A

AQA

Surname _____

Other Names _____

Centre Number _____

Candidate Number _____

Candidate Signature _____

GCSE

MATHEMATICS

H

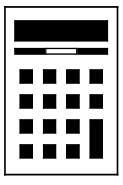
Higher Tier **Paper 3 Calculator**

8300/3H

Tuesday 11 June 2019 **Morning**

Time allowed: 1 hour 30 minutes

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



At the top of the page, write your surname and other names, your centre number, your candidate number and add your signature.

[Turn over]

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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 on blank pages.**
- **Do all rough work in this book. Cross through any work you do not want to be marked.**

INFORMATION

- **The marks for questions are shown in brackets.**
- **The maximum mark for this paper is 80.**
- **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.

DO NOT TURN OVER UNTIL TOLD TO DO SO

Answer ALL questions in the spaces provided

1 **Work out £1.50 as a fraction of 60p**

Circle your answer. [1 mark]

$\frac{2}{5}$ $\frac{1}{4}$ $\frac{4}{1}$ $\frac{5}{2}$

2 **For a biased dice, P(6) = $\frac{3}{5}$**

Circle the probability of two sixes when the dice is rolled twice. [1 mark]

$\frac{6}{25}$ $\frac{6}{10}$ $\frac{9}{25}$ $\frac{9}{5}$

3 **Circle the lowest common multiple (LCM) of 5, 15 and 25**

[1 mark]

5 **45** **75** **150**

4 **Circle the TWO roots of** $(x - 5)(x + 3) = 0$

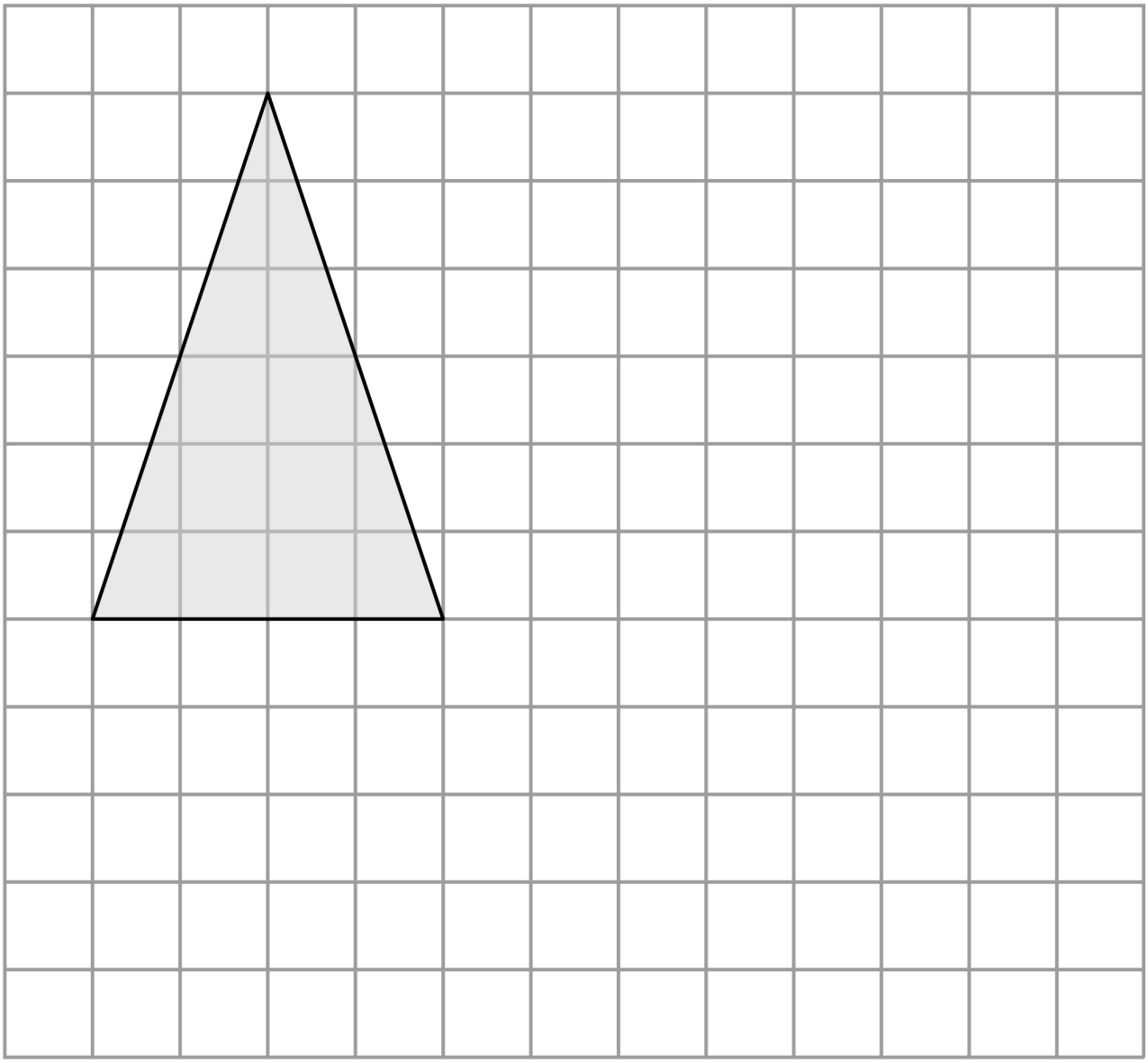
[1 mark]

–5 **–3** **3** **5**

[Turn over]

5 On the grid, draw an enlargement of the triangle with scale factor $\frac{1}{2}$

[2 marks]



6

6 **To the nearest pound, Jon has £9**

To the nearest 50p, Ellie has £6.50

Work out the maximum possible total amount of money. [3 marks]

Answer £ _____

7 **Two solids, J and K, have the same density.**

Complete the table.

