AQA

Please write clearly in block capitals.

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

Surname _____

Forename(s) _____

Candidate signature _____

I declare this is my own work.

GCSE MATHEMATICS
Example-Problem Past Paper

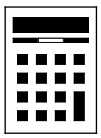
F

Foundation Tier Paper 2 Calculator

June 2023

Materials

For this paper you must have:
- a calculator
- mathematical instruments.



Instructions
- Engage with the fully-worked solutions in full before attempting the shadow questions.
- Explain the fully-worked solutions to yourself, anticipating the next steps in the worked solutions, making links between the problems and the mathematics used to solve them.
- Apply the methods learnt from the fully-worked solutions to the shadow questions, writing down all workings in the spaces provided. Your thought process is important.
- Do all rough work in this book.

Information
- The marks for questions are shown in brackets.
- You may ask for more answer paper, graph paper and tracing paper.
- You should ask your teacher for help on a question if you do not understand a part of the fully-worked solution. Remember to be specific, understanding why the step was completed, rather than simply getting the correct answer.

Advice

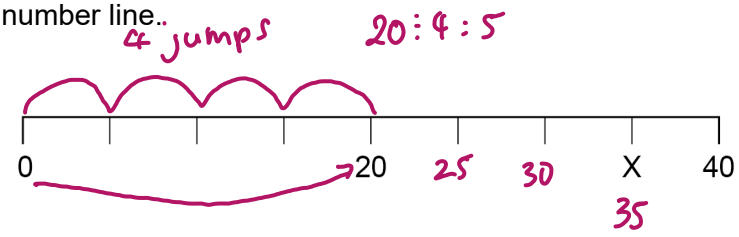
In all calculations, show clearly how you work out your answer.

Where a calculator has been used, show clearly what you entered into the calculator.

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

Do not write outside the box

1 (a) Here is a number line.

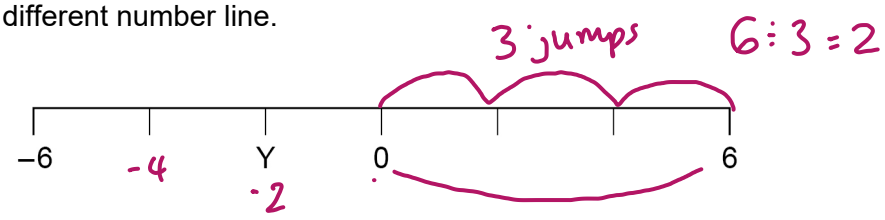


What number is at X?

[1 mark]

Answer 35

1 (b) Here is a different number line.



What number is at Y?

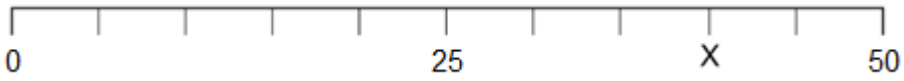
[1 mark]

Answer −2

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

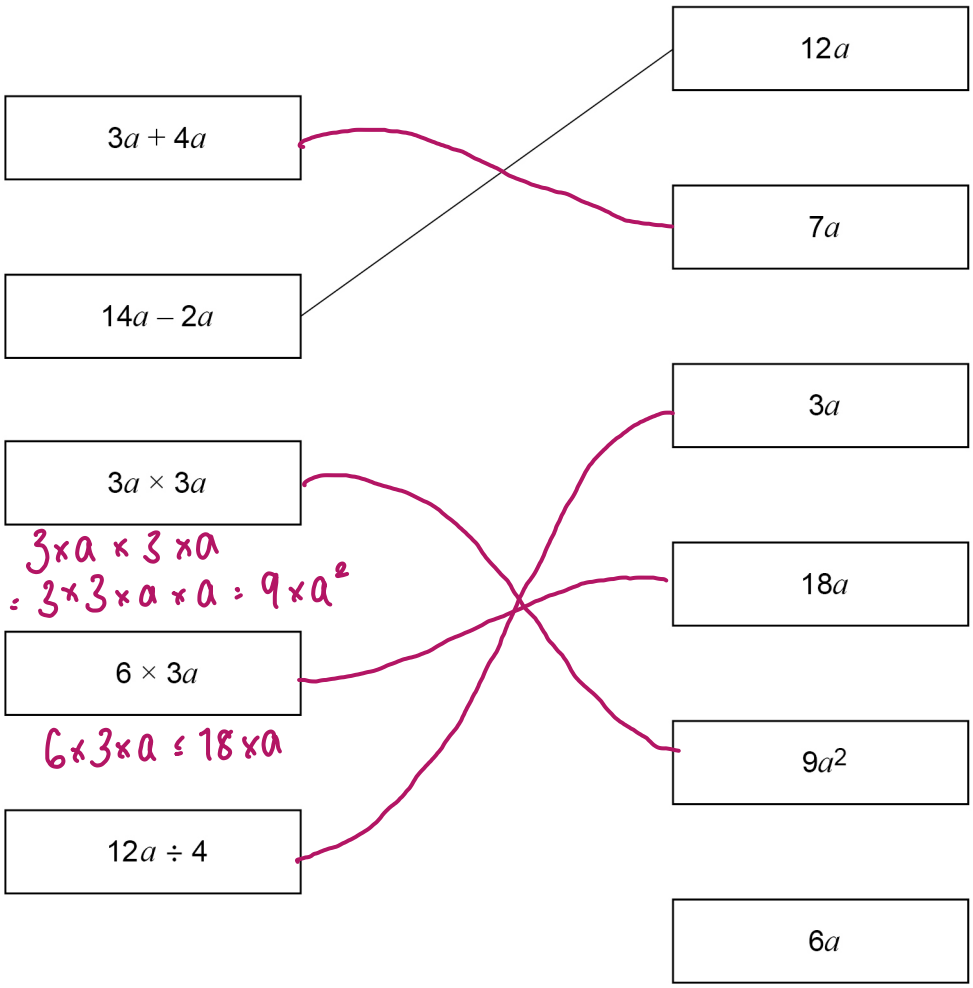
Turn over ►

Do not write outside the box

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

One has been done for you.

