WJEC GCSE MATHEMATICS (UNITISED)

MATHS



EXAM QUESTION PACK

UNIT 3 FOUNDATION TIER 4353 PAPERS

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Surname	Centre Number	Candidate Number
Other Names		0

GCSE

4353/01

S16-4353-01

MATHEMATICS (UNITISED SCHEME)
UNIT 3: Calculator-Allowed Mathematics
FOUNDATION TIER

A.M. TUESDAY, 14 June 2016

1 hour 30 minutes

ADDITIONAL MATERIALS

A calculator will be required for this paper.

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 or use the π button on your calculator.

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 **7**.

For Examiner's use only		
Question	**Maximum Mark**	**Mark Awarded**
1.	**2**	
2.	**4**	
3.	**7**	
4.	**5**	
5.	**4**	
6.	**2**	
7.	**7**	
8.	**4**	
9.	**4**	
10.	**5**	
11.	**5**	
12.	**5**	
13.	**4**	
14.	**5**	
15.	**5**	
16.	**5**	
17.	**2**	
18.	**2**	
19.	**3**	
Total	**80**	

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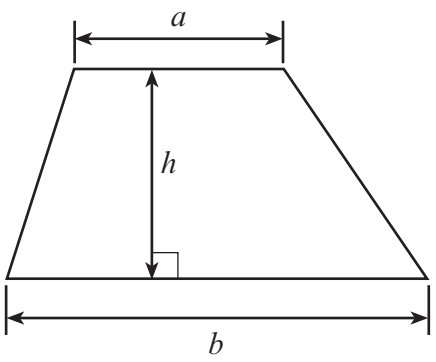
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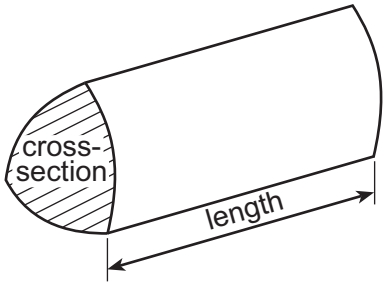
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Formula List

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



Volume of prism = area of cross-section × length



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1. In 2011, Government Statistics showed the number of people in Wales who were able to speak Welsh and the number who were not able to speak Welsh.

In each case, write the number of people correct to the nearest thousand. [2]

	Number of people	Number of people correct to the nearest thousand
Able to speak Welsh	562 016	
Not able to speak Welsh	2 393 825	

2. The solid below is made from small cubes, each with length, width and height of 1 cm.

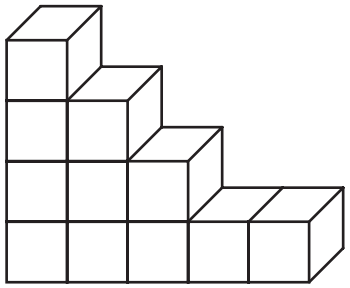


Diagram not drawn to scale

(a) What is the volume of the solid? Give the units of your answer. [2]

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(b) The **whole solid** is dropped into a tin of red paint.
What area will be covered with red paint? [2]

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3. Adam was buying items for his new puppy from a pet store.

(a) Complete his bill. [3]

Items	Cost
2 bags of "Woof" dry dog food @ £12.87 per bag	£
12 tins of "Waggy-tail" dog meat @ 60p each	£
1 dog bowl	£
Total	£ 41.69

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(b)

TODAY'S SPECIAL
Spend £50 and get a free bag of "Doggy Treats".

How much more money would Adam need to spend in order to get a free bag of "Doggy Treats"? [1]

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(c) Adam knew that "Woof" dry dog food cost £12.87 for a bag weighing 3 kg.

(i) What was the cost per kilogram of "Woof" dry dog food? [1]

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(ii) The same type of dry dog food could be purchased in 10 kg economy bags costing £36.50 each.
How much cheaper, per kilogram, was an economy bag than a 3 kg bag? [2]

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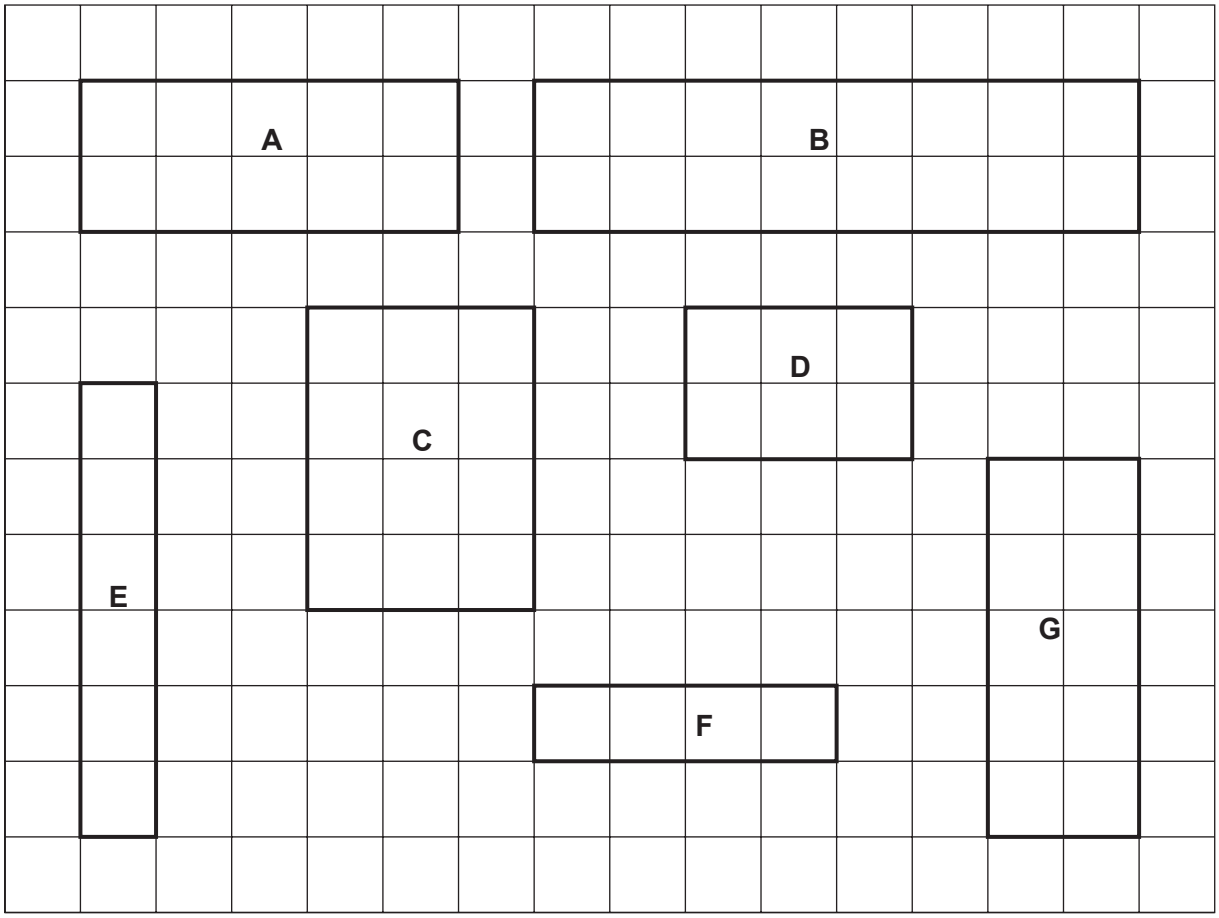
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4. *(a)* The rectangles below are drawn on a grid of centimetre squares.



(i) Write down the letters of two rectangles that are congruent. [1]

Two rectangles that are congruent are ..... and .....

(ii) Write down the letters of two rectangles that are not congruent but have the same area. [1]

Two rectangles that are not congruent but have the same area are .....

and .....

(iii) Four of the rectangles have perimeters of equal length. [2]

Write down the letters of these four rectangles and state the size of the perimeter that they have.

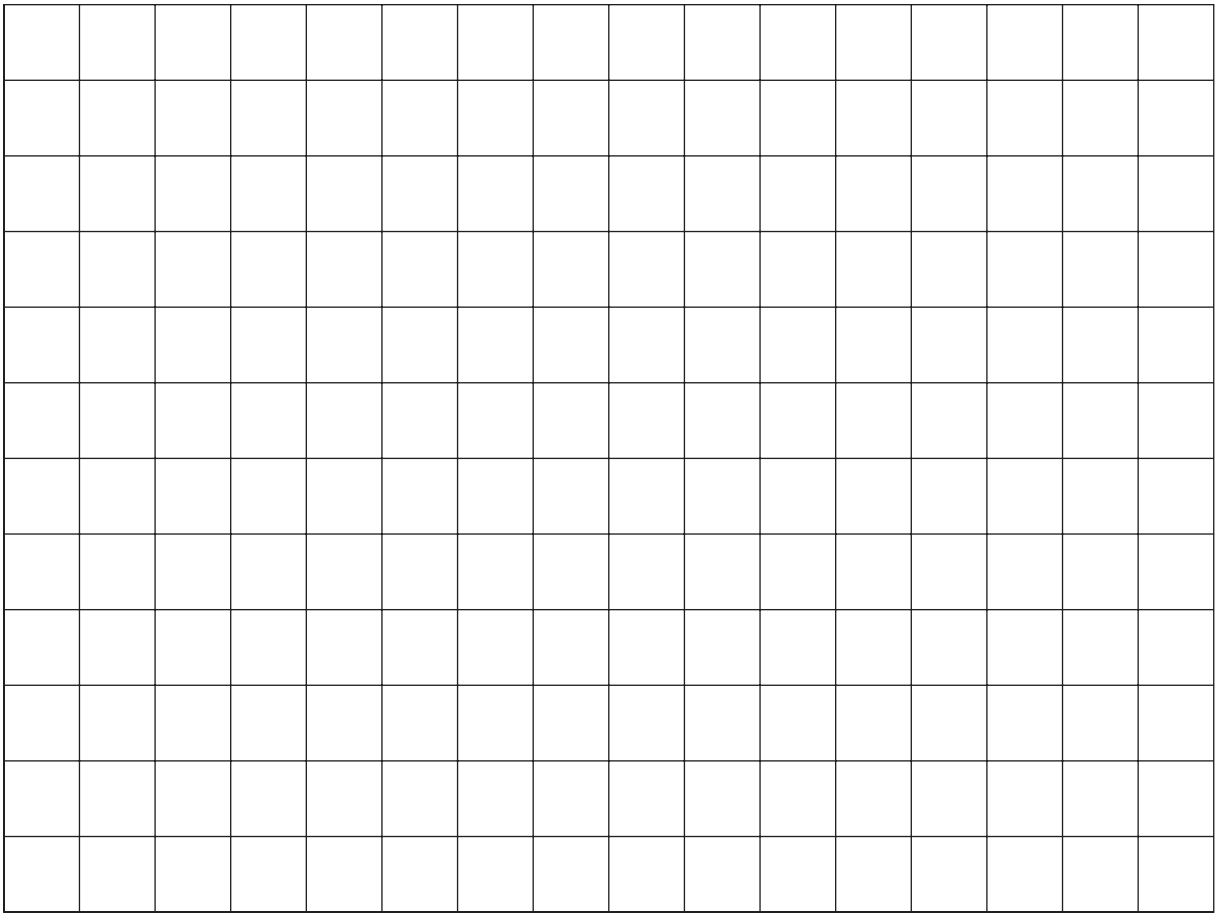
.... have a perimeter of ..... cm.

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(b) On the grid below, draw a rectangle that is similar to rectangle **C** but has a larger area. [1]



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5. Morgan operates a machine that packs bottles of water into boxes.

He has 200 bottles of water to pack into identical boxes.
Each box holds 12 bottles.
He completely fills as many boxes as possible.
How many boxes will he fill and how many bottles will be left over? [4]

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6.



The height of Mount Snowdon is approximately 1100 metres above sea level.
It is known that temperature decreases by 1°C for every 100 metres increase in height.

When the temperature at sea level is 8°C, what is the temperature at the top of the mountain? [2]

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

Elinor plans to sell cups of juice at a disco.
She buys 8 bottles of juice.
Each bottle holds 3 litres and costs £3.65 per bottle.
The total cost of the plastic cups she uses is £2.50.
Each plastic cup is filled with 250 ml of juice and is sold for 75p.
Elinor sells all the juice that she has bought.

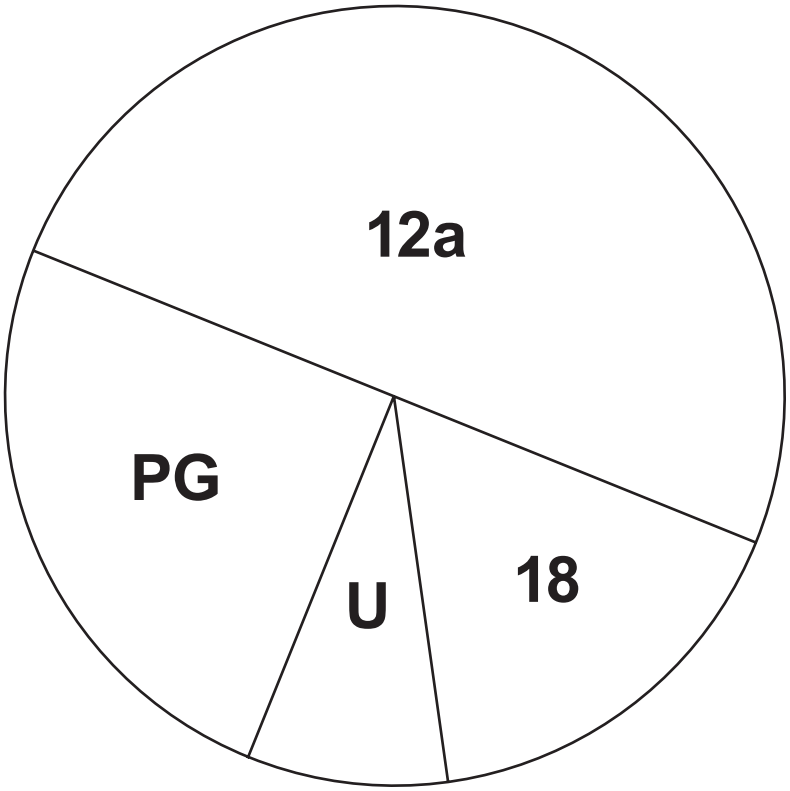
How much profit does she make? [7]

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8. The pie chart below represents the number of films in each age category shown at a multiscreen cinema. Altogether, 24 films were shown at the cinema.



Use this information to complete the pictogram to show the number of films in each age category. [4]

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KEY: = 4 films.

Film Category	
U	
PG	
12a	
18	

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9. James works part-time in a supermarket.

Last week, James worked the following hours:

Day worked	Time recorded
Monday	10:00 to 13:00
Wednesday	14:30 to 17:30
Friday	10:00 to 13:00
Sunday	10:00 to 14:00

He is paid £7.68 per hour for working from Monday to Saturday.

On Sunday, he is paid one and a half times as much per hour.

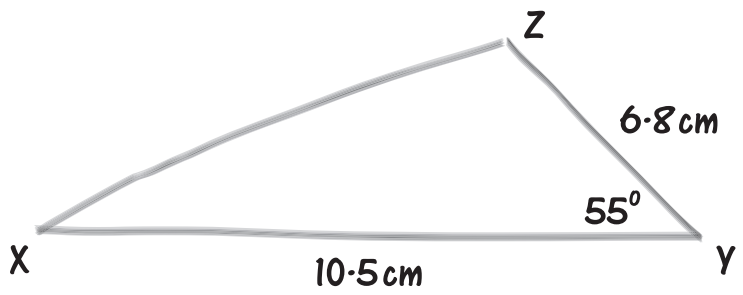
How much did James earn last week? [4]

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10. *(a)* The diagram below shows a freehand sketch of triangle *XYZ*.
It is not drawn to scale.



Use a ruler and a protractor to draw an accurate diagram of triangle *XYZ*.
Line *XY* is drawn accurately for you. [3]



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(b) Using a ruler and compasses only, construct an equilateral triangle *ABC* of side 8 cm.
Line *AB* is drawn accurately for you.
You must show all your construction arcs. [2]



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11. *(a)* x and y are two different numbers taken from the list below.

3	4	5	6	7	8

(i) What values of x and y will make $3x - 2y$ equal zero? [1]

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x = ... and y = ...

(ii) Work out the greatest possible value of $3x - 2y$. [1]

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(iii) Work out the least possible value of $3x - 2y$. [1]

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(b) Find the value of $3(a - 2b)$ when $a = -9$ and $b = \frac{1}{2}$. [2]

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12. *(a)* Jamal has five bags of carrots.
Each bag weighs a whole number of kilograms.
The median weight of these bags is 3 kg, the range of the weights is 4 kg and the modal weight is 5 kg.
What are the weights of the five bags of carrots? [3]

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The weights of the bags of carrots are:

.....kg .....kg .....kg .....kg .....kg

(b) Jamal has a number of 3 kg bags of potatoes and a different number of 8 kg bags of potatoes.
The mean weight of the bags of potatoes is 6 kg.
What is the least number of 3 kg and 8 kg bags of potatoes that Jamal has? [2]

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Jamal has ..... 3 kg bags and ..... 8 kg bags

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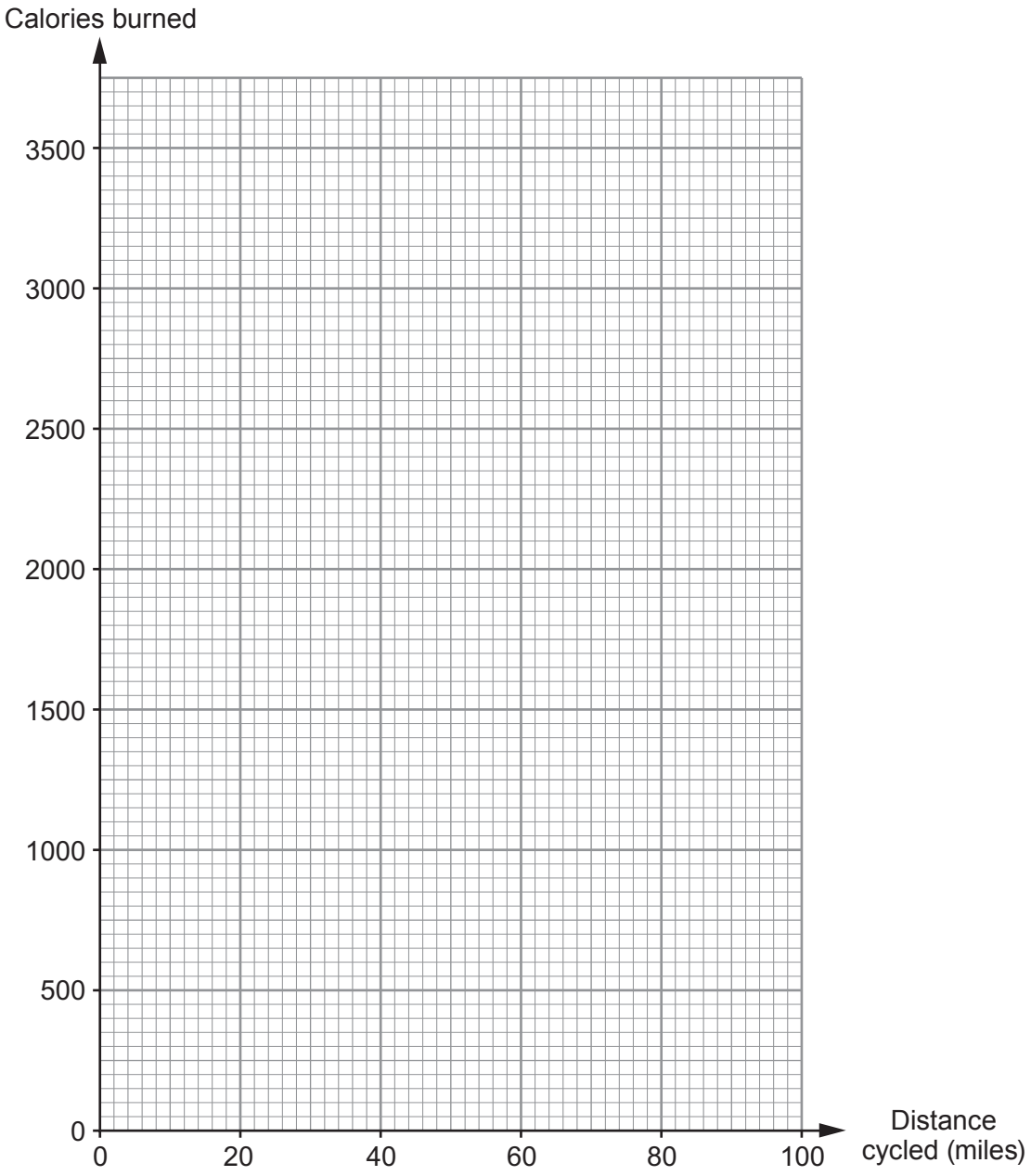
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13. A cyclist used an App on his mobile phone to record the distance he cycled and the calories he burned, on each of his last six rides.
His results are shown in the table below.

Distance cycled (miles)	60	28	86	52	24	76
Calories burned	2100	1500	3500	2500	800	3000

(a) Draw a scatter diagram of this data. [2]



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(b) What type of correlation is shown in the scatter diagram? [1]

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(c) Give a possible reason why the cyclist burned fewer calories on the 60 mile ride than he did on the 52 mile ride. [1]

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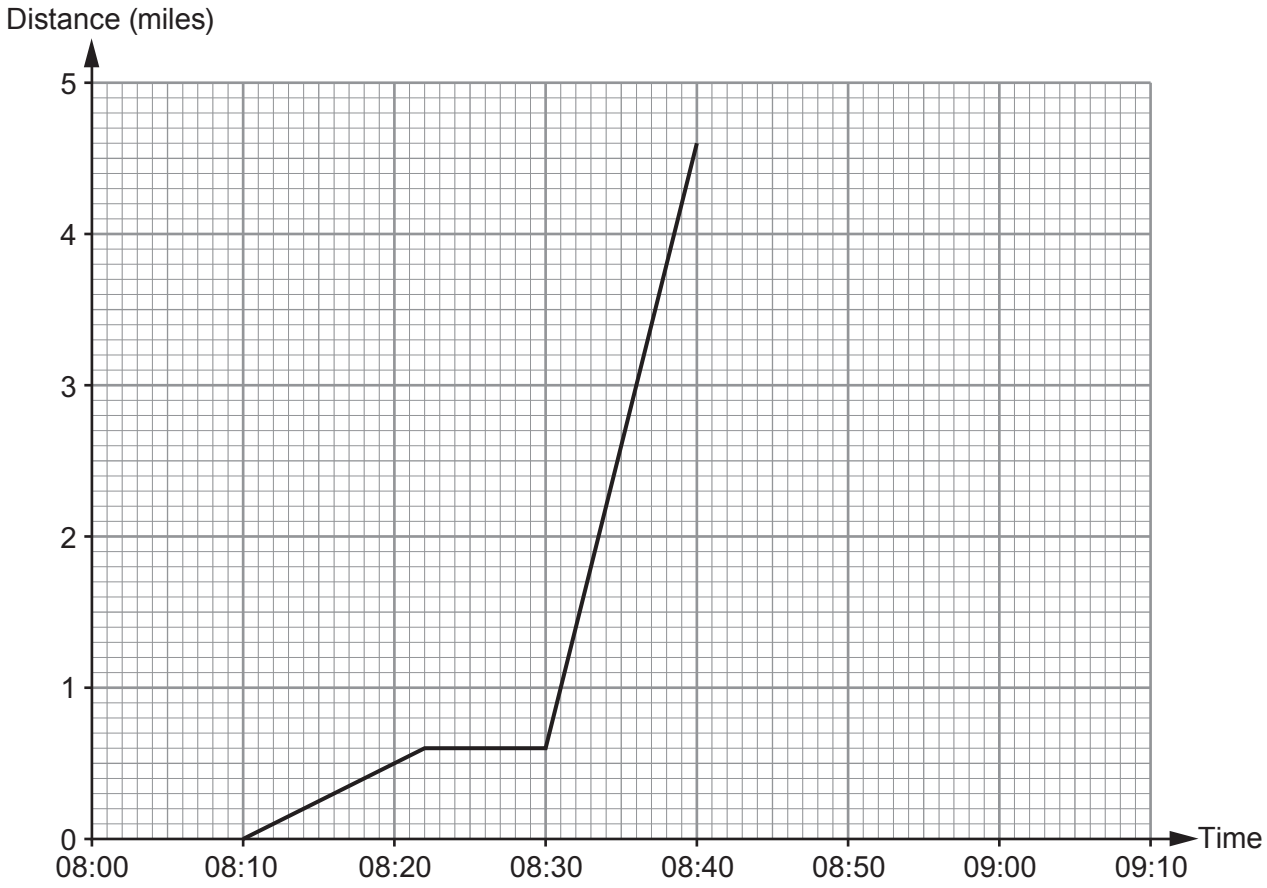
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14. The graph shows Huw's journey to college.
He leaves home at 08:10. The distance from his home to college is 4·6 miles.
He walks to the bus stop and waits for a bus. He gets on the bus and it takes him to college.



(a) How far is Huw's home from the bus stop? Give your answer in miles. [1]

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(b) How long does Huw wait for the bus? [1]

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(c) At what time does Huw arrive at college? [1]

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(d) Huw's sister Erin goes to the same college.
Erin leaves home at 08:00 and walks to college at a steady speed without stopping.
At 08:35 she is passed by Huw's bus.
Draw Erin's journey on the graph opposite and use this to decide if she will arrive at college before 09:00. [2]

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15. Catherine had a stall at a charity event to raise money for two local charities.

(a) Catherine made a fruit juice drink to sell at her stall.
She started by thoroughly mixing 200 ml of lime juice with 300 ml of cranberry juice.
Catherine drank 100 ml of the mixture to test its taste, and decided it was too bitter.
She then mixed in 400 ml of lemonade, and decided that she was happy with this new mixture.
Write down the ratio of lime juice to cranberry juice to lemonade for Catherine's new fruit juice drink. [3]

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lime juice : cranberry juice : lemonade

..... : ..... : .....

(b) Catherine made a profit of £84.80 from selling her fruit juice drink at the charity event.
She decided to share the money between the charities in the ratio 5 : 3.
Calculate the amount of money she gave to each of the two charities. [2]

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16. *(a)* Solve the equation $\frac{x+5}{6} = 3$. [2]

(b) Solve the equation $5(2x - 3) - 8x = 10$. [3]

17. Evaluate $\sqrt[3]{\left(\frac{9{\cdot}8}{3{\cdot}1 - 1{\cdot}7}\right)^2}$. Give your answer correct to 2 decimal places. [2]

18. A regular polygon has exterior angles of 24°.
How many sides does the regular polygon have? [2]

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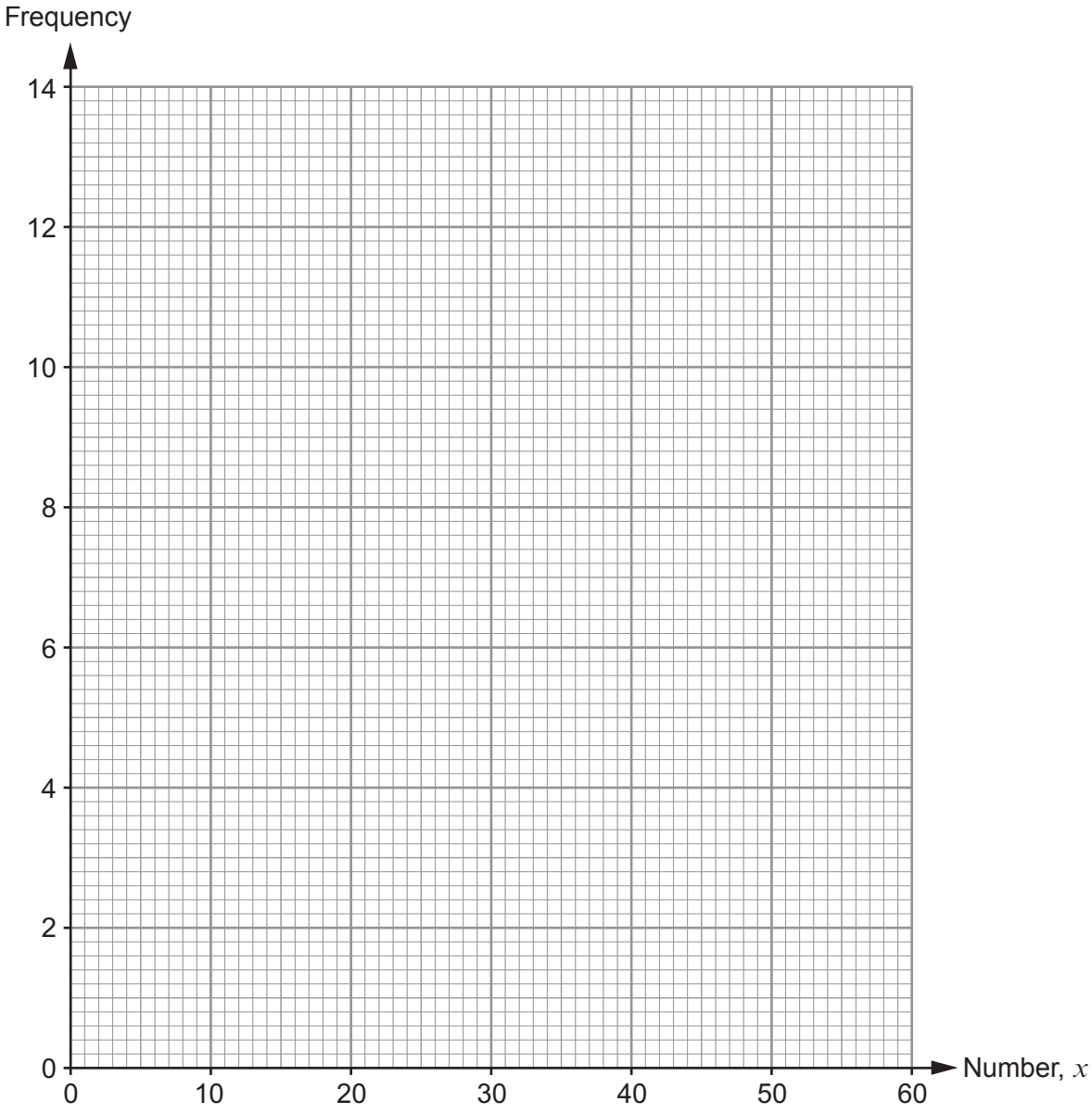
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19. A list of 50 numbers has been summarised in the grouped frequency table below.

Number, x	Frequency
$0 \leqslant x < 10$	3
$10 \leqslant x < 20$	5
$20 \leqslant x < 30$	9
$30 \leqslant x < 40$	13
$40 \leqslant x < 50$	12
$50 \leqslant x < 60$	8

(a) Draw a frequency polygon to show this data. [2]



(b) Write down the group that contains the median. [1]

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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 3
FOUNDATION TIER

4353/01

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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 3 Foundation Tier
Summer 2016 Mark Scheme

Summer 2016 Unitised Unit 3 Foundation Tier	✓	Mark	Comments
1. (Able to speak Welsh) 562 000 (Not able to speak Welsh) 2 394 000		B1 B1	
To be viewed with diagram. 2. (a) (volume=) 11 cm^3		B1 U1	
2. (b) evidence of counting squares (11+11+4+5+9=) 40 (cm^2)		M1 A1	Must consider more than front surface. M0 for 11.
3a. (£) 25.74 (£)7.2(0) (£)8.75	✓ ✓ ✓	B1 B1 B1	 FT (£)41.69 –('their (£) 25.74'+'their (£)7.2(0)')
3b. (£)8.31		B1	
Ribbon marked 3(c)i and 3(c)ii. 3c.(i) (£)4.29		B1	
3c. (ii) (£)4.29 − (£) 36.50/10 (£)0.64 or 64(p)		M1 A1	FT 'their (£)4.29' C.A.O SC1 (£)4.29×10 – (£)36.50 = (£)6.40
To be viewed with diagram. 4. (a) (i) A and G		B1	
(a) (ii) D and E		B1	
(a) (iii) A, C, E, G and 14(cm)		B2	B1 for any three letters correct AND 14(cm) identified OR all four correct without correct perimeter.
4 (b) enlarged version of rectangle C drawn.		B1	
5. 200÷12 (=16.666…) 16(full boxes) 200 − 16×12 (= 200 − 192) 8	✓ ✓ ✓ ✓	M1 A1 M1 A1	Accept alternative methods eg. Repeated subtraction. FT 'their 16' provided less than 16.
6 (drop in temperature =) 11(^oC) (temperature at top =) −3 (^oC)		B1 B1	Or sight of −11 FT 'their 11' provided the answer is negative
7. Use of 1000ml = 1 litre ('Number of cups sold' =) 4 ×3×8 or $\frac{8\times3000}{250}$ or equivalent (=96 cups) ('Total sales' =) 96 × 75(p) (=£72) ('Total expenditure' =) 8×(£)3·65 + ((£)2·50 (=£31·70) (Profit = 'Total sales' − 'Total expenditure' = £72− £31·70 =) (£)40·3(0) QWC: Look for • correct units used i.e. ml and l, £ and p. • spelling in at least 1 statement/sentence • clarity of text explanations QWC2: Candidates will be expected to • present work clearly, with words or quantities shown for clarity of process or steps AND • make few if any mistakes in mathematical form, spelling, punctuation and grammar in their answer QWC1: Candidates will be expected to • present work clearly, with words or quantities shown for clarity of process or steps OR • make few if any mistakes in mathematical form, spelling, punctuation and grammar in their answer	✓ ✓ ✓ ✓ ✓ ✓ ✓	B1 B1 B1 B1 B1 QWC 2	May be implied in further work. FT 'their 4' or 'their 3000'. FT 'their derived 96'. FT 'their derived 72' and 'their derived (£) 31·70'. 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.

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Summer 2016 Unitised Unit 3 Foundation Tier	✓	Mark	Comments
To be viewed with pie chart. 8. 12a-12 films, PG- 6films, U- 2 films, 18- 4 films.  	✓ ✓ ✓ ✓	B2 B2	B1 for any two or three correct May be implied from pictogram. FT number of films B1 for any two or three correct.
To be viewed with table. 9. 9 × (£)7.68 4 × 1.5 × (£)7.68 or 4 × (£)11.52 Both (£)69.12 and (£)46.08 (total earnings=)(£)115.20	✓ ✓ ✓ ✓	B1 B1 B1 B1	 FT 'their 9', 'their 4' or 'their (£) 11.52'. FT from 'their (£)69·12' and 'their (£)46·08' provided at least one of the first two B1 marks awarded.
10. **Use Overlay.** (a) ZY=6·8 ± 2mm XYZ = 55° ± 2° Closed triangle with accurate length or angle.		 B1 B1 B1	
10. **Use Overlay.** (b) Intersecting arcs, radius 8cm, drawn from A and B. Completed triangle with vertex at point of intersection of arcs.		M1 A1	Accept two 60° constructions with appropriate arcs and a completed triangle.
11.(a) (i) $x = 4$, $y = 6$		B1	Accept embedded answers
11. (a) (ii) (3×8−2×3=) 18		B1	
11. (a) (iii) (3×3−2×8=) −7		B1	
11. (b) Correct substitution with at least one correct calculation. −30		B1 B1	B1 for 2×½=1 or (−9 − 'their' 2×½) correctly calculated or B1 for one correct calculation following expansion of brackets with correct substitution of a= −9 and b = ½ .
12. (a) 1 , 2, 3, 5, 5,		B3	In any order Median 3(kg) B1 Mode 5(kg) B1 Range 4(kg) B1 An answer of 1, -, 3, 5, 5, scores B2 for a correct median, mode and range but incomplete answer.
12.(b) Method of trial and improvement. Two 3kg bags and three 8kg bags		M1 A1	Eg. 1 × 3kg + 2 × 8kg = 19kg. 19 ÷ 3 ≠ 6. 2 × 3kg + 1 × 8kg = 14kg. 14 ÷ 3 ≠ 6. 2 × 3kg + 3 × 8kg = 30kg. 30 ÷ 5 = 6. If no marks awarded, SC1 for 2n (3kg) and 3n (8kg) for n≥2.
Use overlay. **Ribbon marked with 13b. Viewed with graph.** 13.(a) All points plotted correctly.		B2	B1 for 3, 4 or 5 points plotted correctly, not joined, **OR** B1 for all points plotted correctly but joined.
Ribbon marked with 13(a) 13. (b) Positive.		B1	
Viewed with graph 13(a) 13. (c) Valid reason e.g. "The 60-mile ride could have been over flat roads whereas the 52-mile ride could have been uphill.", or "The wind could have helped on the 60-mile ride.", or "The cyclist may have ridden more slowly on the 60-mile ride", or "The weather was hotter on the 52-mile ride".		E1	
14.(a) 0·6 (miles)		B1	
14.(b) 8 (mins)		B1	
14.(c) 08:40.		B1	
Use overlay. To be viewed with graph. 14. (d) line drawn from (08:00,0) through (08:35, 2·6 ± 0.05) A statement that she arrives after 09:00		B1 B1	B1 for a line drawn from (08:00,0) through (08:35, 2·6 ± 0.05) FT a statement consistent with the reading of the time shown on their graph (or their graph continued) at 4.6 miles

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Summer 2016 Unitised Unit 3 Foundation Tier	✓	Mark	Comments
15. (a)Volume of lime = (4/5 × 200 =) 160 Volume of cranberry = (4/5 × 300 =) 240 160:240:400 or 2:3:5 or equivalent.		B1 B1 B1	This may be seen in their final answer. FT 'their 160' and 'their 240' provided they add to 'their lemonade' and 'their lime' $\leq$ 'their cranberry' Correct answer implies all 3 marks.
15. (b) (1 part =) (£)84.80 ÷ 8 (£)53 **AND** (£)31.8(0)		M1 A1	
16. (a) $x + 5 = 18$ OR $x/6 = 13/6$ $x = 13$		B1 B1	FT until 2nd error. Accept embedded answers.
16. (b) $10x - 15 - 8x = 10$ $10x - 8x = 10 + 15$ $x = 25/2$ or 12·5		B1 B1 B1	FT until 2nd error.
17. 3·66		B2	B1 for 3·6(5930571) or 3.7.
18. 360 ÷ 24 OR equivalent work involving the internal angle. = 15 (sides)		M1 A1	
19. **Use overlay.** (a) Points plotted at mid-points of groups and straight lines connecting the points.		B2	B1 for at least 4 points plotted and joined correctly **OR** for all points plotted correctly but not joined. Accept intention of straight lines. Ignore any lines outside the first and last points.
19. **To be viewed with frequency table.** (b) $30 \leq x < 40$		B1	

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Surname	Centre Number	Candidate Number
Other Names		0

GCSE

4353/01

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MATHEMATICS (UNITISED SCHEME)

UNIT 3: Calculator-Allowed Mathematics

FOUNDATION TIER

A.M. MONDAY, 18 January 2016

1 hour 30 minutes

For Examiner's use only		
Question	**Maximum Mark**	**Mark Awarded**
1.	**7**	
2.	**5**	
3.	**3**	
4.	**2**	
5.	**3**	
6.	**5**	
7.	**7**	
8.	**5**	
9.	**3**	
10.	**5**	
11.	**3**	
12.	**6**	
13.	**7**	
14.	**3**	
15.	**6**	
16.	**3**	
17.	**3**	
18.	**4**	
Total	**80**	

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ADDITIONAL MATERIALS

A calculator will be required for this paper.

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 or use the π button on your calculator.

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.

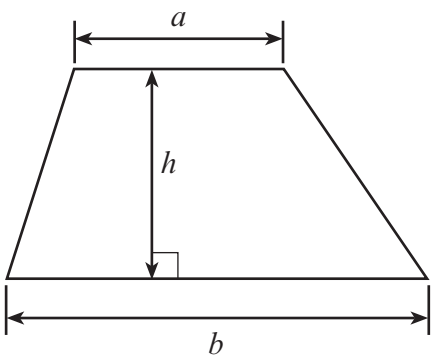
You are reminded that assessment will take into account the quality of written communication (including mathematical communication) used in your answer to question **7**.

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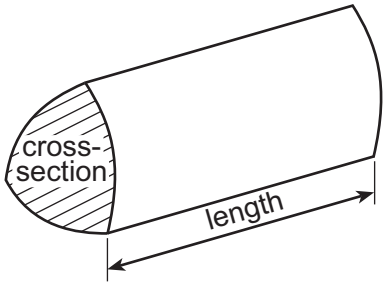
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Formula List

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



Volume of prism = area of cross-section × length

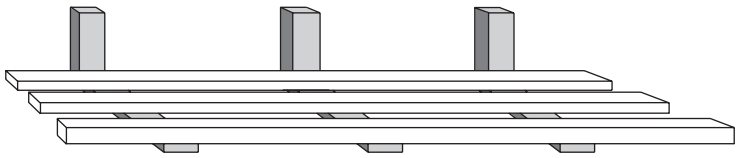


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1. Jo is making a wooden shelf for her bathroom.



She visits a DIY shop to buy the items she needs.

(a) Complete her bill: [3]

Item	Cost
3 metal brackets at £1.89 each	£
2·8 metres of shelving wood at £2.15 per metre	£
1 packet of screws	£
TOTAL	£ 13.75

.....

.....

(b) The bill does not include VAT which is charged at a rate of 20% of the total cost.

(i) How much VAT will Jo need to pay? [2]

.....

.....

(ii) What is the total cost including VAT? [1]

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(c) Jo considers buying a ready-made shelf that would cost her £22.99, including VAT. How much money does she save by making the shelf herself? [1]

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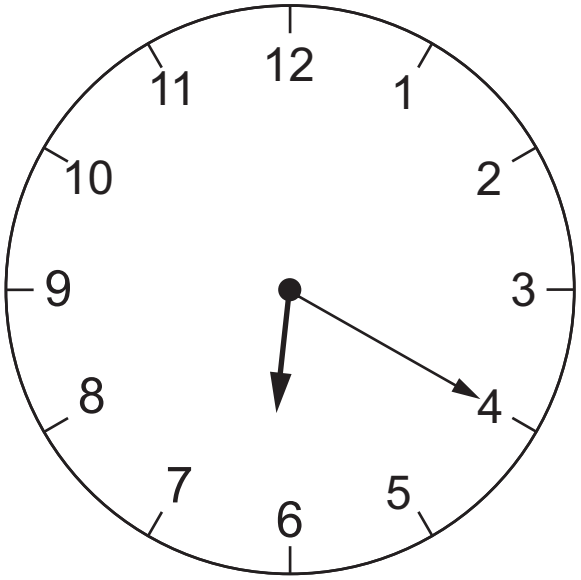
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Turn over.

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2. When Mair came home from work one evening, she looked at the clock on her kitchen wall.



(a) At what time did she arrive home? You must indicate a.m. or p.m. [1]

.....

(b) Thirty five minutes later, Mair looked at the digital clock in her bedroom.
The digital clock showed the time in the 24-hour system.
What time was the digital clock showing? [2]

.....

(c) At half-past eight that evening, Mair started watching a film.
The film ended at ten minutes past eleven. How long did the film last? [2]

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3. *(a)* Solve $x - 3 = 15$. [1]

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(b) Using the rule $A = 5B + 18$, find the value of A when $B = 4{\cdot}3$. [2]

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4. *(a)* Work out the value of $(15 + 3) \times (-4)$. [1]

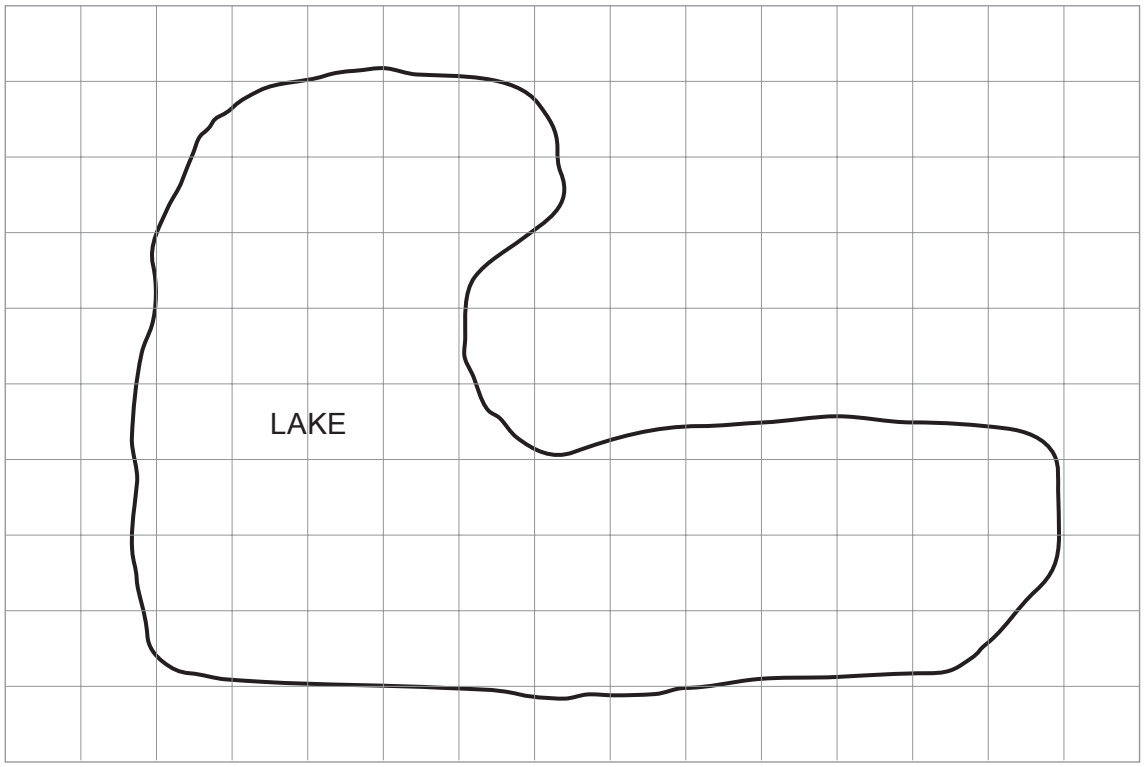
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(b) Work out the value of $15 + 3 \times (-4)$. [1]

.....

2

5.



The above shape represents the outline of a lake.
The diagram is drawn to scale.
Each square on the grid represents an area of $100\,m^2$.

Find the approximate area of the lake in square metres. [3]

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6. *(a)* Calculate $\sqrt{758}$, giving your answer correct to the nearest whole number. [2]

.....

(b) Find $3{\cdot}524^2$, giving your answer correct to one decimal place. [2]

.....

(c) Find the value of the cube root of 512. [1]

.....

5

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

A gardener wants to buy grass seed for a new lawn.
He knows that 40 grams of seed is enough for one square metre of lawn.
The lawn will measure 12 metres by 8 metres.
The seed is sold in boxes.
Each box contains 1 kg of seed and costs £6.30.
How many boxes of grass seed will the gardener need to buy and what is the total cost?
You must show all your working. [7]

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8. *(a)*



Hannah threw 6 darts at a dartboard and hit the following scores:

20, 5, 1, 40, 17, 15

What was Hannah's median score? [2]

.....

.....

(b) Tariq threw three darts at the dartboard and hit three scores.
The lowest was 8.
The range was 9.
The mean was 13.
What were the three scores that Tariq hit? [3]

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The three scores were: ....

5

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Examiner only

9. A cuboid has length 80 cm, width 60 cm and height 75 cm.
Find the volume of the cuboid, stating the units of your answer. [3]

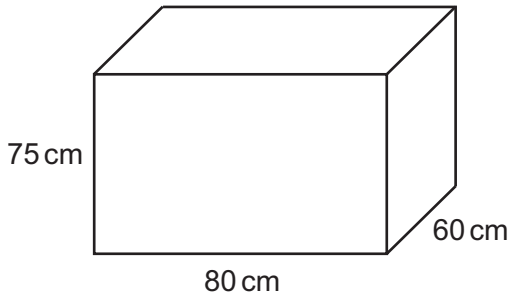


Diagram not drawn to scale

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10. *(a)* Two equations are known.

$$18 = 7 + a$$

$$a + 5 = 10 + b$$

Use **both** equations to work out the value of b. [2]

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(b) Two different rectangles are joined to make a larger rectangle, as shown in the diagram.

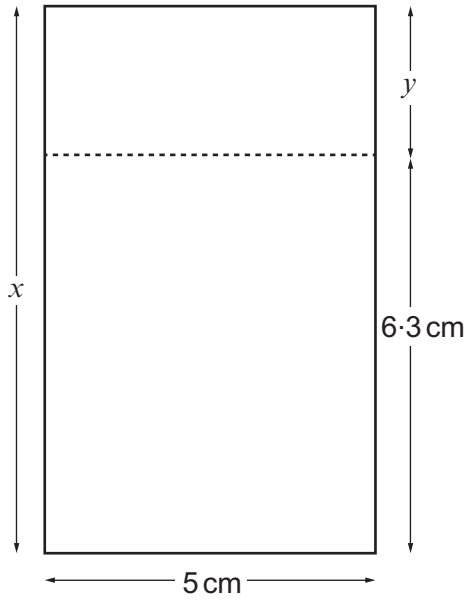


Diagram not drawn to scale

The total area of the whole rectangle is 40 cm^2.
Work out the lengths marked x and y. [3]

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x = ... y = ...

5

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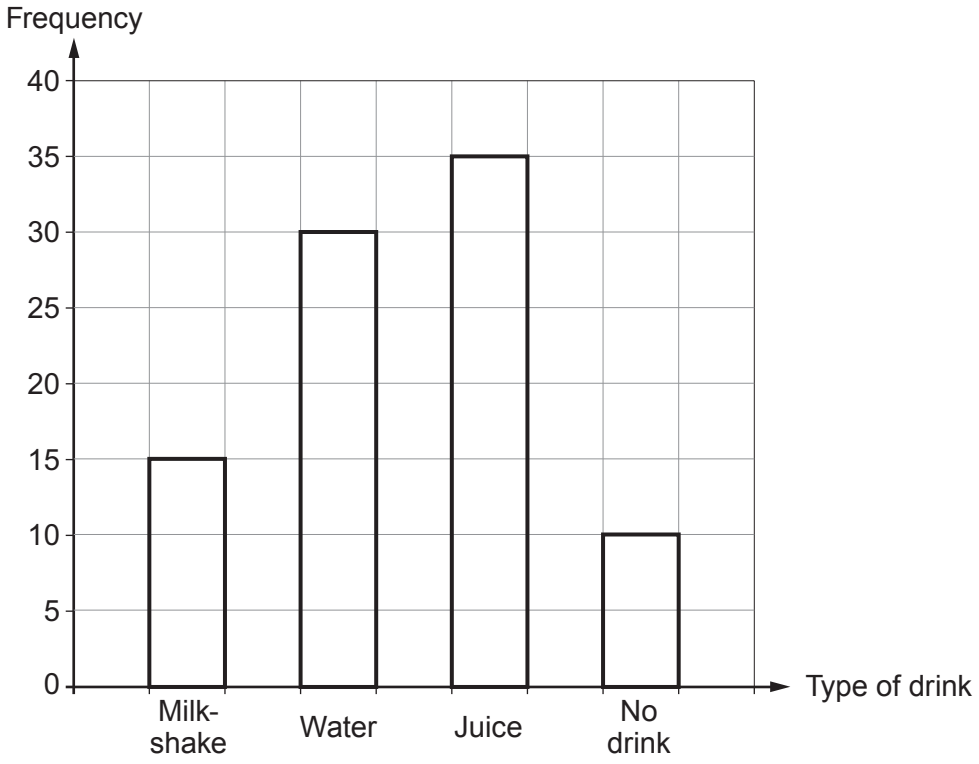
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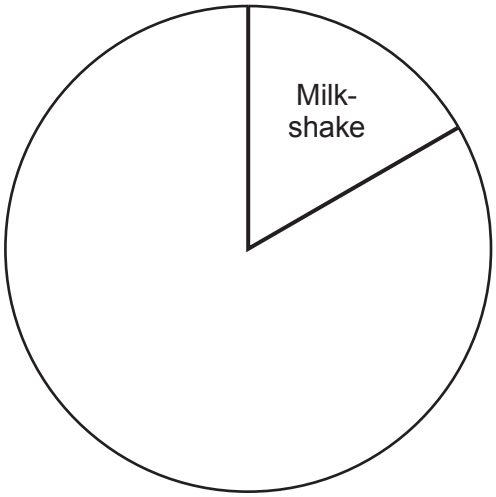
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11. A survey was carried out in a school canteen.
90 students were asked which type of cold drink they had selected with their lunch.
The bar chart shows the results of the survey.



Use the information in the bar chart to complete the pie chart.
One sector has been drawn for you. [3]



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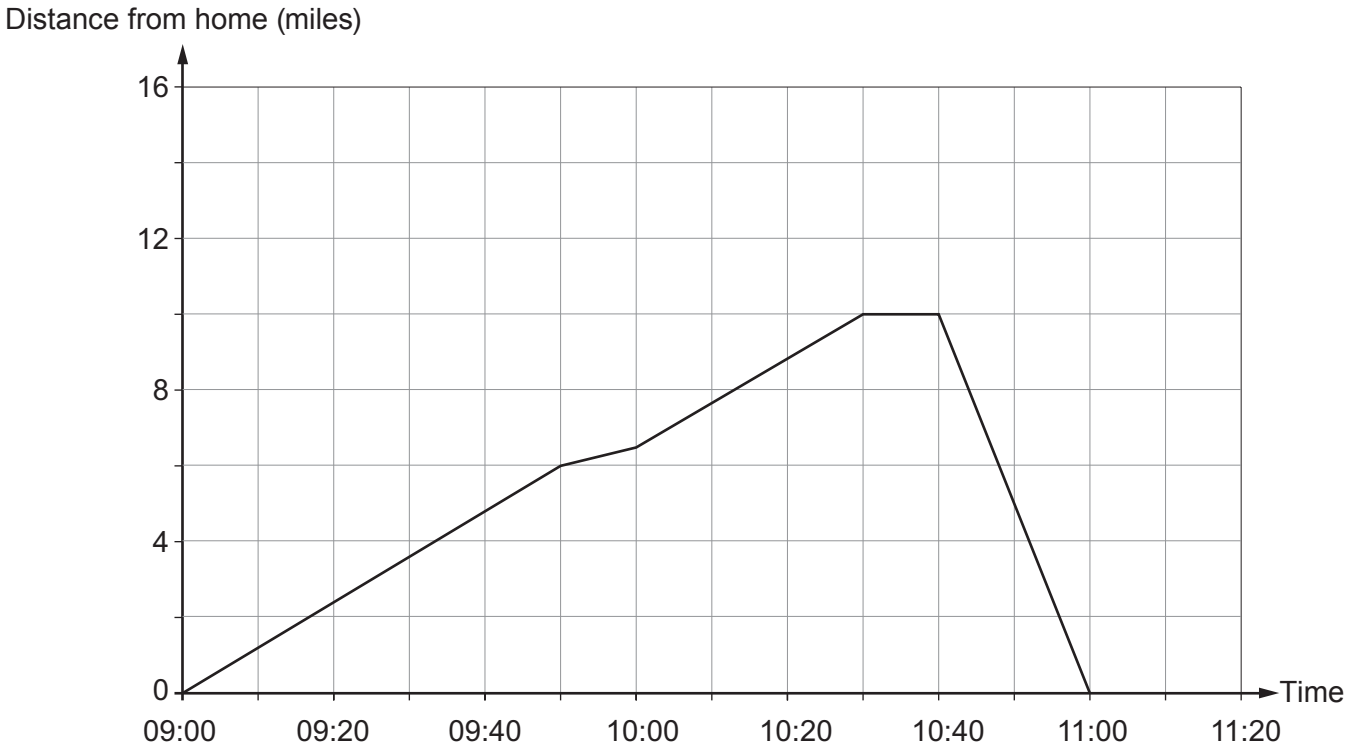
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12. Morgan has started training for a charity run.
She uses an App on her phone to record her training session as a graph.



Morgan set out from home at 9 a.m. She planned to run or walk as far as she could, then telephone her father for a lift home in the car.

(a) How does the graph show that she ran, walked and then started running again? [1]

.....

.....

(b) How many miles had she already run when she started to walk? [1]

.....

(c) She telephoned her father as soon as she stopped running for the second time.
At what time did she telephone her father? [1]

.....

(d) How long did she wait for her father to arrive? [1]

.....

(e) At what speed did her father drive home? [2]

.....

6

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13. The Body Mass Index (BMI) of each of 15 boys in class A was calculated from their height and weight measurements. The results are shown below:

19·9	21·8	21·9	20·5	17·3
18·4	19·7	21·7	18·9	21·1
22·7	19·6	23·7	21·3	24·9

(a) Complete the frequency table for the results. [2]

BMI	Tally	Frequency
$17 \leqslant \text{BMI} < 19$		
$19 \leqslant \text{BMI} < 21$		
$21 \leqslant \text{BMI} < 23$		
$23 \leqslant \text{BMI} < 25$		

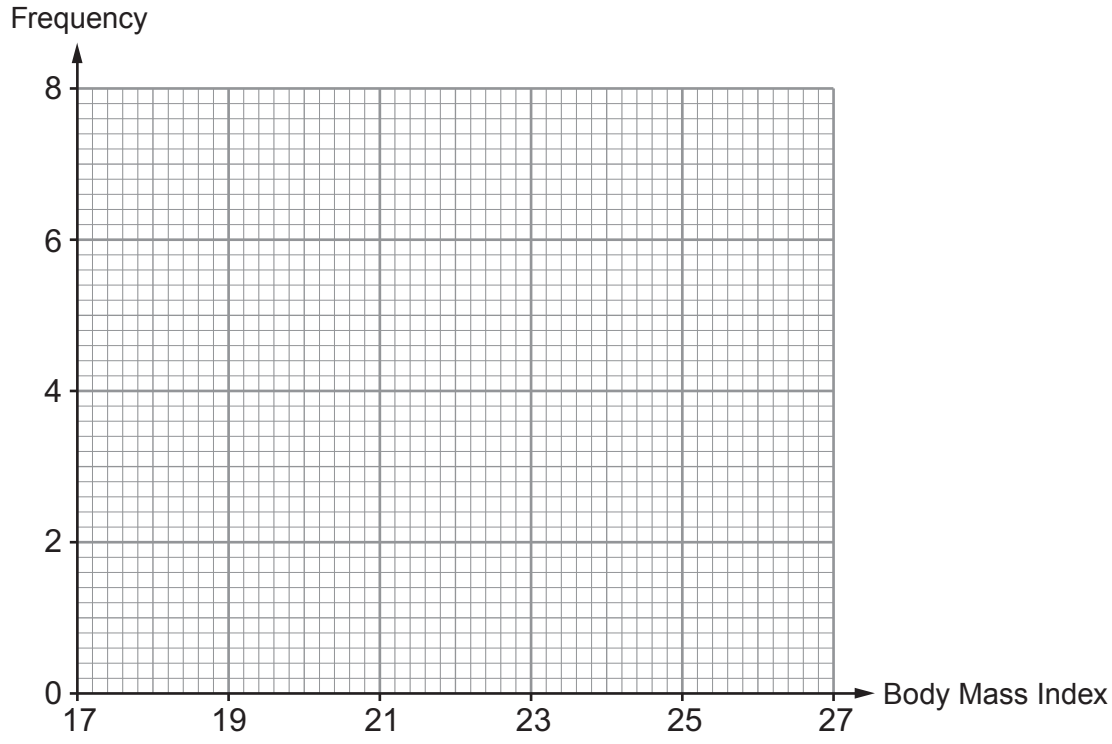
(b) How many of the boys in class A had a Body Mass Index of less than 23? [1]

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(c) Which is the modal group in class A? [1]

.....

(d) On the graph paper below, draw a grouped frequency diagram to show this data. [2]

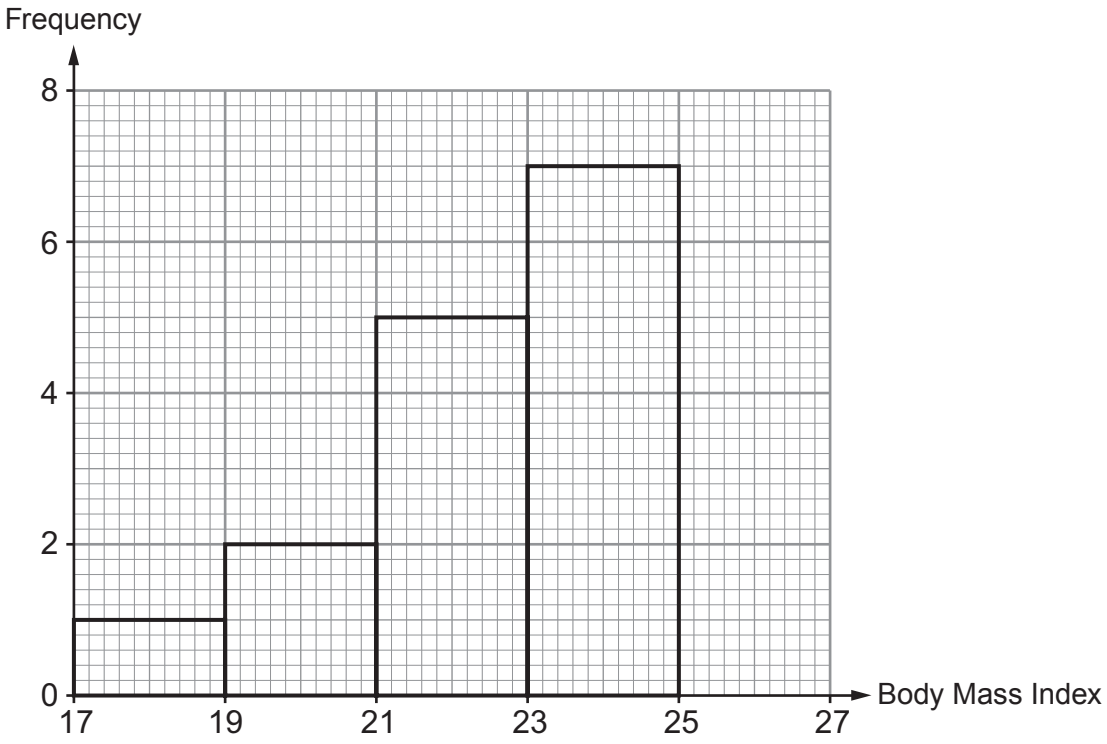


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(e) The grouped frequency diagram below shows the results of the Body Mass Index calculations for 15 boys in class B.



