AQA

Surname _____

Forename(s) _____

Candidate signature _____

I declare this is my own work.

GCSE MATHEMATICS

H

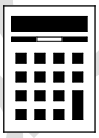
Higher Tier Paper 2 Calculator

Shadow paper based on 2020 question paper

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.
- If you need extra space for your answer(s), use the lined pages at the end of this book. Write the question number against your answer(s).
- 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.

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	
28–29	
TOTAL	

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

Do not write outside the box

1 Which of these is a correct identity?

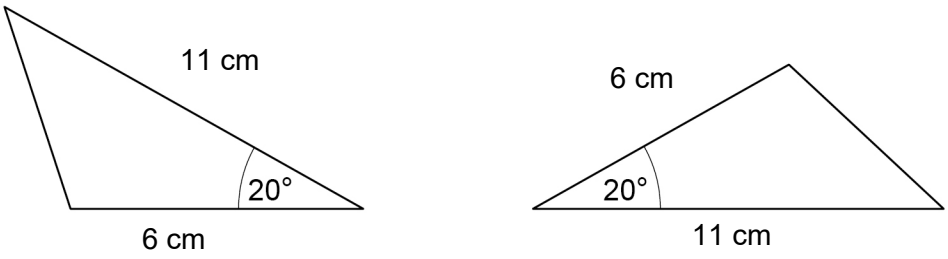
Circle your answer.

[1 mark]

$6x \equiv 18$ $3x - 2 \equiv 7$ $2x + 4x \equiv 6x$ $8x + 2 \equiv x$

2

Not drawn accurately



Circle the reason why these triangles are congruent.

[1 mark]

RHS ASA SSS SAS

Do not write outside the box

3 Circle the number that is written in standard form.

[1 mark]

0.8×10^{-4} $6 \times 10^{0.7}$ 9.2×10^{-9} 22×10^{5}

4 Circle the expression that has the **largest** value when $a < -3$

[1 mark]

$\frac{1}{3}a$ a^2 a^3 a^4

Turn over for the next question

4

Do not write outside the box

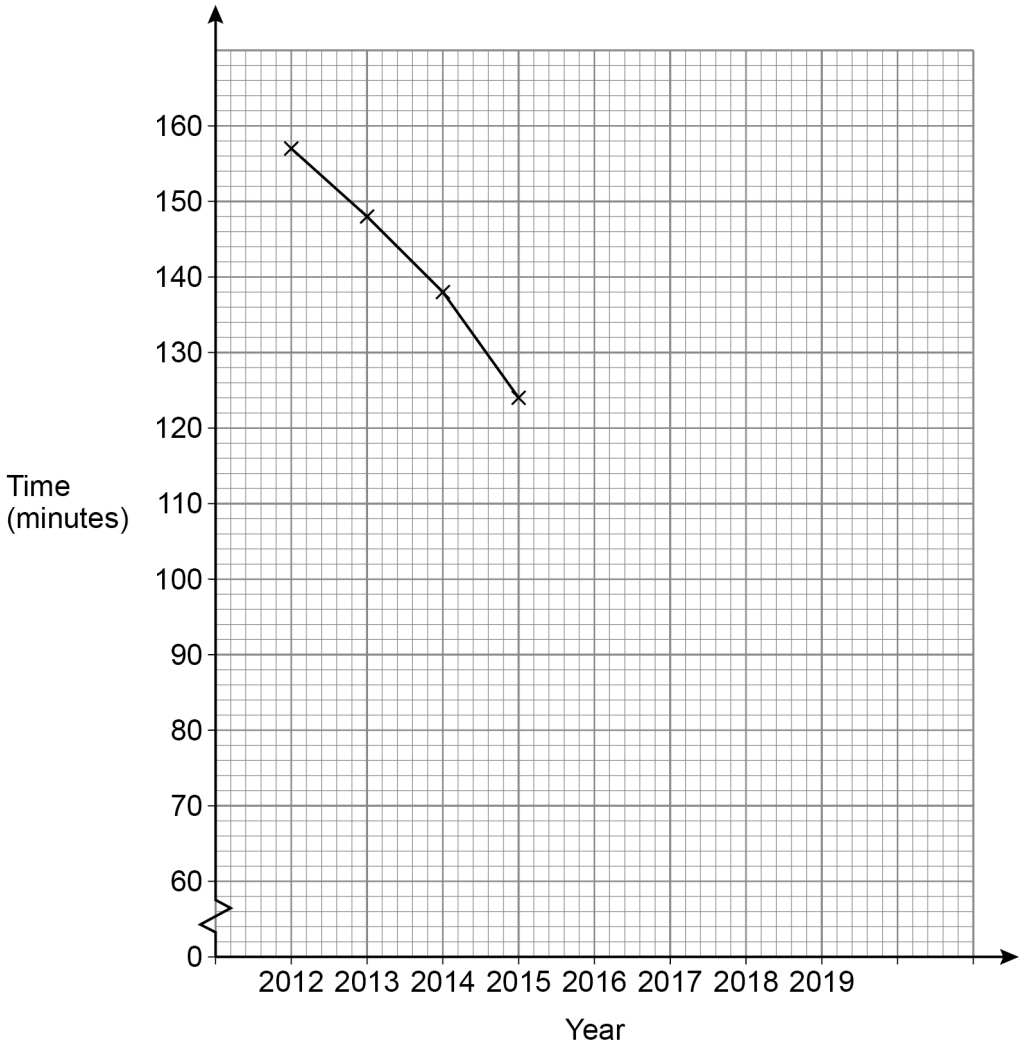
5 The time students spent watching TV was recorded.

