SC1 for a correct translation up with -3 indicated* Intention means that reflection of the curve is correct in at least 2 of the 3 quadrants Accept 8 on the y-axis *Reflection in y=-8 or x = 0 is awarded B0, B0*

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Surname	Centre Number	Candidate Number
Other Names		0

GCSE

4352/02

MATHEMATICS (UNITISED SCHEME)
UNIT 2: NON-CALCULATOR MATHEMATICS
HIGHER TIER

A.M. WEDNESDAY, 13 June 2012

$1\frac{1}{4}$ hours

CALCULATORS ARE NOT TO BE USED FOR THIS PAPER

INSTRUCTIONS TO CANDIDATES

Use black ink or black ball-point pen. Do not use gel pen or correction fluid.

Write your name, centre number and candidate number in the spaces at the top of this page.

Answer **all** the questions in the spaces provided.

If you run out of space, use the continuation page at the back of the booklet, taking care to number the question(s) correctly.

Take π as 3·14.

INFORMATION FOR CANDIDATES

You should give details of your method of solution when appropriate.

Unless stated, diagrams are not drawn to scale.

Scale drawing solutions will not be acceptable where you are asked to calculate.

The number of marks is given in brackets at the end of each question or part-question.

You are reminded that assessment will take into account the quality of written communication (including mathematical communication) used in your answer to question **6**.

For Examiner's use only		
Question	**Maximum Mark**	**Mark Awarded**
1	**5**	
2	**4**	
3	**3**	
4	**8**	
5	**4**	
6	**7**	
7	**5**	
8	**8**	
9	**3**	
10	**4**	
11	**5**	
12	**5**	
13	**4**	
TOTAL MARK		

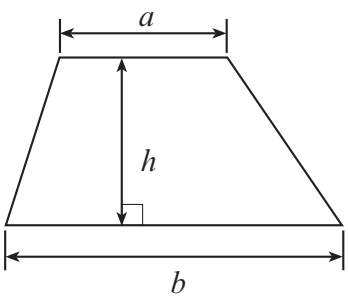
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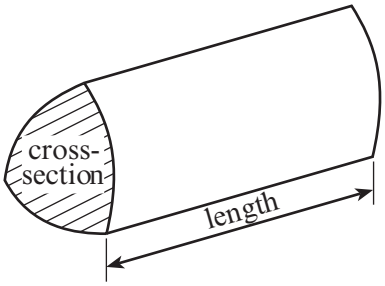
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Formula List

Area of trapezium = $\frac{1}{2}(a + b)h$

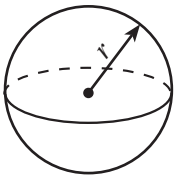


Volume of prism = area of cross-section × length



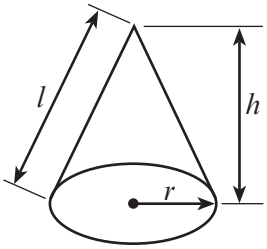
Volume of sphere = $\frac{4}{3}\pi r^3$

Surface area of sphere = $4\pi r^2$



Volume of cone = $\frac{1}{3}\pi r^2 h$

Curved surface area of cone = $\pi r l$

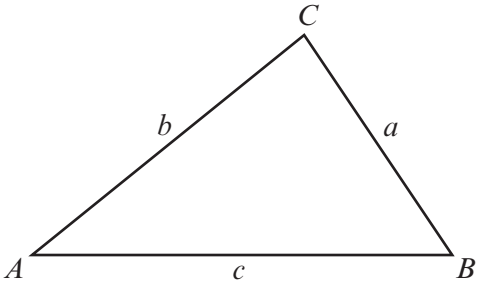


In any triangle ABC

Sine rule $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

Cosine rule $a^2 = b^2 + c^2 - 2bc\cos A$

Area of triangle = $\frac{1}{2}ab\sin C$



The Quadratic Equation

The solutions of $ax^2 + bx + c = 0$

where $a \neq 0$ are given by

$$x = \frac{-b \pm \sqrt{(b^2 - 4ac)}}{2a}$$

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Examiner only

1. Hamish is in London one Tuesday afternoon.
He looks at the world clock shown below.

World clock		
London	New York	Sydney
13:38 Tuesday	08:38 Tuesday	21:38 Tuesday

(a) Hamish has a plane to catch in 6 hours 34 minutes time.
At what time does his plane leave, in New York time?

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[2]

(b) Hamish decides to make a telephone call to Sydney before he leaves.
He makes the call at 17:05 in London.
What time and day is this in Sydney?

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Time ..... Day .....

[3]

2. *(a)* The nth term of a sequence is $n^2 + 25$.
Find the first three terms of the sequence.

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[2]

(b) Find the next term in the sequence 8, 9, 13, 22, 38, ...

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[2]

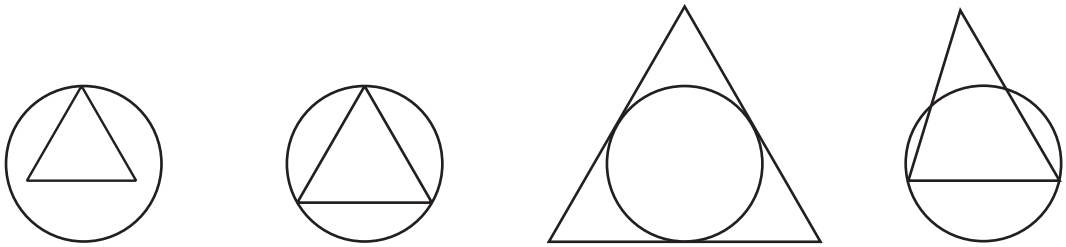
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3.



A *B* *C* *D*

Match each statement in the table with one of the diagrams shown above.

Statement	Diagram
All three sides of the triangle are tangents to the circle	
All the vertices of the triangle touch the circle	
Only one side of the triangle is a chord of the circle	

[3]

4. *(a)* Solve $\frac{40}{5x} = 4$.

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[2]

(b) Solve $3(2x - 5) > 21$.

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[3]

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(c) Make g the subject of the formula $3g^2 - f = 0$.

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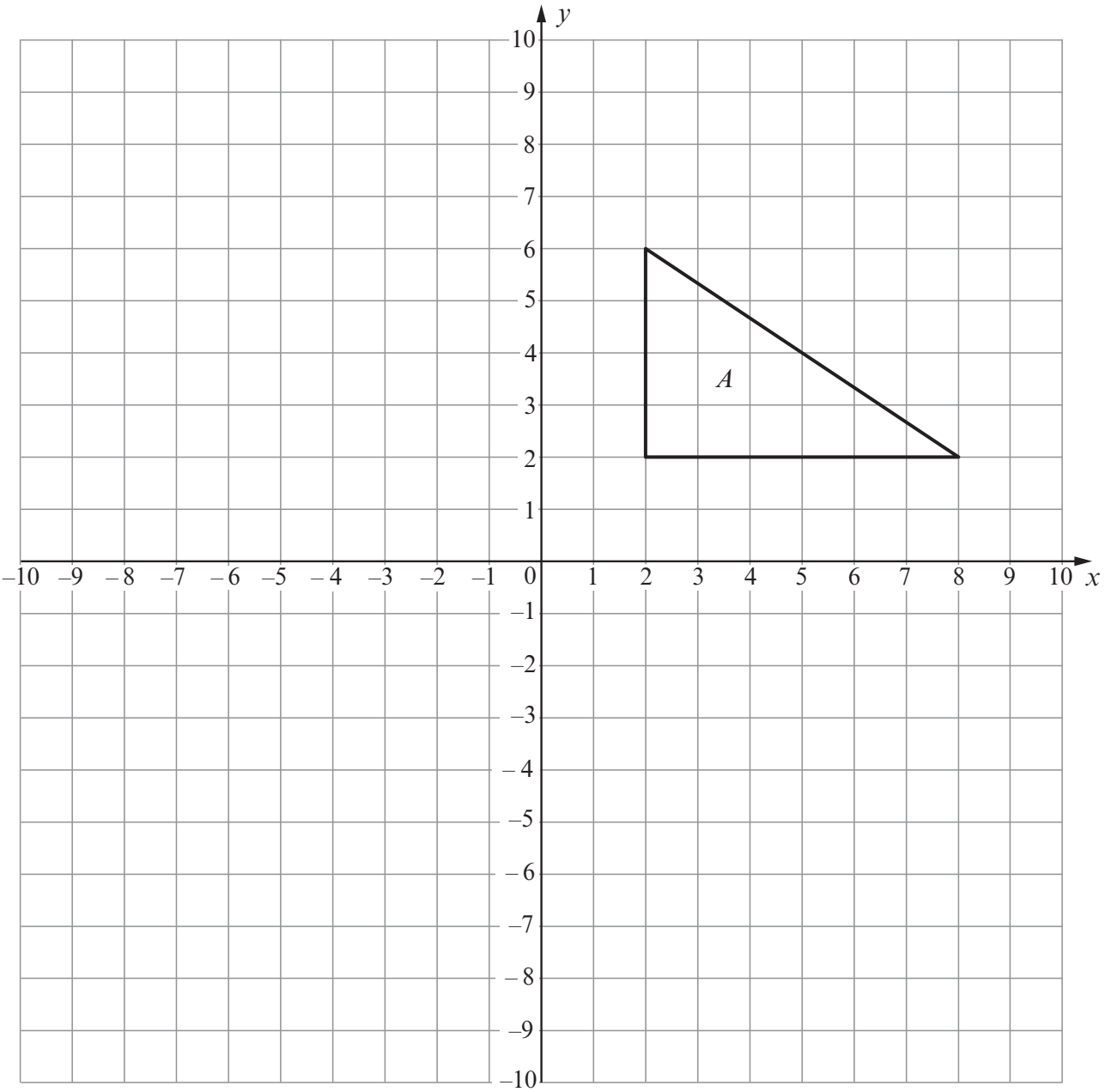
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Turn over.

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5. Reflect triangle A in the x-axis and label your answer B.
Then rotate your triangle B by 90° clockwise about the origin.
Label your final answer C.



[4]

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6. *You will be assessed on the quality of your written communication in this question.*

Thomas bought 30 webcams at £22 each and 120 USB drives at £50 each to sell in his shop.
He made 50% profit on the sale of each webcam.
Thomas sold all his stock of webcams and USB drives.
In total, his takings from the sales of webcams and USB drives was £7590.
Calculate the percentage profit he made on the sale of the USB drives.

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[7]

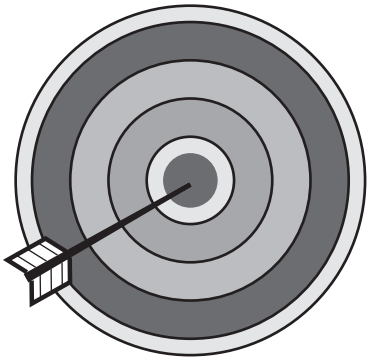
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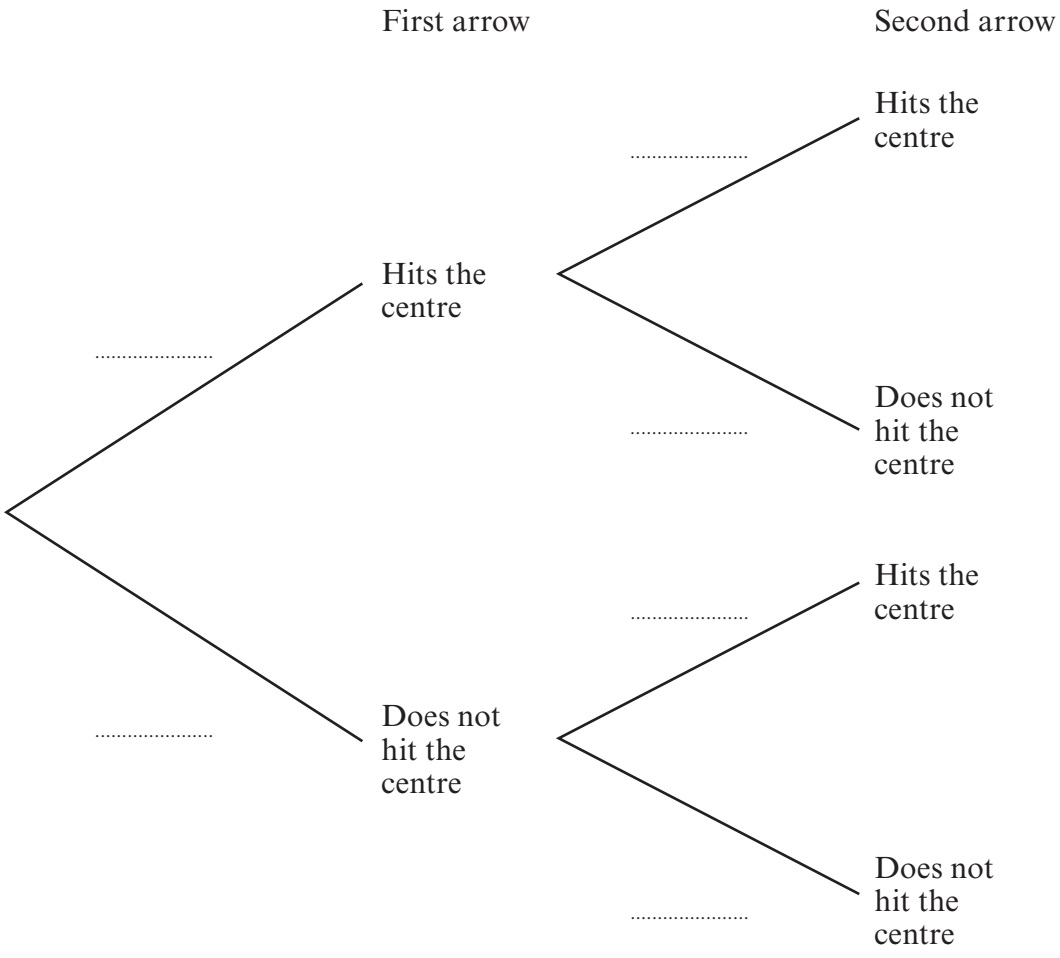
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7. Each time George fires an arrow at a target, the probability that it hits the centre of the target is 0·3.



George fires two arrows at the target.

(a) Complete the following probability tree diagram.



[2]

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(b) Calculate the probability that George only hits the centre of the target once.

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[3]

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8. An experiment was carried out to investigate the probability of obtaining an even number when a biased dice is thrown.
The number of even numbers obtained in each of 5 sets of 20 throws is shown in the table below.

	Number of times an even number is recorded
First set of 20 throws	14
Second set of 20 throws	8
Third set of 20 throws	14
Fourth set of 20 throws	16
Fifth set of 20 throws	10

(a) Complete the table below to show the relative frequency of an even number occurring after throwing the dice a total of 20 times, 40 times, 60 times, 80 times and 100 times.

Number of times the dice is thrown altogether		20	40	60	80	100
Relative frequency of obtaining an even number	Fraction	$\frac{14}{20}$				
	Decimal					

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[3]

(b) Using the above results, write down the best estimate for the probability of obtaining an even number when this biased dice is thrown. Give a reason for your answer.

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[2]

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(c) Explain what you think might happen to the relative frequency if the experiment was continued with more throws of the biased dice.

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[1]

(d) What would be your best estimate of the probability of obtaining an odd number on this biased dice?

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[2]

9. A sheet of card is 0·09 mm thick.
Find the thickness of the card **in metres**, expressing your answer in standard form.
You must show all your working.

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[3]

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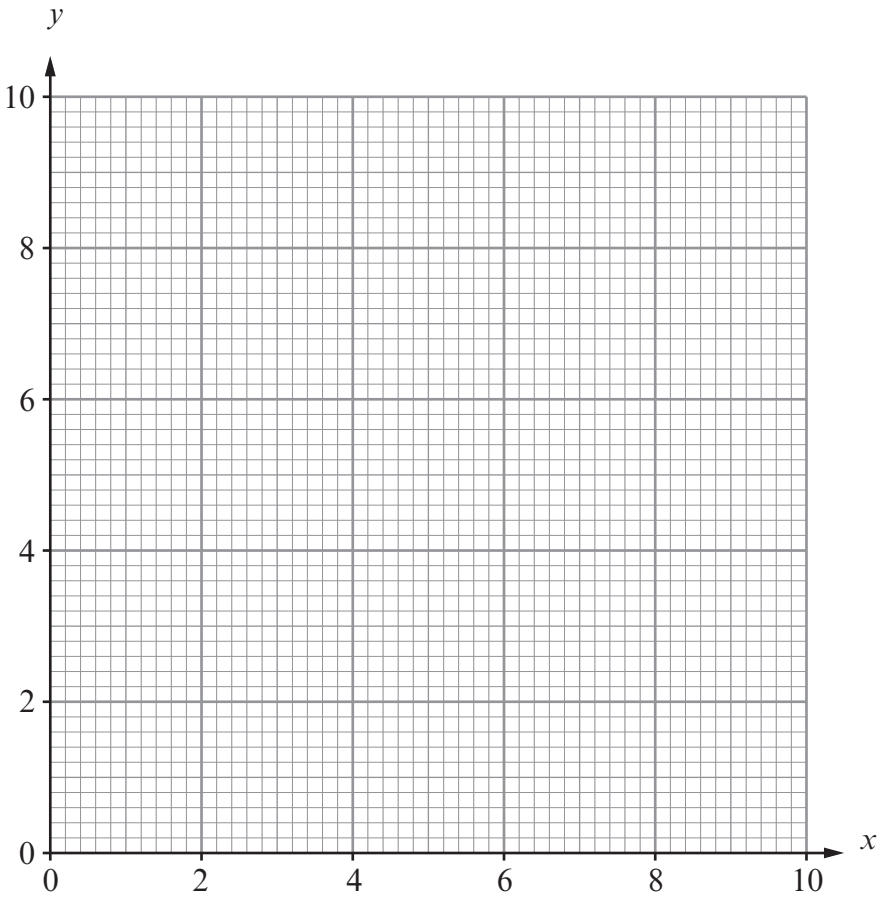
10. A cutting machine has two settings, x and y.
For safety in operating the cutting machine, the settings x and y must be selected so that all the inequalities below are satisfied.

$$x + y < 8$$
$$5x + y > 10$$
$$2y - x > 4$$

(a) Use the graph paper below to identify the region that shows the safe settings of x and y for the cutting machine.

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[3]

(b) Write down a set of possible safe settings for the cutting machine.

$x =$ ..... and $y =$ .....

[1]

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11. The diagram shows a circle with centre O and a tangent PT that touches the circle at C.

