

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

Past Paper
Website
Home



H

Higher Tier

Paper 3 Calculator

Tuesday 11 June 2019

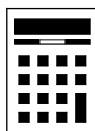
Morning

Time allowed: 1 hour 30 minutes

Materials

For this paper you must have:

- a calculator
- mathematical instruments.



Instructions

- Use black ink or black ball-point pen. Draw diagrams in pencil.
- Fill in the boxes at the top of this page.
- 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. 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.

For Examiner's Use	
Pages	Mark
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	
TOTAL	

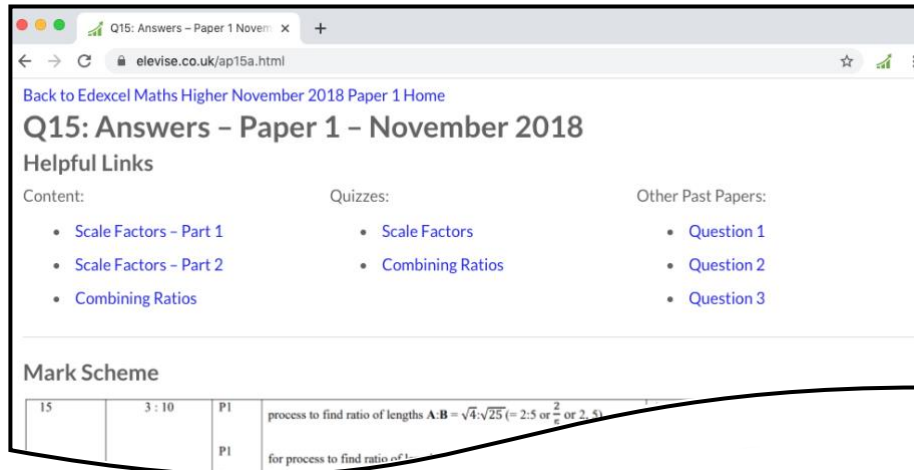
Advice

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



How the Past Papers work

Every past paper question has a corresponding webpage that has the mark scheme and worked solutions for that particular question. There are also helpful links to content for the concepts used to answer the question, quizzes that you can use to try some of the concepts and similar past paper questions. An example of a webpage for a question is given below:



Q15: Answers - Paper 1 - November 2018

Helpful Links

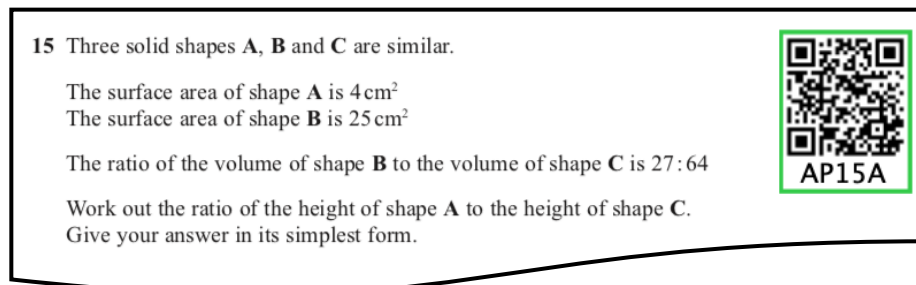
Content:	Quizzes:	Other Past Papers:
<ul style="list-style-type: none">Scale Factors - Part 1Scale Factors - Part 2Combining Ratios	<ul style="list-style-type: none">Scale FactorsCombining Ratios	<ul style="list-style-type: none">Question 1Question 2Question 3

Mark Scheme

Q	Content	Mark	Process
15	3 : 10	P1	process to find ratio of lengths A:B = $\sqrt{4 \cdot \sqrt{25}} = 2.5$ or $\frac{2}{5}$
		P1	for process to find ratio of 1

How to get to the webpage

Every past paper question has a QR code next to it, such as:




15 Three solid shapes A, B and C are similar.

The surface area of shape A is 4 cm^2
The surface area of shape B is 25 cm^2

The ratio of the volume of shape B to the volume of shape C is 27 : 64

Work out the ratio of the height of shape A to the height of shape C.
Give your answer in its simplest form.