It is known that older boys tend to have a higher Body Mass Index.

Explain **how** the grouped frequency diagrams could help you to decide whether class A or class B contains older boys. [1]

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7

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14. William and Rushan earned £45 by washing cars.
They agreed to share the money in the ratio of the time they each spent washing cars.
William washed cars from 10:15 a.m. to 11:45 a.m.
Rushan washed cars from 1:45 p.m. to 4:45 p.m.
How much did each person receive? [3]

.....

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.....

William receives £ ..... Rushan receives £ .....

3

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15. Cellan buys a season ticket each year to watch Swardiff Rovers football club play all their home matches.
The season ticket payment options for next year are given below.

- Normal price is £510
- Pay before the end of January and get a discount of $\frac{1}{12}$ off the normal price
- If you pay by credit card, a charge of 1·6% will be added

Cellan decides to pay before the end of January to get the discount.
He pays using his credit card.
How much less than the normal price does he pay?
You must show your working. [6]

6

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16. Solve the equation $8y - 3 = 2(2y + 8)$. [3]

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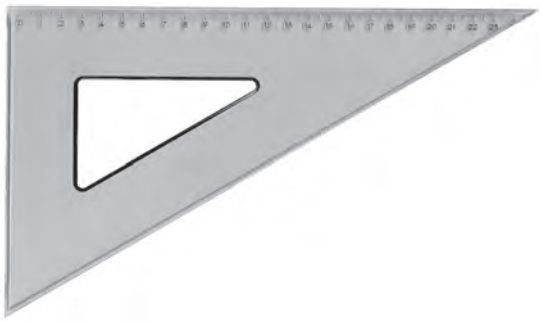
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17. Elwyn is a carpenter.
He normally uses a tool called a try square to measure angles of 90°.



One day, Elwyn forgets to pack his try square.
In his van, Elwyn has three wooden rods of length 8 cm, 15 cm and 17 cm.
Show, using calculations, that he can create an angle of 90° by joining the ends of these rods to form a triangle. [3]

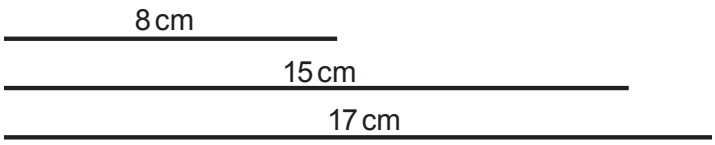


Diagram not drawn to scale

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18. A semi-circle with diameter 7·8 cm has the same perimeter as that of a square.

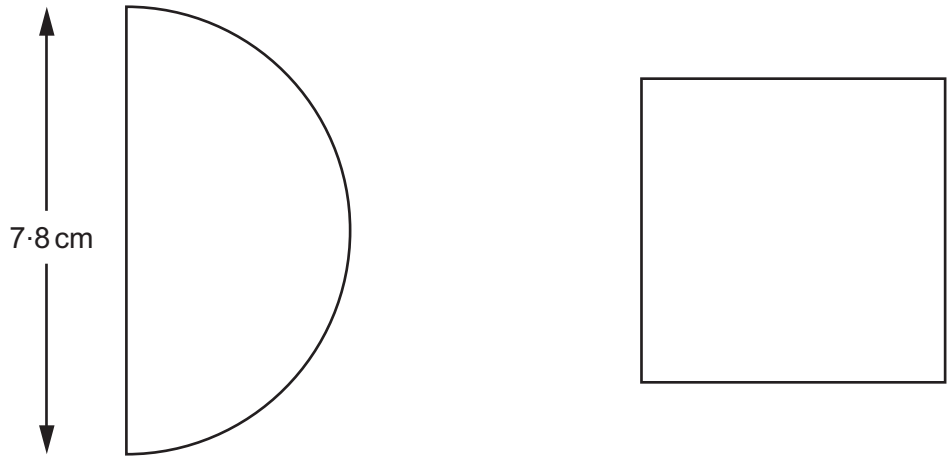


Diagram not drawn to scale

Calculate the area of the square. [4]

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END OF PAPER

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GCSE MARKING SCHEME

JANUARY 2016

MATHEMATICS UNITISED - UNIT 3
FOUNDATION TIER
4353/01

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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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2016 January UNIT 3 (calculator allowed) Foundation Tier Mark Scheme	Mark	Comments (page 1)
1. (a) (£)5·67 (£)6·02 (£)2·06 (b) (i) 0·2×(£)13·75 (£)2·75 (ii) (£)16.5(0) (c) (£)6·49	B1 B1 B1 M1 A1 B1 B1 7	 FT values in the table Or equivalent method Do not penalise (£)13·75±(£)2·75 FT (£)13·75+'their (£)2·75' FT (£)22·99 –'their (£)16.5(0)'
2.(a) 6:20 p.m. (b) 18:55 (c) 2 hours 40 minutes or 160 minutes.	B1 B2 B2 5	 B1 for 6:55(p.m.), or five minutes to 7 (or equivalent) not in 24 hour clock system or 18:55p.m. B1 for 2:40 or 2·40
3. (a) 18 (b) (A =)5×4·3+18 39·5	B1 M1 A1 3	 Correct substitution with intention to multiply 5×4·3
4. (a) −72 (b) 3	B1 B1 2	
5. Evidence of counting squares 56-63 (squares) 5600-6300 (m^2)	M1 A1 B1 3	 F.T. 100×their area Answer in the range 5600-6300 (m^2) gets M1 A1 B1.
6.(a) 28 (b) 12·4 (c) 8	B2 B2 B1 5	B1 for 27·5(317…) B1 for 12·418576

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2016 January UNIT 3 (calculator allowed) Foundation Tier Mark Scheme	Mark	Comments (page 2)
7. (Area of the lawn=) 12×8 (= 96m^2) (Weight of seed needed in grams = 96×40=) 3840(g) (Weight of seed needed in kg =) 3.84(kg) (boxes) (Number of boxes needed =) 4 (boxes) (Total cost= (£) 6·30× 4 =) (£) 25.20 or 2520(p) Alternative: (Area of the lawn=) 12×8 (= 96m^2) B1 (Area of seed covered by one box = 1000÷40 =) 25 (m^2) B1 (Number of boxes needed = 96 ÷25=) 3.84 B1 (Whole number of boxes =) 4 (boxes) B1 (Total cost= (£)6·30× 4 =) (£) 25.20 or 2520(p) B1 Look for • Spelling • Clarity of text explanations, • Consistent use of £ or p and mathematical symbols, • Consistent use of g or kg QWC2: Candidates will be expected to • Present work clearly, with words explaining process and 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.	B1 B1 B1 B1 B1 QWC 2 7	Conversion of 'their 3840(g)' to kg by ÷1000 FT their derived weight providing rounding is required. FT 'their whole number of boxes'. FT 96 ÷ 'their 25'providing rounding is required. FT 'their derived whole number of boxes'. 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 weakness in organisation of material but using acceptable mathematical form, with few, if any, errors in spelling, punctuation and grammar. QWC0 Evident weakness in organisation of material, and errors in use of mathematical form, spelling, punctuation and grammar.
8. (a) 1, 5, 15, 17, 20, 40 (median=) 16 (b) 8 14 17	M1 A1 B3 5	Correctly order the six data values without omissions. B1 for range of 9 B1 for total score 39
9. 80×75×60 or 0.8×0.75×0.6 =360000 or =0.36 cm^3 m^3	M1 A1 U1 3	Or equivalent in metres ISW if 360000 cm^3 seen.
10. (a) b = 6 (b) (x =) 8 (cm) (y=) 8 – 6.3 (y =) 1.7(cm) CAO	B2 B1 M1 A1 5	B1 for a = 11 or a + 5 = 16 or equivalent. If no marks then SC1 for b = 'their a'−5 FT 'their derived x' Alternative: (40 – 5 × 6.3) ÷ 5 M1 (y =) 1.7(cm) A1 (x =) 8 (cm) B1 FT 'their derived y'

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2016 January UNIT 3 (calculator allowed) Foundation Tier Mark Scheme	Mark	Comments (page 3)
11. Use Overlay. Correct readings from bar chart. Milk-shake 15, Water 30, Juice 35, No Drink 10 3 or 2 angles correct and correctly labelled.	B1 B2 3	Seen and used or implied as used. Water 120(^{0}), Juice 140(^{0}), No Drink 40(^{0}). All ±2 ^{0}. OR B1 2 or 3 angles correct, labels not fully correct B1 1 angle correct and correctly labelled
12.(a) Comment on the change of steepness, slope or gradient of the line. (b) 6 (miles) (c) 10:30 (d) 10 (mins) (e) 10 ÷ 1/3 or 10×3 or 10 (miles) in 20 (mins) indicated 30 (mph)	B1 B1 B1 B1 M1 A1 6	
13. (a) Correct frequencies (b) (3 + 4 + 6=) 13 (c) 21 ≤ BMI < 23 (d) Correct frequency diagram (e) (Class B are likely to be older) with an appropriate explanation referring to the frequency diagrams.	B2 B1 B1 B2 E1 7	B1 if one error. One misplaced data value results in two incorrect frequencies. FT frequencies in table throughout question. Or any unambiguous indication. B1 if translated OR for at least 3 bars correct OR if height correct but slight gaps between the bars. **If frequency polygon drawn (with or without frequency diagram), or indication of points at correct heights only, B0 in all cases** A correct reference to the diagrams **must** be made. e.g. The heights of the bars in class B are greater for higher BMI groups, suggesting that more boys in class B have higher BMI.
14. (Ratio =) 1:2 or equivalent (1 part =) 45 ÷ 3 William £15 Rushan £30	B1 M1 A1 3	Allow 2:1 FT the sum of their ratio. CAO William 30 Rushan 15 gets B1 M1 A0
15. (1/12× 510) 42·5(0) OR (0·016 × 510) 8·16 510 – 42.5(0) OR 510 + 8.16 = (£)467·5(0) OR = (£)518·16 1·016 × 467·5(0) OR (11/12) × 518·16 (Cost of season ticket =) (£)474·98 (Saving =) (£)35·02	B1 M1 A1 M1 A1 B1 6	 (11/12)×510 OR 1.016 ×510 gains B1M1. FT 'their 467.50' OR 'their 518·16'. FT provided at least one M1 marks awarded.
16. 8y – 3 = 4y + 16 8y − 4y = 16 + 3 y = 4¾ OR 4·75 OR 19/4	B1 B1 B1 3	FT until 2nd error. Mark final answer.
17. Squaring at least two lengths $8^2 + 15^2$ (= 64 + 225 = 289) 17^2 = 289 or $\sqrt{289}$ is 17 (and conclusion)	B1 M1 A1 3	 Accept equivalent methods.
18. ½×π×7.8 +7.8 =20·(05….) (Length of side of square = 20 divided by 4=) 5(·01….cm) Area of square =25·(1…..) (cm^2)	M1 A1 B1 B1 4	Complete calculation of the perimeter of the semicircle. FT their perimeter from in a calculation involving π. CAO

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Surname	Centre Number	Candidate Number
Other Names		0

GCSE

4353/01

S15-4353-01

MATHEMATICS (UNITISED SCHEME)

UNIT 3: Calculator-Allowed Mathematics

FOUNDATION TIER

A.M. MONDAY, 8 June 2015

1 hour 30 minutes

ADDITIONAL MATERIALS

A calculator will be required for this paper.

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 or use the π button on your calculator.

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 **8**.

For Examiner's use only		
Question	**Maximum Mark**	**Mark Awarded**
1.	**8**	
2.	**2**	
3.	**2**	
4.	**2**	
5.	**2**	
6.	**9**	
7.	**4**	
8.	**7**	
9.	**5**	
10.	**5**	
11.	**4**	
12.	**3**	
13.	**6**	
14.	**3**	
15.	**4**	
16.	**3**	
17.	**7**	
18.	**4**	
Total	**80**	

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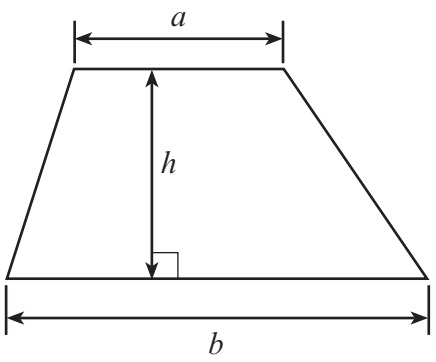
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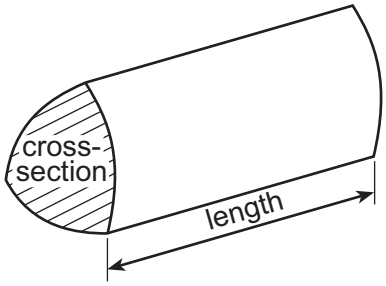
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Formula List

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



Volume of prism = area of cross-section × length



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1. *(a)* Abby buys some items from a chemist to take on her summer holiday.
Complete her bill. [4]

Items	Cost
3 bottles of suntan lotion at £6.25 per bottle	£
2 packets of travel-sickness tablets at 89p per packet	£
6 items of cosmetics at £4 for 3 items	£
Total	£

(b) Abby collects points from the chemist's reward scheme.
She receives 100 points for every complete £5 that she spends.
How many points did she receive? [2]

.....

.....

.....

(c) Abby paid with two twenty-pound notes.
How much change should she receive? [2]

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2. *(a)* Write 31 562 correct to the nearest thousand. [1]

.....

(b) Write 62·839 correct to 1 decimal place. [1]

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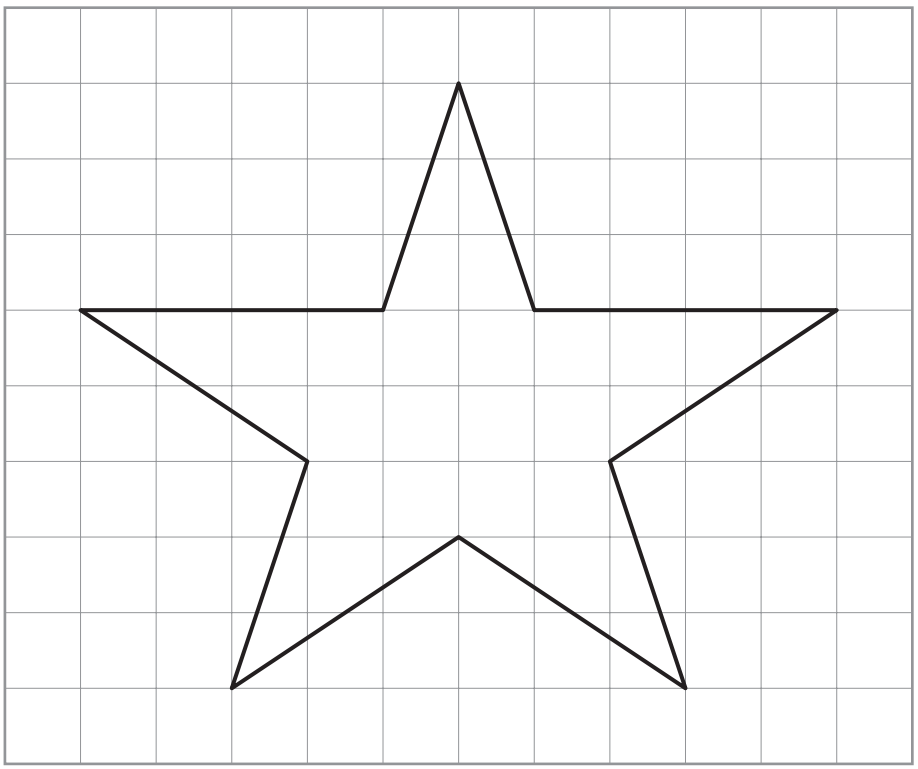
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3. The star shape below is to be used to make a poster for a talent competition.
The star has been drawn on a grid.
Each square on the grid has an area of 1 cm^2.



Find the approximate area of the star. [2]

.....

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4. A piece of wood is 32 cm long.
Alan wants to drill two holes in the wood at points *A* and *B*, where *AB* = 18 cm.
The distances *PA* and *QB* must be equal.

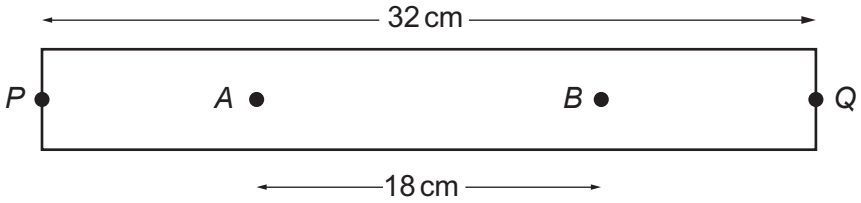


Diagram not drawn to scale

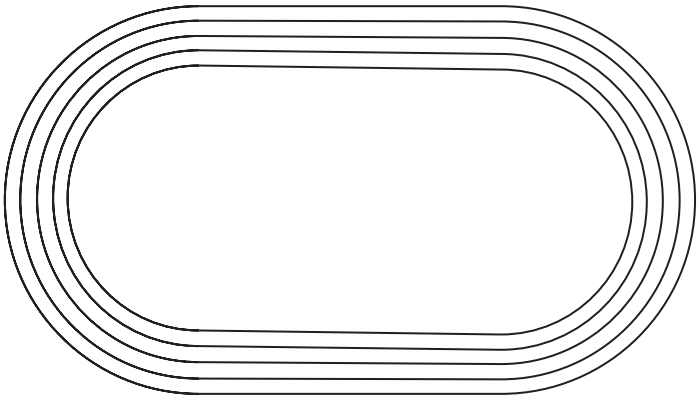
Calculate the length *PA*. [2]

.....

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5.



A single lap of an athletics track is 400 metres.
How many laps will a person run in a two kilometre race? [2]

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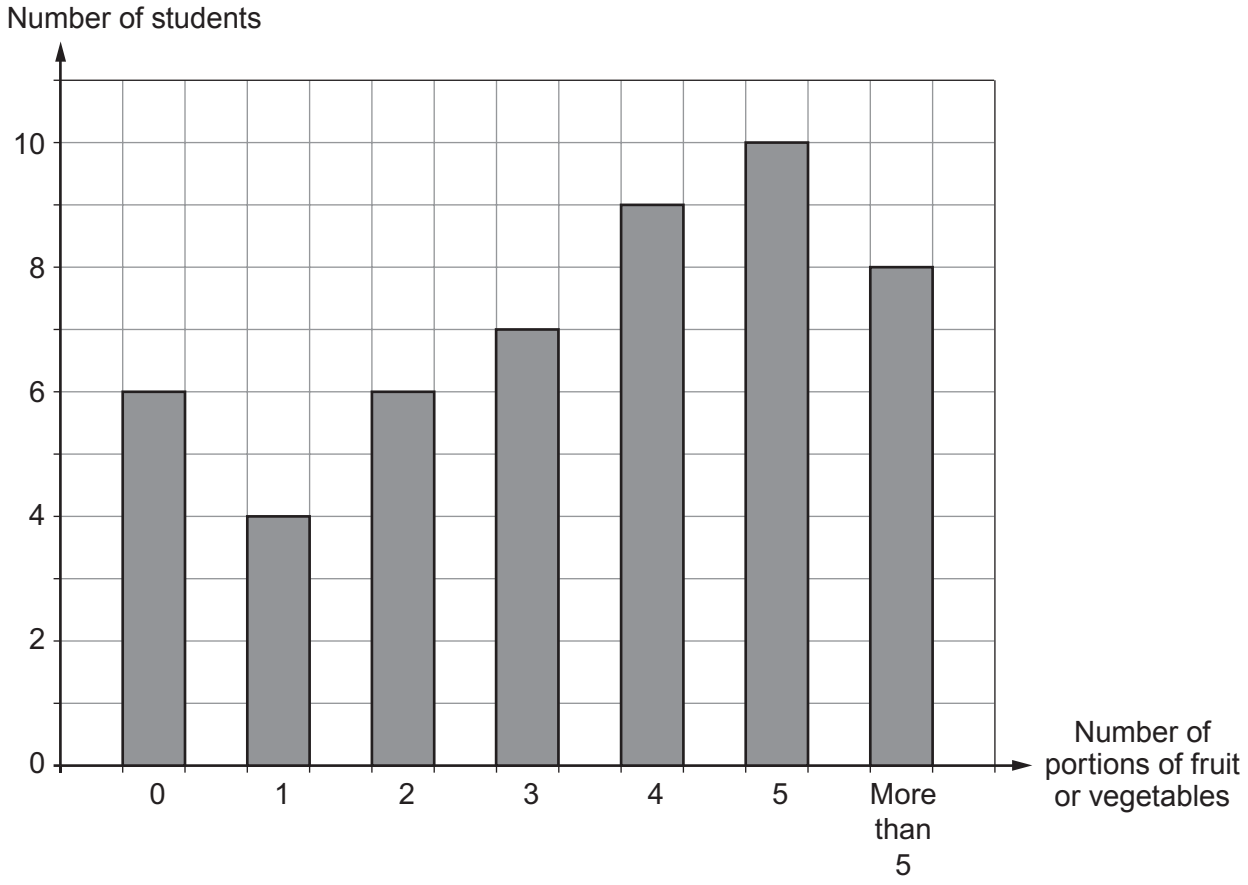
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6. "Most young people eat five or more pieces of fruit or vegetables per day."

Jared carried out a survey at his school to investigate this statement.
On Tuesday, he asked students at his school for the number of portions of fruit or vegetables that they had eaten on Monday.
His results are shown in the graph below.



(a) How many students said that they did not eat any portions of fruit or vegetables? [1]

.....

(b) How many students took part in the survey? [2]

.....

(c) What fraction of these students said that they had eaten five portions or more than five portions of fruit or vegetables? [2]

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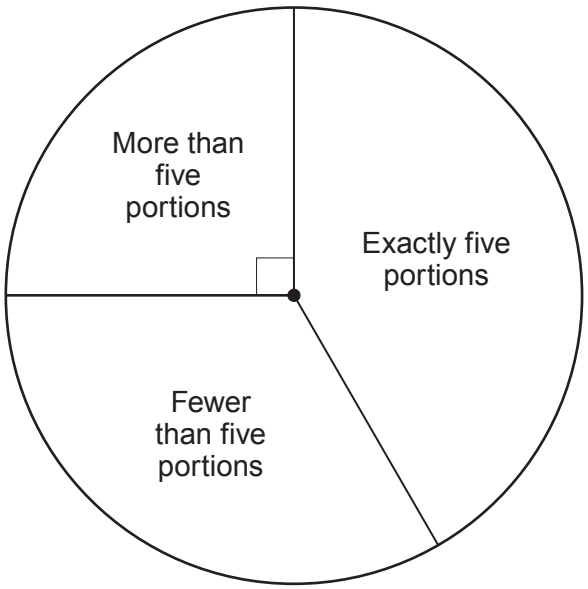
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On Tuesday, Jared also went to the local sports centre and asked 36 young members the same question.
He displayed his results in a pie chart.



(d) What fraction of these members said they ate **fewer than** five portions of fruit or vegetables? [1]

.....

(e) How many of these members said they ate five portions or more than five portions of fruit or vegetables? [2]

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(f) Based upon the results in the graph and the pie chart, what conclusion could Jared make about the statement that he is investigating? [1]

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7. The perimeter of the triangle is 30 cm.
The perimeter of the rectangle is also 30 cm.

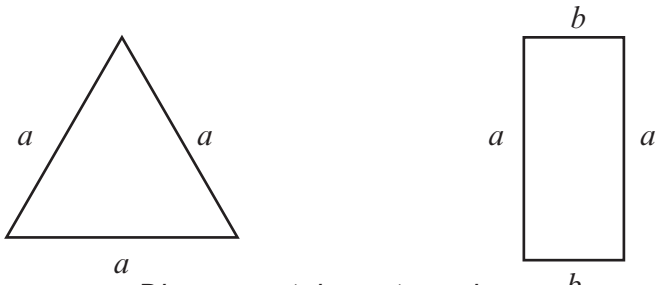


Diagram not drawn to scale

Use this information to find the area of the square below. [4]

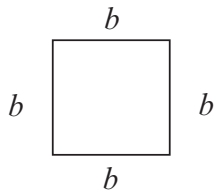


Diagram not drawn to scale

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Area of the square = ... cm^2

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

Ali pays £15 per month for his mobile phone contract.

His contract has a monthly allowance of 120 minutes of call time and 400 standard text messages.

If Ali goes over his allowance he must pay extra charges as well as his £15 contract price.

EXTRA CHARGES

Extra call time
35 pence per minute

Extra standard text messages
12 pence per message

Last month Ali used 150 minutes of call time and sent 490 standard text messages.

Ali is offered a new contract with **double** the allowance of minutes and **double** the allowance of standard text messages for **double** the original contract price.

Using only last month's information, decide whether Ali should accept the new contract.

Give reasons for your answer, showing all your calculations. [7]

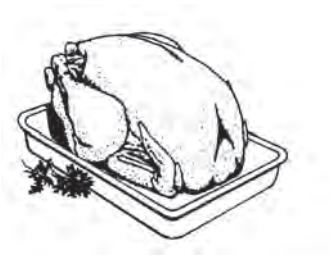
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9. Gordon is planning to cook a large turkey for a dinner party.



He has the following information.

- The turkey weighs 6·75 kg.
- To calculate the cooking time for a turkey of this size, allow 20 minutes for every 450 grams and add on an extra 25 minutes to finish.

Calculate the cooking time for this turkey. Give your answer in hours and minutes. [5]

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10. *(a)* Solve the equation $2x - 5 = 11$. [2]

(b) Given that $A = 4B + 6C$, calculate the value of C when $A = 42$ and $B = 3$. [3]

11. Ivan, Dylan and Joe live in the same building.
The front of the building needs painting and the three men share the cost between them.

Ivan pays $\frac{1}{4}$ of the cost and Dylan pays $\frac{1}{8}$ of the cost.

Joe pays £100 which is the rest of the cost.

What is the total cost of painting the front of the building? [4]

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12. *(a)* The diagram shows a quadrilateral.

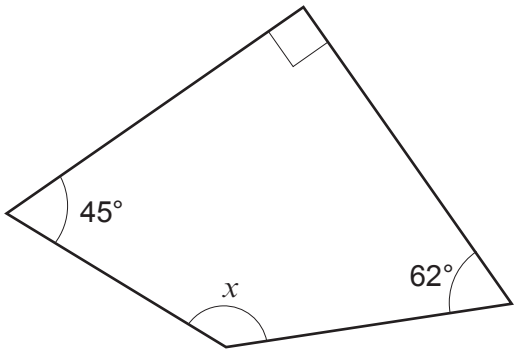


Diagram not drawn to scale

Find the size of angle x. [2]

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(b) In the pentagon below, the sides have been extended to create angles a, b, c, d and e.

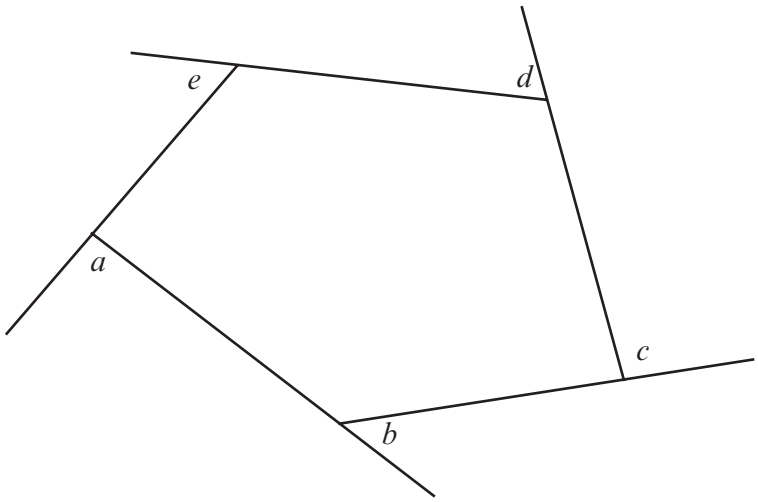


Diagram not drawn to scale

Write down the value of $a + b + c + d + e$. [1]

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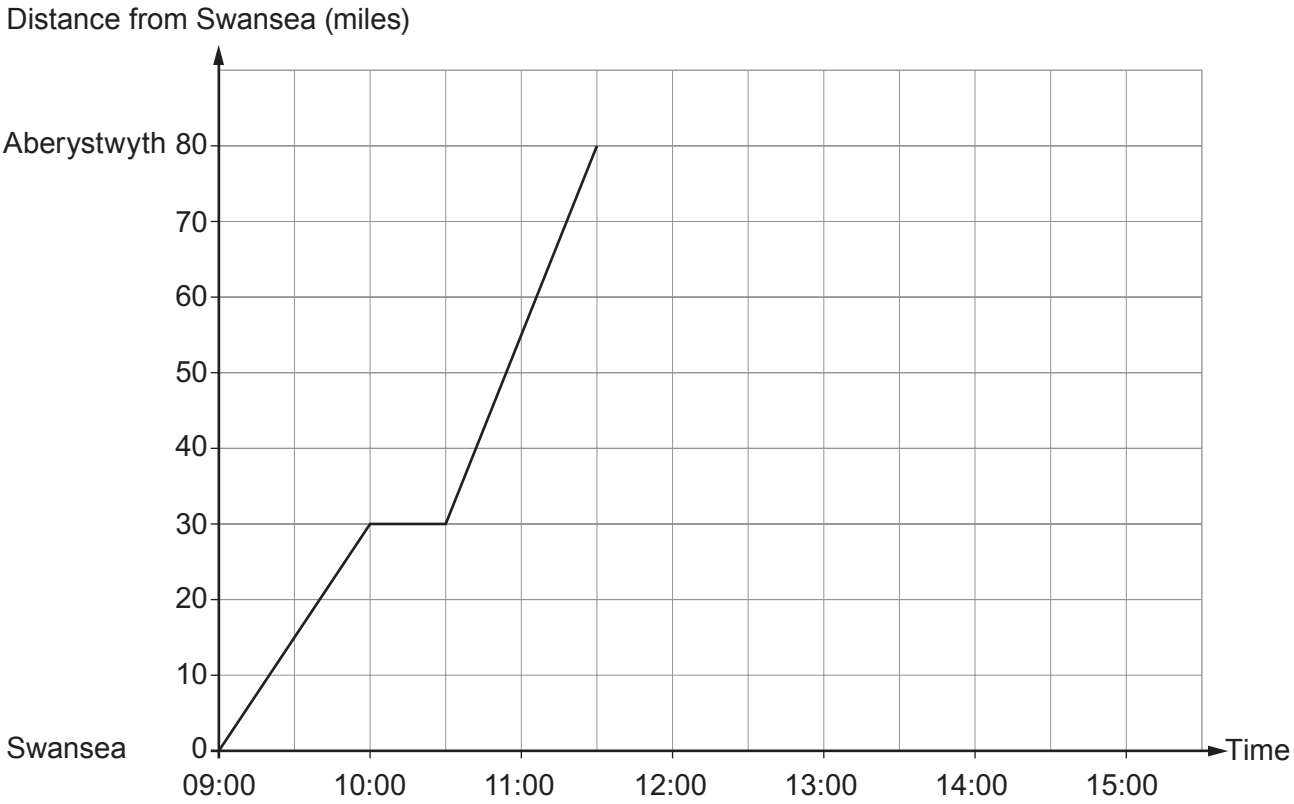
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13. A post office driver travels from Swansea to Aberystwyth to deliver a parcel.
His journey is shown on the travel graph below.



(a) The driver took a break in his journey at a service station.
For how long did he stop at the service station? [1]

.....

(b) How far from Aberystwyth was the service station? [1]

.....

(c) The driver stayed in Aberystwyth for one and a half hours. He then drove back to Swansea at a constant speed, arriving back at Swansea at 15:00.
Complete the graph to show this information. [2]

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(d) What was the driver's average speed on his return journey? [2]

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14. Calculate the area of the triangle.
State the units of your answer. [3]

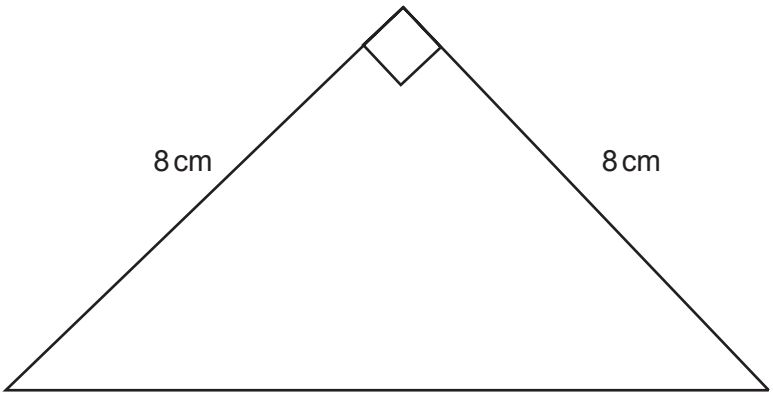


Diagram not drawn to scale

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15. A packet contains cake mixture weighing 385 g.
The mixture is made up of only flour, sugar and raisins. The weight of the flour is twice the weight of the sugar, and the weight of the sugar is twice the weight of the raisins.
Calculate the weight of flour, sugar and raisins in the packet. [4]

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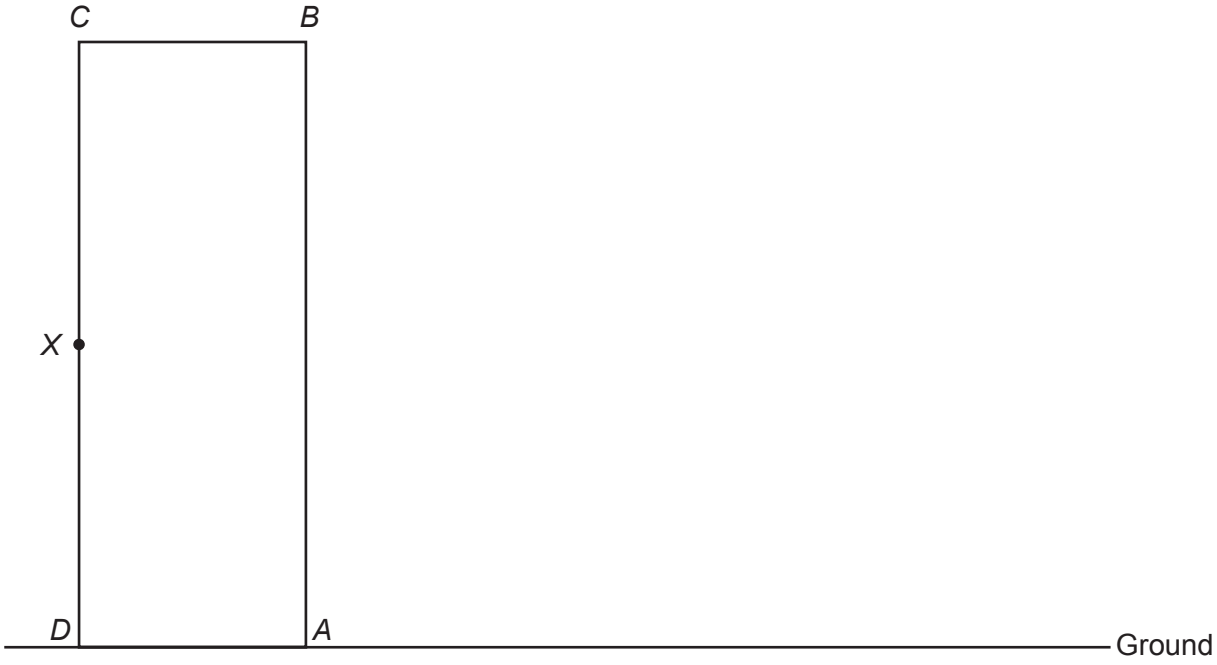
Flour: ..... g Sugar: ..... g Raisins: ..... g

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16. *ABCD* represents a rectangular side of a box.
X is the midpoint of the edge *CD*.
The box is rotated clockwise about point *A* until *B* comes into contact with the ground.
Accurately draw the new position of *ABCD* and the locus of the point *X* as the box rotates about *A*. [3]



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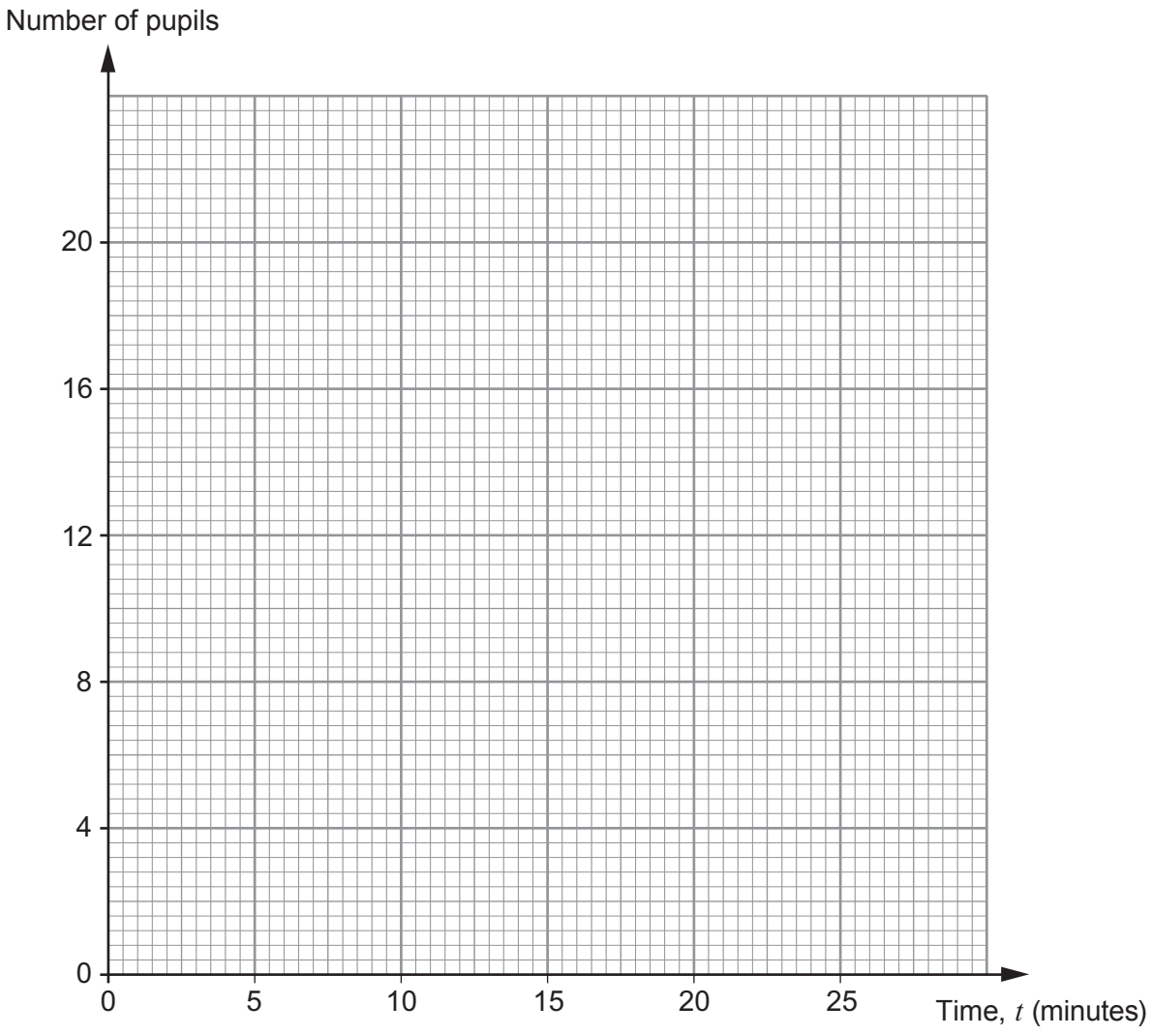
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17. A group of pupils was timed in completing a maths test. The results are shown in the grouped frequency table below.

Time, t (minutes)	Number of pupils
$0 < t \leqslant 5$	19
$5 < t \leqslant 10$	17
$10 < t \leqslant 15$	10
$15 < t \leqslant 20$	5
$20 < t \leqslant 25$	2

(a) Draw a grouped frequency diagram to illustrate these results. [2]



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(b) Calculate an estimate of the mean time taken to complete the test. [4]

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(c) Write down the modal group. [1]

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18.

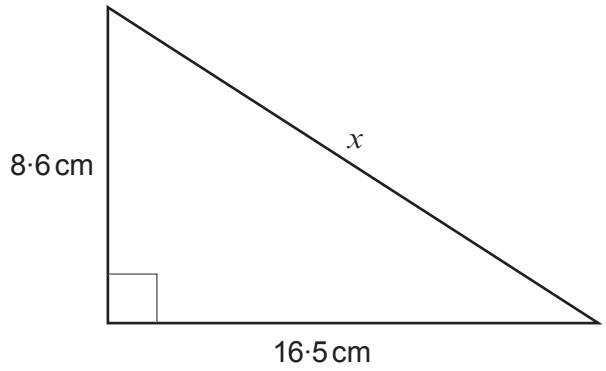


Diagram not drawn to scale

(a) Gwen is asked to calculate the length x in the triangle above.
Her answer is 14·1 cm.
Without calculating x, explain why Gwen's answer cannot be correct. [1]

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(b) Calculate the length x. [3]

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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 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 3 - Higher Tier	24

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2015 June UNIT 3 (calculatorallowed) Foundation Tier	✓	Mark	Comments
Ribbon Marked 1(a) marked with 1(b) and 1(c) 1. (a) (£) 18·75 (£) 1·78 (£) 8(·00) (Total =) (£) 28·53	 ✓ ✓ ✓ ✓	 B1 B1 B1 B1 4	 FT 'their three costs'.
1 (b) (number of complete £5 spent=) 5 (5×100=) 500		B1 B1 2	FT 'their total' for both B1s.
1 (c) 40 – (£)28.53 (£) 11·47		M1 A1 2	FT 'their' total for M1 A1
2(a) 32000		B1 1	
2(b) 62.8		B1 1	
3. Evidence of counting squares 24-28 inclusive (cm^2)		M1 A1 2	
4. (32−18)÷2 7(cm)		M1 A1 2	Or equivalent.
5. Use of 1000m = 1km (2000÷400=) 5 (laps)		B1 B1 2	
Ribbon Marked 6(a) 6(b), 6(c), 6(d), 6(e) and 6(f) 6 (a) 6 (students ate no fruit or veg)		 B1 1	
6 (b) 6+4+6+7+9+10+8 =50		M1 A1 2	An attempt to add at least six vertical heights of bars. FT 'their 6' or allow one other slip in reading from scale CAO
6 (c) 18/50 or equivalent		B2 2	Or equivalent. FT 'their 50' B1 for 18 as a numerator (but denominator not 'their 50') or B1 for an attempt to add 10/'their 50' + 8/'their 50'.
6 (d) 120 /360 or equivalent		B1 1	Allow 120°±2. Accept equivalent fraction. ISW.
6 (e) 36 – 1/3 of 36 24		M1 A1 2	FT 'their fraction' in (d) for M1 A1 24/36 M1 A0
6 (f) A correct comment with reference to both sets of data or that makes specific reference to just one.		E1 1	"Two sets of results give different conclusions" "The school results shows the statement wrong but the sports centre results show the statement correct".

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2015 June UNIT 3 (calculatorallowed) Foundation Tier	✓	Mark	Comments
7. $a = 10$ $b = 5$ b×b (area =) 25 (cm^2)	✓ ✓ ✓ ✓	B1 B1 M1 A1 4	 FT 15 – 'their *a'* FT for M1 and A1,'their b×b' provided at least one B1 awarded.
8. Extras used (150 − 120 =) 30 (mins) or (490 − 400 =) 90 (texts) <u>Cost of Bill</u> Ext mins×(£)0·35 + Ext texts×(£)0·12+(£)15(·00) Total cost = £36·30 <u>New contract</u> (240 mins 800 texts cost) £30 He should accept the new contract. Look for • Spelling in at least one statement or sentence • Clarity of text explanations • Consistent use of £ and p • Correct use of mathematical symbols, QWC2: Candidates will be expected to • Present work clearly, with words explaining process and 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.	 ✓ ✓ ✓ ✓ ✓ ✓ ✓	 B1 M1 A1 B1 E1 QWC2 7	 For either "extra" amount used FT 'their' extra mins and texts but not from 150 mins or 490 texts. CAO FT 'their £36.30'. The bill would have been cheaper by £6.30 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 weakness in organisation of material but using acceptable mathematical form, with few, if any, errors in spelling, punctuation and grammar. QWC0 Evident weakness in organisation of material, and errors in use of mathematical form, spelling, punctuation and grammar.
9. Use of 1000g=1kg to convert units 6750 ÷450 or 6.75÷0·45(0) (=15) or equivalent 15 × 20 + 25 (=325) 325 (mins) 5 hours 25 minutes	✓ ✓ ✓ ✓ ✓	B1 M1 m1 A1 B1 5	 FT error in conversion if consistent units FT 'their 15' CAO For correct conversion to hours and minutes. FT 'their 325'provided equivalent difficulty

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2015 June UNIT 3 (calculatorallowed) Foundation Tier	✓	Mark	Comments
10.(a) $2x = 16$ $x = 8$		B1 B1 2	FT one error Accept embedded answer
10.(b) $42 = 4\times3 + 6C$ $6C = 30$ $C = 5$		B1 B1 B1 3	Correct substitution FT until second error. Accept embedded answer
11. 1 /4+1/8 = 3/8 1− (1/4 + 1/8) = 5/8 5/8 is (£)100 so 1/8 is (£) 20 (Total amount=)(£)160	✓ ✓ ✓ ✓	B1 B1 M1 A1 4	Accept decimal equivalent. B2 for 5/8. FT 'their 3/8' but not 2/12. Alternative 100÷5×8 Look for trial and improvement methods. Award M1 for at least two trials that demonstrate some improvement.
12 (a) 360 – (45 + 90 + 62) 163(°)		M1 A1 2	
12 (b) 360(°)		B1 1	Accept reference to the sum equals 360(°)
13 (a) 30 (minutes)		B1 1	Accept ½ hour or half an hour.
13 (b) 50 (miles)		B1 1	
Ribbon marked 13 (c) and 13 (d) 13 (c)horizontal line from (11:30, 80) to (13:00 ,80) Line with negative gradient to (15:00 , 0)		B1 B1 2	
13 (d) 80 ÷ 2 40(mph)		M1 A1 2	FT 'their line' from part c if line with negative gradient.
14. ½×8×8 = 32 cm^2		M1 A1 U1 3	
15. (Ratio =) 4:2:1 or equivalent (1 part =) 385 ÷ (4+2+1) Flour 220(g) Sugar 110(g) Raisins 55(g)	✓ ✓ ✓ ✓	B1 M1 A2 4	A1 for two correct amounts OR for all three correct but incorrectly designated. *Alternative method using trial and improvement:* *B4 for correct amounts (B3 for 2 correct).* *B2 for two trials using correct proportions working towards the correct amounts.* *B1 for one trial using correct proportions.* *SC1 for Flour 154, Sugar 154, Raisins 77 from use of the ratio (2:2:1)*
16**. Use overlay.** Correct size and position of ABCD. Arc drawn of radius AX centre A. Arc ending on 'their new CD'		B1 M1 A1 3	Allow ± 2mm on the length of the sides and ± 2° on the 90° angles.

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2015 June UNIT 3 (calculatorallowed) Foundation Tier	✓	Mark	Comments
17(a) **Use overlay** Correct grouped frequency diagram.		B2 2	B1 for any 3 correct heights of bars. B0 if a frequency polygon has been drawn, with or without a frequency diagram. Penalise -1 for any other ambiguous lines.
17.(b) **to be viewed with table** Sight of the mid-points 2·5, 7·5, 12·5, 17·5, 22·5 $2·5\times19 + 7·5\times17 + 12·5\times10 + 17·5\times5 + 22·5\times2$ (47·5 +127·5 + 125 + 87·5 + 45 = 432·5) $432·5 \div 53$ = 8·1(60…) or 8· 2 (minutes) or 8 min 9.6 sec	✓ ✓ ✓ ✓	B1 M1 m1 A1 4	 FT their mid-points from within or at the bounds of the groups. FT 'their 432.5' Accept 8 (minutes) from correct working
17.(c) $0 < t \leq 5$ (minutes)		B1 1	Allow any unambiguous reference to the group eg 0 − 5.
18.(a) Valid explanation eg.'x is the hypotenuse so it should be longer than 16.5' or 'x should be the longest side'		E1 1	'x is the hypotenuse' is not sufficient.
18.(b) $(x^2 =) 8·6^2 + 16·5^2$ $x^2 = 346·21$ OR $(x =) \sqrt{346·21}$ $(x =)18·6(067…$cm)		M1 A1 A1 3	 Accept 19 from correct working
TOTAL MARKS		80	

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UNIT 3 - HIGHER TIER

Unitised Unit 3 – June 2015 Higher Tier	✓		Comments
1.(a) 5(2x – 3)		B1	
1.(b) −31		B2	B1 for −6 + … OR … −25 OR B1 for 1½×−4 – 5^2.
1.(c) 8x – 2x = −5 + 77 6x = 72 x = 12		B1 B1 B1	FT until 2nd error.
2. ½×8×8 = 32 cm^2		M1 A1 U1	
3. (a) 'His speed increases' or 'He accelerates'. (b) **To be viewed with graph. Use Overlay.** 1st section: 6 miles travelled in 1 hour. Straight line drawn to (11:45, 14). Horizontal line of 1 square drawn from end of 1st line. 2nd section: Straight line - 6 miles travelled in 1 hour.		E1 B1 B1 B1	E0 for a description of the journey e.g. he travels 3 miles in 30 min, then 5 miles in the next 30 min. If no marks awarded, allow SC1 for journey finishing at (1:00, 20) provided an attempt made at all 3 parts of the journey. Ignore any additional lines.
3.(c) 20 ÷ 3 OR 20 ÷ 180 = 6⅔ (mph) or equivalent = 0·1(111…) (miles/min)		M1 A1	 Accept 6·66, 6·67 and 6·7 but not 6·6. Allow M1 for 20 ÷ 2·75 leading to A1 for 7·2727… Allow M1 for 20 ÷ 165 leading to A1 for 0·1212…
4. 3·40		B2	B1 for 3·3(9636…) or 3·4
5. Sight of $\frac{8}{15}$ or equivalent (fraction remaining =) $1 - (\frac{1}{3} + \frac{1}{5})$ or equivalent) (fraction remaining =) $\frac{7}{15}$ or equivalent		B1 M1 A1	 CAO. *Alternative method:* *B1 for the correct calculation of the addition of 2 fractional amounts.* *M1 for the subtraction of this total from the amount.* *A1 for a correct fraction.*
6. Use Overlay. Correct size and position of ABCD. Arc drawn of radius AX, centre A. Arc ending on 'their new CD'		 B1 M1 A1	 Allow ±2mm on the length of the sides and ±2º on the 90º angles.
7. (Ratio =) 4:2:1 or equivalent (1 part =) 385 ÷ (4+2+1) Flour 220(g) Sugar 110(g) Raisins 55(g)	✓ ✓ ✓ ✓	B1 M1 A2	 A1 for two correct amounts OR all 3 correct but incorrectly designated. *Alternative method using trial and improvement:* *B4 for correct amounts (B3 for 2 correct).* *B2 for two trials using correct proportions working towards the correct amounts.* *B1 for one trial using correct proportions.* *SC1 for Flour 154, Sugar 154, Raisins 77 from use of the ratio (2:2:1)*

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Unitised Unit 3 – June 2015 Higher Tier	✓		**Comments**
8. (Sale price of standard box =) 2.50 – (0·18×2.50) OR 0·82×2.50	✓	M1	
(= £) 2.05	✓	A1	
Perform calculations that allow comparison.			
e.g. Standard box Large box			
205÷750 280÷1000	✓	M1	FT 'their £2.05'including £2.50 used.
= 0.273…(p per gram) = 0.28 (p per gram)	✓	A1	*(Or 365.85g/£ and 357.14g/£)*
			Alternative method: Price of 1kg worth of 750g box or vice versa
			M1 for 2.05 × 4/3 OR 2.80 × ¾
			A1 for (£)2.73… OR (£)2.10
Statement implying that the standard box is better value.	✓	A1	FT *their* values provided M1 awarded.
QWC: Look for • correct units used i.e. kg, g, £, p • spelling in at least 1 statement/sentence • clarity of text explanations QWC2: Candidates will be expected to • present work clearly, with words or quantities shown for clarity of process or steps AND • make few if any mistakes in mathematical form, spelling, punctuation and grammar in their answer QWC1: Candidates will be expected to • present work clearly, with words or quantities shown for clarity of process or steps OR • make few if any mistakes in mathematical form, spelling, punctuation and grammar in their answer	✓ ✓	QWC 2	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.
9. (a) **Use Overlay.** Correct grouped frequency diagram.		B2	B1 for any 3 correct heights of bars. B0 if a frequency polygon has been drawn, with or without a frequency diagram. Penalise −1 for any other ambiguous lines.
9. (b) **To be viewed with table.** Sight of the mid-points 2·5, 7·5, 12·5, 17·5, 22·5	✓	B1	
2·5×19 + 7·5×17 + 12·5×10 + 17·5×5 + 22·5×2 (47·5 + 127·5 + 125 + 87·5 + 45 = 432·5)	✓	M1	FT their mid-points from within or at the bounds of the groups.
432·5 ÷ 53	✓	m1	
= 8·1(60…) or 8· 2 (minutes) or 8 min 9·6 sec	✓	A1	FT 'their 432·5' Accept 8 (minutes) from correct working.
9. (c) $0 < t \leq 5$ (minutes)		B1	Allow e.g. 0 – 5.
10. (a) Valid explanation e.g. 'x is the hypotenuse so it should be longer than 16·5' or 'x should be the longest side'.		E1	'x is the hypotenuse' is not sufficient.
10. (b) $(x^2 =) 8{\cdot}6^2 + 16{\cdot}5^2$		M1	
$x^2 = 346{\cdot}21$ OR $(x =) \sqrt{346{\cdot}21}$		A1	
$(x =) 18{\cdot}6(067\ldots$ cm)		A1	Accept 19 from correct working.
11. (x + 8)(x + 3)		B2	B1 for (x…8)(x…3)
x= −8 AND x = −3		B1	Strict FT their brackets provided previous B1 awarded. Final B0 for solutions obtained using the formula.
12. $3{\cdot}05 \times 10^6$		B3	B2 for $3{\cdot}045 \times 10^6$ OR $3{\cdot}04 \times 10^6$ OR 3 050 000 or equivalent. B1 for 3 045 000 or equivalent. If no marks awarded, SC1 for $1{\cdot}73 \times 10^3$.
13. (length of block =) 40 500/(15×15)	✓	M1	
= 180(cm)	✓	A1	
(Volume of hole =) 25 × 180	✓	M1	FT 'their 180'.
= 4500(cm^3)	✓	A1	
(Mass of block remaining =) 2·7×(40500−4500)	✓	M1	FT 'their 4500' provided it is a volume.
= 97 200 (g) or equivalent	✓	A1	Mark final answer. Accept rounded answers provided previous M1 awarded *Alternative method:* *B1 for (Mass of whole block =) 40 500×2·7 (109 350(g))* *M1 for (length of block =) 40 500/(15×15)* *A1 for 180 (cm)* *M1 for (Mass of hole =) 25 × 180 × 2·7 FT 'their 180'* *A1 for 12 150 (g)* *A1 for 97 200 (g) FT 'their 109 350'.*

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Unitised Unit 3 – June 2015 Higher Tier	✓		Comments
14.(a) (£)17·5(0)		B1	
14.(b) (19·5 to 19·75) – (15·25 to 15·5) = (£)4 to (£)4·50 inclusive		M1 A1	
15. Ribbon marked. To be viewed with graph. Use Overlay. (a) Correct calculation of at least 6 coordinates. Plotting at least 4 points correctly. Correct curve through all 7 correct points. (b) (x =) –1 and 1·5 (c) Rearranging equation to $2x^2 - x - 3 = -x + 4$ Line $y = -x + 4$ drawn Solutions of approximately −1·9 and 1·9		B2 P1 C1 B1 M1 A1 A1	B1 for correct calculation of at least 4 coordinates. FT their curve provided there are at least 2 solutions. Implied by sight of (y =) $-x + 4$. FT their curve. Solutions alone gain no marks.
16. $(AB^2 =) 10{\cdot}8^2 + 7{\cdot}4^2 - 2\times10{\cdot}8\times7{\cdot}4\times\cos96^\circ$ $AB^2 = 188.107\ldots$ OR (AB =) $\sqrt{188.107\ldots}$ (AB =) 13·7(152…m)		M1 A1 A1	
17. (x =) $\frac{27 \pm \sqrt{(-27)^2 - 4\times12\times-2}}{2\times12}$ (x =) $\frac{27 \pm \sqrt{825}}{24}$ x = −0·07 AND x = 2·32		M1 A1 A1	Allow one slip in substitution. CAO. CAO.
18. To be viewed with graph. Idea that each large block is equivalent to frequency of 20 OR each block on the y-axis is a frequency density of 4 OR 4/12 of 240 80 (trees)		M2 A1	M1 for $12 \times (x \times 5) = 240$
19. (Area of sector of circle =) $\frac{1}{12} \times \pi \times 15^2$ = 58·875 to 58·9125 (cm^2) (Length of circular arc =) $\frac{1}{12} \times 2 \times \pi \times 15$ = 7·85 to 7·855 (cm) (Area of curved surface =) 47·1 to 47·13 (cm^2) (Total surface area =) 2×58·875 + 47·1 + 2×(15×6) = 344·85 to 345 (cm^2)	✓ ✓ ✓ ✓ ✓ ✓ ✓	M1 A1 M1 A1 A1 M1 A1	30/360 could be seen instead of 1/12. (Or 75π/4). Sight of 117·75 to 117·825 implies. (Or 5π/2) (Or 15π). FT 6 × 'their 7·85'. FT provided both M1s awarded. (Or 180 + 105π/2).
20. (a), (b) To be viewed with graph. (a) Tangent drawn. Idea of increase in *y*/increase in *x*. Gradient from a reasonable tangent. (b) Split into 4 areas and attempt to sum (Area =) ½×1(26 + 2×35 + 2×33 + 2×20 + 0) = 101 (units^2)		S1 M1 A1 M1 M1 A1	Ignore signs for M1 only. About −7. Or equivalent. Award for up to 1 error in reading scale. CAO

x	−3	−2	−1	0	1	2	3
$y = 2x^2 - x - 3$	18	7	0	−3	−2	3	12

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Surname	Centre Number	Candidate Number
Other Names		0

GCSE

4353/01

W15-4353-01

MATHEMATICS (UNITISED SCHEME)

UNIT 3: Calculator-Allowed Mathematics

FOUNDATION TIER

A.M. MONDAY, 19 January 2015

1 hour 30 minutes

For Examiner's use only		
Question	**Maximum Mark**	**Mark Awarded**
1.	**8**	
2.	**2**	
3.	**2**	
4.	**2**	
5.	**5**	
6.	**6**	
7.	**4**	
8.	**6**	
9.	**6**	
10.	**2**	
11.	**6**	
12.	**2**	
13.	**3**	
14.	**5**	
15.	**2**	
16.	**6**	
17.	**3**	
18.	**3**	
19.	**4**	
20.	**3**	
Total	**80**	

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ADDITIONAL MATERIALS

A calculator will be required for this paper.

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 or use the π button on your calculator.

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.

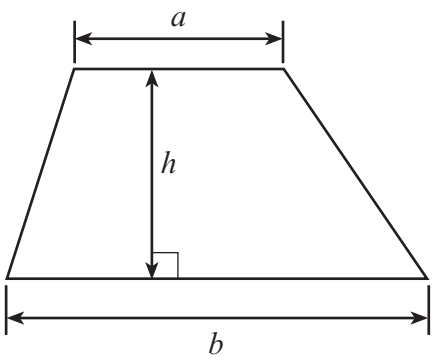
You are reminded that assessment will take into account the quality of written communication (including mathematical communication) used in your answer to question **9**.

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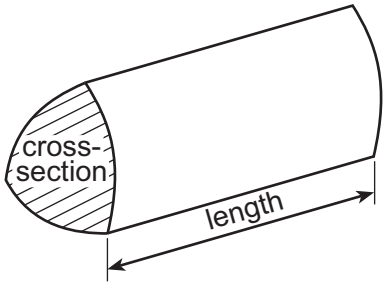
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Formula List

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



Volume of prism = area of cross-section × length



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1. On Thursday, Tom went to the cinema with some friends. The bill for the group is shown below.

(a) Complete the bill. [4]

Item	Cost
5 cinema tickets at £5.30 per ticket	£
3 drinks at 99p each	£
500 g of sweets at 72p per 100 g	£
Total	£

(b) Tom pays the bill with two twenty pound notes.
How much change should he be given? [2]

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(c) Every Tuesday, there is a special offer that gives two cinema tickets for the price of one. How much would the group have saved if they had gone to the cinema on Tuesday instead of Thursday? [2]

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2. *(a)* Write 7236 correct to the nearest 10. [1]

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(b) Write 36·921 correct to the nearest whole number. [1]

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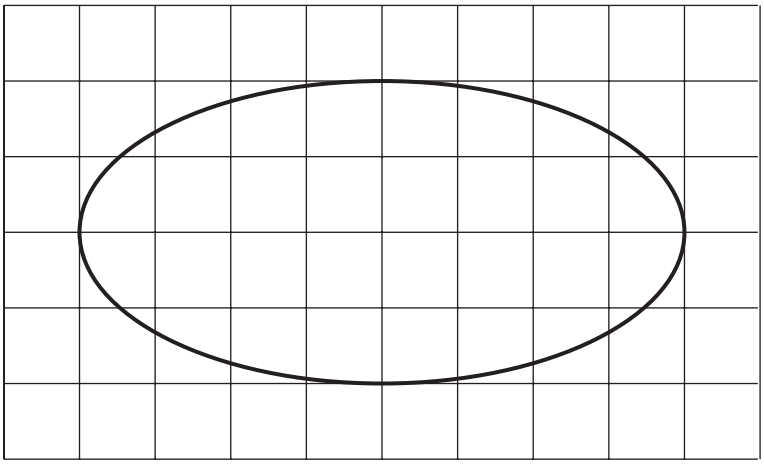
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Turn over.

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3. A shape, called an ellipse, has been drawn on a grid.
Each square on the grid has an area of 1 cm^2.