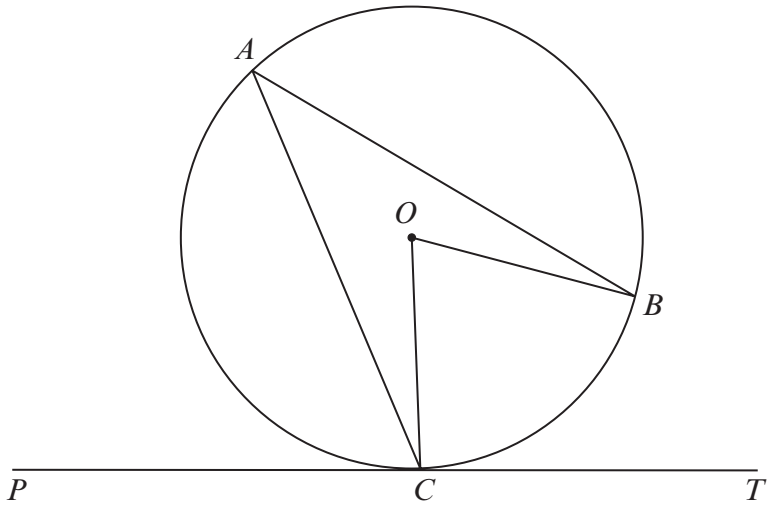


Diagram not drawn to scale

The reflex angle at the centre of the circle is 280°.
Find the size of each of the following angles.
You must give a reason for each answer.

(a) $B\hat{A}C$

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[2]

(b) $B\hat{C}P$

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[3]

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12. *(a)* Complete the table shown below and draw the graph of the curve $y = 2^x$ for values of x from –2 to +2.

x	–2	–1	0	1	2
$y = 2^x$	$\frac{1}{4}$			2	4

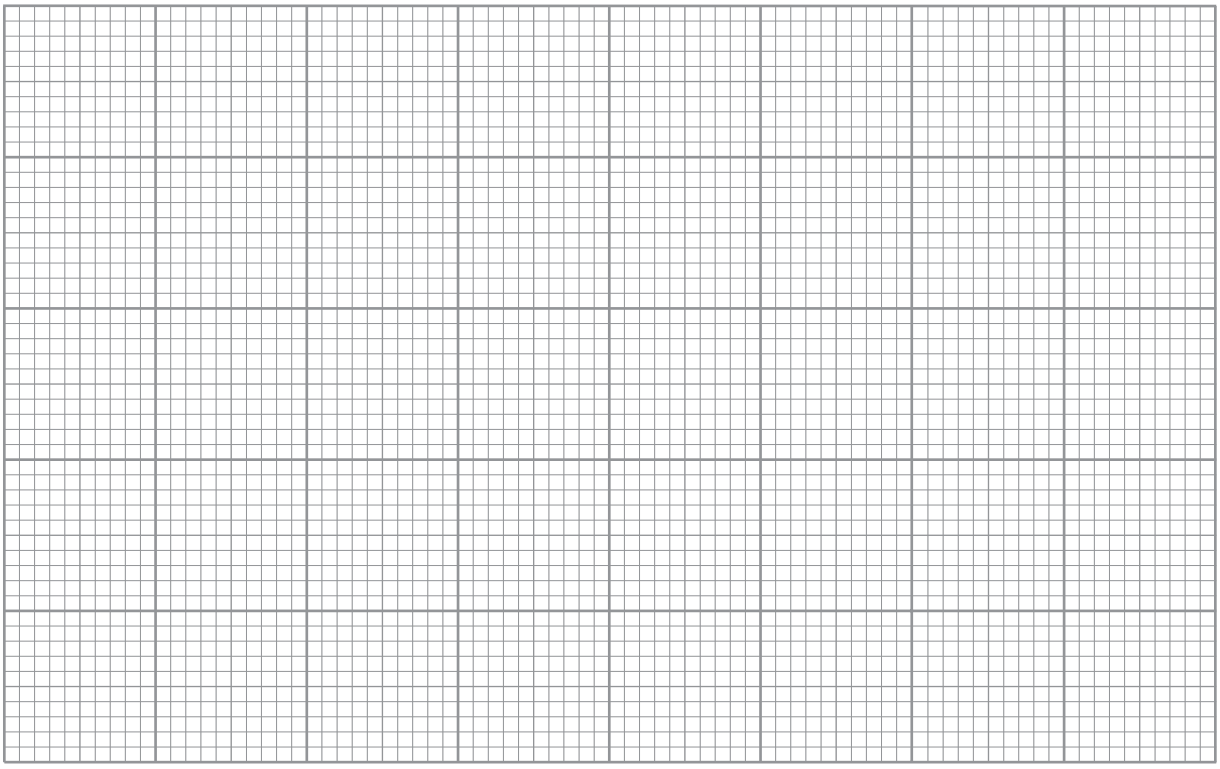
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[3]

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(b) Use your graph to solve $2^x = 3$.

.....

.....

[1]

(c) Find the value of $2^{0.5}$.

.....

[1]

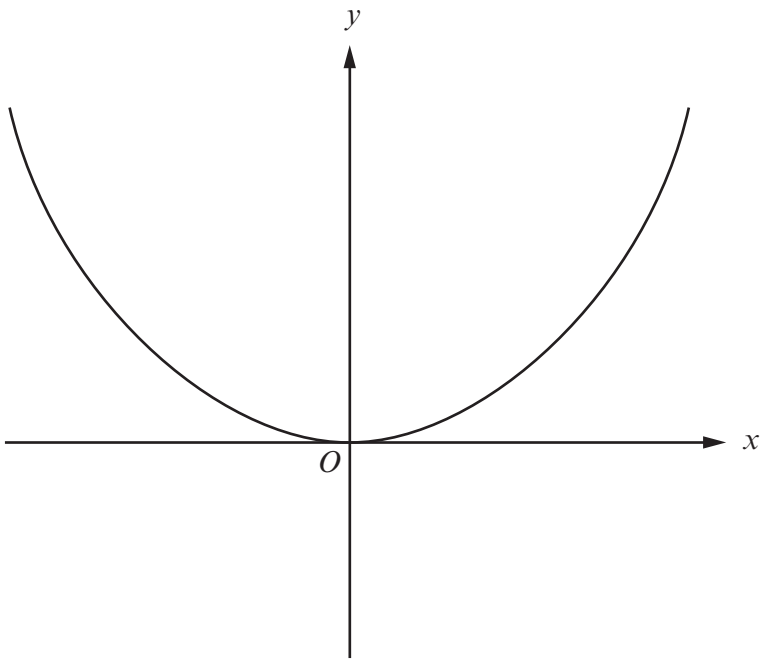
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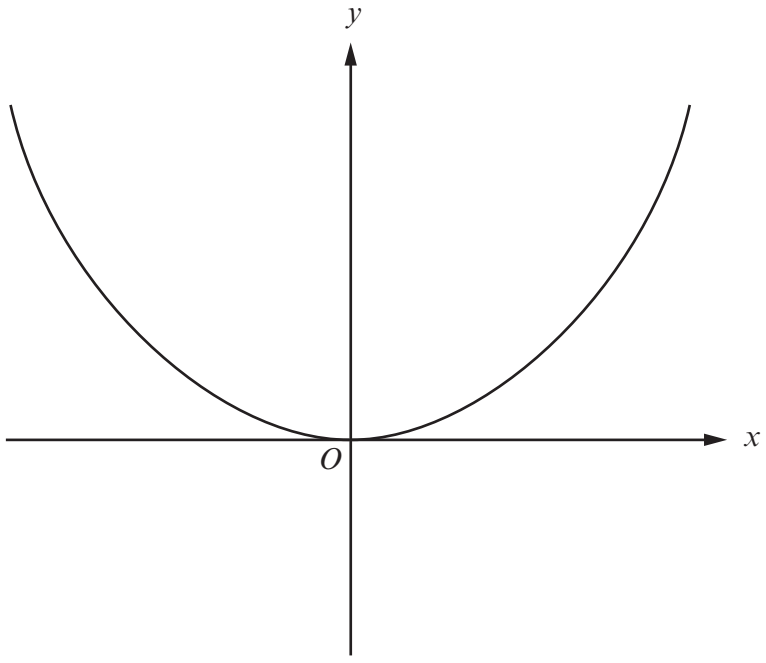
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13. *(a)* The diagram shows a sketch of $y = x^2$.
On the same diagram, sketch the curve $y = x^2 + 3$.
Mark clearly the coordinates of one point where the curve meets or crosses an axis.



[2]

(b) The diagram shows a sketch of $y = x^2$.
On the same diagram, sketch the curve $y = (x + 3)^2$.
Mark clearly the coordinates of one point where the curve meets or crosses an axis.



[2]

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Question number	Additional page, if required. Write the question numbers in the left-hand margin

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GCSE MARKING SCHEME

MATHEMATICS - UNITISED

SUMMER 2012

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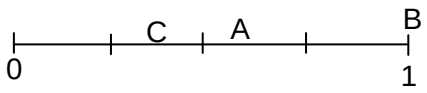
INTRODUCTION

The marking schemes which follow were those used by WJEC for the Summer 2012 examination in GCSE MATHEMATICS - UNITISED. They were finalised after detailed discussion at examiners' conferences by all the examiners involved in the assessment. The conferences were held shortly after the papers were taken so that reference could be made to the full range of candidates' responses, with photocopied scripts forming the basis of discussion. The aim of the conferences was to ensure that the marking schemes were interpreted and applied in the same way by all examiners.

It is hoped that this information will be of assistance to centres but it is recognised at the same time that, without the benefit of participation in the examiners' conferences, teachers may have different views on certain matters of detail or interpretation.

WJEC regrets that it cannot enter into any discussion or correspondence about these marking schemes.

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JUNE 2012 UNIT 2 (Non calculator) Foundation	Marks	FINAL MARK SCHEME Comments
1. (a) (i) Seven thousand and eighty nine	B1	
1. (a) (ii) 37204	B1	
1. (b) 815	B1	
1. (c) 568	B1	
1. (d) 600 or 6 hundred OR hundred(s)	B1	
1. (e) e.g (68, 69 or 70 × 10 or 11) OR 68.9 × 10 680 OR 690 OR 700 OR 770 etc	M1 A1	Good estimates F.T their estimates for simple calculations M0, A0 for actually calculating 68.9 × 11 (757.9) Unsupported answers get M0, A0.
1. (f) 1, 3, 9, 27	B2	B1 for any 2 or 3 with no incorrect OR all 4 correct and one incorrect
2. 80g 800kg 80mg (80kg) 270mm 270cm 270m (270km) (170cm) 17m 170mm 1700cm 27 litres (270 ml) 2.7 cm^3 2700litres	B1 B1 B1 B1	
3. (a)  	B1 B1 B1	Allow 1, 2 and 3 to represent A, B and C respectively. Allow 6/10 and 3/10 to represent A and C respectively. A should be between ½ exclusive and ¾ inclusive (up to the end of 'it.') B should be at 1. C should be between ¼ inclusive (beyond the end of 'that') and ½ exclusive.
3. (b) unlikely	B1	
4. (a) (i) Add 14 to the previous term	B1	Accept +14 Do not accept '2 multiples of 7' or 'two 7s' Do not accept n + 4
4. (a) (ii) Multiply the previous term by 2	B1	Accept ×2 or 'double' Do not accept n × 2
4. (b) 5	B1	Do not accept 5 × 5
4. (c) 60/100 × 70 = 42 I.S.W.	M1 A1	Any correct method for finding 60% A0 for 42%.
4. (d) Strategy for finding how many 85p in £10 11 (and (£)9.35) 65p change **QWC on the next page**	M1 A1 B1	10 is £8.50, 11 is 9.35, (12 is 10.20) For 11 and (£)9.35 OR 11 and no incorrect working. F.T. if possible

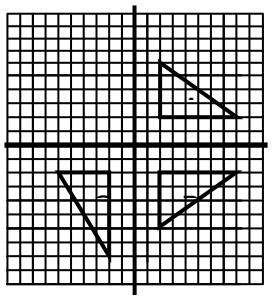
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JUNE 2012 UNIT 2 (Non calculator) Foundation	Marks	FINAL MARK SCHEME Comments
4. (d) continued QWC Look for • Spelling • Clarity of text explanations • The use of notation – watch for '=','£', 'p' being used appropriately. QWC2: Candidates will be expected to • present work clearly, with words explaining their processes or steps AND • make few if any mistakes in mathematical form, spelling, punctuation and grammar and include units in their final answer QWC1: Candidates will be expected to • present work clearly, with words explaining their processes or steps OR • make few if any mistakes in mathematical form, spelling, punctuation and grammar and include units in their final answer	 QWC 2	 QWC2 Presents relevant material in a coherent and logical manner, using acceptable mathematical form, and with few if any errors in spelling, punctuation and grammar. QWC1 Presents relevant material in a coherent and logical manner but with some errors in use of mathematical form, spelling, punctuation or grammar. OR Evident weaknesses in organisation of material but using acceptable mathematical form, with few if any errors in spelling, punctuation and grammar. QWC0 Evident weaknesses in organisation of material, and errors in use of mathematical form, spelling
5. A (4, -3) (4^{th} quadrant) B (-2, 0) (x – axis, left of O) C (- 3, -2) (3^{rd} quadrant)	B1 B1 B1	Reversed coordinates gets B0 each time.
6. Overall strategy including triangle is isosceles Top angle = 40 x = 360 – 90 – 90 – 40 = 140	M1 A1 M1 A1	**Look at diagram also** F.T. 'their 40'except 90°.
7. (a) (i) (£) 6m	B1	Ignore £s. Allow 6×m or m×6 or m6
7. (a) (ii) x − 4 (kg)	B1	Ignore kg. Allow xkg – 4kg, and y = x – 4
7. (b) − 2	B2	B1 for −14 B0 if x and/or y still left in their answer, e.g. −14x + 12y
7. (c) 5x = 20 x = 4	B1 B1	Isolating the 5x F.T. ax = b (a≠1) Accept embedded answers, e.g. 5×4 – 3 = 17
7. (d) (n – 4)/6 OR $\frac{n-4}{6}$	B2	B1 for n – 4 OR B1 for a linear expression in n divided by 6 including n – 4 ÷ 6, OR n – 4 / 6 but not n – 4/6 n – 4 = – 4n ÷ 6 gets B1 for sight of n – 4 – 4n ÷ 6 gets B1 for linear expression in n divided by 6 Ignore n= at the start and =n at the end of their work.

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JUNE 2012 UNIT 2 (Non calculator) Foundation	Marks	FINAL MARK SCHEME Comments
8. (a) Completed ball numbers and disc colours yellow | 1 3 5 7 (green) | 1 3 5 7 blue | 3 9 15 21 (red) | (3) 9 (15) 21 | (1) 3 (5) 7	B1 B2	B1 for 2 or 3 correct columns OR 2 or 3 correct rows.
8. (b) (i) 6/16 I.S.W. OR exact decimals or %s, 37.5% or .375	B2	F.T. their table B1 for a numerator of 6 in a fraction less than 1. B1 for a denominator of 16 in a fraction less than 1. Do not penalise incorrect reduction of fractions. NOTES Penalise –1 for use of words such as "6 out of 16", "6 in 16" OR "6:16". When fraction and wrong notation seen, DO NOT penalise wrong notation.
8. (b) (ii) 10/16 I.S.W. OR exact decimals or %s, 62.5% or .625	B1	F.T. 1− 'their (b)(i)' if a fraction < 1 OR F.T. their table B0 if the incorrect reduced fraction from (b)(i) is used.
9.(a) Attempt to use 8:38 + 6 hours 34 minutes or 13: 38 – 5 + 6 hours 34 minutes 15:12 or 3:12pm	M1 A1	Sight of 14 72 or 3 12 implies M1. Accept '8.38 + 6.34' Accept 15 12 pm. A0 for 3:12 OR 15:12 am *Answers of 3hours 12 mins or 15 hours 12 mins implies M1, A0*
9.(b) Time difference 8 hours (0)1:05 or 1:05 (a.m.) AND Wednesday	B1 B2	Implied by an ans. of 25:05, or 00 65 or attempt 17:05 + 8 FT through 'their time difference' + 17:05 provided ≥6 and ≤10, and correctly evaluated Allow 1 05 or 1.05 AND Wednesday B1 for (0)1:05 or 1:05 (a.m.) or 1 05 or 1.05 B1 for Wednesday and time 01:05pm
10. (Auto marked) C, B, D	B3	With no other entries With no other entries With no other entries
11. Correct reflection in the x-axis (maybe implied by final answer) Correct rotation of their reflection 	B2 B2	B1 for a reflection in the y-axis or in any line indicated FT their reflection provided it is unambiguously identifiable. B1 for anticlockwise rotation through 90° OR rotation of triangle A through 90° clockwise indicated as triangle C Any sight of rotation in all 4 quadrants, then no marks

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JUNE 2012 UNIT 2 (Non calculator) Foundation	Marks	FINAL MARK SCHEME Comments
12. (USBs cost £)6000	B1	
(Webcams takings) (£)990 Or sight of 660+330 (may be in different stages of working)	B2	B1 for sight of 33 or 330 or 660 or 22×1.50×30 or 22×30 + ½ 'their 22×30' or equivalent calculation
(USB profit =) 7590 - 990 - 6000 (=£600)	M1	Do not accept 330 or 660 as their 990 FT 7590 - their 990 – their 6000
(USB profit is) 10%	A1	FT (their USB profit/ their 6000) × 100 *Alternative:* B2 (Webcams takings 30×33 = £)990 (or B1 for sight of 33 or 660 or 22×1.50×30 or equivalent calculation) B1 (USB takings 7590 – 990 =) 6600 M1 (Selling price each USB) 6600÷120 (= £55) A1 (USB profit) 10% Unsupported 10% gets all 5 marks

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UNIT 2 (HIGHER TIER)

JUNE 2012 UNIT 2 Unitised Higher Tier		FINAL MARK SCHEME Comments
1.(a) Attempt to use 8:38 + 6 hours 34 minutes or 13: 38 – 5 + 6 hours 34 minutes 15:12 or 3:12pm	M1 A1	Sight of 14 72 or 3 12 implies M1. Accept '8.38 + 6.34' Accept 15 12 pm. A0 for 3:12 or 15 12 am *Answers of 3hours 12 mins or 15 hours 12 mins implies M1, A0*
1.(b) Time difference 8 hours (0)1:05 or 1:05 (a.m.) AND Wednesday	B1 B2	Implied by an answer of 25:05, or 00 65 or attempt 17:05 + 8 FT through 'their time difference' + 17:05 provided $\geq$6 and $\leq$10, and correctly evaluated Allow 1 05 or 1.05 AND Wednesday B1 for (0)1:05 or 1:05 (a.m.) or 1 05 or 1.05 B1 for Wednesday and time 01:05pm
2.(a) 26, 29, 34	B2	B1 for any 2 correct terms in the correct position, or 25,26,29 or 1^2+25, 2^2+25, 3^2+25
2.(b) 63	B2	B1 for evidence of differences 1, 4, 9, 16, or statement '(goes up in) square numbers' Award B0 for n^2
3. C B D	B1 B1 B1	With no other entries With no other entries With no other entries
4.(a) 40/4 = 5x or 5x = 10 or 40 = 20x or 40 = 4×5x or 8=4x x = 2	M1 A1	Accept embedded answers. Mark final answer
4.(b) 6x – 15 > 21 or 2x – 5 > 21/3 6x > 21 + 15 or 6x > 36 or 2x > 7 + 5 x > 6	B1 B1 B1	FT until 2nd error. Use of '=' gets no marks, unless replaced in final answer, then award all 3 marks Mark final answer. Must be a simplified answer *If working shows 6x – 15 > 21, then 6x > 6 and then x > 1 award B1, B0, B1* *2x – 5 > 21 is 2 errors, hence B0*
4.(c) $3g^2 = f$ $g^2 = f/3$ $g = (\pm)\sqrt{(f/3)}$	 B1 B1 B1	FT until 2nd error, equivalent level of difficulty Accept $3g^2 = f + 0$ Accept inclusion of ±0 Square root clearly needs to include the /3, and accept inclusion of ±0 *Do not accept 0f instead of 0+f* *$9g^2 = f$ is 1 error, first B0 then FT*
5.Correct reflection in the x-axis (may be implied by final answer) Correct rotation of their reflection	B2 B2	B1 for a reflection in the y-axis or in any line indicated FT their reflection provided it is unambiguously identifiable B1 for anticlockwise rotation through 90° OR rotation of triangle A through 90° clockwise indicated as triangle C Any sight of rotation in all 4 quadrants, then no marks