The table shows the average daily time per student each year from 2012 to 2019

Year	2012	2013	2014	2015	2016	2017	2018	2019
Time (minutes)	157	148	138	124	120	112	104	98

A time series graph is drawn to represent the data.

The first four points have been plotted.



Do not write outside the box

5 (a) Complete the graph.

[2 marks]

5 (b) Use the graph to estimate the average daily time per student in 2020

[1 mark]

Answer _____ minutes

6 Work out the highest common factor (HCF) of 112 and 144

[2 marks]

Answer _____

5

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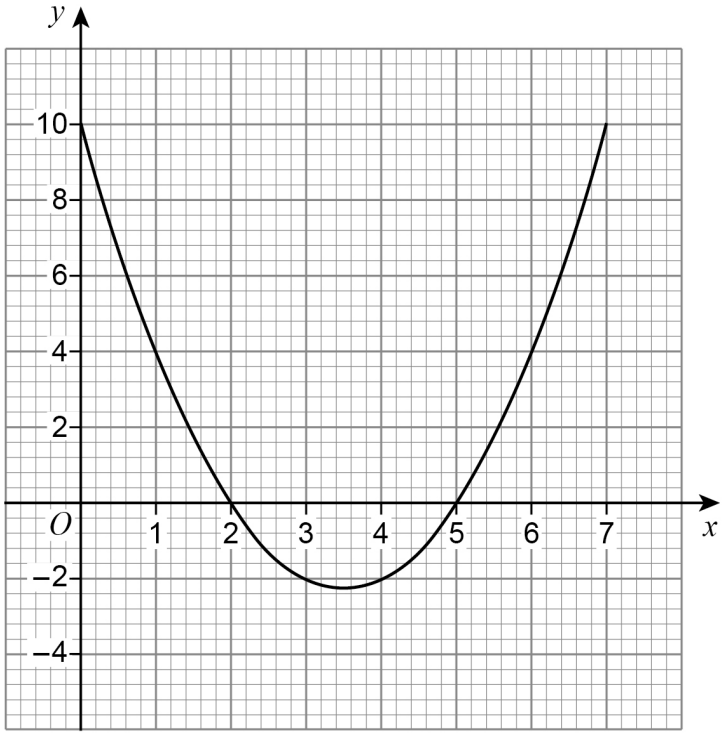
7 Here is the graph of $y = x^2 - 7x + 10$ for values of x from 0 to 7



7 (a) Write down the roots of $x^2 - 7x + 10 = 0$

[2 marks]

Answer _____

7 (b) Write down the x-coordinate of the turning point of the curve.

[1 mark]

_____

Answer _____

Do not write outside the box

8 At a zoo there are 70 children.

31 are girls and 39 are boys.

Some girls arrive.

Some boys leave.

The ratio of girls to boys is now 11 : 12

Are there now more than 70 children at the zoo?

Tick **one** box.

☐ Yes ☐ No ☐ Cannot tell

Show working to support your answer.

