

Please write clearly in block capitals.

Centre number Candidate number

Surname _____

Forename(s) _____

Candidate signature _____

I declare this is my own work.

GCSE MATHEMATICS

F

Foundation Tier Paper 3 Calculator

Monday 8 June 2020

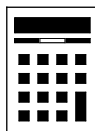
Morning

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.

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	
TOTAL	

Advice

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



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

1 What is 6.2819 to 2 decimal places?

Circle your answer.

[1 mark]

6.2

6.28

6.29

6.3

2 50% of a number is 40 (the number should be twice 40)

Circle the number.

[1 mark]

20

80

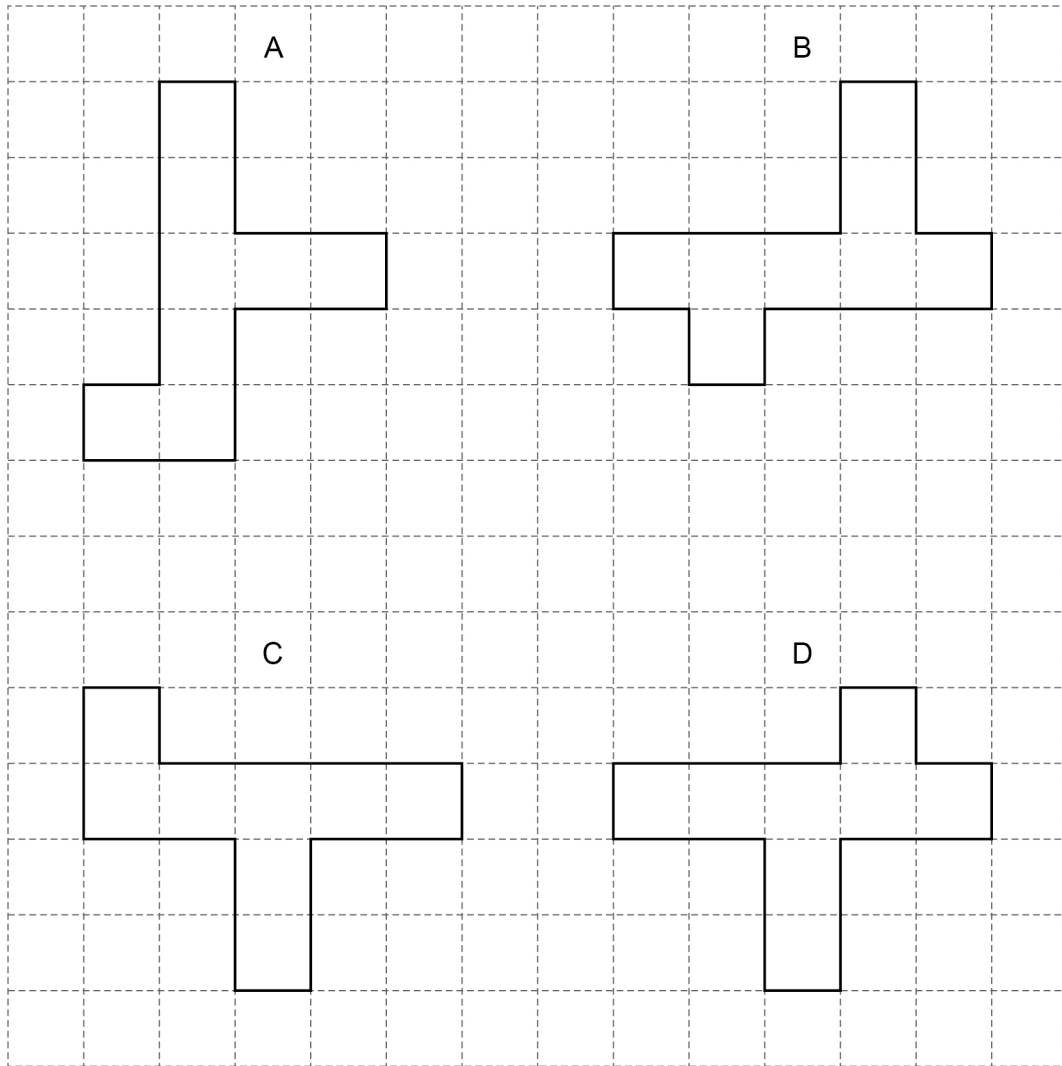
800

2000

3 Circle the correct statement.

[1 mark] $0.07 \geq 0.7$ $0.07 = 0.7$ $0.07 < 0.7$ $0.07 > 0.7$ 

4 Shapes A, B, C and D are on a square grid.



Which two shapes are congruent?

Circle your answer.

[1 mark]

A and C

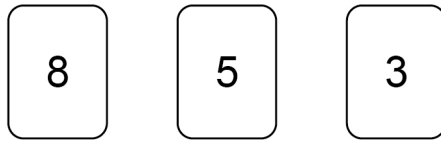
B and A

C and D

D and B



5 Here are three number cards.



5 (a) Use all three cards to make the answer to this calculation a multiple of 10

[1 mark]

$$\boxed{3} \boxed{5} \times \boxed{8}$$

5 (b) Use all three cards to make the answer to this calculation a single-digit number.

