Please write clearly in block capitals.

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

Surname _____

Forename(s) _____

Candidate signature _____
I declare this is my own work.

GCSE
MATHEMATICS

H

Higher Tier Paper 2 Calculator

Thursday 4 June 2020 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.
- 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	

Do not write outside the box

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

1 Which of these is a correct identity?

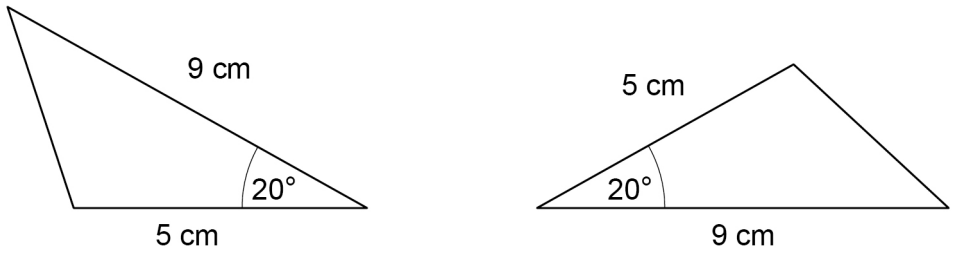
Circle your answer.

[1 mark]

$x + 4x \equiv 5x$ $\quad$ $6x \equiv 18$ $\quad$ $2x + 1 \equiv 7$ $\quad$ $7x + 9 \equiv x$

2

Not drawn accurately



Circle the reason why these triangles are congruent.

[1 mark]

RHS $\quad$ ASA $\quad$ SSS $\quad$ SAS

Do not write outside the box

3 Circle the number that is written in standard form.

[1 mark]

0.9×10^{-3} $6 \times 10^{0.5}$ 5.2×10^{-4} 12×10^{7}

4 Circle the expression that has the **largest** value when $a < -1$

[1 mark]

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

Turn over for the next question

4

Do not write outside the box

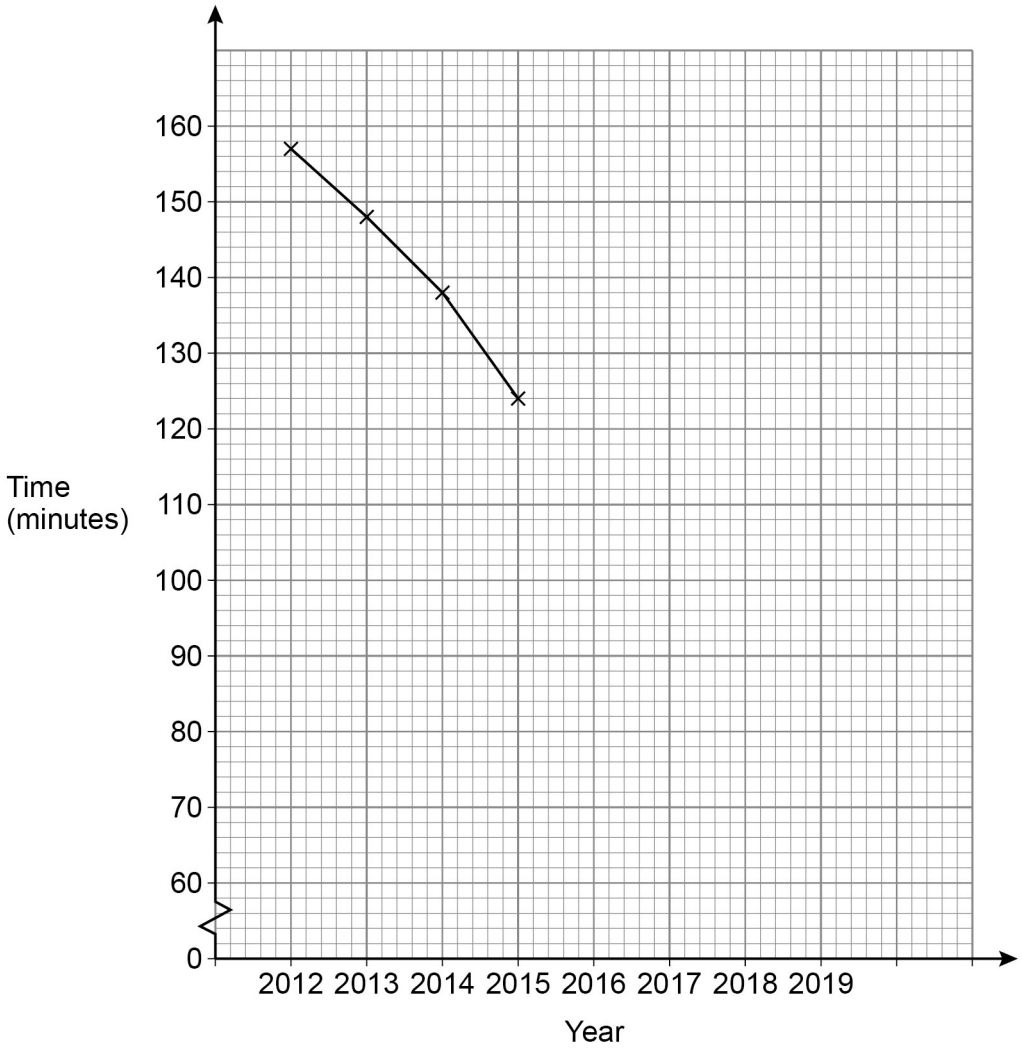
5 The time students spent watching TV was recorded.

