

Please write clearly in block capitals.

Centre number

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Candidate number

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Surname

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Forename(s)

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Candidate signature

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I declare this is my own work.

# GCSE MATHEMATICS

# H

Higher Tier

Paper 2 Calculator

Thursday 4 June 2020

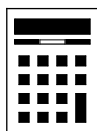
Morning

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	
<b>TOTAL</b>	



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

**1** Which of these is a correct identity?

Circle your answer.

[1 mark]

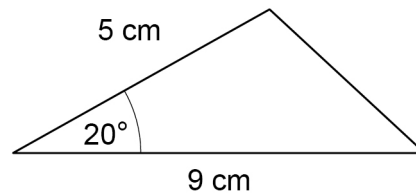
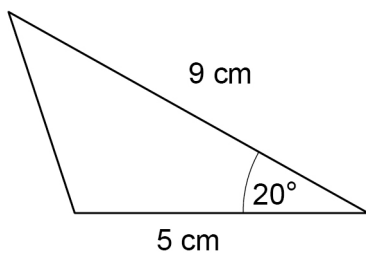
$x + 4x \equiv 5x$

$6x \equiv 18$

$2x + 1 \equiv 7$

$7x + 9 \equiv x$

**2**



Not drawn  
accurately

Circle the reason why these triangles are congruent.

[1 mark]

RHS

ASA

SSS

SAS



3 Circle the number that is written in standard form.

[1 mark]

$0.9 \times 10^{-3}$

$6 \times 10^{0.5}$

$5.2 \times 10^{-4}$

$12 \times 10^7$

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

Turn over ►



5

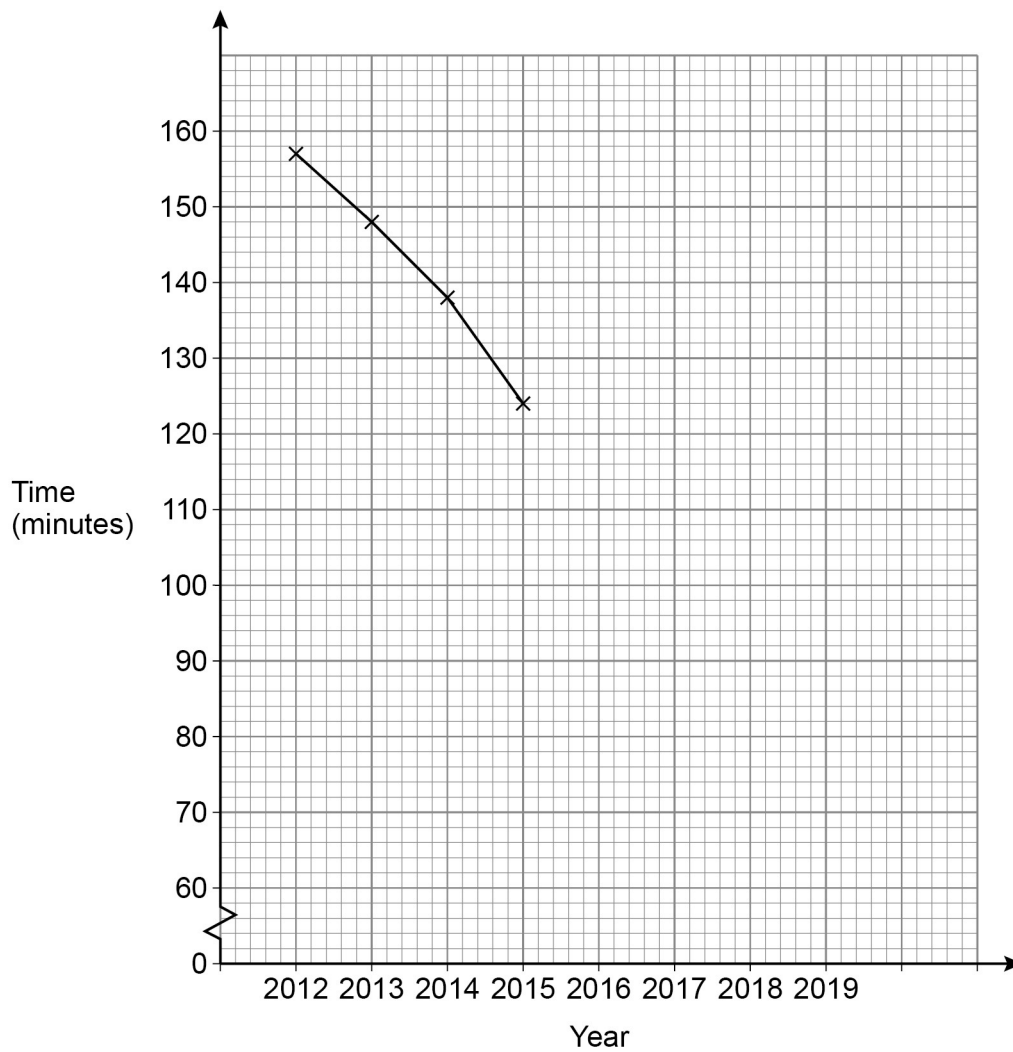
The time students spent watching TV was recorded.