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JUNE 2012 UNIT 2 Unitised Higher Tier		FINAL MARK SCHEME Comments
6. (USBs cost £)6000 (Webcams takings) (£)990 Or sight of 660+330 (may be in different stages of working) (USB profit =) 7590 - 990 - 6000 (=£600) (USB profit is) 10% Look for • relevance • spelling • clarity of text explanations, • the use of notation (watch for the use of '=', £, % being appropriate) QWC2: Candidates will be expected to • present work clearly, with words explaining process or steps AND • make few if any mistakes in mathematical form, spelling, punctuation and grammar and include units in their final answer QWC1: Candidates will be expected to • present work clearly, with words explaining process or steps OR • make few if any mistakes in mathematical form, spelling, punctuation and grammar and include units in their final answer	B1 B2 M1 A1 Q W C 2	 B1 for sight of 33 or 330 or 660 or 22×1.50×30 or 22×30 + ½ 'their 22×30' or equivalent calculation Do not accept 330 or 660 as their 990 FT 7590 - their 990 – their 6000 FT (their USB profit/ their 6000) × 100 *Alternative:* B2 (Webcams takings 30×33 = £)990 (or B1 for sight of 33 or 660 or 22×1.50×30 or equivalent calculation) B1 (USB takings 7590 – 990 =) 6600 M1 (Selling price each USB) 6600÷120 (= £55) A1 (USB profit) 10% <u>Unsupported 10% gets all 5 marks</u> QWC2 Presents relevant material in a coherent and logical manner, using acceptable mathematical form, and with few if any errors in spelling, punctuation and grammar. QWC1 Presents relevant material in a coherent and logical manner but with some errors in use of mathematical form, spelling, punctuation or grammar. OR Evident weaknesses in organisation of material but using acceptable mathematical form, with few if any errors in spelling, punctuation and grammar. QWC0 Evident weaknesses in organisation of material, and errors in use of mathematical form, spelling, punctuation and grammar.
7.(a) 0.3, 0.7 on all 3 sets of branches (b) Sight of 0.3×0.7 or 0.21 0.3×0.7 + 0.7×0.3 = 0.42	B2 B1 M1 A1	B1 for any 3 correct entries OR 1 pair correct FT from (a), but probability values used must >0 and <1 Correct method with addition of the 2 products seen or implied Mark final answer
8.(a) (14/20) | 22/40 | 36/60 | 52/80 | 62/100 0.7 | 0.55 | 0.6 | 0.65 | 0.62 (b) 0.62 or equivalent Reason, e.g. "last value", "most throws" (c) Conclusion, e.g. "settle", "stable", "smooth out", "would get a more accurate answer" (d) 1- 0.62 or 1 – 62/100 0.38 or 38/100 (=19/50)	 B3 B1 E1 E1 M1 A1	B2 for 6, 7 or 8 correct entries, including FT values and calculations, or B1 for 4 or 5 correct entries, including FT values and calculations FT their final column entry in (a) Do not accept 'most accurate'. Mark independently of B1 If no estimate given, but statement that 100 throws as more results then award B0, E1 Do not accept implication that it stays at 0.62 FT 1 – (b), or 1 – 'their final result in the table in (a)' Ignore incorrect cancelling

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JUNE 2012 UNIT 2 Unitised Higher Tier		FINAL MARK SCHEME Comments
9. Sight of, or calculations that imply knowledge of facts 10mm = 1cm and 100cm = 1m, or 1000mm = 1m, or equivalent combinations that could lead to a correct conversion 9×10^{-5} (m)	B1 B2	 B1 for 0.00009 or 0.09×10^{-3} or equivalent *SC1 for their value >0 and <1 correctly expressed in standard form with power of 10 negative. First B1 may also be awarded if appropriate*
10.(a) Any 2 of the lines x+y=8, 5x+y=10 and 2y-x=4 drawn correctly Correct region identified (b) x and y selected <u>within</u> **their** region	B2 B1 B1	B1 for any 1 line correct CAO Not on the lines. FT their identified region. If a closed region is formed but not shaded, accept a point within their closed area within the three lines drawn or by two lines with the inclusion of axes. Not for a non identified open region via extension of the graph paper If no region selected accept any possible correct points, e.g. (2, 4)
11.(a) 40° Angle at the centre is twice the angle at circumference (b) 140° Circle theorem description e.g. Radius meets tangent at 90°, or Alternate segment theorem	B1 E1 B2 E1	 Dependent on B1, unless correct workings seen but with 1 error in their calculation FT their <BOC, i.e. (180 - <BOC)/2 + 90, provided unambiguous B1 for finding <OCB= 50° or <BCT =40° may be seen on the diagram. Dependent on B2, unless correct workings seen but with 1 error in their calculation FT from their (a)
12.(a)Points x: -2, -1, 0, 1, 2 $y=2^x$: (¼), ½, **1**, (2), (4) Suitable choice of axes through the origin and uniform scales, x from -2 to 2 and y from 0 to 4 Plotting all 5 points correctly and joining with a curve (b) Reading from their graph for y=3 (c) Reading their graph for x = 0.5	B1 B1 B1 B1 B1	 Axes must be clear, but may not be labelled (FT their evaluations of y if shown) FT from their points and the three given point <u>Do not FT scales, where the scale is < 1cm representing 1 unit</u> FT their curve, or their graph provided the points are joined Tolerance for accuracy, within 1 small square Accept an answer of $\sqrt{2}$ FT their curve, or their graph provided the points are joined Tolerance for accuracy, within 1 small square
13.(a) Correct sketch (shift up) (0, 3) indicated on the correct sketch	B1 B1	 Depends on the first B1. Dashes to indicate '3 notches' is insufficient
13.(b) Correct sketch (shift to left) (-3, 0) indicated on the correct sketch **OR** (0, 9) indicated on the correct sketch	B1 B1	 Depends on the first B1.

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Surname	Centre Number	Candidate Number
Other Names		0

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GCSE

4352/02

MATHEMATICS (UNITISED SCHEME)
UNIT 2: NON-CALCULATOR MATHEMATICS
HIGHER TIER

A.M. MONDAY, 16 January 2012

$1\frac{1}{4}$ hours

CALCULATORS ARE NOT TO BE USED FOR THIS PAPER

INSTRUCTIONS TO CANDIDATES

Use black ink or black ball-point pen. Do not use gel pen or correction fluid.

Write your name, centre number and candidate number in the spaces at the top of this page.

Answer **all** the questions in the spaces provided.

If you run out of space, use the continuation page at the back of the booklet, taking care to number the question(s) correctly.

Take π as 3·14.

INFORMATION FOR CANDIDATES

You should give details of your method of solution when appropriate.

Unless stated, diagrams are not drawn to scale.

Scale drawing solutions will not be acceptable where you are asked to calculate.

The number of marks is given in brackets at the end of each question or part-question.

You are reminded that assessment will take into account the quality of written communication (including mathematical communication) used in your answer to question **6**.

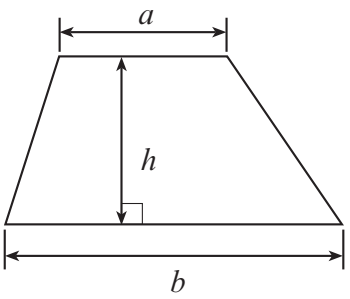
For Examiner's use only		
Question	**Maximum Mark**	**Mark Awarded**
1	**5**	
2	**2**	
3	**8**	
4	**3**	
5	**5**	
6	**5**	
7	**7**	
8	**6**	
9	**11**	
10	**4**	
11	**5**	
12	**4**	
TOTAL MARK		

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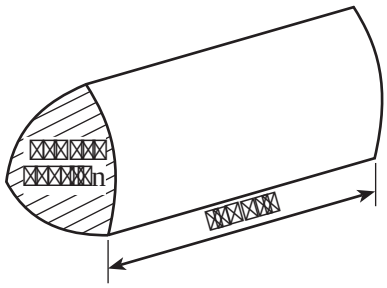
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Formula List

Area of trapezium $= \frac{1}{2}(a + b)h$

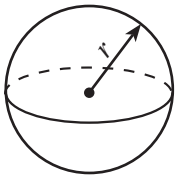


Volume of prism = area of cross section × length



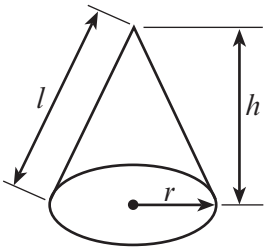
Volume of sphere $= \frac{4}{3}\pi r^3$

Surface area of sphere $= 4\pi r^2$



Volume of cone $= \frac{1}{3}\pi r^2 h$

Curved surface area of cone $= \pi rl$

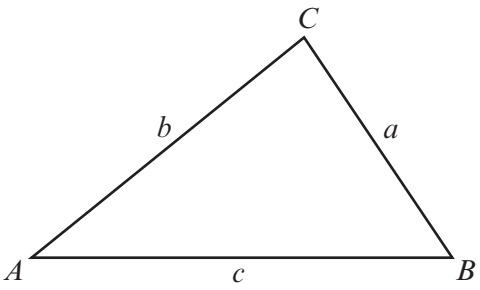


In any triangle ABC

Sine rule $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

Cosine rule $a^2 = b^2 + c^2 - 2bc\cos A$

Area of triangle $= \frac{1}{2}ab\sin C$



The Quadratic Equation

The solutions of $ax^2 + bx + c = 0$, where $a \neq 0$

are given by $x = \dfrac{-b \pm \sqrt{(b^2 - 4ac)}}{2a}$

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1. *(a)* The diagram shows three parallel paths with a cycle track connecting them.

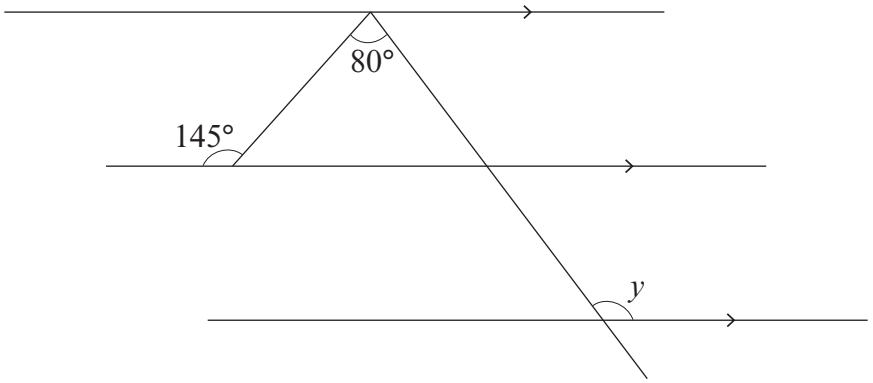


Diagram not drawn to scale

Calculate the size of the angle marked y.

.....

.....

.....

.....

$y =$ ..... °

[2]

(b)

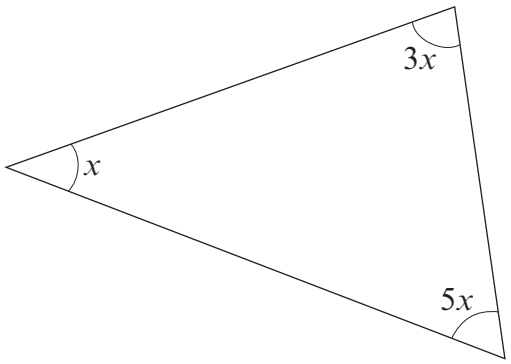


Diagram not drawn to scale

Calculate the size of each of the angles in the triangle.

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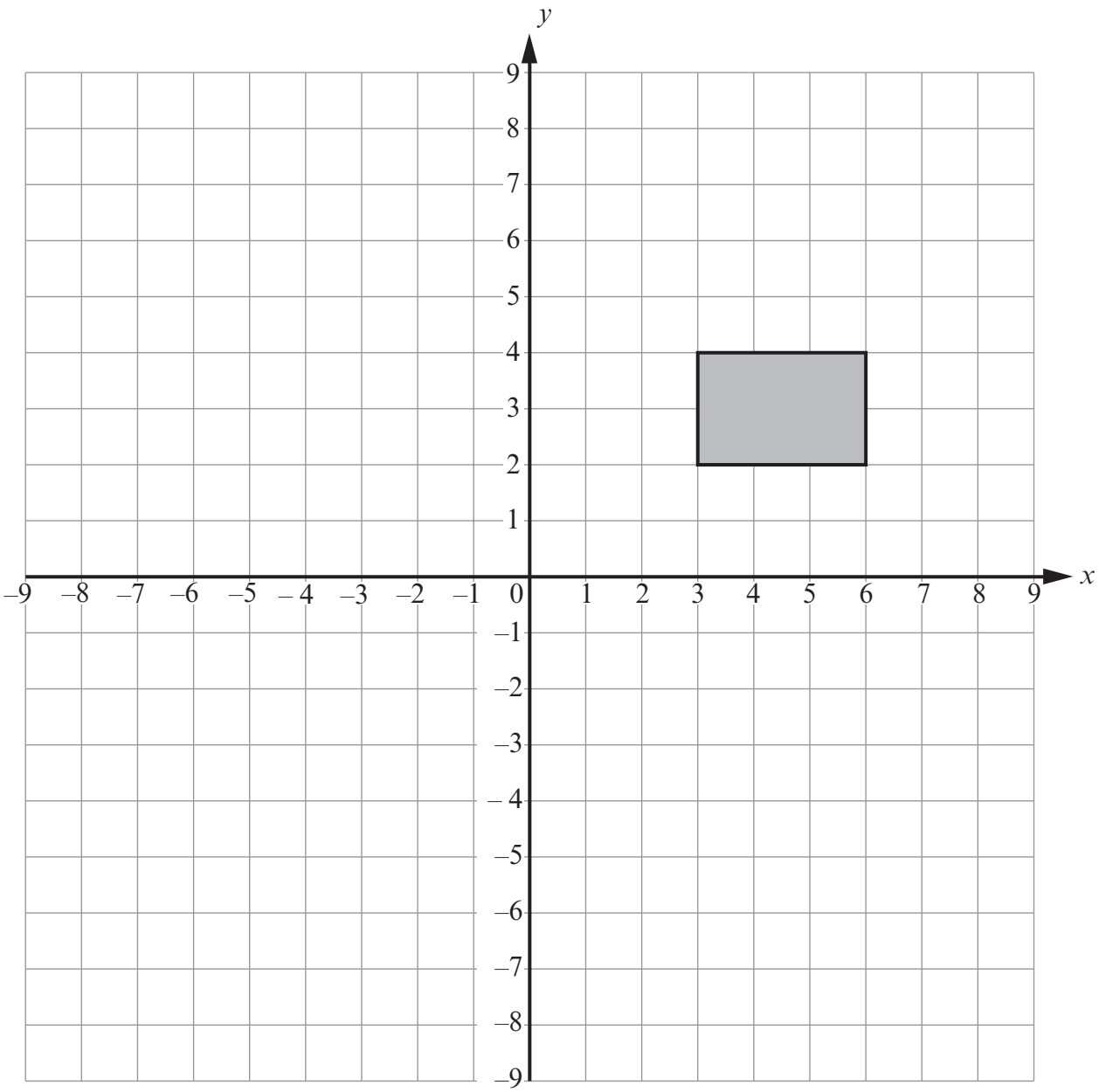
[3]

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2. Rotate the rectangle through 90° clockwise about the point (1, 4).



[2]

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3. *(a)* Show that $7{\cdot}02^2 - 3{\cdot}9^2$ is approximately 33.

[2]

(b) Calculate $6\frac{1}{4}\%$ of £40.

[3]

(c) Write down the reciprocal of 2·5.

[2]

(d) Simplify $2xy + 3y - 13xy + 4x - 17y$.

[1]

Turn over.

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4. Two fair coins are thrown.
Ahmed says,
"the probability of obtaining two tails is less than 0·5."
Is Ahmed correct?
You must show **all** the working necessary to justify your answer.

.....

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.....

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.....

.....

[3]

5. *(a)* Simplify $4(x + 5)$ $3(2x$ $4)$.

.....

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.....

[2]

(b) Simplify $\frac{y^{16} \boxtimes y^2}{y^4}$.

.....

.....

.....

.....

[1]

(c) Solve $3b + 2 \boxtimes 29$.

.....

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.....

.....

[2]

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6. *You will be assessed on the quality of your written communication in this question.*

Explain why the sum of the interior angles of any quadrilateral is always 360°.

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.....

.....

[5]

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Turn over.

Examiner only

7. *(a)* (i) Use the graph paper below to draw the graph of $3x + 2y = 12$.

.....

.....

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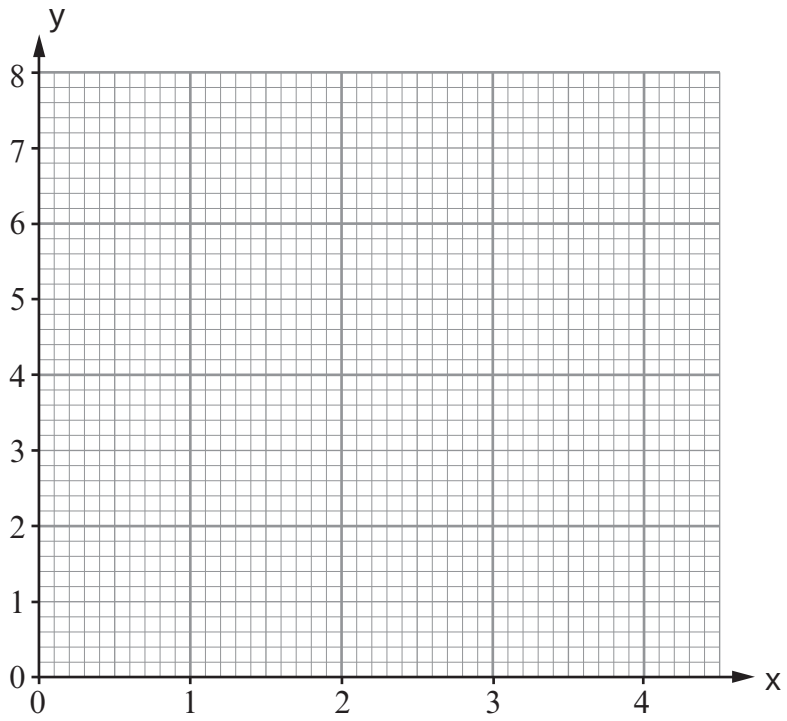
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[3]



(ii) Write down the gradient of $3x + 2y = 12$.

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[1]

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(b) Select from the following list of equations to complete the table below.

