EDEXCEL GCSE MATHEMATICS (MODULAR 2381)

MATHS



EXAM QUESTION PACK

UNIT 3 (PAPERS 13 AND 14) HIGHER TIER 5384H PAPERS

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Centre No.						Paper Reference								Surname	Initial(s)
Candidate No.						5	3	8	4	H	/	1	3	H	Signature

Paper Reference(s)

5384H/13H

Edexcel GCSE

Mathematics (Modular) – 2381

Paper 13 (Non-Calculator)

Higher Tier



Unit 3

Wednesday 9 November 2011 – Afternoon

Time: 1 hour 10 minutes

Examiner's use only

Team Leader's use only

Materials required for examination
Ruler graduated in centimetres and millimetres, protractor, compasses, pen, HB pencil, eraser.
Tracing paper may be used.

Items included with question papers
Nil

Instructions to Candidates

In the boxes above, write your centre number, candidate number, your surname, initials and signature.
Check that you have the correct question paper.
Answer ALL the questions. Write your answers in the spaces provided in this question paper.
You must NOT write on the formulae page.
Anything you write on the formulae page will gain NO credit.
If you need more space to complete your answer to any question, use additional answer sheets.

Information for Candidates

The marks for individual questions and the parts of questions are shown in round brackets: e.g. **(2)**.
There are 14 questions in this question paper. The total mark for this paper is 60.
There are 16 pages in this question paper. Any blank pages are indicated.
Calculators must not be used.

Advice to Candidates

Show all stages in any calculations.
Work steadily through the paper. Do not spend too long on one question.
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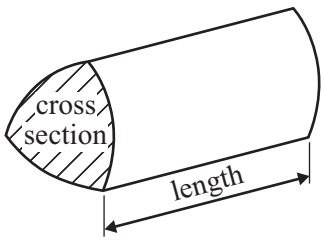
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GCSE Mathematics 2381

Formulae: Higher Tier

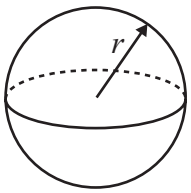
You must not write on this formulae page.
Anything you write on this formulae page will gain NO credit.

Volume of a prism = area of cross section × length



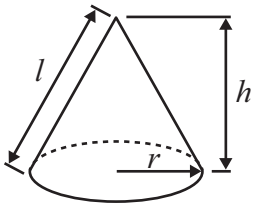
Volume of sphere $= \frac{4}{3}\pi r^3$

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

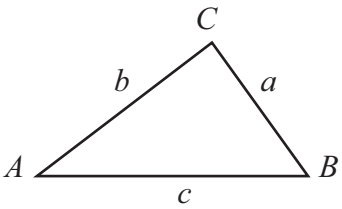


Volume of cone $= \frac{1}{3}\pi r^2 h$

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



In any triangle ABC



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

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

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

The Quadratic Equation

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

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

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Leave blank

Answer ALL FOURTEEN questions.

Write your answers in the spaces provided.

You must write down all stages in your working.

You must NOT use a calculator.

1. Theo earns £20 one weekend.
He gives £4 to his brother.

(a) Express £4 as a fraction of £20
Give your answer in its simplest form.

.....
(2)

Theo gives £6 to his mother.

(b) Express £6 as a percentage of £20

..... %
(2)

Theo spent the remaining £10 on bus fares and food.
He spent £1.50 more on bus fares than on food.

(c) How much did he spend on bus fares?

£ .....
(2)

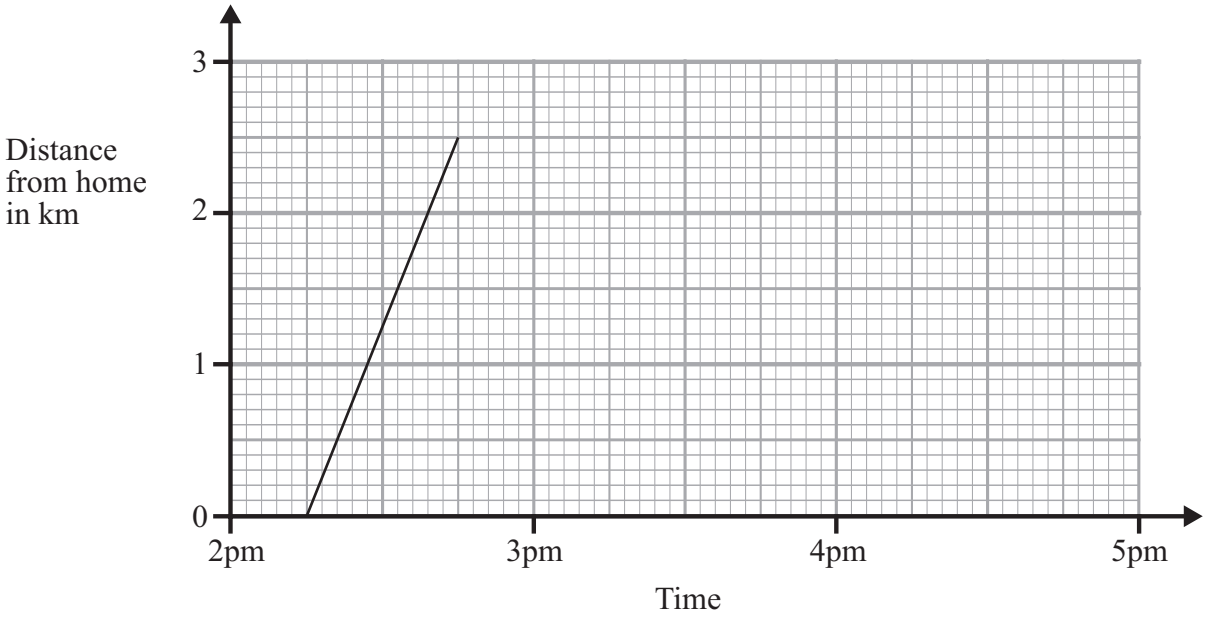
Q1

(Total 6 marks)

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2. Janet walked from her home to the library.
The distance-time graph shows Janet's journey to the library.



(a) Work out Janet's average speed for her journey from home to the library.
Give your answer in kilometres per hour.

..... kilometres per hour
(2)

Janet spent 60 minutes in the library.
She then walked home at a steady speed.
It took her 45 minutes to walk home.

(b) Complete the distance-time graph.

(2) **Q2**

(Total 4 marks)

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3.

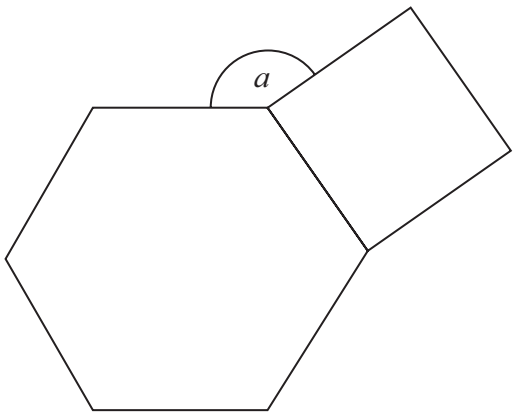


Diagram **NOT** accurately drawn

The diagram shows a regular hexagon and a square.

Calculate the size of the angle *a*.

..... °

Q3

(Total 4 marks)

4. Work out $\frac{2}{3} + \frac{1}{7}$

.....

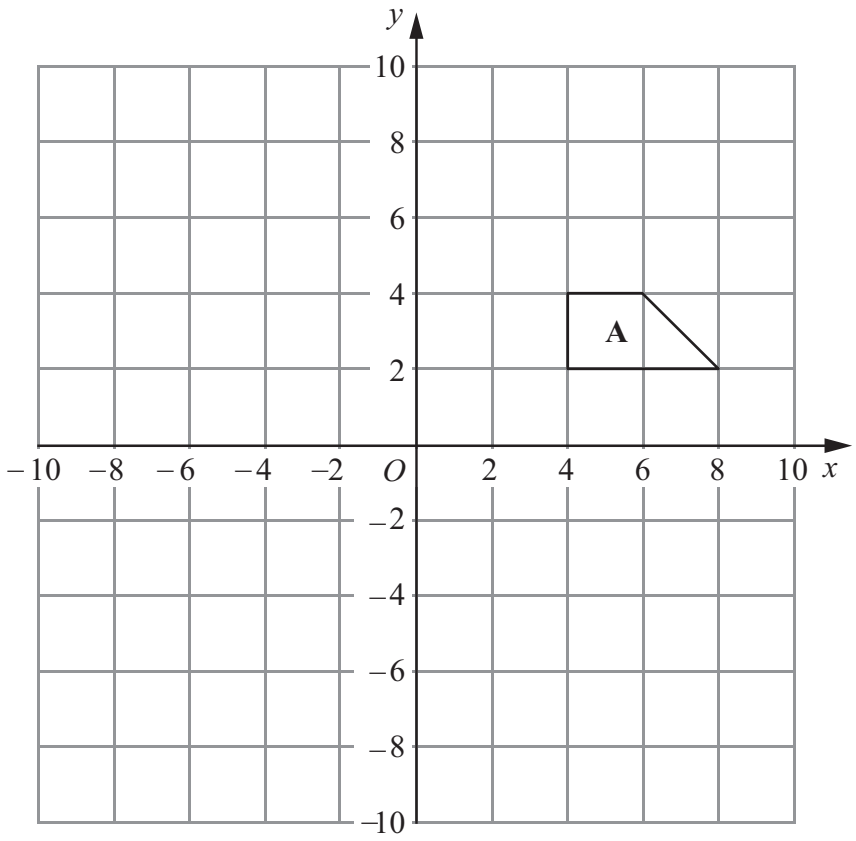
Q4

(Total 2 marks)

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5.



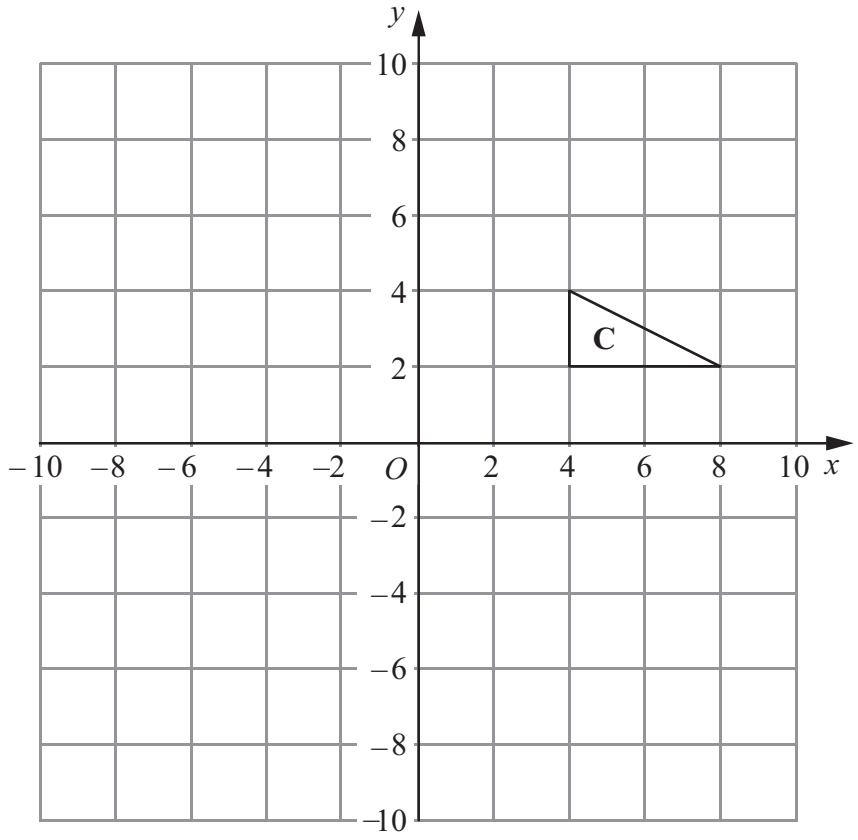
(a) Translate shape **A** by $\begin{pmatrix} -8 \\ -2 \end{pmatrix}$

Label the new shape **B**.

(2)

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Leave blank



(b) Reflect shape **C** in the line $y = x$.
Label the new shape **D**.

(2) **Q5**

(Total 4 marks)

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Leave blank

6. Two shops both sell the same type of suit.
In both shops the price of the suit was £180

One shop increases the price of the suit by $17\frac{1}{2}\%$.

The other shop increases the price of the suit by $22\frac{1}{2}\%$.

Calculate the difference between the new prices of the suits in the two shops.

£ .....

(Total 3 marks)

Q6

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Leave blank

7. (a) Solve $3(2t - 4) = 2t + 12$

$t =$ .....

(3)

(b) Solve $x^2 + 2x - 15 = 0$

.....

(3) **Q7**

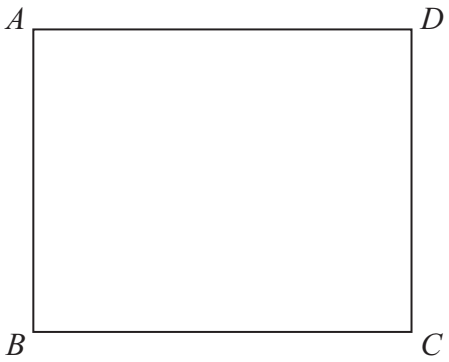
(Total 6 marks)

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Leave blank

8. The diagram represents a rectangular garden *ABCD*.

The scale of the diagram is 1 cm represents 2 m.



Scale: 1 cm represents 2 m

Richard is going to plant a tree in the garden.
The tree must be **both**

closer to the point *B* than to the point *D*
and less than 6 metres from the point *C*.

On the diagram, shade the region in which Richard can plant the tree. **Q8**

(Total 3 marks)

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Leave blank

9. Solve the simultaneous equations

$$3x + 4y = 200$$
$$2x + 3y = 144$$

$x =$ .....

$y =$ .....

(Total 4 marks)

Q9

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Leave blank

10. (a) Work out the value of $(6 \times 10^8) \times (4 \times 10^7)$

Give your answer in standard form.

.....

(2)

(b) Work out the value of $(6 \times 10^8) + (4 \times 10^7)$

Give your answer in standard form.

.....

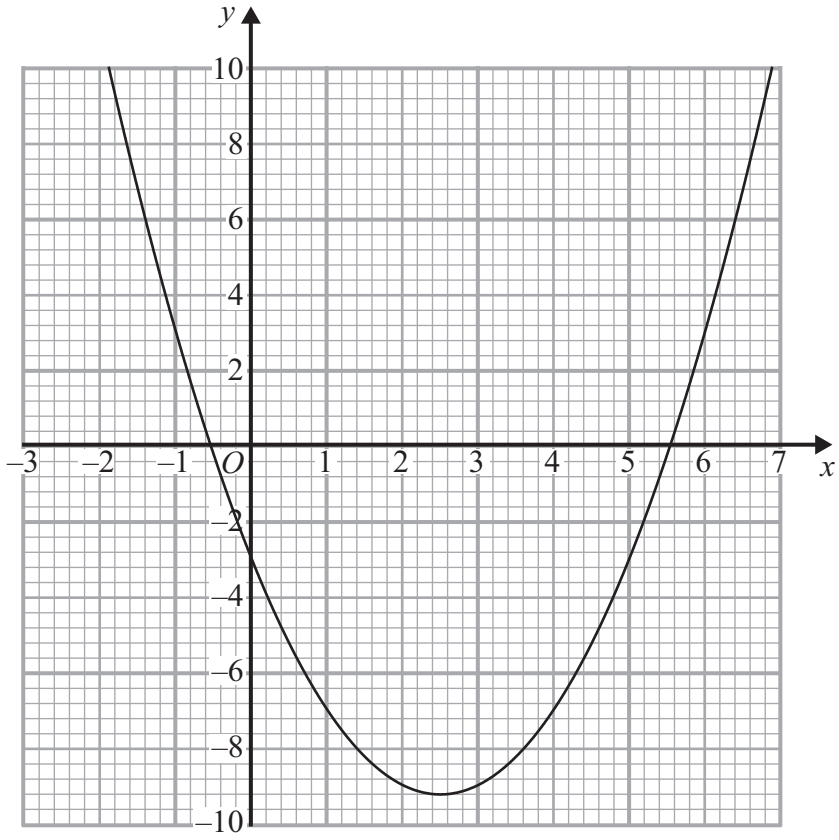
(2) **Q10**

(Total 4 marks)

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Leave blank

11. The diagram shows the graph of $y = x^2 - 5x - 3$



(a) Use the graph to find estimates for the solutions of

(i) $x^2 - 5x - 3 = 0$

.....

(ii) $x^2 - 5x - 3 = 6$

.....

(3)

(b) Use the graph to find estimates for the solutions of the simultaneous equations

$y = x^2 - 5x - 3$

$y = x - 4$

.....

(3)

Q11

(Total 6 marks)

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Leave blank

12. $y = p - 2qx^2$

$p = -10$
$q = 3$
$x = -5$

(a) Work out the value of y.

.....

(2)

(b) Rearrange $y = p - 2qx^2$

to make x the subject of the formula.

.....

(3) **Q12**

(Total 5 marks)

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13.

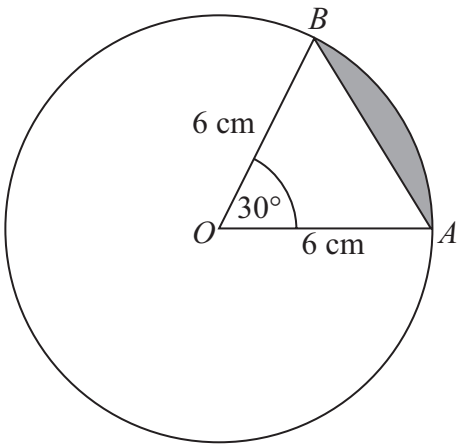


Diagram **NOT** accurately drawn

The diagram shows a circle, centre O.
A and B are points on the circle.
$OA = OB = 6$ cm.

The value of $\sin 30° = \frac{1}{2}$

Work out the area of the shaded segment.
Give your answer in terms of π.

..... cm^2 **Q13**

(Total 4 marks)

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Leave blank

14.

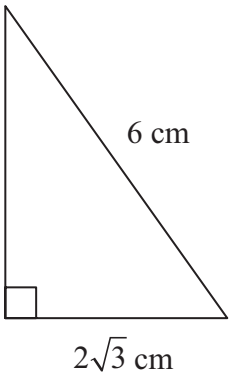


Diagram **NOT** accurately drawn

The diagram shows a right-angled triangle.

The length of the base of the triangle is $2\sqrt{3}$ cm.

The length of the hypotenuse of the triangle is 6 cm.

The area of the triangle is A cm^2.

Show that $A = k\sqrt{2}$ giving the value of k.

.....

Q14

(Total 5 marks)

TOTAL FOR PAPER: 60 MARKS

END

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Candidate No.						5	3	8	4	H	/	1	4	H	Signature

Paper Reference(s)

5384H/14H

Examiner's use only

Team Leader's use only

Edexcel GCSE

Mathematics (Modular) – 2381

Paper 14 (Calculator)



Higher Tier

Unit 3

Monday 14 November 2011 – Morning

Time: 1 hour 10 minutes

Materials required for examination
Ruler graduated in centimetres and millimetres, protractor, compasses, pen, HB pencil, eraser, calculator.
Tracing paper may be used.

Items included with question papers
Nil

Instructions to Candidates

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There are 17 questions in this question paper. The total mark for this paper is 60.
There are 16 pages in this question paper. Any blank pages are indicated.
Calculators may be used.
If your calculator does not have a π button, take the value of π to be 3.142 unless the question instructs otherwise.

Advice to Candidates

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If you cannot answer a question, leave it and attempt the next one.
Return at the end to those you have left out.

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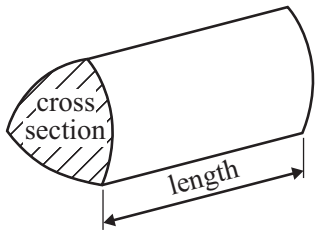
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GCSE Mathematics 2381

Formulae: Higher Tier

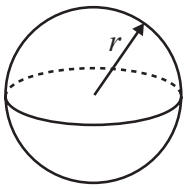
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Volume of a prism = area of cross section × length



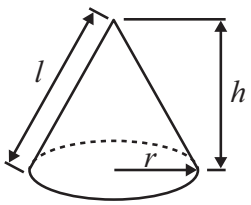
Volume of sphere $= \frac{4}{3}\pi r^3$

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

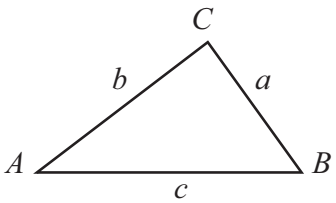


Volume of cone $= \frac{1}{3}\pi r^2 h$

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



In any triangle ABC



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

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

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

The Quadratic Equation

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

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

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Leave blank

Answer ALL SEVENTEEN questions.

Write your answers in the spaces provided.

You must write down all stages in your working.

1. (a) Solve $10x - 7 = 28$

$x =$ .....

(2)

(b) Solve $\frac{4y}{9} = 6$

$y =$ .....

(2) **Q1**

(Total 4 marks)

2. A shop advertises a TV for a cash price of £650

A person can pay for the TV by credit.
The credit cost is a 20% deposit of the cash price, plus 24 payments of £26 each.

Work out the difference between the cash price and the credit cost.

£ .....

Q2

(Total 4 marks)

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3. The diagram shows a solid prism made from centimetre cubes.

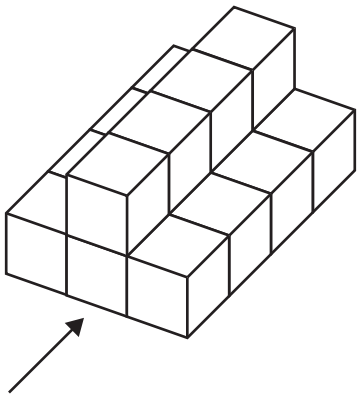
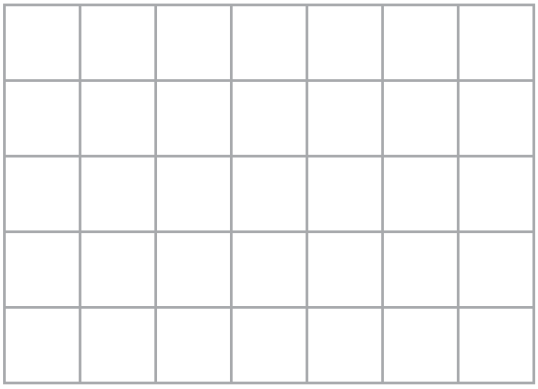


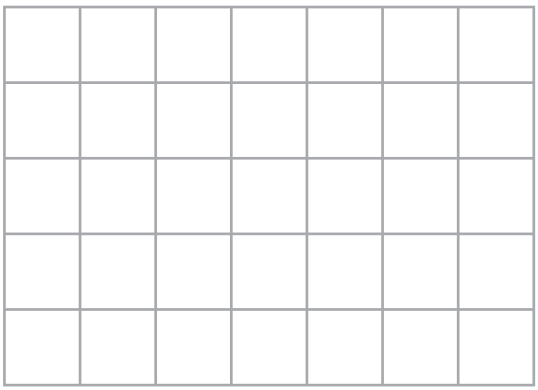
Diagram **NOT** accurately drawn

(a) On the grid below, draw the front elevation of the prism from the direction of the arrow.



(2)

(b) On the grid below, draw the plan of the prism.



(2) **Q3**

(Total 4 marks)

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Leave blank

4. (a) Work out the value of $\frac{6^5 \times 6^2}{6^4}$

Give your answer as a power of 6

.....

(2)

(b) Simplify $(x^3)^5$

.....

(1)

Q4

(Total 3 marks)

5. The diagram shows a CD.
The CD is a circle of radius 6 cm.

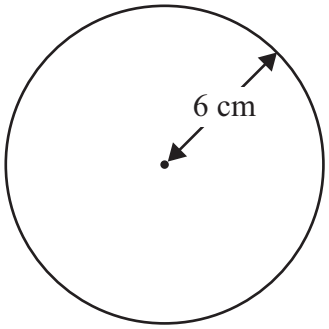


Diagram **NOT** accurately drawn

Work out the circumference of the CD.

..... cm

Q5

(Total 2 marks)

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Leave blank

6.

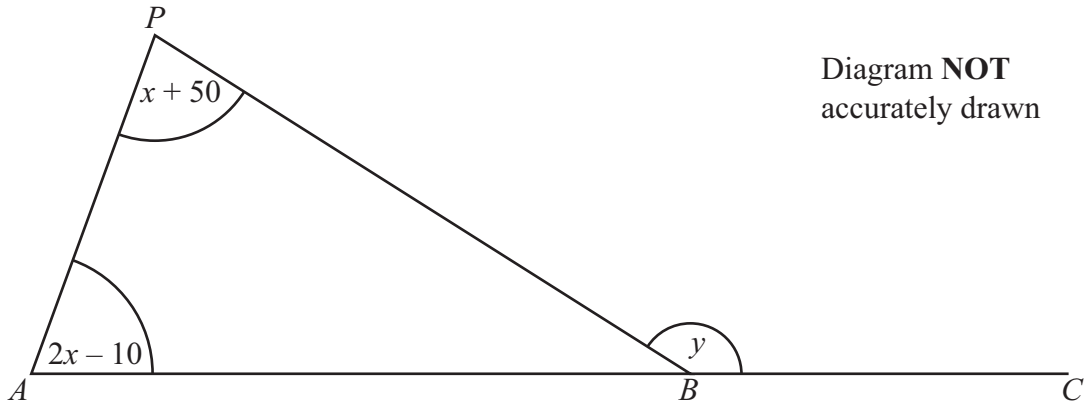


Diagram **NOT** accurately drawn

All angles are measured in degrees.

ABC is a straight line.
Angle *APB* = $x + 50$
Angle *PAB* = $2x - 10$
Angle *PBC* = y

(a) Show that $y = 3x + 40$
Give reasons for each stage of your working.

(3)

(b) Given that $y = 145$,

(i) work out the value of x,

$x =$ .....

(ii) work out the size of the largest angle in triangle *ABP*.

..... °

(4) **Q6**

(Total 7 marks)

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Leave blank

7. Melissa is 13 years old.
Becky is 12 years old.
Daniel is 10 years old.

Melissa, Becky and Daniel share £28 in the ratio of their ages.
Becky gives a third of her share to her mother.

How much should Becky now have?

£ .....

Q7

(Total 4 marks)

8. The exchange rate in London is £1 = €1.14
The exchange rate in Paris is €1 = £0.86

Elaine wants to change some pounds into euros.

In which of these cities would Elaine get the most euros?
You must show all of your working.

.....

Q8

(Total 3 marks)

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Leave blank

9. The diagram shows a right-angled triangle.

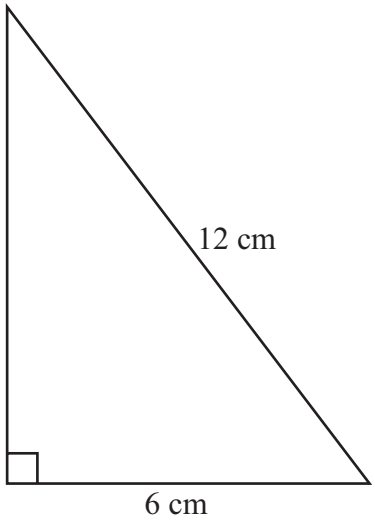


Diagram **NOT** accurately drawn

Calculate the area of the right-angled triangle.
Give your answer correct to 2 decimal places.

..... cm^2

Q9

(Total 4 marks)

10. The equation of a straight line is $y = 2x + 1$

Write down the equation of a straight line that is perpendicular to $y = 2x + 1$

.....

Q10

(Total 2 marks)

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Leave blank

11. Solve the inequality $4x + 1 > 11$

.....

(Total 2 marks)

Q11

12.

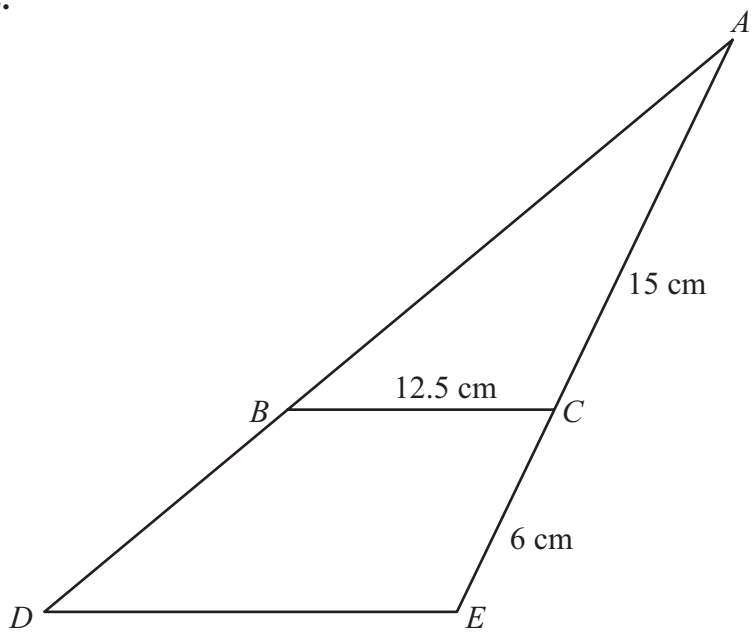


Diagram **NOT** accurately drawn

Triangle ABC is similar to triangle ADE.
$AC = 15$ cm.
$CE = 6$ cm.
$BC = 12.5$ cm.

Work out the length of DE.

..... cm

(Total 3 marks)

Q12

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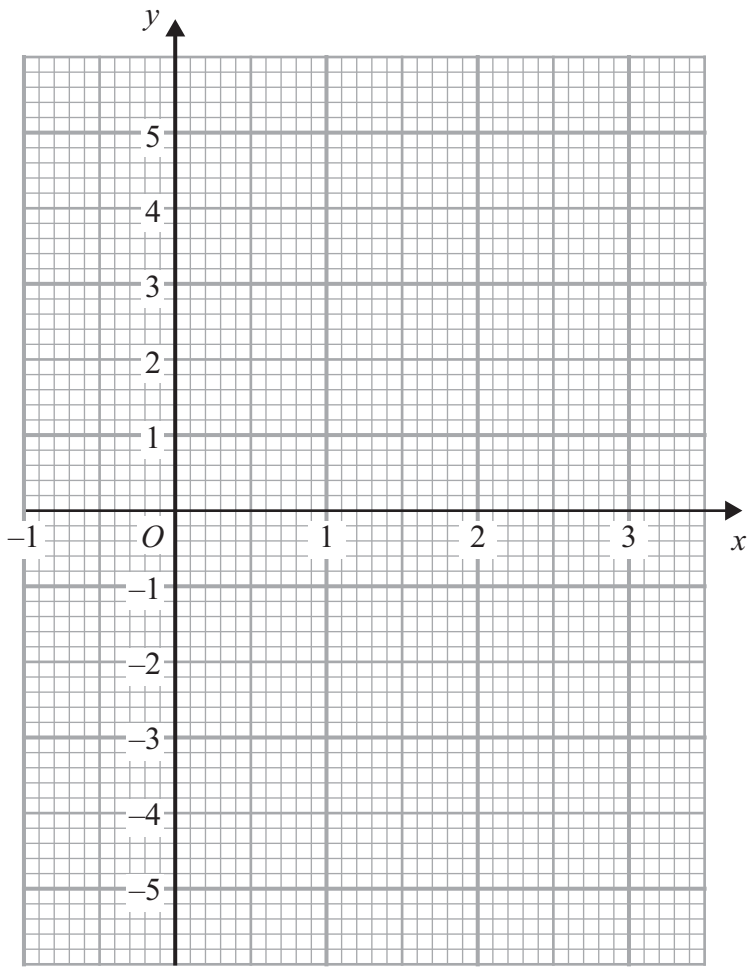
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13. (a) Complete the table for $y = x^3 - 3x^2$

x	–1	–0.5	0	0.5	1	1.5	2	2.5	3
y		–0.875	0	–0.625		–3.375		–3.125	

(2)

(b) On the grid, draw the graph of $y = x^3 - 3x^2$



(2) **Q13**

(Total 4 marks)

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Leave blank

14. Find the exact solutions of $x + \frac{3}{x} = 7$

.....

Q14

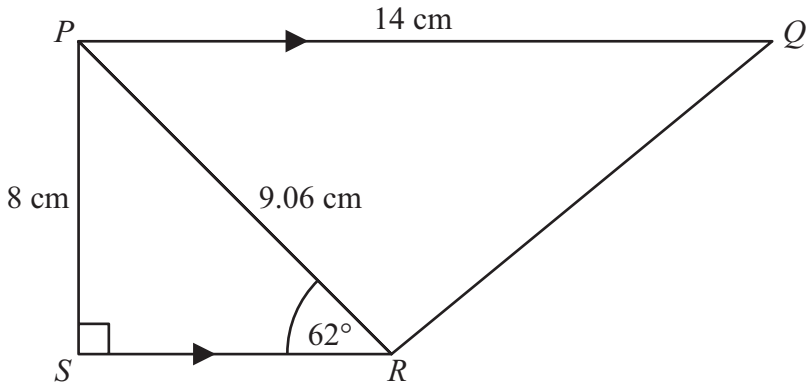
(Total 3 marks)

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Leave blank

15.

Diagram **NOT** accurately drawn



PQRS is a trapezium.
PQ is parallel to *SR*.
Angle *PSR* = 90°.
Angle *PRS* = 62°.
PQ = 14 cm.
PS = 8 cm.
PR = 9.06 cm.

Work out the length of *QR*.
Give your answer to 3 significant figures.

..... cm

Q15

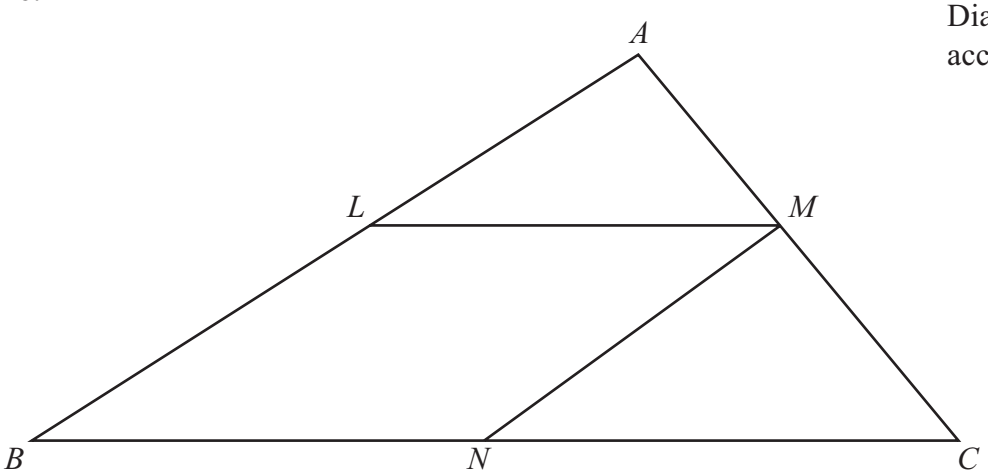
(Total 4 marks)

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Leave blank

16.

Diagram **NOT** accurately drawn



The diagram shows a triangle ABC.

$LMNB$ is a parallelogram where
L is the midpoint of AB,
M is the midpoint of AC,
and N is the midpoint of BC.

Prove that triangle ALM and triangle MNC are congruent.
You must give reasons for each stage of your proof.

Q16

(Total 3 marks)

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Leave blank

17.

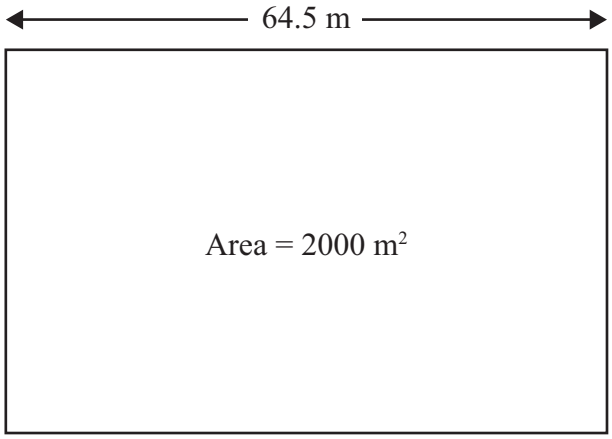


Diagram **NOT** accurately drawn

The diagram shows a rectangular field.

The area of the field is 2000 m^2, correct to 1 significant figure.
The length of the field is 64.5 m, correct to the nearest 10 cm.

Calculate the upper bound for the width of the field.
Give your answer correct to 3 significant figures.

..... m

Q17

(Total 4 marks)

TOTAL FOR PAPER: 60 MARKS

END

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Mark Scheme (Results)

November 2011

GCSE Mathematics (5384H)
Paper 13H (Non-Calculator)

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Full marks can be gained if the solution alone is given on the answer line, or otherwise unambiguously indicated in working (without contradiction elsewhere). Where the correct solution only is shown substituted, but not identified as the solution, the accuracy mark is lost but any method marks can be awarded.

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Accepted with and without the “p” at the end.

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5384H_13H					
Question		**Working**	**Answer**	**Mark**	**Notes**
1	(a)	$\frac{4}{20} = \frac{2}{10}$	$\frac{1}{5}$	2	M1 $\frac{4}{20}$ oe A1 cao SC B1 for $\frac{16}{20}$ oe if M0 scored
	(b)	$\frac{6}{20} \times 100$ or $\frac{6}{20} = \frac{5\times6}{5\times20}$	30	2	M1 $\frac{6}{20} \times 100$ A1 cao OR M1 $\frac{6}{20} = \frac{5\times6}{5\times20}$ A1 cao
	(c)	10 – 1.50 = 8.50 8.50 ÷ 2 = 4.25 10 ÷ 2 = 5 1.50 ÷ 2 = 0.75 5 + 0.75 =	5.75	2	M1 10 – 1.5(0) = 8.5(0) and '8.50' ÷ 2 (= 4.25) or 10 + 1.5(0) = 11.5(0) and '11.50' ÷ 2 or 10 ÷ 2 and 1.5(0) ÷ 2 or $2x \pm 1.5(0) = 10$ oe A1 cao
2	(a)	2.5 ÷ 0.5	5	2	M1 2.5 ÷ 0.5 accept 2.5 ÷ 30 A1 cao
	(b)		Graph completed correctly	2	B1 line from (2 45pm, 2.5) to (3.45pm, 2.5) B1 line from (3 45pm, 2.5) to (4 30pm, 0) or from (x, 2.5) to (x + 45 mins, 0) Tolerance ±1 square

5384H_13H					
Question		**Working**	**Answer**	**Mark**	**Notes**
3		Ext angle = $\frac{360}{6}$ = 60 Int angle = 180 – 60 = 120 120 + 90 = 210 360 – 210 = OR Sum of int angles = 4 × 180 = 720 Int angle = 720 ÷ 6 = 120 120 + 90 = 210 360 – 210 = OR Ext angle = $\frac{360}{6}$ = 60 Ext angle = 90 90 + 60 =	150	4	M1 $\frac{360}{6}$ (=60) M1 (Int angle =) 180 – '60' M1 (dep on at least M1) 360 – ('120' + 90) A1 cao SC B2 answer of 210 OR M1 4 × 180 or 720 seen M1 '720' ÷ 6 M1 (dep on at least M1) 360 – ('120' + 90) A1 cao OR M1 $\frac{360}{6}$ (=60) M1 (Ext angle =) $\frac{360}{4}$ or 180 – 90 or 90 seen as exterior angle on diagram M1 (dep on at least M1) '90' + '60' A1 cao

5384H_13H					
Question		**Working**	**Answer**	**Mark**	**Notes**
4		$\frac{2}{3}+\frac{1}{7}=\frac{14}{21}+\frac{3}{21}$ | + | 2 | 3 | | 1 | | 3 | | 7 | 14 | 21 |	$\frac{17}{21}$	2	M1 suitable common denominator (multiple of 21) and at least one of two fractions correct A1 $\frac{17}{21}$ oe NB sight of $\frac{3}{21}$ or $\frac{14}{21}$ alone is **not** sufficient OR Attempt to use decimals, must use at least 2 dp M1 0.66 + 0.14 A1 0.$\dot{8}$0952$\dot{3}$ OR M1 for table structure correct with all cells correct A1 for $\frac{17}{21}$
5	(a)	Vertices at (–4, 2), (–4, 0), (0, 0) and (–2, 2)	Correct translation	2	M1 any translation A1 cao
	(b)	Vertices at (4, 4), (2, 4) and (2, 8)	Correct reflection	2	M1 line $y = x$ drawn or correct reflection in $y = –x$ A1 cao

5384H_13H					
Question		**Working**	**Answer**	**Mark**	**Notes**
6		22.5% – 17.5% = 5% $180 \times \frac{5}{100}$ OR 22.5/100 × 180 = 40.50 17.5/100 × 180 = 31.50 40.50 – 31.50 OR 1.225 × 180 = 220.5 1.175 × 180 = 211.5 220.5 – 211.5	9	3	M1 22.5 – 17.5 M1 $180 \times \frac{5}{100}$ oe A1 cao OR M1 $180 \times \frac{22\frac{1}{2}}{100}$ oe or $180 \times \frac{17\frac{1}{2}}{100}$ oe M1 (dep) '40.50' – '31.50' A1 cao OR M1 1.225 × 180 or 1.175 × 180 M1 (dep) '220.5' – '211.5' A1 cao A final answer of 9 obtained with arithmetic errors in working gets M2 A0

5384H_13H					
Question		**Working**	**Answer**	**Mark**	**Notes**
7	(a)	$3(2t - 4) = 2t + 12$ $6t - 12 = 2t + 12$ $6t - 2t = 12 + 12$ $4t = 24$	6	3	B1 $6t - 12$ or $2t/3 + 12/3$ M1 correctly isolating their terms in t or their constant terms in an equation A1 cao
	(b)	$(x + 5)(x - 3) = 0$	$-5, 3$	3	M1 $(x \pm 5)(x \pm 3)$ A1 $(x + 5)(x - 3)$ A1 for -5 and 3 **OR** M1 for substitution in formula (condone incorrect signs) M1 for reduction to $\frac{-2 \pm \sqrt{64}}{2}$ A1 for -5 and 3 **OR** M1 for $(x + 1)^2 - 1 - 15 (= 0)$ M1 for $x = -1 \pm \sqrt{16}$ A1 for -5 and 3 **OR** T&I B3 both solutions correct (B1 one solution correct)

5384H_13H					
Question		**Working**	**Answer**	**Mark**	**Notes**
8			Diagram	3	B3 fully correct within guidelines OR B1 arc radius 3 cm centre *C* within the guidelines B1 perpendicular bisector of *BD* within the guidelines B1 shading region inside an arc centre *C* below or to the left of a straight line from *AD* to *BC*. Ignore any drawing outside the given rectangle
9		$9x + 12y = 600$ $8x + 12y = 576$ $x = 24$ $3 \times 24 + 4y = 200$ $6x + 8y = 400$ $6x + 9y = 432$ $y = 32$ $3x + 4 \times 32 = 200$	$x = 24$ $y = 32$	4	M1 correct process to eliminate either *x* or *y* (allow one arithmetical error) A1 either $x = 24$ or $y = 32$ M1 (dep on 1st M1) correct substitution of their value of *x* or *y* into one of the equations OR M1 (indep of 1st M1) correct process to eliminate the other variable (allow one arithmetical error) A1 cao for both $x = 24$ and $y = 32$

5384H_13H					
Question		**Working**	**Answer**	**Mark**	**Notes**
10	(a)	$6 \times 10^8 \times 4 \times 10^7 = 24 \times 10^{15}$	2.4×10^{16}	2	M1 $24 \times 10^{8+7}$ oe or 24 000 000 000 000 000 or 2.4×10^n A1 cao
	(b)	$6 \times 10^8 + 4 \times 10^7 =$ $6 \times 10^8 + 0.4 \times 10^8$	6.4×10^8	2	M1 $6 \times 10^8 + 0.4 \times 10^8$ or $60 \times 10^7 + 4 \times 10^7$ or 600 000 000 + 40 000 000 or 640 000 000 oe or 6.4×10^n A1 cao
11	(a)(i)		– 0.6 to – 0.5 5.5 to 5.6	3	B1 for both, accept – 0.6 to – 0.5 and 5.5 to 5.6
	(ii)	Draw $y = 6$	– 1.4, 6.4		M1 draw $y = 6$ or one value correct A1 –1.4, 6.4 ± 1 sq
	(b)	Draw $y = x - 4$	$x = 0.2$, $y = -3.8$ $x = 5.8$, $y = 1.8$	3	B1 draw $y = x - 4$ M1 use the points of intersection, can be implied by one value ft their line A1 $x = 0.2$, $y = -3.8$ and $x = 5.8$, $y = 1.8 \pm 1$ sq SC B2 for $x = 3 \pm \sqrt{8}$ and $y = -1 \pm \sqrt{8}$

5384H_13H					
Question		**Working**	**Answer**	**Mark**	**Notes**
12	(a)	$-10 - 2 \times 3 \times (-5)^2 = -10 - 150$	-160	2	M1 $-10 - 2 \times 3 \times (-5)^2$ or 75 or 150 or -150 seen A1 cao
	(b)	$y = p - 2qx^2$ $2qx^2 = p - y$ $x^2 = \frac{p-y}{2q}$	$x = \pm\sqrt{\frac{p-y}{2q}}$	3	M1 at least one correct process from: isolate $2qx^2$, divide by q, or by 2 or by $2q$ M1 (dep on M1) attempt to square root both sides of $x^2 = \text{‘}\frac{p-y}{2q}$, A1 $x = \pm\sqrt{\frac{p-y}{2q}}$ oe condone omission of $\pm$
13		Area of triangle $= \frac{1}{2} \times 6 \times 6 \times \sin 30$ Area of sector $= \frac{30}{360} \times \pi \times 6^2$ $\frac{30}{360} \times \pi \times 6^2 - \frac{1}{2} \times 6 \times 6 \times \sin 30$	$3\pi - 9$	4	M1 for ½ × 6 × 6 × sin30 oe M1 for $\frac{30}{360} \times \pi \times 6^2$ oe M1 (dep on at least one previous M1) for subtracting area of triangle from area of sector A1 for $3\pi - 9$ or $3(\pi - 3)$ oe

5384H_13H					
Question		**Working**	**Answer**	**Mark**	**Notes**
14		$6^2 - (2\sqrt{3})^2 = 36 - 12 = 24$ Area $= \frac{1}{2} \times 2\sqrt{3} \times \sqrt{24} = \sqrt{72} =$ $\sqrt{36 \times 2} = 6\sqrt{2}$	Proof	5	M1 $6^2 - (2\sqrt{3})^2$ or $\sqrt{48}$ seen or $x^2 + (2\sqrt{3})^2 = 6^2$ oe A1 $\sqrt{24}$ oe M1 (dep on M1) $\frac{1}{2} \times 2\sqrt{3} \times$ '$\sqrt{24}$' A1 $\sqrt{72}$ oe A1 $6\sqrt{2}$ or ($k =$) 6

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Mark Scheme (Results)

November 2011

GCSE Mathematics (5384H)
Paper 14H (Calculator)

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5384H_14H					
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1	(a)	$10x - 7 + 7 = 28 + 7$ or $10x/10 - 7/10 = 28/10$ $10x = 35$	3.5	2	M1 for attempt to '+7' both sides or ÷10 all three terms A1 for 3.5 oe
	(b)	$4y = 54$	13.5	2	M1 for ×9 or ÷4 or ÷0.44(44…) both sides A1 for 13.5 oe
2		650×20/100=130 24×26=624 130+624=754 754-650=	104	4	M1 650×20/100 (=130) oe M1 24×26 (=624) oe M1 "130"+"624" (=754) OR "754" – 650 A1 cao SC: Award 3 marks for 754 seen
3	(a)		Front elevation	2	B2 for correct front elevation (B1 for correct shape, but one dimension incorrect)
	(b)		Plan	2	B2 for correct plan (B1 for rectangle, but one dimension incorrect)
4	(a)	$\frac{6^7}{6^4}$ or $6^1 \times 6^2$ or $\frac{6^5}{6^2}$	6^3	2	M1 for $\frac{6^7}{6^4}$ or $6^1 \times 6^2$ or $\frac{6^5}{6^2}$ A1 cao SC B1 for 216 if M0 scored.
	(b)		x^{15}	1	B1 cao
5		$\pi \times 6 \times 2$	37.7	2	M1 for $\pi \times 12$ A1 37.6 – 37.8

5384H_14H					
Question		**Working**	**Answer**	**Mark**	**Notes**
6	(a)	$2x - 10 + x + 50$ (ext angle of a triangle = sum of interior opposite angles) OR $180 - (2x - 10 + x + 50) = 140 - 3x$ (sum of the angles in a triangle = 180) $180 - (140 - 3x)$ (sum of the angles on a straight line = 180)	Results with reasons	3	M1 for $2x - 10 + x + 50$ or $2x + x$ and $50 - 10$ A1 for completing the algebra to complete the proof showing $y=3x+40$. B1 for 'ext. angle of a triangle = sum of opp. int. angles' OR M1 for $180 - (2x - 10 + x + 50)$ or $140 - 3x$ seen. A1 for completing the algebra to complete the proof showing $y=3x+40$. B1 for 'sum of angles in triangle = 180' oe**and** 'sum of angles on a straight line = 180' oe
	(b)	$3x = 145 - 40 = 105$ $105 \div 3$ $35 + 50 = 85$ $2 \times 35 - 10 = 60$ $180 - 145 = 35$	35 85	4	M1 for $(3x =)$ $145 - 40$ or 105 seen or for clear attempt to subtract 40 from both sides of the equation or divide all 3 terms by 3 A1 cao M1 for $2\times35 - 10$ or $35 + 50$ or $180 - 145$ or for substituting '35' in order to find at least one angle; can be implied by sight of 85 or 60 A1 for 85 or ft for '35' provided 'x'< 47
7		$2800 \div (13 + 12 + 10) = 80$p / share $80 \times 12 = 960$ $960 \times \frac{2}{3}$	6.40	4	M1 for $2800 \div (13 + 12 + 10)$ or $28 \div (13 + 12 + 10)$ OR 80 or 0.8 or 10.4(0) or 1040 or 8 seen OR 13/35 or 12/35 or 10/35 oe seen M1 for '80' × 12(=960) or'0.8' × 12 OR 960 or 9.6 seen OR $12/35 \times 2800$ or $12/35 \times 28$ oe M1 (indep) for $\times \frac{2}{3}$ oe A1 for £6.40 or 640 pence [accept 6.4] SC : B2 for answer of 10 supported by working

5384H_14H					
Question		**Working**	**Answer**	**Mark**	**Notes**
8		1 ÷ 1.14 = 0.877… worse than 0.86 OR 1 ÷ 0.86 = 1.162… better than 1.14 OR Change say £100: 1.14 × 100 = 114 $100 \times \frac{1}{0.86} = 116.28$	Paris since 1.16..> 1.14	3	M1 for any attempted conversion using 1.14 or 0.86 A1 for arriving at two comparable amounts of money in the same currency A1 for Paris with correct figures.
9		$12^2 = h^2 + 6^2$ $h = \sqrt{144-36} = \sqrt{108} = 10.392$ Area = ½ × 6 × 10.392	31.17 to 31.18	4	M1 for $12^2 = h^2 + 6^2$ or $(h^2=)\ 12^2 - 6^2$ M1 for √(144-36) or 10.3(9...) M1 (indep) for ½ × 6 × "*height*" A1 for 31.17 − 31.18 NB: the figure for "height" has to be less than 12 or ft from their Pythagoras calculation.
10		$y = -\frac{1}{2}x + c$ $x = -2y + c$	$y = -\frac{1}{2}x + c$	2	M1 for identification or statement of $-\frac{1}{m}$ or sight of $-\frac{1}{2}$ A1 for equation $y = -\frac{1}{2}x + c$ oe*c* any number or absent.