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.



5 (a) Complete the graph.

[2 marks]

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

[1 mark]

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Answer \_\_\_\_\_ minutes

6 Work out the highest common factor (HCF) of 75 and 105

[2 marks]

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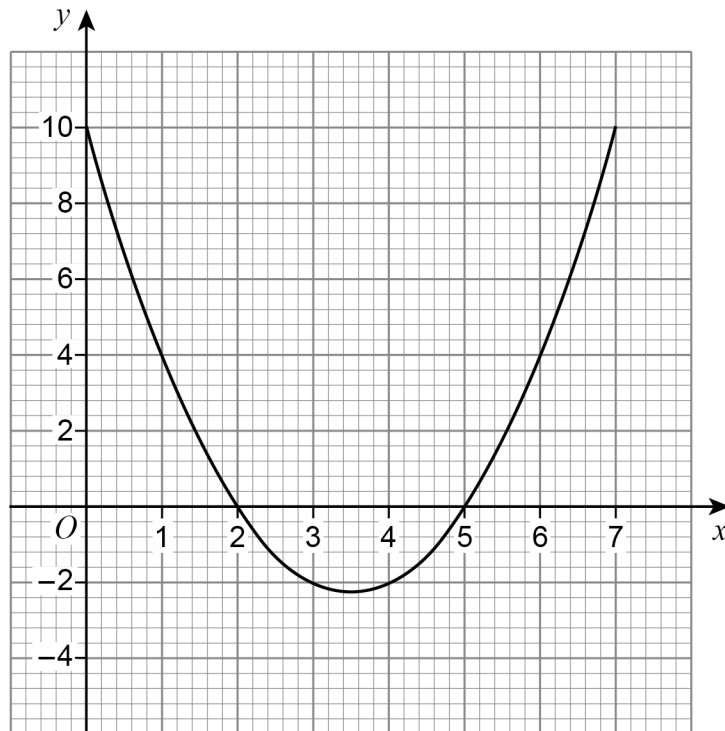
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Answer \_\_\_\_\_



- 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 \_\_\_\_\_



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]

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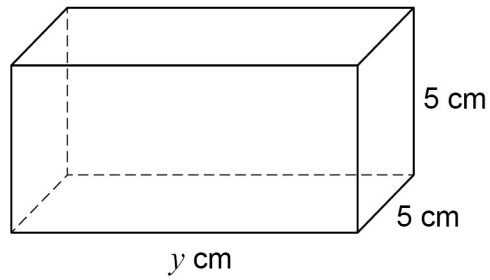
Turn over for the next question

5

Turn over ►



9 Here is a cuboid.



9 (a) Assume that the total surface area of the cuboid is  $200 \text{ cm}^2$

Work out the volume of the cuboid.

**[3 marks]**

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Answer \_\_\_\_\_  $\text{cm}^3$





9 (b) In fact, the total surface area of the cuboid is smaller than  $200 \text{ cm}^2$

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

Turn over ►



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]**

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Answer \_\_\_\_\_ out of 50



11

A solid piece of silver has  
mass 2.625 kilograms  
volume  $250 \text{ cm}^3$

Work out the density of the piece of silver.

Give your answer in grams per cubic centimetre.

