

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

# F

Foundation Tier Paper 3 Calculator

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	
30	
<b>TOTAL</b>	



Answer all questions in the spaces provided.

- 1 Solve  $4 + x = 12$   
Circle your answer.

[1 mark]

$x = -16$

$x = -8$

$x = 8$

$x = 16$

- 2 Circle the largest number.

[1 mark]

4.5061

4.5

4.516

4.56

- 3 Circle the expression that means half the value of  $x$

[1 mark]

$\frac{x}{2}$

$\frac{2}{x}$

$\frac{1}{2} - x$

$x - \frac{1}{2}$



4 Circle the value of  $10^6$ 

[1 mark]

one hundred

one thousand

one million

one billion

5 Complete the bank statement.

[3 marks]

Date	Description	Credit (£)	Debit (£)	Balance (£)
01/05/2020	Starting balance			670.43
08/05/2020	Salary	2156.75		<u>2827.18</u>
11/05/2020	Water bill		48.97	<u>2778.21</u>
18/05/2020	Mortgage payment		<u>1135.72</u>	1642.49

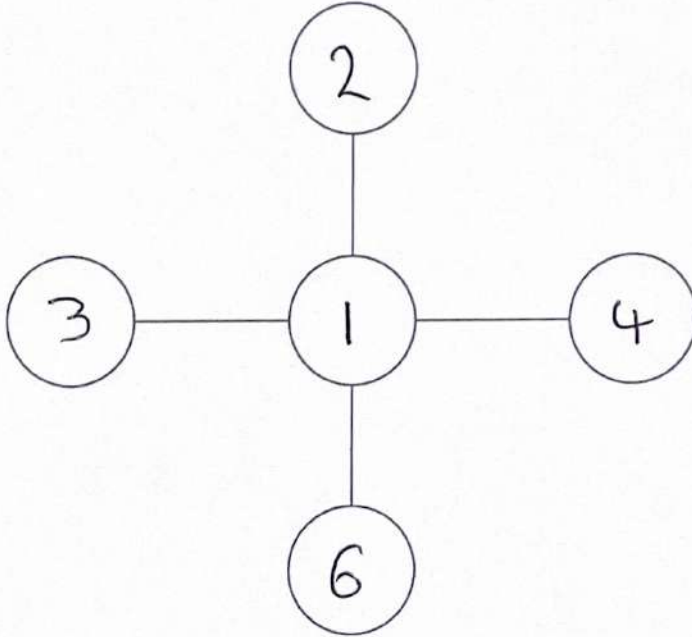
Turn over for the next question

Turn over ►



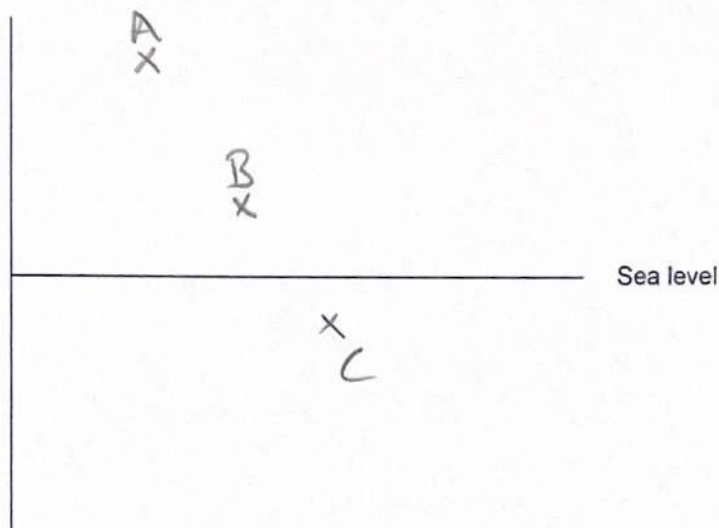
- 6 Put the numbers 1, 2, 3, 4 and 6 into the circles so that  
each line of three numbers multiplies to 12  
the total of the vertical line is one more than the total of the horizontal line.  
Use each number once.

