AQA

Please write clearly in block capitals.

Centre number | | | | | | Candidate number | | | | |

Surname _____

Forename(s) _____

Candidate signature _____

GCSE MATHEMATICS

H

Higher Tier Paper 2

Thursday 9 June 2016 Morning Time allowed: 2 hours

Materials

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

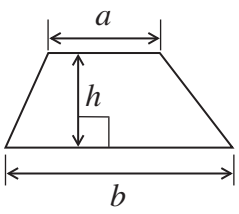
Instructions
- Use black ink or black ball-point pen. Draw diagrams in pencil.
- Answer **all** questions.
- You must answer the questions in the spaces provided. Do not write outside the box around each page or on blank pages.
- Do all rough work in this book.

Information
- The marks for questions are shown in brackets.
- The maximum mark for this paper is 105.
- The quality of your written communication is specifically assessed in Questions 2, 7, 10 and 15. These questions are indicated with an asterisk (*).
- You may ask for more answer paper, graph paper and tracing paper. These must be tagged securely to this answer book.

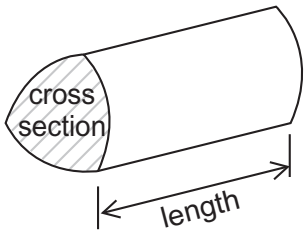
Advice
- In all calculations, show clearly how you work out your answer.

Formulae Sheet: Higher Tier

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

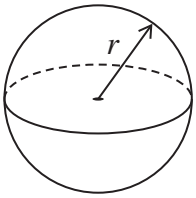


Volume of prism = area of cross section × length



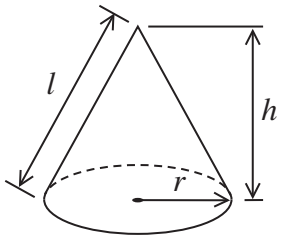
Volume of sphere = $\frac{4}{3}\pi r^3$

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



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

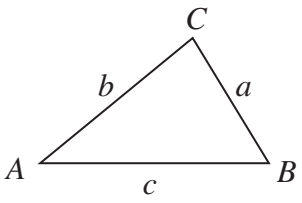
Curved surface area of cone = $\pi r l$



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

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

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

1 Here are the ingredients to make 8 biscuits.

75 g	flour
50 g	sugar
40 g	butter
2	egg yolks

Work out the ingredients to make 20 biscuits.

[3 marks]

_____ g flour

_____ g sugar

_____ g butter

_____ egg yolks

3

***2 (a)** Alice wants to book a holiday for one adult and one child.

Holiday

£720 per adult

£430 per child

Special Offer
15% off

Alice has £1000

Does she have enough money to book this holiday using the special offer?
Tick a box.

Yes ☐ No ☐

You **must** show your working.

[5 marks]

2 (b) Ben changes £800 to Euros before he goes on holiday.
£1 = 1.25 Euro

He spends 895 Euros.

He changes the Euros that he has left to Pounds (£).
The exchange rate is now £1 = 1.40 Euro

How many Pounds does he get back?

[4 marks]

Answer £ _____

Turn over for the next question

9

3 This formula converts degrees Celsius (C) to degrees Fahrenheit (F).

$$F = \frac{9}{5}C + 32$$

Use the formula to convert 28°C to °F
Give your answer to the nearest whole number.

[3 marks]

Answer _____ °F

4 (a) The nth term of a sequence is $6 - 2n$

Work out the first three terms of the sequence.

[2 marks]

Answer _____ , _____ , _____

4 (b) Here is the term-to-term rule for a different sequence.

Multiply previous term by 2 and then subtract 3

The third term in this sequence is 31

Work out the **first** term.

[3 marks]

Answer _____

8

5 The table shows information about the pay per hour of 40 people.

Pay per hour, x (£)	Frequency		
$5 < x \leqslant 15$	14		
$15 < x \leqslant 25$	12		
$25 < x \leqslant 35$	11		
$35 < x \leqslant 45$	2		
$45 < x \leqslant 55$	1		
	Total = 40		

5 (a) Which group contains the median pay per hour?
Circle your answer.

