Version 1.1 0506

ASSESSMENT and QUALIFICATIONS ALLIANCE

General Certificate of Secondary Education

Mathematics 4301
Specification A
2008

SPECIMEN ASSESSMENT MATERIALS

Further copies of this booklet are available to download from the AQA Website: www.aqa.org.uk

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Contents

Background Information

Paper 1

Paper 2

Introduction

The GCSE awarding bodies have prepared revised specifications to incorporate the range of features required by GCSE and subject criteria. The specimen assessment material accompanying the specifications is provided to give centres a reasonable idea of the general shape and character of the planned question papers in advance of the first operational examination.

Papers

These specimen question papers have been designed to exemplify the question papers, Papers 1 and 2, to be set for Specification A, for first examination in June 2008. The associated mark scheme follows each paper.

The question papers are targeted at two tiers A* - D (Higher) and grades C - G (Foundation).

It should be noted that on both tiers candidates must not use a calculator for Paper 1.

The question papers should be read in conjunction with AQA Specification A for 2008. The specification is available on the web site www.aqa.org.uk

The question papers are intended to represent the length and balance of the papers that will be set for the examination and to indicate the types of questions that will be used. It must be emphasised, however, that the questions have not been subjected to the rigorous review that would take place with questions before use in examination.

If this document is printed from AQA's website, there is a possibility that it may not print in its original format. This will affect any questions where candidates are required to measure accurately.

Mark Schemes

Principal Examiners have prepared these mark schemes for **specimen** papers. These mark schemes have not, therefore, been through the normal process of standardising that would take place for live papers.

Glossary for Mark Schemes

GCSE examinations are marked in such a way as to award positive achievement wherever possible. Thus, for GCSE Mathematics Specification A, Papers 1 and 2, marks are awarded under various categories.

M	Method marks are awarded for a correct method which could lead to a correct answer.
A	Accuracy marks are awarded when following on from a correct method. It is not necessary to always see the method. This can be implied.
B	Marks awarded independent of method.
M dep	A method mark dependent on a previous method mark being awarded.
ft	Follow through marks. Marks awarded following a mistake in an earlier step.
SC	Special case. Marks awarded within the scheme for a common misinterpretation which has some mathematical worth.
oe	Or equivalent. Accept answers that are equivalent. eg accept 0.5 as well as $\frac{1}{2}$

Surname		Other Names	
Centre Number			Candidate Number				
Candidate Signature									

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General Certificate of Secondary Education
June 2008

AQA
ASSESSMENT and QUALIFICATIONS ALLIANCE

MATHEMATICS (SPECIFICATION A) **4301/1F**
Foundation Tier
Paper 1 Non-Calculator

Specimen Paper (Two-Tier Specification) 2008

F

For this paper you must have:
- mathematical instruments.

You must **not** use a calculator.

Time allowed: 1 hour 30 minutes

Instructions
- Use blue or black ink or ball-point pen. Draw diagrams in pencil.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- Answer the questions in the spaces provided.
- Do all rough work in this book.

Information
- The maximum mark for this paper is 100.
- The marks for questions are shown in brackets.
- You may ask for more answer paper, graph paper and tracing paper. This must be tagged securely to this answer book.

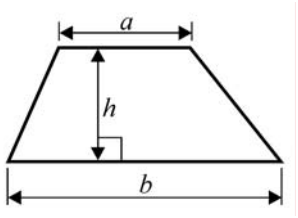
Advice
- In all calculations, show clearly how you work out your answer.

For Examiner's Use	
Pages	Mark
3	
4 – 5	
6 – 7	
8 – 9	
10 – 11	
12 – 13	
14 – 15	
16 – 17	
18 – 19	
20 – 21	
TOTAL	
Examiner's Initials	

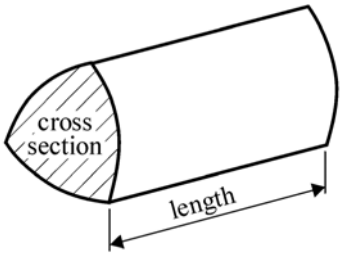
There are no questions printed on this page

Formulae Sheet: Foundation Tier

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



Volume of prism = area of cross section × length



LEAVE MARGIN BLANK

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

1 The price of a new car is £21 350.

(a) Write the number 21 350 in words.

.....

.....

(1 mark)

(b) In the number 21 350, write down the value of the figure 5.

Answer ..... *(1 mark)*

(c) Write the number 21 350 to the nearest thousand.

Answer ..... *(1 mark)*

(d) Work out 1% of £21 350.

.....

.....

Answer £ ..... *(2 marks)*

2 Work out

(a) 500 – 346

.....

.....

Answer ..... *(1 mark)*

(b) 89 + 565

.....

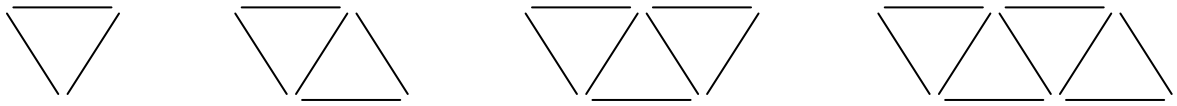
.....

Answer ..... *(1 mark)*

7

Turn over ▶

3 Patterns are made of sticks.



Pattern 1 Pattern 2 Pattern 3 Pattern 4

(a) Complete the table.

Pattern	1	2	3	4
Number of sticks	3	5		

(1 mark)

(b) How many sticks are there in Pattern 5?

Answer ..... *(1 mark)*

(c) Here is a rule for working out the number of sticks.

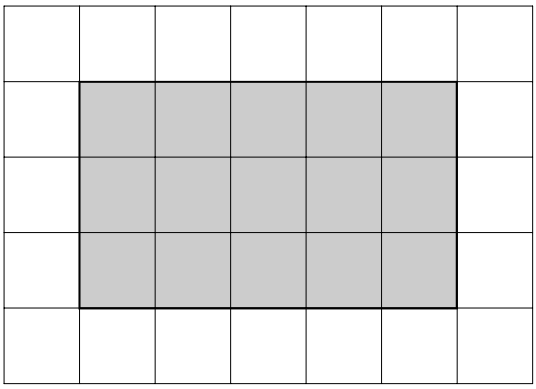
Multiply the pattern number by 2 and add 1

How many sticks are there in Pattern 10?

.....

Answer ..... *(1 mark)*

4 (a) A shaded rectangle is drawn on a centimetre square grid.



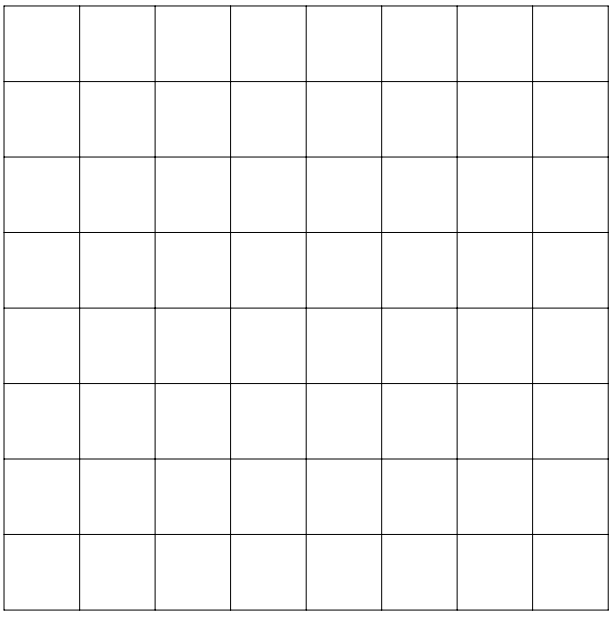
Work out the area of the shaded rectangle.
State the units of your answer.

.....

.....

Answer ..... *(3 marks)*

(b) On the centimetre square grid below draw a rectangle with a **perimeter** of 10 cm.

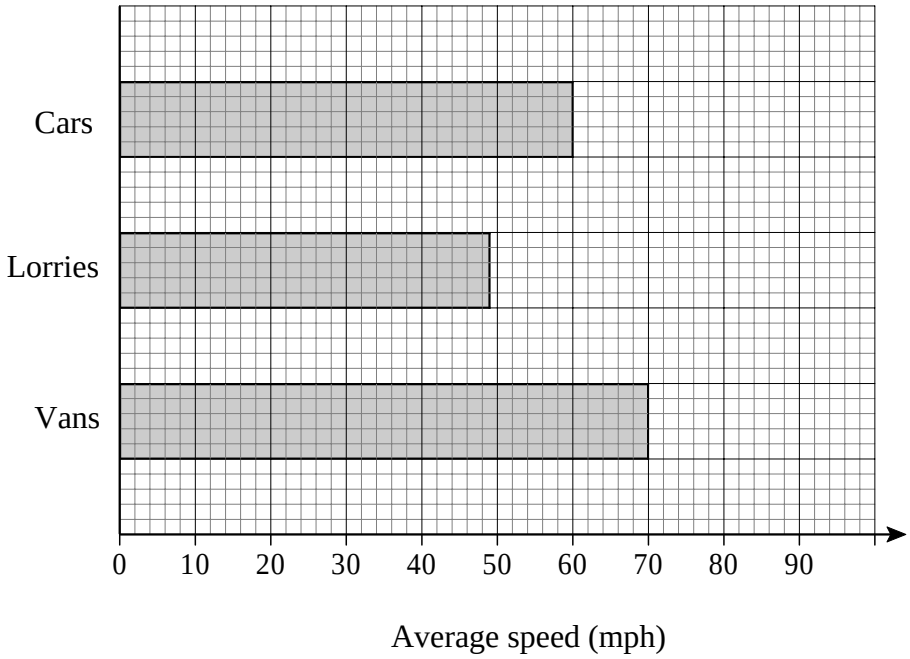


(1 mark)

7

Turn over ▶

5 The bar chart shows the average speeds of cars, lorries and vans on a motorway.



(a) Write down the average speed of cars.

Answer ..... mph *(1 mark)*

(b) Work out the difference between the average speeds of lorries and vans.

.....

.....

Answer ..... mph *(2 marks)*

(c) Andrew says that the graph shows that cars always travel faster than lorries on the motorway.

Is he correct?
Give a reason for your answer.

Answer .....

.....

(2 marks)

6 Here is a list of numbers.

4 11 12 15 17 21 25 30

From this list, write down

(a) a number greater than 15

Answer ..... *(1 mark)*

(b) two numbers with a sum of 38

.....

Answer ..... *(1 mark)*

(c) the number that is half of 24

Answer ..... *(1 mark)*

(d) the two factors of 30

Answer ..... *(2 marks)*

(e) a multiple of 7

Answer ..... *(1 mark)*

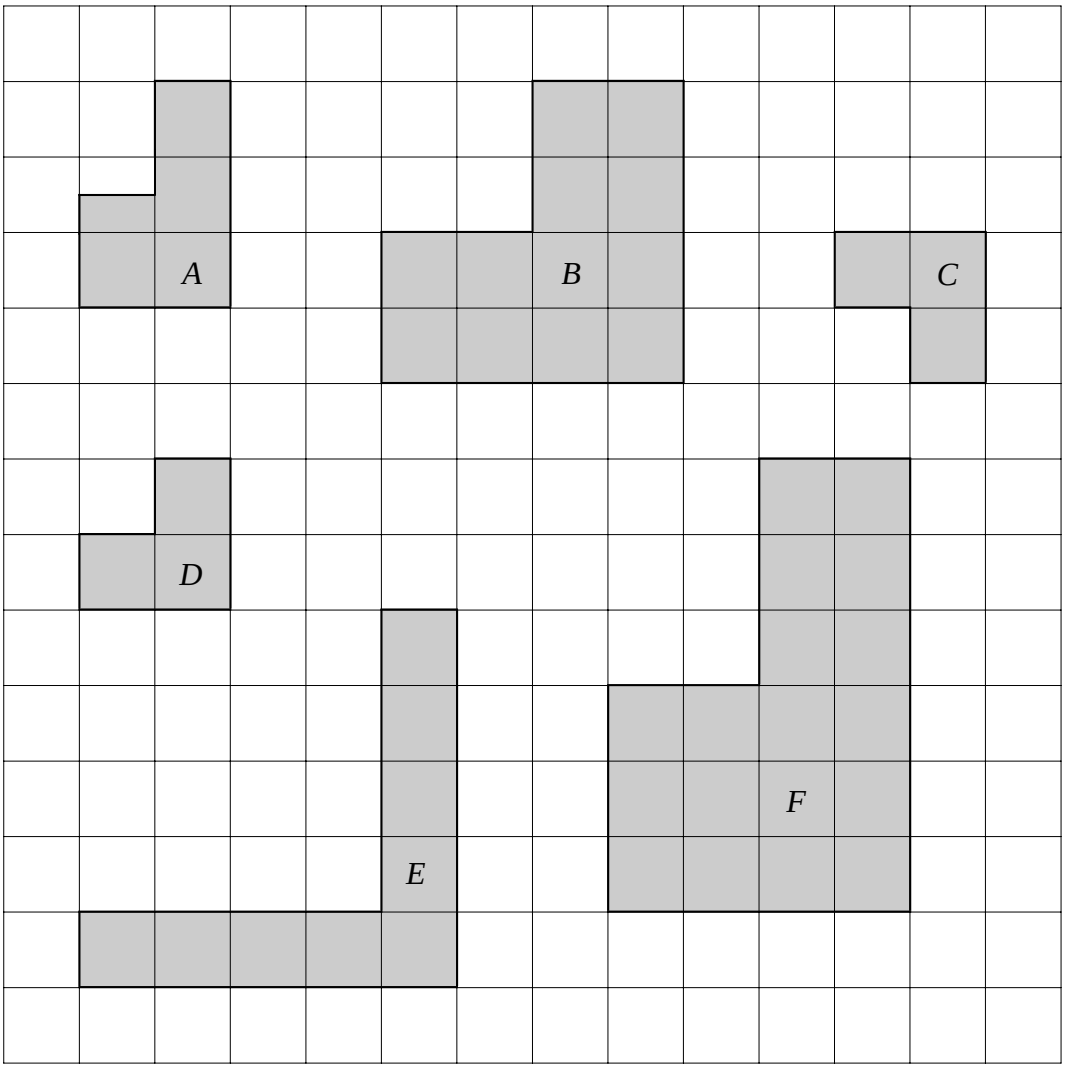
(f) a prime number

Answer ..... *(1 mark)*

12

Turn over ▶

7 (a) Here are six L-shapes on a centimetre square grid.



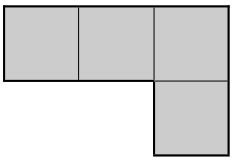
(i) Which two L-shapes are congruent?

Answer ..... and ..... *(1 mark)*

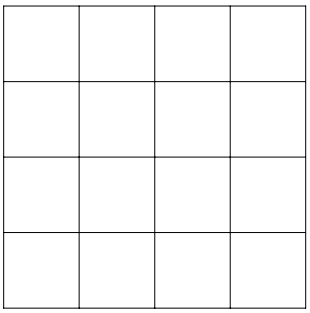
(ii) Which L-shape is an enlargement of *A*?

Answer ..... *(1 mark)*

(b) Here is a different L-shape.

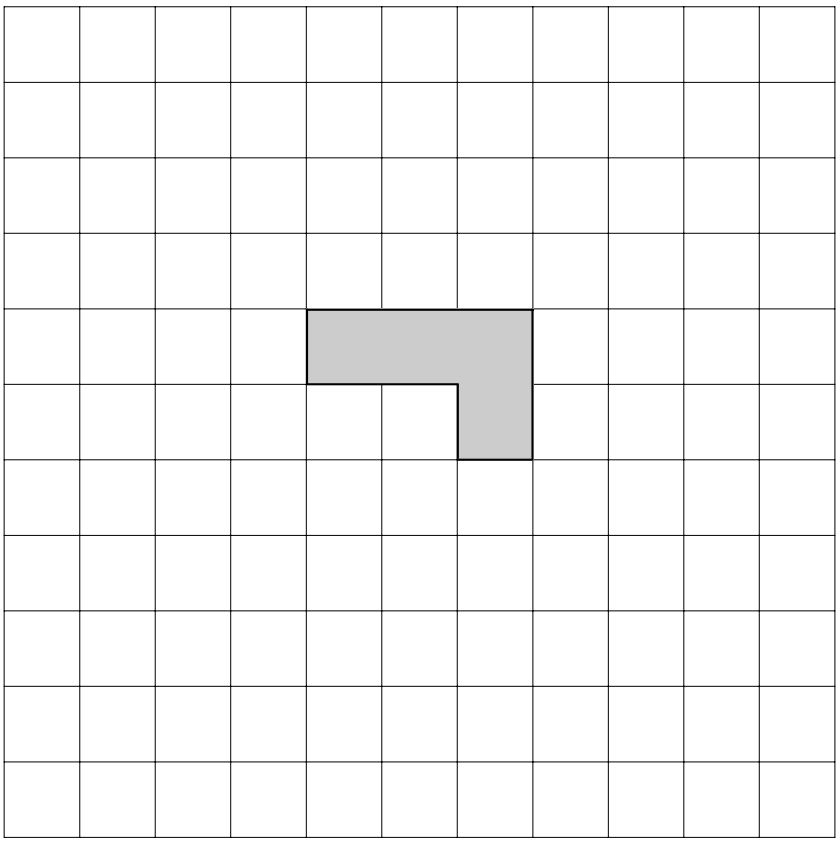


Show on the grid how four of these L-shapes can be fitted together to make a square.



(2 marks)

(c) Draw the L-shape on the centimetre square grid after a rotation of 180°.



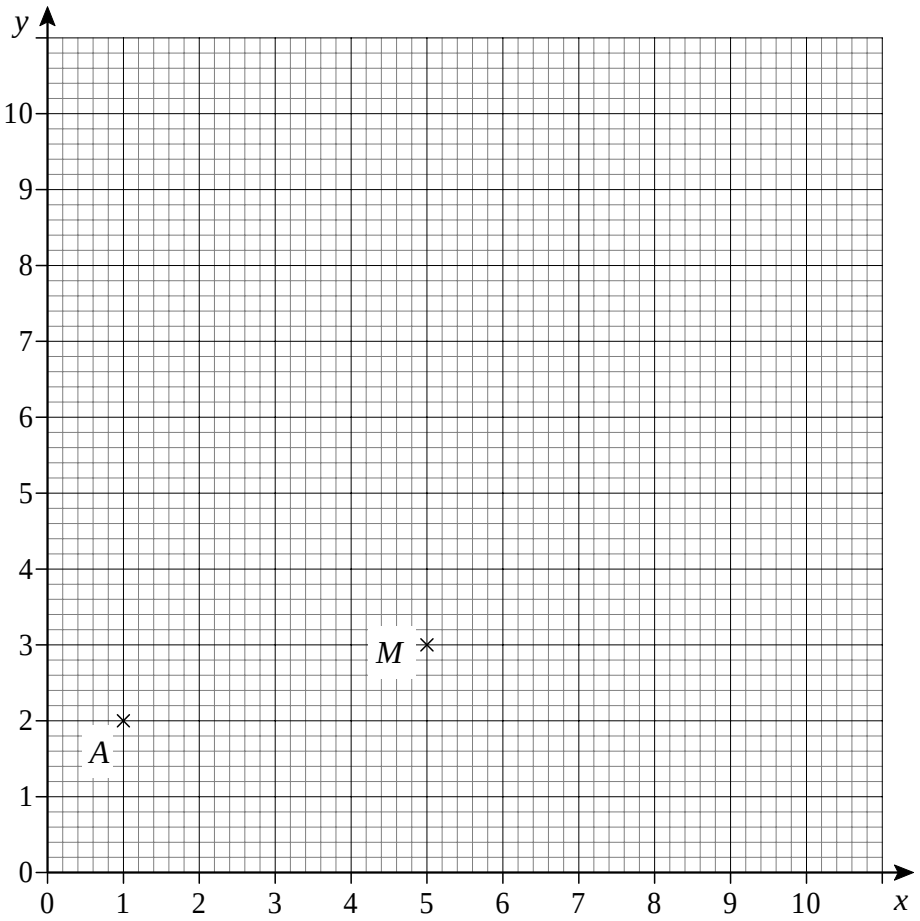
(2 marks)

6

Turn over ▶

LEAVE MARGIN BLANK

8 The points *A* and *M* are shown on the grid.



(a) Write down the coordinates of *A* and *M*.

Answer *A* (..... , ...) and *M* (..... , ...) *(2 marks)*

(b) *M* is the mid-point of a line *AB*.

Work out the coordinates of *B*.

.....

.....

Answer *B* (..... , ...) *(2 marks)*

9 (a) Work out $\frac{1}{4}$ of 12

.....

Answer ..... *(2 marks)*

(b) Work out $\frac{1}{4} + \frac{1}{8}$

.....

.....

Answer ..... *(2 marks)*

(c) Laura uses this method to work out 15% of 80.

10% of 80	= 8
+ 5% of 80	= 4
15% of 80	= 12

Use Laura's method to work out 15% of 140.
Show your working.