[2 marks]



- 7 Point A is 217 metres **above** sea level.  
Point B is 145 metres **lower** than point A.  
Point C is 59 metres **below** sea level.  
How much **higher** is point B than point C?

[3 marks]



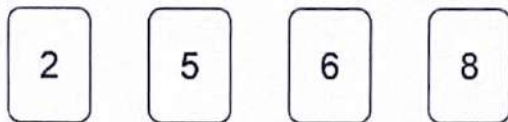
$$217 - 145 = 72 \text{ m}$$

$$72 \text{ m} + 59 = 131 \text{ m}$$

Answer 131 metres



8 Here are four number cards.



8 (a) Use each card once to make this calculation correct.

[1 mark]

$$\boxed{5} + \boxed{6} - \boxed{8} - \boxed{2} = 1$$



Two of the cards are chosen at random.

- 8 (b) List all the possible pairs of cards.  
Two have been done for you.

[2 marks]

First card	Second card
2	5
5	2
2	6
6	2
2	8
8	2
5	6
6	5
5	8
8	5
6	8
8	6

- 8 (c) Write down the probability that the first card is an even number.

[1 mark]

Answer 3/4

Turn over ►



9

School A has 72 tutor groups.

Each group has 28 students.

School B has 16 tutor groups.

Each group has 18 students.

Show that  $\frac{\text{number of students at school A}}{\text{number of students at school B}}$  is a whole number.

[2 marks]

$$\text{School A: } 72 \times 28 = 2016 \text{ pupils.}$$

$$\text{School B: } 16 \times 18 = 288 \text{ pupils.}$$

$$\frac{2016}{288} = 7.$$





- 10 Boxes of chocolates each contain 25 chocolates.  
One box costs £3.25  
A shop has a special offer.

Two boxes for £5

How much cheaper **per chocolate** is the special offer?

[3 marks]

$$325 \div 25 = 13p \text{ per chocolate.}$$

$$500 (\div (25 \times 2)) = 10p \text{ per chocolate.}$$

3p cheaper per chocolate.

Answer \_\_\_\_\_ 3 \_\_\_\_\_ pence

Turn over for the next question



- 11 In a game, the player going first uses crosses and the player going second uses circles. To win the game, a player must get three crosses or three circles together in a line. The line must be horizontal, vertical or diagonal.

- 11 (a) Here is the position in a game.

	A	B	C	D	E	F
1					O	
2				O		
3			X	X		
4				X		
5		O			O	
6		X				

It is Amy's turn to put a cross on the grid.

She wins if she puts a cross in B3

Write down **all** the other squares where she could put a cross to win the game.

[2 marks]

Answer B2, E3, C5, D5



Amy goes first in the next game.

	A	B	C	D	E	F
1						
2						
3						
4						
5						
6						

- 11 (b) Assume that she will choose a square at random.

Write down the probability that she will put her first cross in square F6

[1 mark]

Answer                      $\frac{1}{36}$                     

- 11 (c) In fact, Amy decides to put her first cross into a corner square.

What does this mean about the probability that she will put her first cross in square F6?

Tick a box.

It is smaller than the answer to part (b)

It is greater than the answer to part (b)

It is the same as the answer to part (b)

Give a reason for your answer.

[1 mark]

                    As there are 4 squares to chose from ( $\frac{1}{4}$ ).                    



- 12 A dolphin and a whale are drawn to scale.



Dolphin



Whale

The actual length of the dolphin is 3 metres.

Estimate the actual length of the whale.

You **must** show your working.

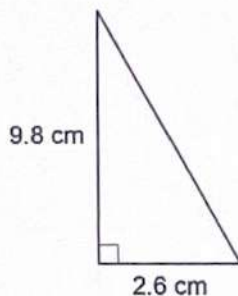
[2 marks]

This whale is 4 times the length of the dolphin. So whale is approx. 12 metres.

Answer 12 metres



- 13 (a) Work out the area of this triangle.