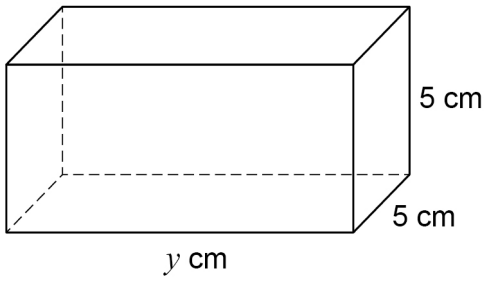
[2 marks]

Turn over for the next question

5

Do not write outside the box

9 Here is a cuboid.



9 (a) Assume that the total surface area of the cuboid is 300 cm^2

Work out the volume of the cuboid.

[3 marks]

Answer _____ cm^3

Do not write outside the box

9 (b) In fact, the total surface area of the cuboid is bigger than 300 cm^2

What does this mean about the volume of the cuboid?

Tick **one** box.

[1 mark]

- ☐ It is smaller than the answer to part (a)
- ☐ It is bigger than the answer to part (a)
- ☐ It is the same as the answer to part (a)
- ☐ It could be any of the above

Turn over for the next question

4

Do not write outside the box

10 Alex and Bev sat six tests, each with 60 marks.

The table shows their mean percentages after five tests.

Alex	60%
Bev	55%

After all six tests, their mean percentages were equal.

In the sixth test, Alex scored 24 out of 60

Work out Bev's score, out of 60, in the sixth test.

[4 marks]

Answer _____ out of 60

Do not write outside the box

11 A solid piece of gold has

mass 6.755 kilograms

volume 350 cm^3

Work out the density of the piece of gold.

Give your answer in grams per cubic centimetre.

[2 marks]

Answer _____ g/cm^3

12 Work out the gradient of the straight line through (–2, 1) and (1, 10)

[2 marks]

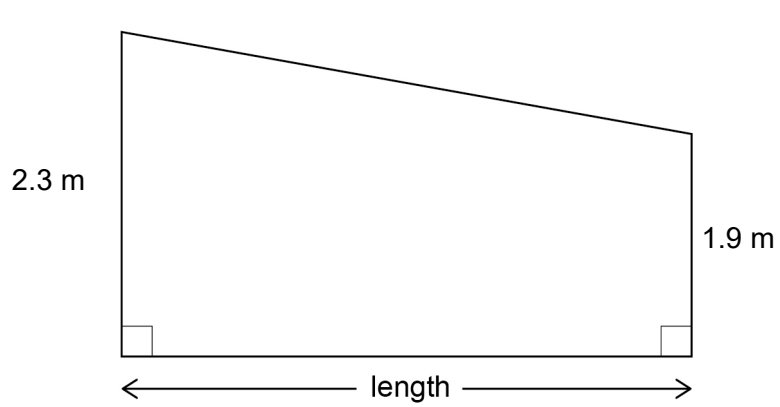
Answer _____

Turn over for the next question

8

Do not write outside the box

13 The diagram shows a pane of glass.



The area of the pane of glass is 35.7 m^2

Work out the length of the pane of glass.

[3 marks]

Answer _____ m

Do not write outside the box

14 A festival takes place each year.

In 2020 there were 12 000 visitors.

Prediction

For each of the next 4 years the number of visitors will increase by 6%

Does this predict that in 2024 there will be more than 16 000 visitors?

You **must** show your working.

[3 marks]

Turn over for the next question

6

Do not write outside the box

15 Rearrange $a = \frac{b}{c} - 2$ to make c the subject.

[3 marks]

Answer _____

Do not write outside the box

16 On a restaurant menu there are

26 main dishes, of which $\frac{5}{13}$ are vegetarian

9 rice dishes, which are all vegetarian

8 side dishes, of which 75% are vegetarian.

This Meal Deal is on the menu.

Choose one main dish, one rice dish and one side dish

How many of the possible Meal Deals are totally vegetarian?