[1 mark]

$$\boxed{3} \times \boxed{5} - \boxed{8}$$



- 5 (c) Use all three cards to make this a correct calculation.

[1 mark]

$$\begin{array}{r} \boxed{6} + \boxed{5} \\ \hline \boxed{8} + \boxed{3} \end{array} = 1$$

- 6 Greg wants to buy a games console that costs £267.50
He already has £125
He will save £7.50 each week.

In how many weeks will he have saved enough?

[3 marks]

$$\begin{array}{l} \text{Remaining amount that is needed : } £267.50 - £125 \\ \hline = £142.50 \end{array}$$

$$\begin{array}{l} \text{Number of weeks needed} = 142.50 \div 7.50 \\ \hline = 19 \text{ weeks} \end{array}$$

Answer 19 weeks

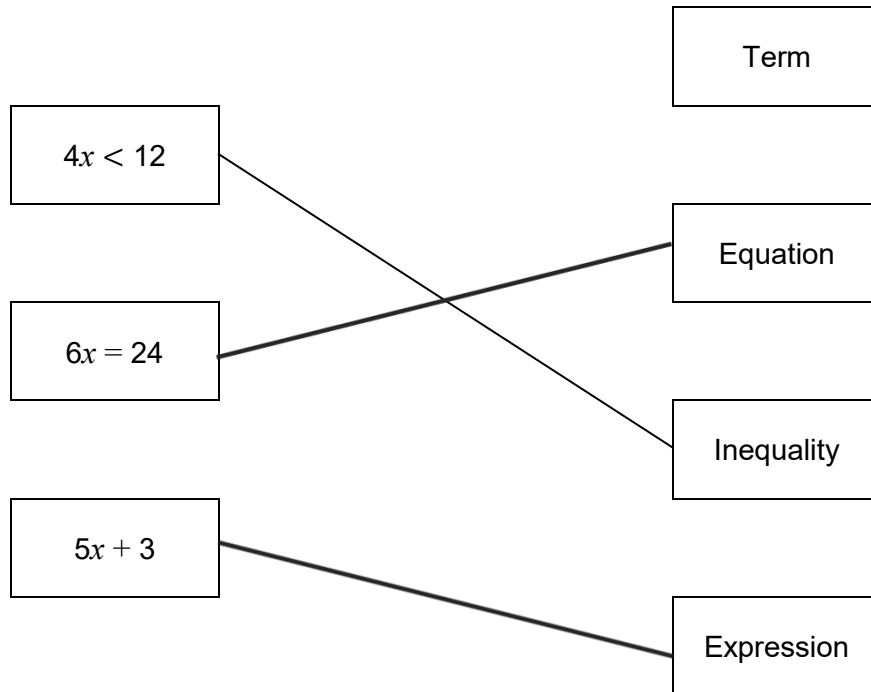
Turn over ►



7

Match the algebra to the correct description.

One has been done for you.

[2 marks]

- 8 A team of two players is picked from these people.

Female	Amy (A) Laura (L)
Male	Erik (E) Rob (R) Tim (T)

The team **must** have one female player and one male player.

Complete this list to show **all** of the possible teams.

[2 marks]