Equations:

A: $y + 4x = 3$ **B:** $y = 5x$ **C:** $y = 5x + 7$

D: $y - 3x = 4$ **E:** $x + y - 5 = 0$ **F:** $2y = 3x + 5$

Description	Equation
Passes through the origin (0, 0)	
Parallel to $y = 3x + 7$	
Intersects the y-axis at $y = 5$	

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[3]

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8. *(a)* In 2004 there were 7 000 000 people living alone in Great Britain, this is four times as many as in 1961.
Calculate how many people lived alone in Great Britain in 1961.
Express your answer in standard form.

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[3]

(b) Two thirds of the 24·6 million households in the UK in 2004 were family households.
How many households in the UK in 2004 were family households?
Express your answer correct to two significant figures.

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[3]

9. *(a)* Expand and simplify $(2x + 3)(3x - 5)$.

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[3]

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(b) Solve the following simultaneous equations.

$$5x + 2y = 5$$
$$7x + 3y = 9$$

[4]

(c) Make t the subject of the formula $3t = d(5 - t)$.

[4]

Turn over.

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10. The points *A, B, C* and *D* lie on the circumference of the circle with centre *O*.
$B\hat{C}D = x$, where x is measured in degrees.

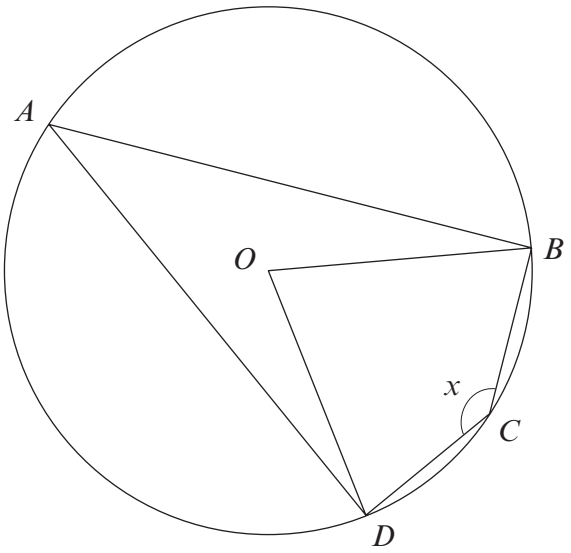


Diagram not drawn to scale

Show, giving reasons in your answer, that the size of $D\hat{O}B$ in degrees is $360 - 2x$.

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[4]

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11. *(a)* Express $0\cdot0\dot{3}\dot{4}$ as a fraction.

[2]

(b) Simplify $(3\sqrt{5} \quad \sqrt{2})(3\sqrt{5} + \sqrt{2})$ and state whether your answer is rational or irrational.

[3]

Turn over.

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12. A box contains 20 marbles, of which 2 are red, 3 are yellow and 15 are black.
Two marbles are selected at random, without replacement, from the box.
What is the probability that exactly one of the marbles is black?

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[4]

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Question number	Additional page, if required. Write the question number(s) in the left-hand margin

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WJEC
CBAC

GCSE MARKING SCHEME

MATHEMATICS - UNITISED

JANUARY 2012

INTRODUCTION

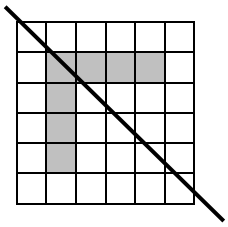
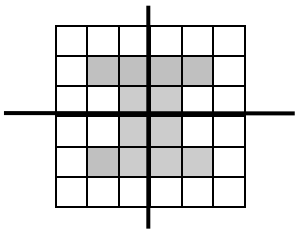
The marking schemes which follow were those used by WJEC for the January 2012 examination in GCSE MATHEMATICS – UNITISED. They were finalised after detailed discussion at examiners' conferences by all the examiners involved in the assessment. The conferences were held shortly after the papers were taken so that reference could be made to the full range of candidates' responses, with photocopied scripts forming the basis of discussion. The aim of the conferences was to ensure that the marking schemes were interpreted and applied in the same way by all examiners.

It is hoped that this information will be of assistance to centres but it is recognised at the same time that, without the benefit of participation in the examiners' conferences, teachers may have different views on certain matters of detail or interpretation.

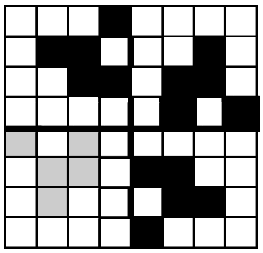
WJEC regrets that it cannot enter into any discussion or correspondence about these marking schemes.

	Page
Unit 1 – Foundation Tier	1
Unit 1 – Higher Tier	4
Unit 2 – Foundation Tier	7
Unit 2 – Higher Tier	12

Unit 2 – Foundation Tier

UNIT 2 (Non-calculator) Foundation Tier	Marks	Comments
1 (a) (i) 6043	1	
1 (a) (ii) thirty two thousand (and) five	1	
1. (b) (i) 36 and 54	1	
1. (b) (ii) 45	1	Allow 45 + 36 (=81)
1. (b) (iii) 42	1	
1. (c) (i) 45700	1	
1. (c) (ii) 46000	1	
1. (d) (i) 24	1	
1. (d) (ii) 27	1	
1. (d) (iii) 23 OR 29	1	For either or both with no incorrect answers
2. g(rams) m(etres) km l(itres) OR cm^3 OR ml OR cc	 1 1 1 1	**Allow incorrect spelling as long as comprehensible** **Note: the contents of a bracket are not required** **If more than one answer given, they all have to be correct.** **e.g. miles, kilometres gets 0** e.g. allow g OR gram OR grams allow m OR metres allow kilometre but not kilo
3. (a) Trapezium Rectangle Rhombus Square	B4	**B1 for each** **B0 for any shape that is in at least 2 places**
3. (b) (i) Correct line with no incorrect lines 	1	
3. (b) (ii) 2 correct lines with no incorrect lines 	1	

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UNIT 2 (Non-calculator) Foundation Tier	Marks	Comments
4. (a) 40	1	
4. (b) (i) Add eleven (to the previous term)	B1	Accept +11 Accept any equivalent statement.
4. (b) (ii) Divide (the previous term) by two	B1	Accept ÷2 Accept any equivalent statement.
4. (c) (i) 7 OR −7	1	Allow 7·0 etc. Do not accept 7×7 OR 72.
4. (c) (ii) 0·09	1	Allow ·09
4. (d) 80/100 × 60 = 48	M1 A1	Any correct method for finding 80% SC1 for 48%
5. (a) (i) (£) ½b OR equivalent	1	Ignore units, no £ sign required. Do not accept words, e.g. half of b, 50% of b B0 for 1/2b OR b – b/2
5. (a) (ii) x + 4 (cm) OR 4 + x	1	Ignore units, no cm required. Ignore x=, for example, B1 for x = x+4, x+4=x B1 for x+4=4x, but B0 for 4x=x|+4
5. (b) 8	B2	B1 for 52/4 or 13 OR B1 for 'their 13' – 5 Accept embedded answers like 8+5=13×4=52
5. (c) 5(n + 6)	B2	Ignore x= etc B1 for 5. n+6 (No bracket). B0 for 5n + 6 B1 for n + 6 × 5 but B0 for n + 30 But n+6 = 6n × 5 gets B0. Also n+6(5) gets B0 Penalise –1 for inappropriate algebra if B2
Overlay (viewed with diagram) 6. All 3 quadrants correct 	B3	B1 for each correct quadrant.

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UNIT 2 (Non-calculator) Foundation Tier	Marks	Comments
7. Indirect (✓) marking		
For trying to find the costs of a common number of bricks	S1	
For example: Davies 40 bricks cost (£) 6 × 4	M1	Method of finding the cost of common number of bricks from either Davies or Jones
= (£) 24	A1	for first correct cost,
Jones 40 bricks cost (£) (£) 20	A1	for the other.
Profit on a common number of bricks	B1	Finding the profit
How many bricks for a profit of (£)20	B1	F.T. their common number of bricks costs.
OR	S1	For trying to find the cost of 1 brick
Davies' bricks cost 600/10	M1	Method of doing it for Davies or Jones
= 60p each	A1	for first correct cost,
Jones' bricks cost 50p each	A1	for the other.
Davies gains 10p per brick	B1	Finding the profit
They sold 200 bricks	B1	F.T. their common number of bricks costs.
Look for • Spelling • Clarity of text explanations • The use of notation – watch for '=','£', 'p' being used appropriately.	QWC 2	
QWC2: Candidates will be expected to • present work clearly, with words explaining their processes or steps AND • make few if any mistakes in mathematical form, spelling, punctuation and grammar and include units in their final answer QWC1: Candidates will be expected to • present work clearly, with words explaining their processes or steps OR • make few if any mistakes in mathematical form, spelling, punctuation and grammar and include units in their final answer		QWC2 Presents material in a coherent and logical manner, using acceptable mathematical form, and with few if any errors in spelling, punctuation and grammar. QWC1 Presents material in a coherent and logical manner but with some errors in use of mathematical form, spelling, punctuation or grammar OR evident weaknesses in organisation of material but using acceptable mathematical form, with few if any errors in spelling, punctuation and grammar. QWC0 Evident weaknesses in organisation of material, and errors in use of mathematical form, spelling, punctuation and grammar.

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UNIT 2 (Non-calculator) Foundation Tier	Marks	Comments	
Both parts (a) – (b) marked at the same time 8. (a) Completed card numbers 2, (3), 4, 5 and 2, 4, (5), 6 6 | 12 18 24 30 (5) | 10 (15) 20 25 (4) | 8 12 16 20 2 | 4 6 8 10 | 2 (3) 4 5	B1 B2	C.A.O. F.T. their table, particularly if they write the column and/or row values in a different order to the mark Scheme B1 for 2 or 3 correct columns OR 2 or 3 correct rows.	
View with table from (a) 8. (b) (i) 9/16	B2	F.T. their table B1 for a numerator of 9 in a fraction less than 1. B1 for a denominator of 16 in a fraction less than 1. Do not penalise incorrect reduction of fractions.	NOTES Penalise –1 for use of words such as "9 out of 16", "9 in 16" OR "9:16". When fraction and wrong notation seen, DO NOT penalise wrong notation.
8. (b) (ii) 7/16	B1	F.T. 1− 'their (b)(i)' if a fraction < 1	
Overlay (viewed with diagram) 9. Correct rotation	B2	B1 for anticlockwise about (1,4) OR Clockwise about (4,1) OR a near miss B0 if all 4 rotations shown	
10.(a) Sight of 35° or 65° in appropriate working (or on diagram) 115°	M1 A1	 May be on the diagram	
10.(b) x +3x + 5x = 180, 9x = 180 or other suitable method (x =) 20(°) (3x =) 60(°) **and** (5x =) 100(°)	M1 A1 B1	 FT their x for their 3x and 5x. May be on the diagram	

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UNIT 2 (Non-calculator) Foundation Tier	Marks	Comments
11. Split into 2 triangles, or 4 when using a centre point Making use of 180° as angle sum of a triangle $2 \times 180° = 360°$ or $4 \times 180° - 360° = 360°$	B1 B1 B1	*If diagram with angles torn to then meet at a point gets B1 B1 B0.* *If only square or rectangle considered, i.e. $4 \times 90°$ is $360°$ award B1 B1 B0,* *Or if only square or rectangle considered with angles discussed but no sizes given, then B1, B0, B0,* *Or angles of $90°$ with implication of '4' sides or angles, B0, B1, B0* *If a candidate quotes '180 (n – 2)' with n =4 substituted to get 360 then B2,* *OR for quoting '180(n – 2) then B1,* *However, if '180(n-2) is explained, based on number triangles, then probably B1, B1 , B1.* *Remember: if a special case quadrilateral is considered then maximum B2.* *If MR and working to show exterior angles $360°$ then for equivalent work treat as MR-1*
12.(a) $4x + 20 – 6x + 12$ $= -2x + 32$	B1 B1	FT until 2nd error
12. (b) y^{14}	B1	
12.(c) $3b > 27$ $b > 9$	M1 A1	27/3 must be evaluated If '=' used but replaced to give b>9 then M1,A1, otherwise no marks SC1 for b>31/3 but do not ignore incorrect cancelling

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Unit 2 – Higher Tier

UNIT 2 (Non-calculator) Higher Tier	Marks	Comments
1.(a) Sight of 35° or 65° in appropriate working (or on diagram) 115°	M1 A1	May be on the diagram
1.(b) x +3x + 5x = 180, 9x = 180 or other suitable method (x =) 20(°) (3x =) 60(°) **and** (5x =) 100(°)	M1 A1 B1	FT their x for their 3x and 5x. May be on the diagram
2. Correct rotation	B2	B1 for anticlockwise about (1,4) OR Clockwise about (4,1) OR a near miss B0 if all 4 rotations shown
3.(a) Sight of 49 or 16 from correct working Sight of 49 – 16 with 33 shown	M1 A1	*Or: 49.2804 – 15.21, both must be correct M1* *(34.0704) rounded to 33 A1* *Or: (7+4)(7-4) or unrounded difference of 2 sq M1* *Followed by 11×3 = 33 A1*
3. (b) Correct interpretation of 6 ¼%, e.g. sight of (25/4)/100 or sight of 6.25/100, or 0.0625 or 6 ¼ /100 6 ¼ / 100 × 40 or 0.0625 × 40 or sum of appropriate percentages (£)2.5(0)	B1 M1 A1	Or splitting percentages correctly with correct place values, but not showing the sum A method that could lead to a correct response
3. (c) 1 / 2.5 or similar evidence of understanding of term reciprocal 2/5 or 0.4 or 10/25 or equivalent	M1 A1	Do not accept answer as a decimal within a fraction
3. (d) -11xy -14y +4x	B1	Do not ignore further working. Mark final answer.
4. Deciding of possible outcomes HH TT HT TH P(TT) = ¼ Conclusion that the statement is true (¼ < ½)	M1 A1 A1	Or calculation P(TT) = ½ × ½ shown
5.(a) 4x + 20 – 6x + 12 = - 2x + 32	B1 B1	FT until 2nd error Mark final answer
5.(b) y^{14}	B1	
5.(c) 3b > 27 b > 9	M1 A1	27/3 must be evaluated If '=' used but replaced to give b>9 then M1,A1, otherwise no marks SC1 for b>31/3 but do not ignore incorrect cancelling

UNIT 2 (Non-calculator) Higher Tier	Marks	Comments
6. Split into 2 triangles, or 4 when using a centre point Making use of 180° as angle sum of a triangle $2 \times 180° = 360°$ or $4 \times 180° - 360° = 360°$	B1 B1 B1	*If diagram with angles torn to then meet at a point gets B1 B1 B0, with maximum QWC2* *If only square or rectangle considered, i.e. $4 \times 90°$ is $360°$ award B1 B1 B0,* *Or if only square or rectangle considered with angles discussed but no sizes given, then B1, B0, B0,* *Or angles of $90°$ with implication of '4' sides or angles, B0, B1, B0* *AND maximum QWC1because the communication is only for a special case* *If a candidate quotes '180 (n – 2)' with n =4 substituted to get 360 then B2,* *OR for quoting '180(n – 2) then B1,* *AND maximum QWC1* *However, if '180(n-2) is explained, based on number triangles, then probably B1, B1 , B1 with QWC2 available* *Remember: if a special case quadrilateral is considered then maximum B2 and QWC1* *If MR and working to show exterior angles $360°$ then for equivalent work treat as MR-1*
QWC2: Candidates will be expected to • present work clearly, with words explaining process or steps with a statement that the angle sum of a triangle is 180° within their response **AND** • make few if any mistakes in mathematical form, spelling, punctuation and grammar and include units in their final answer QWC1: Candidates will be expected to • present work clearly, with words explaining process or steps with a statement that the angle sum of a triangle is 180° within their response **OR** • make few if any mistakes in mathematical form, spelling, punctuation and grammar and include units in their final answer	QWC 2	QWC2 Presents <u>relevant</u> material in a coherent and logical manner, using acceptable mathematical form, and with few if any errors in spelling, punctuation and grammar. QWC1 Presents material in a coherent and logical manner but with some errors in use of mathematical form, spelling, punctuation or grammar OR evident weaknesses in organisation of material but using acceptable mathematical form, with few if any errors in spelling, punctuation and grammar. QWC0 Evident weaknesses in organisation of material, and errors in use of mathematical form, spelling, punctuation or grammar.
7.(a)(i) Any two points calculated or plotted correctly, with no incorrect points, OR a correct straight line but may have an extra incorrect point plotted Points joined by one straight line	M2 A1	Otherwise M1 for any single correct point, not simply an intersection with an incorrect line, or from an incorrect calculation ((0,6) (1,4.5) (2,3) (3,1.5) (4, 0)) Single straight line, do not ignore incorrect points joined *If 1 error in manipulating the equation then penalise -1, then FT. More than 1 manipulative error gets no marks.*
7.(a)(ii) -1.5 or equivalent	B1	
7.(b) B D E in this order ($y = 5x$ $y - 3x = 4$ $x + y - 5 = 0$)	B3	B1 for each correct answer

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UNIT 2 (Non-calculator) Higher Tier	Marks	Comments
8.(a) 7 000 000 ÷ 4 = 1 750 000 1.75×10^6	M1 A1 B1	 FT if M1 awarded, and equivalent difficulty SC1 for 2.8×10^7
8. (b) 2/3 × 24.6 (million) 16.4 (million) or 16 400 000 16 million or 16 000 000 or 1.6×10^7	M1 A1 B1	Ignore place value in initial calculation ISW from 16.4 (million), but if incorrect place value then B0 FT their 2/3 of 24.6 provided M1 awarded. Do not ignore place value, i.e. 16 gets B0
9.(a) $6x^2 + 9x - 10x - 15$ $6x^2 - x - 15$	B2 B1	B1 for any 3 correct terms FT from B1 provided there is a term in x^2. Mark final answer
9.(b) Method to eliminate a variable First variable correct Method to find 2nd variable Second variable	M1 A1 M1 A1	Allow 1 slip (not in matched variable) **x = -3** FT their 1st variable **y = 10**
		FT until 2nd error
9.(c) $3t = 5d - dt$ $3t + dt = 5d$ $t(3 + d) = 5d$ $t = 5d / (3 + d)$	M1 M1 M1 A1	Expansion of bracket within any step Collect terms in t Factorise for t Only FT for equivalent difficulty, must have factorised
10. Cyclic quadrilateral opposite angles total 180° <BAD = 180 –x As an appropriate 2nd stage: angle at the centre is twice the angle at the circumference <BOD = 2(180 – x) OR <BOD = 360 – 2x convincing	M1 M1 M1 A1	'Cyclic quadrilateral' is insufficient, however… If 180-x seen, this implies 'opposite angles total 180', so if 'cyclic quadrilateral' stated previous M1 can be awarded (Accept '2 × 180 –x' for 2(180 – x)) Final A1 depends on all previous M marks *Alternative:* If 'reflex angle at the centre is used, then angles at the point' M1 reflex angle at the centre is twice the angle at the circumference M1 Reflex <BOD = 2x, may be implied in words if given finally algebraically M1As an appropriate 2nd stage: Angles at a point sum is 360 A1 360 – 2x convincing (Final A1 depends on all previous M marks)
11.(a) x = 0.0343434… and 100x = 3.434… with an attempt to subtract, OR equivalent (e.g. 1000x – 10x) 34/990 or equivalent	M1 A1	OR 3.4/99 Mark final answer
11.(b) $45 - 3\sqrt{5}\sqrt{2} + 3\sqrt{5}\sqrt{2} - 2$ 43 **and** rational	B2 B1	B1 for the 45 or the -2 CAO
12. Deciding on a strategy, either tree diagrams or appropriate terms P(BB') + P(B'B) or equivalent $\frac{15}{20} \times \frac{5}{19} + \frac{5}{20} \times \frac{15}{19}$ must show no replacement 150/380 or equivalent	S1 M1 m1 A1	 Or equivalent (For information: P(YB)=45/380, P(RB)=30/380) ISW

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Surname	Centre Number	Candidate Number
Other Names		0

WJEC CBAC

New GCSE

4352/02

MATHEMATICS (UNITISED SCHEME)
UNIT 2: NON-CALCULATOR MATHEMATICS
HIGHER TIER

P.M. THURSDAY, 17 November 2011

$1\frac{1}{4}$ hours

CALCULATORS ARE NOT TO BE USED FOR THIS PAPER

INSTRUCTIONS TO CANDIDATES

Use black ink or black ball-point pen.