[4 marks]



3×a × 3×a
= 3×3×a×a = 9×a²

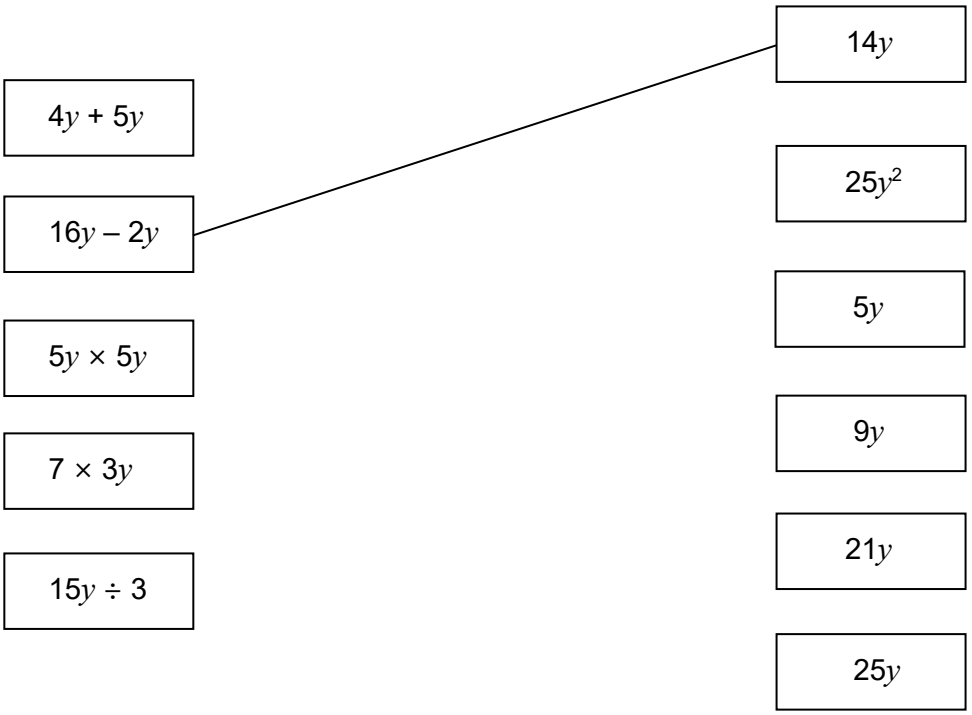
6×3×a = 18×a

Do not write outside the box

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

One has been done for you.

[4 marks]



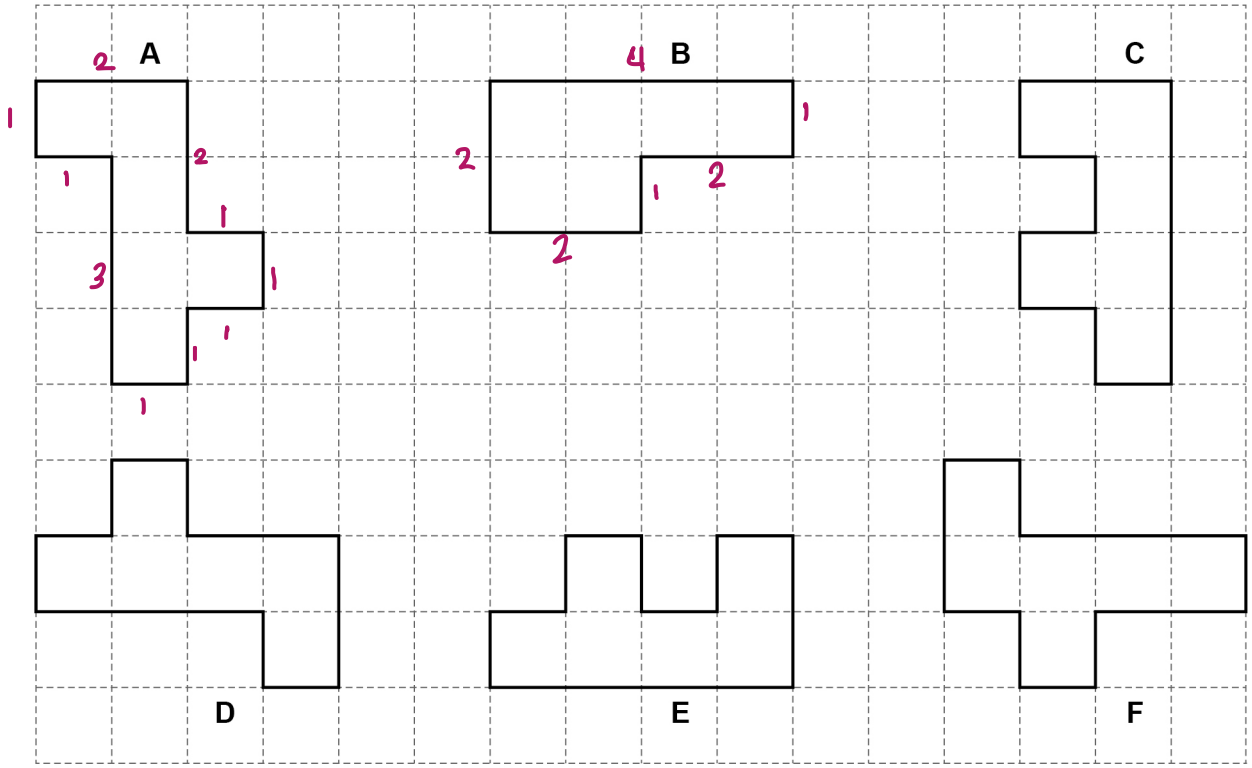
4

Turn over ►

Do not write outside the box

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]

Perimeter A = 2 + 2 + 1 + 1 + 1 + 1 + 1 + 3 + 1 + 1 = 14

Perimeter B = 4 + 1 + 2 + 1 + 2 + 2 = 12

Answer A

3 (b) Which shape is congruent to shape **A**?

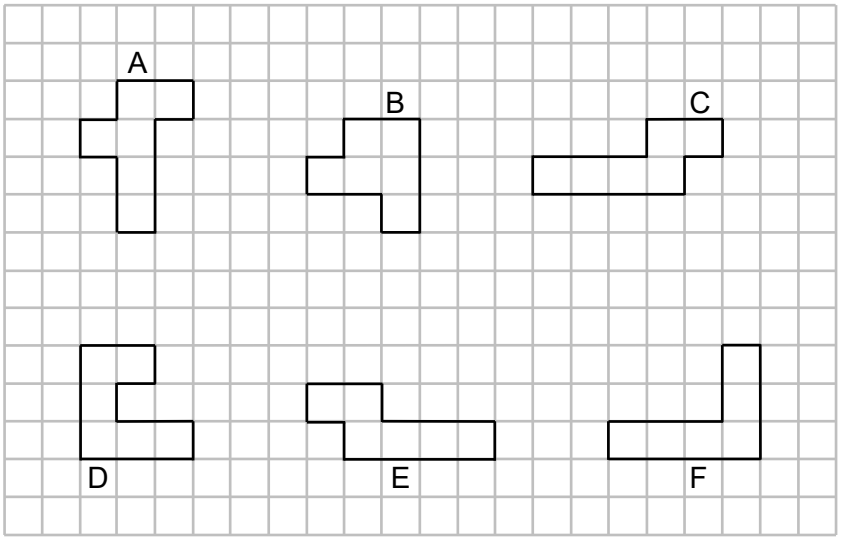
[1 mark]