5384H_14H					
Question		**Working**	**Answer**	**Mark**	**Notes**
11		$4x > 10$	$x > 2.5$	2	M1 for $4x > 11 - 1$ or clear attempt to subtract 1 from both sides or clear attempt to divide all 3 terms by 4 or $4x>10$ or $4x=10$ or $4x<10$ etc. A1 oe SC: B1 for 2.5 oe seen if M0 scored.
12		$\frac{15+6}{15} \times 12.5$	17.5	3	M1 for $\frac{DE}{12.5} = \frac{15+6}{15}$ oe**or** $\frac{15}{15+6}$ **or** $\frac{15+6}{15}$ **or** $\frac{7}{5}$ **or** $\frac{5}{7}$ **or** $\frac{2}{5}$ **or** $\frac{5}{2}$ or 1.4 or 0.4 or 2.5 or 0.714…oe M1 for $\frac{15+6}{15} \times 12.5$ or $\frac{21}{15}$ **or** $\frac{7}{5} \times 12.5$ oe **or** $12.5 + \frac{2}{5} \times 12.5$ oe A1 cao
13	(a)		-4,-2,-4,0	2	B2 for all points correctly calculated (B1 for at least 2 calculated correctly)
	(b)		Graph plotted	2	B1 ft for plotting points from their table (allow 1 error) ±1 small square B1 (dep on previous B1) for joining points with a curve; curve within tolerance of all points.

5384H_14H					
Question		**Working**	**Answer**	**Mark**	**Notes**
14		$x^2 + 3 = 7x$ $x^2 - 7x + 3 = 0$ $x = \frac{-(-7) \pm \sqrt{(-7)^2 - 4 \times 3}}{2}$ OR $(x - 3.5)^2 = 3.5^2 - 3 = 9.25$ $x - 3.5 = \pm\sqrt{9.25}$	$= \frac{7 \pm \sqrt{37}}{2}$ OR $3.5 \pm\sqrt{9.25}$	3	M1 for $x^2 + 3 = 7x$oe**or** clear intention to multiply all terms by x M1 for $x = \frac{-(-7) \pm \sqrt{(-7)^2 - 4 \times 3}}{2}$ ft from a quadratic equation of the form $ax^2 + bx + c = 0$ where $a,b,c \neq 0$; condone wrong signs for a, b, c in substitution A1 for $x = \frac{7 \pm \sqrt{49 - 12}}{2}$ or for $= \frac{7 \pm \sqrt{37}}{2}$ as the final exact solution. OR M1 for $x^2 + 3 = 7x$oe**or** clear intention to multiply all terms by x M1 for $(x - 3.5)^2 - 3.5^2 + 3 = 0$ ft from a quadratic equation of the form $ax^2 + bx + c = 0$ where $a,b,c \neq 0$ A1 for $3.5 \pm\sqrt{9.25}$ SC : If no marks awarded then B2 for both 6.54(1381265..) **and** 0.458(6187349…)

5384H_14H					
Question		**Working**	**Answer**	**Mark**	**Notes**
15		$QR^2 = 14^2 + 9.06^2 - 2.\ 14.\ 9.06\ \cos 62$ $= 196 + 82.08 - 253.68\cos 62$ $= 158.98\ldots.$	12.6	4	B1 for angle $QPR = 62^o$ M1 for $QR^2 = 14^2 + 9.06^2 - 2\times 14\times 9.06\times \cos 62$ M1 for correct order of evaluation **or** 158.9… A1 for 12.6 – 12.62 **or** For methods using trigonometry and Pythagoras No marks until a correct Pythag statement with QR as only unknown (Let M be on PQ such that angle RMQ is 90^o) For example B1 for angle $QPR = 62^o$ M1 for $(QR^2 =)\ 8^2 + (14 - 9.06\cos 62)^2$ M1 for $\sqrt{64+'94.995...'}$ **or** 158.9… A1 for 12.6 – 12.62 SC: B3 for 10.3(5511) or 10.4 using rad **or** 11.6(402014) using grad

5384H_14H					
Question		**Working**	**Answer**	**Mark**	**Notes**
16		*AM* = *MC* (given *M* is midpoint) *AL* = *LB* (given *L* is midpoint) *LB* = *MN* (opp sides of a parallelogram) So *AL* = *MN* *BN* = *NC* (given *N* is midpoint) *BN* = *LM* (opp sides of a parallelogram) So *LM* = *NC* triangles are congruent SSS OR *AM* = *MC* (given *M* is midpoint) Angles: *ALM* = *ABN* = *MNC* (corresponding) Angle *AML* = angle *MCN* (corresponding) triangles are congruent ASA OR Angle *CNM* = angle *NML* (alternate) Angle *NML* = angle *MLA* (alternate) SO angle *MLA* = angle *CNB* *AL* = *LB* (*L* midpoint of *AB*) *LB* = *MN* (opp sides of a parallelogram) SO *AL* = *MN* *BN* = *NC* (*N* midpoint of *BC*) *BN* = *LM* (opposite of a parallelogram) SO *LM* = *NC* Triangles are congruent	Proof	3	M1 for either *AM* = *MC* or *AL* = *LB* or *BN* = *NC* M1 for either *LB* = *MN* or *BN* = *LM* A1 conclusion of congruency (eg SSS) with all three sides shown as equal. OR M1 for *AM* = *MC* M1 for either Angle *ALM* = angle *MNC* or Angle *AML* = angle *MCN* or angle *LAM* = angle *NMC* A1 conclusion of congruency (eg ASA) with two angles and one side shown as equal. OR M1 for either *MLA* = *CNM* or *AL* = *LB* or *BN* = *NC* M1 for either *LB* = *MN* or *BN* = *LM* A1 conclusion of congruency (eg SAS) with two sides and one angle shown as equal. SC: include appropriate pair of sides with justification of midpoint rule for M1 in any of the above.

5384H_14H					
Question		**Working**	**Answer**	**Mark**	**Notes**
17		2500 ÷ 64.45 = 38.7897595	38.8	4	M1 for 2500 or 1500 seen or 2499 (recurring) M1 for 64.55 or 64.45 seen or 64.5499(recurring) M1 for $area_{max}$ ÷ $length_{min}$eg “2500” ÷ “64.45” A1 for 38.8 or better Accept equivalent working in cm for M marks.

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Centre No.						Paper Reference								Surname	Initial(s)
Candidate No.						5	3	8	4	H	/	1	3	H	Signature

Paper Reference(s)

5384H/13H

Edexcel GCSE

Mathematics (Modular) – 2381

Paper 13 (Non-Calculator)

Higher Tier

Unit 3

Monday 6 June 2011 – Afternoon

Time: 1 hour 10 minutes



Examiner's use only

Team Leader's use only

Materials required for examination
Ruler graduated in centimetres and millimetres, protractor, compasses, pen, HB pencil, eraser.
Tracing paper may be used.

Items included with question papers
Nil

Instructions to Candidates

In the boxes above, write your centre number, candidate number, your surname, initials and signature.
Check that you have the correct question paper.
Answer ALL the questions. Write your answers in the spaces provided in this question paper.
You must NOT write on the formulae page.
Anything you write on the formulae page will gain NO credit.
If you need more space to complete your answer to any question, use additional answer sheets.

Information for Candidates

The marks for individual questions and the parts of questions are shown in round brackets: e.g. **(2)**.
There are 18 questions in this question paper. The total mark for this paper is 60.
There are 16 pages in this question paper. Any blank pages are indicated.
Calculators must not be used.

Advice to Candidates

Show all stages in any calculations.
Work steadily through the paper. Do not spend too long on one question.
If you cannot answer a question, leave it and attempt the next one.
Return at the end to those you have left out.

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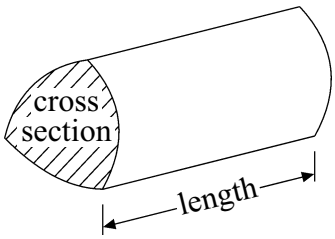
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GCSE Mathematics

Formulae: Higher Tier

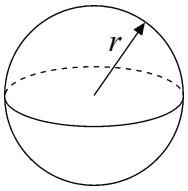
You must not write on this formulae page.
Anything you write on this formulae page will gain NO credit.

Volume of a prism = area of cross section × length



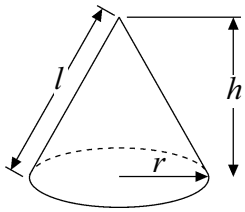
Volume of sphere $= \frac{4}{3}\pi r^3$

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

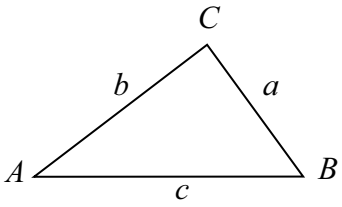


Volume of cone $= \frac{1}{3}\pi r^2 h$

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



In any triangle ABC



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

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

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

The Quadratic Equation

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

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

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Leave blank

Answer ALL EIGHTEEN questions.

Write your answers in the spaces provided.

You must write down all stages in your working.

You must NOT use a calculator.

1. Here is a list of ingredients for making **10** Flapjacks.

Ingredients for 10 Flapjacks
80 g rolled oats
60 g butter
30 m*l* golden syrup
36 g light brown sugar

Work out the amount of each ingredient needed to make **15** Flapjacks.

..... g rolled oats

..... g butter

..... m*l* golden syrup

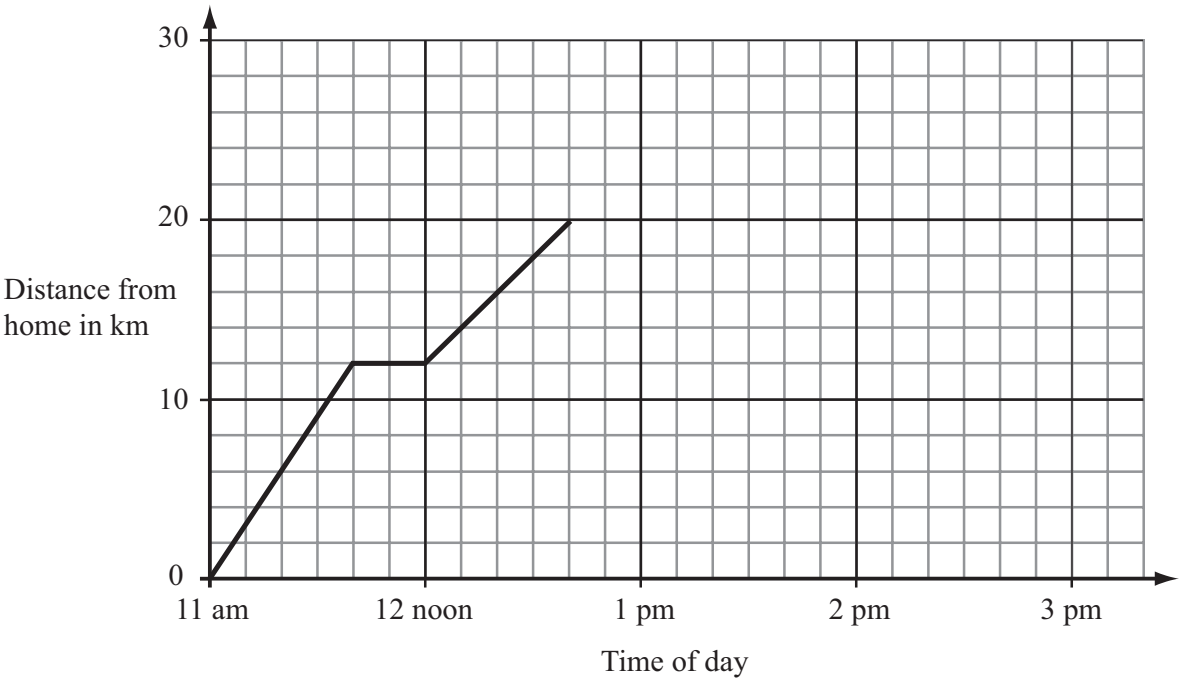
..... g light brown sugar

(Total 3 marks)

Q1

Leave blank

2. Steve went for a cycle ride.
He left home at 11 am.
The travel graph shows part of Steve's journey.



At 11.40 am Steve stopped to have a drink.

(a) For how many minutes did he stop?

..... minutes
(1)

(b) What was Steve's distance from home at 12.30 pm?

..... km
(1)

At 12.40 pm Steve stopped to have lunch for 40 minutes.
He then cycled home at a steady speed.
It took him 1 hour 30 minutes to cycle home.

(c) Complete the travel graph.

(2)

(Total 4 marks)

Q2

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Leave blank

3. $H = 2a + 3b$
$a = 5$
$b = -1$

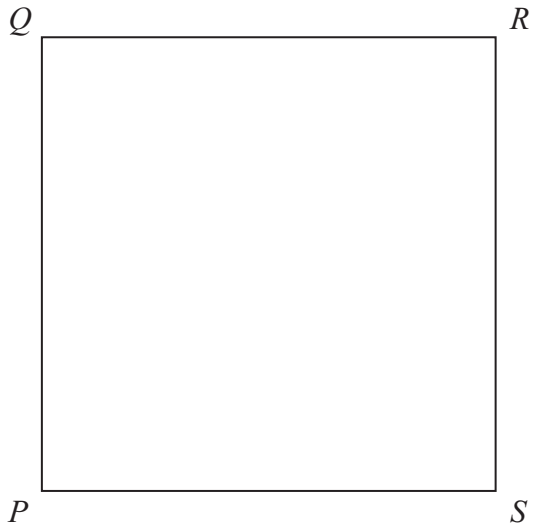
Work out the value of H.

.....

Q3

(Total 2 marks)

4.



$PQRS$ is a square.

Shade the set of points inside the square which are **both**

more than 3 centimetres from the point P
and less than 2 centimetres from the line PS.

Q4

(Total 3 marks)

5. Write down the reciprocal of 8

.....

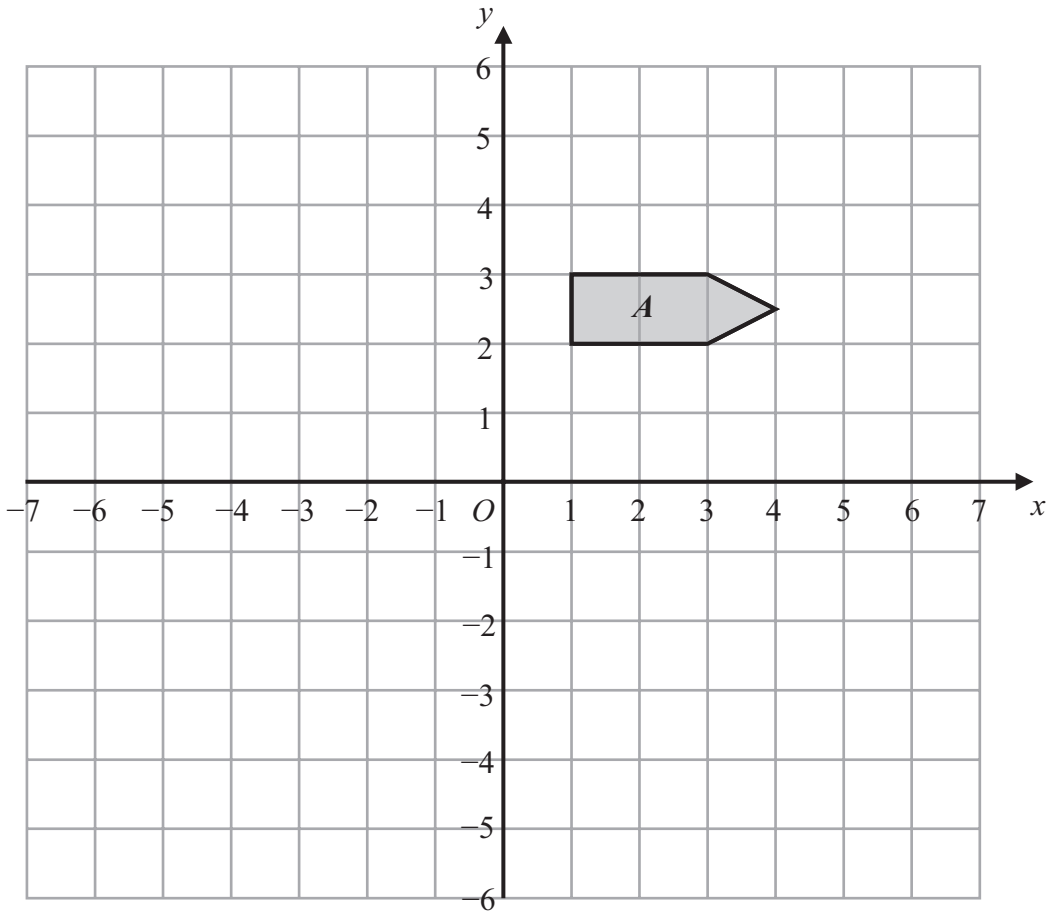
Q5

(Total 1 mark)

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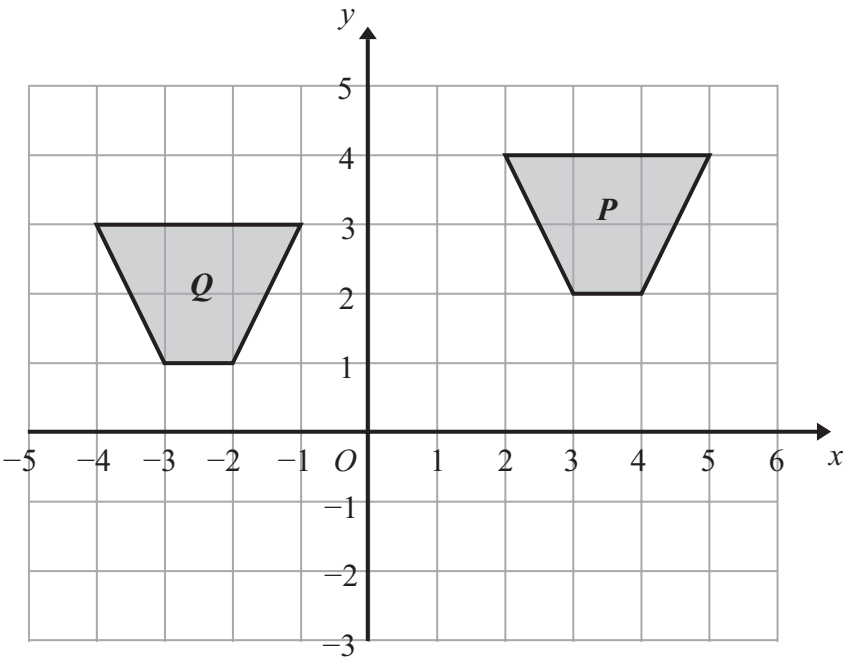
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6.



(a) On the grid above, reflect shape ***A*** in the line $x = -1$

(2)



(b) Describe fully the single transformation that will map shape ***P*** onto shape ***Q***.

.....

.....

Q6

(2)

(Total 4 marks)

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Leave blank

7. Callum says

"4 m^2 is equivalent to 400 cm^2."

Is Callum correct?
Give reasons for your answer.

.....

.....

.....

Q7

(Total 2 marks)

8. Peter, Tarish and Ben share £54

Tarish gets three times as much money as Peter.
Ben gets twice as much money as Tarish.

How much money does Ben get?

£ .....

Q8

(Total 3 marks)

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Leave blank

9. In the year 1958 a school had 250 students.
In the year 2008 the school had 1500 students.

Work out the percentage increase in the number of students between the year 1958 and the year 2008

..... %

(Total 3 marks)

Q9

10.

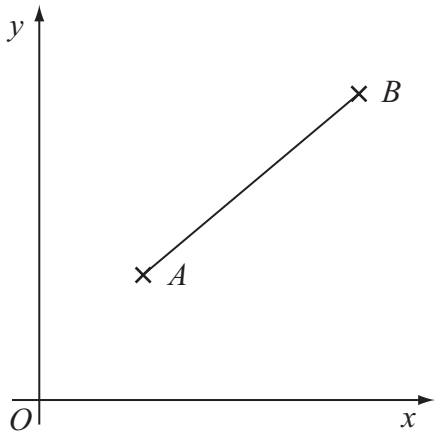


Diagram **NOT** accurately drawn

A is the point (2, 3).
B is the point (6, 6).

Work out the length of *AB*.

.....

(Total 3 marks)

Q10

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Leave blank

11. (a) Work out $\frac{1}{5} \times \frac{2}{3}$

.....

(1)

(b) Work out $2\frac{1}{3} - 1\frac{2}{5}$

.....

(3)

Q11

(Total 4 marks)

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Leave blank

12. (a) Work out the value of $\frac{3^7}{3^5}$

.....

(1)

(b) Find the value of 2^{-3}

.....

(1)

(c) Simplify $(t^3)^2$

.....

(1)

(d) Simplify $\frac{n^4}{n^3 \times n^2}$

.....

(2)

Q12

(Total 5 marks)

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13. Solve the simultaneous equations

$$4x + y = 10$$
$$2x - 3y = 19$$

$x =$ .....

$y =$ .....

(Total 3 marks)

Q13

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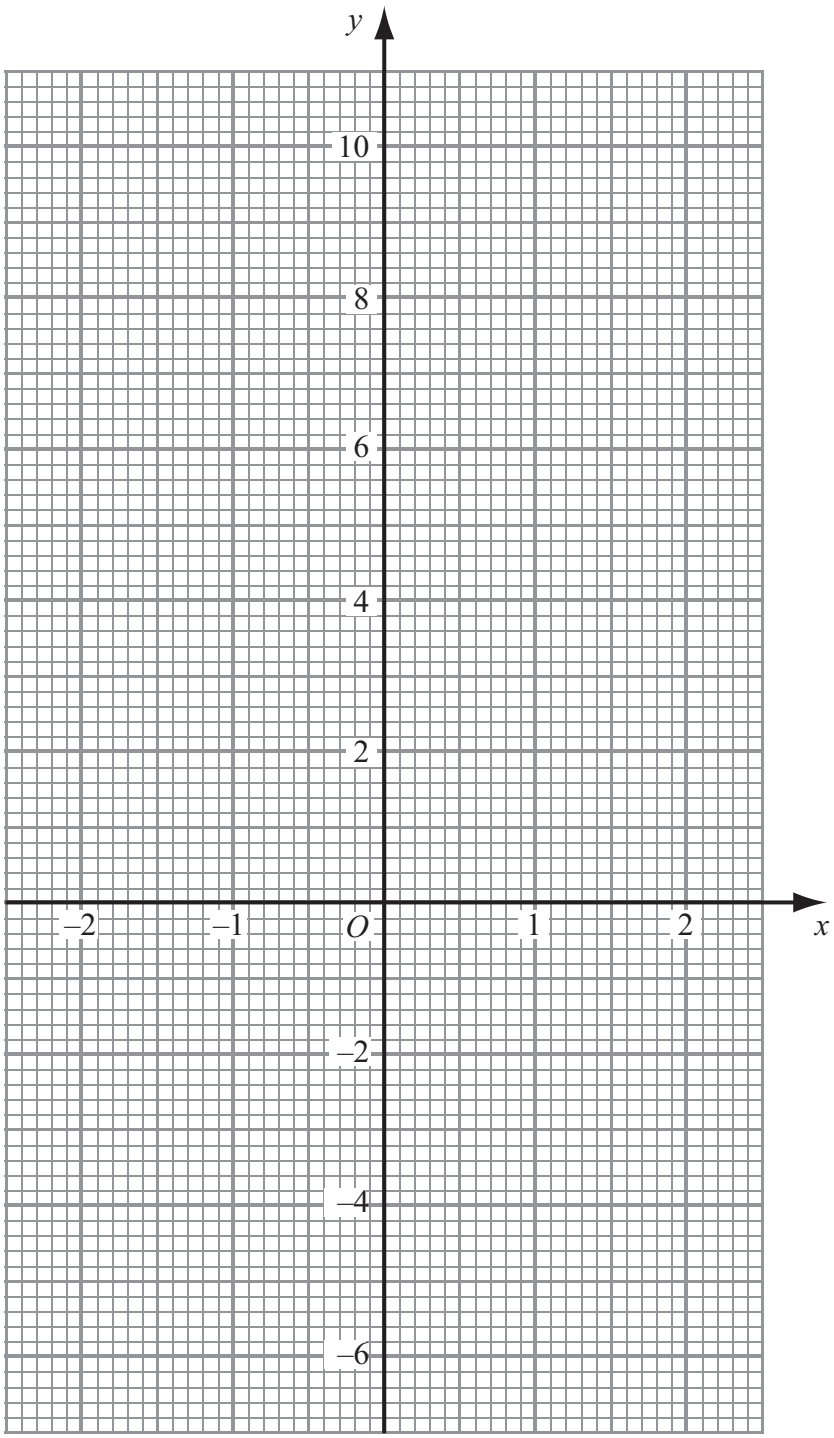
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14. (a) Complete the table of values for $y = 2 - x^3$

x	−2	−1	0	1	2
y	10			1	

(2)

(b) On the grid, draw the graph of $y = 2 - x^3$



(2)

Q14

(Total 4 marks)

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Leave blank

15. Make k the subject of the formula $t = \dfrac{k}{k-2}$

.....

Q15

(Total 4 marks)

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16.

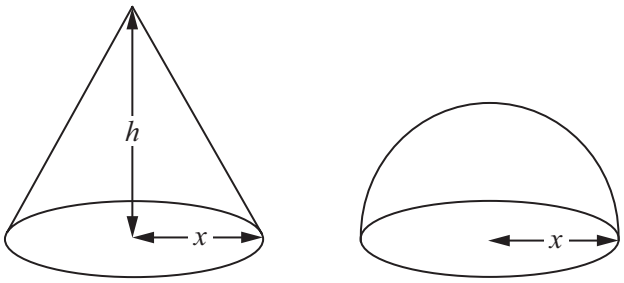


Diagram **NOT** accurately drawn

The diagram shows a solid cone and a solid hemisphere.

The cone has a base of radius x cm and a height of h cm.
The hemisphere has a base of radius x cm.
The surface area of the cone is equal to the surface area of the hemisphere.

Find an expression for h in terms of x.

.....

Q16

(Total 4 marks)

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Leave blank

17.

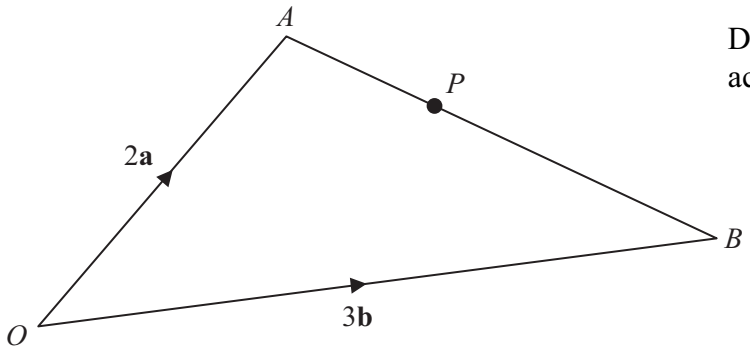


Diagram **NOT** accurately drawn

OAB is a triangle.

$\overrightarrow{OA} = 2\mathbf{a}$

$\overrightarrow{OB} = 3\mathbf{b}$

(a) Find $\overrightarrow{AB}$ in terms of **a** and **b**.

$\overrightarrow{AB}$ = ...

(1)

P is the point on AB such that $AP : PB = 2 : 3$

(b) Show that $\overrightarrow{OP}$ is parallel to the vector **a** + **b**.

(3) **Q17**

(Total 4 marks)

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Leave blank

18. Solve the equation $\frac{x}{2} - \frac{2}{x+1} = 1$

.....

Q18

(Total 4 marks)

TOTAL FOR PAPER: 60 MARKS

END

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Centre No.						Paper Reference								Surname	Initial(s)
Candidate No.						5	3	8	4	H	/	1	4	H	Signature

Paper Reference(s)

5384H/14H

Examiner's use only

Team Leader's use only

Edexcel GCSE

Mathematics (Modular) – 2381

Paper 14 (Calculator)

Higher Tier

Unit 3



Friday 10 June 2011 – Morning

Time: 1 hour 10 minutes

Materials required for examination
Ruler graduated in centimetres and millimetres, protractor, compasses, pen, HB pencil, eraser, calculator.
Tracing paper may be used.

Items included with question papers
Nil

Instructions to Candidates

In the boxes above, write your centre number, candidate number, your surname, initials and signature.
Check that you have the correct question paper.
Answer ALL the questions. Write your answers in the spaces provided in this question paper.
You must NOT write on the formulae page.
Anything you write on the formulae page will gain NO credit.
If you need more space to complete your answer to any question, use additional answer sheets.

Information for Candidates

The marks for individual questions and the parts of questions are shown in round brackets: e.g. **(2)**.
There are 17 questions in this question paper. The total mark for this paper is 60.
There are 16 pages in this question paper. Any blank pages are indicated.
Calculators may be used.
If your calculator does not have a π button, take the value of π to be 3.142 unless the question instructs otherwise.

Advice to Candidates

Show all stages in any calculations.
Work steadily through the paper. Do not spend too long on one question.
If you cannot answer a question, leave it and attempt the next one.
Return at the end to those you have left out.

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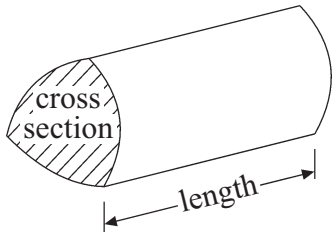
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GCSE Mathematics

Formulae: Higher Tier

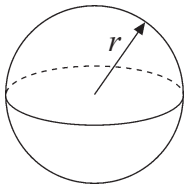
You must not write on this formulae page.
Anything you write on this formulae page will gain NO credit.

Volume of a prism = area of cross section × length



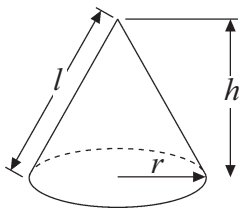
Volume of sphere $= \frac{4}{3}\pi r^3$

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

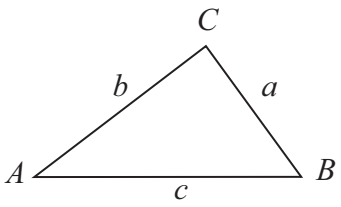


Volume of cone $= \frac{1}{3}\pi r^2 h$

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



In any triangle ABC



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

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

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

The Quadratic Equation

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

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

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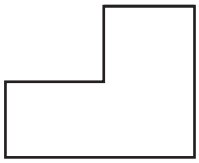
Answer ALL SEVENTEEN questions.

Write your answers in the spaces provided.

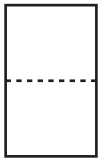
You must write down all the stages in your working.

1. Here are the front elevation, side elevation and plan of a 3-D shape.

Front elevation



Side elevation





Plan

In the space below, draw a sketch of the 3-D shape.

Q1

(Total 2 marks)

Leave blank

2. Bob has 120 beads.
The beads are either red or green.

Bob gives $\frac{3}{4}$ of the beads to his friend.

$\frac{2}{3}$ of the beads Bob now has are red.

Work out how many green beads Bob now has.

.....

Q2

(Total 3 marks)

3. The diagram shows 3 sides of a regular polygon.

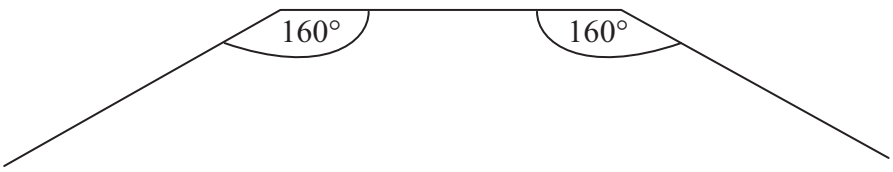


Diagram **NOT** accurately drawn

Each interior angle of the regular polygon is 160°.

Work out the number of sides of the regular polygon.

.....

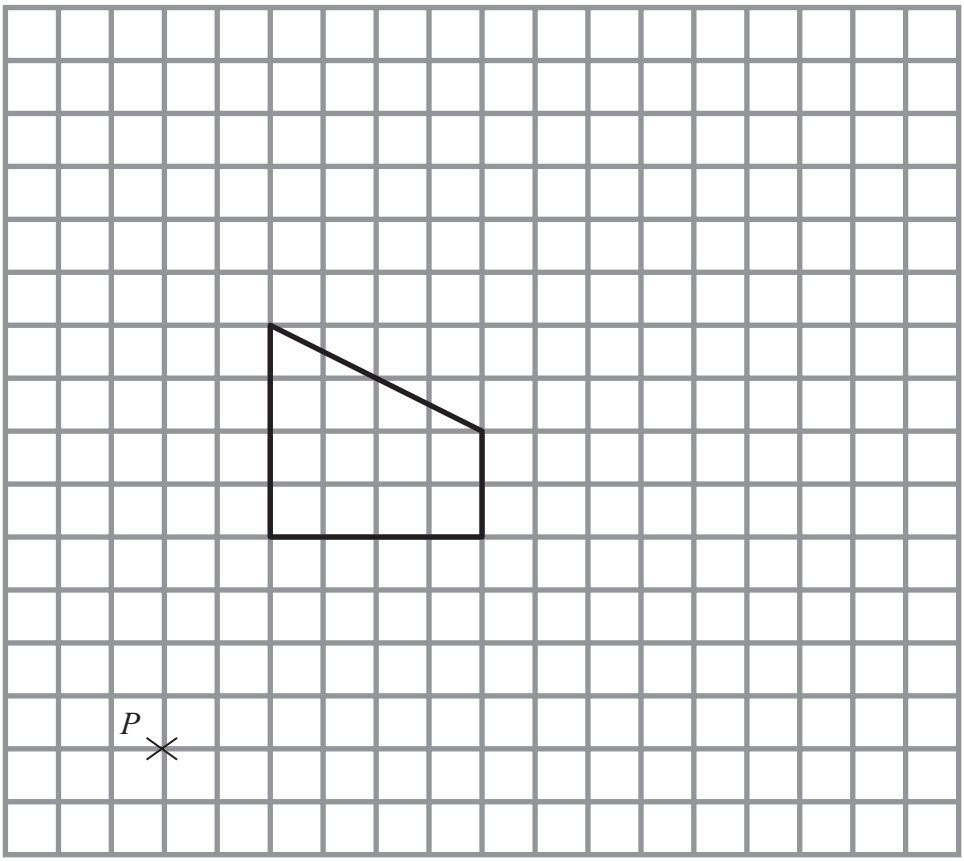
Q3

(Total 3 marks)

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Leave blank

4.



On the grid, enlarge the shape with a scale factor of $\frac{1}{2}$, centre *P*.

Q4

(Total 3 marks)

5. In 2009, Stephen's annual salary was £27 120
In 2010, Stephen's annual salary increased by 2.5%.

In 2009, Michelle earned £2100 each month.
In 2010, Michelle received an increase of £200 per month.

In 2010, who had the larger salary, Stephen or Michelle?
You must show all of your working.

.....

Q5

(Total 4 marks)

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Leave blank

6. The equation

$$x^3 + 5x = 67$$

has a solution between 3 and 4

Use a trial and improvement method to find this solution.
Give your answer correct to one decimal place.
You must show **ALL** your working.

x = ...

Q6

(Total 4 marks)

7. Use your calculator to work out the value of

$$\frac{2.4 \times 1.6^2}{20.4 - 1.2}$$

.....

Q7

(Total 2 marks)

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Leave blank

8. The diagram shows a circular pond with a path around it.

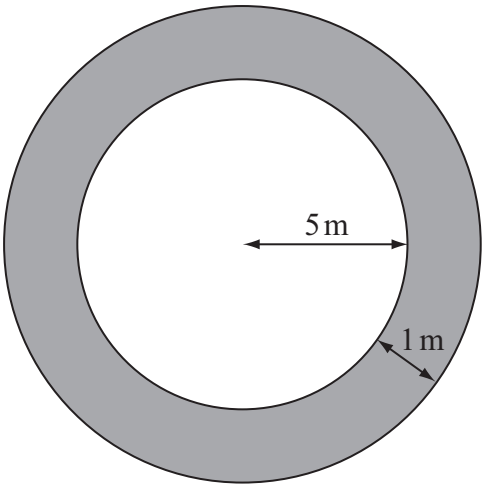


Diagram **NOT** accurately drawn

The pond has a radius of 5 m.
The path has a width of 1 m.

Work out the area of the path.
Give your answer correct to 3 significant figures.

..... m^2 **Q8**

(Total 3 marks)

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Leave blank

9. (a) Solve $4(2x - 1) = 3x - 19$

x = ...

(3)

(b) Solve $\frac{y+4}{5} = 30$

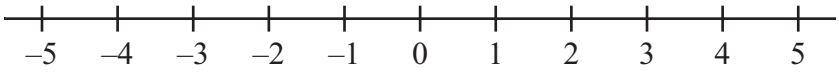
y = ...

(2) **Q9**

(Total 5 marks)

10. (a) $x > -3$

Show this inequality on the number line.



(2)

(b) Solve the inequality $7y + 36 \leqslant 8$

.....

(2) **Q10**

(Total 4 marks)

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11. The diagram shows two similar triangles.

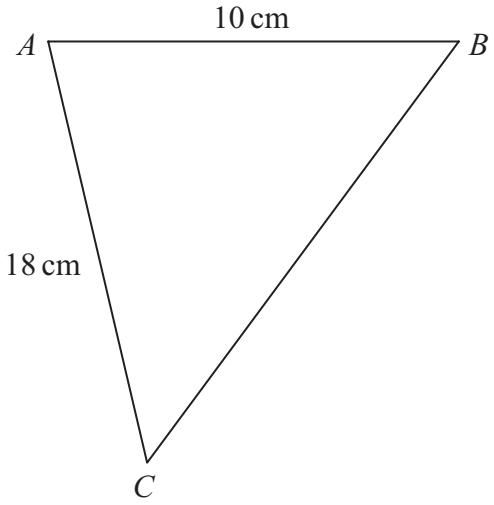
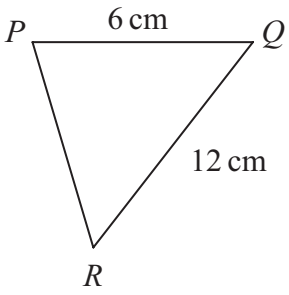


Diagram **NOT** accurately drawn



In triangle ABC, $AB = 10$ cm and $AC = 18$ cm.
In triangle PQR, $PQ = 6$ cm and $QR = 12$ cm.

Angle ABC = angle PQR.
Angle CAB = angle RPQ.

(a) Calculate the length of BC.

..... cm
(2)

(b) Calculate the length of PR.

..... cm
(2)

Q11

(Total 4 marks)

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Leave blank

12. (a) Find the gradient of the straight line with equation $2x - 3y = 12$

.....

(2)

(b) Prove that the straight line with equation $2y = 10 - 3x$
is perpendicular to the straight line with equation $2x - 3y = 12$

(2) **Q12**

(Total 4 marks)

13.

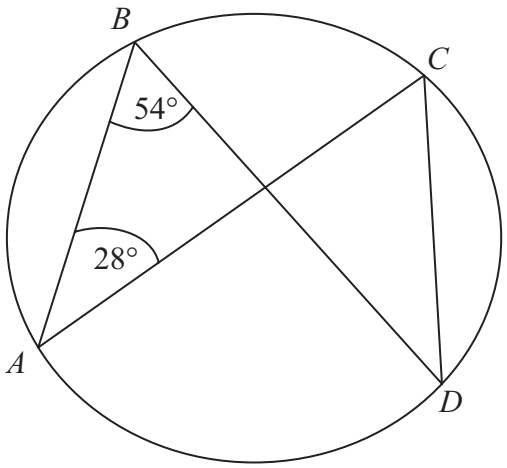


Diagram **NOT** accurately drawn

A, *B*, *C* and *D* are points on the circumference of a circle.
Angle *ABD* = 54°.
Angle *BAC* = 28°.

(i) Find the size of angle *ACD*.

..... °

(ii) Give a reason for your answer.

.....

..... **Q13**

(Total 2 marks)

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Leave blank

14. The surface area of Earth is 510 072 000 km^2.
The surface area of Jupiter is 6.21795×10^{10} km^2.

The surface area of Jupiter is greater than the surface area of Earth.
How many times greater?
Give your answer in standard form.

.....

Q14

(Total 3 marks)

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Leave blank

15. The diagram below shows a large rectangle of length $(2x + 6)$ cm and width x cm.

A smaller rectangle of length x cm and width 3 cm is cut out and removed.

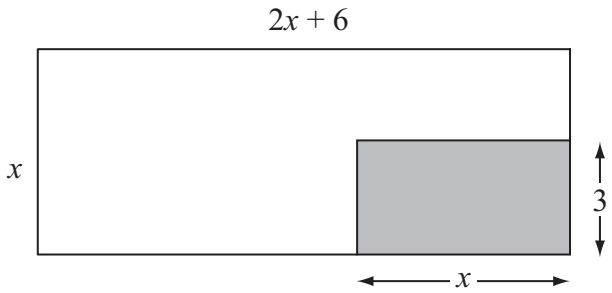


Diagram **NOT** accurately drawn

The area of the shape that is left is 100 cm^2.

(a) Show that $2x^2 + 3x - 100 = 0$

(3)

(b) Calculate the length of the smaller rectangle.
Give your answer correct to 3 significant figures.

..... cm

(4)

Q15

(Total 7 marks)

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Leave blank

16.