Female player	Male player
A	E
A	R
A	T
L	E
L	R
L	T

Turn over for the next question

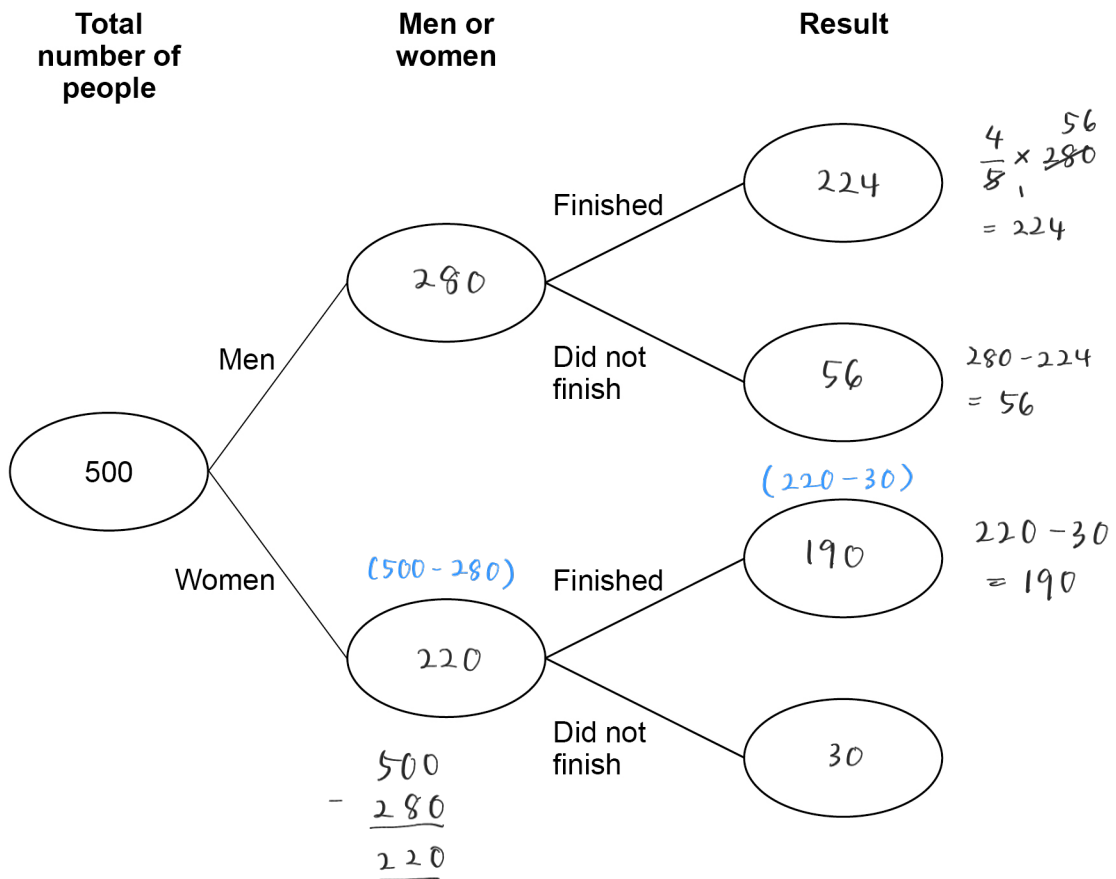
Turn over ►



- 9 500 people started a race.
280 were men and the rest were women.
80% of the men finished the race.
30 women did **not** finish the race.

Complete the frequency tree.

[5 marks]



- 10 Put these three distances in order of size.

1.8 kilometres $1600 \text{ metres} \div 1000 = 1.6 \text{ km}$ $1 \frac{3}{4} \text{ kilometres}$

Start with the shortest.

[2 marks]

$$1600 \text{ m} \div 1000 = 1.6 \text{ km}$$

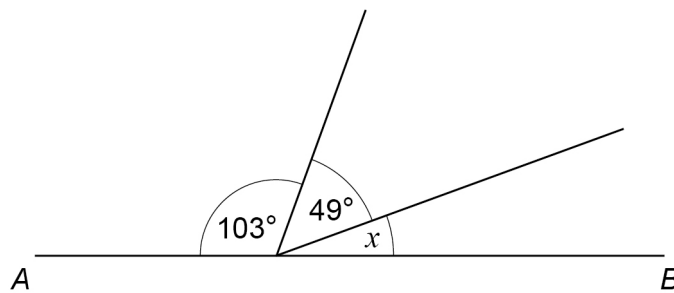
$$1 \frac{3}{4} \text{ km} = 1.75 \text{ km}$$

Shortest distance _____ 1600 metres

_____ $1 \frac{3}{4}$ kilometres

Longest distance _____ 1.8 kilometres

- 11 AB is a straight line.



Not drawn
accurately

Work out the size of angle x .

[2 marks]

$$x = 180^\circ - 103^\circ - 49^\circ$$

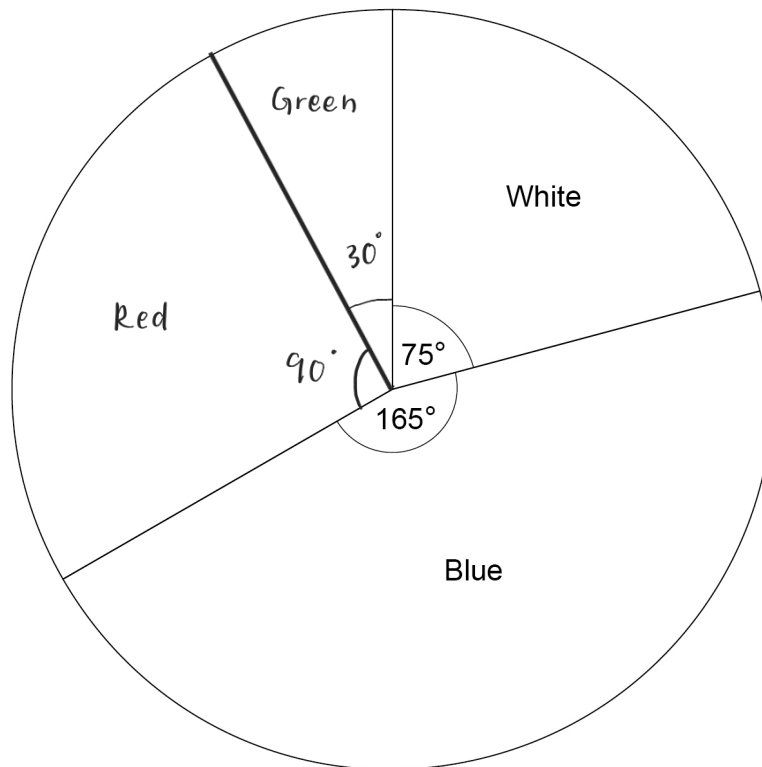
$$x = 28^\circ$$

Answer _____ 28° _____ degrees

Turn over ►



- 12** Some players were asked the shirt colour of their football team.
Each answer was either White, Blue, Red or Green.
A pie chart is drawn to represent the answers.
Two of the sectors are shown.