Include units in your answers. [3 marks]

	J	K
Mass	48 g	78 g
Volume	8 cm^3	
Density		

8 Rearrange $y = 3x - 2$ to make x the subject.

Circle your answer. [1 mark]

$x = \frac{y}{3} - 2$ $\quad$ $x = \frac{y + 2}{3}$

$x = \frac{y - 2}{3}$ $\quad$ $x = \frac{y}{3} + 2$

7

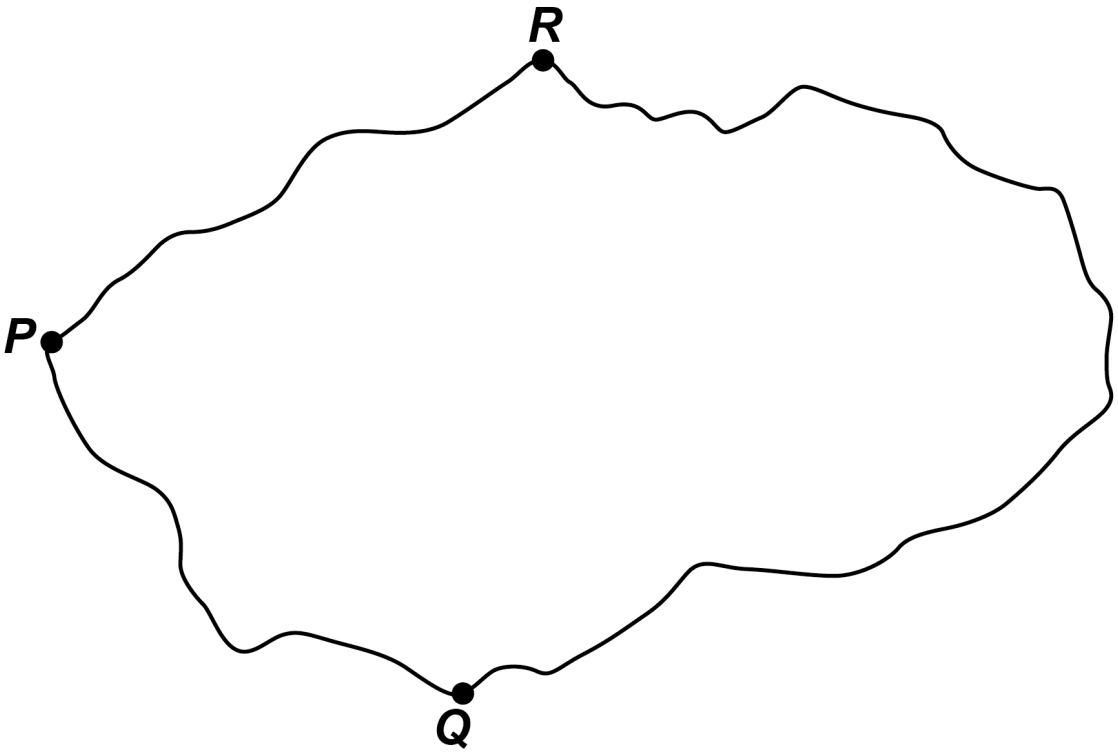
9 Towns *P*, *Q* and *R* are connected by roads *PQ*, *PR* and *QR*.

PR is 10 km longer than *PQ*.

QR is twice as long as *PR*.

The total length of the three roads is 170 km

The diagram is not drawn accurately.



Work out the length of *PQ*. [4 marks]

Answer _____ **km**

[Turn over]

10 **Mia wants to borrow £6000 and repay it, with interest, after two years.**

She sees two offers for loans.

OFFER 1
Compound interest
3% per year

OFFER 2
Compound interest
First year 1%
Second year 5%

Mia says,
"I will pay back the same amount because the average of 1% and 5% is 3%"

Is she correct?

You MUST show your working. [3 marks]

7

[Turn over]

11 **Here are two sets of numbers, A and B.**

Set A

200	160
104	100

Set B

270	400	483
300	x	

mean of Set A : mean of Set B = 3 : 8

Work out the value of x. [4 marks]

Answer _____

[Turn over]