Write your name, centre number and candidate number in the spaces at the top of this page.

Answer **all** the questions in the spaces provided.

Take π as 3·14.

INFORMATION FOR CANDIDATES

You should give details of your method of solution when appropriate.

Unless stated, diagrams are not drawn to scale.

Scale drawing solutions will not be acceptable where you are asked to calculate.

The number of marks is given in brackets at the end of each question or part-question.

You are reminded that assessment will take into account the quality of written communication (including mathematical communication) used in your answer to question **4***(a)*.

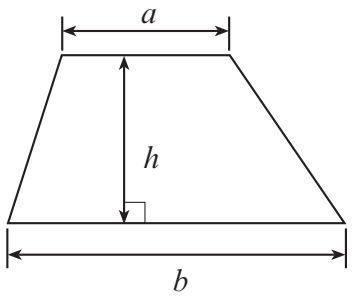
For Examiner's use only		
Question	**Maximum Mark**	**Mark Awarded**
1	**2**	
2	**5**	
3	**3**	
4	**8**	
5	**7**	
6	**6**	
7	**6**	
8	**3**	
9	**4**	
10	**4**	
11	**2**	
12	**4**	
13	**5**	
14	**6**	
TOTAL MARK		

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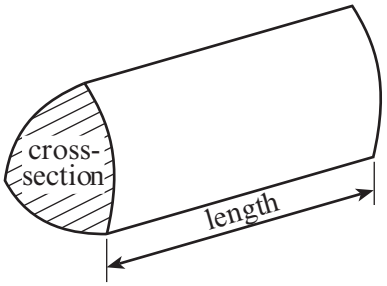
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Formula List

Area of trapezium $= \frac{1}{2}(a + b)h$

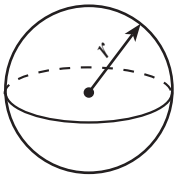


Volume of prism = area of cross-section × length



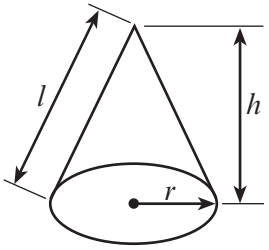
Volume of sphere $= \frac{4}{3}\pi r^3$

Surface area of sphere $= 4\pi r^2$



Volume of cone $= \frac{1}{3}\pi r^2 h$

Curved surface area of cone $= \pi rl$

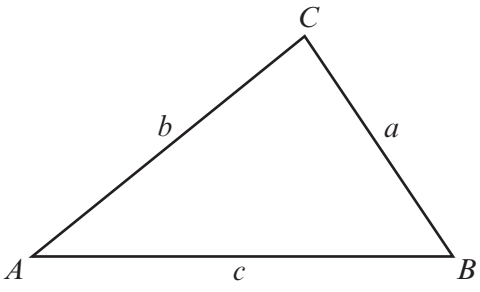


In any triangle ABC

Sine rule $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

Cosine rule $a^2 = b^2 + c^2 - 2bc\cos A$

Area of triangle $= \frac{1}{2}ab\sin C$



The Quadratic Equation

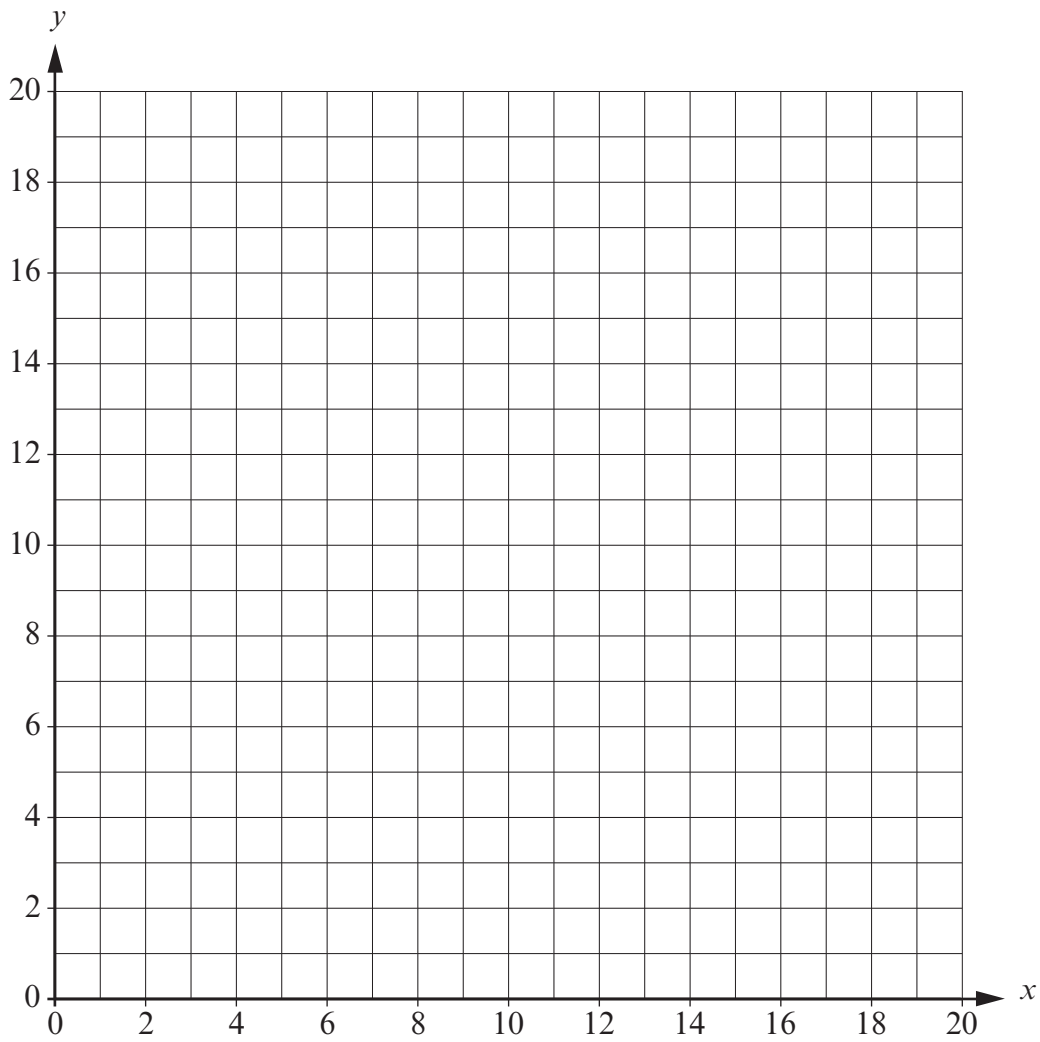
The solutions of $ax^2 + bx + c = 0$ where $a \neq 0$ are given by

$$x = \frac{-b \pm \sqrt{(b^2 - 4ac)}}{2a}$$

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Examiner only

1. Three vertices of a parallelogram are at (6, 18), (3, 2), and (14, 2). Find the coordinates of the fourth vertex of the parallelogram, which lies on the grid shown below.



.....

.....

Co-ordinates of the 4th vertex (..... , ...)

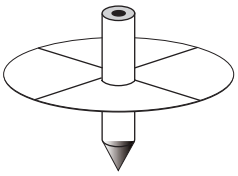
[2]

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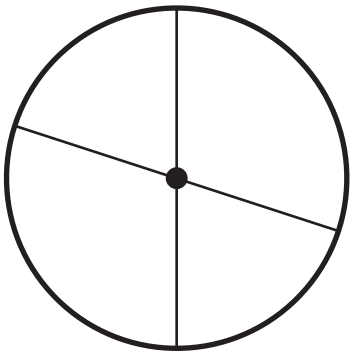
2. Sophie has a spinner.



The spinner is coloured so that

- **Red** is opposite **White,** and
- **Yellow** is opposite **Purple**.

The disc of the spinner is as shown below, with two straight lines passing through the centre of the spinner.



A table to show the probabilities of Sophie obtaining **Red**, **White**, **Yellow** and **Purple** has been started.
Complete the table and indicate how the disc should be coloured by labelling each sector.

Colour	**Red**	**White**	**Yellow**	**Purple**
Probability	0·2			

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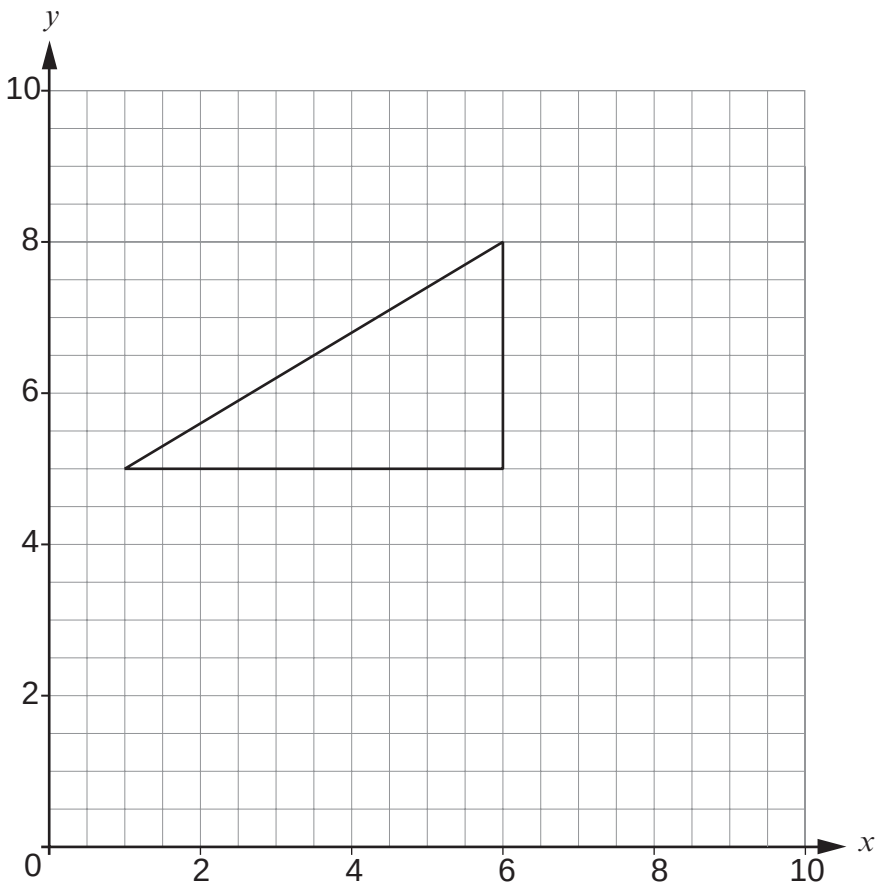
[5]

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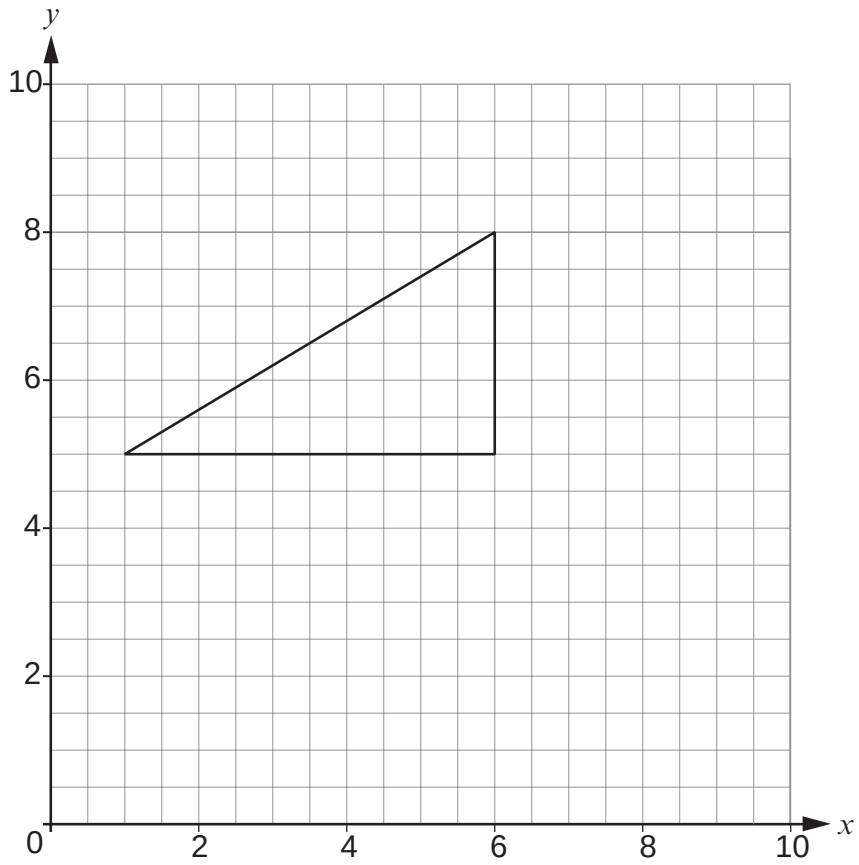
3. *(a)* Draw the reflection of the triangle below in the line $y = 4$.

[2]



(b) Translate the triangle below by 2 units to the right and 4 units down.

[1]



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Turn over.

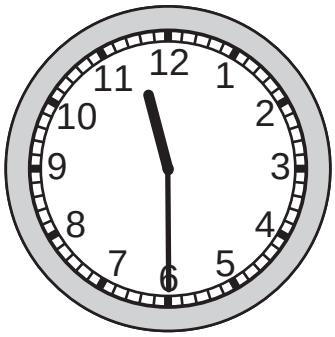
4352
020005

Examiner only

4. *(a) You will be assessed on the quality of your written communication in this part of the question.*

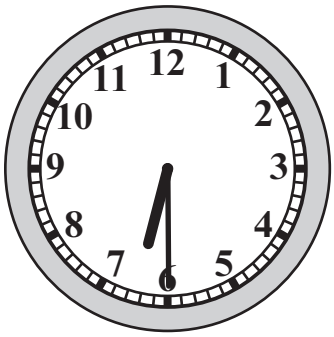
Some mobile phones show a number of world clocks.

London



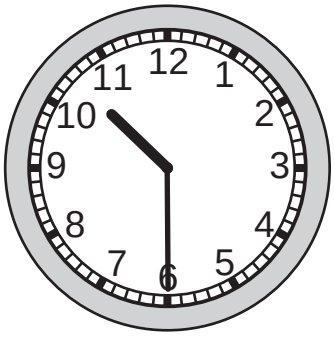
Monday
11:30

New York



Monday
06:30

Sydney



Monday
22:30

When it is 3 p.m. on Wednesday in New York, what day and time will it be in Sydney? Explain your reasoning.

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[5]

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Examiner only

(b) Some mobile phones can convert measurements.
Convert 600 metres per minute to kilometres per hour.
You must show all your working.

.....

.....

.....

.....

.....

[3]

5. *(a)* Solve $4 - x > 7$.

.....

.....

.....

[2]

(b) A garage has x new cars and three times as many used cars for sale.
The total number of cars for sale is 84.
Write down an equation in x and solve it to find the number of new cars for sale.

.....

.....

.....

[2]

(c) When a number n is added to 7 the total is greater than 11.

(i) Write down and simplify an inequality which is satisfied by n.

.....

.....

.....

[2]

(ii) Find the least whole number value of n.

.....

[1]

4352 020007

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Examiner only

6. *(a)* Write down $\sqrt[3]{125}$.

.....

.....

[1]

(b) Write down the reciprocal of a quarter.

.....

.....

[1]

(c) Express 112 as a product of prime numbers in index form.

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[3]

(d) Explain how you know that 32 is **not** a square number.

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[1]

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Examiner only

7. *(a)* Write down the *n*th term of the sequence 11, 15, 19, 23, 27, ...

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[2]

(b) Write down the next two numbers in this sequence.

98, 87, 78, 71, 66, ..., ...

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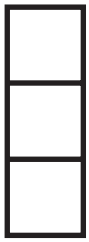
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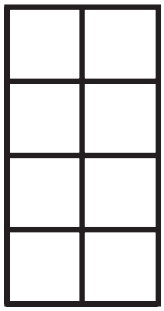
[1]

(c)

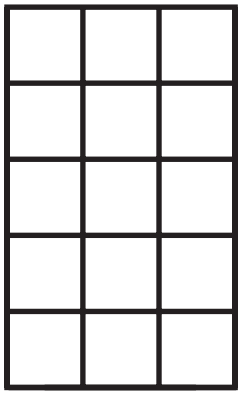
Pattern 1



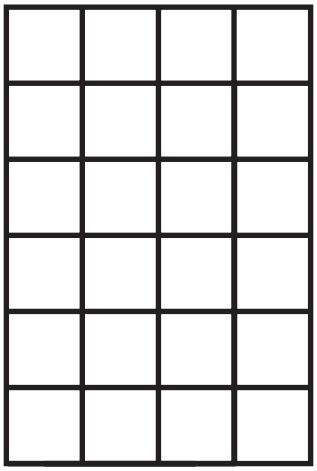
Pattern 2



Pattern 3



Pattern 4



Pattern 1 is made using 3 small squares.
Pattern 2 is made using 8 small squares.
Find the number of small squares in Pattern *n*.

