AQA

Please write clearly in block capitals.

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

Surname _____

Forename(s) _____

Candidate signature _____

GCSE MATHEMATICS (LINEAR)

H

Higher Tier Paper 1

Wednesday 2 November 2016 Morning Time allowed: 1 hour 30 minutes

Materials

For this paper you must have:
- mathematical instruments.

You must **not** use a calculator.

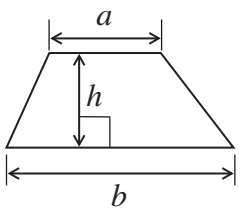
Instructions
- Use black ink or black ball-point pen. Draw diagrams in pencil.
- Answer **all** questions.
- You must answer the questions in the spaces provided. Do not write outside the box around each page or on blank pages.
- Do all rough work in this book.

Information
- The marks for questions are shown in brackets.
- The maximum mark for this paper is 70.
- The quality of your written communication is specifically assessed in Questions 6, 7 and 21. These questions are indicated with an asterisk (*).
- You may ask for more answer paper, tracing paper and graph paper. These must be tagged securely to this answer book.

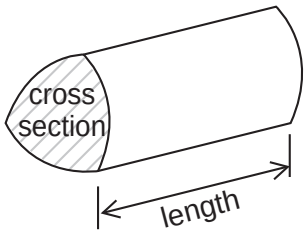
Advice
- In all calculations, show clearly how you work out your answer.

Formulae Sheet: Higher Tier

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

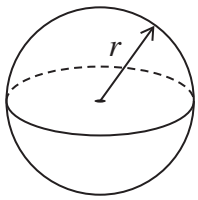


Volume of prism = area of cross section × length



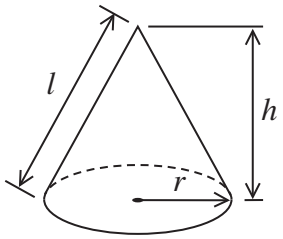
Volume of sphere = $\frac{4}{3}\pi r^3$

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



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

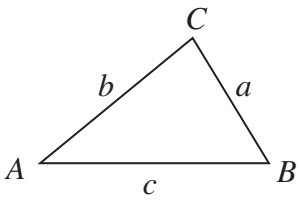
Curved surface area of cone = $\pi r l$



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

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

Do not write outside the box

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

1 Solve $5w - 3 = 3w + 15$

[3 marks]

$w =$ _____

2 A spinner has four sections A, B, C and D.
The table shows the probabilities of the spinner landing on A, B or C.

Outcome	A	B	C	D
Probability	0.2	0.3	0.15	

Work out the probability of landing on D.

[2 marks]