AP15A

You can get to the corresponding webpage in 3 different ways:

- 1) Scanning the QR code with the camera on a smart phone or tablet.
- 2) Typing the code that is underneath the QR code at the end of www.elewise.co.uk/. For this question, the code is AP15A, so you would type www.elewise.co.uk/AP15A into the address bar to obtain the webpage. If you would like to see the question rather than the answers, you change the A at the end of the code to a Q; you would type www.elewise.co.uk/AP15Q
- 3) Clicking on the QR code if you are viewing the past paper as a PDF or on a web browser.

www.elewise.co.uk



Answer **all** questions in the spaces provided

Do not write
outside the
box

- 1 Work out £1.50 as a fraction of 60p
Circle your answer.

$$\frac{2}{5}$$

$$\frac{1}{4}$$

$$\frac{4}{1}$$

$$\frac{5}{2}$$

[1 mark]



- 2 For a biased dice, $P(6) = \frac{3}{5}$
Circle the probability of two sixes when the dice is rolled twice.

$$\frac{6}{25}$$

$$\frac{6}{10}$$

$$\frac{9}{25}$$

$$\frac{9}{5}$$

[1 mark]



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

5

45

75

150

[1 mark]



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

-5

-3

3

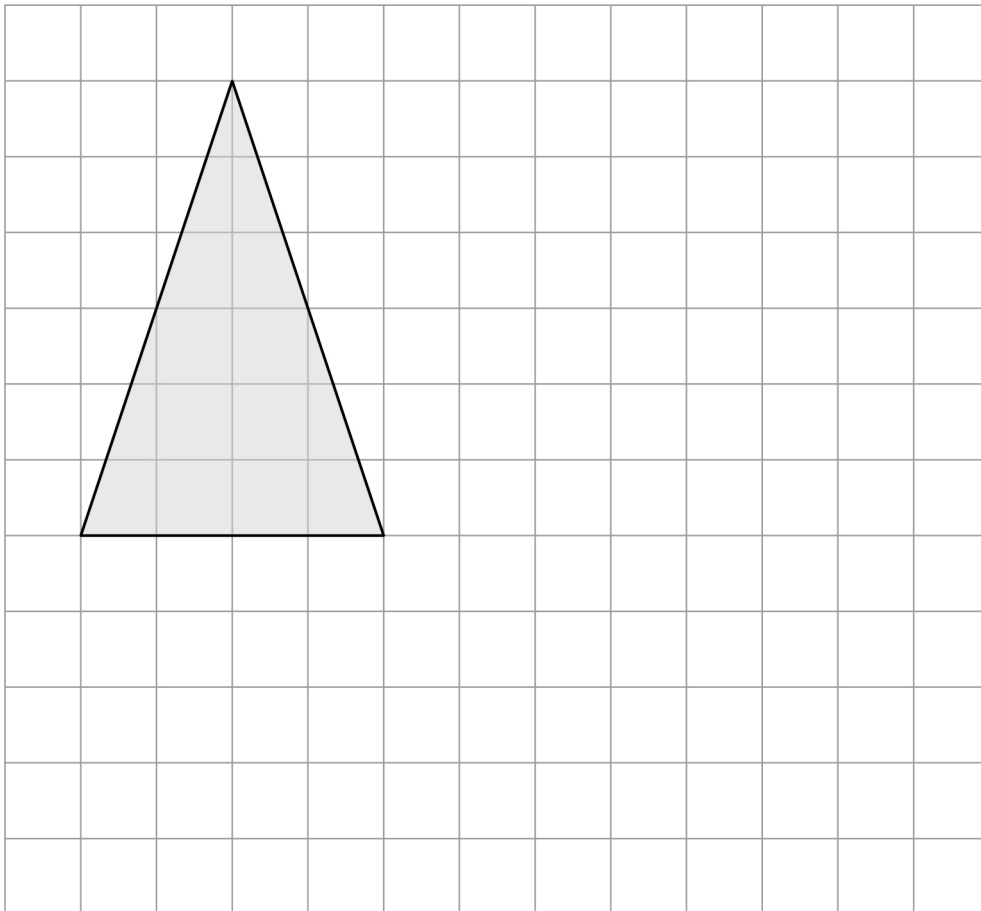
5

[1 mark]