Answer D

Do not write outside the box

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

Turn over ►

Do not write outside the box

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

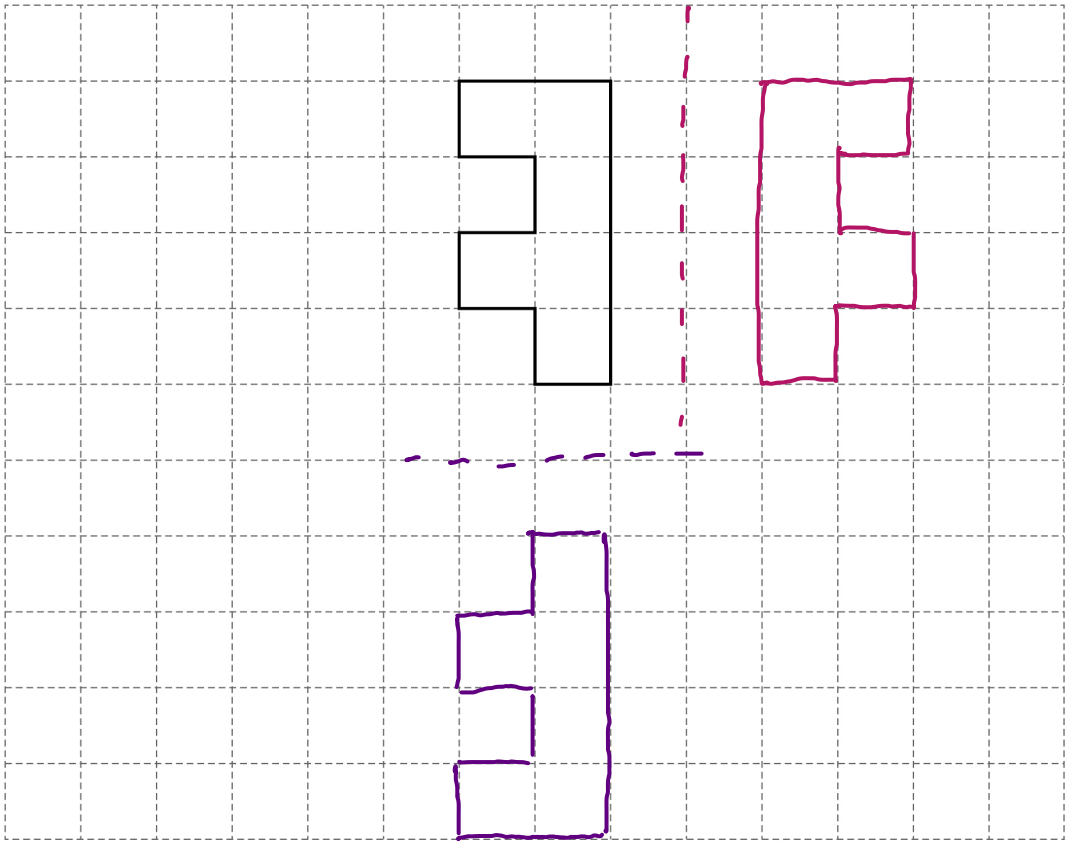
[1 mark]

Answer C and E

3 (d) On this grid draw a reflection of shape **C**.

Show your mirror line.

[2 marks]



Do not write outside the box

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

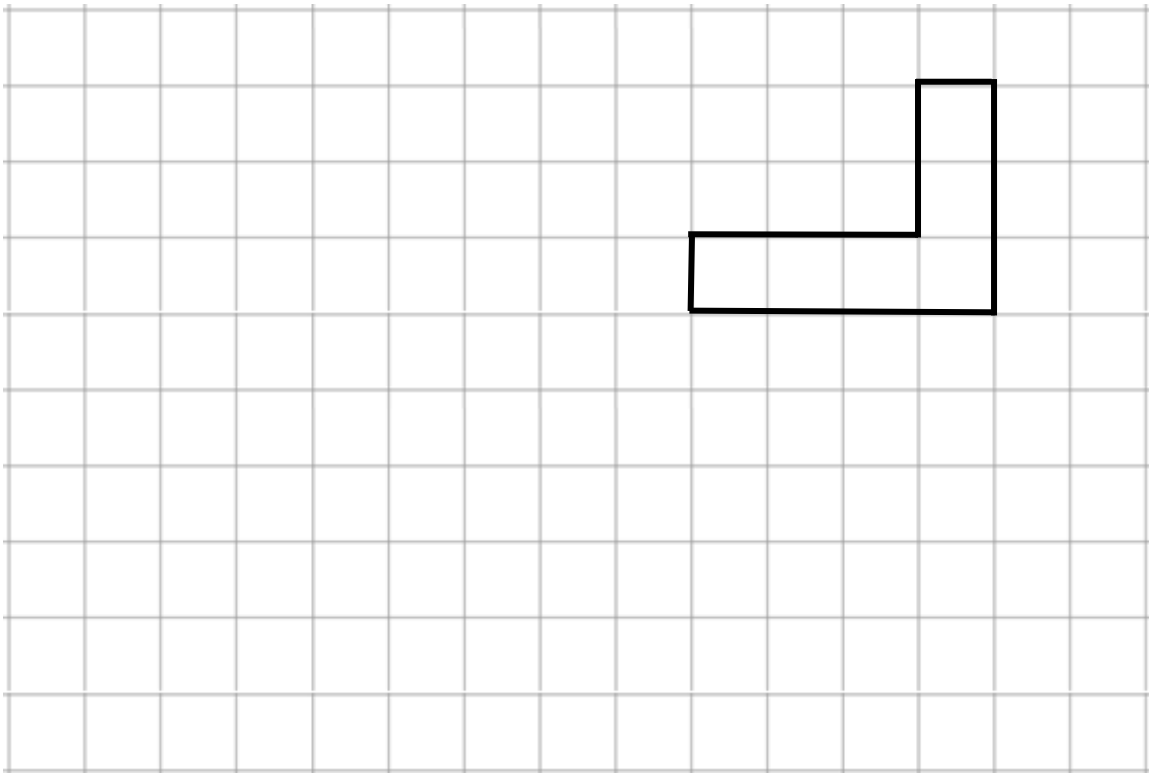
[1 mark]

Answer _____ and _____

3 (d) On this grid draw a reflection of shape **F**.

Show your mirror line.

[2 marks]