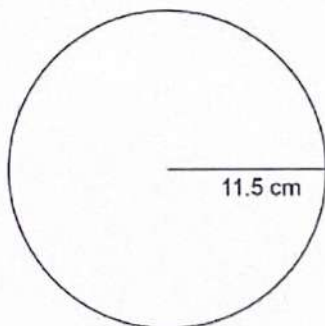
Not drawn  
accurately

[2 marks]

$$\frac{1}{2} \times 2.6 \times 9.8 = 12.74 \text{ cm}^2$$

Answer 12.74 cm<sup>2</sup>

- 13 (b) A circle has a radius of 11.5 cm



Not drawn  
accurately

Work out the area of the circle.

[2 marks]

$$\pi \times (11.5)^2 = 132.25\pi$$

Answer 132.25 × π cm<sup>2</sup>



14 A machine takes 4 seconds to fill a packet of crisps.

14 (a) In total, how many packets can 35 of these machines fill in 8 hours?

[4 marks]

$$60 \times 60 \times 8 = 28800 \text{ seconds in 8 hours.}$$

$$28800 \div 4 = 7200 \text{ packets by one in 8 hours.}$$

$$7200 \times 35 = 252,000 \text{ packets.}$$

Answer 252,000

14 (b) Each packet of crisps contains 32.5 grams of crisps.

At what rate does a machine put the crisps into the packets?

Give your answer in grams per second.

[2 marks]

$$32.5 \div 4 = 8.125 \text{ grams a second.}$$

Answer 8.125 grams per second



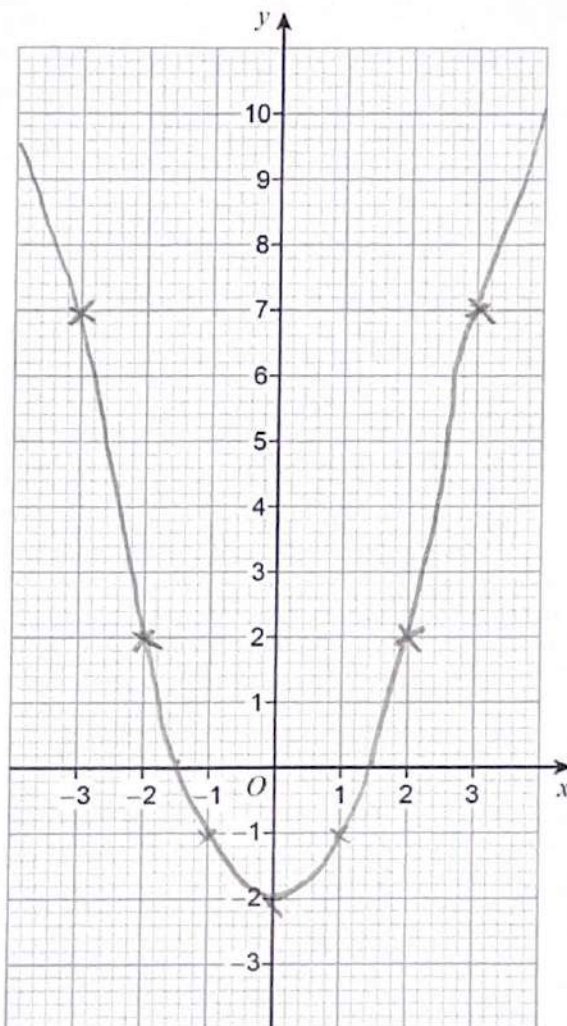
- 15 (a) Complete the table of values for  $y = x^2 - 2$

[1 mark]