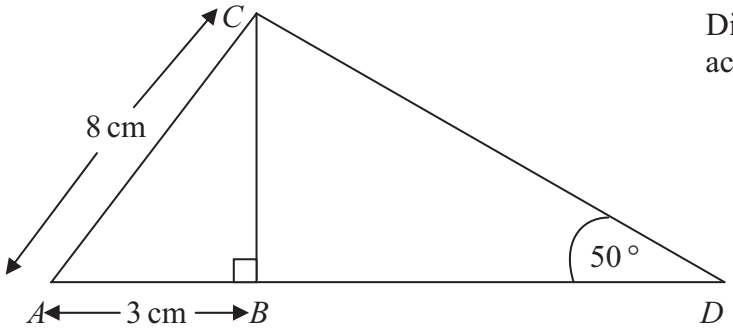


Diagram **NOT** accurately drawn

$AC = 8$ cm.
$AB = 3$ cm.
Angle ABC = angle $CBD = 90°$.
Angle $BDC = 50°$.

Calculate the length of CD.
Give your answer correct to 3 significant figures.

..... cm

Q16

(Total 4 marks)

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Leave blank

17. The voltage V of an electronic circuit is given by the formula

$$V = IR$$

where I is the current in amps
and R is the resistance in ohms.

Given that $V = 218$ correct to 3 significant figures,
$R = 12.6$ correct to 3 significant figures,

calculate the lower bound of I.

.....

Q17

(Total 3 marks)

TOTAL FOR PAPER: 60 MARKS

END

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Mark Scheme (Results)

June 2011

GCSE Mathematics (5384H)
Paper 13H (Non-Calculator)

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ft – follow through
SC: special case
dep – dependent

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Accepted with and without the “p” at the end.

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Unless otherwise stated, when any answer is given as a range (e.g 3.5 – 4.2) then this is inclusive of the end points (e.g 3.5, 4.2) and includes all numbers within the range (e.g 4, 4.1).

5384H_13H					
Question		**Working**	**Answer**	**Mark**	**Notes**
1		15 ÷ 10 80 × 1.5 60 × 1.5 30 × 1.5 36 × 1.5	120, 90, 45, 54	3	M2 for any one of 80 + 40 or 60 + 30 or 30 + 15 or 36 + 18 or 120 or 90 or 45 or 54 seen A1 cao OR M1 for 15 ÷ 10 or 3 ÷ 2 or sight of 1.5 M1(dep) for 80 × '1.5' or 60 × '1.5' or 30 × '1.5' or 36 × '1.5' A1 cao OR M1 for 80 ÷ 10 or 60 ÷ 10 or 30 ÷ 10 or 36 ÷ 10 or 8 or 6 or 3 or 3.6 M1(dep) for '8' × 15 or '6' × 15 or '3' × 15 or '3.6' × 15 A1 cao OR M1 for 80 ÷ 2 or 60 ÷ 2 or 30 ÷ 2 or 36 ÷ 2 or 40 or 30 or 15 or 18 M1(dep) for '40' × 3 or '30' × 3 or '15' × 3 or '18' × 3 A1 cao
2	(a) (b) (c)		20 18 Graph completed	1 1 2	B1 cao B1 cao B1 for line from (12.40, 20) to (1.20, 20) ±2mm B1 ft line from “(1.20, 20)” to axis after 1hr 30 mins±2mm.
3		2 × 5 + 3 × −1	7	2	M1 for 2 × 5 and 3 × −1 or 10 and -3 seen A1 cao

5384H_13H					
Question		**Working**	**Answer**	**Mark**	**Notes**
4			Shaded region	3	B1 for circular arc radius 3 cm centre P within square (±2mm) B1 for line 2 cm from PS within square (±2mm) B1cao (see overlay)
5			$\frac{1}{8}$	1	B1 for $\frac{1}{8}$ or 0.125 or 8^{-1}oe
6	(a)		Reflection	2	B2 for vertices of shape plotted at (−3, 2), (−3, 3), (−5, 3), (−6, 2.5), (−5, 2) (B1 for a reflection in any vertical or horizontal line)
	(b)		Translation; $\begin{pmatrix}-6\\-1\end{pmatrix}$	2	B1 for translation B1 for 6 left and 1 down OR $\begin{pmatrix}-6\\-1\end{pmatrix}$ Note: B0 if more than one transformation given
7		1 m² = 100 × 100 cm² 4 m² = 40 000 cm²	Decision and explanation	2	B2 for states Callum is not correct with full correct explanation (B1 for 100 × 100 or 10000 seen or for 200 × 200 or 40 000 seen or for = 0.01 × 0.01 or 0.0001 seen or for 0.04 seen)

5384H_13H					
Question		**Working**	**Answer**	**Mark**	**Notes**
8		P: T: B = 1: 3: 6 54÷10 × 6 OR e.g. T=3P B=2T So, B=2(3P)=6P P+T+B=P+3P+6P=10P P = 54÷10 = £5.40 B = 6×£5.40	32.40	3	M1 for 1 : 3 : 6 or any 3 numbers in any order in the ratio 1 : 3 : 6 M1 for 54 ÷ (1 + 3 + 6) × 6 A1 for 32.4(0) **Alternatives** M1 for 1: 3: 6 oeor P + 3P + 6P (=10P) oe egT/3 + T + 2T (=10T/3) or egB/6 + B/2 + B (=10B/6) or 5.4(0) or 16.2(0) seen M1 for 54 ÷ 10 × 6 or [54 ÷ " 10/3 "] × 2 or 54 ÷ " 10/6 "oe A1 for 32.4(0) OR M1 for a partial decomposition of £54 in ratio 1:3:6 e.g.(£)5 +(£)15 + (£)30 (=£50) M1 for a decomposition of the remaining amount in the ratio 1:3:6, e.g. 40(p) + 120(p) + 240(p) (=400p) A1 for 32.4(0)

5384H_13H					
Question		**Working**	**Answer**	**Mark**	**Notes**
9		1500 − 250 $\frac{1250}{250}\times\frac{100}{1}$	500	3	B1 for "1500 − 250" or difference of 1250 seen M1 for $\frac{"1500-250"}{250}\times\frac{100}{1}$ A1 cao OR M1 for $\frac{1500}{250}\times\frac{100}{1}$ A1 for 600 B1 ft for "600" – 100
10		$4^2 + 3^2$ $\sqrt{25}$	5	3	M1 for sight of "6 − 2"(=4) and "6 − 3"(=3) M1 (dep) for "4"^{2} + "3"^{2} A1 cao

5384H_13H					
Question		**Working**	**Answer**	**Mark**	**Notes**
11	(a)	$\frac{1\times2}{5\times3}$	$\frac{2}{15}$	1	B1 for $\frac{2}{15}$ oe
	(b)	$(2-1)+\frac{5}{15}-\frac{6}{15}$ or $\frac{35}{15}-\frac{21}{15}$ or | | 1 | 3 | | 2 | | 6 | | 5 | 5 | 15 | | | 7 | 5 | | 7 | | 35 | | 3 | 21 | 15 |	$\frac{14}{15}$	3	M1 for attempt to find a common denominator or sight of $\frac{5}{15}$ or $\frac{6}{15}$ or $\frac{35}{15}$ or $\frac{21}{15}$ oe or a fully correct table A1 for sight of $\frac{5}{15}-\frac{6}{15}$ or $\frac{35}{15}-\frac{21}{15}$ oe A1 for $\frac{14}{15}$ oe Alternative M1 for 0.33(3…) or 0.4 or 2.33(3…) or 1.4 A1 for 0.33(3…) – 0.4 or 2.33(3…) –1.4 A1 for 0.93(recurring)

5384H_13H					
Question		**Working**	**Answer**	**Mark**	**Notes**
12	(a)		9	1	B1 cao
	(b)		$\frac{1}{8}$	1	B1 for $\frac{1}{8}$ oe
	(c)		t^6	1	B1 cao
	(d)	$\frac{n^4}{n^5}$	n^{-1}	2	M1 for $\frac{n^4}{n^{3+2}}$ or $\frac{n^4}{n^5}$ or $\frac{n^{4-3}}{n^2}$ or $\frac{n^1}{n^2}$ or $\frac{n^{4-2}}{n^3}$ or $\frac{n^2}{n^3}$ or a correct second step following an incorrectfirst step eg $\frac{n^4}{n^6}=n^{-2}$ oe A1 for n^{-1} (allow $\frac{1}{n}$)

5384H_13H					
Question		**Working**	**Answer**	**Mark**	**Notes**
13		$4x + y = 10$ $4x - 6y = 38$ $7y = -28$, $y = -4$ $4x - 4 = 10$, $x = 3.5$ OR $12x + 3y = 30$ $2x - 3y = 19$ + $14x = 49$, $x = 3.5$ $7 - 3y = 19$, $y = -4$ Alternative $y = 10 - 4x$ $2x - 3(10 - 4x) = 19$ $14x - 30 = 19$; $x = 3.5$ $4 \times 3.5 + y = 10$; $y = -4$	$x = 3.5$ $y = -4$	3	M1 for full method to eliminate x or y, allow one error in calculation M1(dep) for substitution of one variable into one of the equations, or by appropriate method after starting again A1 for 3.5 and -4 oe Alternative M1 for full method to rearrange and substitute to eliminate x or y, allow one error in calculation M1(dep) for substitution of one variable into one of the equations, or by appropriate method after starting again A1 for 3.5 and -4 oe
14	(a)		(10), 3, 2, (1), −6	2	B2 for all 3 correct values (B1 for 2 correct values)
	(b)			2	B2 for fully correct graph OR B1 ft for 5 points plotted correctly ± 2mm B1 for smooth curve drawn through points provided B1 awarded in (a)

5384H_13H					
Question		**Working**	**Answer**	**Mark**	**Notes**
15		$t(k-2) = tk - 2t = k$ $tk - \text{k} = 2t$ $k(t-1) = 2t$ $k = \frac{2t}{t-1}$	$k = \frac{2t}{t-1}$	4	M1 for attempt to multiply LHS by (k– 2) or sight of $t(k-2)$ or $tk - 2t$ or $tk - 2$ (ignore RHS) M1 for attempt to subtract k from LHS or sight of $tk - k$ (ignore RHS) or attempt to subtract tk to give $-2t = k - kt$(ignore LHS) M1 for attempt to factorise for k e.g. $k(t-1)$ or $k(1-t)$ A1 for $k = \frac{2t}{t-1}$ or $k = \frac{-2t}{1-t}$ oe
16		$\pi xl = 2\pi x^2$ $h^2 + x^2 = 4x^2$ $h^2 = 3x^2$ Alternative $\pi x\sqrt{h^2 + x^2} = 2\pi x^2$ $\sqrt{h^2 + x^2} = 2x$ $h^2 + x^2 = 4x^2$ $h^2 = 3x^2$	$\sqrt{3}x$	4	B1 for curved surface area of one of the shapes eg πxl or$2\pi x^2$ M1 for attempt to equate surface areas eg $\pi xl = 2\pi x^2$ or $l = 2x$ M1 for attempt to connect h and x using Pythagoras theorem eg $h^2 + x^2 = 4x^2$ A1 for $\sqrt{3}x$ or $\sqrt{3x^2}$ Alternative B1 $h^2 + x^2 = l^2$ oe M1 for attempt to equate surface areas eg $\pi x\sqrt{h^2 + x^2} = 2\pi x^2$ oe M1 (dep) for attempt to square both sides of their formula eg $h^2 + x^2 = 4x^2$ A1 for $\sqrt{3}x$ or $\sqrt{3x^2}$ If no marks awarded, SC B1 for attempt to equate surface areas in terms of r rather than x

5384H_13H					
Question		**Working**	**Answer**	**Mark**	**Notes**
17	(a)	**AB** = **AO** + **OB**	$-2\mathbf{a} + 3\mathbf{b}$	1	B1 for $-2\mathbf{a} + 3\mathbf{b}$ or $3\mathbf{b} - 2\mathbf{a}$oe
	(b)	**OP** = $2\mathbf{a} + \frac{2}{5}(3\mathbf{b} - 2\mathbf{a})$ $= \frac{6}{5}\mathbf{a} + \frac{6}{5}\mathbf{b}$ $= \frac{6}{5}(\mathbf{a} + \mathbf{b})$ Parallel	$\frac{6}{5}(\mathbf{a} + \mathbf{b})$ is parallel to $\mathbf{a} + \mathbf{b}$	3	M1 for $2\mathbf{a} \pm \frac{2}{5}$('$3\mathbf{b} - 2\mathbf{a}$') OR $3\mathbf{b} \pm \frac{3}{5}$('$2\mathbf{a} - 3\mathbf{b}$') A1 for $\frac{6}{5}\mathbf{a} + \frac{6}{5}\mathbf{b}$oe A1 for $\frac{6}{5}(\mathbf{a} + \mathbf{b})$ is parallel to $\mathbf{a} + \mathbf{b}$oe
18		$\frac{x\times2(x+1)}{2} - \frac{2\times2(x+1)}{x+1} = 1\times2(x+1)$ $x(x+1) - 4 = 2(x+1)$ $x^2 + x - 4 = 2x + 2$ $x^2 - x - 6 = 0$ $(x-3)(x+2) = 0$	$x = 3, -2$	4	M1 for an attempt to multiply one term of the equation by 2 or $(x + 1)$or $2(x+1)$ with or without cancelling or attempt to write LHS with a common denominator M1for attempt to multiply all terms by $2(x + 1)$ with or without cancelling e.g. $\frac{x\times2(x+1)}{2} - \frac{2\times2(x+1)}{x+1} = 1\times2(x+1)$ or $x(x + 1) - 4 = 2(x + 1)$ A1 for$x^2 + x - 4 = 2x + 2$ or $x^2 - x - 6 = 0$ A1 cao for 3 and – 2

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Mark Scheme (Results)

June 2011

GCSE Mathematics (5384H)
Paper 14H

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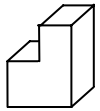
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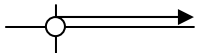
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5384H_14H					
Question		**Working**	**Answer**	**Mark**	**Notes**
1				2	B2 for a clear sketch of a prism with an 'L' shaped cross-section [B1 for a sketch of a cuboid or a sketch of a 2D 'L' with an attempt to make it 3D with additional lines]
2		$\frac{3}{4} \times 120 = 90$ $120 - 90 = 30$ left $30 \div 3$	10	3	M1 for $\frac{3}{4} \times 120$ oe or 90 or $\frac{1}{4} \times 120$ oe or 30 M1(dep) for '30' – (2 × '30' ÷ 3) oe or $\frac{1}{3} \times$ '30' oe A1 cao
3		$360 \div (180 - 160)$ $360 \div 20$ OR $180(n - 2) = 160n$ $180n - 360 = 160n$ $180n - 160n = 360$ $20n = 360$	18	3	M1 for 180 – 160 or 20 seen M1 (dep) for 360 ÷ "20" A1 cao OR M1 for $180(n - 2) = 160n$ oe M1 for fully correct method to isolate terms in n A1 cao
4			Correct enlargement, s.f. ½ centre P	3	B3 for correct enlargement s.f. ½ centre P (B2 for correct enlargement s.f. ½ incorrect centre or correct enlargement s.f. ≠ ½ or 1, centre P) (B1 for 2 sides correctly enlarged s.f. ½ or correct enlargement s.f. ≠ ½ or 1, incorrect centre)

5384H_14H					
Question		**Working**	**Answer**	**Mark**	**Notes**
5		**<u>Monthly</u>:** 27120 × 2.5 ÷ 100 = 678 27120 + 678 = 27 798 **S:** 27798 ÷ 12 = 2316.50 **M:** 2100 + 200 = 2300 **<u>Monthly</u>:** 27120 ÷ 12 = 2260 2260 × 2.5 ÷ 100 = 56.50 **S:** 2260 + 56.5 = 2316.50 **M:** 2100 + 200 = 2300 **<u>Yearly</u>:** 27120 × 2.5 ÷ 100 = 678 **S:** 27120 + 678 = 27 798 **M:** (2100 + 200) × 12 = 27 600 **<u>Yearly</u>:** 27120 × 2.5 ÷ 100 = 678 **S:** 27120 + 678 = 27 798 **M:** 2300 + 2500 + 2700 + ... + 4500 = 40 800	Stephen with correct working	4	M2 27120 × 1.025 oe or 27798 seen (M1 27120 × 2.5 ÷ 100 oe or 678 seen) M1 '27798' ÷ 12 oe A1 Stephen and **2316.5(0)** and **2300** OR M1 27120 ÷ 12 oe or 2260 seen M2 for '2260' × 1.025 or 2316.5(0) seen (M1 '2260' × 2.5 ÷ 100 oe or 56.5(0) seen) A1 Stephen and **2316.5(0)** and **2300** OR M2 27120 × 1.025 oe or 27798 seen (M1 27120 × 2.5 ÷ 100 oe or 678 seen) M1 (2100 + 200) × 12 oe or 27600 seen A1 Stephen and **27 798** and **27 600** OR M2 27120 × 1.025 oe or 27798 seen (M1 27120 × 2.5 ÷ 100 oe or 678 seen) M1 2300 + 2500 + 2700 + ...+ 4500 or 40 800 seen A1 Michelle and **27 798** and **40 800** NOTE: : If Michelle's 2010 salary is calculated assuming an additional month or 4 weeks in a month then give full credit throughout; with Michelle earning the larger salary

5384H_14H

Question		Working	Answer	Mark	Notes
6		<table><tr><td>x</td><td>$x^3 + 5x$</td></tr><tr><td>3</td><td>42</td></tr><tr><td>3.4</td><td>56.(304)</td></tr><tr><td>3.5</td><td>60.(375)</td></tr><tr><td>3.6</td><td>64.(656)</td></tr><tr><td>3.7</td><td>69.(153)</td></tr><tr><td>3.8</td><td>73.(872)</td></tr><tr><td>3.9</td><td>78.(819)</td></tr><tr><td>4</td><td>84</td></tr><tr><td>3.65</td><td>66.8(77)</td></tr><tr><td>3.66</td><td>67.3(27)</td></tr><tr><td>3.67</td><td>67.7(80)</td></tr><tr><td>3.68</td><td>68.2(36)</td></tr><tr><td>3.69</td><td>68.6(93)</td></tr></table>	3.7	4	B2 for a trial between 3 and 4 exclusive (B1 for a trial between 3 and 4 inclusive) B1 for a different trial of $3.65 \leq x < 3.7$ B1 (dep on at least one previous B1) for 3.7 NB For values of x to 1 dp trials should be evaluated to at least 2 s.f., and for values of x to 2 dp truncated or rounded to 1 dp NB No working scores 0 marks
7		$\frac{2.4 \times 2.56}{19.2}$ $\frac{6.144}{19.2}$ $= 6.144 \div 19.2$	0.32 or $\frac{8}{25}$	2	B2 for 0.32 or $\frac{8}{25}$ (B1 for 6.144 or $\frac{768}{125}$ or $6\frac{18}{125}$ seen)
8		$\pi(6)^2 - \pi(5)^2$ $= 113(.0973\ldots) - 78.5(398\ldots)$ $= 34.55751919$	34.5 – 34.6	3	M1 for $\pi(6)^2$ oe or $\pi(5)^2$ oe or 113… or 78.5… M1 for $\pi(6)^2 - \pi(5)^2$ oe A1 for 34.5 – 34.6

5384H_14H					
Question		**Working**	**Answer**	**Mark**	**Notes**
9	(a)	$8x - 4 = 3x - 19$ $8x - 3x = -19 + 4$ $5x = -15$	-3	3	B1 for $8x - 4$ or $\frac{3x}{4}$ □ $\frac{19}{4}$ seen M1 for a fully correct process which results in the terms in x or the constant terms on one side of an equation from '$ax + b$' = '$cx + d$', $b \neq 0$ A1 cao
	(b)	$y + 4 = 150$ $y = 150 - 4$	146	2	M1 for $y + 4 = 30 \times 5$ oe or $\frac{y}{5} = 30 - \frac{4}{5}$ oe A1 for 146
10	(a)		 -3	2	B2 for an open circle at -3 with either an arrow to the right or a line segment from -3 to at least 5, ±2 mm (B1 for an open circle at -3 with either an arrow to the left or an incorrect line segment OR a closed circle or no circle at -3 with either an arrow to the right or a line segment from -3 to at least 5) ±2 mm
	(b)	$7y \leq 8 - 36$ $7y \leq -28$	$y \leq -4$	2	M1 for a correct process to isolate $7y$ in an inequality or $y = -4$ or $y < -4$ A1 cao
11	(a)	$BC \div 12 = 10 \div 6$ $BC = 10 \times 12 \div 6$	20	2	M1 for $12 \div 6$ or $6 \div 12$ or $10 \div 6$ or $6 \div 10$ oe or a decimal equivalent including 1.6, 1.66..., 1.67 or 1.7 A1 for 19.9 – 20.4
	(b)	$PR \div 18 = 6 \div 10$ $PR = 6 \times 18 \div 10$	10.8	2	M1 for $6 \times 18 \div 10$ oe or $18 \div$ (1.6, 1.66..., 1.67, 1.7) or a complete method ft from '20' or $12 \div$ '20' $\times 18$ A1 for 10.8

5384H_14H					
Question		**Working**	**Answer**	**Mark**	**Notes**
12	(a)	$3y = 2x - 12$ $y = \frac{2}{3}x - 4$	$\frac{2}{3}$	2	M1 for $y = \frac{2}{3}x + c$ or $y = \frac{2x+3}{3}$ A1 for $\frac{2}{3}$ oe or 0.66... or 0.67 SC: B1 for reading a 'correct' gradient from an incorrect rearranged equation if M0 scored
	(b)	Gradient of $2y = 10 - 3x$ is -1.5 $-1.5 \times \frac{2}{3} = -1$	Proof	2	B1 for both gradients identified (can f.t. from (a)) B1 indep for product of gradients -1 eg one gradient = – reciprocal of other gradient S.C. B1 for a 'proof' using a correct diagram, if B0 scored
13	(i)		54	2	B1 cao
	(ii)		reason		B1 for angles in the same segment (are equal) oe. or angles subtended at the circumference by the same chord (or arc) (are equal)
14		$(6.21795 \times 10^{10}) \div 510\,072\,000$ $= 121.9(033783\ldots)$	$1.21 \times 10^2 - 1.22 \times 10^2$	3	M1 for SA Jupiter ÷ SA Earth eg $(6.21795 \times 10^{10}) \div 510\,072\,000$ oe eg 6 200 000 ÷ 51 OR digits 121... or digits 122 A1 for 121– 122 A1 for $1.21 \times 10^2 - 1.22 \times 10^2$

5384H_14H					
Question		**Working**	**Answer**	**Mark**	**Notes**
15	(a)	$x(2x + 6) - 3x = 100$ $2x^2 + 6x - 3x = 100$ $2x^2 + 3x - 100 = 0$	Proof	3	M1 for a correct algebraic expression for the area of at least 1 rectangle eg $x(2x + 6)$, $3x$, $2x^2 + 6x$ M1 for a correct algebraic expression for the area of the unshaded region eg $x(2x + 6) - 3x$ (= 100) or eg $x(2x + 6) = 100 + 3x$ A1 for completion from eg $2x^2 + 6x - 3x = 100$
	(b)	$a = 2 \quad b = 3 \quad c = -100$ $x = \frac{-3 \pm \sqrt{3^2 - 4(2)(-100)}}{2(2)}$ $= \frac{-3 \pm \sqrt{809}}{4}$ $= 6.36073\ldots$ or $-7.86073\ldots$ **OR** $x^2 + \frac{3}{2}x - 50 = 0$ $(x + \frac{3}{4})^2 - (\frac{3}{4})^2 - 50 = 0$ $x + \frac{3}{4} = \pm\sqrt{(\frac{3}{4})^2 + 50}$ $x = 6.36073\ldots$ or $-7.86073\ldots$	6.36 to 6.365	4	M1 for correct substitution in formula allow sign errors in b and c M1 for reduction to $\frac{-3 \pm \sqrt{809}}{4}$ or $\frac{-3 + \sqrt{809}}{4}\ \frac{-3+\sqrt{809}}{4}$ A1 for 6.36 to 6.365 or –7.86 to –7.865 A1 for 6.36 to 6.365 OR M1 for $(x + \frac{3}{4})^2$ M1 for $-\frac{3}{4} \pm \sqrt{\frac{9+800}{16}}$ or $-\frac{3}{4} + \sqrt{\frac{9+800}{16}}$ A1 for 6.36 to 6.365 or – –7.86 to –7.865 A1 for 6.36 to 6.365 SC: T&I scores 1 mark for 1 correct root or 4 marks for correct length

5384H_14H					
Question		**Working**	**Answer**	**Mark**	**Notes**
16		$BC = \sqrt{8^2 - 3^2}$ $= \sqrt{55}$ $= 7.416198\ldots$ $CD = 7.416\ldots \div \sin 50°$ $= 7.416... \div 0.766...$ $= 9.6811\ldots.$	9.67 – 9.69	4	M1 for $8^2 - 3^2$ oe M1 (dep) for $\sqrt{8^2 - 3^2}$ oe or 7.41… or 7.42 seen OR M1 for $A = \cos^{-1} 3/8$ (= 67.98°) M1 (dep) for 3 × tan '67.98' or 7.41... or 7.42 seen M1 for '7.4…' ÷ sin 50 A1 for 9.67 – 9.69 SC B3 for –28.2 to –28.3 (using rad) or 10.4 to 10.5 (using grad)
17		LB of 218 = 217.5 UB of 12.6 = 12.65 217.5 ÷ 12.65 = 17.1936…	17.1936....	3	B1 for 217.5 or 12.65 or 12.6499... or 12.649 seen M1 for LB of 218 ÷ UB of 12.6 where 217.5 ≤ LB < 218 and 12.6 < UB ≤ 12.65 A1 for 17.19 – 17.2

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Centre No.						Paper Reference								Surname	Initial(s)
Candidate No.						5	3	8	4	H	/	1	3	H	Signature

Paper Reference(s)

5384H/13H

Examiner's use only

Team Leader's use only

Edexcel GCSE

Mathematics (Modular) – 2381

Paper 13 (Non-Calculator)

Higher Tier



Unit 3

Tuesday 9 November 2010 – Morning

Time: 1 hour 10 minutes

Materials required for examination
Ruler graduated in centimetres and millimetres, protractor, compasses, pen, HB pencil, eraser.
Tracing paper may be used.

Items included with question papers
Nil

Instructions to Candidates

In the boxes above, write your centre number, candidate number, your surname, initials and signature.
Check that you have the correct question paper.
Answer ALL the questions. Write your answers in the spaces provided in this question paper.
You must NOT write on the formulae page.
Anything you write on the formulae page will gain NO credit.
If you need more space to complete your answer to any question, use additional answer sheets.

Information for Candidates

The marks for individual questions and the parts of questions are shown in round brackets: e.g. **(2)**.
There are 17 questions in this question paper. The total mark for this paper is 60.
There are 16 pages in this question paper. Any blank pages are indicated.
Calculators must not be used.

Advice to Candidates

Show all stages in any calculations.
Work steadily through the paper. Do not spend too long on one question.
If you cannot answer a question, leave it and attempt the next one.
Return at the end to those you have left out.

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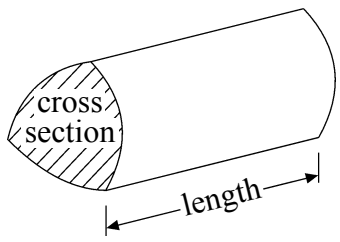
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GCSE Mathematics 2381

Formulae: Higher Tier

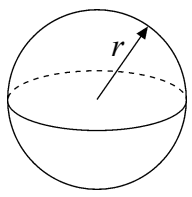
You must not write on this formulae page.
Anything you write on this formulae page will gain NO credit.

Volume of a prism = area of cross section × length



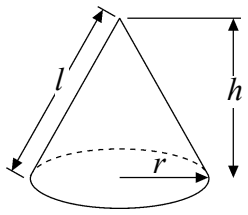
Volume of sphere $= \frac{4}{3}\pi r^3$

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

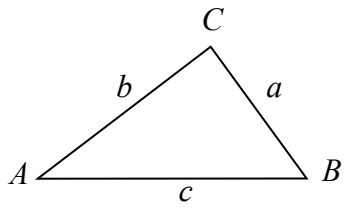


Volume of cone $= \frac{1}{3}\pi r^2 h$

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



In any triangle ABC



The Quadratic Equation

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

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

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

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

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

N 3 7 7 3 3 A 0 2 1 6

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Leave blank

Answer ALL SEVENTEEN questions.

Write your answers in the spaces provided.

You must write down all stages in your working.

You must NOT use a calculator.

1. A box contains milk chocolates and dark chocolates only.
The number of milk chocolates to the number of dark chocolates is in the ratio 2 : 1

There are 24 milk chocolates.

Work out the total number of chocolates.

.....

(Total 2 marks)

Q1

2. Steve makes a scale drawing of his school hall.

He uses a scale of 1 : 200

On the scale drawing the length of the school hall is 15 cm.

What is the real length of the school hall?

.....

(Total 2 marks)

Q2

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3. Here is a sketch of a triangle.

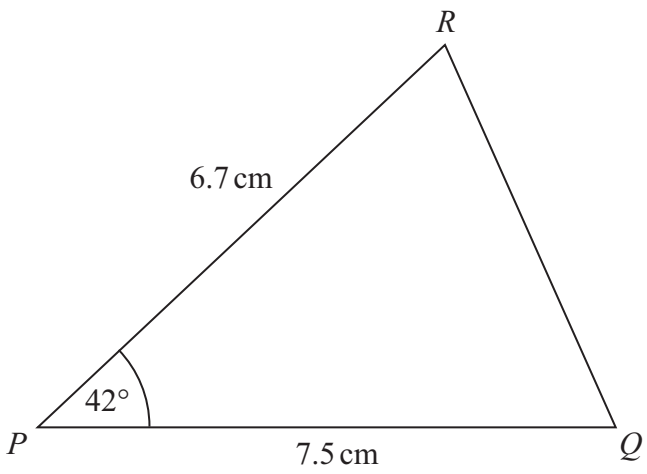


Diagram **NOT** accurately drawn

In the space below, draw an accurate diagram of triangle *PQR*.
The line *PQ* has been drawn for you.

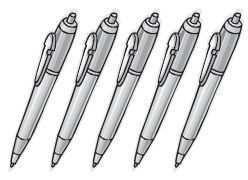
P *Q*

Q3

(Total 2 marks)

4. Yasmin can buy 5 identical pens for 75p.

How much should she pay for 3 of these pens?



..... p

Q4

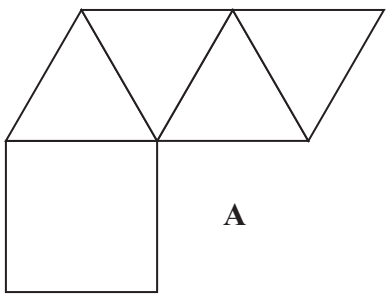
(Total 2 marks)

N 3 7 7 3 3 A 0 4 1 6

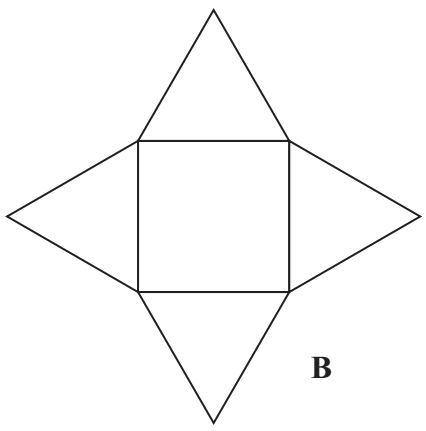
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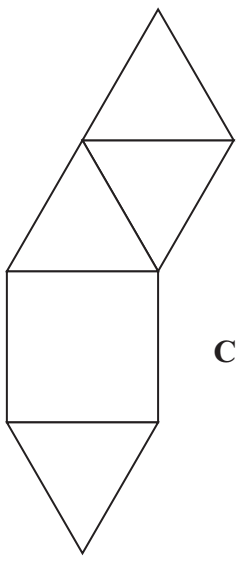
5. Here are 5 diagrams.



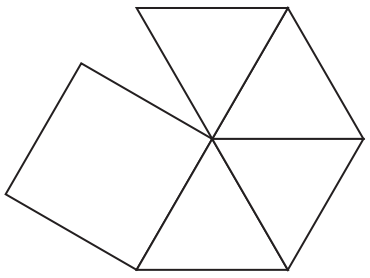
A



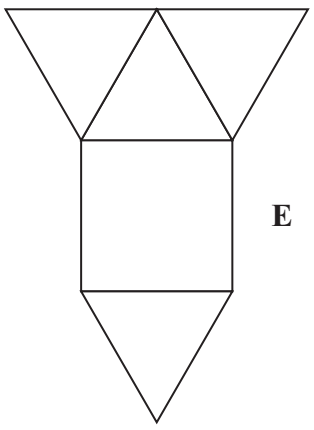
B



C



D



E

Two of these diagrams show a net for a square-based pyramid.

Write down the letter of each of these two diagrams.

..... and **Q5**

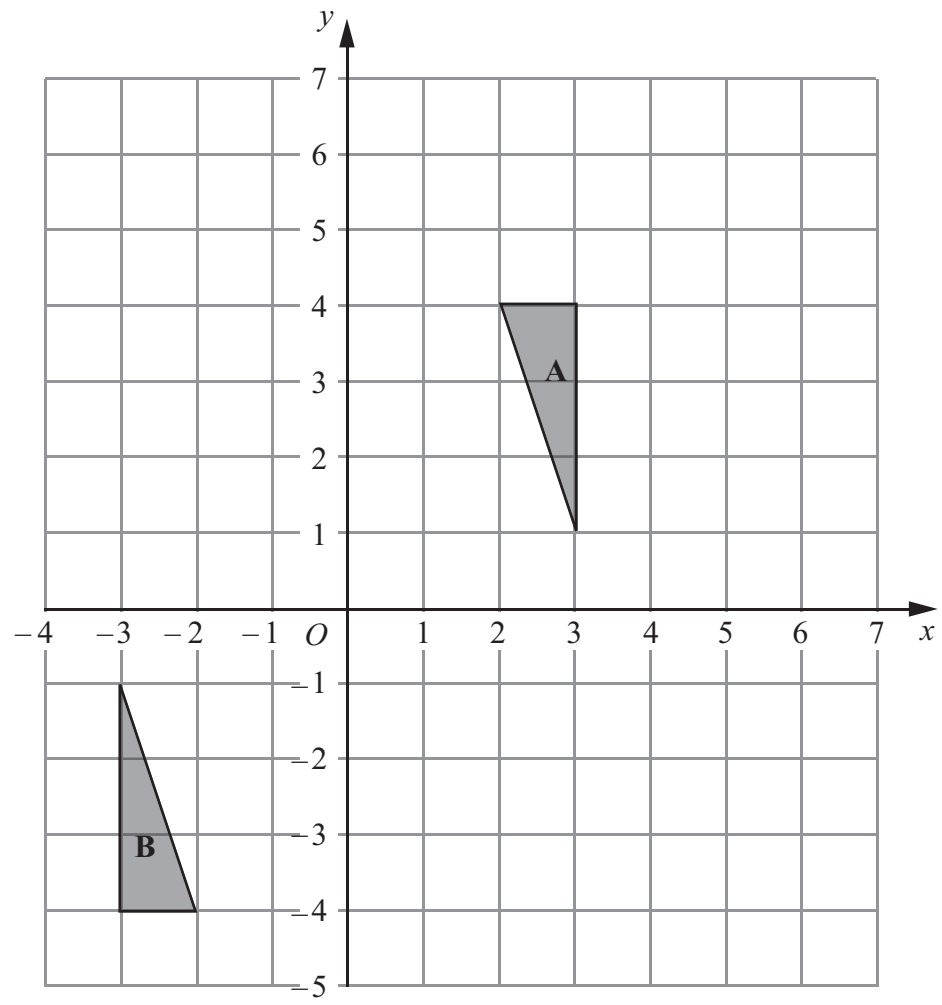
(Total 2 marks)

N 3 7 7 3 3 A 0 5 1 6

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6.



Triangle **A** and triangle **B** are drawn on the grid.

(a) Describe fully the single transformation which maps triangle **A** onto triangle **B**.

.....

.....

(3)

(b) Translate triangle **A** by the vector $\begin{pmatrix} 3 \\ 0 \end{pmatrix}$.

Label the new triangle **C**.

(1)

(Total 4 marks)

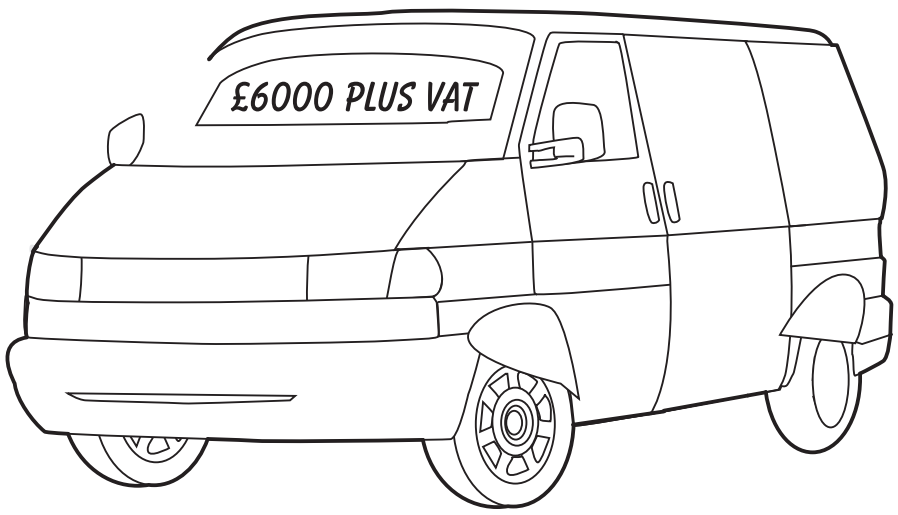
Q6

N 3 7 7 3 3 A 0 6 1 6

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7. Lizzie bought a van.
The total cost of the van was £6000 **plus** VAT at $17\frac{1}{2}$ %.



Lizzie paid £3000 when she got the van.
She paid the rest of the total cost of the van in 10 equal monthly payments.

Work out the amount of each monthly payment.

£ .....

(Total 6 marks)

Q7

N 3 7 7 3 3 A 0 7 1 6

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8.

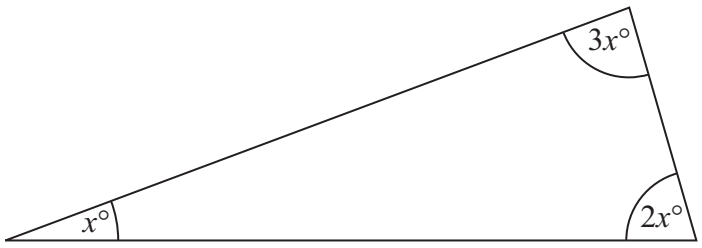


Diagram **NOT** accurately drawn

The three angles of this triangle are $x°$, $2x°$ and $3x°$.

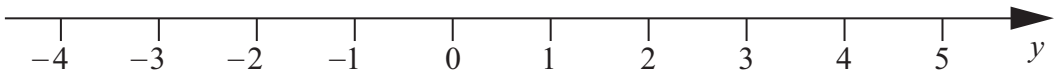
Find the size of the angle marked $x°$.

.....

(Total 2 marks)

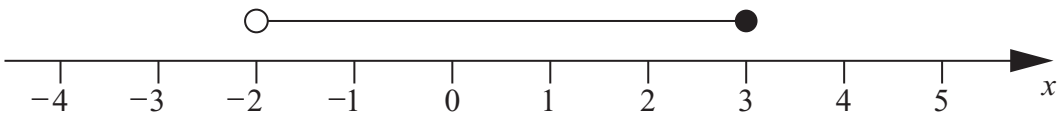
Q8

9. (a) On the number line below mark the inequality $-1 < y < 4$



(1)

(b) Here is an inequality, in x, shown on a number line.



Write down the inequality.

.....

(2)

(c) Solve the inequality $3t + 5 > 17$

.....

(2)

Q9

(Total 5 marks)

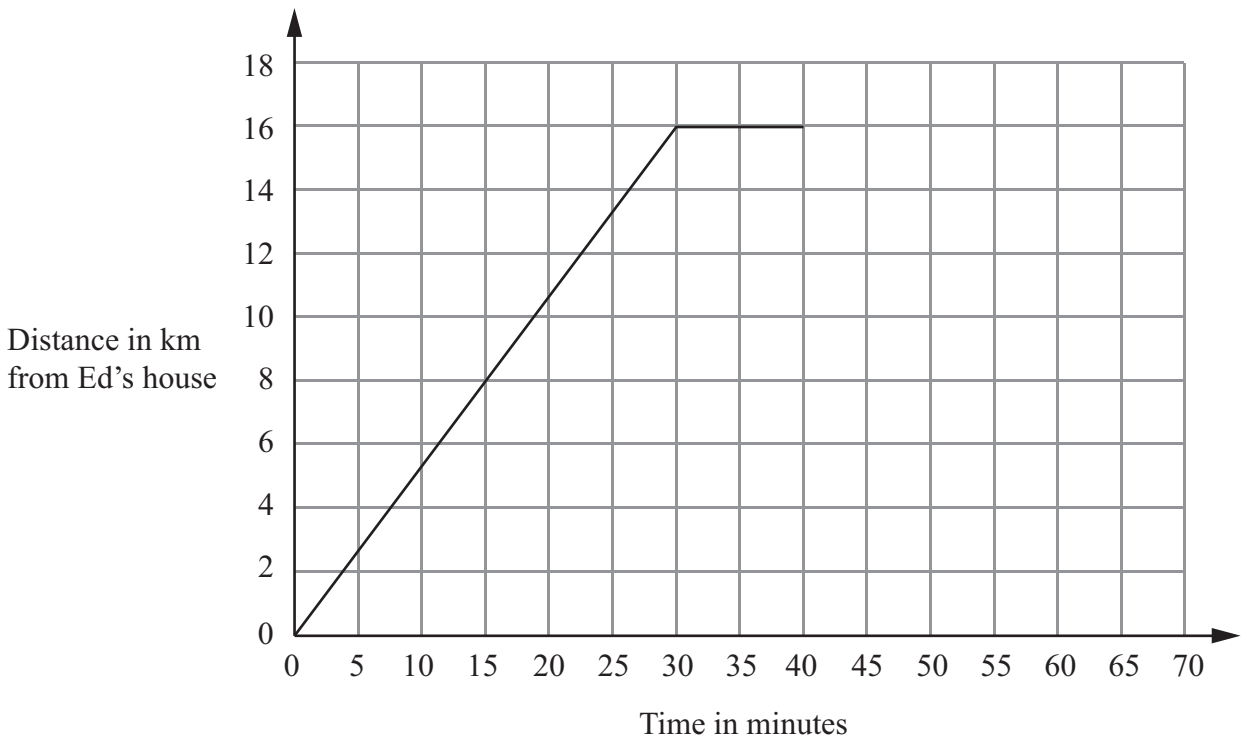
N 3 7 7 3 3 A 0 8 1 6

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Leave blank

10. Ed went from his home to the shops and then home again.

Here is part of a travel graph for Ed's journey.



(a) Work out the average speed for the first 30 minutes of Ed's journey.

Give your answer in km per hour.

..... km per hour
(2)

Ed was at the shops for 10 minutes.
He then went home.

His journey home took 25 minutes.

(b) Complete the travel graph.

(1)

(Total 3 marks)

Q10

N 3 7 7 3 3 A 0 9 1 6

Turn over

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Leave blank

11. (a) Work out $2\frac{17}{20} - 1\frac{2}{5}$

.....

(3)

(b) Work out $2\frac{2}{3} \times 1\frac{3}{4}$

.....

(3)

Q11

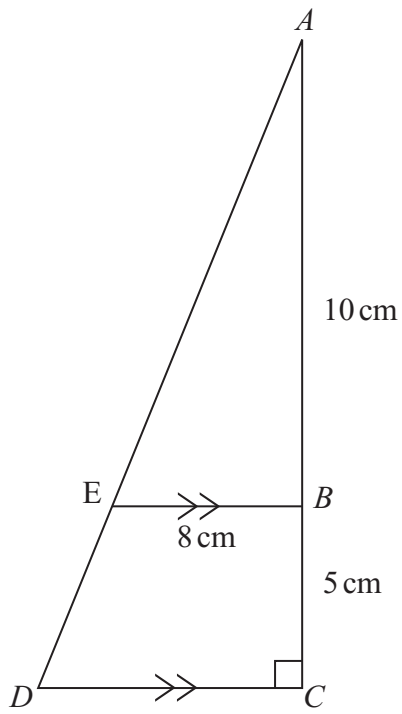
(Total 6 marks)

N 3 7 7 3 3 A 0 1 0 1 6

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12.



ABC and *AED* are straight lines.
EB is parallel to *DC*.
Angle *ACD* = 90°.

AB = 10 cm.
BC = 5 cm.
EB = 8 cm.

(a) Work out the length of *DC*.

.....cm
(2)

(b) Work out the area of the trapezium *EBCD*.

.....cm^2
(2)

(Total 4 marks)

Q12

N 3 7 7 3 3 A 0 1 1 1 6

Turn over

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Leave blank

13. Solve the simultaneous equations

$$6x + 2y = -3$$
$$4x - 3y = 11$$

$x =$ ....., $y =$ .....

Q13

(Total 4 marks)

14. Solve $x^2 + 8x - 9 = 0$

.....

Q14

(Total 3 marks)

N 3 7 7 3 3 A 0 1 2 1 6

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Leave blank

15. P is inversely proportional to V.

When $V = 8$, $P = 5$

(a) Find a formula for P in terms of V.

$P =$ .....

(3)

(b) Calculate the value of P when $V = 2$

.....

(1)

Q15

(Total 4 marks)

N 3 7 7 3 3 A 0 1 3 1 6

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16.

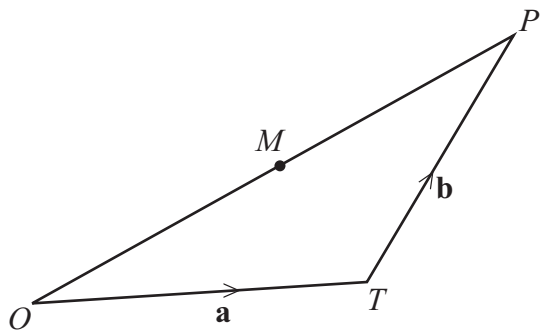


Diagram **NOT** accurately drawn

OPT is a triangle.
M is the midpoint of *OP*.

$\overrightarrow{OT} = \mathbf{a}$

$\overrightarrow{TP} = \mathbf{b}$

(a) Express $\overrightarrow{OM}$ in terms of **a** and **b**.