[3 marks]

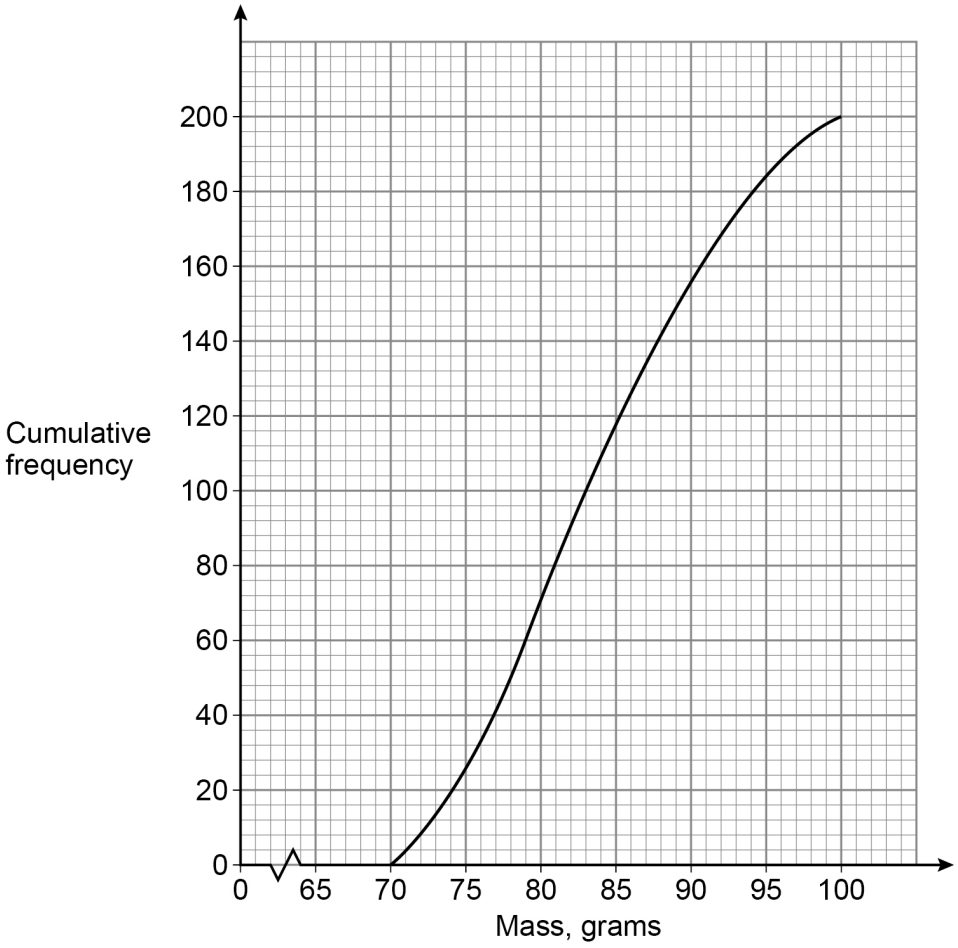
Answer _____

Turn over for the next question

6

Do not write outside the box

17 The cumulative frequency graph shows information about the masses of 200 pears.



17 (a) Estimate the median mass.

[1 mark]

Answer _____ grams

Do not write outside the box

17 (b) Pears with mass 80 grams or less cost 15p each.
Pears with mass more than 80 grams cost 18p each.

Estimate the **total** cost of the 200 pears.

[3 marks]

Answer £ _____

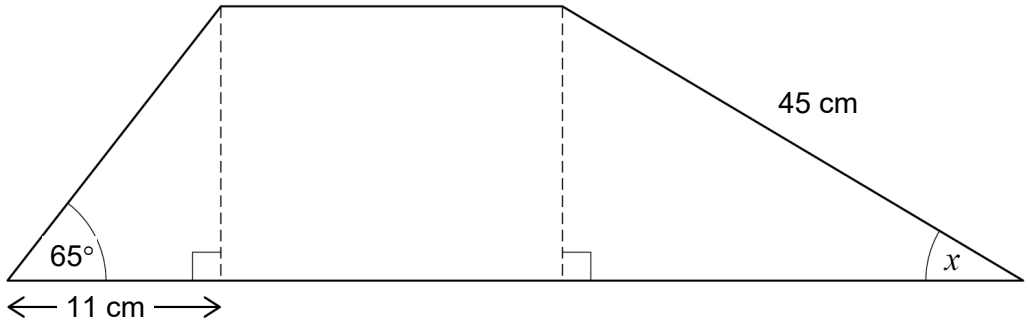
Turn over for the next question

4

Do not write outside the box

18 This shape is made from two right-angled triangles and a rectangle.

Not drawn accurately



Work out the size of angle x.

[4 marks]

Answer _____ degrees

Do not write outside the box

19 a and b are positive values.

