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I declare this is my own work.

GCSE MATHEMATICS

F

Foundation Tier

Paper 1 Non-Calculator

Shadow paper based on November 2021 question paper

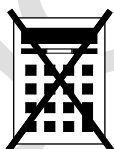
Time allowed: 1 hour 30 minutes

Materials

For this paper you must have:

- mathematical instruments.

You must **not** use a calculator.



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	
TOTAL	

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

Do not write
outside the
box

1 Circle the answer to 0.6×10 **[1 mark]**

0.6

6

60

600

2 Circle the expression that is equal to $y - y + y$ **[1 mark]**

y

$2y$

$3y$

$-y$

3 What is 260 centimetres in metres?
Circle your answer. **[1 mark]**

0.26 m

2.6 m

26 m

260 m

- 4 Which shape **can** have sides with lengths that are all different?
Circle your answer.

[1 mark]

square

triangle

parallelogram

rectangle


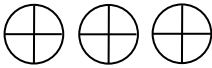
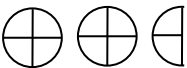
- 5 Work out $6 \times (-7)$

[1 mark]

Answer _____

Turn over for the next question

- 7 Zahid counted the pieces of three types of furniture he had repaired at his workshop. He draws a pictogram to show the results.

	Key:  represents 4 pieces of furniture
Table	
Chair	
Sideboard	

- 7 (a) Zahid had repaired 7 sideboards.

Show this information on the pictogram.

[1 mark]

- 7 (b) Zahid spent 45 minutes repairing each chair.

Work out the **total** time he spent repairing chairs.

Give your answer in hours and minutes.

[3 marks]

Answer _____ hours _____ minutes

8

A travel company is taking some passengers on a sea trip.

They can use sailing boats or speedboats.

Each sailing boat can carry 41 passengers.

Each speedboat can carry 7 passengers.

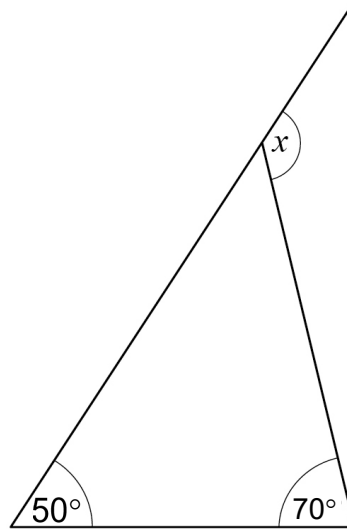
The passengers going on the trip would exactly fill two sailing boats.

If the company uses only speedboats, how many will they need?

[4 marks]

Answer _____

- 9 One side of a triangle is extended.



Not drawn
accurately



Circle the size of angle x .

[1 mark]

120°

60°

70°

50°

- 10 Paul uses his calculator to work out 456×5634

Circle the **last** digit in the answer.

[1 mark]

2

4

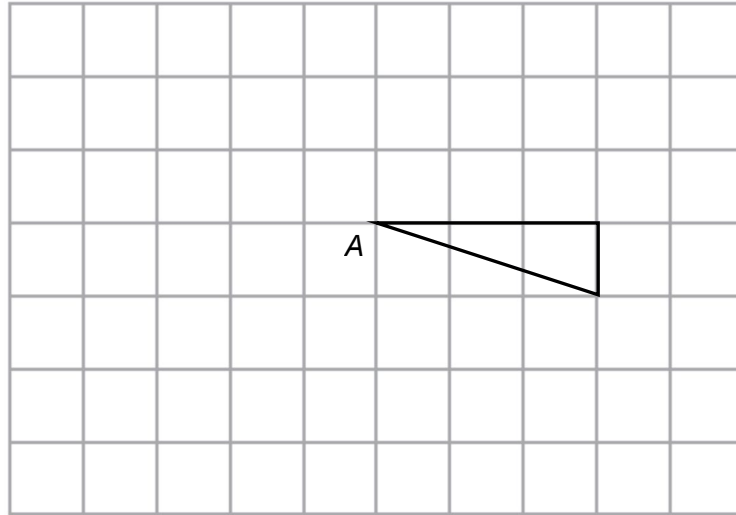
6

8

Turn over for the next question

- 11 Complete the diagram so that it has
rotational symmetry of order 4
centre of rotation at point A.

[2 marks]



13

Karen records the number of lorries boarding a ferry each hour for 24 hours.

Here are the results.

46 30 47 63 52 41 34 28 49 45 40 57
48 27 23 28 23 45 20 17 6 28 41 67

Karen makes this tally and frequency chart to put the data into groups.

Number of lorries	Tally	Frequency
0 to 10		
10 to 20		
20 to 30		
30 to 40		
40 to 50		
50 to 60		

Make **two** criticisms of Karen's tally and frequency chart.

You do **not** need to complete the chart.

[2 marks]

Criticism 1 _____

Criticism 2 _____

- 14** Counters in a bag are yellow, green or red.
A counter is picked at random.
Complete the table.

[2 marks]

	Yellow	Green	Red
Probability	0.45	0.3	

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

15 Here is a calculation.

$$53 \times 72 = 3816$$

You can use the calculation to help answer the following questions.

15 (a) Work out $3816 \div 72$

[1 mark]

Answer _____

15 (b) Work out 5.3×7.2

[1 mark]

Answer _____

15 (c) Work out 53×73

[2 marks]

Answer _____

- 16** A security code has 60 characters.
It is made up of 30 letters, 12 numbers and some symbols.
Work out the ratio letters : numbers : symbols
Give your answer in its simplest form.

[2 marks]

Answer _____ : _____ : _____

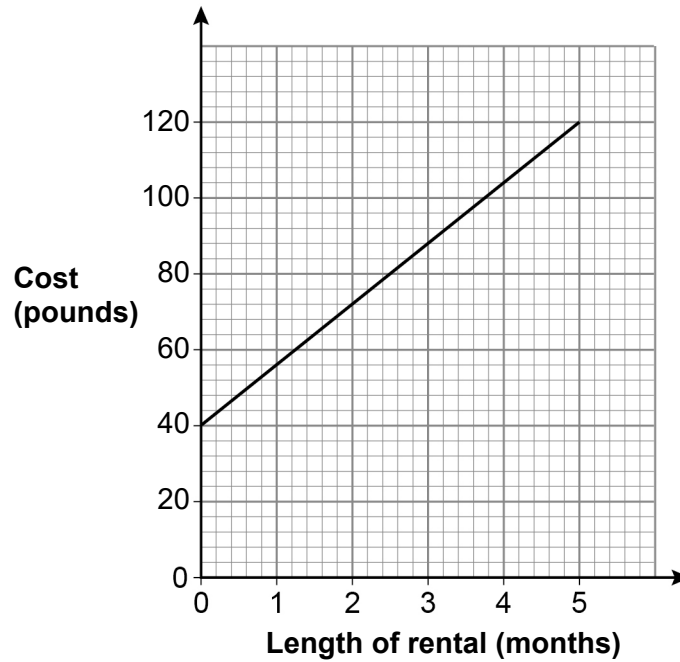
- 17** Work out $\frac{7}{8} + \frac{9}{16}$
Give your answer as a mixed number.

[3 marks]

Answer _____

- 18** The cost of renting a storage unit is
a fixed charge
and
a charge per month.

The costs of renting a storage unit up to 5 months are represented by the graph.



- 18 (a)** Write down the fixed charge.

[1 mark]

Answer _____ pounds

18 (b) Work out the charge per month.

[2 marks]

Answer _____ pounds

18 (c) Work out the cost of a renting a storage unit for 7 months.

[2 marks]

Answer _____ pounds

Turn over for the next question

19

A company sells boxes of bolts and boxes of washers.

Here are the numbers of items in 11 boxes of bolts.

65 60 59 61 65 57 64 60 59 65 67

Here are the numbers of items in 10 boxes of washers.

56 57 57 58 58 60 63 64 64 64

The company claims that the average number of items per box is at least 60

Using medians, is the company's claim correct for each type of item?

You **must** work out the median for bolts and the median for washers.

[4 marks]

Bolts _____

Tick a box for bolts.

Yes

No

Washers _____

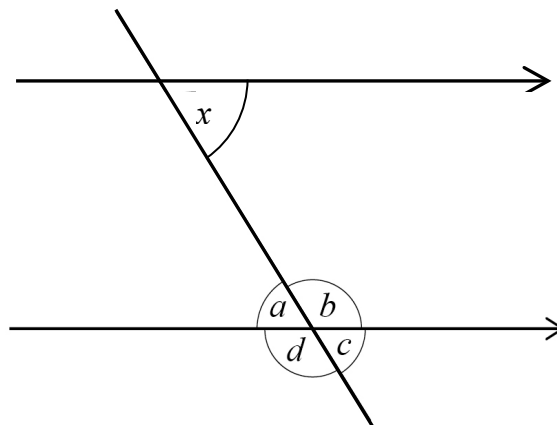
Tick a box for washers.

Yes

No

- 20 Firoz tries to work out $\frac{39.17 + 76.78}{19.84}$
- His answer is 14.92
- By rounding each number to the nearest 10, show that his answer is incorrect. [3 marks]

- 21 A straight line passes through two parallel lines.



Not drawn
accurately

Circle the angle that is **alternate** to angle x .

[1 mark]

a

b

c

d

22 (a) Jackie wants to simplify $7p - (5q - 3p)$

She writes $4p - 5q$

Is she correct?

Tick a box.

Yes

No

Give a reason for your answer.

[1 mark]

22 (b) Jackie also wants to simplify $4a^3 \times 7a^5$

She says,

“Multiply 4 and 7, then multiply 3 and 5”

Her answer is $28a^{15}$

Tick a box for each part of her method.

[1 mark]

	Correct	Not correct
Multiply 4 and 7	<input type="checkbox"/>	<input type="checkbox"/>
Multiply 3 and 5	<input type="checkbox"/>	<input type="checkbox"/>

22 (c) Jackie thinks of a number.

$$20 \times \text{the number} = 80 \div \text{the number}$$

Give a possible value of the number.

[1 mark]

Answer _____

23 Adam's age is 3 years and 6 months.

Zara's age is 2 years and 11 months.

Write Adam's age in months as a fraction of Zara's age in months.

Give your fraction in its simplest form.

[2 marks]

Answer _____

24

Working alone, it takes Kai 3 hours to concrete an area of 8 m^2

Kai and Jade are going to concrete an area of 24 m^2

Jade says,

“Working together at the same rate it will take us 9 hours, because 24 is 3×8 ”

Is she correct?

Tick a box.

Yes

No

Give a reason for your answer.

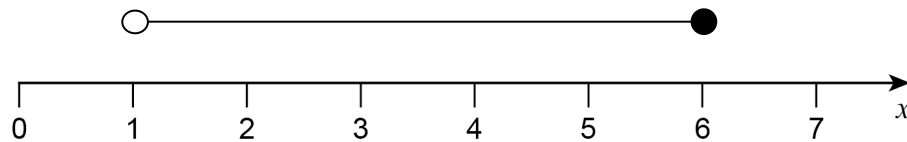
[1 mark]

25 (a) Solve $7x + 3 > 5x + 10$

[3 marks]

Answer _____

25 (b) Write down the inequality represented by the number line.

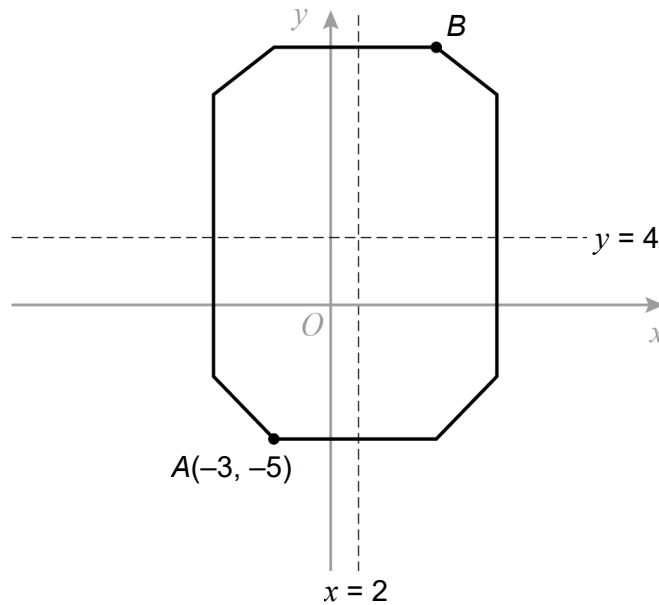


[2 marks]

Answer _____

26

The diagram shows an octagon.

Not drawn
accurately

$x = 2$ and $y = 4$ are lines of symmetry.

Work out the coordinates of point B .

[2 marks]

Answer (_____ , _____)

- 27 (a)** Work out $3000 \times 60\,000$
Give your answer in standard form.

[2 marks]

Answer _____

- 27 (b)** Work out $\frac{2.1 \times 10^3}{3 \times 10^{-2}}$
Give your answer as an ordinary number.

[2 marks]

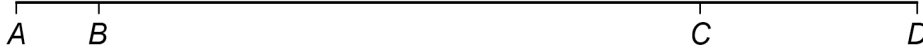
Answer _____

Turn over ►

28

A , B , C and D are markers on a park run route.

Not drawn
accurately



distance $CD = 2 \times$ distance AB

distance $BC = 4$ km

Sheena runs from A to C .

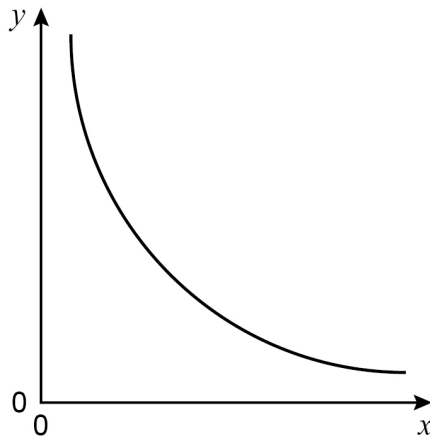
She runs for 30 minutes at an average speed of 14 km per hour.

Work out the distance AD .

[4 marks]

Answer _____ km

29 Here is a sketch of a graph.



Circle the equation of the graph.