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

[2 marks]



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]



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

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

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

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





Do not write
outside the
box

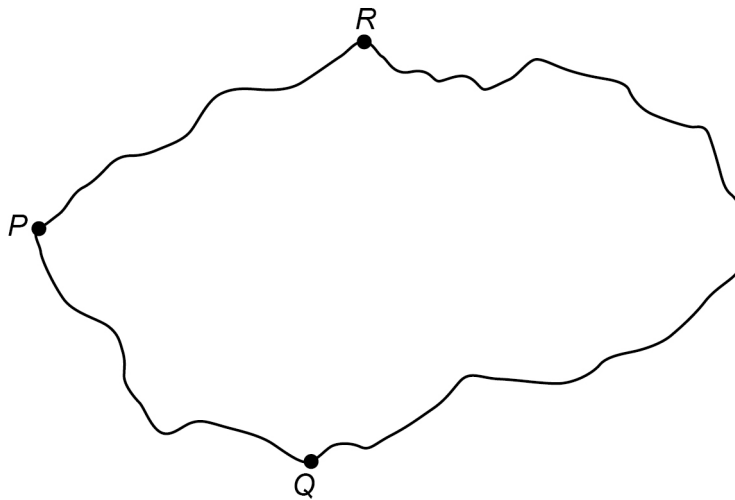
9

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



Not drawn
accurately

Work out the length of PQ .

[4 marks]

Answer _____ km



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]