Show that $\dfrac{12a+5b-2a}{7a+5b-a-2b}$ always simplifies to the same value.

[3 marks]

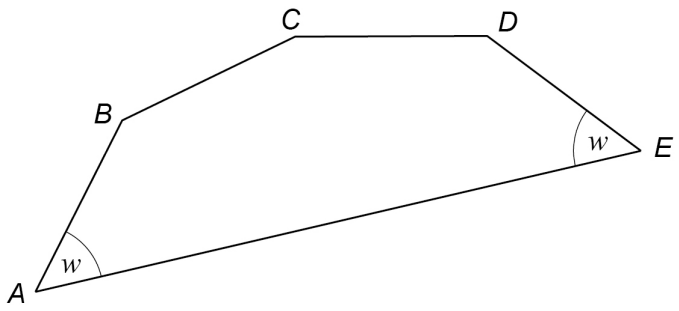
Turn over for the next question

7

Do not write outside the box

20 *AB*, *BC*, *CD* and *DE* are four of the sides of a regular nonagon (9-sided polygon).

Not drawn accurately



Work out the size of angle w.

[3 marks]

Answer _____ degrees

Do not write outside the box

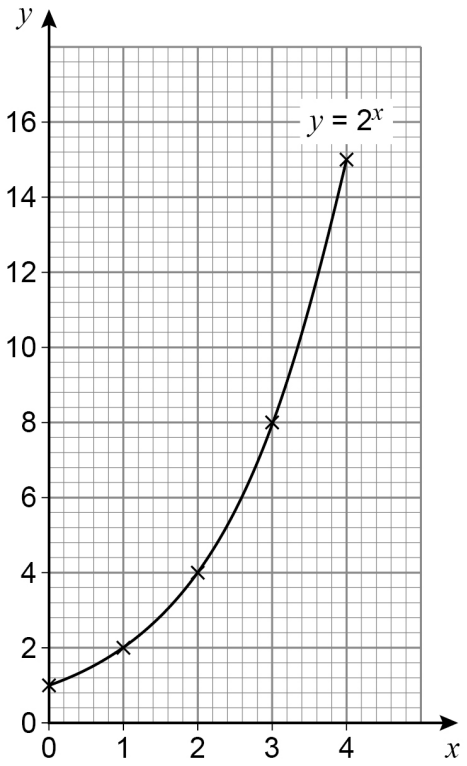
21 (a) Circle the point that is on the graph of $y = \frac{2}{x}$

[1 mark]

(–2, 2) (0.3, 6) (0.8, 2.5) (2.5, 5)

21 (b) Leo wants to draw the graph of $y = 2^x$ for values of x from 0 to 4

Here is his graph.



Make one criticism of his graph.

[1 mark]

5

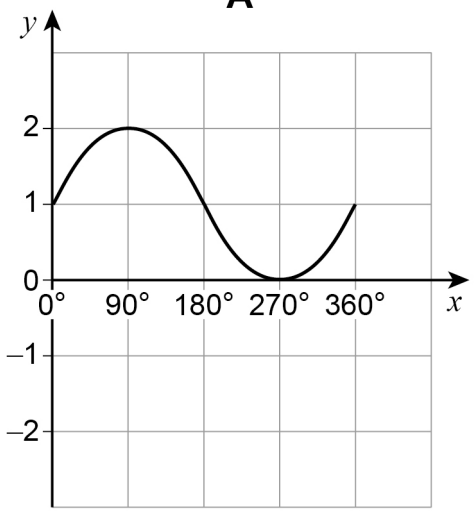
Do not write outside the box

22 One of these is the graph of $y = 1 + \cos x$ for $0° \leqslant x \leqslant 360°$

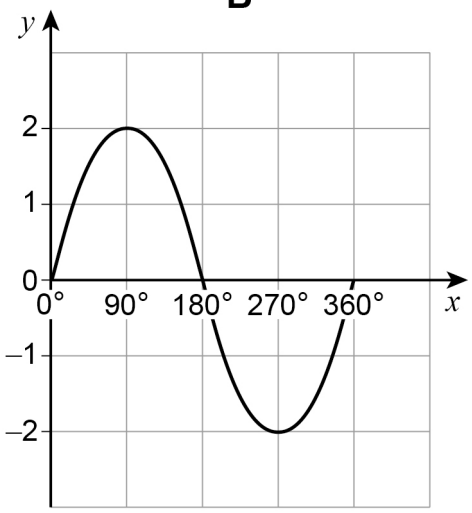
Circle the letter above the correct graph.