- 12 (a)** The number who answered Red is three times the number who answered Green.
Complete the pie chart.

[3 marks]

$$\begin{aligned} \text{Red + Green angle} &= 360^\circ - 165^\circ - 75^\circ \\ &= 120^\circ \end{aligned}$$

$$\text{Red} = 3 \times \text{Green}$$

$$120^\circ \div 4 \text{ parts} = 30^\circ$$

$$\begin{array}{l} \times 30^\circ \quad 3 = 1 \quad \times 30^\circ \\ \quad \quad \quad \downarrow \quad \quad \quad \downarrow \\ \quad \quad \quad 90^\circ = 30^\circ \end{array}$$

$$1 \text{ part} = 30^\circ$$



12 (b) There were 600 players altogether.

How many players answered White?

[2 marks]

$$\frac{75^\circ}{360^\circ} \times 600 = 125 \text{ players}$$

Answer _____ 125 players _____

13 Milly has an equal number of 20p coins and 50p coins.

The value of her 20p coins is £2.80

Work out the **total** value of her 20p and 50p coins.

[3 marks]

$$\begin{aligned} \text{Number of 20p coins} &= \text{£} 2.80 \div \text{£} 0.20 \\ &= 14 \text{ coins} \end{aligned}$$

$$\begin{aligned} \text{Value of her 50p coins} &= 14 \times \text{£} 0.50 \\ &= \text{£} 7 \end{aligned}$$

$$\begin{aligned} \text{Total value of both coins} &= \text{£} 7 + \text{£} 2.80 \\ &= \text{£} 9.80 \end{aligned}$$

Answer £ _____ 9.80 _____



- 14 Here are ticket prices for a theme park.

Single tickets	
Adult	£48
Child	£26
Special offer tickets	
1 adult and 2 children	£82
2 adults and 2 children	£120

- 14 (a) Freya buys tickets for 3 adults and 4 children.
She pays the cheapest possible total cost.

How much does she save compared to buying all single tickets?

[4 marks]

$$\begin{aligned} \text{Total cost Freya pays} &: £82 + £120 \\ &= £202 \end{aligned}$$

Individual tickets :

$$1 \text{ Adult} : £48$$

$$3 \text{ Adults} : £48 \times 3$$

$$: £144$$

$$1 \text{ Child} : £26$$

$$4 \text{ Children} : £26 \times 4$$

$$: £104$$

$$\text{Total Individual Tickets} : £104 + £144$$

$$: £248$$

$$\text{Answer } £ \quad 46$$



- 14 (b)** Leroy buys 5 single adult tickets.
He uses a voucher that reduces the price of tickets by a quarter.
In total, how much does he pay?

[3 marks]

$$\text{Original Adult ticket : 1 Adult : } \pounds 48$$

$$\text{Ticket after voucher} = (1 - \frac{1}{4}) \times 48 = \frac{3}{4} \times 48 = \pounds 36$$

$$1 \text{ Adult : } \pounds 36 \text{ (after discount)}$$

$$5 \text{ Adults : } \pounds 36 \times 5$$

$$: \pounds 180$$

Answer \pounds 180

- 15** n is negative.

Circle the expression that is **positive**.

[1 mark]

$n - 1$

n^2

n^3

$\frac{1}{n}$

Turn over for the next question

Turn over ►



16 Here is a formula.

$$y = 3.6x$$

16 (a) Draw the graph of $y = 3.6x$ for values of x from 0 to 20

[2 marks]