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	113	100	90	82

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 75 and 105

[2 marks]

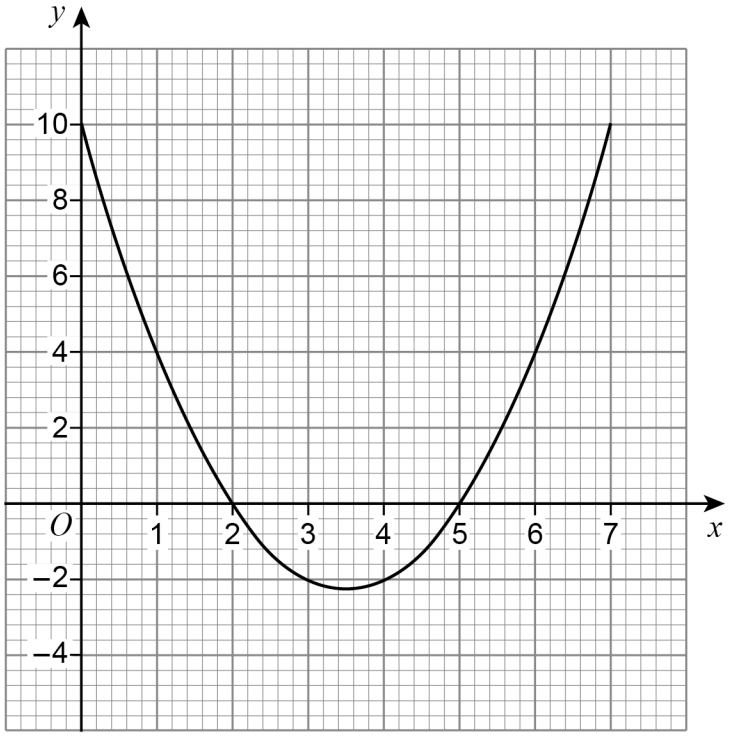
Answer _____

5

Turn over ►

Do not write outside the box

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 party there are 90 people.

48 are women and 42 are men.

Some women leave.

Some men arrive.

The ratio of women to men is now 10 : 11

Are there now more than 90 people at the party?

Tick **one** box.

☐ Yes ☐ No ☐ Cannot tell

Show working to support your answer.

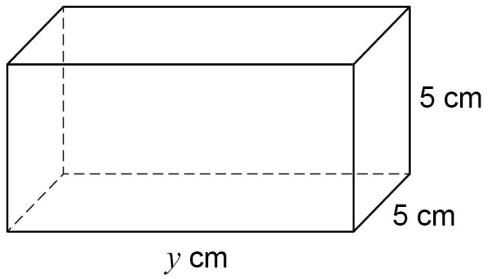
[2 marks]

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 200 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 smaller than 200 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 50 marks.