[1 mark]

$$y = x$$

$$y = 1 + x$$

$$y = \frac{1}{x}$$

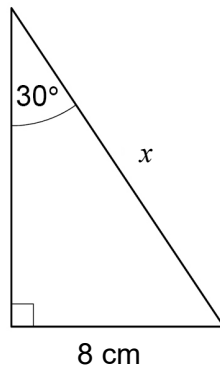
$$y = 1 - x$$

30 Write 360 as a product of prime factors.
Give your answer in index form.

[3 marks]

Answer _____

- 31 Here is a right-angled triangle.



Not drawn
accurately

Use trigonometry to work out the value of x .

[3 marks]

Answer _____ cm

- 32 Factorise $x^2 + 10x + 21$

[2 marks]

Answer _____

END OF QUESTIONS

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outside the
box*

**DO NOT WRITE ON THIS PAGE
ANSWER IN THE SPACES PROVIDED**



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GCSE MATHEMATICS

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Foundation Tier

Paper 2 Calculator

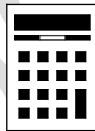
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22–23	
24–25	
TOTAL	

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

1 Circle the factor of 36

[1 mark]

72

18

5

14

2 y is 5 more than x .

Circle the correct equation.

[1 mark]

$$y = 5x$$

$$y = x - 5$$

$$y = x + 5$$

$$y = \frac{x}{5}$$

3 Circle the value of 0.6 as a fraction.

[1 mark]

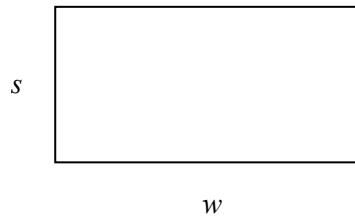
$\frac{3}{5}$

$\frac{2}{3}$

$\frac{7}{20}$

$\frac{3}{50}$

4 Here is a rectangle.



Circle the expression for the **area**.

[1 mark]

$2s + 2w$

$s + w$

sw

$2sw$

5 Work out the value of $a^2 + 3a$ when $a = 4$

[2 marks]

Answer _____

Turn over for the next question

Turn over ►

- 6** 16 people were asked to name their favourite cake.
Here are the results.

Favourite cake	Frequency
Sponge	7
Fruit	3
Carrot	1
Walnut	5

- 6 (a)** One of the people was picked at random.
Work out the probability that their favourite cake was carrot or walnut.

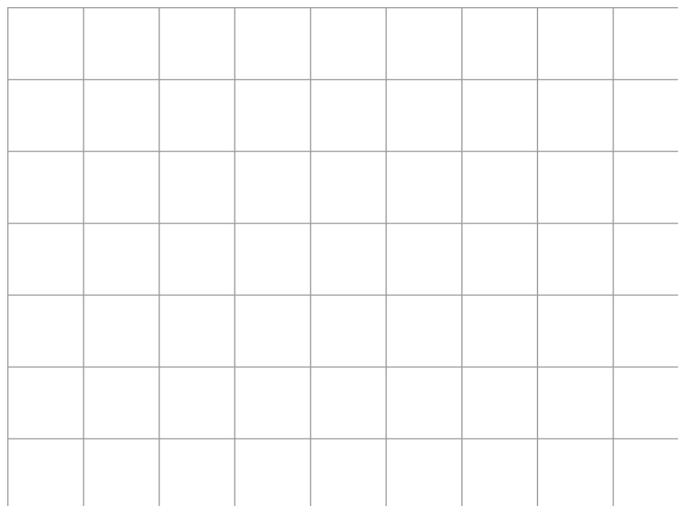
[1 mark]

Answer _____

- 6 (b)** On the grid, draw a bar chart to represent the results.

[3 marks]

Favourite cake



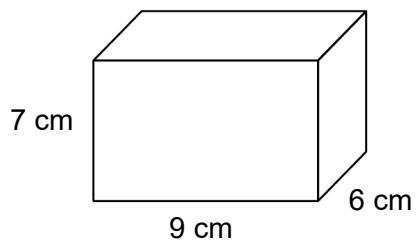
7 8 pies £11.92

Work out the cost of 13 of these pies.

[2 marks]

Answer £ _____

8 Here is a cuboid.



Work out the volume.

[1 mark]

Answer _____ cm^3

- 9** Work out two numbers that
are multiples of 7
and
have a difference of 28

[2 marks]

Answer _____ and _____

- 10** Convert 20 kilometres into miles.
Use $8 \text{ km} = 5 \text{ miles}$

[2 marks]

Answer _____ miles

- 11 Anita spends these amounts in three shops using 50p coins, 20p coins, 10p coins and 5p coins.

Shop A	75p
Shop B	45p
Shop C	£1.35

In each shop she
pays the exact amount
uses the **smallest** possible number of coins.

Work out the total number of each coin she uses.

[3 marks]

Number of 50p coins _____

Number of 20p coins _____

Number of 10p coins _____

Number of 5p coins _____

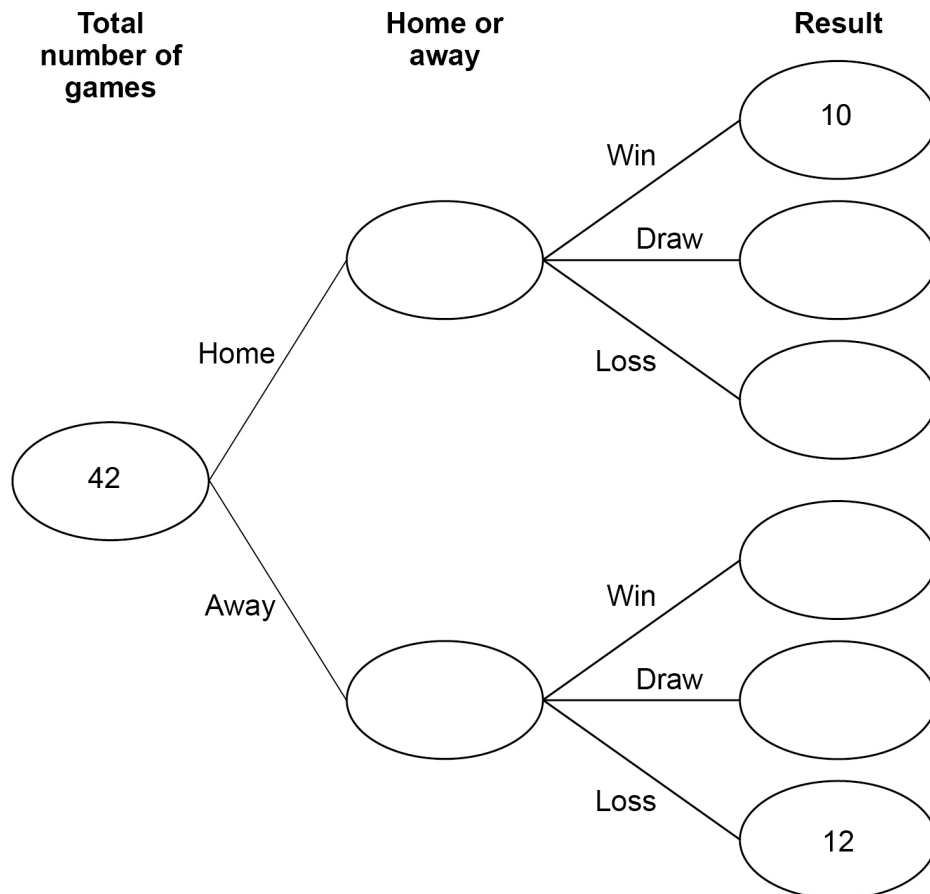
- 12** A sports team played 42 games.
Half were home games and half were away games.
Each game was a win, a draw or a loss.

Of the **home** games, $\frac{1}{3}$ were losses.

Of the **away** games, $\frac{1}{7}$ were wins.

- 12 (a)** Complete the frequency tree.

[4 marks]



- 12 (b)** The team gets
3 points for a win
1 point for a draw
0 points for a loss.

Work out the **total** number of points that the team got.

[2 marks]

Answer _____

- 13** Factorise fully $4x + 12$

[2 marks]

Answer _____

14 Some sweets are yellow or orange in the ratio yellow : orange = 2 : 7

What fraction of the sweets are yellow?

Circle your answer.

[1 mark]

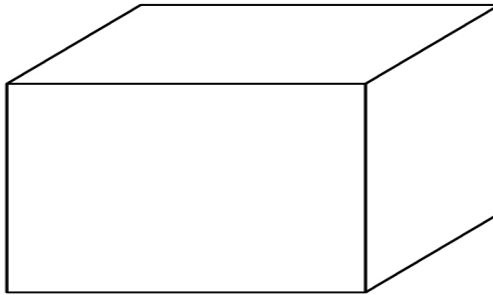
$$\frac{5}{7}$$

$$\frac{2}{7}$$

$$\frac{2}{9}$$

$$\frac{7}{9}$$

15 Which of these is a correct statement about a cuboid?



Tick **one** box.

[1 mark]

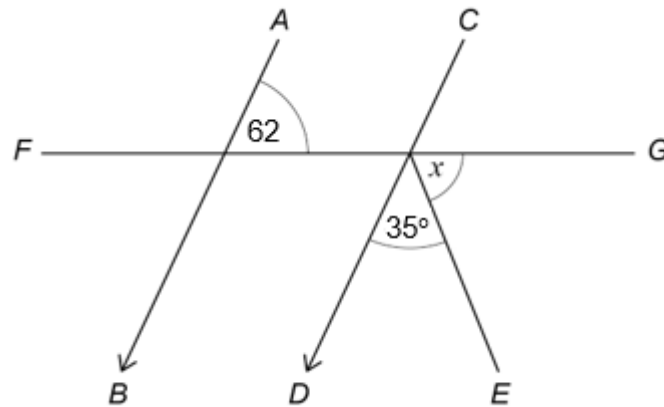
It has 4 edges.

It has 6 faces.

It has 8 planes.

It has 12 vertices.

16

AB is parallel to *CD*.*FG* is a straight line.Not drawn
accuratelyWork out the size of angle x .**[3 marks]**

Answer _____ degrees

18 Solve $5x - 2 = 11$

[2 marks]

$x =$ _____

19 Work out which of these fractions is closer in value to 1

$$\frac{7}{16} \qquad \frac{39}{25}$$

You **must** show your working.

[2 marks]

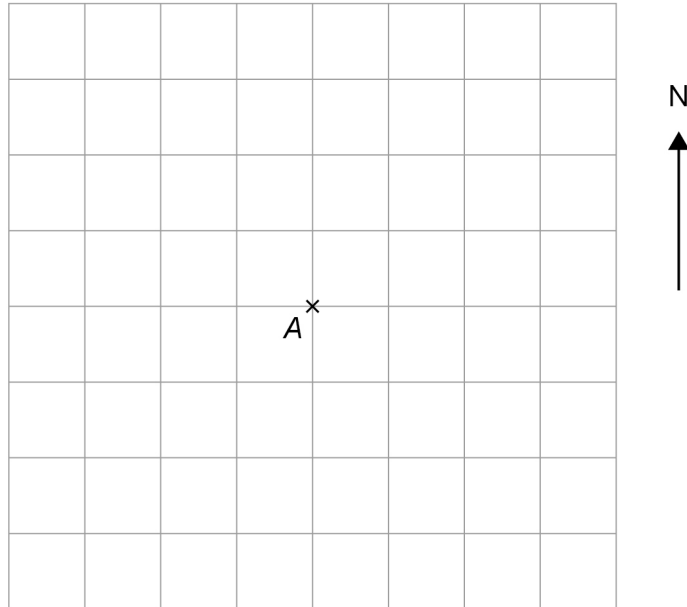
Answer _____

20 (a) Point *B* is 600 metres south west of point *A*.

Mark point *B* on the centimetre grid.

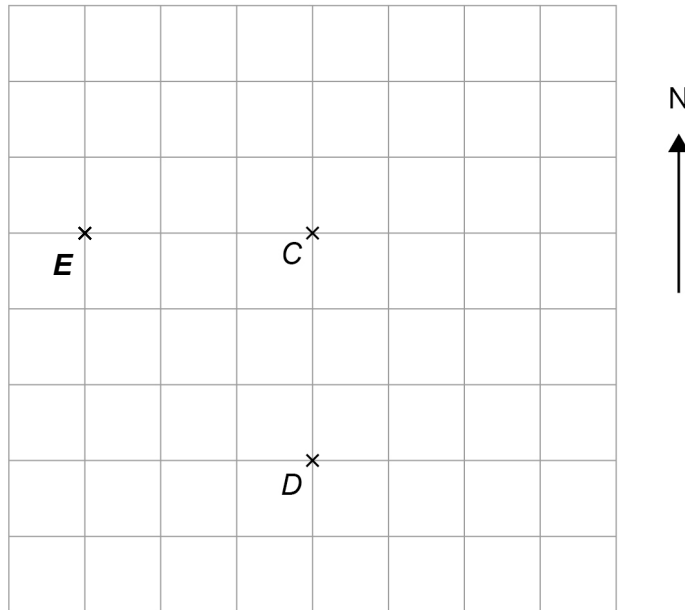
Use a scale of 1 centimetre represents 200 metres.

[2 marks]



Points *C*, *D* and *E* are shown on a different centimetre grid.

Scale: 1 : 1000



20 (b) Work out the bearing of *E* from *C*.

[1 mark]

Answer _____ °

20 (c) Work out the actual distance, in metres, of *C* from *D*.

Use the scale 1 : 1000

[1 mark]

Answer _____ metres

22 The cube of x is 125

Circle the value of x^2

[1 mark]

625

5

25

250

23 Here is a rule for a sequence.

After the first two terms, each term is the sum of the previous two terms.

The first five terms are a 19 b 45 c

Work out the values of a , b and c .

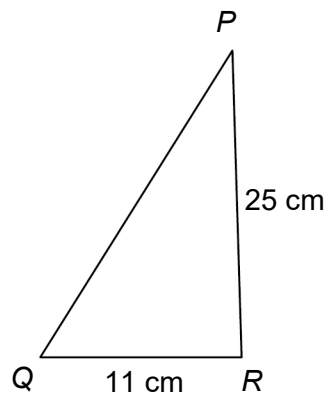
[2 marks]

$a =$ _____

$b =$ _____

$c =$ _____

24 Here is triangle PQR .



Not drawn
accurately

24 (a) Assume that angle $PRQ = 90^\circ$

Work out the length PQ .

[3 marks]

Answer _____ cm

24 (b) The actual length PQ is less than the answer to part (a).

What does this mean about angle PRQ ?

Tick **one** box.