$x$	-3	-2	-1	0	1	2	3
$y$	7	2	-1	-2	-1	2	7

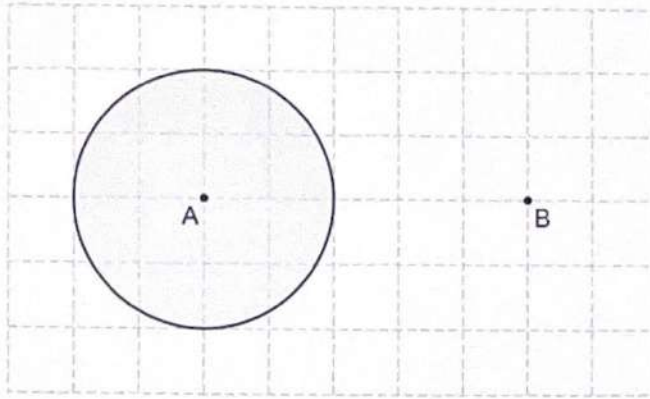
- 15 (b) Draw the graph of  $y = x^2 - 2$  for values of  $x$  from -3 to 3

[2 marks]



16 (a) Towns A and B are shown on a centimetre grid.

Scale: 1 cm represents 10 miles



What does the shaded area represent?

Tick **one** box.

[1 mark]

All the points nearer to A than to B

All the points at least 30 miles from B

All the points halfway between A and B

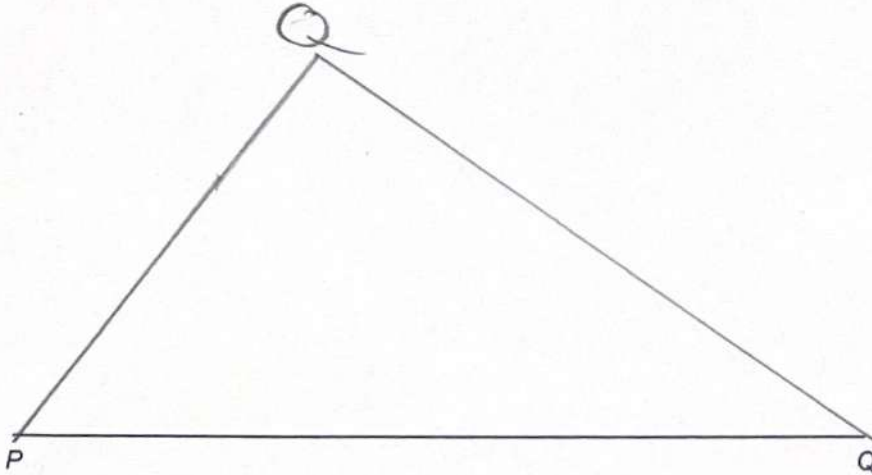
All the points within 20 miles of A





- 16 (b) Complete an accurate drawing of triangle  $PQR$  so that  
angle  $QPR$  is  $53^\circ$   
the length of side  $PR$  is 7.5 cm

[2 marks]



- 17 Multiply out  $5x(3x - 2)$

[2 marks]