Estimate the area of the ellipse. [2]

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4. Caleb has these coins.



Manon has these coins.



Caleb gives Manon some coins so that they each have the same amount of money.

Which coins does Caleb give to Manon? [2]

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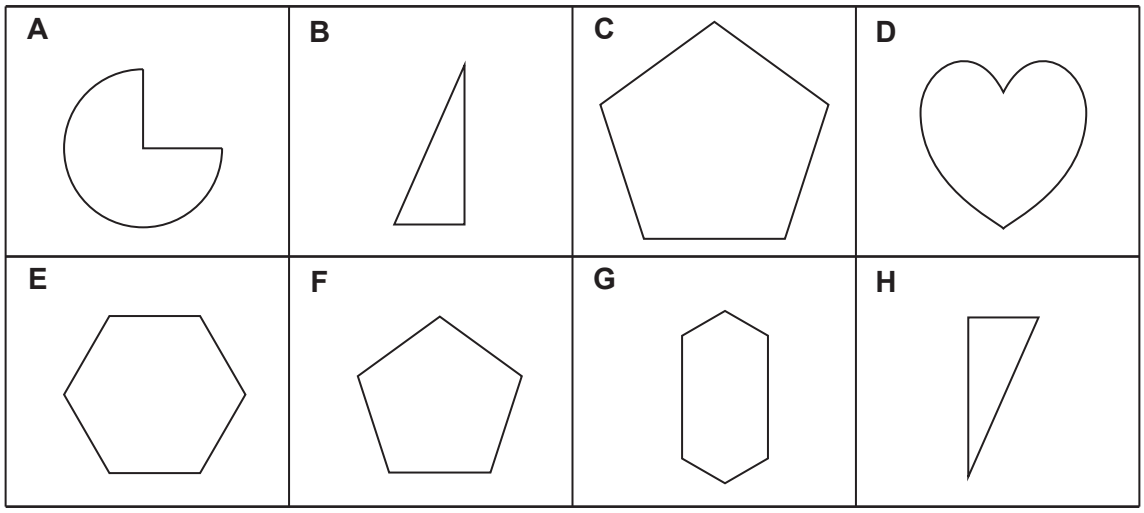
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5. The pictures show eight shapes. Some of these shapes are regular polygons, some are irregular polygons and some are not polygons.



(a) In the table below, write the letter of each shape in the correct group.
Each shape is in only one group. [3]

REGULAR POLYGON	IRREGULAR POLYGON	NOT A POLYGON

(b) From the shapes above:

(i) Write down the letters of two shapes that are congruent. [1]

Two congruent shapes are ..... and .....

(ii) Write down the letters of two shapes that are similar but not congruent. [1]

..... and ..... are similar but not congruent.

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6. *(a)* Jo drew a pictogram to show information about the drinks sold from a vending machine on a Monday afternoon.

The key for the pictogram is incomplete.

KEY  = ?

Cool Cola 

Orange Fizz 

Lemon Lush 

Jo knew that 80 drinks were sold in total that afternoon.

How many drinks of Lemon Lush were sold that afternoon? [2]

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(b) On Tuesday, Jo recorded the sales of drinks that afternoon.

Drink	Number of drinks sold
Cool Cola	24
Orange Fizz	18
Lemon Lush	7

Explain why the key that Jo used for Monday's sales of drinks would not be suitable for him to **clearly represent** Tuesday's sales of drinks in a pictogram. [1]

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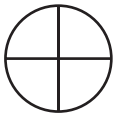
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(c) A **different symbol** is to be used to represent 4 drinks in a new key.

Use this new key to draw a pictogram to represent the drinks sold on Tuesday. [3]

New Key:  = 4 drinks

Cool Cola	
Orange Fizz	
Lemon Lush	

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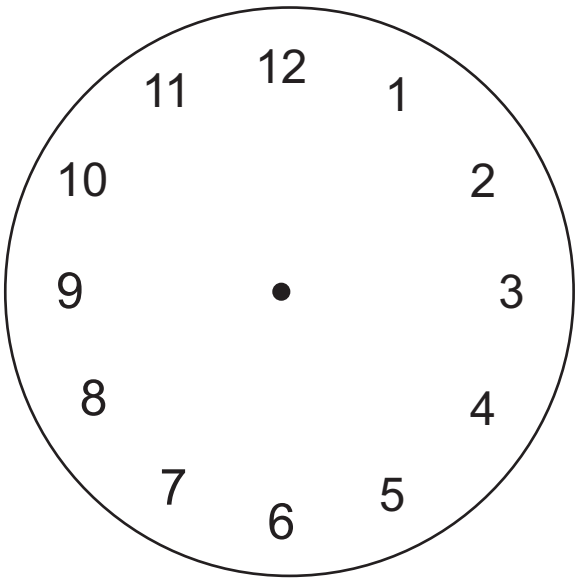
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7. Amira watched three episodes of a TV series that she had recorded.

She started watching the first episode at 16:40.

(a) Draw hands on the clock below to show the time 16:40. [1]



(b) Amira watched three episodes, each 50 minutes long.

She took a break between each episode. The breaks were of equal length.

She finished watching the third episode at 19:40.

How long was the break between each episode? [3]

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8. *(a)* The table below shows the number of smoothies sold in a school café on 5 days in a particular week.

Day	Monday	Tuesday	Wednesday	Thursday	Friday
Number of smoothies sold	54	38	65	58	80

(i) Find the median number of smoothies sold per day. [1]

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(ii) Work out the mean number of smoothies sold per day. [3]

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(iii) Work out the range of the number of smoothies sold per day. [1]

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(b) Milkshakes are also sold in the school café.
In the same week, the mean number of milkshakes sold per day was the same as the mean number of smoothies sold per day.
The range of the number of milkshakes sold per day was 4.

Explain the meaning of the difference in values for the range of the daily sales of smoothies and milkshakes. [1]

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

Mr Jones is organising a school trip, travelling by bus.

Each bus can carry 50 passengers.
There will be 240 students going on the trip.
For every 15 students, there must be one adult.

How many buses will Mr Jones need to book?

You must show all your working. [6]

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10. Find the value of $\frac{5 \cdot 2^2 - \sqrt{46}}{4}$, giving your answer correct to 1 decimal place. [2]

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11. Callum bought 80 baseball caps for £3.50 each, to sell on a market stall.

He sold $\frac{2}{5}$ of the 80 baseball caps for £5 each.

He wants to sell all the baseball caps and does not want to make a loss.

What is the least amount he should charge for each remaining cap to avoid making a loss?

You must show all your working. [6]

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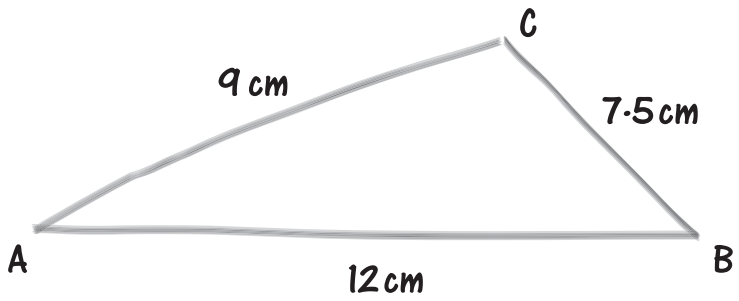
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12. The diagram below shows a freehand sketch of a triangle *ABC* that is not drawn to scale.



Use a ruler and a pair of compasses to draw an accurate diagram of triangle *ABC*.
Line *AB* is drawn accurately for you.
You must show all your construction arcs. [2]

A ——————————————————— *B*

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13. In the following table, the letters a and b represent numbers.
The total for each row is given at the side of the table.

a	$3a$	b	23
a	a	20	30

Find the value of a and the value of b. [3]

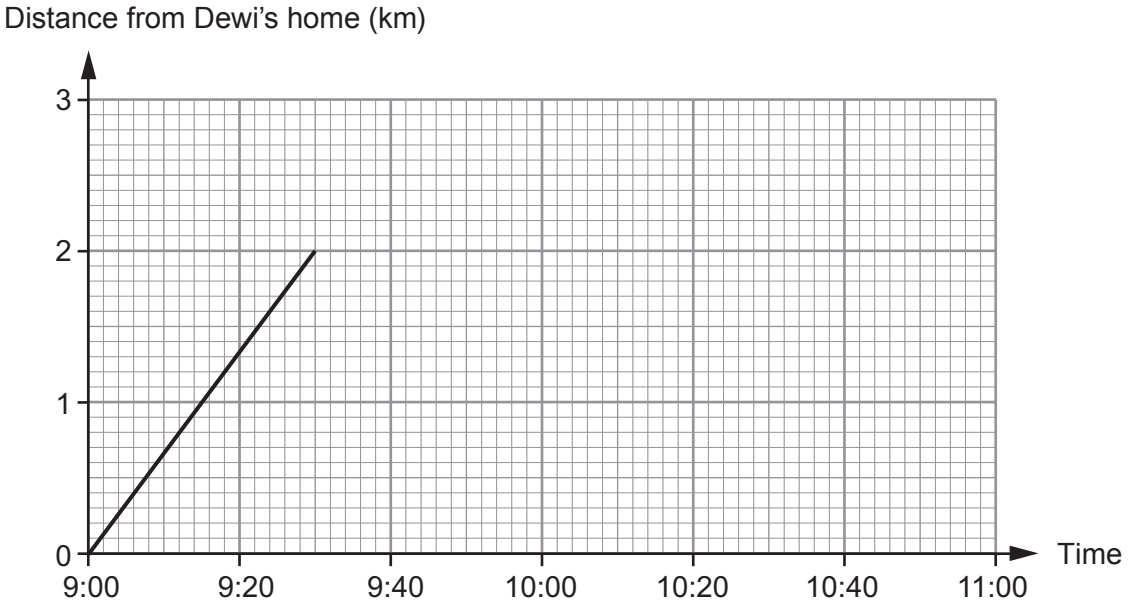
a = ... b = ...

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14. The travel graph below represents part of Dewi's journey as he walked to a swimming pool which was 3 km from his home.



The graph shows that Dewi left his home at 9:00 a.m. and walked 2 km to his friend Gareth's house.

(a) At what time did Dewi arrive at Gareth's house? [1]

.....

(b) Gareth was not ready and so Dewi had to wait for him for 50 minutes.
Draw this on the travel graph above. [1]

(c) Dewi and Gareth then walked the final kilometre at a steady speed and arrived at the swimming pool at 10:40 a.m.
Draw the final stage of Dewi's journey on the graph above and find the speed at which Dewi and Gareth walked the final kilometre. Give your answer in kilometres per hour.
[3]

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15. Share 252 kg in the ratio 5 : 1. [2]

16. *(a)* Solve the equation $3(x - 7) = 21$. [3]

(b) Solve the equation $9y - 2 = 5y + 12$. [3]

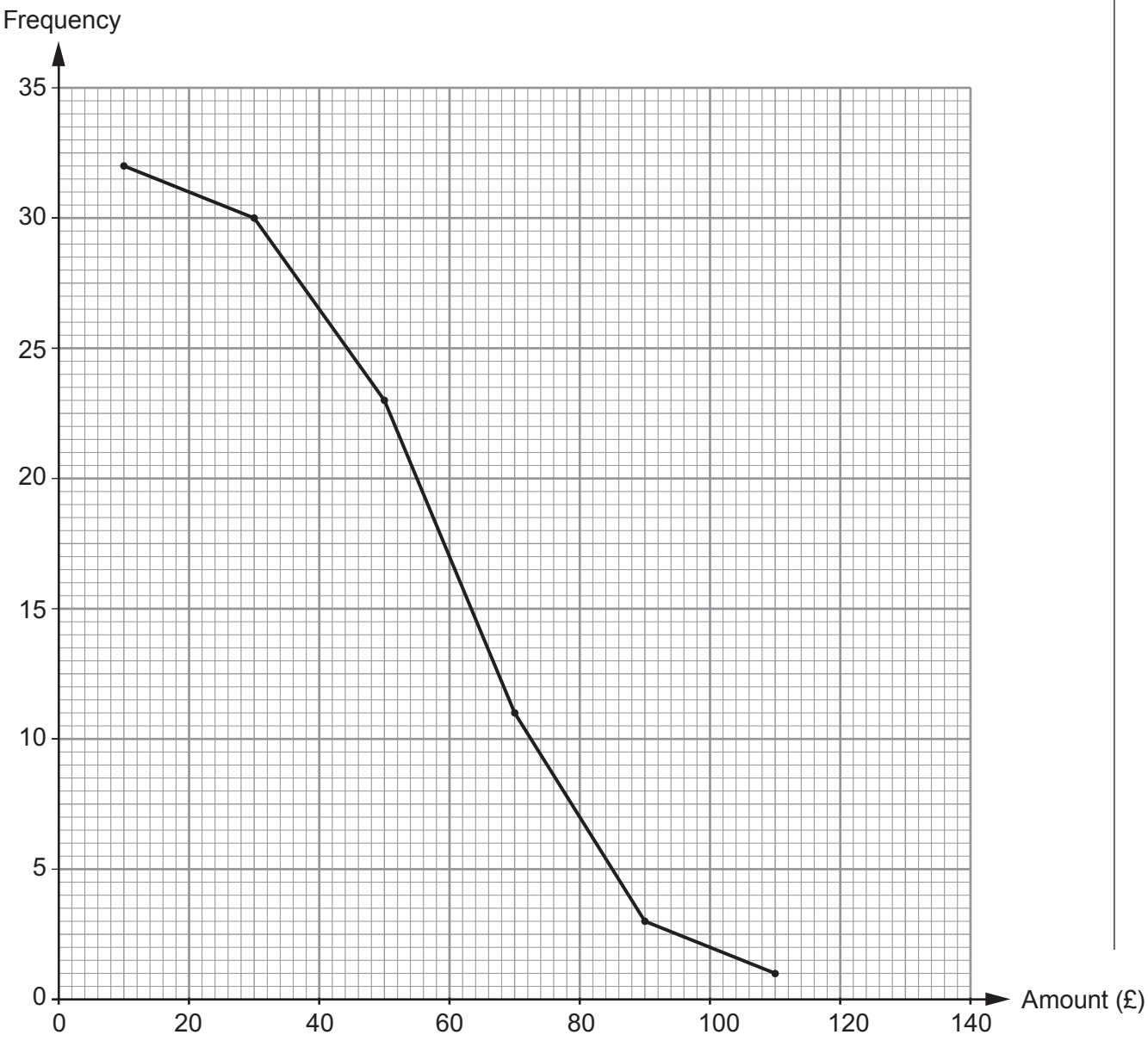
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17. The frequency polygon below shows the amount of money that 100 customers spent in a supermarket on a Monday morning.



The amount of money that **another 100 customers** spent in the same supermarket on a **Saturday afternoon** is shown below.

Amount, s (£)	Frequency
$0 < s \leqslant 20$	5
$20 < s \leqslant 40$	19
$40 < s \leqslant 60$	34
$60 < s \leqslant 80$	12
$80 < s \leqslant 100$	12
$100 < s \leqslant 120$	10
$120 < s \leqslant 140$	8

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(a) On the **same graph paper**, draw a frequency polygon to show the amount of money that the customers spent on the Saturday afternoon. [2]

(b) Use the two frequency polygons to make one comparison between the amount spent on Monday morning and the amount spent on Saturday afternoon. [1]

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18. Calculate the length x in the triangle below. [3]

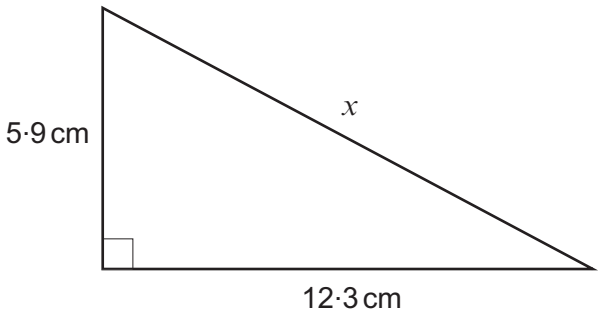


Diagram not drawn to scale

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19. A company has a large semicircle as part of its logo.
The company plans to paint the logo onto one of the walls of its headquarters.
One tin of paint covers $15\,m^2$.

Calculate the number of tins of paint that the company needs to buy to paint a semicircle of radius 6·3 m onto the wall. [4]

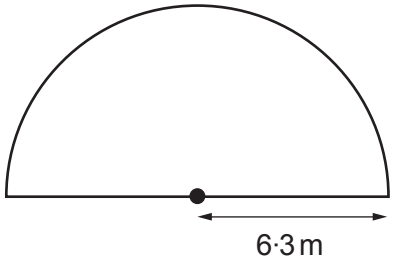


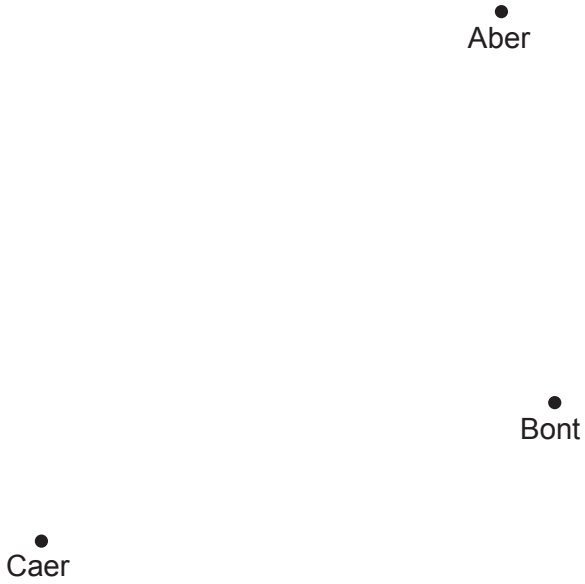
Diagram not drawn to scale

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20. Leah is drawing a map of her local area. She has accurately plotted the positions of the villages of Caer, Aber and Bont on the map below.
Leah now wants to plot the position of her house.
Her house is the same distance from Aber as it is from Bont.
According to the scale she is using, it needs to be plotted 6 cm from Caer.
Find the two possible positions of Leah's house, and mark each with a cross. [3]



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.

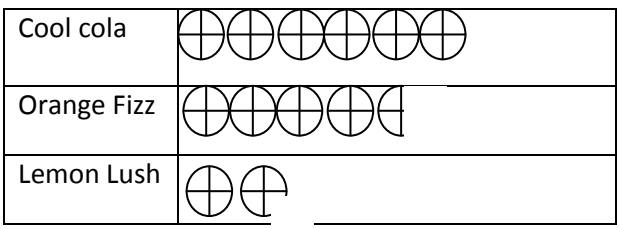
WJEC regrets that it cannot enter into any discussion or correspondence about these marking schemes.

	Page
Unit 1 - Foundation Tier	1
Unit 1 - Higher Tier	4
Unit 2 - Foundation Tier	7
Unit 2 - Higher Tier	11
Unit 3 - Foundation Tier	14
Unit 3 - Higher Tier	18

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UNIT 3 - FOUNDATION TIER

January 2015 **UNIT 3 (calculator allowed) Foundation**	**Mark**	**Final Mark Scheme** **Comments**
1. (a) (£)26.5(0) (£)2.97 (£)3.6(0) Total = (£)33.07 1 (b) 40−(£)33.07 (£)6.93 1 (c) Two free tickets identified (£) 10.6(0) ISW.	B1 B1 B1 B1 M1 A1 M1 A1 8	 FT if at least B1 awarded. FT candidate's total. FT 'their (£)33.07' Sc1 for ('their (£)33.07'− (£)15.9(0) =)(£)17.17 where drinks and sweets have not been considered.
2. (a) 7240	B1 1	
2. (b) 37	B1 1	
3. Evidence of counting squares 24-28 inclusive (cm^2)	M1 A1 2	
4. 5(p) and 2(p) coins	B2 2	B1 if candidate identifies 14(p) as the difference OR identifies 7(p) needs to be given.
5. (a) All letters correctly placed Regular Polygon C, E, F Irregular Polygon B,G,H Not a Polygon A, D (b) indicates B and H (c) indicates F and C	B3 B1 B1 5	B2 for six or seven shapes correctly placed. B1 for four or five shapes correctly placed. Duplication of letters counts as an error. Sc1 for three shapes correctly placed with one in each box with no shapes incorrectly placed.
6(a) (lemon lush=) 24 (b) difficult to show a part of the diagram with accuracy. e.g. the symbol needs to be easily divided into 8 pieces. . (c) One row represented in symbols consistent with the key. Two rows represented in symbols consistent with the key. Three rows represented in symbols consistent with the key.	B2 E1 B1 B1 B1 6	B1 for one can = 8 Alternative: 3/10 of 80 (=8×3)=24 e.g. the data for Tuesday's sales needs to be a multiple of 8 

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7. (a) Hands drawn to show twenty minutes to 5. (b)(16:40 to 19:40 Total time) 3hrs =180 min or 150 mins = 2½ hrs (180 − 150 =) 30 (mins) or (3 − 2½ =) ½ (hr). (30 ÷ 2 =)15 (min) or (½ ÷ 2 =) ¼ (hr) or	B1 B1 B1 B1 4	Hour hand <u>should</u> be between 4 and 5 but accept at 4. FT total 'their 180 mins'
8. (a) Median 58 (Thursday) (ii) Sum of the numbers (295) Sum/5 59 (iii) 42 (b) Correct interpretation of the range of daily sales of at least one of milkshakes or smoothies, in context.	B1 M1 m1 A1 B1 E1 6	B0 for Thursday without number. For attempt to add the numbers division by 5 of a number in the range 215-375 (54+38+65+58+80)/5 gets M1, m1 FT interpretation of 'their range' if in context. On average sales of milkshakes are consistent/around the same each day but smoothies' sales are more varied. E0 if no interpretation. Eg the range is smaller and the mean is the same.
9. (number of adults needed 240÷15) 16 (adults needed) (240+16=)256 (total people on the trip) 256÷50(=5.12) or equivalent 6 (buses needed) Look for • Spelling in at least one statement or sentence • Clarity of text explanations, • The use of notation (watch for the use of '=', '−' and '+' being appropriate. QWC2: Candidates will be expected to • Present work clearly, with words explaining process and 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.	 B1 B1 M1 A1 QWC2 6	Any appropriate method that gives 16 adult places. FT 'their 256'or 240 If no marks awarded, SC1 for use of 1 adult for every 15 students. e.g. 45 students and 3 adults per bus. Award M1A1 for "240÷50 (=4.8),so 5 buses needed" only if neither B1 has been awarded. 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 weakness in organisation of material but using acceptable mathematical form, with few, if any, errors in spelling, punctuation and grammar. QWC0 Evident weakness in organisation of material, and errors in use of mathematical form, spelling, punctuation and grammar.

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January 2015 UNIT 3 (calculator allowed) Foundation	Mark	Final Mark Scheme Comments
10. 5.1	B2 2	B1 for 5.0(64417504..) seen B0 for 5 alone.
11. (80×3.50 =) (£)280 (2/5 × 80=) 32 280 – 32 × 5 (£)120 120/(80 − 32) (£)2.5(0)	B1 B1 M1 A1 M1 A1 6	 FT 'their 280'and 'their 32' so long as B1 awarded. FT 'their 120'and 'their 32'
12. Intersecting construction arcs with radius 9cm and 7.5cm drawn from A and B respectively. Completed triangle with vertex at intersection of construction arcs.	M1 A1 2	Accuracy ±2mm M0 for freehand arcs or no arcs seen.
13. a = 5 Substitution of a =5 e.g. 5+3× 5+b = 23 or equivalent b=3	B1 B1 B1 3	 FT 'their a'. Implies previous B1. Look for answers in table.
14. (a) 9:30 (am) or 09:30 (b) horizontal line drawn stopping at point (10:20, 2) (c) Draw a line with positive gradient from (10:20 , 2) to (10:40 , 3) Use of distance divided by time or gradient of line. 3 (km/h)	B1 B1 B1 M1 A1 5	 FT part (b) for start of line. Ignore additional lines beyond 10:40. FT positive gradient of 'their line'. '1 km in 20 mins', without further working, earns M1 A0
15. 252 ÷ 6 (= 42) 210 (kg) AND 42 (kg)	M1 A1 2	
16. (a) 3x – 21 = 21 OR x – 7 = 21/3 3x = 42 OR x = 7 + 7 x = 14 (b) 9y – 5y = 12 + 2 4y = 14 y = 3.5	 B1 B1 B1 B1 B1 B1 6	 Accept embedded answer. FT until 2nd error. FT until 2nd error. Accept 7/2. Mark final answer.
17. a) Points plotted at mid-points of groups and straight lines connecting the points b) Appropriate comment that compares purchases made on Monday and Saturday.	B2 E1 3	B1 at least 4 points plotted and joined correctly OR for all points plotted correctly but not joined, OR consistent horizontal translation within the limits of the groups. Accept intention of straight lines. Ignore any lines outside the first and last points. E.g. "More low value purchases on a Monday morning", "More money is spent on a Saturday afternoon".

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January 2015 UNIT 3 (calculator allowed) Foundation	Mark	Final Mark Scheme Comments
18. $(x^2 =)$ $12.3^2 + 5.9^2$ $x^2 = 186.1$ OR $(x =)$ $\sqrt{186.1}$ $(x =)$ 13.6(418…cm)	M1 A1 A1 3	
19. (Area of semi-circle =) $\pi \times 6{\cdot}3^2/2$ $= 62{\cdot}3$ to $62{\cdot}4$ (m^2) (Number of tins of paint needed =) $(\pi \times 6{\cdot}3^2/2) \div 15$ = 5(tins)	M1 A1 M1 A1 4	 FT 'their area' provided π used in the calculation. Provided of equivalent difficulty.
20. Perpendicular bisector of line joining Aber and Bont drawn. Correct 2 points identified.	B1 B2 3	Use overlay with tolerances included. B1 for 1 point identified Or correct circle or arc drawn within tolerance. If no marks awarded, SC1 for complete method but outside tolerances.

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UNIT 3 - HIGHER TIER

January 2015 UNIT 3 Higher	Mark	Final Mark Scheme Comments
1. $\frac{27}{18}$ or equivalent. = 1.5	B2 B1 3	B1 for sight of 27 or 18. FT provided B1 already awarded. If no marks awarded, allow SC1 for answers of 18.72 (not used brackets) or 0.5 (used squared instead of cubed) as evidence of a correct numerator or denominator.
2. 252 ÷ 6 (= 42) 210 (kg) AND 42 (kg)	M1 A1 2	
3. (a) x(x – 9) (b) 3x – 21 = 21 OR x – 7 = 21/3 3x = 42 OR x = 7 + 7 x = 14 (c) 9y – 5y = 12 + 2 4y = 14 y = 3.5	B1 B1 B1 B1 B1 B1 B1 7	Accept embedded answer. FT until 2nd error. FT until 2nd error. Accept 7/2. Mark final answer.
4. (Distance =) $\frac{90 \times 1000}{3600} \times 10$ = 250 (m)	M2 A1 3	M1 for a distance conversion into m OR a speed conversion into 'per second' OR speed × time. CAO. Allow M1 SC1 for 0.25 **km**.
5. One correct evaluation $2 \leq x \leq 3$ 2 correct evaluations $2.25 \leq x \leq 2.4$ one either side of 0 2 correct evaluations $2.25 \leq x \leq 2.35$ one either side of 0 *If evaluations not seen, accept 'too high' or 'too low'.* $x = 2.3$	B1 B1 M1 A1 4	**x** / **$5x^3-2x-60$**: 2 / -24; 2.1 / -17.895; 2.2 / -11.16; 2.3 / -3.765; 2.4 / 4.32; 2.5 / 13.125; 2.6 / 22.68; 2.7 / 33.015; 2.8 / 44.16; 2.9 / 56.145; 3 / 69; 2.25 / -7.547; 2.26 / -6.804; 2.27 / -6.055; 2.28 / -5.298; 2.29 / -4.535; 2.3 / -3.765; 2.31 / -2.988; 2.32 / -2.204; 2.33 / -1.413; 2.34 / -0.615; 2.35 / 0.189; 2.36 / 1.001; 2.37 / 1.820; 2.38 / 2.646; 2.39 / 3.480; 2.4 / 4.320
6. $(x^2 =)\ 12.3^2 + 5.9^2$ $x^2 = 186.1$ OR $(x =)\ \sqrt{186.1}$ (x =) 13.6(418…cm)	M1 A1 A1 3	
7. (a) (Angle inside pentagon =) 540/5 = 108 (º) (b) Sight of 60 (º) as an angle in an equilateral triangle. 360 – 60 – 60 – 108 (= 132) y = (180 – 132)/2 y = 24 (º)	M1 A1 B1 M1 m1 A1 6	OR 180 – (360/5) FT 'their 108' for all remaining marks.

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January 2015 UNIT 3 Higher	Mark	Final Mark Scheme Comments
8. (Area of semi-circle =) $\pi \times 6 \cdot 3^2/2$ $= 62 \cdot 3$ to $62 \cdot 4$ (m^2) (Number of tins of paint needed =) $(\pi \times 6 \cdot 3^2/2) \div 15$ = 5 (tins) QWC: Look for • spelling in at least 1 statement/sentence • clarity of working • correct units used i.e. m^2, tins QWC2: Candidates will be expected to • present work clearly, with words or quantities shown for clarity of process or steps AND • make few if any mistakes in mathematical form, spelling, punctuation and grammar in their answer QWC1: Candidates will be expected to • present work clearly, with words or quantities shown for clarity of process or steps OR • make few if any mistakes in mathematical form, spelling, punctuation and grammar in their answer	M1 A1 M1 A1 QWC 2 6	 FT 'their area' provided π used in the calculation. Provided of equivalent difficulty. 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.
9. (a) Mid-points 10, 30, 50, 70, 90, 110 Frequencies 32, 30, 23, 11, 3, 1 Sum of mid-points × freq (= 3520) ÷ 100 = (£) 35.2(0) (b) Points plotted at mid-points of groups, and straight lines connecting the points. (c) Appropriate comment that compares purchases made on Monday and Saturday.	B1 B1 M1 m1 A1 B2 E1 8	 FT their mid-points and frequencies. Mid-points need to be within the limits of each group, including the limits themselves. Dividing by 100 or their total frequency. B1 at least 4 points plotted and joined correctly, OR for all points plotted correctly but not joined, OR consistent horizontal translation within the limits of the groups. Accept intention of straight lines. Ignore any lines outside the first and last points. e.g. 'More low value purchases on a Monday morning.' 'More money is spent on a Saturday afternoon.'
10. Perpendicular bisector of line joining Aber and Bont drawn. Correct 2 points identified.	B1 B2 3	Use overlay with tolerances included. B1 for 1 point identified Or correct circle or arc drawn within tolerance. If no marks awarded, SC1 for complete method but outside tolerances.
11. (a) 6×10^2 (b) $2 \times (1.66 \times 10^{-24}) + 2.66 \times 10^{-23}$ $= 2.99 \times 10^{-23}$	B2 M1 A2 5	B1 for 600 or 0.6×10^3. Or equivalent. A1 for 2.992×10^{-23} or equivalent. SC1 for a correct answer to their calculation written instandard form to 3 s.f., provided rounding required.
12. $(x + 15)(x - 3)$ $x = -15$ or $x = 3$	B2 B1 3	B1 for (x…15)(x…3). FT for their pair of brackets. Both solutions needed for this B1. B0 for solutions obtained from the quadratic formula.
13. $\frac{1}{3} \times 5^2 \times 9$ = 75 cm^3	M1 A1 U1 3	 Independent mark.
14. (a) 3, 7, 15, 21, 23, 24 (b) Idea, plotting the upper class boundary consistently with the corresponding cumulative frequency. At least 4 points plotted correctly. All points correct and joined by straight lines or a curve, including to zero. (c) A correct reading from their graph. (d) Pupils got quicker AND suitable reason e.g. "upper quartile is now less than the median from the start of the week", "both quartiles have come down in time".	B1 M1 A1 A1 B1 E2 7	 FT, for all marks, their cumulative frequencies, provided an attempt made to be cumulative. If no marks awarded, SC1 if points plotted at mid-points. M0A0A0 for bars with or without plots. Answers are likely to be in the range 27·5to 29. E1 for 'pupils got quicker' OR E1 for valid statement e.g.'the spread of marks has not changed much from start of the week.' If the quartiles from the start of the week are quoted, they need to be correct. LQ=23 to 24·5, UQ=32 to 33·5.

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January 2015 UNIT 3 Higher	Mark	Final Mark Scheme Comments
15. Use of scale factor of (12/10) or (10/12) Area ACD/24 = $(12/10)^2$ Area ACD = 24 x 1.44 = 34.56 (cm^2) Area of trapezium = 10.56 (cm^2)	B1 M1 A1 A1 4	Sight of 1.2 or 0.8333… Or equivalent. FT 'their 34.56' provided M1 awarded. *Alternative method:* *Ratio of lengths 10:12 or 5:6* *B1* *Ratio of areas 100:144 = 25:36* *B1* *Area of trapezium = 11/25 x 24* *M1* *Area = 10.56 (cm^2)* *A1*
16. (a) $c = k \times d^2$ or $c \propto d^2$ $18 = k \times 1.5^2$ $c = 8d^2$ (b) 42.3(2) (c) $98 = 8d^2$ $(d =) \pm 3.5$	B1 M1 A1 B1 M1 A1 6	 FT for their non-linear expression from (a), in (b) and (c). FT for their non-linear expression from (a) provided positive and negative roots required.
17. (Area of 1 triangle =) ½ x 6 x 11 x sin130º x 2 (Area of kite =) 50.5(58…cm^2) or 51 (cm^2)	M1 m1 A1 3	 An answer of 25(.279…) gets M1m0A0.
18. (Angle inside triangle at A =) 72º $BP^2 = 147^2 + 95^2 - 2x147x95xcos\ 72º$ BP^2 = 22003(.15535) or (BP =) √22003(.15535) (BP =) 148(.334…km)	B1 M1 A1 A1 4	 FT 'their 72º' providing it's less than 122°. FT their 22003(.15535) provided M1 awarded.
19. "Area under a v-t graph gives the distance travelled." (½ x 5 x 8) + (5 x 8) C	M1 A1 A1 3	Could be implied by their calculations. OR Distance A = ½×10×6 AND Distance B = ½×10×8.
20. (a) $(3x^2 - 2)\sin 30º = 3x$ $3x^2 - 6x - 2 = 0$ (b) $\frac{-(-6) \pm \sqrt{((-6)^2 - 4\times3\times-2)}}{2\times3}$ $\frac{6 \pm \sqrt{60}}{6}$ x = 2.29(…) or 2.3 (or x = -0.29 or -0.3) BC = 6.9 (cm)	M2 A1 M1 A1 A1 B1 7	M1 for $\sin 30º = 3x/(3x^2 - 2)$ Convincing work needed. *Alternative method:* *M2 for $6x = 3x^2 - 2$ with convincing argument for an equilateral triangle.* *A1 for $3x^2 - 6x - 2 = 0$.* Allow 1 slip in substitution for M1 only. Do not accept a part trial and improvement method. CAO. CAO. If no workings shown, SC1 for x = 2·29 or 2·3. FT their value of x, provided M1 or SC1 awarded, and BC is positive.

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Surname	Centre Number	Candidate Number
Other Names		0

GCSE

4353/01

A14-4353-01

MATHEMATICS (UNITISED SCHEME)
UNIT 3: Calculator-Allowed Mathematics
FOUNDATION TIER

A.M. MONDAY, 10 November 2014

1 hour 30 minutes

For Examiner's use only		
Question	**Maximum Mark**	**Mark Awarded**
1.	**7**	
2.	**3**	
3.	**2**	
4.	**3**	
5.	**3**	
6.	**2**	
7.	**6**	
8.	**5**	
9.	**3**	
10.	**4**	
11.	**8**	
12.	**2**	
13.	**5**	
14.	**3**	
15.	**2**	
16.	**4**	
17.	**4**	
18.	**3**	
19.	**4**	
20.	**3**	
21.	**4**	
Total	**80**	

4353
010001

ADDITIONAL MATERIALS

A calculator will be required for this paper.

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 or use the π button on your calculator.

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.

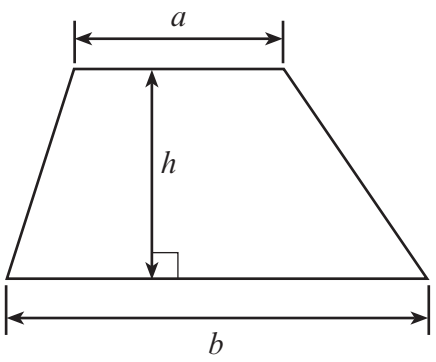
You are reminded that assessment will take into account the quality of written communication (including mathematical communication) used in your answer to question **8**.

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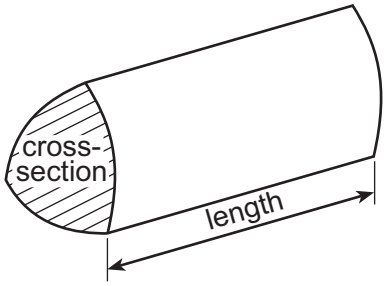
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Formula List

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



Volume of prism = area of cross-section × length



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1. *(a)* Siân buys the following items from an online music store.

Complete her bill. [4]

Item	Cost
10 badges @ 85p each	£
3 T-shirts @ £7.95 each	£
20 blank CDs @ £4.99 per pack of 10	£
Total	£

(b) The online store gives free delivery if the total cost is £50 or over.
How much more does Siân need to spend to get free delivery? [1]

.....

.....

(c) The music store also has a special offer on music-video downloads.

Download one music-video
For £1.99

SPECIAL OFFER TODAY

3 for the price of 2

What is the cost of 9 music-video downloads with this special offer? [2]

.....

.....

.....

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Turn over.

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2. *(a)* Write 52 836 correct to the nearest 1000. [1]

.....

(b) Write 67·121 correct to the nearest whole number. [1]

.....

(c) Write 37·786 correct to one decimal place. [1]

.....

3. There were 38 people on a bus.
At a bus stop, 12 people got off the bus and some people got on.
There were then 42 people on the bus.
How many people got on the bus at the bus stop? [2]

.....

.....

.....

.....

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4. The electricity meter readings at the beginning and the end of a three month period were:

Reading at the end of the period	6	4	3	5
Reading at the beginning of the period	5	7	9	3

The cost of the electricity used was 15p for each unit.

What was the cost of the electricity used in the three month period? [3]

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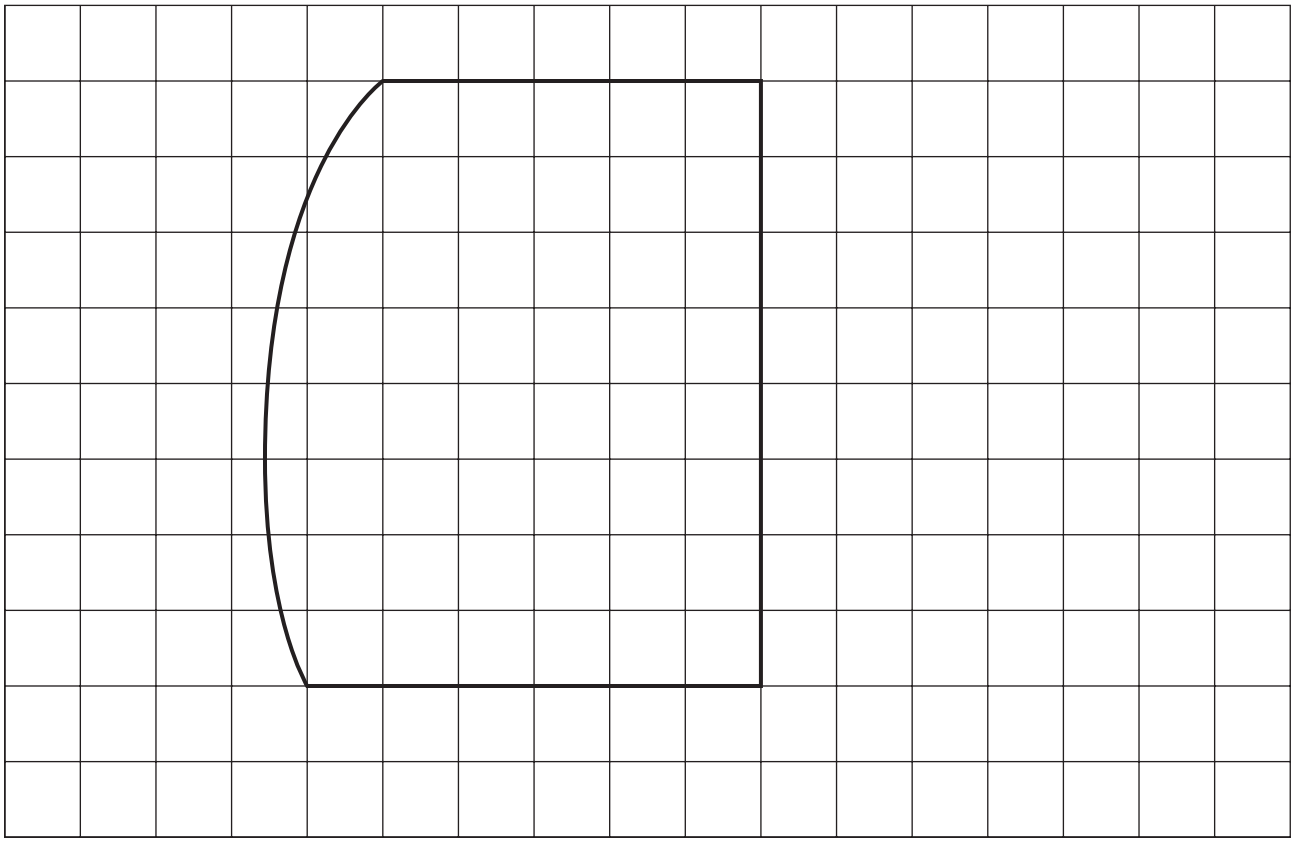
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5.



The above shape represents the outline of a garden drawn to scale.
Each square on the grid represents an area of $5\,m^2$.
Find the approximate area of the garden. [3]

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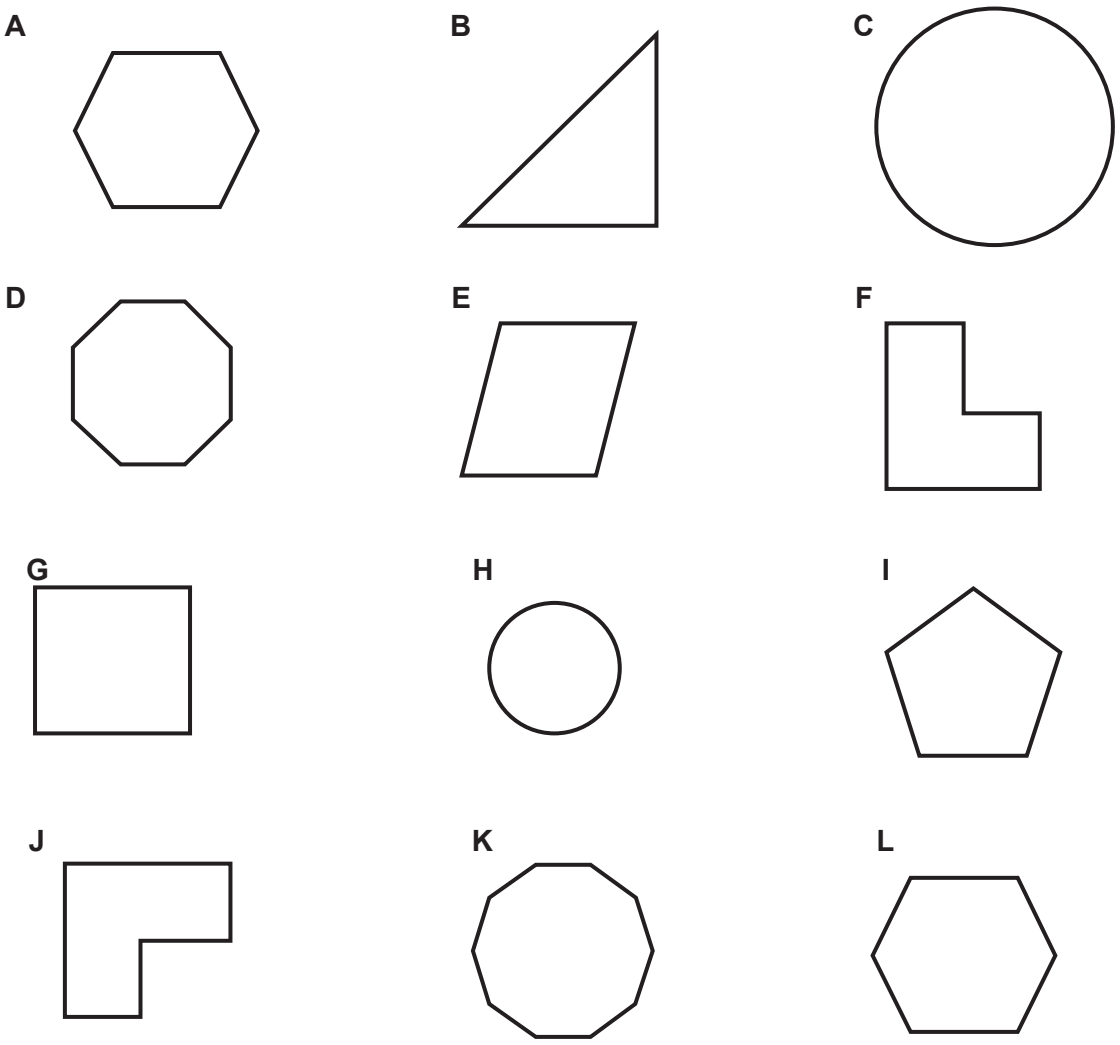
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6.



(a) Write down **one** pair of congruent shapes from the above diagrams. [1]

..... and ..... are congruent shapes.

(b) Write down **one** pair of shapes that are **similar** but not congruent. [1]

..... and ..... are similar but not congruent.

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7. *(a)* Using the following numbers **once only** in each case,

3	5	12	20

fill in the boxes so that the equations are correct.

(i) $\square + \square = \square - \square$ [1]

(ii) $\square \div \square = \square \div \square$ [1]

(b) (i) Work out the value of [1]

$$4 \times 9 \div 3 - 1$$

(ii) The following calculation will be correct only if brackets are used.
Insert brackets to make the calculation correct. [1]

$$4 \times 9 \div 3 - 1 = 18$$

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(c) Using **only numbers from the list below**,

6	–5	8	–10

select two **different** numbers that **add together** to give the **lowest** possible answer. [1]

$\square + \square = _____$

(d) Using **only numbers from the list below**,

–4	7	3	–6

select two **different** numbers that **multiply together** to give the **highest** possible answer. [1]

$\square \times \square = _____$

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

The same size bottles of energy drink are sold in a supermarket in 2 different packs.

4-bottle pack £3.00 per pack	6-bottle pack £4.30 per pack

A sports team manager wants to buy **exactly** 16 bottles of energy drink.

What is the cheapest total price that he can pay for exactly 16 bottles?

You must explain why your total price is the cheapest and show all your working. [5]

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9. Shape A and shape B are made from five identical squares.



A B

Diagrams not drawn to scale

The perimeter of shape A is 36 cm. Calculate the perimeter of shape B. [3]

10. *(a)* Work out the value of $\frac{A}{6}$ when $A = 108$. [1]

(b) Use the formula $W = X + 5Y$ to find the value of Y when $W = 120$ and $X = 45$. [3]

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11. A class of 24 students was given a test.

These are the marks that each student scored.

22	50	11	31	24	41
39	26	35	33	25	32
15	28	13	25	19	29
49	21	17	27	43	38

(a) What is the range of the marks? [1]

.....

.....

Each group of marks was awarded a grade as shown in the table below.

(b) Complete the frequency table for these marks. [2]

MARK	GRADE	TALLY	FREQUENCY
11 to 20	D		
21 to 30	C		
31 to 40	B		
41 to 50	A		

(c) What is the modal group of marks? [1]

.....

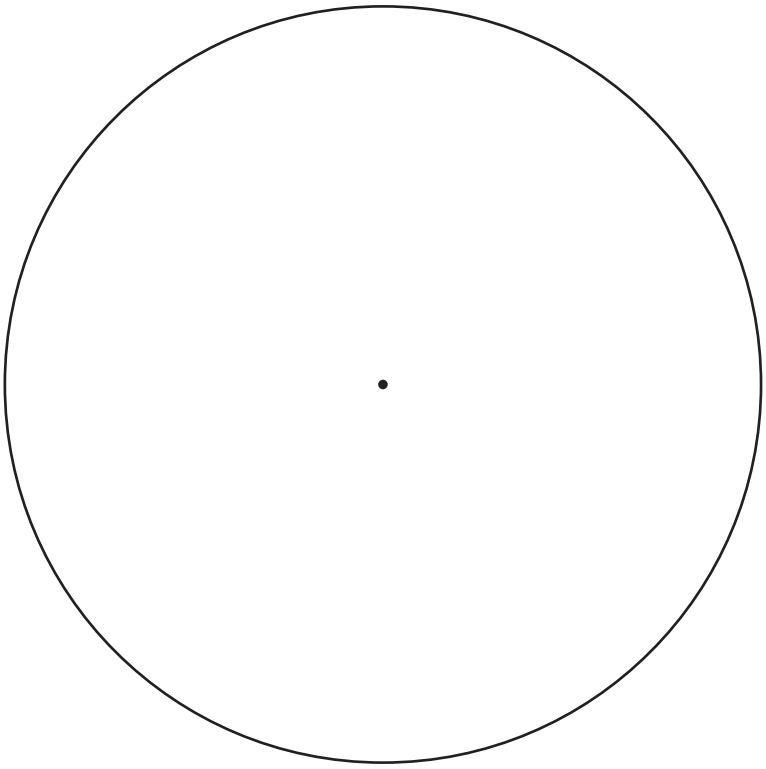
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(d) Draw a pie chart to illustrate the grades obtained by the class.

You should show how you calculate the angles of the pie chart. [4]

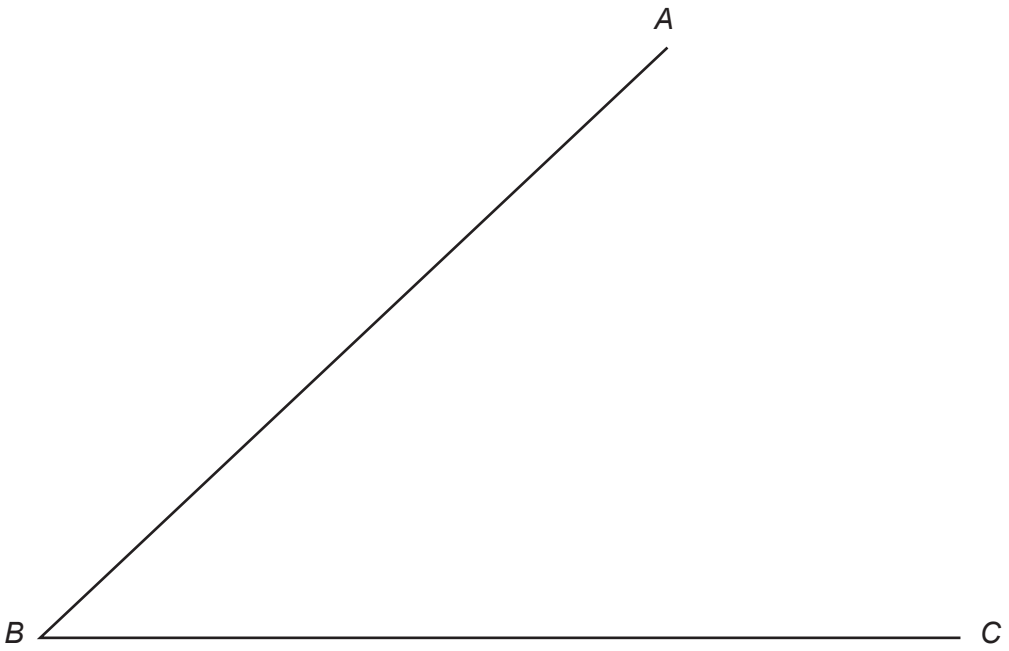


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12. Using a ruler and a pair of compasses, construct the bisector of $A\hat{B}C$. [2]



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13. A tank in the shape of a cuboid has length 45 cm, width 32 cm and height 30 cm, as shown in the diagram below.

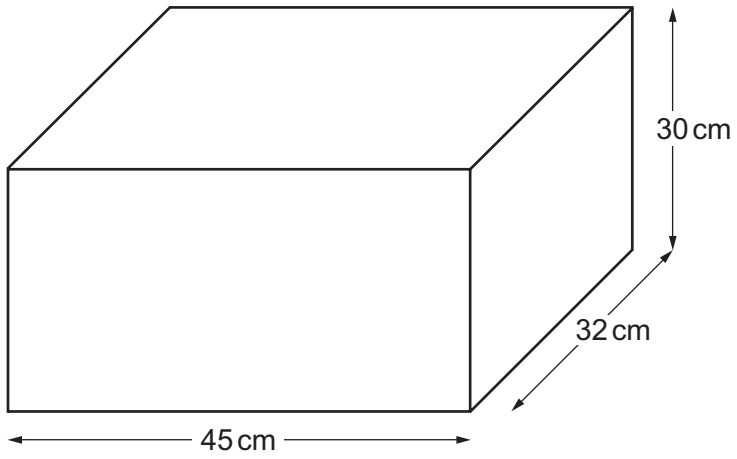


Diagram not drawn to scale

(a) Calculate the volume of the tank. State the units of your answer. [3]

.....

.....

.....

(b) 43 litres of water is poured into the empty tank.
Does the water overflow?
You must show all your working to support your answer. [2]

.....

.....

.....

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14. In a survey, some pupils were asked if they had eaten a school dinner that day.

$\frac{5}{8}$ of the pupils said "Yes".

$\frac{3}{8}$ of the pupils said "No".

48 **more** pupils said "Yes" than said "No".

How many pupils took part in the survey? [3]

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15. Find the size of each interior angle of a regular pentagon. [2]

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Examiner only

16. A bathroom mirror is shown below. Two vertical and two horizontal overlapping wooden pieces are placed over the mirror as shown. The width of each of the wooden pieces is 2 cm.

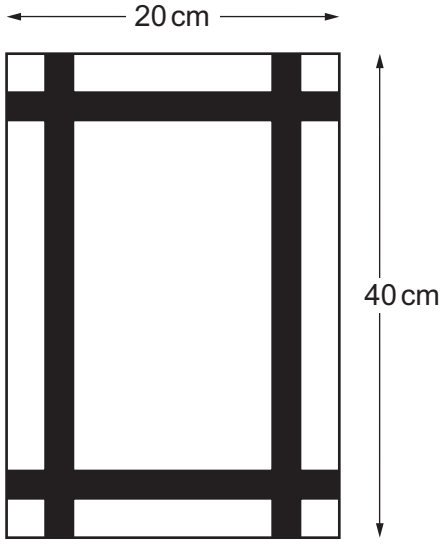


Diagram not drawn to scale

Calculate the area of the mirror that is **not** covered by the wooden pieces.
Show all your working. [4]

Examiner only

17. A theme park collects a large amount of data for every day that it is open.
The following table shows the data collected for six randomly selected days in August 2014.

Day	**1**	**2**	**3**	**4**	**5**	**6**
Number of visitors (thousands)	4	6	14·6	10·4	9·8	13
Weight of litter collected (tonnes)	1·6	3	6·1	3·8	4·6	5

(a) On the graph opposite, draw a scatter diagram to show this information. [2]

(b) Draw a line of best fit on your scatter diagram. [1]

(c) Use your line of best fit to estimate the weight of litter that would be collected on a day when 12 000 people visited the park. [1]

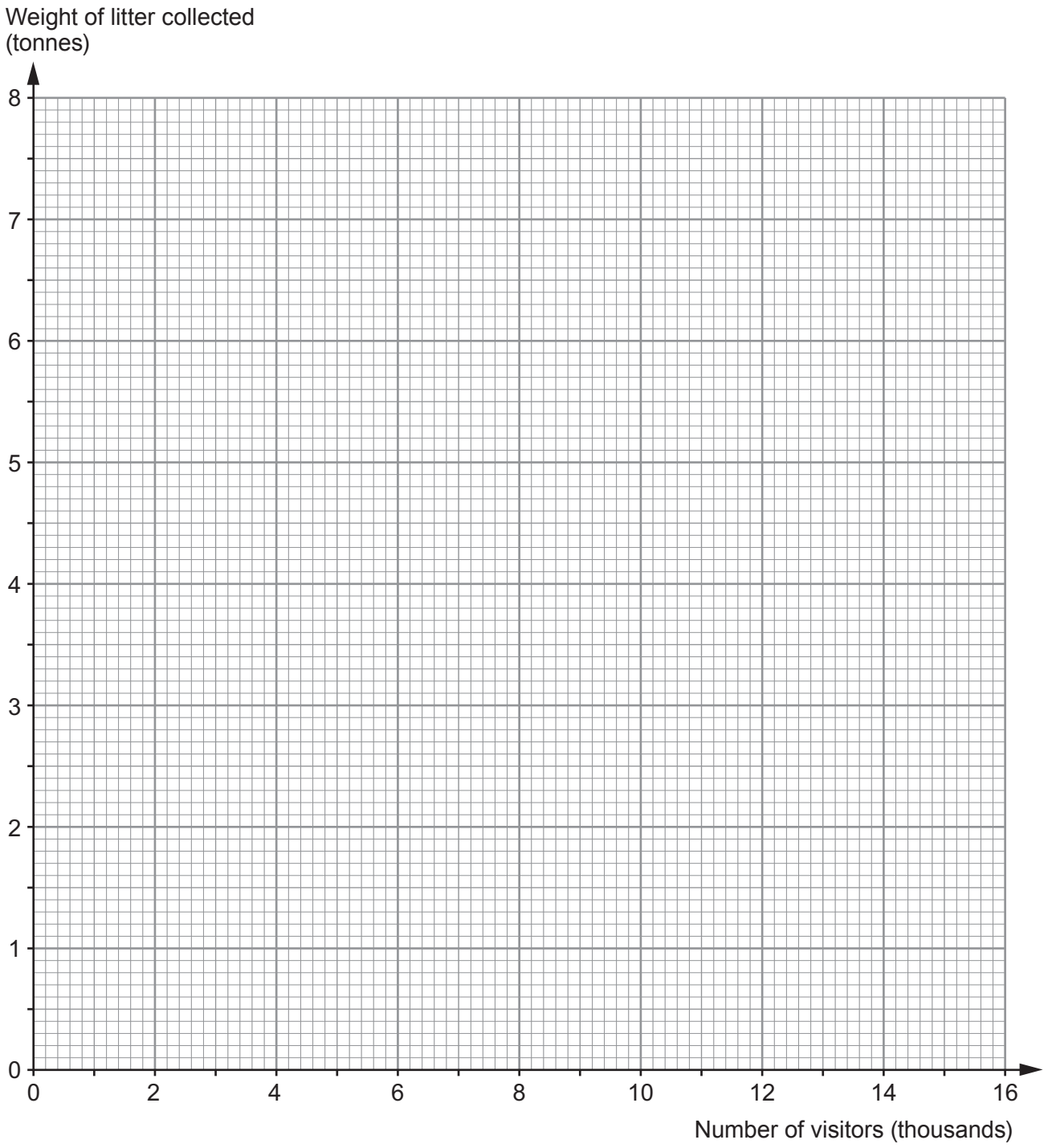
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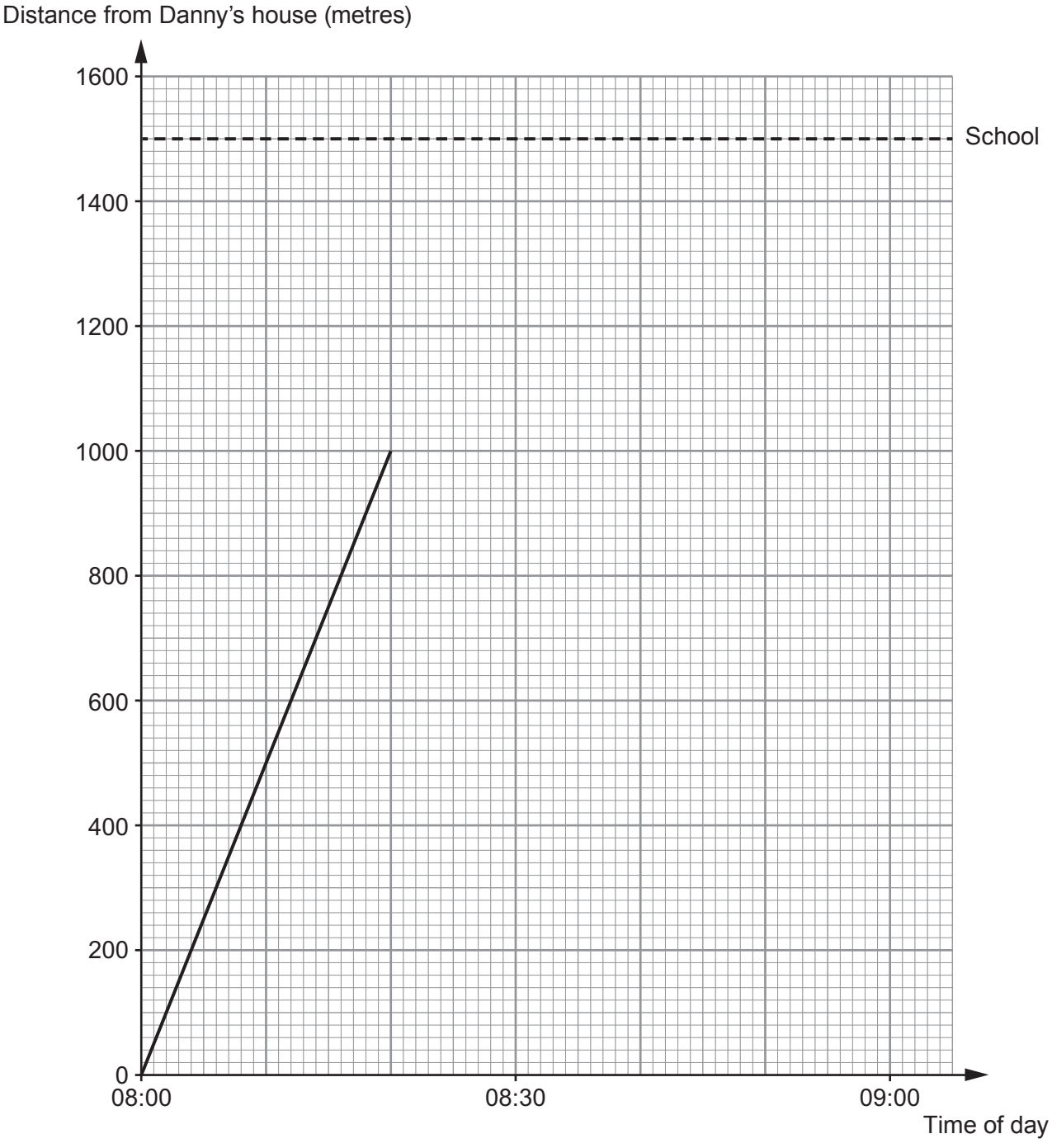
Turn over.