12 A straight line
has gradient 4
and
passes through the point (5, 23)

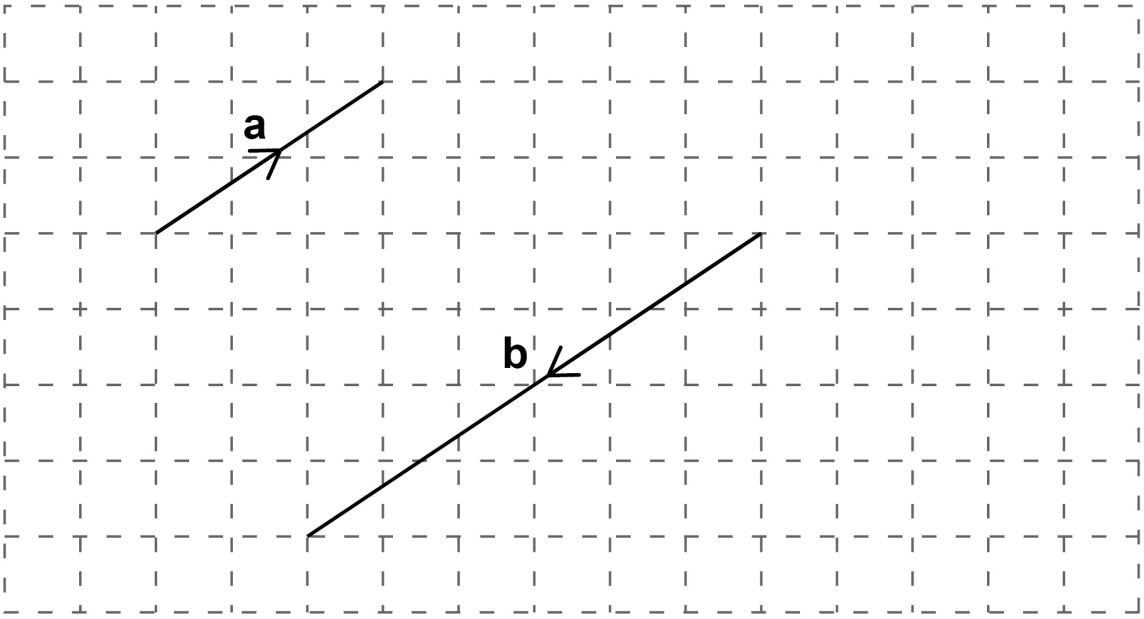
Work out the equation of the line.

Give your answer in the form $y = mx + c$
[3 marks]

Answer _____

7

13 (a) Vectors a and b are drawn on a grid.

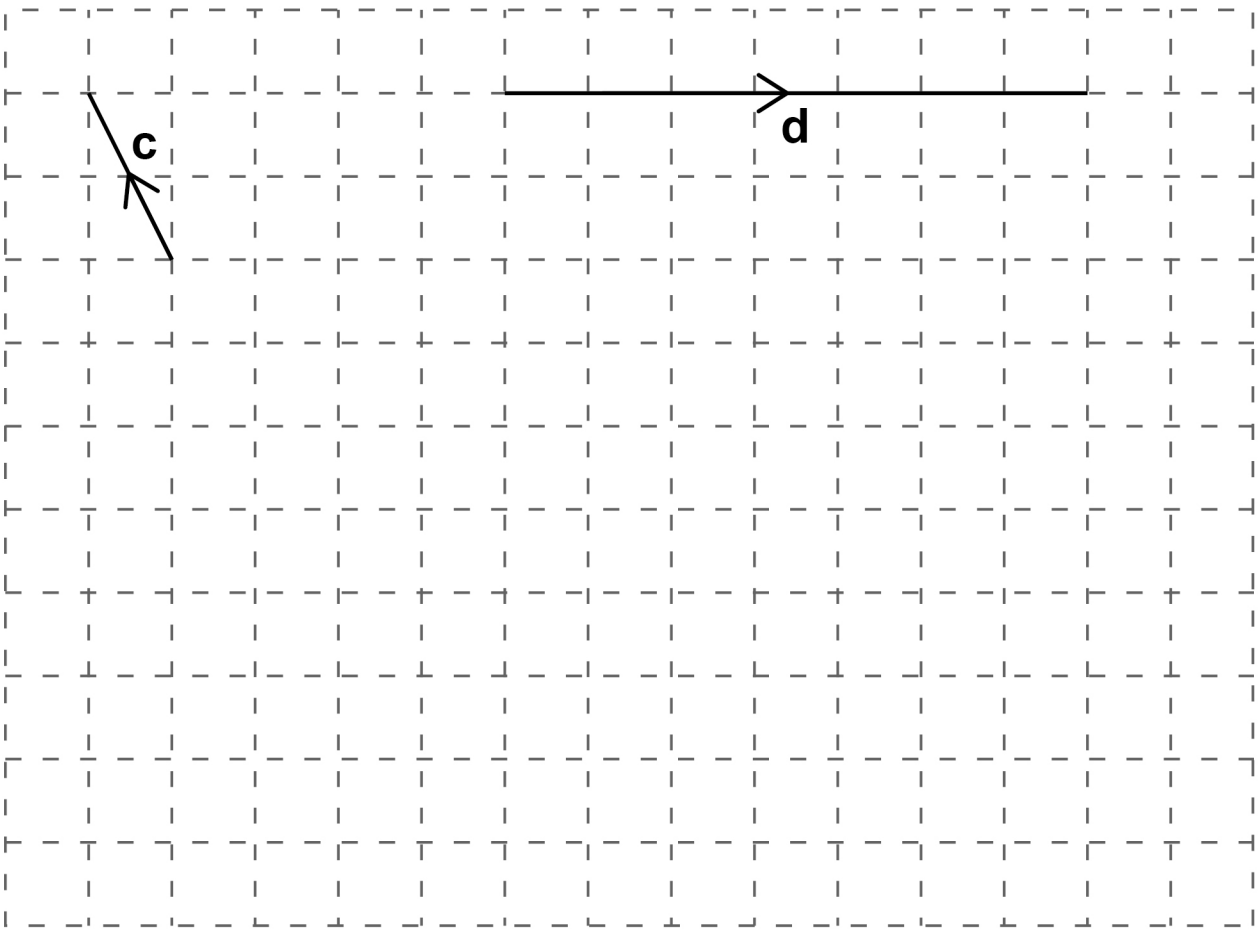


Write b in terms of a. [1 mark]

b = _____

[Turn over]

13 (b) Vectors c and d are drawn on a grid.