**[2 marks]**

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Answer \_\_\_\_\_  $\text{g/cm}^3$

12

Work out the gradient of the straight line through  $(-2, 3)$  and  $(1, 9)$

**[2 marks]**

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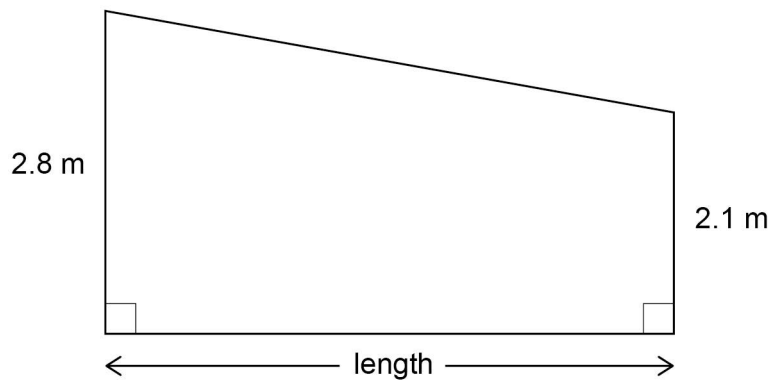
Answer \_\_\_\_\_

**Turn over for the next question**



13

The diagram shows a wall.

Not drawn  
accuratelyThe area of the wall is  $39.2 \text{ m}^2$ 

Work out the length of the wall.

**[3 marks]**

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Answer \_\_\_\_\_ m



**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]**

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**Turn over for the next question**

6

**Turn over ►**



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

[3 marks]

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Answer \_\_\_\_\_



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]

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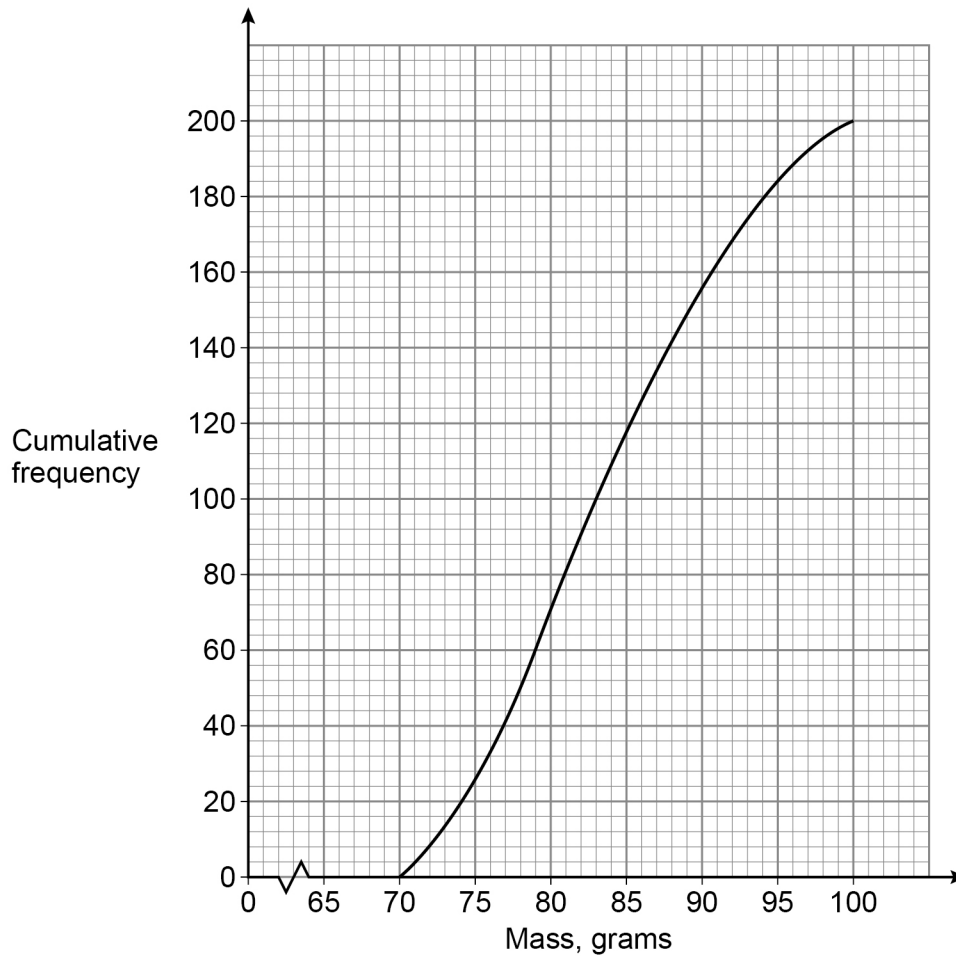
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Answer \_\_\_\_\_

Turn over for the next question



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



- 17 (a) Estimate the median mass.