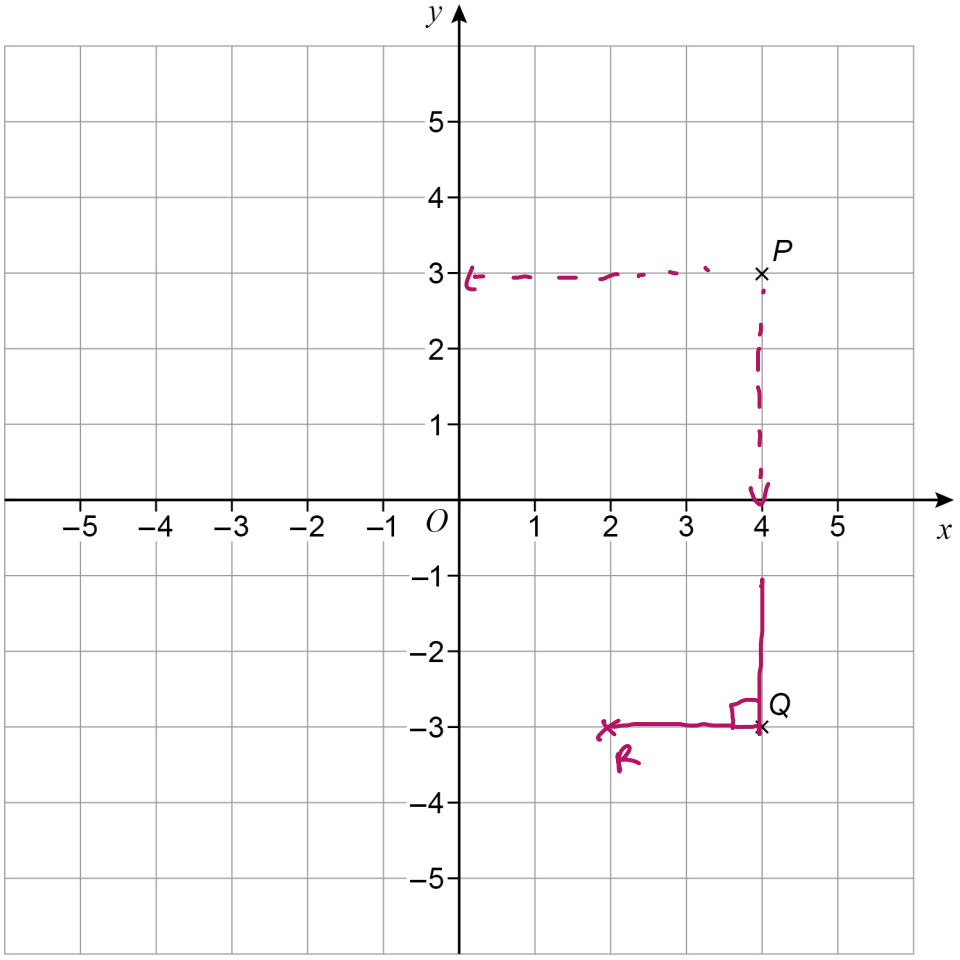


3

Turn over ►

Do not write outside the box

4 Points P and Q are shown on the grid.



4 (a) Write down the coordinates of P.

[1 mark]

(x , y)

Answer (4 , 3)

4 (b) Angle PQR is a right angle.

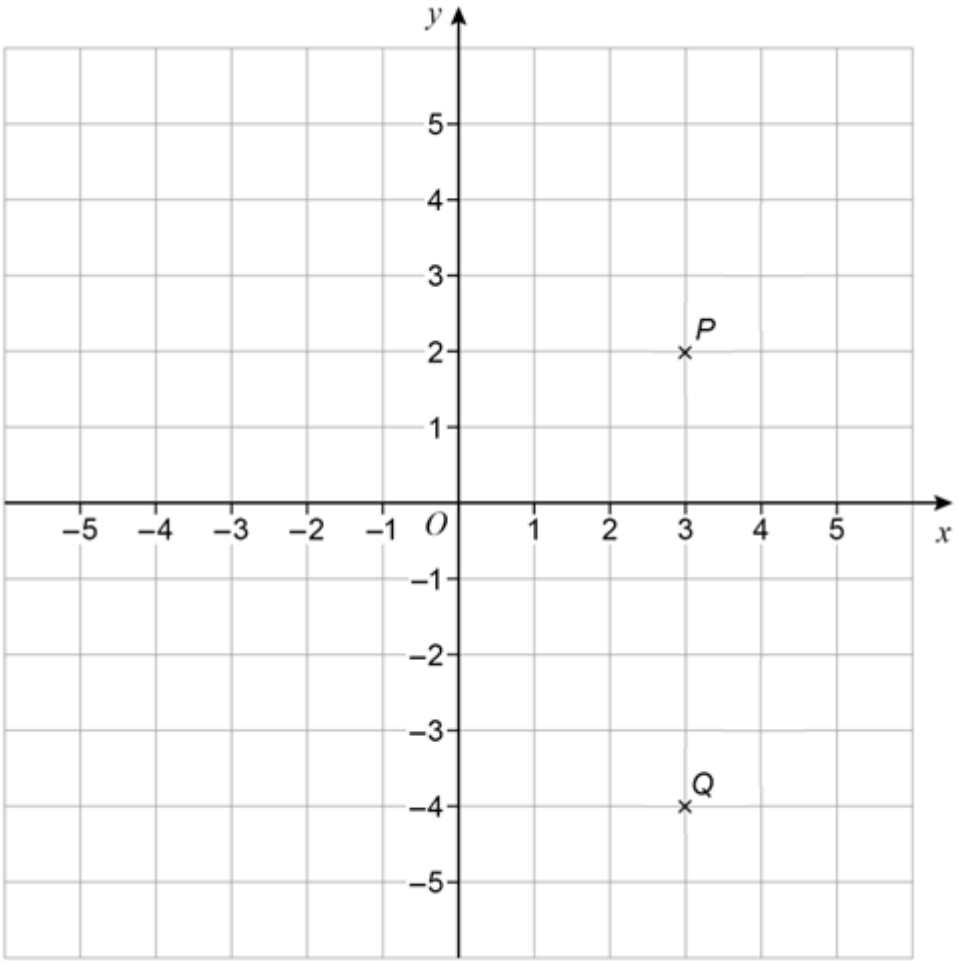
Work out possible coordinates for R.

[1 mark]

Answer (2 , -3)

Do not write outside the box

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 (_____ , _____)

2

Turn over ►

Do not write outside the box

5 (a) A shop sells bottles of orange juice.

Each bottle costs 75p

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

[2 marks]

£5 = 500p

500p ÷ 75p = 6.6̇

Answer 6

5 (b) Two shops sell bottles of apple juice.

Shop X
pack of 4 bottles
Was £2.50
Now 10% off

Shop Z
pack of 12 bottles
£7

At which shop is it cheaper to buy 24 bottles?

Show working to support your answer.

[4 marks]

(X) 10% of £2.50 = 25p

£2.50 − 25p = £2.25

×6

4 bottles	24 bottles
£2.25	£13.50

×6

(Y)

×2

12 bottles	24 bottles
£7	£14

×2

Answer Shop X

Do not write outside the box

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	**Shop F**
pack of 8 bottles Was £5.50 Now 10% off	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

Turn over ►

Do not write outside the box

6 A game has four cards labelled A, B, C and D.

Ellie picks two of the cards at random.

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

[2 marks]

AB
AC
AD
BC
BD
CD

7 (a) Complete the boxes using

two **different** even numbers

and

two **different** odd numbers.

[2 marks]

2	+	4	+	19	+	21	= 46
even		even		odd		odd	

Do not write outside the box

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

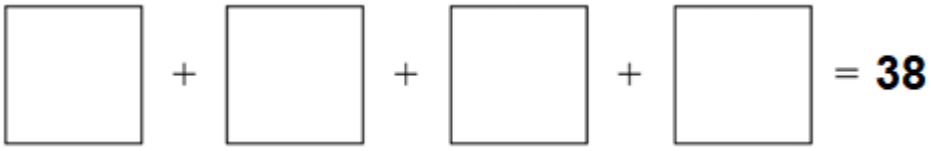
7 (a) Complete the boxes using

two **different** even numbers

and

two **different** odd numbers.