The table shows their mean percentages after five tests.

Alex	60%
Bev	52%

After all six tests, their mean percentages were equal.

In the sixth test, Alex scored 24 out of 50

Work out Bev's score, out of 50, in the sixth test.

[4 marks]

Answer _____ out of 50

Do not write outside the box

11 A solid piece of silver has

mass 2.625 kilograms

volume 250 cm^3

Work out the density of the piece of silver.

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, 3) and (1, 9)

[2 marks]

Answer _____

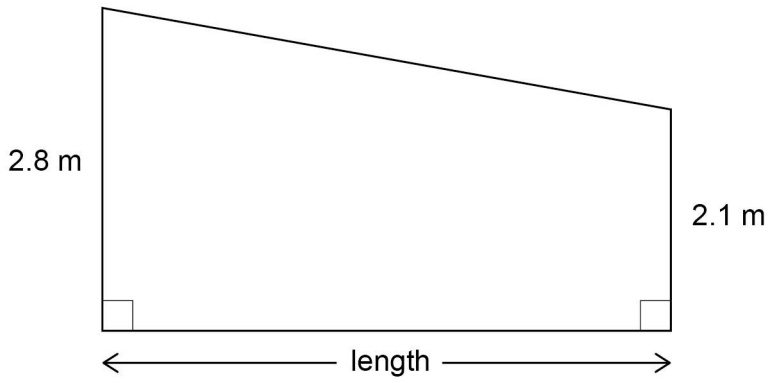
Turn over for the next question

8

Do not write outside the box

13 The diagram shows a wall.

Not drawn accurately



The area of the wall is 39.2 m^2

Work out the length of the wall.

[3 marks]

Answer _____ m

Do not write outside the box

14 A marathon takes place each year.

In 2020 there were 6500 runners.

Prediction

For each of the next 3 years the number of runners will increase by 5%

Does this predict that in 2023 there will be more than 7500 runners?

You **must** show your working.

[3 marks]

Turn over for the next question

6

Do not write outside the box

15 Rearrange $a = \frac{b}{c} + 5$ to make c the subject.

[3 marks]

Answer _____

Do not write outside the box

16 On a restaurant menu there are

22 main dishes, of which $\frac{4}{11}$ are gluten-free

7 rice dishes, which are all gluten-free

5 naan breads, of which 40% are gluten-free.

This Meal Deal is on the menu.

Choose one main dish, one rice dish and one naan bread

How many of the possible Meal Deals are totally gluten-free?

[3 marks]