[1 mark]

$5 < x \leqslant 15$ $15 < x \leqslant 25$ $25 < x \leqslant 35$ $35 < x \leqslant 45$ $45 < x \leqslant 55$

5 (b) Work out an estimate of the mean pay per hour.

[4 marks]

Answer £ _____

6 A baker makes 130 loaves so that there are

6 times as many white loaves as granary loaves

half as many brown loaves as white loaves.

How many of each type does he make?

[3 marks]

White _____

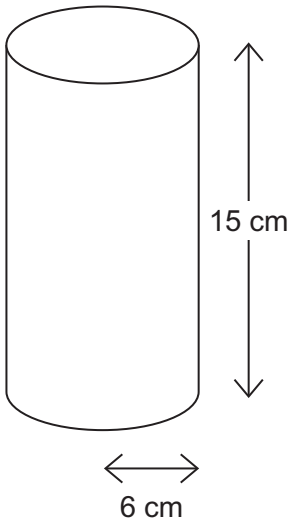
Brown _____

Granary _____

Turn over for the next question

8

7 (a) The diagram shows a cylinder.



The radius of the base is 6 cm
The height is 15 cm

Work out the volume.

[3 marks]

Answer _____ cm^3

***7 (b)** 1000 cm^3 = 1 litre

A tank contains 45 000 cm^3 of water.
The tank leaks at 0.75 litres/minute.

How long does the tank take to empty?

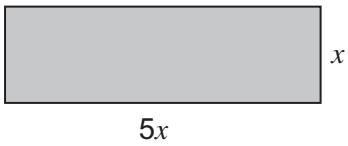
[4 marks]

Answer _____

Turn over for the next question

7

8 The diagram shows a rectangle.



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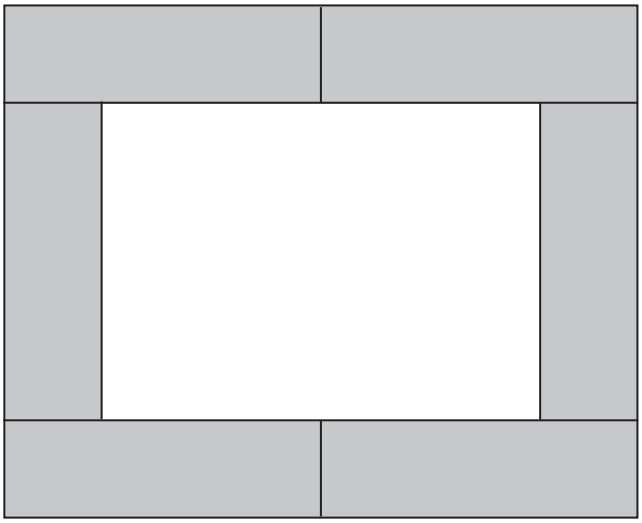
Six of these rectangles are joined to make this shape.



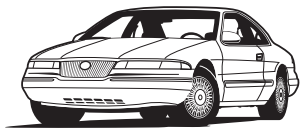
The area of the white rectangle in the middle is 1440 cm^2

Work out the area of **one** shaded rectangle.

[5 marks]

Answer _____ cm^2

9



Price reduced

25% off

Now £14 625

Work out the price of the car before it was reduced.

[3 marks]

Answer £ _____

Turn over for the next question

8

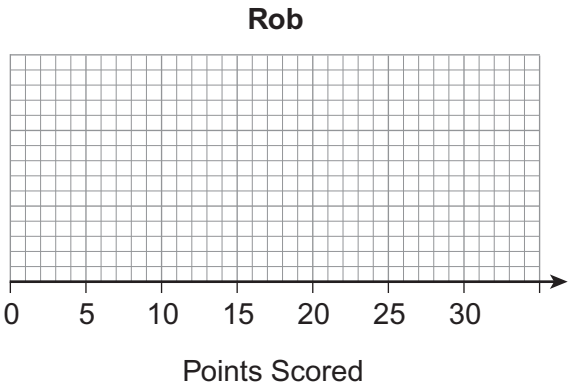
10 Rob played in 15 basketball matches.
The stem-and-leaf diagram shows the number of points he scored in each match.