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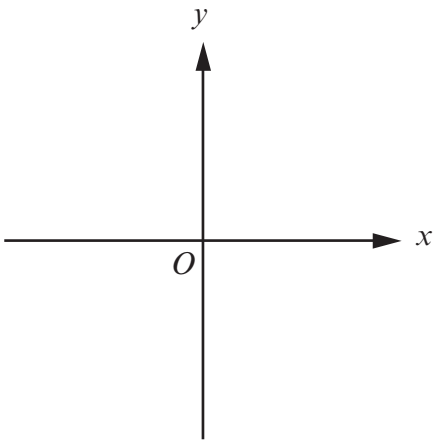
[3]

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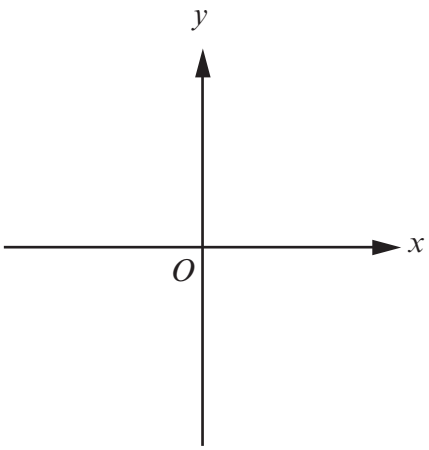
Examiner only

8. Use the axes below to sketch the graph of each of the following equations.

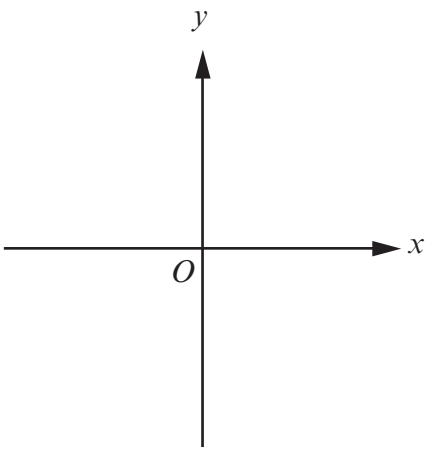
$y = x^2$



$y = \frac{1}{x}$



$y = x^3$



[3]

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Examiner only

9. On the graph paper below, draw the region which satisfies **all** of the following inequalities.

$$\begin{aligned} y &\leqslant 5 \\ x + y &\leqslant 4 \\ x &\leqslant 3 \\ x + y &\geqslant 0 \end{aligned}$$

Make sure that you clearly indicate the region that represents your answer.

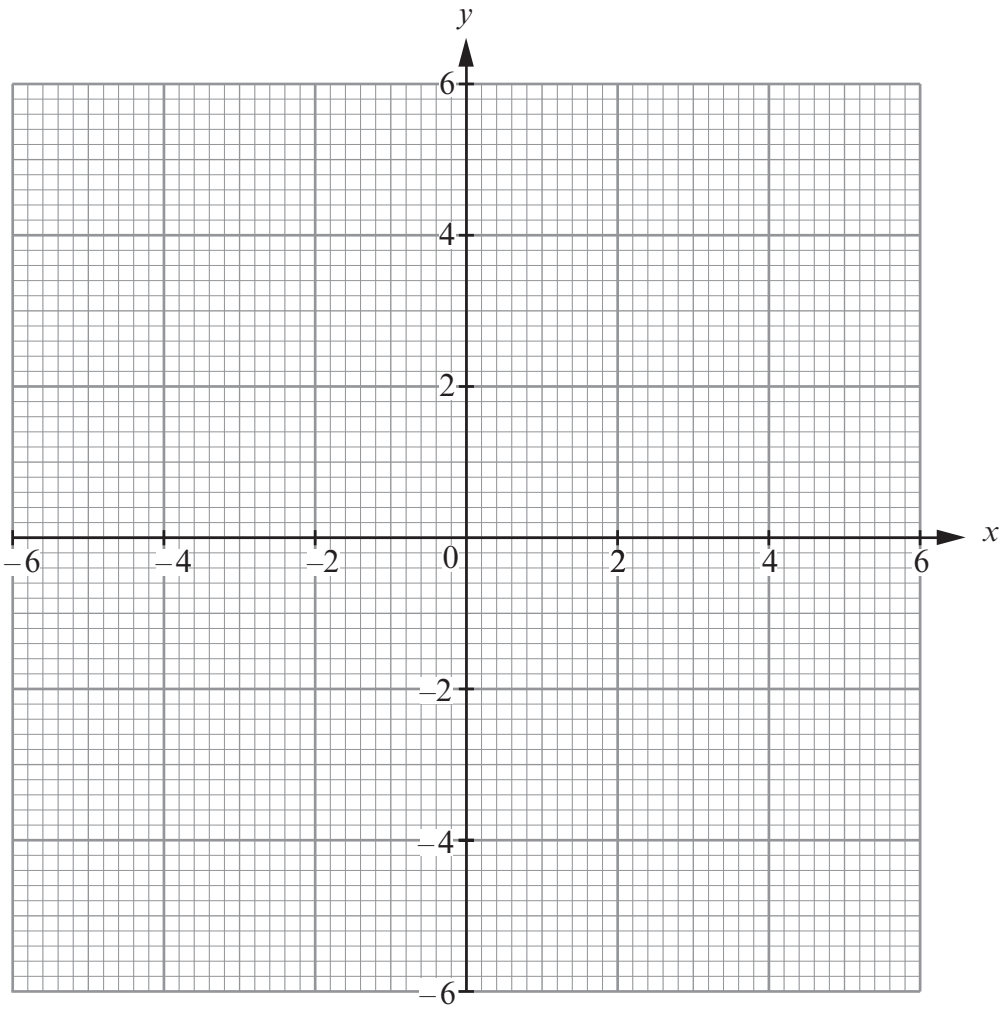
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..... [4]



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Turn over.

Examiner only

10. Solve the following simultaneous equations using an algebraic (not graphical) method.

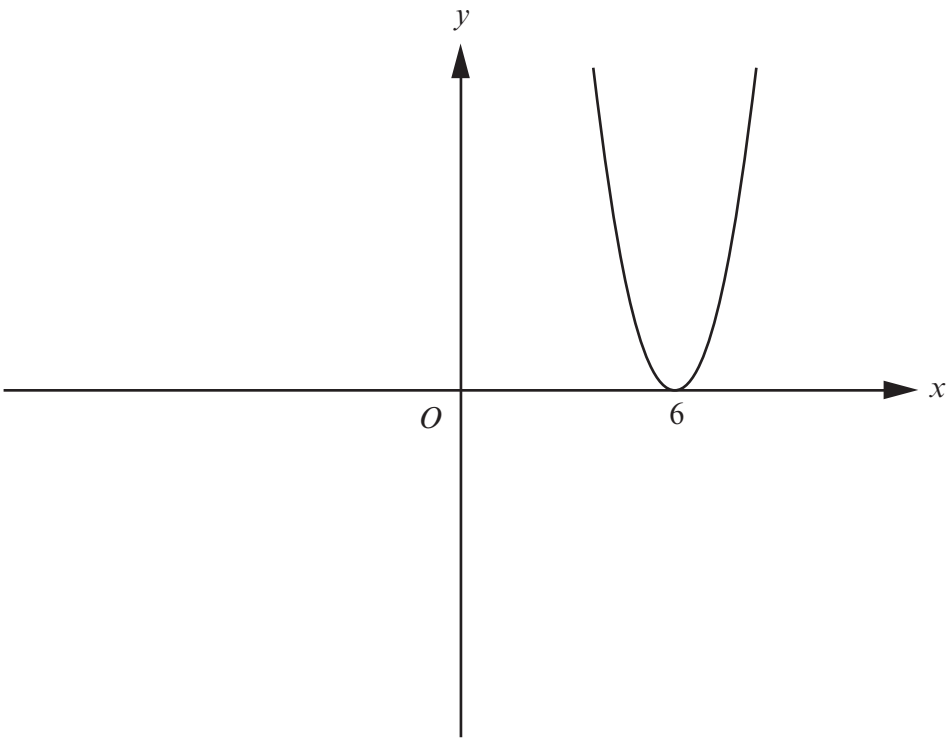
$$3x + 5y = 9$$
$$4x + 3y = 23$$

[4]

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11. The diagram shows a sketch of $y = f(x)$.
On the same diagram, sketch the curve $y = f(x - 3)$.
Mark clearly the value of x at the point where this curve touches the x-axis.



[2]

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Turn over.

Examiner only

12. The diagram shows a circle with centre O.
PAQ and RCQ are tangents to the circle.
A, B, C and D are points on the circumference of the circle.

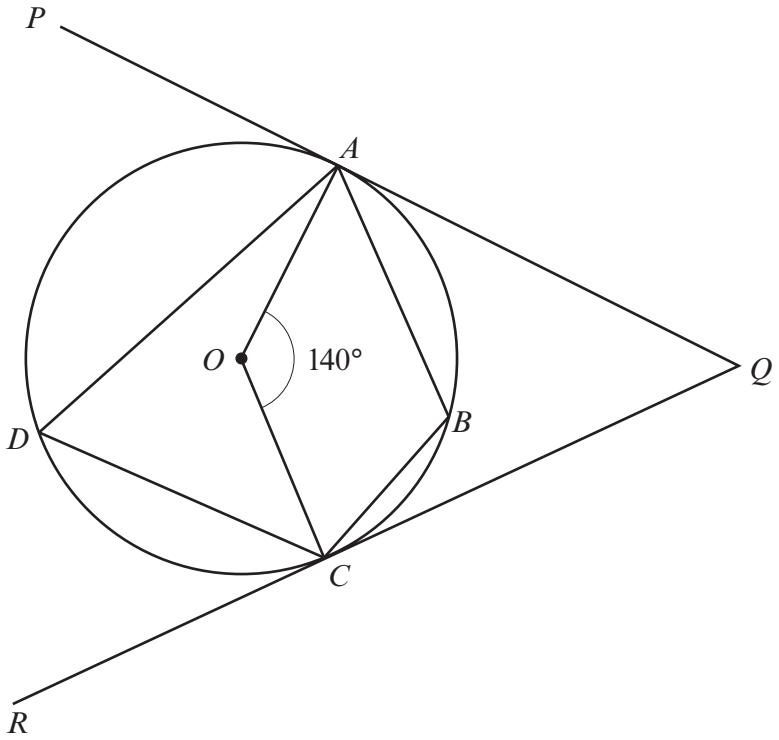


Diagram not drawn to scale

(a) Write down a line that is equal in length to AQ and state a reason for your answer.

$AQ =$ .....

.....

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.....

[2]

(b) Calculate the size of $A\hat{B}C$ and give reasons for your answer.

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[2]

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Examiner only

13. *(a)* Express $0\cdot\dot{7}\dot{6}\dot{4}$ as a fraction.

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[2]

(b) Simplify $(5 - 3\sqrt{2})^2$ and state whether your answer is rational or irrational.

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[3]

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Turn over.

Examiner only

14. One hundred raffle tickets are sold.
The tickets sold are numbered from 1 to 100.
The raffle tickets are placed in a drum.
Two raffle tickets are selected at random, one ticket at a time, and not replaced in the drum.

(a) Find the probability that one of the tickets drawn is even and the other is odd.

[3]

(b) Find the probability that at least one of the tickets drawn is even.

[3]

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GCSE MARKING SCHEME

MATHEMATICS - UNITISED

NOVEMBER 2011

INTRODUCTION

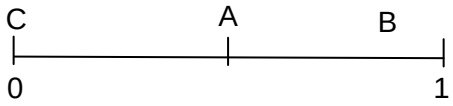
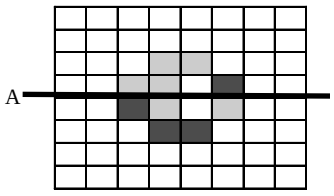
The marking schemes which follow were those used by WJEC for the November 2011 examination in GCSE MATHEMATICS - UNITISED. They were finalised after detailed discussion at examiners' conferences by all the examiners involved in the assessment. The conferences were held shortly after the papers were taken so that reference could be made to the full range of candidates' responses, with photocopied scripts forming the basis of discussion. The aim of the conferences was to ensure that the marking schemes were interpreted and applied in the same way by all examiners.

It is hoped that this information will be of assistance to centres but it is recognised at the same time that, without the benefit of participation in the examiners' conferences, teachers may have different views on certain matters of detail or interpretation.

WJEC regrets that it cannot enter into any discussion or correspondence about these marking schemes.

	Page
Mathematics Unit 1 - Foundation Tier	1
Mathematics Unit 2 - Foundation Tier	4
Mathematics Unit 1 - Higher Tier	7
Mathematics Unit 2 - Higher Tier	10

UNIT 2 - FOUNDATION TIER

2011 Autumn UNIT 2 (Non calculator) Foundation Tier	**Marks**	**FINAL POST CONFERENCE MARK SCHEME Comments (21/11/2011) (Page 1)**
1. (a) (i) Eleven thousand three hundred and sixty five (pounds) (ii) (£) 110680(.00p) (b) (i) 30 (ii) 25 (iii) 29 OR 31	B1 B1 B1 B1 B1 5	 **Accept 5×5 OR 5^2** For either or both, but B0 if any incorrect number given
2. (a) 700 OR 7 hundred (b) 1, 3, 9, 27 (c) <table><tr><td></td><td>(0) ·25</td><td></td></tr><tr><td>2/10 OR 1/5</td><td></td><td></td></tr><tr><td></td><td></td><td>60(%)</td></tr></table> (d) £5 – 5 × **90(p)** = 50**(p)** (e) 3 × 70 = 210	B1 B2 B1 B1 B1 M1 A1 M1 A1 10	Do not accept hundred(s) B1 for any 2 or 3 factors and no incorrect numbers OR for all 4 factors and 1 incorrect number. **60/100 gets B0** Intention to subtract as many 90p as possible allowing for arithmetical errors. **Allow £.50p for the A1, but .50p or £50 get A0.** **The 3 must not be changed. The 69.8 must be changed to a whole number. Only 3 × 70 = 210 gets M1, A1.** **All others, for example, 3 × 69 (= 207) get M1, A0.**
3. (a)  (b) unlikely	B1 B1 B1 B1 4	A should be at the half way mark **B should be to the right of the 'd' and up to 1 exclusive** C should be at 0.
4. (a) 2 rectangles of 6 by 4·5 2 rectangles of 3 by 4·5 1 rectangle of 6 by 3 Makes a correct net (b) 4 (c) 	B1 B1 B1 B1 B1 B2 7	Use overlay (±2mm) B1 for all 4 correct squares and one extra OR 2/3 correct squares and no incorrect squares
5. A (- 4, 4) B (0, -2) C (-1, -3)	B1 B1 B1 3	Allow the marks even if only the letters as long as it is clear that the correct point is being indicated. **Reverse coordinates gets B0 on every occasion.**

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2011 Autumn UNIT 2 (Non calculator) Foundation Tier	Marks	FINAL POST CONFERENCE MARK SCHEME Comments (21/11/2011) (Page 2)	
6. (a) [11 12 13] 21 22 23 31 32 33 41 42 43 51 52 53 61 62 63	B2	**B1 for at least 9 correct entries**	**IF their sample space has more than 18 entries (including the given 3), then B0 for (a) and F.T. in parts (b) and (c) where possible**
(b) 3/18 ISW (= 1/6)	B2	F.T. their table B1 for a numerator of 3 in a fraction less than 1. B1 for a denominator of 18 in a fraction less than 1. Do not penalise incorrect reduction of fractions.	NOTES Penalise –1 for use of words such as "3 out of 18", "3 in 18" OR "3:18". When fraction and wrong notation seen, DO NOT penalise wrong notation.
(c) (i) 6/18 I.S.W (= 1/3)	B1	F.T. 'their sample space in (a) if at least B1 awarded	
(ii) 12/18 I.S.W (= 2/3)	B1	F.T. 1− 'their (c)(i)' if a fraction < 1	
	6		
Alternative Mark Scheme for Q6 when the tens and units are reversed OR their sample space has less than 9 entries:			
6. (a) [11 12 13] 12 22 32 13 23 33 14 24 34 15 25 35 16 26 36	**B1**	**For all entries correct**	**IF their sample space has less than 9 entries, then 0 (a) B0 (b) 0 (c) 0**
(b) 0/18	**B2**	**B1 for 0 or impossible.**	
(c) (i) 9/18 I.S.W (ii) 9/18 I.S.W	**B1** **4**	**IF their (c)(ii) is 1 – their (c) i)**	
7. (a) (i) (B =) 4 (g)	B1		
(ii) e.g. 5, 5 on left pan and 3, 3 on right pan	B1	Any answer that makes B = 4. F.T. 'their B'	
(iii) e.g. 3, 3 on left with 5 on right pan	B1	Any answer that balances with the 1	
(b) (i) e.g. 7, 7 on left with 4 on right with the 10	B1	Any answer that balances with the 10	
(ii) e.g. 4, 4 on left and 7 with the 1	B1	Any answer that balances with the 1	
	5		
8. (a) 9	B1		
(b) (i) 84n (p)	B1	Ignore units	
(ii) x – 100 (m)	B1	Ignore units	
(c) 3x + 3y	B2	B1 for 3x + f(y) OR g(x) + 3y	
(d) 6x – 3 **(= 4x + 2)**	B1	Correct clearing bracket	F.T. until 2nd error
2x = 5	B1	Collecting terms correctly	
x = 2·5 OR 2½ OR 5/2	B1	F.T. ax = b (a≠1)	
	8		
9. Table: Probabilities total 1 from the 4 boxes	B1	Evidence for the 1st 3 marks may be elsewhere on the page	
White is 0.2	B1		
P(Y) = 0.3 and P(P) = 0.3	B1		
Spinner: R opposite W and Y opposite P	B1		
Given that P(Y) = P(P) and P(R) = P(W) and P(W)< P(Y) in the table, Y & P in larger sectors and R & W in smaller sectors	B1	**Must be** from entries in the table. No entries in the table, B0	
H2	5		

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2011 Autumn UNIT 2 (Non calculator) Foundation Tier	Marks	FINAL POST CONFERENCE MARK SCHEME Comments (21/11/2011) (Page 3)
10.(a) Strategy for the idea of time difference, e.g. 16 hours different, 2 days + 8 ½ (from NY time on clock)	S1	For the idea of time difference, but there may be an error in the actual time difference Sight of 16.
Use of timeline or calculation, e.g. 15 00 + 16 hours, or 3pm + 9 hours to midnight + …., or 0630 + 48 hrs + 8 ½ hrs	M1	Sight of 31 or 56 ½ . Or M1 for an alternative complete method that could lead to a correct answer
Thursday **AND** 07(:)00 or 7 am	A1	Needs day and time, time (0700 or 7am) alone gets S1 M1 A0. Do not accept 700 or 7 as a time, but do not penalise again in QWC *An answer of '7(pm) Thurs' when S1 awarded gets M1 A0, but when S1 not awarded gets M0 A0.* *Penalise-1 for going from London to Sydney (leading to 2am Thursday)*
QWC: Candidates would be expected to • clearly show how they arrived at their solution • have few errors in spelling, punctuation and grammar • use capital letters appropriately QWC2: Candidates will be expected to • present work clearly, with words explaining process or steps AND • make few if any mistakes in mathematical form, spelling, punctuation and grammar QWC1: Candidates will be expected to • present work clearly, with words explaining process or steps OR • make few if any mistakes in mathematical form, spelling, punctuation and grammar and include units in their final answer	QWC 2	QWC2 Presents relevant material in a coherent and logical manner, using acceptable mathematical form, and with few if any errors in spelling, punctuation and grammar. QWC1 Presents relevant material in a coherent and logical manner but with some errors in use of mathematical form, spelling, punctuation or grammar OR evident weaknesses in organisation of material but using acceptable mathematical form, with few if any errors in spelling, punctuation and grammar. QWC0 Evident weaknesses in organisation of material, and errors in use of mathematical form, spelling, punctuation or grammar. A final statement only, e.g. 'Thursday 0700' gets QWC0
(b) $\frac{600 \times 60}{1000}$ 36 (km/h)	M2 A1 8	M1 for intention to multiply by 60, or M1 for intention to divide by 1000 (may be shown by 0.6 km) CAO
11. (a) Method that produces at least 2 correct prime factors	M1	Before 2nd error
	A1	Ignore 1s seen
Sight of correct factors (2, 2, 2, 2, 7) $2^4 \times 7$	B1	FT their factors (with at least 1 index >1 used). Do not ignore 1s.
(b) E.g. '2^5 not even power' or 'no **whole** number times itself gives 32', '32 is in between 5^2 and 6^2'	E1	Accept no number times itself gives 32 **with** 5×5 **and** 6×6 given. Accept '$5\times5 = 25$ and $6\times6 = 36$'. Do not accept '25, 36'
H6cd	4	