[1 mark]

Answer \_\_\_\_\_ grams





- 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]**

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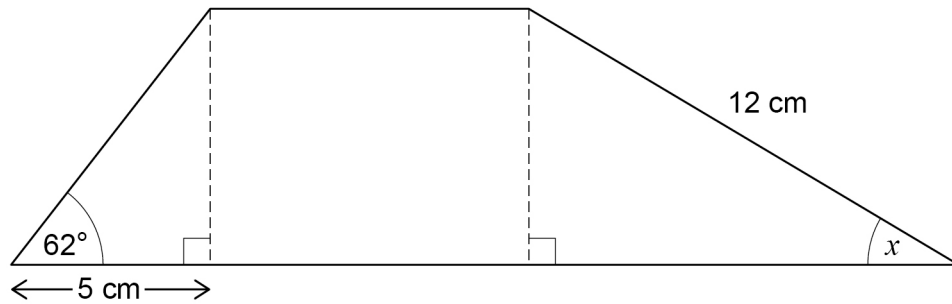
Answer £ \_\_\_\_\_

**Turn over for the next question****Turn over ►**

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]

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Answer \_\_\_\_\_ degrees



19

$a$  and  $b$  are positive values.

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

**[3 marks]**

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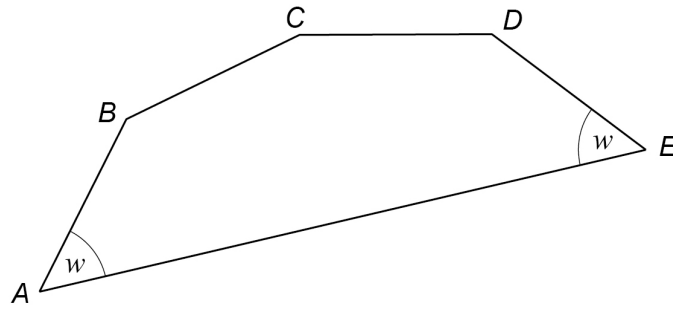
Turn over for the next question

7
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**Turn over ►**

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]

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Answer \_\_\_\_\_ degrees



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

[1 mark]

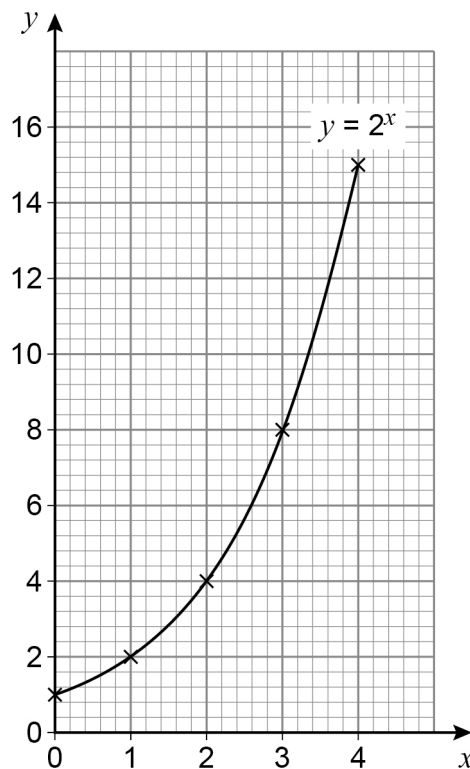
(-1, 1)

(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]