Answer _____

5

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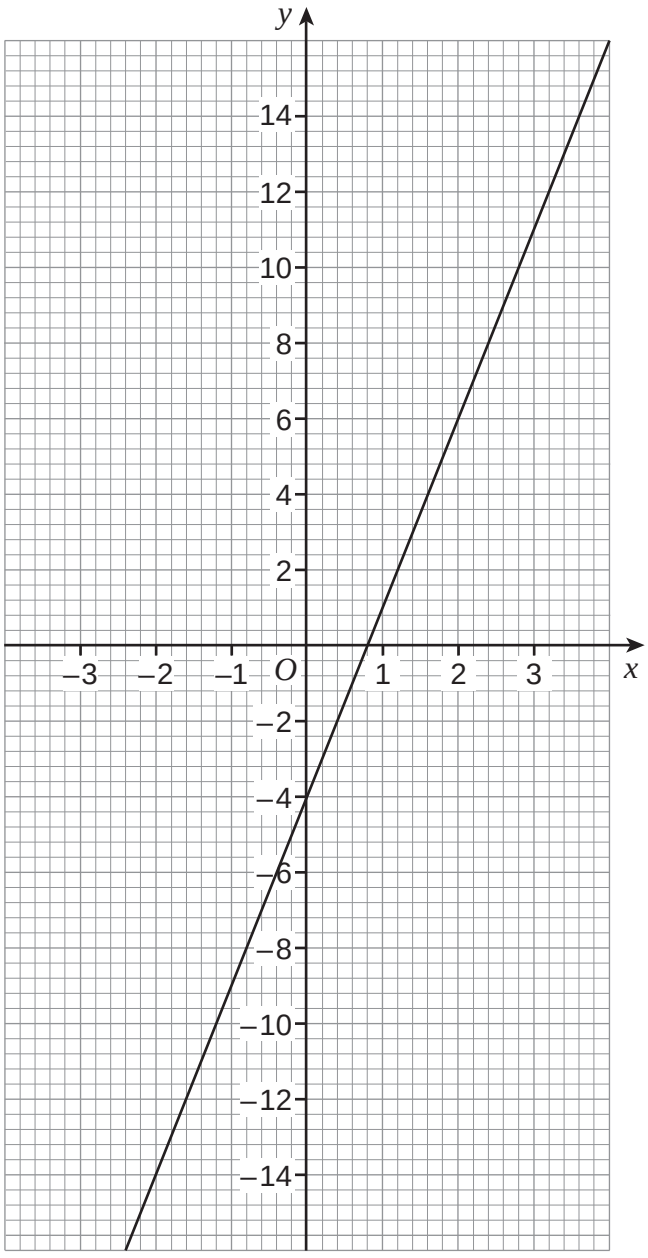
3 Here is a straight-line graph.



3 (a) Use the graph to work out the value of x when $y = 8$

[1 mark]

Answer _____

Do not write outside the box

3 (b) Work out the gradient of the line.

[3 marks]

Answer _____

4 Expand and simplify $6(x - 3) - 4(x - 5)$

[3 marks]