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UNIT 2 - HIGHER FOUNDATION

Unitised Unit 2 Nov 2011 Higher Tier Markscheme		Final 29/11/11
1. (17, 18) in answer space or annotated on the diagram.	B2 2	B1 for either OR correct parallelogram shown OR the point (17,18) marked unambiguously on the grid
2. Table: Probabilities total 1 from the 4 boxes White is 0.2 P(Y) = 0.3 and P(P) = 0.3 Spinner: R opposite W and Y opposite P Given that P(Y) = P(P) and P(R) = P(W) and P(W)< P(Y) in the table, Y & P in larger sectors and R & W in smaller sectors	B1 B1 B1 B1 B1 5	Evidence for the 1st 3 marks may be elsewhere on the page **Must be** from entries in the table. No entries in the table, B0
3.(a) Correct reflection (b) Correct translation	B2 B1 3	B1 Any horizontal reflection or a reflection in x=4, OR line y=4 seen
4.(a) Strategy for the idea of time difference, e.g. 16 hours different, 2 days + 8 ½ (from NY time on clock) Use of timeline or calculation, e.g. 15 00 + 16 hours, or 3pm + 9 hours to midnight + …., or 0630 + 48 hrs + 8 ½ hrs Thursday **AND** 07(:)00 or 7 am QWC: Candidates would be expected to • clearly show how they arrived at their solution • have few errors in spelling, punctuation and grammar • use capital letters appropriately QWC2: Candidates will be expected to • present work clearly, with words explaining process or steps AND • make few if any mistakes in mathematical form, spelling, punctuation and grammar QWC1: Candidates will be expected to • present work clearly, with words explaining process or steps OR • make few if any mistakes in mathematical form, spelling, punctuation and grammar and include units in their final answer (b) $\frac{600 \times 60}{1000}$ 36 (km/h)	S1 M1 A1 QWC 2 <

6.(a) 5 (b) 4 (c) Method that produces at least 2 correct prime factors Sight of correct factors (2, 2, 2, 2, 7) $2^4 \times 7$ (d) E.g. '2^5 not even power' or 'no **whole** number times itself gives 32', '32 is in between 5^2 and 6^2'	B1 B1 M1 A1 B1 E1 6	Accept embedded answer $\sqrt[3]{5\times5\times5}$. Mark final answer. CAO. Do not accept 4/1 Before 2nd error Ignore 1s seen FT their factors (with at least 1 index >1 used). Do not ignore 1s. Accept no number times itself gives 32 **with** 5×5 **and** 6×6 given. Accept '$5\times5 = 25$ and $6\times6 = 36$'. Do not accept '25, 36'
7.(a) $4n + 7$ (b) 63, 62 (c) Strategy, e.g. 1×3, 2×4, 3×5, OR (3, 8,) 15, 24 with an attempt to look at differences, OR n^2 $n \times (n \ldots.)$ OR second difference of 2 OR $n^2 \pm \ldots$ $n\times (n + 2)$ OR $n^2 + 2n$	B2 B1 S1 M1 A1 6	B1 for $4n \pm ..$, B0 for $4n$ alone, B0 for n+4. Allow B2 for n=4n+7 Looking at the number of squares with differences If M1 awarded then also award S1
8.Three reasonable sketches	B3 3	B1 for each sketch. N.B. The 2nd needs to show two disjoint curves, 1st&3rd intention to pass through *O*.
9.Any 3 of the lines $y = 5$, $x + y = 4$, $x = 3$, $x + y = 0$ drawn Correct region indicated	B3 B1 4	Award B2 for any 2 lines OR B1 for any 1 line drawn CAO
10. Method to find the first variable Correct first variable Method to find the second variable Correct second variable	M1 A1 M1 A1 4	Allow 1 slip, but not in the equal coefficient $x = 8$ or $y = -3$ FT from their first variable
11. Transformation horizontally to the right 9 indicated correctly on the x-axis with the correct transformation	B1 B1 2	 SC1 for left shift with 3 indicated on the x-axis
12. (a) CQ or QC Tangents equal in length (b) 110° Angle centre twice angle circumference **AND** cyclic quadrilateral	 B1 E1 B1 E1 4	E marks depend on B marks being awarded Or equivalent description in words OR angles at a point (or centre) **AND** angle centre twice angle circumference
13.(a) Attempt to subtract $100x = 76.464\ldots$ and $x = 0.76464\ldots$ 757/990 (b) $25 - 15\sqrt{2} - 15\sqrt{2} + 18$ $= 43 - 30\sqrt{2}$ Irrational	M1 A1 M1 A1 B1 5	Or equivalent for $1000x - 10x$ Final answer of 75.7/99 M1 only With at least 3 of the terms correct OR $25 \pm a\sqrt{2} + 18$ with $a \neq 0$ CAO FT provided at least M1 awarded
14. (a) $50/100 \times 50/99$ (= 2500/9900) $50/100 \times 50/99 + 50/100 \times 50/99$ 5000/9900 (=50/99) (b) 1 – P(odd, odd) $= 1 - 50/100 \times 49/99$ = 7450/9900 (=149/198)	B1 M1 A1 M1 M1 A1 6	 OR $2\times 50/100 \times 50/99$ Ignore incorrect cancelling *FT from (a) if P(OE) and P(EO) and P(OO) used* OR P(OE) + P(EO) + P(EE) OR FT (a) + P(EE) $50/100\times50/99+50/100\times50/99+50/100\times49/99$ OR (a) + $50/100\times49/99$ CAO. Ignore incorrect cancelling

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Candidate Name	Centre Number	Candidate Number
		0

WJEC CBAC

New GCSE

4352/02

MATHEMATICS (UNITISED SCHEME)

UNIT 2: NON-CALCULATOR MATHEMATICS

HIGHER TIER

A.M. TUESDAY, 21 June 2011

$1\frac{1}{4}$ hours

CALCULATORS ARE NOT TO BE USED FOR THIS PAPER

INSTRUCTIONS TO CANDIDATES

Use black ink or black ball-point pen.

Write your name, centre number and candidate number in the spaces at the top of this page.

Answer **all** the questions in the spaces provided.

Take π as 3·14.

INFORMATION FOR CANDIDATES

You should give details of your method of solution when appropriate.

Unless stated, diagrams are not drawn to scale.

Scale drawing solutions will not be acceptable where you are asked to calculate.

The number of marks is given in brackets at the end of each question or part-question.

You are reminded that assessment will take into account the quality of written communication (including mathematical communication) used in your answer to question **4**.

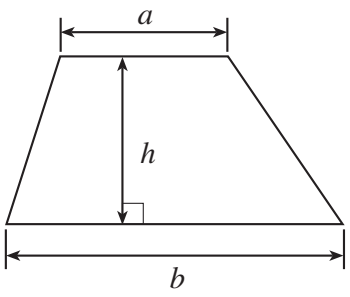
For Examiner's use only		
Question	**Maximum Mark**	**Mark Awarded**
1	**4**	
2	**7**	
3	**3**	
4	**6**	
5	**6**	
6	**4**	
7	**2**	
8	**3**	
9	**3**	
10	**3**	
11	**6**	
12	**4**	
13	**4**	
14	**7**	
15	**3**	
TOTAL MARK		

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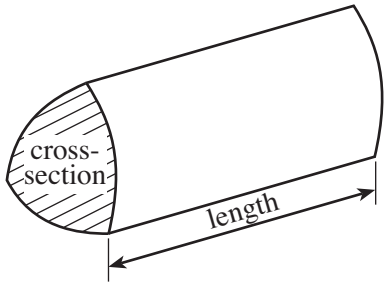
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Formula List

Area of trapezium = $\frac{1}{2}(a + b)h$

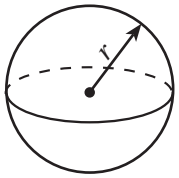


Volume of prism = area of cross-section × length



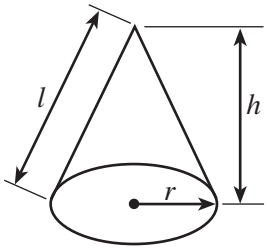
Volume of sphere = $\frac{4}{3}\pi r^3$

Surface area of sphere = $4\pi r^2$



Volume of cone = $\frac{1}{3}\pi r^2 h$

Curved surface area of cone = $\pi r l$

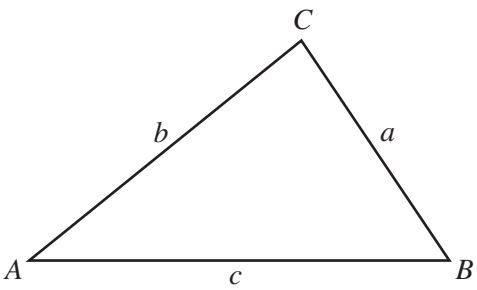


In any triangle ABC

Sine rule $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

Cosine rule $a^2 = b^2 + c^2 - 2bc\cos A$

Area of triangle = $\frac{1}{2}ab\sin C$



The Quadratic Equation

The solutions of $ax^2 + bx + c = 0$

where $a \neq 0$ are given by

$$x = \frac{-b \pm \sqrt{(b^2 - 4ac)}}{2a}$$

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1. *(a)* Write down the size of each of the angles marked x and y in the diagram.

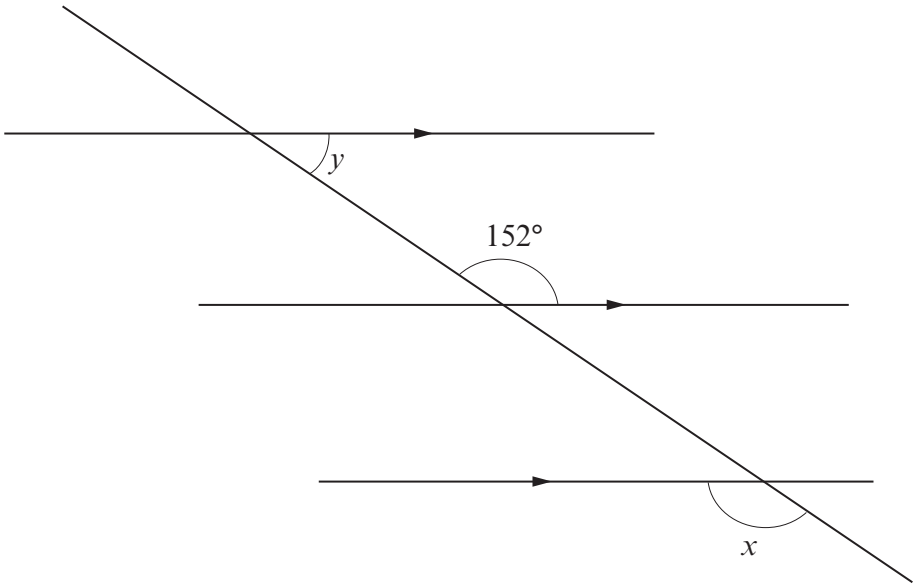


Diagram not drawn to scale

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x = ... °

y = ... °

[2]

(b) Find the size of the angle marked z.

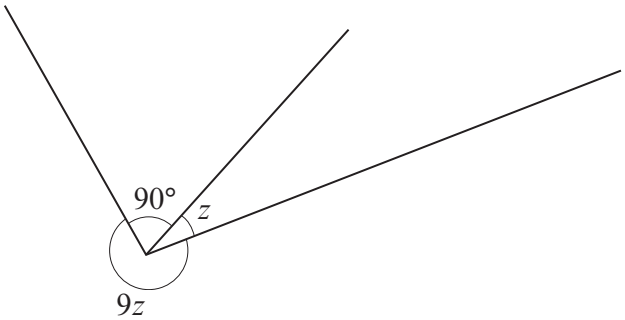


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z = ... °

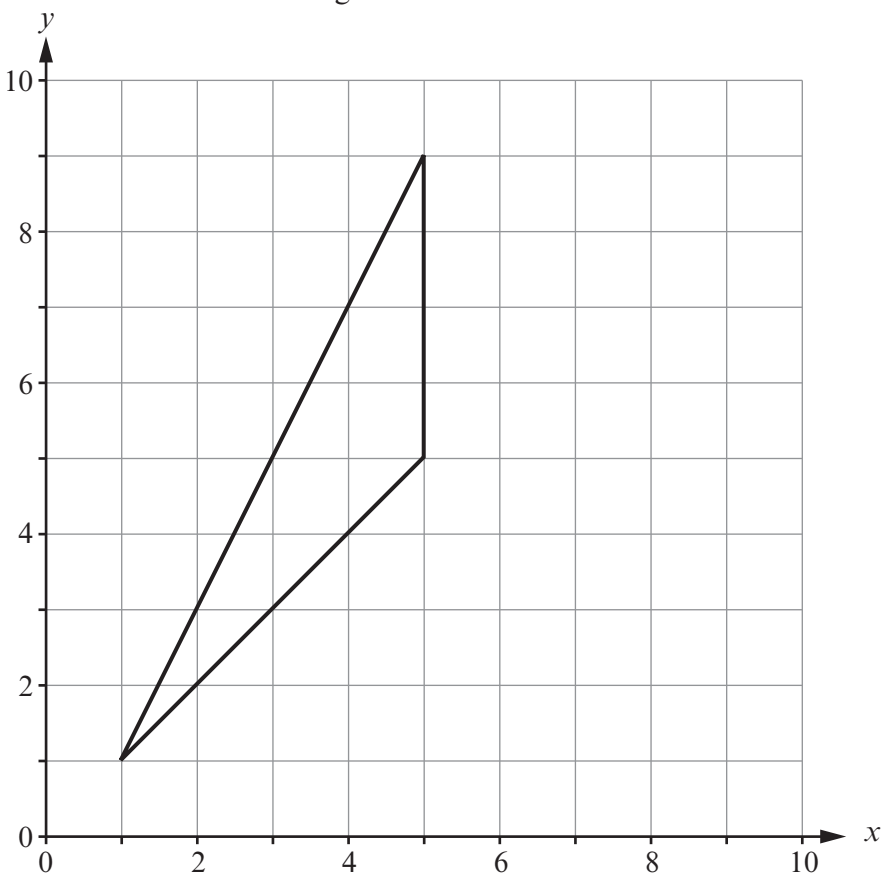
[2]

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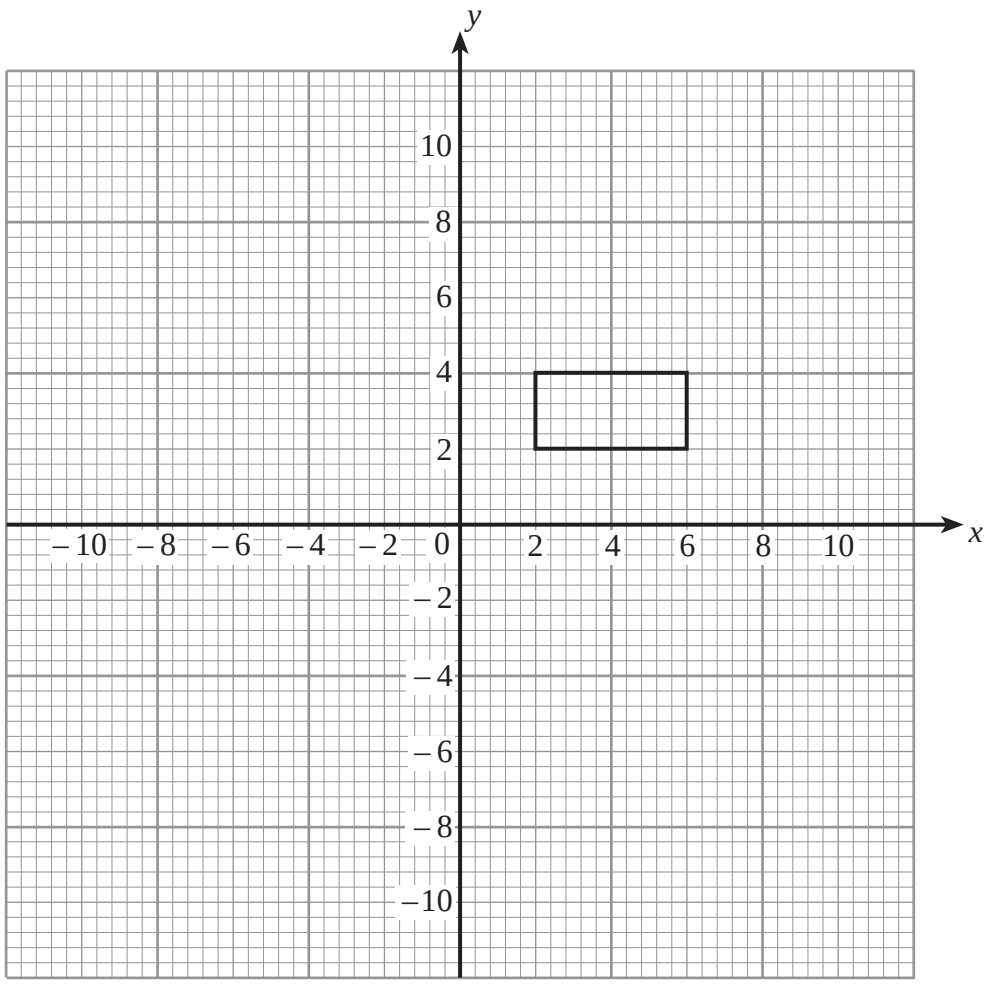
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2. *(a)* Draw the reflection of the triangle shown in the line $x = 5$. [2]



(b) Rotate the rectangle through 90° anticlockwise about the point (6, 2). [2]

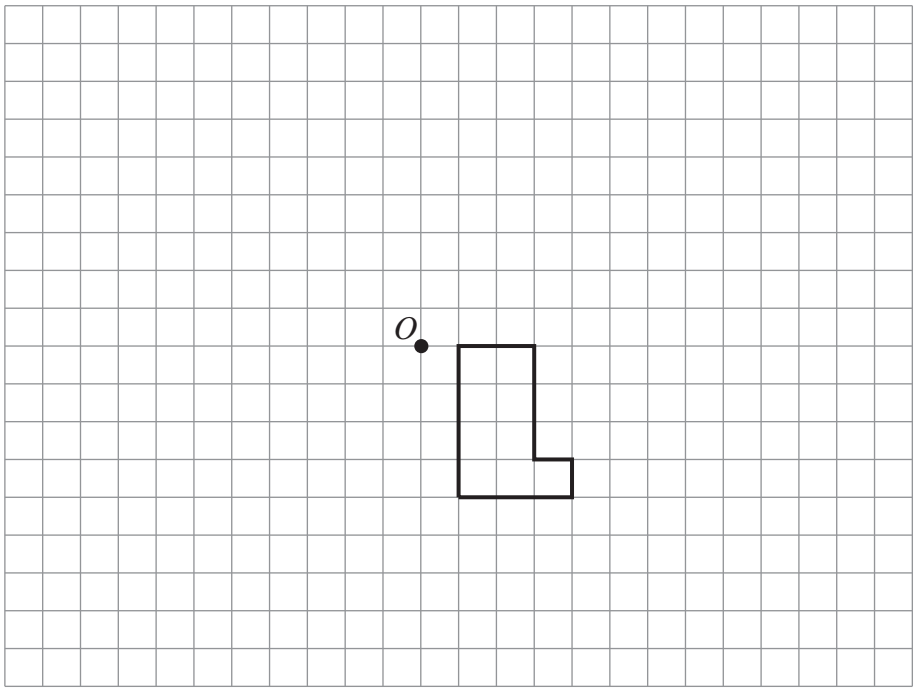


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(c) On the grid below, draw the enlargement of the given shape using a scale factor of 2 and centre O.