Turn over for the next question

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 _____



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]**

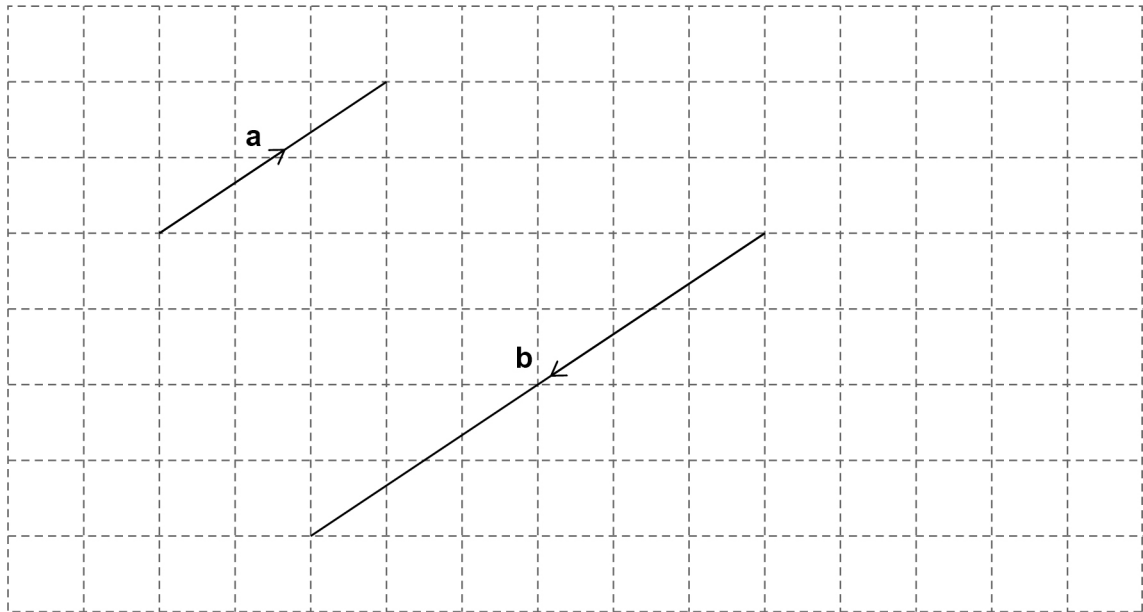
Answer _____

Turn over for the next question

7

Turn over ►

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



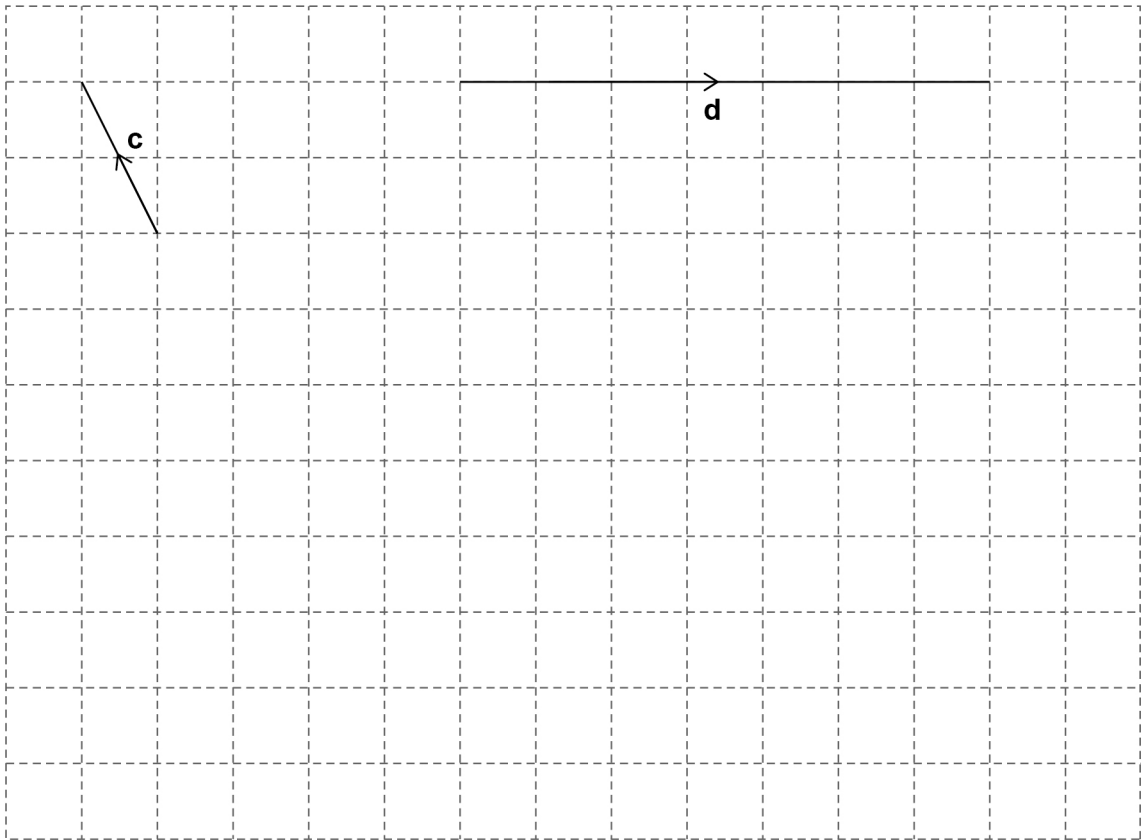
Write **b** in terms of **a**.

[1 mark]

b = _____



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



On the grid above, draw a vector representing $\mathbf{c} - \mathbf{d}$

[2 marks]

Turn over for the next question



- 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

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

[3 marks]

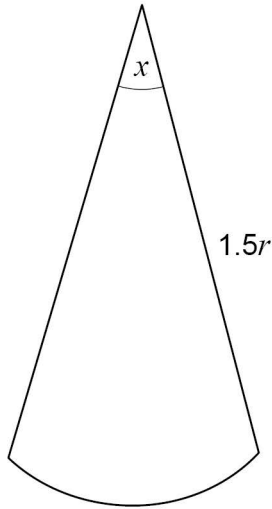


Answer _____



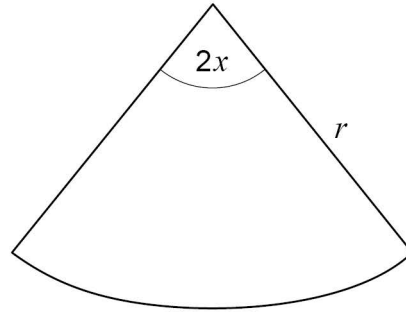
16 Here are two sectors from different circles.

Sector A



Sector B

Not drawn accurately



Which sector has the bigger area?

Tick a box.

Sector A

Sector B



[2 marks]

Show working to support your answer.