$\overrightarrow{OM}$ = ...

(2)

(b) Express $\overrightarrow{TM}$ in terms of **a** and **b**.
Give your answer in its simplest form.

$\overrightarrow{TM}$ = ...

(2)

Q16

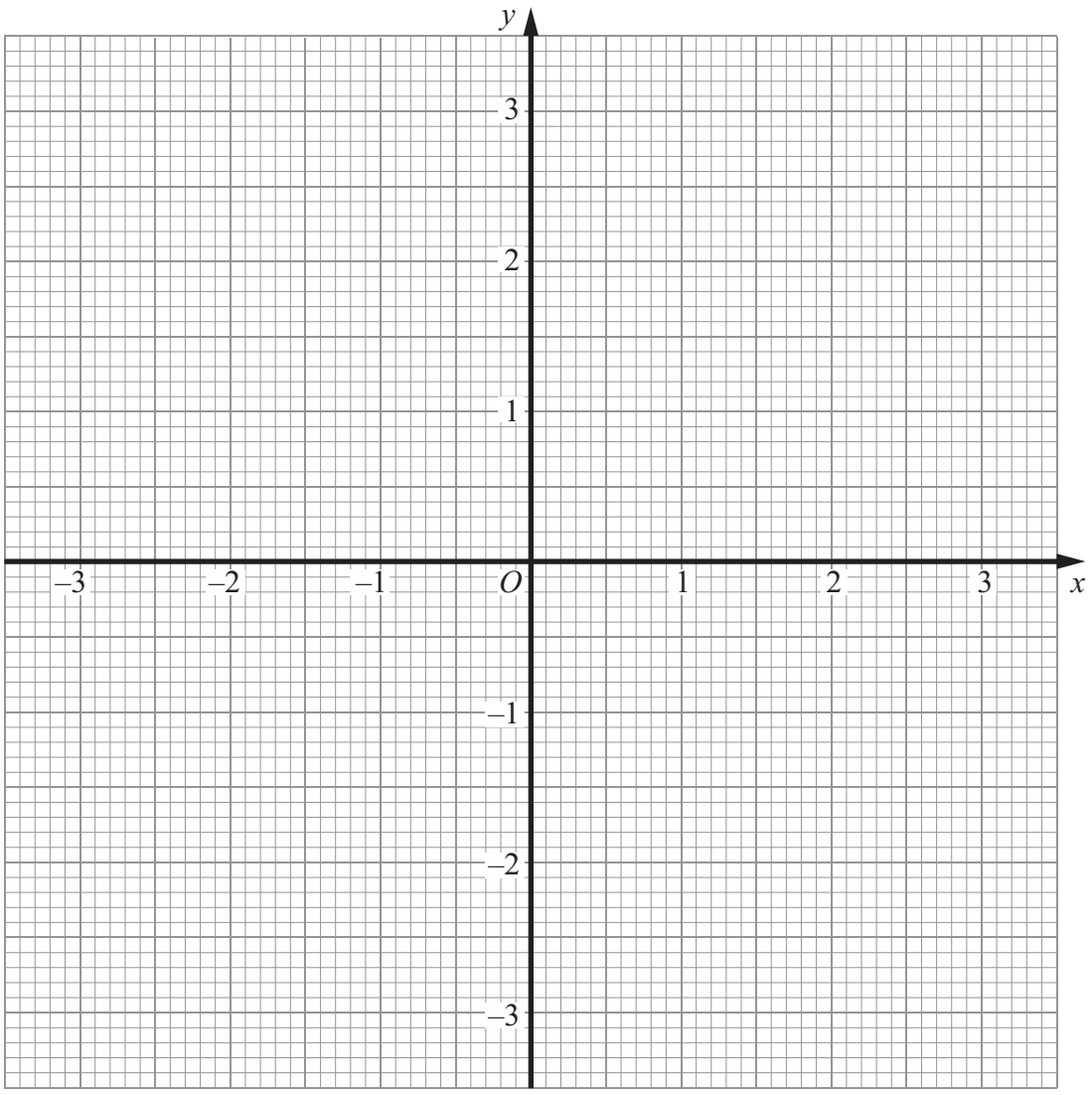
(Total 4 marks)

N 3 7 7 3 3 A 0 1 4 1 6

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17. (a) Construct the graph of $x^2 + y^2 = 9$



(2)

(b) By drawing the line $x + y = 1$ on the grid, solve the equations

$x^2 + y^2 = 9$
$x + y = 1$

$x =$ ..... , $y =$ .....

or $x =$ ..... , $y =$ .....

(3)

Q17

(Total 5 marks)

TOTAL FOR PAPER: 60 MARKS

END

N 3 7 7 3 3 A 0 1 5 1 6

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N 3 7 7 3 3 A 0 1 6 1 6

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Centre No.						Paper Reference								Surname	Initial(s)
Candidate No.						5	3	8	4	H	/	1	4	H	Signature

Paper Reference(s)

5384H/14H

Examiner's use only

Team Leader's use only

Edexcel GCSE

Mathematics (Modular) – 2381

Paper 14 (Calculator)

Higher Tier



Unit 3

Friday 12 November 2010 – Morning

Time: 1 hour 10 minutes

Materials required for examination
Ruler graduated in centimetres and millimetres, protractor, compasses, pen, HB pencil, eraser, calculator. Tracing paper may be used.

Items included with question papers
Nil

Instructions to Candidates

In the boxes above, write your centre number, candidate number, your surname, initials and signature.
Check that you have the correct question paper.
Answer ALL the questions. Write your answers in the spaces provided in this question paper.
You must NOT write on the formulae page.
Anything you write on the formulae page will gain NO credit.
If you need more space to complete your answer to any question, use additional answer sheets.

Information for Candidates

The marks for individual questions and the parts of questions are shown in round brackets: e.g. **(2)**.
There are 19 questions in this question paper. The total mark for this paper is 60.
There are 16 pages in this question paper. Any blank pages are indicated.
Calculators may be used.
If your calculator does not have a π button, take the value of π to be 3.142 unless the question instructs otherwise.

Advice to Candidates

Show all stages in any calculations.
Work steadily through the paper. Do not spend too long on one question.
If you cannot answer a question, leave it and attempt the next one.
Return at the end to those you have left out.

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N 3 7 7 3 4 A 0 1 1 6

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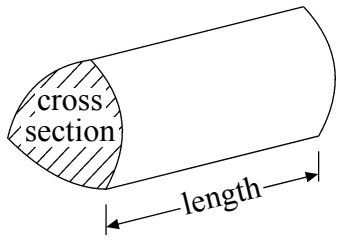
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GCSE Mathematics 2381

Formulae: Higher Tier

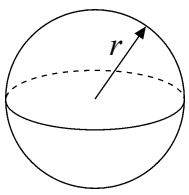
You must not write on this formulae page.
Anything you write on this formulae page will gain NO credit.

Volume of a prism = area of cross section × length



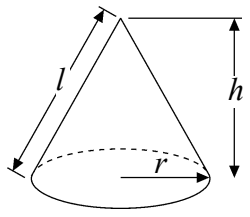
Volume of sphere $= \frac{4}{3}\pi r^3$

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

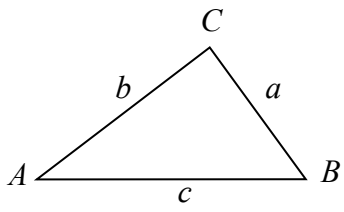


Volume of cone $= \frac{1}{3}\pi r^2 h$

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



In any triangle ABC



The Quadratic Equation

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

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

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

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

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

N 3 7 7 3 4 A 0 2 1 6

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Leave blank

Answer ALL NINETEEN questions.

Write your answers in the spaces provided.

You must write down all stages in your working.

1. Here is a list of ingredients to make melon sorbet for **6** people.

Melon Sorbet
for 6 people

800 g	melon
4	egg whites
$\frac{1}{2}$	lime
100 g	caster sugar

Terry makes melon sorbet for 18 people.

(a) Work out how much caster sugar he uses.

..... g
(2)

Hedley makes melon sorbet.
He uses 2 limes.

(b) Work out how many people he makes melon sorbet for.

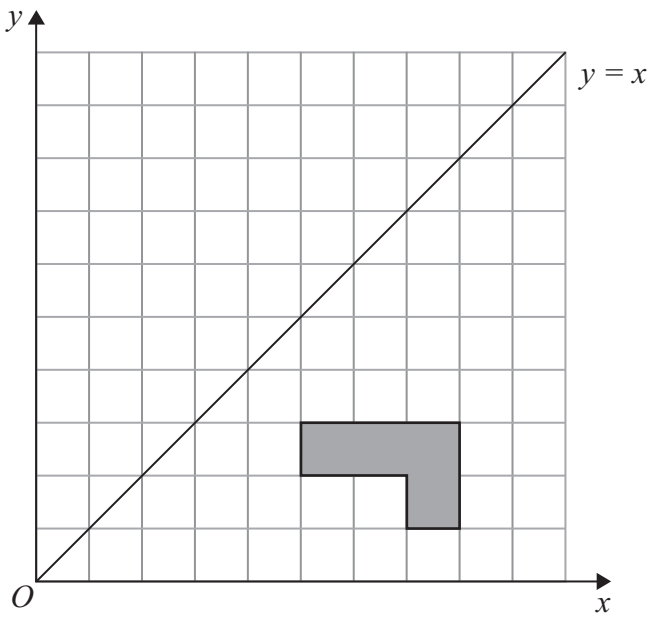
.....
(2) **Q1**

(Total 4 marks)

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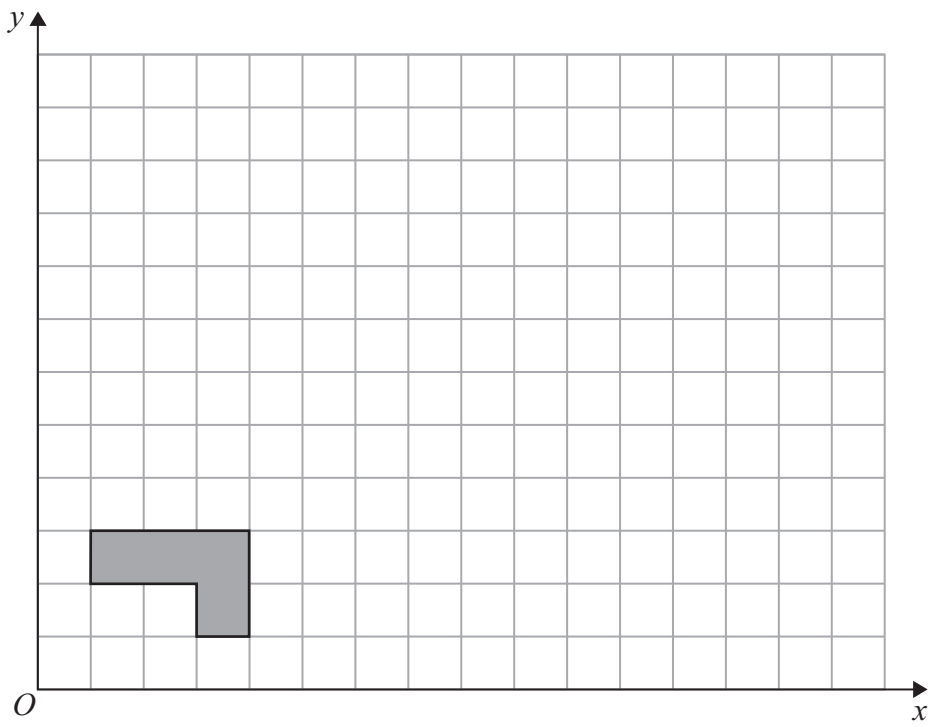
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2.



(a) Reflect the shaded shape in the line $y = x$.

(2)



(b) On the grid, enlarge the shaded shape by a scale factor of 3, centre O.

(3)

Q2

(Total 5 marks)

N 3 7 7 3 4 A 0 4 1 6

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3. Noah got 8 out of 20 in a test.

Write 8 out of 20 as a percentage.

..... %

(Total 2 marks)

Q3

4. (a) Solve $2x + 3 = 10$

$x =$ .....

(2)

(b) Simplify

(i) $c^5 \times c^6$

.....

(ii) $e^{12} \div e^4$

.....

(2)

(Total 4 marks)

Q4

N 3 7 7 3 4 A 0 5 1 6

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5. Use your calculator to work out

$$\frac{13.7 + 5.86}{2.54 \times 3.17}$$

Write down all the figures on your calculator display.
You must give your answer as a decimal.

.....

Q5

(Total 2 marks)

6. $-3 < k \leqslant 2$
k is an integer.

Write down all the possible values of k.

.....

Q6

(Total 2 marks)

N 3 7 7 3 4 A 0 6 1 6

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7. A shop sells small boxes and large boxes for storing CDs.

A small box stores x CDs.
A large box stores y CDs.

Ethan buys 7 small boxes.

(a) Write down an expression for the number of CDs he can store in the 7 small boxes.

.....

(1)

Ethan also buys 5 large boxes.

(b) Write down an expression for the number of CDs he can store in the 5 large boxes.

.....

(1)

Ethan can store a total of T CDs.

(c) Write down a formula for T in terms of x and y.

.....

(1)

Q7

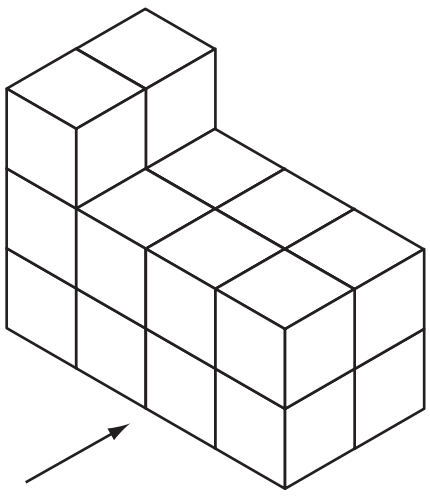
(Total 3 marks)

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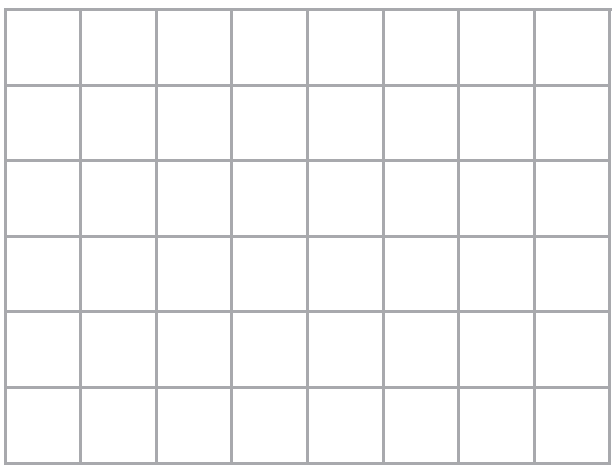
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8. The diagram shows a solid prism made from centimetre cubes.

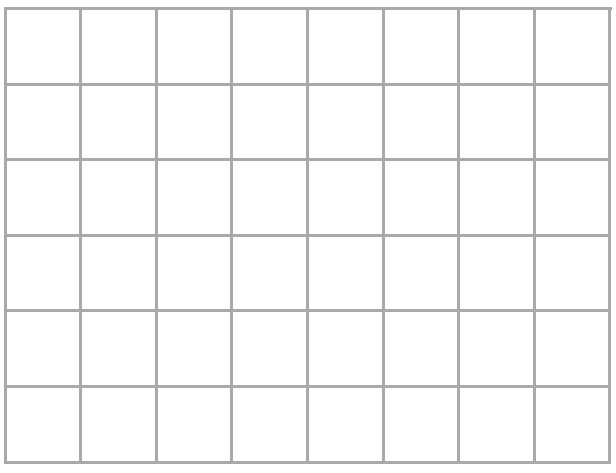


(a) On the centimetre square grid, draw the front elevation of the solid prism from the direction shown by the arrow.



(2)

(b) On the centimetre square grid below, draw the plan of the solid prism.



(2) **Q8**

(Total 4 marks)

N 3 7 7 3 4 A 0 8 1 6

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9. (a) Solve $3(k - 5) = 24$

.....

(2)

$2x^2 = 162$

(b) Find a value of x.

.....

(2)

Q9

(Total 4 marks)

10. Work out $(5.2 \times 10^{-7}) \times (2.8 \times 10^{-9})$

Give your answer in standard form.

.....

Q10

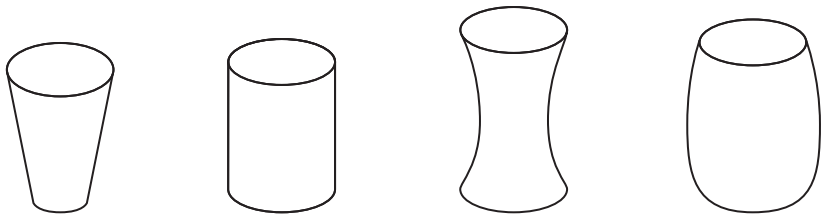
(Total 2 marks)

N 3 7 7 3 4 A 0 9 1 6

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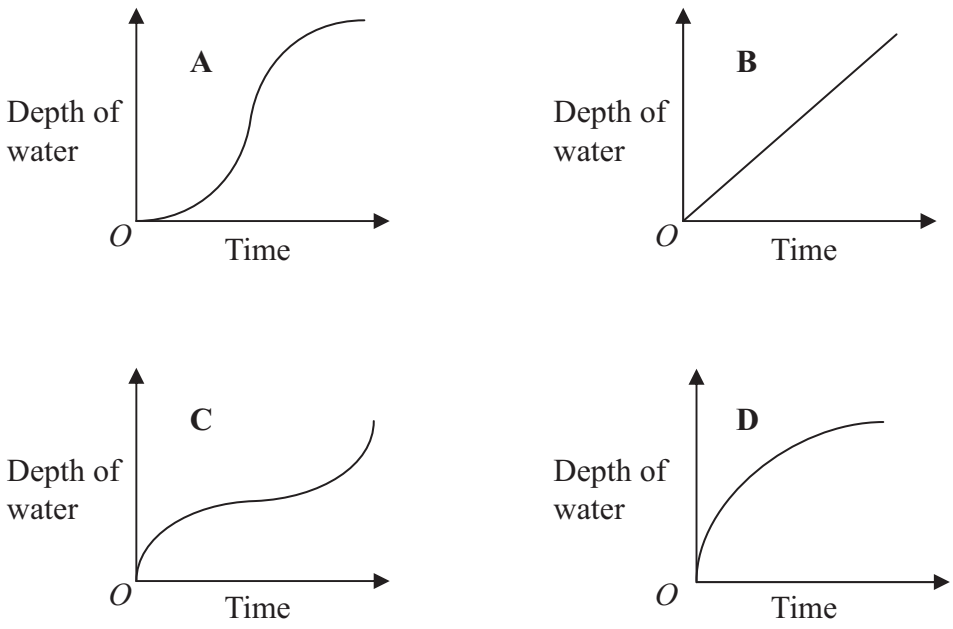
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11. Here are four containers.
Water is poured into each container at a constant rate.



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

Here are four graphs.
The graphs show how the depth of the water in each container changes with time.



Match each graph with the correct container.

A and .....

B and .....

C and .....

D and **Q11**

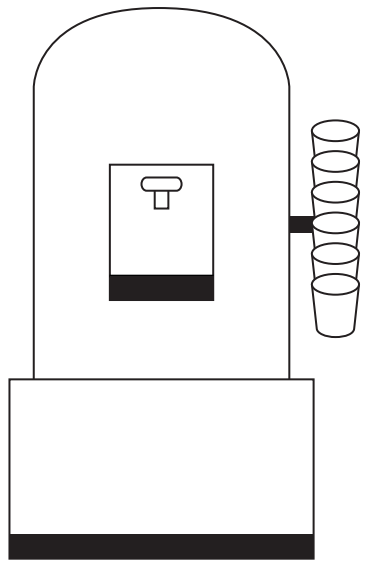
(Total 2 marks)

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12.



A water container has 19.5 litres of water in it.
A cup holds 210 m*l* of water.

At most 92 cups can be filled completely from the water container.
Explain why.
You must show all your working.

Q12

(Total 3 marks)

N 3 7 7 3 4 A 0 1 1 1 6

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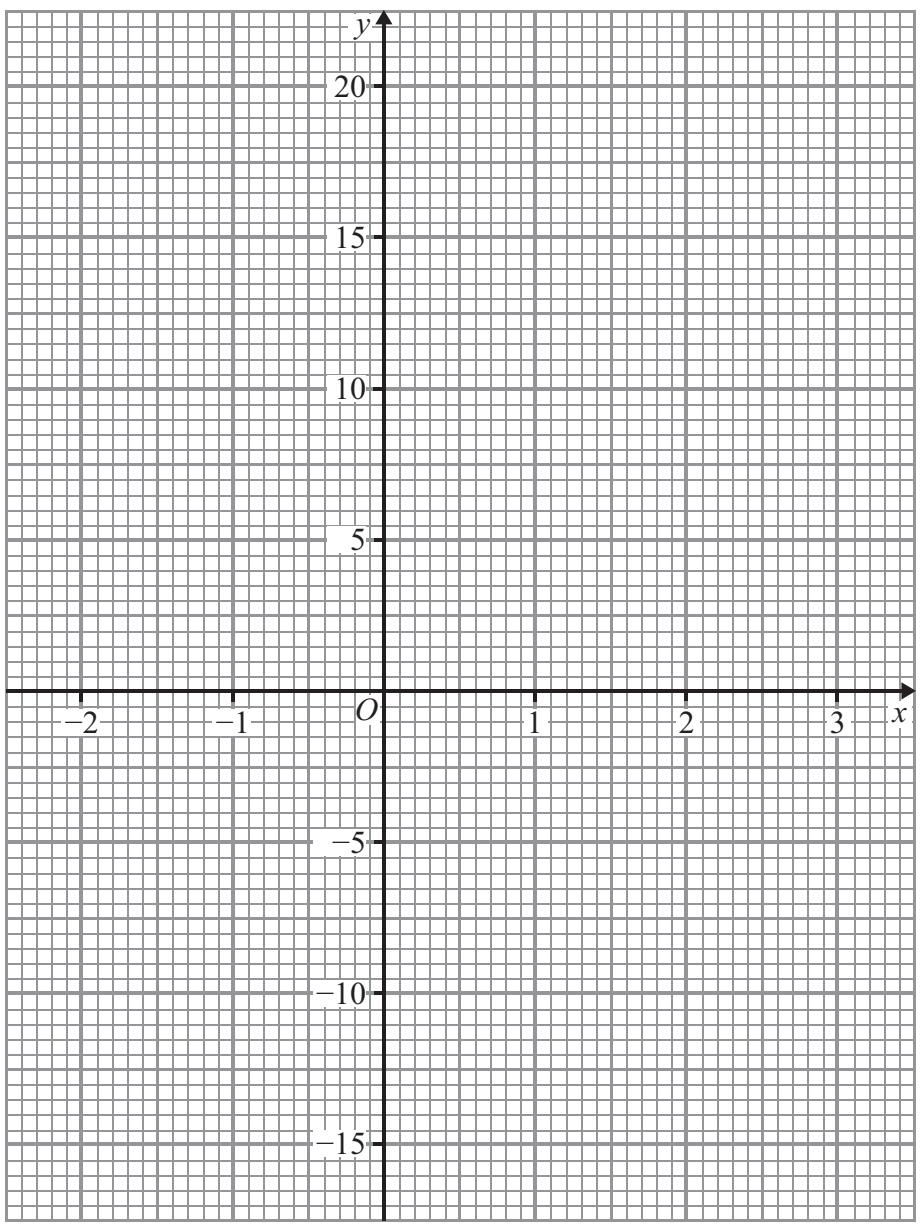
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13. (a) Complete the table of values for $y = x^3 - 7$

x	−2	−1	0	1	2	3
y		−8				20

(2)

(b) On the grid, draw the graph of $y = x^3 - 7$ for values of x from −2 to 3



(2)

Q13

(Total 4 marks)

N 3 7 7 3 4 A 0 1 2 1 6

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14.

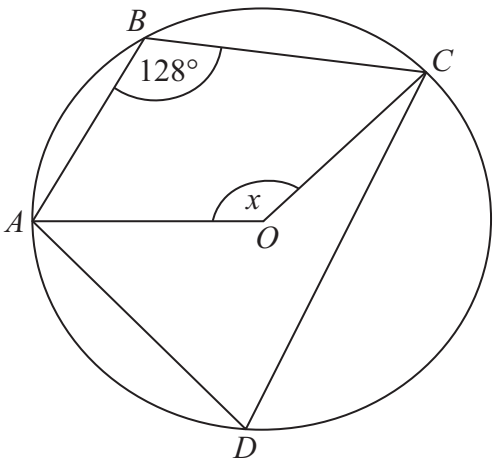


Diagram **NOT** accurately drawn

The diagram shows a circle, centre O.
A, B, C and D are points on the circumference of the circle.

Angle $ABC = 128°$.

Work out the size of the angle marked x.

..... °

Q14

(Total 2 marks)

15.

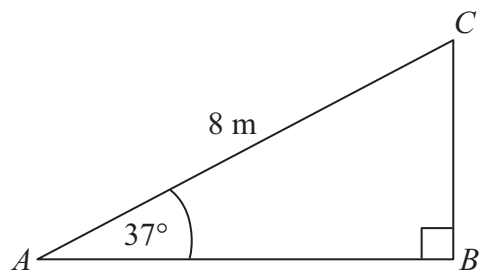


Diagram **NOT** accurately drawn

ABC is a right-angled triangle.
$AC = 8$ m.
Angle $CAB = 37°$.

Calculate the length of AB.
Give your answer correct to 3 significant figures.

..... m

Q15

(Total 3 marks)

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16.

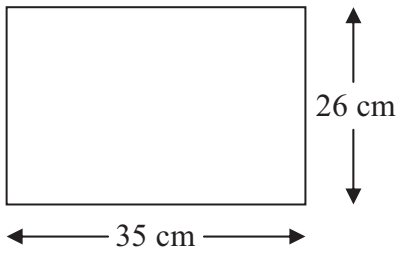


Diagram **NOT** accurately drawn

The length of the rectangle is 35 cm correct to the nearest cm.
The width of the rectangle is 26 cm correct to the nearest cm.

Calculate the upper bound for the area of the rectangle.
Write down all the figures on your calculator display.

..... cm^2 **Q16**

(Total 3 marks)

N 3 7 7 3 4 A 0 1 4 1 6

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17. Solve $\frac{x}{2}+\frac{x}{3}=8$

$x =$ .....

Q17

(Total 2 marks)

18. Make n the subject of the formula

$$a=\frac{6a-n}{3+n}$$

$n =$ .....

Q18

(Total 4 marks)

N 3 7 7 3 4 A 0 1 5 1 6

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19.

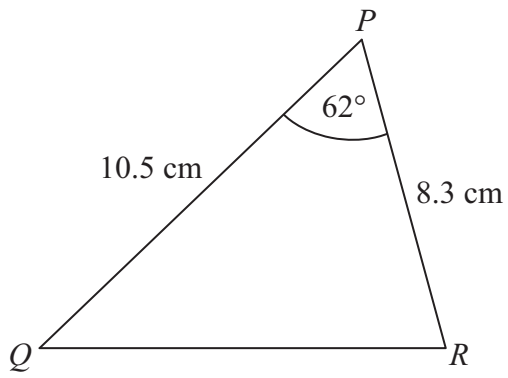


Diagram **NOT** accurately drawn

In triangle PQR,

$PQ = 10.5$ cm,
$PR = 8.3$ cm,
angle $QPR = 62°$.

(a) Calculate the area of triangle PQR.
Give your answer correct to 3 significant figures.

.....cm^2
(2)

(b) Calculate the length of QR.
Give your answer correct to 3 significant figures.

.....cm
(3)

Q19

(Total 5 marks)

TOTAL FOR PAPER: 60 MARKS

END

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Mark Scheme (Results)
November 2010

GCSE

GCSE Mathematics (5384H)
Paper 13H

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November 2010

Publications Code UG025845

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NOTES ON MARKING PRINCIPLES

1 Types of mark

M marks: method marks
A marks: accuracy marks
B marks: unconditional accuracy marks (independent of M marks)

2 Abbreviations

cao – correct answer only
isw – ignore subsequent working
oe – or equivalent (and appropriate)
indep - independent
ft – follow through
SC: special case
dep – dependent

3 No working

If no working is shown then correct answers normally score full marks
If no working is shown then incorrect (even though nearly correct) answers score no marks.

4 With working

If there is a wrong answer indicated on the answer line always check the working in the body of the script (and on any diagrams), and award any marks appropriate from the mark scheme.
If working is crossed out and still legible, then it should be given any appropriate marks, as long as it has not been replaced by alternative work.
If it is clear from the working that the "correct" answer has been obtained from incorrect working, award 0 marks. Send the response to review, and discuss each of these situations with your Team Leader.
If there is no answer on the answer line then check the working for an obvious answer.
Any case of suspected misread loses A (and B) marks on that part, but can gain the M marks. Discuss each of these situations with your Team Leader.
If there is a choice of methods shown, then no marks should be awarded, unless the answer on the answer line makes clear the method that has been used.

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5 Follow through marks

Follow through marks which involve a single stage calculation can be awarded without working since you can check the answer yourself, but if ambiguous do not award.

Follow through marks which involve more than one stage of calculation can only be awarded on sight of the relevant working, even if it appears obvious that there is only one way you could get the answer given.

6 Ignoring subsequent work

It is appropriate to ignore subsequent work when the additional work does not change the answer in a way that is inappropriate for the question: e.g. incorrect canceling of a fraction that would otherwise be correct

It is not appropriate to ignore subsequent work when the additional work essentially makes the answer incorrect e.g. algebra.

Transcription errors occur when candidates present a correct answer in working, and write it incorrectly on the answer line; mark the correct answer.

7 Probability

Probability answers must be given a fractions, percentages or decimals. If a candidate gives a decimal equivalent to a probability, this should be written to at least 2 decimal places (unless tenths).

Incorrect notation should lose the accuracy marks, but be awarded any implied method marks.

If a probability answer is given on the answer line using both incorrect and correct notation, award the marks.

If a probability fraction is given then cancelled incorrectly, ignore the incorrectly cancelled answer.

8 Linear equations

Full marks can be gained if the solution alone is given on the answer line, or otherwise unambiguously indicated in working (without contradiction elsewhere). Where the correct solution only is shown substituted, but not identified as the solution, the accuracy mark is lost but any method marks can be awarded.

9 Parts of questions

Unless allowed by the mark scheme, the marks allocated to one part of the question CANNOT be awarded in another.

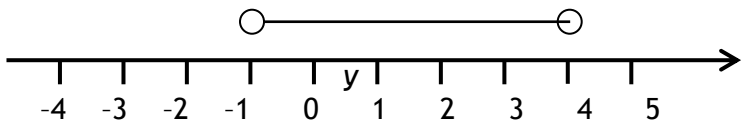
10 Range of answers

Unless otherwise stated, when an answer is given as a range (e.g 3.5 – 4.2) then this is inclusive of the end points (e.g 3.5, 4.2) and includes all numbers within the range (e.g 4, 4.1)

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5384H/13H				
Question	**Working**	**Answer**	**Mark**	**Notes**
1	24 ÷ 2	36	2	M1 for 24 ÷ 2 or $\frac{3}{2}\times 12$ oe or 24 + 12 or sight of the number 12 A1 cao
2	15 × 200	30 m or 3000 cm	2	M1 for 15 × 200 or sight of 3000 or 30 A1 for 3000 cm or 30 m
3		Accurate diagram	2	B2 for fully correct diagram within overlay (B1 for correct angle at *P* ± 2° or correct length of *PR* ± 2 mm)
4	5 pens cost 75p 1 pen costs 75 ÷ 5 3 pens cost 15 × 3	45	2	M1 for 75 ÷ 5 or sight of 15 or $\frac{3}{5}\times 75$ or 75 × 0.6 or 5*p* = 75; *p* = 75÷5 A1 for 45
5		B and E	2	B2 for B and E (B1 for one correct)
6 (a)		Correct description	3	B1 for rotation B1 for about (0,0), or point *O*, or the origin B1 for 180° (accept half turn) NB: if more than one transformation seen then B0.
(b)		triangle with vertices (6, 1) (6, 4) (5, 4)	1	B1 cao

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Question	Working	Answer	Mark	Notes
7	600 + 300 + 150 6000 + 1050 7050 − 3000 4050 ÷ 10	405	6	M1 for 600 + 300 + 150 oe or shows a method to find the VAT eg 6000 × 0.175 oe M1 for 6000 + "1050" A1 for 7050 cao M1 for "7050" − 3000 M1 for dividing by 10 A1 for 405 cao
8	$x + 2x + 3x = 180$ $6x = 180$	30	2	M1 for $x + 2x + 3x$ or $6x$ (= 180) Or M1 for all three of 30,60, 90 seen Or M1 for both of 60,90 identified on the diagram. Or M1 for 180 - $2x$ - $3x$ or any equivalent statement in algebra or words. Or M1 for 180 ÷ 6 A1 for 30° or 30° identified on the diagram near x . A1 for 30 N.B. look for answers on drawing
9 (a)			1	B1 for fully correct
(b)		$-2 < x \leq 3$	2	B2 for fully correct answer (B1 for -2 < or ≤ 3 seen)
(c)	$3t + 5 > 17$ $3t > 17 - 5$ $3t > 12$	$t > 4$	2	M1 for 3t …17 – 5 or dividing throughout by 3 or sight of 4 or an attempt to move the 5. A1 for $t>4$ oe

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Question	Working	Answer	Mark	Notes
10 (a)	Speed = distance ÷ time	32	2	M1 for 16 × 2 or attempts to find the speed by distance ÷ time: $\frac{16}{30}$ or 16 ÷ ½ or $\frac{16}{1/2}$ or 0.53(33..) A1 cao
(b)		Correct line	1	B1 for line drawn from (40, 16) to (65, 0)
11 (a)	$2\frac{17}{20} - 1\frac{8}{20}$	$1\frac{9}{20}$	3	M1 for dealing with the whole numbers M1 for finding a correct common denominator A1 for $1\frac{9}{20}$ oe OR B1 for $\frac{57}{20}$ or $\frac{7}{5}$ oe M1 for finding a correct common denominator A1 for $1\frac{9}{20}$ oe OR M1 for 2.85 M1 for 1.4 A1 for 1.45 oe
(b)	$\frac{8}{3} \times \frac{7}{4} = \frac{8\times7}{3\times4} = \frac{56}{12}$	$4\frac{2}{3}$	3	B1 for $\frac{8}{3}$ oe or $\frac{7}{4}$ oe M1 for multiplying numerator and denominator of "$\frac{8}{3}$" and "$\frac{7}{4}$" A1 for $4\frac{2}{3}$ oe mixed number or $\frac{14}{3}$ oe OR B1 for 2.67 or 2.66(…) and 1.75 M1 (dep B1) for correct method of multiplication A1 for $4\frac{2}{3}$ oe

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Question	Working	Answer	Mark	Notes
12 (a)	15 ÷ 10 8 × 1.5	12	2	M1 for 15 ÷ 10 or sight of 1.5 or $\frac{3}{2}$ or $\frac{2}{3}$ A1 cao
(b)	½ × (8 +"a") × 5	50	2	NB: ft from (a) provided DC > 8 M1 for $\frac{(8+"a")\times 5}{2}$ A1 ft OR M1 for (8× 5) + ½("*DC*" − 8) × 5 A1 ft OR M1 for ½ × "*DC*" × 15 − ½ × 8 × 10 A1 ft OR M1 for ½ × 8 × 10 × "1.5"² − ½ × 8 × 10 A1 ft
13	Equation (1) × 3 then add equation (2) × 2 leads to 26*x* = 13 3 + 2*y* = − 3	$x = \frac{1}{2}$ y = − 3	4	M1 for coefficients of *x* or *y* the same followed by correct operation, condone one arithmetic error A1 for one correct answer M1 (dep) for substituting found value in one equation A1 cao (SC: B2 for one correct answer only if M's not awarded)

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Question	Working	Answer	Mark	Notes
14	$(x + 9)(x - 1) = 0$ OR a = 1, b = 8, c = − 9 $x = \frac{-8 \pm \sqrt{8^2 - 4 \times 1 \times -9}}{2 \times 1}$ $= \frac{-8 \pm \sqrt{100}}{2}$ OR $(x + 4)^2 = 16 + 9$ $(x + 4)^2 = 25$ $x = -4 \pm \sqrt{25}$	$x = 1$ or $x = -9$	3	M2 for $(x + 9)(x - 1)$ (M1 for $(x \pm 9)(x \pm 1)$) A1 cao OR M1 for correct substitution in formula of 1, 8, ±9 M1 for reduction to $\frac{-8 \pm \sqrt{100}}{2}$ A1 cao OR M1 for $(x + 4)^2$ M1 for $-4 \pm \sqrt{25}$ A1 cao SC: trial and improvement: B1 for 1 correct root, B3 for both correct roots.
15 (a)	$P = \frac{k}{V}$: 5 = $\frac{k}{8}$; $k = 40$	$P = \frac{40}{V}$	3	M1 for $P \mu \frac{k}{v}$ or $P = \frac{k}{V}$, k algebraic M1 for subs $P = 5$ and $V = 8$ into $P = \frac{k}{V}$ A1 for $P = \frac{40}{V}$
(b)	$P = \frac{40}{2}$	20	1	B1 ft on k only in an equation of the form $P = \frac{k}{V}$

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Question	Working	Answer	Mark	Notes
16 (a)	$\overrightarrow{OP} = \mathbf{a} + \mathbf{b}$ $\overrightarrow{OM} = \frac{1}{2}\overrightarrow{OP}$	$\frac{1}{2}(\mathbf{a} + \mathbf{b})$	2	M1 for $\overrightarrow{OP} = \mathbf{a} + \mathbf{b}$ or $\overrightarrow{OM} = \frac{1}{2}\overrightarrow{OT} + \frac{1}{2}\overrightarrow{TP}$ or $\overrightarrow{OP} = \overrightarrow{OT} + \overrightarrow{TP}$ A1 for $\overrightarrow{OM} = \frac{1}{2}(\mathbf{a} + \mathbf{b})$ oe SC B1 for $\mathbf{a} + \mathbf{b} \div 2$
(b)	$\overrightarrow{TO} + \overrightarrow{OM}$ $-\mathbf{a} + \frac{1}{2}(\mathbf{a} + \mathbf{b})$	$-\frac{1}{2}\mathbf{a} + \frac{1}{2}\mathbf{b}$	2	M1 for $-\mathbf{a}$ + "$\frac{1}{2}(\mathbf{a} + \mathbf{b})$" oe or $\overrightarrow{TM} = \overrightarrow{TO} + \overrightarrow{OM}$ or $\overrightarrow{TM} = \overrightarrow{TP} + \overrightarrow{PM}$ oe A1 ft but simplified
17 (a)		Circle, centre O, radius 3	2	M1 for complete circle centre (0, 0) A1 correct circle (within overlay)
(b)		$x = 2.6$, $y = -1.6$ or $x = -1.6$, $y = 2.6$	3	M1 for $x + y = 1$ drawn M1 (dep) ft from (a) for an attempt to find coordinates of point(s) of intersection (with any curve) A1 for $x = 2.6$, $y = -1.6$ or $x = -1.6$, $y = 2.6$ given to a tolerance of ±0.1

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Mark Scheme (Results)

November 2010

GCSE

GCSE Mathematics (5384H)
Paper 14H

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November 2010

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NOTES ON MARKING PRINCIPLES

1 Types of mark

M marks: method marks A marks: accuracy marks
B marks: unconditional accuracy marks (independent of M marks)

2 Abbreviations

cao – correct answer only
ft – follow through
isw – ignore subsequent working
SC: special case
dep – dependent
oe – or equivalent (and appropriate)
indep - independent

3 No working

If no working is shown then correct answers normally score full marks
If no working is shown then incorrect (even though nearly correct) answers score no marks.

4 With working

If there is a wrong answer indicated on the answer line always check the working in the body of the script (and on any diagrams), and award any marks appropriate from the mark scheme.
If working is crossed out and still legible, then it should be given any appropriate marks, as long as it has not been replaced by alternative work.
If it is clear from the working that the "correct" answer has been obtained from incorrect working, award 0 marks. Send the response to review, and discuss each of these situations with your Team Leader.
If there is no answer on the answer line then check the working for an obvious answer.
Any case of suspected misread loses A (and B) marks on that part, but can gain the M marks. Discuss each of these situations with your Team Leader.
If there is a choice of methods shown, then no marks should be awarded, unless the answer on the answer line makes clear the method that has been used.

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5 Follow through marks

Follow through marks which involve a single stage calculation can be awarded without working since you can check the answer yourself, but if ambiguous do not award.

Follow through marks which involve more than one stage of calculation can only be awarded on sight of the relevant working, even if it appears obvious that there is only one way you could get the answer given.

6 Ignoring subsequent work

It is appropriate to ignore subsequent work when the additional work does not change the answer in a way that is inappropriate for the question: e.g. incorrect canceling of a fraction that would otherwise be correct

It is not appropriate to ignore subsequent work when the additional work essentially makes the answer incorrect e.g. algebra.

Transcription errors occur when candidates present a correct answer in working, and write it incorrectly on the answer line; mark the correct answer.

7 Probability

Probability answers must be given a fractions, percentages or decimals. If a candidate gives a decimal equivalent to a probability, this should be written to at least 2 decimal places (unless tenths).

Incorrect notation should lose the accuracy marks, but be awarded any implied method marks.

If a probability answer is given on the answer line using both incorrect and correct notation, award the marks.

If a probability fraction is given then cancelled incorrectly, ignore the incorrectly cancelled answer.

8 Linear equations

Full marks can be gained if the solution alone is given on the answer line, or otherwise unambiguously indicated in working (without contradiction elsewhere). Where the correct solution only is shown substituted, but not identified as the solution, the accuracy mark is lost but any method marks can be awarded.

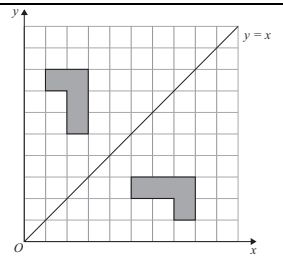
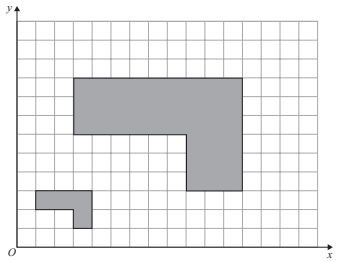
9 Parts of questions

Unless allowed by the mark scheme, the marks allocated to one part of the question CANNOT be awarded in another.

10 Range of answers

Unless otherwise stated, when an answer is given as a range (e.g 3.5 – 4.2) then this is inclusive of the end points (e.g 3.5, 4.2) and includes all numbers within the range (e.g 4, 4.1)

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5384H/14H					
Question		**Working**	**Answer**	**Mark**	**Notes**
1	(a)	3×100	300	2	M1 for 3×100 or $100 \div 6 \times 18$ oe A1 cao
	(b)	$2 \div ½ \times 6$	24	2	M1 for $2 \div ½ \times 6$ oe A1 cao
2	(a)			2	B2 cao (B1 for shape in the correct orientation or for shape above the line, elongated or shortened by one square with either top or bottom in the correct position and correct orientation)
	(b)			3	B3 for correct enlargement in correct position (B2 for enlargement SF 3 in incorrect position or enlargement, centre *O*, but different scale factor) (B1 for 4 lines enlarged by SF 3 or enlargement, not from *O*, different scale factor)
3		$8 \div 20 \times 100$	40	2	M1 for $8 \div 20 \times 100$ oe A1 cao
4	(a)	$2x = 10 - 3 = 7$ $x = 7 \div 2$	3.5	2	M1 for $2x = 10 - 3$ or $2x = 7$ or $(10 - 3) \div 2$ A1 for 3.5 oe
	(b)(i)		c^{11}	2	B1 accept c^{5+6}
	(ii)		e^{8}		B1 accept e^{12-4}

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5384H/14H				
Question	**Working**	**Answer**	**Mark**	**Notes**
5		2.42927(0474)	2	B2 for 2.42927 … (B1 for 19.56 or 8.0518 or 2.43 or 2.429 or 2.4292 or 2.4293 or digits 242927 or $\frac{97800}{40259}$ seen)
6		−2, −1, 0, 1, 2	2	B2 for −2, −1, 0, 1, 2 (B1 for one extra or one missing) A1 cao
7 (a)		$7x$	1	B1 for $7x$ or $7 \times x$ oe
(b)		$5y$	1	B1 for $5y$ or $5 \times y$ oe
(c)		$T = 7x + 5y$	1	B1 f.t. dep on B1 in (a) or (b), for $T = 7x + 5y$ oe
8 (a)			2	B2 for correct front elevation (B1 for the correct diagram with extra row or extra column) Internal lines need not be drawn
(b)			2	B2 for correct plan - it can be rotated (B1 for any rectangle that is not a square) Internal lines need not be drawn

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5384H/14H					
Question		**Working**	**Answer**	**Mark**	**Notes**
9	(a)	$k - 5 = 24 \div 3$ $k = 8 + 5$	13	2	M1 for $k - 5 = 24 \div 3$ or $3 \times k - 3 \times 5$ oe A1 cao
	(b)	$x^2 = 162 \div 2$ $x = \sqrt{81}$	9	2	M1 for $162 \div 2$ or 81 seen A1 for 9 (accept -9 or ± 9)
10		$= 14.56 \times 10^{-16}$	1.456×10^{-15}	2	M1 for digits 1456×10^n or $A \times 10^{-15}$, $1 < A < 2$ A1 for 1.456×10^{-15}
11			A and 3 B and 2 C and 4 D and 1	2	B2 for all 4 correct (B1 for 2 correct)
12		$19.5 \times 1000 \div 210 = 19500 \div 210$ $= 92.8(5714\ldots)$ or $92 \times 210 = 19320 = 19.32$ *l* $93 \times 210 = 19530 = 19.53$ *l* or $19500 \div 92 = 211.95$ $19500 \div 93 = 209.67$	explanation	3	M1 for converting between ml and l correctly or for 0.21 or 19500 seen M1 for '19500' ÷ '210' or '92' × '210' or '93' × '210' or '19500' ÷ '92' A1 for a worded explanation with correct calculations
13	(a)		−15, (−8), −7, −6, 1, (20)	2	B2 for all 4 correct (B1 for 2 or 3 correct)
	(b)		graph	2	B2 for fully correct graph B1 ft for 6 'points' plotted correctly ± 1square B1 for smooth curve plotted through all '5 or 6 plotted points' provided B1 awarded in (a)

5384H/14H				
Question	**Working**	**Answer**	**Mark**	**Notes**
14	Angle *ADC* = 180 − 128 = 52° *x* = 2 × 52° or reflex angle *AOC* = 256° *x* = 360 − 256	104	2	M1 for valid method to get angle *ADC* or 128 × 2 or 256° seen (can be on the diagram) A1 cao
15	*AB* = 8cos 37° = 8 × (0.7986…) = 6.389…	6.38 – 6.39	3	M1 for cos37 = $\frac{AB}{8}$ M1 for *AB* = 8 cos 37° or 6.4 seen (dep on 1st M1) A1 for 6.38 – 6.39 OR M1 for $\frac{AB}{\sin 53} = \frac{8}{\sin 90}$ M1 for *AB* = $\frac{8\sin 53}{\sin 90}$ or 6.4 seen (dep on 1st M1) A1 for 6.38 – 6.39 S.C. M2 A0 for 6.12 (radians) or 6.69 (grad)
16	35.5 × 26.5	940.75	3	B1 for sight of 35.5 or 26.5 or 35.4999(…) or 26.4999(…) M1 for UB length × UB width where 35.**49** ≤ UB length ≤ 35.5 26.**49** ≤ UB width ≤ 26.5 A1 for 940.74 – 940.75 (or $\frac{3763}{4}$)
17	$\frac{3x+2x}{6}=8$	9.6	2	M1 for $\frac{3x+2x}{6}=8$ oe or $\frac{x}{2}\times 6+\frac{x}{3}\times 6=8\times 6$ or $\frac{x}{2}\times 2+\frac{x}{3}\times 2=8\times 2$ or $\frac{x}{2}\times 3+\frac{x}{3}\times 3=8\times 3$ A1 for 9.6 oe (accept $\frac{48}{5}$)

5384H/14H				
Question	**Working**	**Answer**	**Mark**	**Notes**
18	$a \times (3 + n) = 6a - n$ $3a + an = 6a - n$ $an + n = 6a - 3a$ $n(a + 1) = 3a$	$n = \frac{3a}{a+1}$	4	M1 for multiplying both sides by $3+n$ M1 for correctly isolating 'terms in n' from $6a - n$ = any one of $a(3 + n)$, $3a + an$, $3a + n$ or $3 + an$ M1 for correctly factorising 'terms in n' A1 for $\frac{3a}{a+1}$ oe
19 (a)	½ (8.3 × 10.5) sin 62° = 43.575 × 0.88294… = 38.47444136	38.5	2	M1 for ½ (8.3 × 10.5) sin 62° A1 for 38.45 – 38.5 o SC: M1 AO for ± 32.2 (rad) or 36.0 (grad)
(b)	$8.3^2 + 10.5^2 - 2(8.3)(10.5) \cos 62$ = 68.89 + 110.25 – 174.3(0.46947…) = 179.14 – 81.828… *OR* = $\sqrt{97.3111...}$ = 9.8646320	9.86	3	M1 for correct substitution into cosine rule M1 dep for correct order of evaluation (excluding square root) (can be implied by 97.3 seen) A1 for 9.86 – 9.865 SC: M2 AO for 7.86 (rad) or 9.01(grad)

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Centre No.						Paper Reference								Surname	Initial(s)
Candidate No.						5	3	8	4	H	/	1	3	H	Signature

Paper Reference(s)

5384H/13H

Examiner's use only

Team Leader's use only

Edexcel GCSE

Mathematics (Modular) – 2381

Paper 13 (Non-Calculator)

Higher Tier



Unit 3

Monday 7 June 2010 – Afternoon

Time: 1 hour 10 minutes

Materials required for examination
Ruler graduated in centimetres and millimetres, protractor, compasses, pen, HB pencil, eraser.
Tracing paper may be used.