On the grid above, draw a vector representing c – d

[2 marks]

3

14 For Class X,
number of boys : number of girls = 7 : 8

For Class Y,
number of boys : number of girls = 3 : 4

Which statement MUST be true?

Tick ONE box. [1 mark]

- ☐ Class X has more boys than class Y
- ☐ Class X has twice as many girls as class Y
- ☐ Class X has a greater proportion of boys than class Y
- ☐ Class X has the same proportion of boys as class Y

[Turn over]

15 Simplify fully $\frac{a^3b^2}{cd} \times \frac{c}{ab^5}$

[3 marks]

Answer _____

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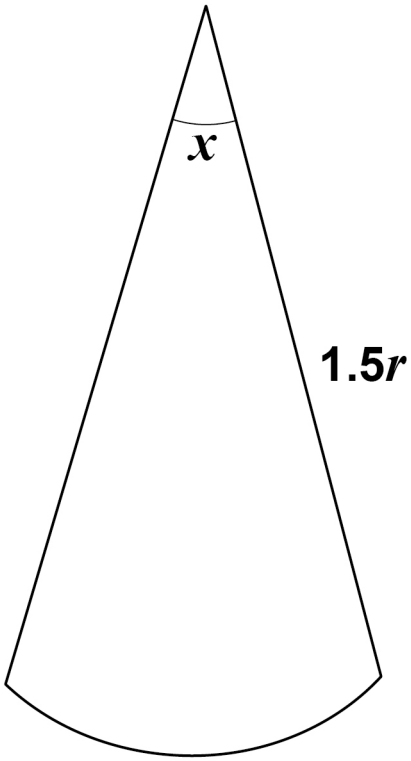
[Turn over]

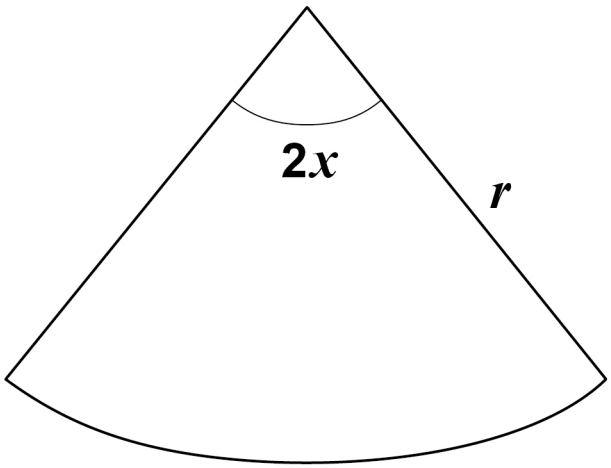
16 Here are two sectors from different circles.

The sectors are not drawn accurately.

SECTOR A



SECTOR B



Which sector has the bigger area?

Tick a box.

☐ **Sector A**

☐ **Sector B**

Show working to support your answer. [2 marks]

17 A factory makes kettles.

Four samples of kettles are tested for faults.

Each sample has size 200

Here are the relative frequencies of faulty kettles in the samples.

Sample	P	Q	R	S
Relative frequency	0.03	0.035	0.015	0.01

Work out the range of the number of faulty kettles in the four samples. [3 marks]

Answer _____

18 (a) Write $x(3x - 9) = 4$ in the form $ax^2 + bx + c = 0$ where a, b and c are integers. [1 mark]

Answer _____

[Turn over]

18 (b) Solve $x(3x - 9) = 4$

Give your answers to 2 decimal places.
[2 marks]

Answer _____

6

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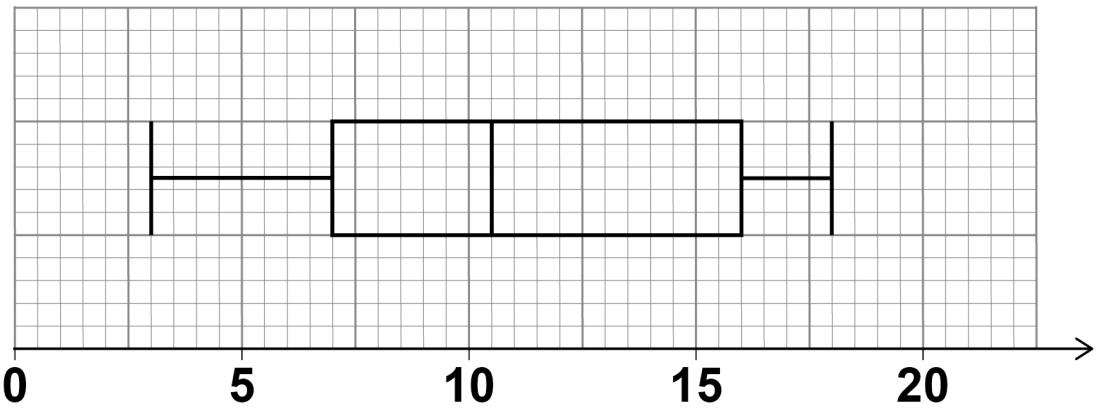
[Turn over]

19 Here is some information about the times people took to complete a survey.

Fastest time	3 minutes
Slowest time	18 minutes
Median	11 minutes
Lower quartile	7 minutes
Interquartile range	8 minutes

Ben draws this box plot to show the information.