Examiner only

18. Danny lives 1500 m away from his school. He walks to school at the same constant speed every day starting at 08:00.
The travel graph below shows the start of his journey one day.

Complete the travel graph using the following information:

- When he had travelled 1000 m he realised that he had left his dinner money in the house, so he turned around, arriving back at his home at 08:30.
- He immediately set off from home running at a steady speed, so that he ran a distance of 500 m every 5 minutes, until he reached his school. [3]



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19. A solution to the equation $x^3 + 10x - 20 = 0$ lies between 1·5 and 1·6.
Use the method of trial and improvement to find this solution correct to 2 decimal places. [4]

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20. The diagram below shows a ladder resting against the top of a vertical wall.
The ladder is 4·9 m long and the wall is 4 m high.
How far is the bottom of the ladder from the base of the wall? [3]

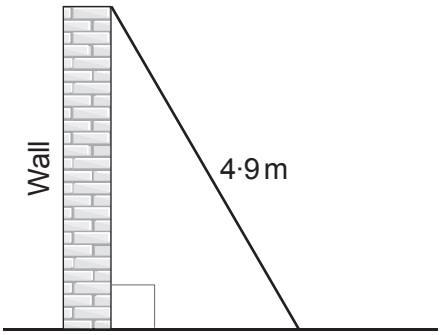


Diagram not drawn to scale

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Examiner only

21. A golfer hits 40 golf balls with one of his clubs.
He records the distance each ball travels. The grouped frequency table shows his results.

Distance travelled, d, in yards	Frequency
$75 < d \leqslant 80$	4
$80 < d \leqslant 85$	13
$85 < d \leqslant 90$	17
$90 < d \leqslant 95$	6

Calculate an estimate for the mean distance travelled by these balls. [4]

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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 3 - FOUNDATION TIER

GCSE Mathematics - Unitised Unit 3 (calculator allowed) Foundation Tier November 2014	Mark	Final Mark Scheme Comments
1. (a) (£)8·5(0) (£)23·85 (£) 9·98 (£)42·33 (b) (£)7·67 (c) 6×1·99 (£) 11·94	B1 B1 B1 B1 B1 B1 B1 7	 FT candidate's values, provided equivalent difficulty FT 50 – 'their 42·33'. Or equivalent SC1 for (9×1·99=)(£)17·91
2. (a) 53000 (b) 67 (c) 37·8	B1 B1 B1 3	
3. 42− (38−12) 16	M1 A1 2	Or equivalent
4. (6435-5793)= 642 (units used) 642 ×15(p) (£)96·3(0) or 9630(p)	B1 M1 A1 3	 FT 'their 642' from working If given, £ and/or p must be correct
5 Evidence of counting squares 48-52 (squares) 240-260 (m^2)	M1 A1 B1 3	 F.T. 5× 'their number of squares'
6. (a) A and L OR F and J (b) H and C	B1 B1 2	
7. (a) (i) any correct combination using 5, 3, 12 and 20. (ii) any correct combination (b) (i) 11 (ii) 4×9÷(3−1) (c) −10 + −5 (d) −4 × −6	B1 B1 B1 B1 B1 B1 6	5+3 = 20 −12 12+5=20 − 3 12+3 = 20 −5 Accept answers in boxes or on lines 20 ÷ 5 = 12 ÷ 3 or 5 ÷ 3 = 20 ÷ 12 (incl reciprocals) Accept answers in boxes or on lines A pair of brackets inserted correctly around subtraction. Extra brackets accepted if correct. Eg. (4×9)÷(3−1) Select the two negative numbers. In any order

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GCSE Mathematics - Unitised Unit 3 (calculator allowed) Foundation Tier November 2014	Mark	Final Mark Scheme Comments
8. Choosing a combination of 4 and 6 to make 16. 4, 4, 4, 4 or 6, 6, 4 Correct costing for one combination (£) 12 or (£) 11.6(0) (£) 11·6(0) and a convincing argument that 6, 6, 4 is cheapest OR both costings evaluated with a final answer of (£) 11·6(0)	B1 B1 B1	**Alternative method** Cost of 1 bottle from 6-bottle pack = (£)4·30÷6 = (£)0·71(6). Cost of 1 bottle from 4-bottle pack = (£)0·75. B1 for both. B1 for "Buy 2 6-bottle packs + 1 4 6-bottle pack". B1 for correct total price (£) 11·6(0)
Look for • Spelling • Clarity of text explanations, • Consistent and correct use of £ or p signs. QWC2: Candidates will be expected to • Present work clearly, with words explaining process and 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 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 weakness in organisation of material but using acceptable mathematical form, with few, if any, errors in spelling, punctuation and grammar. QWC0 Evident weakness in organisation of material, and errors in use of mathematical form, spelling, punctuation and grammar.
9. A: 12 ('sides') (36÷12=) 3(cm) (Perimeter B= 10×3) 30 (cm)	B1 B1 B1 3	Attempt to find the side length of a square. FT candidate's number of 'sides' on perimeter A. No FT for 36÷5 FT 10 × times 'their 3' If no marks awarded, SC1 for B has perimeter of 10 'sides'.
10. (a) 18 (b) 120=45+5*Y* 5*Y*=75 *Y*=15	B1 B1 B1 B1 4	Correct substitution Isolating the Y. Accept 5*Y*=120−45 F.T if aY=b (a≠1)

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GCSE Mathematics - Unitised Unit 3 (calculator allowed) Foundation Tier November 2014	Mark	Final Mark Scheme Comments
11.(a) 39	B1	
(b) D 5, C 9, B 6, A 4	B2	B1 for any two/three correct frequencies If frequencies score zero then B1 for all correct tallies.
(c) 21 to 30 or C	B1	FT from their frequencies
(d) **Use overlay** 3 or 4 angles correct and correctly labelled	B4	Ft from their frequencies
	OR	
3 or 4 angles correct, labels not fully correct 2 angles correct and correctly labelled. 2 angles correct, labels not fully correct. 1 angle correct and correctly labelled.	B3 B3 B2 B1	If only B1 is scored for the diagram, and all the angles given correctly, then cancel the B1 and award M1, A1. If B0 scored for the diagram, check the angles and the method to see if the M1 and the A1 can be awarded. (1 is) 15° gets M1.
OR <u>If 0 or 1 for the diagram or no diagram</u> 360/24 Angles are 75, 135, 90, and 60.	OR M1 A1 8	Or SC1 for all correct percentages. 20·8, 37·5, 25, 16·7
12. 3 (or 4) arcs and the bisector of the angle drawn.	B2 2	B1 for the first arc crossing both lines (or two equal radius arcs crossing both lines) **and** an attempt at the next stage in the construction.
13. (a) 45×32×30 43200 cm^3 (b) use of 1 litre = 1000 cm^3 (eg 43L = 43000 cm^3) (43litres is less than the volume of the tank) The water will not overflow	M1 A1 U1 M1 A1 5	Or equivalent Accept ml May be implied but not stated explicitly. Eg. 200 cm^3 space left. FT candidate's volume of tank provided M1 awarded in part (a).
14. 2/8 is 48(pupils) or ¼ is 48(pupils) 48×4 or equivalent 192	B1 M1 A1 3	
15. 180 – (360/5) OR ((5-2) x 180) / 5 108 (°)	M1 A1 2	Or equivalent
16. Area of one rectangle correctly evaluated (e.g. whole mirror) Area of two or more different white or black rectangles correctly evaluated A complete method of subtracting or adding areas e.g. 800 – (2×20×2 + 2×40×2 – 4×2×2) mirror wooden strips overlap = 576(cm^2)	B1 B1 M1 A1 4	*Possible calculation for the white pieces:* *4 corner pieces 4×2×2 (assuming squares)* *2 long rectangles 2×12×2* *2 tall rectangles 2×32×2* *Centre piece 12×32* *Or B1B1M1A1 for 36*×16=576(cm^2) CAO
17 (a) All points plotted correctly. (b) Appropriate straight line of best fit drawn with some values above and below the line. (c) from their line of best fit ± 0·05 (tonnes).	B2 B1 B1 4	B1 for 3, 4 or 5 points plotted correctly, not joined, or B1 for all points plotted correctly but joined. Mark intention. FT from their line. B0 if no line drawn.

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GCSE Mathematics - Unitised Unit 3 (calculator allowed) Foundation Tier November 2014	Mark	Final Mark Scheme Comments
18. Line or curve drawn from end of existing line to (08:30,0). Straight line drawn from (08:30,0) to (08:45, 15:00).	B1 B2 3	 FT their first line. B1 for straight line drawn from (08:30,0) with correct gradient (500m every 5min) but not finishing at (08:45 , 15: 00) , OR B1 for straight line finishing at the school with correct gradient but not starting immediately after the first line.
19. One correct evaluation $1{\cdot}5 \le x \le 1{\cdot}6$ 2 correct evaluations $1{\cdot}585 \le x \le 1{\cdot}6$ one either side of 0 2 correct evaluations $1{\cdot}585 \le x \le 1{\cdot}595$ one either side of 0 *If evaluations not seen, accept 'too high' or 'too low'.* $x = 1{\cdot}59$	B1 B1 M1 A1 4	x $x^3 + 10x - 20$ x $x^3 + 10x - 20$ 1·5 -1·625 1·591 -0·063 1·51 -1·457 1.592 -0.045 1·52 -1·288 1.593 -0.028 1·53 -1·118 1·594 -0·010 1·54 -0·948 1·595 0·008 1·55 -0·776 1·596 0·025 1·56 -0·604 1·597 0·043 1·57 -0·430 1·598 0·061 1·58 -0·256 1·599 0·078 1·59 -0·080 1·6 0·096 The second B1 can be gained by calculating one value that is too low in the range 1·585 to 1·6 AND stating clearly that 1·6 will be too high.
20. (Distance^2 =) $4{\cdot}9^2 - 4^2$ Distance^2 = 8·01 OR (Distance =) $\sqrt{8.01}$ (Distance =) 2·8(30…) (m)	M1 A1 A1 3	
21. Sight of the mid-points 77·5, 82·5, 87·5, 92·5 77·5×4 + 82·5×13 + 87·5×17 + 92·5×6 (=3425) (310 + 1072·5 + 1487·5 + 555) ÷ 40 = 85(·625) (yards)	B1 M1 m1 A1 4	 FT their mid-points from within or at the bounds of the groups

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UNIT 3 - HIGHER TIER

GCSE Mathematics - Unitised Unit 3 Higher Tier November 2014	Mark	Final Mark Scheme
1. −20 + 9.8×5 = 29	M1 A1 2	
2. All three amounts correct in comparable form e.g. 20%, 30%, 50%, OR 0.2, 0.3, 0.5 or equivalent 2:3:5	 B2 B1 3	Allow fractions of a sum of money. B1 for any 2 amounts correct in comparable form.
3. (a) All points plotted correctly. (b) Appropriate straight line of best fit drawn with some values above and below the line. (c) from their line of best fit ± 0.05 (tonnes).	B2 B1 B1 4	B1 for 3, 4 or 5 points plotted correctly, not joined, or B1 for all points plotted correctly but joined. Mark intention. FT from their line. B0 if no line drawn.
4. (a) Line or curve drawn from end of existing line to (08:30,0). Straight line drawn from (08:30, 0) to (08:45, 15:00). (b) 08:45 – 08:30 = 15 (min)	B1 B2 M1 A1 5	 FT their first line. B1 for straight line drawn from (08:30,0) with correct gradient. (500m every 5min) but not finishing at (08:45, 15:00), OR B1 for straight line finishing at the school with correct gradient but not starting immediately after the first line. FT 'their 08:45'.
5. 180 – (360/5) OR ((5-2) x 180) / 5 108 (º)	M1 A1 2	Or equivalent.
6. Suitable arcs drawn for 60° angle. 60° angle drawn with line 6cm long. Correct arcs drawn from the ends of the 10cm and 6cm lines. Lines of length 7cm and 4cm joining to complete the quadrilateral.	M1 A1 B1 B1 4	Allow ± 2º for the 60º angle, ±2mm for all lengths. Only award this B1 for the quadrilateral shown.
7.Area of one rectangle correctly evaluated (e.g. whole mirror) Area of two or more different white or black rectangles correctly evaluated A complete method of subtracting or adding areas e.g. 800 – (2×20×2 + 2×40×2 – 4×2×2) mirror wooden strips overlap = 576(cm^2) QWC: Look for • correct units used i.e. cm^2 • correct use of mathematical notation e.g. +, −,=. • spelling in at least 1 statement/sentence • clarity of text explanations QWC2: Candidates will be expected to • present work clearly, with words or quantities shown for clarity of process or steps AND • make few if any mistakes in mathematical form, spelling, punctuation and grammar in their answer QWC1: Candidates will be expected to • present work clearly, with words or quantities shown for clarity of process or steps OR • make few if any mistakes in mathematical form, spelling, punctuation and grammar in their answer	B1 B1 M1 A1 QWC 2 6	*Possible calculation for the white pieces:* *4 corner pieces 4×2×2 (assuming squares)* *2 long rectangles 2×12×2* *2 tall rectangles 2×32×2* *Centre piece 12×32* *OR B1B1M1A1 for 36×16 = 576(cm^2)* CAO 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.

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GCSE Mathematics - Unitised Unit 3 Higher Tier November 2014	Mark	Final Mark Scheme
8. (a) 2.4 or 2⅖ (b) $8x - 20 = 3x - 5$ $5x = 15$ $x = 3$ (c) One correct evaluation $1.5 \leq x \leq 1.6$ 2 correct evaluations $1.585 \leq x \leq 1.6$ one either side of 0 2 correct evaluations $1.585 \leq x \leq 1.595$ one either side of 0 *If evaluations not seen, accept 'too high' or 'too low'.* $x = 1.59$	B1 B1 B1 B1 B1 B1 M1 A1 8	FT until 2nd error. x $x^3 + 10x - 20$ x $x^3 + 10x - 20$ 1.5 -1.625 1.591 -0.063 1.51 -1.457 1.592 -0.045 1.52 -1.288 1.593 -0.028 1.53 -1.118 1.594 -0.010 1.54 -0.948 1.595 0.008 1.55 -0.776 1.596 0.025 1.56 -0.604 1.597 0.043 1.57 -0.430 1.598 0.061 1.58 -0.256 1.599 0.078 1.59 -0.080 1.6 0.096 The 2nd B1 can be gained by calculating a value that is too low in the range 1·585 to 1·6 AND stating clearly that 1·6 will be too high.
9. (First 2000 units cost) 13766(p) OR (£)137.66 (Remaining 16000 units cost) 47792(p) OR (£)477.92 1.05×61558 OR 1.05×615.58 (Total cost including VAT =) 64635.9(p) OR (£) 646.359 Monthly payment = £ 53.86	B1 B1 M1 A1 A1 5	 FT provided at least B1 awarded and both amounts considered. Accept rounded or truncated answer, to nearest penny. Must be correct to nearest penny.
10. (Distance^2 =) $4.9^2 - 4^2$ Distance^2 = 8.01 OR (Distance =) $\sqrt{8.01}$ (Distance =) 2.8(30…) (m)	M1 A1 A1 3	
11. Sight of the mid-points 77.5, 82.5, 87.5, 92.5 $77.5 \times 4 + 82.5 \times 13 + 87.5 \times 17 + 92.5 \times 6$ (=3425) (310 + 1072.5 + 1487.5 + 555) ÷ 40 = 85(.625) (yards)	B1 M1 m1 A1 4	FT their mid-points from within or at the bounds of the groups.
12. $12/\tan 72°$ = 3.8(990…) AC = 7.79(80…) OR 7.8	M2 A1 A1 4	M1 for $\tan 72° = 12/x$ Only accept 8 from correct working
13. Correct numerical representation of the numbers involved e.g. 500,000,000,000 or 5×10^{11} or 500×10^9 Multiplication using the correct numbers $= 1.5 \times 10^{23}$	B1 M1 A1 3	Accept correct representation of one of the numbers. If no marks gained, SC1 for an answer expressed in standard form following through from their consistent representation of each number.
14. OA=OC (or OA=OD) and OB=OD (or OB=OC) (all radii) AND angle AOB = angle COD (vertically opposite angles) (Therefore the triangles are congruent) SAS	M2 A1 3	M1 for one correct statement. These may be seen on the diagram. *One alternative method: M2 angle BAO = angle DCO and angle ABO = angle CDO (angles in the same segment) AND AO = OC (both radii). M1 for 1 pair of equal angles and equal radii. A1 for triangles are congruent (AAS).*
15. (a) $3a^2(3ab + 2)$ (b) $(x + 10)(x - 2)$ $x = -10$ AND $x = 2$	B2 M2 A1 5	B1 for $3a^2(3ab + \ldots)$ OR $3a^2(\ldots + 2)$ OR for correct partial factorisation. M1 for $(x \ldots 10)(x \ldots 2)$ FT their brackets, providing M1 awarded
16. (Volume of cube =) 343 (cm^3) (Volume of a sphere =) $4/3 \times \pi \times 1.5^3$ = 14.13 to 14.14 (cm^3) (Maximum number of spheres =) 343/14.1… = 24	B1 M1 A1 M1 A1 5	Accept sight of 343 in working. FT their values provided first M1 awarded. FT provided rounding required.

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GCSE Mathematics - Unitised Unit 3 Higher Tier November 2014	Mark	Final Mark Scheme
17. (PQ =) (12.6/sin44) × sin28 (PQ =) 8.5(154…) (cm)	M2 A1 3	M1 for PQ/sin28 = 12.6/sin44 or equivalent
18. Volume scale factor = 3510/130 = 27 Length scale factor = 3 Height of water = 12/3 = 4 (cm)	M1 A1 M1 A1 4	FT cube root of their 27 provided M1 awarded. *Alternative:* *M2 for $h^3=12^3\times130/3510$. M1 for $(h/12)^3= 130/3510$ or equivalent.* *m1 for* $h = \sqrt[3]{12^3 \times \frac{130}{3510}}$ *. A1 for 4(cm).*
19. (a) 5(x + 1) + 4(x – 2) as numerator AND (x – 2)(x + 1) as denominator OR multiply throughout by (x – 2) and (x + 1) 5(x + 1) + 4(x – 2) = 2(x – 2)(x + 1) $0 = 2x^2 - 11x - 1$ (b) $x = \frac{11\pm\sqrt{(-11)^2-4\times2\times(-1)}}{2\times2}$ $x = \frac{11 \pm \sqrt{129}}{4}$ x = 5.59 and x = -0.09 (Answers to 2 d.p.)	M2 A1 A1 M1 A1 A1 7	Brackets required or implied later. M1 for either correct numerator or denominator, or multiply throughout with 1 error. convincing Allow one error, in sign or substitution, but not in the formula CAO CAO
20. (a) Uniform scale on the vertical axis starting at 0 in blocks of 0.5. Appropriate width bars of height 1.4, 2.6, 2. (b) 6	B1 B2 B1 4	 FT their scale for all remaining marks provided not frequencies used. B1 for 2 correct bars or B1for sight of correct frequency densities stated.
21. a) Tangent drawn at x = 1. Idea of increase in *y*/increase in *x*. Gradient from a reasonable tangent. (b) Split into 3 areas and attempt to sum (Area =) ½×1(3 + 2×5 + 2×11 + 21) = 28 (units^2)	S1 M1 A1 M1 M1 A1 6	*Alternative method: M1 for (dy/dx) = 4x* *A1 for 4×1* *A1 for 4* Or equivalent. Award for up to 1 error in reading scale. CAO

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Surname	Centre Number	Candidate Number
Other Names		0

GCSE

4353/01

MATHEMATICS (UNITISED SCHEME)
UNIT 3: Calculator-Allowed Mathematics
FOUNDATION TIER

A.M. TUESDAY, 17 June 2014

1 hour 30 minutes

ADDITIONAL MATERIALS

A calculator will be required for this paper.

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 or use the π button on your calculator.

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.	**6**	
2.	**3**	
3.	**2**	
4.	**5**	
5.	**6**	
6.	**6**	
7.	**1**	
8.	**10**	
9.	**5**	
10.	**5**	
11.	**3**	
12.	**5**	
13.	**5**	
14.	**3**	
15.	**2**	
16.	**4**	
17.	**2**	
18.	**3**	
19.	**4**	
Total	**80**	

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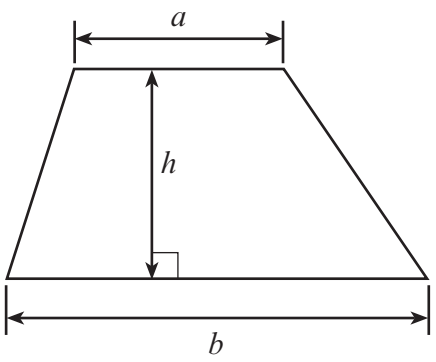
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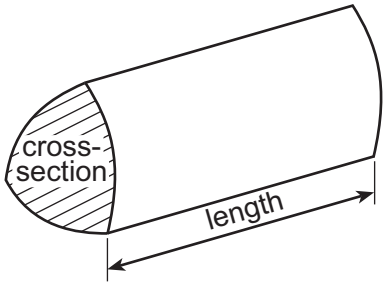
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Formula List

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



Volume of prism = area of cross-section × length



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Examiner only

1. *(a)* Barry works in a restaurant and he is paid different rates of pay depending on the days he works.

Complete the summary of his earnings for last week. [4]

Days worked	Hours worked	Rate of pay	Earnings
Monday to Friday	16 hours	£6 per hour	£
Saturday	5 hours	£6.84 per hour	£
Sunday	2 hours	£7.40 per hour	£
		Total	£

(b) Barry is paid 5% of his total week's earnings as a bonus.

How much was Barry paid as a bonus last week? [2]

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4353 010003

2. Write 457·832

(a) correct to 1 decimal place, [1]

.....

(b) correct to the nearest whole number, [1]

.....

(c) correct to the nearest hundred. [1]

.....

3. Use the formula $M = 4A - 6B$ to find the value of M when A = 8 and B = 3. [2]

.....

.....

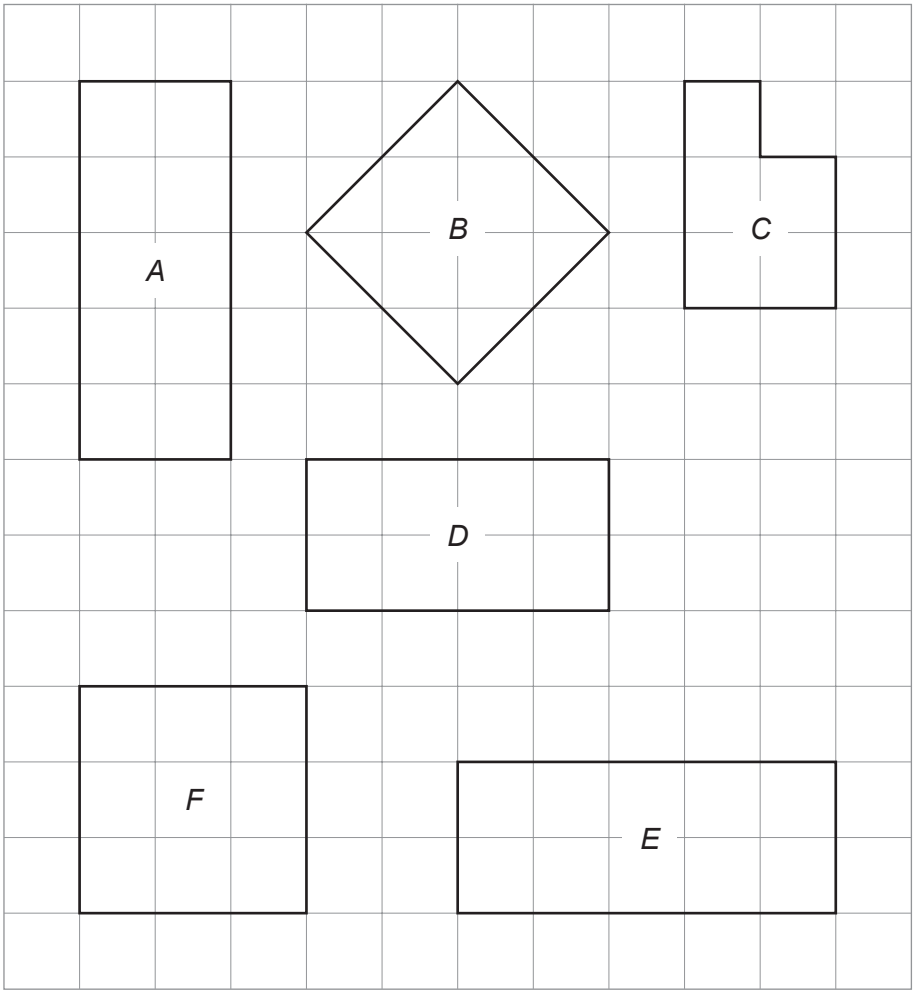
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4. Some shapes are drawn on 1 cm squared paper.



(a) Which shape is congruent to shape *A*? [1]

.....

(b) Which **two** shapes are similar but not congruent? [1]

.....

(c) Which shape has half the area of shape *E*? [1]

.....

(d) (i) Find the perimeter of shape *F*. [1]

Perimeter = ... cm

(ii) Which shape has the same perimeter as shape *F*? [1]

.....

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5. A jar contains a total of 24 marbles.

- The marbles are only red, yellow, blue or green.
- There are 8 red marbles.
- The number of yellow marbles is half the number of red marbles.
- There is an equal number of blue and green marbles.

(a) Use this information to fill in the table. [2]

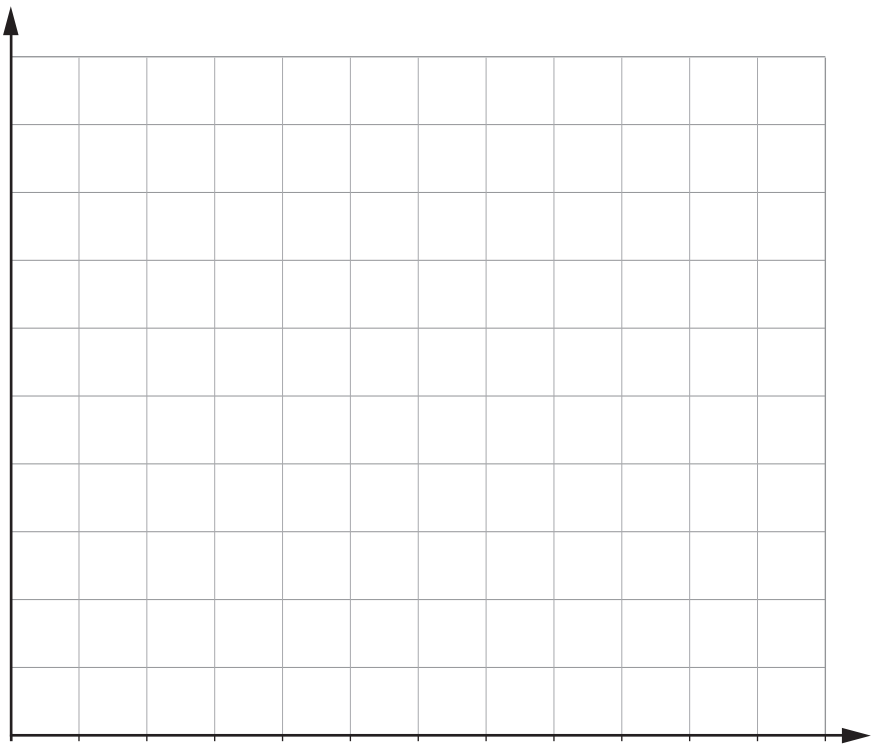
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Colour of marbles	Red	Yellow	Blue	Green
Number of marbles	8			

(b) Draw a bar chart to show the number of red, yellow, blue and green marbles in the jar. [4]



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

Jane has £15 to spend on buying packets of biscuits.
A packet of biscuits costs 89p.

She buys as many packets of biscuits as possible.

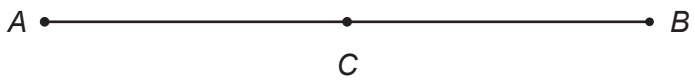
How many packets of biscuits does she buy and what change does she receive?
Show all your working. [6]

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7. Draw a circle with its centre at *C* that passes through the points *A* and *B*. [1]



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8. *(a)* The table shows the minimum temperature recorded on 1st December in seven cities around the world.

City	Berlin	Calgary	Cardiff	Delhi	Milan	Moscow	New York
Temperature (°C)	0	–39	11	42	11	1	–5

(i) What is the difference in temperature between the warmest and coldest cities? [2]

.....

.....

(ii) What is the median temperature recorded? [2]

.....

.....

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(b) The table shows the midday temperature readings that were recorded in Cardiff on the first day of each month.

Month	Jan.	Feb.	Mar.	Apr.	May	June	Jul.	Aug.	Sept.	Oct.	Nov.	Dec.
Temperature (°C)	1	4	2	7	11	16	17	21	19	10	7	11

(i) Find the mean and range of these temperature readings and complete the table below. [4]

.....

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	Cardiff	Paris
Mean midday temperature (°C)		15·8
Range of midday temperatures (°C)		29

(ii) Midday temperature readings were also recorded on the first day of each month in Paris.

The mean was found to be 15·8°C and the range was 29°C.

Use the mean and range to compare the temperatures recorded in Cardiff and Paris. [2]

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9. *(a)* Complete an accurate drawing of triangle XYZ in which $XY = 8\,\text{cm}$, $\hat{YXZ} = 98°$ and $\hat{XYZ} = 40°$. The line XY has been drawn for you. [3]

X ——————————————— Y

(b) Using a ruler and a pair of compasses, construct the perpendicular bisector of the line PQ. [2]

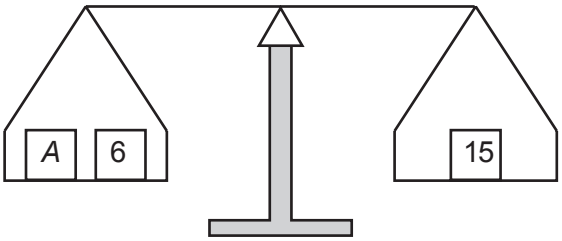
P ——————————————— Q

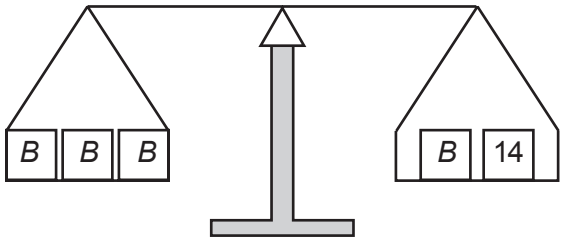
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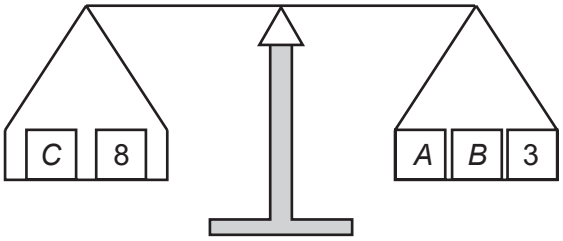
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10. Each diagram represents a balance with the total weight on each side being equal.
Find the values of *A*, *B* and *C*. [5]







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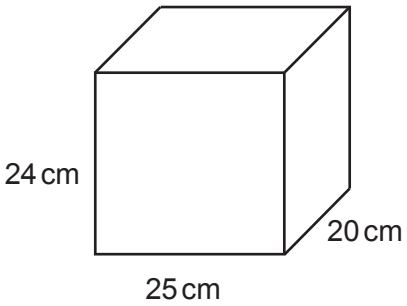
A = ... *B* = ... *C* = ...

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11. A jug holds one and a half litres of water when full.
A tank has dimensions 25 cm by 24 cm by 20 cm.



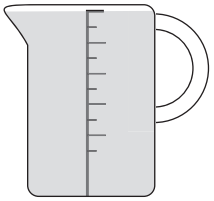


Diagram not drawn to scale

How many full jugs of water will it take to fill the tank? [3]

12. *(a)* Solve $3x + 4 = 25$. [2]

(b) Given that $P = \frac{1}{2}Q + 5R$, find R when $P = 75$ and $Q = 50$. [3]

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13. Mr Jones pays for his gas by 12 **equal** monthly payments.
Each monthly payment is worked out using the following information.

- Mr Jones uses 15 000 units of gas in a year.
- The cost of gas is 4.028 pence per unit used.
- There is a fixed charge of £6.98 **per month**.
- There is a discount of £48 per year.

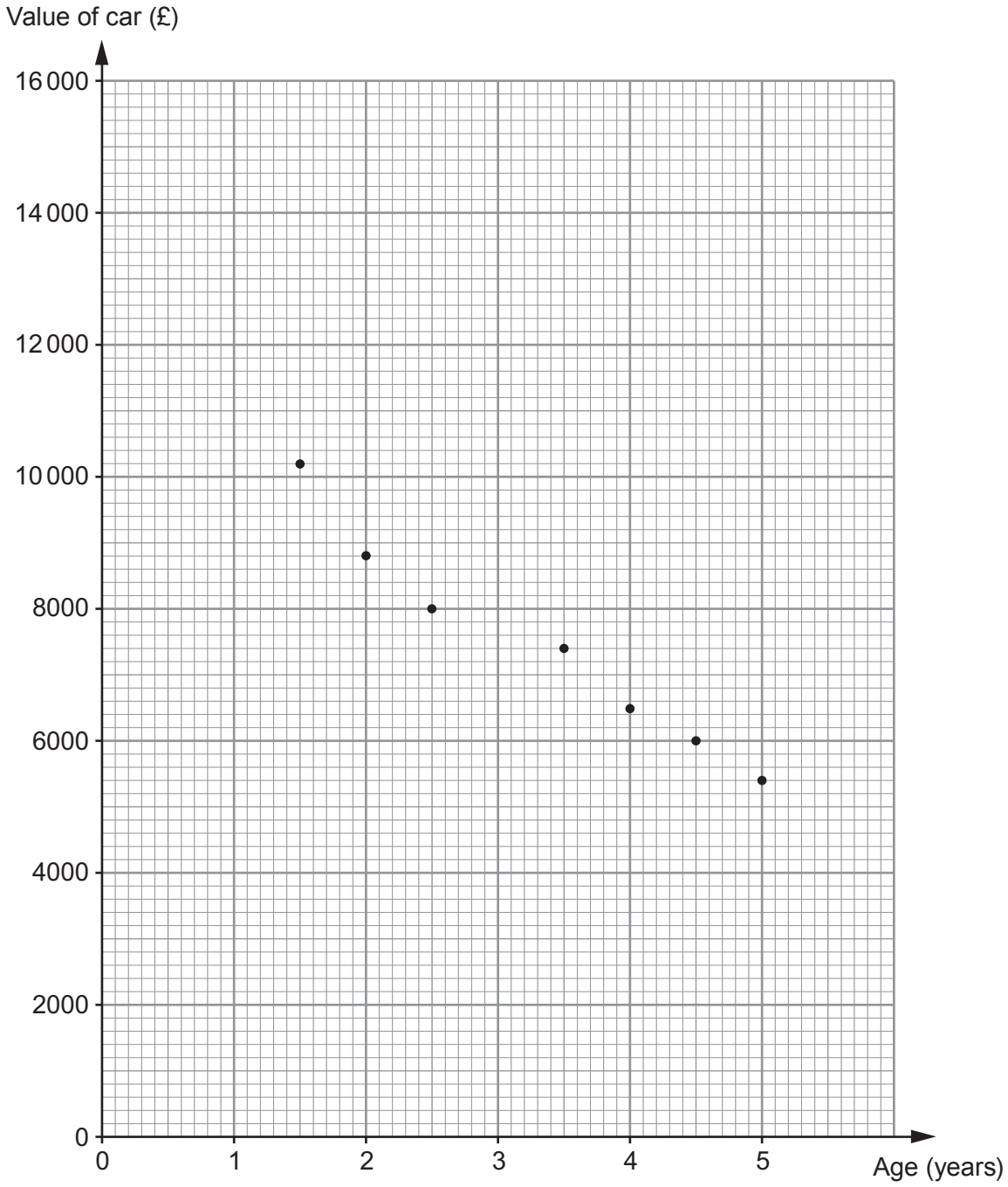
Calculate Mr Jones's **monthly payment**. [5]
You must show all your working.

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14. The scatter diagram shows the values and ages of cars of a particular model.



(a) Write down the value of the oldest car. [1]

.....

(b) Draw, by eye, a line of best fit on the scatter diagram. [1]

(c) Use your line of best fit to estimate the value of a 3-year-old car of this model. [1]

.....

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15. Evaluate $\dfrac{\sqrt[3]{90}}{10{\cdot}5 - 7{\cdot}74}$. Give your answer correct to 2 decimal places. [2]

.....

.....

16. Two brothers, Gethin and David, share a sum of money in the ratio 2 : 7.
David gets £30 more than Gethin. Calculate how much money the brothers share. [4]

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17. The diagram below shows part of a regular polygon.
Calculate the number of sides of this regular polygon. [2]



Diagram not drawn to scale

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18. Solve the equation $3(x - 2) = x + 2$. [3]

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19. In a speedboat race, competitors travel 8·5 km south from the start to buoy *A*. Then they travel 7 km east to buoy *B* and then travel directly back to the start. Calculate the total distance that the competitors travel in the race. [4]

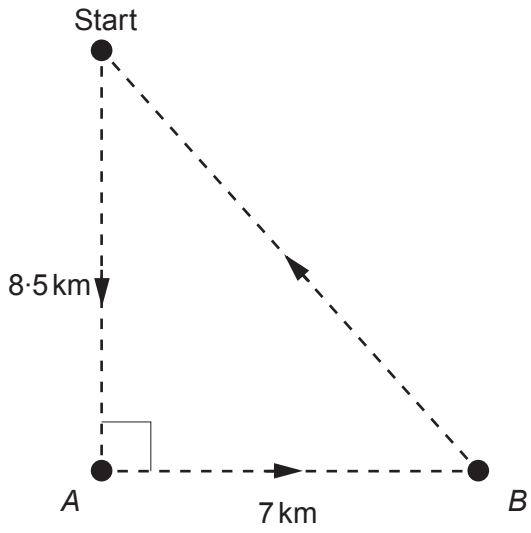


Diagram not drawn to scale

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 3 - Higher Tier	15

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UNIT 3 - FOUNDATION TIER

June 2014 UNIT 3 (calculator allowed) Foundation Tier	✓	Mark	Comments
1. **Ribbon marking for 1(a) and 1(b)** (a) (£)96 (£)34.2(0) (£)14.8(0) Total = 96 + 34.2(0) + 14.8(0)=(£)145 (b) 0.05×(£)145 or equivalent (£) 7.25	 ✓ ✓ ✓ ✓ 	 B1 B1 B1 B1 M1 A1 6	 FT candidate's values. FT 'their total'. (£) 152.25 gets M1 A1
2. (a) 457.8		B1 1	
2. (b) 458		B1 1	
2. (c) 500		B1 1	
3. 14		B2 2	B1 for sight of 32 or (–) 18
4. (a) E (is congruent to A)		B1	
4. (b) B and F (similar but not congruent)		B1	
4. (c) C (has half the area of shape E)		B1	
Ribbon marking for 4(d)(i) and 4(d)(ii) 4. (d) (i) 12 (cm) (ii)D (has the same perimeter as shape F)		 B1 B1 5	
5. **Ribbon marking for 5(a) and 5(b)** (a)Yellow = 4 Blue = 6 and Green = 6 (b) Both axes labelled, eg Frequency or number along vertical axis, Red, Yellow, Blue, Green along horizontal axis **and** uniform scale for frequency axis starting at 0. Four bars at correct heights and equal widths.	 ✓ ✓ ✓ ✓	 B1 B1 B2 B2 6	 FT their yellow provided whole number Or suitable code e.g. R, Y, B, G. F.T. their table values. B1 for any 2 or 3 correct bars on F.T.

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June 2014 UNIT 3 (calculator allowed) Foundation Tier	✓	Mark	Comments
6. (number of packets=)(£)15 ÷ 0.89 (=16.853932..)	✓	M1	1500 ÷ 89 or appropriate method.
16 (packets can be purchased)	✓	A1	
(Change=)(£)15 - 16 × (£) 0.89 or 1500(p)−16×89(p)	✓	M1	FT number of packets of biscuits
(£)0.76 or 76(p)	✓	A1	A0 for £76 or 0·76p
Look for • Spelling • Clarity of text explanations, • Consistent use of £ or p signs.	✓ ✓	QWC	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 and steps AND • Make few, if any, mistakes in mathematical form, spelling, punctuation and grammar in their final answer.			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 weakness 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 in their final answer.			QWC0 Evident weakness in organisation of material, and errors in use of mathematical form, spelling, punctuation and grammar.
		6	
7. Circle with AB as diameter		B1 1	Intention of circle accepted.
8. (a) (i) identify warmest and coldest (42°C and −39°C) and intention to subtract.		M1	M0 A0 for 42−39=3 M1A0 for −39−42=-81
81 (°C)		A1	M1A0 for 42− −39=3
8. (a) (ii) order data (−39, −5, 0, 1, 11, 11, 42) (median) 1 (°C)		M1 A1 4	Allow M1 for data ordered with one omitted. CAO
8. **8b(i) and 8b(ii) ribbon marked 8b(i) to be viewed with table below**			
(b) (i) Sum of numbers (126)	✓	M1	For an attempt to add the numbers
Sum/12	✓	m1	For a division by 12. FT one slip. (1+4+2+7+11+16+17+21+19+10+7+11)/12 gets M1 m1
	✓	A1	CAO
(mean=) 10·5 (°C)	✓	B1	
(range = 21 – 1=) 20		B2	B1 for a numerical comparison of mean and range with correct interpretation of one of mean or range.
(ii) A correct statement, in context, involving meanand range with interpretation.		6	

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June 2014 UNIT 3 (calculator allowed) Foundation Tier	✓	Mark	Comments
9. **Use overlay** (a) Angle $YX\hat{Z} = 98^{\circ}$ Angle $XY\hat{Z} = 40^{\circ}$ Completed triangle		B1 B1 B1 3	Allow ± 2° Allow ± 2° Only if at least one angle correct. **Complete reflection of the triangle gets B2**
9. **Use overlay** (b) Appropriate arcs above and below the given line with perpendicular bisector correctly constructed.		B2 2	B1 for at least two correct arcs.
10. Finding *A*: $A = 9$ Finding *B*: $2B=14$ $B=7$ Finding C: $C+8= 9+7+3$ or equivalent $C=11$	✓ ✓ ✓ ✓	B1 B1 B1 B1 B1 5	Seen or implied. Correct answer need not be on written on answer line. Seen or implied. F.T their *A* and *B*
11. $25\times24\times20$ (cm^3) OR $25\times24\times20\div1000$ (litres) $\div1500$ (cm^3) $\div1{\cdot}5$(litres) 8 (jugs)		M1 m1 A1 3	Or correct volume in units. Consistent units CAO
12. (a) $3x= 21$ $x = 7$		B1 B1 2	FT $ax=b$ if $a\neq1$.B0 for $\frac{21}{3}$ or if b is a multiple of a and fraction not simplified on FT.
12. (b) $75 = ½ \times 50 + 5 \times R$ $75 - 25 = 5 \times R$ $R = 10$		B1 B1 B1 3	Correct substitution. Isolating *R* term FT $aR=b$ if $a\neq1$ Accept embedded answer.
13. (Annual cost of units) 15000×4.028(p) 60420(p) or (£)604.2(0) (Fixed charge per year £6.98 × 12 =) (£)83.76 (cost of units + fixed charge per year – 48) ÷12 (£639.96÷12 or 63996÷12) (Monthly payment=) (£)53.33 or 5333(p)	✓ ✓ ✓ ✓ ✓	M1 A1 B1 M1 A1 5	Alternative mark scheme- Monthly cost (Monthly cost of units=)$15000\div12\times4.028$(p) (£)50.35 or 5035(p) (Monthly discount=)(48÷12=)(£)4 (£)604.2(0) ÷12 + 6·98 – 4 . (=£50·35+6·98 – 4) (Monthly payment=)(£)53.33 or 5333(p)
14. Ribbon marked. To be viewed with graph. (a) (£) 5400 (b) Appropriate straight line of best fit, with some points above and below the line at each end of the line, or touching at least one point at each end of the line. (c) Answer should be approximately (£) 7800		B1 B1 B1 3	FT from their line. B0 if no line drawn.

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June 2014 UNIT 3 (calculator allowed) Foundation Tier	✓	Mark	Comments
15. 1·62		B2 2	B1 for 1.6(23697…). All digits given must be correct.
16. 5 parts = 30 OR 30 ÷ 5 OR 7x – 2x = 30 OR equivalent (1 part) = 6 (Amount shared =) 6 × 9 = (£) 54	✓ ✓ ✓ ✓	M1 A1 m1 A1 4	Accept 5/9=30 FT their 1 part, provided M1 awarded. Award M1A1m1 A0 for answers of £12 and £42.
17. **To be viewed with diagram.** 360 ÷ 45 = 8 sides		 M1 A1 2	 Or appropriate working using the internal angle.
18. 3x – 6 = x + 2 3x – x = 2 + 6 x = 4		B1 B1 B1 3	For expanding the bracket. FT until 2nd error. Accept embedded answers
19. **To be viewed with diagram.** $8{\cdot}5^2 + 7^2$ $\sqrt{121{\cdot}25}$ = 11(·011…km) (Race distance =) 26·5(113…km)	 ✓ ✓ ✓ ✓	 M1 A1 A1 B1 4	 FT "their 11·011"+15.5 provided Pythagoras' attempted.

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UNIT 3 - HIGHER TIER

June 2014 UNIT 3 Higher Tier	✓	Mark	Comments
1. (a) 1.62		B2	B1 for 1.6(23697…). All digits given must be correct.
1. (b) 9(2 – y)		B1	
1. (c) 0.4 or equivalent.		B2	B1 for sight of 4 OR -3.6.
1. (d) 0.3 OR 3/10		B1	Accept embedded answers.
1. (e) 3x – 6 = x + 2 3x – x = 2 + 6 x = 4		B1 B1 B1	For expanding the bracket. FT until 2nd error. Accept embedded answers.
2. Ribbon marked. To be viewed with graph. (a) (£) 5400 (b) Appropriate straight line of best fit, with some points above and below the line at each end of the line, or touching at least one point at each end of the line. (c) Answer should be approximately (£) 7800		 B1 B1 B1	 Mark intention. FT from their line. B0 if no line drawn.
3. (Annual cost of units) 15000×4.028(p) 60420(p) or (£)604.2(0) (Fixed charge per year £6.98 × 12 =) (£)83.76 (cost of units + fixed charge per year – 48) ÷12 (£639.96÷12 or 63996÷12) (Monthly payment=)(£)53.33 or 5333(p) QWC: Look for • units - p, £ • spelling in at least 1 statement/sentence • clarity of text explanations QWC2: Candidates will be expected to • present work clearly, with words or quantities shown for clarity of process or steps AND • make few if any mistakes in mathematical form, spelling, punctuation and grammar in their answer QWC1: Candidates will be expected to • present work clearly, with words or quantities shown for clarity of process or steps OR • make few if any mistakes in mathematical form, spelling, punctuation and grammar in their answer	 ✓ ✓ ✓ ✓ ✓ <

June 2014 UNIT 3 Higher Tier	✓	Mark	Comments
7. To be viewed with diagram.			
$(SB^2 =)\ 8.5^2 + 7^2$	✓	M1	
$(SB^2 =)\ 121.25$ or $SB = \sqrt{121.25}$	✓	A1	
$(SB =)\ 11(.011\ldots km)$	✓	A1	
(Race distance =) 26.5(113…km)	✓	B1	FT 'their 11.011' + 15.5 provided Pythagoras attempted.
8. **Use Overlay.**			
Correct line drawn.		B1	Mark intention ±2mm.
Correct arc drawn from B.		B1	±2mm.
Correct region identified within the triangle.		B1	FT for a region bounded by a straight line crossing AB and BC and an arc centre B but outside tolerances.
9. 920000 – 30000 (= 890000)		M1	OR $9.2\times10^5 - 0.3\times10^5$ OR $92\times10^4 - 3\times10^4$ OR 89×10^4 OR 890×10^3
$= 8.9 \times 10^5$		A1	
10. (Volume of block =) $10 \times 8 \times 5$ (=400) (cm^3)	✓	B1	
(Density of metal =) $1100 \div 400$ OR $1.1 \div 400$ OR $1.1 \div 0.0004$	✓	M1	FT 1100 or 1.1 ÷ 'their volume' provided it is a product. Volume may be given in another metric unit.
$= 2.75$ OR 0.00275 OR 2750	✓	A1	
Appropriate unit g/cm^3 kg/cm^3 kg/m^3	✓	U1	
11. Ribbon marked			
(a) 18, 40, 100, 184, 200		B1	
(b) Use Overlay. To be viewed with table from (a).			
Idea, unique vertical plotting of the upper class boundary consistently with the corresponding cumulative frequency.		M1	FT, for all marks, their cumulative frequencies, provided an attempt made to be cumulative.
2 points plotted correctly.		A1	
All points correct and joined by straight lines or a curve, including to 0.		A1	SC1 if points plotted at mid-points and joined by straight lines or a curve, including to0.
(c) To be viewed with graph from (b).			
200 – their reading at 250 evaluated correctly.		B2	Accept 130. B1 for sight of their reading at 250 OR 84+16+½ of 60.
12. Method of working with all 3 terms to clear the 2 fractions.	✓ ✓	M2	M1 for appropriate working for 2 of the 3 terms. Clearing implies denominator of 1.
Correctly expanding brackets and collecting like terms i.e.			
$(24x - 2 - 5x = -40$ leading to) $19x - 2 = -40$	✓	A1	FT provided at least M1 awarded. FT until 2nd error.
$x = -2$	✓	A1	Mark their final answer. *If no marks awarded SC1 for sight of (19x − 2)/10.*
13. To be viewed with diagram.			
15º marked on diagram or used correctly.	✓	B1	
$h = \tan 15º \times 700$ OR $h = 700/\tan 75°$	✓✓	M2	FT their angle of depression. M1 for $\tan 15º = h/700$ OR M1 for $\tan 75° = 700/h$
$h = 187(.564\ldots)$ or 188	✓	A1	An answer of 2612(.435…) may earn B0M2A1 or B1M0A0. Watch out for compensating errors.
14. Ribbon marked.			
(a) Use overlay.			
Calculation of at least 3 of the coordinates.		B1	(-2,8) (-1,3) (0,0) (1,-1) (2,0) (3,3) (4,8)
Plotting at least 4 correct points.		P1	
Correct curve.		C1	CAO.
(b) To be viewed with graph from (a).			
0 and 2		B1	FT from their non-linear graph.
(c) To be viewed with graph from (a).			
Rearranging equation to $x^2 - 2x = x + 1$		M1	
Line $y = x + 1$ drawn		A1	
Solution of approximately -0.3 AND 3.3		A1	FT their curve. A solution obtained using the formula gets M0A0A0.
15. To be viewed with diagram.			
$(35/360)\times2\pi\times25$		M1	
$= 15.2(...)$ up to 15.3		A1	Accept an answer of 15 from correct working.
16. $p = k/r^2$ or $p \propto 1/r^2$		B1	
$6 = k/3^2$		M1	FT for non-linear start only.
$p = 54/r^2$		A1	

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June 2014 UNIT 3 Higher Tier	✓	Mark	Comments
17. To be viewed with diagram. (Area =) $(6x+4)(x+2)/2$ $3x^2 + 8x + 4 = 10$ OR $6x^2 + 16x + 8 = 20$ $3x^2 + 8x - 6 = 0$ OR $6x^2 + 16x - 12 = 0$ $\frac{-8 \pm \sqrt{(8^2 - 4\times3\times-6)}}{2\times3}$ OR $\frac{-16 \pm \sqrt{(16^2 - 4\times6\times-12)}}{2\times6}$ $(-8 \pm \sqrt{136})/6$ OR $(-16 \pm \sqrt{544})/12$ x = 0.6(10... or -3.276…) x = 0.6(10...)	✓ ✓ ✓ ✓ ✓ ✓ ✓	M1 m1 A1 M1 A1 A1 A1	Allow 1 slip. CAO. FT their equation provided it's a quadratic of comparable difficulty. Allow one slip in substitution. CAO from 'their quadratic.' CAO from 'their quadratic.' Realisation that x = -3.2 is not a valid solution. FT provided 2nd M1 awarded AND 1 possible and 1 impossible solution.
18. To be viewed with diagram. Strategy to find AD using sine rule, equating it to BC, then using cosine rule to find angle BFC. $AD = 10/\sin68 \times \sin60$ AD = 9(.340…) $\cos BFC = \frac{14^2 + 18^2 - AD^2}{2\times14\times18}$ (0.8586452...) *BFC* = 30.8(351…º)	✓ ✓ ✓ ✓ ✓	S1 M2 A1 M2 A1	M1 for AD/sin60 = 10/sin68 FT their derived AD. M1 for $AD^2 = 14^2 + 18^2 - 2\times14\times18\times\cos BFC$
19. (a) Correct sketch, with inflection points at (0,0), (180,0) and (360,0) AND vertical asymptotes at x = 90 and x = 270.		B2	B1 for a sketch with inflection points at (0,0), (180,0) and (360,0) OR vertical asymptotes at x = 90 and x = 270.
19. (b) 116(.565…º) or 117 (°) 296(.565…º) or 297(°)		B1 B1	 FT 180 + their first angle. MR-1 if additional angles given within the range 0 to 360.

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Surname	Centre Number	Candidate Number
Other Names		0

GCSE

4353/01

MATHEMATICS (UNITISED SCHEME)

UNIT 3: Calculator-Allowed Mathematics FOUNDATION TIER

A.M. MONDAY, 20 January 2014

1 hour 30 minutes

ADDITIONAL MATERIALS

A calculator will be required for this paper.

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 or use the π button on your calculator.

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.	**7**	
2.	**2**	
3.	**5**	
4.	**3**	
5.	**3**	
6.	**5**	
7.	**2**	
8.	**2**	
9.	**6**	
10.	**5**	
11.	**2**	
12.	**6**	
13.	**6**	
14.	**6**	
15.	**4**	
16.	**5**	
17.	**3**	
18.	**2**	
19.	**3**	
20.	**3**	
Total	**80**	

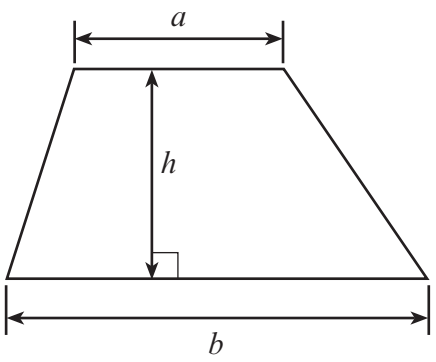
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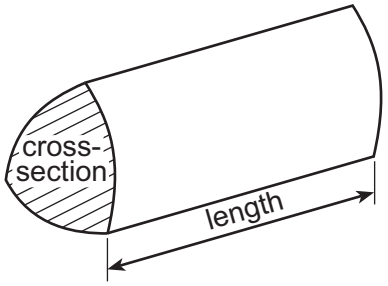
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Formula List

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



Volume of prism = area of cross-section × length



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1. Susan bought some Christmas items in the January sales.

(a) Complete her bill. [4]

Item	Cost
5 packs of Christmas cards at £1.20 per pack	£
4·5 metres of tinsel at 82p per metre	£
40 tree decorations at £1 for 10 decorations	£
Total	£

(b) A special offer gives one free roll of Christmas wrapping paper with every £5 spent.
How many free rolls of wrapping paper will Susan receive? [1]

.....

.....

(c) Christmas tree lights were priced at £11.98 before the sale.
In the sale, the price is reduced by 50%.
How much will Susan have to pay if she buys the Christmas tree lights in the sale? [2]

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Turn over.

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2. Write 57·3826

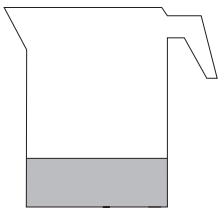
(a) correct to the nearest whole number, [1]

.....

(b) correct to one decimal place. [1]

.....

3. A measuring jug contains 500 ml of water.
750 ml of water is added to the jug.



(a) What is the new volume of water in the jug in millilitres? [1]

.....

(b) Some of the water is poured away until there is 250 ml left.
How much water was poured away? Give your answer in litres. [2]

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(c) A cup holds 80 ml of water when full.
How many cups can be completely filled with the 250 ml of water from the jug? [2]

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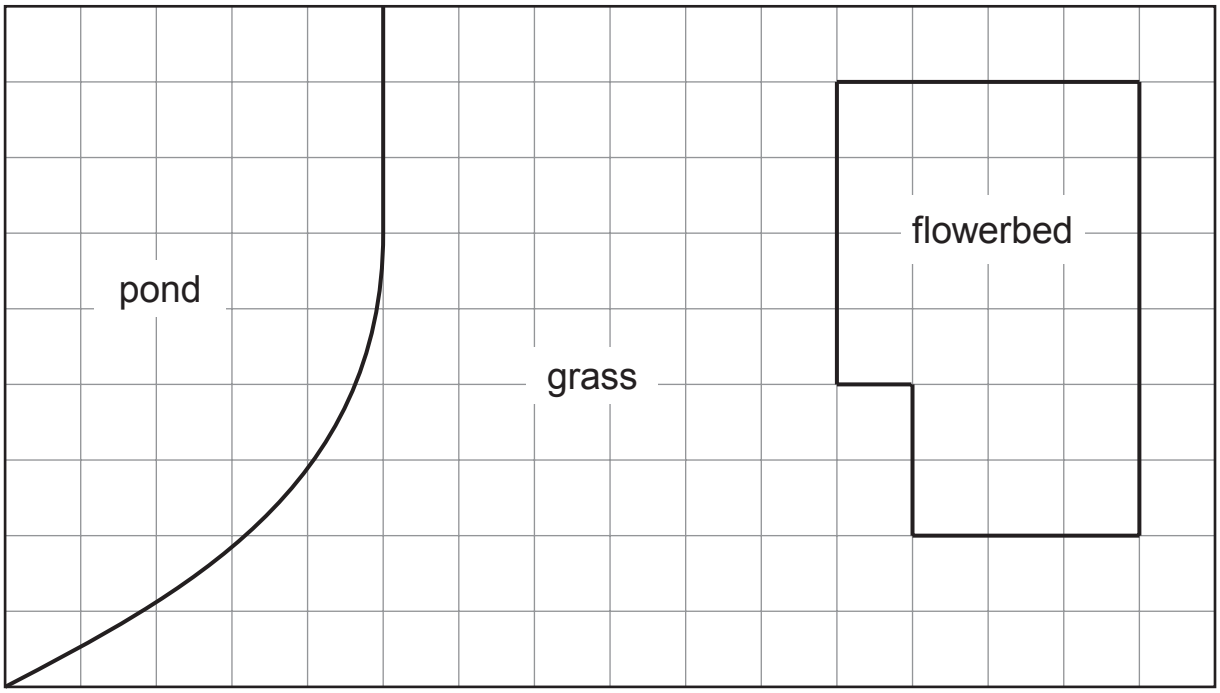
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4. The following plan shows a garden made up of a pond, a flowerbed and a grassed area. Each square on the grid represents an area of $1\,m^2$.



(a) Find an estimate for the area of the pond. [2]

.....

.....

(b) Find the perimeter of the flowerbed. [1]

.....

.....

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5. Find the exact value of each of the following.

(a) $5 \cdot 6^2$ [1]

.....

(b) 4 to the power of 5 [1]

.....

(c) the square root of 28·09 [1]

.....

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



Entry to Caerlech Castle

Adult £4.95
Child £4.60
Family ticket £14.50
(A family ticket provides entry for 2 adults and all children under 16 in the family)

Mr and Mrs Jones and their three children visit Caerlech Castle.
The children are all under 16 years of age.

How much cheaper is it for the Jones family to buy a family ticket compared with buying individual tickets?
You must show all your working. [5]

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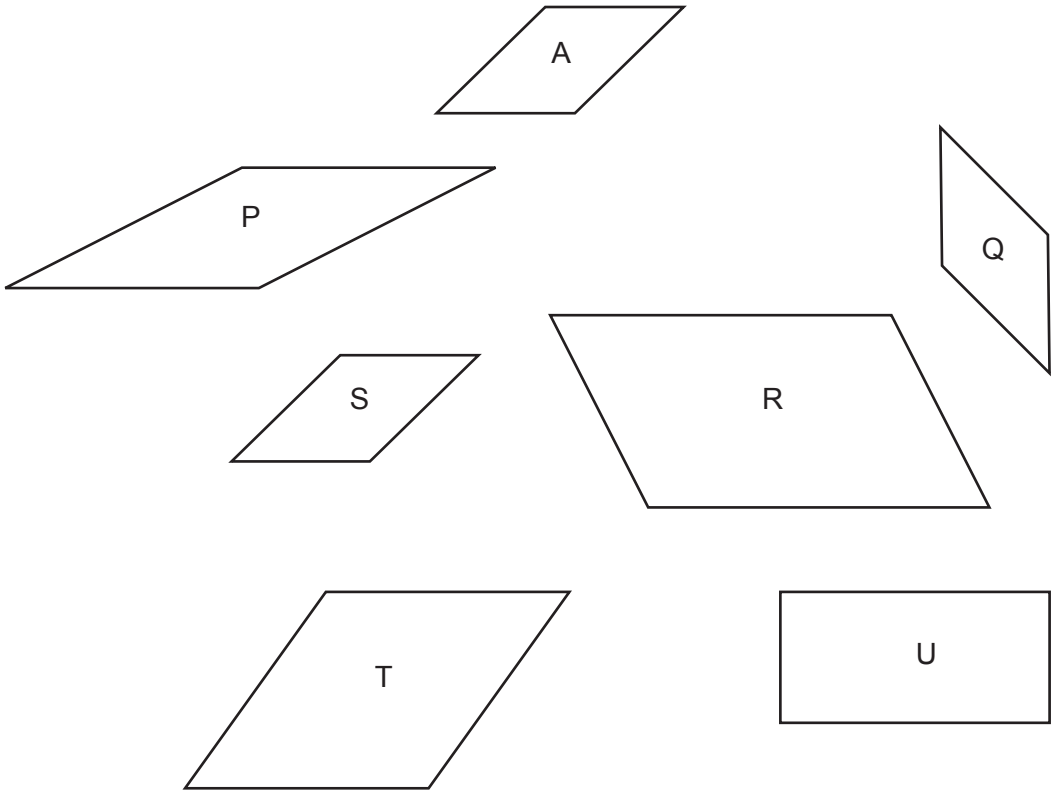
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7.