Items included with question papers
Nil

Instructions to Candidates

In the boxes above, write your centre number, candidate number, your surname, initials and signature.
Check that you have the correct question paper.
Answer ALL the questions. Write your answers in the spaces provided in this question paper.
You must NOT write on the formulae page.
Anything you write on the formulae page will gain NO credit.
If you need more space to complete your answer to any question, use additional answer sheets.

Information for Candidates

The marks for individual questions and the parts of questions are shown in round brackets: e.g. **(2)**.
There are 18 questions in this question paper. The total mark for this paper is 60.
There are 16 pages in this question paper. Any blank pages are indicated.
Calculators must not be used.

Advice to Candidates

Show all stages in any calculations.
Work steadily through the paper. Do not spend too long on one question.
If you cannot answer a question, leave it and attempt the next one.
Return at the end to those you have left out.

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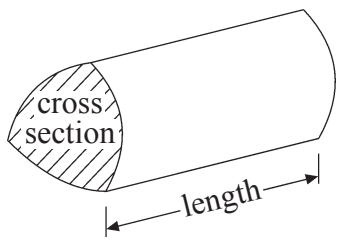
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GCSE Mathematics

Formulae: Higher Tier

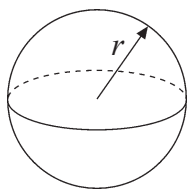
You must not write on this formulae page.
Anything you write on this formulae page will gain NO credit.

Volume of a prism = area of cross section × length



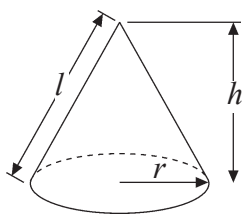
Volume of sphere $= \frac{4}{3}\pi r^3$

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

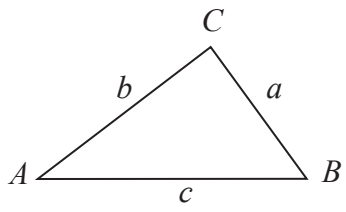


Volume of cone $= \frac{1}{3}\pi r^2 h$

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



In any triangle ABC



The Quadratic Equation

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

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

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

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

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

N 3 6 8 1 1 A 0 2 1 6

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Leave blank

Answer ALL EIGHTEEN questions.

Write your answers in the spaces provided.

You must write down all stages in your working.

You must NOT use a calculator.

1. There are 200 children in a school.
120 of the children are boys.

What percentage of the children are boys?

..... %

(Total 2 marks)

Q1

2. $B = 2k + 12$

$k = 5$

(a) Work out the value of B.

$B =$ .....

(2)

$T = 4w - 2$

$T = 22$

(b) Work out the value of w.

$w =$ .....

(2)

(Total 4 marks)

Q2

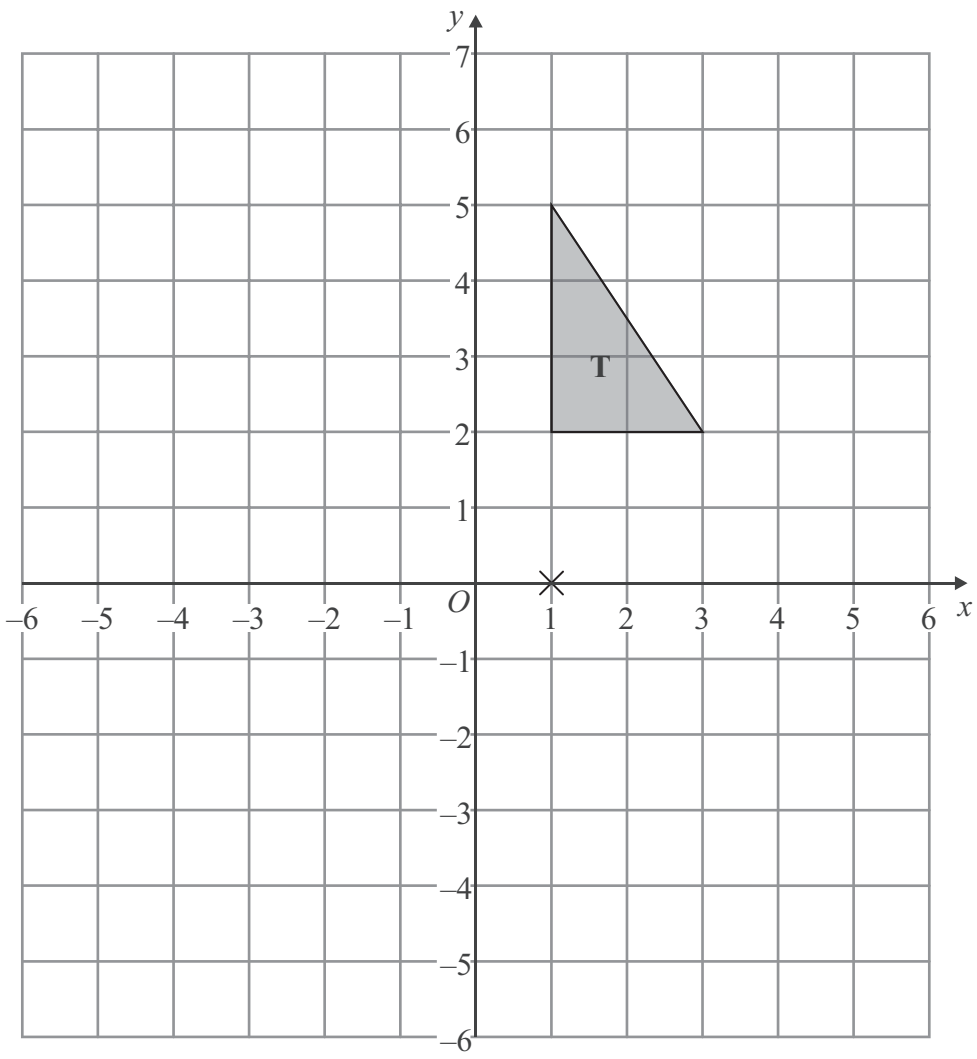
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3.



Triangle **T** has been drawn on the grid.

Rotate triangle **T** 180° about the point (1, 0).
Label the new triangle **A**.

Q3

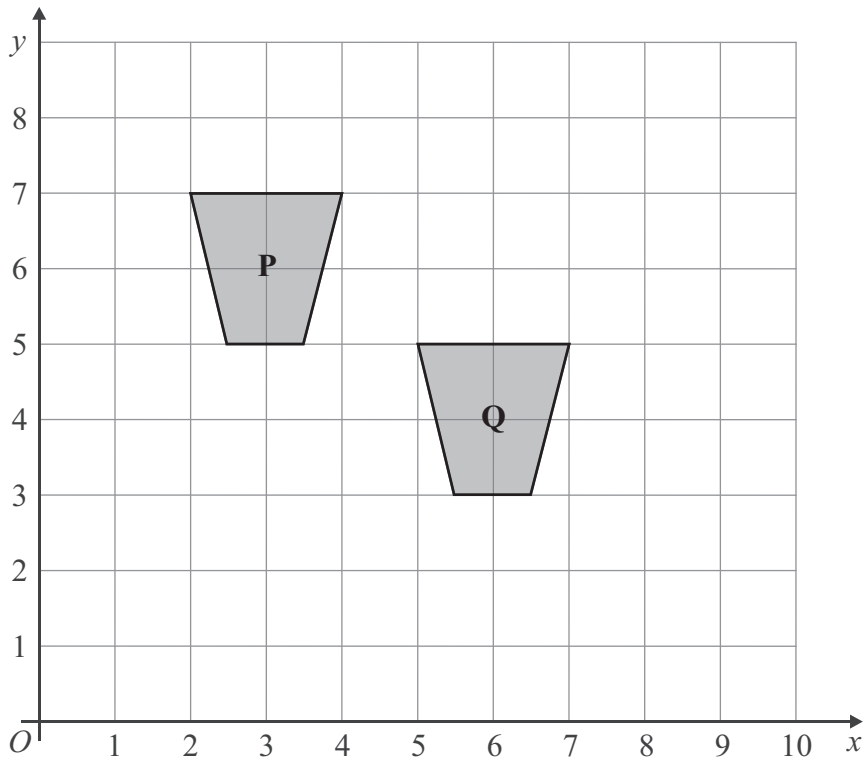
(Total 2 marks)

N 3 6 8 1 1 A 0 4 1 6

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4.



Describe fully the single transformation which maps shape **P** onto shape **Q**.

.....

.....

Q4

(Total 2 marks)

N 3 6 8 1 1 A 0 5 1 6

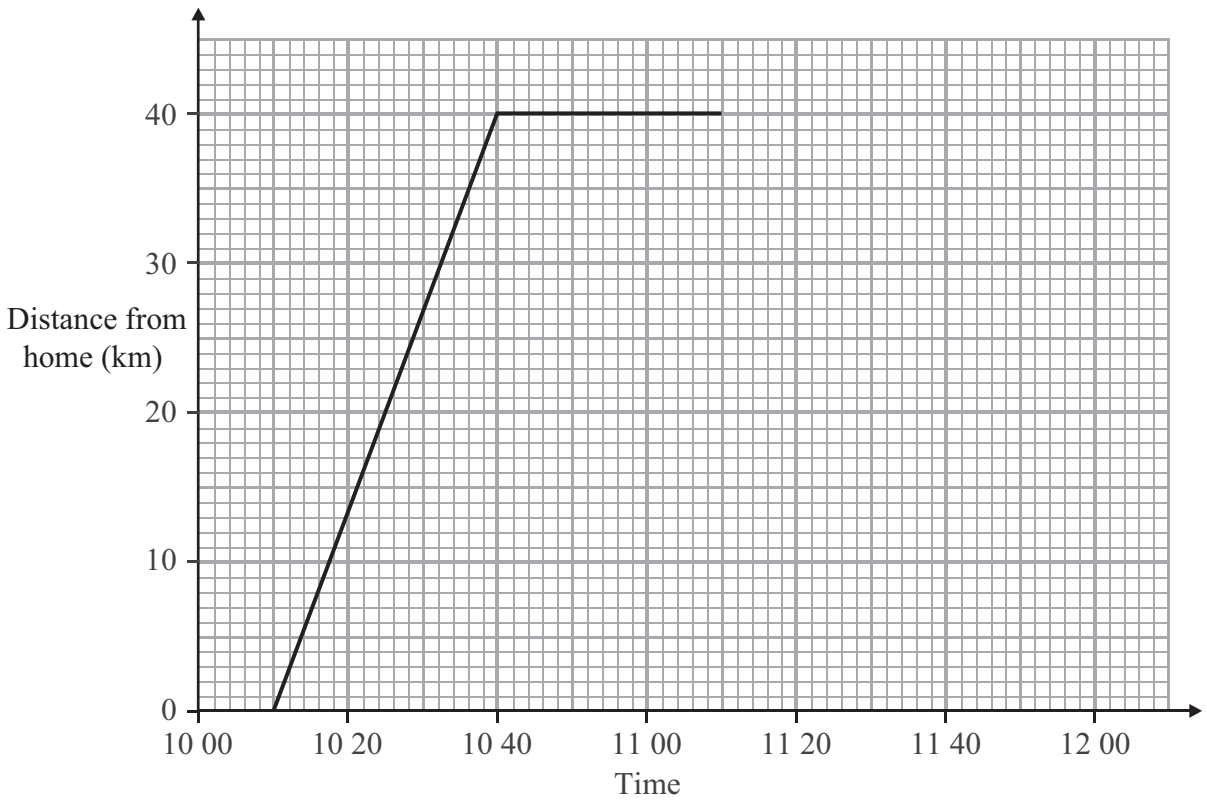
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5. Nigel travelled from his home to his friend's house 40 km away.
He stayed at his friend's house for 30 minutes.
Nigel then travelled home.

Here is part of the distance-time graph for Nigel's journey.



(a) At what time did Nigel leave home?

.....
(1)

(b) How far was Nigel from home at 10 20?

..... km
(1)

Nigel arrived home at 11 50

(c) Complete the distance-time graph.

(1)

Q5

(Total 3 marks)

N 3 6 8 1 1 A 0 6 1 6

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6. Here is a sketch of a cuboid.

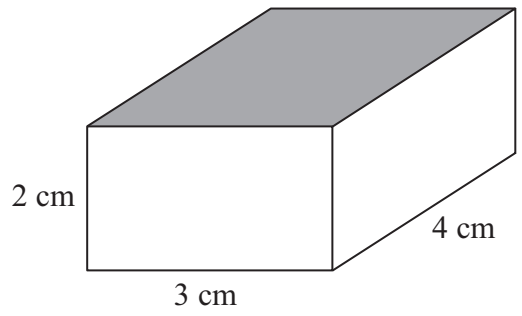
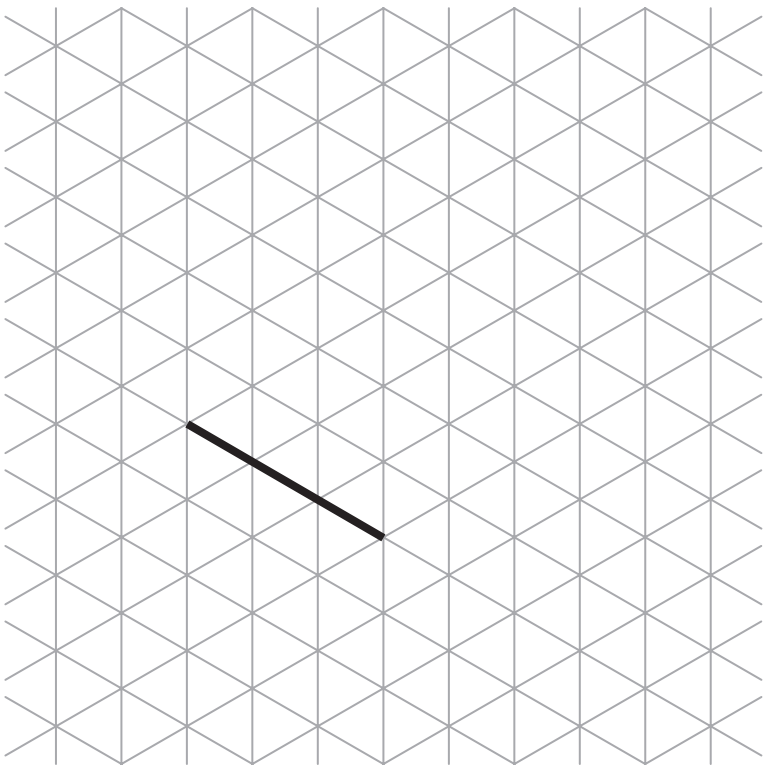


Diagram **NOT** accurately drawn

(a) On the isometric grid below, make an accurate drawing of this cuboid.
One edge has been drawn for you.



(2)

(b) Work out the area of the top face of the cuboid.

..... cm^2

(2)

Q6

(Total 4 marks)

N 3 6 8 1 1 A 0 7 1 6

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7.

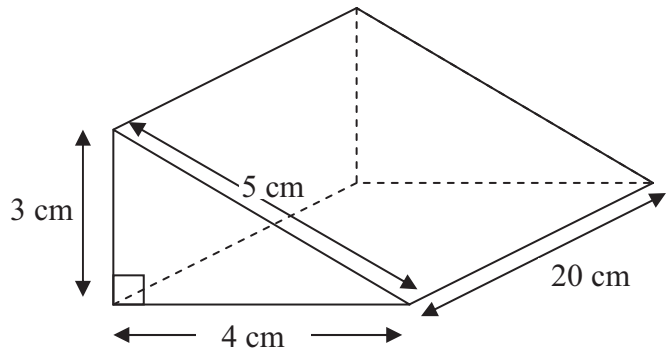


Diagram **NOT** accurately drawn

Work out the volume of the triangular prism.

..... cm^3

Q7

(Total 2 marks)

N 3 6 8 1 1 A 0 8 1 6

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8. There are 300 people in a cinema.

$\frac{1}{6}$ of the 300 people are boys.

$\frac{3}{10}$ of the 300 people are girls.

The rest of the people are adults.

Work out how many people are adults.

.....

Q8

(Total 4 marks)

9.

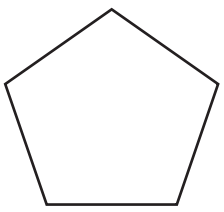


Diagram **NOT** accurately drawn

Work out the size of an exterior angle of a regular pentagon.

..... °

Q9

(Total 2 marks)

N 3 6 8 1 1 A 0 9 1 6

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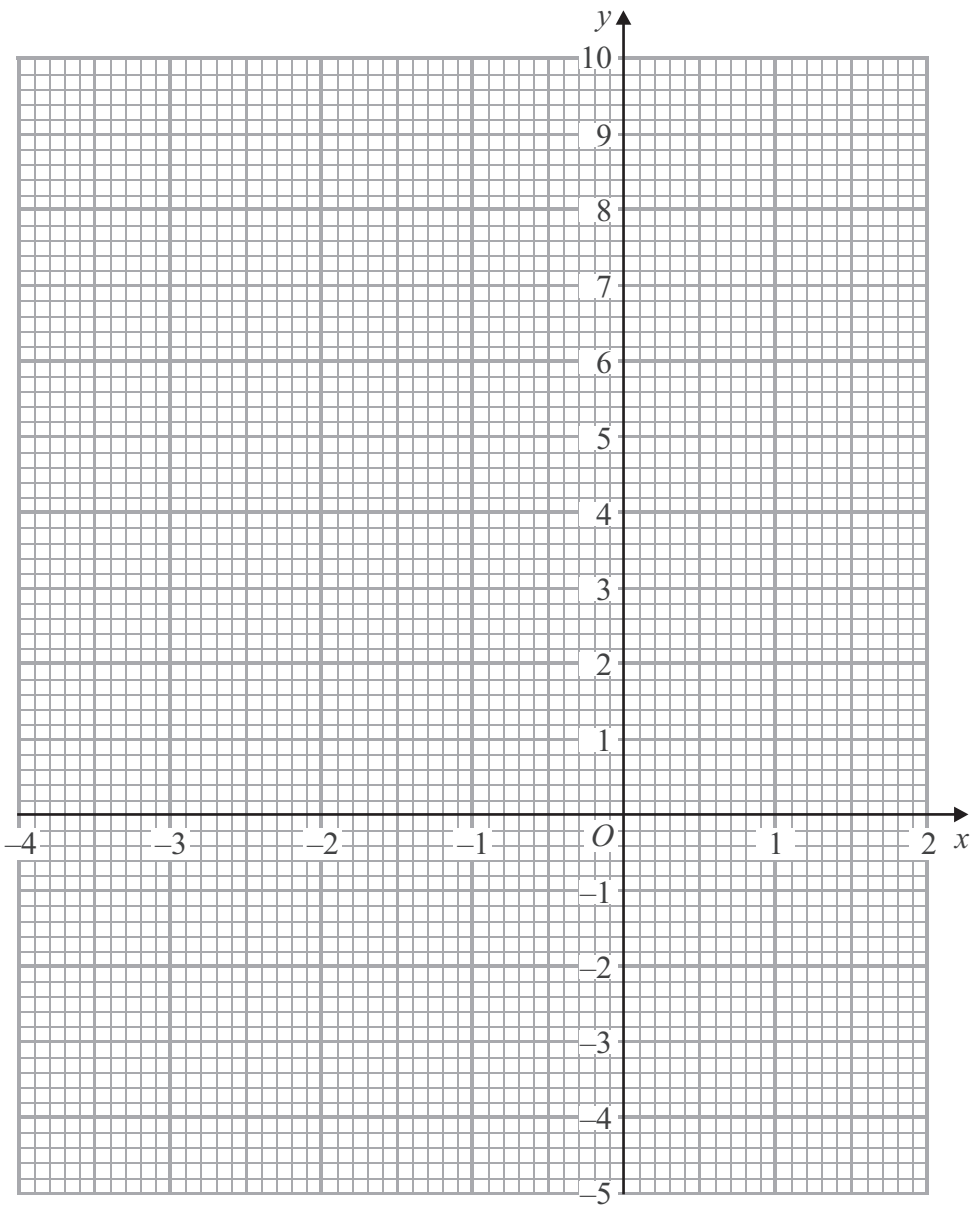
10. (a) Complete the table of values for $y = x^2 + x - 3$

x	–4	–3	–2	–1	0	1	2
y	9		–1	–3			3

(2)

(b) On the grid below, draw the graph of $y = x^2 + x - 3$ for values of x from –4 to 2

(2)



N 3 6 8 1 1 A 0 1 0 1 6

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(c) Use your graph to find estimates for the solutions of $x^2 + x - 3 = 0$

$x =$ .....

$x =$ .....

(1)

(Total 5 marks)

Leave blank

Q10

11. Here is a square.

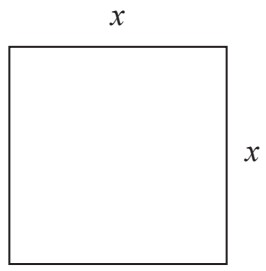


Diagram **NOT** accurately drawn

All the measurements are in centimetres.

The perimeter of the square is P cm.

(a) Express P in terms of x.

$P =$ .....

(1)

The area of the square is A cm^2.

(b) Express A in terms of P.
Give your answer in its simplest form.

$A =$ .....

(2)

(Total 3 marks)

Q11

N 3 6 8 1 1 A 0 1 1 1 6

Turn over

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Leave blank

12. Arwen buys a car for £4000
The value of the car depreciates by 10% each year.

Work out the value of the car after two years.

£ .....

Q12

(Total 3 marks)

13. (a) Here are some expressions.

a^3b	$a^2(c + b)$	$4abc$	$ab + c^3$	$4\pi c^2$

The letters a, b, and c represent lengths.
π and 4 are numbers that have no dimension.

Two of the expressions could represent volumes.
Tick the boxes (✓) underneath these two expressions.

(2)

The volume of this cube is 8 m^3.

(b) Change 8 m^3 into cm^3.

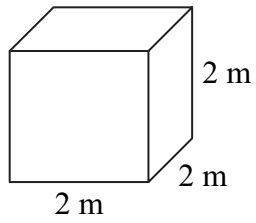


Diagram **NOT** accurately drawn

..... cm^3

(2)

Q13

(Total 4 marks)

N 3 6 8 1 1 A 0 1 2 1 6

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Leave blank

14. Solve the simultaneous equations

$$3x + 2y = 8$$
$$2x + 5y = -2$$

$x =$ .....

$y =$ **Q14**

(Total 4 marks)

15. A straight line passes through (0, –2) and (3, 10).

Find the equation of the straight line.

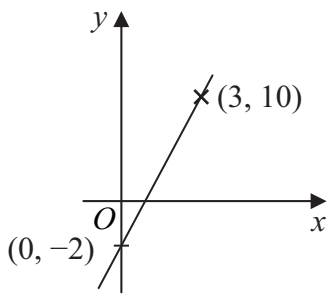


Diagram **NOT** accurately drawn

..... **Q15**

(Total 3 marks)

N 3 6 8 1 1 A 0 1 3 1 6

Turn over

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Leave blank

16. Find the value of

(i) 6^0

.....

(ii) $64^{\frac{1}{2}}$

.....

(iii) $\left(\frac{27}{8}\right)^{-\frac{2}{3}}$

.....

Q16

(Total 4 marks)

17. Solve $x^2 = 4x + 12$

.....

Q17

(Total 4 marks)

N 3 6 8 1 1 A 0 1 4 1 6

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18.

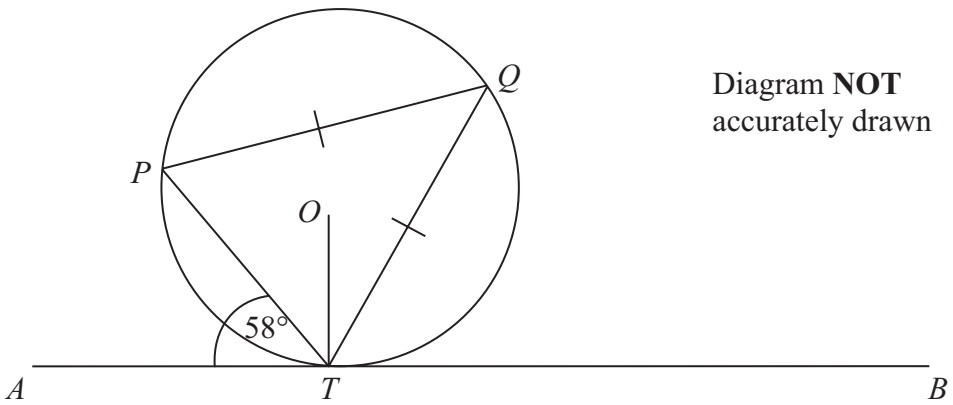


Diagram **NOT** accurately drawn

P, Q and T are points on the circumference of a circle, centre O.
The line ATB is the tangent at T to the circle.

$PQ = TQ$.
Angle $ATP = 58°$.

Calculate the size of angle OTQ.
Give a reason for each stage in your working.

.....°

Q18

(Total 5 marks)

TOTAL FOR PAPER: 60 MARKS

END

N 3 6 8 1 1 A 0 1 5 1 6

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N 3 6 8 1 1 A 0 1 6 1 6

Centre No.						Paper Reference								Surname	Initial(s)
Candidate No.						5	3	8	4	H	/	1	4	H	Signature

Paper Reference(s)

5384H/14H

Examiner's use only

Team Leader's use only

Edexcel GCSE

Mathematics (Modular) – 2381

Paper 14 (Calculator)

Higher Tier



Unit 3

Friday 11 June 2010 – Morning

Time: 1 hour 10 minutes

Materials required for examination
Ruler graduated in centimetres and millimetres, protractor, compasses, pen, HB pencil, eraser, calculator. Tracing paper may be used.

Items included with question papers
Nil

Instructions to Candidates

In the boxes above, write your centre number, candidate number, your surname, initials and signature.
Check that you have the correct question paper.
Answer ALL the questions. Write your answers in the spaces provided in this question paper.
You must NOT write on the formulae page.
Anything you write on the formulae page will gain NO credit.
If you need more space to complete your answer to any question, use additional answer sheets.

Information for Candidates

The marks for individual questions and the parts of questions are shown in round brackets: e.g. **(2)**.
There are 18 questions in this question paper. The total mark for this paper is 60.
There are 16 pages in this question paper. Any blank pages are indicated.
Calculators may be used.
If your calculator does not have a π button, take the value of π to be 3.142 unless the question instructs otherwise.

Advice to Candidates

Show all stages in any calculations.
Work steadily through the paper. Do not spend too long on one question.
If you cannot answer a question, leave it and attempt the next one.
Return at the end to those you have left out.

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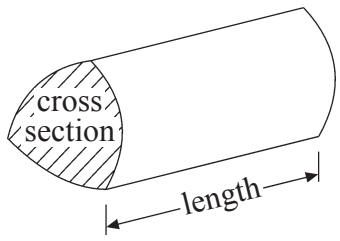
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GCSE Mathematics

Formulae: Higher Tier

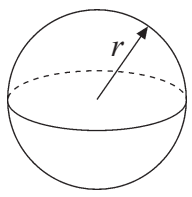
You must not write on this formulae page.
Anything you write on this formulae page will gain NO credit.

Volume of a prism = area of cross section × length



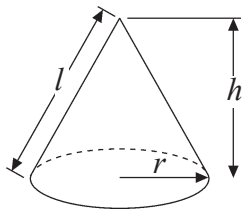
Volume of sphere $= \frac{4}{3}\pi r^3$

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

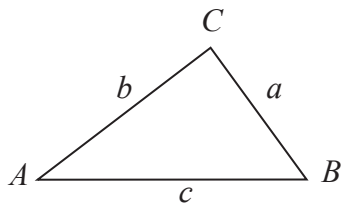


Volume of cone $= \frac{1}{3}\pi r^2 h$

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



In any triangle ABC



The Quadratic Equation

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

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

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

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

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

N 3 6 8 1 2 A 0 2 1 6

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Answer ALL EIGHTEEN questions.

Write your answers in the spaces provided.

You must write down all stages in your working.

1. Here is a list of ingredients for making a trifle for 4 people.

Trifle for 4 people	
120 g	of raspberry jelly
8	sponge fingers
420 m*l*	of custard
180 g	of tinned fruit

Rob is going to make a trifle for 6 people.
Work out the amount of each ingredient he needs.

..... g of raspberry jelly

..... sponge fingers

..... m*l* of custard

..... g of tinned fruit

(Total 3 marks)

Q1

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2. In August 2008, Eddie hired a car in Italy.

The cost of hiring the car was £620
The exchange rate was £1 = €1.25

(a) Work out the cost of hiring the car in euros (€).

€ .....

(2)

Eddie bought some perfume in Italy.

The cost of the perfume in Italy was €50
The cost of the same perfume in London was £42

The exchange rate was still £1 = €1.25

(b) Work out the difference between the cost of the perfume in Italy and the cost of the perfume in London.
Give your answer in pounds (£).

£ .....

(3)

Q2

(Total 5 marks)

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3. A circle has a diameter of 12 cm.

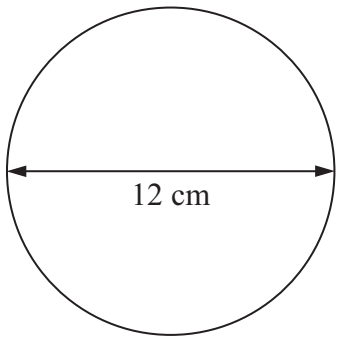


Diagram **NOT** accurately drawn

(a) Work out the circumference of the circle.
Give your answer correct to 3 significant figures.

..... cm
(2)

(b) Work out the area of the circle.
Give your answer correct to 3 significant figures.

..... cm^2
(2)

Q3

(Total 4 marks)

N 3 6 8 1 2 A 0 5 1 6

Turn over

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4. The equation

$$x^3 + 10x = 25$$

has a solution between 1 and 2

Use a trial and improvement method to find this solution.
Give your answer correct to one decimal place.
You must show **all** your working.

$x =$ .....

(Total 4 marks) **Q4**

5. (a) Solve $8x - 3 = 17$

$x =$ .....

(2)

(b) Solve $\frac{2y}{3} = 9$

$y =$ .....

(2) **Q5**

(Total 4 marks)

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6.

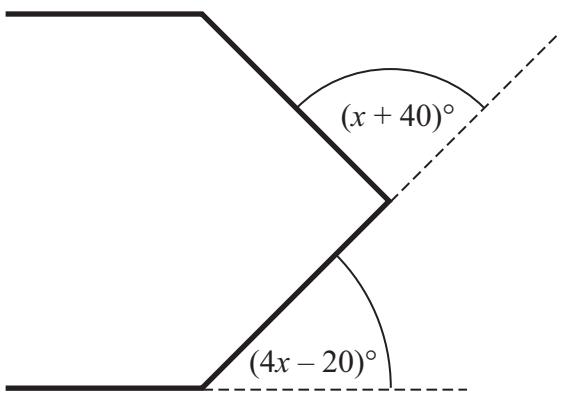


Diagram **NOT** accurately drawn

The diagram shows two exterior angles of a regular polygon.

(a) Explain why $4x - 20 = x + 40$

.....

(1)

(b) Solve $4x - 20 = x + 40$

$x =$ .....

(2)

Q6

(Total 3 marks)

7. Work out £84 as a percentage of £350

..... %

Q7

(Total 2 marks)

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8.

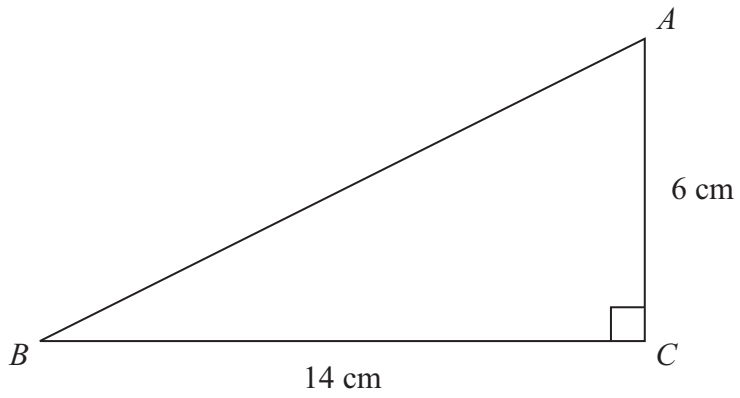


Diagram **NOT** accurately drawn

ABC is a right-angled triangle.
AC = 6 cm.
BC = 14 cm.

Calculate the length of *AB*.
Give your answer correct to 2 decimal places.

..... cm

(Total 3 marks)

Q8

N 3 6 8 1 2 A 0 8 1 6

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9. The diagram shows a solid prism.

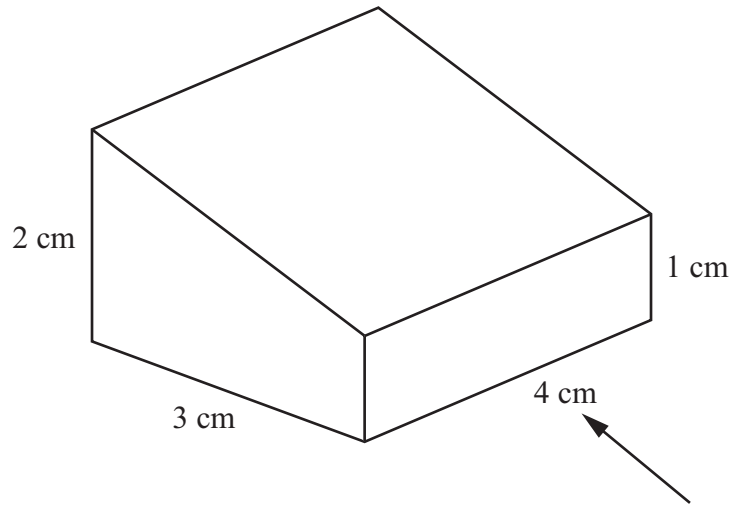
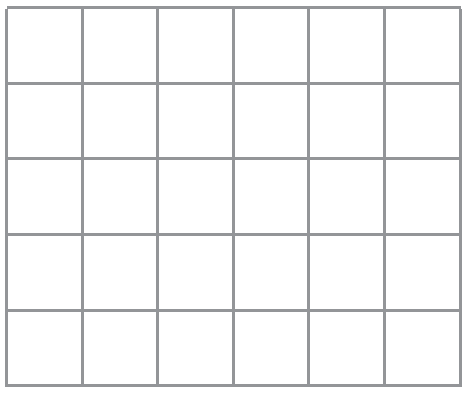


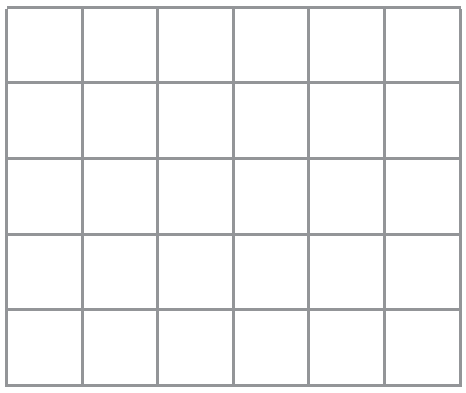
Diagram **NOT** accurately drawn

(a) On the grid below, draw the front elevation of the prism from the direction of the arrow.



(2)

(b) On the grid below, draw the plan of the prism.



(2) **Q9**

(Total 4 marks)

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Leave blank

10. $-4 < n \leqslant 1$
n is an integer.

(a) Write down all the possible values of n.

.....

(2)

(b) Solve $3x - 2 > x + 7$

.....

(2) **Q10**

(Total 4 marks)

11. Draw the locus of all points which are equidistant from the lines AB **and** AC.



Q11

(Total 2 marks)

N 3 6 8 1 2 A 0 1 0 1 6

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12. Make A the subject of the formula

$$r = \sqrt{\frac{A}{3}}$$

Leave blank

$A =$ .....

(Total 2 marks)

Q12

13. Work out the value of

$$24\,500 \div (1.25 \times 10^{-4})$$

Give your answer in standard form.

.....

(Total 2 marks)

Q13

14.

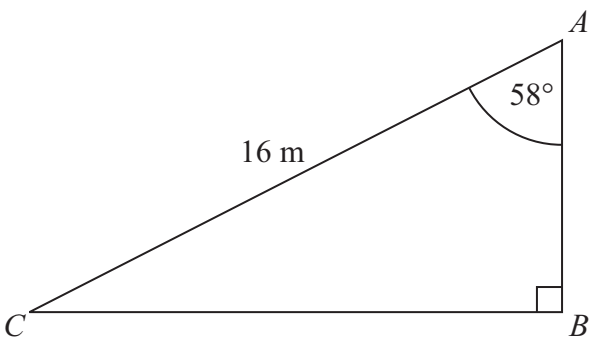


Diagram **NOT** accurately drawn

ABC is a right-angled triangle.
$AC = 16$ m.
Angle $CAB = 58°$

Calculate the length of AB.
Give your answer correct to 3 significant figures.

..... m

(Total 3 marks)

Q14

N 3 6 8 1 2 A 0 1 1 1 6

Turn over

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15. A field is in the shape of a rectangle.
The width of the field is 28 metres, measured to the nearest metre.

(a) Work out the upper bound of the width of the field.

..... metres
(1)

The length of the field is 145 metres, measured to the nearest 5 metres.

(b) Work out the upper bound for the perimeter of the field.

..... metres
(3)

(Total 4 marks)

Q15

16. (a) Simplify $p^5 \times p^4$

.....
(1)

(b) For $x > 1$, write the following expressions in order of size.
Start with the expression with the least value.

x^0 x^2 x x^{-2} $x^{\frac{1}{2}}$

.....
(2)

(Total 3 marks)

Q16

N 3 6 8 1 2 A 0 1 2 1 6

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17. The diagram shows a sector of a circle with centre O.
The radius of the circle is 8 cm.

PRS is an arc of the circle.
PS is a chord of the circle.
Angle $POS = 40°$

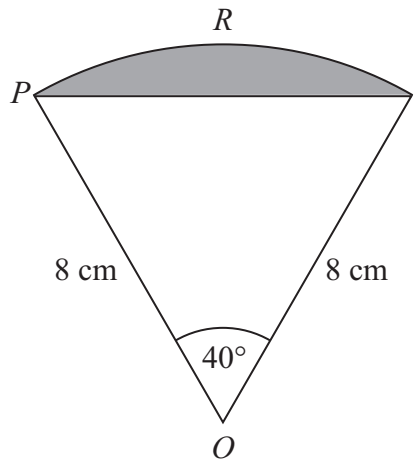


Diagram **NOT** accurately drawn

Calculate the area of the shaded segment.
Give your answer correct to 3 significant figures.

..... cm^2

Q17

(Total 5 marks)

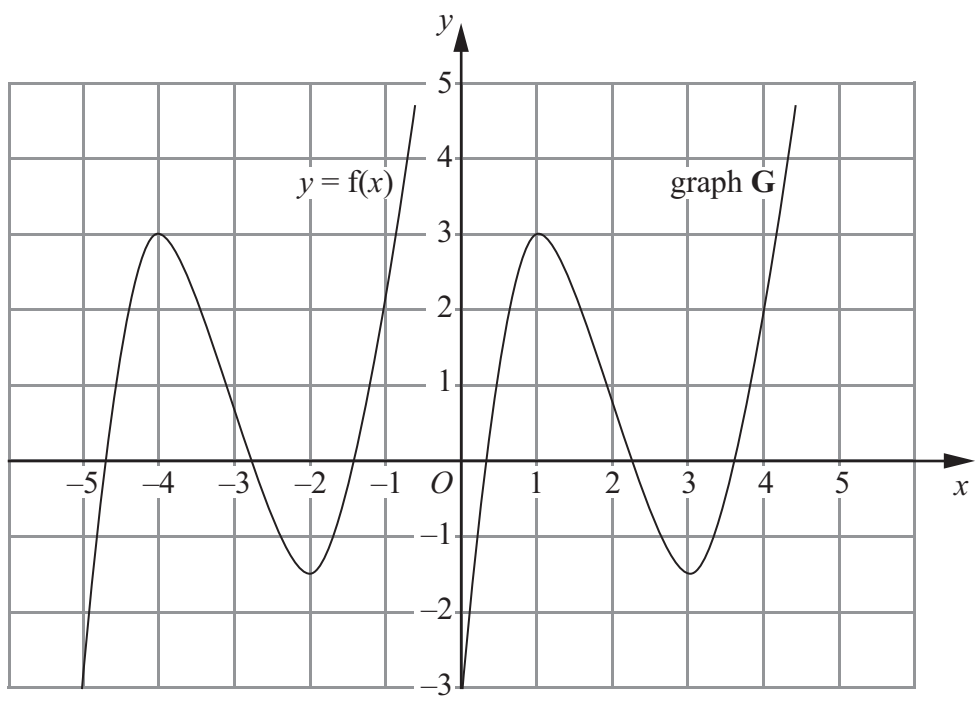
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18. The graph of $y = f(x)$ is shown on the grid.



The graph **G** is a translation of the graph of $y = f(x)$.

(a) Write down, in terms of f, the equation of graph **G**.

$y =$ .....

(1)

The graph of $y = f(x)$ has a maximum point at $(-4, 3)$.

(b) Write down the coordinates of the maximum point of the graph of $y = f(-x)$.

(..... , ...)

(2) **Q18**

(Total 3 marks)

TOTAL FOR PAPER: 60 MARKS

END

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N 3 6 8 1 2 A 0 1 5 1 6

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N 3 6 8 1 2 A 0 1 6 1 6

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Mark Scheme (Results)

Summer 2010

GCSE

GCSE Mathematics (5384H)
Non-Calculator Paper 13H

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Summer 2010
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NOTES ON MARKING PRINCIPLES

1 Types of mark

M marks: method marks
A marks: accuracy marks
B marks: unconditional accuracy marks (independent of M marks)

2 Abbreviations

cao – correct answer only
isw – ignore subsequent working
oe – or equivalent (and appropriate)
indep - independent
ft – follow through
SC: special case
dep – dependent

3 No working

If no working is shown then correct answers normally score full marks
If no working is shown then incorrect (even though nearly correct) answers score no marks.

4 With working

If there is a wrong answer indicated on the answer line always check the working in the body of the script (and on any diagrams), and award any marks appropriate from the mark scheme.
If working is crossed out and still legible, then it should be given any appropriate marks, as long as it has not been replaced by alternative work.
If it is clear from the working that the "correct" answer has been obtained from incorrect working, award 0 marks. Send the response to review, and discuss each of these situations with your Team Leader.
If there is no answer on the answer line then check the working for an obvious answer.
Any case of suspected misread loses A (and B) marks on that part, but can gain the M marks. Discuss each of these situations with your Team Leader.
If there is a choice of methods shown, then no marks should be awarded, unless the answer on the answer line makes clear the method that has been used.

5 Follow through marks

Follow through marks which involve a single stage calculation can be awarded without working since you can check the answer yourself, but if ambiguous do not award.

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Follow through marks which involve more than one stage of calculation can only be awarded on sight of the relevant working, even if it appears obvious that there is only one way you could get the answer given.