[1 mark]

It is 90°

It is less than 90°

It is more than 90°

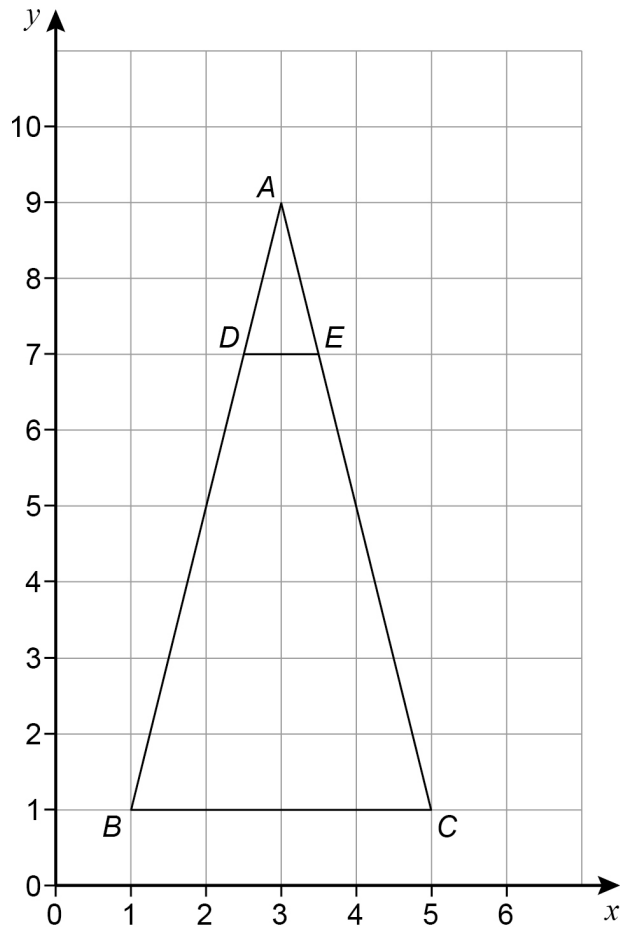
It could be any of the above.

25 Rearrange $s = 7t + 3$ to make t the subject.

[2 marks]

Answer _____

26



Describe fully the **single** transformation that maps triangle ADE to triangle ABC .

[3 marks]

27

A ball contains 3000 cm^3 of air.

More air is pumped into the ball at a rate of 500 cm^3 per second.

The ball is full of air when it becomes a sphere with radius 20 cm



$$\text{Volume of a sphere} = \frac{4}{3} \pi r^3 \quad \text{where } r \text{ is the radius}$$

Does it take **less than** 1 minute to fill the ball?

You **must** show your working.

[4 marks]

Turn over ►

28

 a is a negative number. b is a negative number.

For each statement, tick the correct box.

[4 marks]

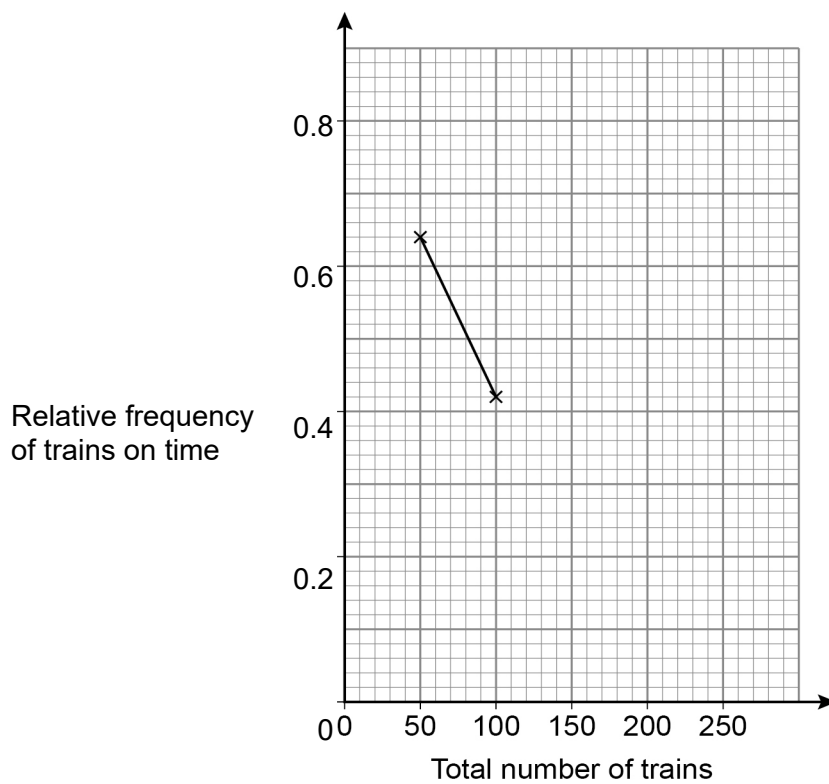
	Always true	Sometimes true	Never true
$a + b$ is positive	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
$a - b$ is positive	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
$a^2 + b^2$ is positive	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
$a^3 \div b^3$ is positive	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

- 29** 250 trains arrived at a station.
The number of trains that were on time was recorded after every 50 trains.
The table shows some information about the results.

Total number of trains	50	100	150	200	250
Total number of trains on time	32	42	108	160	185
Relative frequency of trains on time	0.64	0.42			

- 29 (a)** Complete the relative frequency graph.

[3 marks]



- 29 (b)** Write down the best estimate of the probability that a train arriving at the station is on time.

[1 mark]

Answer _____

31

A straight line

has gradient 5

and

passes through the point (3, 11)

Work out the equation of the line.

Give your answer in the form $y = mx + c$ **[3 marks]**

Answer _____

END OF QUESTIONS

There are no questions printed on this page

*Do not write
outside the
box*

**DO NOT WRITE ON THIS PAGE
ANSWER IN THE SPACES PROVIDED**

Surname _____

Forename(s) _____

Candidate signature _____

I declare this is my own work.

GCSE MATHEMATICS

F

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Paper 3 Calculator

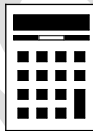
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20–21	
22–23	
24–25	
26–27	
28–29	
30	
TOTAL	

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

1 Solve $5 + x = 12$

Circle your answer.

[1 mark]

$x = -17$

$x = -7$

$x = 7$

$x = 17$

2 Circle the largest number.

[1 mark]

8.6

8.62

8.605

8.5999

3 Circle the expression that means x divided by three.

[1 mark]

$\frac{x}{3}$

$\frac{3}{x}$

$\frac{1}{3} - x$

$x - \frac{1}{3}$

- 4 Circle the value of 10^3 [1 mark]

one hundred one thousand ten thousand one million

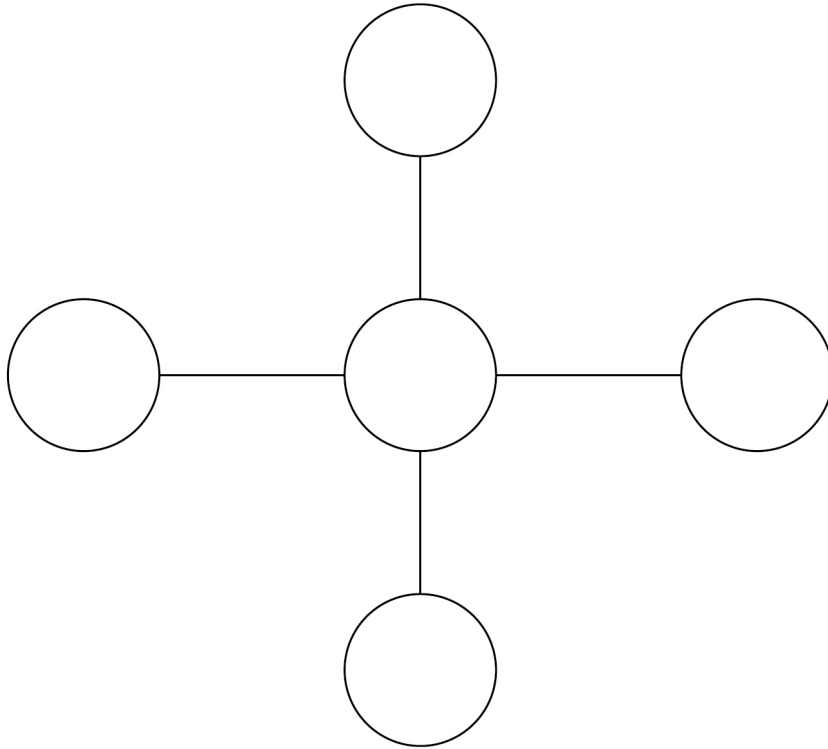
- 5 Complete the bank statement. [3 marks]

Date	Description	Credit (£)	Debit (£)	Balance (£)
01/05/2020	Starting balance			670.43
08/05/2020	Wages	1673.25		_____
11/05/2020	Gas bill		58.26	_____
18/05/2020	Rent		_____	1564.52

Turn over for the next question

- 6** Put the numbers 1, 3, 4, 7 and 8 into the circles so that each line of three numbers adds up to 12
Use each number once.

[2 marks]



- 7 Point A is 50 metres **below** sea level.
Point B is 75 metres **higher** than point A.
Point C is 60 metres **above** sea level.
How much **higher** is point C than point B?

[3 marks]



Answer _____ metres

8 Here are four number cards.

3

6

7

9

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

[1 mark]

$$\square + \square - \square - \square = 1$$

9

Packet of biscuits A costs 64p.

A shop has 33 packets in stock.

Packet of biscuits B costs 88p.

The shop has 12 packets in stock .

Show that $\frac{\text{value of biscuits A}}{\text{value of biscuits B}}$ is an even number.

[2 marks]

- 10** Packets of batteries each contain 25 batteries.
One packet costs £17.50
A shop has a special offer.

Two packets for £30

How much cheaper is **one** battery with the special offer?

[3 marks]

Answer _____ 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 Anna's turn to put a cross on the grid.

She wins if she puts a cross in C3

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

[2 marks]

Answer _____

Anna 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 A1

[1 mark]

Answer _____

- 11 (c)** In fact, Anna decides to put her first cross in row 1.

What does this mean about the probability that she will put her first cross in square A1?

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)

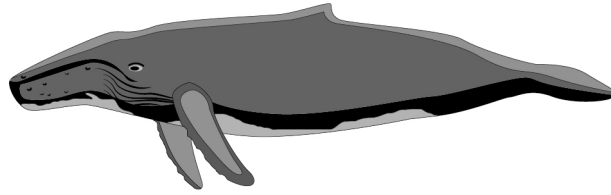
Give a reason for your answer.

[1 mark]

12 A dolphin and a whale are drawn to scale.



Dolphin



Whale

The actual length of the whale is 12 metres.

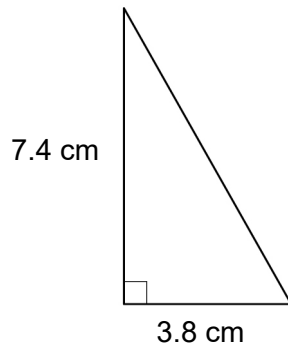
Estimate the actual length of the dolphin.

You **must** show your working.

[2 marks]

Answer _____ metres

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

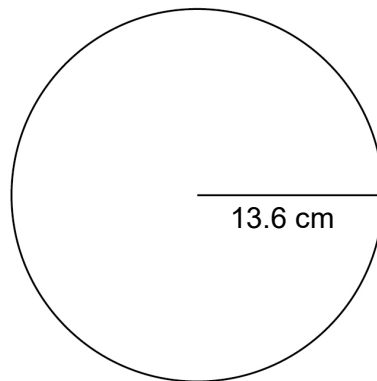


Not drawn
accurately

[2 marks]

Answer _____ cm^2

- 13 (b)** A circle has a radius of 13.6 cm



Not drawn
accurately

Work out the circumference of the circle.

[2 marks]

Answer _____ cm

6

Turn over ►

14 A machine takes 12 seconds to fill a bottle of orange squash.

14 (a) In total, how many bottles can 45 of these machines fill in 6 hours?

[4 marks]

Answer _____

14 (b) Each bottle of orange squash contains 750 ml of squash.

At what rate does a machine put the squash into the bottles?

Give your answer in ml per second.

[2 marks]

Answer _____ ml per second

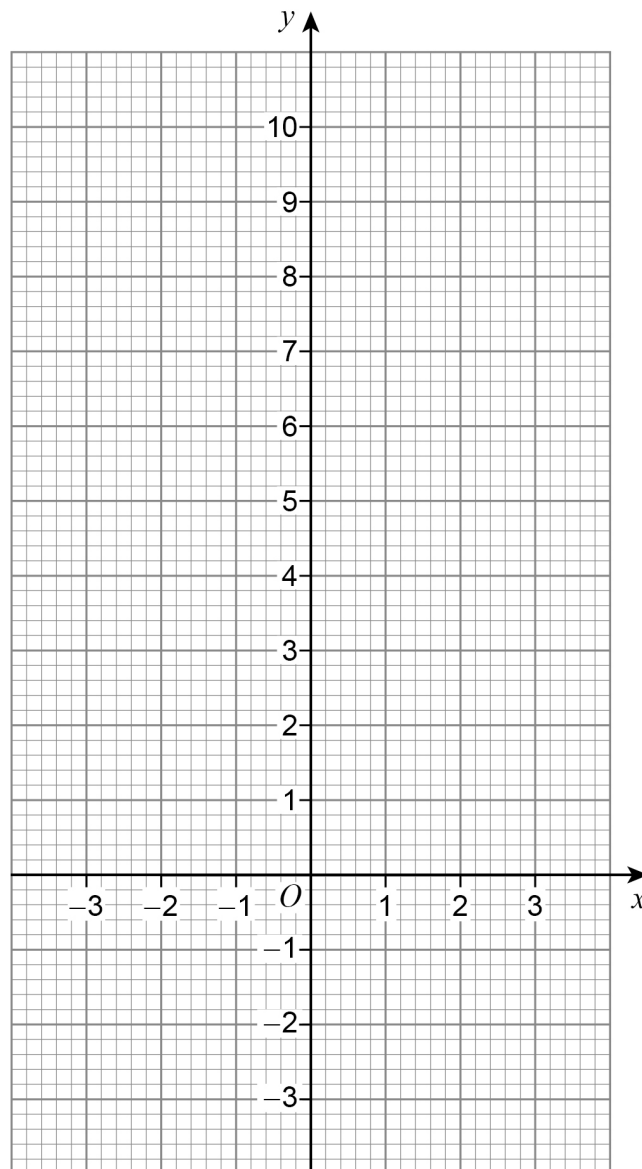
15 (a) Complete the table of values for $y = x^2 - 3$

[1 mark]

x	-3	-2	-1	0	1	2	3
y	6		-2	-3	-2		

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

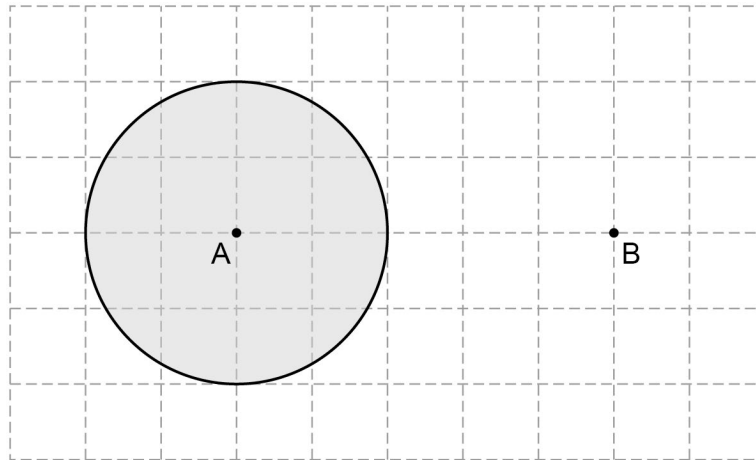
[2 marks]



Turn over ►

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

Scale: 1 cm represents 20 km



What does the shaded area represent?