Answer _____

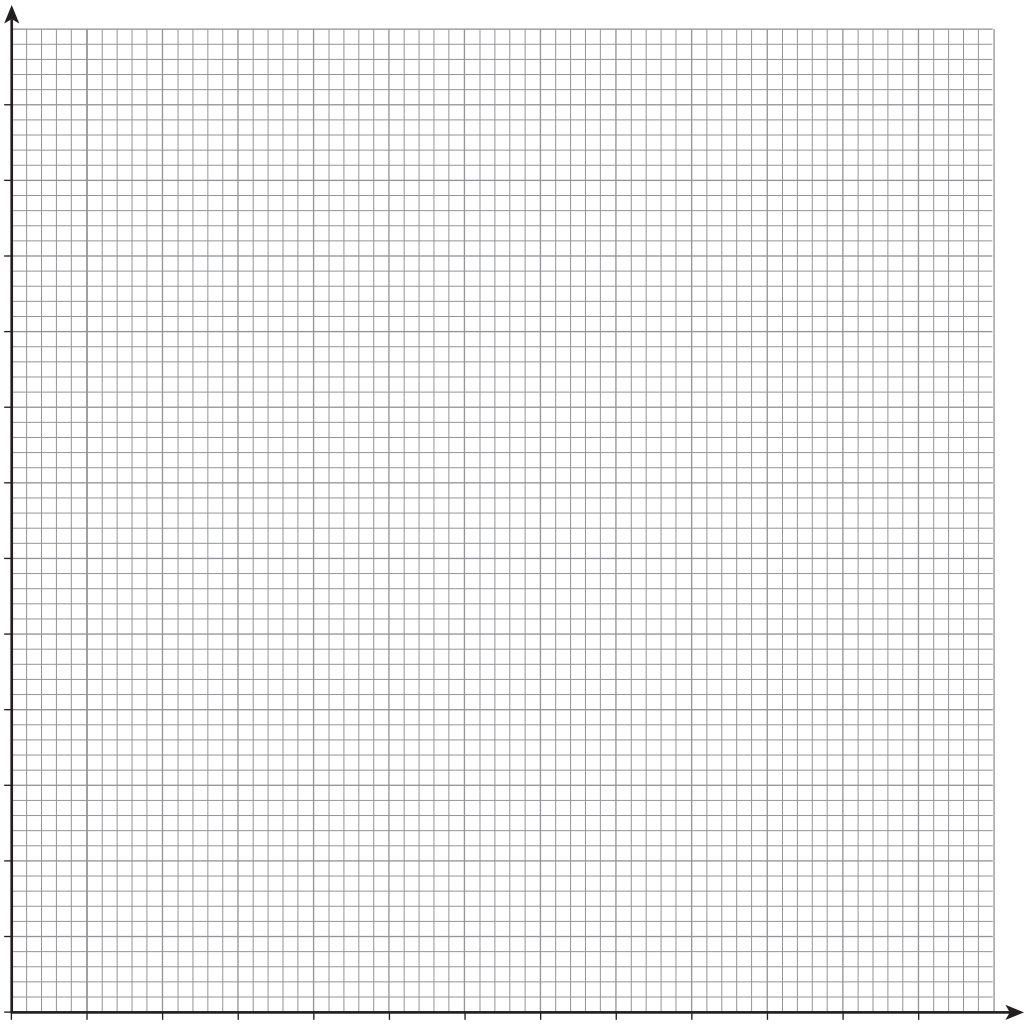
Turn over for the next question

7

5 Draw a diagram to show this data.

Height, h, (cm)	Frequency
$5 < h \leqslant 10$	4
$10 < h \leqslant 15$	9
$15 < h \leqslant 20$	12
$20 < h \leqslant 25$	5

[3 marks]



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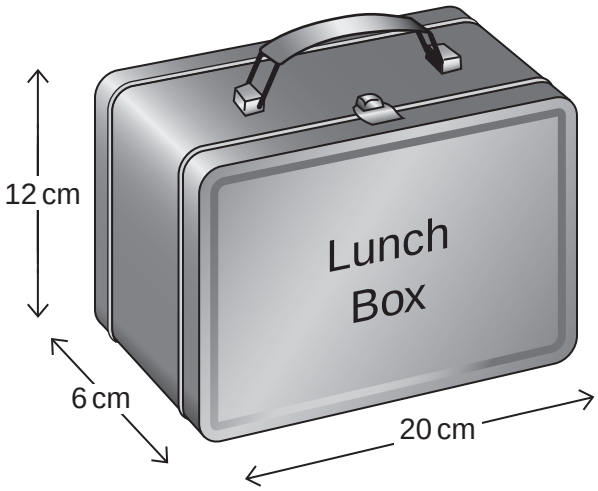
*6 Here is a drink container and a lunch box.



The drink container is a cuboid with a square base.
The area of the base = 25 cm^2
The volume of the container = 400 cm^3

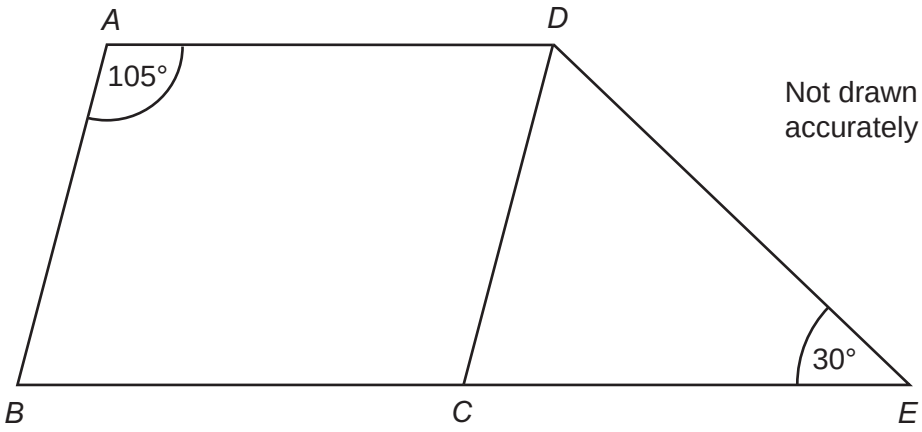
Will the container fit inside the lunch box?
You **must** show your working.