[2 marks]



4

Turn over ►

Do not write outside the box

7 (b) Complete the boxes using

a factor of 12

and

a factor of 40

[2 marks]

$\boxed{3} \times \boxed{10} = 30$

12

1 × 12
2 × 6
3 × 4

40

1 × 40
2 × 20
4 × 10

7 (c) Complete the boxes using

a square number

and

a prime number.

[2 marks]

$\boxed{36} \div \boxed{2} = 18$

Squares: 1, 4, 9, 16, 25, 36, 49, 64, 81, ...

Primes: 2, 3, 5, 7, 11, ...

Do not write outside the box

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]

$\square \div \square = 32$

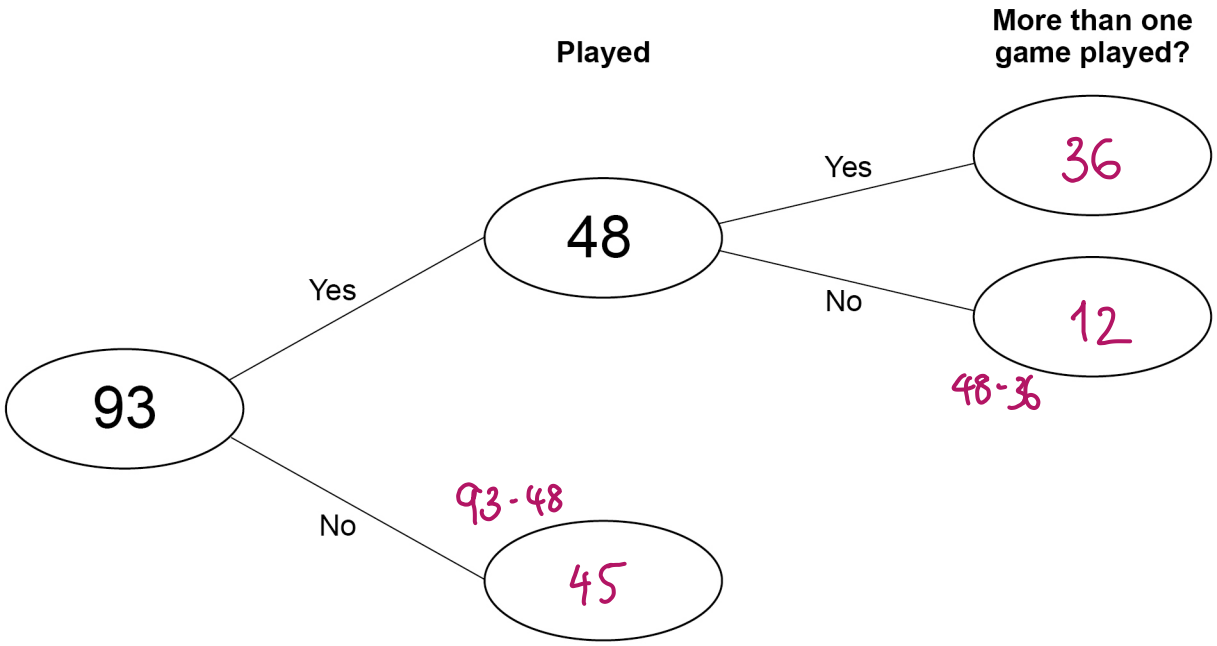
4

Turn over ►

Do not write outside the box

8 93 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.

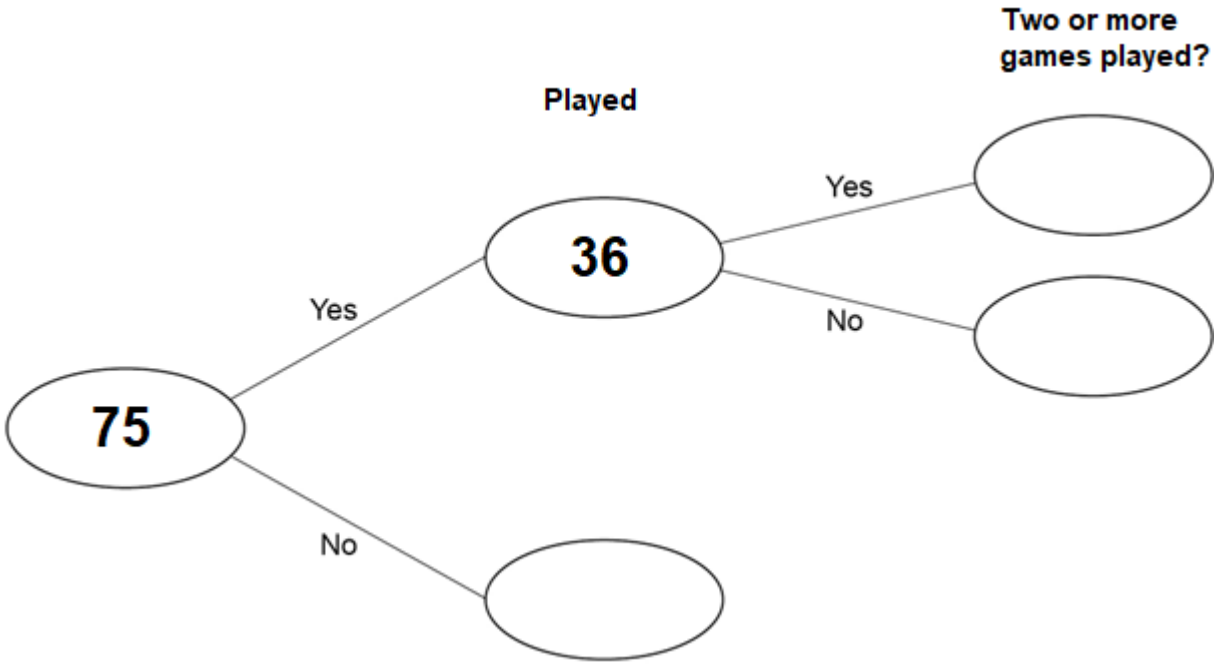
[3 marks]

75% : $\frac{3}{4}$ $\frac{3}{4}$ of 48 : (48 ÷ 4) × 3 = 36

Do not write outside the box

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]

3

Turn over ►

Do not write outside the box

8 (b) One of the 93 people is chosen at random.

P(used social media) is **more than** 0.68

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

[2 marks]

0.68 × 93 = 63.24

Answer 64

Do not write outside the box

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 _____

2

Turn over ►

Do not write outside the box

9 (a) The cost of a TV streaming service is

£6 per month for the first 4 months

then

£11 per month for the rest of the year. (12 - 4 = 8 months)

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

[2 marks]

£6 × 4 = £24

£11 × 8 = £88

1
24
+ 88
112

Answer £ 112

9 (b) A TV series has ten episodes.