.....

.....

.....

.....

Answer ..... *(3 marks)*

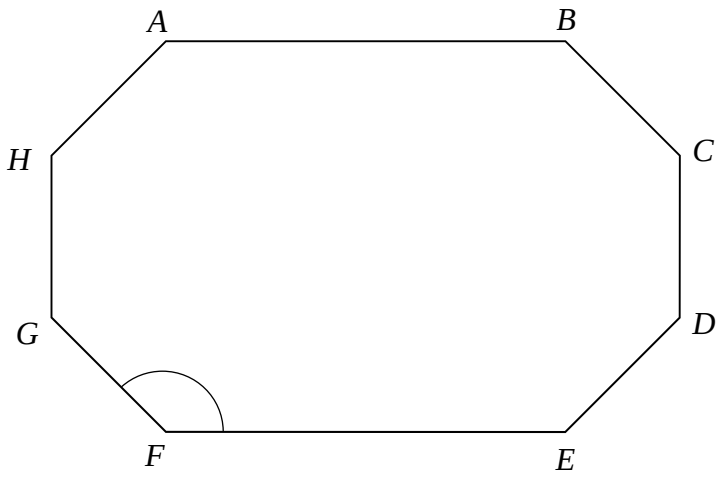
(d) Work out 85% of 140.

.....

Answer ..... *(2 marks)*

13

10 The diagram shows an eight-sided shape.



(a) What name is given to an eight-sided shape?

Answer ..... *(1 mark)*

(b) Which line is parallel to *BC?*

Answer ..... *(1 mark)*

(c) (i) Measure accurately the length of line *AB.*

Answer ..... cm *(1 mark)*

(ii) Write down the length of line *AB* to the nearest centimetre.

Answer ..... cm *(1 mark)*

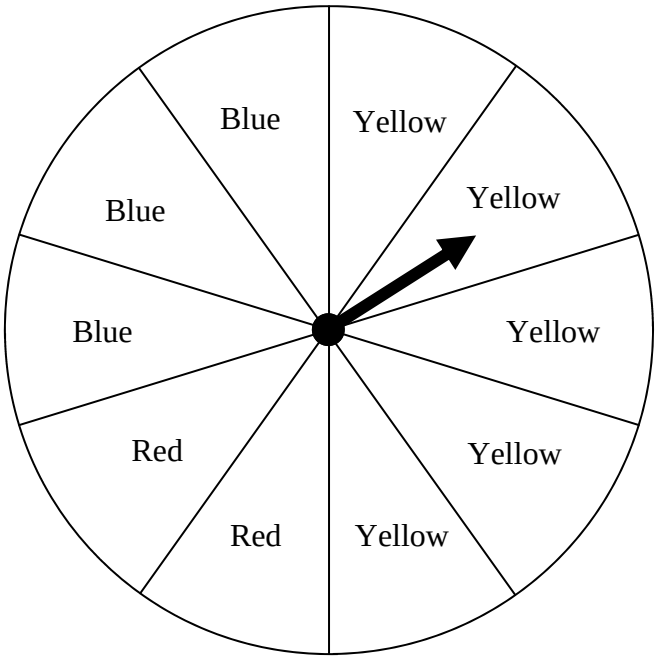
(d) (i) What type of angle is angle *F?*

Answer ..... *(1 mark)*

(ii) Measure accurately the size of angle *F*.

Answer ..... degrees *(1 mark)*

11 A fair spinner has 10 equal sections.
Five sections are yellow, three are blue and two are red.



(a) The arrow is spun.

(i) What is the probability of the arrow landing on blue?

.....

Answer ..... *(2 marks)*

(ii) What is the probability of the arrow landing on green?

.....

Answer ..... *(1 mark)*

(b) The arrow is spun 100 times.

How many times do you expect the arrow to land on yellow?

.....

.....

Answer ..... *(2 marks)*

11

Turn over ▶

12 The stem and leaf diagram shows the number of books on 12 shelves in a library.

3	1	2	7	9	9
4	0	0	2	3	
5	9				
6	5				
7	3				

Key 3 | 1 represents 31 books

(a) How many of the shelves have less than 40 books?

.....

Answer ..... *(1 mark)*

(b) What is the median number of books?

.....

.....

Answer ..... *(1 mark)*

(c) What is the range of the number of books?

.....

.....

Answer ..... *(1 mark)*

(d) The mean number of books per shelf is 45.

Which average, mean or median, better represents the data?
Give a reason for your answer.

.....

.....

.....

(1 mark)

13 (a) Find the value of $4x - 3y$ when $x = 5$ and $y = -6$

.....

.....

Answer ..... *(2 marks)*

(b) Find the value of $\frac{x}{y}$ when $x = 30$ and $y = -2$

.....

.....

.....

Answer ..... *(2 marks)*

14 (a) Solve $4x = 12$

.....

Answer x = ... *(1 mark)*

(b) Solve $y + 7 = 11$

.....

Answer y = ... *(1 mark)*

10

Turn over ▶

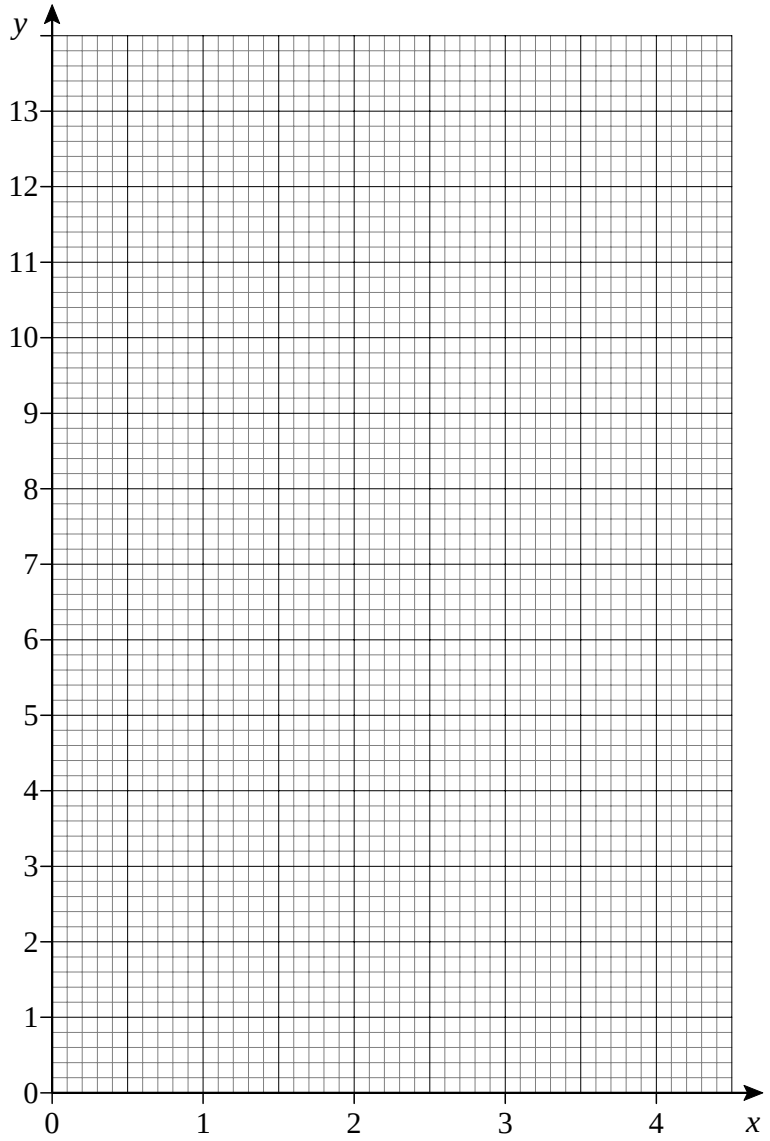
15 (a) Complete the table of values for $y = 3x + 1$

x	0	1	2	3	4
y	1		7		13

.....

(1 mark)

(b) On the grid draw the graph of $y = 3x + 1$ for values of x from 0 to 4.



(2 marks)

(c) Use your graph to solve $5.5 = 3x + 1$

.....

.....

Answer x = ... *(2 marks)*

16 (a) Work out the value of 2^3

.....

Answer ..... *(1 mark)*

(b) Work out $6 \times 15 + 4 \times 15$

.....

.....

.....

.....

Answer ..... *(2 marks)*

(c) Use approximations to estimate the value of $\dfrac{37.48 \times 6.13}{(1.95)^2}$

You **must** show your working.

.....

.....

.....

.....

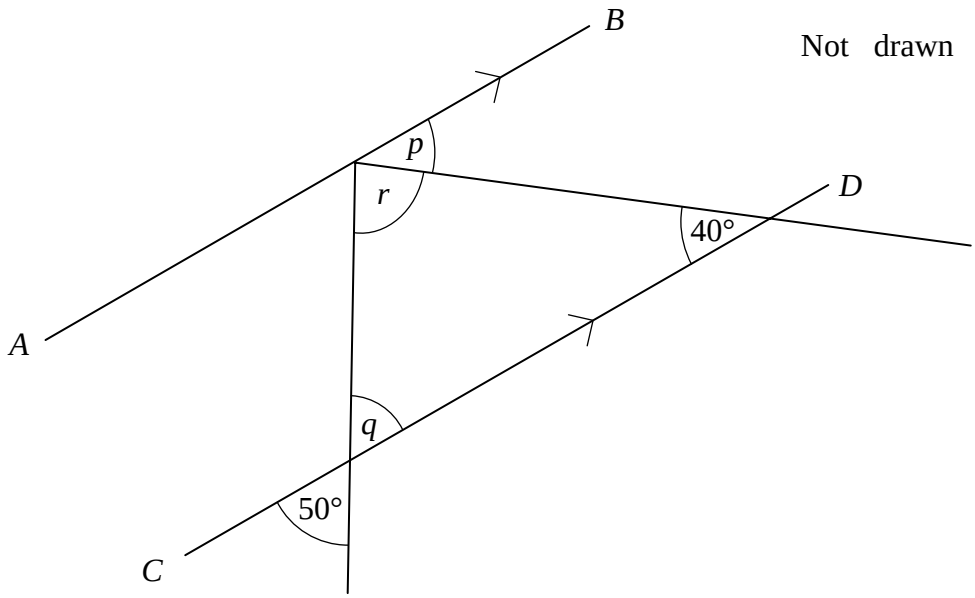
Answer ..... *(3 marks)*

11

Turn over ▶

LEAVE MARGIN BLANK

17 The lines *AB* and *CD* are parallel.



Not drawn accurately

(a) Write down the value of *p*.
Give a reason for your answer.

Answer p = ... degrees

Reason .....

(2 marks)

(b) Write down the value of *q*.
Give a reason for your answer.

Answer q = ... degrees

Reason .....

(2 marks)

(c) Work out the value of *r*.

.....

.....

Answer r = ... degrees *(2 marks)*

18 p is an even number.
q is an odd number.

(a) Is pq an odd number, an even number or could it be either?
Tick the correct box.

☐ odd ☐ even ☐ could be either

(1 mark)

(b) Is p a prime number, not a prime number or could it be either?
Tick the correct box.

☐ prime ☐ not prime ☐ could be either

(1 mark)

(c) Is $q \div p$ an integer, not an integer or could it be either?
Tick the correct box.

☐ integer ☐ not an integer ☐ could be either

(1 mark)

Turn over for the next question

9

19 500 people voted in an election.
The table shows the four candidates and the votes received by two of them.

Allgood	Betterdon	Carewell	Didright
155	105		

Carewell received twice as many votes as Didright.

How many votes did Carewell receive?

.....

.....

.....

Answer ..... *(3 marks)*

20 (a) Expand $d(d^2 + 6)$

.....

Answer ..... *(2 marks)*

(b) Simplify $g^4 \times g^4$

.....

Answer ..... *(1 mark)*

(c) Expand and simplify $2(p + 5) + 3(2p - 1)$

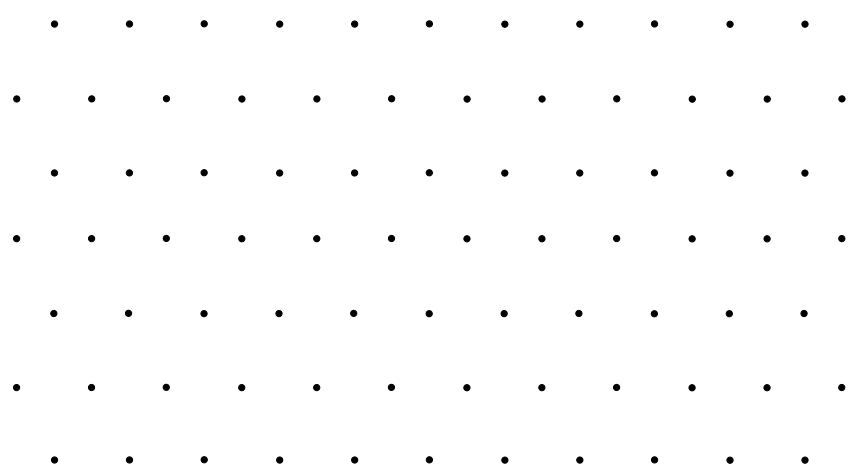
.....

.....

.....

Answer ..... *(2 marks)*

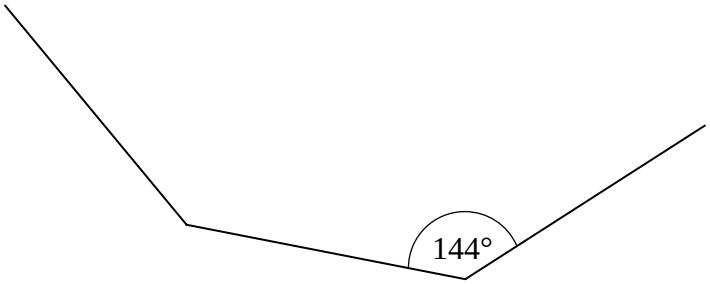
21 (a) On the triangular paper below, show clearly that regular hexagons will tessellate.



(2 marks)

(b) The diagram shows part of a regular polygon.
Each interior angle is 144°.

Not drawn accurately



(i) Calculate the size of the exterior angle of the polygon.

.....

.....

Answer ..... degrees *(2 marks)*

(ii) Calculate the number of sides of the polygon.

.....

.....

Answer ..... *(2 marks)*

END OF QUESTIONS

14

Q	Answers	Mark	Comments
1a	Twenty one thousand three hundred (and) fifty	B1	
1b	Fifty or 50	B1	Accept tens Do not accept 10
1c	21000	B1	
1d	21350 ÷ 100 or 213.5	M1	oe
	(£) 213.50 (p)	A1	
2a	154	B1	
2b	654	B1	
3a	7 9	B1	
3b	11	B1	
3c	21	B1	
4a	5×3	M1	oe
	15	A1	
	cm^2	B1	Units mark
4b	Correct rectangle drawn	B1	4×1 3×2
5a	60 (mph)	B1	
5b	70 – 49 or 10 + 10 + 1	M1	allow 70 – (48 to less than 50)
	21 (mph)	A1	
5c	No with attempt at reason	B1	Note: No can be implied
	Valid reason	B1	eg only average speeds eg some cars go slower eg only looking at a sample
6a	17 or 21 or 25 or 30	B1	Ignore extras unless contradictory
6b	17 and 21	B1	
6c	12	B1	
6d	15 and 30	B2	B1 for each answer Do not allow extras
6e	21	B1	
6f	11 or 17	B1	Ignore extras unless contradictory

Q	Answers	Mark	Comments
7ai	*C* and *D*	B1	
7aii	*F*	B1	
7b	Attempt to put 2 L shapes together without overlap	M1	
	Fully correct diagram	A1	
7c	Any rotation	M1	
	Correct rotation	A1	in any position
8a	*A* (1, 2)	B1	penalise reversed coordinates on first occurrence only in whole question.
	M (5, 3)	B1	
8b	Evidence of adding on correctly to at least one coordinate eg one coordinate correct	M1	May be shown on diagram Allow M1 for (3, 2.5)
	(9, 4)	A1	
9a	$^1/_4 \times 12$	M1	oe
	3	A1	
9b	Common denominator seen	M1	eg $^2/_8$ and $^1/_8$ or $^8/_{32}$ and $^4/_{32}$
	$^3/_8$	A1	oe Accept decimals
9c	(10% of 140) = 14	M1	
	(5% of 140) = 7	M1	eg 16 followed by 8 scores M0M1
	(15% of 140) = 21	A1	
9d	140 – 21 or $8 \times 14 + 7$ or $^{85}/_{100} \times 140$	M1	140 – their 21 oe
	119	A1ft	ft only on 140 – their answer from (c)
10a	Octagon	B1	
10b	*GF*	B1	Accept *AE*
10ci	5.25 (cm)	B1	± 0.2 cm
10cii	5 (cm)	B1ft	ft provided (i) not an integer
10di	Obtuse	B1	Accept: Interior
10dii	135	B1	± 2°

Q	Answers	Mark	Comments
11ai	0.3 or $^{3}/_{10}$	B2	B1 for 3 in numerator or 10 in denominator eg 3 in 10 penalise 1 mark on first occasion
11aii	0	B1	Accept: Impossible, Zero, Nought, Nil, $^{0}/_{10}$
11b	$^{1}/_{2} \times 100$	M1	50% scores M1A0
	50	A1	Accept $^{50}/_{100}$ Do not ignore cancelling down eg $^{50}/_{100} = {}^{1}/_{2}$ scores M1 only
12a	5	B1	
12b	40	B1	
12c	42	B1	
12d	median, mean affected by extreme values	B1	must give a reason; median can be implied
13a	4×5 (–) 3×-6 or 20 (–) – 18 or 20 + 18	M1	
	38	A1	2 implies M1A0
13b	$^{30}/_{-2}$	M1	oe
	– 15	A1	not eg $^{-15}/_{1}$
14a	3	B1	
14b	4	B1	
15a	4 10	B1	
15b	At least 2 correct points plotted	M1	May be implied by a correct line
	Correct ruled line drawn	A1	Tolerance 1 square from points
15c	Attempt to read off at $y = 5.5$	M1	Tolerance $\pm {}^{1}/_{2}$ square
	1.5	A1ft	Use of graph not essential ft is from their line

Q	Answers	Mark	Comments
16a	8	B1	
16b	10×15 or 90 + 60 or their 90 + their 60	M1	with attempt at multiplication seen
	150	A1	
16c	Sight of two from 40, 6 and 2	M1	Allow 36, 37, 38
	$\frac{240}{4}$	M1dep	oe or $\frac{6 \times \text{(their 36, 37 or 38)}}{4}$
	60	A1	54, 55.5, 57
17a	40	B1	
	Alternate	B1	Do not accept: Z angle Accept: Corresponding angle if corresponding angle seen. Accept: Allied or interior if angle seen
17b	50	B1	
	Opposite	B1	Accept: Vertically opposite Straight line (= 180) if 130 seen
17c	180 – 40 – 50 or 180 – 40 – their q	M1	oe
	90	A1ft	
18a	Even	B1	
18b	Could be either	B1	
18c	Not an integer	B1	
19	500 – 155 – 105 or 240	M1	
	their 240 ÷ 3 (× 2)	M1dep	oe
	160	A1	

Q	Answers	Mark	Comments
20a	$d^3 + 6d$	B2	B1 for each term Do not accept d6
20b	g^8	B1	
20c	$2p + 10 + 6p - 3$	M1	For 3 correct terms
	$8p + 7$	A1	SC1 for $8p + n$ or $np + 7$ provided consistent with any working shown
21a	any regular hexagon	B1	
	any three regular hexagons meeting at a point	B1	
21bi	180 – 144	M1	
	36	A1	
21bii	360 ÷ 36 or 360 ÷ their 36	M1	
	10	A1	

Surname		Other Names	
Centre Number			Candidate Number				
Candidate Signature									

Leave Blank

General Certificate of Secondary Education
June 2008

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ASSESSMENT and QUALIFICATIONS ALLIANCE

MATHEMATICS (SPECIFICATION A) **4301/1H**
Higher Tier
Paper 1 Non-Calculator

Specimen Paper (Two-Tier Specification) 2008

H

For this paper you must have:
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Advice
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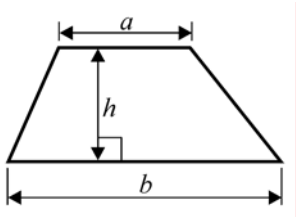
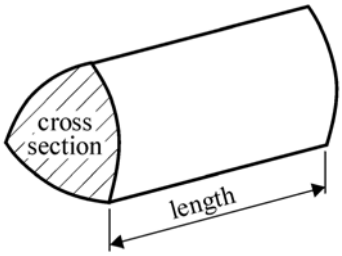
16 – 17	
18 – 19	
20 – 21	
22 – 23	
TOTAL	
Examiner's Initials	

Formulae Sheet: Higher Tier

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

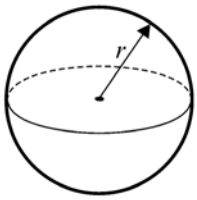


Volume of prism = area of cross section × length



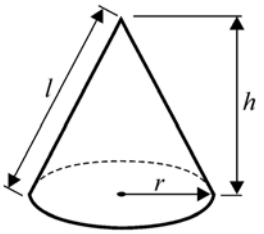
Volume of sphere $= \frac{4}{3}\pi r^3$

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



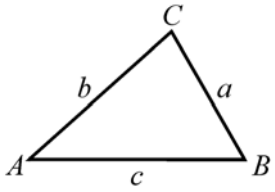
Volume of cone $= \frac{1}{3}\pi r^2 h$

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



In any triangle *ABC*

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



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

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

The Quadratic Equation

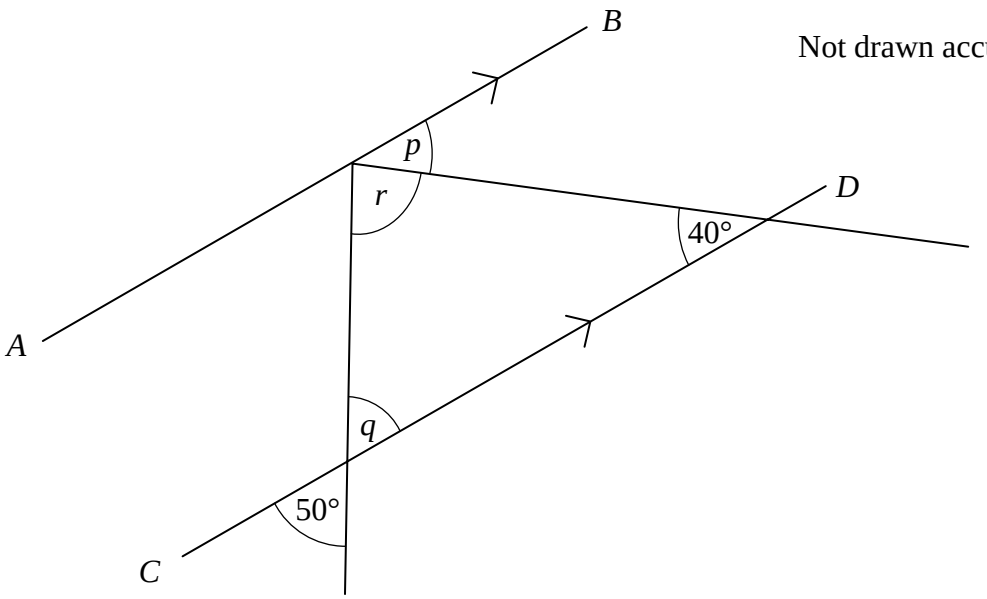
The solutions of $ax^2 + bx + c = 0$, where $a \neq 0$, are given by

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

LEAVE MARGIN BLANK

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

1 The lines *AB* and *CD* are parallel.



(a) Write down the value of *p*.
Give a reason for your answer.