Tick **one** box.

[1 mark]

All the points nearer to A than to B

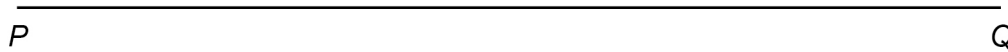
All the points at least 60 km from B

All the points within 40 km of A

All the points halfway between A and B

- 16 (b)** Complete an accurate drawing of triangle PQR so that
angle QPR is 38°
the length of side PR is 8.6 cm

[2 marks]



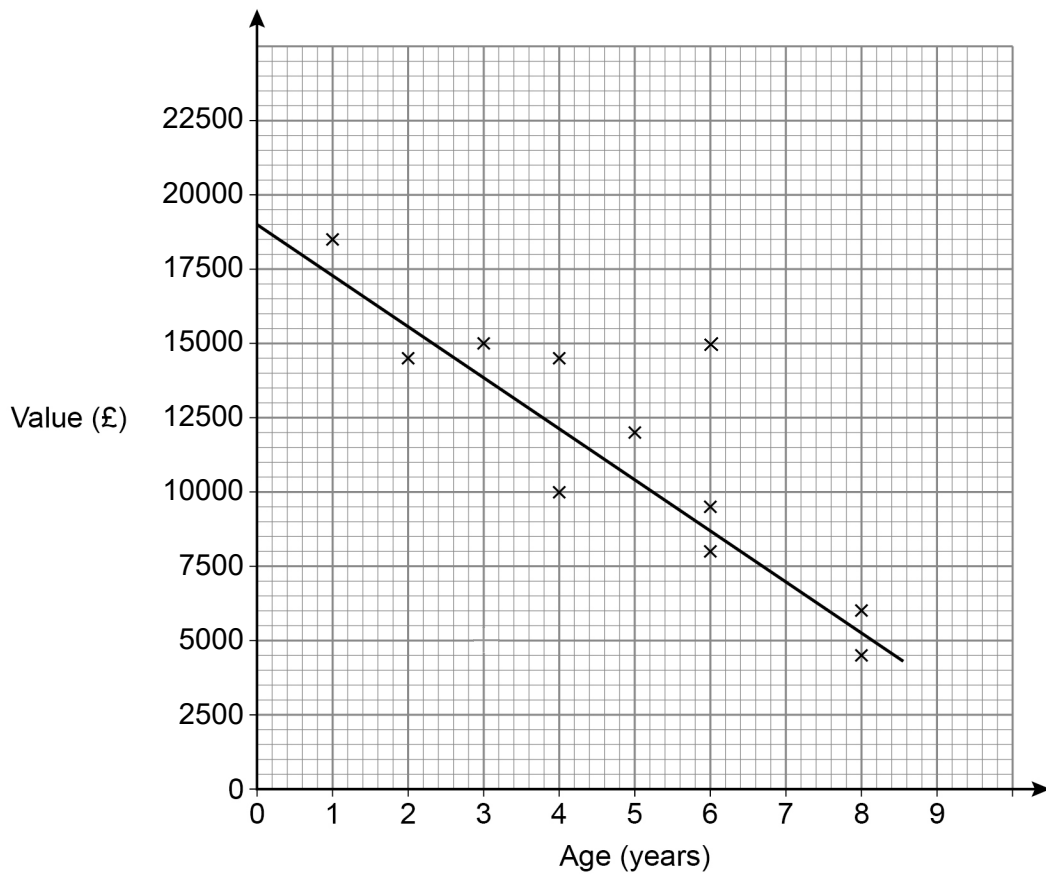
- 17** Multiply out $6x(2x - 7)$

[2 marks]

Answer _____

Turn over for the next question

- 18** The scatter diagram shows the age and value of some motorbikes in 2021.
All the motorbikes were of the same make and model.



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

[1 mark]

Answer _____

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

[1 mark]

Answer £ _____

18 (c) Use the graph to estimate the value of a new motorbike of this make and model in 2021.

[1 mark]

Answer £ _____

18 (d) A motorbike of this make and model had a value of £12 000 in 2021.

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

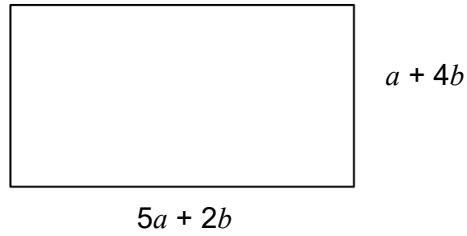
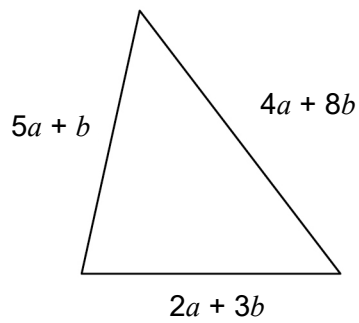
[2 marks]

Answer _____

Turn over for the next question

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]**

Tick a box.

triangle

rectangle

cannot tell

20 The n th term of a sequence is $7n - 40$

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

[2 marks]

Answer _____

21 What is the name of the **longest** possible chord in a circle?
Circle your answer.

[1 mark]

tangent

diameter

radius

segment

Turn over for the next question

- 22** The number of people living in a town is 58 000 to the nearest 1000
Which **one** of these is a possible number of people living in the town?
Circle your answer.

[1 mark]

57 000

57 750

58 500

60 000

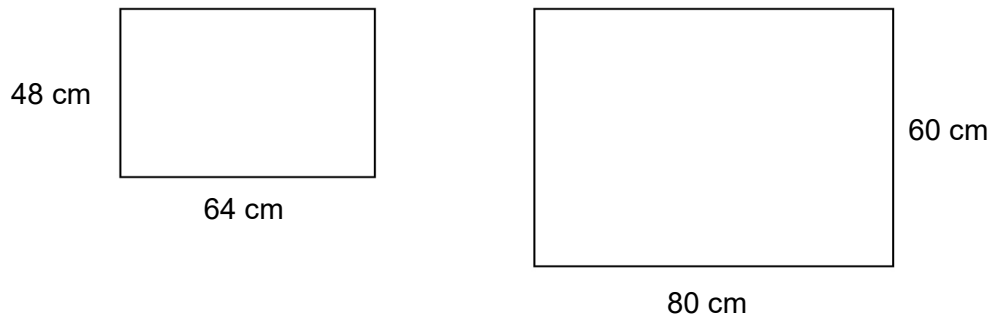
- 23** Adam and Kitty share £312 in the ratio Adam : Kitty = 3.8 : 1
How much **more** than Kitty does Adam get?

[3 marks]

Answer £ _____

24

Here are two rectangles.

Not drawn
accurately

Show that the rectangles are similar.

[1 mark]

25

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

Circle the gradient of the line.

[1 mark]

6

8

3

4

Turn over ►

26

At an adventure park there is a zoo, a fair and a cafe.
The table shows the prices per person to visit the park.

	Price per person
Cafe only	Free
Zoo and fair	£27.50
Zoo only	£18
Fair only	£17

One day, 4200 people visit the adventure park.

67 visit the cafe **only**.

45% visit the zoo **and** the fair.

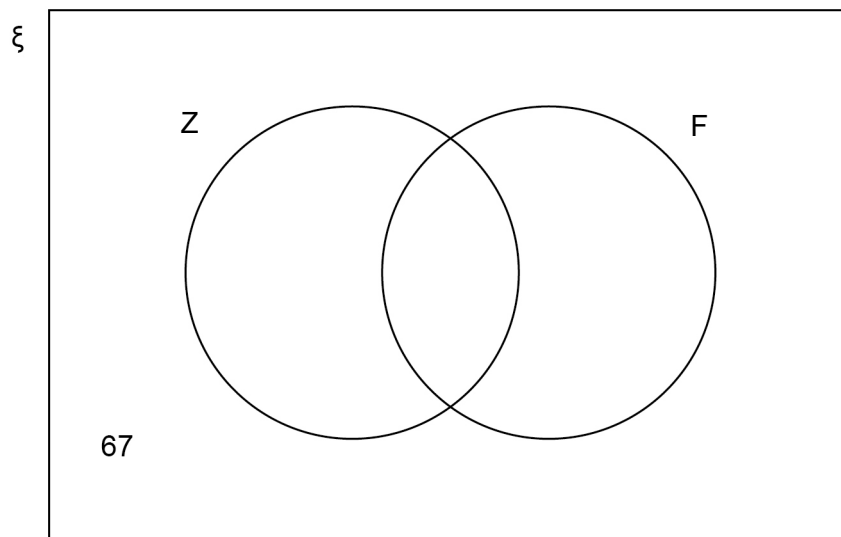
$\frac{2}{7}$ visit the zoo **only**.

The rest visit the fair **only**.

In total, how much do the 4200 people pay to visit the adventure park?

You may use the Venn diagram to help you.

[5 marks]



27

A widget compressor exerts a pressure of 258 pounds per square inch.

Convert this pressure into kilograms per square centimetre.

Use

1 pound = 0.45 kilograms

1 square inch = 6.25 square centimetres

[3 marks]

Answer _____ kg/cm²

28

Five positive numbers have

a mean of 8

a range of 10

Three of the numbers are 3 7 12

Work out the other two numbers.

[3 marks]

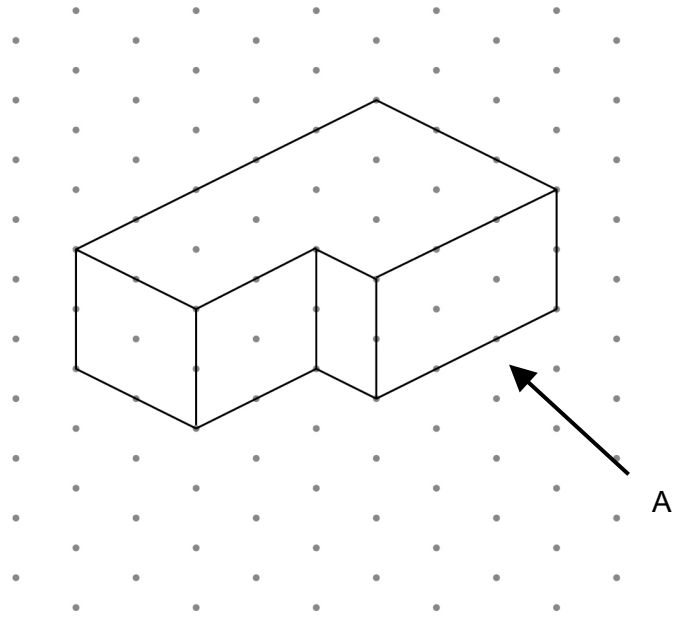
Answer _____ and _____

Turn over for the next question

6

Turn over ►

- 29 A solid shape is drawn on isometric paper.



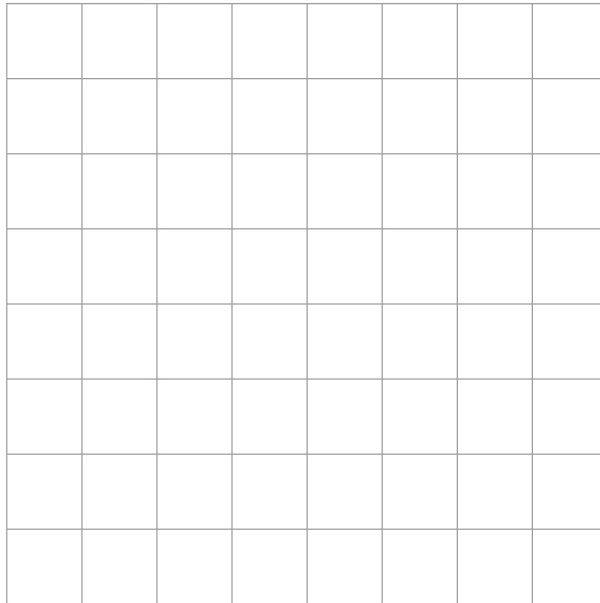
- 29 (a) On the centimetre grid, draw the elevation of the shape from A.

[1 mark]



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

[1 mark]



30 Eloise thinks of a prime number between 30 and 40

Her number is $x\%$ of 121

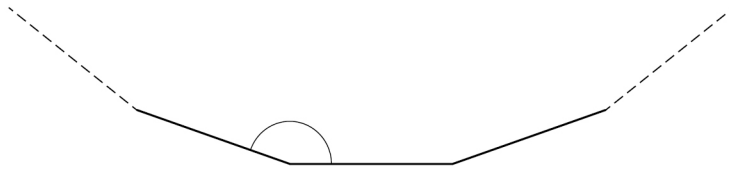
Work out **one** possible value of x .

[3 marks]

Answer _____

31

Part of a regular polygon with 20 sides is shown.

Not drawn
accuratelyWork out the size of an **interior** angle.**[2 marks]**

Answer _____ degrees

END OF QUESTIONS

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GCSE MATHEMATICS

F

Foundation Tier

Paper 1 Non-Calculator

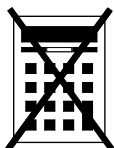
Shadow paper based on June 2023 question paper

Time allowed: 1 hour 30 minutes

Materials

For this paper you must have:

- mathematical instruments



You must **not** use a calculator.

