

Please write clearly in block capitals.

Centre number

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Candidate number

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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.

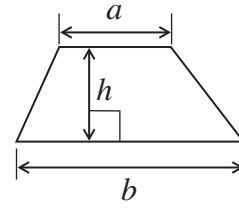
Advice

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

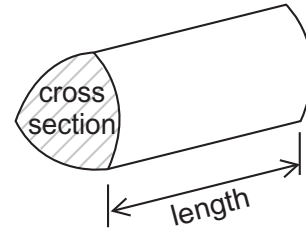


Formulae Sheet: Higher Tier

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

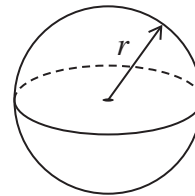


Volume of prism = area of cross section \times length



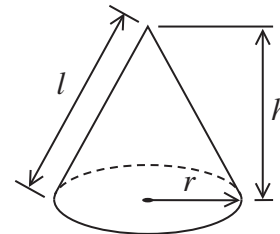
Volume of sphere = $\frac{4}{3}\pi r^3$

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



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

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

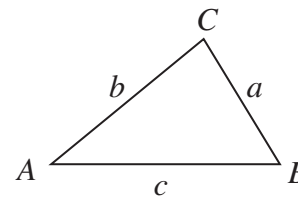


In any triangle ABC

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 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 | |

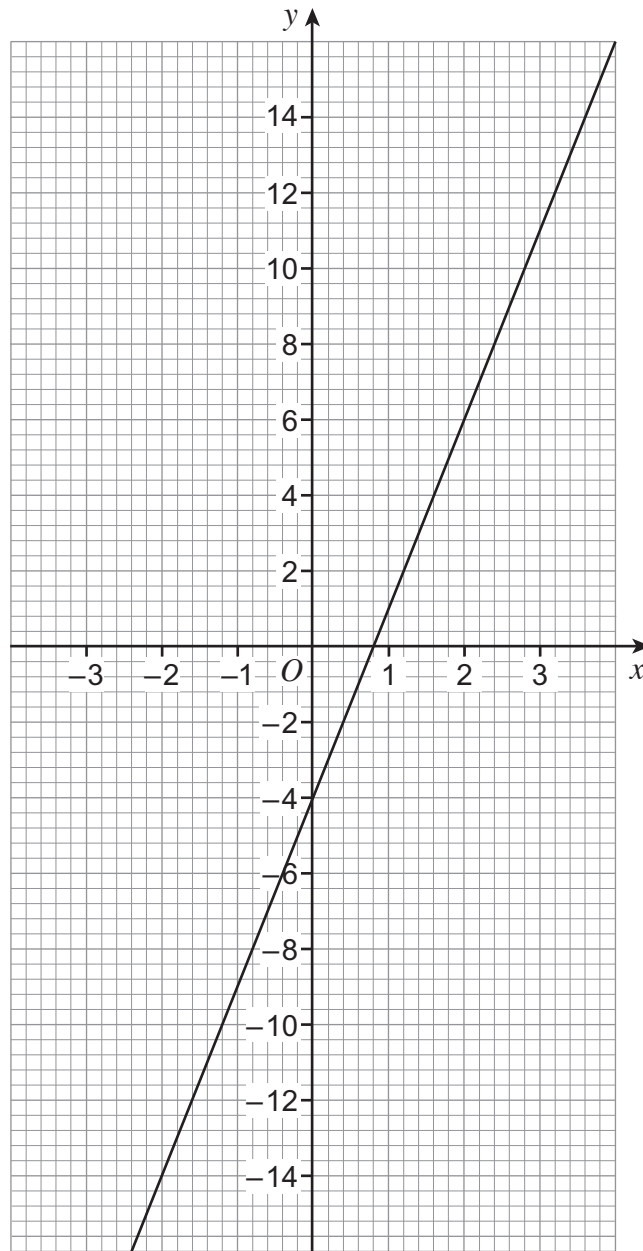
Work out the probability of landing on D.