[1 mark]

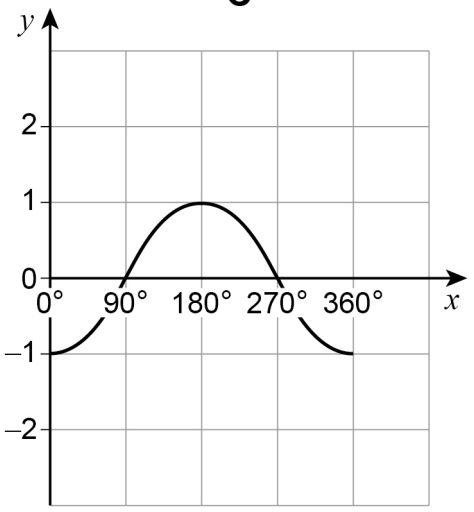
A



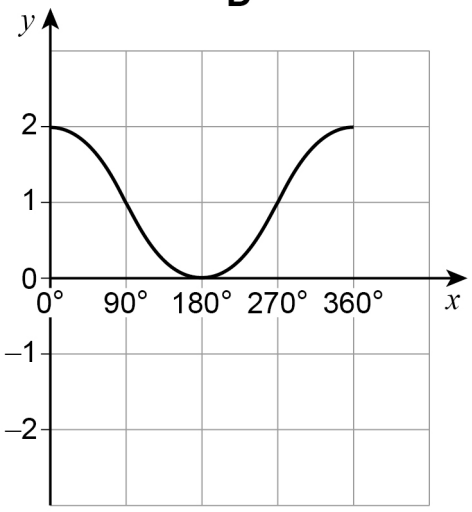
B



C



D



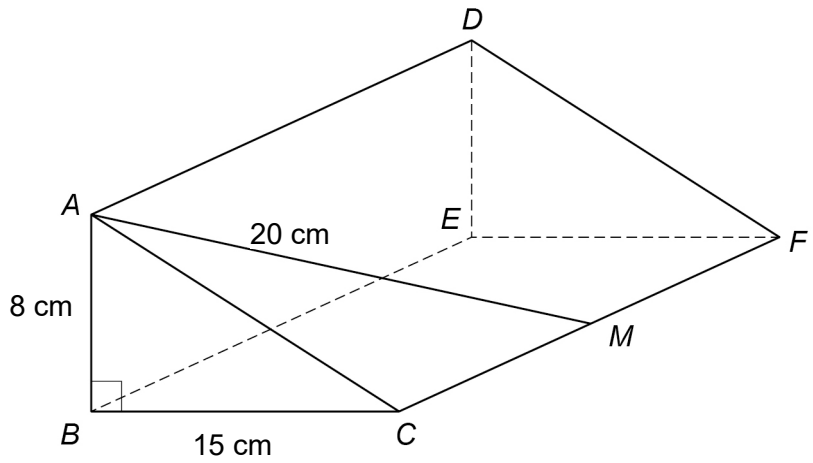
Do not write outside the box

23 Right-angled triangle ABC is the cross section of a prism.

$AB = 8$ cm $BC = 15$ cm

M is the midpoint of CF.

$AM = 20$ cm



[4 marks]

Work out the volume of the prism.