Which of these shapes are congruent to shape A? [2]

.....

8. *(a)* Solve $a + 6 = 19$. [1]

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(b) Solve $6b = 42$. [1]

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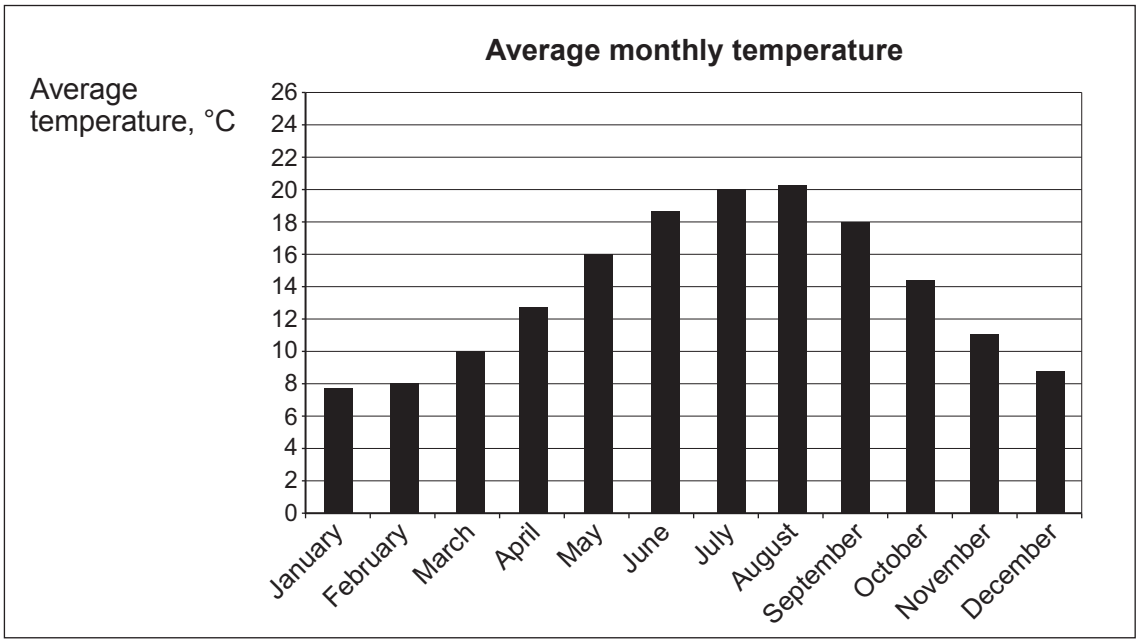
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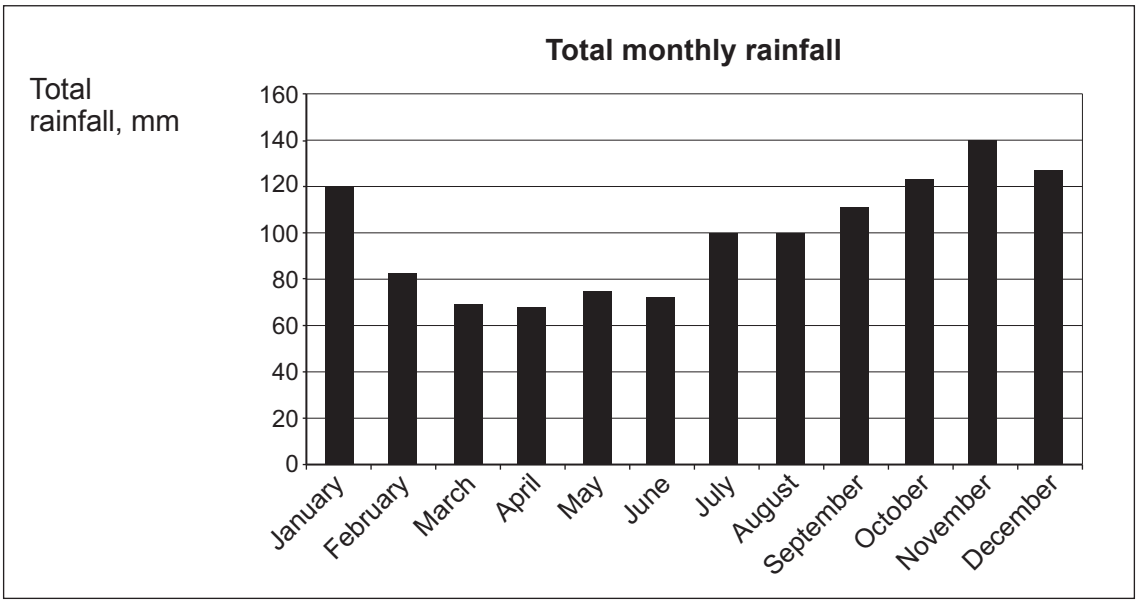
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9. The graphs below show the average monthly temperature and the total monthly rainfall in Swansea Bay during 2013.





(a) Which month had the lowest total monthly rainfall? [1]

.....

(b) What was the average temperature in the month with the highest total rainfall? [1]

.....

(c) What was the total monthly rainfall in the warmest month? [1]

.....

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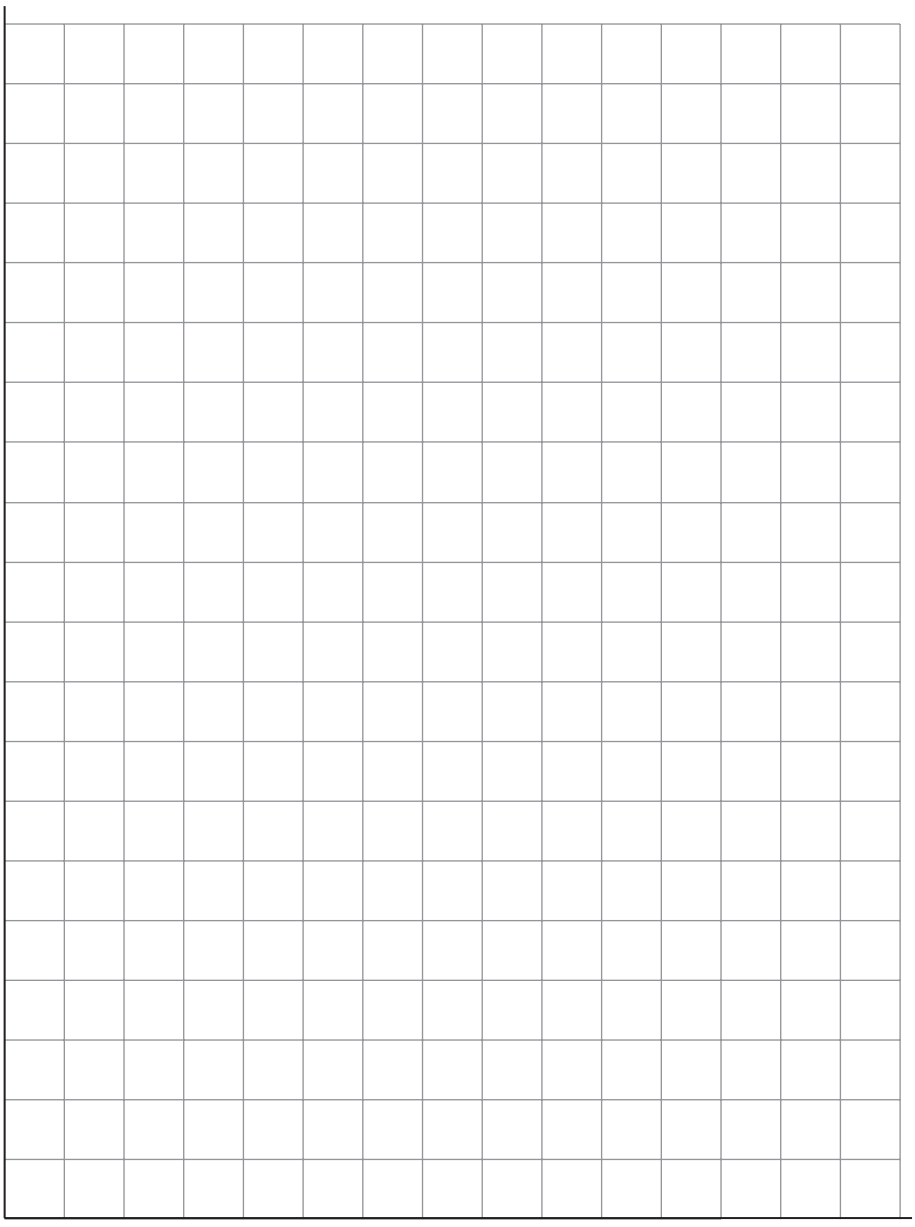
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(d) The average monthly sunshine hours recorded at Swansea Bay for the four seasons of 2013 are given in the table below.

Season	Spring	Summer	Autumn	Winter
Average monthly sunshine hours	160	190	100	60

Using the squared paper below, draw a suitable bar chart for the data given in the table. [3]



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10. In a quiz, there are 20 questions in a round.
A contestant scores

+5 points for each correct answer,

–3 points for each incorrect answer,

–2 points for each question not answered.

Alyn and Gwen are two contestants in the quiz.

(a) Alyn answers 12 questions correctly, answers 5 questions incorrectly and does not answer 3 questions.
What is his final score? [2]

(b) After 19 questions, Gwen's score was 87 points.
After 20 questions, Gwen's score was 85 points.

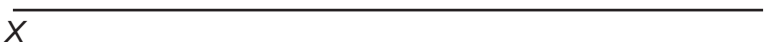
Explain, showing your calculations, how Gwen may have answered the 20 questions. [3]

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11. Using a ruler and a pair of compasses, construct an angle of 60° at the point *X*. [2]



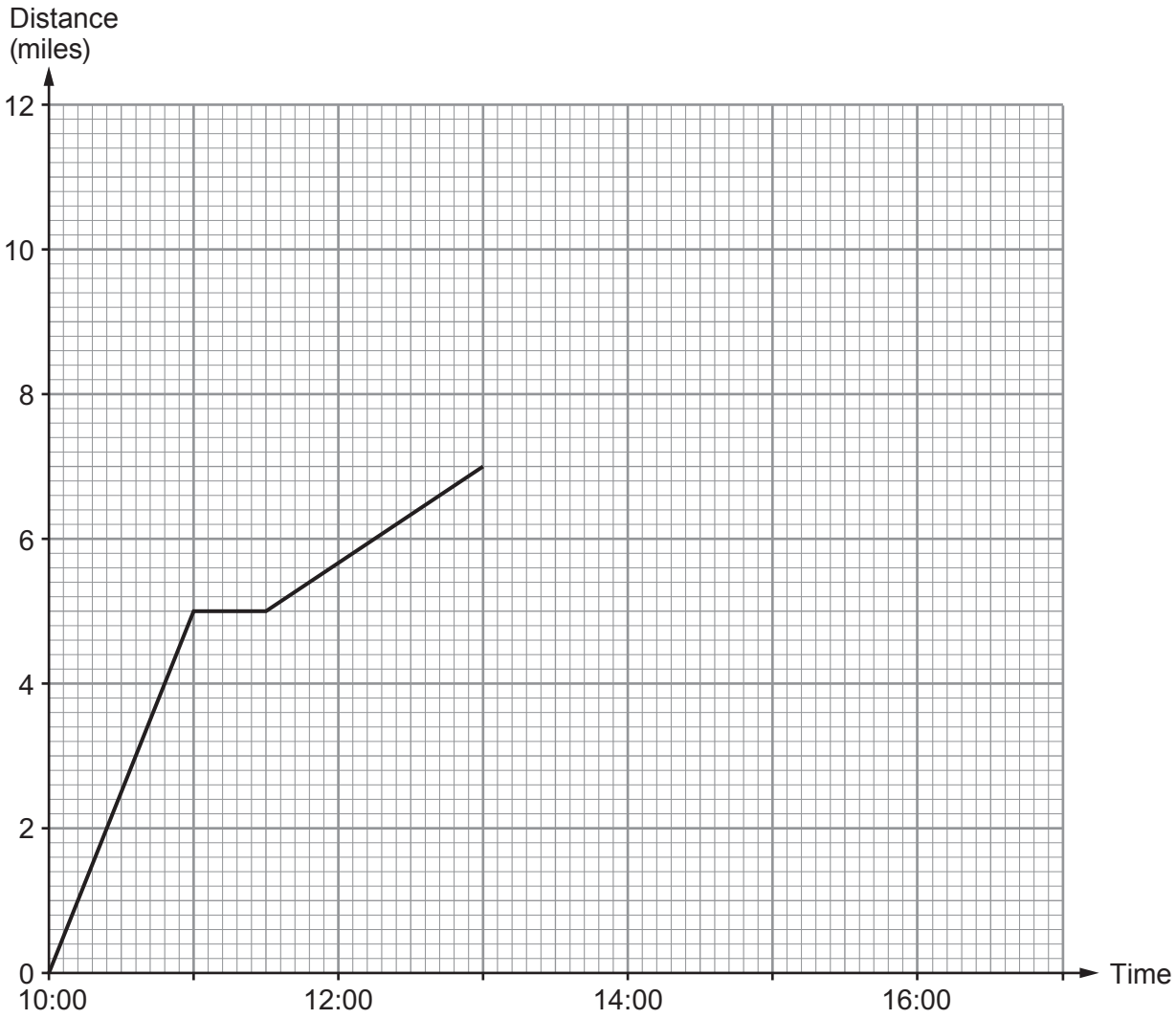
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12. David has completed a 12-mile walk.
David has drawn a graph of distance against time for the first stage of his journey.



(a) How far did David walk in the first hour? [1]

.....

(b) David stopped for a rest. For how many minutes did he stop? [1]

.....

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(c) Without calculating any speeds, explain how the graph shows that David walked more slowly after his rest. [1]

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(d) At 13:00 David stopped for a lunch break for one hour.
David then continued his walk at a constant speed.
He completed his 12-mile walk at 16:12.
Complete the graph of David's walk. [3]

13. A cardboard box is in the shape of a cuboid measuring 45 cm by 26 cm by 23 cm.

Small wooden blocks are cubes of length 5 cm.

(a) What is the maximum number of wooden blocks that can be packed inside the cardboard box? [3]

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(b) The empty cardboard box weighs 400 grams.
Some of the wooden blocks are put in the box.
Each wooden block weighs 60 grams.
The total weight of the box and the blocks is 1600 grams.
How many blocks are there in the box? [3]

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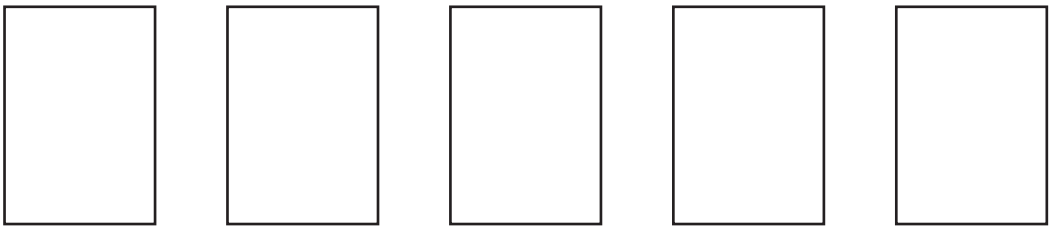
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14. *(a)* Given that $A = 4B + 5C$, find C when $A = 57$ and $B = 3$. [3]

(b) Solve the equation $6x - 19 = 2x + 12$. [3]

15.



Five **single digit numbers** need to be written on the cards above.
The median, mode, mean and range of the numbers must all be 5.
Write a possible set of **single digit numbers** on the cards, in ascending order. [4]

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16. Alan, Ben and Carwyn are three brothers.
Alan has 3 children, Ben has 2 children and Carwyn has 1 child.

(a) Alan, Ben and Carwyn's parents win £5700.
They decide to share this money between Alan, Ben and Carwyn, in the ratio of the number of children that they each have.
How much money does each brother receive?
You must show all your working. [3]

(b) Alan is happy with this suggestion.
Carwyn argues that it is unfair and that the money should be divided equally between the three brothers.
Will this way of sharing the money affect Ben's share? Show your working. [2]

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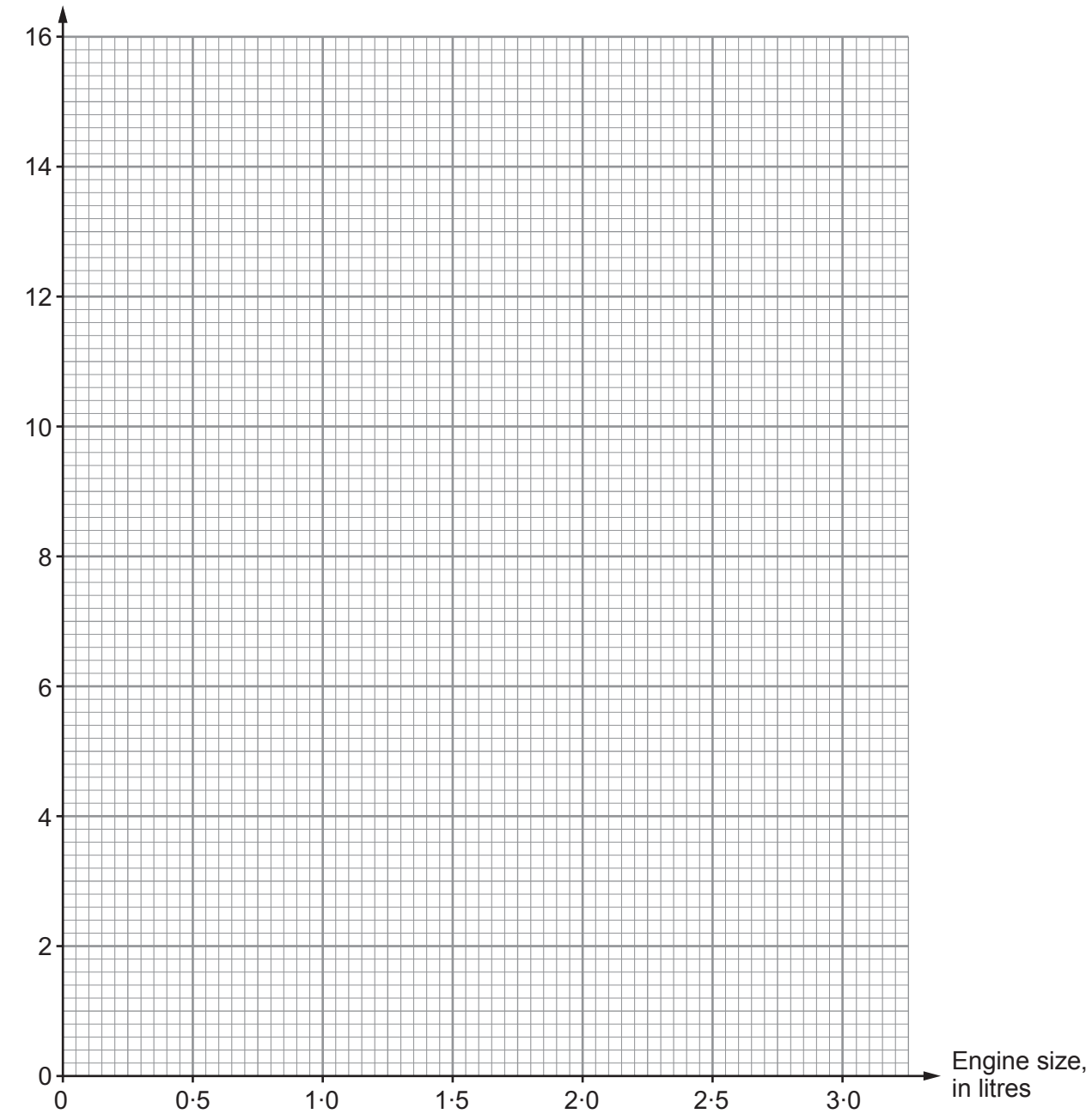
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17. The table shows the engine sizes of six cars and the distance they each travel per litre of petrol.

Engine size, in litres	1·0	2·2	1·4	2·0	2·5	1·7
Distance travelled per litre, in km	12·0	7·4	10·6	7·6	5·8	8·2

(a) Draw a scatter diagram to display this data. [2]



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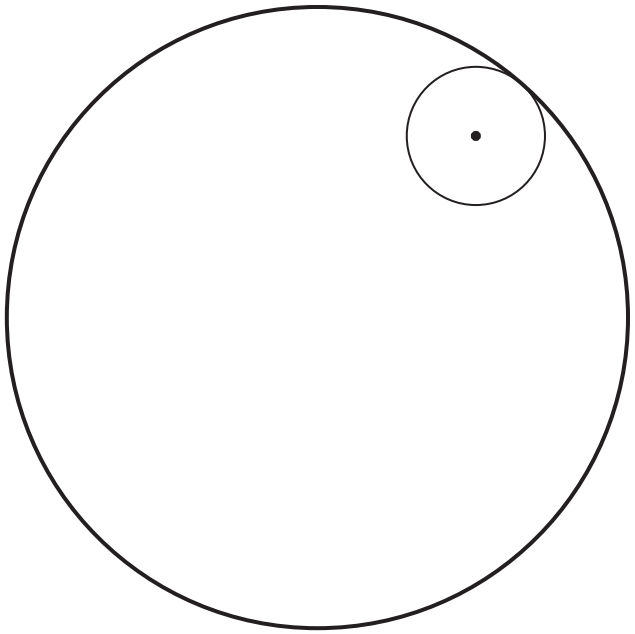
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(b) Describe the relationship between engine size and distance travelled per litre shown by your scatter diagram. [1]

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.....

18. The diagram shows a coin inside a large circular ring.
The centre of the coin is shown.
The coin is rolled around the inside of the ring, so that it is always in contact with the ring.
Sketch the locus of the centre of the coin as it is rolled around the inside of the ring. [2]



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19.

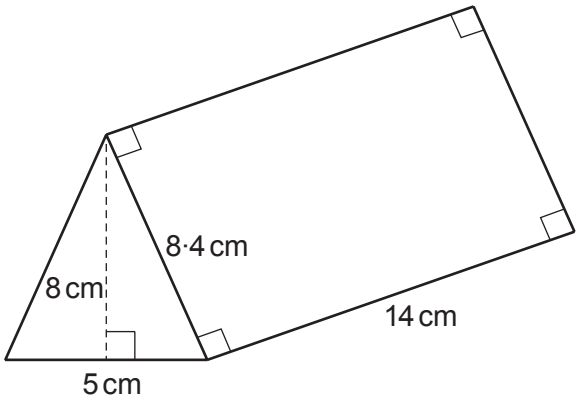


Diagram not drawn to scale

Calculate the volume of the triangular prism shown.
State the units of your answer. [3]

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20. The diagram shows a regular hexagon *ABCDEF*.

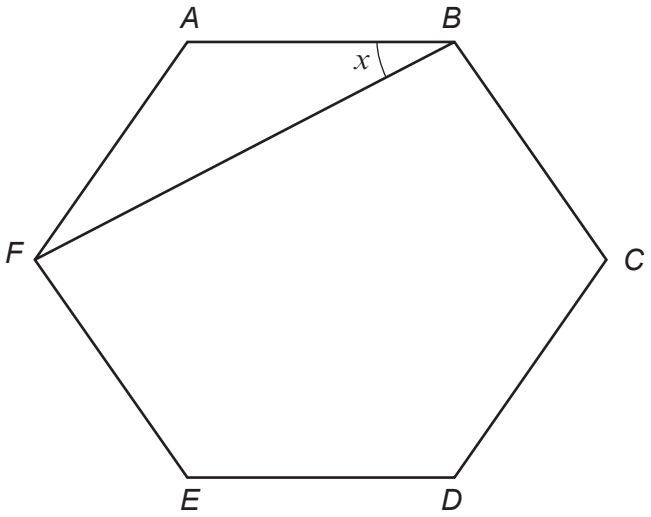


Diagram not drawn to scale

Calculate the size of angle x.
You **must** show all your working to support your answer. [3]

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.....

.....

x = ... °

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	8
Unit 2 - Higher Tier	13
Unit 3 - Foundation Tier	16
Unit 3 - Higher Tier	19

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UNIT 3 - FOUNDATION TIER

UNIT 3 (calculator allowed) Foundation Tier	Mark	FINAL MARK SCHEME Comments
1. (a) 6(.00) 3.69 4(.00) 13.69 (b) 2 (rolls) (c) 11.98÷2 or equivalent (£) 5.99 ISW	B1 B1 B1 B1 B1 M1 A1 7	 FT candidate's values for at least one B1. FT candidate's total.
2. (a) 57 (b) 57.4	B1 B1 2	
3. (a) 1250 (millilitres) (b) 1 (litre) (c) 250÷80 3 full cups	B1 B2 M1 A1 5	 B1 for sight of 1000(ml) as final answer or in working If units are given they must be correct. 1000 litres without working gets B0 FT their volume from (a) Amount left over, if given, must be correct for A1 e.g. 3.125 with no working gets M1 A0. 3 cups 10ml left over gets M1 A1.
4. (a) Evidence of counting squares 35-38 (square metres) (b) 20 (m)	M1 A1 B1 3	
5. (a) 31.36 (b) 1024 (c) 5.3	B1 B1 B1 3	
6.(Cost of individual tickets=) 2×4.95 (£9.90) + 3×4.60(£13.80) = (£) 23.7(0) (Saving = 23.7 − 14.5=) (£) 9.2(0) Look for • Spelling • Clarity of text explanations, • Consistent use of £ or p signs. • Consistent use of mathematical symbols. QWC2: Candidates will be expected to • Present work clearly, with words explaining process and 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.	M1 A1 A1 QWC2 <

UNIT 3 (calculator allowed) Foundation Tier	Mark	FINAL MARK SCHEME Comments
7. S and Q	B2 2	B1 for at least one correct answer and no more than one incorrect answer.
8. (a) 13 (b) 7	B1 B1 2	Accept embedded answers
9. (a) April (b) 11 (°C) (c) 100 (mm) (d) Spring, Summer, Autumn, Winter indicated along one axis AND vertical axis correctly labelled Uniform scale for frequency axis starting at 0 Four bars at correct heights	B1 B1 B1 B1 B2 6	 Or indicated on the bars themselves. B1 for at least 2 correct bars, consistent with their scale. Bars must be of equal width.
10. (a) $12\times5-5\times3-3\times2$ (= 60 −15 − 6) 39 (b) Strategy to explore possible combinations. $18\times5=90$ $90-3=87$ so 18 correct answers (with one incorrect answer). The mark drops to 85 from 87 so the 20th question scores −2, (so the last question was not answered).	M1 A1 S1 B1 B1 5	Sight of two of 60, −15, −6 and an attempt to combine marks gets M1 39 alone get 2 marks. Evidence of trial and improvement or correct answer gets S1. Sc2 for correct answer with no working Correct calculations infer correct answer
11. First arc(s) crossing the given line. Final arc and line with angle of 60° at the point *X*	B1 B1 2	Arc must be big enough for the second arc to cut it. B2 for correct construction at X Allow ±2°**.** If no arc(s) B0 B0. Arc must be big enough for the second arc to cut it. B1 maximum for a correct construction elsewhere on the line.
12. (a) 5 (miles) (b) 30 (mins) (c) Reference to decrease in steepness, gradient or equivalent after horizontal section. (d) A horizontal line stopping at the point (14:00, 7) Point at (16:12, 12) Points joined with straight lines.	B1 B1 E1 B1 B1 B1 6	 Accept half an hour Ignore calculations. Explanation should refer to gradient, slope or steepness or any other evidence **from the graph**. B1 for a horizontal line that continues past (14:00, 7) so long as no other line is drawn. FT their points, provided one point correct and walk finishes at 12 miles.
13. (a) Method of finding the number of whole blocks that fit in length, width and height. $9\times5\times4$ 180 (blocks) (b) 1600 – 400 ÷ 60 20 (blocks)	M1 m1 A1 M1 m1 A1 6	May be implied by sight of two of 9, 5 or 4 Multiplication of three values, at least two correct C.A.O. SC1 for 26910÷125 or 215.28 or 215 C.A.O

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UNIT 3 (calculator allowed) Foundation Tier	Mark	FINAL MARK SCHEME Comments
14. (a) $57 = 4\times3 + 5C$ $5C = 45$ $C = 9$ (b) $6x - 2x = 12 + 19$ $4x = 31$ $x = 7.75$ or $7\frac{3}{4}$	B1 B1 B1 B1 B1 B1 6	Correct substitution. FT until second error. Isolating the C. FT if $aC = b$ and $a \neq 1$. Accept embedded answer. FT until 2nd error. Accept embedded answer. Mark final answer. Accept improper fractions provided they are in simplest form.
15 2, 5, 5, 6, 7 or 3, 4, 5, 5, 8 Median of 5. At least two 5s entered with no other number occurring more times. Difference of 5 between the highest and lowest numbers. The total of the 5 numbers being 25, provided not all 5s.	 B1 B1 B1 B1 4	Use of 2 digit numbers, mark as a misread.
16.(a) (Each share = £)5700 ÷ (1+2+3) (= £950) (Alan receives £ 3×950 =£) 2850, (Ben receives £ 2×950 =) 1900 and (Carwyn receives £) 950. (b) 5700 ÷ 3 = 1900 OR Ben gets the same fraction (2/6 = 1/3) No (it does not affect the amount Ben receives).	M1 A2 B1 E1 5	FT 'their 950' for A1 if all amounts correct. A1 for any 2 correct amounts. A1 for no labels or incorrect labels. Do not award E1 if B1 not awarded. FT Ben's share from (a).
17. (a) All points plotted correctly. (b) Negative correlation OR "As engine size increases the distance travelled on one litre decreases".	B2 E1 3	B1 for 3, 4 or 5 points plotted, not joined or. B1 for all points plotted correctly but joined. The word correlation is needed if the first answer used. Accept inverse relationship.
18. Sketch of circle of correct radius drawn.	B2 2	Allow freehand sketch. Use overlay. (±5mm) B1 for intention of sketching the correct circle using points, or arcs, OR B1 for intention of correct circle but outside the tolerance. Ignore other lines on the diagram drawn to find the centre of the circle. Penalise −1 for other loci drawn that are not intended to find the centre of the circle.
19. ½ × 5×8×14 280 cm^3	M1 A1 U1 3	
20. Interior Angle of Hexagon ((6 - 2) × 180) ÷ 6 120(°) ($x = (180 - 120)/2 =$) or ($x = 120 - 90 =$) or ($x = 120 \div 4 =$) 30(°)	M1 A1 B1 3	Or 180 – (360 ÷ 6) Or 360 ÷ 3 Or 60×2 Working may be implied from diagram. FT "their 120°" B1 requires evidence of an appropriate method used

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UNIT 3 - HIGHER TIER

Unit 3 Higher Tier		FINAL MARK SCHEME Comments
1. (a) $4y(3 + 5y)$	B2	B1 for $4y(3\ldots.)$ or $4y(\ldots..+ 5y)$ or correct partial factorisation.
(b) 105	B2	B1 for answer of 15 OR B1 for adding 45 to their first term or for sight of +45.
(c) $4x = 20 \times 5$ OR $\frac{x}{5} = \frac{20}{4}$	M1	
$x = 25$	A1	
(d) $6x - 2x = 12 + 19$	B1	FT until 2nd error.
$4x = 31$	B1	
$x = 7.75$ or $7\frac{3}{4}$	B1 9	Mark final answer. Accept improper fractions provided they are written in simplest form. Accept embedded answers.
2. (a) All points plotted correctly.	B2	B1 for 3, 4 or 5 points plotted correctly, not joined, or B1 for all points plotted correctly but joined.
(b) Negative correlation OR "As engine size increases the distance travelled on one litre decreases".	E1	The word correlation is needed if the first answer used. Accept inverse relationship.
(c) Appropriate straight line of best fit drawn through (1.8, 8.6), with some values above and below the line.	B2	B1 for unreasonable line of best fit drawn through (1.8, 8.6) B1 for reasonable line of best fit but not drawn through (1.8, 8.6).
(d) From their line of best fit ± 0.1 (km)	B1 6	If no line of best fit, accept answer of 9.4 to 9.6 inclusive.
3. 90 ÷ time	B1	Accept 90 ÷ 2.3 for B1 only
90 ÷ 2.5	M1	
= 36 (mph)	A1 3	
4. 2, 5, 5, 6, 7 or 3, 4, 5, 5, 8		Use of 2 digit numbers, mark as a misread.
Median of 5.	B1	
At least two 5s entered with no other number occurring more times.	B1	
Difference of 5 between the highest and lowest numbers.	B1	
The total of the 5 numbers being 25, provided not all 5s	B1 4	
5. (a) (Each share = £) 5700 ÷ (1+2+3) (=£950)	M1	FT 'their 950' for A1 if all amounts correct.
(Alan receives £ 3×950 =£)2850,	A2	A1 for any 2 correct amounts.
(Ben receives £ 2×950 =£)1900 and		A1 for no labels or incorrect labels.
(Carwyn receives £) 950.		
QWC: Look for • units £ • spelling in at least 1 statement/sentence • clarity of text explanations		QWC2 Presents 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 or quantities shown for clarity of process or steps AND • make few if any mistakes in mathematical form, spelling, punctuation and grammar in their answer	QWC 2	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.
QWC1: Candidates will be expected to • present work clearly, with words or quantities shown for clarity of process or steps OR • make few if any mistakes in mathematical form, spelling, punctuation and grammar in their answer.		QWC0 Evident weaknesses in organisation of material, and errors in use of mathematical form, spelling, punctuation or grammar.
(b) 5700 ÷ 3 = 1900 OR Ben gets the same fraction (2/6 = 1/3)	B1	
No (it does not affect the amount Ben receives).	E1 7	Do not award E1 if B1 not awarded. FT Ben's share from (a).

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Unit 3 Higher Tier		FINAL MARK SCHEME Comments
6. Sketch of circle of correct radius drawn.	B2 2	Allow freehand sketch. Use overlay. (±5mm) B1 for intention of sketching the correct circle using points, or arcs, OR B1 for intention of correct circle but outside the tolerance. Ignore other lines on the diagram drawn to find the centre of the circle. Penalise −1 for other loci drawn that are not intended to find the centre of the circle.
7. ½×5×8×14 280 cm^3	M1 A1 U1 3	 Independent of other marks.
8. (a) ((6 - 2) × 180) ÷ 6 120(°) (b) (Angle at bottom of triangle = 120 – 90 =) 30° (180 – 30) / 2 75(°)	M1 A1 B1 M1 A1 5	OR 180 – (360÷6) OR 360÷3 OR 60×2 May be indicated on the diagram. FT 'their 120' – 90. FT 'their 120' – 90.
9. Strategy of multiplying h by (h+2) either numerically or algebraically towards an answer of 70 or equivalent. One correct evaluation $7 \le h \le 8$ 2 correct evaluations $7.35 \le h \le 7.55$ one either side of 70 2 correct evaluations $7.35 \le h \le 7.45$ one either side of 70 *If evaluations not seen, accept 'too high' or 'too low'.* $h = 7.4$	S1 B1 B1 M1 A1 5	h / $h \times (h+2)$ / h / $h \times (h+2)$ 7 / 63 / 7.35 / 68.7225 8 / 80 / 7.36 / 68.8896 7.1 / 64.61 / 7.37 / 69.0569 7.2 / 66.24 / 7.38 / 69.2244 7.3 / 67.89 / 7.39 / 69.3921 7.4 / 69.56 / 7.41 / 69.7281 7.5 / 71.25 / 7.42 / 69.8964 7.6 / 72.96 / 7.43 / 70.0649 7.7 / 74.69 / 7.44 / 70.2336 7.8 / 76.44 / 7.45 / 70.4025 7.9 / 78.21
10. (a) (8 ÷ 5) × 7 or 7 ÷ (5 ÷ 8) 11.2 (cm) (b) 20 ÷ (8 ÷ 5) or 20 × (5 ÷ 8) 12.5 (cm)	M1 A1 M1 A1 4	 Accept 11 from correct working. Accept 13 from correct working.
11. a) 0.02 + 0.3 or 0.32 or equivalent 3.2×10^{-1} b) Correct conversion to common units. 20,000 ÷ 1.25 or 2,000,000 ÷ 125 (= 16000 or equivalent) 1.6×10^4	M1 A1 B1 M1 A1 5	 FT with incorrect place value provided conversion attempted.
12. tan (RPQ) = 45/80 OR tan(PRQ) = 80/45 29(.35…°) OR 60.6(42…°) or 61. (Bearing =) 029(.35…°)	M1 A2 B1 4	 A1 for $\tan^{-1}(45/80 (= 0.5625))$ or $\tan^{-1}(80/45 (= 1.77...))$ FT from incorrect trigonometry AND FT 'their angles' obtained from premature rounding.
13. a) Interquartile range: Readings from cf's of 15 and 45 (50 to 52) – (24 to 25) = 25 to 28 inclusive b) Valid reason e.g 'Kevin's median is higher than Sunil's', 'Kevin's graph is to the right of Sunil's' Kevin	 M1 A1 E1 B1 4	 SC1 for Kevin's IQR of 24 to 26 inclusive. Accept sight of medians for both cricketers (36 and 60). Provided E1 awarded. Penalise −1 if incorrect medians are quoted.
14. a) $d \propto t^2$ or $d = kt^2$ $4.9 = k \times 1^2$ $d = 4.9t^2$ b) d = 19.6 (when t = 2) $t^2 = 28.2/4.9 (= 5.755...)$ or $(t =) \sqrt{(28.2/4.9)}$ t = 2.39(89…) or 2.4(0)	B1 M1 A1 B1 M1 A1 6	 FT for non-linear only. Maybe implied by responses to (b). FT from their non-linear (a). .

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Unit 3 Higher Tier		FINAL MARK SCHEME Comments
15. a) i)Correct expansion of both brackets $x^2 + 4x + 4 + 3x + 3 - 11$ (=) $x^2 + 7x - 4$	M1 A1	
ii) (x =) $\frac{-7 \pm \sqrt{(7^2 - 4\times1\times(-4))}}{2\times1}$	M1	Use of formula, allow one slip in substitution.
(x =) $\frac{-7 \pm \sqrt{65}}{2}$	A1	CAO.
(x =) 0.53 and -7.53	A1	CAO. Must be correct to 2 decimal places.
b) $(5x - 3)(x + 5)$ $x = 3/5$ or $x = -5$	B2 B1 8	B1 for $(5x\ldots3)(x\ldots5)$. FT for their pair of brackets provided at least one bracket is of form (ax…). Must come from factorising.
16. a) Cosine curve starting at 1 on the y axis Maximum and minimum points at (0,1), (180, -1) and (360,1)	M1 A1	
b) 113.578...(º) 246.42…(°) with no other angles given.	B1 B1 4	Accept rounded or truncated answers for both B1's. FT 360 – their first angle.
17. a) Frequencies: 14, 15, 21, 29, 46	B2	B1 for 2, 3 or 4 correct frequencies.
b) $14 + 0{\cdot}4 \times 15$ or equivalent 20	M1 A1 4	FT 'their 14' and 'their 15' provided not 0·7 and 1·5.
18. Overall strategy e.g. cosine rule & ½absinC $AC^2 = 9.9^2 + 7.2^2 - 2\times9.9\times7.2\times\cos75$ $AC^2 = 112.95\ldots$ AC = 10.6(279…) Area ABC = ½×9.9×7.2×sin75 (= 34.425…) Area ADC = ½×AC×4.9×sin24 (= 10.590…) Area quadrilateral = 23.8(348…cm^2)	S1 M1 A1 A1 M1 M1 A1 7	 FT provided M1 awarded. FT their AC but not for 9.9, 7.2 or 4.9. Accept answers in the range 23.8 to 23.9. FT if one of the last M1 marks awarded, and their calculations are accurate to 1 d.p.

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Surname	Centre Number	Candidate Number
Other Names		0

GCSE

4353/01

MATHEMATICS (UNITISED SCHEME)
UNIT 3: Calculator-Allowed Mathematics
FOUNDATION TIER

A.M. MONDAY, 11 November 2013

1 hour 30 minutes

ADDITIONAL MATERIALS

A calculator will be required for this paper.

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 or use the π button on your calculator.

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 **7**.

For Examiner's use only		
Question	**Maximum Mark**	**Mark Awarded**
1.	**8**	
2.	**3**	
3.	**3**	
4.	**6**	
5.	**9**	
6.	**3**	
7.	**8**	
8.	**4**	
9.	**5**	
10.	**3**	
11.	**3**	
12.	**2**	
13.	**5**	
14.	**5**	
15.	**4**	
16.	**3**	
17.	**6**	
Total	**80**	

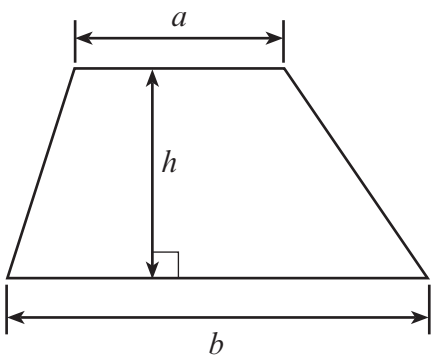
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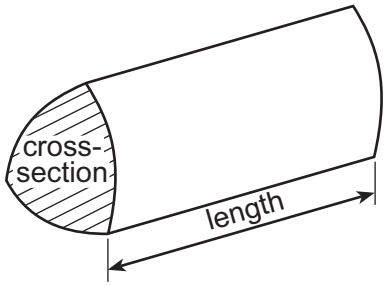
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Formula List

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



Volume of prism = area of cross-section × length



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1. *(a)* Mr Jones does some shopping at a fruit and veg shop.

Complete his bill. [4]

2 kg of apples at £1.75 per kg	.....
6 oranges at 32p each	.....
2·5 kg of bananas at £0.68 per kg	.....
1 pack of strawberries	.....
TOTAL	£9.37

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(b) Mr Jones paid for the fruit with a twenty-pound note.
What change should he receive? [2]

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(c) Mr Jones later notices a special offer.
"Buy 3 packs of strawberries for £5.49".

Using this special offer, what would be the price of each pack of strawberries? [2]

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2. *(a)* Write 126·72 correct to the nearest whole number. [1]

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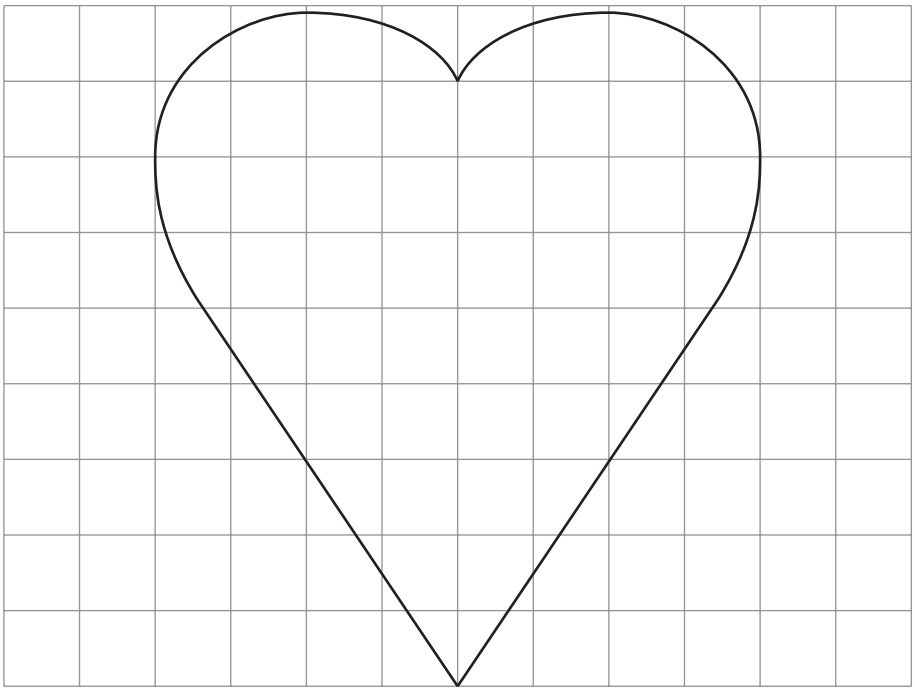
(b) Write 138 264 correct to the nearest 1000. [1]

.....

(c) Write 14·182 correct to 1 decimal place. [1]

.....

3. Sioned made a heart for a wall display.
Her design is shown on the centimetre-squared grid below.



Each square on the grid represents 10 cm^2.

What is the approximate area of the heart that Sioned made? [3]

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4. Gareth caught a train from Cardiff to Holyhead and then he sailed on a ferry from Holyhead to Dublin.

(a) Gareth's train journey should have taken 4 hours and 50 minutes.
The train was delayed and the journey took 310 minutes.
By how many minutes was the train delayed? [2]

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(b) The ferry left Holyhead at 13:50.
The crossing took 3 hours and 15 minutes.
At what time did the ferry arrive in Dublin? [2]

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(c) Gareth left his house at 6:30 a.m. and arrived at his hotel in Dublin at 5:55 p.m.
Altogether, how long did his journey take?
Give your answer in hours and minutes. [2]

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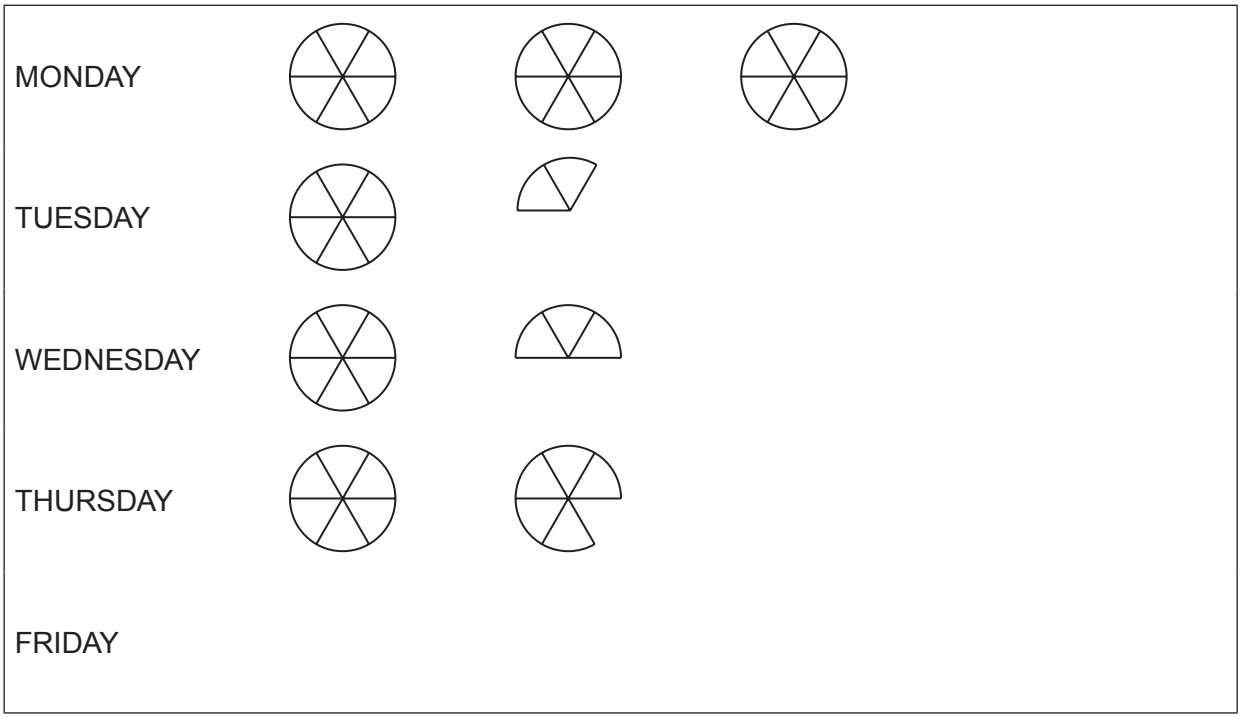
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5. A farmer keeps hens on his farm.

The pictogram shows the number of eggs that the farmer collected on 5 days last week.

The symbol representing 12 eggs is 



(a) 30 eggs were collected on Friday.
Complete the pictogram above. [1]

(b) Complete the table to show the number of eggs collected on each day. [2]

Day	Mon	Tues	Wed	Thurs	Fri
Number of eggs collected					30

(c) What is the median number of eggs collected per day over the 5 days? [2]

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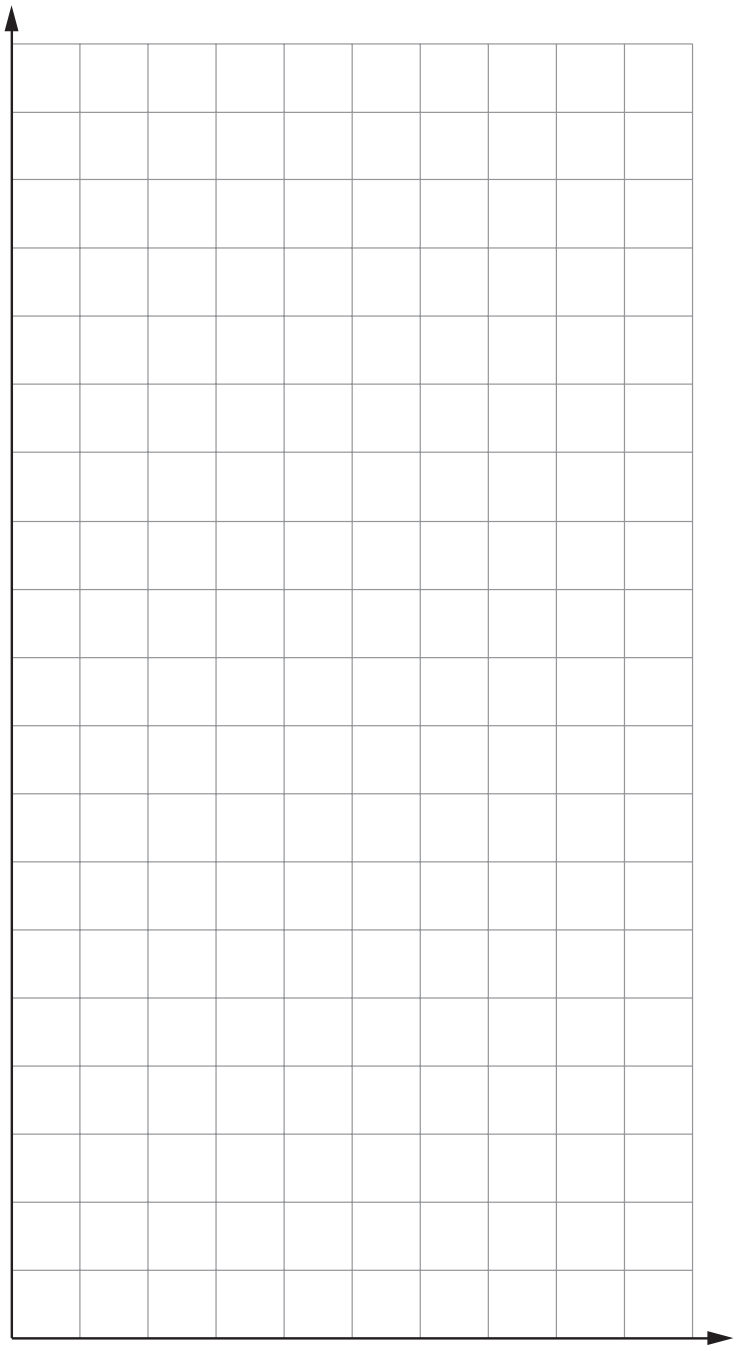
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(d) On the squared paper below, draw a bar chart to represent the number of eggs collected on each of these five days. [4]



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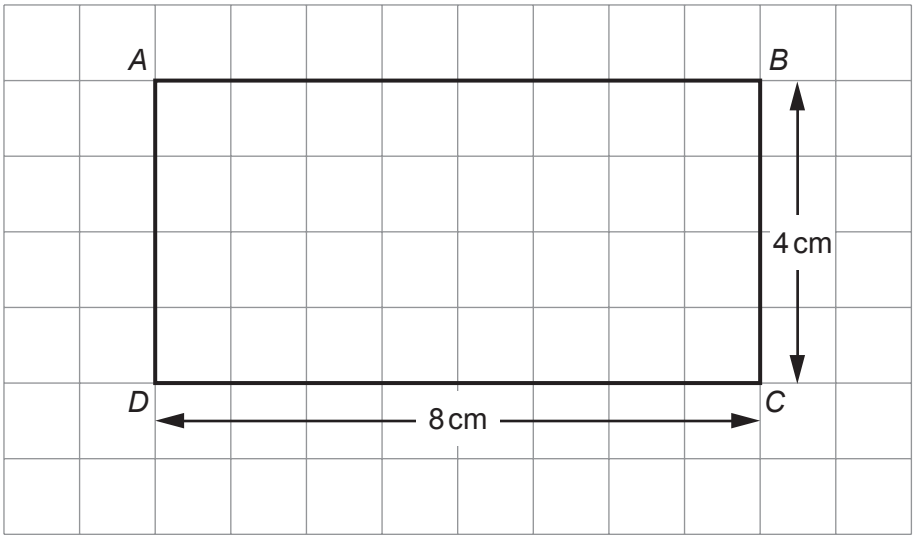
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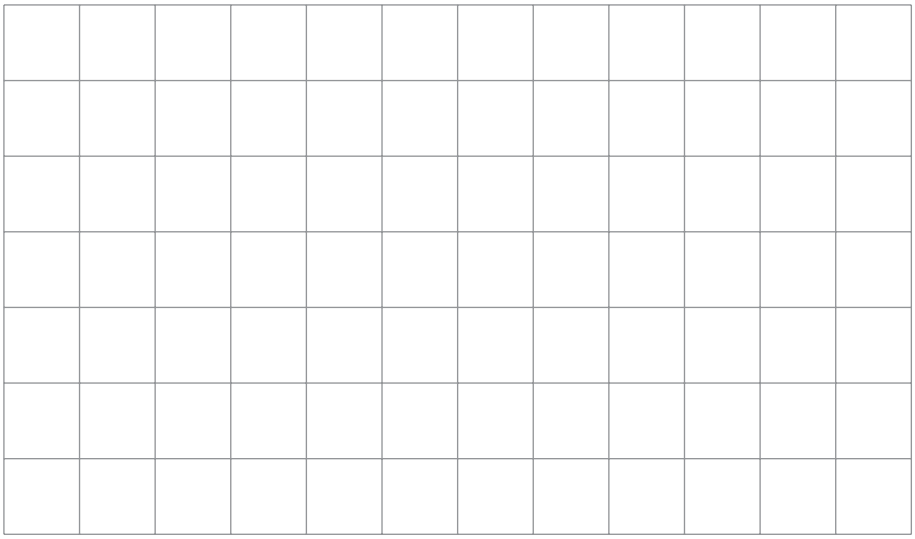
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6. The diagram below shows a rectangle *ABCD*, with *AB* = 8 cm and *BC* = 4 cm.



On the grid below, draw **one different** rectangle that has

- the same perimeter as rectangle *ABCD* and
- a larger area than rectangle *ABCD*. [3]



Space for working:

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

Three friends are going to have a Chinese meal.

KIM WOK

SET DINNER
£23.40
FOR THREE PEOPLE

Special offer
10% OFF THIS PRICE

KIM WOK

GENERAL MENU

MAIN DISHES £4.50 each
FRIED RICE £1.85 per portion
PRAWN CRACKERS £1.59 per portion

The three friends consider two options:

Option 1. Order the Set Dinner that is on special offer.

Option 2. From the General Menu, order 3 main dishes, 3 portions of fried rice and 1 portion of prawn crackers.

The three friends choose the cheaper of the two options and they agree to share the total cost equally.

How much will each friend pay?
You must show all your working. [8]

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8. Jane is given three calculations to work out.

Calculation A: $\sqrt{2{\cdot}25} + 1{\cdot}4^2$

Calculation B: $\sqrt{2{\cdot}25 + 1{\cdot}4^2}$

Calculation C: $\sqrt{(2{\cdot}25 + 1{\cdot}4)^2}$

She thinks that they all work out to have the same answer.
Show that she is wrong and write the answers in ascending order. [4]

9. *(a)* Solve the equation $a + 3 = 11$. [1]

(b) Solve the equation $2y - 7 = 9$. [2]

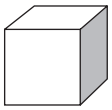
(c) Solve the equation $\frac{x}{3} + 5 = 15$. [2]

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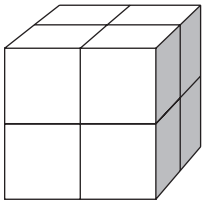
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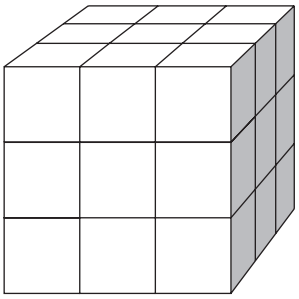
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10. Aled has a bag of 2500 small cubes, each with a volume of 1 cm^3.



He can place them together to make bigger cubes.





What is the volume of the largest cube that he can make with his bag of 2500 cubes? [3]

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11. Using a ruler and a pair of compasses, construct an accurate drawing of a triangle with sides of length 12·5 cm, 10 cm and 7·5 cm.
You must show all your construction arcs. [3]

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12. The maximum heart rate that an athlete can safely reach when training is given by H.

Male athletes and female athletes use different formulae.



The formulae are:

$H = 202 - 0{\cdot}55M,$ where M is the age of a male athlete,

$H = 216 - 0{\cdot}71F,$ where F is the age of a female athlete.

Alan is a male athlete aged 24 and Bethan is a female athlete aged 20.

Which athlete has the higher maximum heart rate?
You **must** show all your working. [2]

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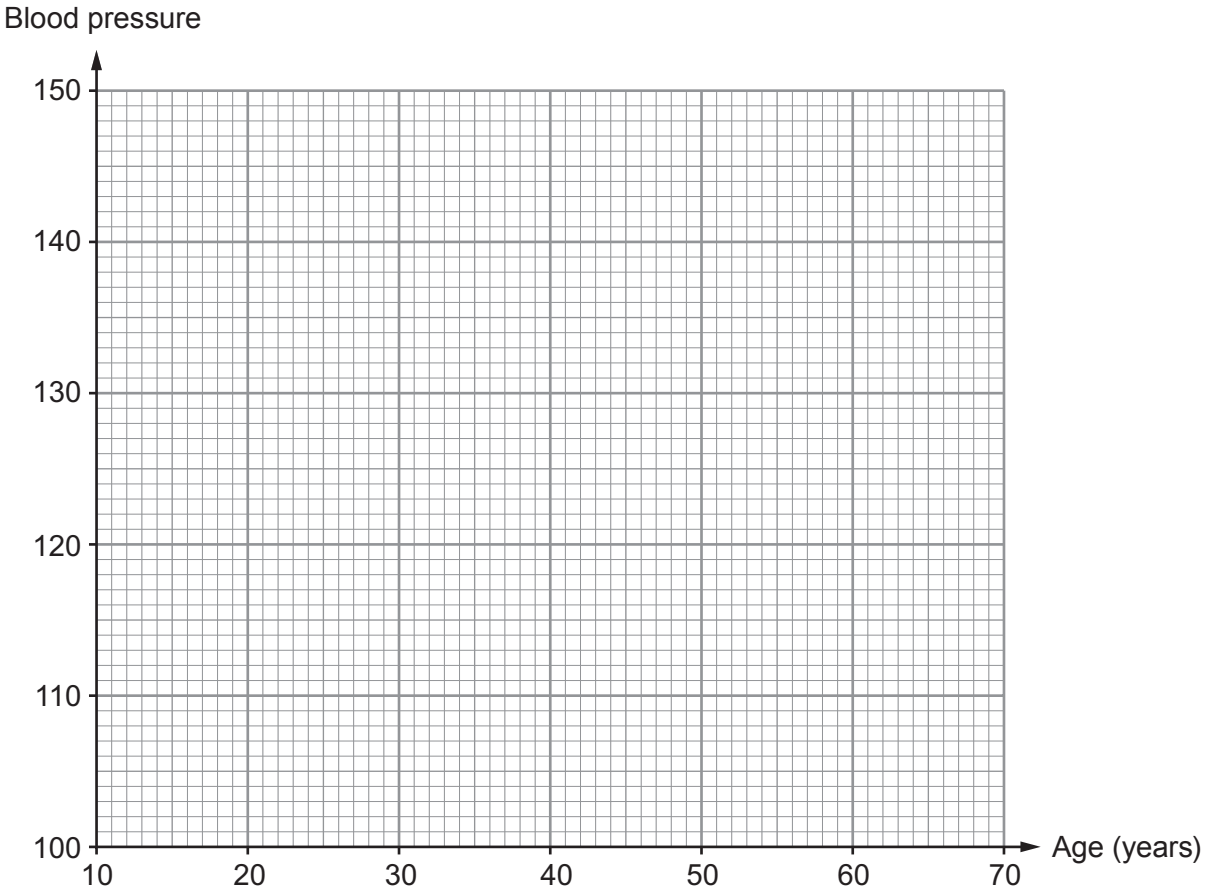
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13. A doctor carried out tests to investigate possible cases of high blood pressure in the male work force of a factory.
She collected data from a sample of 8 male workers and recorded their age and blood pressure.

Worker	A	B	C	D	E	F	G	H
Age, in years	24	36	40	45	49	50	53	60
Blood pressure	120	125	146	137	128	138	140	147

(a) Plot the 8 points on the scatter diagram below. [2]



(b) Draw a line of best fit, by eye, on the scatter diagram. [1]

(c) One worker has high blood pressure for his age.

(i) Use the scatter diagram to decide which worker has high blood pressure for his age. [1]

.....