[4 marks]

7

Do not write outside the box

*7 A parallelogram *ABCD* and a triangle *DCE* are joined as shown.
BCE is a straight line.



Show that *DCE* is an isosceles triangle.
You **must** show your working.

[4 marks]

Do not write outside the box

8 Field A is a rectangle with sides of 30 m and 70 m

Field B is a square with the same **perimeter** as Field A.

Not drawn accurately

How much bigger in area is Field B than Field A?
You **must** show your working.

[4 marks]

Answer _____ m^2

Turn over for the next question

8

Do not write outside the box

9 Here are the first five terms of a linear sequence.

9 15 21 27 33 ...

Work out the nth term.

[2 marks]

Answer _____

10 Factorise $x^2 - 100$

[1 mark]

Answer _____

Do not write outside the box

11 (a) Work out $2 \times 10^6 \times 8 \times 10^4$
Give your answer in standard form.

[2 marks]

Answer _____

11 (b) Work out $\frac{2 \times 10^6}{8 \times 10^4}$

Give your answer as an ordinary number.

[2 marks]

Answer _____

Turn over for the next question

7

Do not write outside the box

12 Solve $2x + 3 + \frac{4x - 1}{2} = 10$

Do **not** use trial and improvement.

[4 marks]

$x =$ _____

Do not write outside the box

13 A park ranger wants to estimate the number of fish in a lake.

She catches 400 fish.
She marks them with ink and puts them back in the lake.

The next day she catches 60 fish.
There are 3 marked with ink.

The ranger says,

"There are about 8000 fish in the lake."

Show that she is correct.

[3 marks]