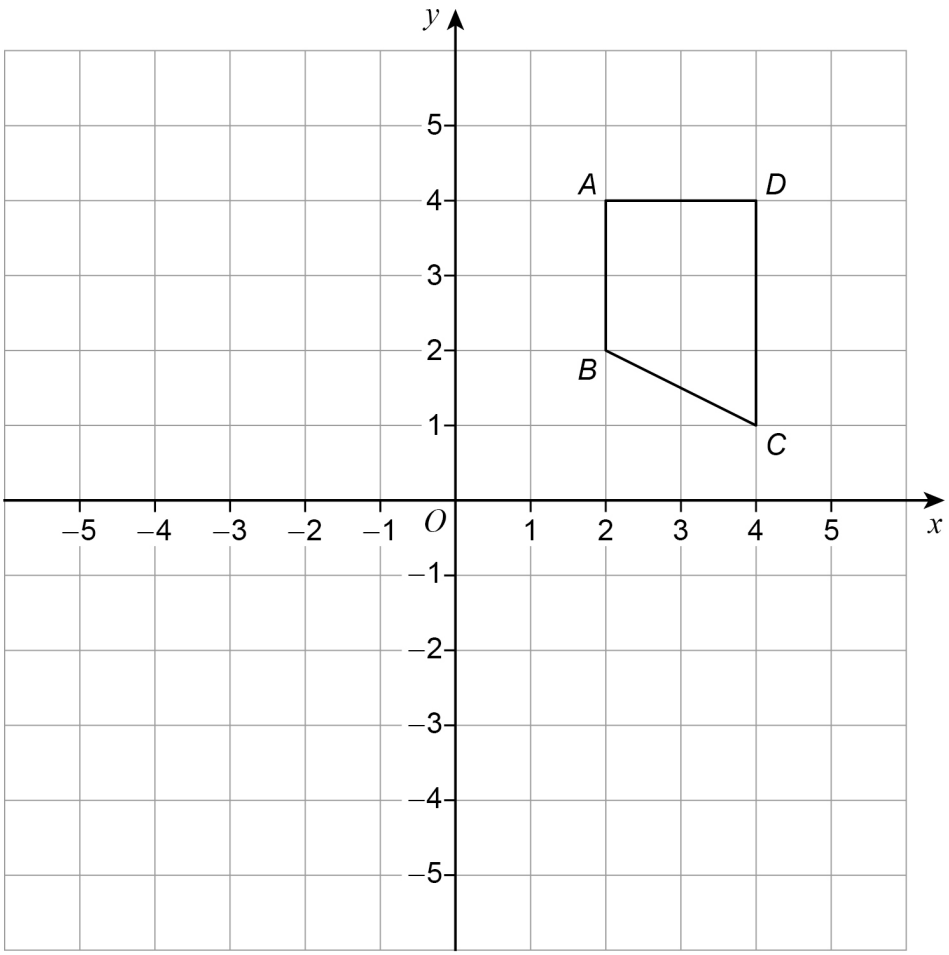
Answer _____ cm^3

5

Turn over ►

Do not write outside the box

24 Quadrilateral *ABCD* is shown.



24 (a) Work out the coordinates of *C* when *ABCD* is

rotated 90° anti-clockwise about O

then

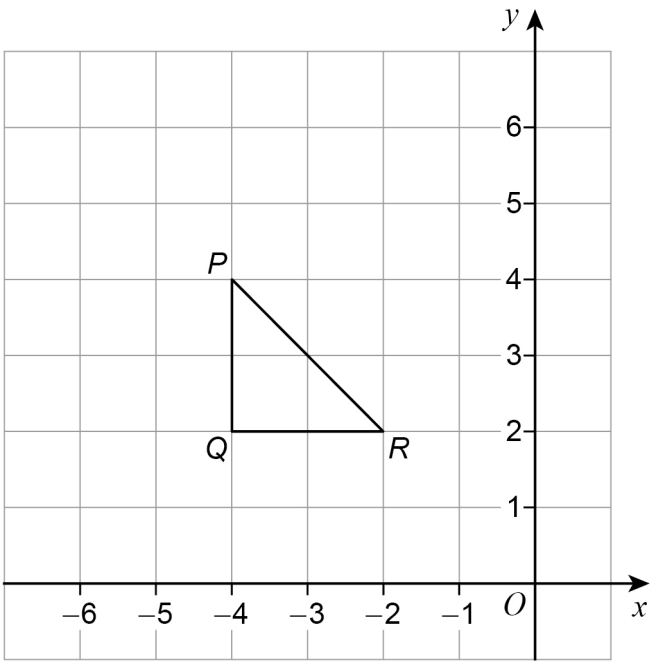
translated by $\begin{pmatrix} 5 \\ -2 \end{pmatrix}$

[2 marks]

Answer (_____ , _____)

Do not write outside the box

24 (b) Triangle *PQR* is shown.



When *PQR* is reflected in a line, *Q* is an invariant point.

Circle a possible equation of the line.