$$y = 3.6x$$

$$y \text{ intercept} = 0$$

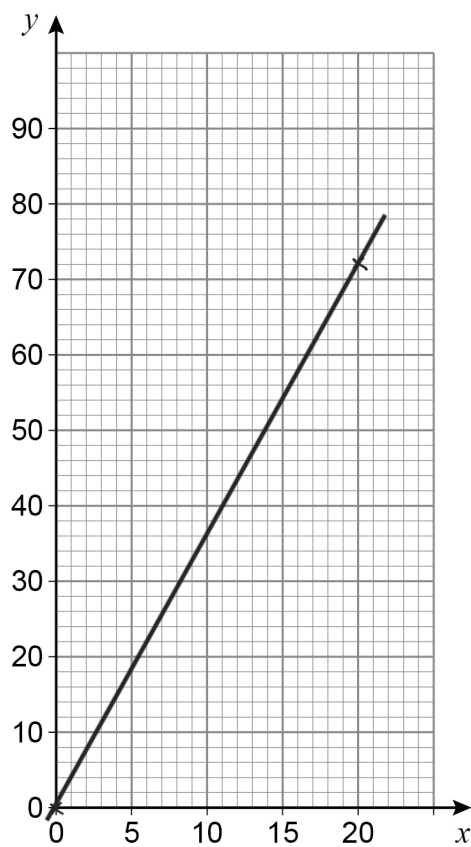
$$\text{When } x = 0, y = 0$$

$$(0, 0)$$

$$\text{When } x = 20,$$

$$y = 3.6 \times 20 = 72$$

$$(20, 72)$$



In the formula $y = 3.6x$

y is speed in kilometres per hour (km/h)

x is speed in metres per second (m/s)

16 (b) Convert 50 km/h to m/s

Give your answer to the nearest whole number.

[1 mark]

$$\frac{50 \text{ km} \times 1000}{1 \text{ h} \times 60 \times 60} = \frac{50\,000}{3600} = 13.888 \dots \approx 14$$

Answer 14 m/s

16 (c) Convert 30 m/s to miles per hour.

Use 1 mile per hour = 1.61 km/h

[3 marks]

$$\begin{aligned} & \text{m/s} \rightarrow \text{km/h} \\ \frac{30 \text{ m}}{1 \text{ s}} \div (60 \times 60) &= \frac{0.03}{1 \div 3600} = 0.03 \times 3600 = 108 \text{ km/h} \end{aligned}$$

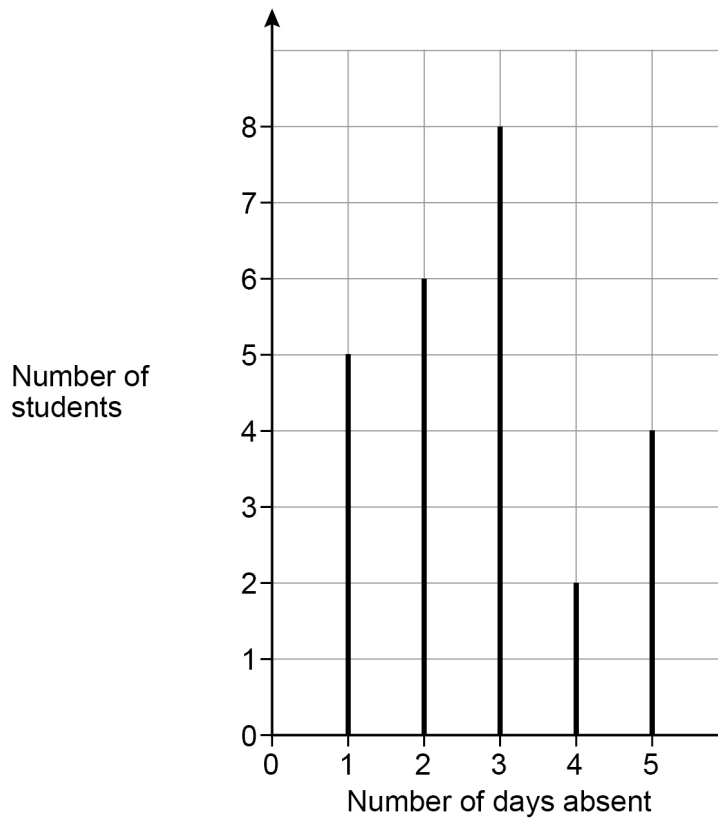
$$\begin{aligned} 108 \text{ km/h} \div 1.61 \text{ km/h} &= 67.08 \text{ miles per hour} \\ &\approx 67.1 \text{ miles per hour} \end{aligned}$$

Answer 67.1 miles per hour

Turn over for the next question



- 17 A record was kept of the number of days that 25 students were absent one term. The chart represents the results.



- 17 (a) Work out the mean number of days absent.

[3 marks]

$$\text{Number of days absent} = 1(5) + 2(6) + 3(8) + 4(2) + 5(4)$$

$$= 5 + 12 + 24 + 8 + 20$$

$$= 69$$

$$\text{Mean number of days absent} = 69 \div 25$$

$$= 2.76 \text{ days}$$

Answer 2.76



17 (b) One of the students is chosen at random.

Work out the probability that the student was absent for **less than** 4 days.

[2 marks]

$$\begin{aligned} \text{Number of students absent for } < 4 \text{ days} &: 5 + 6 + 8 \\ &= 19 \end{aligned}$$

$$P(< 4 \text{ days}) = 19/25$$

Answer $\frac{19}{25}$

18 Bobbi has these notes.

Note	Number of notes
£5	3
£10	x

The total value of her notes is £ T

Write a formula for T in terms of x .