Nine episodes are each 50 minutes long.

One episode is 1 hour 42 minutes long.

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

Give your answer in hours and minutes.

[3 marks]

1h 42m = 102m

9 × 50m = 450m

450 + 102 = 552 minutes

552 ÷ 60 = 9.2 hours

9 hours = 9 × 60 = 540 minutes

552 - 540 = 12

Answer 9 hours 12 minutes

Do not write outside the box

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

5

Turn over ►

Do not write outside the box

10 (a) There are 1020 books in a box.

$\frac{2}{5}$ of the books are blue.

How many are blue?

[2 marks]

$\frac{2}{5}$ of 1020 : (1020 : 5) × 2 = 408

Answer 408

10 (b) There are green pens and red pens in the box.

The ratio of green : red is 4 : 3

What fraction of the pens are green?

[1 mark]

G G G G R R R

Answer $\frac{4}{7}$

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

220 are scientific.

30 are not.

What percentage of the calculators are scientific?

[2 marks]

220 + 30 = 250 $\frac{220}{250}$ = 0.88 = 88%

Answer 88 %

Do not write outside the box

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 _____ %

5

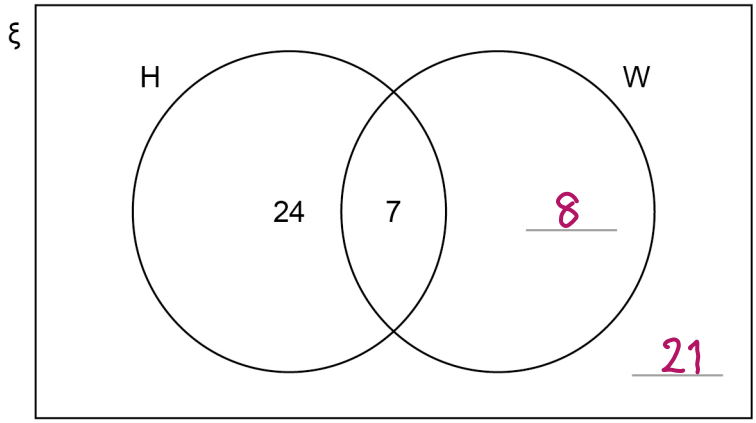
Do not write outside the box

11 Here is a Venn diagram.

ξ = 60 people

H = people who own a gaming headset

W = people who own a smart watch



11 (a) 15 of the people own a smart watch.

Complete the Venn diagram.

[2 marks]

15 - 7 = 8 60 - (24 + 7 + 8) = 60 - 39 = 21

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

What is the probability that they own **both** a gaming headset and a smart watch?

[1 mark]

Answer $\frac{7}{60}$

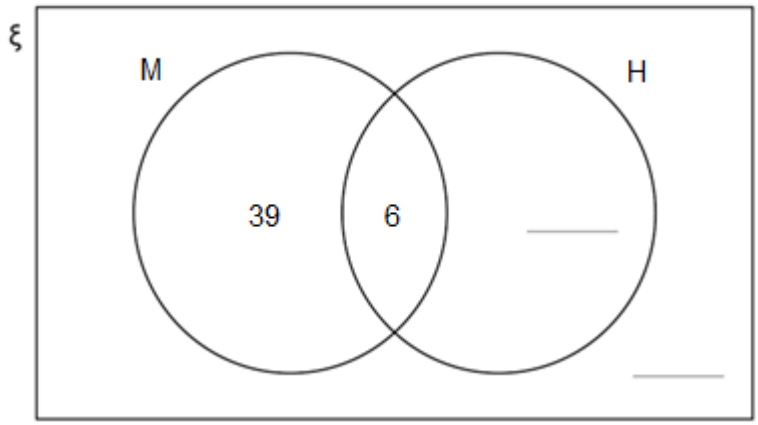
Do not write outside the box

11 Here is a Venn diagram.

ξ = 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 _____

3

Turn over ►

Do not write outside the box

11 (c) Marek is going to buy a gaming headset that costs £35

He already has £19

He plans to save the rest in two equal amounts over the next two weeks.

He uses this method to work out in pounds how much to save each week.

$35 - 19 \div 2$

What is wrong with his method?

[1 mark]

This calculation will complete division first.

Marek should work out (35 - 19) ÷ 2

Do not write outside the box

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]

1

Turn over ►

Do not write outside the box

12 Kai says that 3 : 2 is an equivalent ratio to 9 : 6

Jo says that 1.5 : 1 is an equivalent ratio to 9 : 6

Who is correct?

Tick **one** box.

- ☐ Both of them
- ☑ Kai only
- ☐ Jo only
- ☐ Neither of them

Give reasons for your answer.

[2 marks]

Equivalent ratios are not written in the form n:1.

Do not write outside the box

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]

2

Do not write outside the box

13 28 is increased by 25%

40 is decreased by 15%

Which answer is bigger?

Show how you decide.

[4 marks]

$28 \times 1.25 = 35$

$40 \times 0.85 = 34$

Answer 28 increased by 25%

Do not write outside the box

13 40 is increased by 15%

64 is decreased by 25%

Which answer is bigger?

Show how you decide.

[4 marks]

Answer _____

4

Turn over ►

Do not write outside the box

14 Factorise $12a + 15b$

[1 mark]

$2 \times 2 \times 3 \times a + 3 \times 5 \times b = 3(2 \times 2 \times a + 5 \times b)$

Answer $3(4a + 5b)$

15 Write down all the integers that satisfy the inequality

$-3 \leqslant x < 2$

can be equal to ↑ { can not be equal to

[2 marks]

Answer $-3, -2, -1, 0, 1$

16 A linear sequence starts

7 (+3) 10 (+3) 13 (+3) 16

Work out an expression for the nth term of the sequence.

[2 marks]

$3n$: 3 6 9 12

$3n+4$: 7 10 13 16

Answer $3n + 4$

Do not write outside the box

14 Factorise $14x + 21y$

[1 mark]

Answer _____

15 Write down all the integers that satisfy the inequality

$$-1 \leqslant x < 4$$

[2 marks]

Answer _____

16 A linear sequence starts

7 12 17 22

Work out an expression for the nth term of the sequence.

[2 marks]

Answer _____

5

Turn over ►

Do not write outside the box

17 Jess saves 2p, 5p and 10p coins.

She has

- 45 10p coins
- 8 times as many 2p coins as **10p coins**
- £17.70 in total.

Work out total **value** of 2p coins : total **value** of 5p coins

Give your answer in its simplest form.

[4 marks]

45 × 10p : £4.50 (10p coins)

8 × 45 : 360 360 × 2p : £7.20 (2p coins)

4.50 + 7.20 : 11.70 17.70 − 11.70 : £6.00 (5p coins)

£7.20 : £6.00

÷10 ↓ 720p : 600p ↓ ÷10

÷12 ↓ 72 : 60 ↓ ÷12

6 : 5

Answer 6 : 5

Do not write outside the box

17 Emily saves 2p, 5p and 10p coins.

She has

- 35 10p coins
- 9 times as many 2p coins as **10p coins**
- £14.30 in total.