(ii) Use your line of best fit to estimate the normal blood pressure for a man of his age. [1]

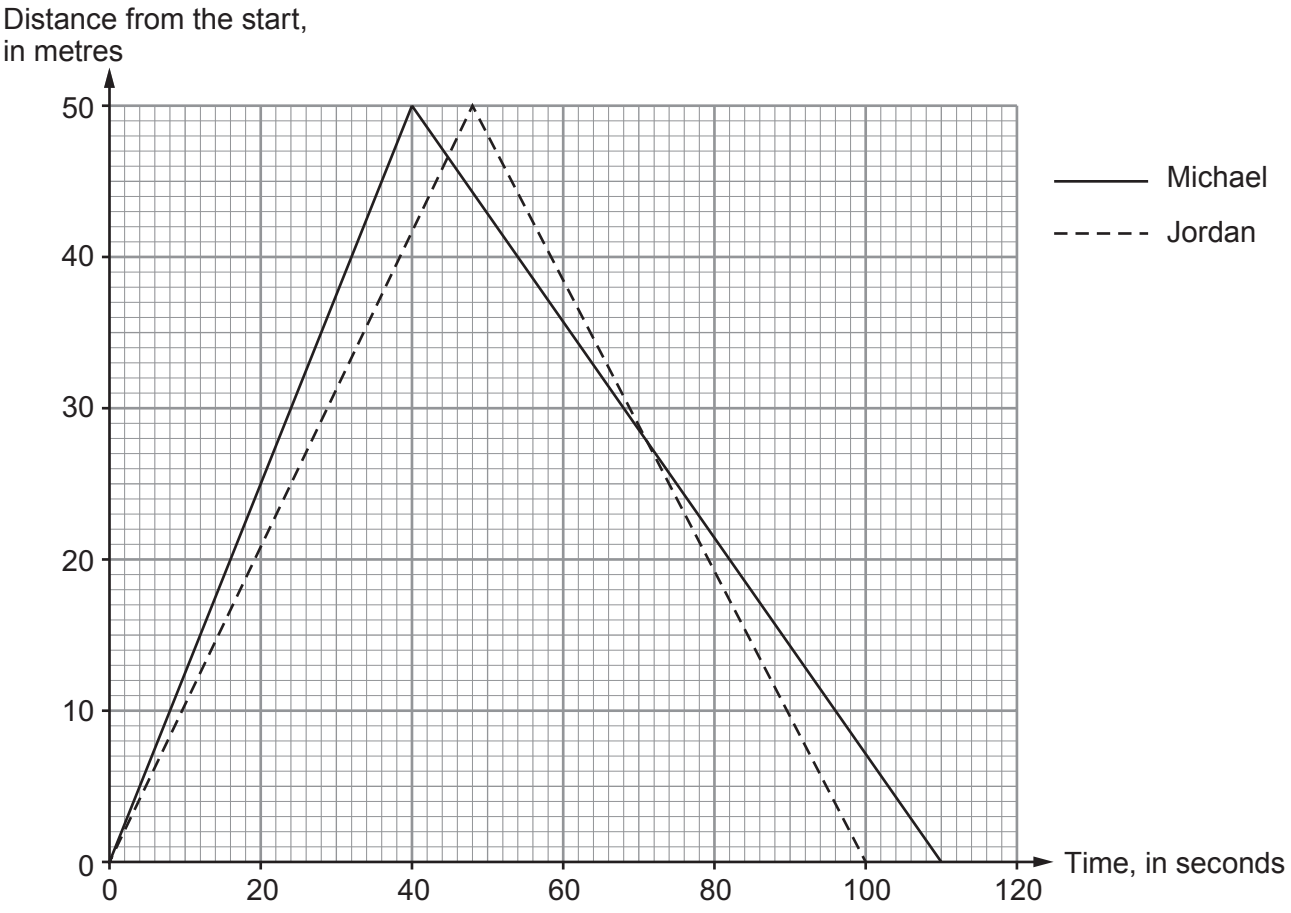
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14. Two swimmers, Michael and Jordan, have a race over two lengths of a swimming pool. The travel graph for the race is shown below.



(a) Who was in the lead during the first length of the race? Use the graph to explain your answer. [1]

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(b) What was Michael's average speed for the first length of the race? Give the units of your answer. [3]

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(c) For what length of time were Michael and Jordan swimming in opposite directions? [1]

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15. A solution to the equation $x^3 + 3x = 90$ lies between 4 and 5.
Use the method of trial and improvement to find this solution correct to 1 decimal place. [4]

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16. Calculate the length of the line *AB* in the diagram below. [3]

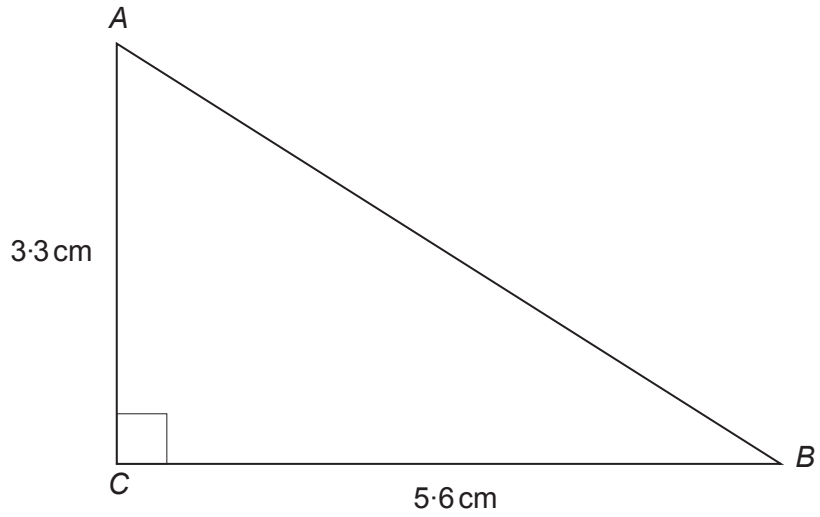


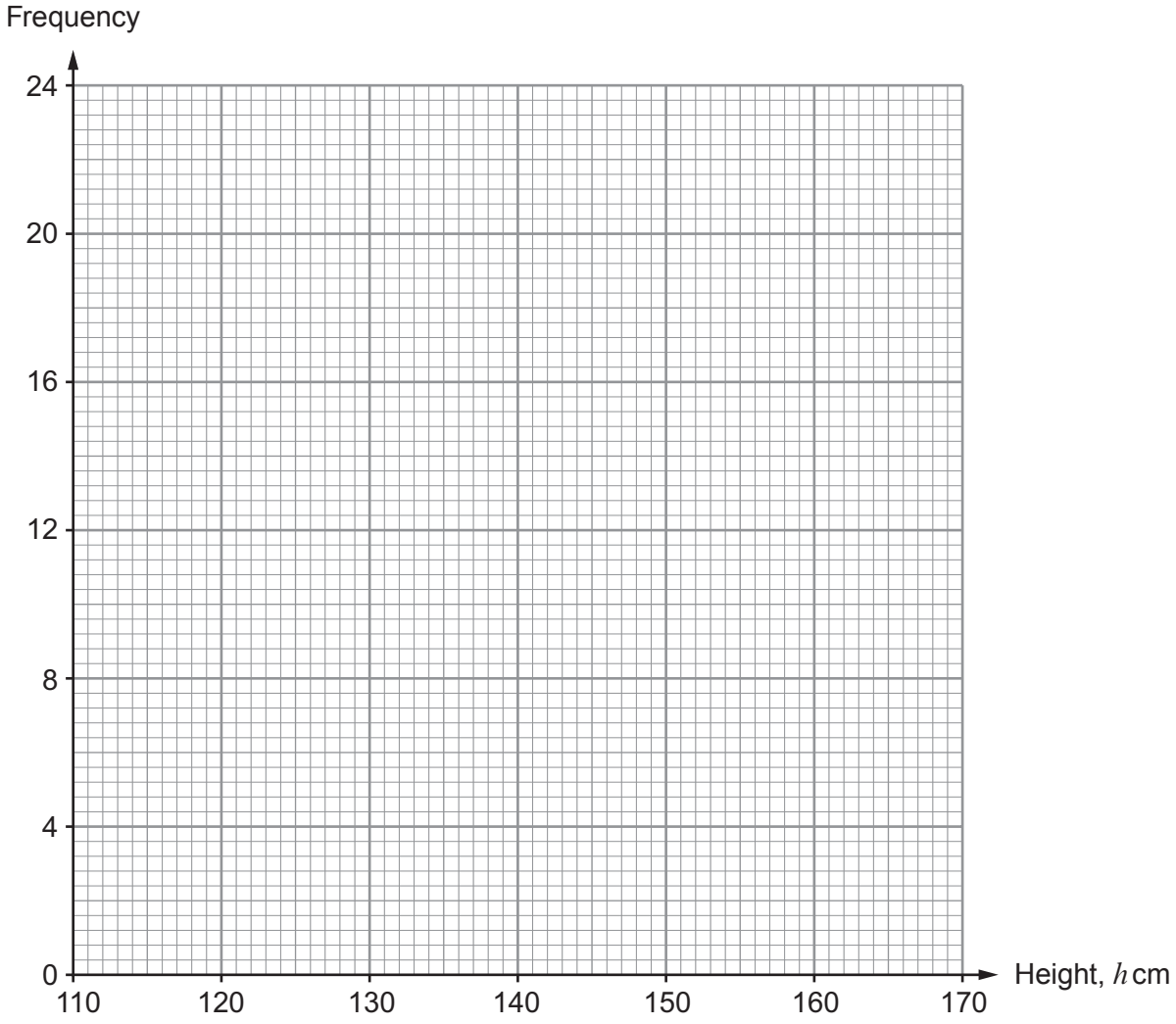
Diagram not drawn to scale

Examiner only

17. The heights, in centimetres, of 55 children are shown in the grouped frequency table below.

Height, h cm	Frequency
$120 < h \leqslant 130$	2
$130 < h \leqslant 140$	8
$140 < h \leqslant 150$	13
$150 < h \leqslant 160$	22
$160 < h \leqslant 170$	10

(a) Draw a frequency polygon for the heights of the children. [2]



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(b) Calculate an estimate of the mean height of the children. [4]

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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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UNIT 3 FOUNDATION

2013 November UNIT 3 (calculator allowed) Foundation Tier Mark Scheme	Mark	Comments (page 1)
1. (a)(£) 3·5(0) or 350(p) (£)1·92 or 192(p) (£)1·7(0) or 170(p) (£) 2·25 or 225(p) (b) 20 – 9·37 or 2000 – 937 (£) 10·63 or 1063(p) (c) 5·49 ÷ 3 or 549 ÷ 3 (£)1·83 or 183(p)	B1 B1 B1 B1 M1 A1 M1 A1 8	 FT one error. Attempt to subtract or find the difference
2. (a) 127 (b) 138 000 (c) 14·2	B1 B1 B1 3	
3. Evidence of square counting 40-50 (squares) Candidate's area × 10 (cm^2)	M1 A1 B1 3	E.g. dots or marks in the squares. F.T. 'their area' × 10 Final answer of 400-500 gets 3 marks.
4. (a) Attempt to use 60 minutes = 1 hour in context. e.g. 4 × 60 + 50 OR 310 / 60 (Delay =) 20 (minutes) (b) 13:50 + 3 hours 15 minutes. 17:05 or 5:05 (pm) (c) Attempt to find time between 6:30 a.m. and 5:55 p.m. with correct interpretation of a.m. and p.m. 11 hours and 25 minutes.	M1 A1 M1 A1 M1 A1 6	Sight of 290 (minutes) or 5.16(66…) or 5.17 (hours) or 5 hours 10 minutes C.A.O. Attempt to add time Accept 11:25 or 11·25
5. (a) Drawing showing 2 and a half circles (b) Mon-36, Tues-16, Wed-18, Thur-22 (c) Ordering data 16, 18, 22, 30, 36 Median 22 (d) Mon, Tues, Wed, Thur, Fri (or equivalent) along one axis Uniform scale and label for frequency or equivalent. Five bars at correct heights	B1 B2 M1 A1 B1 B1 B2 9	 B1for any 2 or 3 correct answers. FT candidate's values from table. Or indicated on the bars themselves. FT from their table values. B1 for at least 3 correct bars on FT. B1 for unequal width bars.
6. Correct rectangle or square with sum of two sides equal to 12 and product of two sides greater than 32. e.g. 6 by 6 or 7 by 5	B3 3	Any orientation. B2 for perimeter= 24 cm but area<32cm^2 eg. 3 by 9 or 2 by 10 B1 for area >32 cm^2 but perimeter ≠24 cm B1 for stating area = 32 (cm^s) and Perimeter = 24(cm) B0 for 4 by 8 or 8 by 4

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2013 November UNIT 3 (calculator allowed) Foundation Tier Mark Scheme	Mark	Comments (page 2)
7. Set dinner discount (£)2.34 Set dinner cost after discount (£)23·40-(£)2·34=(£)21·06 (Set dinner cost for each person £7·02) Total general Menu cost 3×(£)4·50+3× (£)1·85+(£)1·59 (£)20·64 General menu cost for each person (£)20·64 ÷3 =(£) 6·88 (cheaper option) Look for • Spelling • Clarity of text explanations, • Consistent use of £ or p QWC2: Candidates will be expected to • Present work clearly, with words explaining process and 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.	B1 B1 M1 A1 M1 A1 QWC 2 8	Alternative 0.9×23·40=21·06 for B2 FT 'their £2·34' from appropriate working. Total price or price per person may be seen. Ignore incorrect division if (£)21·06 seen. Treat multiplication of price of set meal by 3 as misread. Alternative method if total cost not shown: (£)1.59÷3=(£)0.53 for M1A1 (£)4.50+(£)1.85+(£)0.53=(£)6.88 for M1A1 FT their costs so that correct division of their lower total by 3 gets M1 A1. 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 weakness in organisation of material but using acceptable mathematical form, with few, if any, errors in spelling, punctuation and grammar. QWC0 Evident weakness in organisation of material, and errors in use of mathematical form, spelling, punctuation and grammar.
8. Calculation A 3.46 Calculation B 2.(051828453….) Calculation C 3.65 Order B, A ,C	B1 B1 B1 B1 4	CAO Rounded or truncated CAO FT candidate's values in ascending order.
9.(a) a=8 (b) $2y$=16 y=8 (c) $x/3$ =10 or x+ 15 = 45 x=30	B1 B1 B1 B1 B1 5	Accept embedded answers throughout.
10. Cubing whole numbers. Trial and improvement shown. Answer of (13×13×13=) 2197(cm^3)	S1 B2 3	Alternative method. Cube root of 2500 with appropriate rounding. B1 for 13×13×13 or 13 cubed without 2197
11. A triangle with at least two correct lengths (±2mm) One line drawn correctly AND two intersecting arcs drawn from the ends of this line. Triangle correctly constructed using intersecting arcs with all 3 sides of the correct length (±2mm).	B1 M1 A1 3	Any orientation.

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2013 November UNIT 3 (calculator allowed) Foundation Tier Mark Scheme	Mark	Comments (page 3)
12.**Both** heart rates correct **AND** Bethan identified as higher Alan 188.(8) Bethan 201.(8)	B2 2	B1 for sight of one of 188(.8) or 201(.8)
13. (a) All points plotted correctly (b) Line of best fit with positive gradient and points above and below. (c) (i)Identify worker C (ii)Appropriate reading for 40 year old from candidate's line of best fit.	B2 B1 B1 B1 5	B1 for at least 5 correct plots. Ignore line of best fit at this stage. Penalise -1 if joined point to point. Worker C, named, described or identified on the graph. Consistent with candidate's positive gradient line of best fit. FT 'their (c)(i)'.
14. a) Michael with reason, e.g. "Michael because he took less time", "Michael finished in 40 sec", "Michael, his line is steeper" b) 50 ÷ 40 or equivalent OR 25 × 60/20 1.25 or equivalent OR 75 m/s OR m/min c) 8 (seconds)	E1 M1 A1 U1 B1 5	Allow "Michael because he was faster" M1A0 for use of e.g. 26 ÷ 20 (misread from graph) If no marks awarded, SC1 for answers of 1.04 or 62.5 (Jordan's speed in m/s or m/min) or 0.9…(speed for whole race) Must be appropriate.
15. One correct evaluation $4 \leq x \leq 5$ 2 correct evaluations $4.2 \leq x \leq 4.35$ One either side of 90 2 correct evaluations $4.25 \leq x \leq 4.35$ One either side of 90 *If evaluations not seen, accept 'too high' or 'too low'.* $x = 4.3$	B1 B1 M1 A1 4	x / $x^3 + 3x$ / x / $x^3 + 3x$ 4 76 4.21 87.24… 5 140 4.22 87.81… 4.1 81.221 4.23 88.37… 4.2 86.688 4.24 88.94… 4.3 92.407 4.25 89.51… 4.4 98.384 4.26 90.08… 4.5 104.625 4.27 90.66… 4.6 111.136 4.28 91.24… 4.7 117.923 4.29 91.82… 4.8 124.992 4.9 132.349 4.35 95.36….. Watch for comparison to 0
16. $(AB^2 =) 3 \cdot 3^2 + 5 \cdot 6^2$ $AB^2 = 42.25$ OR $(AB =) \sqrt{42.25}$ OR $(AB =)$ 6.5(cm)	M1 A1 A1 3	Addition of squares seen or implied $(AB=)\sqrt{(3 \cdot 3^2 + 5 \cdot 6^2)}$ alone gets M1A0A0
17. a) Points plotted at mid-points of groups and straight lines connecting the points b) Sight of the mid-points 125, 135, 145, 155, 165 125×2 + 135×8 + 145×13 + 155×22 + 165×10 (250 + 1080 + 1885 + 3410 + 1650 = 8275) '*Their 8275*' ÷ 55 = 150(.45)	B2 B1 M1 m1 A1 6	B1 at least 4 points plotted and joined correctly OR for all points plotted correctly but not joined, OR consistent horizontal translation within the limits of the groups. Accept intention of straight lines. Ignore any lines outside the first and last points FT their mid-points from within or at the bounds of the groups

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UNIT 3 - HIGHER TIER

Unitised Unit 3 – Nov 2013 Higher Tier Mark scheme – Post Conference		
1. a) $x(x - 6)$ b) $7x - 3x = 5 - 13$ $4x = -8$ $x = -2$	B1 B1 B1 B1 4	 FT until 2nd error
2. Suitable arcs drawn for 60° angle 60° angle drawn with line 8cm long Arcs drawn 5.5cm from the ends of the 8cm lines 2 lines of length 5.5cm joining to complete the kite	M1 A1 B1 B1 4	Use overlay. Allow ±2°. Allow ±2mm for all lengths.
3. a) Michael with reason, e.g. "Michael because he took less time", "Michael finished in 40 sec", "Michael, his line is steeper" b) 50 ÷ 40 or equivalent OR 25 × 60/20 1.25 or equivalent OR 75 m/s OR m/min c) 8 (seconds)	E1 M1 A1 U1 B1 5	Allow "Michael because he was faster" M1A0 for use of e.g. 26 ÷ 20 (misread from graph) If no marks awarded, SC1 for answers of 1.04 or 62.5 (Jordan's speed in m/s or m/min) or 0.9… (speed for whole race) Must be appropriate.
4. a) (6.5 × 7) + (½×7×3) OR 2×½(9.5 + 6.5)×3.5 $= 56(m^2)$ b) 56/15 (= 3.73...) 4 (tins needed)	M2 A1 M1 A1 5	M1 for (6.5×7) + ... OR .... + (½×7×3) CAO FT '*their* 56' Award provided rounding up required
5. a) $\pi \times 6^2$ Answers in the range 113 to 113.14(…sq inches) b) (Area of small pizza =) 38.4 to 38.5 Perform calculations that allow comparison e.g. Large 113 ÷ 10 = 11.3 to 11.314(…) (sq inch per £) *or 10 ÷ 113 = (£)0.08(8)(per sq inch)* Small 38.4 ÷ 4 = 9.6 to 9.625 (sq inch per £) *or 4 ÷ 38.4 = (£)0.10 (per sq inch)* Statement implying that large pizza is better value	M1 A1 B1 M2 A1 6	 Sight of area of small pizza FT *their* areas provided not 7 and 12. M1 for each calculation. *Alternative method to get £10 worth of small pizza or £4 worth of large pizza* *B1 sight of 2.5 as a multiplier or divisor* *M1 for 2.5×38.4(=96) OR 113 ÷ 2.5(=45.2)* *Alternative method to get comparable price for large or small pizza using similar areas:* *B1 for $(12/7)^2$ or 2.9(38…) OR $(7/12)^2$ or 0.3(40…)* *M1 for 2.9(38...) × 4 OR 0.3(40…) ×10* *A1 for £11.75(5…) OR £3.40(2…)* SC2 for convincing argument e.g. 3 small pizzas give nearly the same area for £2 more If no marks awarded, SC1 for convincing statement after comparing costs or areas

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Unitised Unit 3 – Nov 2013 Higher Tier Mark scheme – Post Conference		
6. (1 part =) 500/10 (Composite steel) = 350(kg) (Chromium) = 100(kg) (Nickel) = 50(kg) (Cost of Composite Steel =) (£) (0.)50 × 350 (Cost Of Chromium needed =) 1.90 × 100 (Cost of Nickel needed =)12.70 × 50 (Total cost =) (0.)50 × 350 + 1.90 × 100 + 12.70 × 50 (Total Cost =) £1000 QWC: Look for • correct units used i.e. kg, £, p • spelling in at least 1 statement/sentence • clarity of text explanations QWC2: Candidates will be expected to • present work clearly, with words or quantities shown for clarity of process or steps AND • make few if any mistakes in mathematical form, spelling, punctuation and grammar in their answer QWC1: Candidates will be expected to • present work clearly, with words or quantities shown for clarity of process or steps OR • make few if any mistakes in mathematical form, spelling, punctuation and grammar in their answer	M1 A2 M1 A1 QWC 2 7	A1 for any 2 correct FT their weights provided first M1 awarded CAO *Alternative method:* *Price of 10kg:* *M4 for 7×50p×50 + 2×£1.90×50 + 1×£12.70×50* *OR M3 for any 2 correct with intention to add* *OR M2 for any 1 correct with intention to add* *OR M1 for 7×50p+ 2×£1.90+ 1×£12.70 (=£20)* *A1 for £1000 CAO* 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.
7. One correct evaluation $4 \leq x \leq 5$ 2 correct evaluations $4.2 \leq x \leq 4.35$ one either side of 90 2 correct evaluations $4.25 \leq x \leq 4.35$ one either side of 90 *If evaluations not seen, accept 'too high' or 'too low'.* $x = 4.3$	B1 B1 M1 A1 4	$\underline{x}$ $\underline{x^3 + 3x}$ $\underline{x}$ $\underline{x^3 + 3x}$ 4 76 4.21 87.24… 5 140 4.22 87.81… 4.1 81.221 4.23 88.37… 4.2 86.688 4.24 88.94… 4.3 92.407 4.25 89.51… 4.4 98.384 4.26 90.08… 4.5 104.625 4.27 90.66… 4.6 111.136 4.28 91.24… 4.7 117.923 4.29 91.82… 4.8 124.992 4.9 132.349 4.35 95.36… Watch for comparison to 0.
8. a) Points plotted at mid-points of groups and straight lines connecting the points b) Sight of the mid-points 125, 135, 145, 155, 165 125×2 + 135×8 + 145×13 + 155×22 + 165×10 (250 + 1080 + 1885 + 3410 + 1650 = 8275) '*Their 8275*' ÷ 55 = 150(.45)	B2 B1 M1 m1 A1 6	B1 at least 4 points plotted and joined correctly OR for all points plotted correctly but not joined, OR consistent horizontal translation within 1 small square. Accept intention of straight lines. Ignore any lines outside the first and last points. FT their mid-points from within or at the bounds of the groups

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Unitised Unit 3 – Nov 2013 Higher Tier Mark scheme – Post Conference		
9. a) 1.5×10^9 b) 9.6×10^{-2} (mm)	B2 B2 4	B1 for 1.4×10^9 or 1.49×10^9 or 15×10^8 or 1.488×10^9 B1 for 0.096(mm) or 9.6×10^{-3} (cm)
10. a) $12 \times \cos37°$ 9.6 (cm) or 9.5(83..cm) b) (length^2 =) $9^2 + 6.5^2$ length^2 = 123.25 OR (length =) $\sqrt{123.25}$ (*length* =) 11(.101…) (Perimeter =) 44(.407…cm)	M2 A1 M1 A1 A1 A1 7	M1 for cos37 = AC/12 Accept an answer of 10 from correct working FT 'their length' × 4
11. a) 4, 6, 7, 11, 23, 30 b) Idea, plotting the upper class boundary consistently with the corresponding cumulative frequency. At least 3 points plotted correctly. All points correct and joined by straight lines or a curve. c) Median = Answers in the range 63 to 64 inclusive Interquartile range: (69 to 70) – (51 to 53) Answers in the range 16 to 19 inclusive d) valid comment e.g. more young people would use the bus at 4p.m.. fewer old people	B1 M1 A1 A1 B1 M1 A1 E1 8	 FT, for all marks, provided frequencies are cumulative. SC1 if points plotted at mid-points. FT their diagram provided frequencies are cumulative. Intention to subtract must be clear Must FT from their calculation if shown. Allow a consistent misread of the horizontal scale. CAO
12. $6(x - 1) + 4(4x – 6) = 3 \times 1$ or equivalent $22x – 30 = 3$ or equivalent $x = 1.5$	M2 A1 A1 4	For correctly clearing all 3 fractions M1 for clearing 2 fractions FT from M1 Mark their final answer. *If no marks awarded SC1 for sight of (11x − 15)/6 or (22x – 30)/12*
13. a) Frequency densities of 1.8, 2.6, 6, 2.2, 2 Histogram of their frequency densities drawn b) An attempt to add the areas of the bars (5 + 4 + 5 + 14 + 8 + 6) = 42 Search for the median within the 30-35 group = 32.5	M2 A1 M1 A1 M1 A1 7	M1 for any 3 or 4 correct. Provided M1 awarded. CAO FT their 42 provided a clear attempt made to add the areas of the bars
14. $(3x – 1)(x – 12)$ $x = 1/3$ (or 0.33) or $x = 12$	M2 A1 3	M1 for (3x…1)(x…12) FT provided at least M1 awarded. Do not accept solutions from use of the quadratic formula only.
15. Use of ½absinC followed by cosine rule $18.25 = ½\times9.5\times GH\times\sin125°$ $GH = (2 \times 18.25)/(9.5 \times \sin125°)$ GH = 4.69(…) or 4.7 $FH^2 = 9.5^2 + GH^2 – 2\times9.5\times GH\times\cos125$ $FH^2 = 163.35$ to 164 FH = 12.7(8) or 12.8(cm)	S1 M1 m1 A1 M1 A1 A1 7	*Alternative strategy – Calculate the height, then base, then cosine rule* FT provided M1 awarded

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Unitised Unit 3 – Nov 2013 Higher Tier Mark scheme – Post Conference		
16. a) Tangent drawn	S1	
Idea of increase in *y*/increase in *x*	M1	
Gradient from a reasonable tangent	A1	About 0.4 (ms^{-2})
b) Split into 3 areas and attempt to sum	M1	
(Area =) ½×10(0 + 2×17 + 2×23 + 25)	M1	Or equivalent. Award for up to 1 error in reading scale.
= 525	A1	CAO
c) (Total distance travelled =) 525 + (10×25) + (½×20×25) (=1025)	M1	FT 'their 525'
(Average speed =) 'their 1025'/60	M1	
= 17.(08…) (m/s)	A1	CAO for 'their 525'
	9	

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Surname	Centre Number	Candidate Number
Other Names		0

GCSE

4353/01

MATHEMATICS (UNITISED SCHEME)

UNIT 3: Calculator-Allowed Mathematics FOUNDATION TIER

A.M. MONDAY, 17 June 2013

$1\frac{1}{2}$ hours

ADDITIONAL MATERIALS

A calculator will be required for this paper.

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 or use the π button on your calculator.

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 **10**.

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

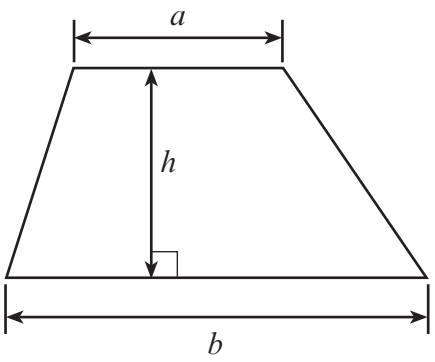
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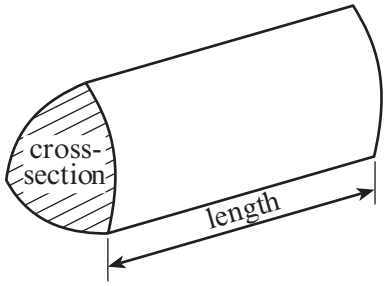
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Formula List

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



Volume of prism = area of cross-section × length



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1. *(a)* (i) Mike buys the following on a superstore's online service.
Complete his bill.

Item	Cost
6 kg potatoes @ 76p per kg	£
3 packets of cereal @ £3.36 per packet	£
4 cartons of milk @ £1.89 each	£
Total	£

[4]

(ii) The superstore offers a 5% discount on this service.
How much discount does Mike get?

.....

.....

[2]

(b) Write 9627 correct to the nearest 10.

.....

[1]

(c) Write 8·47

(i) correct to 1 decimal place,

.....

[1]

(ii) correct to the nearest whole number.

.....

[1]

(d) Use the formula $H = 3A + 4B$ to find the value of H when $A = 6$ and $B = 8$.

.....

.....

.....

[2]

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2. 30 pupils were asked to think of their favourite football team and to write down which League their team belonged to: Premier (P), Championship (C) or Other league (O). Pupils who did not have a favourite football team wrote down 'None' (N).
Their results are shown below.

P	C	O	P	N	C	O	P	C	C
C	P	O	N	C	P	N	C	O	O
P	N	C	P	O	C	C	O	P	C

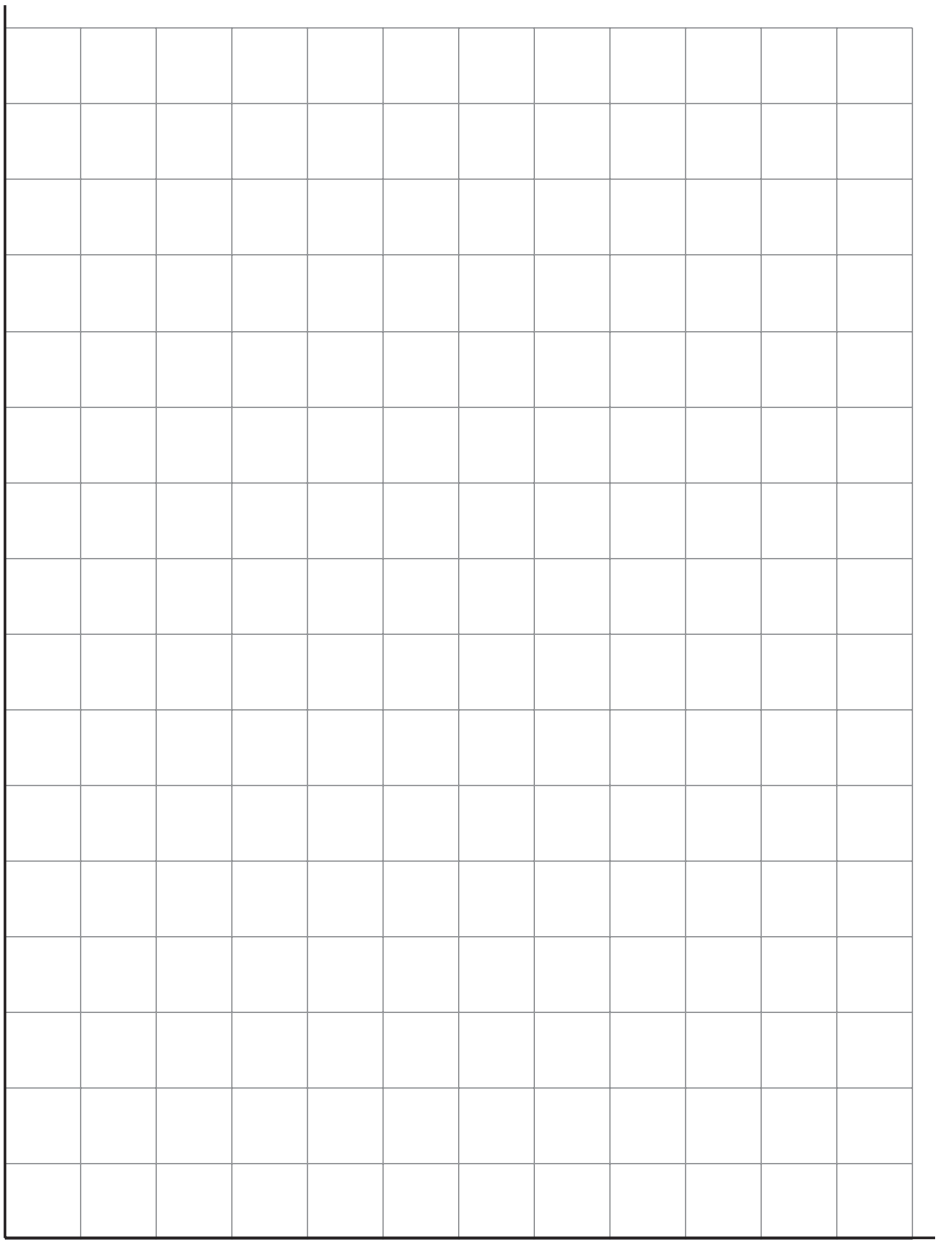
(a) Using the centimetre squared grid on the opposite page, draw a bar chart for the data given.

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For use with question 2



[6]

(b) Write down the mode.

.....

[1]

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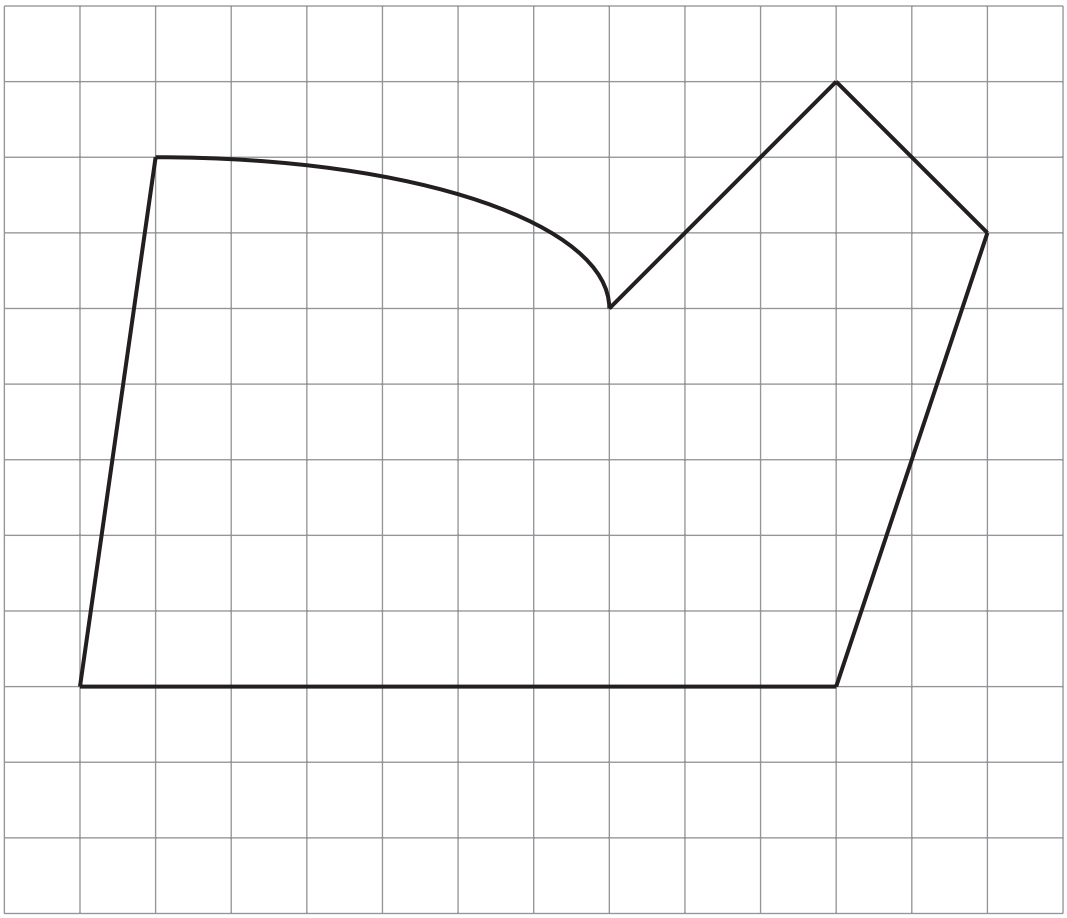
Turn over.

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3.



The above shape, drawn on a square grid, represents a field.
Estimate the area of the field if each square represents an area of $5\,m^2$.

.....

.....

.....

.....

.....

.....

Area of the field = ... m^2

[3]

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4. Selvy, Megan, David and Roberta are playing with ten cards, numbered 1 to 10.

1	2	3	4	5	6	7	8	9	10

Each player gets two cards.
Selvy's cards add up to 4.
Megan's cards add up to 8.
David's cards add up to 11.
Roberta's cards add up to 15.
Work out which cards each person has.

.....

.....

.....

.....

Selvy's cards are ..... and .....

Megan's cards are ..... and .....

David's cards are ..... and .....

Roberta's cards are ..... and .....

[4]

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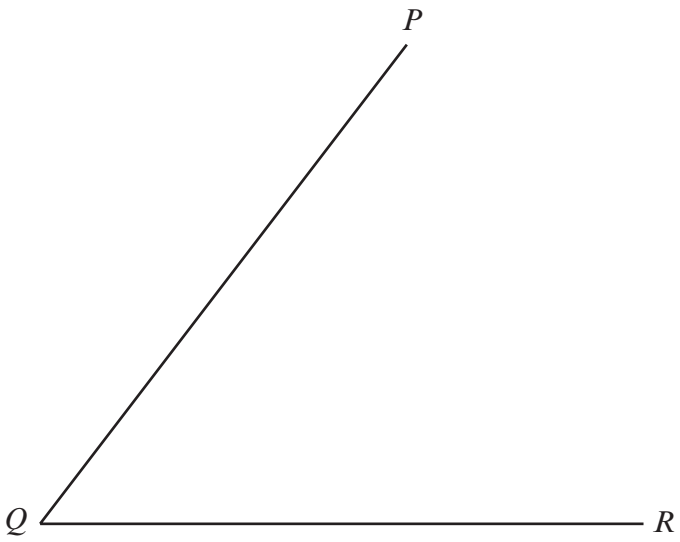
5. *(a)* Complete an accurate drawing of the quadrilateral $ABCD$, in which $AB = 9\,\text{cm}$, $B\hat{A}D = 67^\circ$, $AD = 7{\cdot}5\,\text{cm}$, $A\hat{B}C = 106^\circ$ and $BC = 10\,\text{cm}$.
The side AB has been drawn for you.

[4]



(b) Using a ruler and a pair of compasses, construct the bisector of $P\hat{Q}R$.

[2]



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6. Find the value of

(a) $\dfrac{43{\cdot}73 \times 26{\cdot}23}{523{\cdot}9 - 26{\cdot}74}$, giving your answer correct to three significant figures,

.....

[2]

(b) $\sqrt{\left(43^3 \div 52\right)}$, giving your answer correct to two decimal places.

.....

[2]

7. The populations of some villages were:

419 510 122 162 74 19 206 272

(a) Find the range of these populations.

.....

.....

[1]

(b) Find the mean of these populations.

.....

.....

.....

.....

[3]

(c) Find the median of these populations.

.....

.....

.....

.....

[2]

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8. The travel graph below represents part of Nigel's journey.

(a) How far from Bangor was Nigel when he started out?

.....

[1]

(b) How far did he travel in the first hour?

.....

[1]

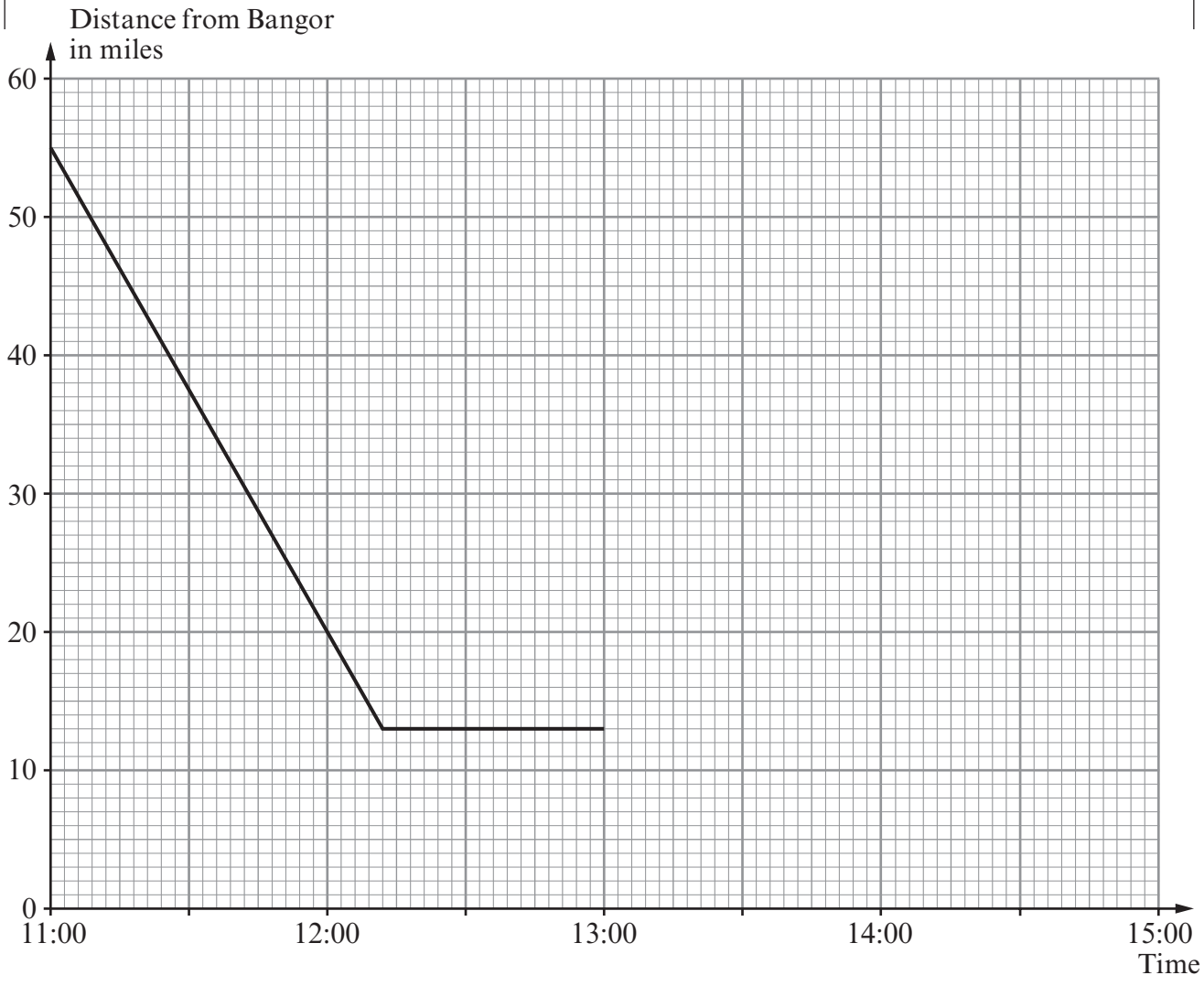
(c) For how many minutes did he stop on his journey?

.....

[1]

(d) After his stop, he continued his journey at a steady speed. By 14:18 he had reached a point 48 miles from Bangor. Draw the graph for this part of his journey.

[2]



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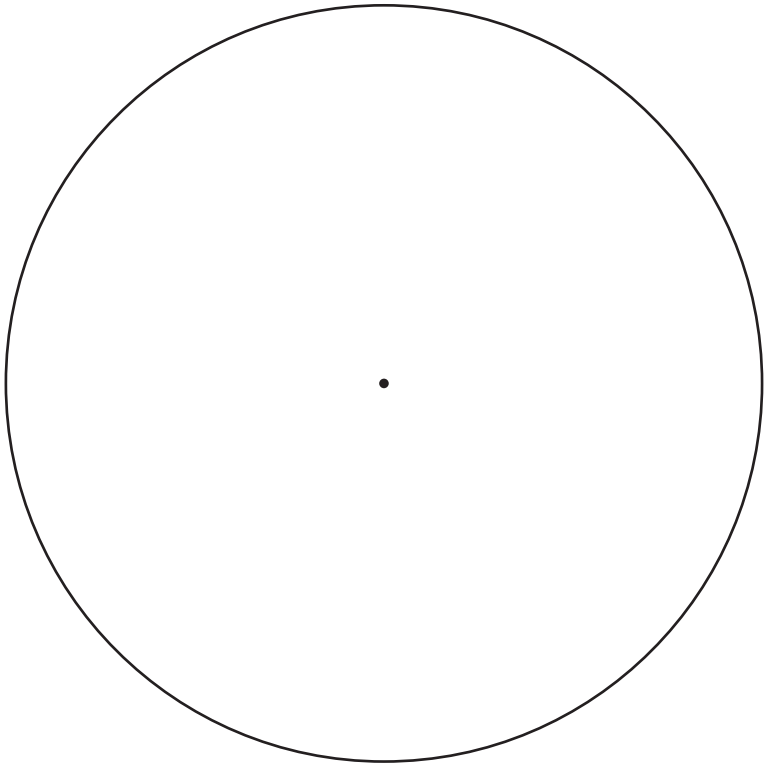
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9. The table shows the number of ice creams of each of four flavours bought from a van one Saturday.

Ice cream flavour	Vanilla	Chocolate	Strawberry	Raspberry
Number bought	110	70	38	22

Draw a pie chart to illustrate this data. You should show how you calculate the angles of your pie chart.



.....

.....

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.....

.....

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.....

.....

[4]

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

Melanie earns £1200 per month.
Of this, she spends $\frac{1}{3}$ on rent and $\frac{1}{4}$ on food.
What fraction of her earnings does she have left?

You must show all your working and write your fraction in its simplest form.

.....

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.....

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.....

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[6]

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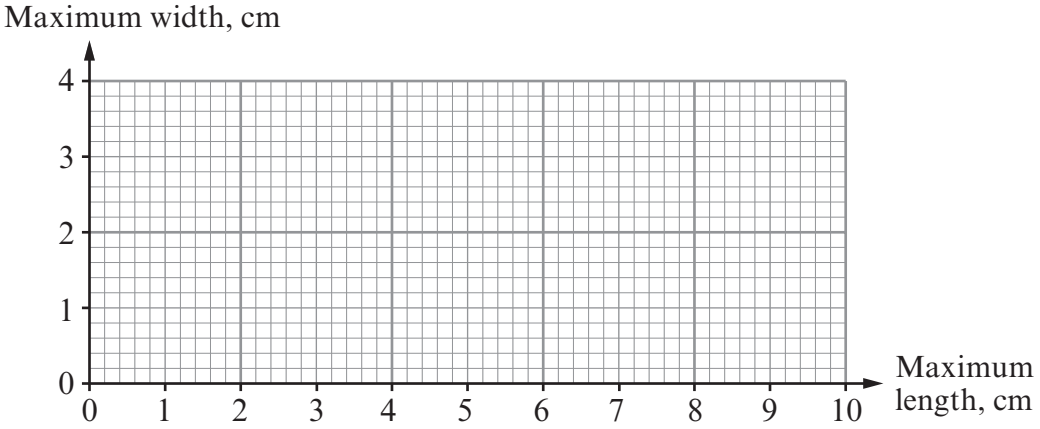
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11. The maximum lengths and maximum widths of a number of leaves from one tree were measured.

Maximum length, cm	6·8	7·4	3·2	8·2	9·4	7·6	4·2	2·8	8·4
Maximum width, cm	2·4	2·6	1·2	3·0	3·4	2·8	1·4	1·0	3·2

(a) Draw a scatter diagram to display these measurements.

[2]



(b) Draw, by eye, a line of best fit on your scatter diagram.

[1]

(c) State the type of correlation shown in your scatter diagram.

.....

[1]

(d) Another leaf from the same tree has a maximum length of 5 cm.
Use your line of best fit to estimate the maximum width of this leaf in cm.

..... cm

[1]

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12. Daisy buys a torch and a battery.
The torch costs eight times as much as the battery.
Daisy pays with a £20 note and gets £15.86 change.
How much does the battery cost?

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[4]

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13. Tansy opened a regular savings account.
Interest is only payable on 31st December each year.
Tansy paid £20 into her account on the first day of every month, starting from 1st January 2012.
On 31st December 2012, interest of 1·4% of the total amount of money that Tansy had saved during 2012 was added to her account.
Calculate how much money Tansy had in her account on 15th April 2013.

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[4]

14. Solve $3(2x - 7) = 2x + 9$.

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[3]

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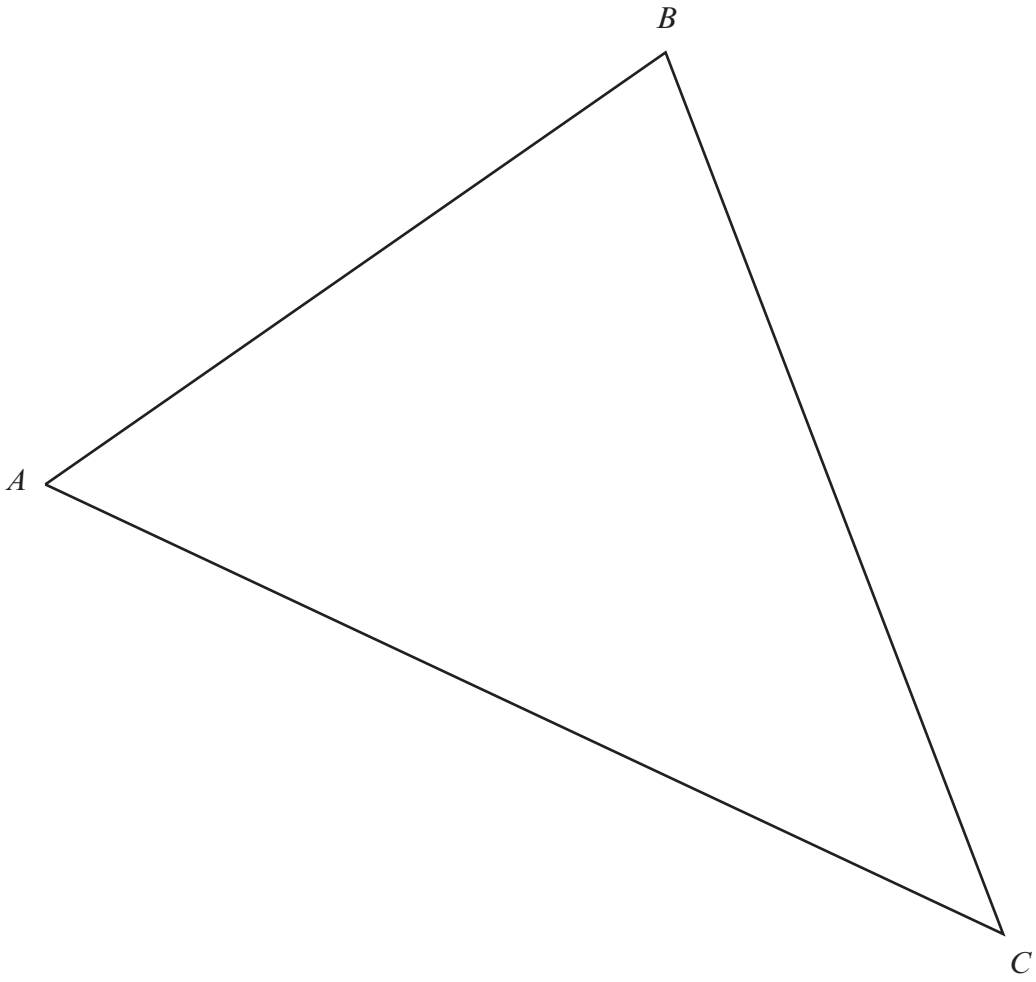
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15. *(a)* A region is found within triangle ABC using the following criteria.
Points in the region are:

- nearer to B than to C,
- greater than 4 cm from A.

Shade this region in the triangle ABC.

[3]



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(b) Calculate the area of the quadrilateral *ABCD*.

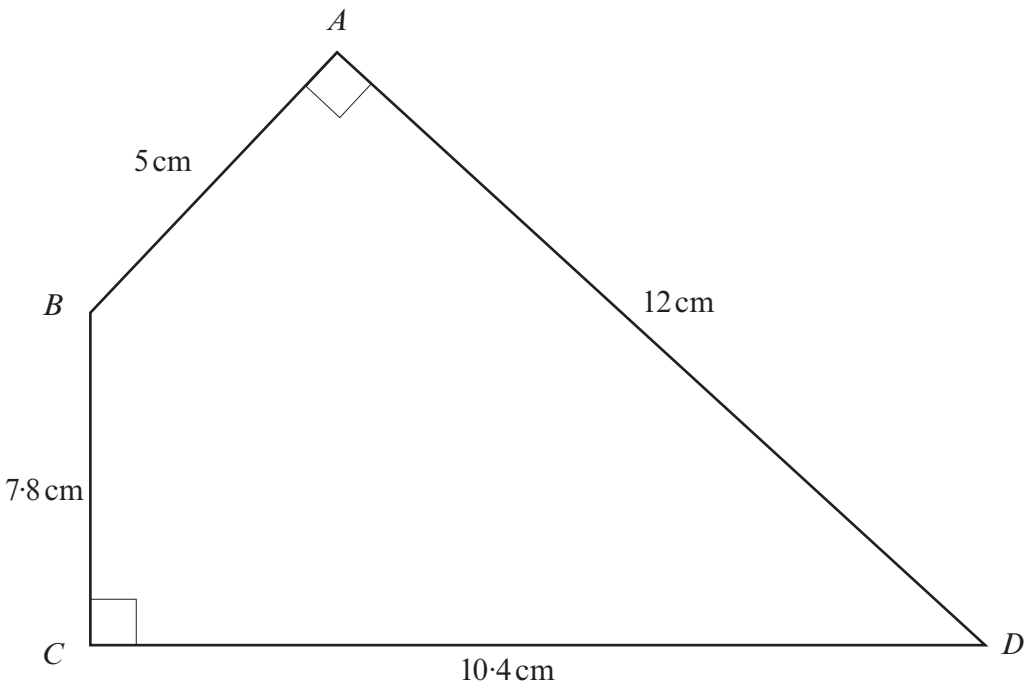


Diagram not drawn to scale

[5]

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 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 3 (Calculator allowed) Foundation Tier	Marks	FINAL MARK SCHEME Comments
Parts (a)(i) & (ii) marked at the same time 1. (a) (i) 4.56 (potatoes) 10.08 (cereal) 7.56 (milk) 22.2(0)	 B1 B1 B1 B1	 F.T. their figures for 1 error Unsupported 22.2(0) gets B4.
1. (a) (ii) For example, 10% = (£) 2.22 5% = (£) 1.11	M1 A1	Any valid method F.T. their (a)(i). Ignore extra decimal places in their answer. If (£)1.11 not given, then (£) 21.09 gains M1 A1
1. (b) 9630	B1	
1. (c) (i) 8.5	B1	Extra zeros get B0, e.g. 8.50 gets B0.
1. (c) (ii) 8	B1	Extra zeros get B0, e.g. 8.0 gets B0
1. (d) 18 + 32 = 50	M1 A1	Correct substitution. B1 for 3×6 + 4×8 gets M1, A0. Substitutions like 36+48 OR 18A +32B get M0, A0.
Parts (a) – (b) marked at the same time 2. (a) Premier 8, Championship 11, Other 7, None 4 Both axes labelled, e.g. frequency along one axis and P(remier), C(hampionship), O(ther),N(one) along other axis. Anywhere within the base (inc.) of the corresponding bar. Uniform scale for the frequency axis starting at 0. Four bars at correct heights. Can be in any order. Bars must be of equal width. Penalise –1 for each different width bar. (b) Championship OR C	✓ B2 B2 B2 B1	Part (a) only ✓ B1 for any two/three correct frequencies If frequencies score 0, then give B1 for all 4 correct tallies. B1 if no scale but allow one square to represent 1 OR B1 if not labelled as 'frequency' or similar. If frequency scale starts with 1 at the top of the first square the starting at 0 will be implied for this axis. Condone frequency numbers alongside squares instead of at the top of squares. F.T. their table of frequencies B1 for any 2 or 3 correct bars on F.T. If no frequencies given in their working, penalise -1 for each incorrect frequency on their bars up to -4 (First and third B2s) F.T. Accept 11 and C or Championship, but B0 for 11 only **F.T. their frequencies**
3. Evidence of square counting 69 – 73 345 – 365	M1 A1 B1	 F.T. 5 × 'their area'
4. Selvy must have 1 and 3 (4) Megan must now have 2 and 6 (8) David must now have 4 and 7 (11) Roberta must now have 5 and 10 (15)	✓ B1 B1 B1 B1	F.T. wrong choices, but cards can only be used once.
Use overlay 5. (a) Angle BAD (67º) AD = 7.5cm Angle ABC (106º) BC = 10cm	 B1 B1 B1 B1	 Allow ± 2º Allow ±2mm Allow ± 2º Allow ±2mm B4 only if quadrilateral is completed.
5. (b) 3 arcs for bisector and the line	B2	B1 for the first arc crossing both arms. Watch out for equal arcs from P and R.

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2013 June UNIT 3 (Calculator allowed) Foundation Tier	Marks	FINAL MARK SCHEME Comments
6. (a) 2.31	B2	B1 for 2.30(71805857...) All places given must be correct.
6. (b) 39.10	B2	B1 for 39.1(02183...) All places given must be correct.
7. (a) 491	B1	
7. (b) Sum of the numbers (1784) Sum/8 223	M1 M1 A1	For attempt to add the numbers For a division by 8 of a number in the range 1200 − 2300 C.A.O.
7. (c) (19 74 122) <u>162 206</u> (272 419 510) 184	M1 A1	For ordering the numbers in descending or ascending order. OR showing 162 and 206 only.
8. (a) 55 (miles)	B1	
8. (b) 35 (miles)	B1	
8. (c) 48 (minutes)	B1	
8. (d) Correct line drawn to (14:18, 48)	B2	B1 for a line to (..., 48) and later than 13:00 OR for a line to (14:18, ...). (14:18, 48) without the line gets B1.
9. **<u>Use angle measuring tool</u>** 3 or 4 angles correct and correctly labelled. 3 or 4 angles correct, labels not fully correct. 2 angles correct and correctly labelled. 2 angles correct, labels not fully correct. 1 angle correct and correctly labelled. OR <u>If 0 OR 1 for their diagram or no diagram,</u> 360/240 Angles are 165, 105, 57 and 33	 B4 OR B3 B3 B2 B1 M1 A1	 Correct labels (Words NOT the frequency OR angle). 3 correct labels is enough. If only B1 is scored for the diagram, and all the angles given correctly, then cancel the B1 and award M1, A1 for 2 marks. If B0 scored for the diagram, check the angles and the method to see if the M1 and the A1 can be awarded. (1 is) 1½ ° gets the M1. OR SC1 for all correct percentages: 45.8, 29.2, 15.8, 9.2
10. EITHER ¼ + ⅓ M1 = 7/12 A1 leaving 1 – 7/12 M1 = 5/12 A1 OR ¼ of (£)1200 = (£)300 ⅓ of (£)1200 = (£)400 Leaving 500 5/12	✓ B1 B1 M1 A1	 M1 for implementing the addition of the fractions by a correct method. This M1 is F.T. in both methods C.A.O.
Look for • Spelling • Clarity of text explanations, e.g. food, rent • 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, punctuation and grammar.