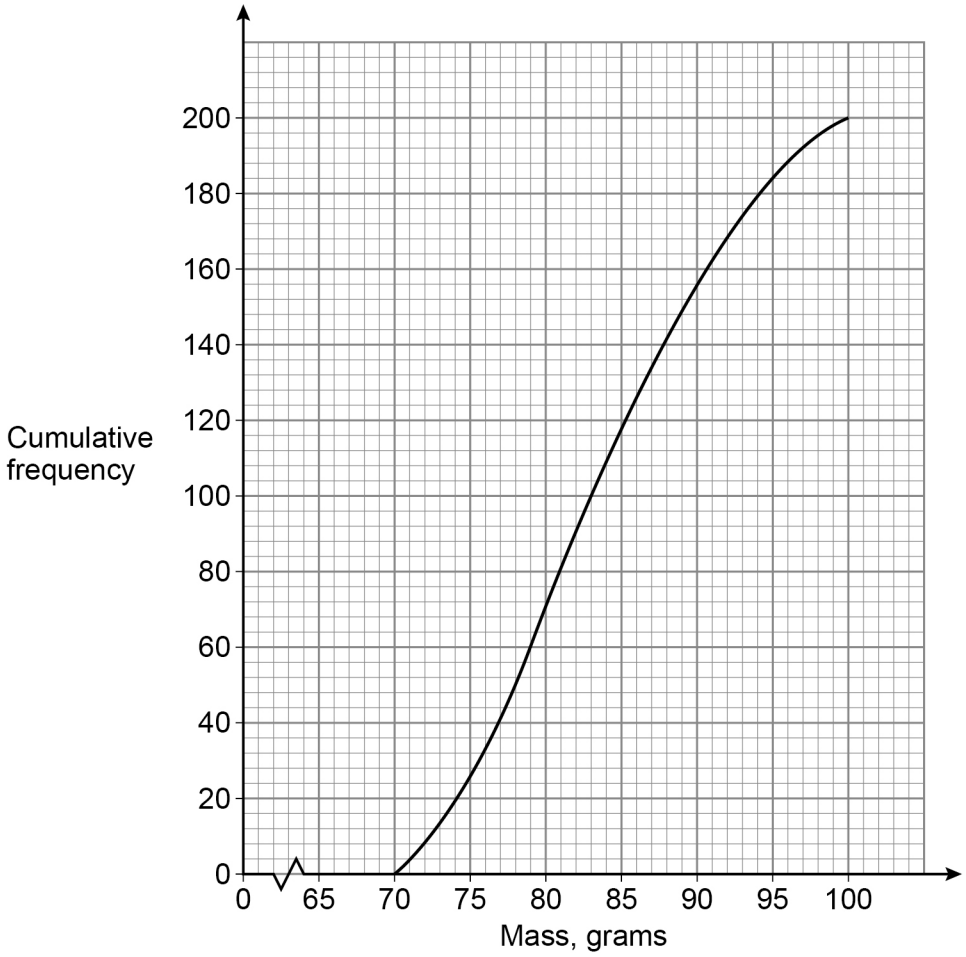
Answer _____

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 apples.



17 (a) Estimate the median mass.

[1 mark]

Answer _____ grams

Do not write outside the box

17 (b) Apples with mass 90 grams or less cost 32p each.

Apples with mass more than 90 grams cost 39p each.

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

[3 marks]

Answer £ _____

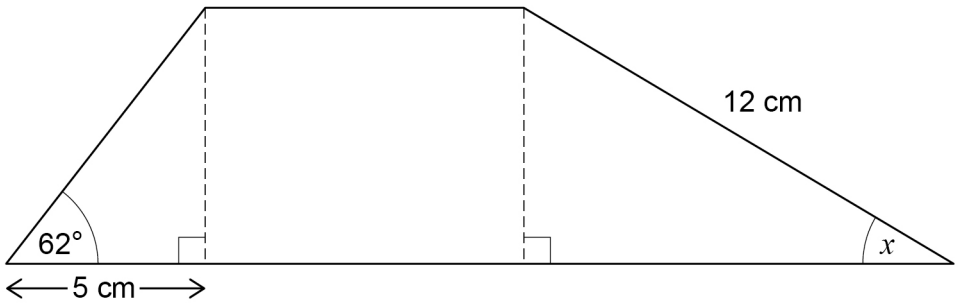
Turn over for the next question

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 $\dfrac{7a + 2b - 3a}{8a + 6b + 2a - b}$ always simplifies to the same value.

[3 marks]

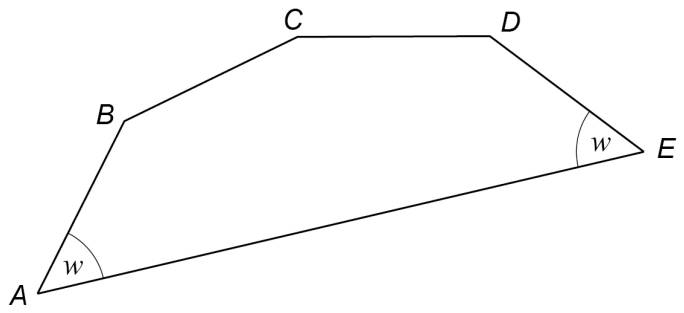
Turn over for the next question

7

Do not write outside the box

20 *AB*, *BC*, *CD* and *DE* are four of the sides of a regular decagon.