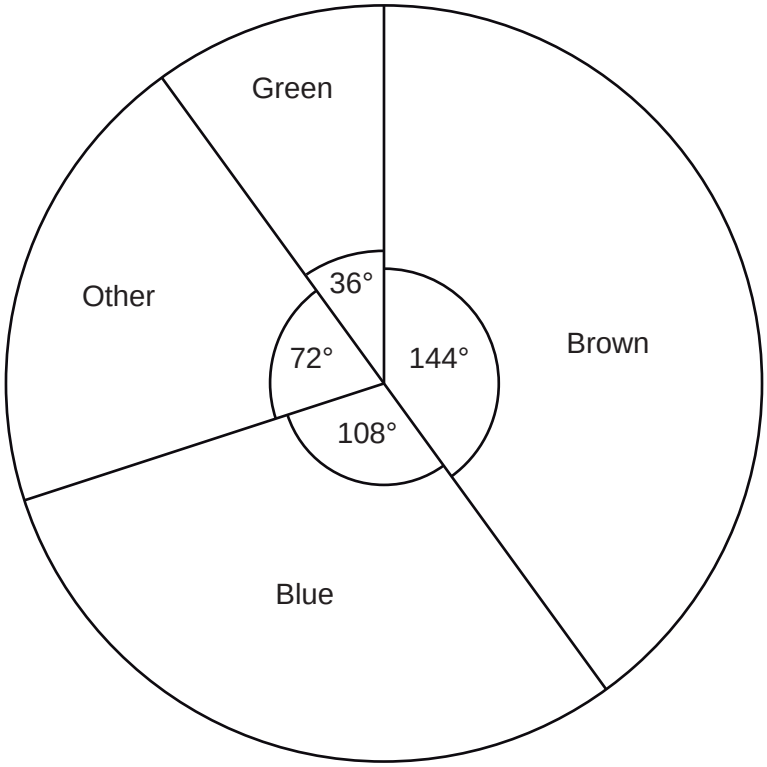
Turn over for the next question

7

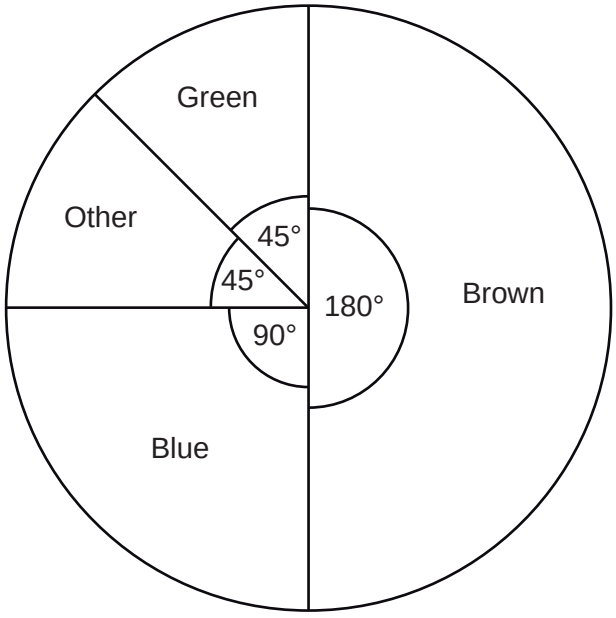
Do not write outside the box

14 The pie charts show the eye colour of some students.

Girls



Boys



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The areas of the pie charts are proportional to the number of students.

The radius of the girls' pie chart is 5 cm
The radius of the boys' pie chart is 4 cm

5 girls have green eyes.

How many boys and girls altogether have blue eyes?

[5 marks]

Answer _____

Turn over for the next question

5

Do not write outside the box

15 A headteacher wants to do a survey of students in years 9, 10 and 11
The table shows the number of students in each year.

Year	9	10	11
Number in year	235	215	250

She wants to take a sample of 70 students, stratified by year group.

Complete the table below to show the number of students in each year she should sample.

[3 marks]

Year	9	10	11
Number in year	235	215	250
Sample size			

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16 Work out $64^{\frac{2}{3}}$

[2 marks]

Answer _____

17 Show that $\left(\sqrt{3} + \sqrt{75}\right)^2 = 108$

[2 marks]

Turn over for the next question

7

Do not write outside the box

18 Show that $\frac{2}{x-3} + \frac{1}{x-1} = 1$

simplifies to $x^2 - 7x + 8 = 0$

[3 marks]

Do not write outside the box

19 The area of this rectangle is 8 cm^2

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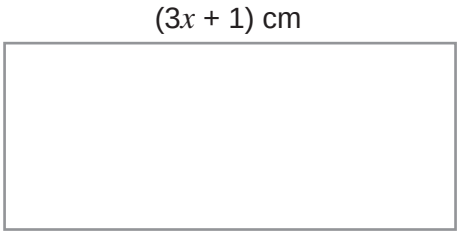

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Work out the value of x.

[4 marks]

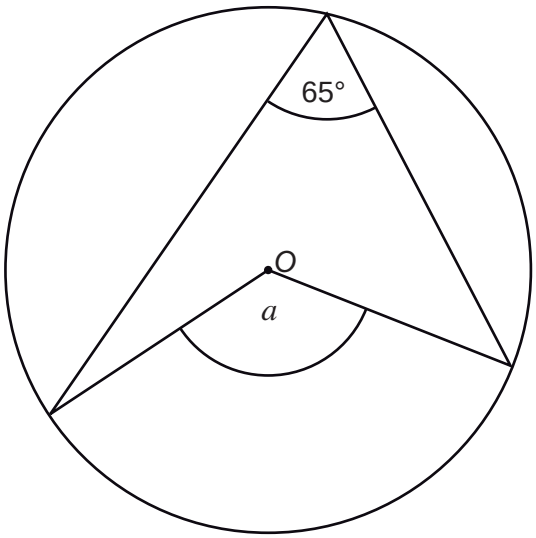
Answer _____

Turn over for the next question

7

20 (a) O is the centre of the circle.