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	
TOTAL	

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

1 Here is a list of numbers.

12 20 42 27 18 36 6

1 (a) Which number in the list is a multiple of 5?

[1 mark]

Answer _____

1 (b) Which number in the list is a square number?

[1 mark]

Answer _____

1 (c) Which **two** numbers in the list have a total of 45 ?

[1 mark]

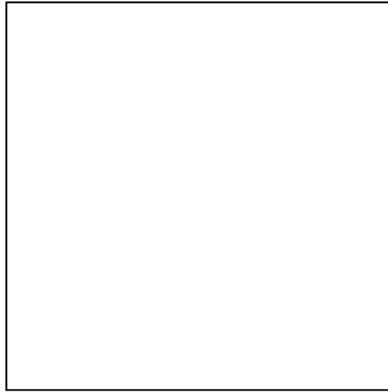
Answer _____ and _____

1 (d) Work out
largest number in the list \div smallest number in the list

[1 mark]

Answer _____

2 (a) Here is a square.



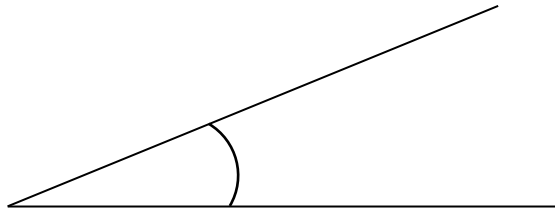
Use a ruler to measure a side length of the square.

Give your answer in **millimetres**.

[1 mark]

Answer _____ mm

2 (b) Here is an angle.



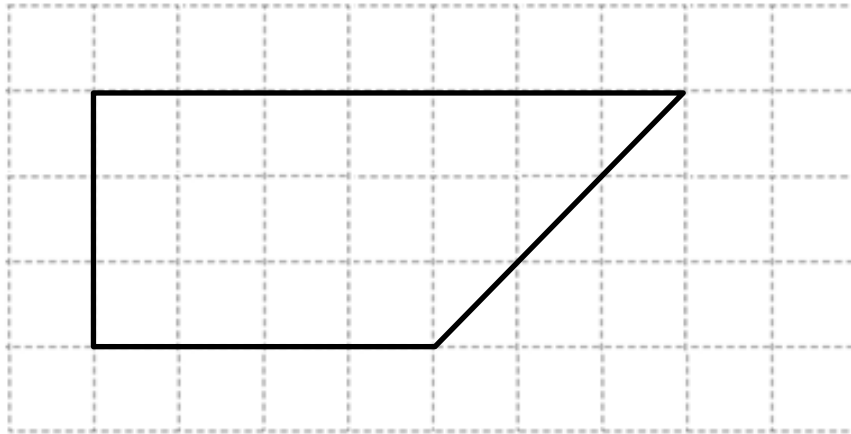
Use a protractor to measure the size of the angle.

[1 mark]

Answer _____ °

Turn over for the next question

- 2 (c) A quadrilateral is drawn on a centimetre grid.

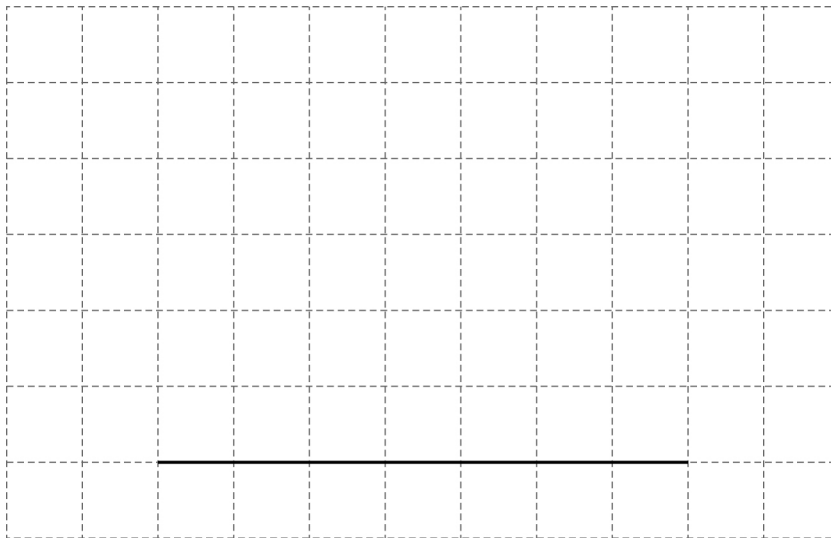


By counting squares, work out the **area** of the quadrilateral.

[1 mark]

Answer _____ cm^2

- 2 (d) One side of a rectangle is drawn on this centimetre grid.



Complete the rectangle so that it has an **area** of 28 square centimetres.

[1 mark]

3 (a) Work out $(-2) \times (-5)$

[1 mark]

Answer _____

3 (b) Work out $3 \times (-8)$

[1 mark]

Answer _____

3 (c) Work out $(-4)^2$

[1 mark]

Answer _____

3 (d) Work out 2^3

[1 mark]

Answer _____

Turn over for the next question

4 Write 12 out of 40 as a fraction in its simplest form.

[2 marks]

Answer _____

5 At a cinema

the normal price of a ticket is £12

the normal price of a regular popcorn tub is £4.90

The cinema has these special offers.

Cinema Ticket

Half the normal price

Regular popcorn tub

£1.40 less than the normal price

Work out the **total** price of 3 cinema tickets and 1 regular popcorn tub using the special offers.

[4 marks]

Answer £ _____

6 (a) Write $2\frac{3}{7}$ as an improper fraction.

[1 mark]

Answer _____


6 (b) Write 0.23 as a fraction.

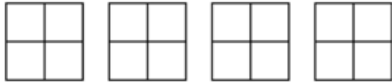
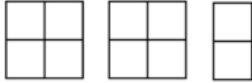

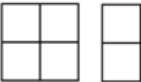
[1 mark]

Answer _____

Turn over for the next question

- 7 Talal recorded the colour of 100 cars.
The pictogram shows the results.

Key:  = 8 cars

White	
Black	
Blue	
Red	
Silver	
Other	

There were 4 **more** red cars than silver cars.

Complete the pictogram for the 100 cars.

[4 marks]

8

$$T = 2A - B$$

8 (a) Work out the value of T when $A = 10$ and $B = 8$ **[2 marks]**

$$T = \underline{\hspace{10em}}$$

8 (b) Work out the value of A when $T = -22$ and $B = 16$ **[3 marks]**

$$A = \underline{\hspace{10em}}$$

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

9

Match each box on the left to the box on the right with the same value.

One has been done for you.

[3 marks]

$$\frac{1}{25}$$

$$\frac{1}{2}$$

$$\frac{1}{50}$$

$$\frac{1}{4}$$

$$0.04$$

$$\frac{2}{100}$$

$$20\%$$

$$\frac{2}{6}$$

$$25\%$$

$$0.5$$

10 Here are two calculations, **A** and **B**.

A	$12 \times 2 + 6$
B	$11 - (10 - 7)$

Work out answer to **A** \times answer to **B**

[3 marks]

Answer _____

11 Convert 18 litres to gallons.

Use 1 gallon = 4.5 litres

[2 marks]

Answer _____ gallons

Turn over for the next question

- 12** The table shows the number of visitors to a museum.

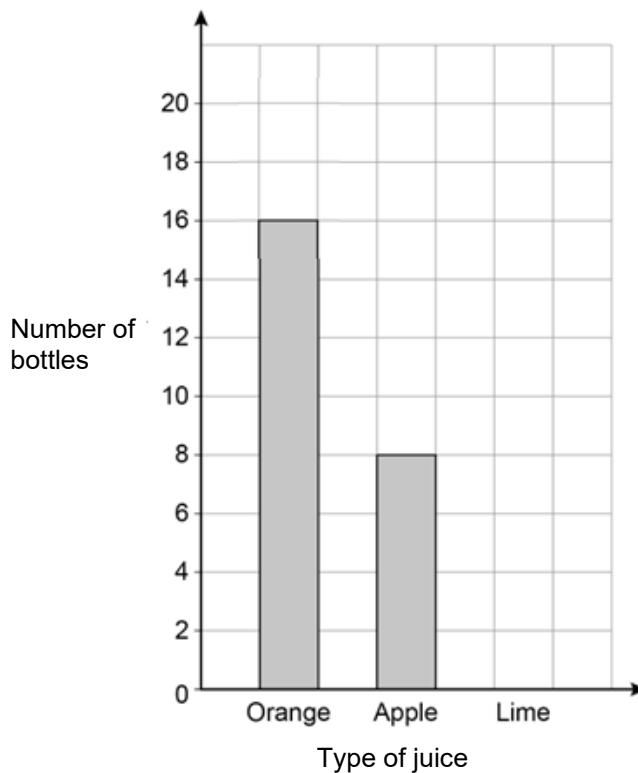
October	November
200	400

Write down the percentage increase from October to November.

[1 mark]

Answer _____ %

- 13** A shop stocks juice in the ratio
orange : apple : lime = 4 : 2 : 3



Complete the bar chart.

[3 marks]

14

Here is some data about people visiting a ski centre one week.

	Percentage of all visitors	Mean number of hours visiting	Range of number of hours visiting
Members	32	3.5	3
Guests	68	2	4

Compare the data for the members with the data for the guests.

Make **three** comparisons.

[3 marks]

Comparison 1 _____

Comparison 2 _____

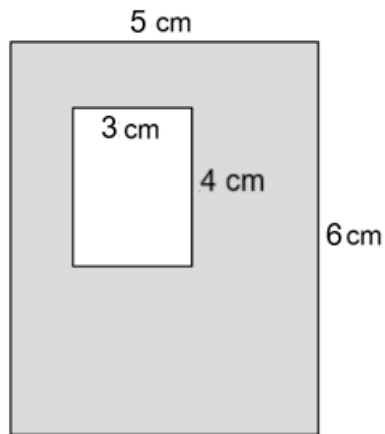
Comparison 3 _____

Turn over for the next question

Turn over ►

- 15** A large rectangle has a rectangular hole cut out.

Not drawn
accurately



Work out the percentage of the large rectangle that is shaded.

[3 marks]

Answer _____ %

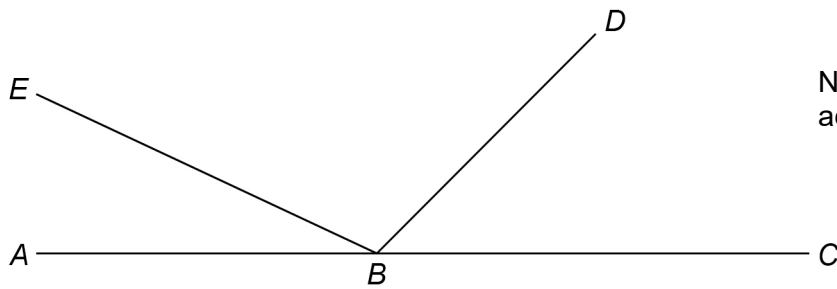
- 16** Sabina travels 12 miles in 15 minutes.

Work out her average speed in miles per hour.

[3 marks]

Answer _____ mph

17 ABC , BD and BE are straight lines.



Not drawn
accurately

$$\text{angle } EBD = 6 \times \text{angle } ABE$$

$$\text{angle } DBC = 3 \times \text{angle } ABE$$

Work out the size of angle DBC .

[3 marks]

Answer _____ °

Turn over for the next question

- 18** Two prime numbers are multiplied together.
The answer is an **even** number between 40 and 50
Complete the calculation.

[3 marks]

$$\square \times \square = \square$$

- 19** Chloe and Mikey share some money in the ratio 3 : 4
Mikey gets £72

Chloe gives $\frac{1}{6}$ of her share to Pippa.

Mikey gives $\frac{4}{9}$ of his share to Pippa.

How much money does Pippa receive?

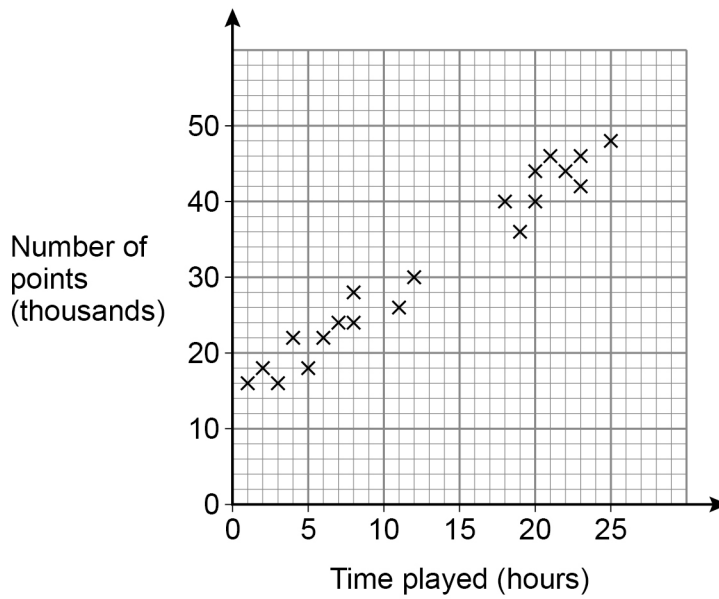
[4 marks]

Answer £ _____

20

Players score points in a game.

The scatter graph shows the time played and the points scored by some players.



20 (a) Circle the type of correlation shown.

[1 mark]

none

weak

negative

positive

20 (b) Players get one extra life for every 500 points they score.

Amy plays the game for 10 hours.

Use a line of best fit to estimate the number of extra lives she gets.

[3 marks]

Answer _____

Turn over for the next question

21 $2^a \times 3^2 \times 5 = 360$

Work out the value of a .

You **must** show your working.