Key: 0 | 5 represents 5 points

0	5						
1	2	2	4	5	6	7	8
2	2	2	3	6	6	9	
3	0						

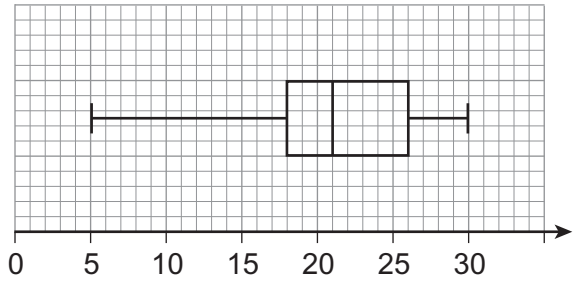
***10 (a)** Draw a box plot to represent the data.

[4 marks]



10 (b) This box plot represents the points that Jack scored in 15 basketball matches.

Jack



Jack says,

"I am better at basketball than Rob."

Give **two** reasons that support his statement.

[2 marks]

Reason 1 _____

_____

Reason 2 _____

_____

Turn over for the next question

6

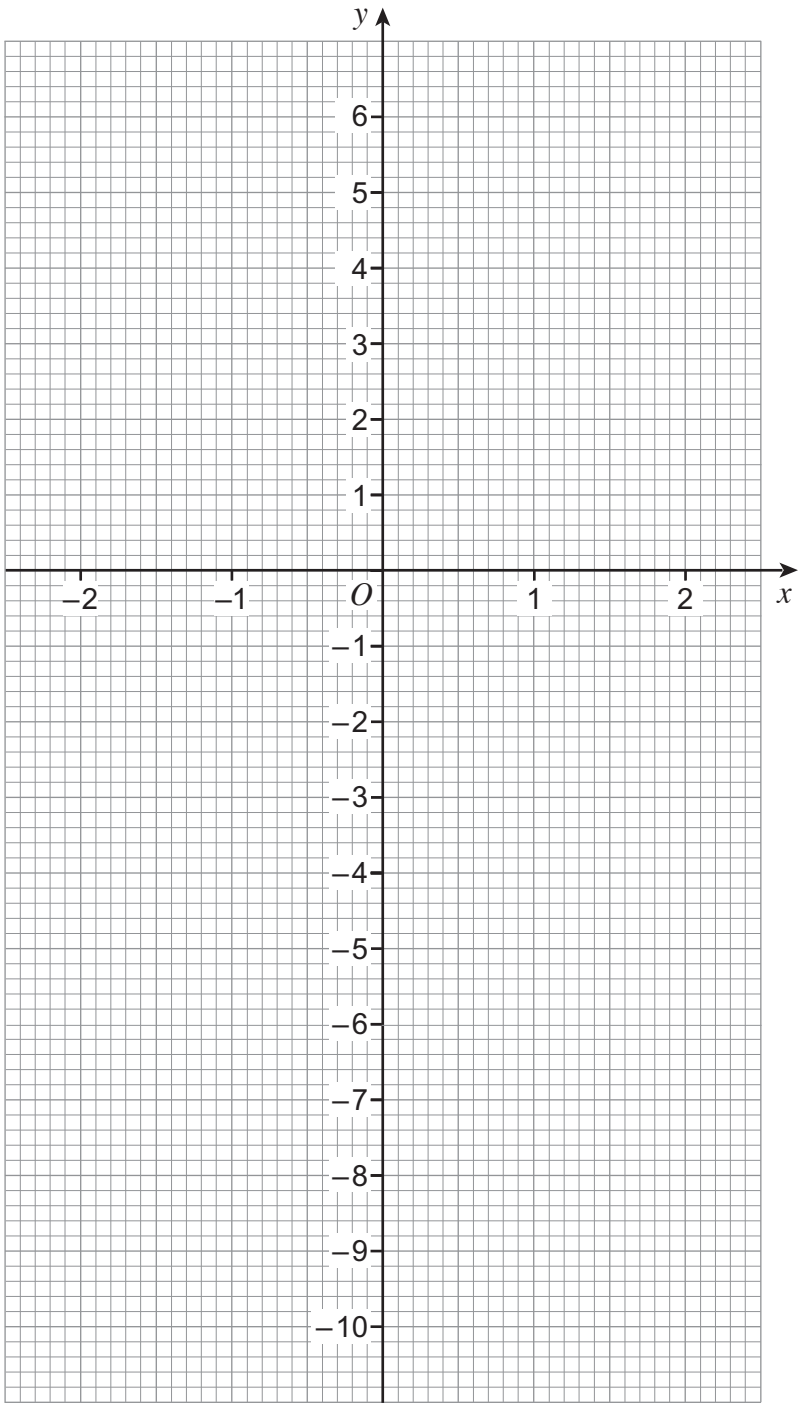
Turn over ▶

11 Here is a table of values for $y = x^3 - 2$ for $x = -2$ to 2

x	– 2	– 1	0	1	2
y	– 10	– 3	– 2	– 1	6

Draw the graph of $y = x^3 - 2$ for values of x from – 2 to 2

[2 marks]



12 Two boats leave a port at the same time.
Boat A travels due West at an average speed of 20 km/h
Boat B travels due South at an average speed of 30 km/h