[2 marks]

$$T = 5(3) + 10(x)$$

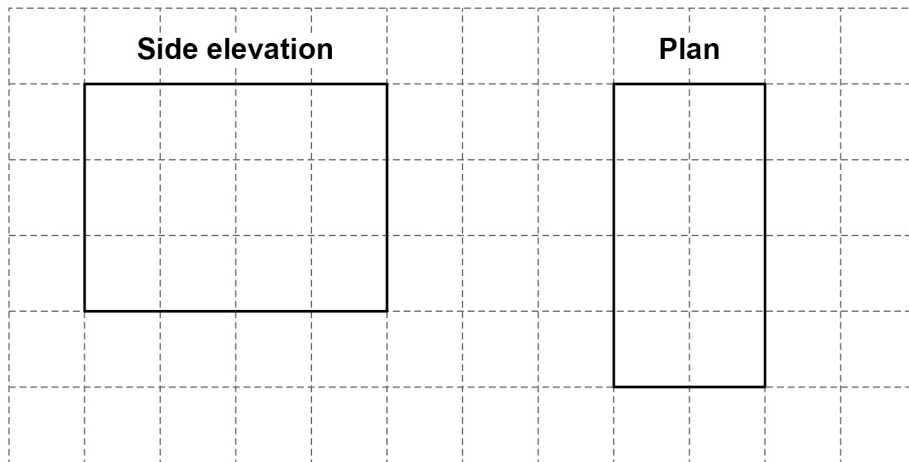
$$T = 15 + 10x$$

Answer $T = 15 + 10x$

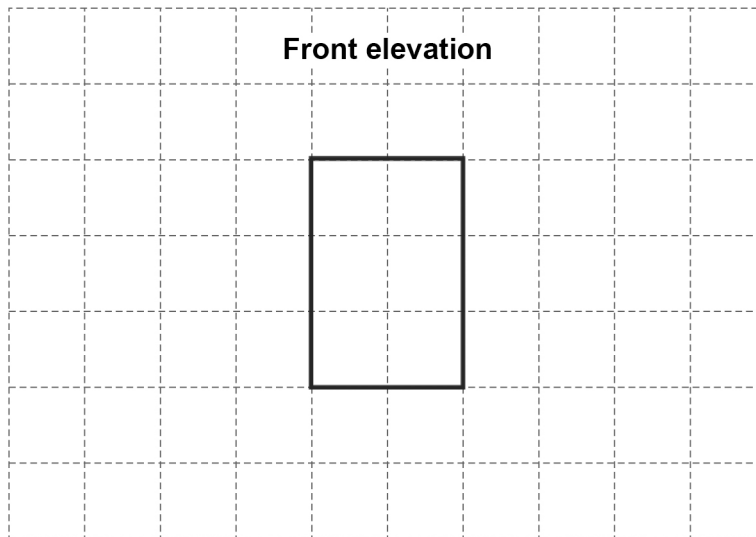


19

The side elevation and plan of a cuboid are shown on the centimetre grid.



Draw the front elevation of the cuboid on this centimetre grid.

[2 marks]

20 To the nearest 1000, there are 18 000 people at a festival.

20 (a) Write down the minimum possible number of people at the festival.

$$\text{Error interval} = 1000 \div 2 = 500 \quad \text{Lower limit} = 18000 - 500 = 17500 \quad [1 \text{ mark}]$$

Answer 17500

20 (b) Write down the maximum possible number of people at the festival.

$$\text{Error interval} = 500 \quad \text{Upper limit} = 18000 + 500 = 18500 \quad [1 \text{ mark}]$$

Answer 18 499 (answer must be less than 18 500)

21 Circle the equation of the line parallel to $y = 5x + 2$

[1 mark]

$$y = 2x + 5$$

$$y = 5x - 2$$

$$y = -5x + 2$$

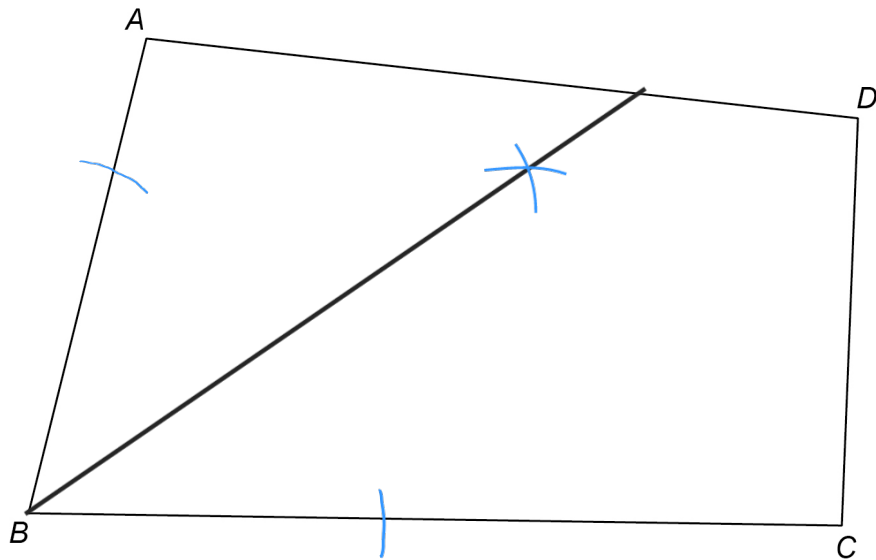
$$y = -2x - 5$$

Turn over for the next question

Turn over ►



22

 $ABCD$ represents the plan of a field.