Not drawn accurately



Work out the size of angle w.

[3 marks]

Answer _____ degrees

Do not write outside the box

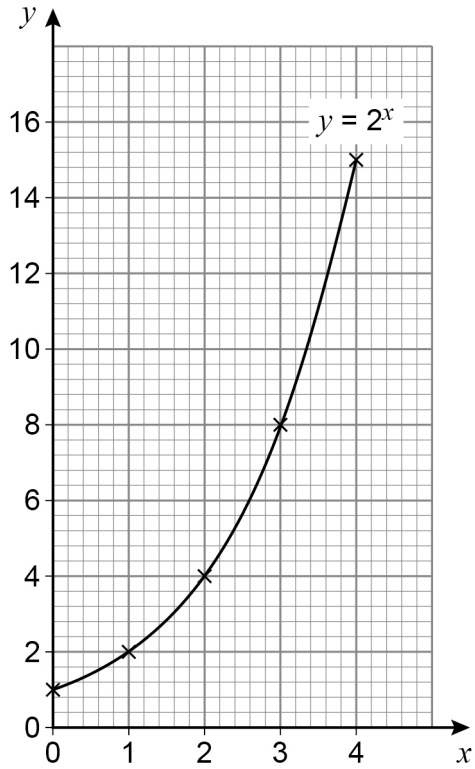
21 (a) Circle the point that is on the graph of $y = \frac{1}{x}$

[1 mark]

(–1, 1) (0.3, 3) (0.8, 0.2) (2.5, 0.4)

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

Turn over ►

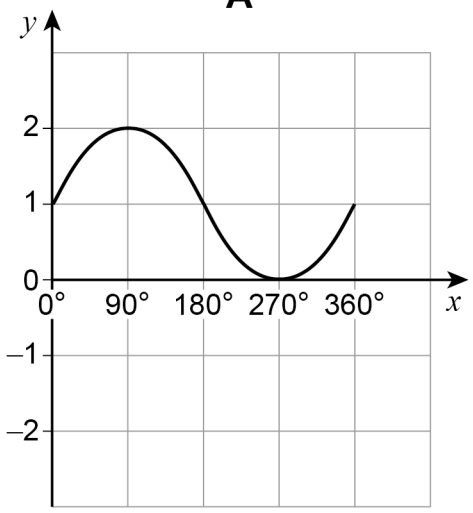
Do not write outside the box

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

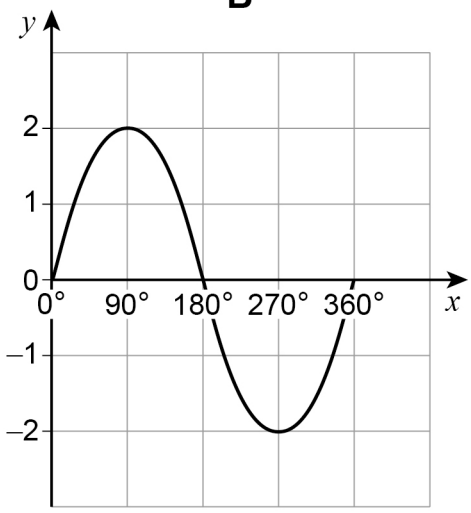
Circle the letter above the correct graph.

[1 mark]