[3 marks]

$a =$ _____

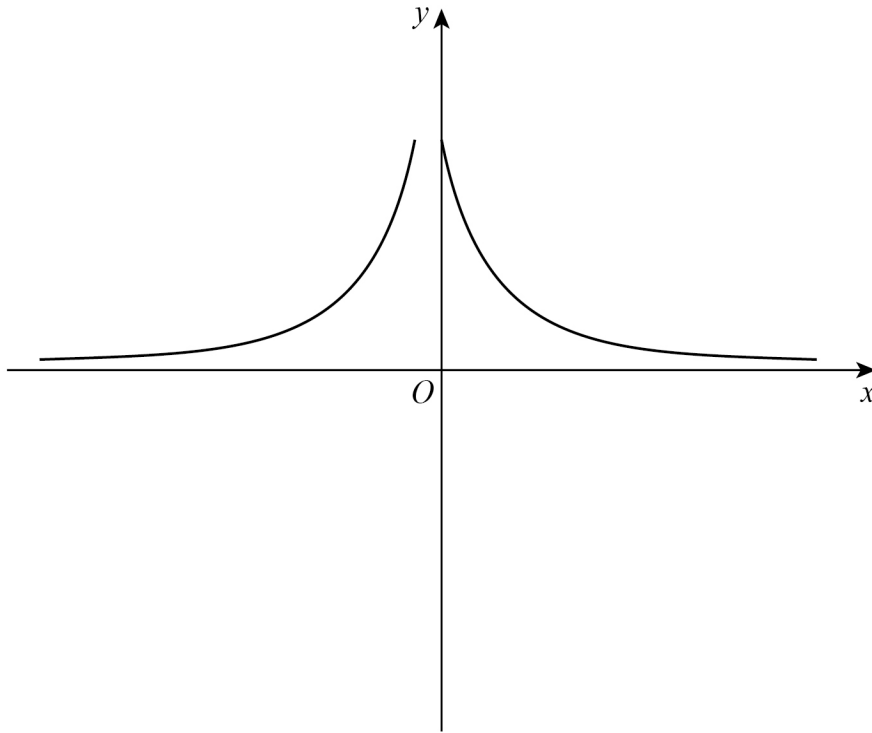
22 Expand and simplify fully $2(5x + 6) - 3(x - 2)$

[2 marks]

Answer _____

23

Erika tries to sketch the graph $y = \frac{1}{x}$ with $x \neq 0$



Make **two** different criticisms of her sketch.

[2 marks]

Criticism 1 _____

Criticism 2 _____

Turn over for the next question

Turn over ►

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Surname _____

Forename(s) _____

Candidate signature _____

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GCSE MATHEMATICS

F

Foundation Tier Paper 2 Calculator

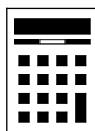
Shadow paper based on June 2023 question paper

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.
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- You must answer the questions in the spaces provided. Do not write outside the box around each page or on blank pages.
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Advice

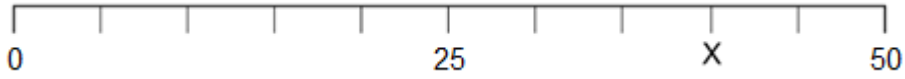
In all calculations, show clearly how you work out your answer.

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	
TOTAL	

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

*Do not write
outside the
box*

- 1 (a) Here is a number line.



What number is at X?

[1 mark]

Answer _____

- 1 (b) Here is a different number line.



What number is at Y?

[1 mark]

Answer _____

2

Match each expression on the left with the simplified expression on the right.

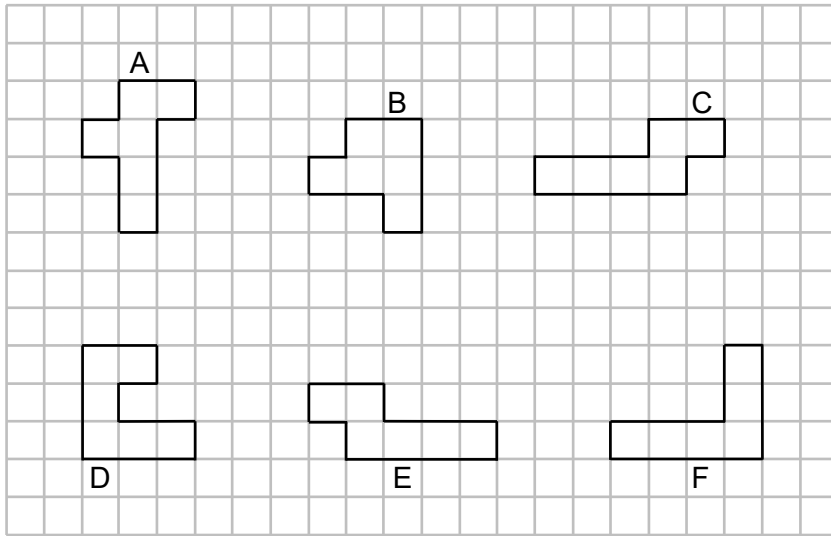
One has been done for you.

[4 marks]

$4y + 5y$	$14y$
$16y - 2y$	$25y^2$
$5y \times 5y$	$5y$
$7 \times 3y$	$9y$
$15y \div 3$	$21y$
	$25y$

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

- 3** Here are some shapes.
Each shape has an area of six square centimetres.



- 3 (a)** Which has the bigger perimeter, shape **A** or shape **B**?
You **must** show the lengths of both perimeters.

[2 marks]

Answer _____

- 3 (b)** Which shape is congruent to shape **C**?

[1 mark]

Answer _____

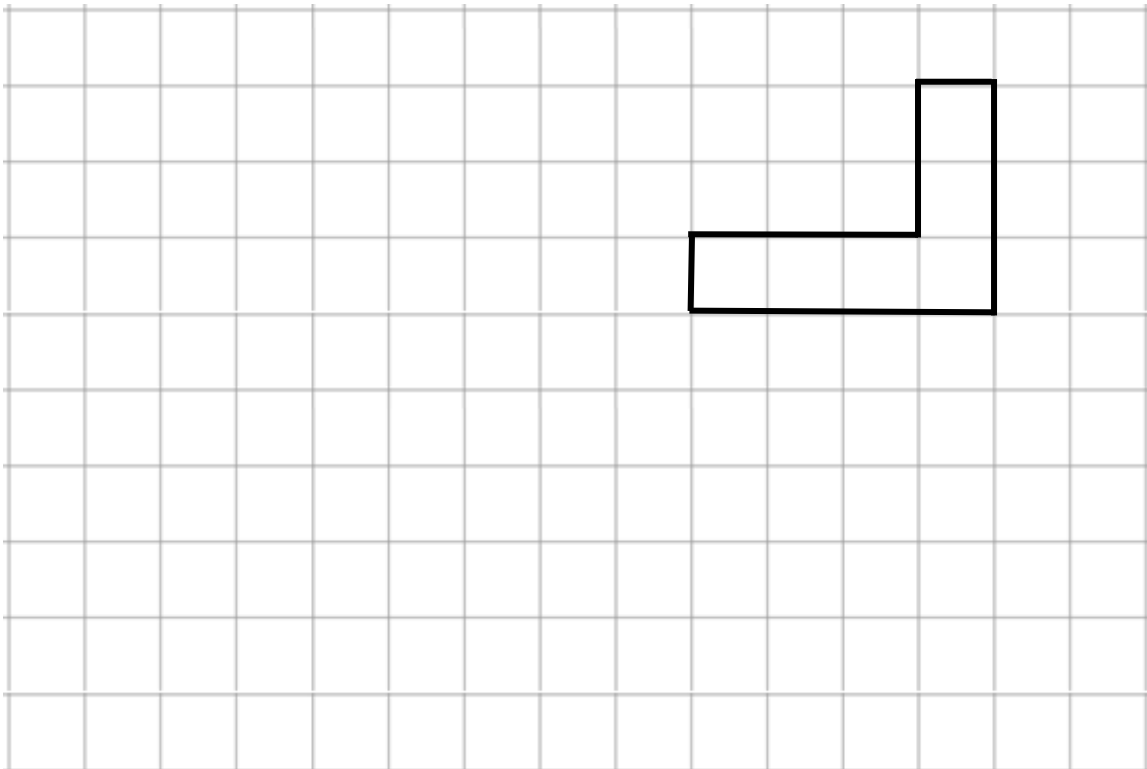
3 (c) Which **two** shapes fit together to make a rectangle?

[1 mark]

Answer _____ and _____

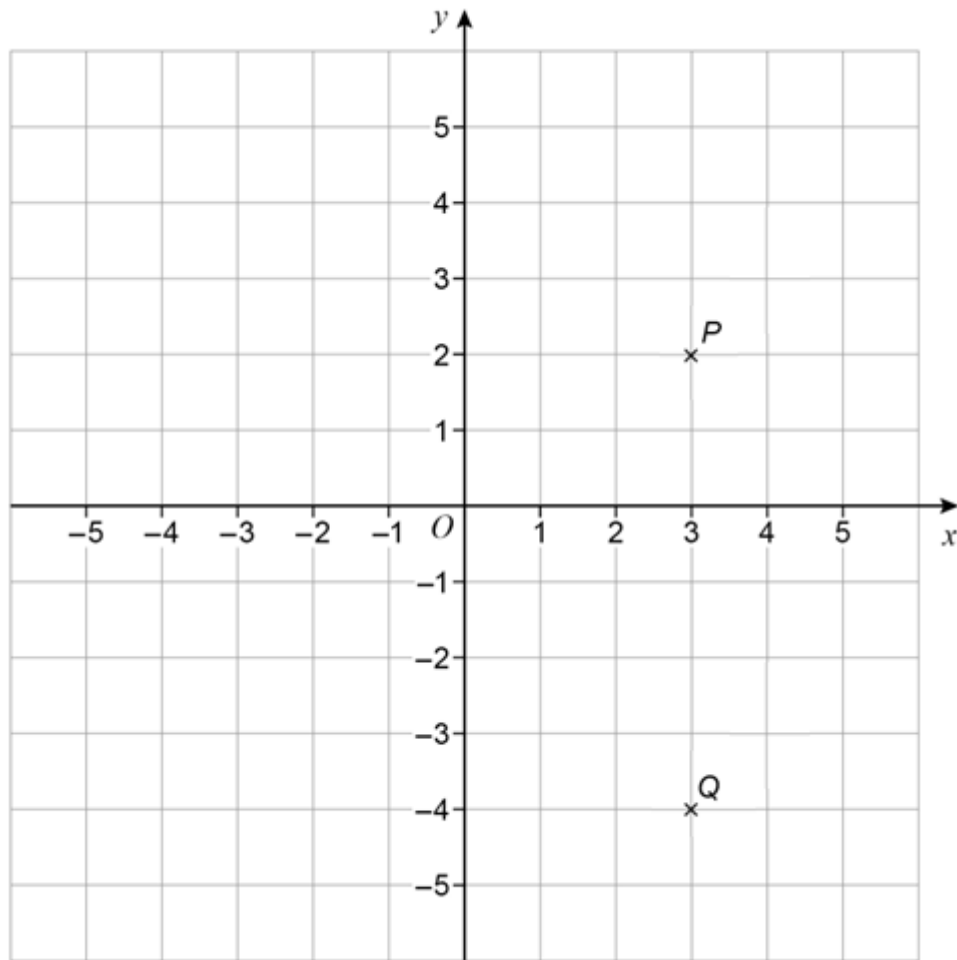
3 (d) On this grid draw a reflection of shape **F**.
Show your mirror line.

[2 marks]



Turn over for the next question

- 4 Points P and Q are shown on the grid.



- 4 (a) Write down the coordinates of P .

[1 mark]

Answer (_____ , _____)

- 4 (b) Angle PQR is a right angle.
Work out possible coordinates for R .

[1 mark]

Answer (_____ , _____)

5 (a) A shop sells bottles of cola.

Each bottle costs 65p

Work out the greatest number of bottles that can be bought with £5

[2 marks]

Answer _____

5 (b) Two shops sell bottles of lemonade.

Shop D

pack of 8 bottles

Was £5.50

Now 10% off

Shop F

pack of 20 bottles

£13

At which shop is it cheaper to buy 40 bottles?

Show working to support your answer.

[4 marks]

Answer _____

- 6 A game has four cards labelled W, X, Y and Z.
Holly picks two of the cards at random.

Complete the list of the **six** possible pairs of cards she could pick.

[2 marks]

WX

- 7 (a) Complete the boxes using
two **different** even numbers
and
two **different** odd numbers.

[2 marks]

$$\square + \square + \square + \square = 38$$

- 7 (b) Complete the boxes using
a factor of 24
and
a factor of 50.

[2 marks]

$$\square \times \square = 40$$

- 7 (c) Complete the boxes using
a square number
and
a prime number.

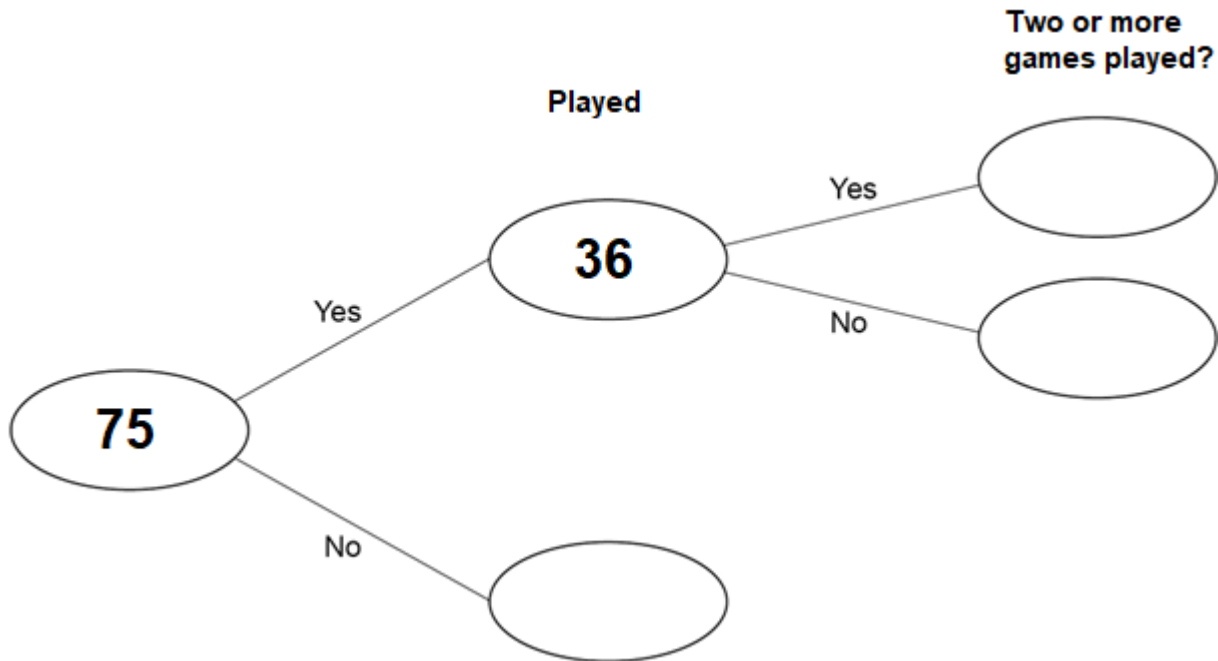
[2 marks]

$$\square \div \square = 32$$

Turn over for the next question

Turn over ►

- 8 75 people were asked if they played online games one day.
The frequency tree shows some information about their answers.