There is a path across the field that
starts at B
is the same distance from BA and BC .

Using ruler and compasses, show the position of the path.

[2 marks]

23

 a is two times b .Circle the ratio $a : b$

[1 mark]

1 : 3

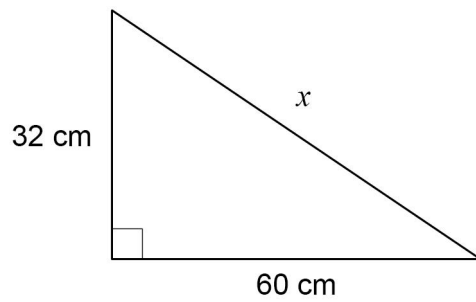
3 : 1

1 : 2

2 : 1



24

Use Pythagoras' theorem to work out the value of x .Not drawn
accurately**[3 marks]**

$$x^2 = (32)^2 + (60)^2$$

$$= 4624$$

$$x = \sqrt{4624}$$

$$= 68 \text{ cm}$$

Answer 68 cm

Turn over for the next question

Turn over ►



25

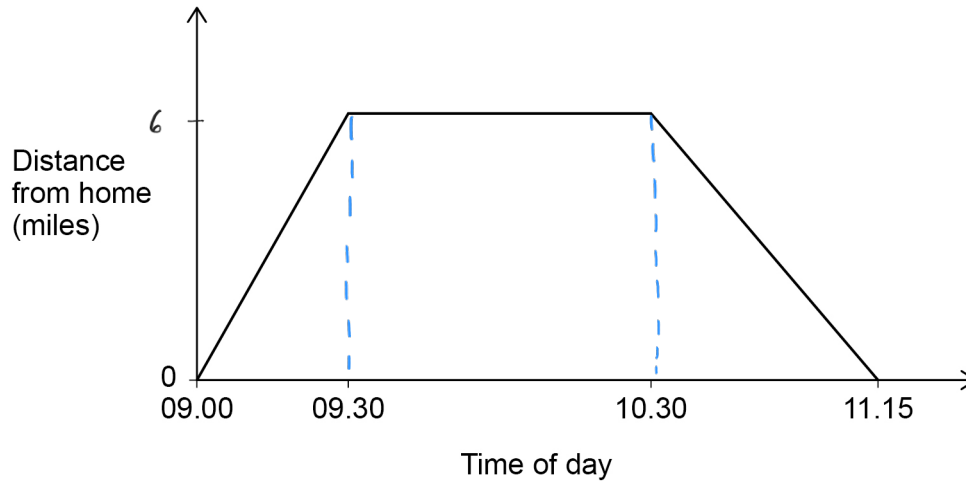
Chris visits a library.

He cycles to the library in half an hour at a speed of 12 miles per hour.

He stays at the library for one hour.

He then cycles home.

The sketch graph represents his visit.



Work out the speed, in miles per hour, at which Chris cycles home.

[3 marks]

$$\begin{aligned} \text{Distance travelled to the library} &= 12 \text{ miles per hour} \times 0.5 \text{ hour} \\ &= 6 \text{ miles} \end{aligned}$$

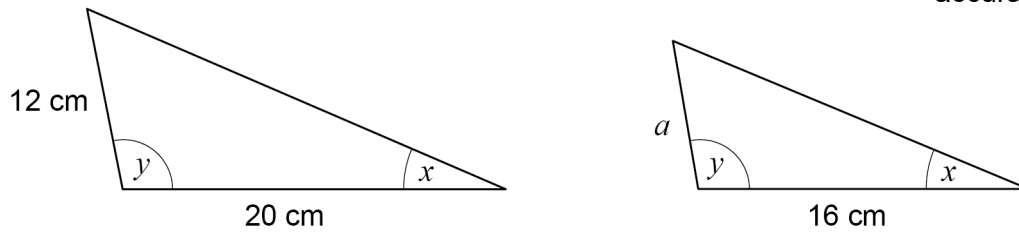
$$\text{Time taken to cycle home} = 10:30 \text{ to } 11:15 = 45 \text{ mins}$$

$$45 \text{ mins} / 60 \text{ mins} = 0.75 \text{ hour} \quad \text{Speed home} : 6 / 0.75 = 8 \text{ mph}$$

Answer 8 mph

26

These two triangles are similar.

Not drawn
accuratelyWork out the value of a .