Time to complete a survey



Make TWO criticisms of his box plot. [2 marks]

Criticism 1 _____

_____

_____

_____

_____

Criticism 2 _____

_____

_____

_____

_____

[Turn over]

20 d **is directly proportional to the square of** v**.**

$d = 6$ **when** $v = 20$

20 (a) Work out an equation connecting d **and** v**.**
[3 marks]

Answer _____

20 (b) **Work out the value of d when $v = 30$**

[2 marks]

Answer _____

7

21 **Hanif makes green paint by mixing blue paint and yellow paint in the ratio**

blue : yellow = 7 : 3

He buys blue paint in 50-litre containers, each costing £225

He buys yellow paint in 20-litre containers, each costing £80

He wants to

sell the green paint in 5-litre tins

make 40% profit on each tin.

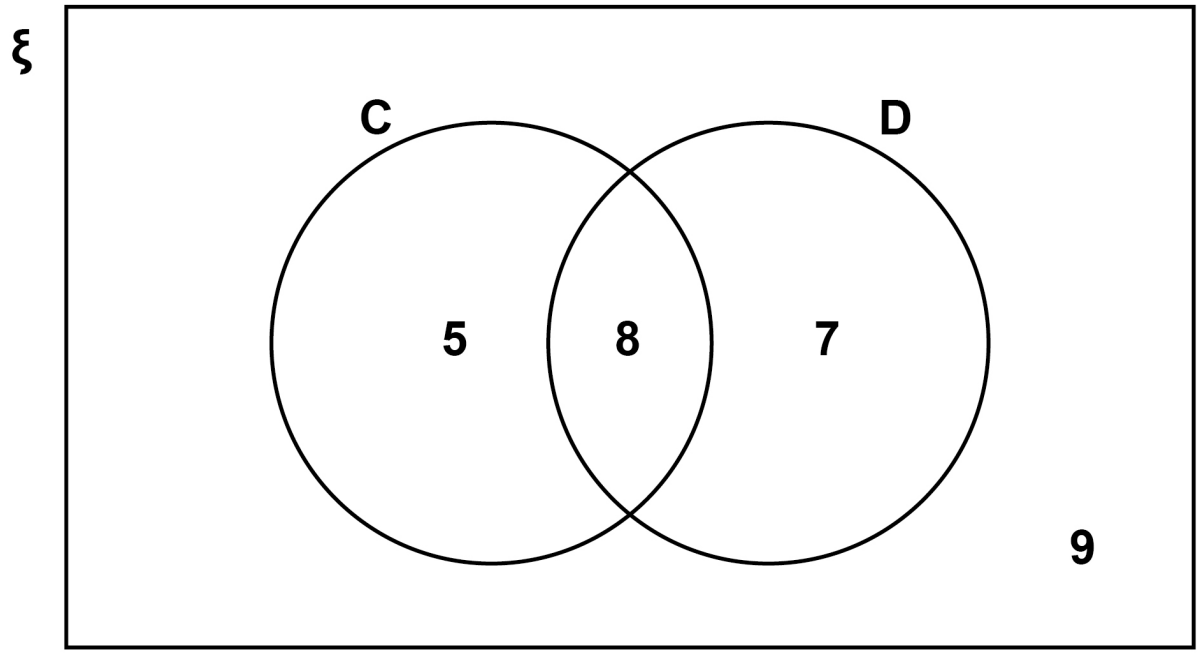
How much should he sell each tin for?
[5 marks]

Answer £ _____

22 ξ = 29 students in a class

C = students who own a cat

D = students who own a dog



22 (a) A student is chosen at random.

Circle the probability that the student owns a cat or a dog but not both. [1 mark]

$\frac{12}{29}$ $\frac{13}{29}$ $\frac{15}{29}$ $\frac{20}{29}$

22 (b) A student who owns a dog is chosen at random.

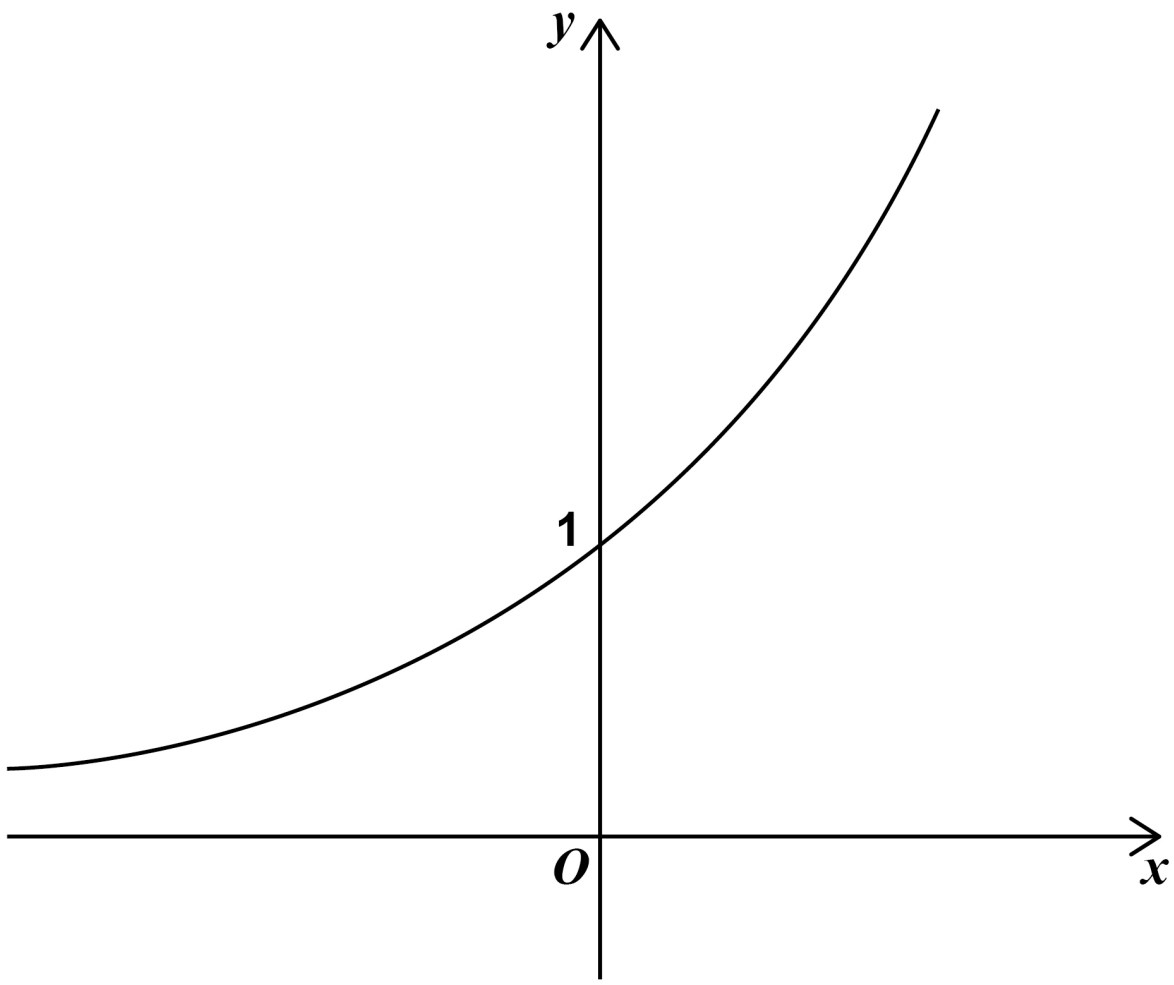
Circle the probability that the student also owns a cat. [1 mark]