Work out total **value** of 2p coins : total **value** of 5p coins

Give your answer in its simplest form.

[4 marks]

Answer _____ : _____

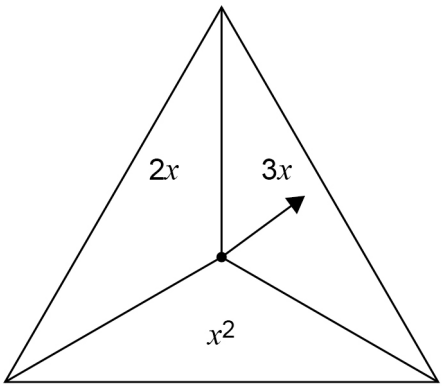
4

Turn over ►

Do not write outside the box

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
$2x$	2	4	6	8	10 ✓	12 ✓
$3x$	3	6	9	12 ✓	15 ✓	18 ✓
x^2	1	4	9	16 ✓	25 ✓	36 ✓

Do not write outside the box

18 (b) A player wins the game if their score is 10 or more.

Work out the probability that they win the game.

[1 mark]

8 scores of 10 or more.

18 scores

Answer $\frac{8}{18} : \frac{4}{9}$

18 (c) The game is played 711 times.

Estimate the number of games that are won.

[2 marks]

$\frac{4}{9} \times 711 : 316$

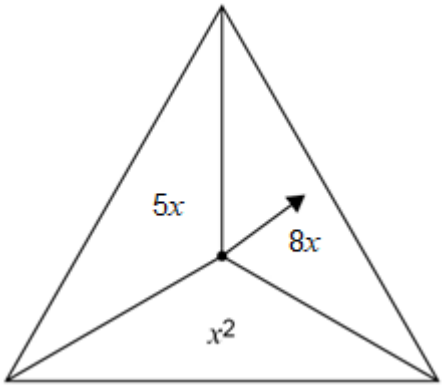
Answer 316

Turn over ►

Do not write outside the box

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		

Do not write outside the box

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.

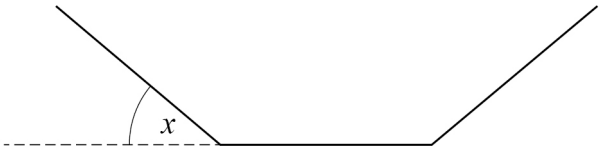
[2 marks]

Answer _____

5

Do not write outside the box

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



Not drawn accurately

Assume that the polygon is an octagon. (8 angles)

Work out the size of angle x.

[2 marks]

Exterior angles add up to 360°

360 ÷ 8 = 45

Answer 45 °

19 (b) In fact, the polygon has **more** sides than an octagon.

$\frac{360}{9} = 40°$ $\frac{360}{10} = 36°$

What does this mean about the size of angle x ?

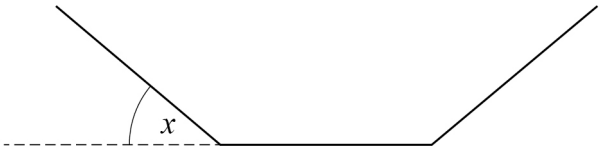
Tick **one** box.

[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

Do not write outside the box

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]

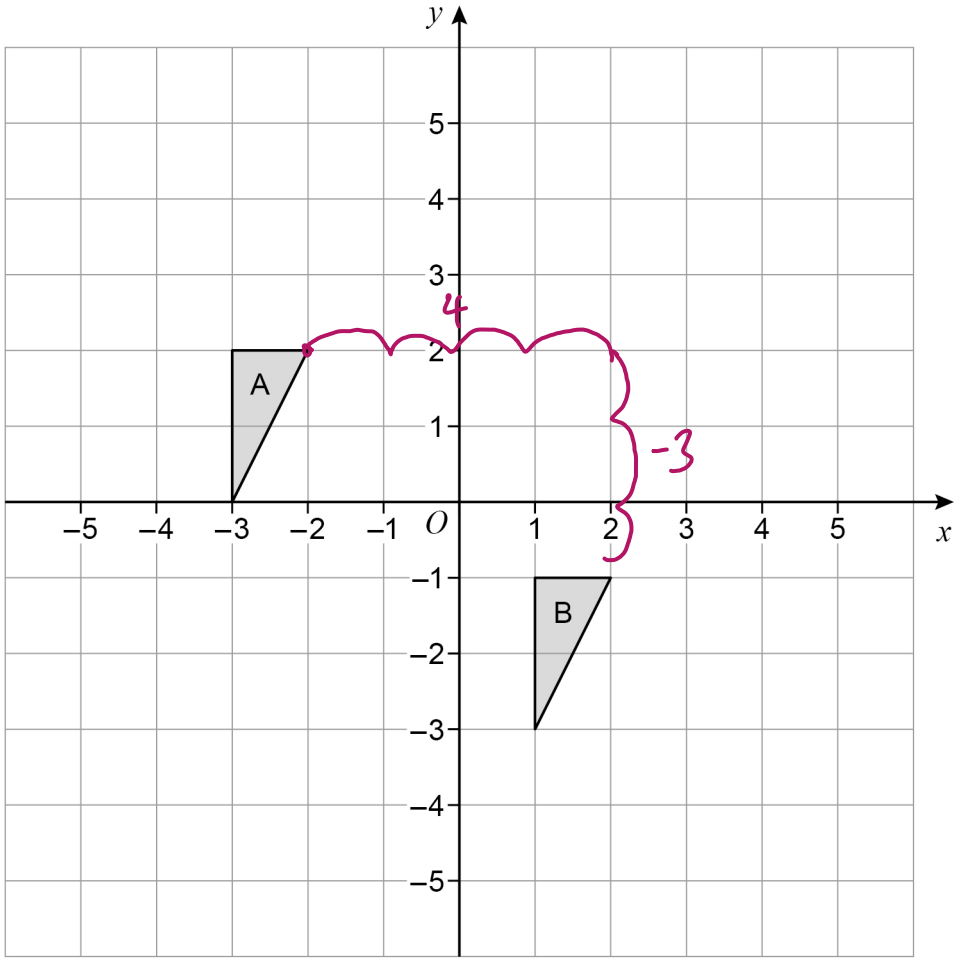
- ☐ It is more than the answer to part (a)
- ☐ It is the same as the answer to part (a)
- ☐ It is less than the answer to part (a)
- ☐ It could be any of the above

3

Do not write outside the box

20 Write down the translation vector that maps shape A onto shape B.

[2 marks]