6 Ignoring subsequent work

It is appropriate to ignore subsequent work when the additional work does not change the answer in a way that is inappropriate for the question: e.g. incorrect canceling of a fraction that would otherwise be correct
It is not appropriate to ignore subsequent work when the additional work essentially makes the answer incorrect e.g. algebra.
Transcription errors occur when candidates present a correct answer in working, and write it incorrectly on the answer line; mark the correct answer.

7 Probability

Probability answers must be given a fractions, percentages or decimals. If a candidate gives a decimal equivalent to a probability, this should be written to at least 2 decimal places (unless tenths).
Incorrect notation should lose the accuracy marks, but be awarded any implied method marks.
If a probability answer is given on the answer line using both incorrect and correct notation, award the marks.
If a probability fraction is given then cancelled incorrectly, ignore the incorrectly cancelled answer.

8 Linear equations

Full marks can be gained if the solution alone is given on the answer line, or otherwise unambiguously indicated in working (without contradiction elsewhere). Where the correct solution only is shown substituted, but not identified as the solution, the accuracy mark is lost but any method marks can be awarded.

9 Parts of questions

Unless allowed by the mark scheme, the marks allocated to one part of the question CANNOT be awarded in another.

10 Range of answers

Unless otherwise stated, when an answer is given as a range (e.g 3.5 – 4.2) then this is inclusive of the end points (e.g 3.5, 4.2) and includes all numbers within the range (e.g 4, 4.1)

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5384H/13H				
Question	**Working**	**Answer**	**Mark**	**Notes**
1	$\frac{120}{200}\times 100$ OR $\frac{120}{200} = \frac{60}{100}$	60	2	M1 for $\frac{120}{200}\times 100$ A1 cao OR M1 for $\frac{120}{200}\div\frac{2}{2}$ oe e.g. $\frac{60}{100}$ seen A1 cao
2 (a)	$2\times 5+12$	22	2	M1 for 2×5 or 10 seen A1 cao
(b)	$22 = 4w-2$ $w = (22+2)\div 4$	6	2	M1 for $22 = 4w-2$ or for $22+2\div 4$ oe A1 cao
3		Triangle at (1, −2), (−1, −2), (1, −5)	2	B2 for triangle at (1,-2), (-1,-2), (1,-5) (B1 for rotation of 180° about the wrong centre or for a rotation of $90°$, centre (1,0) clockwise or anticlockwise)

Question	Working	Answer	Mark	Notes
4		Translation by $\begin{pmatrix} 3 \\ -2 \end{pmatrix}$	2	B1 for translation B1 (indep) for $\begin{pmatrix} 3 \\ -2 \end{pmatrix}$ or 3 to the right and 2 down oe Note: B0 if more than one transformation given.
5 (a)		10 10	1	B1 for 10 10 oe
(b)		13 – 14	1	B1 for answer in range 13–14 inclusive
(c)		Line from (11 10, 40) to (11 50, 0)	1	B1 for line drawn from (11 10, 40) to (11 50, 0) ±2mm
6 (a)		Accurate drawing	2	B2 cao (any orientation) ±2mm (B1 for any isometric drawing of a cuboid) Ignore presence of hidden lines
(b)	4×3	12	2	M1 for a correct method to find the area of one "face" of the cuboid A1 cao or ft from (a)

Question	Working	Answer	Mark	Notes
7	$\frac{1}{2}\times 3\times 4\times 20$	120	2	M1 for $\frac{1}{2}\times 3\times 4\times 20$ A1 cao
8	$300\div 6=50$ $300\div 10\times 3=90$ $300-50-90$ OR $\frac{1}{6}+\frac{3}{10}=\frac{7}{15}$ $\frac{7}{15}\times 300=140$ $300-140$	160	4	M1 for $300\div 6$ or 50 seen M1 for $300\div 10\times 3$ oe or $30+30+30$ or 90 seen M1 (dep on at least 1 previous M1) for $300-"50"-"90"$ A1 cao OR M1 for $\frac{1}{6}+\frac{3}{10}$ or $\frac{7}{15}$ oe M1 for $"\frac{7}{15}"\times 300$ or 140 seen or $1-"\frac{7}{15}"$ or $\frac{8}{15}$ oe seen M1 (dep on at least 1 previous M1) for $300-"140"$ or 160 seen or $"\frac{8}{15}"\times 300$ A1 cao
9	$360\div 5$ OR $180-(3\times 180\div 5)$	72	2	M1 for $360\div 5$ or $180-(3\times 180\div 5)$ oe A1 cao

Question	Working	Answer	Mark	Notes
10 (a)		3, −3, −1	2	B2 for all 3 correct (B1 for 1 or 2 correct)
(b)		Graph	2	B2 for a fully correct graph OR B1 ft for "7 points" plotted correctly ±2mm B1 for smooth curve drawn through their points provided B1 awarded in (a) Note: a straight line drawn from (-1, -3) to (0, -3) gets a maximum of B1
(c)		−2.3 and 1.3	1	B1 for -2.3 and 1.3 or ft ±2mm on a graph with exactly 2 points of intersection with the *x* axis
11 (a)	$P = x + x + x + x$	$P = 4x$	1	B1 for any correct expression for *P* in terms of *x*, eg. $P = 4x$, $P = 4 \times x$, $P = x + x + x + x$
(b)	$A = x^2 \quad x = \frac{P}{4} \quad A = \frac{P}{4} \times \frac{P}{4}$	$A = \frac{P^2}{16}$	2	M1 rearrange the *P* equation to make *x* the subject, may be implied by $\frac{P}{4}$ seen A1 $A = \frac{P^2}{16}$ oe

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Question	Working	Answer	Mark	Notes
12	$4000-\frac{10}{100}\times 4000$ = 3600 $3600-\frac{10}{100}\times 3600$	3240	3	M1 for $4000-\frac{10}{100}\times 4000$ or 0.9×4000 oe or sight of 3600 or 400 or 3200 or 800 seen M1 (dep) $"3600"-\frac{10}{100}\times"3600"$ oe or $"3600"\times 0.9$ A1 cao OR M2 for 4000×0.9^2 (M1 for 4000×0.9^3) A1 cao SC: B2 for answer of 4840, with or without working
13 (a)		$a^2(c+b)$ $4abc$	2	B1 for $a^2(c+b)$ B1 for $4abc$ (−1 for each additional answer to a minimum of 0)
(b)	8×100×100×100	8 000 000 or 8×10^6 or 8 million	2	M1 for sight of 10^6 oe or $100\times 100\times 100$ or $200\times 200\times 200$ A1 for 8 000 000 or 8×10^6 or 8 million

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Question	Working	Answer	Mark	Notes
14	$6x + 4y = 16$ $6x + 15y = -6$ $-11y = 22$ $6x + 4 \times -2 = 16$ OR $x = \frac{8 - 2y}{3}$ $2\left(\frac{8-2y}{3}\right) + 5y = -2$ $16 - 4y + 15y = -6$ $11y = -22$ $6x + 4 \times -2 = 16$	$x = 4$, $y = -2$	4	M1 for correct process to eliminate either x or y (condone one arithmetic error) A1 for either $x = 4$ or $y = -2$ M1 (dep on 1st M1) for correct substitution of their found variable or (indep) for correct process to eliminate either x or y (condone one arithmetic error) A1 cao for both $x = 4$ and $y = -2$ SC B1 for $x = 4$ or $y = -2$ if M0 scored

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Question	Working	Answer	Mark	Notes
15	Gradient = $\frac{10--2}{3-0}$	$y = 4x - 2$	3	M1 for gradient = $\frac{10--2}{3-0}$ or $(y =)4x + c$ or a right-angled triangle with sides 12 and 3 shown M1 for $(y =)\, mx - 2$, $m \neq 0$, or $10 = 3m + c$ or $-2 = 0m + c$ A1 for $y = 4x - 2$ oe (the y must be included in the equation)
16 (i) (ii) (iii)		1 8 $\frac{4}{9}$	4	B1 cao B1 for 8 or -8 or ±8 M1 for $\left(\frac{8}{27}\right)^{\frac{2}{3}}$ or $\left(\frac{3}{2}\right)^{-2}$ or $\left(\frac{2}{3}\right)^{2}$ or $\frac{1}{\left(\sqrt[3]{\frac{27}{8}}\right)^{2}}$ or better or $\frac{9}{4}$ seen A1 cao

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Question	Working	Answer	Mark	Notes
17	$x^2 - 4x - 12 = 0$ $(x-6)(x+2) = 0$ $x = 6, -2$ OR $x^2 - 4x - 12 = 0$ $x = \frac{--4 \pm \sqrt{(-4)^2 - 4\times1\times(-12)}}{2\times1}$ $x = \frac{4 \pm \sqrt{64}}{2}$ $x = 6, -2$	6, −2	4	B1 for $x^2 - 4x - 12 (= 0)$, can be implied by M2 M1 for $(x \pm 6)(x \pm 2)$ M1 for $(x-6)(x+2)$ A1 cao 6 and −2 OR B1 for $-x^2 + 4x + 12 (= 0)$, can be implied by M2 M1 for $(6 \pm x)(2 \pm x)$ M1 for $(-x+6)(x+2)$ A1 cao 6 and −2 OR B1 for $x^2 - 4x - 12 (= 0)$, can be implied by M2 or by correct values of *a*, *b* and *c* M1 for substitution of ±1, ±4 and ±12 into formula (condone incorrect signs) M1 for $x = \frac{4 \pm \sqrt{64}}{2}$ or $x = \frac{-4 \pm \sqrt{64}}{-2}$ A1 cao 6 and −2 OR T&I B4 both solutions correct (B1 one correct solution)

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Question	Working	Answer	Mark	Notes
18	*PQT* = 58° (Alternate segment theorem) *QTP* = (180 – 58)/2 (= 61°) (Isosceles triangle) *OTQ* = 61 – (90–58) (Angle between tangent and radius) OR *OTP* = 90 – 58 (=32°) (Angle between tangent and radius) *OTP* = *OPT* = 32° (Isosceles triangle) *POT* = 180 – 32 – 32 = 116° (Angles in a triangle) *PQT* = 116÷2 = 58° (Angle at centre is twice angle at circumference) *QTP* = (180 – 58)/2 (= 61°) (Isosceles triangle) *OTQ* = 61 – (90–58) (Angle between tangent and radius)	29	5	M1 for *PQT* = 58° or $\frac{1}{2}$ (180 – (2 × (90 – 58)) M1 (dep) for *QPT* or *QTP* = (180 – "58")/2 A1 for *OTQ* = 29° B2 for fully correct reasons (B1 for alternate segment theorem or equivalent circle theorems leading to *PQT*)

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Mark Scheme (Results)

Summer 2010

GCSE

GCSE Mathematics (2381)
Calculator Paper 14H

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Summer 2010
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NOTES ON MARKING PRINCIPLES

1 Types of mark

M marks: method marks
A marks: accuracy marks
B marks: unconditional accuracy marks (independent of M marks)

2 Abbreviations

cao – correct answer only
isw – ignore subsequent working
oe – or equivalent (and appropriate)
indep - independent
ft – follow through
SC: special case
dep – dependent

3 No working

If no working is shown then correct answers normally score full marks
If no working is shown then incorrect (even though nearly correct) answers score no marks.

4 With working

If there is a wrong answer indicated on the answer line always check the working in the body of the script (and on any diagrams), and award any marks appropriate from the mark scheme.
If working is crossed out and still legible, then it should be given any appropriate marks, as long as it has not been replaced by alternative work.
If it is clear from the working that the "correct" answer has been obtained from incorrect working, award 0 marks. Send the response to review, and discuss each of these situations with your Team Leader.
If there is no answer on the answer line then check the working for an obvious answer.
Any case of suspected misread loses A (and B) marks on that part, but can gain the M marks. Discuss each of these situations with your Team Leader.
If there is a choice of methods shown, then no marks should be awarded, unless the answer on the answer line makes clear the method that has been used.

5 Follow through marks

Follow through marks which involve a single stage calculation can be awarded without working since you can check the answer yourself, but if ambiguous do not award.

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Follow through marks which involve more than one stage of calculation can only be awarded on sight of the relevant working, even if it appears obvious that there is only one way you could get the answer given.

6 Ignoring subsequent work

It is appropriate to ignore subsequent work when the additional work does not change the answer in a way that is inappropriate for the question: e.g. incorrect canceling of a fraction that would otherwise be correct
It is not appropriate to ignore subsequent work when the additional work essentially makes the answer incorrect e.g. algebra.
Transcription errors occur when candidates present a correct answer in working, and write it incorrectly on the answer line; mark the correct answer.

7 Probability

Probability answers must be given a fractions, percentages or decimals. If a candidate gives a decimal equivalent to a probability, this should be written to at least 2 decimal places (unless tenths).
Incorrect notation should lose the accuracy marks, but be awarded any implied method marks.
If a probability answer is given on the answer line using both incorrect and correct notation, award the marks.
If a probability fraction is given then cancelled incorrectly, ignore the incorrectly cancelled answer.

8 Linear equations

Full marks can be gained if the solution alone is given on the answer line, or otherwise unambiguously indicated in working (without contradiction elsewhere). Where the correct solution only is shown substituted, but not identified as the solution, the accuracy mark is lost but any method marks can be awarded.

9 Parts of questions

Unless allowed by the mark scheme, the marks allocated to one part of the question CANNOT be awarded in another.

10 Range of answers

Unless otherwise stated, when an answer is given as a range (e.g 3.5 – 4.2) then this is inclusive of the end points (e.g 3.5, 4.2) and includes all numbers within the range (e.g 4, 4.1)

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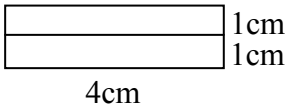
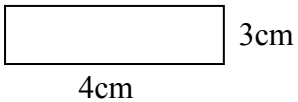
5384H/14H					
Question		**Working**	**Answer**	**Mark**	**Notes**
1		120×1.5 8×1.5 420×1.5 180×1.5	180 12 630 270	3	M1 for $\times 6 \div 4$ or $\frac{6}{4}$ oe or $\div 4\times 6$ or $(120+60)$ or 1.5 seen or sight of any one of the four correct answers A1 for 2 or more correct answers A1 for 4 correct answer
2	(a)	1.25×620	775	2	M1 for 1.25×620 oe A1 cao
	(b)	$50\div1.25=40$ $42-40$	2	3	M1 for $50\div1.25$ $(=40)$ oe M1 (dep) for $42-$ '40' or '40' -42 A1 cao OR M1 for 42×1.25 $(=52.5)$ oe M1 (dep) for '52.5' -50 or $50-$ '52.5' A1 cao (A0 for €2.5(0) or £2.5(0) without any working) (SC award B2 for –2)

Question	Working	Answer	Mark	Notes
3 (a)	$\pi \times 12$	37.7	2	M1 for $\pi \times 12$ (accept π as 22/7 or 3.1 or better) A1 for an answer in the range 37.6 – 37.8
(b)	$\pi \times 6 \times 6$	113	2	M1 for $\pi \times 6 \times 6$ (accept π as 22/7 or 3.1 or better) A1 for an answer in the range 113 – 113.2
4	$x = 1$ gives 11 $x = 2$ gives 28 $x = 1.5$, gives 18.(3..) $x = 1.6$, gives 20.(09..) $x = 1.7$, gives 21.(9..) $x = 1.8$, gives 23.(8..) $x = 1.9$, gives 25.(8..) $x = 1.85$, gives 24.8(3..) $x = 1.86$ gives 25.(0..) $x = 1.87$ gives 25.2(3..) $x = 1.88$ gives 25.4(4..) $x = 1.89$ gives 25.6(5..)	1.9	4	B2 for a trial between $1.8 \leq x \leq 1.9$ evaluated (B1 for a trial between $1 \leq x \leq 2$ evaluated) B1 for a different trial between $1.85 \leq x < 1.9$ evaluated B1 (dep on at least one previous B1) for 1.9 NB: no working scores no marks even if answer is correct. Accept trials correct to the nearest whole number (rounded or truncated) if the value of x is to 1dp but correct to 1dp (rounded or truncated) if the value of x is to 2dp

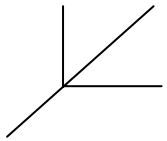
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Question	Working	Answer	Mark	Notes
5 (a)	$8x = 17 + 3$	2.5	2	M1 for $8x = 17 + 3$ or $8x - 3 + 3 = 17 + 3$ or for $8x/8 - 3/8 = 17/8$ or for ('17+3')÷8 A1 for 2.5 or $\frac{20}{8}$ oe NB embedded answer of 2.5 must be clearly indicated in the equation and gets SC B1
(b)	$y = 9 \times 3 \div 2$	13.5	2	M1 for attempt to multiply both sides by 3 or 3/2 or divide both sides by 2 or 9÷(2/3) or 9×(3/2) A1 for 13.5 or $\frac{27}{2}$ oe NB embedded answer of 13.5 must be clearly indicated in the equation and gets SC B1
6 (a)		exterior angles of a regular polygon are equal	1	B1 for exterior angles of a regular polygon are equal (correct explanations must include each of the features exterior angles, regular polygon oe, and equal oe
(b)	$3x = 60$	20	2	M1 for an attempt to move x to LHS or –20 to RHS or +40 to LHS or $4x$ to LHS, e.g. $-x$ each side or +20 each side or –40 each side or $-4x$ each side, or sight of $3x$ on LHS of equation or 60 on RHS of equation A1 cao
7	$\frac{84}{350} \times 100$	24	2	M1 for $\frac{84}{350} \times 100$ oe A1 cao

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Question	Working	Answer	Mark	Notes
8	$\sqrt{6^2+14^2} = \sqrt{232}$	15.23	3	M1 for $6^2 + 14^2$ or 36+196 or 232 M1 for $\sqrt{36+196}$ or $\sqrt{232}$ A1 for answer in the range 15.2 – 15.3
9 (a)			2	B2 cao (B1 for a rectangle 4cm×1cm or a rectangle 4cm×2cm. Could be attached to other rectangles) Do not accept rectangles with additional external lines.
(b)			2	B2 cao [B1 for a rectangle with one correct dimension] NB any orientation possible, ignore internal lines
10 (a)		−3, −2, −1, 0, 1	2	B2 for all 5 correct values, ignore repeats, any order (−1 for each omission or additional value)
(b)	$3x - x > 7 + 2$ $2x > 9$	$x > 4.5$	2	M1 for an attempt to move x to LHS or –2 to RHS, e.g. $-x$ each side or +2 each side or sight of $2x$ or 9 or $2x > 9$, or sight of $2x$ on LHS of (in)equality or 9 on RHS of (in)equality e.g.. $3x - x > 7 + 2$ A1 oe allow $x > \frac{9}{2}$ and $x > 4\frac{1}{2}$ [SC: B1 for $x = 4.5$, $x < 4.5$ if M0 scored]

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Question	Working	Answer	Mark	Notes
11			2	B2 for correct locus within guidelines (overlay) (B1 for a line drawn parallel to either given line OR a line passing through the angle outside of the guidelines OR for a line drawn within guidelines but not passing through angle)
12	$r^2 = \frac{A}{3}$	$A = 3r^2$	2	M1 for $r^2 = \frac{A}{3}$ or an attempt to square both sides or an attempt to multiply both sides by $\sqrt{3}$ A1 cao
13	$24500 \div 0.000125 = 196000000$	1.96×10^8	2	B2 cao [B1 for 196000000 or $1.96 \times 10^4 \times 10^4$ oe or 1.96×10^n or digits 196×10^n, where *n* is a number other than 8 or absent]
14	$\cos 58^o = \frac{AB}{16}$ $AB = 16 \times \cos\ 58°$	8.48	3	M1 for $\cos 58^o = \frac{AB}{16}$ M1 (dep) for $16 \times \cos\ 58°$ A1 for answer in range 8.47 – 8.48 [SC M2 A0 for 1.9-1.91 (rad) or 9.8 – 9.81 (grad)]

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Question	Working	Answer	Mark	Notes
15 (a)		28.5	1	B1 for 28.5 or 2850 cm or 28.499 or 28.49…
(b)	2 × (147.5 + 28.5)	352	3	B1 for upper bound of length = 147.5 or 14750 cm or 147.49 recurring oe M1 for 2 × ("upper bound width" + "upper bound length"), where these are not the given values A1 for answer in the range 351.999 – 352
16 (a)	p^{5+4}	p^9	1	B1 (accept p^{5+4})
(b)		$x^{-2}\ x^0\ x^{\frac{1}{2}}\ x\ x^2$	2	B2 cao (B1 for any 4 in relative correct order or all correct but in reverse order)
17	$\frac{40}{360}\times\pi\times8^2 - \frac{1}{2}\times8^2\times\sin 40^o$ = 22.34…. − 20.569… OR $\frac{40}{360}\times\pi\times8^2 - 8\times\sin 20^o\times8\times\cos 20^o$ = 22.34… − 20.569…	1.77	5	M1 for $\frac{40}{360}$ oe seen or 0.11 seen or ÷9 M1 for $\frac{40}{360}\times\pi\times8^2$ oe or sight of 22 – 22.35 M1 for $\frac{1}{2}\times8^2\times\sin 40°$ or $8\times\sin 20°\times8\times\cos 20°$ or sight of answer in range 20.56 – 20.57 M1 (dep on at least one M1 scored) for the difference between the area of triangle *OPS* and the area of sector *OPRS* A1 for answer in range 1.74 – 1.78 [B3 for ±1.50(3…) (rad) or 3.53(1…) (grad)]

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Question	Working	Answer	Mark	Notes
18 (a)		$y = f(x-5)$	1	B1 cao
(b)		(4, 3)	2	B2 cao (B1 for one correct (in correct position) or for (3, 4))

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Centre No.						Paper Reference								Surname	Initial(s)
Candidate No.						5	3	8	4	H	/	1	3	H	Signature

Paper Reference(s)

5384H/13H

Examiner's use only

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Edexcel GCSE

Mathematics (Modular) – 2381

Paper 13 (Non-Calculator)



Higher Tier

Unit 3

Thursday 5 November 2009 – Morning

Time: 1 hour 10 minutes

Materials required for examination
Ruler graduated in centimetres and millimetres, protractor, compasses, pen, HB pencil, eraser.
Tracing paper may be used.

Items included with question papers
Nil

Instructions to Candidates

In the boxes above, write your centre number, candidate number, your surname, initials and signature.
Check that you have the correct question paper.
Answer ALL the questions. Write your answers in the spaces provided in this question paper.
You must NOT write on the formulae page.
Anything you write on the formulae page will gain NO credit.
If you need more space to complete your answer to any question, use additional answer sheets.

Information for Candidates

The marks for individual questions and the parts of questions are shown in round brackets: e.g. **(2)**.
There are 18 questions in this question paper. The total mark for this paper is 60.
There are 16 pages in this question paper. Any blank pages are indicated.
Calculators must not be used.

Advice to Candidates

Show all stages in any calculations.
Work steadily through the paper. Do not spend too long on one question.
If you cannot answer a question, leave it and attempt the next one.
Return at the end to those you have left out.

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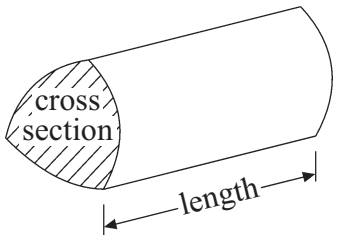
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GCSE Mathematics 2381

Formulae: Higher Tier

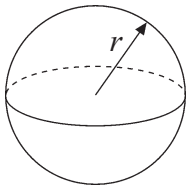
You must not write on this formulae page.
Anything you write on this formulae page will gain NO credit.

Volume of a prism = area of cross section × length



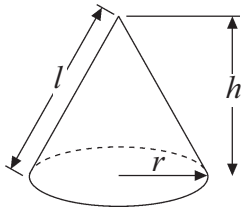
Volume of sphere $= \frac{4}{3}\pi r^3$

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

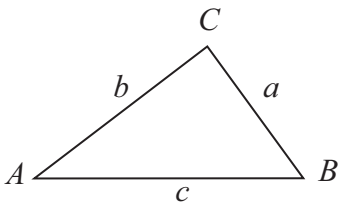


Volume of cone $= \frac{1}{3}\pi r^2 h$

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



In any triangle ABC



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

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

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

The Quadratic Equation

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

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

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N 3 5 5 2 4 A 0 2 1 6

Leave blank

Answer ALL EIGHTEEN questions.

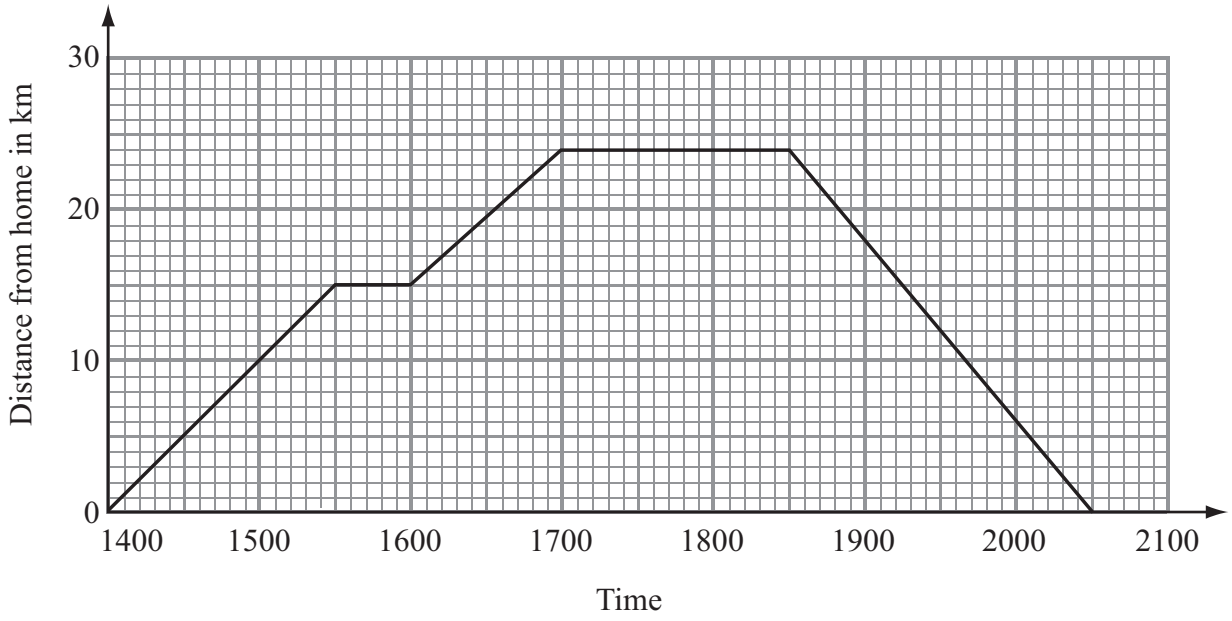
Write your answers in the spaces provided.

You must write down all stages in your working.

You must NOT use a calculator.

1. Jenny cycled from home to visit her uncle.

She had a rest on the way to her uncle's house.
The travel graph shows her journey.



(a) How far is Jenny's uncle's house from Jenny's home?

..... km
(1)

(b) How long did Jenny stay at her uncle's house?

.....
(1)

Q1

(Total 2 marks)

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Leave blank

2. (a) Work out 25% of 800

.....

(1)

(b) Write 52 out of 200 as a percentage.

..... %

(2)

Q2

(Total 3 marks)

3. The ratio of pink tiles to white tiles on a bathroom floor is 1:4
There are 6 pink tiles.

Work out the number of white tiles.

.....

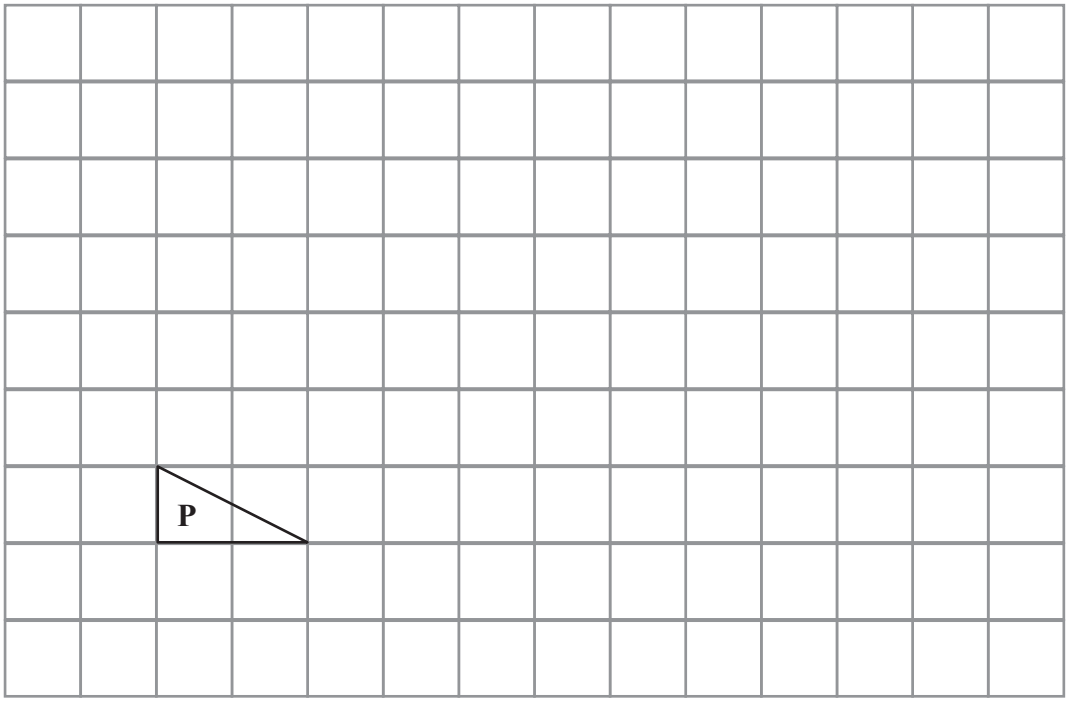
Q3

(Total 2 marks)

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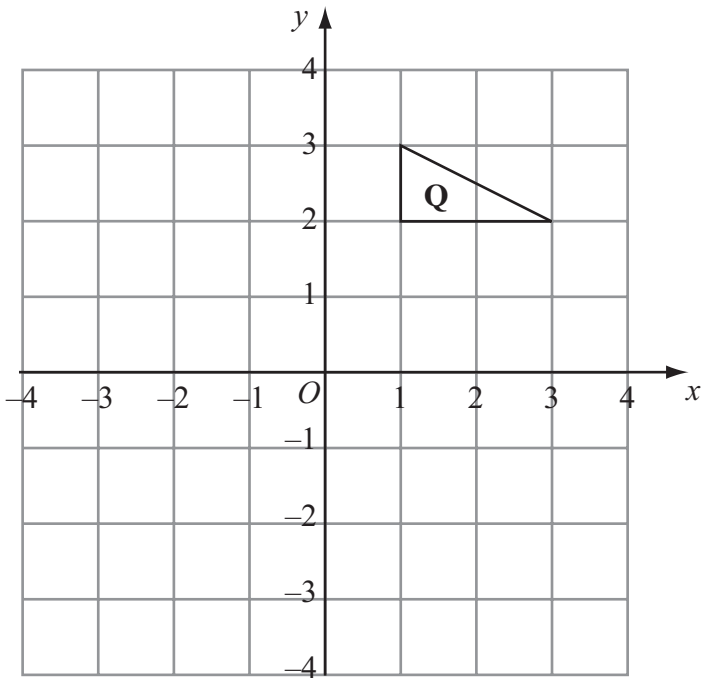
4.



Triangle **P** has been drawn on a grid.

(a) On the grid, draw an enlargement of the triangle **P** with scale factor 3

(2)



Triangle **Q** has been drawn on a grid.

(b) On the grid, rotate triangle **Q** 90° clockwise, centre *O*.

(3)

Q4

(Total 5 marks)

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Leave blank

5. (a) Solve $4(x - 3) = 2x + 13$

$x =$ .....

(3)

(b) k is an integer such that $-1 \leqslant k < 3$

List all the possible values of k.

.....

(2)

(c) Solve the inequality $6y \geqslant y + 10$

.....

(2) **Q5**

(Total 7 marks)

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Leave blank

6. (a) A solid cube has sides of length 5 cm.

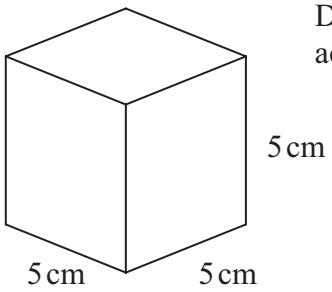


Diagram **NOT** accurately drawn

Work out the total surface area of the cube.
State the units of your answer.

.....

(4)

The volume of the cube is 125 cm^3.

(b) Change 125 cm^3 into mm^3.

..... mm^3

(2)

Q6

(Total 6 marks)

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Leave blank

7. (a) Work out $\frac{3}{8}+\frac{1}{4}$

Give your answer in its simplest form.

.....

(2)

(b) Work out $\frac{2}{3}\times\frac{4}{5}$

.....

(2) **Q7**

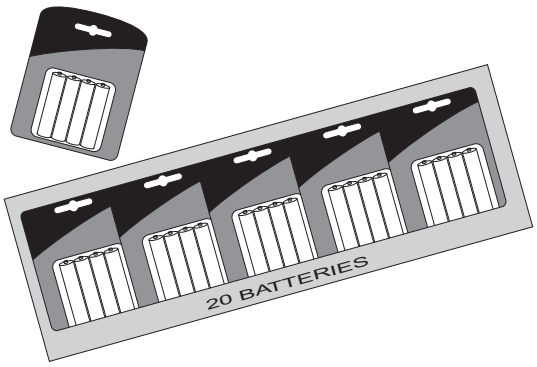
(Total 4 marks)

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N 3 5 5 2 4 A 0 8 1 6

Leave blank

8. Batteries are sold in packets and boxes.



Each packet contains 4 batteries.
Each box contains 20 batteries.

Bill buys p packets of batteries
and b boxes of batteries.
Bill buys a total of N batteries.

Write down a formula for N
in terms of p and b.

.....

Q8

(Total 3 marks)

9. Make q the subject of the formula $5(q + p) = 4 + 8p$
Give your answer in its simplest form.

q = ...

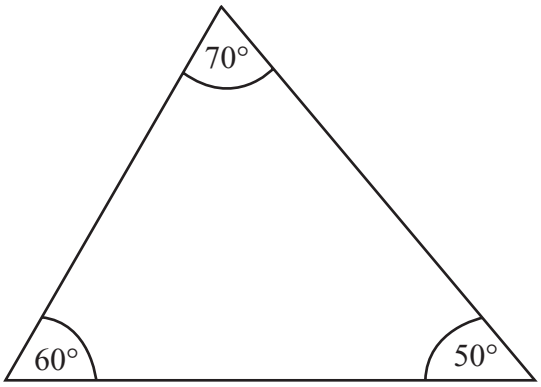
Q9

(Total 3 marks)

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10. (a) Here is a triangle.



This triangle is to be enlarged by a scale factor of 2

Emily says the angles will be doubled.

Emily is **wrong**.
Explain why.

.....

.....

(1)

(b) Here are two rectangles.

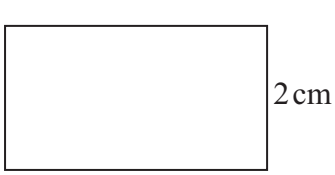




Diagram **NOT** accurately drawn

Ross says that the larger rectangle is an enlargement of the smaller rectangle.

Ross is **correct**.
Explain why.

.....

.....

(2)

Q10

(Total 3 marks)

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Leave blank

11.

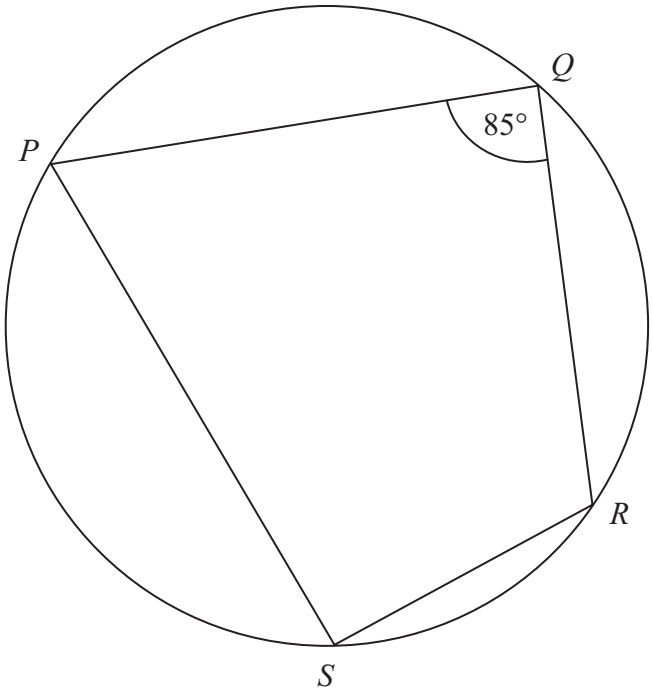


Diagram **NOT** accurately drawn

P, *Q*, *R* and *S* are points on the circumference of a circle.
Angle *PQR* = 85°.

Find the size of angle *PSR*.

Give a reason for your answer.

..... °

Q11

(Total 2 marks)

Leave blank

12. Solve the simultaneous equations

$$4x + y = -1$$

$$4x - 3y = 7$$

$x =$ ..... $y =$ .....

(Total 3 marks)

Q12

13. Work out $\dfrac{5\times10^{8}}{2\times10^{15}}$

Give your answer in standard form.

.....

(Total 2 marks)

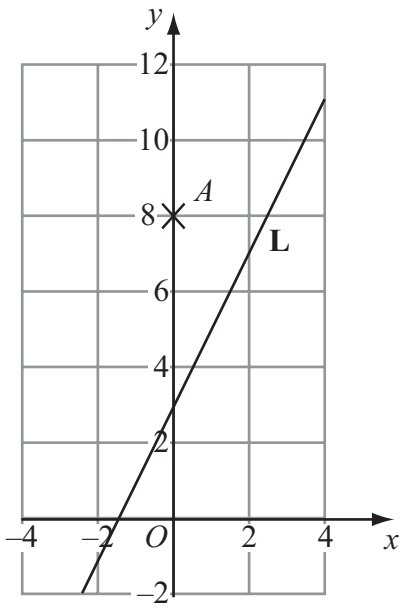
Q13

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N 3 5 5 2 4 A 0 1 2 1 6

Leave blank

14.



A is the point (0, 8).
L is the line with equation $y = 2x + 3$

Find the equation of the line passing through *A*, that is also perpendicular to **L**.

.....

Q14

(Total 3 marks)

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Leave blank

15. (a) Work out $(9^{\frac{1}{2}})^4$

.....

(1)

$y^3 = 11$

y can be written in the form 11^a

(b) Write down the value of a.

$a =$ .....

(1)

Q15

(Total 2 marks)

16. Work out $(2 + \sqrt{3})(2 - \sqrt{3})$

Give your answer in its simplest form.

.....

Q16

(Total 2 marks)

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17.

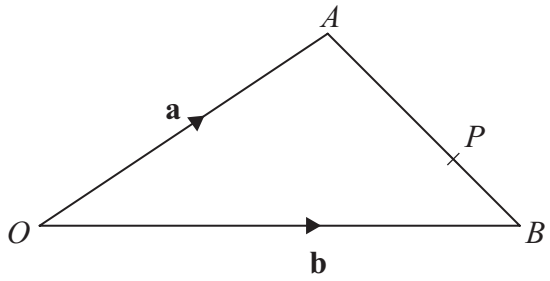


Diagram **NOT** accurately drawn

OAB is a triangle.

$\overrightarrow{OA} = \mathbf{a}$, $\overrightarrow{OB} = \mathbf{b}$

(a) Find the vector $\overrightarrow{AB}$ in terms of **a** and **b**.

$\overrightarrow{AB}$ = ...

(1)

P is the point on AB so that $AP : PB = 2 : 1$

(b) Find the vector $\overrightarrow{OP}$ in terms of **a** and **b**.
Give your answer in its simplest form.

$\overrightarrow{OP}$ = ...

(3)

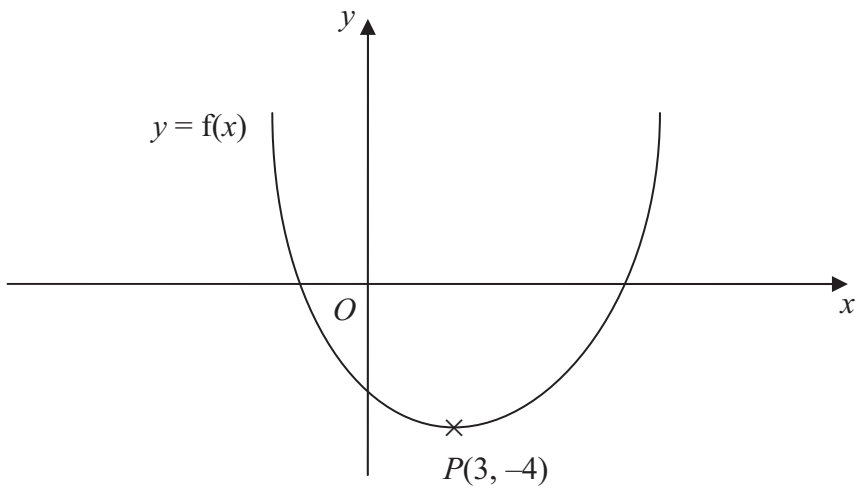
Q17

(Total 4 marks)

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18. This is a sketch of the curve with the equation $y = f(x)$.
The only minimum point of the curve is at $P(3, -4)$.



(a) Write down the coordinates of the minimum point of the curve with the equation $y = f(x - 2)$

(..... , ...)
(2)

(b) Write down the coordinates of the minimum point of the curve with the equation $y = f(x + 5) + 6$

(..... , ...)
(2)

Q18

(Total 4 marks)

TOTAL FOR PAPER: 60 MARKS

END

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Centre No.						Paper Reference								Surname	Initial(s)
Candidate No.						5	3	8	4	H	/	1	4	H	Signature

Paper Reference(s)

5384H/14H

Examiner's use only

Team Leader's use only

Edexcel GCSE

Mathematics (Modular) – 2381

Paper 14 (Calculator)

Higher Tier

Unit 3



Tuesday 10 November 2009 – Morning

Time: 1 hour 10 minutes

Materials required for examination
Ruler graduated in centimetres and millimetres, protractor, compasses, pen, HB pencil, eraser, calculator. Tracing paper may be used.

Items included with question papers
Nil

Instructions to Candidates

In the boxes above, write your centre number, candidate number, your surname, initials and signature.
Check that you have the correct question paper.
Answer ALL the questions. Write your answers in the spaces provided in this question paper.
You must NOT write on the formulae page.
Anything you write on the formulae page will gain NO credit.
If you need more space to complete your answer to any question, use additional answer sheets.

Information for Candidates

The marks for individual questions and the parts of questions are shown in round brackets: e.g. **(2)**.
There are 18 questions in this question paper. The total mark for this paper is 60.
There are 16 pages in this question paper. Any blank pages are indicated.
Calculators may be used.
If your calculator does not have a π button, take the value of π to be 3.142 unless the question instructs otherwise.

Advice to Candidates

Show all stages in any calculations.
Work steadily through the paper. Do not spend too long on one question.
If you cannot answer a question, leave it and attempt the next one.
Return at the end to those you have left out.

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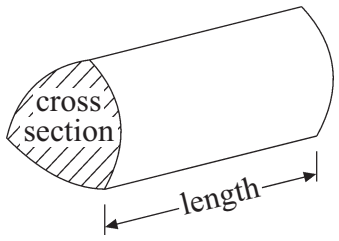
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GCSE Mathematics 2381

Formulae: Higher Tier

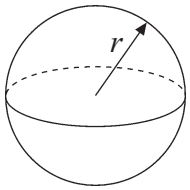
You must not write on this formulae page.
Anything you write on this formulae page will gain NO credit.

Volume of a prism = area of cross section × length



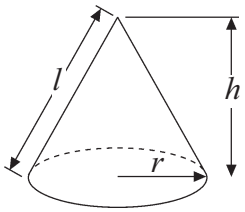
Volume of sphere $= \frac{4}{3}\pi r^3$

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

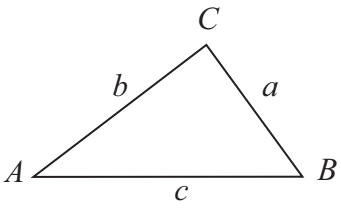


Volume of cone $= \frac{1}{3}\pi r^2 h$

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



In any triangle ABC



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

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

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

The Quadratic Equation

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

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

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Leave blank

Answer ALL EIGHTEEN questions.

Write your answers in the spaces provided.

You must write down all stages in your working.

1. Use your calculator to work out the value of $\dfrac{8.7\times12.3}{9.5-5.73}$

Write down all the digits from your calculator.
Give your answer as a decimal.

.....

(Total 2 marks)

Q1

2. (a) $p = 2$
$q = -4$

Work out the value of $3p + 5q$

.....

(2)

(b) Solve $8x + 11 = 39$

$x =$ .....

(2)

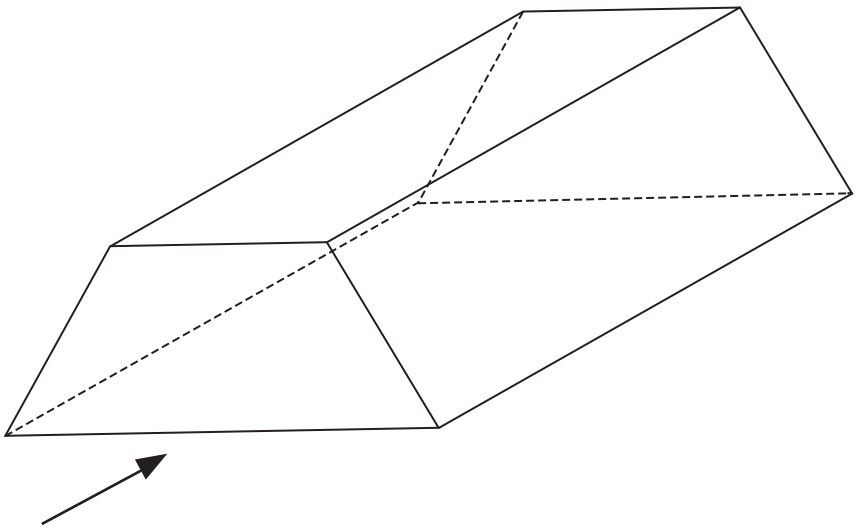
(Total 4 marks)

Q2

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3.



The diagram shows a prism.

(a) On the diagram, draw in **one** plane of symmetry for the prism.

(2)

(b) In the space below, sketch the front elevation from the direction marked with an arrow.

(2) **Q3**

(Total 4 marks)

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4. A circle has a radius of 5 cm.