Answer p = ... degrees

Reason .....

(2 marks)

(b) Write down the value of *q*.
Give a reason for your answer.

Answer q = ... degrees

Reason .....

(2 marks)

(c) Work out the value of *r*.

.....

.....

Answer r = ... degrees *(2 marks)*

6

Turn over ▶

2 Solve the equation $3(z - 2) = 27$

.....

.....

.....

Answer $z =$ ..... *(3 marks)*

3 Which of these fractions is closest to $\frac{1}{4}$?

You **must** show your working.

$$\frac{2}{5} \quad \frac{3}{10} \quad \frac{7}{20} \quad \frac{13}{40}$$

.....

.....

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.....

.....

.....

(3 marks)

4 p is an even number.
q is an odd number.

(a) Is pq an odd number, an even number or could it be either?
Tick the correct box.

☐	☐	☐
odd	even	could be either

(1 mark)

(b) Is p a prime number, not a prime number or could it be either?
Tick the correct box.

☐	☐	☐
prime	not prime	could be either

(1 mark)

(c) Is $q \div p$ an integer, not an integer or could it be either?
Tick the correct box.

☐	☐	☐
integer	not an integer	could be either

(1 mark)

Turn over for the next question

9

5 500 people voted in an election.
The table shows the four candidates and the votes received by two of them.

Allgood	Betterdon	Carewell	Didright
155	105		

(a) What percentage of the votes did Allgood receive?

.....

.....

.....

.....

Answer ..... % *(2 marks)*

(b) Carewell received twice as many votes as Didright.

How many votes did Carewell receive?

.....

.....

.....

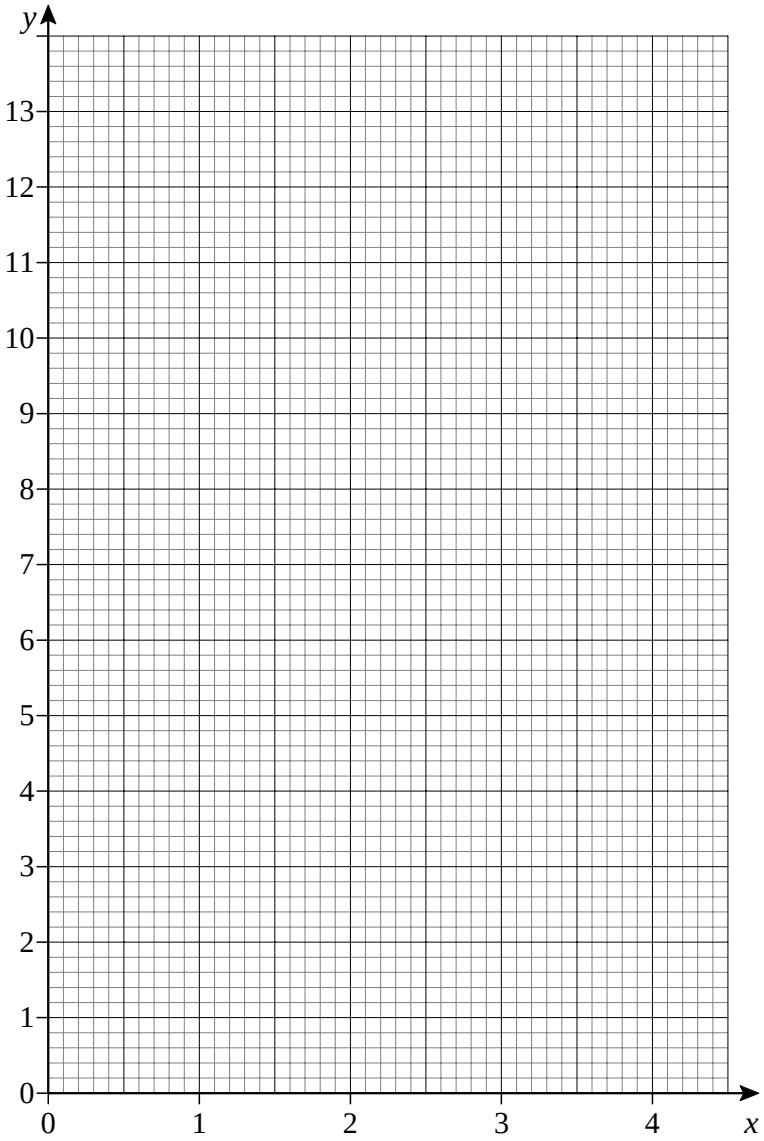
Answer ..... *(3 marks)*

LEAVE MARGIN BLANK

6 (a) On the grid draw the graph of $y = 3x + 1$ for values of x from 0 to 4.

.....

.....



(3 marks)

(b) Use your graph to solve $5.5 = 3x + 1$

.....

.....

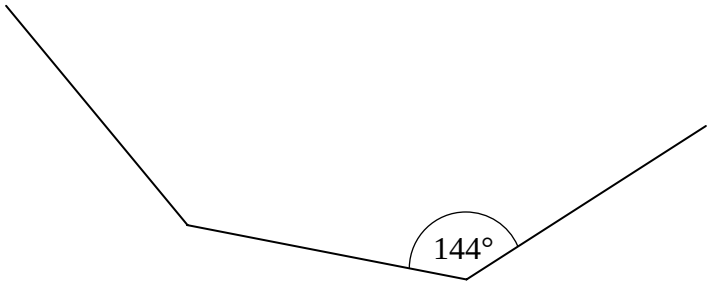
Answer x = ... *(2 marks)*

10

Turn over

7 The diagram shows part of a regular polygon.
Each interior angle is 144°.

Not drawn accurately



Calculate the size of the exterior angle of the polygon.

.....

.....

Answer ..... degrees *(2 marks)*

8 Use approximations to estimate the value of $\dfrac{37.48 \times 6.13}{(1.95)^2}$

You **must** show your working.

.....

.....

.....

.....

Answer ..... *(3 marks)*

9 50 people were asked how long they had to wait for a bus.
The table shows the results.

Time, *t* (minutes)	**Frequency**	**Mid-point**	
$0 < t \leqslant 5$	16		
$5 < t \leqslant 10$	21		
$10 < t \leqslant 15$	10		
$15 < t \leqslant 20$	3		

(a) Calculate an estimate of the average time they had to wait.

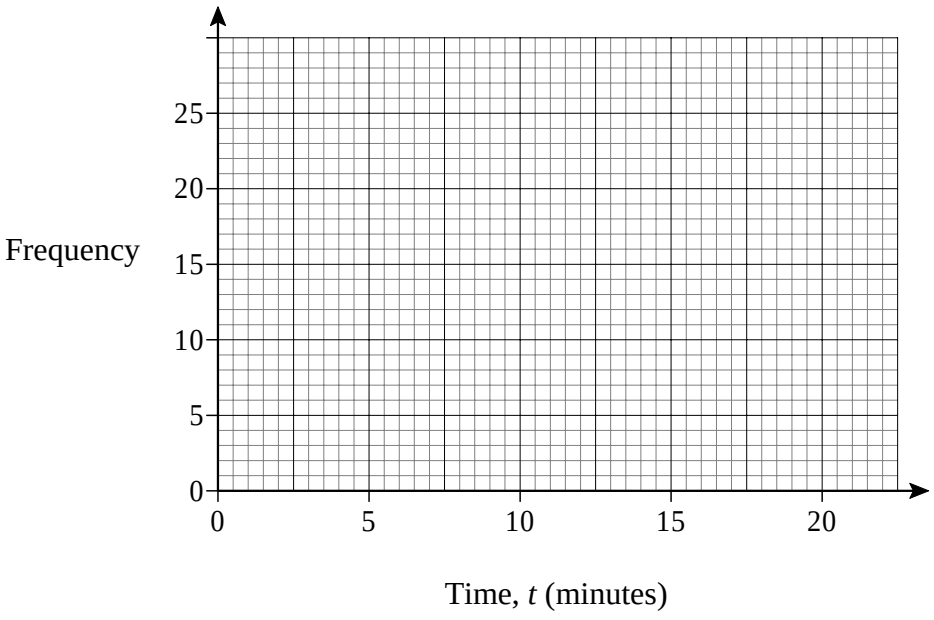
.....

.....

.....

Answer ..... minutes *(3 marks)*

(b) Draw a frequency diagram to represent the data.

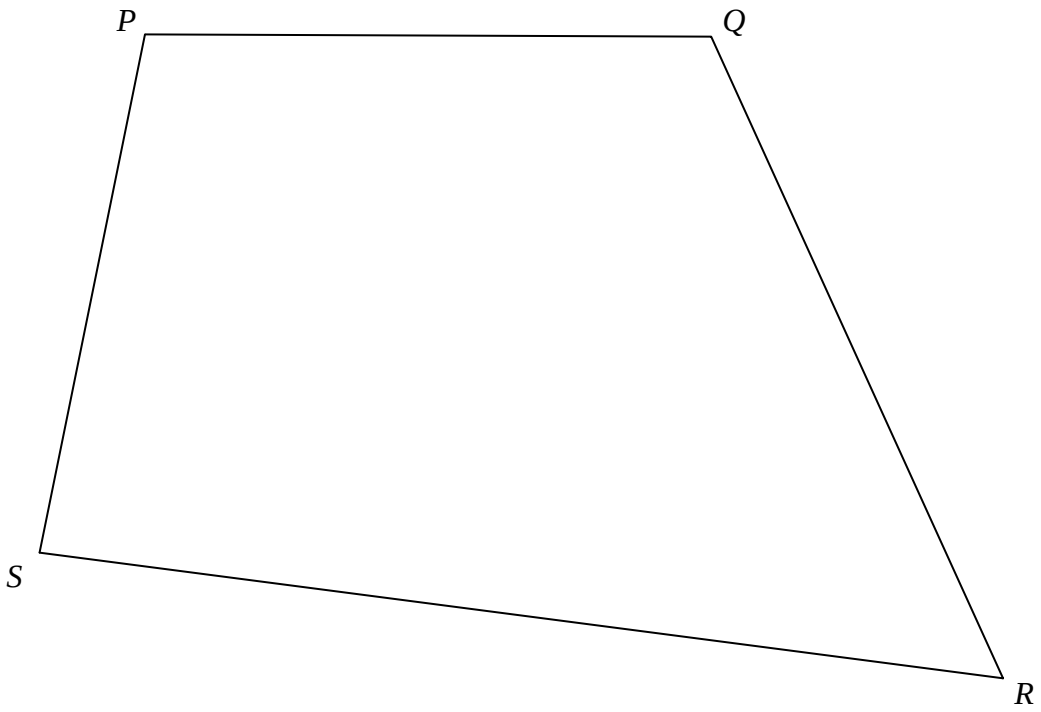


(2 marks)

10

Turn over

10 The diagram shows a quadrilateral *PQRS*.



(a) Draw the locus of points that are the same distance from *P* as from *Q*.

(2 marks)

(b) Shade the region inside the quadrilateral which is less than 7 cm from *S* and nearer to *Q* than to *P*.

(2 marks)

LEAVE MARGIN BLANK

11 A sequence of numbers is shown.

5 9 13 17 21

(a) Find an expression for the *n*th term of the sequence.

.....

.....

Answer ..... *(2 marks)*

(b) Explain why 83 will not be a term in this sequence.

.....

.....

.....

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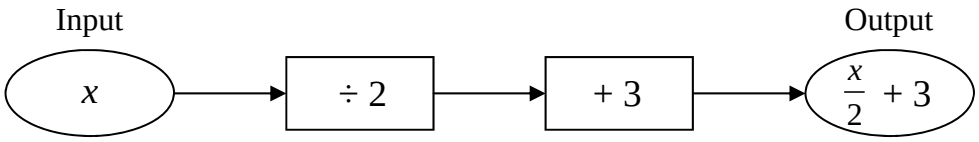
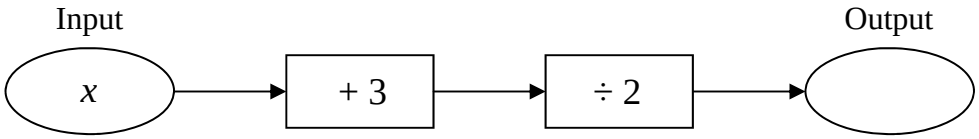
(2 marks)

12 A function diagram produce algebraic expressions.
For example

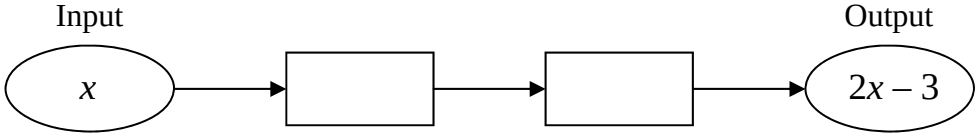


(a) Fill in the missing expression in this function diagram.



(2 marks)

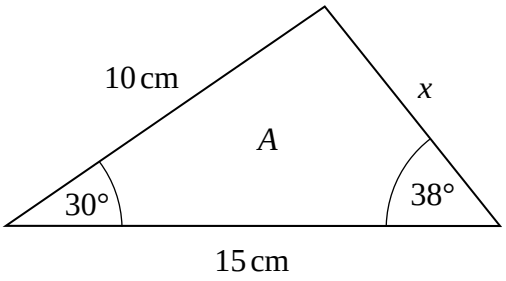
(b) Fill in the missing operations in this function diagram.

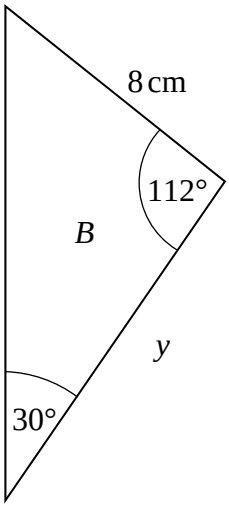


(2 marks)

12

13 The triangles *A* and *B* are congruent.





Not drawn accurately

(a) Write down the values of *x* and *y*.

.....

.....

Answer x = ... cm , y = ... cm *(2 marks)*

(b) Given that sin 30° = 0.5, calculate the area of triangle *A*.
State the units of your answer.

.....

.....

.....

.....

Answer ..... *(3 marks)*

14 (a) x is an integer.

List all the values of x such that $-1 < 2x \leqslant 8$

.....

.....

.....

Answer ..... *(3 marks)*

(b) (i) Factorise $y^2 - 8y + 15$

.....

.....

Answer ..... *(2 marks)*

(ii) Hence solve the equation $y^2 - 8y + 15 = 0$

.....

.....

Answer ..... *(1 mark)*

Turn over for the next question

11

15 Emma has a box of counters.
The counters are green, red or blue.
She picks a counter at random.
The table shows the probability that she picks a green counter and the probability that she picks a red counter.

Colour	**Probability**
Green	0.6
Red	0.25
Blue	

(a) What is the probability that Emma picks a blue counter?

.....

.....

Answer ..... *(2 marks)*

(b) There are 10 red counters in the box.

How many green counters are in the box?

.....

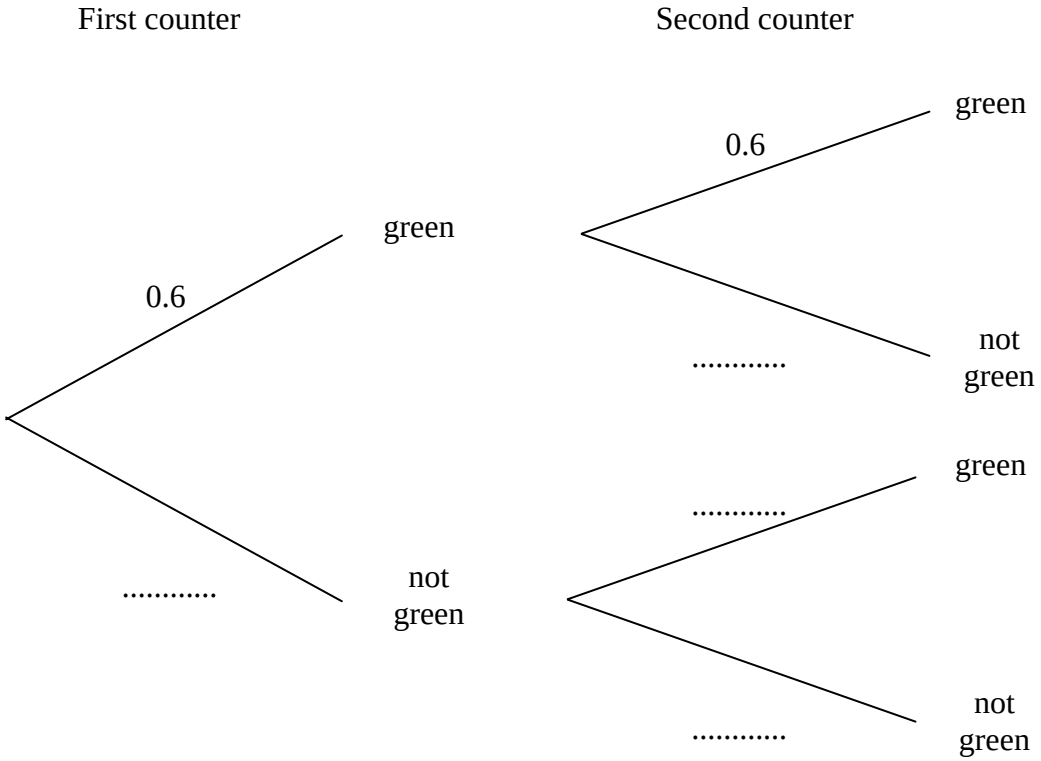
.....

.....

Answer ..... *(3 marks)*

(c) Emma picks a counter at random.
She replaces it in the box and then picks another counter at random.

(i) Complete the tree diagram.



(1 mark)

(ii) What is the probability that at least one of the counters is green?

.....

.....

.....

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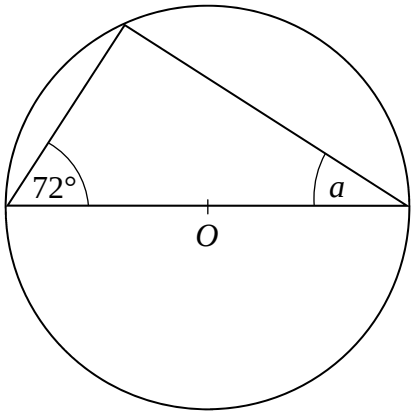
Answer ..... *(3 marks)*

9

Turn over ▶

16 (a) *O* is the centre of the circle.