$\frac{7}{15}$ $\frac{8}{15}$ $\frac{7}{29}$ $\frac{8}{29}$

7

[Turn over]

23 Here is a sketch of the curve $y = 2^x$



On the axes above, sketch the curve $y = 3^x$

[2 marks]

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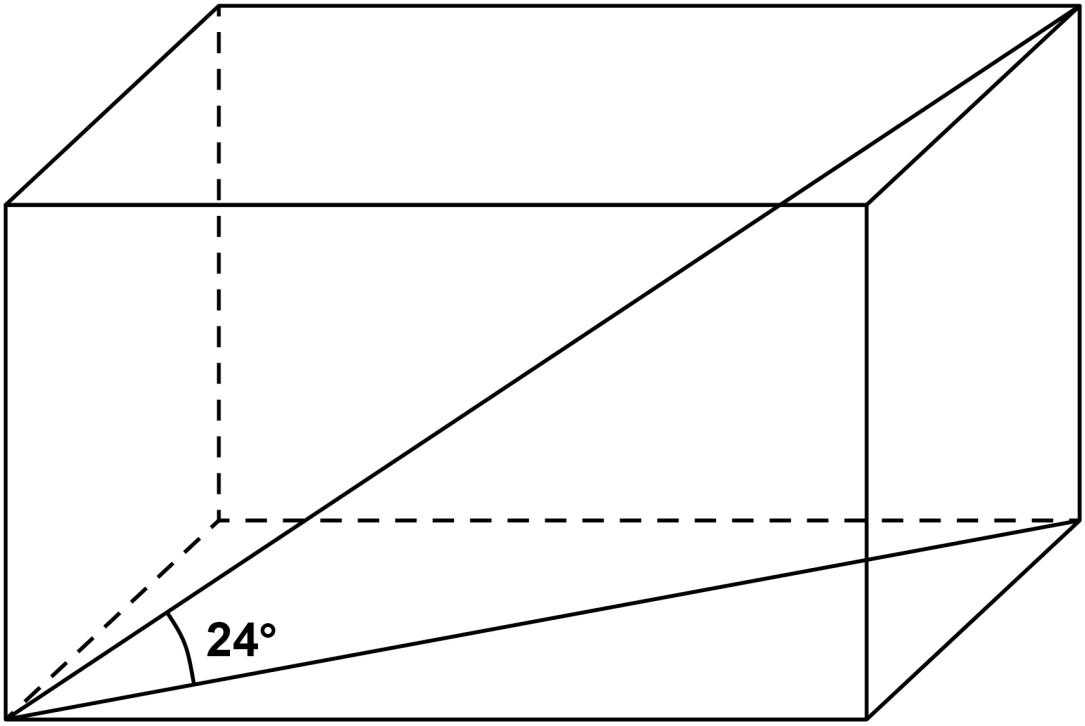
[Turn over]

24 **The length of a diagonal of a cuboid is 20 cm**

The diagonal makes an angle of 24° with the base.