[2 marks]

Answer _____



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 _____



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 |
|---|

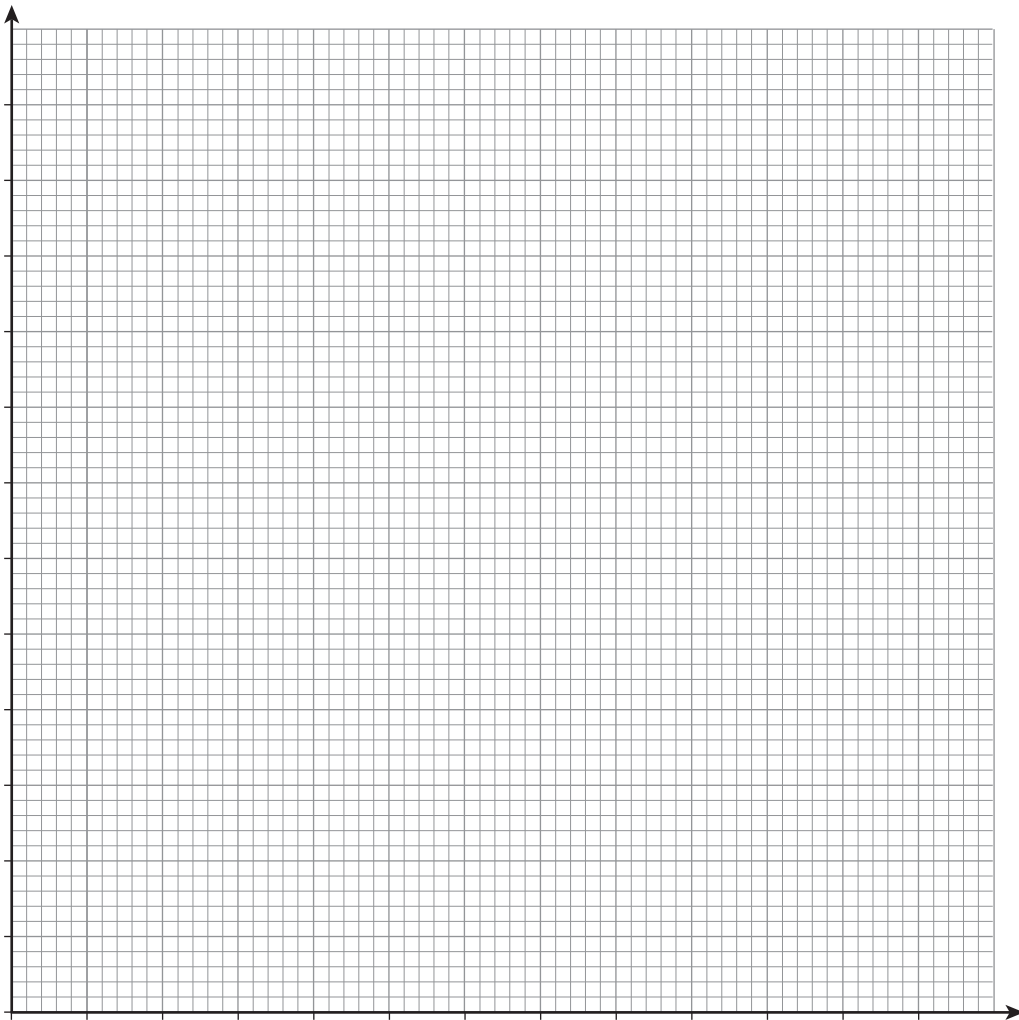
Turn over ►



5 Draw a diagram to show this data.

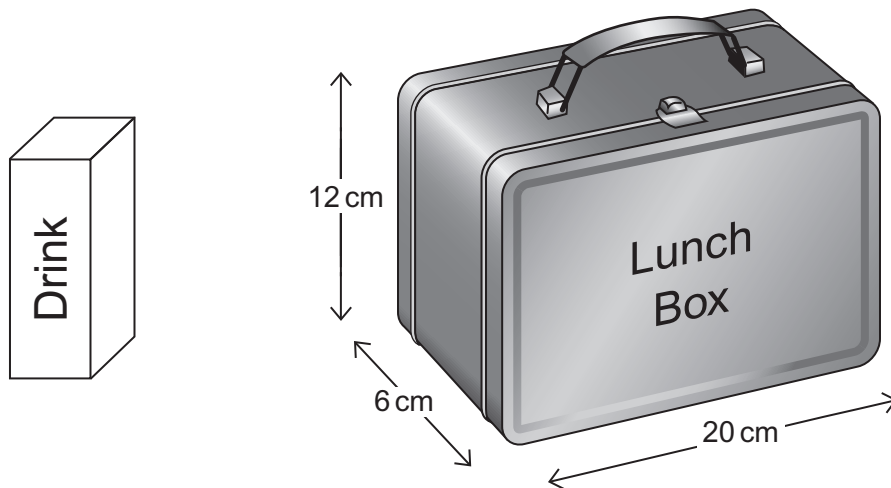
| Height, h , (cm) | Frequency |
|--------------------|-----------|
| $5 < h \leq 10$ | 4 |
| $10 < h \leq 15$ | 9 |
| $15 < h \leq 20$ | 12 |
| $20 < h \leq 25$ | 5 |

[3 marks]



*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?

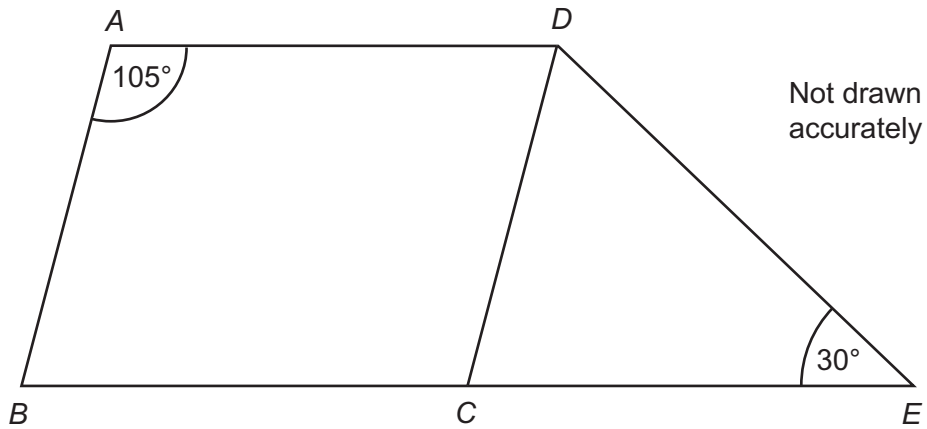
You **must** show your working.

[4 marks]



*7

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]



- 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.



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

[4 marks]

Answer _____ m²

Turn over for the next question



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

9 15 21 27 33 ...

Work out the n th term.

[2 marks]

Answer _____

10 Factorise $x^2 - 100$

[1 mark]

Answer _____



- 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



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

Do **not** use trial and improvement.

[4 marks]