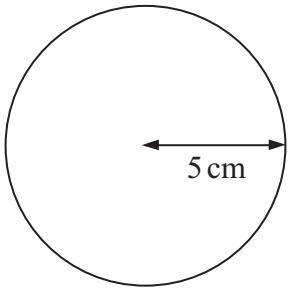


Diagram **NOT** accurately drawn

Work out the area of the circle.
Give your answer correct to 3 significant figures.

..... cm^2

Q4

(Total 2 marks)

5. A regular polygon has 12 sides.

Work out the size of an exterior angle of this regular polygon.

..... °

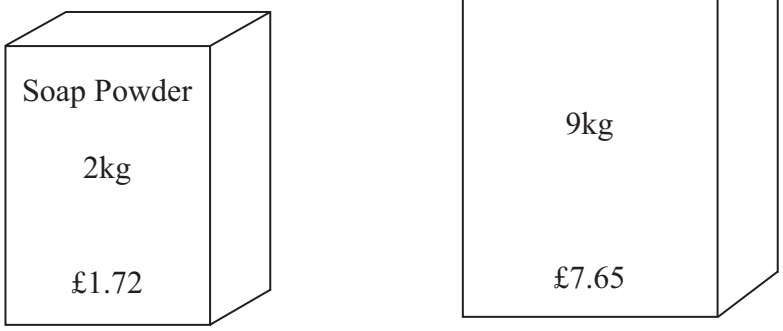
Q5

(Total 2 marks)

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6. Soap powder is sold in two sizes of box.



Small box Large box

A small box contains 2 kg of soap powder and costs £1.72
A large box contains 9 kg of soap powder and costs £7.65

Which size of box gives the better value for money?

.....

Explain your answer.
You must show all your working.

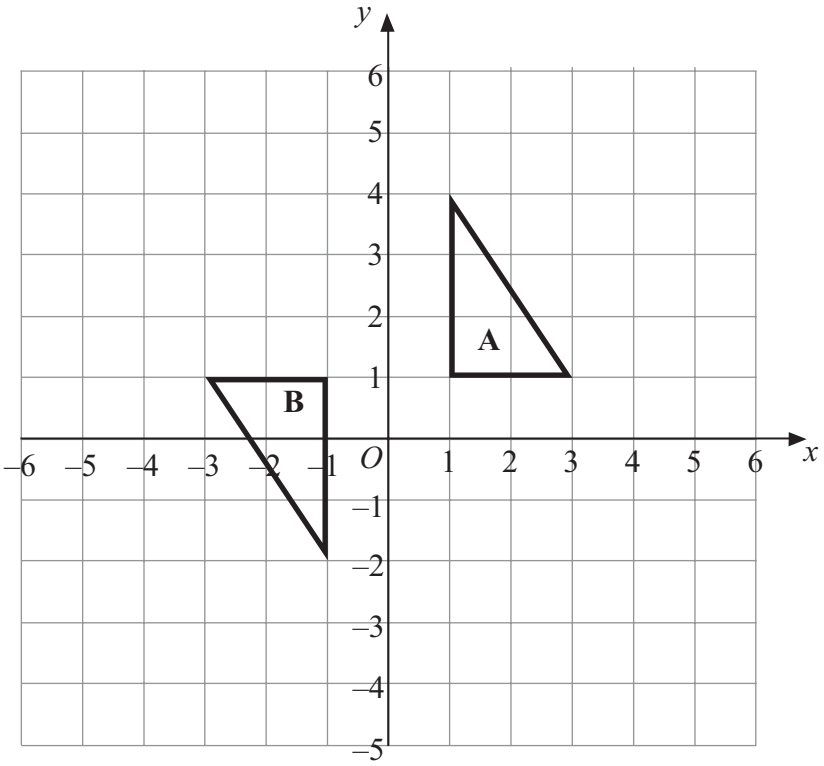
Q6

(Total 3 marks)

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Leave blank

7.



Describe fully the single transformation that maps triangle **A** onto triangle **B**.

.....

.....

Q7

(Total 3 marks)

8. A computer costs £360 plus $17\frac{1}{2}$% VAT.

Calculate the total cost of the computer.



£360

plus

$17\frac{1}{2}$% VAT

£ .....

Q8

(Total 3 marks)

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Leave blank

9. A piece of wood is 180 cm long.
Tom cuts it into three pieces in the ratio 2 : 3 : 4

Work out the length of the longest piece.

..... cm

Q9

(Total 3 marks)

10. The equation

$$x^3 + 2x = 60$$

has a solution between 3 and 4

Use a trial and improvement method to find this solution.
Give your answer correct to 1 decimal place.
You must show all your working.

$x =$ .....

Q10

(Total 4 marks)

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11. (a) Simplify $m^3 \times m^4$

.....

(1)

(b) Simplify $p^7 \div p^3$

.....

(1)

(c) Simplify $4x^2y^3 \times 3xy^2$

.....

(2) **Q11**

(Total 4 marks)

12.

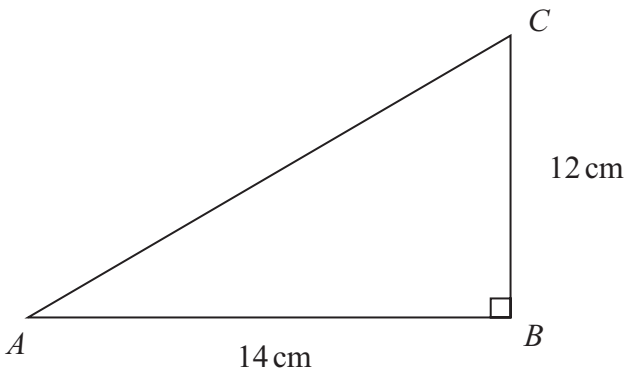


Diagram **NOT** accurately drawn

ABC is a right-angled triangle.
AB = 14 cm.
BC = 12 cm.

Calculate the length of *AC*.
Give your answer correct to 3 significant figures.

..... cm **Q12**

(Total 3 marks)

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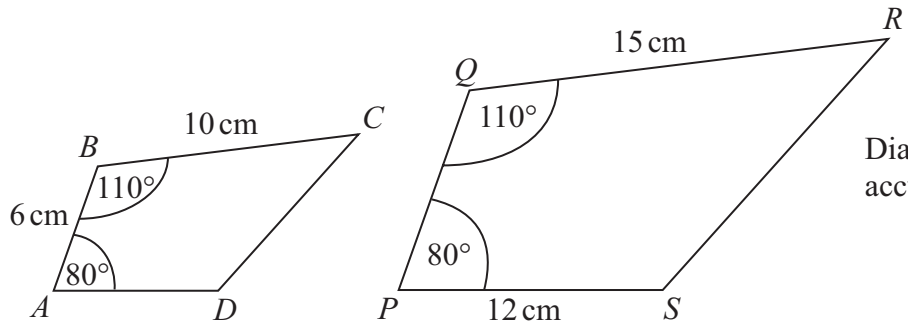
13. Solve $\dfrac{29-x}{4} = x+5$

$x =$ .....

(Total 3 marks)

Q13

14.



Diagrams **NOT** accurately drawn

ABCD and *PQRS* are mathematically similar.

(a) Find the length of *PQ*.

..... cm

(2)

(b) Find the length of *AD*.

..... cm

(2)

(Total 4 marks)

Q14

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15. y is directly proportional to x.

When $x = 500$, $y = 10$

Find a formula for y in terms of x.

$y =$ .....

Q15

(Total 3 marks)

16.

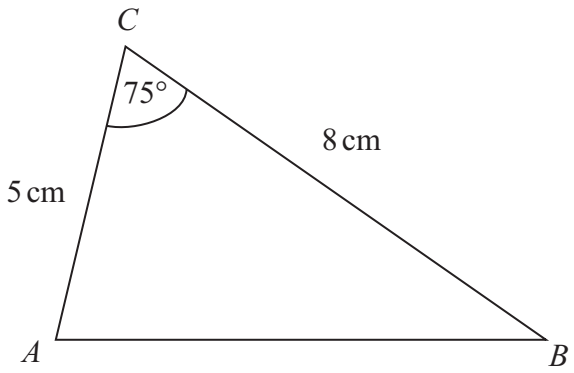


Diagram **NOT** accurately drawn

In triangle ABC,

$AC = 5$ cm.
$BC = 8$ cm.
Angle $ACB = 75°$.

Calculate the length of AB.
Give your answer correct to 3 significant figures.

..... cm

Q16

(Total 3 marks)

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17. $v = \sqrt{\frac{a}{b}}$

a = 6.43 correct to 2 decimal places.
b = 5.514 correct to 3 decimal places.

By considering bounds, work out the value of v to a suitable degree of accuracy.

You must show all your working and give a reason for your final answer.

v = ...

Q17

(Total 5 marks)

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Leave blank

18. Solve $\frac{4}{x+3}+\frac{3}{2x-1}=1$

.....

Q18

(Total 5 marks)

TOTAL FOR PAPER: 60 MARKS

END

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Mark Scheme (Results)

November 2009

GCSE

GCSE Mathematics (Modular) - 2381
Paper: 5384H/13H

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November 2009

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5384H_13H
0911

5384H/13H					
Question		**Working**	**Answer**	**Mark**	**Notes**
1	(a)		24	1	B1 cao
	(b)		1½ hours	1	B1 for 1½ hours oe (do not accept 1.30 hrs)
2	(a)	$\frac{25}{100}$ x 800	200	1	B1 cao
	(b)	$\frac{52}{200} \times 100$	26	2	M1 for $\frac{52}{200} \times 100$ or a clear attempt to change $\frac{52}{200}$ to an equivalent fraction over 100 A1 cao
3		4×6	24	2	M1 for 4×6 A1 cao
4	(a)		Enlarged P	2	B2 any correct enlargement (B1 at least one side drawn to a sf of 3 or any enlargement ≠ 3 or 1) Tolerance ½ square
	(b)		Rotated Q	3	B3 fully correct (B2 correct orientation in correct quadrant or anticlockwise rotation 90º centre O) (B1 any rotation about O or correct orientation in incorrect quadrant or correct orientation in all 4 quadrants).

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5384H/13H					
Question		**Working**	**Answer**	**Mark**	**Notes**
5	(a)		12½	3	M1 for $4 \times x - 4 \times 3$ or $4x - 12$ or $(2x + 13) \div 4$ M1 for $2x - 12 = 13$ or $4x = 2x + 25$ or $0.5x = 3.25 + 3$oe A1 12½ oe
	(b)		–1,0,1,2	2	B2 cao (–1 each error or omission)
	(c)	$5y \geq 10$	$y \geq 2$	2	M1 for $5y \geq 10$, condone use of = sign or > sign A1 for(y) ≥ 2 as a final answer [SC: B1 for 2 or $\frac{10}{5}$ seen if M0]
6	(a)	$(5\times5)\times6=$	150	4	M1 for attempt to find the area of one face (eg 5×5 or 25) M1 for 6 faces with an intention to add or × 6 A1 cao
			cm^2		B1 (indep) for cm^2 (with or without numerical answer) **N.B.** Do not accept any multiplication which should lead to 125
	(b)	$125 \times 10 \times 10 \times 10$ or $50 \times 50 \times 50$	125 000	2	M1 125×10^3 (oe) or 50^3 (oe) A1 cao

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5384H/13H					
Question		**Working**	**Answer**	**Mark**	**Noteso**
7	(a)	$\frac{3}{8}+\frac{1}{4}=\frac{3}{8}+\frac{2}{8}=$ |	| 1 | 4 | | 3 | × | 12 | | 8 | 8 | 32 | $8 + 12 = 20 = \frac{20}{32}$	$\frac{5}{8}$	2	M1 Use of common denominator: $\frac{1}{4}=\frac{1\times2}{4\times2}$ or $\frac{2}{8}$ or writing both fractions with a common denominator other than 8 with at least one fraction correct or 0.375 + 0.25 or correct table with sight of 8 + 12 or 20 A1 $\frac{5}{8}$ Accept 0.625
	(b)	$\frac{2}{3}\times\frac{4}{5}=\frac{2\times4}{3\times5}=\frac{8}{15}$	$\frac{8}{15}$	2	M1 for multiplying numerator and denominator of $\frac{2}{3}$ oe and $\frac{4}{5}$ oe OR 0.66(..)×0.8 OR 0.67(..)×0.8 oe A1 for $\frac{8}{15}$ oe OR for 0.533…
8			$N = 4p + 20b$	3	B3 for $N = 4p + 20b$ oe (B2 for 4p + 20b or $N = k + 20b$ oe or $N = 4p + k$ oe where k is ≠ 0) (B1 for $N = cp + db$ where c and d are numerical and not both zero OR $k+20b$ oe or $4p+ k$ oe where k ≠ 0) SC B2 for $N = 4p + 20b$ subsequently incorrectly simplified SC B2 for $kN = 4p + 20b$ where k ≠ 1 SC B1 for $4p + 20b$ subsequently incorrectly simplified SC B1 for $N = 4p$ (space) $20b$ or $N = 4p \times 20b$

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5384H/13H					
Question		**Working**	**Answer**	**Mark**	**Notes**
9		$5q + 5p = 4 + 8p$ $5q = 4 + 8p - 5p$ $5q = 4 + 3p$ $q = \frac{4 + 3p}{5}$	$q = \frac{4 + 3p}{5}$	3	M1 for expansion of bracket or $5q + 5p$ or each term ÷5 throughout M1 for correct process to obtain $aq = bp + c$ where a,b ,and c are numbers A1 for $q = \frac{4 + 3p}{5}$ oe e.g. $q = \frac{4}{5} + \frac{3}{5}p$ or $q = 0.8 + 0.6p$ [SC B2 for ambiguous answer eg 4+3p/5]
10	(a)		Reason	1	B1 for "angles stay the same" or "angles will be 60º, 70º, 50º" oe (B0 for "not doubled" oe)
	(b)		Reason	2	M1 for attempt to find scale factor or sight of 10 unless not relevant or recognition that the same scale factor has been used A1 for reason that uses both dimensions of the rectangle or states that a scale factor of 10 has been used for both dimensions (accept "5 × 10 = 50, 2 × 10 = 20" oe for M1A1)
11			95° Reason	2	B1 for 95° B1 for opposite angles in cyclic quadrilateral add to 180º
12		$4x + y = -1$ $\quad 12x+3y = -3$ $4x - 3y = 7$ $\quad 4x - 3y = 7$ $4y = -8$ $\quad 16x = 4$ $y = -2$ $\quad x = 1/4$	$x = \frac{1}{4}$ $y = -2$	3	M1 for correct process to eliminate either x or y (condone one arithmetic error) M1 (dep on previous M1) for substituting found value into an appropriate equation, or further elimination A1 cao

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5384H/13H					
Question		**Working**	**Answer**	**Mark**	**Notes**
13			2.5×10^{-7}	2	B2 for 2.5×10^{-7} (B1 for 2.5×10^{n} or $a \times 10^{-7}$)
14			$y = -\frac{1}{2}x + 8$	3	M1 for $y = mx + 8$ M1 for drawing $y = -\frac{1}{2}x + 8$ on diagram with attempt to identify the value of the gradient or writing $2 \times m = -1$) A1 for $y = = -\frac{1}{2}x + 8$ oe
15	(a) (b)		81 $\frac{1}{3}$	1 1	B1 cao B1 for $\frac{1}{3}$ oe
16		$(2+\sqrt{3})(2-\sqrt{3})$ $= 4-2\sqrt{3}+2\sqrt{3}-\sqrt{3}\sqrt{3}$ $= 4-3$	1	2	M1 for all 4 terms correct ignoring signs or 3 out of 4 terms with correct signs or $2^2 - (\sqrt{3^2})$ or $2^2 - (\sqrt{3})^2$ from difference of 2 squares) A1 cao
17	(a) (b)	$\overrightarrow{OP} = \overrightarrow{OA} + \overrightarrow{AP}$ $= \overrightarrow{OA} + \frac{2}{3}\overrightarrow{AB}$ $= \underline{\mathbf{a}} + \frac{2}{3}(\underline{\mathbf{b}} - \underline{\mathbf{a}})$	$\mathbf{b} - \mathbf{a}$ $\frac{1}{3}\mathbf{a} + \frac{2}{3}\mathbf{b}$	1 3	B1 cao M1 for $\overrightarrow{OP} = \overrightarrow{OA} + \overrightarrow{AP}$ or $\overrightarrow{OP} = \overrightarrow{OB} + \overrightarrow{BP}$ M1 for $\overrightarrow{OP} = \mathbf{a} + n \times$ "$(\mathbf{b} - \mathbf{a})$" or $\underline{\mathbf{b}} + n$ "$(\underline{\mathbf{a}} - \mathbf{b})$" where $0 < n < 1$ or $\overrightarrow{AP} = \frac{2}{3}\overrightarrow{AB}$ or $\overrightarrow{BP} = \frac{1}{3}\overrightarrow{BA}$ A1 for $\frac{1}{3}\mathbf{a} + \frac{2}{3}\mathbf{b}$ oe

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Question		Working	Answer	Mark	Notes
18	(a)		(5, –4)	2	B2 for (5, –4) (B1 for (a, –4) or (5,b) where $a\neq5$ or 3 and $b\neq-4$)
	(b)		(–2, 2)	2	B2 for (–2, 2) (B1 for (a, 2) or (–2, b) where $a\neq-2$ and $b\neq2$)

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GCSE

GCSE Mathematics (Modular) - 2381
Paper: 5384H/14H

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November 2009

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5384H/14H					
Question		**Working**	**Answer**	**Mark**	**Notes**
1			28.38461538	2	B2 for 28.3846…. (B1 for 107.01 or 3.77 or 28.38(…) or $28\frac{5}{13}$ oe seen)
2	(a)	$3 \times 2 + 5 \times -4$	-14	2	M1 for $3 \times 2 + 5 \times -4$ oe or 6 and –20 seen A1 cao for –14
	(b)	$8x + 11 - 11 = 39 - 11$ $8x = 28$	3.5	2	M1 for $8x = 39 - 11$ oe or $(39 - 11) \div 8$ A1ft for 3.5 or $3\frac{1}{2}$ oe
3	(a)		Correct plane	2	B2 for a correct plane defined by showing at least 2 adjacent lines of the plane (B1 for a line of symmetry on one face)
	(b)		Correct elevation 	2	B2 for sketch of trapezium (B1 for trapezium with a rectangle or parallelogram added at top or a side or lines drawn from vertices)
4		$\pi \times 5 \times 5$	78.5	2	M1 for $\pi \times 5 \times 5$ (accept π as 3.1 or better) A1 for 77.5 to 78.6 or 25π
5		$360 \div 12$	30	2	M1 for $360 \div 12$ A1 cao

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5384H/14H					
Question		**Working**	**Answer**	**Mark**	**Notes**
6		$1.72 \div 2$ (= 0.86) $7.65 \div 9$ (= 0.85)	Large box with reasons	3	M1 for $1.72 \div 2$ (= 0.86) M1 for $7.65 \div 9$ (= 0.85) A1 for large box or 9 kg with correct calculations OR M1 for $2 \div 1.72$ (= 1.162…) M1 for $9 \div 7.65$ (= 1.176…) A1 for large box or 9 kg with correct calculations OR M2 for $7.65 \times 2 \div 9$ (=1.70) or for $1.72 \div 2 \times 9$ (=7.74) A1 for large box ot 9 kg with correct calculations OR M1 for 1.72×9 (= 15.48) M1 for 7.65×2 (= 15.30) A1 for large box or 9 kg with correct calculations Accept equivalent methods for comparison
7			Rotation 180° Centre (0, 1)	3	B1 for rotation B1 for 180° or half turn B1 for (0, 1) (B0 for any combination of transformations)
8		$360 + \frac{17.5}{100} \times 360$	423	3	M1 for $\frac{17.5}{100} \times 360$ oe **or** 10% + 5% + 2½ % condone 1 calculation error **or** 63 **or** 36, 18 and 9 seen M1 (dep) for 360 + '63' A1 for 423 OR M2 for 1.175×360 oe A1 for 423

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Question		**Working**	**Answer**	**Mark**	**Notes**
9		180 ÷ 9 (=20) 20 × 4	80	3	M2 for 180 ÷ (2 + 3 + 4) × 4 or 40, 60, 80 seen (M1 for 180 ÷ (2 + 3 + 4) or 20 seen) A1 cao
10		3→ 33 4 → 72 3.1 → 35.9(91) 3.2 → 39.1(68) 3.3 → 42.5(37) 3.4 → 46.1(04) 3.5 → 49.8(75) 3.6 → 53.8(56) 3.7 → 58.0(53) 3.8 → 62.4(72) 3.9 → 67.1(19) 3.75 → 60.2(34375)	3.7	4	B2 for a trial between 3.7 and 3.8 inclusive (B1 for a trial between 3 and 4 inclusive) B1 for a different trial between 3.7 and 3.8 exclusive B1 (dep on at least one previous B1) for 3.7 NB trials should be evaluated to at least 1dp truncated or rounded
11	(a)		m^7	1	B1 for m^7, accept m^{3+4}
	(b)		p^4	1	B1 for p^4, accept p^{7-3}
	(c)		$12x^3y^5$	2	B2 cao (B1 for two of 12, x^3, y^5 in a product ignore × signs)
12		$14^2 + 12^2 =$ 196 + 144 = 340 $\sqrt{340}$ = 18.4…	18.4	3	M1 for $14^2 + 12^2$ M1 (dep) for √(14 ^2 + 12 ^2) A1 for 18.4 to 18.44

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Question		**Working**	**Answer**	**Mark**	**Notes**
13		$\frac{29-x}{4}\times 4 = x\times 4 + 5\times 4$ $29 - 20 = 4x + x$	1.8	3	M1 for multiplying through by 4 or for $\frac{29}{4} - \frac{x}{4} = x + 5$ M1 for correct rearrangement of their 4 terms to separate x and non-x terms A1 for 1.8 oe
14	(a)	$6\times\frac{15}{10}$	9	2	M1 for sight of $\frac{15}{10}$ or $\frac{10}{15}$ or $\frac{10}{6}$ or $\frac{6}{10}$ oe seen A1 cao NB ratios get M0 unless of the form 1:n
	(b)	$12\times\frac{10}{15}$	8	2	M1 for correct use of $\frac{15}{10}$ or $\frac{10}{15}$ or $\frac{15}{12}$ or $\frac{12}{15}$ or $\frac{"9"}{6}$ or $\frac{6}{"9"}$ oe A1 for 8 **or** 12 × 6 ÷ "9"
15		$y = kx$ $10 = k\times 500$	$y = \frac{1}{50}x$	3	M2 for $10 = k \times 500$ oe **or** $10 = \frac{500}{k}$ oe (M1 for $y = kx$ **or** $y \propto x$ **or** $y = x/k$) A1 for $y = \frac{1}{50}x$ oe e.g $y = 0.02x$
16		$AB^2 = 5^2 + 8^2 -$ $2\times 5\times 8\times\cos 75$ $= 25 + 64 - 80\times\cos 75$ $= 68.29\ldots$ $AB = \sqrt{89 - 80\times\cos 75}$ $= \sqrt{68.29\ldots}$	8.26	3	M1 for $AB^2 = 5^2 + 8^2 - 2\times 5\times 8\times\cos 75$ M1 (dep) for correct order of evaluation A1 for 8.26(40…) SC M1M1A0 for 3.9(0..) or 7.6(4..) seen

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Question		**Working**	**Answer**	**Mark**	**Notes**
17		Upper bound $\sqrt{\frac{6.435}{5.5135}} = 1.080340$ Lower bound $\sqrt{\frac{6.425}{5.5145}} = 1.079402$	1.08 because the LB and UB agree to that number of figures	5	B1 for either 6.435 or 6.425 or 6.434999… B1 for either 5.5145 or 5.5135 or 5.5144999… M1 for '6.435' ÷ '5.5135' where 6.43<'6.435'≤6.44 and where 5.513≤ '5.5135'<5.514 OR for '6.425' ÷ '5.5145 where 6.42≤ '6.425'<6.43 and 5.514<'5.5145'≤5.515 A1 for 1.0794… and 1.0803… A1 for 1.08 **and** 'both LB and UB round to 1.08' oe
18		$4(2x – 1) + 3(x + 3) = (x + 3)(2x – 1)$ $8x – 4 + 3x + 9 = 2x^2 – x + 6x – 3$ $2x^2 – 6x – 8 = 0$ $2(x – 4)(x + 1) = 0$	$x = –1, 4$	5	M1 for $4(2x – 1) + 3(x + 3) = (x + 3)(2x – 1)$or $\frac{4(2x – 1) + 3(x + 3)}{(x + 3)(2x – 1)}$ (= 1) or Multiplying all 3 terms by $(x + 3)$ or by $(2x – 1)$ M1 for either $8x – 4 + 3x + 9$ oe or $2x^2 – x + 6x – 3$ oe seen A1 for correct quadratic (=0) M1(dep on M2) for a correct method to solve 3 term quadratic A1 cao for both solutions

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Centre No.						Paper Reference								Surname	Initial(s)
Candidate No.						5	3	8	4	H	/	1	3	H	Signature

Paper Reference(s)

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Team Leader's use only

Edexcel GCSE

Mathematics (Modular) – 2381

Paper 13 (Non-Calculator)

Higher Tier



Unit 3

Monday 18 May 2009 – Afternoon

Time: 1 hour 10 minutes

Materials required for examination
Ruler graduated in centimetres and millimetres, protractor, compasses, pen, HB pencil, eraser.
Tracing paper may be used.

Items included with question papers
Nil

Instructions to Candidates

In the boxes above, write your centre number, candidate number, your surname, initials and signature.
Check that you have the correct question paper.
Answer ALL the questions. Write your answers in the spaces provided in this question paper.
You must NOT write on the formulae page.
Anything you write on the formulae page will gain NO credit.
If you need more space to complete your answer to any question, use additional answer sheets.

Information for Candidates

The marks for individual questions and the parts of questions are shown in round brackets: e.g. **(2)**.
There are 19 questions in this question paper. The total mark for this paper is 60.
There are 16 pages in this question paper. Any blank pages are indicated.
Calculators must not be used.

Advice to Candidates

Show all stages in any calculations.
Work steadily through the paper. Do not spend too long on one question.
If you cannot answer a question, leave it and attempt the next one.
Return at the end to those you have left out.

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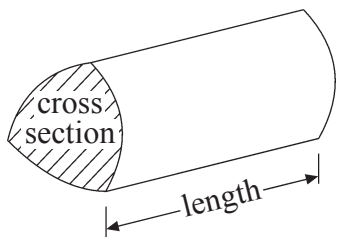
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GCSE Mathematics

Formulae: Higher Tier

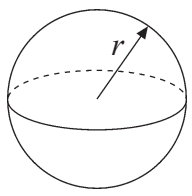
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Volume of a prism = area of cross section × length



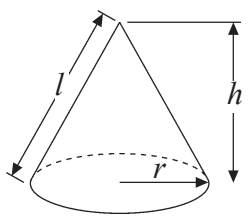
Volume of sphere $= \frac{4}{3}\pi r^3$

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

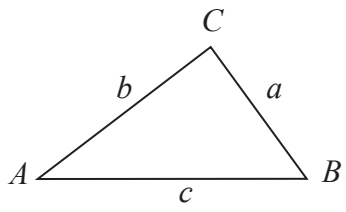


Volume of cone $= \frac{1}{3}\pi r^2 h$

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



In any triangle ABC



The Quadratic Equation

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

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

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

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

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

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Answer ALL NINETEEN questions.

Write your answers in the spaces provided.

You must write down all stages in your working.

You must NOT use a calculator.

1. Here is a list of ingredients for making **8** cheese scones.

Ingredients for 8 cheese scones
200 g self-raising flour
60 g butter
30 g cheese
150 m*l* milk

Work out the amount of each ingredient needed to make **12** cheese scones.

..... g self-raising flour

..... g butter

..... g cheese

..... m*l* milk

(Total 3 marks)

Q1

2. Work out $\frac{3}{5} \times \frac{1}{4}$

.....

(Total 2 marks)

Q2

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3.

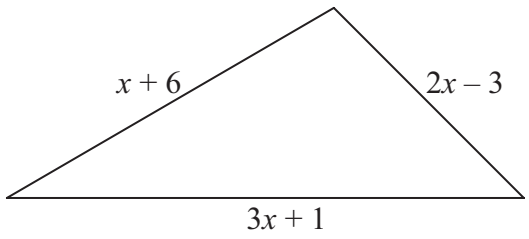


Diagram **NOT** accurately drawn

In the diagram, all measurements are in centimetres.

The lengths of the sides of the triangle are

$x + 6$
$2x - 3$
$3x + 1$

(a) Find an expression, in terms of x, for the perimeter of the triangle.

Give your expression in its simplest form.

.....

(2)

The perimeter of the triangle is 37 cm.

(b) Find the value of x.

$x =$ .....

(2)

Q3

(Total 4 marks)

N 3 4 8 1 9 A 0 4 1 6

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4. Alan bought 20 melons for £15

$\frac{1}{5}$ of the melons were bad so he threw them away.

He sold the remaining melons for £1.50 each.

Work out Alan's profit.

£ .....

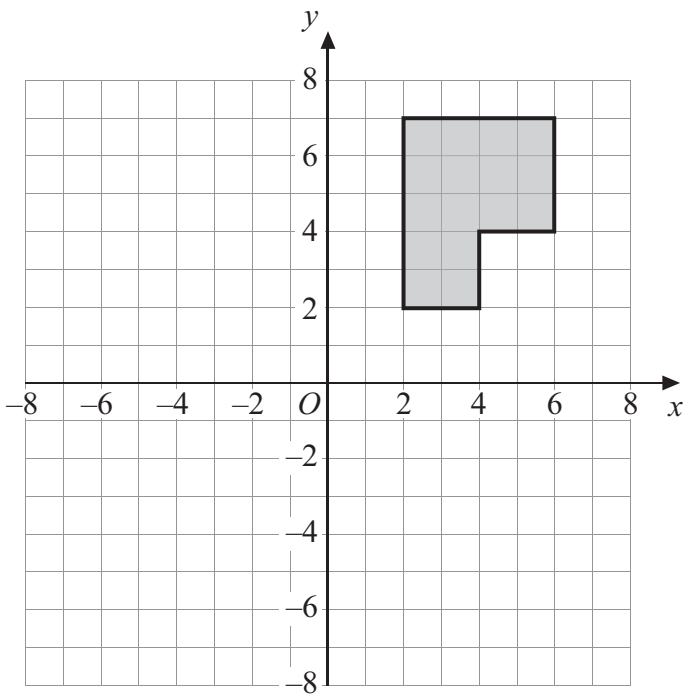
Q4

(Total 4 marks)

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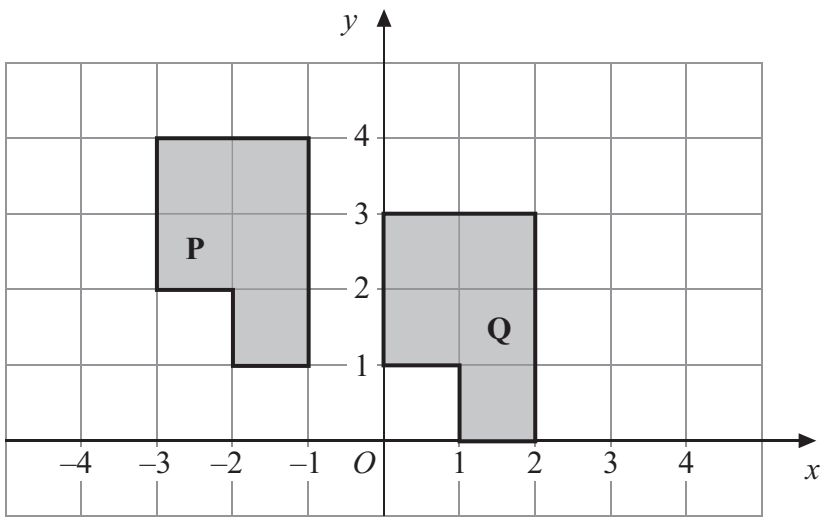
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5.



(a) Rotate the shaded shape 90° clockwise about the point O.

(2)



(b) Describe fully the single transformation that will map shape **P** onto shape **Q**.

.....

(2)

Q5

(Total 4 marks)

N 3 4 8 1 9 A 0 6 1 6

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Leave blank

6. (a) Solve $2(y - 3) = 8$

$y =$ .....

(2)

(b) Solve $4x + 1 = 2x + 12$

$x =$ .....

(2)

Q6

(Total 4 marks)

7. $2x^2 = 72$

Find a value of x.

.....

Q7

(Total 2 marks)

N 3 4 8 1 9 A 0 7 1 6

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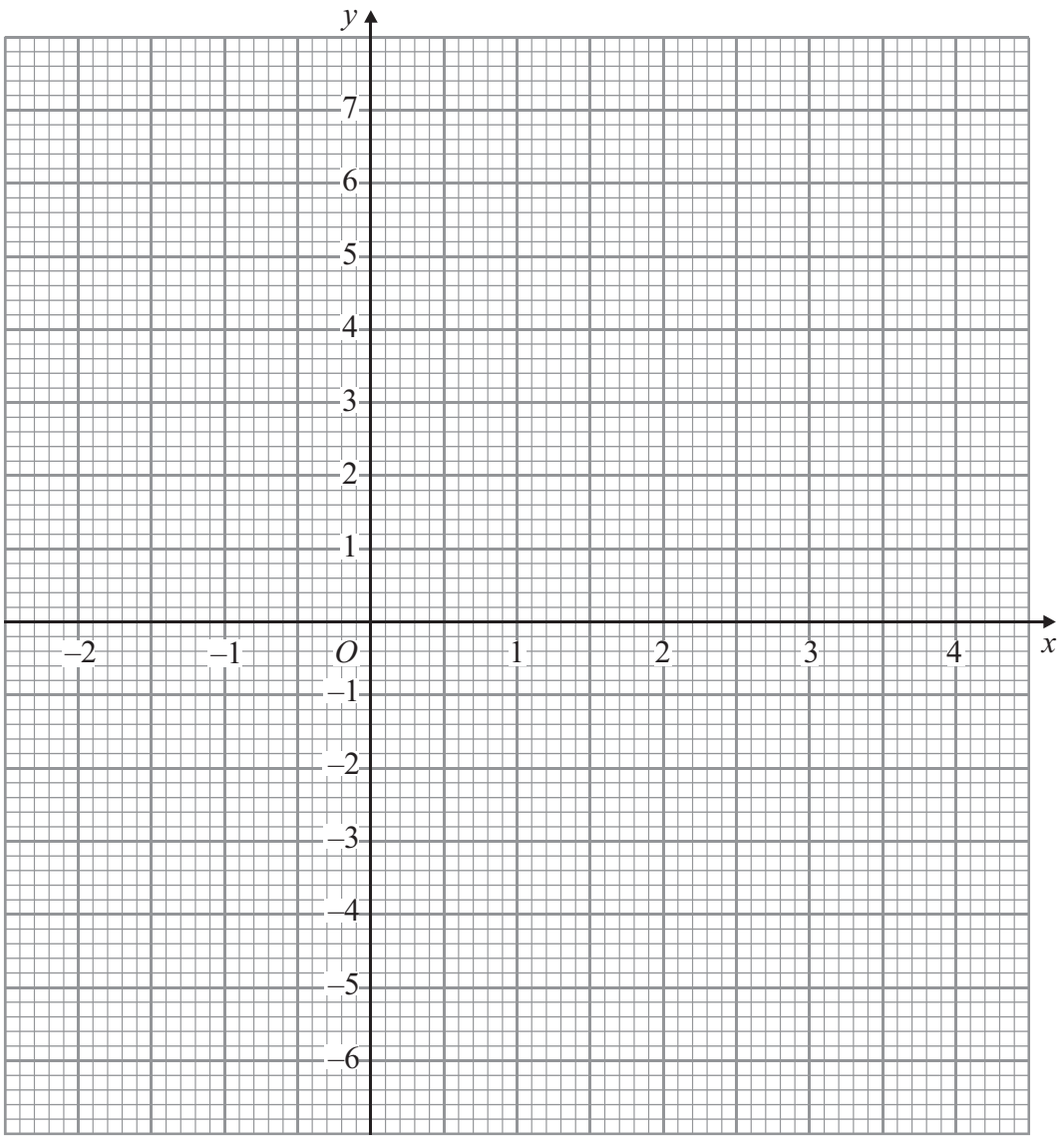
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8. (a) Complete the table for $y = x^2 - 2x - 4$

x	–2	–1	0	1	2	3	4
y	4		–4	–5		–1	

(2)

(b) On the grid, draw the graph of $y = x^2 - 2x - 4$



(2) Q8

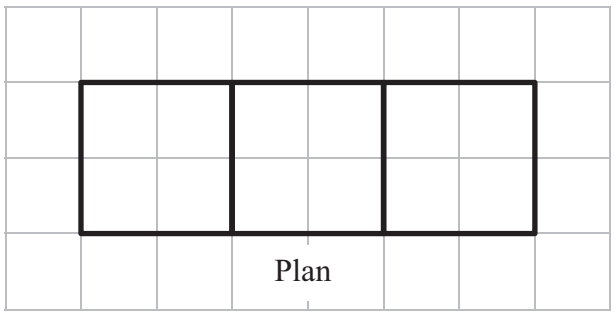
(Total 4 marks)

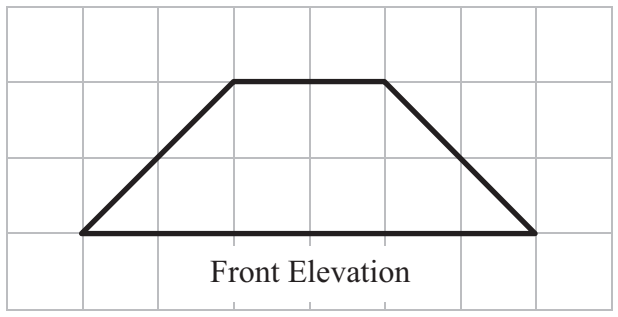
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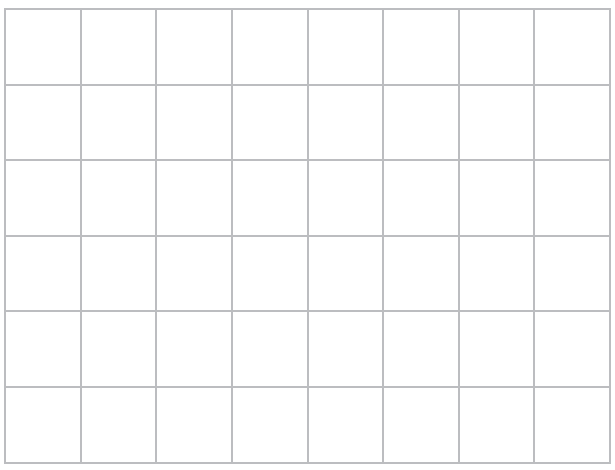
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9. Here are the plan and front elevation of a solid shape.





(a) On the grid below, draw the side elevation of the solid shape.



(2)

(b) In the space below, draw a sketch of the solid shape.

(2) **Q9**

(Total 4 marks)

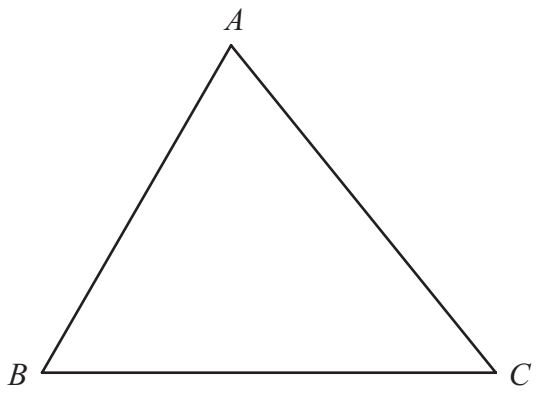
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10.



ABC is a triangle.

Shade the region inside the triangle which is **both**

less than 4 centimetres from the point *B*
and closer to the line *AC* than the line *AB*.

Q10

(Total 4 marks)

N 3 4 8 1 9 A 0 1 0 1 6

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11. Solve the simultaneous equations

$$3x + 4y = 7$$
$$5x - 2y = 16$$

$x =$ .....

$y =$ .....

(Total 3 marks)

Q11

12. (a) Solve the inequality

$$3t + 1 < t + 12$$

.....

(2)

(b) t is a whole number.
Write down the largest value of t that satisfies

$$3t + 1 < t + 12$$

.....

(1)

Q12

(Total 3 marks)

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13.

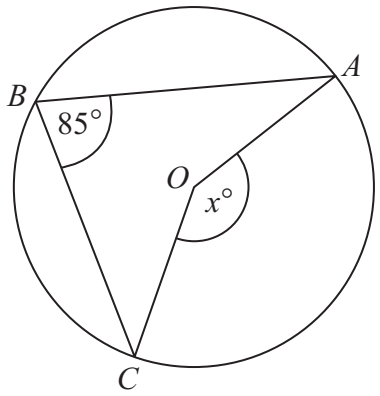


Diagram **NOT** accurately drawn

In the diagram, A, B and C are points on the circumference of a circle, centre O.

Angle $ABC = 85^\circ$.

(i) Work out the size of the angle marked x°.

..... °

(ii) Give a reason for your answer.

.....

.....

Q13

(Total 2 marks)

14. Solve $x^2 - 4x - 45 = 0$

.....

Q14

(Total 3 marks)

N 3 4 8 1 9 A 0 1 2 1 6

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15. (a) Find the value of $36^{\frac{1}{2}}$

.....

(1)

(b) Find the value of $8^{-\frac{2}{3}}$

.....

(2)

(Total 3 marks)

Q15

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16.

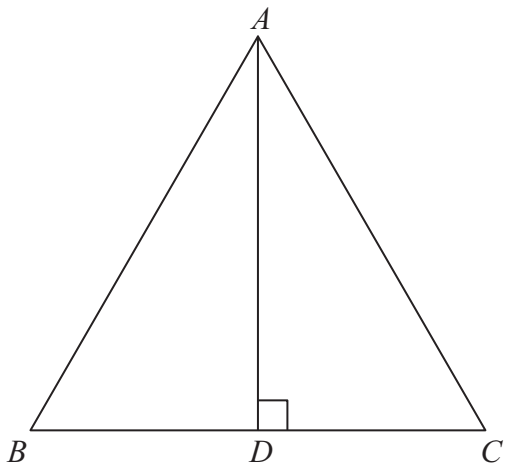


Diagram **NOT** accurately drawn

ABC is an equilateral triangle.
D lies on *BC*.
AD is perpendicular to *BC*.

Prove that triangle *ADC* is congruent to triangle *ADB*.

Q16

(Total 3 marks)

N 3 4 8 1 9 A 0 1 4 1 6

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17. Rearrange $\frac{1}{u} + \frac{1}{v} = \frac{1}{f}$

to make u the subject of the formula.

Give your answer in its simplest form.

.....

Q17

(Total 2 marks)

18. Expand and simplify

$$(2+\sqrt{3})(7-\sqrt{3})$$

Give your answer in the form $a + b\sqrt{3}$, where a and b are integers.

.....

Q18

(Total 3 marks)

N 3 4 8 1 9 A 0 1 5 1 6

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19.

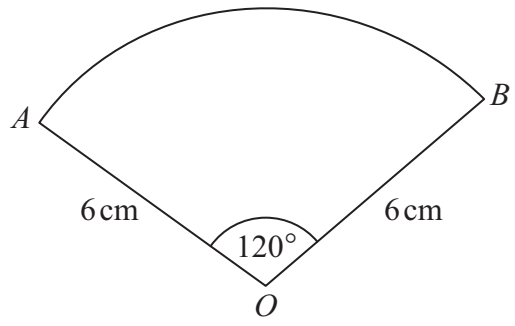


Diagram **NOT** accurately drawn

The diagram shows a sector of a circle, centre O.
The radius of the circle is 6 cm.
Angle $AOB = 120^\circ$.

Work out the **perimeter** of the sector.
Give your answer in terms of π in its simplest form.

..... cm

Q19

(Total 3 marks)

TOTAL FOR PAPER: 60 MARKS

END

N 3 4 8 1 9 A 0 1 6 1 6

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Centre No.						Paper Reference								Surname	Initial(s)
Candidate No.						5	3	8	4	H	/	1	4	H	Signature

Paper Reference(s)

5384H/14H

Examiner's use only

Team Leader's use only

Edexcel GCSE

Mathematics (Modular) – 2381

Paper 14 (Calculator)

Higher Tier



Unit 3

Monday 1 June 2009 – Morning

Time: 1 hour 10 minutes

Materials required for examination
Ruler graduated in centimetres and millimetres, protractor, compasses, pen, HB pencil, eraser, calculator.
Tracing paper may be used.

Items included with question papers
Nil

Instructions to Candidates

In the boxes above, write your centre number, candidate number, your surname, initials and signature.
Check that you have the correct question paper.
Answer ALL the questions. Write your answers in the spaces provided in this question paper.
You must NOT write on the formulae page.
Anything you write on the formulae page will gain NO credit.
If you need more space to complete your answer to any question, use additional answer sheets.

Information for Candidates

The marks for individual questions and the parts of questions are shown in round brackets: e.g. **(2)**.
There are 17 questions in this question paper. The total mark for this paper is 60.
There are 20 pages in this question paper. Any blank pages are indicated.
Calculators may be used.
If your calculator does not have a π button, take the value of π to be 3.142 unless the question instructs otherwise.

Advice to Candidates

Show all stages in any calculations.
Work steadily through the paper. Do not spend too long on one question.
If you cannot answer a question, leave it and attempt the next one.
Return at the end to those you have left out.

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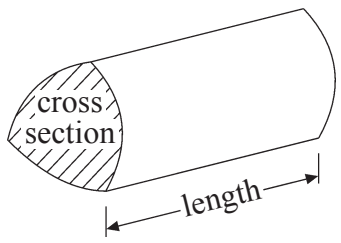
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GCSE Mathematics

Formulae: Higher Tier

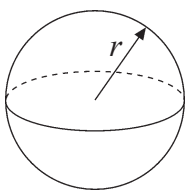
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Anything you write on this formulae page will gain NO credit.

Volume of a prism = area of cross section × length



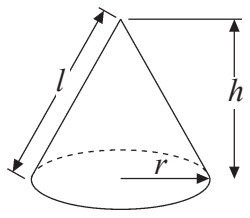
Volume of sphere $= \frac{4}{3}\pi r^3$

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

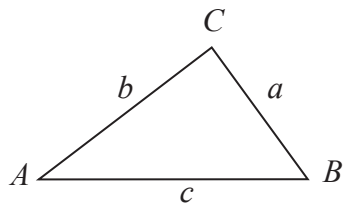


Volume of cone $= \frac{1}{3}\pi r^2 h$

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



In any triangle ABC



The Quadratic Equation

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

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

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

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

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

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Answer ALL SEVENTEEN questions.