The area of the base is 150 cm^2



Work out the volume of the cuboid. [3 marks]

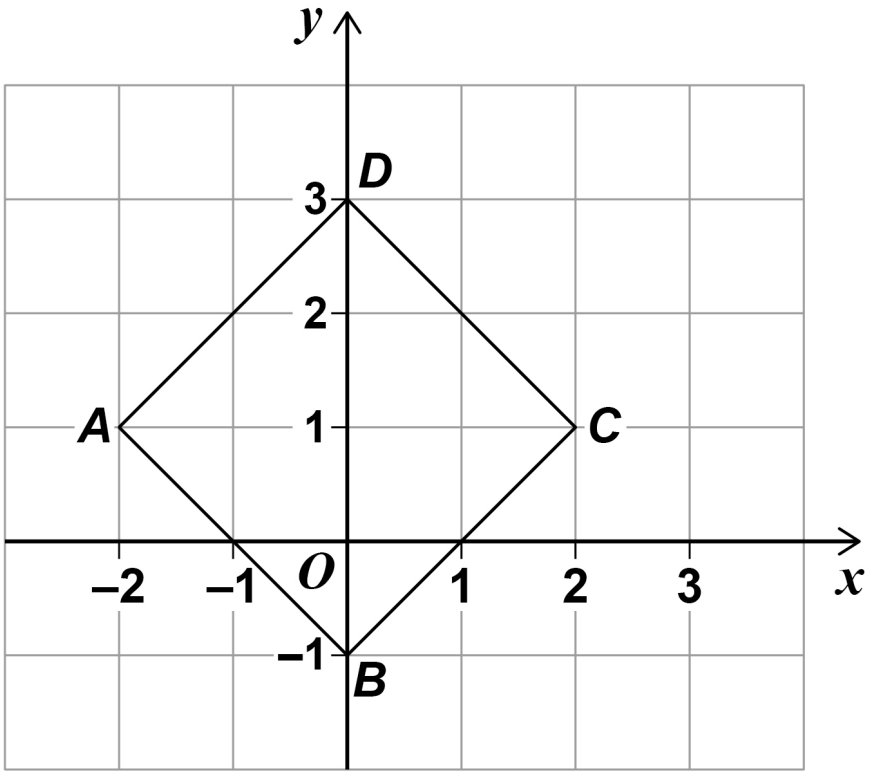
Answer _____ cm^3

5

[Turn over]

25 ***ABCD*** **is a square.**

A **is (–2, 1)** ***B*** **is (0, –1)** ***C*** **is (2, 1)** ***D*** **is (0, 3)**



25 (a) A SINGLE transformation of ***ABCD*** **is such that**

B **is mapped to** ***D***

D **is mapped to** ***B***

A **and** ***C*** **are invariant points.**

Describe fully the transformation. [2 marks]

25 (b) **A different SINGLE transformation of *ABCD* is such that**

B* is mapped to *D

D* is mapped to *B

the only invariant point is (0, 1)

Describe fully the transformation. [3 marks]

26 $g(x) = 16 - x$ $h(x) = x^3$

Solve $gh(x) = 24$

[3 marks]

$x =$ _____

8

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[Turn over]

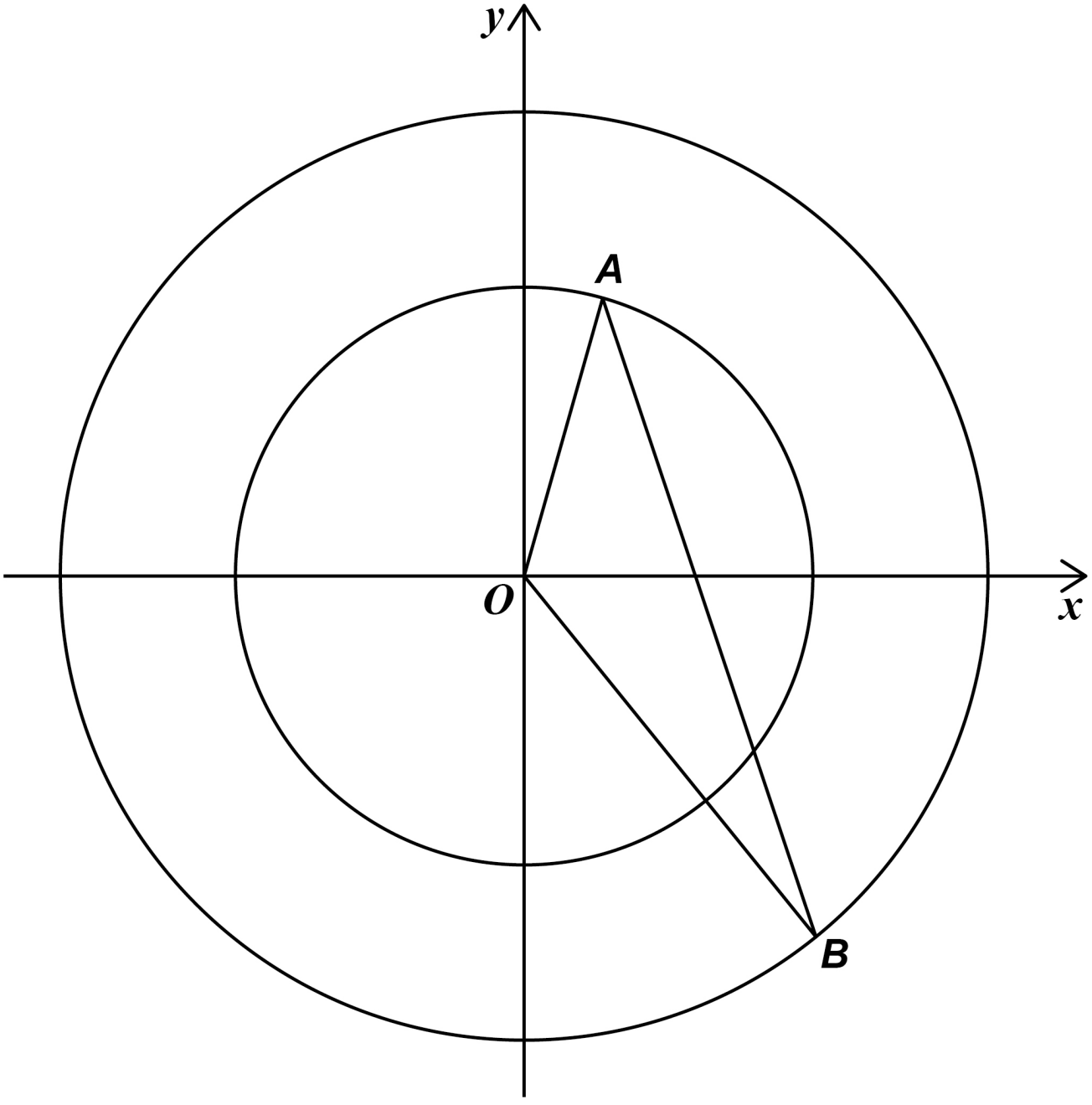
27 **In this question, all lengths are in centimetres.**