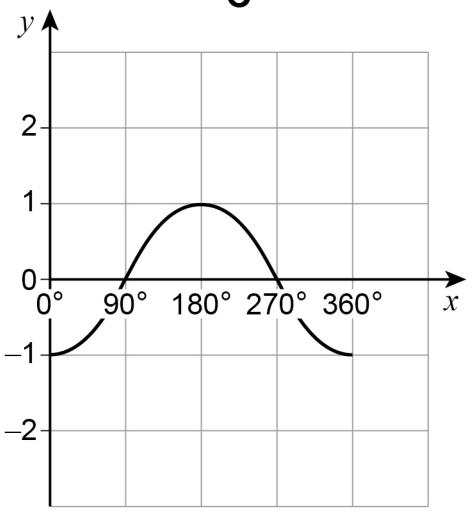
A



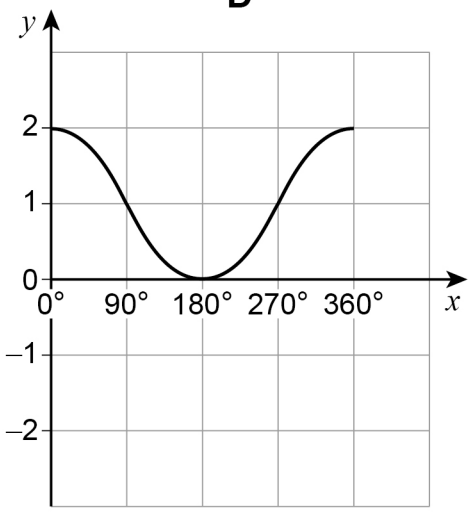
B



C



D



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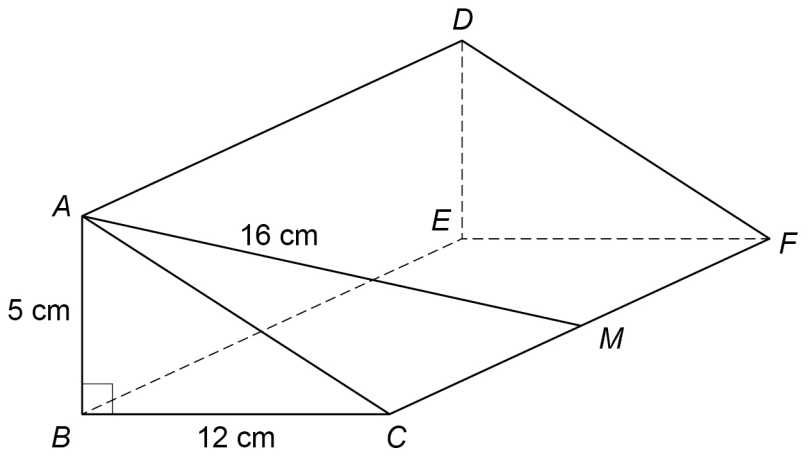
23 Right-angled triangle *ABC* is the cross section of a prism.

AB = 5 cm *BC* = 12 cm

M is the midpoint of *CF*.

AM = 16 cm



Work out the volume of the prism.

[4 marks]