Write your answers in the spaces provided.

You must write down all stages in your working.

1. Tania went to Italy.
She changed £325 into euros (€).

The exchange rate was £1 = €1.68

(a) Change £325 into euros (€).

€ .....

(2)

When she came home she changed €117 into pounds.

The new exchange rate was £1 = €1.50

(b) Change €117 into pounds.

£ .....

(2)

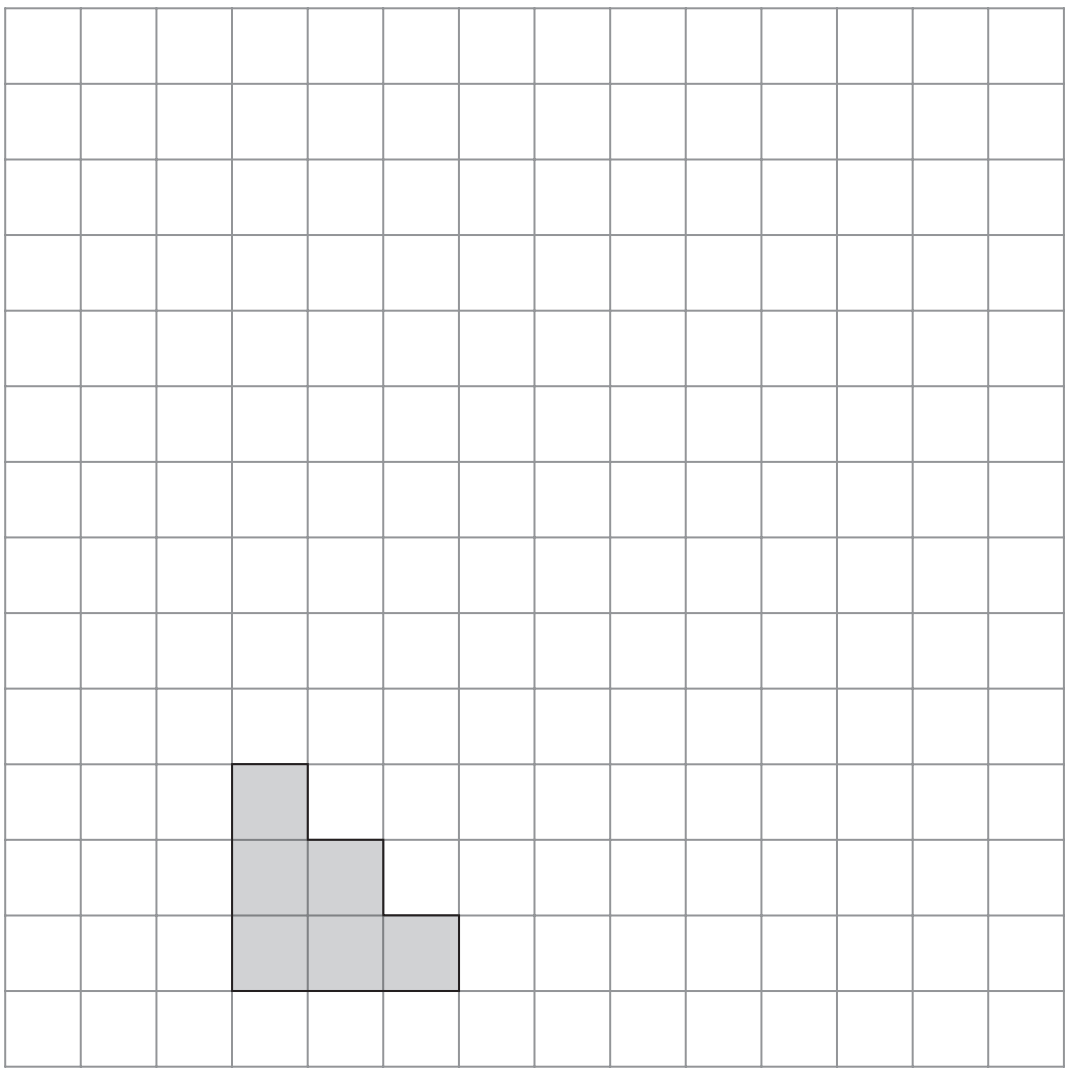
Q1

(Total 4 marks)

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2.



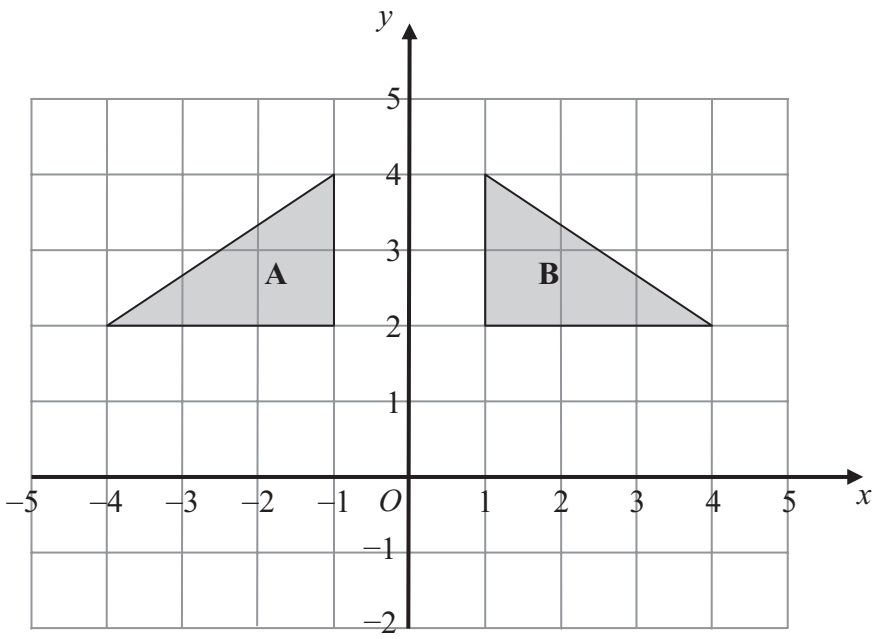
(a) On the grid, draw an enlargement, scale factor 2, of the shaded shape.

(2)

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(b) Describe fully the single transformation that maps triangle **A** onto triangle **B**.

.....

(2) **Q2**

(Total 4 marks)

3. Julie buys 19 identical calculators.
The total cost is £143.64

Work out the total cost of 31 of these calculators.

£ **Q3**

(Total 3 marks)

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4. $F = 1.8C + 32$

(a) Work out the value of F when $C = -8$

.....

(2)

(b) Work out the value of C when $F = 68$

.....

(2) **Q4**

(Total 4 marks)

H 3 4 8 0 6 A 0 6 2 0

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5. There are some sweets in a bag.

18 of the sweets are toffees.
12 of the sweets are mints.

(a) Write down the ratio of the number of toffees to the number of mints.
Give your ratio in its simplest form.

..... : .....

(2)

There are some oranges and apples in a box.
The total number of oranges and apples is 54
The ratio of the number of oranges to the number of apples is 1 : 5

(b) Work out the number of apples in the box.

.....

(2)

Q5

(Total 4 marks)

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6. The equation

$$x^3 + 20x = 71$$

has a solution between 2 and 3

Use a trial and improvement method to find this solution.
Give your answer correct to one decimal place.
You must show **ALL** your working.

$x =$ .....

Q6

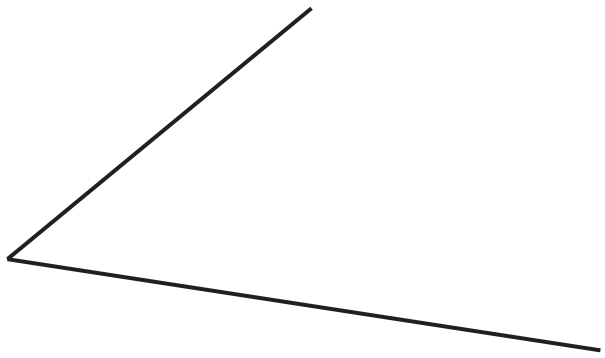
(Total 4 marks)

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7. Use ruler and compasses to **construct** the bisector of this angle.
You must show all your construction lines.



Q7

(Total 2 marks)

8. Here is a tile in the shape of a semicircle.

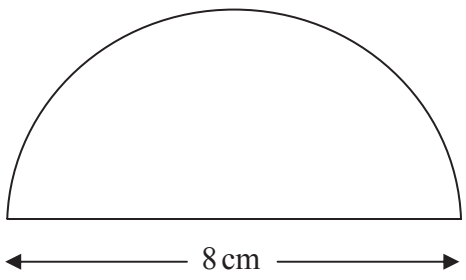


Diagram **NOT** accurately drawn

The diameter of the semicircle is 8 cm.

Work out the perimeter of the tile.
Give your answer correct to 2 decimal places.

..... cm

Q8

(Total 3 marks)

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9. Work out $\dfrac{4.6+3.85}{3.2^2-6.51}$

Write down all the numbers on your calculator display.

.....

(Total 2 marks)

Q9

10. (a) Simplify $t^6 \times t^2$

.....

(1)

(b) Simplify $\dfrac{m^8}{m^3}$

.....

(1)

(c) Simplify $(2x)^3$

.....

(2)

(d) Simplify $3a^2h \times 4a^5h^4$

.....

(2)

(Total 6 marks)

Q10

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11.

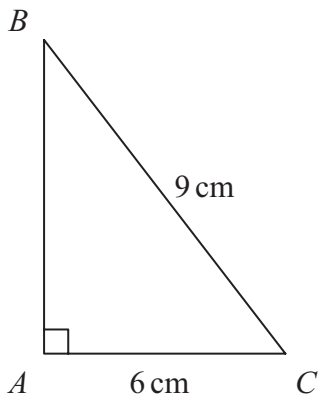


Diagram **NOT** accurately drawn

ABC is a right-angled triangle.

AC = 6 cm.
BC = 9 cm.

Work out the length of *AB*.
Give your answer correct to 3 significant figures.

..... cm

Q11

(Total 3 marks)

Turn over

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12. Toby invested £4500 for 2 years in a savings account.
He was paid 4% per annum compound interest.

How much did Toby have in his savings account after 2 years?

£ .....

Q12

(Total 3 marks)

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13. Here is a right-angled triangle.

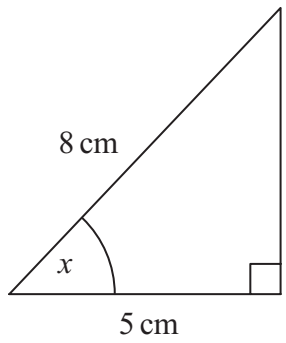


Diagram **NOT** accurately drawn

Calculate the size of the angle marked x.
Give your answer correct to 1 decimal place.

$x =$ ..... °

Q13

(Total 3 marks)

14. P is inversely proportional to d^2.

$P = 10\,000$ when $d = 0.4$

Find the value of P when $d = 0.8$

$P =$ .....

Q14

(Total 3 marks)

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15. (a) Solve $x^2 - 2x - 1 = 0$

Give your solutions correct to 2 decimal places.

.....

(3)

(b) Write down the solutions, correct to 2 decimal places, of $3x^2 - 6x - 3 = 0$

.....

(1) **Q15**

(Total 4 marks)

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16.

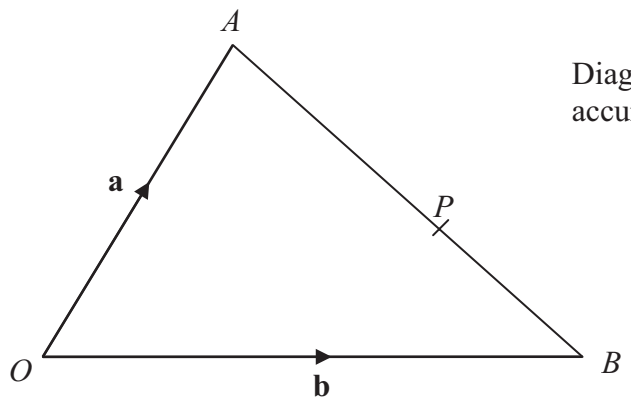


Diagram **NOT** accurately drawn

OAB is a triangle.

$\overrightarrow{OA} = \mathbf{a}$

$\overrightarrow{OB} = \mathbf{b}$

(a) Find the vector $\overrightarrow{AB}$ in terms of **a** and **b**.

$\overrightarrow{AB}$ = ...

(1)

P is the point on AB such that $AP : PB = 3 : 2$

(b) Show that $\overrightarrow{OP} = \frac{1}{5}(2\mathbf{a} + 3\mathbf{b})$

(3) **Q16**

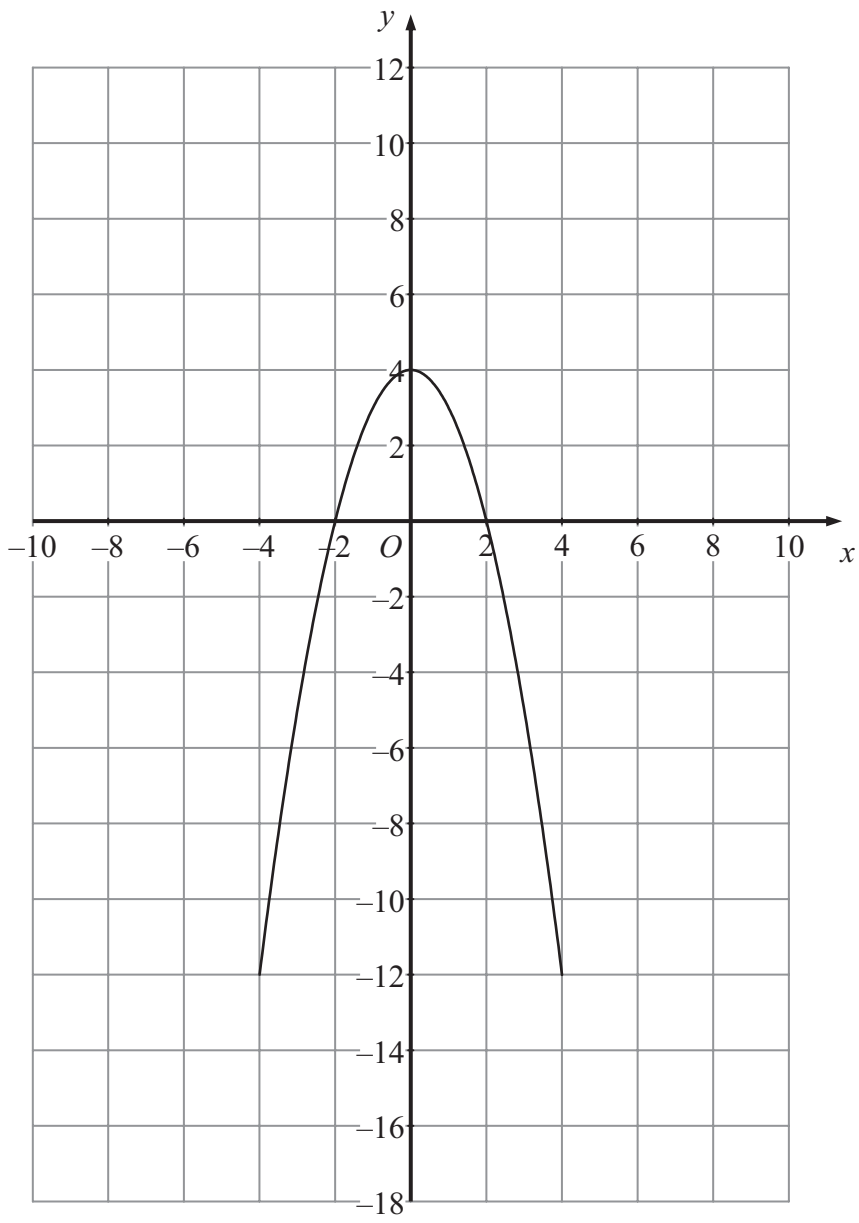
(Total 4 marks)

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17. The graph of $y = f(x)$ is shown on the grids.

(a) On this grid, sketch the graph of $y = f(x) - 4$



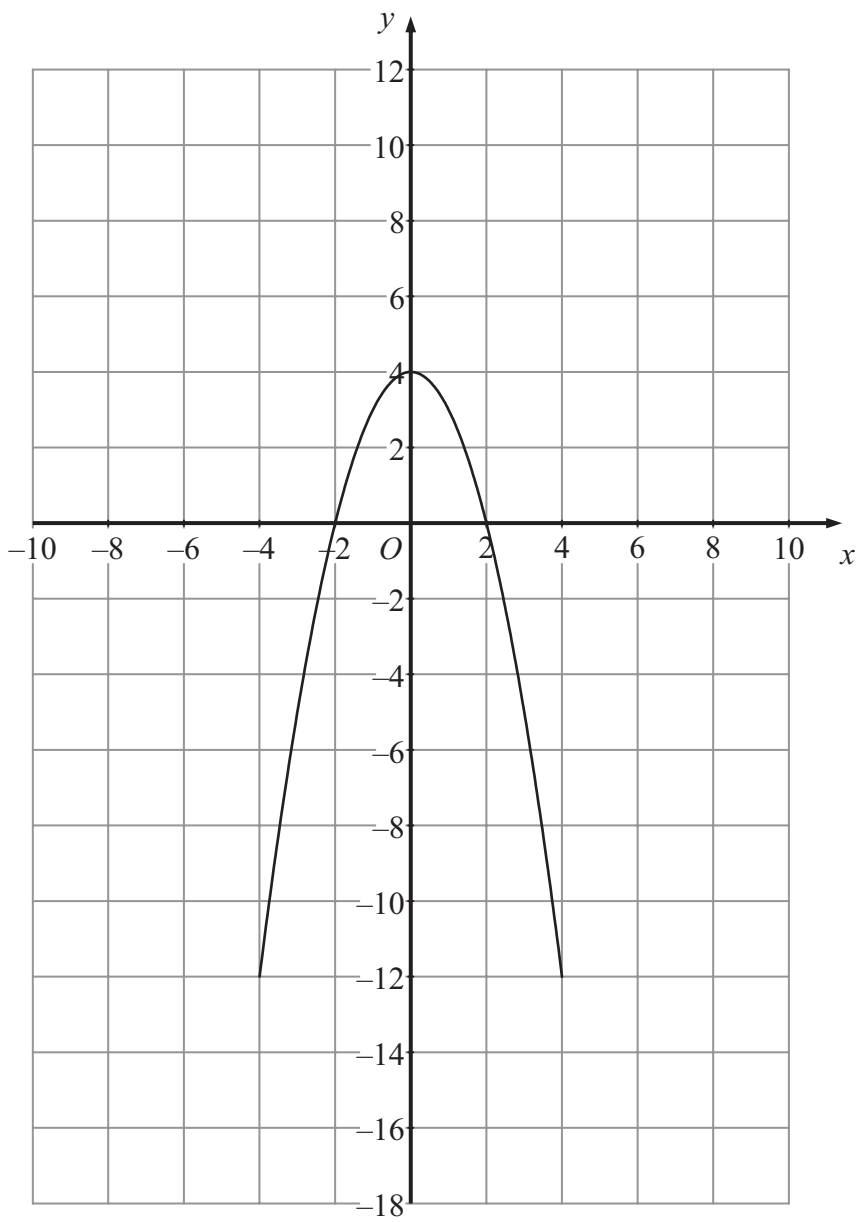
(2)

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(b) On this grid, sketch the graph of $y = f(\frac{1}{2}x)$.



(2) **Q17**

(Total 4 marks)

TOTAL FOR PAPER: 60 MARKS

END

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Edexcel GCSE

Mathematics 2381

Summer 2009

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Mark Scheme (Results)

Edexcel GCSE
Mathematics 2381

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5384H/13H					
Question		**Working**	**Answer**	**Mark**	**Notes**
1			300, 90, 45, 225	3	M2 for any one of 200 + 100 **or** 60 + 30 **or** 30 + 15 **or** 150 + 75 **or** 300 **or** 90 **or** 45 **or** 225 seen. A1 cao or M1 for 12÷8 or $6 \div 4$ or 3 ÷ 2 or sight of 1.5 M1 for 200 × "1.5" or 60 × "1.5" or 30 × "1.5" or 150 × "1.5" A1 cao or M1 200 ÷ 8 or 25 M1 25 × 12 or 300 A1 cao or M1 200 ÷ 4 or 50 M1 50 × 6 or 300 A1 cao or M1 200 ÷ 2 or 100 M1 100 × 3 or 300 A1 cao (In any of the above methods the M marks can be awarded for equivalent calculations with 60, 30 or 150)
2			$\frac{3}{20}$	2	M1 for clear attempt to multiply numerators and multiply denominators e.g $\frac{3\times1}{5\times4}$ or $\frac{12\times5}{20\times20}$ A1 for $\frac{3}{20}$ oe

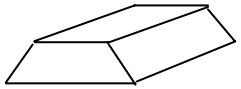
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5384H/13H					
Question		**Working**	**Answer**	**Mark**	**Notes**
3	(a)	$2x - 3 + x + 6 + 3x + 1$	$6x + 4$	2	M1 for $2x - 3 + x + 6 + 3x + 1$ **or** $6x + k$ seen A1 for $6x + 4$, condone $P = 6x + 4$ but not $x=6x+4$ or $0=6x+4$
	(b)	$6x + 4 = 37$ $6x = 33$ $x = 5.5$	5.5	2	M1 for "$6x + 4$" = 37, must be 3 term linear equation with coefficient of $x \neq 1$ A1 for 5.5, $\frac{11}{2}$, $5\frac{1}{2}$ oe or ft for their "$6x + 4$" provided x is positive. Or M1 for a correct 2 stage numerical process to find x A1 for 5.5, $\frac{11}{2}$, $5\frac{1}{2}$ oe or ft for their "$6x + 4$" provided x is positive. T&I Allow 2 marks for 5.5oe , otherwise 0 (SC B1 " $x + k = 37$" or "$kx = 37$") NB Do not award marks in (a) for 6x+4 in (b)
4		$20 \div 5$ (=4) 20 - "4" (=16) "16" $\times$ 1.50 (=24)	9	4	M1 for $20 \div 5$ M1 for 20 - "4" where $0 <$ "4" < 20 M1 for "16" $\times$ 1.50 where $0 <$ "16" < 20 A1 cao

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5384H/13H					
Question		**Working**	**Answer**	**Mark**	**Notes**
5	(a)		Vertices at (2, –2), (7, –2), (7, –6), (4, –6), (4, –4), (2, –4)	2	B2 for a fully correct rotation [B1 for correct shape with correct orientation **OR** a 90° anticlockwise rotation about *0* **OR** a 180° rotation about *O* **OR** for any 3 correct sides in the correct position]
	(b)		Translation by $\begin{pmatrix} 3 \\ -1 \end{pmatrix}$	2	B1 for translation B1 (indep) for $\begin{pmatrix} 3 \\ -1 \end{pmatrix}$ or 3 right and 1 down N.B. If more than 1 transformation is given then award no marks'
6	(a)		7	2	M1 for $2y - 6 = 8$ or $y - 3 = \frac{8}{2}$ A1 cao
	(b)	$4x - 2x = 12 - 1$	5.5	2	M1 $4x - 2x = 12 - 1$ oe A1 5.5 oe
7		$x^2 = 72 \div 2$	6	2	M1 for 72 ÷ 2 or 36 seen A1 6 or -6 or ± 6
8	(a)		-1, -4, 4	2	B2 for all 3 values correct (B1 for 1 or 2 values correct)
	(b)			2	B1 ft for all 7 of their points correctly plotted B1 ft (dep on at least B1 in (a)) for smooth curve through all 7 of their points

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Question		**Working**	**Answer**	**Mark**	**Notes**
9	(a)			2	M1 rectangle with either correct width or height or any square A1 cao
	(b)			2	B2 for a correct sketch (B1 any 3-D sketch of no more than 4 faces seen, with a trapezoidal face)
10			Diagram	4	M1 arc radius 4 cm centre *B* within the guidelines M1 angle bisector from *A* to *BC* within the guidelines A1 for clear indication that inside of arc is being identified as correct region for the first condition, or that side of straight line nearer to *C* is identified as correct region for the second condition. (Note that only 1 of the Ms need be awarded for this A mark to be awarded) A1 fully correct region Ignore any drawing outside the given triangle

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Question		**Working**	**Answer**	**Mark**	**Notes**
11		3x + 4y = 7 10x – 4y = 32 13x = 39 x = 3 3×3 + 4y = 7 4y = – 2 X = $\frac{7-4y}{3}$ $10(\frac{7-4y}{3}) - 4y = 32$	x = 3, y = $-\frac{1}{2}$	3	M1 for coefficients of x or y the same followed by correct operation, condone one arithmetical error M1 (dep) for substituting found value in one equation A1 cao SC: B1 for one correct answer only if Ms not awarded **Alternative method** M1 for rearranging one equation and substituting in other to eliminate one variable(condone one arithmetical error) M1 (dep) for substituting found value in one equation A1 cao
12	(a)	$3t + 1 < t + 12$ $3t - t < 12 - 1$ $2t < 11$	$t < 5.5$	2	M1 $3t - t < 12 - 1$ A1 $t < 5.5$ oe (B1 for $t = 5.5$ or $t > 5.5$ or 5.5 or $t \leq 5.5$ or $t \geq 5.5$ on the answer line)
	(b)		5	1	B1 for 5 or ft (a)
13	(i)		170^o	1	B1 cao
	(ii)		Reason	1	B1 for Angle at centre is twice angle at circumference (accept edge, middle, *O* origin)oe

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Question		**Working**	**Answer**	**Mark**	**Notes**
14		$(x + 5)(x - 9)$	9, –5	3	M2 for $(x - 9)(x + 5)$ (M1 for $(x \pm 9)(x \pm 5)$ A1 cao 9 and –5 **OR** M1 for substitution into formula (condone incorrect signs) M1 for $\frac{4 \pm \sqrt{196}}{2}$ A1 cao **OR** M1 for $(x - 2)^2 - 2^2 - 45$ (= 0) M1 for $x = 2 \pm \sqrt{4 + 45}$ A1 cao **OR** T&I B3 Both solutions correct (B1 One solution correct)
15	(a)		6	1	B1 for 6 or ±6
	(b)		$\frac{1}{4}$	2	M1 for $8^{\frac{1}{3}} = 2$ or $\frac{1}{8^{\frac{2}{3}}}$ or 4^{-1} or $64^{-\frac{1}{3}}$ or 2^2 or 4 or $\frac{1}{2^2}$ or 2^{-2} A1 for $\frac{1}{4}$ or 0.25 or any equivalent vulgar fraction or decimal

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Question		**Working**	**Answer**	**Mark**	**Notes**
16		*AB* = *AC* (equilateral triangle) *AD* is common *ADC*=*ADB* (= 90^o given) $\Delta ADC \equiv \Delta ADB$ (RHS) OR *DAC* = *DAB* (since *ACD* = *ABD* and *ADC* = *ADB*) *AB* = *AC* (equilateral triangle) *AD* is common $\Delta ADC \equiv \Delta ADB$ (SAS) OR *DAC* = *DAB* (since *ACD* = *ABD* and *ADC* = *ADB*) *AD* is common *ACD* = *ABD* (equilateral triangle) $\Delta ADC \equiv \Delta ADB$ (AAS)	Proof	3	M1 for any three correct statements (which do not have to be justified) that together lead to a congruence proof (ignore irrelevant statements) A1 for a full justification of these statements A1 for RHS, SAS, AAS, ASA or SSS as appropriate NB The two A marks are independent

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Question		**Working**	**Answer**	**Mark**	**Notes**
17		$\frac{1}{u}=\frac{1}{f}-\frac{1}{v}$ $\frac{1}{u}=\frac{v-f}{fv}$	$u=\frac{fv}{v-f}$	2	M1 $\frac{1}{u}=\frac{v-f}{fv}$ oe or $vf+uf=uv$ oe or $\frac{1}{u}=\frac{f-v}{fv}$ **or** $u=\frac{1}{\frac{v-f}{fv}}$ or $u=\frac{1}{\frac{1}{f}-\frac{1}{v}}$ A1 $u=\frac{fv}{v-f}$ or $u=\frac{-fv}{f-v}$
18		$2\times7-2\times\sqrt{3}+7\times\sqrt{3}-\sqrt{3}\times\sqrt{3}=$ $14+5\sqrt{3}-3$	$11+5\sqrt{3}$	3	M1 for exactly 3 or exactly 4 terms correct including correct signs or all 4 terms correct with wrong signs. M1(dep) for either collecting their two or three terms in $\sqrt{3}$ or for $\sqrt{3}\times\sqrt{3}$ =3 A1 cao
19		$\frac{120}{360}\times\pi\times2\times6$	4π + 12	3	M1 for $\frac{120}{360}\times\pi\times2\times6$ oe allow 3.14, 3.142, $\frac{22}{7}$ for π A1 for 4π or anything in the closed interval [12.56, 12.57], or $12\frac{4}{7}$ oe *or* $\frac{a\pi}{b}$ where a and b are integers with *a = 4b* A1 4π + 12 or π4 + 12 oe SC(B2 for a fully correct, but unsimplified expression for the perimeter, including $\left(\frac{2\pi r}{3}\right)+12$ or $\left(\frac{2\pi r}{3}\right)+2r$ Or for any value in the closed interval [24.56, 24.57])

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Question		**Working**	**Answer**	**Mark**	**Notes**
1	(a)	325 × 1.68	546	2	M1 for 325 × 1.68 seen or digits 546 A1 for 546, accept 546.00, 546.0
	(b)	117 ÷1.5	78	2	M1 for 117 ÷1.5 seen or digits 78 A1 for 78, accept 78.00, 78.0
2	(a)		Correct shape	2	B2 for correct shape; any orientation. (B1 for any two sides correct or all correct for scale factor other than 1 or 2), tolerance to within half square
	(b)		Reflection in line x = 0	2	B1 for reflection, reflect, reflected. B1 for line x = 0 or y-axis NB: more than one transformation should be awarded 0 marks.
3		143.64 ÷ 19 = 7.56 7.56 × 31 =	234.36	3	M1 for 143.64 ÷ 19 (or 7.56 seen) or 143.64 × 31 (or 4452.84 seen) M1(dep) for '7.56' × 31 or '4452.84' ÷ 19 or 143.64 + 12×'7.56' A1 for 234.36 cao accept 234.36p **Alternative method:** M1 for $\frac{31}{19}$ (or 1.63(1…) seen) M1 (dep) '1.63…' × 143.64 A1 for 234.36 cao accept 234.36p

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5384H/14H					
Question		**Working**	**Answer**	**Mark**	**Notes**
4	(a)	$1.8 \times -8 + 32$	17.6	2	M1 for 1.8×-8 or -14.4 or $\frac{-72}{5}$ seen or $32 - $ '1.8×8' or $1.8 \times -8 + 32$ seen A1 for 17.6 or $\frac{88}{5}$ or 17.60 oe
	(b)	$68 = 1.8C + 32$ $1.8C = 68 - 32$ $C = 36 \div 1.8$	20	2	M1 for $68 - 32$ or 36 or $68 = 1.8C + 32$ seen; condone replacement of C by another letter. A1 for 20 cao NB Trial and improvement score 0 or 2
5	(a)	$18 \div 6 : 12 \div 6$	3 : 2	2	M1 for 18 : 12 or 12 : 18 or 1.5:1 or 1:0.67 oe or correct ratio reversed eg 2:3 A1 for 3 : 2 or 1 : 0.6 ... [recurring]
	(b)	$5 + 1 = 6$ $54 \div 6 = 9$ 5×9	45	2	M1 for $\frac{5}{5+1} \times 54$ or $\frac{1}{5+1} \times 54$ or $54 \div$ '$5+1$' or 54×5 or 270 or 9 : 45 or 9 seen, as long as it is not associated with incorrect working. A1 for 45 cao

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Question		Working	Answer	Mark	Notes
6		<table><tr><td>2</td><td>48</td></tr><tr><td>3</td><td>87</td></tr><tr><td>2.5</td><td>65.(625)</td></tr><tr><td>2.6</td><td>69.(576)</td></tr><tr><td>2.7</td><td>73.(683)</td></tr><tr><td>2.65</td><td>71.6(09)</td></tr><tr><td>2.61</td><td>69.9(79)</td></tr><tr><td>2.62</td><td>70.3(84)</td></tr><tr><td>2.63</td><td>70.7(91)</td></tr><tr><td>2.64</td><td>71.1(99)</td></tr><tr><td>2.66</td><td>72.(021)</td></tr><tr><td>2.67</td><td>72.4(34)</td></tr><tr><td>2.68</td><td>72.8(48)</td></tr><tr><td>2.69</td><td>73.2(65)</td></tr></table>	2.6	4	B2 for trial $2.6 \leq x \leq 2.7$ evaluated (B1 for trial $2 \leq x \leq 3$ evaluated) B1 for different trial $2.6 < x \leq 2.65$ B1(dep on at least one previous B1) for 2.6 Values evaluated can be rounded or truncated, but to at least 2sf when x has 1dp and 3sf when x has 2dp **NB** Allow 72 for evaluation using $x = 2.66$ **NB** No working scores no marks even if answer is correct
7			construction	2	M1 for a pair of arcs drawn from the same centre on 2 lines at same distance from meeting point; or a single arc crossing both lines; using an arc with a radius which is the length of the shorter line will imply an intersection with the end of that line. (± 2mm) A1 for bisector (± 2°) and correct arcs **SC:** B1 for bisector (± 2°) with no arcs, or incorrect arcs if M0 awarded. Accept bisectors that are dashed or dotted.
8		$(0.5 \times 3.14\ldots \times 8) + 8$	20.56 – 20.58	3	M2 for $(0.5 \times \pi \times 8)$ or $\pi \times 4$ or $(\pi \times 8 + 8)$ or $(0.5 \times \pi \times 8 + 8)$ oe (M1 for $\pi \times 8$ or $2\pi \times 4$; for a value 25.1-25.2 inclusive unless seen with incorrect working eg πr^2) A1 for 20.56 – 20.58 (**SC**: B2 if M0 scored for 12.56 – 12.58)

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Question		**Working**	**Answer**	**Mark**	**Notes**
9		4.6 + 3.85 = 8.45 $3.2^2 - 6.51 = 3.73$ 8.45 ÷ 3.73 =	2.26541555	2	M1 for $\frac{169}{20}$ or $\frac{256}{25}$ or $\frac{373}{100}$ or 3.73 or 10.24 or 8.45 seen A1 for 2.265(41555); accept $\frac{845}{373}$
10	(a)	t^{6+2}	t^8	1	B1 for t^8 or for t^{6+2}
	(b)	m^{8-3}	m^5	1	B1 for m^5 or for m^{8-3}
	(c)	$2^3 \times x^3$	$8x^3$	2	B2 for $8x^3$ cao (B1 for ax^3, $a \neq 8$ or $2x \times 2x \times 2x$ or $8x^n$ $n \neq 0,3$)
	(d)	$3 \times 4 \times a^{2+5} \times h^{1+4}$	$12a^7h^5$	2	B2 for $12a^7h^5$ (B1 for $12a^7h^n$, $n \neq 0,5$ or $12a^mh^5$, $m \neq 0,7$ or ka^7h^5, $k \neq 12$ or $3 \times 4 \times a^{2+5} \times h^{1+4}$)

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Question		**Working**	**Answer**	**Mark**	**Notes**
11		$9^2 - 6^2$ $81 - 36 = 45$ $\sqrt{45}$	6.705 - 6.71	3	M1 for $9^2 - 6^2$ or 81 – 36 or 45 or $9^2 = AB^2 + 6^2$ oe M1 for $\sqrt{81-36}$ or $\sqrt{45}$ A1 for 6.705 – 6.71 [**SC:** M1 for $\sqrt{81+36}$ or $\sqrt{117}$]
12		4500×1.04^2	4867.20	3	M1 for 4500 × 1.04 or for 4500 + 0.04 × 4500 or for 4680 or 180 or 360 or 4860 M1 (dep) '4680' × 1.04 or for '4680' + 0.04 × '4680' A1 for 4867.2(0) cao (If correct answer seen then ignore any extra years) **Alternative method** M2 for 4500×1.04^2 or 4500 × 1.04^3 A1 for 4867.2(0) cao [SC: 367.2(0) seen B2]

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Question		**Working**	**Answer**	**Mark**	**Notes**
13		$\cos x = \frac{5}{8}$	51.3 – 51.35	3	M1 for $\cos(x=)\frac{5}{8}$ M1 for $\cos^{-1}\frac{5}{8}$ or $\cos^{-1}0.625$, or $\cos^{-1}(5\div 8)$ A1 for 51.3 – 51.35 (SC B2 for 0.89 – 0.9 or 57 – 57.1 seen) **Alternative Scheme** $h^2 = 8^2 - 5^2$ (=39) M1 for sin(x=) $\frac{\sqrt{"39"}}{8}$ or tan (x=) $\frac{\sqrt{"39"}}{5}$ or $\frac{\sin x}{\sqrt{"39"}} = \frac{\sin 90}{8}$ oe or $(\sqrt{"39"})^2 = 8^2 + 5^2 - 2\times 8\times 5\times \cos x$ M1 for $\sin^{-1}(\frac{\sqrt{"39"}}{8})$ or $\sin^{-1}(\frac{\sqrt{"39"}\times \sin 90}{8})$ or $\tan^{-1}(\frac{\sqrt{"39"}}{5})$ or $\cos^{-1}(\frac{8^2+5^2-(\sqrt{"39"})^2}{2\times 8\times 5})$ A1 for 51.3 – 51.35

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Question		**Working**	**Answer**	**Mark**	**Notes**
14		$P = \frac{k}{d^2}$ $k = Pd^2$ = 10000 x 0.4² = 1600 when d = 0.8, $P = \frac{1600}{0.8^2}$	2500	3	M1 $P = \frac{k}{d^2}$ or $P \propto \frac{1}{d^2}$ M1 k = 10000 x 0.4² A1 2500 cao **OR** M1 $\frac{x}{10000} = \frac{0.4^2}{0.8^2}$ M1 $\frac{0.4^2}{0.8^2}$ x 10000 A1 2500 cao

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Question		**Working**	**Answer**	**Mark**	**Notes**
15	(a)	$x = \frac{--2 \pm \sqrt{(-2)^2 - 4\times1\times(-1)}}{2}$ $= \frac{2 \pm \sqrt{8}}{2}$ $= \frac{2 \pm 2.82843}{2}$ $x = -0.4142$ or $x = 2.4142$	−0.41, 2.41	3	M1 for substitution into formula (condone incorrect signs) M1 for $\frac{2 \pm \sqrt{8}}{2}$ A1 for −0.41 to -0.415 and 2.41 to 2.415 **OR** M1 for $(x-1)^2 - 1^2 - 1$ seen M1 for $(x-1) = \pm\sqrt{2}$ A1 for -0.41 to – 0.415 and 2.41 to 2.415 T&I B3 both solutions, B1 1 solution
	(b)		−0.41, 2.41	1	B1 ft from (a)
16	(a)		**b** – **a**	1	B1 for **b** – **a** or – **a** + **b** oe
	(b)	$\overrightarrow{OP} = \overrightarrow{OA} + \overrightarrow{AP}$ $\overrightarrow{OP} = \mathbf{a} + \frac{3}{5}(\mathbf{b} - \mathbf{a})$ $\overrightarrow{OP} = \frac{1}{5}(2\mathbf{a} + 3\mathbf{b})$	proof	3	M1 for $\overrightarrow{OP} = \overrightarrow{OA} + \overrightarrow{AP}$ oe or $\overrightarrow{OP} = \overrightarrow{OB} + \overrightarrow{BP}$ oe M1 for $\overrightarrow{AP} = \frac{3}{5}$ x **"(b – a)"** oe or $\overrightarrow{BP} = \frac{2}{5}$ x **"(a – b)"** oe A1 for **a** + $\frac{3}{5}$ x (**b** – **a**) oe or **b** + $\frac{2}{5}$ x (**a** – **b**) oe leading to given answer with correct expansion of brackets seen

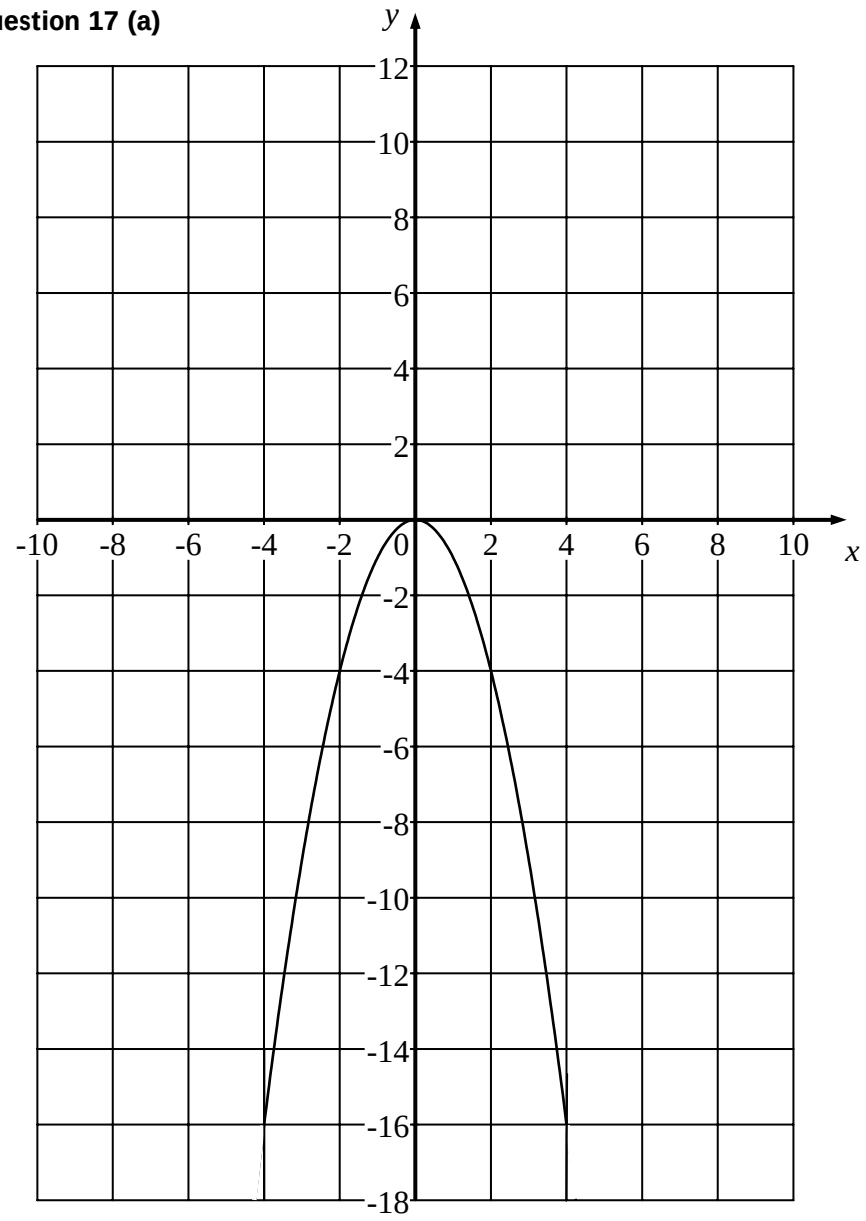
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Question		**Working**	**Answer**	**Mark**	**Notes**
17	(a)		Curve	2	B2 parabola max (0,0), through (−2, −4) and (2, −4) Tol ½sq (B1 parabola with single maximum point (0,0) or through (−2, −4) and (2, −4),but not both or the given parabola translated along the y-axis by any other value than -4 – the translation must be such that the points (0,4), (-2,0), (2,0) are translated by the same amount. Tol ½sq)
	(b)		Curve	2	B2 parabola max (0,4), through (−4, 0) and (4,0) Tol ½sq (B1 parabola with single maximum point (0,4)) Tol ½sq

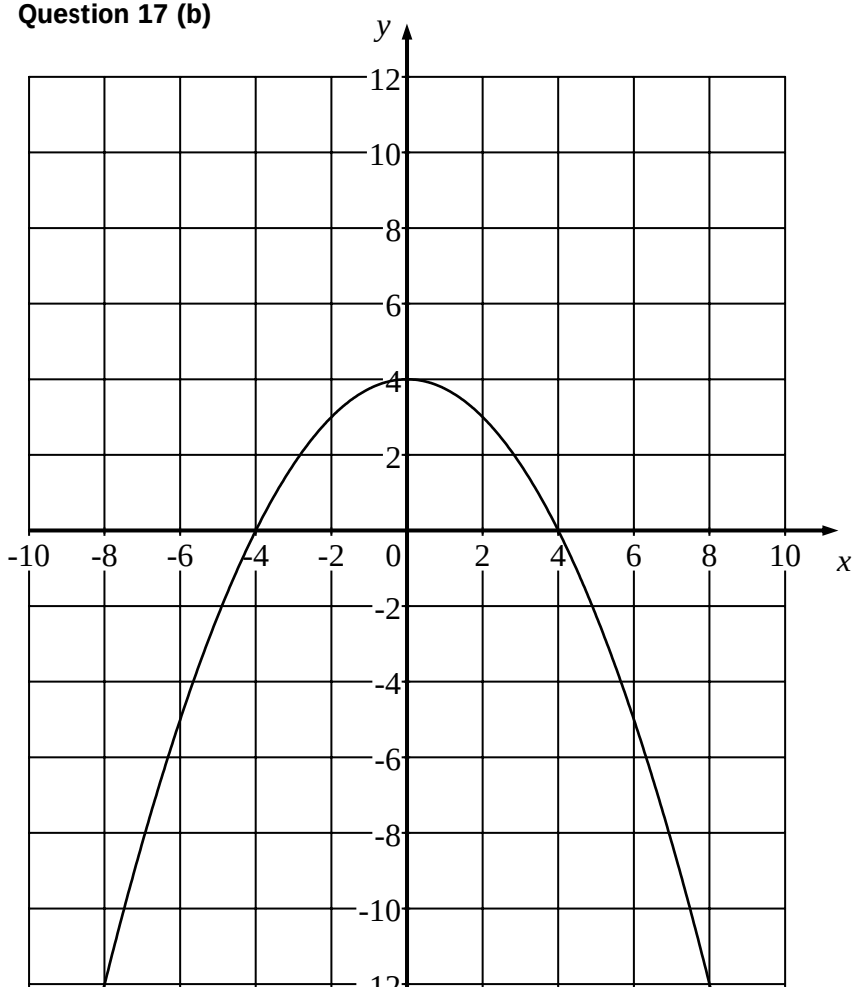
PTO for graphs for Q17

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Question 17 (a)



Question 17 (b)



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