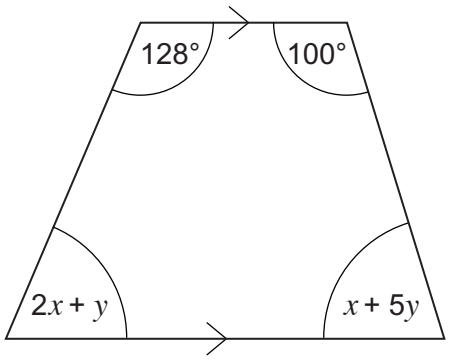
How far apart are the boats after 2.5 hours?
Give your answer to 2 significant figures.

[5 marks]

Answer _____ km

7

13 The diagram shows a trapezium.



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Work out the values of x and y.

[5 marks]

x = _____ degrees

y = _____ degrees

14 Write down the equation of the straight line that

passes through the point (0, 4)

and

is parallel to the line $y = 5x + 3$

[2 marks]

Answer _____

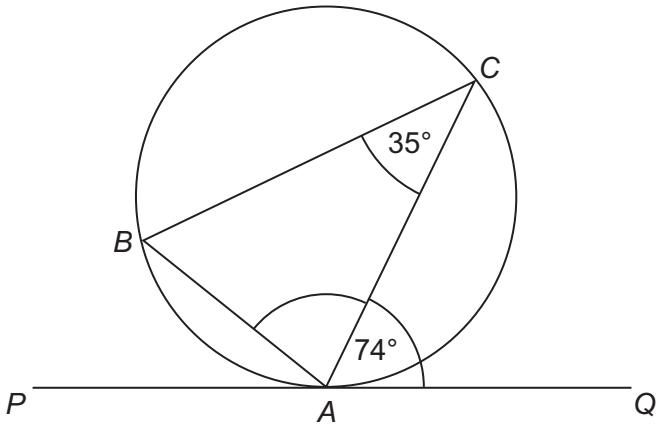
***15** Bags of nails weigh 200 grams each.
Boxes of screws weigh 140 grams each.
Both measurements are given to the nearest 10 grams.

Show that 4 bags of nails **could** weigh the same as 6 boxes of screws.

[3 marks]

10

16 *A*, *B* and *C* are points on a circle.
PAQ is a tangent to the circle.