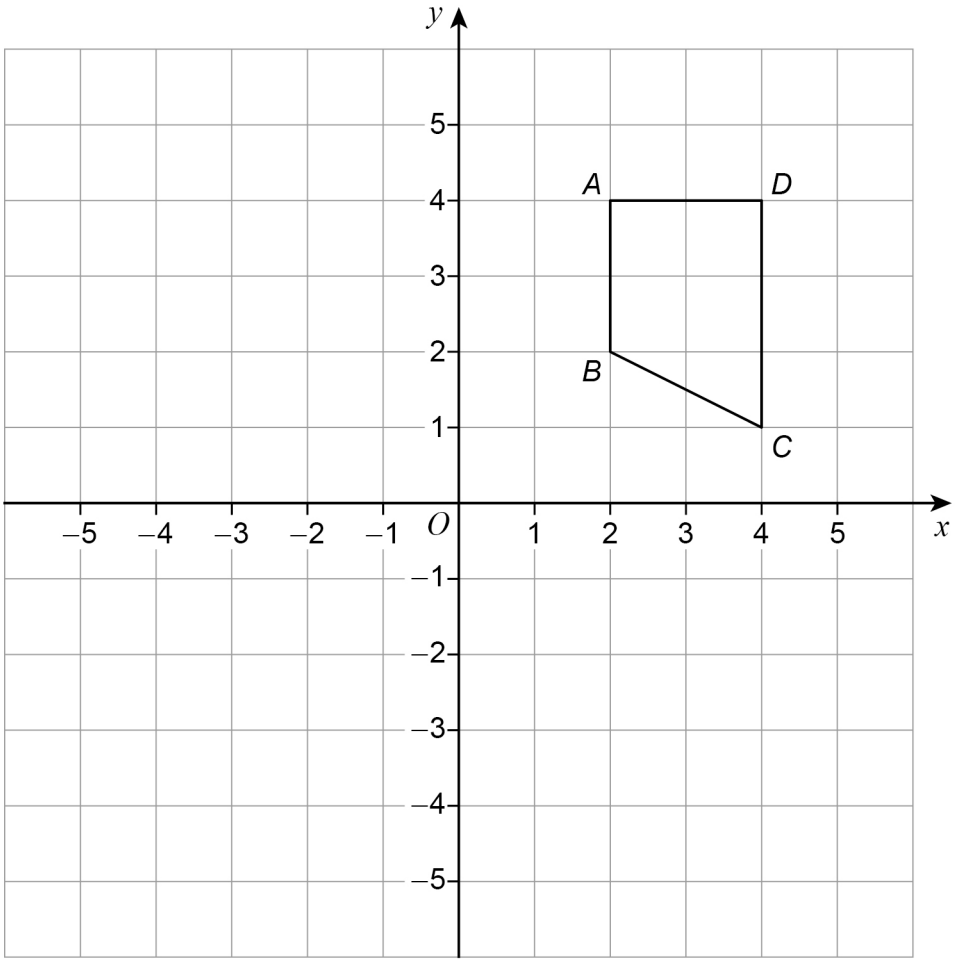
Answer _____ cm^3

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° clockwise about O

then

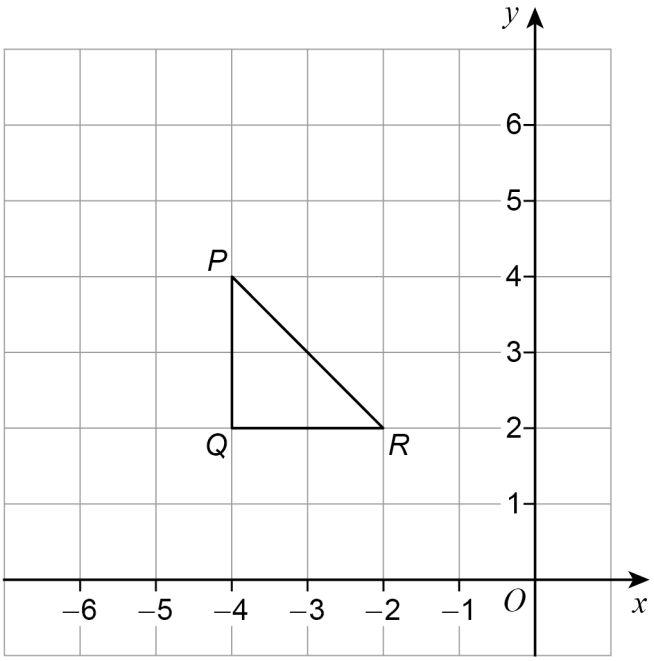
translated by $\begin{pmatrix} -6 \\ 2 \end{pmatrix}$

[2 marks]

Answer (_____ , _____)

Do not write outside the box

24 (b) Triangle *PQR* is shown.



When *PQR* is reflected in a line, *P* **and** *R* are invariant points.

Circle the equation of the line.

[1 mark]

$y = x + 6$ $\quad$ $y = -x$ $\quad$ $y = 2$ $\quad$ $x = -4$

25 Factorise $3x^2 + 11x - 20$

[2 marks]

Answer _____

5

Turn over ►

Do not write outside the box

26 Edith's van can safely carry a maximum load of 920 kilograms.

She wants to use her van to carry

30 sacks of potatoes, each of mass 25 kilograms to the nearest kilogram

and

20 sacks of carrots, each of mass 7.5 kilograms to 1 decimal place.