[2 marks]

$$20 \div 16 = 1.25 \quad \div 1.25 \quad 20 = 12 \quad \div 1.25$$

$$12 \div 1.25 = 9.6 \quad 16 = 9.6$$

$$a = 9.6 \text{ cm}$$

Answer 9.6 cm

27

Circle the expression that is equivalent to $(x-1)^2$

[1 mark]

$x^2 - 1$

$x^2 + 1$

$x^2 - 2x - 1$

$x^2 - 2x + 1$

$$= (x-1)(x-1)$$

$$= x^2 - x - x + 1$$

$$= x^2 - 2x + 1$$

Turn over for the next question

Turn over ►



28

Here is some information about 26 houses.

 a , b and c are all **different** numbers.

Number of bedrooms	Number of houses
1	7
2	a
median → 3	b
4	c
5	8

Handwritten notes: A blue bracket on the right groups the first two rows (1 and 2 bedrooms) with the value 13. Another blue bracket groups the last two rows (4 and 5 bedrooms) with the value 13. A blue arrow points to the value 3 in the 'Number of bedrooms' column, with the word 'median' written next to it.

The median number of bedrooms is 3.5

Work out a possible set of values for a , b and c .**[3 marks]**

$$26 \div 2 = 13$$

$$a = 4 \quad b = 2 \quad (\text{any different numbers that add up to } 6)$$

$$7 + a + b = 13$$

$$a + b = 13 - 7$$

$$8 + c = 13$$

$$a + b = 6$$

$$c = 13 - 8 = 5$$

$$a = \underline{\quad 4 \quad}$$

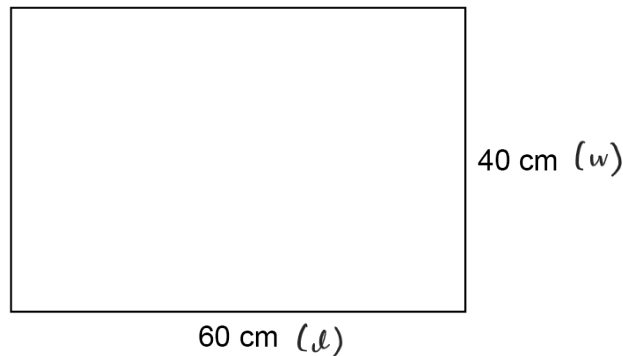
$$b = \underline{\quad 2 \quad}$$

$$c = \underline{\quad 5 \quad}$$



29

A rectangle has length 60 cm and width 40 cm

Not drawn
accurately

The length decreases by 15%

The width decreases by 10%

Sue says,

"The perimeter decreases by 25% because 15% + 10% is 25%"

Is she correct?

You **must** show calculations to support your answer.**[4 marks]**

$$\begin{aligned} \text{new length} &= (1 - 0.15) \times 60 \\ &= 0.85 \times 60 = 51 \text{ cm} \end{aligned}$$

$$\begin{aligned} \text{new width} &= (1 - 0.1) \times 40 \\ &= 0.9 \times 40 = 36 \text{ cm} \end{aligned}$$

$$\begin{aligned} \text{New perimeter} &= 2(51) + 2(36) \\ &= 174 \text{ cm} \end{aligned}$$

No, Sue is incorrect.

$$\begin{aligned} \text{Original perimeter} &= 2(60) + 2(40) \\ &= 200 \end{aligned}$$

The perimeter decreases
by 13%.

$$\text{Difference in perimeter} = 200 - 174 = 26$$

$$\text{Percentage decrease} = \frac{26}{200} \times 100 = 13\%$$



30 Expand and simplify fully $4(2c + 3) - (5c - 1)$

[2 marks]

$$= 4(2c + 3) - (5c - 1)$$

$$= 8c + 12 - 5c + 1$$

$$= 8c - 5c + 12 + 1$$

$$= 3c + 13$$

Answer $3c + 13$

31 $\mathbf{c} = \begin{pmatrix} 4 \\ 9 \end{pmatrix}$ $\mathbf{d} = \begin{pmatrix} 2 \\ -5 \end{pmatrix}$

Work out $4\mathbf{c} + 3\mathbf{d}$

$$4 \begin{pmatrix} 4 \\ 9 \end{pmatrix} + 3 \begin{pmatrix} 2 \\ -5 \end{pmatrix} = \begin{pmatrix} 4 \times 4 \\ 4 \times 9 \end{pmatrix} + \begin{pmatrix} 3 \times 2 \\ 3 \times (-5) \end{pmatrix}$$

[2 marks]

$$= \begin{pmatrix} 16 \\ 36 \end{pmatrix} + \begin{pmatrix} 6 \\ -15 \end{pmatrix}$$

$$= \begin{pmatrix} 16+6 \\ 36-15 \end{pmatrix} = \begin{pmatrix} 22 \\ 21 \end{pmatrix}$$

Answer $\begin{pmatrix} 22 \\ 21 \end{pmatrix}$

END OF QUESTIONS



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3 2



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