***A* is a point on a circle, centre *O*.**

***B* is a point on a different circle, centre *O*.**

***AB* = 20**

The diagram is not drawn accurately.



The equation of the larger circle is $x^2 + y^2 = 144$

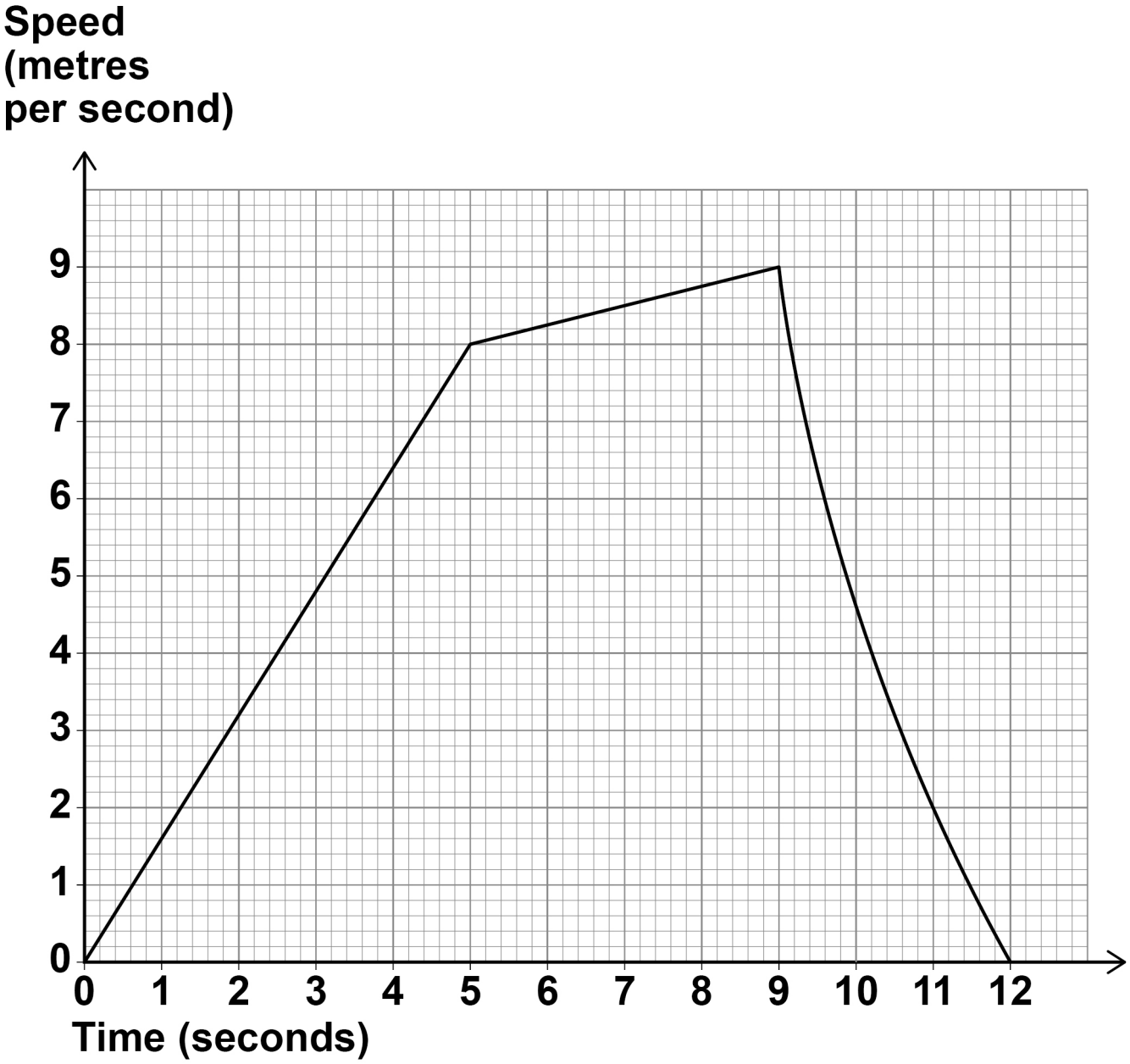
radius of smaller circle : radius of larger circle = 4 : 5

Work out the size of angle *AOB*. [5 marks]

Answer _____ degrees

28 Leo runs for 12 seconds.

The graph shows his speed.



28 (a) Show that the distance he runs is less than 67.5 metres. [4 marks]

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28 (b) Work out his average acceleration for the first 9 seconds.

State the units of your answer. [2 marks]

Answer _____

6

END OF QUESTIONS

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For Examiner's Use	
Pages	Mark
4–6	
7–9	
10–13	
14–16	
17–18	
19–23	
24–26	
28–31	
32–35	
36–39	
40–42	
44–45	
46–49	
TOTAL	