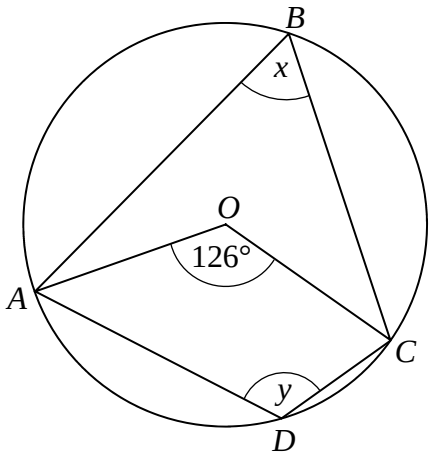
Not drawn accurately

Calculate the value of *a*.

.....

Answer ..... degrees *(2 marks)*

(b) *O* is the centre of the circle.
A, *B*, *C* and *D* are points on the circumference.
Angle *AOC* = 126°



Not drawn accurately

(i) Calculate the value of *x*.

.....

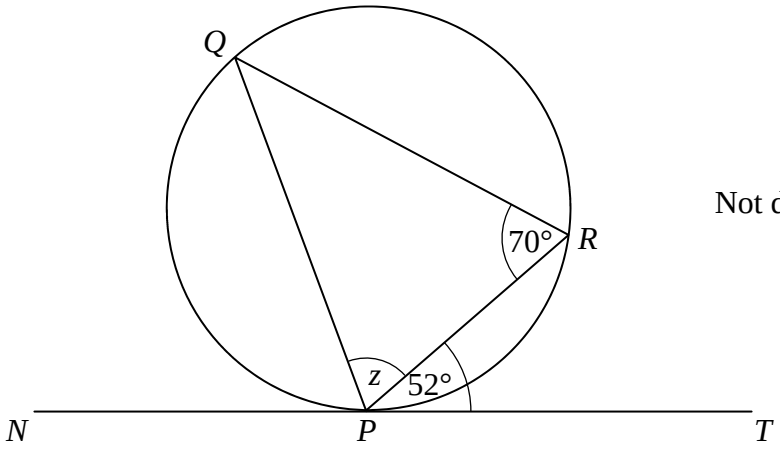
Answer ..... degrees *(1 mark)*

(ii) Calculate the value of *y*.

.....

Answer ..... degrees *(1 mark)*

(c) *P*, *Q*, and *R* are points on the circumference of the circle.
NPT is the tangent to the circle at *P*.



Not drawn accurately

Calculate the value of *z*.
Give a reason for each step of your working.

.....

.....

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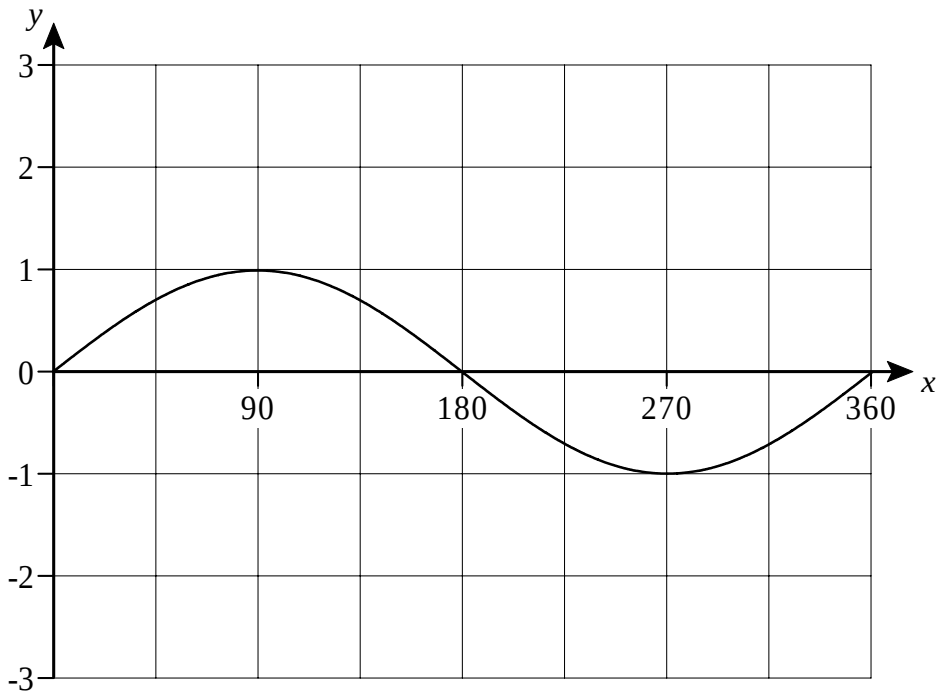
.....

Answer ..... degrees *(3 marks)*

Turn over for the next question

7

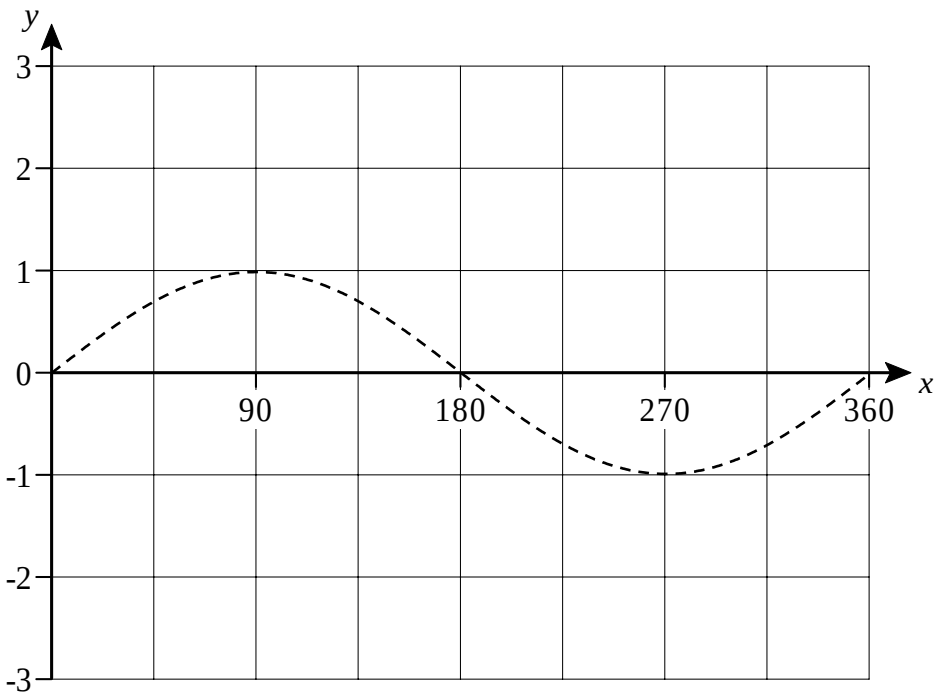
17 This is the graph of $y = \sin x$ for $0° \leqslant x \leqslant 360°$



Draw the graphs indicated for $0° \leqslant x \leqslant 360°$

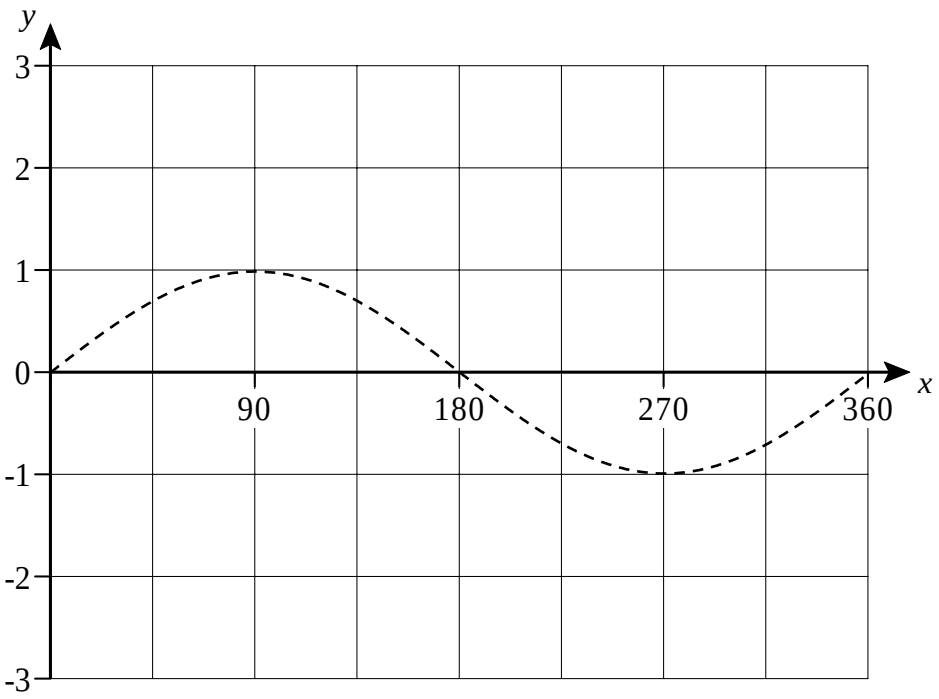
In each case the graph of $y = \sin x$ is shown to help you.

(a) $y = 2\sin x$



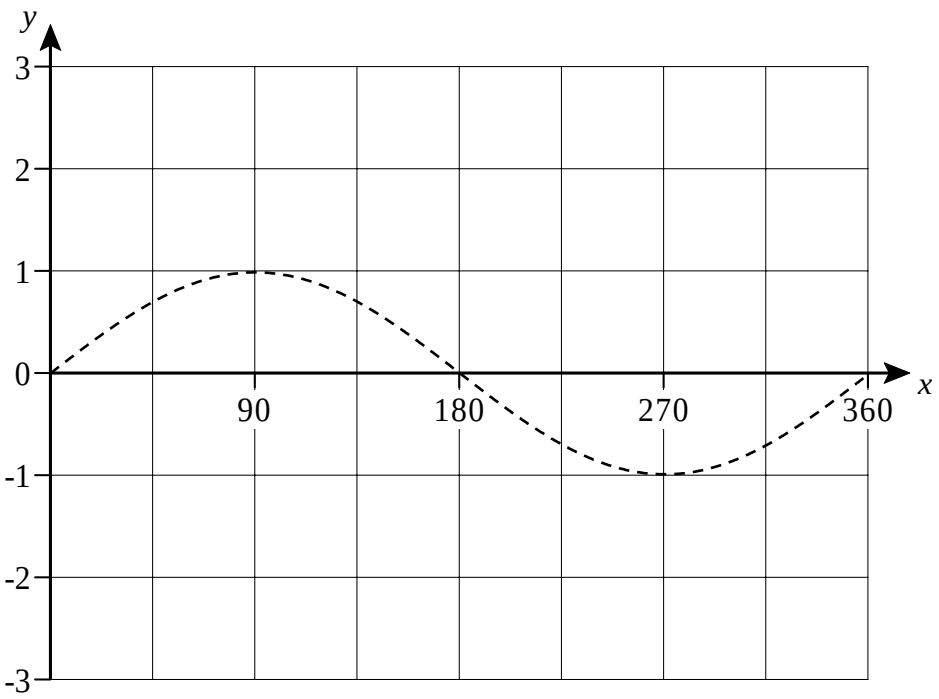
(1 mark)

(b) $y = -\sin x$



(1 mark)

(c) $y = \sin 2x$

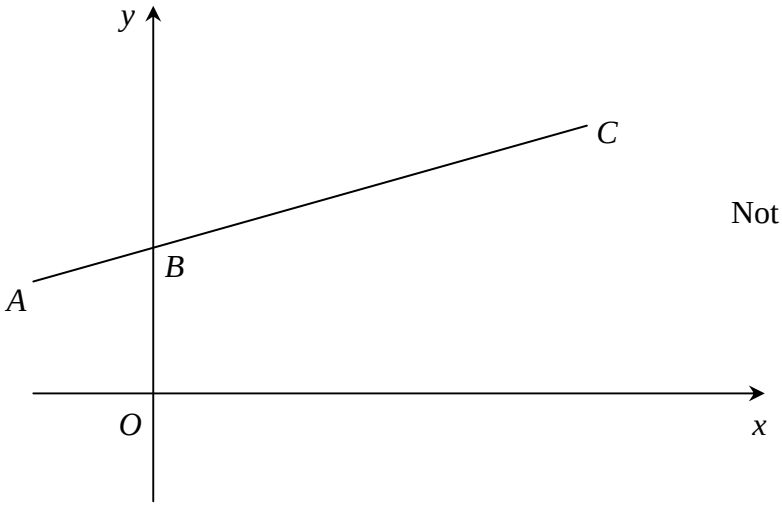


(1 mark)

3

Turn over ▶

18 The diagram shows the points $A(-2, 2)$, $B(0, 3)$ and $C(8, 7)$.



Not drawn accurately

Find the equation of the straight line which passes through A, B and C.

.....

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.....

.....

.....

Answer $y =$ ..... *(3 marks)*

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

Answer ..... *(1 mark)*

(b) Simplify $2^{-2} \times 81^{\frac{1}{4}}$

.....

.....

.....

Answer ..... *(3 marks)*

20 (a) Simplify

(i) $\sqrt{3} + \sqrt{3}$

Answer ..... *(1 mark)*

(ii) $\sqrt{3} \times \sqrt{3}$

Answer ..... *(1 mark)*

(b) Show that $\dfrac{\sqrt{75} - \sqrt{12}}{\sqrt{75} + \sqrt{12}}$ simplifies to $\dfrac{3}{7}$

.....

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(3 marks)

Turn over for the next question

12

21 Solve the simultaneous equations

$$y = 2x + 3$$

$$x^2 + y^2 = 2$$

You **must** show your working.

Do **not** use trial and improvement.

.....

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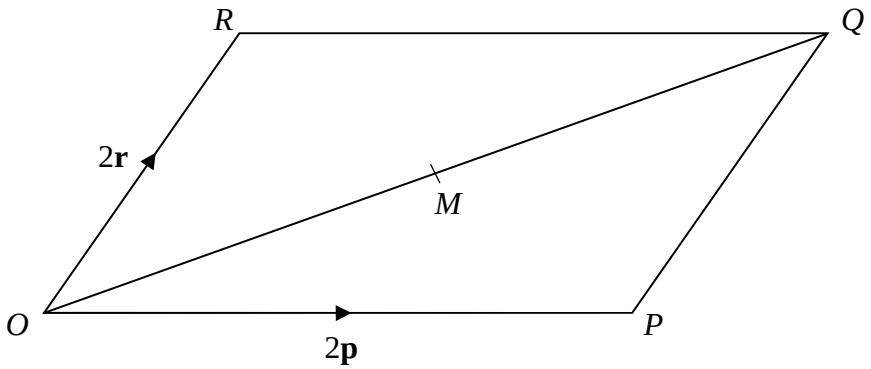
Answer ..... *(7 marks)*

22 $OPQR$ is a parallelogram.
M is the mid-point of the diagonal OQ.

$\overrightarrow{OP} = 2\mathbf{p}$ and $\overrightarrow{OR} = 2\mathbf{r}$



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

.....

.....

Answer $\overrightarrow{OM}$ = ... *(1 mark)*

(b) Use vectors to prove that M is also the mid-point of PR.

.....

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.....

.....

(3 marks)

END OF QUESTIONS

11

Q	Answers	Mark	Comments
1a	40	B1	
	Alternate	B1	Do not accept: Z angle Accept: Corresponding angle if corresponding angle seen. Accept: Allied or interior if angle seen
1b	50	B1	
	Opposite	B1	Accept: Vertically opposite Straight line (= 180) if 130 seen
1c	180 – 40 – 50 or 180 – 40 – their q	M1	oe
	90	A1ft	
2	$3z - 6 = 27$	M1	or $z - 2 = 9$
	$3z = 27 + 6$	M1	or $z = 9 + 2$
	11	A1	
3	Attempt to find common denominator	M1	eg 16/40, 12/40, 14/40, 13/40
	Any correct conversion	A1	
	3/10	A1	oe
4a	Even	B1	
4b	Could be either	B1	
4c	Not an integer	B1	
5a	155/500 × 100	M1	or 155 ÷ 5
	31	A1	$^{31}/_{100}$ scores M1A0
5b	500 – 155 – 105 or 240	M1	
	their 240 ÷ 3 (× 2)	M1dep	oe
	160	A1	

Q	Answers	Mark	Comments
6a	any 2 pts calculated from (0, 1) (1, 4) (2, 7) (3, 10) (4, 13)	M1	May be implied from a correct line
	at least 2 of these correct pts plotted	M1	
	Correct ruled line drawn from (0, 1) to (4,13)	A1	Tolerance 1 square from points
6b	Attempt to read off at $y = 5.5$	M1	Tolerance $\pm \frac{1}{2}$ square
	1.5	A1ft	Use of graph not essential, but then mark will be 2 or 0 ft is from their line
7	180 – 144	M1	
	36	A1	
8	Sight of two from 40, 6 and 2	M1	Allow 36, 37, 38
	$\frac{240}{4}$	M1dep	oe or $\frac{6 \times \text{(their 36, 37 or 38)}}{4}$
	60	A1	54, 55.5, 57
9a	correct midpoints 2.5, 7.5, 12.5 and 17.5	B1	
	$\sum mf = 375$	M1	40,157.5, 125, 52.5 allow 1 error
	mean = 7.5	A1	
9b	correct polygon or histogram	B2	–1 eeoo eg curve or incorrect point if all plots consistently at r.h. edge of the intervals, award SC1
10a	Line through mid-point of PQ	B1	± 2mm 2 pairs of arcs but no line: SC1
	Perpendicular to PQ	B1	± 2°
10b	Arc of radius 7cm, centre S, at least from SR to their p.b.	M1	± 2mm
	Area shaded	A1	Arc attempted (well) without use of compass + correct area shaded: SC1

Q	Answers	Mark	Comments
11a	$4n + 1$	B2	oe Accept n x 4 + 1 4 x n + 1 B1 for any of these: $n4 + 1$ $4n \pm c$ with $c \neq 0$
11b	81 or 85 seen	B1	
	$T_{20} = 81$, next term is 85	B1	oe alternative $4n + 1 = 83$ B1 82 not divisible by 4 (oe) B1 SC1 for: $4n \pm c = 83 \Rightarrow n$ not a whole number or T_{20} and T_{21} from their $4n \pm c$
12	$(x+3) \div 2$ or $\frac{x + 3}{2}$	B2	B1 for $x+3$ or $\frac{x}{2} + 3$
	$\times 2$	B1	
	-3	B1	sc B1 for -3 and $\times 2$
13a	$x = 8$	B1	
	$y = 10$	B1	
13b	$^1/_2$ x 10 x 15 x 0.5	M1	oe
	37.5	A1	
	cm^2	B1	Units mark
14a	$-^1/_2 < x \leq 4$	M1	may not be seen
	0, 1, 2, 3, 4	A2	-1 eeoo
14bi	$(y \pm a)(y \pm b)$ where $ab = 15$	M1	
	$(y - 3)(y - 5)$	A1	
14bii	(+) 3 and (+) 5	B1	ft from b(i) if M awarded

Q	Answers	Mark	Comments
15a	1 – 0.6 – 0.25	M1	0.69 implies M1 if 0.31 seen
	0.15	A1	
15b	10 ÷ 0.25	M1	oe or 40 seen
	their 40 x 0.6	M1dep	
	24	A1	
15ci	0.6 on all "up" branches 0.4 on all "down" branches	B1	
15cii	0.6 x 0.6 or 0.6 x 0.4 or 0.4 x 0.6	M1	one correct product seen (could be on tree diagram)
	addition of 2 or more of these	M1dep	
	0.84	A1	Alternative method 0.4 x 0.4 M1 1 – their 0.16 M1dep 0.84 A1
16a	180 – 90 – 72	M1	oe
	18	A1	
16bi	63	B1	
16bii	117	B1	or 180 – their 63 correctly evaluated (do not allow 90)
16c	52 at Q	M1	or angle NPQ = 70 may be credited from diagram
	(angles in) alternate segment	B1	
	58	A1	58 as answer scores M1A1
17a	curve through (0,0) (90,2) (180,0) (270,−2) (360,0)	B1	
17b	curve through (0,0) (90,−1) (180,0) (270,1) (360,0)	B1	
17c	curve through (0,0) (45,1) (90,0) (135,−1) (180,0) (225,1) (270,0) (315,−1) (360,0)	B1	

Q	Answers	Mark	Comments
18	Attempt at $\frac{7-2}{8--2}$	M1	or $\frac{7-3}{8-0}$ or $\frac{3-2}{0--2}$
	(their $^1/_2$) x + c	M1	their $^1/_2$ must come from an attempt at a gradient
	$^1/_2 x + 3$	A1	
19a	(±)6	B1	
19b	$^1/_4$	B1	or 0.25
	3	B1	
	$^3/_4$	B1	
20ai	$2\sqrt{3}$	B1	
20aii	3	B1	
20b	$5\sqrt{3}$ seen	M1	or $2\sqrt{3}$
	$(5\sqrt{3} - 2\sqrt{3} =)\ 3\sqrt{3}$	M1	$(5\sqrt{3} + 2\sqrt{3} =)\ 7\sqrt{3}$
	Cancelling $\sqrt{3}$ to get $^3/_7$	A1	
21	$x^2 + (2x + 3)^2 = 2$	M1	
	$4x^2 + 6x + 6x + 9$	M1	condone one error
	$5x^2 + 12x + 7 = 0$	A1	oe
	$(x + a)(5x + b) = 0$	M1	$ab = 7$ or by the formula
	$(x + 1)(5x + 7) = 0$	A1	
	$x = -1$ or $-^7/_5$	A1	Alternative (–1, 1) A1
	$y = 1$ or $^1/_5$	A1	$(-^7/_5, ^1/_5)$ A1
22a	**p** + **r**	B1	
22b	PM = –2**p** + **p** + **r**	M1	or MR = –(**p**+ **r**) + 2**r** or PR = –2**p** + 2**r**
	PM = – **p** + **r**	A1	or MR = –**p**+ **r**
	PR = 2PM so M is mid-point	A1	

Surname		Other Names	
Centre Number			Candidate Number									
Candidate Signature												

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General Certificate of Secondary Education
June 2008

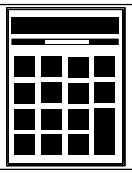
AQA
ASSESSMENT and QUALIFICATIONS ALLIANCE

MATHEMATICS (SPECIFICATION A) 4301/2F
Foundation Tier
Paper 2 Calculator

Specimen Paper (Two-Tier Specification) 2008

F

For this paper you must have:
- a calculator
- mathematical instruments.