6

Turn over ►



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 _____

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

Give your answers to 2 decimal places.

[2 marks]

Answer _____

Turn over for the next question



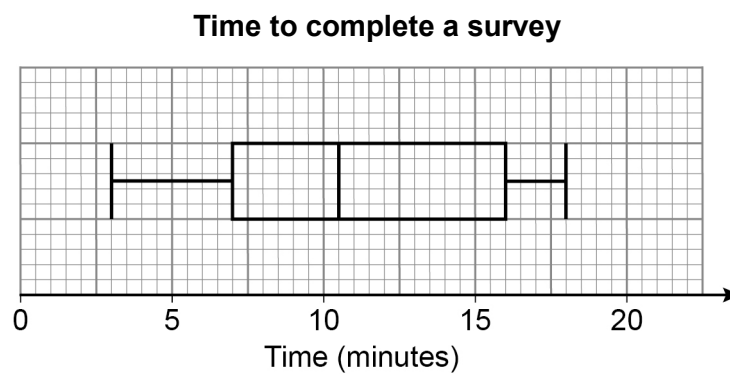
19

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.



Make **two** criticisms of his box plot.

[2 marks]

Criticism 1 _____

Criticism 2 _____



20 d is directly proportional to the square of v .

$$d = 6 \text{ when } v = 20$$



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 _____

Turn over for the next question

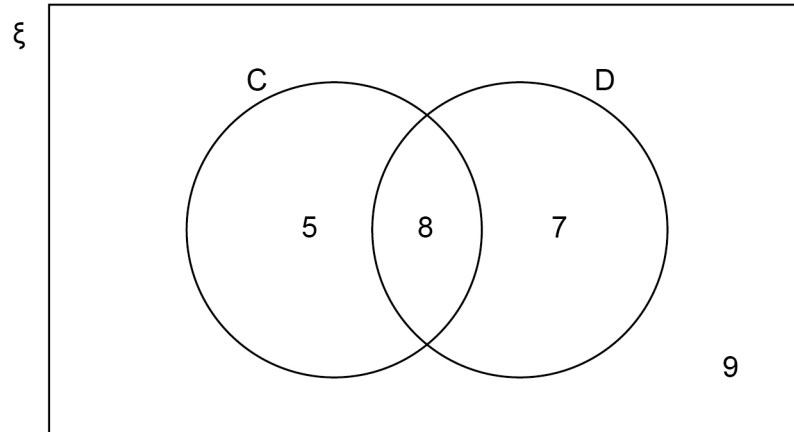


22

 $\xi = 29$ 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]

$\frac{7}{15}$

$\frac{8}{15}$

$\frac{7}{29}$

$\frac{8}{29}$

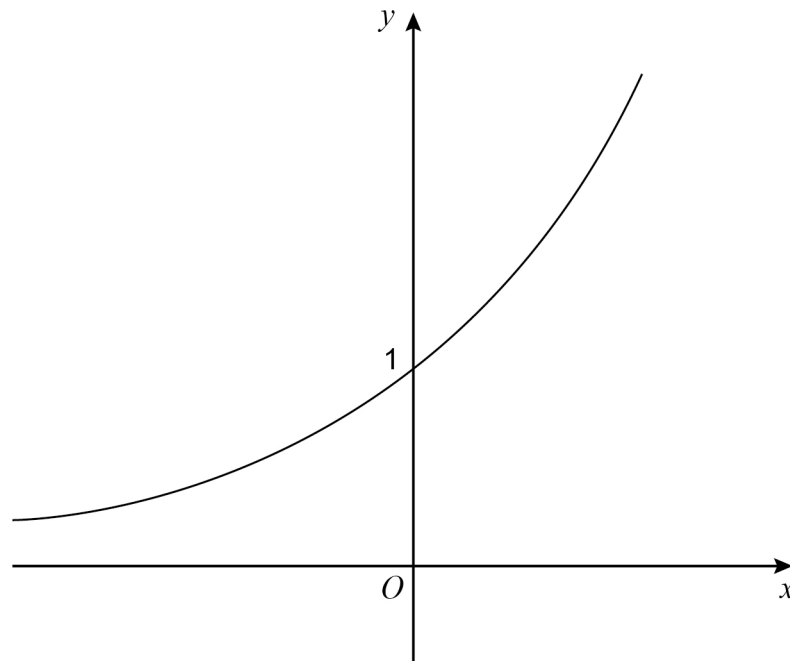


23

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



Do not write
outside the
box



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

[2 marks]