[1 mark]

$y = x + 6$ $y = -x$ $y + x = 6$ $x = -6$

25 Factorise $5x^2 + 7x - 6$

[2 marks]

Answer _____

5

Turn over ►

Do not write outside the box

26 Adam's trailer can safely carry a maximum load of 960 kilograms.

He wants to use his van to carry

60 crates of oranges, each of mass 12 kilograms to the nearest kilogram

and

40 crates of bananas, each of mass 5.5 kilograms to 1 decimal place.

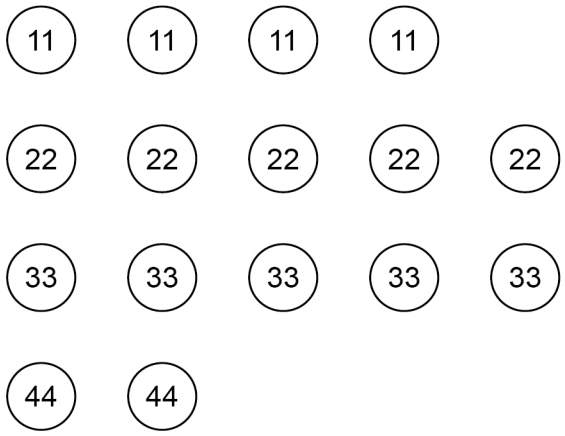
Can he definitely use his trailer safely in one journey?

You **must** show your working.

[4 marks]

Do not write outside the box

27 These 16 discs are in a bag.



Two of the discs are taken at random from the bag.

Work out the probability that the first disc has a **smaller** number than the second disc.

[4 marks]

Answer _____

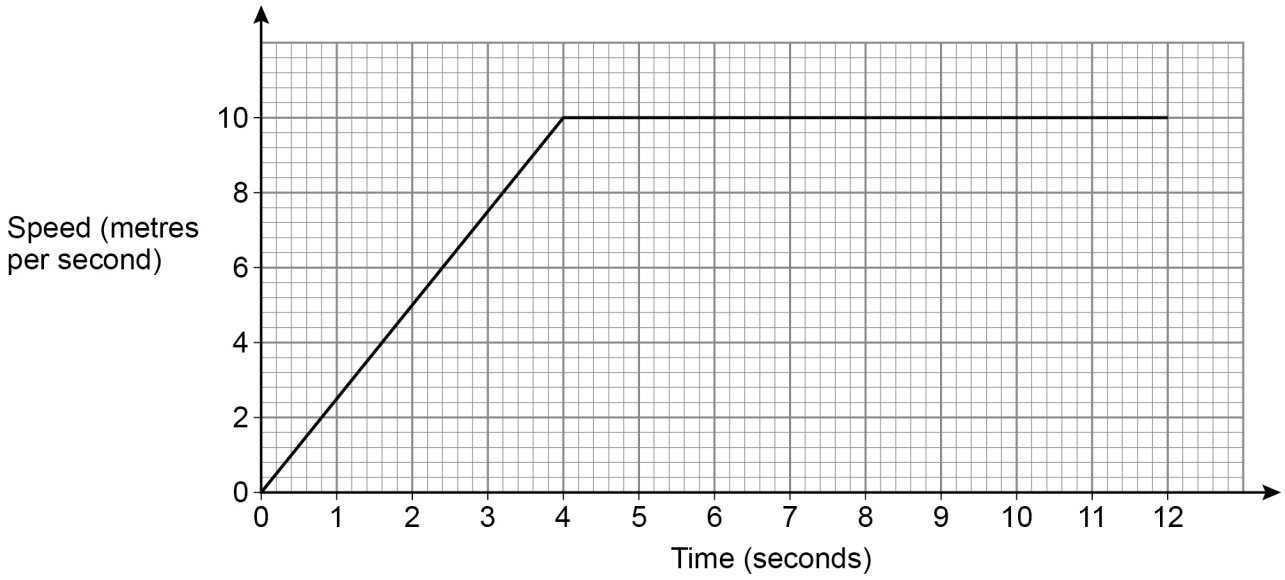
8

Turn over ►

Do not write outside the box

28 A horse runs in a field.

The speed-time graph represents the first 12 seconds of the run.



How far had the horse run after 9 seconds?

[3 marks]

Answer _____ metres

Do not write outside the box

29 Solve $\dfrac{3}{2x-1} = \dfrac{4x}{x^2+5}$

Give your solutions to 3 significant figures.

You **must** show your working.

[5 marks]

Answer _____

END OF QUESTIONS

8

Turn over ►

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