Work out the size of angle a.



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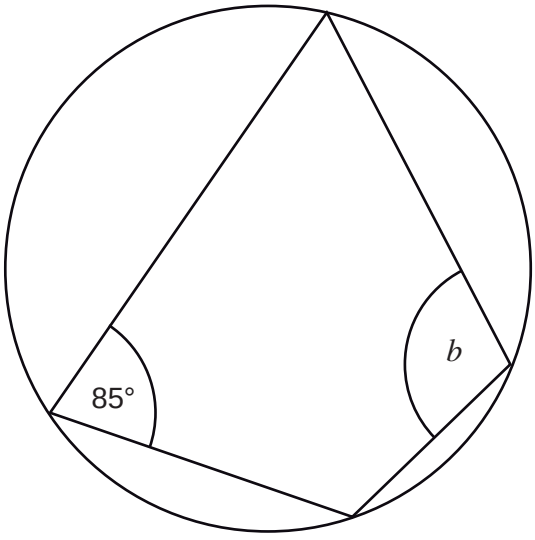
Circle your answer.

[1 mark]

115° 130° 135° 295°

20 (b) Work out the size of angle b.



Not drawn accurately

Circle your answer.

[1 mark]

85° 90° 95° 115°

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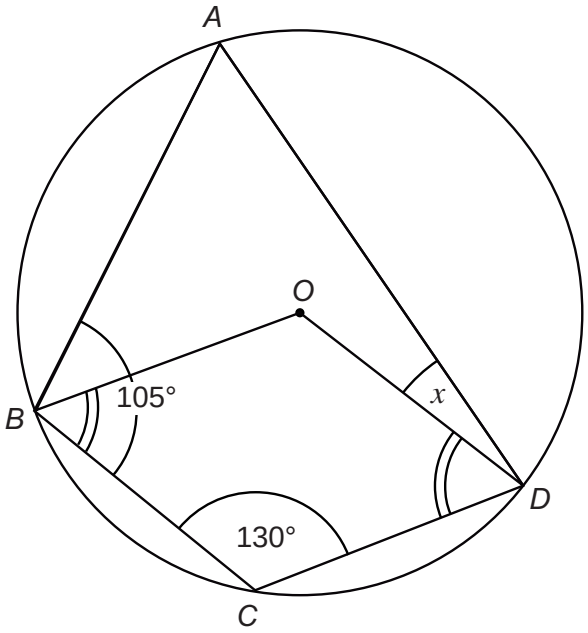
20 (c) *ABCD* are points on the circumference of a circle centre *O*.

Angle *BCD* = 130°
Angle *ABC* = 105°
Angle *OBC* = Angle *ODC*



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Work out the size of angle *ADO*, marked x on the diagram.
You **must** show your working which may be on the diagram.

[4 marks]

Answer _____ degrees

6

Turn over ▶

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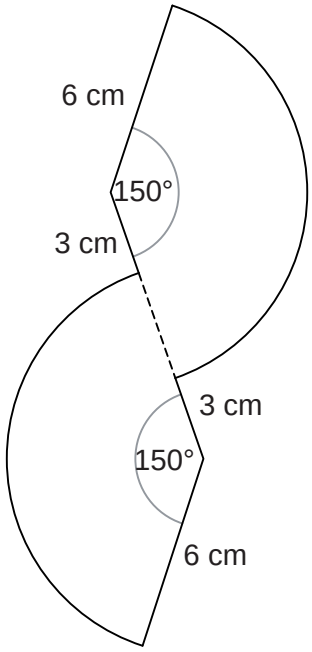
***21** This shape is made from two identical sectors.



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Work out the perimeter of the shape.
Give your answer in terms of π.

[4 marks]

Answer _____ cm

END OF QUESTIONS

4

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