$x =$ _____



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

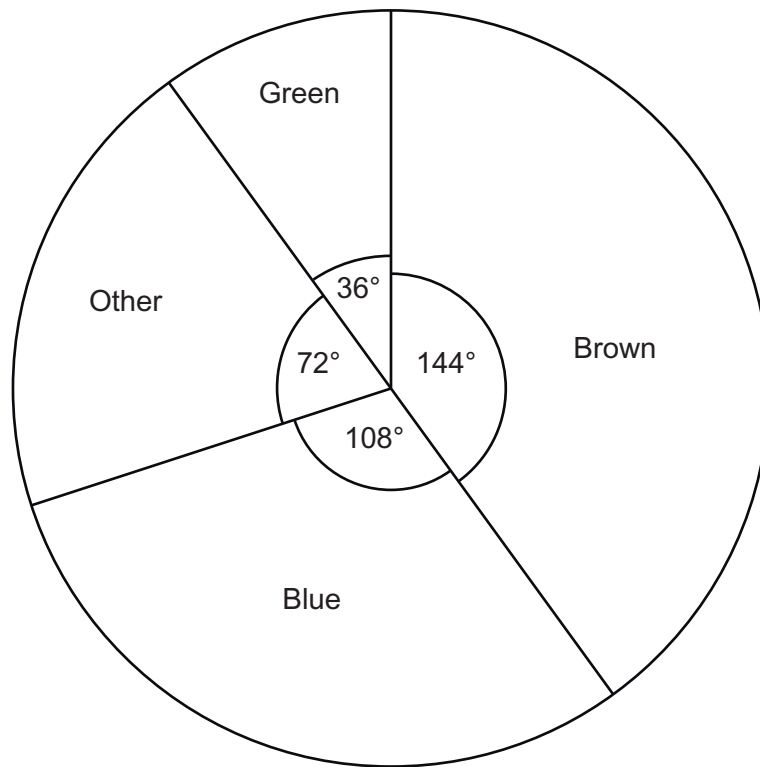
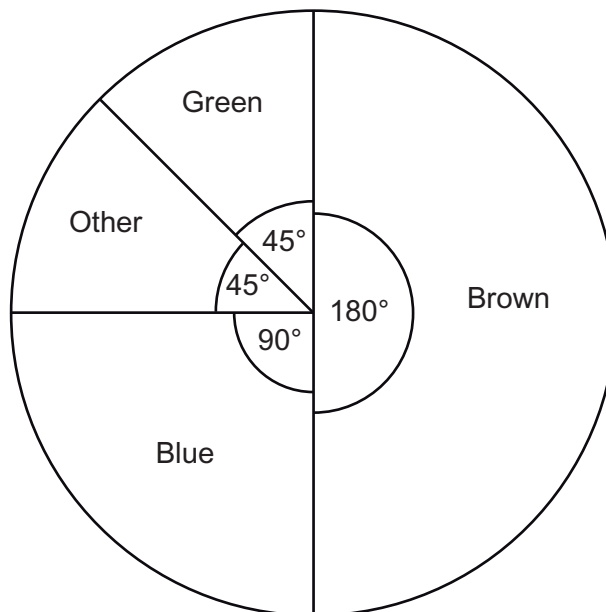
7

Turn over ►



14

The pie charts show the eye colour of some students.

Girls**Boys**

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 |
|---|

Turn over ►



- 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 | | | |



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

Answer _____

17 Show that $(\sqrt{3} + \sqrt{75})^2 = 108$ [2 marks]

Turn over for the next question

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| 7 |
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Turn over ►



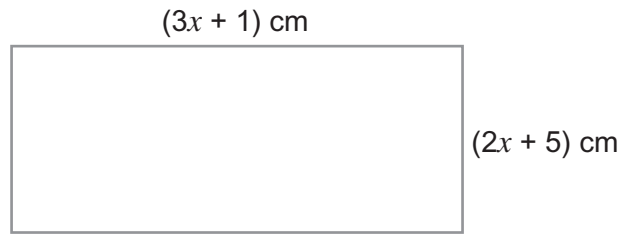
18 Show that $\frac{2}{x-3} + \frac{1}{x-1} = 1$

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

[3 marks]



- 19 The area of this rectangle is 8 cm^2



Not drawn
accurately

Work out the value of x .

[4 marks]

Answer _____

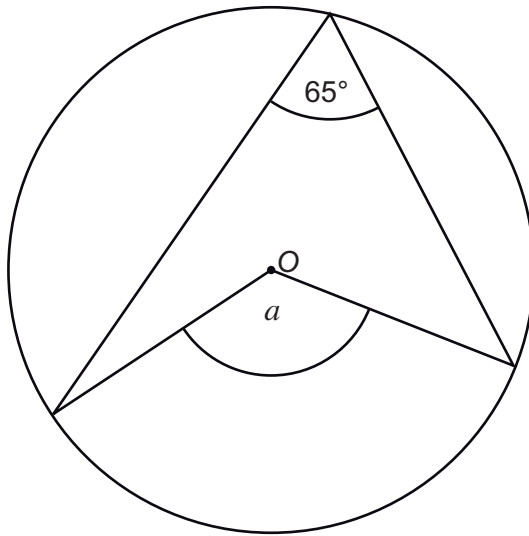
Turn over for the next question

7

Turn over ►



- 20 (a)** O is the centre of the circle.
Work out the size of angle a .