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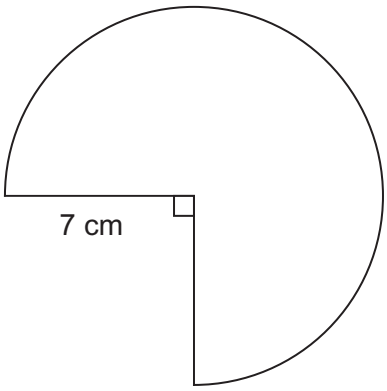
Work out the size of angle *CAB*.

[2 marks]

Answer _____ degrees

17 The diagram shows a sector of a circle.
The radius is 7 cm



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Work out the **perimeter** of the shape.

[3 marks]

Answer _____ cm

Turn over for the next question

5

18 The table shows information about the masses of 400 hamsters.

Mass, w (grams)	Frequency
$80 < w \leqslant 100$	100
$100 < w \leqslant 115$	150
$115 < w \leqslant 125$	90
$125 < w \leqslant 150$	60

18 (a) A sample of size 50, stratified by the groups in the table, is to be taken.

Work out the number of hamsters from each group in the sample.
Write your answers in the table below.

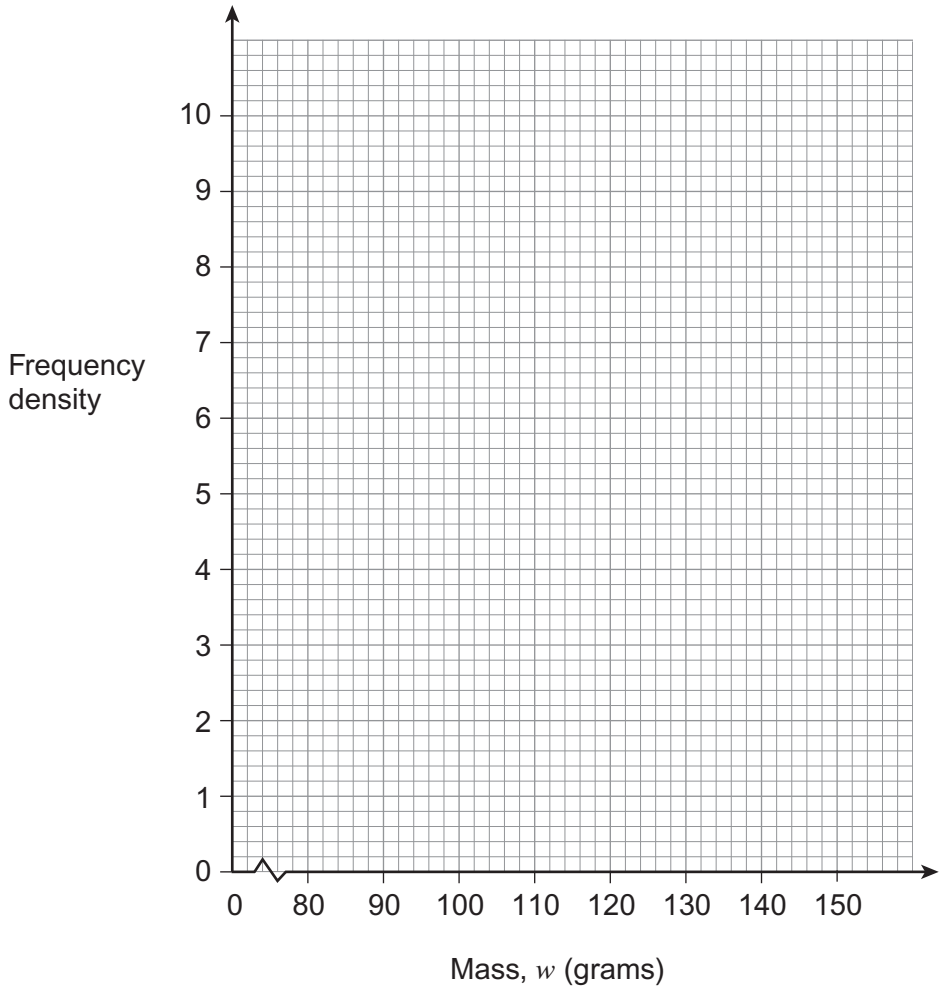
[3 marks]

Mass, w (grams)	Number in the sample
$80 < w \leqslant 100$	
$100 < w \leqslant 115$	
$115 < w \leqslant 125$	
$125 < w \leqslant 150$	

18 (b) Draw a histogram for the data.
You may use the table to help you.