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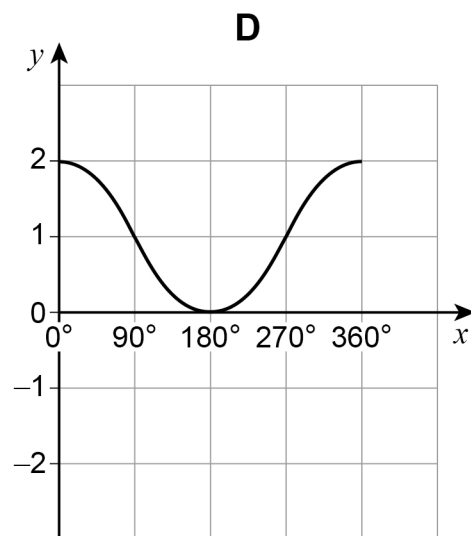
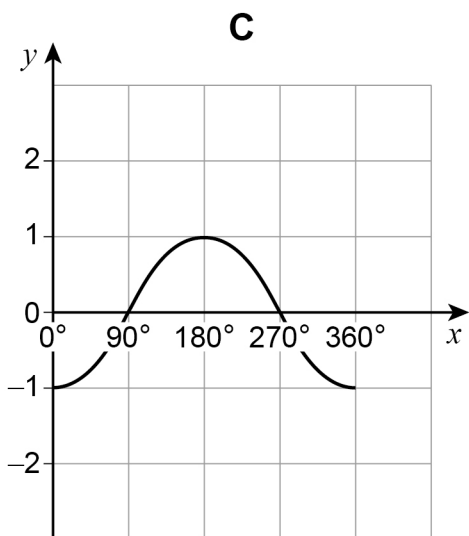
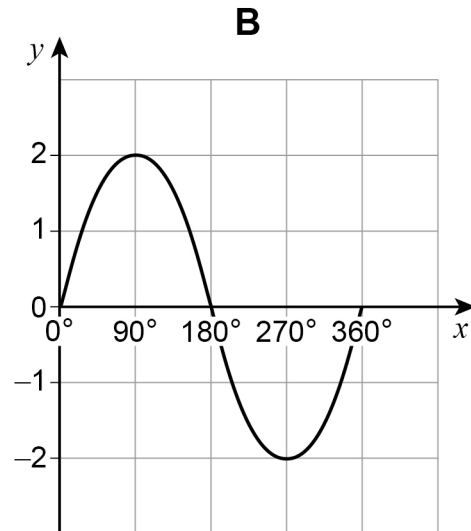
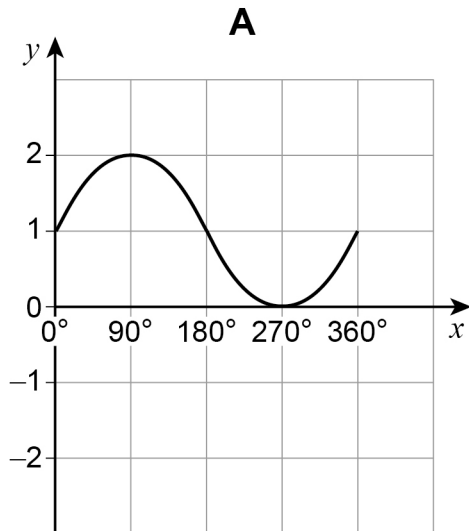


22

One of these is the graph of  $y = 1 + \sin x$  for  $0^\circ \leq x \leq 360^\circ$

Circle the letter above the correct graph.

[1 mark]



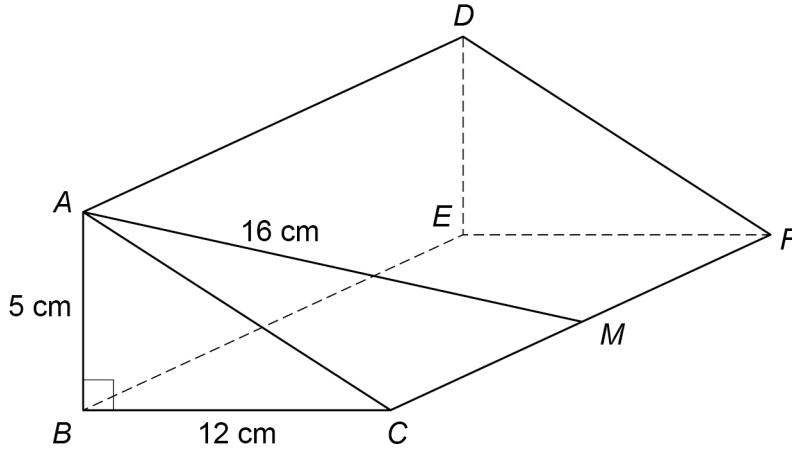
23

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

$AB = 5 \text{ cm}$        $BC = 12 \text{ cm}$

$M$  is the midpoint of  $CF$ .

$AM = 16 \text{ cm}$



Work out the volume of the prism.