Not drawn
accurately

Circle your answer.

[1 mark]

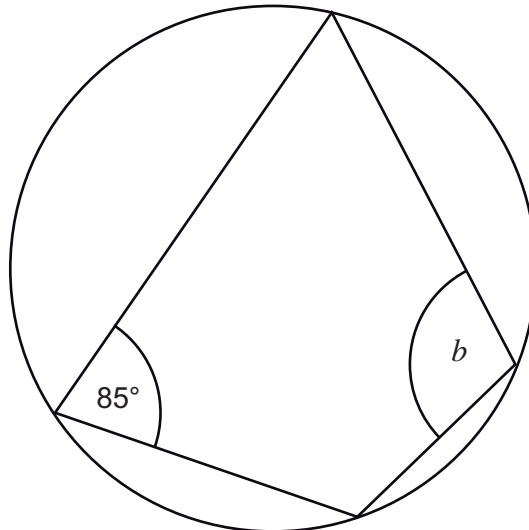
115°

130°

135°

295°

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



Not drawn
accurately

Circle your answer.

[1 mark]

85°

90°

95°

115°

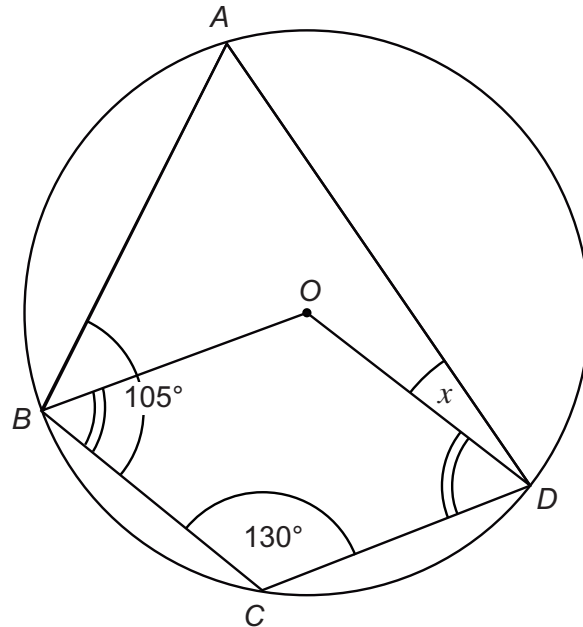


20 (c) $ABCD$ are points on the circumference of a circle centre O .

$$\text{Angle } BCD = 130^\circ$$

$$\text{Angle } ABC = 105^\circ$$

$$\text{Angle } OBC = \text{Angle } ODC$$



Not drawn
accurately

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

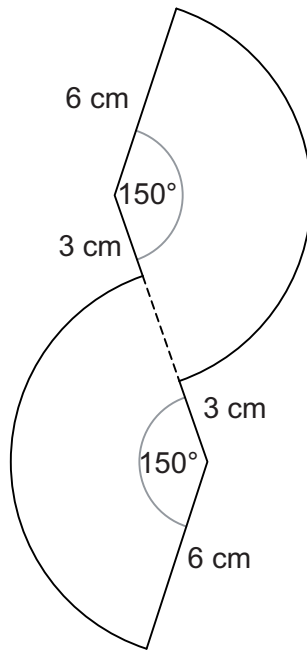
[4 marks]

Answer _____ degrees

Turn over ►



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



Not drawn
accurately

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

[4 marks]

Answer _____ cm

END OF QUESTIONS



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