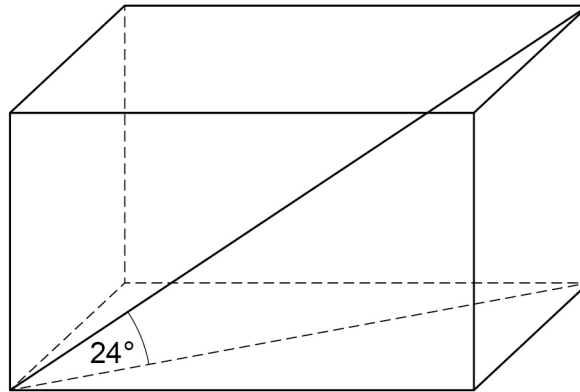


24

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



Do not write
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Work out the volume of the cuboid.

[3 marks]

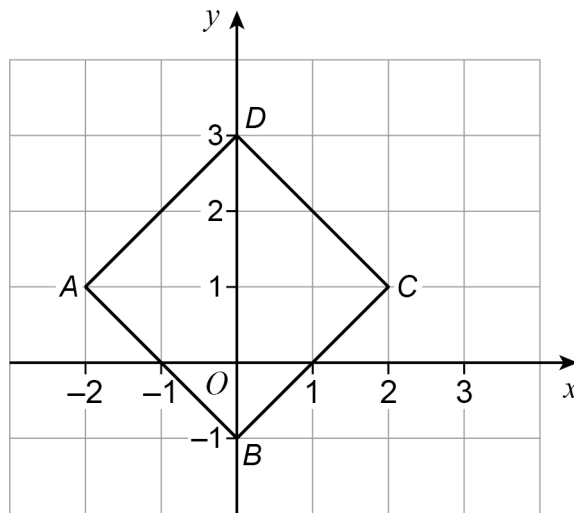
Answer _____ cm^3

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]



$x =$ _____

Turn over for the next question



27

In this question, all lengths are in centimetres.

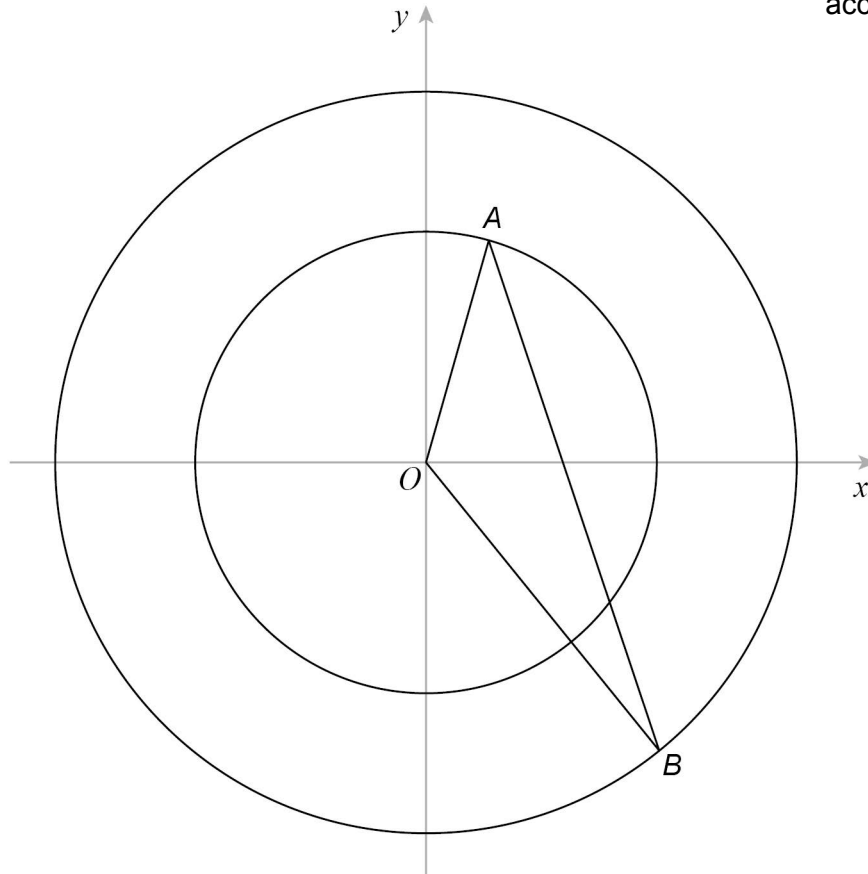
A is a point on a circle, centre O .