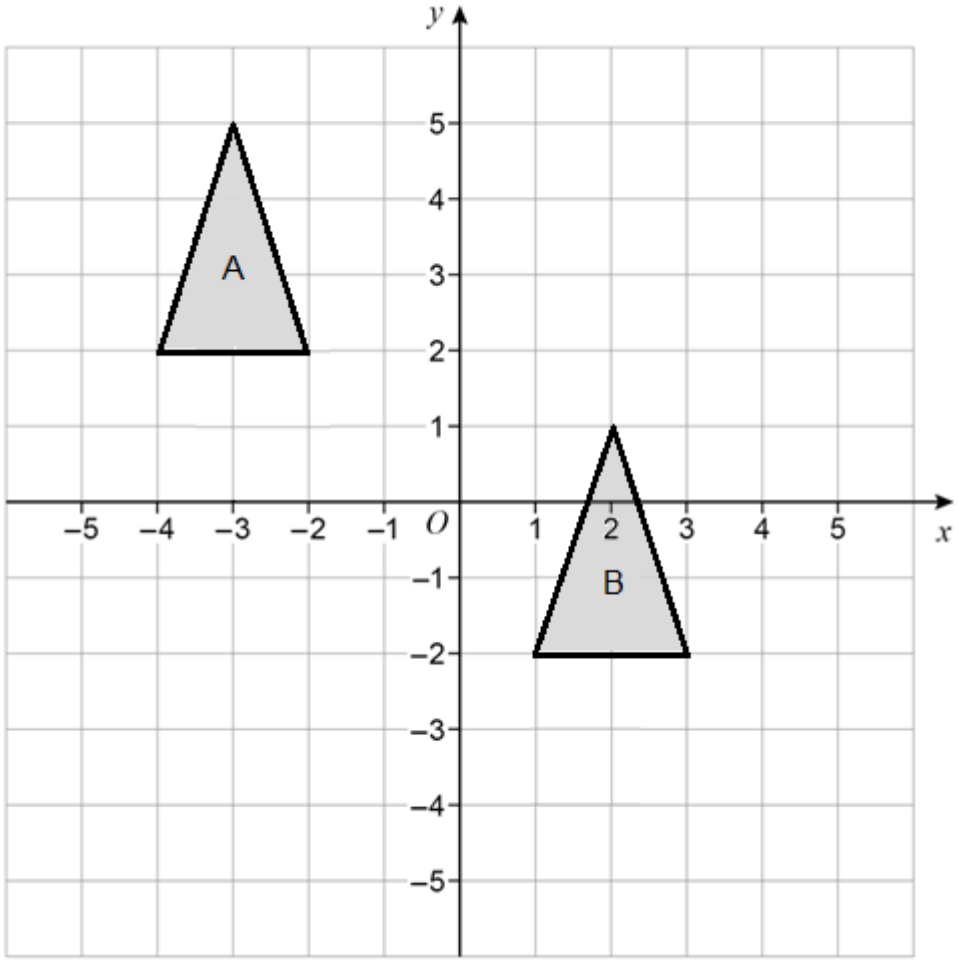


Answer $\begin{pmatrix} 4 \\ -3 \end{pmatrix}$

Do not write outside the box

20 Write down the translation vector that maps shape A onto shape B.

[2 marks]



Answer _____

2

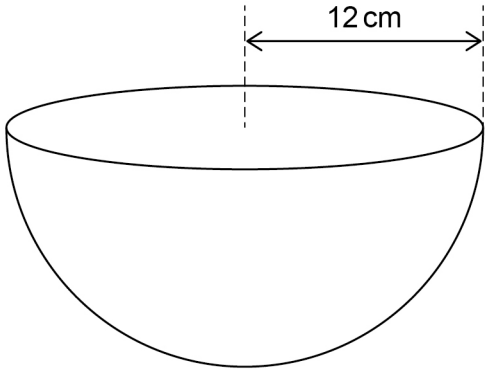
Turn over ►

Do not write outside the box

21

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

A bowl is a hemisphere with radius 12 cm



Water is poured into the bowl

at a rate of 325 cm^3 per second

for 8 seconds.

Does the water fill **more than** 70% of the bowl?

You **must** show your working.

[4 marks]

$325\,cm^3/s \times 8\,s = 2600\,cm^3$ (water)

$\frac{4}{3} \times \pi \times 12^3 = 7,238.229473871$

$7,238.229473871 \div 2 = 3,619.114736935$ (volume of the bowl)

$3,619.114736935 \times 0.7 = 2,533.380315855\ cm^3$

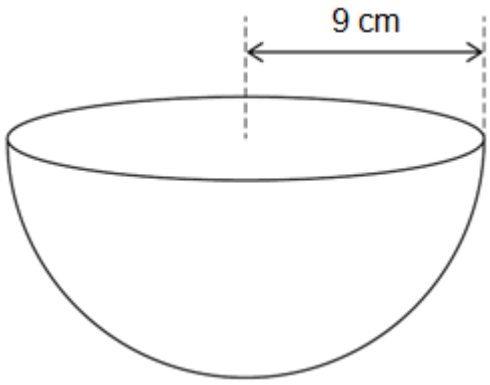
Yes. $2600 > 2533.38$

Do not write outside the box

21

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]

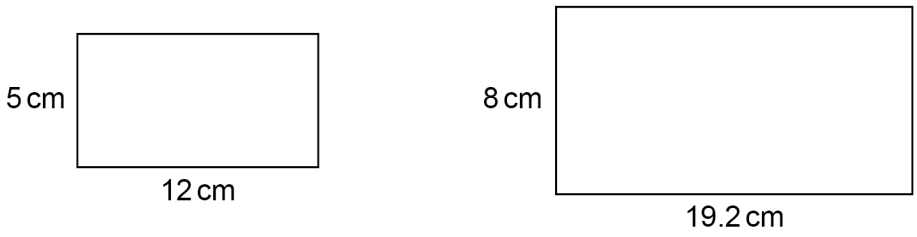
4

Do not write outside the box

22 Show that these two rectangles are similar.

[2 marks]

Not drawn accurately



$\frac{8}{5} = 1.6$ $\frac{19.2}{12} = 1.6$

Scale factor = 1.6

23 A factory packs x boxes of teabags per hour.

Each box contains 80 teabags.

Show that the factory packs $\frac{4x}{3}$ teabags per minute.

[2 marks]

$80 \times x = 80x$ teabags per hour

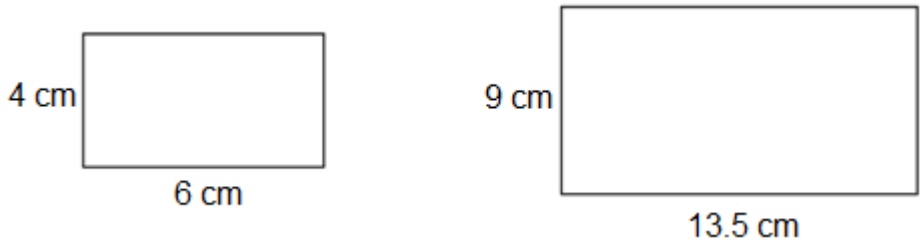
$80x \div 60 =$ tea bags per minute $\frac{80x}{60} = \frac{4x}{3}$ (÷20 ÷20)

Do not write outside the box

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

4