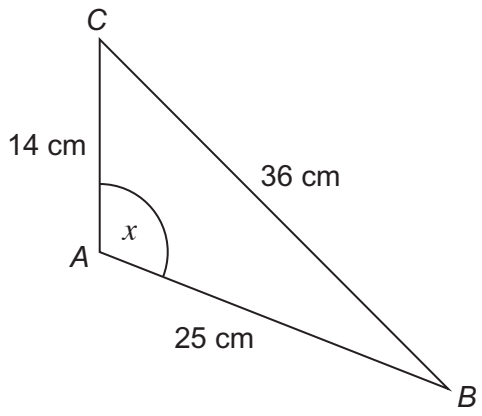
[4 marks]

Mass, w (grams)	**Frequency**		
$80 < w \leqslant 100$	100		
$100 < w \leqslant 115$	150		
$115 < w \leqslant 125$	90		
$125 < w \leqslant 150$	60		



7

19 Work out the size of angle x.



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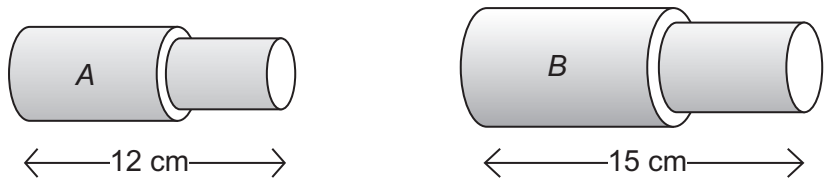
[3 marks]

Answer _____ degrees

20 These two solid shapes are similar.



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The volume of A is 1400 cm^3

Work out the volume of B.

[3 marks]

Answer _____ cm^3

Turn over for the next question

6

21 A bag contains 10 counters.
4 of the counters are black and 6 are white.

Two counters are picked at random.

Work out the probability that they are both black.

[3 marks]

Answer _____

22 (a) Factorise $49c^2 - d^2$

[2 marks]

Answer _____

22 (b) Simplify $\dfrac{x^2 - 6x}{2x^2 - 7x - 30}$

[3 marks]

Answer _____

23 You are given that $(x + a)^2 - 7 \equiv x^2 + 10x + b$

Work out the values of a and b.

[2 marks]

a = _____

b = _____

10

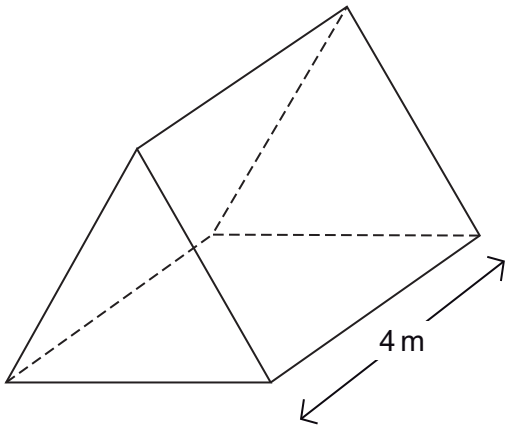
24 Solve the equation $\frac{6}{x+3} + \frac{1}{2x+5} = 3$

Give your answers to 2 decimal places.

[6 marks]

Answer _____ and _____

25 A tent is in the shape of a triangular prism.



The length of the tent is 4 metres.
The volume is 8 m^3

The cross-section of the tent is an **equilateral** triangle.

Shaun is 1.95 metres tall.

Can he stand at the highest part of the tent without having to bend over?
You **must** show your working.

[5 marks]

Answer _____

END OF QUESTIONS

11

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