[4 marks]

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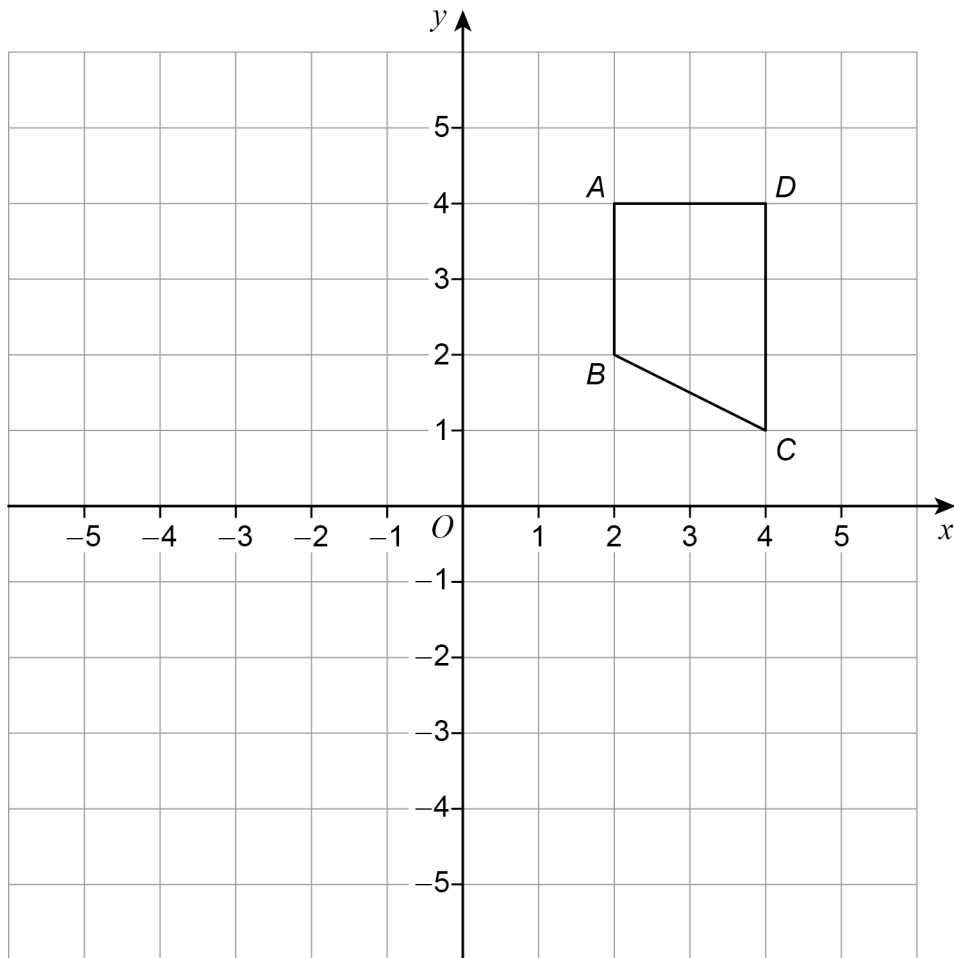
Answer \_\_\_\_\_  $\text{cm}^3$

5
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Turn over ►



24

Quadrilateral  $ABCD$  is shown.

- 24 (a) Work out the coordinates of  $C$  when  $ABCD$  is rotated  $90^\circ$  clockwise about  $O$  then translated by  $\begin{pmatrix} -6 \\ 2 \end{pmatrix}$

**[2 marks]**


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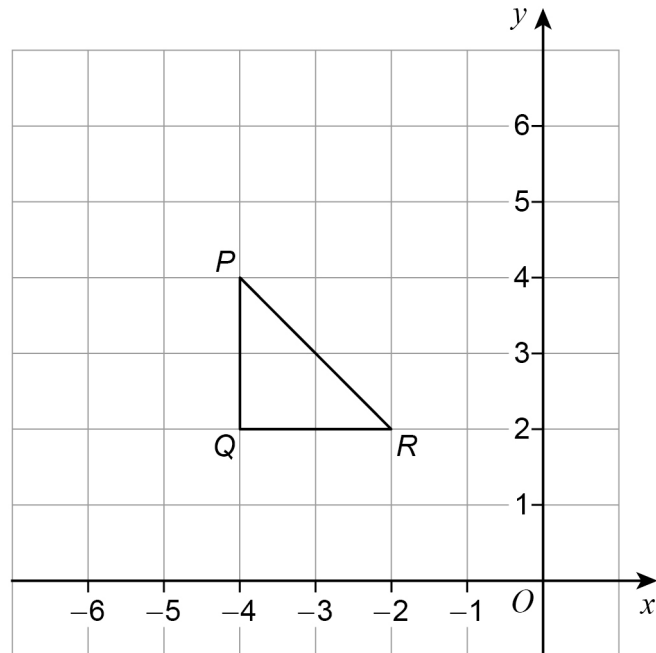
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Answer ( \_\_\_\_\_ , \_\_\_\_\_ )