- 8 (a) 75% of the people who answered Yes played one game.

Complete the frequency tree.

[3 marks]

- 8 (b) One of the 75 people is chosen at random.

P(used social media) is **more than** 0.63

What is the **smallest** possible number of people who used social media?

[2 marks]

Answer _____

Turn over for the next question

- 9 (a) The cost of a TV streaming service is
£9 per month for the first 2 months
then
£16 per month for the rest of the year.

Work out the **total** cost for the year.

[2 marks]

Answer £ _____

- 9 (b) A TV series has twelve episodes.
Eleven episodes are each 40 minutes long.
One episode is 1 hour 22 minutes long.

Work out the **total** length of the series.

Give your answer in hours and minutes.

[3 marks]

Answer _____ hours _____ minutes

10 (a) There are 1440 books in a library.

$\frac{2}{3}$ of the books are fiction.

How many are fiction?

[2 marks]

Answer _____

10 (b) There are milk chocolates and dark chocolates in a box.

The ratio of milk : dark is 7 : 4

What fraction of the chocolates are milk?

[1 mark]

Answer _____

10 (c) There are some pens in the box.

114 are black.

36 are not.

What percentage of the pens are black?

[2 marks]

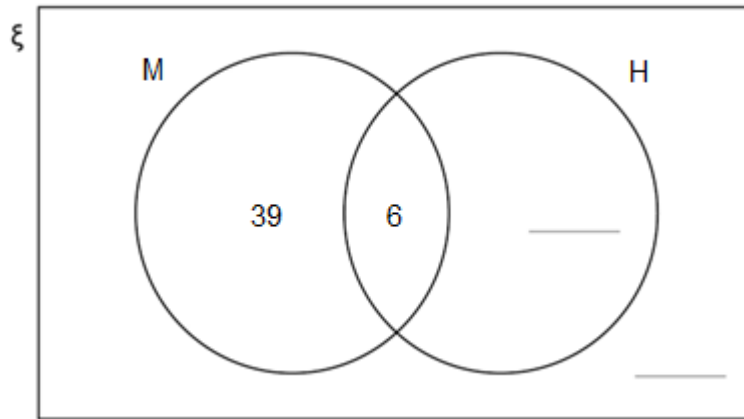
Answer _____ %

11 Here is a Venn diagram.

$\xi = 60$ students

M = people who own a mobile phone

H = people who own headphones



11 (a) 11 of the people own headphones.

Complete the Venn diagram.

[2 marks]

11 (b) One of the 60 students is chosen at random.

What is the probability that they own **both** a mobile phone and headphones?

[1 mark]

Answer _____

- 11 (c)** Charlie is going to buy headphones that cost £45
He already has £17
He plans to save the rest in four equal amounts over the next four weeks.
He uses this method to work out in pounds how much to save each week.

$$45 - 17 \div 4$$

What is wrong with his method?

[1 mark]

Turn over for the next question

12

Sune says that $2 : 5$ is an equivalent ratio to $6 : 15$

Peter says that $1.2 : 3$ is an equivalent ratio to $6 : 15$

Who is correct?

Tick **one** box.

Both of them

Sune only

Peter only

Neither of them

Give reasons for your answer.

[2 marks]

14 Factorise $14x + 21y$

[1 mark]

Answer _____

15 Write down all the integers that satisfy the inequality

$$-1 \leq x < 4$$

[2 marks]

Answer _____

16 A linear sequence starts

7 12 17 22

Work out an expression for the n th term of the sequence.

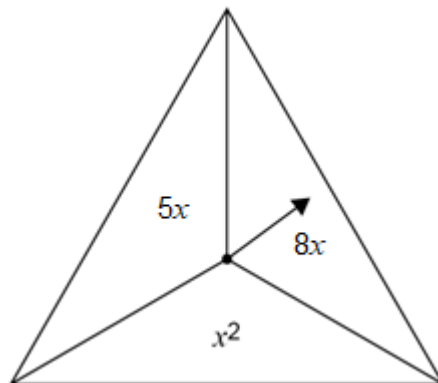
[2 marks]

Answer _____

18

In a game,

- an ordinary fair six-sided dice is rolled
- the fair spinner shown is spun.



The score is the dice number **substituted** into the spinner expression.

18 (a) Complete the table to show all of the possible scores.

[2 marks]

	1	2	3	4	5	6
$5x$						30
$8x$		16				
x^2				16		

18 (b) A player wins the game if their score is 30 or more.

Work out the probability that they win the game.

[1 mark]

Answer _____

18 (c) The game is played 756 times.

Estimate the number of games that are won.

[2 marks]

Answer _____

Turn over for the next question

19 (a) Part of a regular polygon is shown.



Not drawn
accurately

Assume that the polygon is a hexagon.

Work out the size of angle x .

[2 marks]

Answer _____ °

19 (b) In fact, the polygon has **fewer** sides than a hexagon.

What does this mean about the size of angle x ?

Tick **one** box.

[1 mark]

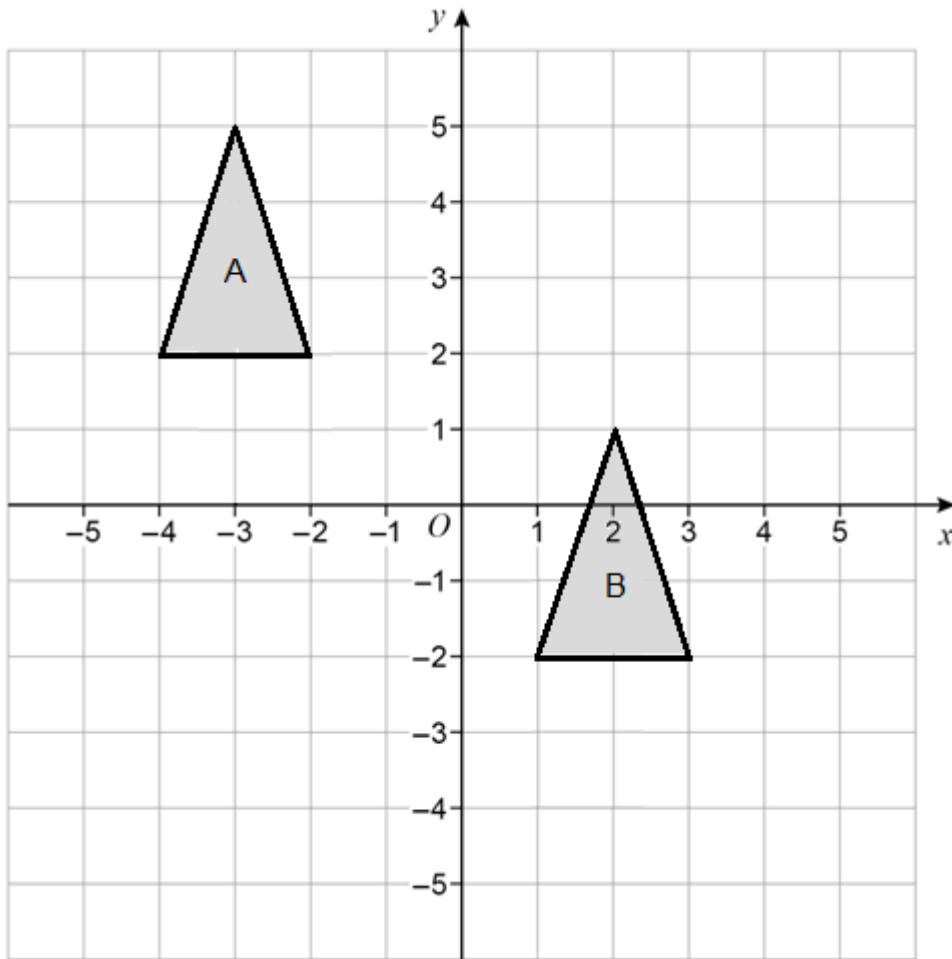
It is more than the answer to part (a)

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

It is less than the answer to part (a)

It could be any of the above

20 Write down the translation vector that maps shape A onto shape B. [2 marks]



Answer _____

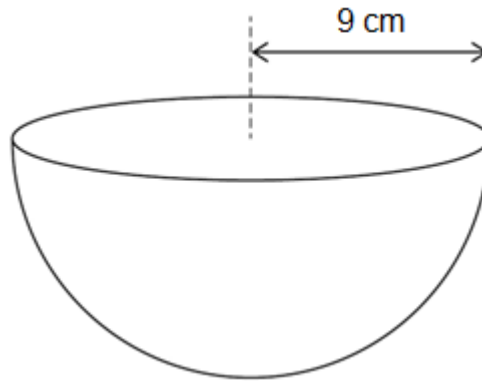
Turn over for the next question

Turn over ►

21

$$\text{Volume of a sphere} = \frac{4}{3}\pi r^3$$

A bowl is a hemisphere with radius 9 cm



Water is poured into the bowl
at a rate of 185 cm^3 per second
for 7 seconds.

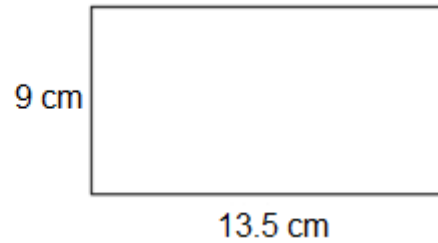
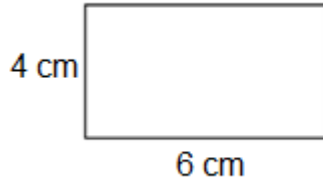
Does the water fill **more than** 80% of the bowl?
You **must** show your working.

[4 marks]

22 Show that these two rectangles are similar.

[2 marks]

Not drawn
accurately



23 A factory packs x boxes of plasters per hour.
Each box contains 100 plasters.

Show that the factory packs $\frac{5x}{3}$ plasters per minute.

[2 marks]

END OF QUESTIONS

There are no questions printed on this page

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ANSWER IN THE SPACES PROVIDED**

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Surname _____

Forename(s) _____

Candidate signature _____

I declare this is my own work.

GCSE MATHEMATICS

F

Foundation Tier Paper 3 Calculator

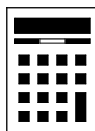
Shadow paper based on June 2023 question paper

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	
TOTAL	

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

Do not write
outside the
box

1 (a) Solve $6y = 42$

[1 mark]

$y =$ _____

1 (b) Solve $h + 8 = 35$

[1 mark]

$h =$ _____

1 (c) Solve $\frac{a}{7} = 9$

[1 mark]

$a =$ _____

2 Here is a list of numbers.

20 18 13 1 13 7 2 5

2 (a) Write down the mode.

[1 mark]

Answer _____

2 (b) Work out the median.

[2 marks]

Answer _____

2 (c) Work out the range.

[1 mark]

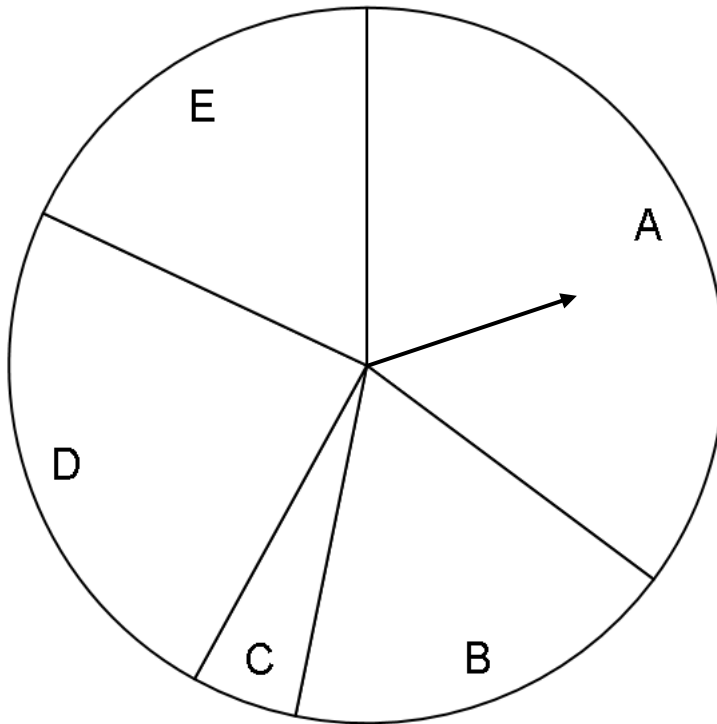
Answer _____

Turn over for the next question

7

Turn over ►

- 3 (a) A fair spinner with five sections is spun.



Complete these statements.

[2 marks]

The spinner is **least likely** to land on section _____

The spinner is **equally likely** to land on sections _____ and _____

3 (b) Two different spinners are spun.

One spinner has sections labelled with colours.

The other spinner has sections labelled with shapes.

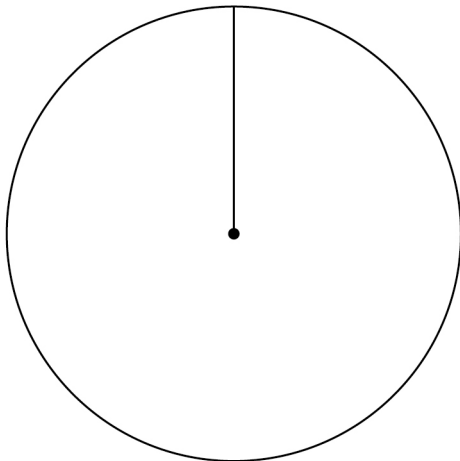
Here is a list of **all** the possible outcomes.