[3]



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3. Solve $4x - 9 > 15 + 2x$.

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[3]

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4. *You will be assessed on the quality of your written communication in this question.*

In a supermarket the same brand of washing up liquid is sold in two different size bottles.



Large bottle 800 ml for £1.28



Small bottle 300 ml for 45p

Which bottle of washing up liquid offers the better value for money?
You must show your working and give a reason for your choice.

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[6]

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5. The table shows values of $y = 2x^2 - 5x - 12$ for values of x from –3 to 5.

x	–3	–2	–1	0	1	2	3	4	5
$y = 2x^2 - 5x - 12$	21	6	–5	–12	–15	–14		0	13

(a) Complete the table above.

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[1]

(b) On the graph paper opposite, draw the graph of $y = 2x^2 - 5x - 12$ for the values of x between –3 and 5.

[2]

(c) Write down the x-coordinates of the points where the curve $y = 2x^2 - 5x - 12$ intersects the x-axis.

[1]

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(d) Draw the line $y = -2$ on your graph paper and write down the x-coordinates of the points where this line intersects the curve $y = 2x^2 - 5x - 12$.

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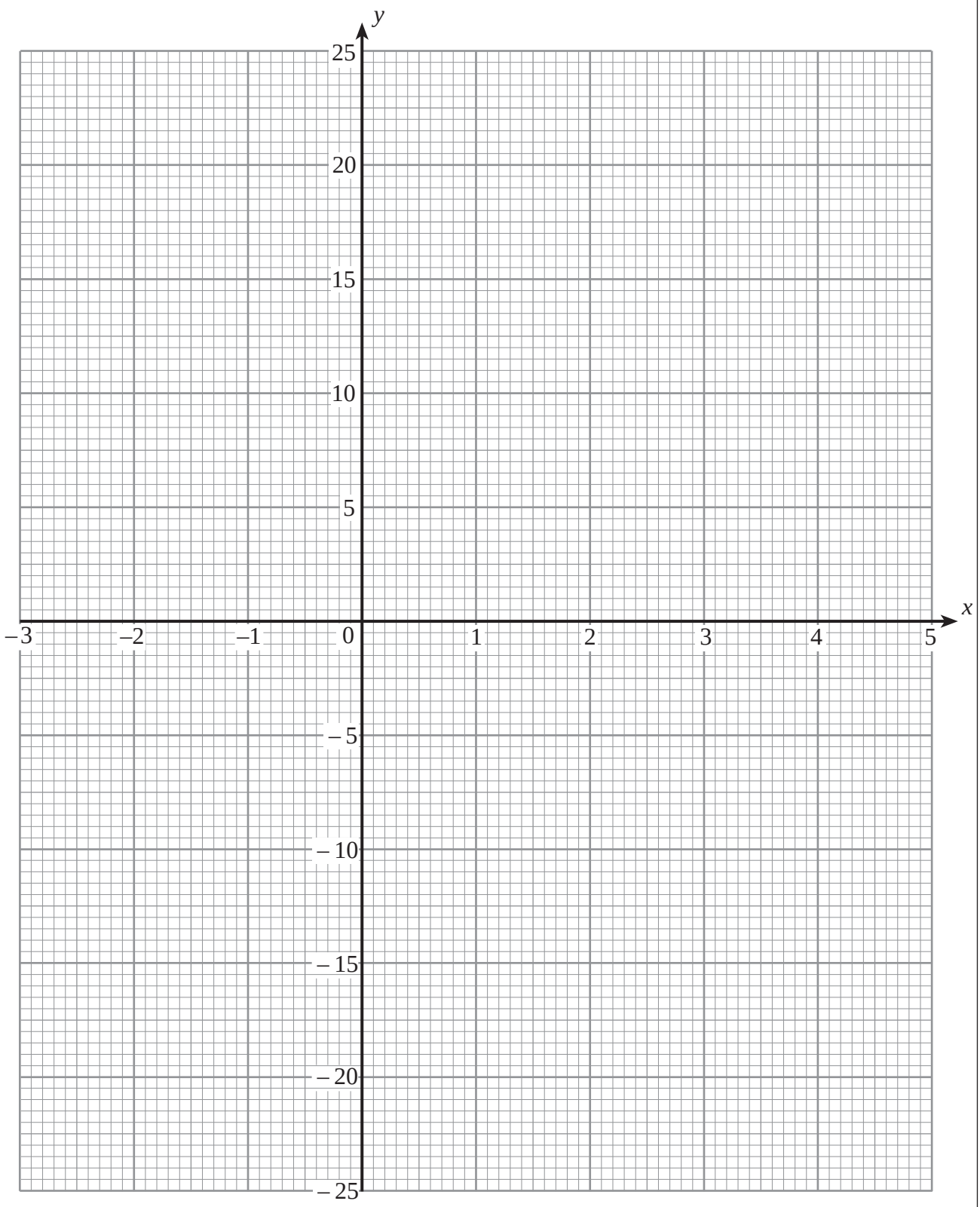
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[2]

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Turn over.

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6. *(a)* Complete the following table by placing a tick (✓) in any box where the given statement is true.

Statement	Kite	Rhombus	Parallelogram
The diagonals are **not** equal in length			
Only one line of symmetry			
The diagonals bisect each other			

[2]

(b) Write down

(i) the name of the three-dimensional solid that has only four faces, all of which are triangular,

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[1]

(ii) the name of the three-dimensional solid that has only five faces, two of which are triangular and three of which are rectangular.

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[1]

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7. Michelle has been given 6 equations and she has been asked to draw 6 graphs.
Before starting, she looks at the equations.

$y = 3x$ $\quad$ $y = x$ $\quad$ $y = \frac{1}{2}x$

$y = 2x + 5$ $\quad$ $y = 4x + 2$ $\quad$ $y = 2x + 4$

(a) Michelle says, "the steepest graph will be $y = 2x + 5$".
Is Michelle correct?
You must give a reason for your answer.

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[1]

(b) Michelle also says, "no two graphs will be parallel to each other".
Is she correct?
You must give a reason for your answer.

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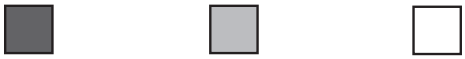
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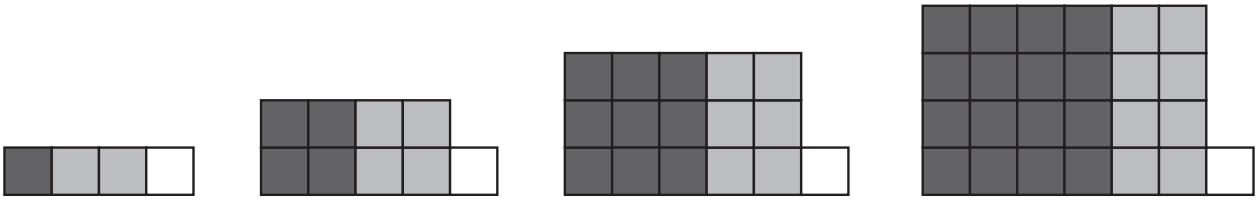
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8. Patterns are made using tiles of three different colours.



The patterns are made as shown below.



Pattern 1 Pattern 2 Pattern 3 Pattern 4

Write down an expression for the total number of tiles in Pattern n.

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[3]

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9. A company owns a number of buses.

Bus	Unladen weight in kg
 Single decker low floor bus	$7{\cdot}72 \times 10^3$
 Minibus	$4{\cdot}68 \times 10^3$

Calculate the **total** unladen weight of **two** single decker low floor buses and **one** minibus altogether.
Give your answer in standard form.

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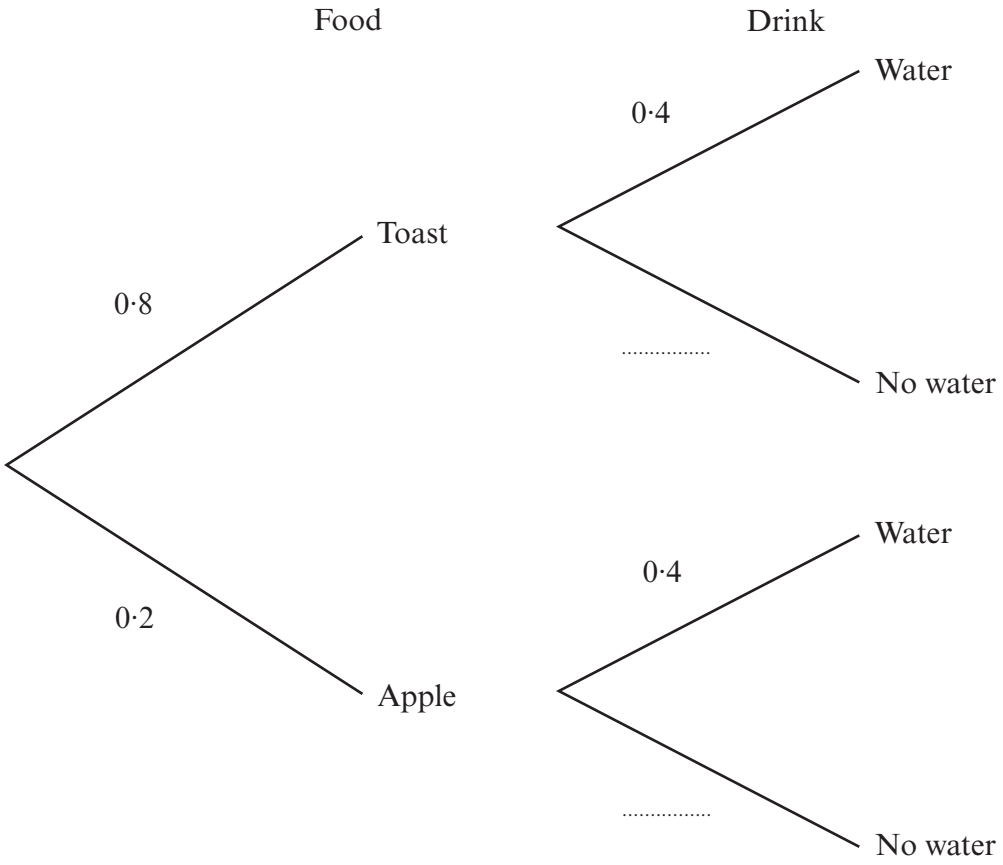
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10. Each morning break, Robert buys either a slice of toast or an apple in the school snack bar.
The probability that he buys a slice of toast is 0·8.
Whatever he eats, the probability that he buys a bottle of water is 0·4.

(a) Complete the following tree diagram.



[1]

(b) Calculate the probability that Robert buys an apple but does not buy a bottle of water.

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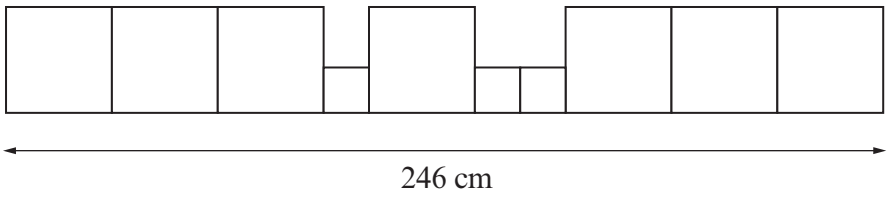
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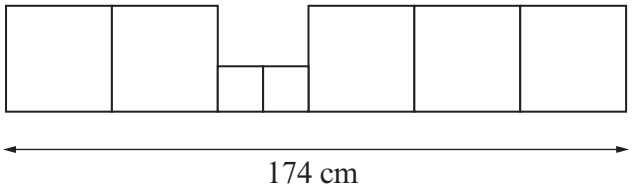
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11. Two sizes of square tiles are used to make these 2 patterns.



246 cm



174 cm

What would be the length of a pattern made using 2 large and 2 small tiles?

[6]

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12. *(a)* Calculate the size of the angle marked x.
You must give a reason for your answer.

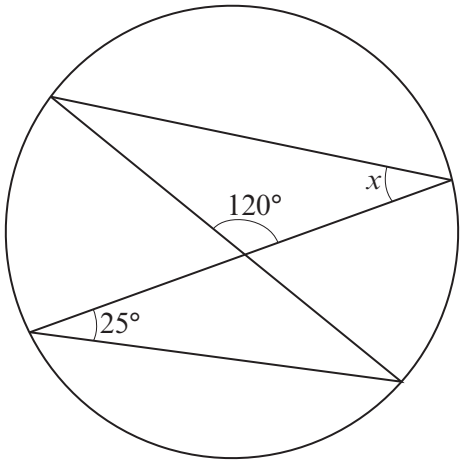


Diagram not drawn to scale

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[2]

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(b) Calculate the size of the angle marked y.
You must give a reason for your answer.

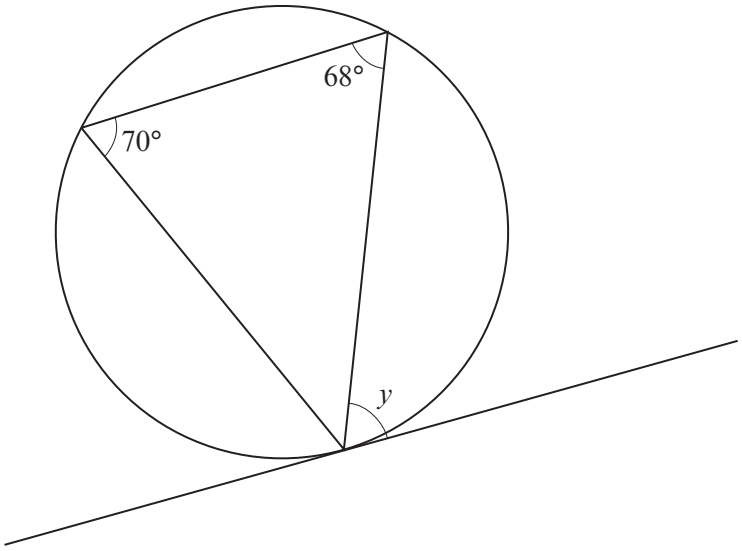


Diagram not drawn to scale

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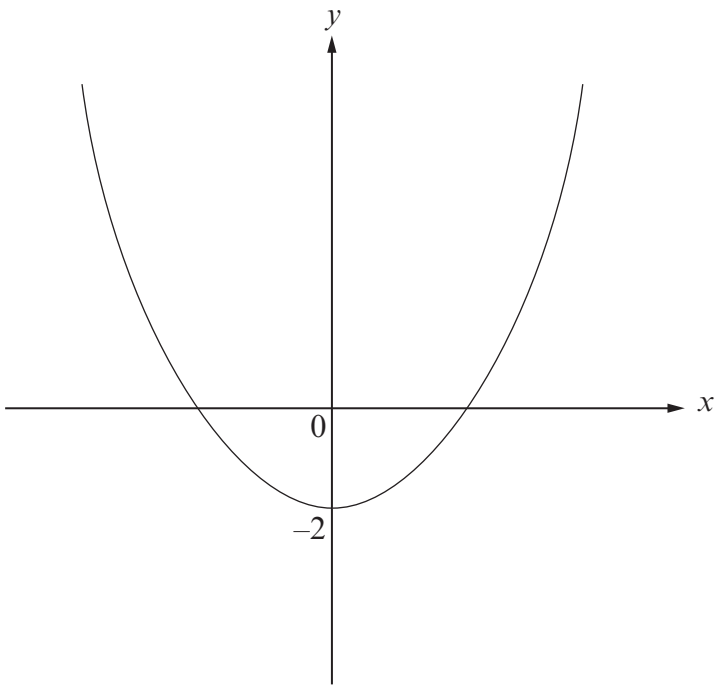
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[2]

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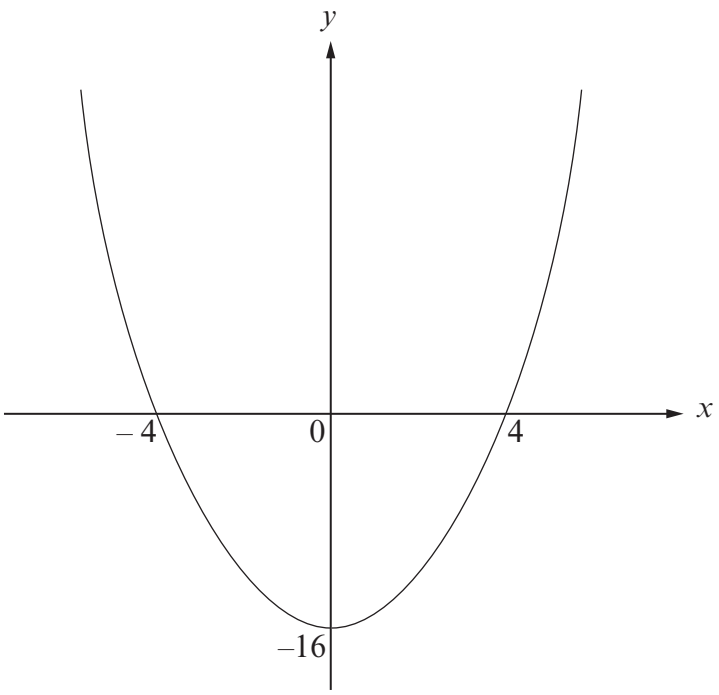
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13. *(a)* The diagram shows a sketch of $y = f(x)$.
On the same diagram, sketch the curve $y = f(x) + 6$.
Mark clearly the value of y at the point where this curve crosses the y-axis.



[2]

(b) The diagram shows a sketch of $y = g(x)$.
On the same diagram, sketch the curve $y = -g(x)$.
Mark clearly the value of y at the point where this curve crosses the y-axis.



[2]

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14. *(a)* Express $0\dot{8}\dot{5}$ as a fraction.

[2]

(b) Simplify $\left(\sqrt{75} - \sqrt{3}\right)^2$ and state whether your answer is rational or irrational.

[3]

(c) Simplify $1000^{-\frac{2}{3}}$.

[2]

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15. A bag contains 11 beads, 6 of which are yellow, 3 are white and 2 are black.
Two beads are drawn at random, without replacement, from the bag.
Calculate the probability that at least one white bead is drawn.

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[3]

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