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]

$y = x + 6$

$y = -x$

$y = 2$

$x = -4$

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

[2 marks]

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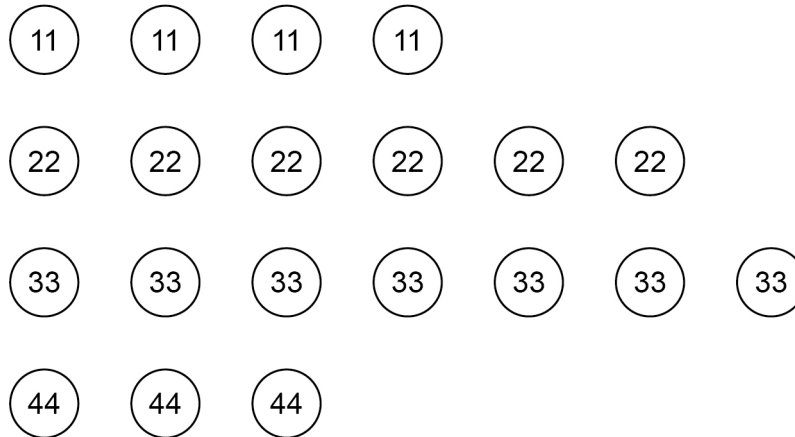
Answer \_\_\_\_\_





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]**


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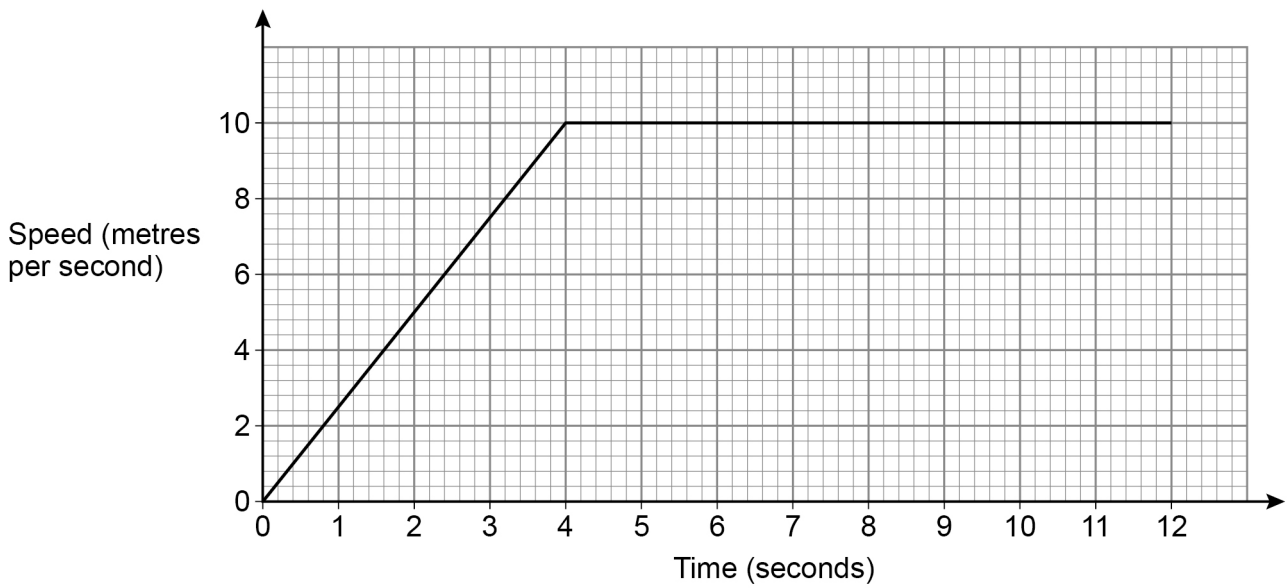
Answer \_\_\_\_\_



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]

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Answer \_\_\_\_\_ seconds





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ANSWER IN THE SPACES PROVIDED**