Time allowed: 1 hour 30 minutes

Instructions
- Use blue or black ink or ball-point pen. Draw diagrams in pencil.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- Answer the questions in the spaces provided.
- Use a calculator where appropriate.
- Do all rough work in this book.
- If your calculator does not have a π button, take the value of π to be 3.14 unless another value is given in the question.

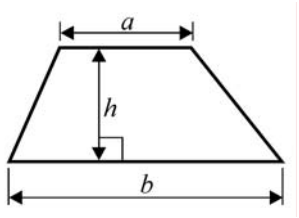
Information
- The maximum mark for this paper is 100.
- The marks for questions are shown in brackets.
- You may ask for more answer paper, graph paper and tracing paper. This must be tagged securely to this answer book.

Advice
- In all calculations, show clearly how you work out your answer.

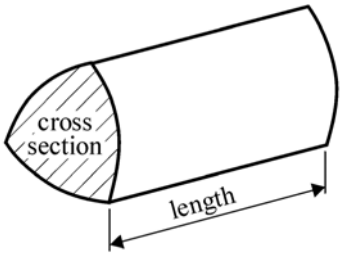
For Examiner's Use	
Pages	Mark
3	
4 – 5	
6 – 7	
8 – 9	
10 – 11	
12 – 13	
14 – 15	
16 – 17	
18 – 19	
20 – 21	
22 – 23	
24 – 25	
26	
TOTAL	
Examiner's Initials	

Formulae Sheet: Foundation Tier

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



Volume of prism = area of cross section × length



LEAVE MARGIN BLANK

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

1 (a) Complete the shopping bill.

		£	p
Onions	4 kg at £0.79 per kg		
Apples	3 kg at £1.96 per kg		
Lemonade	5 bottles at £0.85 per bottle		
	Total		

(4 marks)

(b) Adam buys 9 pens at 57 pence each.
He pays with a £10 note.

How much change does he receive?

.....

.....

Answer £ ..... *(2 marks)*

2 (a) Write $\frac{1}{2}$ as a percentage.

.....

Answer ..... % *(1 mark)*

(b) Write 25% as a fraction.

Answer ..... *(1 mark)*

8

Turn over ▶

3 (a) Which **two** of these fractions are equivalent to $\frac{1}{3}$?

$\frac{2}{6}$ $\frac{5}{12}$ $\frac{6}{18}$ $\frac{11}{30}$

.....

Answer ..... *(2 marks)*

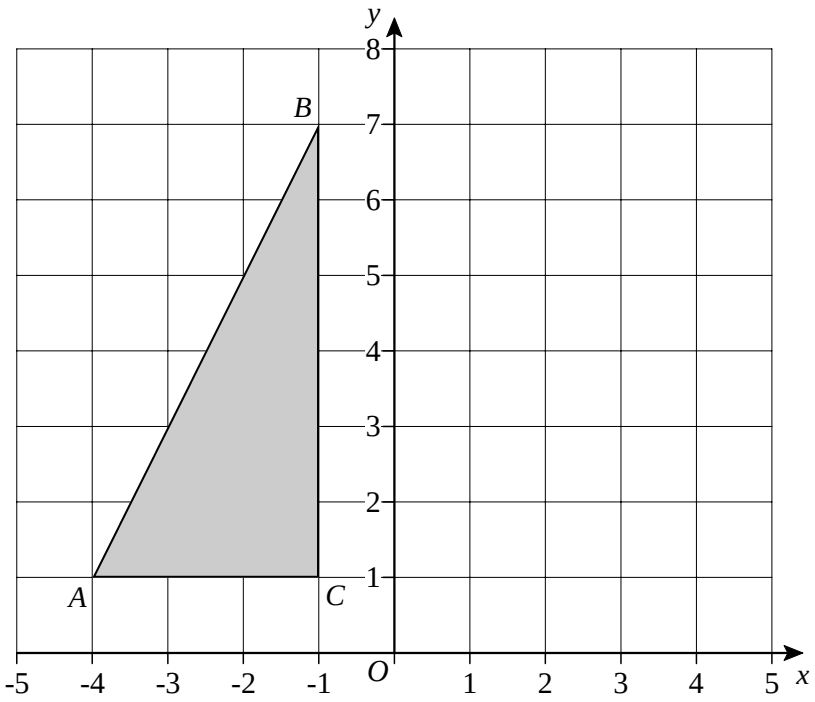
(b) Write 70% as a decimal.

Answer ..... *(1 mark)*

(c) Write $\frac{3}{10}$ as a decimal.

Answer ..... *(1 mark)*

4 The diagram shows a triangle drawn on a centimetre square grid.



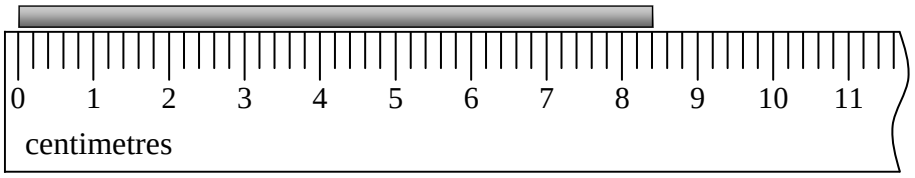
(a) Write down the coordinates of *A*.

Answer *A* (..... , ...) *(1 mark)*

(b) Draw the reflection of the triangle in the *y*-axis.

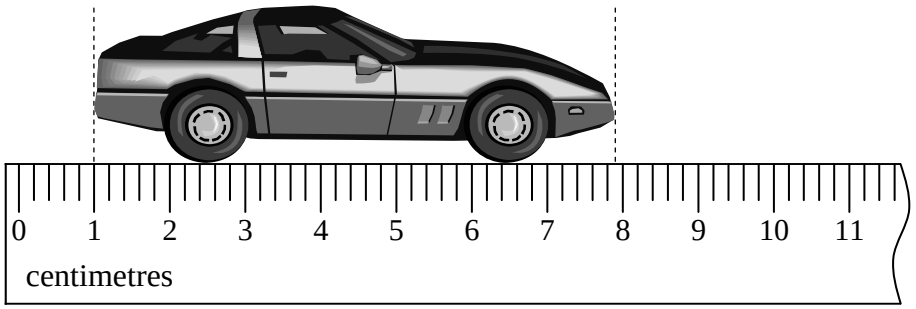
(2 marks)

5 (a) Write down the length of this stick.



Answer ..... cm *(1 mark)*

(b) Tom has a toy car.



What is its length in **millimetres**?

.....

Answer ..... millimetres *(2 marks)*

Turn over for the next question

10

Turn over ▶

6 (a) Write down the next two numbers in this sequence.

3 9 15 21 ....

(2 marks)

(b) Another sequence of numbers begins

4 5 7

The rule for continuing the sequence is

Multiply by 2
then
Subtract 3

What are the next two numbers in this sequence?

.....

.....

.....

Answer ..... , ... *(2 marks)*

7 (a) A circle has a radius of 4 cm.

Write down the length of the diameter.

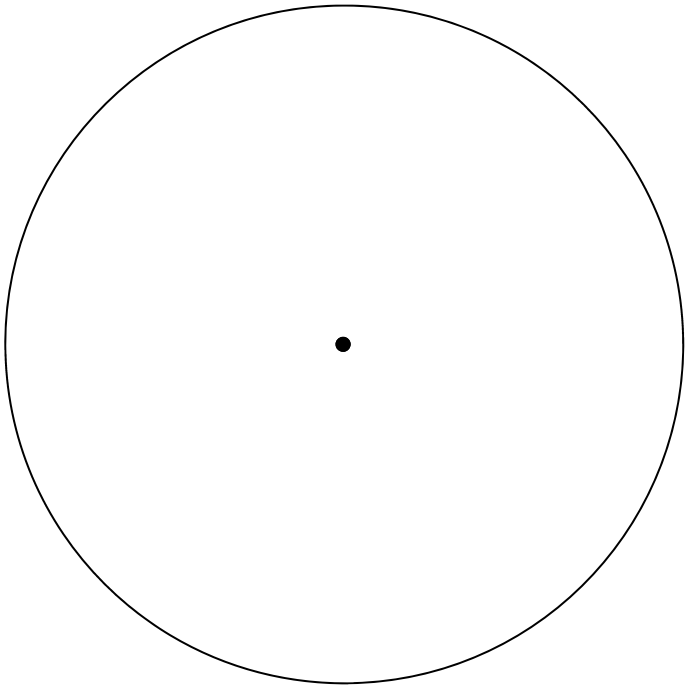
Answer ..... cm *(1 mark)*

(b) On the circle below

(i) draw a diameter

(ii) mark with a cross a point on the circumference

(iii) draw a tangent

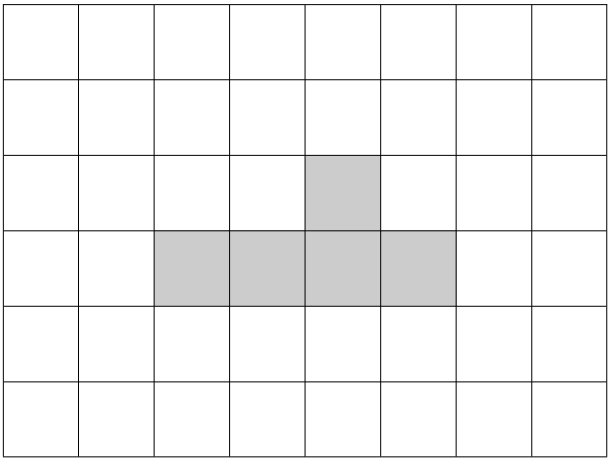


(3 marks)

8

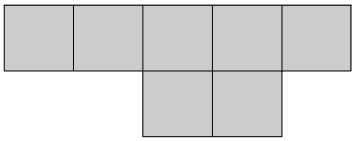
Turn over ▶

8 (a) (i) Shade one more square so that the shaded shape is a net of a cube.



(1 mark)

(ii) Explain why this shape is **not** the net of a cube.



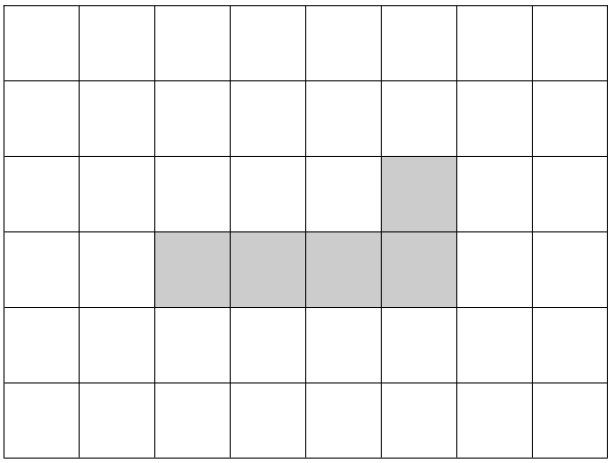
.....

.....

.....

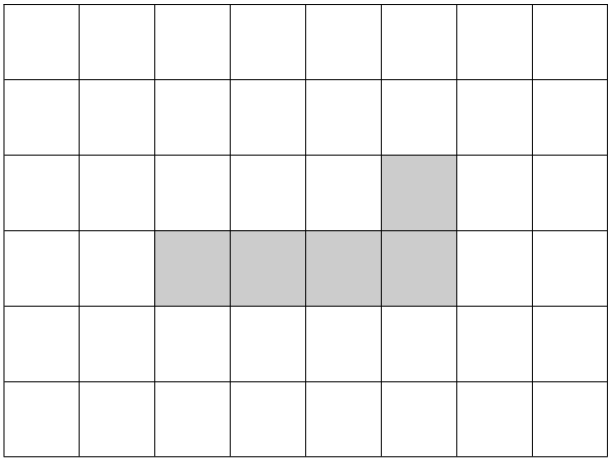
(1 mark)

(b) (i) Shade one more square so that the shaded shape has one line of symmetry.



(1 mark)

(ii) Shade one more square so that the shaded shape has rotational symmetry of order 2.



(1 mark)

4

Turn over ▶

9 A table has four columns *A*, *B*, *C* and *D*.
Part of the table is shown.

A	***B***	***C***	***D***
1	6	94	36
2		93	49
4	9		
7			144

(a) This is the 2nd row of the table.

A	***B***	***C***	***D***
2		93	49

The number in column *B* = The number in column *A* + 5

Work out the number in column *B* in this row.

.....

Answer ..... *(1 mark)*

(b) This is the 3rd row of the table.

A	*B*	*C*	*D*
4	9		

(i)

The number in column *C* = 100 – The number in column *B*

Work out the number in column *C* in this row.

.....

Answer ..... *(1 mark)*

(ii)

The number in column *D* = The number in column *B* squared

Work out the number in column *D* in this row.

.....

Answer ..... *(1 mark)*

(c) This is the 4th row of the table.

A	*B*	*C*	*D*
7			144

Work out the number in column *C* in this row.

.....

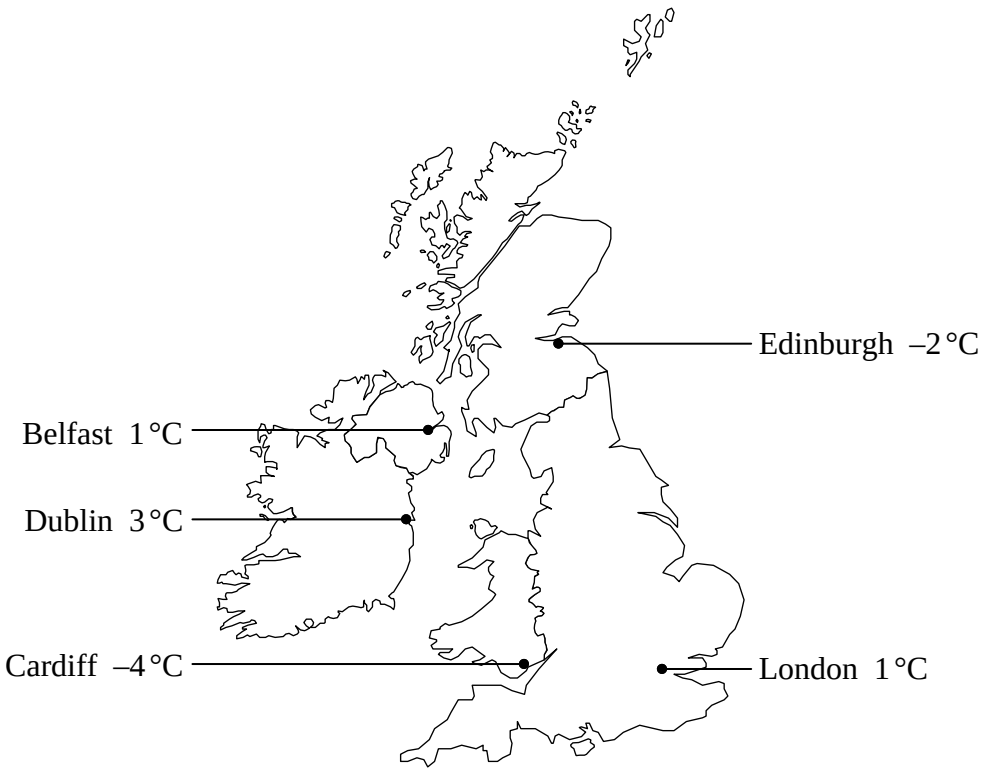
.....

.....

Answer ..... *(2 marks)*

5

10 The map shows the temperatures at sunset in five cities in the British Isles.



(a) In which city is the temperature the lowest?

Answer ..... *(1 mark)*

(b) How much higher is the temperature in Dublin than the temperature in Edinburgh?

.....

Answer ..... °C *(1 mark)*

(c) The temperature in Cardiff at midday is 10 °C **higher** than it is at sunset.

What is the temperature at midday in Cardiff?

.....

Answer ..... °C *(1 mark)*

(d) The temperature in Edinburgh at midnight is 3 °C **lower** than it is at sunset.

What is the temperature at midnight in Edinburgh?

.....

Answer ..... °C *(1 mark)*

LEAVE MARGIN BLANK

11 (a) (i) Simplify $2n + 3p - n + 7p$

.....

Answer ..... *(2 marks)*

(ii) Simplify $2n \times 5n$

.....

Answer ..... *(1 mark)*

(b) Afzal scored x marks in a test.

(i) Ben scored 3 more marks than Afzal.

Write an expression for Ben's score in terms of x.

Answer ..... *(1 mark)*

(ii) Jason scored half of Afzal's marks.

Write an expression for Jason's score in terms of x.

Answer ..... *(1 mark)*

Turn over for the next question

9

12 (a) Adam and Betty take a mental arithmetic test each week for seven weeks. Adam's test scores are

8 9 8 9 9 7 6

(i) What is the mode of Adam's scores?

.....

Answer ..... *(1 mark)*

(ii) What is the median of Adam's scores?

.....

.....

Answer ..... *(2 marks)*

(b) Betty's test scores are

3 6 7 8 8 4 6

Complete this table.

	Range	**Mean**
Adam	3	8
Betty	5	

.....

.....

.....

.....

(3 marks)

(c) Use the range and mean to compare their test scores.

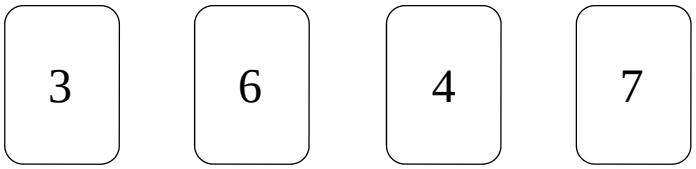
.....

.....

.....

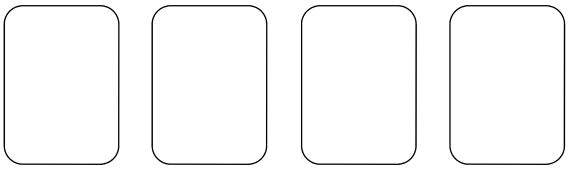
(2 marks)

13 Here are four number cards.

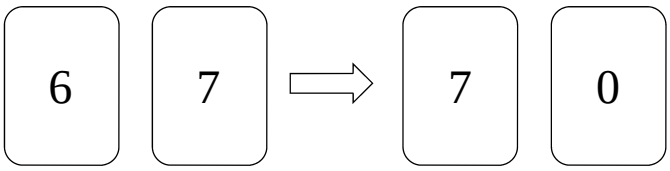


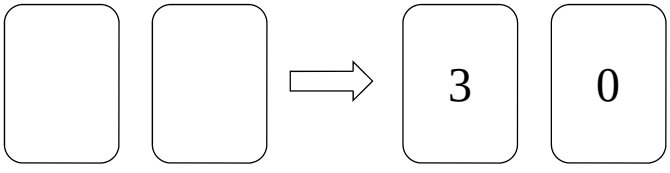
(a) Use all four cards to make the largest possible odd number.

.....

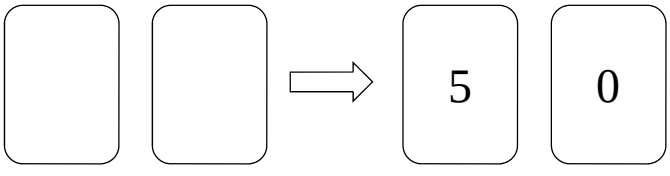
Answer  *(1 mark)*

(b) Use two of the cards to make the number that is closest to the following numbers. The first one has been done for you.