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

$AB = 20$



Not drawn
accurately



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

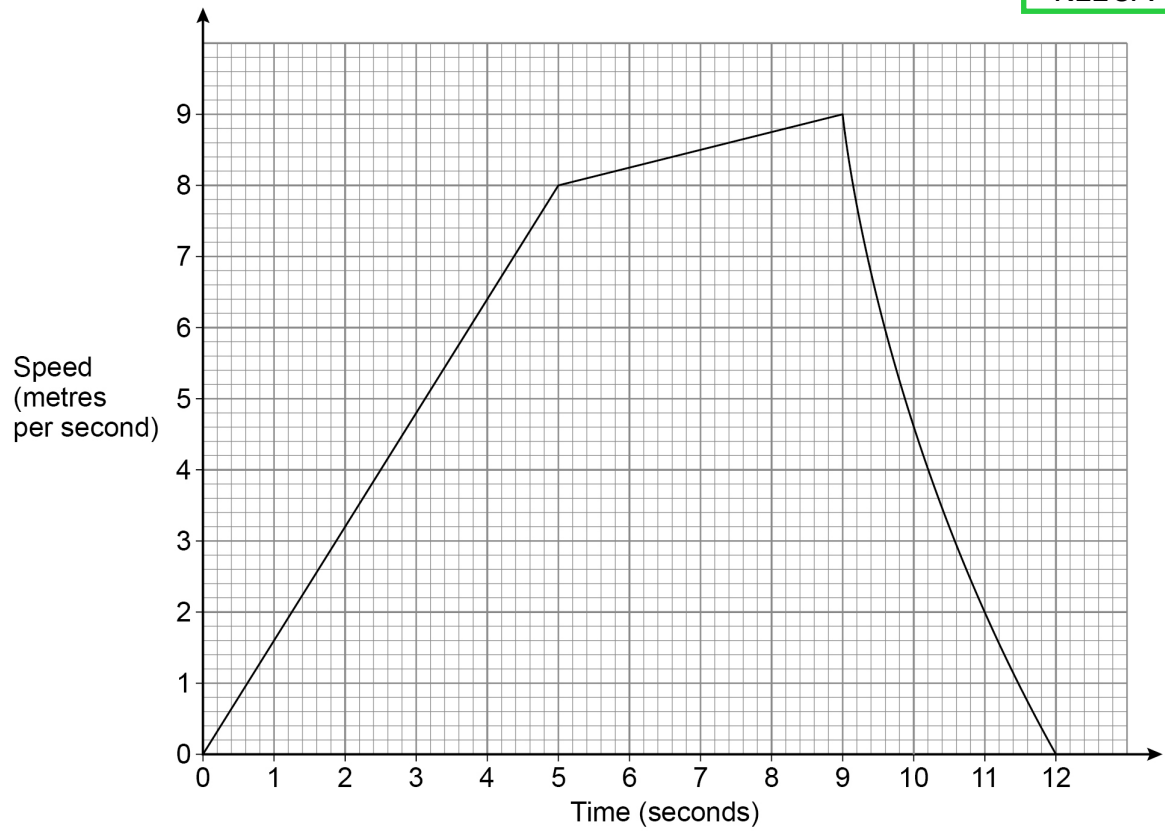
radius of smaller circle : radius of larger circle = 4 : 5



28

Leo runs for 12 seconds.

The graph shows his speed.

Do not write
outside the
box

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

[4 marks]



- 28 (b)** Work out his average acceleration for the first 9 seconds.
State the units of your answer.

[2 marks]

Answer _____

END OF QUESTIONS