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2013 June UNIT 3 (Calculator allowed) Foundation Tier	Marks	FINAL MARK SCHEME Comments
All parts (a) – (d) marked at the same time **Use Overlay**		
11. (a) All points correctly plotted	B2	Mark intention B1 for any 4 points correctly plotted
11. (b) Reasonable (straight) line of best fit	B1	In an appropriate direction, fit for purpose, with some points above and some points below the straight line. Intention to be 'straight', accept without a ruler Do not accept line drawn corner to corner
11. (c) Positive	B1	Do not accept descriptions
11. (d) Their maximum width read from their line of best fit for a maximum length of 5cm	B1	Accuracy of reading within 1 square small If no line of best fit then B0
12. (Cost of torch and battery) (£)4.14 (Cost of battery =) 4(.)14/9 46(p) or (£)0.46	B1 M2 A1	 FT their 4.14 provided 20–15.86 attempted M1 for realising this is '9× the cost of the battery', e.g. $x + 8x = 4(.)14$, or $9\times\ldots. = 4(.)14$ If units are given they must be correct (B1 and) also possible SC1 from ÷8 leading to an answer of 51(.75p), 52(p), (£)0.51(75) or (£)0.52
13. Evidence of 240×1.4/100 or equivalent + 240 (=243.36) + 80 (£)323.36	✓ M1 m1 M1 A1	 Accept 12×20 for 240 Accept 12×20 for 240 *OR award M1, m1 for 240 × 1.014* Accept 4×20 for 80. FT for idea to add 80 to an amount > 'their 12×20' CAO. Accept (£)323. Mark final answer. If units are given they must be correct
14. $6x – 21 = 2x + 9$ $4x = 30$ $x = 30/4$ OR 7½ OR 7.5	B1 B1 B1	Clearing bracket correctly F.T. until 2nd error 6x – 21 need not be in an equation. Gathering terms on both sides F.T. $ax = b$ ($a \neq 1$)
15(a). Perpendicular bisector of BC ± 2° Arc centre A with radius 4cm +2mm (As on the overlay) Correct region identified	B1 B1 B1	 FT for a similar region (i.e. correct but outside tolerances)
15(b). Drawing the line BD OR considering the area of one of 2 right angled triangles ABD or BCD Area ΔABD = ½ ×12 ×5 OR Area ΔBCD = ½ ×7.8×10.4 Area ΔABD = 30 (cm^2) Area ΔBCD = 40.56 (cm^2) Sum of their 2 areas evaluated 70.56 (cm^2)	S1 M1 A1 A1 A1	 For ½ base×height used for one of the right angled triangles F.T. provided M1 awarded

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Higher Tier GCSE Mathematics Unit 3 June 2013	Marks	FINAL MARK SCHEME Comments
1. (Cost of torch and battery) (£)4.14 (Cost of battery =) 4(.)14/9 46(p) or (£)0.46	B1 M2 A1	 FT their 4.14 provided 20-15.86 attempted M1 for realising this is '9× the cost of the battery', e.g. $x + 8x = 4(.)14$, or $9\times\ldots. = 4(.)14$ If units are given they must be correct (B1 and) also possible SC1 from ÷8 leading to an answer of 51(.75p), 52(p), (£)0.51(75) or (£)0.52
2.(a) All points correctly plotted	B2	Mark intention B1 for any 4 points correctly plotted
2.(b) Reasonable (straight) line of best fit	B1	In an appropriate direction, fit for purpose, with some points above and some points below the straight line. Intention to be 'straight', accept without a ruler Do not accept line drawn corner to corner
2.(c) Positive	B1	Do not accept descriptions
2.(d) Their maximum width read from their line of best fit for a maximum length of 5cm	B1	Accuracy of reading within 1 square small If no line of best fit then B0
3.(a) $12x(x - 4)$ (ISW)	B2	B1 for 1 slip inside bracket or partially factorised,
3.(b) -250	B1	CAO
3.(c) E.g. (25 - - 3)/56 28/56 0.5	M1 A1 A1	 Decimal answer required *If no marks:SC1 for answer 0.392857… rounded or truncated from (25-3)/56, or* *for 28/'their 56' where 8×7 has not been evaluated correctly, with the answer evaluated correctly as a decimal*
4. *Iona* (a)(i) Mid points (2.5,) 7.5, 12.5, 17.5 (, 22.5) (7.5×5 + 12.5×9 + 17.5×17) (=447.5) /31 14(.435….°C)	 B1 M1 m1 A1	 FT their midpoints if within or at bounds FT their Σfx ÷ 31 Ignore further rounding
4(a)(ii) Explanation, e.g. 'most common', 'more data than in other groups'	E1	
4(a)(iii) 15 (°C)	B1	Accept 14.9(99…)
4.(b)(i) Reason, e.g. 'uses all data', 'mean is a single value (whereas the mode is in a group)'	E1	Do not accept 'more accurate' without a reason
4.(b)(ii) Reason, e.g. 'range doesn't tell you how hot it is', 'you don't know if it is cold looking at the range'	E1	Accept 'extreme value might impact on the range more than on the mean' Do not accept 'mean gives you one value where as the range does not', 'range only considers largest and smallest values'
4.(c) Correct frequency polygon	B2	Ignore bars drawn as working. B1 correct except that the polygon has been translated by 0.5, OR B1 4 of the 5 points plotted correctly and a polygon formed, OR B1 for the plots at 7.5, 12.5 and 17.5 plotted correctly and these plots joined by straight lines (ignore extra spurious lines), OR B1 for correct plots but not joined or joined by a curve

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Higher Tier GCSE Mathematics Unit 3 June 2013	Marks	FINAL MARK SCHEME Comments
5. Evidence of 240×1.4/100 or equivalent + 240 (=243.36) + 80 (£)323.36 Look for • organised layout • spelling • clarity of text explanations, • the use of notation and units 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 m1 M1 A1 QWC 2	Accept 12×20 for 240 Accept 12×20 for 240 *OR award M1, m1 for 240 × 1.014* Accept 4×20 for 80. FT for idea to add 80 to an amount > 'their 12×20' CAO. Accept (£)323. Mark final answer. If units are given they must be correct 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.
6.(a) Perpendicular bisector of BC ±2° and ±2mm Arc centre A with radius 4cm ±2mm Correct region identified	B1 B1 B1	 FT for a similar region (i.e. correct but outside tolerances)
6.(b) Drawing the line BD OR considering the area of one of 2 right angled triangles ABD or BCD Area ΔABD = ½ ×12 ×5 OR Area ΔBCD = ½ ×7.8×10.4 Area ΔABD = 30 (cm^2) Area ΔBCD = 40.56 (cm^2) Sum of their 2 areas evaluated 70.56 (cm^2)	S1 M1 A1 A1 A1	 For ½ base×height used for one of the right angled triangles F.T. provided M1 awarded
7.(a) x/1.5= 3.6/2 OR x = (3.6/2)× 1.5 OR x = 1.8× 1.5 x = 2.7 (cm) y/4.5 = 2/3.6 OR y = (2/3.6) ×4.5 OR y = 4.5÷1.8 y = 2.5 (cm)	M1 A1 M1 A1	
7.(b) In either order Option: 'Length of the third side', 'another side' Option: 'Included angle', 'size of angle between two sides'	E1 E1	Accept 'SSS' Do not accept 'all the sides are different lengths' Must refer to 'included' angle in some way. Accept 'SAS' *Read descriptions, they must not contradict!*

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Higher Tier GCSE Mathematics Unit 3 June 2013	Marks	FINAL MARK SCHEME Comments
8.(a) $(2x + 5)(3x – 5)$	B2	B1 for $(2x … 5)(3x … 5)$
8.(b) Method of clearing all 3 fractions Correctly collecting like terms LHS, i.e. $(16x + 2 – 12x – 21 = 3$ leading to) $4x – 19 = 3$ $x = 22/4$ or equivalent (11/2 or 5.5 or 5 ½)	M2 A1 A1	M1 for clearing 2 of the 3 fractions. 'Clearing' implies that the denominator is 1 FT provided at least M1 already awarded FT provided at least M1 already awarded Mark their final answer *If no marks SC1 for sight of (4x-19)/6*
9.(a) Strategy, sketch with tanker to boat (3.2km) and lighthouse to boat (4.5km)perpendicular $d^2 = 3.2^2 + 4.5^2$ 30.49 Distance 5.5(2… km)	S1 M1 A1 A1	 FT from their sketch interpretation *If no marks, 45 as hypotenuse, then SC1 for an answer of 3.16…(km)* *Do not accept scale drawings*
9.(b) Calculating an angle in their right angled triangle, e.g. tanBOL=4.5/3.2 or sinBOL=4.5/5.5 or CosBOL=3.2/5.5, OR accept tanBLO=3.2/4.5, or sinBLO=3.2/5.5, or CosBLO=4.5/5.5 Appropriate sketch with an angle of 54(°) to 55(°) Bearing (rounds to) 305(°) to 306(°)	M1 A2 B1	FT their distance '5.5'  OR for appropriate angle that if continued would give the correct bearing (see sketch above) A1 for $\tan^{-1}1.4…$ or $\sin^{-1}0.8…$ or $\cos^{-1}0.58..$, OR answer 35(°) to 36(°) or inappropriate 54(°) to 55(°) CAO *Do not accept scale drawings*
10. $x(x + 5) = 2100$ or $x^2 + 5x – 2100 = 0$ $x = \{-5 \pm \sqrt{(5^2 - 4\times1\times-2100)}\}/ 2$ $= (-5 \pm \sqrt{8425})/ 2$ Width 43.4 (cm)	S1 M1 A1 A1	Brackets must be intended Allow 1 slip in substitution. FT for their quadratic with no zero terms and with sight of 2100 and 5 in the equation FT from S0, M1 CAO. Ignore -48.4 as not required Must be from evidence of using the quadratic formula
11.Use of ½ absinC ½ ×3.4×2.7×sin123° 3.8(49…cm^2)	M1 A1 A1	 Accept 3.9 or 4(cm^2) from appropriate working
12.(a)(i) Idea of frequency density × 10 (2+4+6+10+8+10) × 10 400 (people)	S1 M1 A1	 Allow 1 error CAO. Must be from correct working for 2nd August SC1 for an answer of 400 from reading 2nd September
12.(b)Reason, e.g. 'only know total time', '**only** shows the amount of time'	E1	
12.(c) Implies 'Grant correct' AND reason, e.g. 'can only estimate from the group', 'yes as the histogram only gives 120 to 140 minutes'	E1	
12.(d) Frequency densities: 3, 8, 9, 10, 9,6.5, 11, 3.5 Correct histogram	M2 A1	Watch last 3.5 height is of width 140 - 180 M1 for any 4 correct frequency densities CAO
13.(a) Calculation of at least 3 of the coordinates Plotting at least 5 correct points accurately Correct curve through all 6 correct points	B1 P1 C1	(-2,0) (-1,4) (0,6) (1,6) (2,4) (3,0) Do not accept drawn with straight lines, or a 'flat' part
13.(b)(i) -2 and 3	B1	FT their curve provided it crosses y=0 at least twice, all values must be given
13.(b)(ii) Considering y = 2 Two x-values from their graph	M1 A1	FT their curve FT for all possible values, provided at least 2solutions
13.(c) Split into areas by ordinates given & attempt to sum Use of (0,6) (1,6) (2,4) (3,0) Correct substitution into trapezium rule 13	M1 B1 m1 A1	FT from (a) Or correct calculations shown for the area (6+5+2)

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Higher Tier GCSE Mathematics Unit 3 June 2013	Marks	FINAL MARK SCHEME Comments
14. Correct placement of <ABD= 134° $AD^2 = 5.6^2 + 26.8^2 - 2\times5.6\times26.8\times\cos134$ $AD^2 = 958.1(0865\ldots)$ AD = 30.9(533… m) or 31(m)	S1 M1 A1 A1	Or 46° if appropriate for their alternative calculations FT their 134° provided it is an obtuse angle for possible M1 and final A1 only (use of 140° leads to 31.297…)
15. 195° or 345° Then: 345° or 195° with no other values	B1 B1	Answers from calculations that strictly round or truncate to those given FT 540 – their first answer. Do not FT from multiples of 90° *Accept sight of -15° as working not as another value answer*

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Surname	Centre Number	Candidate Number
Other Names		0

WJEC CBAC

GCSE

4353/01

MATHEMATICS (UNITISED SCHEME)

UNIT 3: Calculator-Allowed Mathematics FOUNDATION TIER

A.M. THURSDAY, 17 January 2013

$1\frac{1}{2}$ hours

ADDITIONAL MATERIALS

A calculator will be required 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 or use the π button on your calculator.

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 **9**.

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

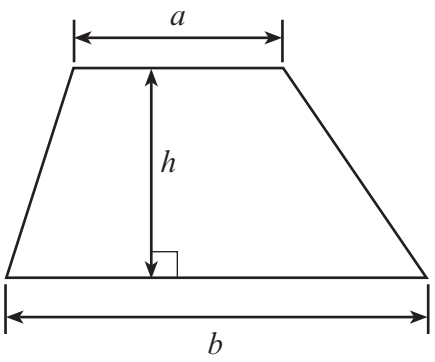
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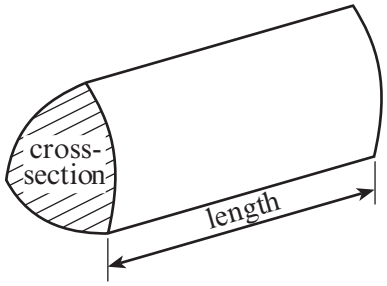
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Formula List

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



Volume of prism = area of cross-section × length



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Examiner only

1. *(a)* (i) The following is part of a weekly food bill for a family.
Complete the bill.

Item	Cost
2 joints of meat @ £9.85 each	£ 19.70
8 loaves of bread @ £1.57 each	£
14 litres of milk @ 83p per litre	£
3 packets of cereal @ £1.64 per packet	£
Total	£

[4]

(ii) What change would you get if you paid the bill with three £20 notes?

.....

.....

.....

[2]

(iii) The shop that supplies the food gives 5 loyalty points for every £10 spent.
How many points will this bill deserve?

.....

.....

.....

.....

[2]

(b) (i) Write 5·324 correct to 2 decimal places.

.....

[1]

(ii) Write 74·63 correct to the nearest whole number.

.....

[1]

(iii) Write 65 839 correct to the nearest 1000.

.....

[1]

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2. *(a)* The table shows the number of crates of oranges sold by a wholesaler in each of four weeks.

Week number	1	2	3	4
Number of crates	120	220	170	110

Draw a pictogram to represent the above information, using  to represent 40 crates.

Week 1	
Week 2	
Week 3	
Week 4	

[4]

(b) On the squared paper on the following page draw a bar graph to represent the data given above.

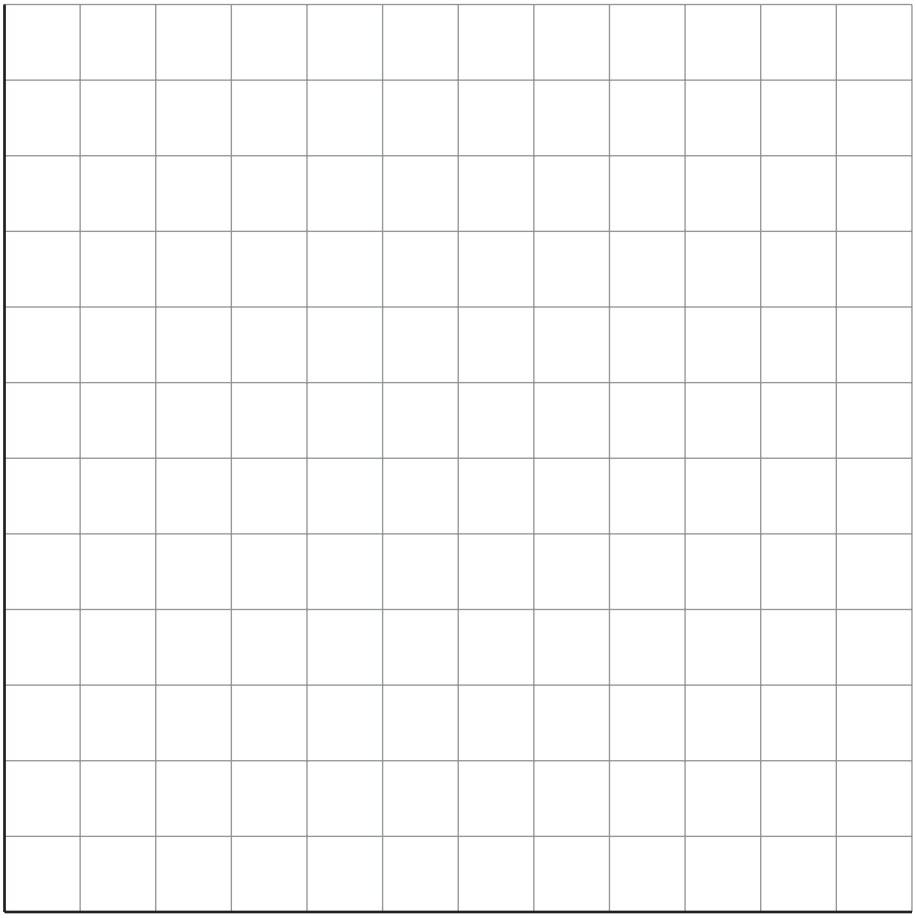
[4]

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For use with Question 2.



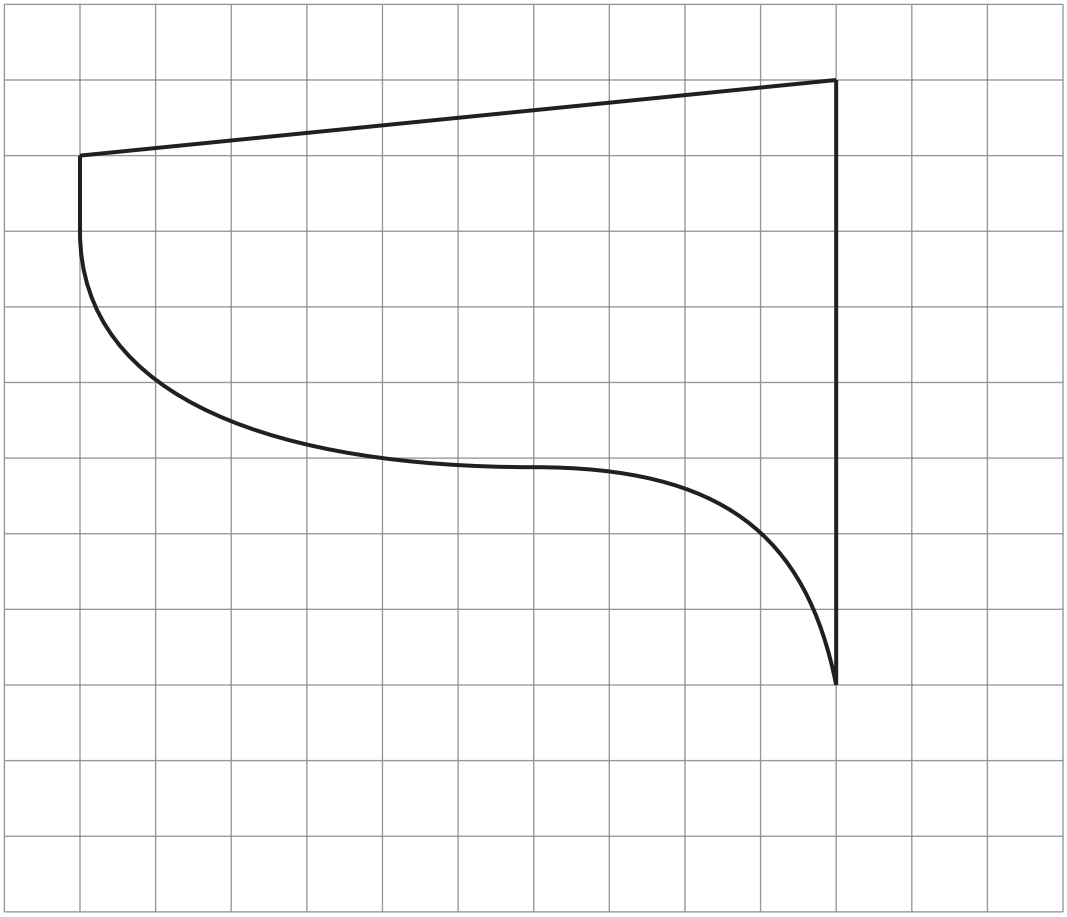
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3.



The above shape represents the outline of a field on a map drawn to scale.
Each square on the grid represents $10\,m^2$.
Find an estimate for the area of the field.

.....

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.....

.....

.....

.....

Area of the field = ... m^2

[3]

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4. The diagram represents a rectangular garden with dimensions of 8 m by 5 m.



Diagram not drawn to scale

(a) Calculate the perimeter of the garden, giving the units of your answer.

.....

.....

.....

[2]

(b) Calculate the area of the garden.

.....

.....

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[2]

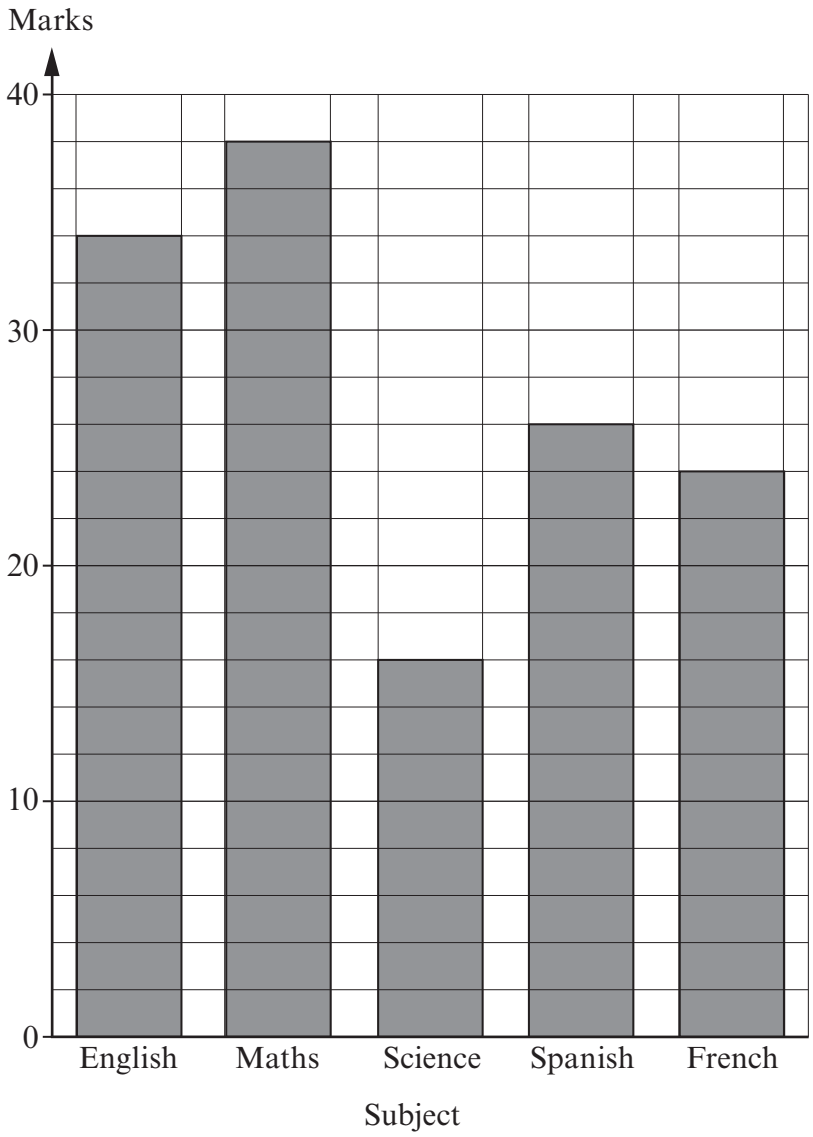
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5. Jake has taken tests in five subjects.
Each test is marked out of 40.
The diagram shows his results.



(a) What is the range of the marks scored by Jake?

.....

.....

[2]

(b) Write down Jake's median mark.

.....

.....

[1]

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(c) Showing all your working, find the mean number of marks scored by Jake.

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[3]

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6. *(a)* Complete an accurate drawing of the triangle ABC, in which $BC = 11\,\text{cm}$, $A\hat{B}C = 73^\circ$ and $A\hat{C}B = 55^\circ$.
The line BC has been drawn for you.

[3]



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(b) Using a ruler and a pair of compasses, bisect the line XY.

[2]



(c) Using a ruler and a pair of compasses, construct an angle of 30° at the point A.

[3]



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7. *(a)* Calculate $\frac{5}{8} - \frac{1}{4}$.

.....

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[2]

(b) Solve $3x + 8 = 23$.

.....

.....

.....

[2]

(c) Given that $B = 3T + 2W$, find W when $B = 32$ and $T = 6$.

.....

.....

.....

.....

[3]

8. Find the value of the following, giving each answer correct to four significant figures.

(a) $\dfrac{300{\cdot}27}{24{\cdot}36 \times 6{\cdot}74}$

.....

.....

[2]

(b) $5{\cdot}8^2 - 4{\cdot}79 + \sqrt{34{\cdot}5 \div 9{\cdot}64}$

.....

.....

[2]

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

The table below shows the basic hotel costs for a two week holiday in August.

Start date	Price for each adult (£)	Price for each child (£)
August 1	654	Half adult price + £100
August 15	668	Half adult price + £150
August 29	586	Half adult price

Supplements	Sea view	£10 per person per night
	Balcony	£6 per person per night

Mr and Mrs Hodgkin book a two week holiday for themselves and their three children with a start date of 15th August.
They decide to book rooms with a sea view and a balcony.
Calculate the total amount that they have to pay the hotel.
You must explain each step of your calculation and show all your working.

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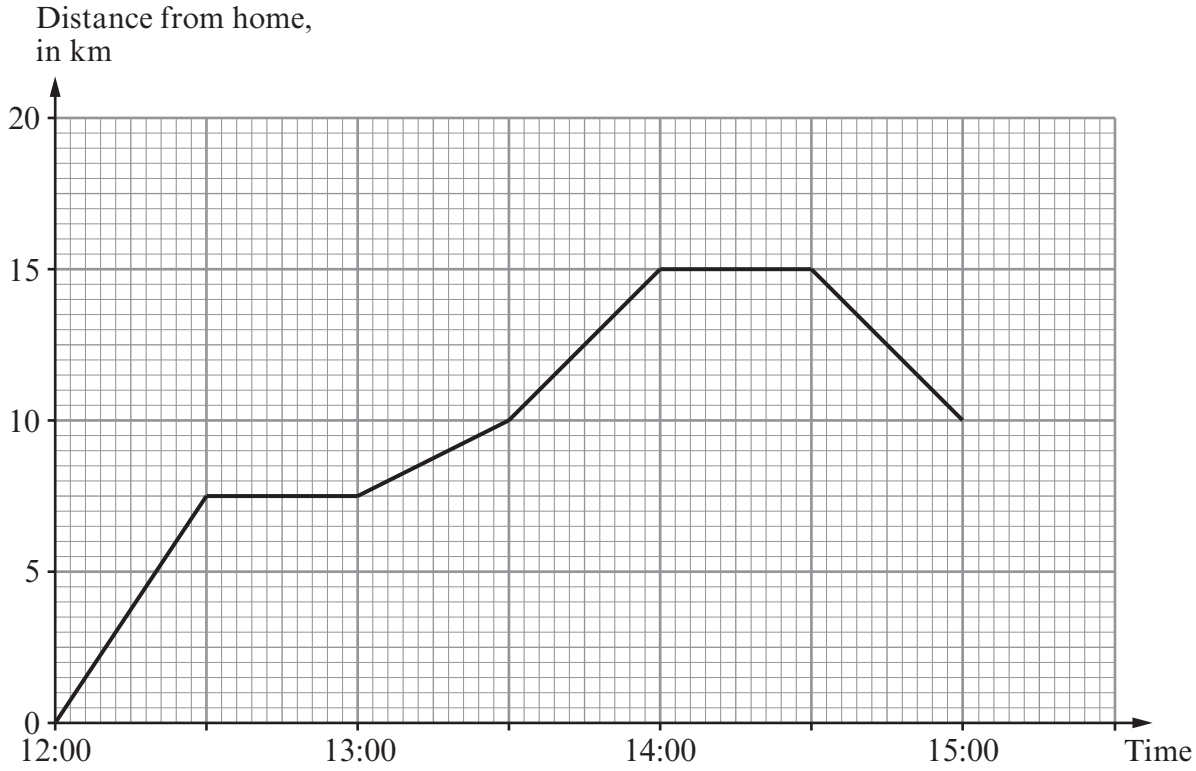
[8]

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10. The travel graph below represents Scot's bike ride starting from home.



(a) Between which two times was Scot furthest away from home?

Between ..... and .....

[1]

(b) Scot started his bike ride at 12:00.
He has a cycle computer that shows the distance he rides.
He had two half-hour rests, but otherwise kept on cycling.
He set his cycle computer to zero when he left home.
What distance did his cycle computer show at 15:00?

.....

.....

[1]

(c) What was Scot's average speed between 13:00 and 13:30?
You must give the units of your answer.

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.....

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[3]

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11. Cerys makes hats for a living.



Each hat she makes needs 0·45 m^2 of fabric costing £3.40 per m^2 and 50 cm of ribbon.
Cerys pays herself £12.60 per hour.
She can make 3 hats in two hours.
There are no other costs or outgoings.
Cerys sells each hat for £10.25, which exactly balances the costs and outgoings.

Calculate how much the ribbon costs per metre.
You must show all your working.

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[7]

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12. Solve

(a) $6x + 7 = 4(x + 6)$,

.....

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.....

[3]

(b) $\frac{x}{5} + 4 = 13$.

.....

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.....

.....

[2]

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13. A solution to the equation $x^3 + 2x - 25 = 0$ lies between 2 and 3.
Find this solution correct to 1 decimal place.

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[4]

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

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.

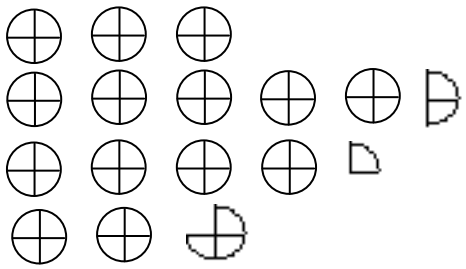
It is hoped that this information will be of assistance to centres but it is recognised at the same time that, without the benefit of participation in the examiners' conferences, teachers may have different views on certain matters of detail or interpretation.

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

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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 3 - FOUNDATION TIER

UNIT 3 (Calculator allowed) Foundation Tier	Marks	Final Mark Scheme Comments
All parts (a) – (c) marked at the same time 1. (a) (i) 19.70 (meat) 12.56 (bread) 11.62 (milk) 4.92 (cereal) 48.8(0) 1. (a) (ii) (£) 60 – (£)48.8(0) =(£)11.2(0) 1. (a) (iii) Points = 4×5 = 20	 B1 B1 B1 B1 M1 A1 M1 A1	 F.T. their figures for 1 error F.T. their '48.80'
1. (b) (i) 5.32	B1	
1. (b) (ii) 75	B1	B0 for any decimal places e.g. 75.0 and 75.00 etc get B0
1. (b) (iii) 66000	B1	
All parts (a) – (b) marked at the same time **Indirect marking - Tick marked** 2. (a)  (b) Weeks 1,2,3, 4 along one axis Uniform scale for the frequency axis starting at 0 and labelled Four bars at correct heights (bars must be of equal width). Can be in any order.	✓ B1 B1 B1 B1 B1 B1 B2	 Anywhere within the base (inc.) of the corresponding bar. If no scale then B0, but allow one square to represent 20. If frequency scale starts with 20 at the top of the first square the starting at 0 will be implied for B1. Condone frequency numbers alongside square instead of at the top of the squares. B1 for any 2 or 3 correct bars on F.T.
3. Evidence of square counting 42 – 48 inclusive area = 420 – 480 (m^2)	M1 A1 B1 3	 F.T. 10 times their 'square count'
All parts (a) – (b) marked at the same time 4. (a) 26 m (b) 8 × 5 = 40	 B1 U1 M1 A1 4	 Independent of other marks

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UNIT 3 (Calculator allowed) Foundation Tier	Marks	Final Mark Scheme Comments
5.(a) 38 – 16 = 22	M1 A1	
5. (b) 26	B1	
5. (c) Total = 138 /5 27.6	M1 m1 A1	Allow up to 2 errors in their readings for the M1 C.A.O.
Use Overlay 6. (a) $A\hat{B}C = 73°$ $A\hat{C}B = 55°$ Completed triangle	 B1 B1 B1	 Allow ± 2º Allow ± 2º Only if at least one B1 awarded. Complete reflection of the triangle gets B2
Use Overlay 6. (b) Arcs for first step Line drawn	 B1 B1	
Use Overlay 6. (c) Arcs for 60° Bisecting 60° arcs step 1 Bisecting 60° arcs step 2 and line drawn.	 B1 B1 B1	
7. (a) 5/8 – 2/8 = 3/8	M1 A1	Accept decimals, e.g. (0).625 – (0).25 = (0).375
(b) 3x = 15 x = 5	B1 B1	 F.T. ax = b, a≠1
(c) 32 = 3×6 + 2W 2W = 14 W = 7	B1 B1 B1	Correct substitution Isolating the W F.T. if ax = b (a≠1)
8. (a) 1.829	B2	B1 for 1.82(8836..) OR 1.83 All places given must be correct rounded or truncated.
8. (b) 30.74	B2	B1 for 30.74(1781...) All places given must be correct rounded or truncated
9. Adults (£) 668 + 668 (1336) Cost per child = 668/2 + 150 Children 484 × 3 (1452) Sea view 10 × 5 × 14 (700) Balcony 6 × 5 × 14 (420) Total (£)3908 Look for • spelling • clarity of text explanations, • the use of notation (watch for the units £) 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	B1 B1 B1 B1 B1 B1 QWC 2	Using the adult and child prices consistently from another row of the table gets MR–1. OR B1 for 50 AND 30 OR B1 for 140 AND 84 F.T. for one error (i.e. if B4 awarded from first five B1s). 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.

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UNIT 3 (Calculator allowed) Foundation Tier	Marks	Final Mark Scheme Comments
10. (a) (Between) 14(:)00 and 14(:)30 or equivalent	B1	If am/pm used it must be correct, i.e. pm. Do not accept ½ hour or 30 minutes
10. (b) 20 (km)	B1	Ignore sight of incorrect units
10. (c) 2 ½ (km) / 30(minutes) OR 2 ½ / 0.5 OR equivalent 5 km/h	M1 A1 U1	Accept statement '2 ½ (km) in half hour' or similar (OR 5000) Independent of other marks (OR ……. m/h) Accept k(m)ph
Indirect marking - Tick marked 11. 1 hat made in 2/3 hour or 40 minutes Pay per hat (2/3 of £12.60) (£)8.4(0) (Cost of fabric) 0.45 × 3.4(0) (= £)1.53 (Total costs excluding ribbon £) 8.4(0)+ 1.53 (=£9.93) (Ribbon cost per hat) (£)10.25 – (£)9.93 (= £0.32 or 32p) (Ribbon costs) 64(p) (per metre)	 B1 B1 M1 A1 m1 m1 A1	*If units are given they must be correct, penalise once only* FT 'their 1.53' provided M1 awarded and 'their £8.40' provided ≠£12.60 FT 10.25 – 'their 9.93', provided it includes pay and fabric costs CAO *Alternative:* *(Cost of fabric for 3 hats) 3×0.45×3.4(0) M1* *= (£)4.59 A1* *(or M1, A1 for cost of fabric for 1 hat £1.53)* *(Pay for 3 hats in 2 hours 2×£12.60 = £)25.2(0) B1* *(Sales of 3 hats 3 ×10.25 = £)30.75 B1* *(Cost of ribbon for 3 hats)* *(£)30.75 – (£)4.59 –(£)25.2(0) (=96p) m1* *FT provided first M1 and includes pay and sales* *(Cost ribbon per hat or per metre) ÷3 (×2) m1* *FT provided first M1 and includes pay and sales* *(Cost of ribbon per metre)* *64(p) or (£)0.64 A1 CAO*
12. (a) 6x + 7 = 4x +24 2x = 17 x = 8.5 OR 8½ (b) $\frac{x}{5} = 9$ OR x + 20 = 65 x = 45	B1 B1 B1 B1 B1	Correctly clearing brackets F.T. until second error Collecting terms F.T. ax = b with a≠1 Accept embedded answers such as 45/5 = 9 for B2, but if they go on to write x=13 for example then B1 only.
13. One correct evaluation, $2 \le x \le 3$ 2 correct evaluations, 2.55 ≤x ≤2.75, one either side of 0 2 correct evaluations, 2.65 ≤ x ≤2.75, one either side of 0 2.7 *No calculations shown: accept "too high", ">", etc.*	B1 B1 M1 A1	x $x^3 + 2x - 25$ 2 -13 2.1 -11.5.. 2.2 -9.95.. 2.3 -8.2.. 2.4 -6.37.. 2.5 -4.37.. 2.55 -3.318.. 2.6 -2.2.. **2.65 -1.09..** **2.7 0.083** 2.75 1.29.. 2.8 2.55.. 2.9 5.18.. 3 8

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UNIT 3 - HIGHER TIER

Unit 3 Higher Tier	Mark	Final Mark Scheme Comments
1(a) (Between) 14(:)00 and 14(:)30 or equivalent	B1	If am/pm used it must be correct, i.e. pm. Do not accept ½ hour or 30 minutes
1(b) 20 (km)	B1	Ignore sight of incorrect units
1(c) 2 ½ (km) / 30(minutes) OR 2 ½ / 0.5 OR equivalent 5 km/h	M1 A1 U1	Accept statement '2 ½ (km) in half hour' or similar (OR 5000) Independent of other marks (OR ……. m/h) Accept k(m)ph
2. 360/6 OR 4 × 180/6 OR 720/6 60(° exterior) OR 120(° interior) **4** (of the 5) sides to be drawn forming a polygon drawn all of length 4cm (±2mm) **4** (of the 6) angles drawn correctly (within 2° tolerance) A correct hexagon, within tolerances allowed	M1 A1 B1 B1 B1	Need not be associated with interior or exterior angle Accept in working, or 120(°) **implied** in the drawing, Do not accept if incorrectly labelled on a drawing, e.g 120° drawn but incorrectly labelled 60°, allow M1, A0. Allow unless contradicted Irrespective of angles See overlay *Penalise drawing polygons with number of sides 5, 7, 8, … as -1 then FT,*
3. Strategy: measure angles 120°, 240° in both pie charts, or appropriate 1:2 ratio, or sight of appropriate ⅓ to ⅔, or appropriate use of ratio for 1 pie chart 50 boys **and** 100 girls in year 7 90 boys in Year 8 90/2 or 45 girls in Year 8 (Total number of girls) 145	S1 B1 B1 B1 B1	Accept sight of '120 and 240', or '120(°/360°) is ⅓' or '240(°/360°) is ⅔' May be in different sections of working and implies S1 FT 'their 50' + 40 provided S1 awarded and 'their 50'≠120 FT 'their 90'/2 provided S1 awarded CAO *If incorrect angles used, they must total 360°, then mark as follows:* *S0, FT to possible B1, B1, then B0, B0*
4. (£) 42.21/7 (£)6.03 and (£)36.18	M1 A1	
5. One correct evaluation, $2 \le x \le 3$ 2 correct evaluations, $2.55 \le x \le 2.75$, one either side of 0 2 correct evaluations, $2.65 \le x \le 2.75$, one either side of 0 2.7 *No calculations shown: accept "too high", ">", etc.*	B1 B1 M1 A1	x $x^3 + 2x - 25$ 2 -13 2.1 -11.5.. 2.2 -9.95.. 2.3 -8.2.. 2.4 -6.37.. 2.5 -4.37.. 2.55 -3.318.. 2.6 -2.2.. **2.65** **-1.09..** **2.7** **0.083** 2.75 1.29.. 2.8 2.55.. 2.9 5.18.. 3 8

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Unit 3 Higher Tier	Mark	Final Mark Scheme Comments
6. 1 hat made in 2/3 hour or 40 minutes Pay per hat (2/3 of £12.60) (£)8.4(0) (Cost of fabric) 0.45 × 3.4(0) (= £)1.53 (Total costs excluding ribbon £) 8.4(0)+ 1.53 (=£9.93) (Ribbon cost per hat) (£)10.25 – (£)9.93 (= £0.32 or 32p) (Ribbon costs) 64(p) (per metre) QWC2 requires sight of the majority of the process steps shown, labelled, with units and money expressed correctly, with a clear final answer QWC1 requires at least 2 of the process steps, which are labelled and units correct in a labelled final answer OR QWC1 majority of process steps shown with units correct in a labelled final answer Look for • spelling • clarity of text explanations, • the use of notation (watch for the units and '0' for unit pence when using £) 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	 B1 B1 M1 A1 m1 m1 A1 QWC 2	*If units are given they must be correct, penalise once only* FT 'their 1.53' provided M1 awarded and 'their £8.40' provided ≠£12.60 FT 10.25 – 'their 9.93', provided it includes pay and fabric costs CAO *Alternative:* *(Cost of fabric for 3 hats) 3×0.45×3.4(0)* *M1* *= (£)4.59 A1* *(or M1, A1 for cost of fabric for 1 hat £1.53)* *(Pay for 3 hats in 2 hours 2×£12.60 = £)25.2(0) B1* *(Sales of 3 hats 3 ×10.25 = £)30.75 B1* *(Cost of ribbon for 3 hats)* *(£)30.75 – (£)4.59 –(£)25.2(0) (=96p) m1* *FT provided first M1 and includes pay and sales* *(Cost ribbon per hat or per metre) ÷3 (×2) m1* *FT provided first M1 and includes pay and sales* *(Cost of ribbon per metre)* *64(p) or (£)0.64 A1 CAO* 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) $6x^2(x - 2)$	B2	B1 for correct partial factorisation, OR B1 for correct highest common factor and 1 term in brackets correct
7(b) $(x - 7)(x + 6)$	B2	Mark final answer. B1 for (x … 7)(x … 6)
7(c) $(3x + 2)(5x + 7)$	B2	Mark final answer. B1 for (3x + 7)(5x + 2) or (3x … 2)(5x … 7) or 5x(3x +2) + 7(3x + 2) or equivalent
8(a) 2x + 5 = 5x + 5 x = 0	M1 A1	Or 3x = 0 Accept 0 = x. Do not accept x = 0 from incorrect working, if M0 seen, then A0
8(b) 2x + 3 + 3×4x = 8×3 or 2x/3 + 1 + 4x = 8 14x = 21 or 14x/3 = 7 x = 3/2 or 1.5 or equivalent	B1 B1 B1	Sight of ⅔ written as 0.6 is an error. FT until 2nd error Mark final answer
9(a) $w^2 + 12.7^2 = 56.2^2$ or $(w^2 =) 56.2^2 - 12.7^2$ $w^2 = 2997.15$ or $(w =) \sqrt{2997.15}$ 54.7(46… cm) or 55 (cm)	M1 A1 A1	

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Unit 3 Higher Tier	Mark	Final Mark Scheme Comments
9(b) sin m = 14.2/34.6 m = 24(.23…°)	M1 A2	A1 for m = $\sin^{-1}0.4(104…)$
10. (x =) (46.2/8.4) × 10 (OR 5.5 × 10) (=) 55(cm) (y =) 18.7 ÷ (46.2/8.4) (OR 18.7/5.5) (=) 3.4(cm)	M1 A1 M1 A1	Or alternative full method to find x, x not implicit Or alternative full method to find y, y not implicit Alternatively candidates may refer to scale factor 5.5 throughout
11. In either order: D with F, in any order Reason: 3 sides or SSS C with E, in any order Reason: 2 sides and <u>included</u> angle or SAS	 B1 E1 B1 E1	E marks depend on B marks
12(a) Intention to subtract horizontal values on x-axis for vertical axis reading across at 45 and 15 (= 30 – 13 to 14) IQR answers in the range 16 to 17 12(b) Indicates the first task due to smaller IQR	M1 A1 E1	 FT for 'their IQR' comparison with conclusion
13(a)(i) -2.5 **and** 5	B1	
13(a)(ii) Sight of y=5, in working or on graph -2.2 to -2.1AND 4.6 to 4.7	M1 A1	
13(b) Strategy, set up a table or list to calculate values for $y=x^2$ -2x -3 with at least 1 point correct, or equate $-2x^2+5x+25=x^2-2x-3$ At least 3 values in their table or list correct **and** plotted, OR $3x^2-7x-28=0$ with substitution into quadratic formula (allow 1 slip) All necessary correct points plotted joined with **correct curve drawn** to intersections, OR x ={7±√385}/6 Intersection approximately at x = 4.4 and x = -2.1 x = 4.4, y = 7.8 and x = -2.1, y = 5.6	S1 M1 A1 A1 A1	 x: -3, -2, -1, 0, 1, 2, 3, 4, 5, 6 y: 12, 5, 0, -3, -4, -3, 0, 5, 12, 21 CAO. Not a FT from incorrect points, then FT for possible A marks FT from points plotted but not joined FT provided M1 FT their graph, or their x calculation to evaluate y correctly
14(a) Mid points 14.5, 24.5, 34.5, 44.5 2×14.5 + 18×24.5 + 29×34.5 + 1×44.5 (=1515) $\sum fx$ / 50 (£) 30.3(0)	B1 M1 m1 A1	 FT for their mid points from within group FT for correct sum of their *fx* terms /50 FT their $\sum fx$ / 50 correctly evaluated Accept (£)30 provided correct working seen
14(b) Strategy, e.g. noticing 0 to 20 same area as 20 to 30, or noticing first 2 rectangles are of equal area 20× frequency density = 8, or equivalent, or 16 people split 8 people and 8 people for first 2 rectangles Uniform scale, implied or shown (height of first rectangle is 0.4, 2nd height is 0.8, etc.) 8×10+8×25+11×32.5(0)+12×37.5(0)+9×42.5(0)+1×47.5(0) OR 20×0.4×10 + 10×0.8×25 + 5×2.2×32.50 + 5×2.4×37.50 + 5×1.8×42.50 + 5×0.2×47.50 (£)1517.5(0)	S1 B1 B1 M2 A1	Or £20 with 8 people, or 32 squares for £30, or 32 squares for 16 people, or 16 squares for 8 people Or sight of 0.4 Award of this B1 implies S1 also Or sight of 0.4 and 0.8 appropriately, or 'each person 2 squares', or sight of 8, 8,11,12, 9,1or sight of any 4 of 10, 25, 32.5(0), 37.5(0), 42.5(0), 47.5(0) Award of this B1 implies S1 and previous B1 also *If M1 or M2 are awarded,* *this implies previous S1, B1 and B1* <u>Do not FT from incorrect frequency density scale</u> M1 for • any 3 correct products within the overall sum • the appropriate sum of products but with bounds used instead of mid points, or • use of mid points 10, 25, 32.5(0), 37.5(0), 42.5(0) and 47.5(0) within a product sum CAO. Mark final answer

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<table>
<tr><th>Unit 3
Higher Tier</th><th>Mark</th><th>Final Mark Scheme
Comments</th></tr>
<tr><td>15(a) $g \propto t^2$ or $g = kt^2$
$450 = k \times 7.5^2$
$g = 8t^2$
15(b)
<table><tr><td>g</td><td>50</td><td>450</td><td>800</td></tr><tr><td>t</td><td>2.5</td><td>7.5</td><td>(±) 10</td></tr></table></td><td>B1
M1
A1

B2</td><td>Ignore incorrect use of ‘=’ or ‘α’ throughout
FT from non linear only
May be implied in (b)

B1 for each value.
FT non linear expressions for SC1 only if both FT answers accurately evaluated</td></tr>
<tr><td>16. Use of sine rule followed by cosine rule
AC/sin49 = 142/sin62
AC = sin49 × 142/sin62
AC = 121 or 121.3(76…) or 121.4 (metres)
$AD^2 = AC^2 + 224^2 - 2 \times AC \times 224 \times \cos 74$
$AD^2 = 49875.25$ to 49922.816..
AD = 223(.3…. metres)</td><td>S1
M1
A1
A1
M1
A1
A1</td><td>

FT their AC provided ≠142 or ≠224 or spurious

Depends on previous M1 and A1</td></tr>
<tr><td>17. 70(°) and 290(°) with no other values</td><td>B2</td><td>B1 for either value</td></tr>
</table>

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Surname	Centre Number	Candidate Number
Other Names		0

GCSE

4353/01

MATHEMATICS (UNITISED SCHEME)

UNIT 3: Calculator-Allowed Mathematics

FOUNDATION TIER

A.M. MONDAY, 12 November 2012

$1\frac{1}{2}$ hours

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

ADDITIONAL MATERIALS

A calculator will be required 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 or use the π button on your calculator.

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 **10***(a)*.

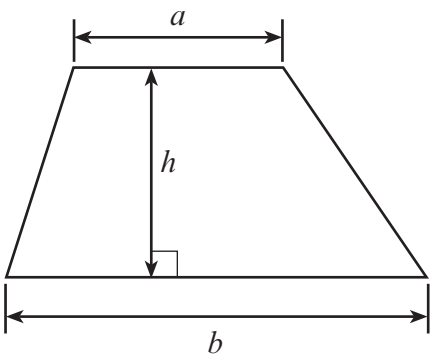
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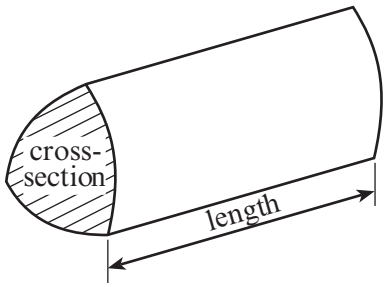
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Formula List

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



Volume of prism = area of cross-section × length



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1. *(a)* (i) Simon does some shopping.

Complete his bill.

Item	Cost
2·5 kg of meat @ £8.66 per kg	£
700 g of cheese @ 73p per 100 g	£
6 bottles of squash @ £1.64 per bottle	£
Total	£

[4]

(ii) Simon gets 5% discount.
How much is this discount and how much does Simon have to pay?

.....

.....

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.....

.....

[3]

(b) Write 256·743

(i) correct to 1 decimal place,

.....

[1]

(ii) correct to the nearest whole number,

.....

[1]

(iii) correct to the nearest 100.

.....

[1]

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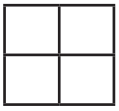
Turn over.

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2. In a survey, people were asked to state their favourite season. The results are shown below.

Season	Spring	Summer	Autumn	Winter
Number of people	400	550	225	375

(a) Draw a pictogram to represent the above information, using  to represent 100 people.

Spring	
Summer	
Autumn	
Winter	

[4]

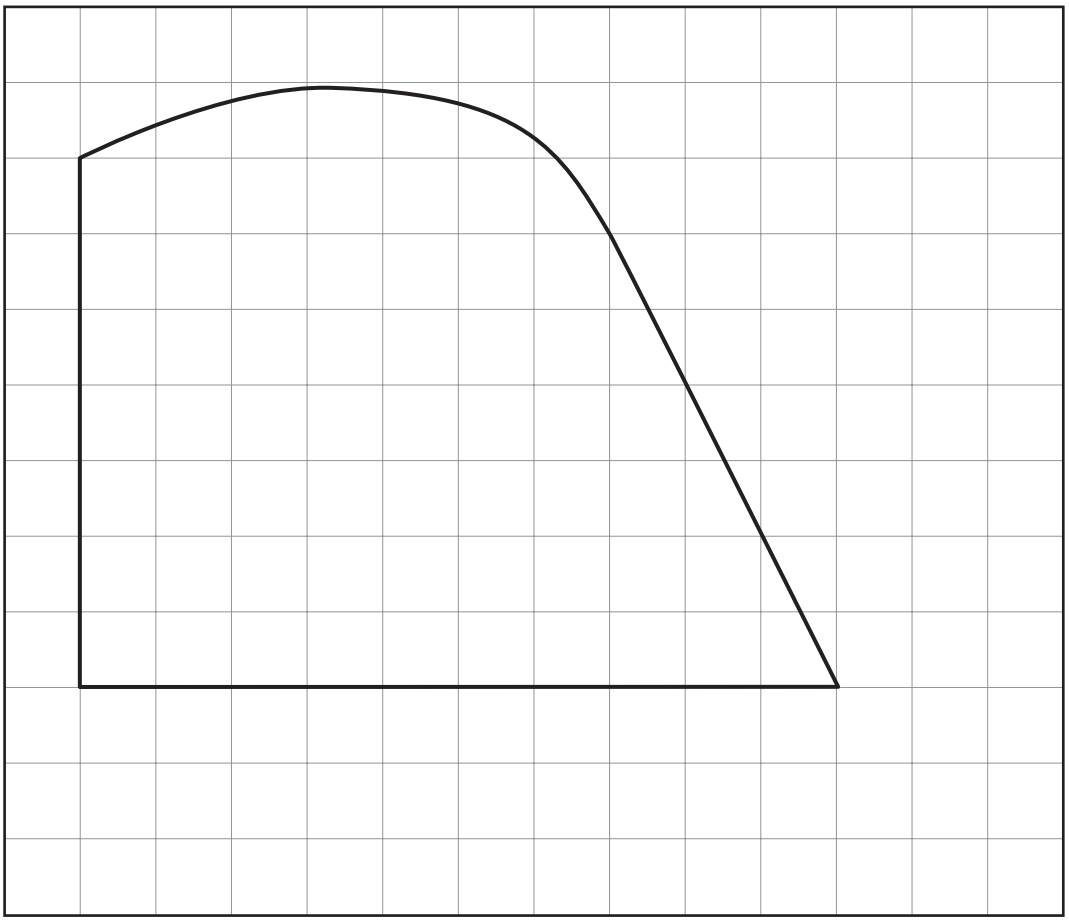
(b) Write down the mode. ..... [1]

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3.



The above shape, drawn on a square grid, represents a field.
Estimate the area of the field if each square represents an area of $10\,m^2$.

.....

.....

.....

.....

.....

.....

Area of the field = ... m^2 [3]

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010005

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Turn over.

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4. *(a)* Complete an accurate drawing of the triangle XYZ, in which $XY = 12\,\text{cm}$, $XZ = 9{\cdot}6\,\text{cm}$ and $Z\hat{X}Y = 63°$.
The line XY has been drawn for you. [3]

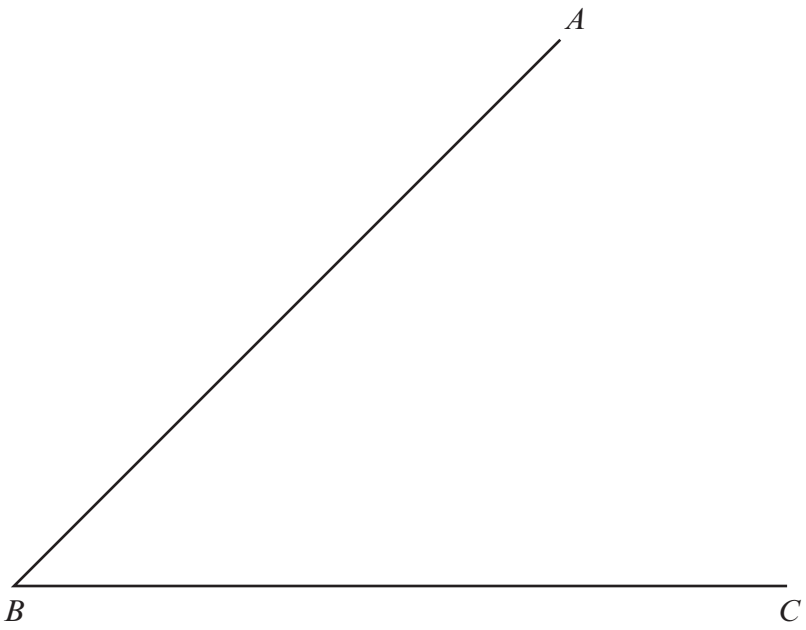


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(b) Using a ruler and a pair of compasses, bisect $A\hat{B}C$.

[2]



(c) Using a ruler and a pair of compasses, construct an angle of 90° at the point A.

[3]

A _____

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5. The gas meter readings at the beginning and at the end of a 90-day period were:

Reading at the end of the period	4	8	5	7	6
Reading at the beginning of the period	4	8	2	6	2

The cost of the gas is 24p per unit.
There is also a charge of 35p per day.

Complete the following table to find the total cost.

Reading at the end of the period	48576
Reading at the beginning of the period	48262
Number of units used	
Cost of the units in £	£
Charge: 35p per day for 90 days	£
Total cost	£

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[5]

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6. The diagram shows a 9 cm by 6 cm rectangle.

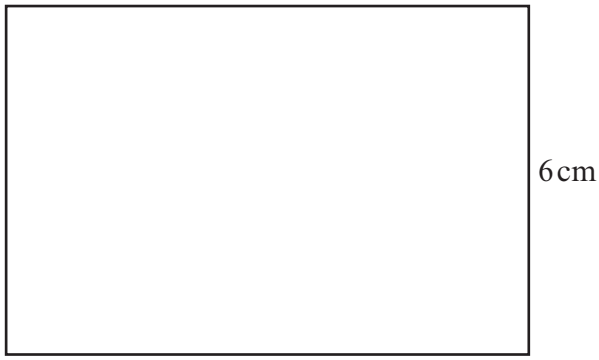


Diagram not drawn to scale

(a) Calculate the area of the rectangle, giving the units of your answer.

.....

.....

.....

[3]

(b) Calculate the perimeter of the rectangle.

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.....

.....

[1]

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7. *(a)* Find the value of $4A + 3B$ when $A = 3$ and $B = 5$.

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.....

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[2]

(b) Evaluate $3x + 4y - 6z$ when $x = 3$, $y = 2$ and $z = \frac{1}{2}$.

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.....

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[2]

8. Find the value of each of the following, giving each answer correct to three significant figures.

(a) $\dfrac{82{\cdot}13}{123{\cdot}7 - 53{\cdot}8}$

.....

[2]

(b) $3{\cdot}4^3 + \sqrt{(0{\cdot}225 + 0{\cdot}459)}$

.....

[2]

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9. Dennis walked the 1 km from his home to the bus stop.
This took him 20 minutes.
Dennis had to wait at the bus stop for 10 minutes before the bus arrived.
The bus travelled at a constant speed for half an hour until it reached Dennis' school, a distance of 10 km from the bus stop.

(a) On the graph paper below, draw a graph of Dennis' journey from home to school.

.....

[4]

(b) What was the speed of the bus in km/h?

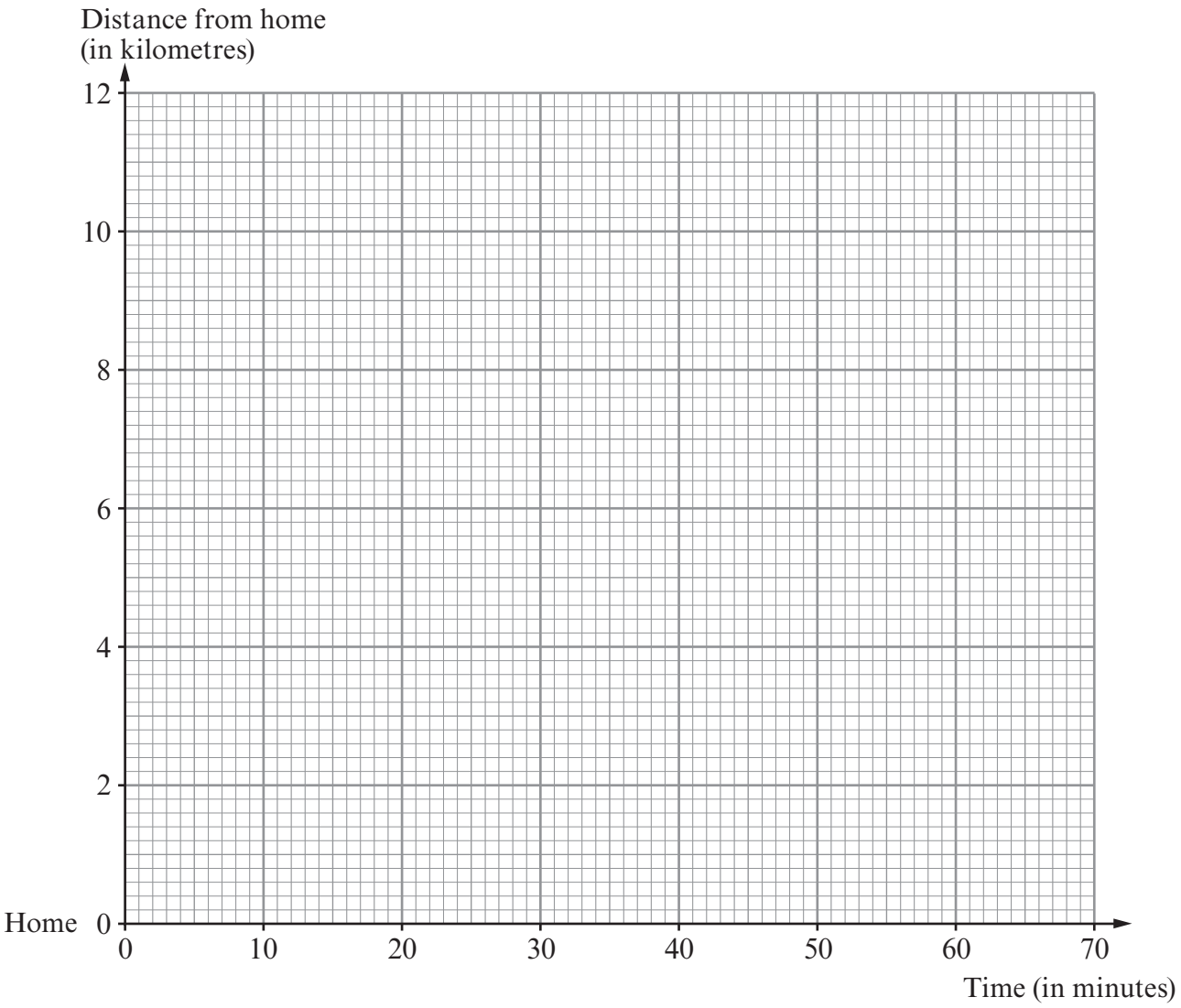
.....

[2]

(c) After 50 minutes, how far was Dennis **from the school**?

.....

[1]



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10. Marcus has to take three different types of tablets (tablet A, tablet B and tablet C).
Tablet A comes in a box of 40 tablets and he has to take 2 tablets every morning and 2 tablets every evening.
Tablet B comes in a box of 60 tablets and he has to take 3 tablets every day.
Tablet C comes in a box of 60 tablets and he has to take 2 tablets every day.
Marcus starts with a full box of each type of tablet.

(a) *You will be assessed on the quality of your written communication in this part of the question.*
Which type of tablet will he run out of first and after how many days will this happen?
Give a full explanation for your decision.

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[6]

(b) Marcus gets a new box of tablets each time a box runs out.
Which two types of tablets will be the first to run out on the **same day** and after how many days will this happen?

.....

.....

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.....

[2]

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(c) After how many days will all three types of tablets first run out on the **same day**?

.....

.....

.....

[2]

11. *(a)* The mean of 5 numbers in a list is 24.
When two extra numbers are added to the list, the mean increases by four.
What does this tell you about the values of the two extra numbers?

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[3]

(b) Four numbers are listed in ascending order.
The mode of the four numbers is 3.
No number in the list is greater than 3.
The range of the four numbers is 5.
The median of the four numbers is 2.
Find the four numbers.

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.....

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.....

.....

[3]

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12. *(a)* Use a ruler and a pair of compasses only to construct an accurate drawing of the rhombus described below.

Rhombus
- All sides are of length 6 cm
- The acute angles are 60°

You must show all your construction lines.

[4]

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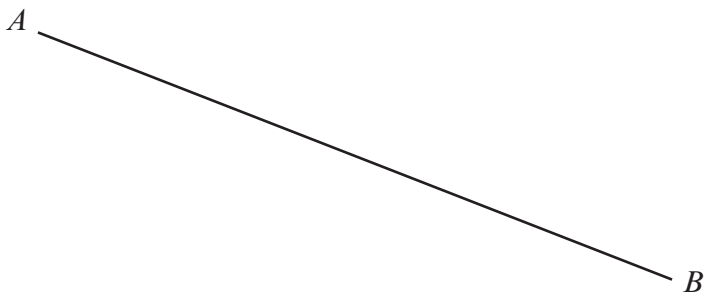
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(b) Shade the region that satisfies both of the following conditions.

(i) The points are less than 6·5 cm from A.
(ii) The points are nearer to B than to A.