(i) 

(1 mark)

(ii) 

(1 mark)

11

Turn over ▶

14 A bag contains only red, blue and white counters.
The table shows the probability of taking a red or blue counter from the bag at random.

Colour	Red	Blue	White
Probability	0.25	0.3	

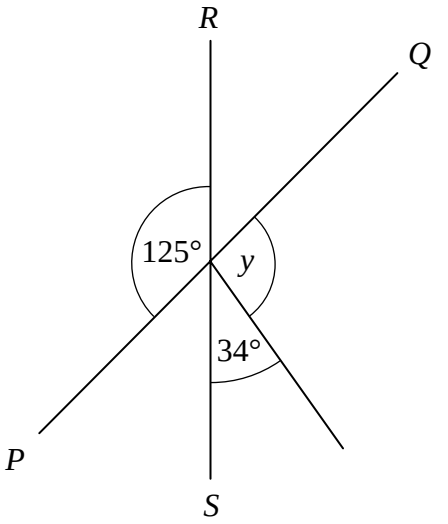
Work out the probability of taking a white counter from the bag.

.....

.....

Answer ..... *(2 marks)*

15 *PQ* and *RS* are straight lines.



Not drawn accurately

Work out the value of *y*.

.....

.....

.....

Answer *y* = ... degrees *(3 marks)*

16 (a)

Zoo Admission Prices

Adults	£14.00
Children	£10.75

A family ticket for 2 adults and 2 children costs £45

How much does a family of 2 children and 2 adults save by buying a family ticket?

.....

.....

.....

.....

Answer £ ..... *(3 marks)*

(b)

Zoo Admission Prices
For groups of more than 10

Adults	£11.20
Children	£8.60

One adult goes **free** for every 10 children

A group of adults and children go to the zoo.
The total cost is £265.80
There are 27 children in the group.

How many adults are in the group?

.....

.....

.....

.....

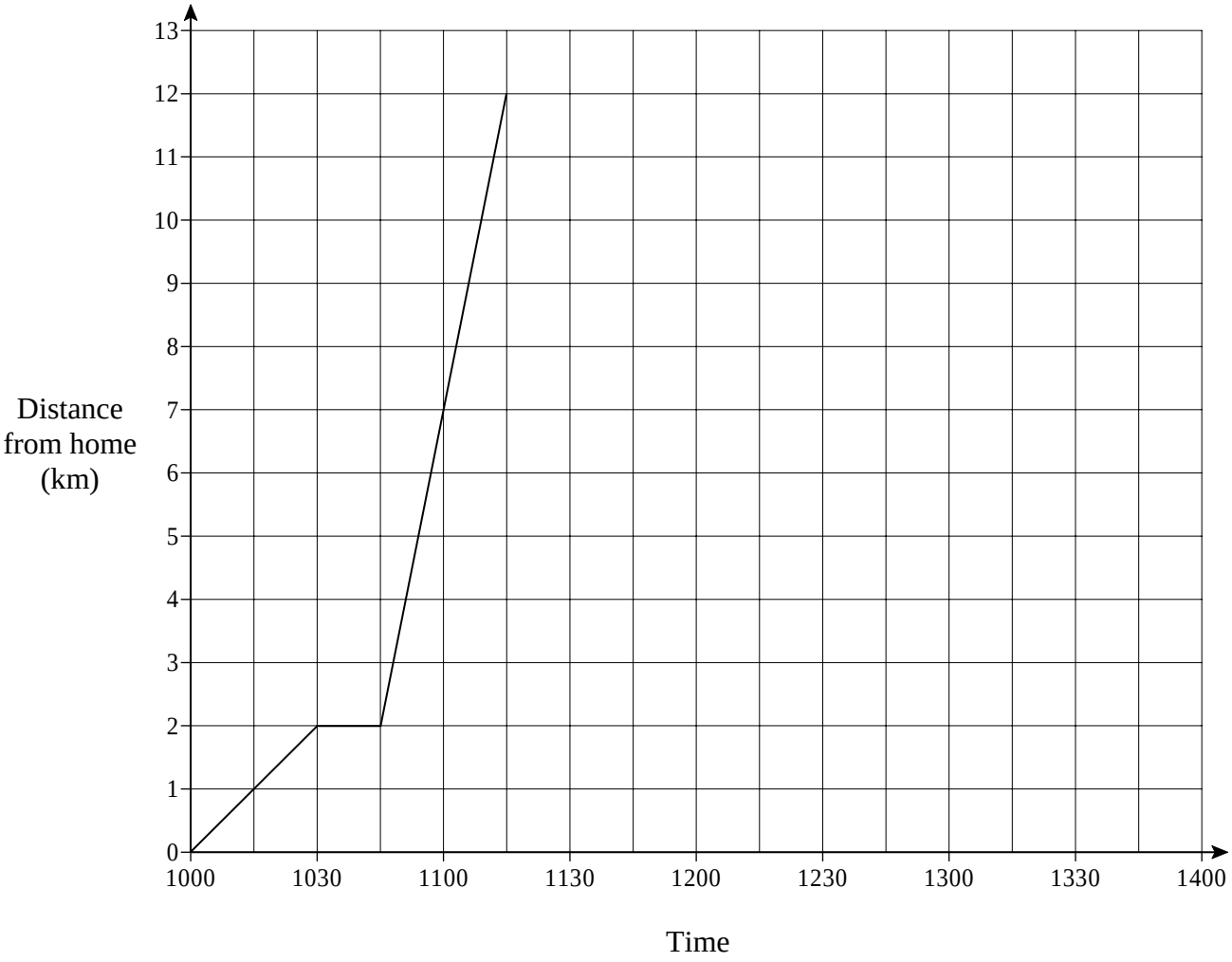
.....

Answer ..... *(4 marks)*

12

Turn over ▶

17 Mr Smith leaves home at 10 am to go to the shopping mall.
He walks to the station where he catches a train.
He gets off at the mall.
The travel graph shows his journey.



(a) How far is Mr Smith from home at 11 am?

Answer ..... km *(1 mark)*

(b) After shopping Mr Smith goes home by taxi.
The taxi leaves the mall at 1 pm and arrives at his home at 1.45 pm.

Complete the travel graph.

(2 marks)

LEAVE MARGIN BLANK

18 Use your calculator to work out $\dfrac{95.4+18.9}{35.2-17.3}$

(a) Write down your full calculator display.

Answer ..... *(1 mark)*

(b) Give your answer to 2 significant figures.

Answer ..... *(1 mark)*

Turn over for the next question

5

19 A car dealer is offering two different schemes to buy a car.
Some parts of Scheme B are missing.

CASH PRICE £4000

Scheme A	
Deposit	£1200
12 monthly payments of £250	£3000
Total to be paid	£4200
Less cash price	£4000
Cost of credit	£200

Scheme B	
Deposit	£800
monthly payments of £150	
Total to be paid	
Less cash price	£4000
Cost of credit	£400

(a) Work out the total to be paid using Scheme B.

.....

.....

Answer £ ..... *(1 mark)*

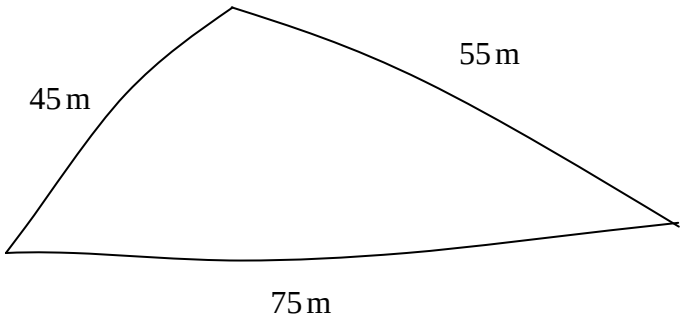
(b) Work out the number of monthly payments using Scheme B.

.....

.....

Answer ..... *(2 marks)*

20 The diagram shows a rough sketch of a triangular field.



(a) Using ruler and compasses only, make an accurate scale drawing of the field.
Use a scale of 1 cm to represent 10 m.
You **must** show clearly all your construction arcs.

(3 marks)

(b) The length of one side of the field is 75 metres.
This length is measured to the nearest metre.

What is the smallest possible length of this side.

Answer ..... m *(1 mark)*

7

Turn over ▶

21 (a) Expand $3(x + 2)$

.....

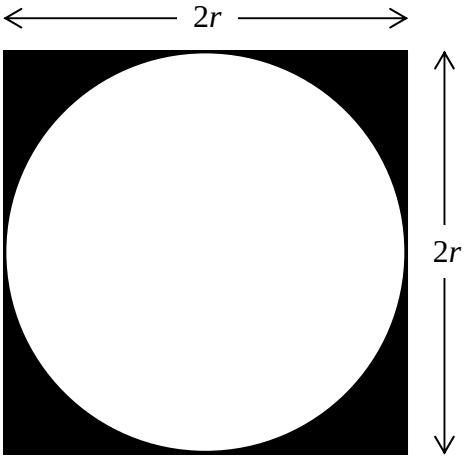
Answer ..... *(1 mark)*

(b) Factorise $6a - 10$

.....

Answer ..... *(1 mark)*

(c) A star shape is made by cutting quadrants of a circle from a square of side $2r$.



Show that the shaded area is given by the formula

$$A = 4r^2 - \pi r^2$$

.....

.....

.....

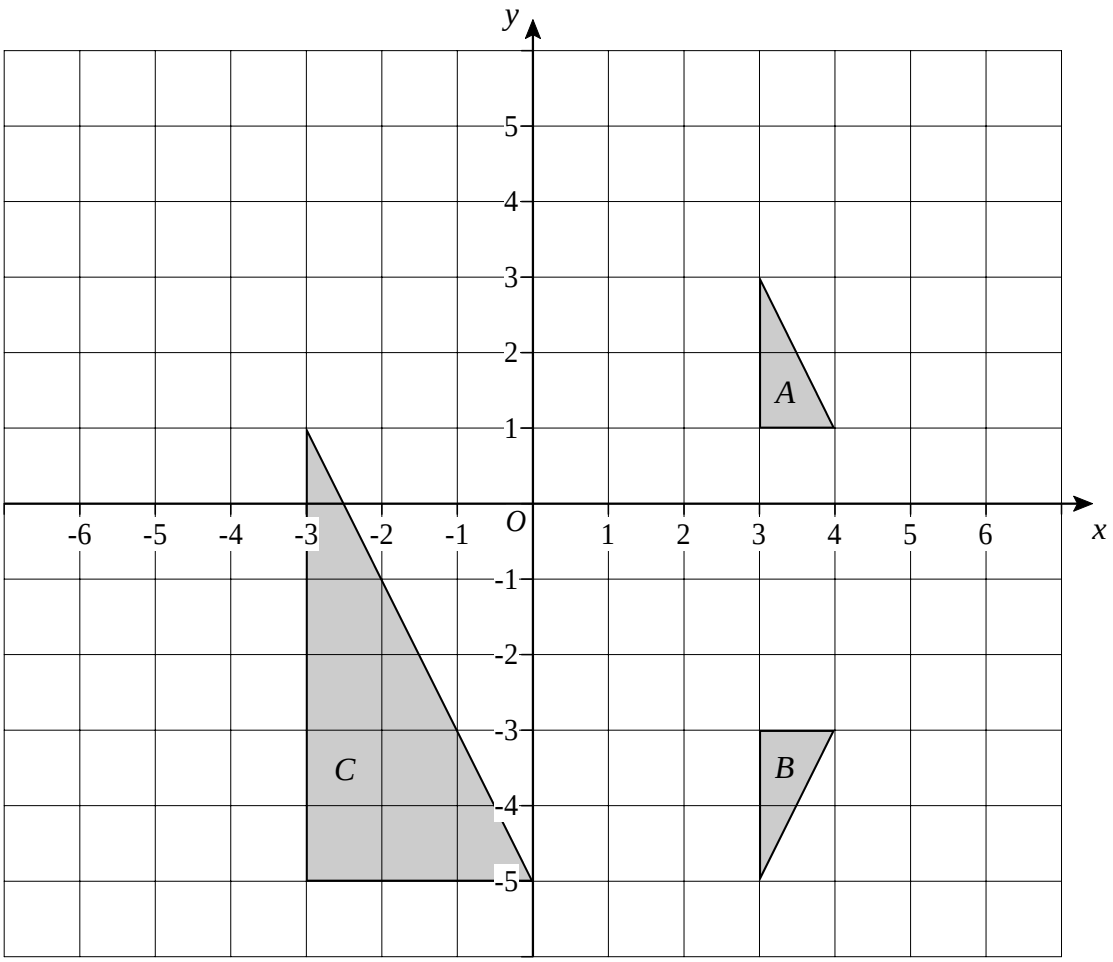
.....

.....

(2 marks)

LEAVE MARGIN BLANK

22



(a) Describe the transformation that maps triangle *A* to triangle *B*.

.....

.....

.....

(2 marks)

(b) Triangle *C* is an enlargement of triangle *A*.

(i) Write down the scale factor of the enlargement.

Answer ..... *(1 mark)*

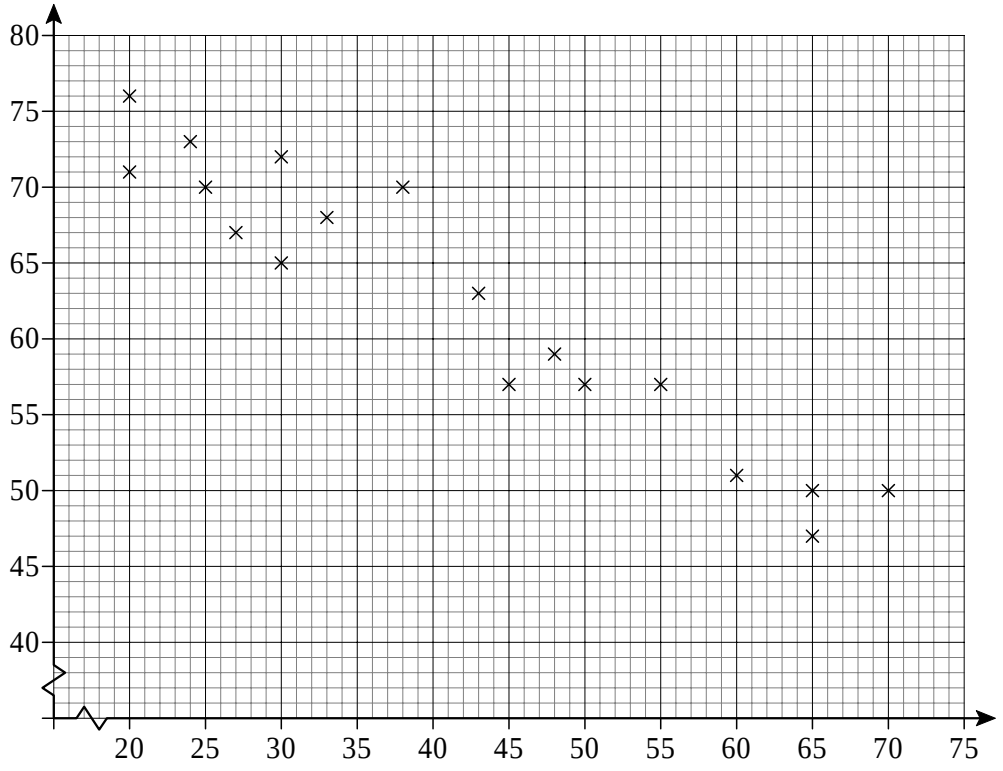
(ii) Write down the coordinates of the centre of the enlargement.

Answer (..... , ...) *(1 mark)*

8

Turn over ▶

23 Some runners recorded their resting pulse rates and miles run per week.
The scatter graph shows the results.



(a) How many runners have a resting pulse rate of 57 beats per minute?

Answer ..... *(1 mark)*

(b) Draw a line of best fit.

(1 mark)

(c) Predict the resting pulse rate of a runner who runs 40 miles per week.

Answer ..... beats per minute *(1 mark)*

(d) Describe the relationship between the resting pulse rate and miles run per week.

.....

.....

(1 mark)

24 Use trial and improvement to complete the table to find a solution to the equation

$$x^3 - 2x = 90$$

Give your answer to 1 decimal place.

x	$x^3 - 2x$	**Comment**
4	56	Too low
5	115	Too high

Answer $x =$ ..... *(3 marks)*

25 Jane earns £11 400 per year.
After her pay rise she earns £12 198 per year.

What was her percentage pay rise?

.....

.....

.....

.....

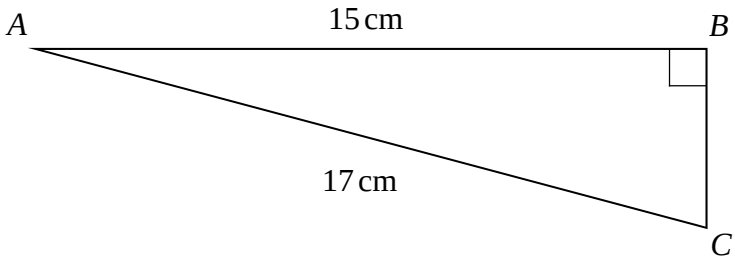
.....

Answer ..... % *(3 marks)*

10

Turn over ▶

26 *ABC* is a right-angled triangle.
AB = 15 cm, *AC* = 17 cm



Not drawn accurately

Calculate the length of the side *BC*.

.....

.....

.....

.....

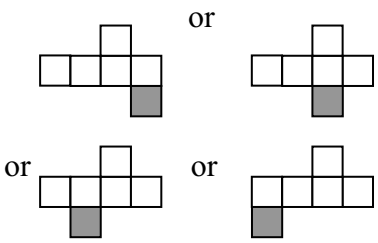
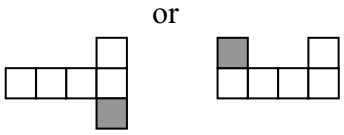
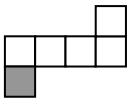
.....