Red Square	Blue Square	Green Square	Yellow Square
Red Circle	Blue Circle	Green Circle	Yellow Circle
Red Triangle	Blue Triangle	Green Triangle	Yellow Triangle

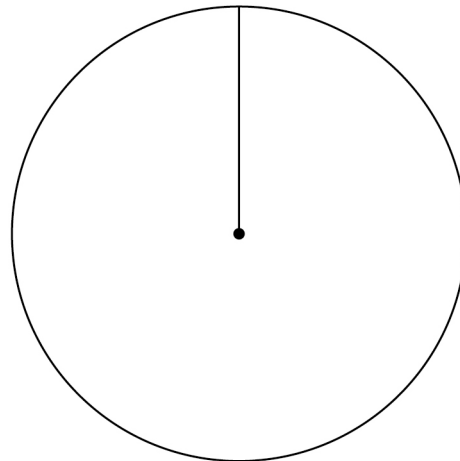
Show the possible sections on the two spinners.

[2 marks]

Colour



Shape



Turn over for the next question

- 4** A roll holds 10.5 metres of wallpaper.
3 pieces of wallpaper are cut from the roll.
Each piece is 80 centimetres long.
What length of wallpaper is left on the roll?
State the units of your answer.

[3 marks]

Answer _____

- 5 (a) The term-to-term rule for a sequence is

add 3 then multiply by 4

The 1st term is 1

Work out the 3rd term.

[2 marks]

Answer _____

- 5 (b) The term-to-term rule for a different sequence is

subtract 45 then divide by 5

The 2nd term is 30

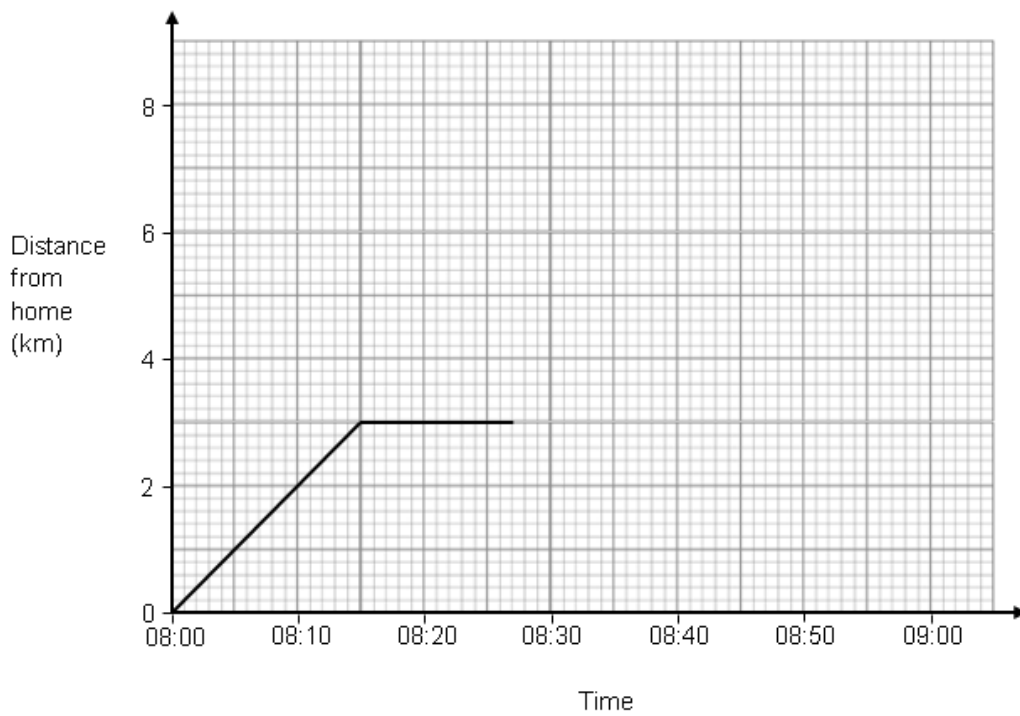
Work out the 1st term.

[2 marks]

Answer _____

Turn over for the next question

- 6** Ronnie leaves home at 08.00 to cycle to a friend's house.
Here is part of a distance-time graph of his trip.



- 6 (a)** He arrives at the friend's house at 8:15
How far is Ronnie's friend's house from his home?

[1 mark]

Answer _____ km

- 6 (b)** Ronnie leaves his friend's house at 8.27
How long does he stay at his friend's?

[1 mark]

Answer _____ minutes

- 6 (c)** Ronnie cycles home at a constant speed using the same route.
It takes him 6 minutes longer than his journey to his friend's house.
Complete the distance-time graph.

[2 marks]

- 7** This week, Anisha works
24 hours at £10.40 per hour
and
extra hours at the weekend at £15.60 per hour.

Here are the extra hours she works at the weekend.

Saturday	6 am to 10 am
Sunday	2 pm to 8 pm

In **total**, how much is she paid this week?

[4 marks]

Answer £ _____

- 8 Three plums have masses of 40 g, 40 g and 35 g

Show that their **total** mass is between $\frac{1}{10}$ and $\frac{1}{8}$ of a kilogram.

[3 marks]

- 9 For each statement, tick the correct box.

[3 marks]

	Always true	Sometimes true	Never true
At least one of the three angles in a triangle has to be acute.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
All three angles in a triangle are the same size.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
One of the three angles of a triangle is obtuse.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

10 (a) Simplify fully $m^5 \times m^3$

[1 mark]

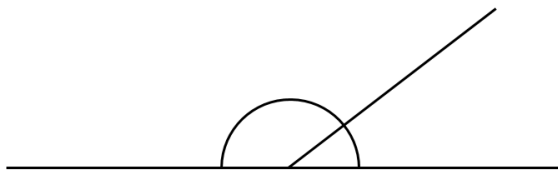
Answer _____

10 (b) Simplify fully $8h + 9g - 2h + 5g$

[2 marks]

Answer _____

11 Two angles on a straight line are shown.



Not drawn
accurately

The angles are in the ratio 4 : 11

Show that the smaller angle is 48°

[2 marks]

12 (a) $a > 7$ $b < 3$ $a - b = 10$

Work out a possible pair of values for a and b .

[2 marks]

$a =$ _____ $b =$ _____

12 (b) w is greater than 4 **and** less than 5
 x is greater than 1 **and** less than 2

$w + x = 6.5$

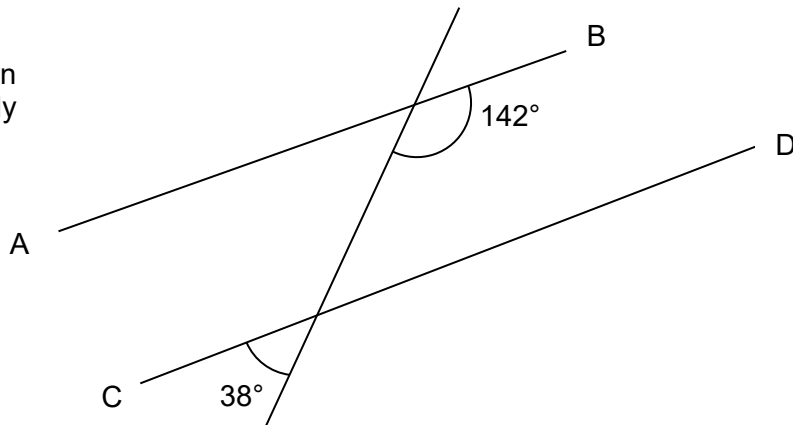
Work out a possible pair of values for w and x .

[2 marks]

$w =$ _____ $x =$ _____

13 Here are three straight lines.

Not drawn
accurately



Are the lines AB and CD parallel?

Tick a box.

Yes

No

Show working to support your answer.

[2 marks]

Turn over for the next question

14

Match the algebra to the correct description.

One has been done for you.

[3 marks]

$$4(a + 3) \equiv 4a + 12$$

$$3b - 6a$$

$$5x + 7 = 22$$

$$A = 2r + 6d$$

Identity

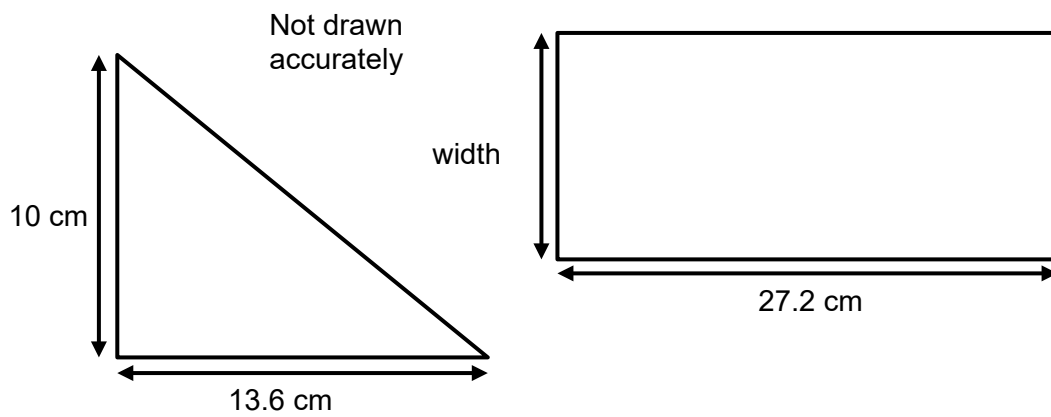
Formula

Equation

Inequality

Expression

16 The square and the triangle have the same area.



Work out the width of the rectangle.

[3 marks]

Answer _____ cm

- 17 Match the name to the correct sequence.
One has been done for you.

[2 marks]

Name	Sequence
Quadratic sequence	10, 7, 4, 1, -2...
Linear sequence	7, 16, 27, 40, 55
Fibonacci-type sequence	1, 5, 9, 11, 13
	2, 5, 7, 12, 19, 31

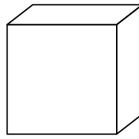
- 18 The number of foxes in England is expected to **increase** by 2% each year.
Assume there are now 357 000 foxes in England.
Work out the expected number of foxes in England after **six** years.
You **must** show your working.

[3 marks]

Answer _____

19 Here is a cube A.

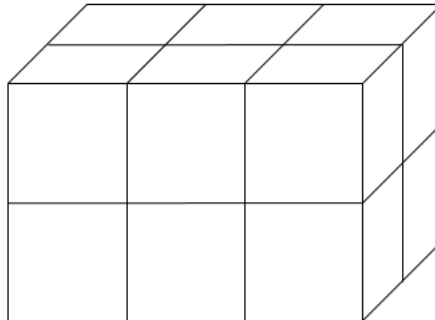
A



Not drawn
accurately

Cuboid B is made from **twelve** of cube A.

B



volume of A : volume of B = 1 : 12

Henry says,

“surface area of A : surface area of B must be 1 : 12 because cuboid B is made of 12 of A.”

Is Henry correct?

Tick **one** box.

Yes

No

Cannot tell

Give a reason for your answer.

[2 marks]

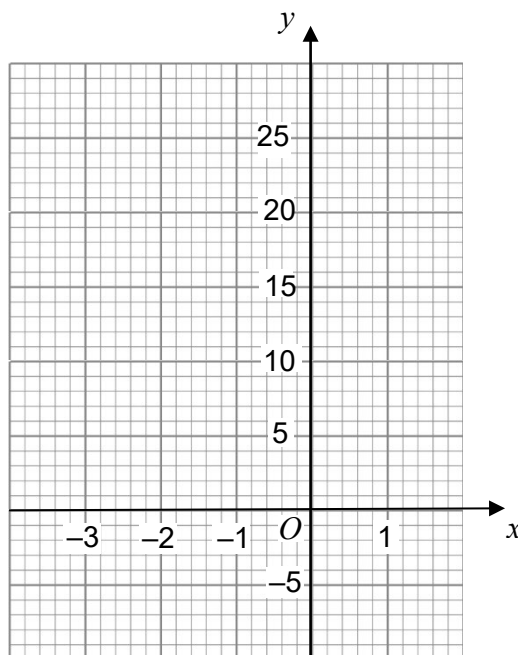
20 (a) Complete the table of values for $y = x^2 - 4x$

[2 marks]

x	-3	-2	-1	0	1
y	21		5	0	

20 (b) Draw the graph of $y = x^2 - 4x$ for values of x from -3 to 1

[2 marks]



Turn over for the next question

Turn over ►

21

Shirley has £5625

She saves some and donates the rest to charity.

money saved : money given to charity = 2 : 7

She gives each of **five** charities the **same** amount.

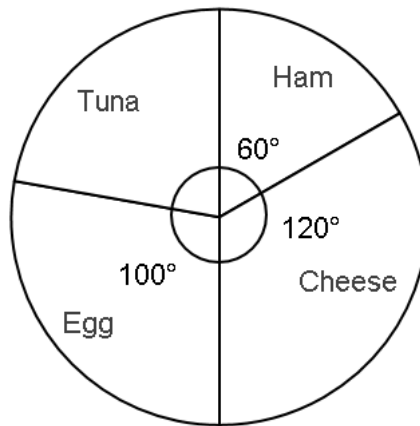
Does each charity receive more than £870 ?

You **must** show your working.

[4 marks]

22

The pie chart shows information about customers choice of sandwich filling.



Not drawn
accurately

12 **more** customers chose egg than chose ham.

Work out the number of customers who chose tuna.

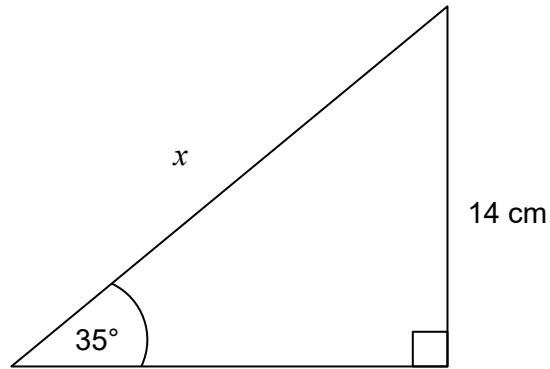
[3 marks]

Answer _____

Turn over for the next question

Turn over ►

23

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

 $x =$ _____ cm

24 Aiza is estimating the value of $\frac{2}{(\sqrt{4.36})^3 \times 5.49}$

She rounds each decimal number to 1 significant figure.

24 (a) Work out Aiza's estimate.
You **must** show your working.

[2 marks]

Answer _____

24 (b) Aiza says,
"My estimate must be larger than the exact value."
Without working out the exact value, give a reason how she can know this.

[1 mark]

Turn over for the next question

25 (a) Factorise $x^2 + 4x - 21$

[2 marks]

Answer _____

25 (b) Write down the **two** solutions of $(y - 9)(y - 2) = 0$

[1 mark]

Answer _____

END OF QUESTIONS

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