$$15x^2 - 10x$$

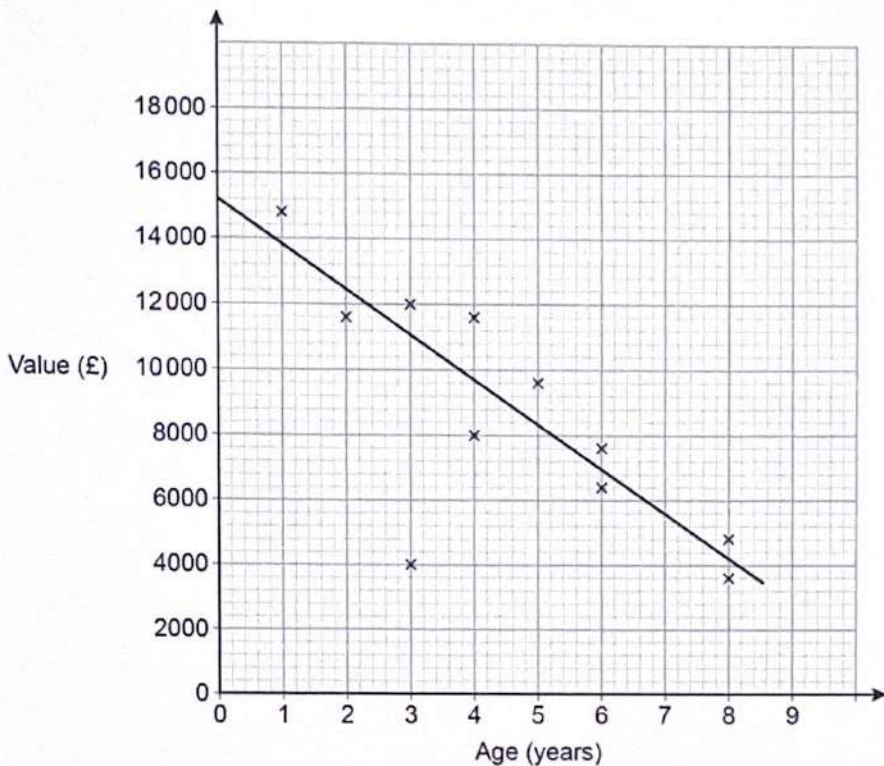
Answer  $15x^2 - 10x$

Turn over for the next question

Turn over ►



- 18 The scatter diagram shows the age and value of some cars in 2019  
All the cars were of the same make and model.



- 18 (a) What type of correlation does the scatter graph show?

[1 mark]

Answer Negative



Do not write  
outside the  
box

- 18 (b) Write down the value of the car that was an outlier.

[1 mark]

Answer £ 4000

- 18 (c) Use the graph to estimate the value of a new car of this make and model in 2019

[1 mark]

Answer £ 15200

- 18 (d) A car of this make and model had a value of £5600 in 2019

Use the graph to estimate the year in which it was made.

[2 marks]

Answer 2012

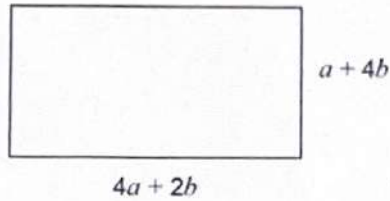
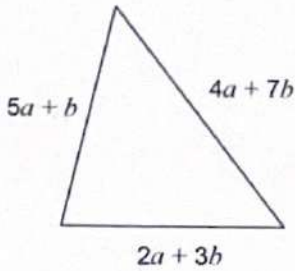
Turn over for the next question

Turn over ►



19

Here are a triangle and a rectangle.

Not drawn  
accurately $a$  and  $b$  are positive numbers.Which shape has the **larger** perimeter?You **must** work out expressions for both perimeters.

[3 marks]

$$5a + b + 4a + 7b + 2a + 3b = 11a + 11b.$$

$$2(4a + 2b) + 2(a + 4b) = 6a + 12b.$$

We cannot tell with knowing one of  $a$  or  $b$ .

Tick a box.

triangle

rectangle

cannot tell



20

The  $n$ th term of a sequence is  $19 - 4n$

What is the **smallest** value of  $n$  that gives a negative term?

[2 marks]

$$\text{When } n=4, \quad 19-4n=3$$

$$n=5, \quad 19-4n=-1.$$

Answer 5

21

What is the name of the **longest** possible chord in a circle?

Circle your answer.

[1 mark]

tangent

circumference

radius

diameter

Turn over for the next question

Turn over ►



- 22 The number of people living in a town is 47 000 to the nearest 1000  
Which **one** of these is a possible number of people living in the town?  
Circle your answer.

[1 mark]

46 000

46 500

47 500

48 000

- 23 Jeff and Kaz share £270 in the ratio Jeff : Kaz = 2.6 : 1

How much **more** than Kaz does Jeff get?

[3 marks]

$$270 \div (2.6 + 1) = 270 \div 3.6 = 75.$$

$$75 \times 2.6 = 195, \quad 75 \times 1 = 75.$$

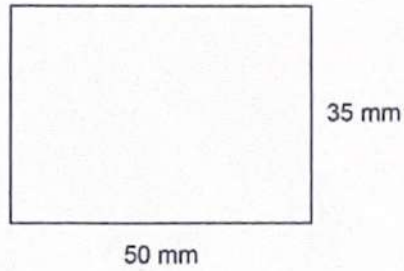
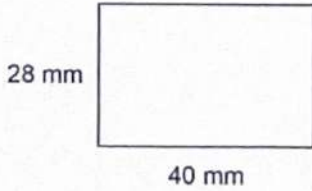
$$195 - 75 = 120.$$

Answer £ 120.