Answer ..... cm *(3 marks)*

END OF QUESTIONS

3

Q	Answers	Mark	Comments
1a	(£) 3.16	B1	
	(£) 5.88	B1	
	(£) 4.25	B1	
	(£) 13.29	B1ft	
1b	$10 - 9 \times 0.57$ or 5.13	M1	oe eg 513(p)
	4.87	A1	
2a	50	B1	
2b	$^1/_4$	B1	oe
3a	$^2/_6$ and $^6/_{18}$	B2	−1 eeoo 2 right 1 wrong B1 1 right 2 wrong B0
3b	0.7(0)	B1	
3c	0.3(0)	B1	
4a	(–4, 1)	B1	
4b	Correct reflection	B2	B1 Reflected triangle in wrong position, or Any 2 points in correct position
5a	8.4	B1	allow ± 1mm
5b	69	B2	allow ± 1mm (68 to 70) B1 6.9 or (their 6.9) × 10 or digits … 68 … to … 70 SC1 79
6a	27	B1	
	33	B1ft	(their 27) + 6
6b	11	B1	
	19	B1ft	(their 11) × 2 – 3 Sc. B1 19 and 11 reversed on answer line only

Q	Answers	Mark	Comments
7a	8 cm	B1	
7bi	Any diameter drawn	B1	Straight line within 2 mm of centre
7bii	Any cross on the circumference	B1	± 2 mm
7biii	Any tangent drawn	B1	Straight line within 2 mm of circumference
8ai		B1	
8aii	Explanation eg Too many squares There is a gap (when folded) One square needs to move	B1	oe Ignore irrelevant statements Penalise contradictory statements
8bi		B1	
8bii		B1	
9a	7	B1	
9bi	91	B1	
9bii	81	B1	
9c	7 + 5 or √144	M1	or 12
	88	A1	
10a	Cardiff	B1	allow –4
10b	5	B1	
10c	6	B1	
10d	–5	B1	

Q	Answers	Mark	Comments
11ai	$n + 10p$	B2	B1 each term
11aii	$10n^2$	B1	
11bi	$x + 3$	B1	or $3 + x$
11bii	$\frac{x}{2}$	B1	or $x \div 2$ or $^1/_2x$ or $^1/_2 \times x$ or $x \times {}^1/_2$
12ai	9	B1	
12aii	6, 7, 8, 8, 9, 9, 9	M1	
	8	A1	
12b	3 + 6 + 7 + 8 + 8 + 4 + 6	M1	or 42
	(their 42) ÷ 7	M1	
	Mean = 6	A1	
12c	Betty's scores are more spread out	B1ft	Betty has bigger range of scores oe
	Betty has a lower average score	B1ft	Betty has a lower mean score oe Deduct 1 for contradictory statement(s)
13a	7643	B1	
13bi	34	B1	
13bii	47	B1	
14	1 – (0.25 + 0.3)	M1	oe
	0.45	A1	
15	180 – 125	M1	or 55
	180 – (55 + 34)	M1	or 360 – (125 + 55 + 55 + 34) oe M2 125 – 34 oe
	91	A1	

Q	Answers	Mark	Comments
16a	$2 \times 14 + 2 \times 10.75$	M1	or £49.50 oe
	(their 49.5) – 45	M1	
	4.50	A1	or 4.5 M2A0
16b	27×8.6	M1	or £232.20 oe
	265.8 – (their 232.2)	M1	or £33.60 oe
	33.6 ÷ 11.2 or 3	M1	
	(their 3) + 2 or 5	A1ft	ft if M2 awarded and integer answer SC1 2 (adults) go free seen only
17a	7	B1	
17b	Line from (11.15,12) to (13.00, 12)	B1	± 1mm.
	'Line' from (13.00 , 12) to (13.45,0)	B1ft	ft their (13.00, 12) ± 1mm.
18	6.385475, 6.38547486	B1	6.3854….
	6.4	B1ft	f.t. their answer if correctly rounded from a value seen greater then 2d.p. 6.40 is B0
19a	4400	B1	
19b	(their 4400 – 800) ÷ 150	M1	
	24	A1ft	ft if M1 awarded.
20a	Line of 7.5 cm (or 4.5 cm or 5.5 cm) drawn	B1	± 2 mm
	Two intersecting arcs for remaining lengths	M1	1 length correct ± 2 mm
	Fully accurate triangle	A1	All lengths ± 2 mm
20b	74.5	B1	
21a	$3x + 6$	B1	
21b	$2(3a - 5)$	B1	or $-2(5 - 3a)$
21c	$(A) = (2r)^2$	B1	oe
	(–) a full circle	B1	Must make reference to full circle or 4 × quarter circles

Q	Answers	Mark	Comments
22a	Reflection	B1	Must be single transformation
	$y = -1$	B1	
22bi	3	B1	or 3:1 or 6:2
22bii	(6, 4)	B1	Accept any clear indication eg 6-4 or marked on grid
23a	3	B1	
23b	Line between limits	B1	Passing between (20, 71) and (20, 76) (inclusive) at one end and (65, 47) and (70, 50) (inclusive) at the other. If not 'ruled' B0.
23c	(63)	B1ft	ft their line. ± 1mm
23d	Negative correlation or More miles run, lower pulse rate	B1	oe
24	Guess between 4 and 5	B1	Must be evaluated correctly to at least nearest whole number (4.1, 60.721), (4.2, 65.688), (4.3, 70.907), (4.4, 76.384), (4.5, 82.125), (4.6, 88.136), (4.7, 94.423), (4.8, 100.992), (4.9, 107.849)
	Bracketing answer between 4.6 and 4.7 (inclusive)	B1	Any values between 4.6 and 4.7 that bracket answer.
	Testing a value ≤ 4.65 and > actual answer (4.6301141) and stating answer as 4.6	B1	(4.65, 91.244625), (4.64, 90.617344)
25	12198 – 11400	M1	798 implies M1. 12198/11400x100 = (x) M1 12198/1140 = 1.07 M1
	Their 798/11400 x 100	DM1	Their 'x' – 100 DM1 (1.07 – 1) x (100) DM1
	7	A1	
26	$17^2 - 15^2$ (=64)	M1	or $x^2 + 15^2 = 17^2$
	√64	DM1	For squaring, subtracting and indication of square rooting
	8	A1	

Surname		Other Names	
Centre Number			Candidate Number									
Candidate Signature												

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General Certificate of Secondary Education
June 2008

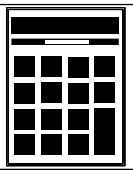
AQA
ASSESSMENT and QUALIFICATIONS ALLIANCE

MATHEMATICS (SPECIFICATION A) 4301/2H
Higher Tier
Paper 2 Calculator

Specimen Paper (Two-Tier Specification) 2008

H

For this paper you must have:
- a calculator
- mathematical instruments.



Time allowed: 2 hours

Instructions
- Use blue or black ink or ball-point pen. Draw diagrams in pencil.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- Answer the questions in the spaces provided.
- Use a calculator where appropriate.
- Do all rough work in this book.
- If your calculator does not have a π button, take the value of π to be 3.14 unless another value is given in the question.

Information
- The maximum mark for this paper is 100.
- The marks for questions are shown in brackets.
- You may ask for more answer paper, graph paper and tracing paper. This must be tagged securely to this answer book.

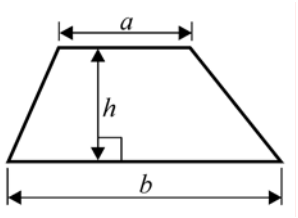
Advice
- In all calculations, show clearly how you work out your answer.

For Examiner's Use	
Pages	Mark
3	
4 – 5	
6 – 7	
8 – 9	
10 – 11	
12 – 13	
14 – 15	
16 – 17	
18 – 19	
20 – 21	
22	
TOTAL	
Examiner's Initials	

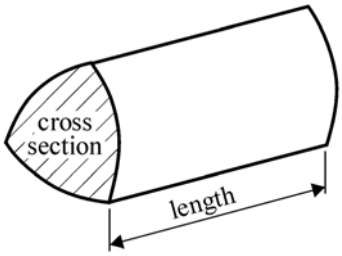
There are no questions printed on this page

Formulae Sheet: Higher Tier

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

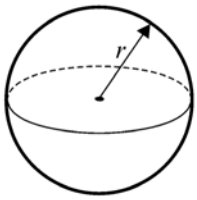


Volume of prism = area of cross section × length



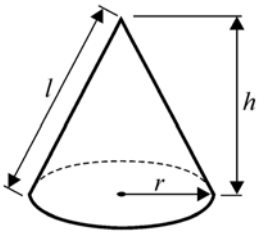
Volume of sphere = $\frac{4}{3}\pi r^3$

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



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

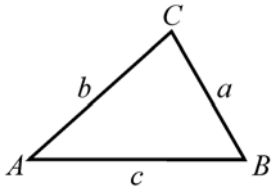
Curved surface area of cone = $\pi r l$



In any triangle *ABC*

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

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



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

The Quadratic Equation

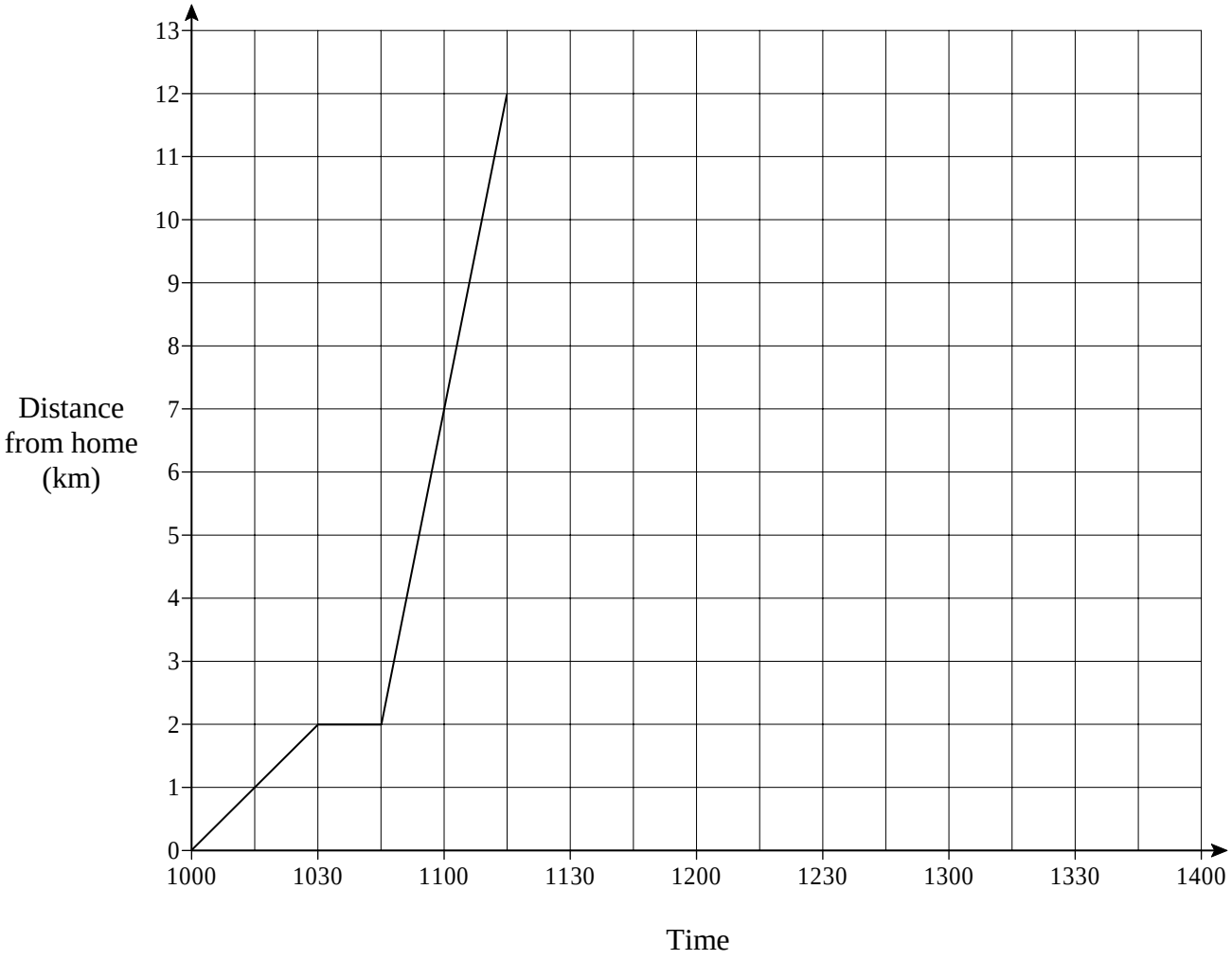
The solutions of $ax^2 + bx + c = 0$, where $a \neq 0$, are given by

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

LEAVE MARGIN BLANK

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

1 Mr Smith leaves home at 10 am to go to the shopping mall.
He walks to the station where he catches a train.
He gets off at the mall.
The travel graph shows his journey.



After shopping Mr Smith goes home by taxi.
The taxi leaves the mall at 1 pm and arrives at his home at 1.45 pm.

(a) Complete the travel graph.

(2 marks)

(b) Calculate the average speed of the taxi.

.....

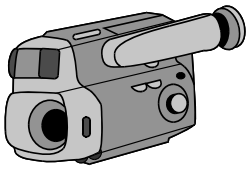
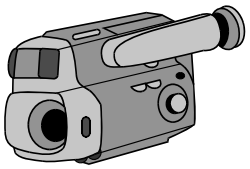
.....

Answer ..... km per hour *(2 marks)*

4

Turn over ▶

2 A camera is advertised in two shops.
VAT is 17.5%

Dicksons Cameras	**Carry's Electrical**
Sonny DC-23	**Sonny DC-23**
	
£330 plus VAT	**£385 including VAT**

In which shop is the camera cheaper and by how much?

.....

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.....

Answer ..... *(4 marks)*

LEAVE MARGIN BLANK

3 A car dealer is offering two different schemes to buy a car.
Some parts of Scheme B are missing.

CASH PRICE £4000

Scheme A	
Deposit	£1200
12 monthly payments of £250	£3000
Total to be paid	£4200
Less cash price	£4000
Cost of credit	£200

Scheme B	
Deposit	£800
monthly payments of £150	
Total to be paid	
Less cash price	£4000
Cost of credit	£400

(a) Work out the total to be paid using Scheme B.

.....

.....

Answer £ ..... *(1 mark)*

(b) Work out the number of monthly payments using Scheme B.

.....

.....

Answer ..... *(2 marks)*

7

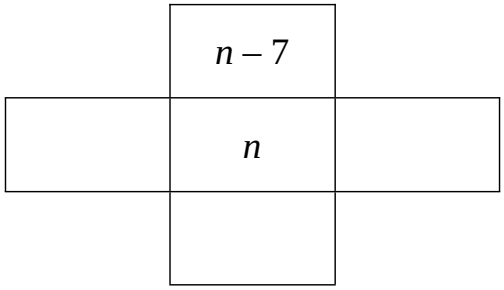
Turn over ▶

4 Part of a number grid is shown below.

1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31	32	33	34	35

The shaded cross is called C_{11} because it has the number 11 at the centre.

(a) This is C_n



Fill in the empty boxes.

(2 marks)

(b) Kevin notices that $4 + 10 + 12 + 18 = 44$
and that $4 \times 11 = 44$

Show, using algebra, that the sum of the arms of any cross is equal to four times the number at the centre of the cross.

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(2 marks)

5 Use your calculator to work out $\dfrac{95.4+18.9}{35.2-17.3}$

(a) Write down your full calculator display.

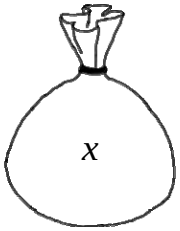
Answer ..... *(1 mark)*

(b) Give your answer to 2 significant figures.

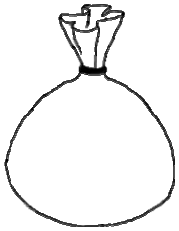
Answer ..... *(1 mark)*

6 Bag *A* contains *x* counters.
Bag *B* contains 8 more counters than bag *A*.
Bag *C* contains twice as many counters as bag *A*.

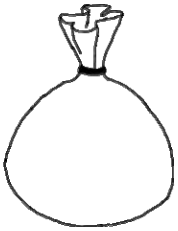
(a) Write down the number of counters in bags *B* and *C*.



Bag *A*



Bag *B*



Bag *C*

.....

.....

Answer Bag *B* ..... counters

Bag *C* ..... counters *(2 marks)*

(b) Show that the total number of counters in bags *A*, *B* and *C* is $4(x + 2)$

.....

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(2 marks)

10

Turn over ▶

7 Dan and Doris are doing a survey on the type of music people buy.

(a) This is one question from Dan's survey.

> Classical music is just for snobbish people.
> Don't you agree?
> Tick (✓) a box.
>
> Strongly agree ☐ Agree ☐ Don't know ☐

Give two criticisms of Dan's question.

Criticism 1 .....

.....

Criticism 2 .....

.....

(2 marks)

(b) This is a question from Doris' survey.

> Do you buy CDs? ☐ Yes ☐ No
>
> If yes, how many CDs do you buy on average each month?
>
> ☐ 2 or less ☐ 3 or 4 ☐ 5 or 6 ☐ More than 6

Give two reasons why this is a good question.

Reason 1 .....

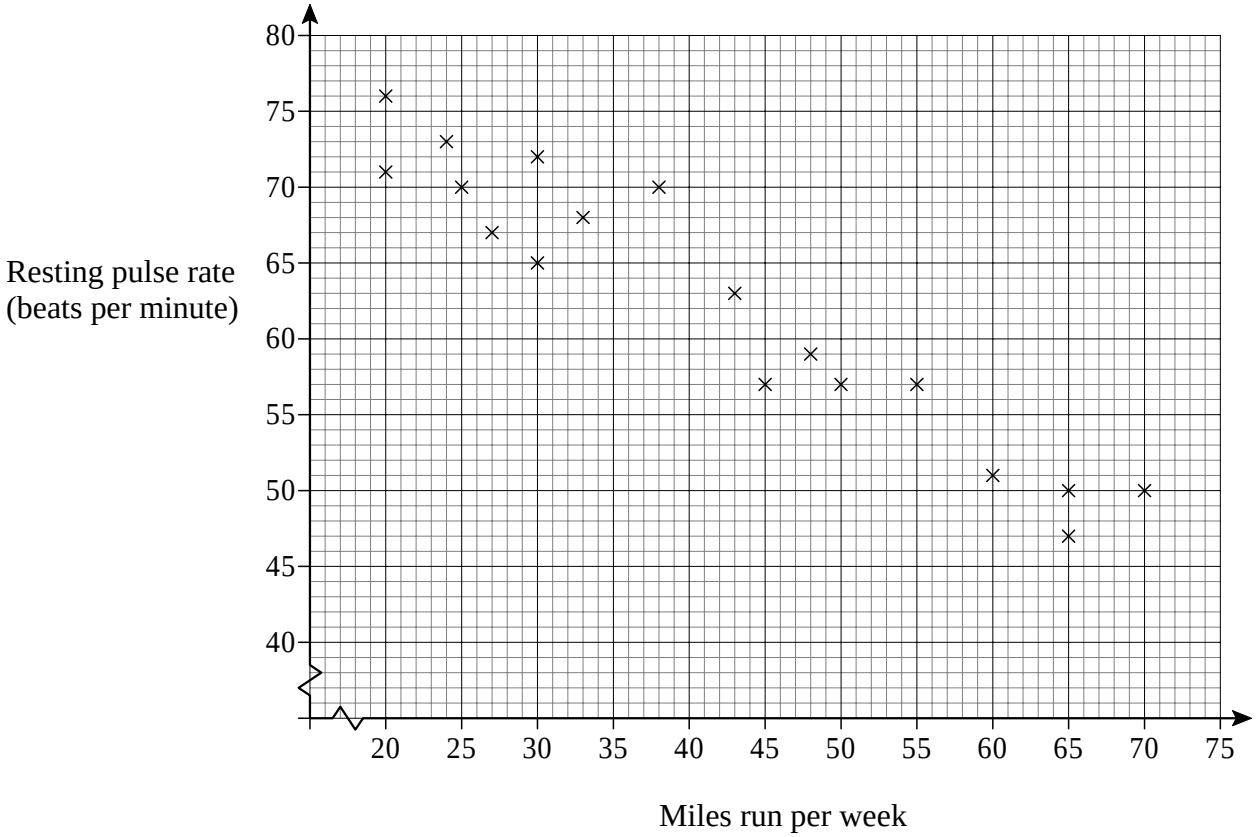
.....

Reason 2 .....

.....

(2 marks)

8 Some runners recorded their resting pulse rates and miles run per week.
The scatter graph shows the results.



(a) How many runners have a resting pulse rate of 57 beats per minute?

Answer ..... *(1 mark)*

(b) Draw a line of best fit.

(1 mark)

(c) Predict the resting pulse rate of a runner who runs 40 miles per week.

Answer ..... beats per minute *(1 mark)*

(d) Describe the relationship between the resting pulse rate and miles run per week.

.....

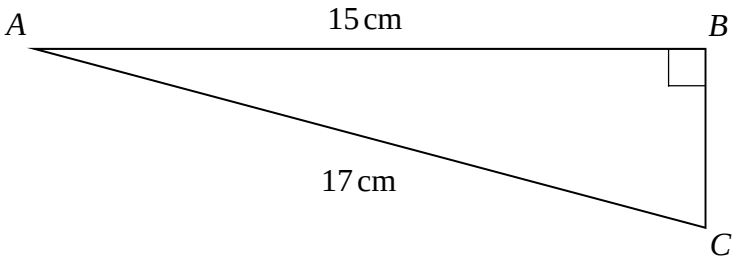
.....

(1 mark)

8

Turn over ▶

9 *ABC* is a right-angled triangle.
AB = 15 cm, *AC* = 17 cm



Not drawn accurately

Calculate the length of the side *BC*.

.....

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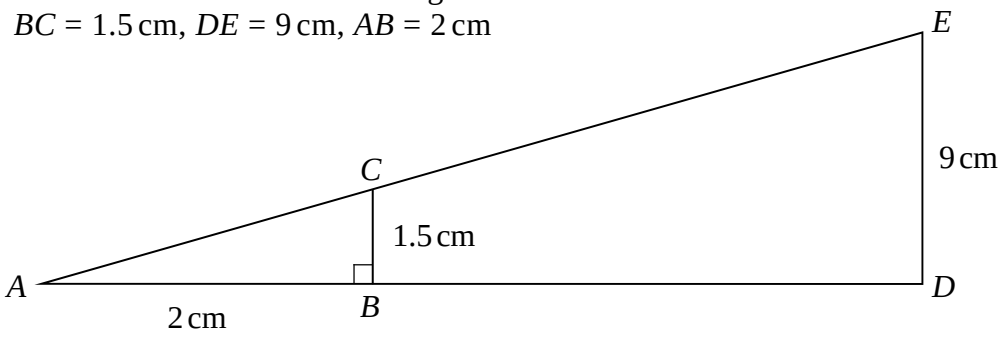
Answer ..... cm *(3 marks)*

10 *ABC* and *ADE* are similar triangles.
BC = 1.5 cm, *DE* = 9 cm, *AB* = 2 cm



Not drawn accurately

Calculate the length of *BD*.

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Answer ..... cm *(3 marks)*

11 (a) Expand $3(x + 2)$

.....

Answer ..... *(1 mark)*

(b) Factorise $6a - 10$

.....

Answer ..... *(1 mark)*

(c) Factorise fully $6a^2b + 9ab^2$

.....

.....

Answer ..... *(2 marks)*

12 A dish contains 2000 bacteria.
The number of bacteria increases by 16% per hour.

How many bacteria will be in the dish after 12 hours?

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.....