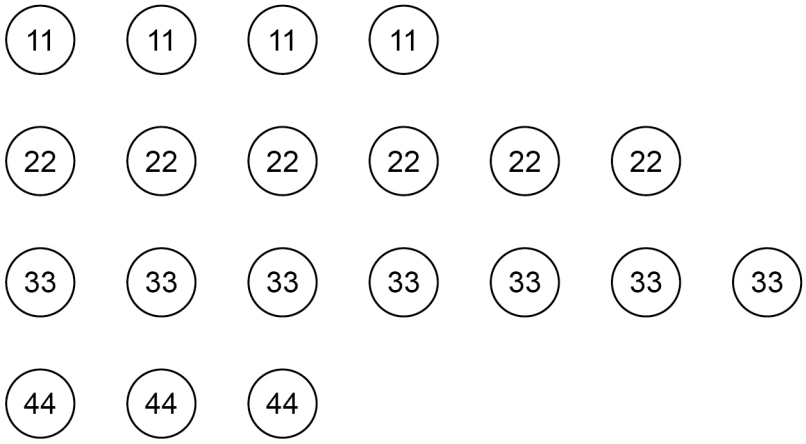
Can she definitely use her van safely in one journey?

You **must** show your working.

[4 marks]

Do not write outside the box

27 These 20 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 _____

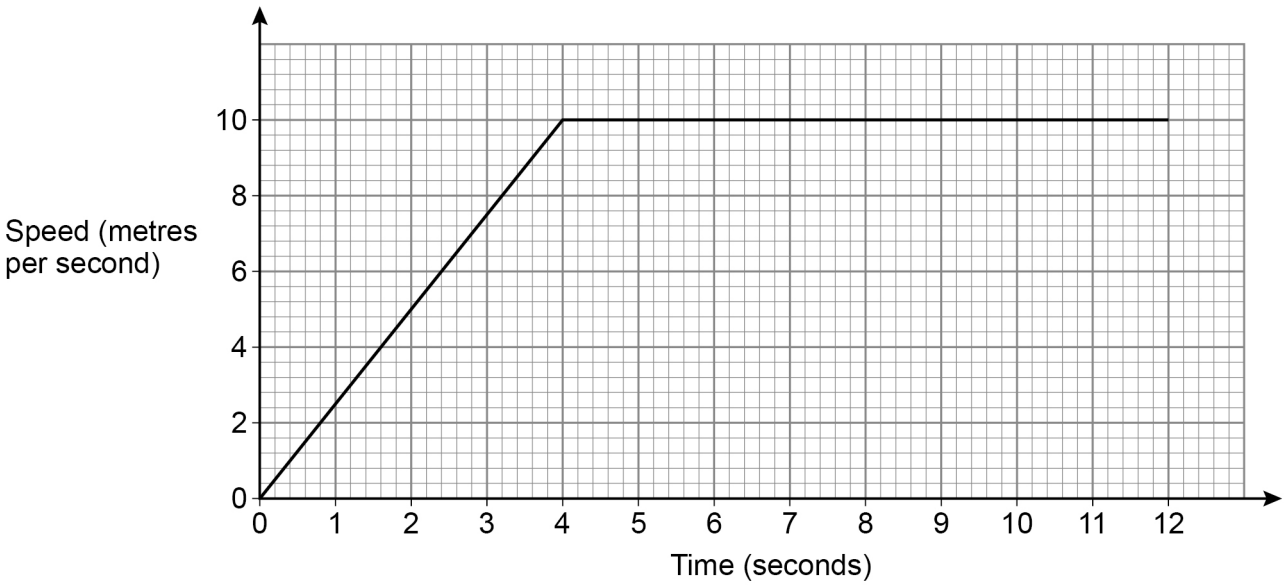
8

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.



After how many seconds had the horse run a distance of 75 metres?

[3 marks]

Answer _____ seconds

Do not write outside the box

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

Give your solutions to 3 significant figures.

You **must** show your working.

[5 marks]

Answer _____

END OF QUESTIONS

8

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ANSWER IN THE SPACES PROVIDED

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Question number	**Additional page, if required.** **Write the question numbers in the left-hand margin.**

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