24

Here are two rectangles.

Not drawn  
accurately

Show that the rectangles are similar.

[1 mark]

$$\frac{28}{40} = 0.8. \quad \frac{35}{50} = 0.8.$$

Hence similar.

25

The equation of a straight line is  $2y = 6x + 8$ 

Circle the gradient of the line.

[1 mark]

6

8

3

4



26

At a country park there is a house, a museum and a garden.  
The table shows the prices per person to visit the park.

	Price per person
Garden only	Free
House and museum	£12.50
House only	£8
Museum only	£7

One day, 480 people visit the park.

67 visit the garden **only**.

40% visit the house **and** the museum.

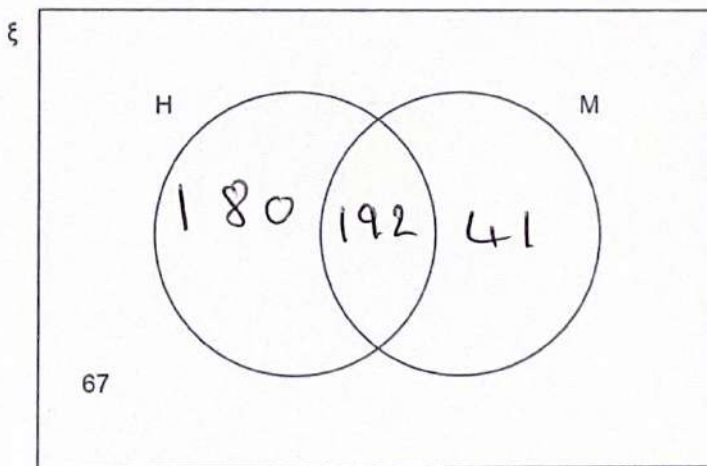
$\frac{3}{8}$  visit the house **only**.

The rest visit the museum **only**.

In total, how much do the 480 people pay to visit the park?

You may use the Venn diagram to help you.

[5 marks]





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outside the  
box

$$480 \times 0.4 = 192 \text{ visited both.}$$

$$480 \times \frac{3}{8} = 180 \text{ visited house only.}$$

$$480 - (180 + 192 + 67) = 41 \text{ visited the museum only.}$$

$$\begin{aligned} \text{Amount paid} &= £12.50 \times 192 + 180 \times 8 + 41 \times 7 \\ &= £4127 \end{aligned}$$

Answer £ 4127.

Turn over for the next question

Turn over ►



27 The heel of a shoe exerts a pressure of 198 pounds per square inch.

Convert this pressure into kilograms per square centimetre.

Use

$$1 \text{ pound} = 0.45 \text{ kilograms}$$

$$1 \text{ square inch} = 6.25 \text{ square centimetres}$$

[3 marks]

$$198 \times 0.45 = 89.1 \text{ kg per square inch}$$

$$89.1 \div 6.25 = 14.256 \text{ kg per square centimetre}$$

Answer 14.256 kg/cm<sup>2</sup>



28

Six positive numbers have  
a mean of 10  
a range of 19

Four of the numbers are 12 7 15 3

Work out the other two numbers.

[3 marks]

$$6 \times 10 - (12 + 7 + 15 + 3) = 60 - 37 = 23.$$

So they add to 23.

Current range is  $15 - 3 = 12$ .

So range of them is 19.