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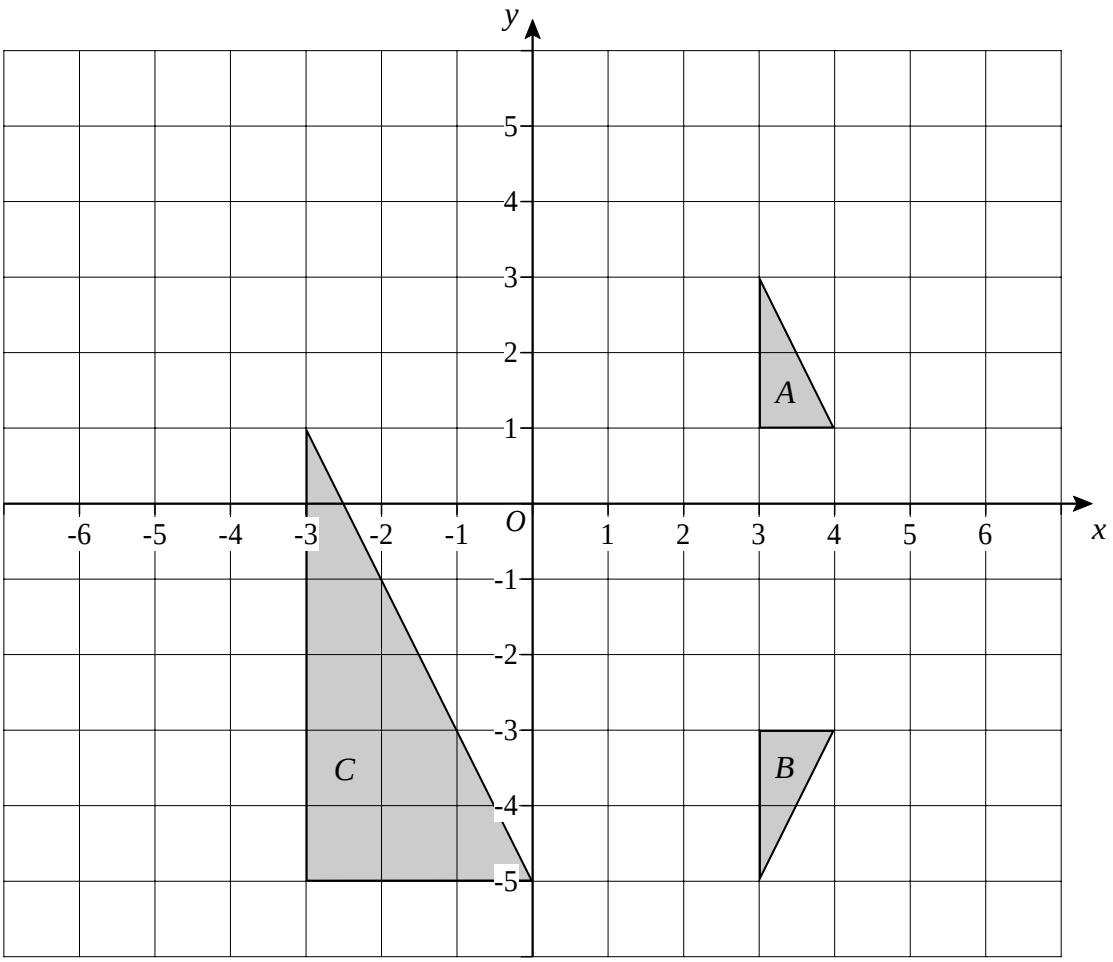
Answer ..... *(3 marks)*

13

Turn over ▶

LEAVE MARGIN BLANK

13



(a) Describe the transformation that maps triangle *A* to triangle *B*.

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(2 marks)

(b) Triangle *A* is rotated 90° anti-clockwise about (0, –1).

Draw the image of *A* after this transformation.

(2 marks)

(c) Triangle *C* is an enlargement of triangle *A*.

(i) Write down the scale factor of the enlargement.

Answer ..... *(1 mark)*

(ii) Write down the coordinates of the centre of the enlargement.

Answer (..... , ...) *(1 mark)*

14 Use trial and improvement to complete the table to find a solution to the equation

$$x^3 - 2x = 90$$

Give your answer to 1 decimal place.

x	$x^3 - 2x$	**Comment**
4	56	Too low
5	115	Too high

Answer $x =$ ..... *(3 marks)*

9

15 (a) Write 0.000 000 07 in standard form.

.....

Answer ..... *(1 mark)*

(b) The planet Mercury is approximately a sphere of radius 2440 km.

Calculate the approximate volume of the planet Mercury.
Give your answer in standard form to an appropriate degree of accuracy.

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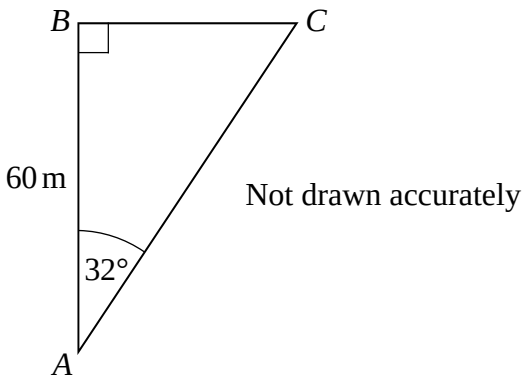
Answer ..... km^3 *(3 marks)*

16 *ABC* is a right-angled triangle.
AB = 60 m
Angle *BAC* = 32°



Not drawn accurately

Find the length of *BC*.

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Answer ..... m *(3 marks)*

17 Cases each weigh 20 kg to the nearest kilogram.

What is the least that six cases could weigh?

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Answer ..... kg *(2 marks)*

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

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Answer $x =$ ..... *(4 marks)*

Turn over for the next question

13

19

Sale

Exercise Bike

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

Now £181.50

How much was the exercise bike before the reduction?

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Answer £ ..... *(3 marks)*

20 y is inversely proportional to the square root of x.
When $x = 16$, $y = 2$

What is the value of y when $x = 0.25$?

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Answer ..... *(3 marks)*

21 (a) Solve the inequality $3x + 7 \geqslant 13$

.....

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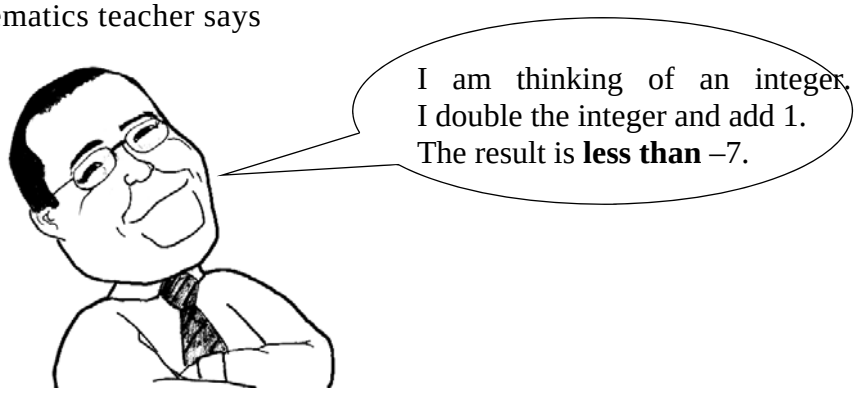
Answer ..... *(2 marks)*

(b) A mathematics teacher says



What is the **largest** integer the teacher could have thought of?

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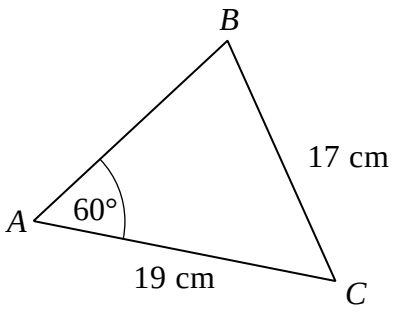
Answer ..... *(2 marks)*

10

22 (a) *ABC* is a triangle.
AC = 19 cm, *AC* = 17 cm and angle *BAC* = 60°



Not drawn accurately

Calculate the size of angle *ABC*.

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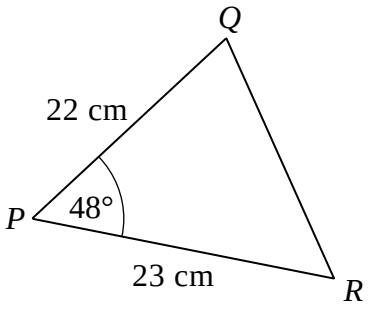
Answer ..... degrees *(3 marks)*

(b) *PQR* is a triangle.
PR = 23 cm, *PQ* = 22 cm and angle *QPR* = 48°



Not drawn accurately

Calculate the length of *QR*.

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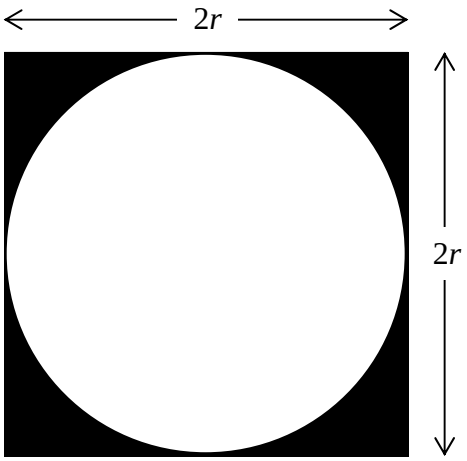
Answer ..... cm *(3 marks)*

23 A star shape is made by cutting quadrants of a circle from a square of side $2r$.



(a) Show that the shaded area is given by the formula

$$A = 4r^2 - \pi r^2$$

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(2 marks)

(b) Rearrange the formula $A = 4r^2 - \pi r^2$

to make r the subject.

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Answer ..... *(3 marks)*

11

Turn over ▶

24 The triangle number sequence is

1, 3, 6, 10, 15, 21, …

The nth term of this sequence is given by

$$\frac{1}{2}n(n+1)$$

(a) Write down an algebraic expression for the $(n-1)$th term of the sequence.

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.....

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Answer ..... *(1 mark)*

(b) Prove, algebraically, that the sum of any two consecutive triangle numbers is a square number.

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(3 marks)

25 The table shows the weights of 100 children in year 7.
An estimate of the mean weight of the children is calculated as 44 kg.

Calculate the values of a and b.

Weight, w (kg)	**Frequency**
$20 < w \leqslant 30$	12
$30 < w \leqslant 40$	21
$40 < w \leqslant 50$	38
$50 < w \leqslant 60$	a
$60 < w \leqslant 70$	b

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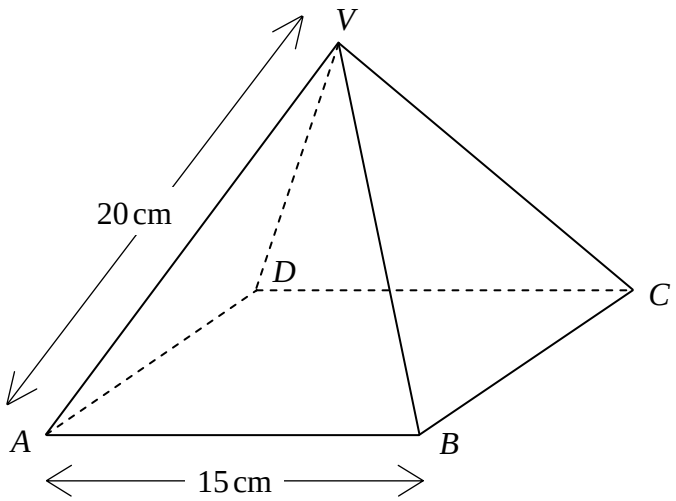
Answer a = ... , b = ... *(6 marks)*

10

Turn over ▶

LEAVE MARGIN BLANK

26 *VABCD* is a right pyramid on a square base.
V is vertically above the centre of the square.
VA = *VB* = *VC* = *VD* = 20 cm
AB = 15 cm



Not drawn accurately

Calculate the angle between the edge *VA* and the base *ABCD*.

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Answer ..... degrees *(5 marks)*

END OF QUESTIONS

5

Q	Answers	Mark	Comments
1a	Line from (11.15,12) to (13.00, 12)	B1	± 1mm.
	'Line' from (13.00 , 12) to (13.45,0)	B1ft	ft their (13.00, 12) ± 1mm.
1b	'Their 12' ÷ 'Their 45m'	M1	oe i.e 12 ÷ 0.45, 1200 ÷ 45 etc.. Allow ft from the 'distance' and 'time' on their graph
	16	A1ft	ft if M1 awarded rounded to ≥ 3sf.
2	sight of 0.175	B1	
	330 × 1.175	M1	
	387.75	A1	
	Carry's by £2.75	A1	must see £ sign Carry's can be implied
3a	4400	B1	
3b	(their 4400 – 800) ÷ 150	M1	
	24	A1ft	ft if M1 awarded.
4a	n-1, n+1, n+7	B2	-1 eeoo NB n-8, n+8 is one error
4b	$n - 1 + n + 1 + n - 7 + n + 7$	M1	Attempt to add their 'arms'
	$= 4 \times n$	A1	Accept 4n. Do not need to see 'cancelling'
5	6.385475, 6.38547486	B1	6.3854….
	6.4	B1ft	f.t. their answer if correctly rounded from a value seen greater then 2d.p. 6.40 is B0
6a	$x + 8$	B1	
	$2x$	B1	
6b	$x + x + 8 + 2x$	M1	
	$4x + 8 = 4(x + 2)$	A1	Can be shown either way but must be stated. SC1 Complete correct numerical verification

Q	Answers	Mark	Comments
7a	Valid criticism	B1	eg Question offensive Leading question
	Valid criticism	B1	eg No option to disagree Not enough choices
7b	Valid reason	B1	eg Yes No answer Simple question
	Valid reason	B1	eg All possible responses covered. Not too many choices for responses.
8a	3	B1	
8b	Line between limits	B1	Passing between (20, 71) and (20, 76) (inclusive) at one end and (65, 47) and (70, 50)(inclusive) at the other. If not 'ruled' B0.
8c	(63)	B1ft	ft their line. ± 1mm
8d	Negative correlation or More miles run, lower pulse rate	B1	oe
9	$17^2 - 15^2$ (=64)	M1	or $x^2 + 15^2 = 17^2$
	$\sqrt{64}$	M1dep	For squaring, subtracting and indication of square rooting
	8	A1	
10	$\frac{x}{2} = \frac{9}{1.5}$	M1	oe. Scale factor 6, $^1/_6$ etc.
	(AD =)12	A1	SC 12 on answer line with no working B1.
	BD = 10	A1	

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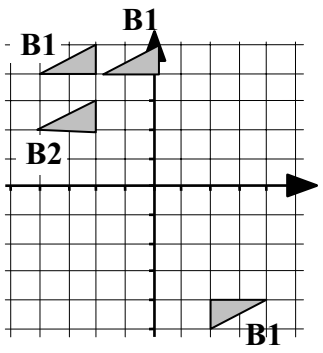
11a	$3x + 6$	B1	
11b	$2(3a – 5)$	B1	$-2(5 – 3a)$
11c	$3ab(2a + 3b)$	B2	B1 for $3ab$ B1 for $(2a + 3b)$ B1 for correct partial factorisation with at least two common factors outside bracket. eg $3a(2ab + 3b^2)$
12	Sight of 1.16	B1	If calculate 'interest' and 'add on' method used award M1 if at least three years shown. A1 for all 12 values accurate or rounded ≈ 2320, 2691, 3122, 3621, 4201, 4873, 5652, 6557, 7606, 8823, 10235, 11872.
	2000 x their '1.16'^{12}	M1	Their 1.16 must be sensible 1.016, 1.6 etc.
	11870 to 11875	A1	Allow 11900 or 12000 if working seen.(no ft) 9872 is sc2 unless 11872 seen then fw.
13a	Reflection	B1	Must be single transformation
	$y = -1$	B1	
13b		B2	B2 Fully correct B1 if 90° clockwise about (0, -1) B1 if 90° anti-clockwise about (-1, 0) B1 if 90° clock-wise about (0, 1)
13c	3	B1	or 3:1 or 6:2
	(6, 4)	B1	Accept any clear indication eg 6-4 or marked on grid

Q	Answers	Mark	Comments
14	Guess between 4 and 5	B1	Must be evaluated correctly to at least nearest whole number (4.1, 60.721), (4.2, 65.688), (4.3, 70.907), (4.4, 76.384), (4.5, 82.125), (4.6, 88.136), (4.7, 94.423), (4.8, 100.992), (4.9, 107.849)
	Bracketing answer between 4.6 and 4.7 (inclusive)	B1	Any values between 4.6 and 4.7 that bracket answer.
	Testing a value ≤ 4.65 and > actual answer (4.6301141) and stating answer as 4.6	B1	(4.65, 91.244625), (4.64, 90.617344),
15a	7×10^{-8}	B1	
15b	(V =) $^4/_3 \pi$ x '2440'^{3}	M1	2440 could be 2400, 2450
	5.5… to 6.2…..…. x 10^{10} (Does not have to be SF)	A1	If $\pi = 3$ used accept 5.8….. x 10^{10} If $\pi = 3.1$ used accept 6….. x 10^{10}
	Any value between 5.5 and 6.2 rounded to 4sf or better x 10^{10}	B1	ft their volume if a value ≥ 4sf seen or implied and correctly rounded to 1sf , 2sf., 3 s.f. or 4sf
16	Sight of tan	M1	NB alternative methods such as sine rule must be used correctly for M1 and must be complete, so if for example Hypotenuse found Pythagoras or further trig must be used.
	(BC =) 60 tan 32	M1dep	
	BC = 37.5, 37.49(….)	A1	
17	6x19.5	B1	
	117	B1	

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18	$2(x + 3) + 3(x – 4)$	M1	Allow one error. No brackets must be recovered $2(x + 3) + 3(x – 4) = 6$ is M2
	$5x – 6$	A1	oe
	Their '$5x – 6$' $= 6$	M1dep	M1dep for = 6. NB $5x = 7$ implies A1 if RHS = 1 and M1 awarded
	$(x =) \, {}^{12}/_{5} = 2.4$	A1ft	ft 'their $5x – 6$' $= 6$ if both Ms awarded.
19	Sight of 0.825	B1	82.5% = 181.50 M1
	181.50 ÷ 0.825	M1	1% = 2.2 A1 oe 181.5 ÷ 82.5 x 100
	220	A1	
20	$y \propto \frac{1}{\sqrt{x}}$ or $y = \frac{k}{\sqrt{x}}$	M1	oe
	$k = 8$	A1	$k = – 8$
	$(y =)$ 16	A1	–16
21a	$3x \geq 13 – 7$ (6)	M1	
	$x \geq 2$	A1	
21b	$2x + 1 < -7$ or attempt at inverse function	M1	eg -7 -1 ÷ 2
	$x = -5$	A1	
22a	$\frac{\text{Sin } B}{19} = \frac{\sin 60}{17}$	M1	Accept $\frac{19}{\text{Sin } B} = \frac{17}{\sin 60}$
	Sin $B = 0.9679(1…)$	A1	
	$B = 75.4(…)$	A1	
22b	$x^2 = 22^2+23^2 – 2$ x22x23xcos 48	M1	
	$x^2 = 335.8(…)$	A1	
	$x = 18.32(….)$	A1ft	ft only if an error made in calculation of x^2 but not on $(22^2+23^2 – 2$ x22x23 (=1))cos 48 $(=\sqrt{0.669} = 0.818)$

Q	Answers	Mark	Comments
23a	$(A =)\ (2r)^2$	B1	oe
	$(-)$ (a full circle)	B1	Must make Reference to full circle or 4 x quarter circles
23b	$(A =)\ r^2(4 - \pi)$	M1	
	$r^2 = A \div (4 - \pi)$	A1	
	$r = \sqrt{(A \div (4 - \pi))}$	A1	oe. Must have r = ..
24a	$\frac{1}{2}n(n - 1)$	B1	or equivalent
24b	$\frac{1}{2}n(n-1)+\frac{1}{2}n(n+1)$	M1	or equivalent eg $\frac{1}{2}n(n+1)+\frac{1}{2}(n+1)(n+2)$
	$\frac{1}{2}n^2 - \frac{1}{2} + \frac{1}{2}n^2 + \frac{1}{2}$	A1	$n^2 + 2n + 1$
	n^2	A1	$(n + 1)^2$
25	$a + b = 29$	B1	Sight of 29 alone is not B1
	$12\times25 + 21\times35 + 38\times45 + 55a + 65b$ $(= 4400)$	M1	
	$55a + 65b = 1655$	A1	oe
	$55a + 55b = 1595$	M1	oe $65a + 65b = 1885$ for balancing and attempting to eliminate.
	$10b = 60$	A1	$10a = 230$
	$a = 23$, $b = 6$,	A1	Need both Ucb, lcb used B1, M0, A0, M1, A0 possible.
26	Identifying $\Delta\ VAC$ or $\angle VAC$	B1	Can be implied by working.
	$AC^2 = 15^2 + 15^2$	M1	oe
	$^1/_2AC = 10.6(066\ldots)$	A1	$\sqrt{450} \div 2$ is A1 $\sqrt{450}$ is A1 if used in cos rule on VAC.
	$VAC = \cos^{-1}(\text{their } {}^1/_2AC \div 20)$	M1dep	
	$VAC = 57.97\ldots°$ or 58°	A1	