[3]

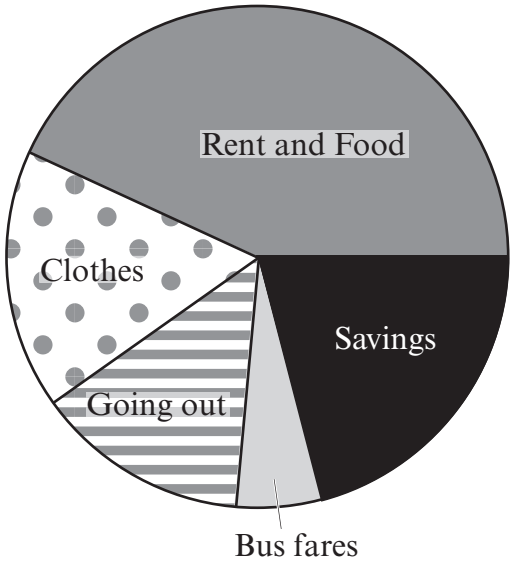


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13. The pie chart shows what Maria plans to do with her first month's salary of £1620.



(a) Calculate the amount Maria plans to spend on clothes from her first month's salary.

.....

.....

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.....

[3]

(b) How much more does Maria plan to spend, in the first month, on clothes than on bus fares?

.....

.....

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.....

.....

[2]

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(c) Mark finds a job with a lower first month's salary than Maria's first month's salary. He draws a pie chart that shows what he plans to do with his first month's salary.

The angle for 'going out' on Mark's pie chart is the same as the angle for 'going out' on Maria's pie chart.

Looking at Mark's pie chart, Maria states

"We will both have the same amount of money to spend on going out."

Explain, with reasons, whether Maria is correct or not.

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.....

.....

[2]

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GCSE MARKING SCHEME

MATHEMATICS - UNITISED

NOVEMBER 2012

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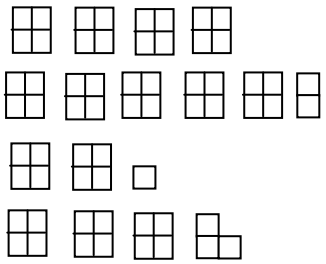
INTRODUCTION

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 3 (Calculator allowed) Foundation Tier	Mark	FINAL MARK SCHEME Comments
1. (a)(i) 21.65 (meat) 5.11 (cheese) 9.84 (drinks) (£) 36.6(0) (ii) 10% = (£) 3.66 5% = (£) 1.83 OR 183 **(p)** Pays (£) 34.77 (b) (i) 256.7 (ii) 257 (iii) 300	B1 B1 B1 B1 M1 A1 B1 B1 B1 B1 10	 F.T. their figures for 1 error Unsupported 36.6(0) gets B4. Any valid method **for finding 5%** F.T. their total Unsupported (£)1.83 gets the M1, A1. F.T. their total and discount
2. (a)  (b) Summer	B1 B1 B1 B1 B1 5	 Accept any orientation of the rectangle Accept any orientation of the 3 squares joined together B0 for 550, but B1 for Summer and 550
3. Evidence of square counting 59 – 65 590 – 650	M1 A1 B1 3	 F.T. 10 × 'their area' Unsupported answers in the range 590 – 650 get all 3 marks
Use overlay allow ± 2mm 4. (a) XZ=9.6cm Angle ZXY (63º) Completed triangle (b) Arc through both arms of the angle centre B Arcs to give bisector and line drawn. (c) 2 arcs for 120° Bisecting 60° and 120° arcs Drawing the 90°	 B1 B1 B1 B1 B1 B1 B1 B1 8	 Allow ±2mm Allow ± 2º as on overlay Only if at least one B1 awarded. **Complete reflection of the triangle gets B2**
5. Reading at the end of the period 48576 Reading at the beginning of the period 48262 Number of units used 314 314 × 24 (÷ 100) 75.36 Charge: 35p per day for 90 days 31.5(0) Total cost 106.86	 B1 M1 A1 B1 B1 5	 Must be in £s for the A1. **Pence gets A0.** F.T. their figures.

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UNIT 3 (Calculator allowed) Foundation Tier	Mark	FINAL MARK SCHEME Comments
6. (a) 9×6 $= 54$ cm^2 (b) 30 (cm)	M1 A1 U1 B1 4	 Independent of other marks
7. (a) 27 (b) 14	B2 B2 4	B1 for 12 OR 15 B1 for – 3 OR (9 and 8)
8. (a) 1.17 (b) 40.1	B2 B2 4	B1 for 1.174(96423) All places given must be correct rounded or truncated B1 for 40.13(10429) All places given must be correct rounded or truncated
9. (a) Plotting at (20, 1) Horizontal line 10 minutes long Plotting the point 30 minutes along and 10km above the end of their horizontal line OR at (60, 11) (b) 10 km in ½ hour = 20 (km/h) (c) 3.3 to 3.4 (km)	B1 B1 B2 M1 A1 B1 7	 F.T. 'their bus stop' plot The line must be drawn for the B2. B1 for each **OR B1 for a plot at (60,10) and the line drawn.** F.T. their graph. **Difference between distances from 'their school' position and where their line cuts time = 50 secs.**
10. (a) Tablet A runs out after $40/(2+2)$ $= 10$ (days) Tablet B runs out after 20 days Tablet C runs out after 30 days 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 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 (b) Tablets A and B will run out after 20 days (c) All 3 tablets will run out after 60 days	M1 A1 B1 B1 QWC 2 <

UNIT 3 (Calculator allowed) Foundation Tier	Mark	FINAL MARK SCHEME Comments
11. (a) Interpretation of the two extra numbers, e.g. 'the total of the 2 numbers is 76', or 'mean of the two extra numbers is 38'	B3	B2 for 7×28=196 and 5×24= 120 with difference 76, or "each number is 38", OR B1 for 5×24= 120 or 7×28=196 or sight of 7×28 - 5×24, or statement such as 'mean of the two numbers is greater than 24' B0 if reference in a statement only to one of the extra numbers
(b) -2, 1, 3, 3 given in any order	B3	B2 for satisfying 3 of the 4 conditions, e.g. greatest number 3 and more than one three with smallest number -2, OR B1 for satisfying 2 of the 4 conditions, e.g. greatest number 3 and more than one three, or for the greatest 3 and smallest -2 *Conditions to check for 'their numbers':* *Mode 3, No number>3, Range 5, Median 2* *B2 for 3 conditions satisfied* *B1 for 2 conditions satisfied*
H3	6	
12.(a) Accurate rhombus drawn within tolerances with all appropriate construction arcs shown (6 cm ± 2mm, 60°±2°, 120°±2°)	B4	B3 for sides all correct lengths (±2mm) and evidence of suitable construction for either a 60°±2° or a 120°±2°with arcs shown, OR B2 for a least 2 sides shown correct (±2mm) and either 60°±2° or 120°±2° constructed correctly with arcs shown, OR B1 for knowing the rhombus has angles 60°, 60°, 120°±2° and 120° ±2°(may be a correct rhombus drawn), or for a construction of 60°±2° or 120°±2° with appropriate arcs, or a construction of a rhombus with sides 6cm showing arcs
(b)Correct region shaded	B3	Mark intention. B1 for line, B1 for arc, B1 for shading (FT arc centre A and a line crossing AB). Shading needs to be on both sides of AB. Remember arc centre B is MR-1 continue to mark *If 2 arcs are drawn, with shading ambiguous then mark the straight line only, B0, B1, B0*
H5	7	
13.(a) Angle 60° (±2°) or sight of ⅙ or equivalent	B1	
60/360 × 1620	M1	Not for 60/360 of 1620, need to see (or imply) "×"
(£)270	A1	FT from their angle , fraction or percentage
b) Complete method, e.g. 2/3 × 270	M1	FT from (a). For bus fares accept 20°(±2°), or 0.05 to 0.06, or 5% to 6%
(£)180	A1	Mark final answer. If no marks SC1 for (£)90 *Errors of premature approximation are penalised -1 in (a) & (b)* *Do not credit 'spurious correct' answers from incorrect working*
(c) Explanation that shows clear understanding that the pie charts are based on different amounts so the angles cannot be directly compared, with a conclusion that Maria is wrong, e.g. 'Maria is wrong as the same angle means that the same proportion of money is spent, not the same amount of money, as Maria has more to spend'	E2	Accept explanations that imply that Maria is wrong. E1 for statement, e.g, 'Maria is wrong, as Mark has less to start with', or 'Mark has a lower first month salary than Maria, so Maria is wrong', OR E1 for understanding shown but no conclusion *Accept errors in calculation if process and idea correct*
H4	7	

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UNIT 3 - HIGHER

UNIT 3 Higher Tier	Mark	FINAL MARK SCHEME Comments
1.(a) All points plotted correctly (b)(i) (26+38+56+64+46+36+62+48+14+20)/10 41 (ii) Line of best fit through means (c) Positive (d) From their line of best fit (reading to 1 small square)	B2 M1 A1 B2 B1 B1 8	B1 for 5 correct, or reverse correct for 7 or 8 points 410/10. Allow 1 slip in y-values used For intention to add y-values and divide by 10 CAO Tolerance within half square, excluding 40 and 42. B1 for a straight line of best fit, with points above and below, OR for straight line of best fit through the means but skewed FT from straight lines or curves. If no line, B0
2.(a) 5×6.2 - 2×-3.1 37.2 (b) 1/4 + 7×3/4 22/4 or equivalent (5.5)	M1 A1 M1 A1 4	31 + 6.2 If no mark SC1 for 24.8 ½ needs to be squared within a correct substitution with an attempt to add Mark final answer, if 22/4 incorrectly simplified A0
3.(a) Interpretation of the two extra numbers, e.g. 'the total of the 2 numbers is 76', or 'mean of the two extra numbers is 38'   (b) -2, 1, 3, 3 given in any order   <

UNIT 3 Higher Tier	Mark	FINAL MARK SCHEME Comments
5.(a) Accurate rhombus drawn within tolerances with all appropriate construction arcs shown (6 cm $\pm$ 2mm, 60°$\pm$2°, 120°$\pm$2°)	B4	B3 for sides all correct lengths ($\pm$2mm) and evidence of suitable construction for either a 60°$\pm$2° or a 120°$\pm$2°with arcs shown, OR B2 for a least 2 sides shown correct ($\pm$2mm) and either 60°$\pm$2° or 120°$\pm$2° constructed correctly with arcs shown, OR B1 for knowing the rhombus has angles 60°, 60°, 120°±2° and 120° ±2°(may be a correct rhombus drawn), or for a construction of 60°±2° or 120°±2° with appropriate arcs, or a construction of a rhombus with sides 6cm showing arcs
(b)Correct region shaded	B3 7	Mark intention. B1 for line, B1 for arc, B1 for shading (FT arc centre A and a line crossing AB). Shading needs to be on both sides of AB. Remember arc centre B is MR-1 continue to mark *If 2 arcs are drawn, with shading ambiguous then mark the straight line only, B0, B1, B0*
6.(a) Mid points 124, 133, 142, 151 $\frac{124\times8 + 133\times26 + 142\times48 + 151\times18}{100}$ (OR13984) = 139.8(4) or 140 (b) 138 to 146 (c) Suitable uniform scales with axes labelled Correct frequency polygon	B1 M1 m1 A1 B1 B1 B2 8	Two shown is sufficient if no error Attempt $\sum$fx for their mid-points, FT provided their mid points are within interval including bounds Attempt their$\sum$ fx divided by 100. Depends on M1 Allow 139 and accept 140 from correct working Do not accept 142 alone Number of boxes vertical, Raisins horizontal Mid-points uniformly spaced, irrespective of (0,0) *FT their scales if possible* *FT reversed axes for appropriate plots* B1 for frequency polygon with one error in plotting, or for a translated polygon, or correct points plotted (but not joined with straight lines (curves or not joined)) *Ignore frequency diagram if polygon seen.*
7. Correct statement of Pythagoras' Theorem with values given, e.g. $34.7^2 - 26.1^2$ $x^2 = 522.88$ or x = $\sqrt{522.88}$ x = 22.866569… or 22.9 or 22.87 (cm)	M1 A1 A1 3	1204.09 – 681.21 Accept 22.8, 22.86 (cm) *Alternative:* *Full method using trigonometry and/or Pythagoras' Theorem* *M1* *Accurate intermediate answer* *A1* *Correct response* *A1*
8.(a) 5x(x - 2) (b) x(x – 6) (=0) x = 0 AND x =6	B2 M1 A1 4	B1 for 5x(x …) or 5x(… -2) or correct partially factorised
9.(a) 5×10^5 (b) 3.1×10^{-5}	B2 B2 4	B1 for 500 000 B1 for 3.08×10^{-5} or 0.0000308 or 0.000031 *Penalise incorrect notation only once, -1*

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UNIT 3 Higher Tier	Mark	FINAL MARK SCHEME Comments
10. (x =) (24.5/7) × 9 (OR 3.5 × 9) (=) 31.5(cm) (y =) 15.4 ÷ (24.5/7) (OR 15.4/3.5) (=) 4.4(cm) Look for: QWC1: Calculations shown in full QWC2: Labelled calculations shown in full with units and labelled (x and y) in final answers with correct use of '=' QWC2: Candidates will be expected to • present work clearly, use of '=' and cm 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, use of '=' and cm 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	Or alternative full method to find x, x not implicit Or alternative full method to find y, y not implicit Alternatively candidates may refer to scale factor 3.5 throughout *If no marks SC1 for sight of scale factor 3.5 or equivalent* 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.
11.(a) (x – 7)(x + 2) (b) 2(x+2) + 3(x-2) = 3×2×3 OR equivalent 2x + 4 + 3x – 6 = 18 OR 5x = 20 OR equivalent x = 4 (c) x = { -3 $\pm\sqrt{}$(3^2 – 4 . 2 . -3)} / 2×2 = [-3 $\pm\sqrt{}$33] /4 0.69 and -2.19	B2 M2 A1 A1 M1 A1 A1 9	B1 for (x … 7)(x … 2) Penalise any further incorrect work -1 (e.g. 'solve') M1 for 2 of the 3 terms correct FT from M1 for both A marks equivalent difficulty Depends on previous A1 and must be simplified form Allow one slip CAO. Must be correct to 2 decimal places
12.Attempt Volume = 4/3 π 3.4^3 (OR 4/3 π 0.034^3) 164(.636.. cm^3) (OR 0.000164(…m^3)) Answers in range 164(.55 to 164.70…) or 165 (cm^3) Use of conversion 1m^3 = 1 000 000cm^3 3509.6g converted to 3.5096(kg), or implied Use of mass / their volume Answers when rounded to 3sig.figs give 21300 (kg/ m^3)	M1 A1 B1 B1 M1 A1 6	Accept incorrect place value for digits 3 4 for M1 FT incorrect place value 3 4, correct evaluation OR for sight of 0.034^3, not for 3.4 cm = 0.034m 'Their volume', i.e. must have attempted use of formula dimensionally correct Do not award A1 for correct response from compensating errors in place value
13.Realising the aim is to find angle in triangle at P sin P = (36 × sin 48)/42 (=0.636981….) Angle at P = 39.567…(°) 062.5(67°) to 063°	S1 M2 A1 B1 5	M1 for sin P/ 36 = (sin 48)/42 or equivalent Answers from 39.5 to 39.6 or 40. Do not accept 39 FT "23 + their P" provided leading zero given for the bearing and that at least M1 awarded

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UNIT 3 Higher Tier	Mark	FINAL MARK SCHEME Comments
14.(a) Reasonable tangent drawn	S1	
Gradient = difference v / difference t	M1	With or without tangent
Calculated gradient for **their tangent**	A1	(Answers may be in the range 25 to 37)
Units given m/s^2 or ms^{-2}	U1	Independent of other marks
(b)(i) Attempt to find area by splitting up or trapezium rule	S1	
Suitable area sections with at least 2 correct areas OR using trapezium rule correct substitution for the majority of areas	M2	M1 Suitable area sections with at least 1 correct area OR an attempt to use the trapezium rule (correct rule, but with a slip). *Allow tolerance in reading the velocity, as estimation required.*
Answers in the range 134 to 158 from correct working	A1	Units not required
(ii) FT from their answer in (b)	B1	FT irrespective of their answer not being within the range required in (a) If an incorrect unit is given, then B0 *e.g. 5 areas of width 1 seconds, heights are 26, 46 to 47, 46 to 48, 32 to 33, min area 150, max area 154* *2 areas split at 2.5 seconds gives 97.5*
	9	
15.(a) Sin curve, through the origin	M1	
± 1 shown, and $\pm 180^0$ shown or implied	A1	
(b) -27^0 and -153^0 with no other angles	B2	B1 for a correct angle. Accept unrounded values and embedded answers
	4	

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Surname	Centre Number	Candidate Number
Other Names		0

GCSE

4353/01

MATHEMATICS (UNITISED SCHEME)
UNIT 3: CALCULATOR-ALLOWED MATHEMATICS
FOUNDATION TIER

P.M. TUESDAY, 19 June 2012

$1\frac{1}{2}$ hours

ADDITIONAL MATERIALS

A calculator will be required 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 or use the π button on your calculator.

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 **10**.

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

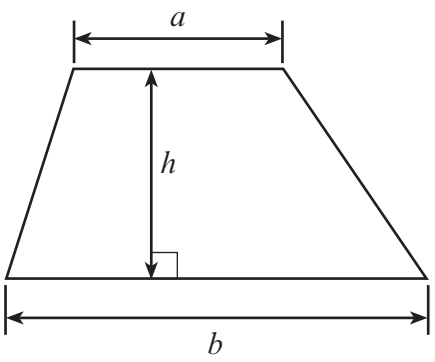
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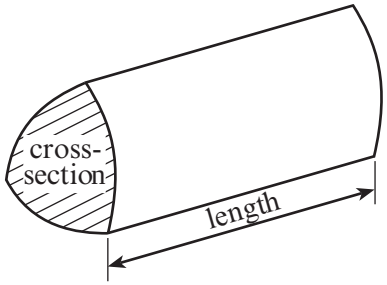
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Formula List

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



Volume of prism = area of cross-section × length



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1. *(a)* Jane goes to a garden centre to buy some materials for her garden.

Complete her bill.

Item	Cost
12 plants @ £5.54 each	£
5 rose bushes @ £15.96 each	£
8 bags compost @ £6.24 per bag	£
Total	£

[4]

(b) (i) Jane gets 5 reward points for every complete £10 spent.
How many reward points does Jane get?

.....

.....

[2]

(ii) How much more would Jane have to spend to get another 5 reward points?

.....

.....

[1]

(c) Write 16 836

(i) to the nearest 100,

.....

[1]

(ii) to the nearest 1000.

.....

[1]

(d) Write 46·32 to the nearest whole number.

.....

[1]

(e) Using the rule $G = 4H + 12$, find the value of G when $H = 10$.

.....

.....

[2]

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2. Forty pupils are asked to choose between the television channels BBC1 (shown as 1), BBC2 (2), ITV (3) or Sky (4).
The following table shows their results.

3	1	4	3	1	2	3	4	3	2
1	3	4	3	3	1	4	3	1	2
4	1	2	4	3	4	4	4	3	4
2	3	4	1	4	1	3	4	2	4

(a) Complete the frequency table below.

Channel	Tally	Frequency
BBC1 (1)		
BBC2 (2)		
ITV (3)		
SKY (4)		

[2]

(b) Write down the mode. .....

[1]

(c) Using the squared paper on the next page, draw a suitable bar chart for the data given in the table.

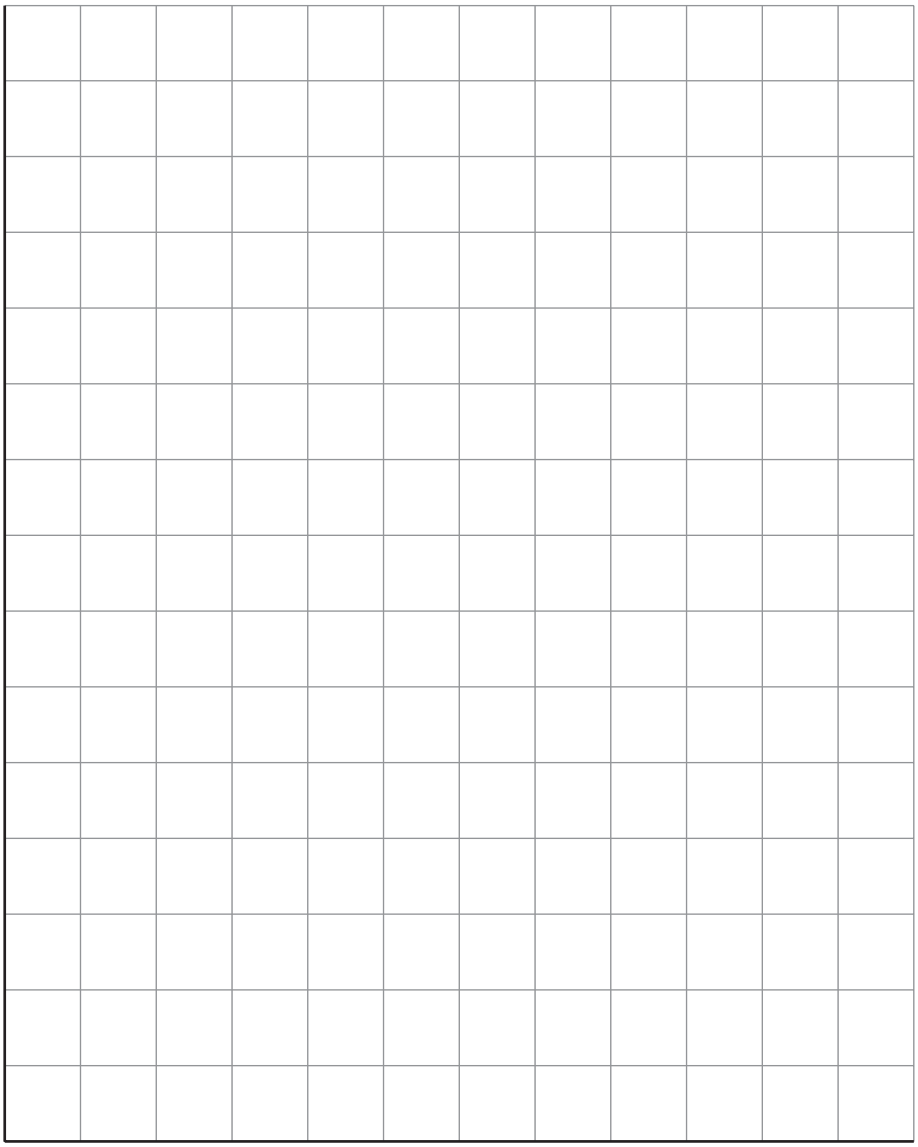
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For use with question 2



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3.



The above shape, drawn on a square grid, represents a playground.
Estimate the area of the playground if each square represents an area of $5\,m^2$.

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.....

.....

Area of the playground = ... m^2

[3]

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4. The electricity meter readings at the beginning and the end of a 90 day period were:

Reading at the end of the period

2	4	3	8	7

Reading at the beginning of the period

2	3	7	5	4

The cost of the electricity is 16p per unit.
There is also a charge of 30p per day.
Complete the following table to find the total cost.

Reading at the end of the period	24387
Reading at the beginning of the period	23754
Number of units used	
Cost of the units in £	£
Charge: 30p per day for 90 days	£
Total cost	£

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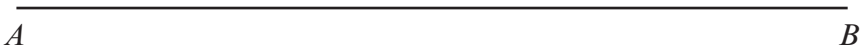
[5]

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5. *(a)* Complete an accurate drawing of the triangle ABC in which $AB = 11$ cm, $B\hat{A}C = 40°$ and $A\hat{B}C = 76°$.
The side AB has been drawn for you.

[3]



(b) Using a ruler and a pair of compasses, construct an angle of 60° at the point A.

[2]



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(c) Using a ruler and a pair of compasses, construct the perpendicular bisector of the line XY.

[2]



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6. The ages of the members of a chess team were:

25 49 62 18 53 37 71

(a) Find the median of these ages.

.....

.....

.....

..... [2]

(b) Find the mean of these ages.

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.....

.....

..... [3]

(c) Find the range of these ages.

.....

..... [1]

7. Find the value of each of the following, giving your answers correct to two decimal places.

(a) $\dfrac{654{\cdot}6}{93 + 26{\cdot}74}$

..... [2]

(b) $\sqrt{480 \times 0{\cdot}69}$

..... [2]

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8. The travel graph below represents Gethin's car journey.

(a) How far from Swansea was Gethin when he started out?

.....

[1]

(b) How far did he travel in the first 2 hours?

.....

[1]

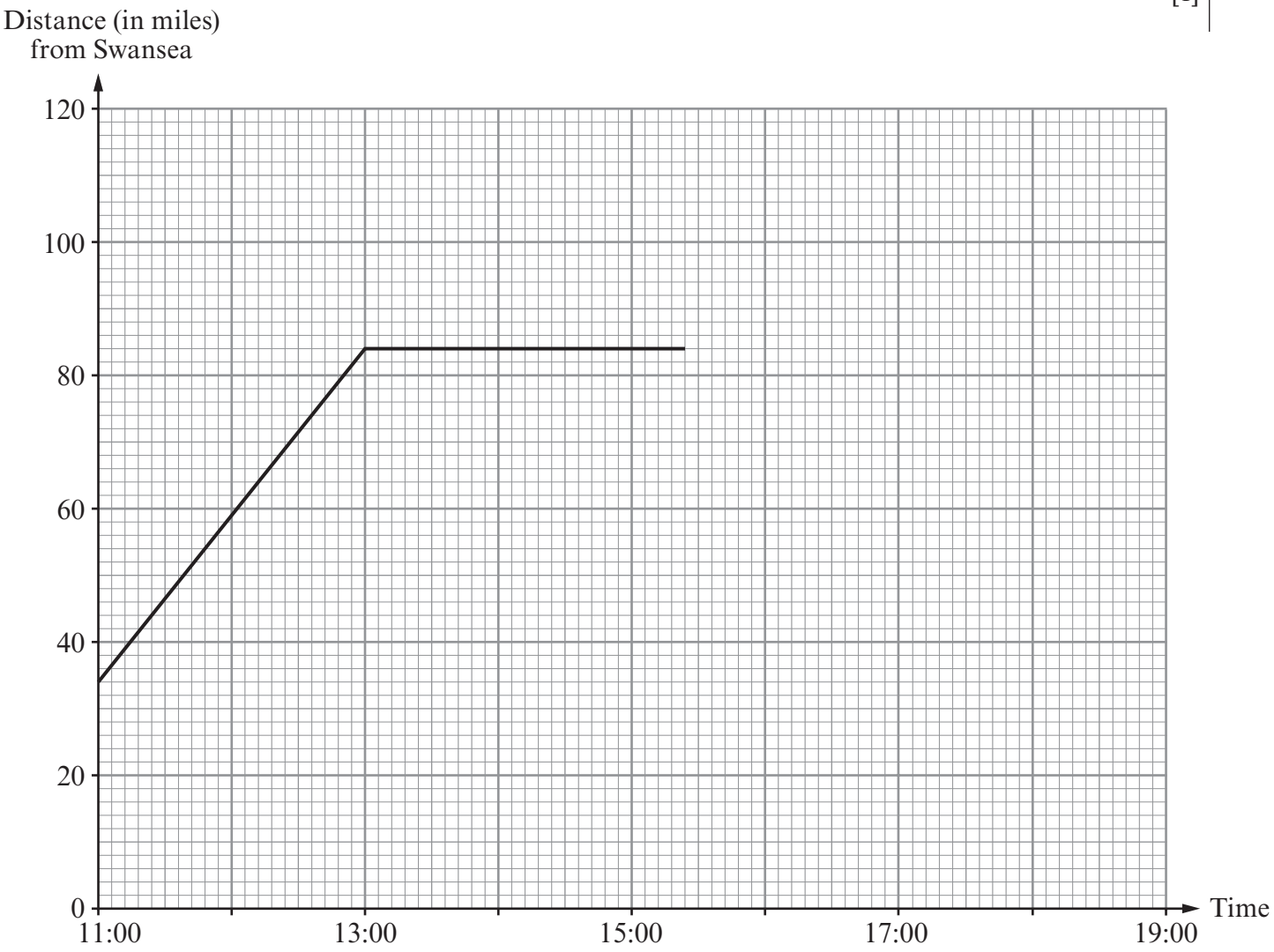
(c) For how many minutes did he stop on his journey?

.....

[1]

(d) After his stop he continued his journey at a steady speed. By 17:24 he had reached a point 118 miles from Swansea. Draw the graph for this part of his journey.

[1]



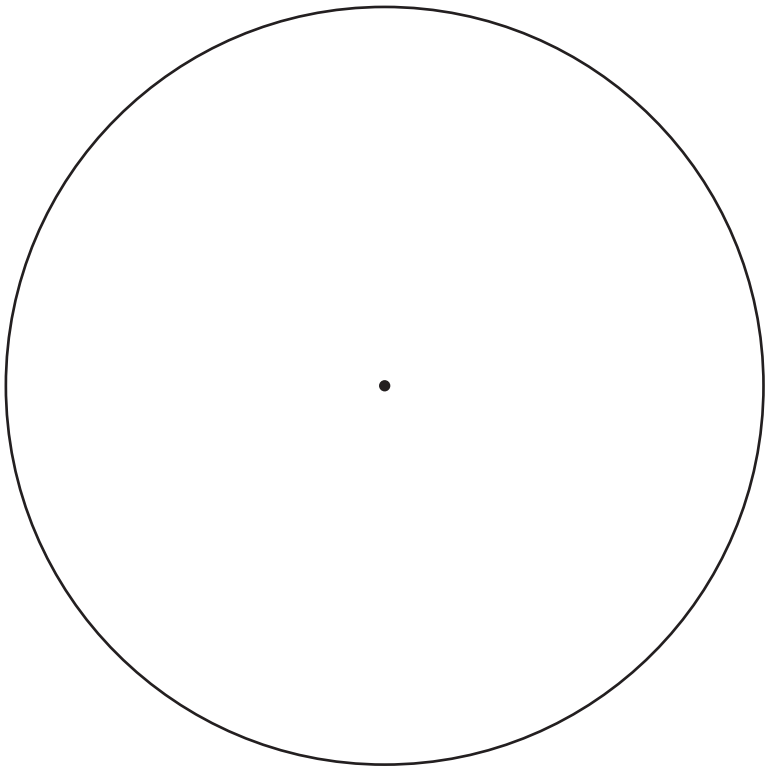
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9. The table shows the various types of car washes available at a garage and the number of each type used by motorists during one month.

Type of car wash	'A'	'B'	'C'	'D'
Number of car washes	96	64	52	28

Draw a pie chart to illustrate this data. You should show how you calculate the angles of your pie chart.



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[4]

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10. *The quality of your written communication will be assessed in this question.*

Sue buys 12·6 kg of potatoes and 5·4 kg of carrots for £27.63.
The potatoes cost £1.85 per kg.
Find the cost of 1 kg of carrots.

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[6]

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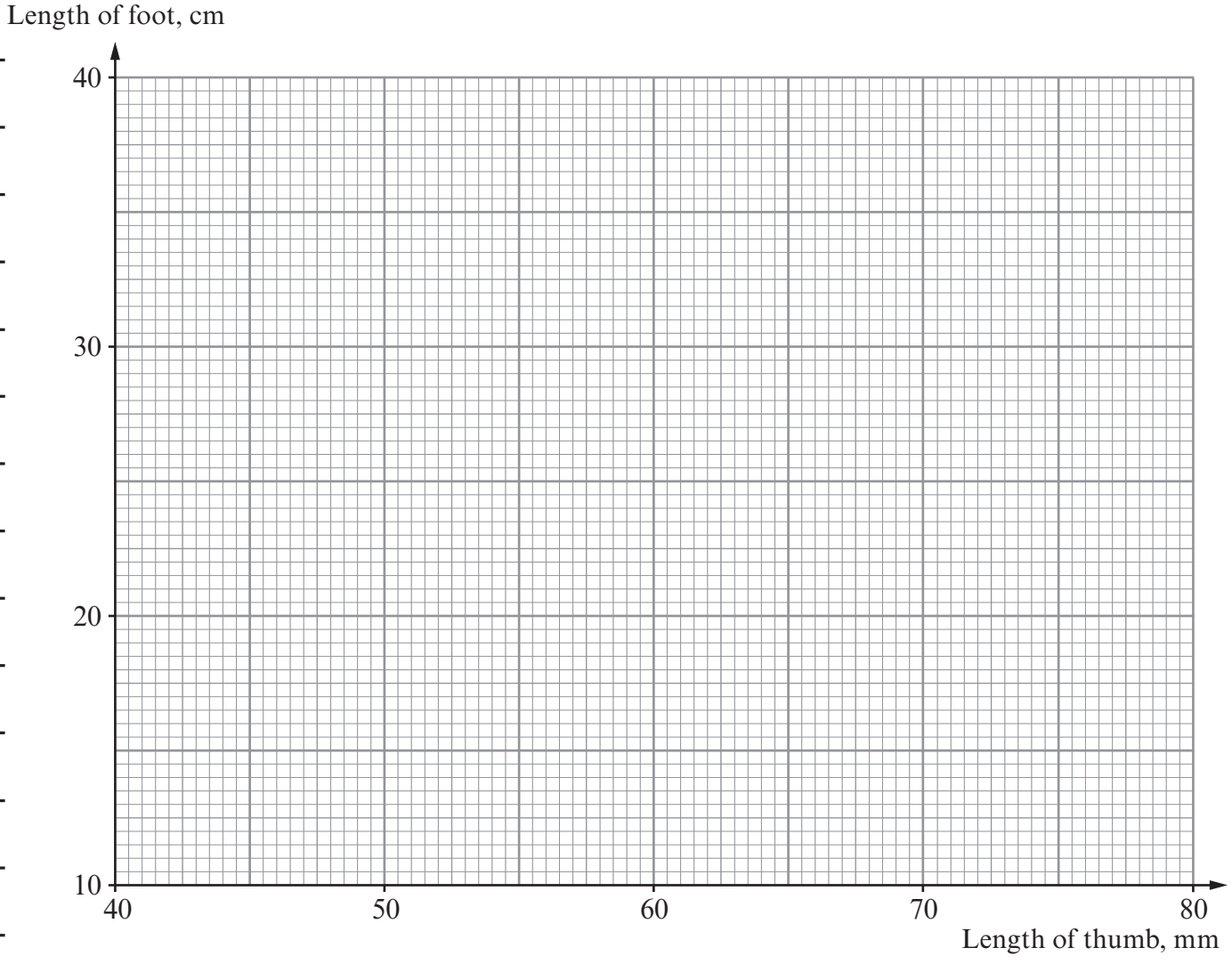
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11. A number of students measured the length of their thumb in millimetres and the length of their foot in centimetres.

Thumb, mm	56	70	48	54	62	64
Foot, cm	24	36	20	22	28	32

(a) Draw a scatter diagram to display these measurements.

[2]



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(b) (i) For the given data, find one point that the line of best fit needs to pass through.

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.....

.....

[2]

(ii) Draw a line of best fit on your scatter diagram. [2]

(c) State the type of correlation shown in your scatter diagram.

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[1]

(d) Give a possible reason why the graph was drawn with neither scale starting at zero.

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[1]

12.

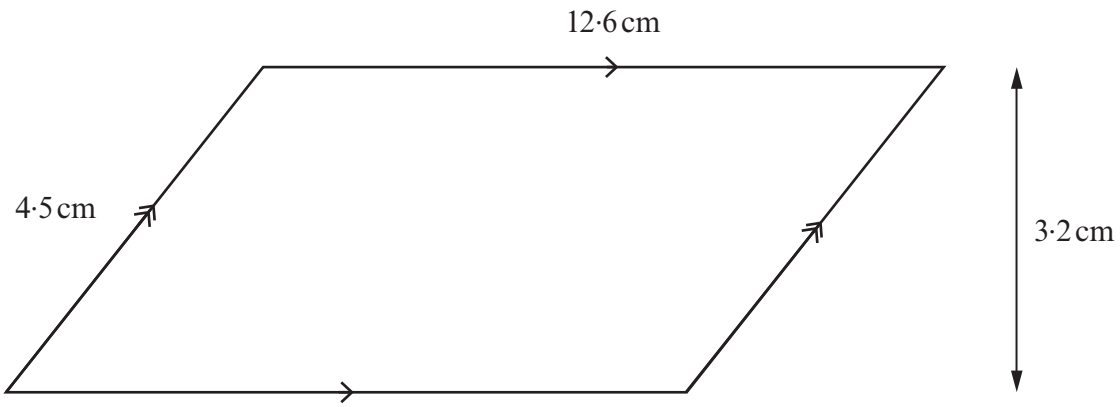


Diagram not drawn to scale

Calculate the area of the parallelogram.

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[2]

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13.

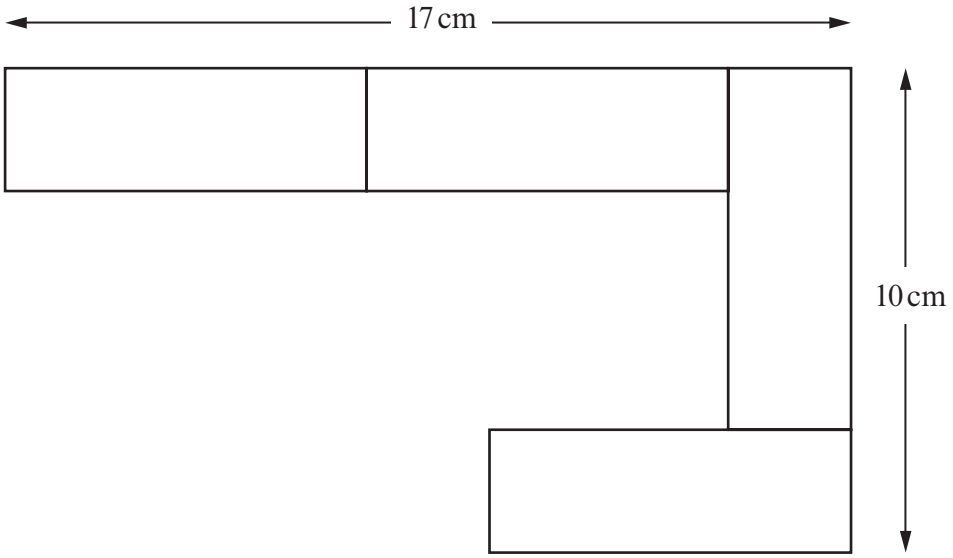


Diagram not drawn to scale

Four identical rectangles fit together as shown.
Find the total area that they cover, clearly stating the units of your answer.

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[6]

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14. A shop's prices for paint and the paint shades they can mix for customers are shown below.

Paint price list	
Colour	**Price per 100 ml**
White	£1.20
Blue	£1.30
Red	£1.35

Paint mixing chart	
Shade	**Recipe**
Hint of pink	4 parts white and 1 part red
Hint of blue	17 parts white and 2 parts blue
Hint of purple	20 parts white, 3 parts blue and 2 parts red

Jenny is asked to mix paint for a customer. The customer has ordered 1 litre of "hint of pink" paint and 5 litres of "hint of purple" paint. Calculate the cost of the customer's order for paint.

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[6]

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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 3 (Calculator allowed) Foundation Tier	Marks	FINAL MARK SCHEME Comments
1. (a) 66.48 (plants) 79.8(0) (roses) 49.92 (compost) 196.2(0)	B1 B1 B1 B1	 F.T. their figures for 1 error Unsupported 196.2(0) gets B4.
1. (b) (i) 19 × 5 = 95 (reward points)	M1 A1	Any valid method F.T. their total Unsupported 95 gets the M1, A1. SC1 for 85 F.T. their (6+7+4)×5 **OR F.T. 'their tens, 190' from part (a) ÷2**
1. (b) (ii) (£)3.8(0)	B1	F.T. their total
1. (c) (i) 16800	B1	
1. (c) (ii) 17000	B1	
1. (d) 46	B1	B0 for 46.0 or 46.00
1. (e) 40 + 12 = 52	M1 A1	Correct substitution
2. (a) 8 6 12 14	B2	B1 for any two/three correct frequencies If frequencies score 0, then give B1 for all 4 correct tallies.
2. (b) 4 OR Sky	B1	F.T. their table of frequencies B0 for 14, but B1 for 4 (or Sky) and 14
2. (c) Both axes labelled, e.g. frequency along one axis and BBC1 (1), BBC2 (2), ITV (3), SKY (4) along other axis anywhere within the base (inc.) of the corres. bar. and uniform scale for the frequency axis starting at 0 and labelled 'frequency' OR 'Number'. Four bars at correct heights (bars must be of equal width)	B2 B2	B1 if no scale, but allow one square to represent 1 OR B1 if not labelled as 'frequency' or similar. If frequency scale starts with 1 at the top of the first square the starting at 0 will be implied for this axis. F.T. their table of frequencies B1 for any 2 or 3 correct bars on F.T. Bars must have same width
3. Evidence of square counting 48 – 52 240 – 260	M1 A1 B1	 **Numbers in this range get the M1, A1** F.T. 5 × 'their area' **Numbers in this range get the 3 marks**
4. Reading at the end of the period 24387 Reading at the beginning of the period 23754 Number of units used 633 633 × 16 (÷ 100) 101.28 Charge: 30p per day for 90 days 27.00 Total cost 128.28	 B1 M1 A1 B1 B1	 C.A.O. F.T. their number of units Must be in £s for the A1 **OR for 2700 if working in pence** F.T. their figures.
5. (a) Angle BAC (40º) Angle ABC (76º) Completed triangle	B1 B1 B1	Allow ± 2º Allow ± 2º Only if at least one angle correct. **Complete reflection of the triangle gets B2**
5. (b) Two appropriate arcs Angle of 60º	M1 A1	Allow construction of 60° at the other end of the line for M1 and A1 Allow ± 2 º
5. (c) Intersecting arcs of equal radii above and below the given line. Line bisector	M1 A1	

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JUNE 2012 UNIT 3 (Calculator allowed) Foundation Tier	Marks	FINAL MARK SCHEME Comments
6. (a) 18 25 37 <u>49</u> 53 62 71 49	M1 A1	**<u>For ordering all 7 numbers</u>**
6. (b) Sum of the numbers (315) Sum/7 45	M1 m1 A1	For attempt to add the numbers For a division by 7 of a number in the range 240−390 C.A.O. (25 + 49 + 62 + 18 + 53 + 37 + 71)/7 gets M1,m1
6. (c) 53	B1	
7. (a) 5·47	B2	B1 for 5.46(6844830) All places given must be correct **<u>rounded or truncated</u>**
7. (b) 18.20	B2	B1 for 18·19(890107) All places given must be correct **<u>rounded or truncated</u>** **<u>B1 for 18.2</u>**
8. (a) 34 (miles)	B1	
8. (b) 50 (miles)	B1	
8. (c) 144 (minutes) OR 2 hours 24 minutes	B1	Accept 2:24 or 2.24
8. (d) Correct line drawn to (118, 17:24)	B1	Allow ± ½ square, but line must stop at his point.
9. Angles are 144°, 96°, 78° and 42° **<u>A</u>** **<u>B</u>** **<u>C</u>** **<u>D</u>** 3 or 4 angles correct and correctly labelled. 3 or 4 angles correct, labels not fully correct. 2 angles correct and correctly labelled. 2 angles correct, labels not fully correct. 1 angle correct and correctly labelled. OR <u>If 0 OR 1 for their diagram or no diagram,</u> 360/240. Look for the angles 144°, 96°, 78° and 42° calculated correctly for this M1, A1.	 B4 OR B3 B3 B2 B1 M1 A1	 Correct labels (Words NOT the frequency OR angle)**.** 3 correct labels is enough. If only B1 is scored for the diagram, and all the angles given correctly, then cancel the B1 and award M1, A1 for 2 marks. If B0 scored for the diagram, check the angles and the method to see if the M1 and the A1 can be awarded. (1 is) 1½ ° gets the M1. OR SC1 for all correct percentages: 40, 26·7, 21·7, 11·7
10. Total cost of carrots = £27.63 – 12·6 × 1.85 = (£) 4.32 OR 432(p) Carrots cost per kg = 4.32/5·4 = 80 (p) OR (£) (0)·8(0) 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 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	M1 A1 M1 A1 QWC 2	(£)27.63 – (£)23.31 F.T. 'their 4.32', but not £27.63. Final answer must be in correct money format 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.

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JUNE 2012 UNIT 3 (Calculator allowed) Foundation Tier	Marks	FINAL MARK SCHEME Comments
11.(a) All points correctly plotted	B2	Ignore any attempt to draw a line of best fit. B1 for 3, 4 or 5 points correctly plotted, not joined. B1 if all points plotted correctly but joined.
(b)(i) Method of finding the mean for thumb or foot, sum of 6 appropriate measurements and intention to divide their sum by 6	M1	(354/6 or 162/6)
Thumb 59 (mm) Foot 27 (cm)	A1	Does not need to be expressed as coordinates Sight of thumb 59 (mm) or foot 27 (cm) implies M1 Statement that the line passes through mean without any attempt at calculation is M0, A0
(ii) Appropriate straight line of best fit through Thumb 59 (mm), Foot 27 (cm), with some values above and some values below the line on each side of the mean point	B2	Need to check passes through (59, 27) even if not calculated. Accept line of best fit that passes through (40,10) FT from (i) for B2 if reasonable; however if their means produce an unreasonable line but it is drawn through the point then award B1 only. B1 straight line through the mean point but not a reasonable line of best fit B1 reasonable straight line of best fit but not through the mean point
(c) Positive	B1	
11.(d) Explanation, e.g. "otherwise points would be squashed", "no small values", "efficient use of the graph paper", "a clearer display", 'no one had thumb and feet measurements below those shown", " it would be a waste of graph paper", "too big a gap between zero and the data range"	E1	Do not accept "no zig-zag (to show a missing part of the axes)", or "can't have zero length thumb or foot", "can't have zero length of thumb or foot", without further explanation Do not accept if only referring to the point (0,0)
12. (a) 12.6×3.2 $40(cm^2)$ or $40.3(cm^2)$ or $40.32(cm^2)$	M1 A1	Accept an unsupported correct answer
13. Strategy: length + width = 10 OR $2 \times$ length + width = 17 OR length = 17 – 10	S1	Strategy for finding the dimensions of a rectangle
Length = 7cm	B1	
Width = 3 cm	B1	
Area = $4 \times 7 \times 3$	M1	F.T. 'their 7' and 'their 3'
= 84	A1	
cm^2	U1	

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JUNE 2012 UNIT 3 (Calculator allowed) Foundation Tier	Marks	FINAL MARK SCHEME Comments
14. Understanding that 1litre = 10×100 ml or 1litre =1000ml	B1	May be seen or implied
Hint of pink: 800ml white, 200ml red	B1	Or sight of 8:2, or sight of 4/5 white with 1/5 red, or white and red quantities in the correct ratio seen but NOT 4 (100ml),1 (100ml)
Hint of purple: 4000ml white, 600ml blue, 400ml red	B1	Or sight of 40:6:4, or sight of 20/25 white with, 3/25 blue and 2/25 red or equivalent, or white, blue and red quantities in the correct ratio seen but NOT 20(100ml), 3(100ml), 2(100ml) (Maybe ½ these values, then doubled)
Method of costing, e.g. costing correctly expressed for hint of pink or hint of purple, or equivalent or 1 correct product in the sum of 3, or 2 correct products in the sum of 5 combined calculations shown below. 48×1.2(0) + 6×1.3(0) + 6×1.35 (need 1 correct product in a sum of 3, using all correct paint prices) OR 8×1.2(0) + 2×1.35 + 40×1.2(0) + 6×1.3(0) + 4×1.35 (need 2 correct products in a sum of 5, using all correct paint prices)	M1	N.B. The cost of hint of pink or hint of purple may be found within a combined calculation, this gets M1 (Hint of pink (£)12.3(0), hint of purple (£)61.2(0)) (Note: sight of, for example (£)12.30, triggers: B1 (1000ml = 1 litre), B1 Hint of pink ratio, and M1 for stage correct towards an overall calculation)
48×1.2(0) + 6×1.3(0) + 6×1.35, OR 8×1.2(0) + 2×1.35 + 40×1.2(0) + 6×1.3(0) + 4×1.35	A1	(57.6(0) + 7.8(0) + 8.1(0)) (9.6(0) + 2.7(0) + 48 + 7.8(0) + 5.4(0))
(£)73.5(0)	A1	CAO *SC1 for £36.75, with possible first B1 for unit conversion if seen* **Treat working with hint of blue with one of the other shades of paint as MR-1 then FT for all marks** (Cost of 1litre of hint of blue is £12.11, so 5litres is £60.55)

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UNIT 3 (HIGHER TIER)

JUNE 2012 UNIT 3 Higher		FINAL MARK SCHEME Comments
1.(a) 12.6×3.2 $40(cm^2)$ or $40.3(cm^2)$ or $40.32(cm^2)$	M1 A1	Accept an unsupported correct answer
1.(b) Sight of 360(°) $360 \div 22.5 =$ 16 (sides)	B1 M1 A1	Award all marks for an unsupported answer of 16 *Interior angle methods:* *M1 Use of 157.5 as an interior angle with,* *For example 157.5 = 180(n – 2)/n* *A1 157.5n = 180n – 360 or n = 360/22.5* *A1 16 (sides)* *M1 Attempt use a trial & improvement, with 2 appropriate trials using, for example:* *(Number of triangles × 180) /(number of triangles +2)* *A2 16 (sides) or A1 for two correct trials, one leading to $\geq$157.5(°) and one leading to $\leq$157.5(°)*
2.(a) All points correctly plotted and not joined	B2	Ignore any attempt to draw a straight line of best fit. B1 for 3, 4 or 5 points correctly plotted, not joined. B1 if all points plotted correctly but joined.
(b)(i) Method of finding the mean for thumb or foot, sum of 6 appropriate measurements and intention to divide their sum by 6	M1	(354/6 or 162/6)
(Thumb) 59 (mm) (Foot) 27 (cm)	A1	Does not need to be expressed as coordinates Sight of thumb 59 (mm) or foot 27 (cm) implies M1 Statement that the line passes through mean without any attempt at calculation is M0, A0
(ii) Appropriate straight line of best fit through Thumb 59 (mm), Foot 27 (cm), with some values above and some values below the line on each side of the mean point	B2	Need to check passes through (59, 27) even if not calculated. Accept line of best fit that passes through (40,10) FT from (i) for B2 if reasonable; however if their means produce an unreasonable line but it is drawn through the mean point then award B1 only. B1 straight line through the mean point but not a reasonable line of best fit B1 reasonable straight line of best fit but not through the mean point
(c) Positive	B1	
2.(d) Explanation, e.g. "otherwise points would be squashed", "no small values", "efficient use of the graph paper", "a clearer display", 'no one had thumb and feet measurements below those shown", " it would be a waste of graph paper", "too big a gap between zero and the data range"	E1	Do not accept "no zig-zag (to show a missing part of the axes)", "can't have zero length of thumb or foot", without further explanation Do not accept if only referring to the point (0,0)
3.(a) A line from (0,0) to (1 30 pm, 60) Horizontal line joining the first line, for period 30 minutes From end of horizontal line to (5 p.m., 120)	B1 B1 B1	Points need to be joined, not necessarily a straight line FT from their first line FT from the end of their second line. Points need to be joined, not necessarily a straight line
(b) 120 / 5 24 (mph)	 M1 A1	Only FT their travel graph provided at least B1 in (a) Accept 120/4.5 leading to an answer of 26.6(6…) or 26.7 or 27 (mph) *SC1 for an answer of 27.9(0…) from a calculation 120/4.3*

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JUNE 2012 UNIT 3 Higher		FINAL MARK SCHEME Comments
4(a) $15x(x - 3)$	B2	B1 for $15x(x \ldots.)$ or $15x(\ldots - 3)$ or correct partial factorisation
4(b) $2/3\ x + 1/3\ x = 10 - 6$ OR $2x + 3\times6 = 3\times10 - x$ $x = 4$	B1 B1	FT until 2nd error Do not accept 12/3 as a final answer. Final answers must be simplified if possible $2x + 6 = 10 - 1x$ is 2 errors, hence B0, B0
4(c) -64	B1	CAO
4(d) E.g. $(2\times9 - - 7)/50$ 25/50 0.5	M1 A1 A1	Substitution with at least two steps of calculation '—7' written as '+7' is one step of calculation Decimal answer required. FT provided M1 awarded *If no marks: SC1 for answers 0.22, 0.38 or 18.14 following evidence of substitution*
5.Lines or unambiguous set of points parallel to all sides of the box, radius width from the box Intention of all lines in the correct position that **stop** and intention to meet at right angles at all four corners of the box	B2 B1	Mark the intention, $\pm$2mm B1 for one set of points or lines parallel to the box, radius width from the box If sets of points are shown there needs to be sufficient evidence to show the intention of parallel lines and the 4 right angles *A set of points implies at least 3 points, which may include the one given in the question* *Ignore extra additional arcs or lines used to develop a method* *Ignore any regions shaded*
6. One correct evaluation, $1 \le x \le 2$ 2 correct evaluations, $1.85 \le x \le 2$, one either side of 0 2 correct evaluations, $1.85 \le x \le 1.95$, one either side of 0 OR correct evaluation of 1.95 if previous B1 awarded 1.9 *No calculations shown: accept "too high", ">", etc.*	B1 B1 M1 A1	x $x^3 - x - 5$ 1 -5 1.1 -4.769 1.2 -4.472 1.3 -4.103 1.4 -3.656 1.5 -3.125 1.6 -2.504 1.7 -1.787 1.8 -0.968 **1.9** **-0.041** 2 1 1.85 -0.518375 1.91 0.057871 1.92 0.157888 1.93 0.259057 1.94 0.361384 **1.95** **0.464875**

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JUNE 2012 UNIT 3 Higher		FINAL MARK SCHEME Comments
7. Understanding that 1litre = 10×100 ml or 1litre =1000ml	B1	May be seen or implied
Hint of pink: 800ml white, 200ml red	B1	Or sight of 8:2, or sight of 4/5 white with 1/5 red, or white and red quantities in the correct ratio seen but NOT 4 (100ml),1 (100ml)
Hint of purple: 4000ml white, 600ml blue, 400ml red	B1	Or sight of 40:6:4, or sight of 20/25 white with, 3/25 blue and 2/25 red or equivalent, or white, blue and red quantities in the correct ratio seen but NOT 20(100ml), 3(100ml), 2(100ml)
Method of costing, e.g. costing correctly expressed for hint of pink or hint of purple, or equivalent or 1 correct product in the sum of 3, or 2 correct products in the sum of 5 combined calculations shown below. 48×1.2(0) + 6×1.3(0) + 6×1.35 (need 1 correct product in a sum of 3, using all correct paint prices) OR 8×1.2(0) + 2×1.35 + 40×1.2(0) + 6×1.3(0) + 4×1.35 (need 2 correct products in a sum of 5, using all correct paint prices)	(Maybe ½ these values, then doubled) M1	N.B. The cost of hint of pink or hint of purple may be found within a combined calculation, this gets M1 (Hint of pink (£)12.3(0), hint of purple (£)61.2(0)) (Note: sight of, for example (£)12.30, triggers: B1 (1000ml = 1 litre), B1 Hint of pink ratio, and M1 for stage correct towards an overall calculation)
48×1.2(0) + 6×1.3(0) + 6×1.35, OR 8×1.2(0) + 2×1.35 + 40×1.2(0) + 6×1.3(0) + 4×1.35	A1	(57.6(0) + 7.8(0) + 8.1(0)) (9.6(0) + 2.7(0) + 48 + 7.8(0) + 5.4(0))
(£)73.5(0)	A1	CAO
QWC2 requires process steps for both colours linked with appropriate text and correct use of units, with the £ symbol given inthe final answer. If the candidate has not engaged with the complexity of the question, then maximum QWC1 if process steps for both colours is linked with appropriate text, units are generally used and £ symbol given in the final answer Must be relevant work for the problem, otherwise QWC0 Look for • relevance • spelling • clarity of text explanations, • the use of notation (watch for the units and '0' for unit pence when using £) 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	Q W C 2	*SC1 for £36.75, with possible first B1 for unit conversion if seen* **<u>Treat working with hint of blue with one of the other shades of paint as MR-1 then FT for all marks</u>** (Cost of 1litre of hint of blue is £12.11, so 5litres is £60.55) 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.
8.(a) Median 20 Interquartile range: (24 to 24.5) – (15.5 to 16) Answers in the range 8 to 9 inclusive	B1 M1 A1	 Intention to subtract must be clear Must FT from their calculation if shown *Treat working with The Leopards as MR-1 only if consistent for median and inter-quartile range* *Leopards: Median 16 to 16.5* *IQR (22 to 22.5) - 10.5 = 11.5 to 12*

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8.(b) Valid reason e.g., 'median is higher', 'median is slower than The Leopards', 'greater number of players took longer to finish', 'most of the data times for The Tigers is behind The Leopards' The Tigers	M1 A1	Selecting The Leopards is M0, A0 Must be with a valid reason *N.B. remember slower times are to the right of the diagram*
8.(c) Mid points 5, 15, 25, 35 5×2 + 15×30 + 25× 45 + 35×3 $\sum fx$ /80 (= 1690/80) 21(.125)	B1 M1 m1 A1	 FT for their mid points from within group (including bounds) FT their $\sum fx$ / 80 Accept 21.13 *Unsupported 21.12(5) or 21.13 awarded all 4 marks.*
9. 4(8x – 5) + 3(4x + 5) = 149 44x – 5 = 149 x = 154/44 (=3.5)	M2 A1 A1	For correctly clearing all 3 fractions, OR M1 for clearing 2 fractions FT from M1 (for all further marks), for their equation, for correct expansion of bracket(s) and collection of like terms on LHS Ignore incorrect cancelling
10. Strategy, using Pythagoras' Theorem then trigonometry $8.2^2 = 6.3^2 + AC^2$ $AC = \sqrt{(8.2^2 - 6.3^2)}$ (=√27.55) AC = 5.248…. Tan D = AC / 10.6 Answers in the range 26.1…(°) to 26.35(°)	S1 M1 A1 A1 M1 A1	Needs to involve working towards use of triangle ADC FT candidates AC Allow rounded or truncated answers in working throughout, but the final answer must be in the given range to award the final A1 *Alternative:* *S1 Complete strategy* *M1 method for both of the first 2 stages* *A1 for first stage answer* *A1 for second stage answer* *M1 method for the third stage* *A1 Answers in the range 26.1…(°) to 26.35(°)* *For example:* *S1 Strategy, using trigonometry – cos ratio, cosine rule and sine rule* *M1 cosB = 6.3/8.2* ***AND*** $AD^2 = 8.2^2 + 16.9^2 - 2\times8.2\times16.9\times\cos B$ *A1 Angle B = 39.799…. rounded or truncated* *A1 AD = 11.828… rounded or truncated* *M1 sinD/8.2 = sinB/11.8 FT candidates angle B* *A1 Answers in the range 26.1…(°) to 26.35(°)*
11.(a) Volume = 4/3 ×Π ×8^3 Answers in the range 2143 to 2146 (cm^3) inclusive	M1 A1	

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11.(b) Strategy, attempt to form an equation using the product of at least 3 of the given: ⅓, 24, x, (3x + 1), and showing '=192' 1/3(3x+1)×*x*×24 (= 192) $24x^2 + 8x - 192 = 0$ or $3x^2 + x - 24 = 0$ (3*x* … 8)(*x* … 3) (= 0) *x* = 8/3 (and *x*=-3) Dimension of the base 8/3 (cm) and 9 (cm)	S1 M1 A1 M1 A1 B1	Not for an expression Correct expression or equation Collecting terms and equate to zero FT their quadratic equivalent difficulty FT for correct solution of their quadratic FT only if there is a need to discard one negative answer and provided previous M1 awarded *For formula method, last 3 marks:* *Correct substitution in formula with correct evaluation of b^2-4ac M1, then possible A1 & B1 as main method* *For a trial & improvement method* *S1 As main method* *M1 Implied as main method* *A1 Implied as main method, but may be trials towards 192* *M1 Two correct trials, one either side of 192, or including 192* *A1 8/3 (cm) or 2.6666….(cm) (Accept 2.67, do not accept 2.6, 2.7 or 3)* *B1 Dimension of the base 8/3 (cm) and 9 (cm) (only FT provided previous M1 awarded)* ***Watch for correct answers from incorrect methods, do not automatically award 6 marks for sight of correct answers***
12. 2× (125/360)×Π ×3.6 = 7.85(398… cm) or 7.9 (cm)	M1 A1	
13.(a) Method of finding an area 2 correct areas AND intention to add all areas 200	M1 M1 A1	 Areas are 30+70+80+20 CAO
13.(b) Identifying the 100, 100 split 40 (seconds)	 M1 A1	Must be from 200, not FT May be indicated on the histogram. Accept sight of 200÷2 = 100 CAO. Check (a), if working is shown it must be from the 100, 100 split, not a 10, 10 split. *Unsupported 40, is M1, A1*
14. $F = k/d^2$ or $F \propto 1/d^2$ $8 = k/5^2$ k = 200 or $F = 200/d^2$ $12.5 = k/d^2$ $d^2 = 16$ d = 4 **mm**	M1 M1 A1 M1 A1 A1	 FT only non linear FT their k, and their non linear if possible CAO with unit mm
15. Finding y=8 when x=1 **and** y=5 when x=2 Split into 3 areas and attempt to sum, or 1 slip in stating **OR** substitution into trapezium rule Correct substitution into trapezium rule 17.5	B1 M1 M1 A1	 FT their values for y at x=0, 1, 2 & 3. Must be clearly working with area, may be incorrect formula for trapezium (8.5+6.5+2.5) Or equivalent. FT their values for y at x=1&2, OR 2 areas correct in sum of 3 CAO

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16. Strategy: use of similar triangles with sine rule or parallel lines with sine rule	S1	
Use of scale factor 1.5 or 2/3 as appropriate, or angles in ABC correctly as (60,) 80 and 40	M1	
DE/sin 60 = 9/sin 40 or AB/sin60 = 6/sin40	M1	
DE = 9 × sin60/sin40 or AB = 6 ×sin60/sin40	m1	(DE = 12(.126 cm))
AB = 8(.084 cm) or 8.1(cm)	A1	CAO *Alternative:* *S1 Strategy: sine rule, similar triangles and cosine rule OR parallel lines, sine rule and cosine rule* *M1 CD/sin80 = 9/sin40 or CD = sin80×9/sin40* *OR AC/sin80 = 6/sin40 or AC = sin80×6/sin40* *M1 AC = ⅔CD or AC =9.19 (CD=13.79)* *m1 $AB^2 = 6^2 + AC^2 - 2\times6\times AC\times\cos60$* *(FT their AC but not their CD used)* *A1 AB = 8(.084cm) or 8.1(cm) CAO* Unsupported 8(cm) gets no marks

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