Answer 21 and 2

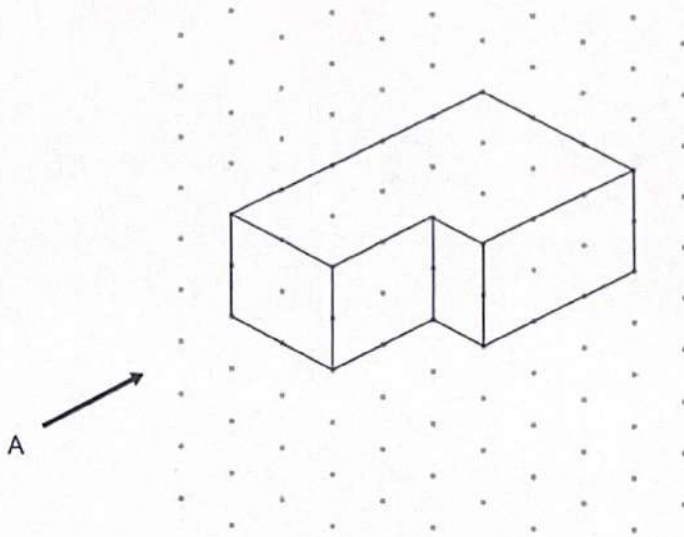
Turn over for the next question



29

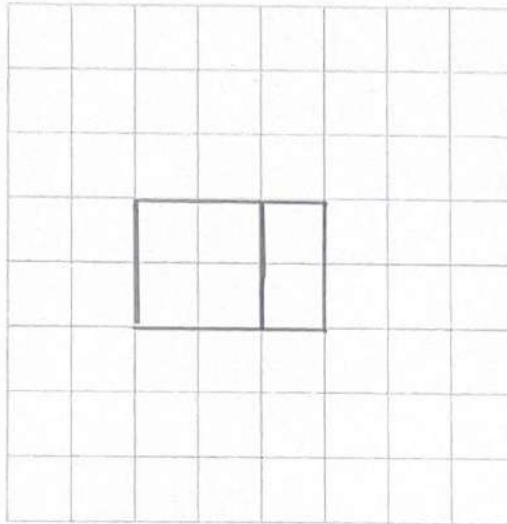
A solid shape is drawn on isometric paper.

Do not write  
outside the  
box



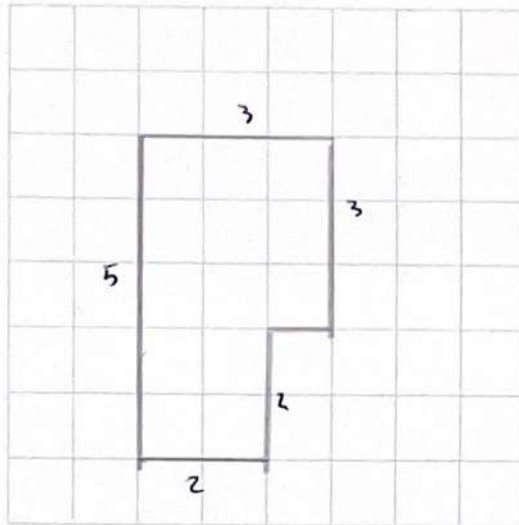
29 (a) On the centimetre grid, draw the elevation of the shape from A.

[1 mark]



- 29 (b) On the centimetre grid, draw a plan of the shape.

[1 mark]



- 30 Erik thinks of a prime number between 20 and 30  
His number is  $x\%$  of 125

Work out **one** possible value of  $x$ .

[3 marks]

Prime between 20 & 30: 23, 29. Choose 29.

$$\frac{29}{125} \times 100 = 23.2$$

29 is 23.2% of 125.

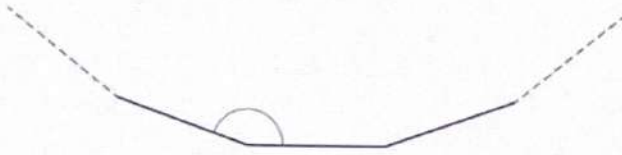
Answer 23.2

Turn over ►



31

Part of a regular polygon with 15 sides is shown.

Not drawn  
accurately

Work out the size of an interior angle.

[2 marks]

$$\text{Sum of internal angles} = (15 - 2) \times 180$$

$$= 2340.$$

There are 15 angles,

$$2340 / 15 = 156^\circ$$

Answer 156 degrees

END OF QUESTIONS

