



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 2 Calculator

Wednesday 7 June 2023

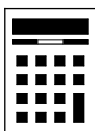
Morning

Time allowed: 1 hour 30 minutes

### Materials

For this paper you must have:

- a calculator
- mathematical instruments
- the Formulae Sheet (enclosed).



### 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	
<b>TOTAL</b>	

### Advice

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

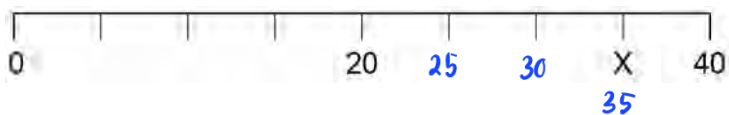


J U N 2 3 8 3 0 0 2 F 0 1

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

Do not write  
outside the  
box

1 (a) Here is a number line.

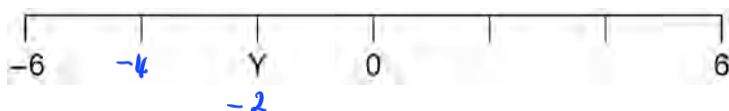


What number is at X?

[1 mark]

Answer 35 (1)

1 (b) Here is a different number line.



What number is at Y?

[1 mark]

Answer -2 (1)



2

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

One has been done for you.

Do not write  
outside the  
box

[4 marks]

Left column expressions:

- $3a + 4a$
- $14a - 2a$
- $3a \times 3a$
- $6 \times 3a$
- $12a \div 4$

Right column simplified expressions:

- $12a$
- $7a$
- $3a$
- $18a$
- $9a^2$
- $6a$

Connections:

- $14a - 2a$  is connected to  $12a$  (grey line).
- $3a + 4a$  is connected to  $7a$  (blue line).
- $3a \times 3a$  is connected to  $9a^2$  (blue line).
- $6 \times 3a$  is connected to  $18a$  (blue line).
- $12a \div 4$  is connected to  $3a$  (blue line).

Red circles with '1' are next to  $7a$ ,  $3a$ ,  $18a$ , and  $9a^2$ .

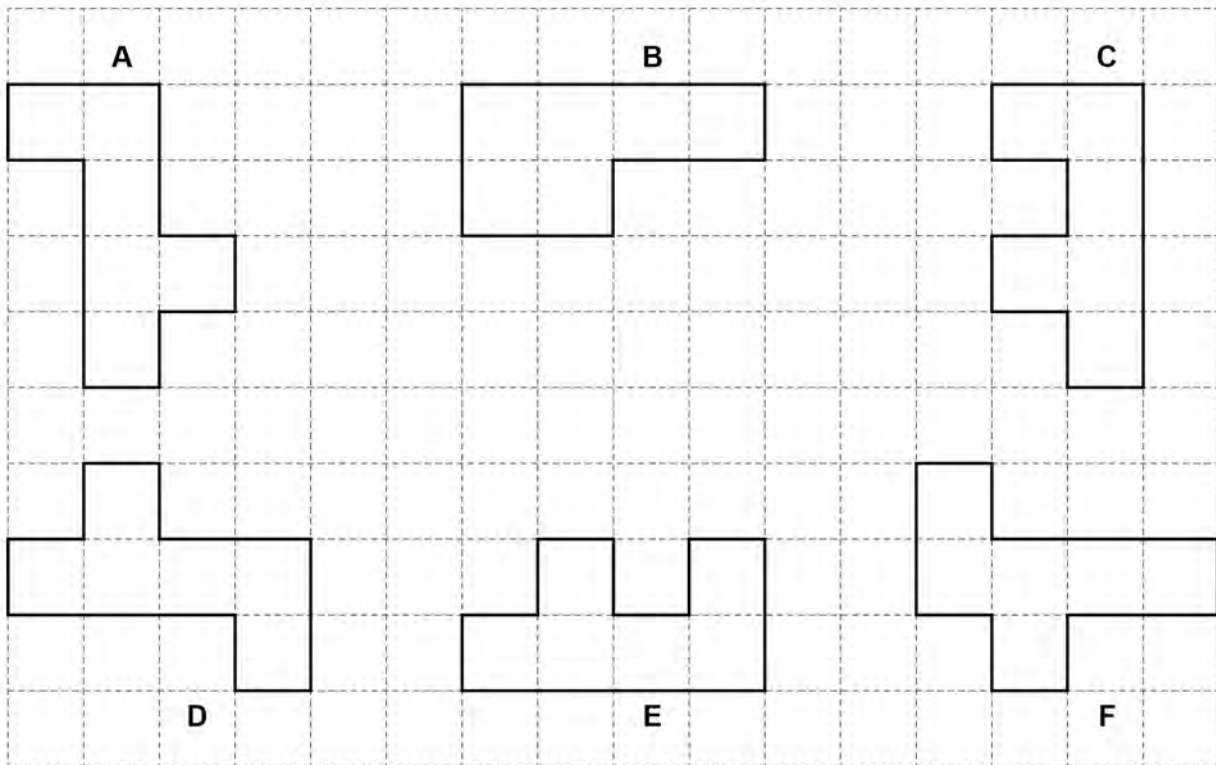
Turn over for the next question

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]

$A = 14$  ,  $B = 12$

①

Answer     A     ①

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

[1 mark]

Answer     D     ①



Do not write  
outside the  
box

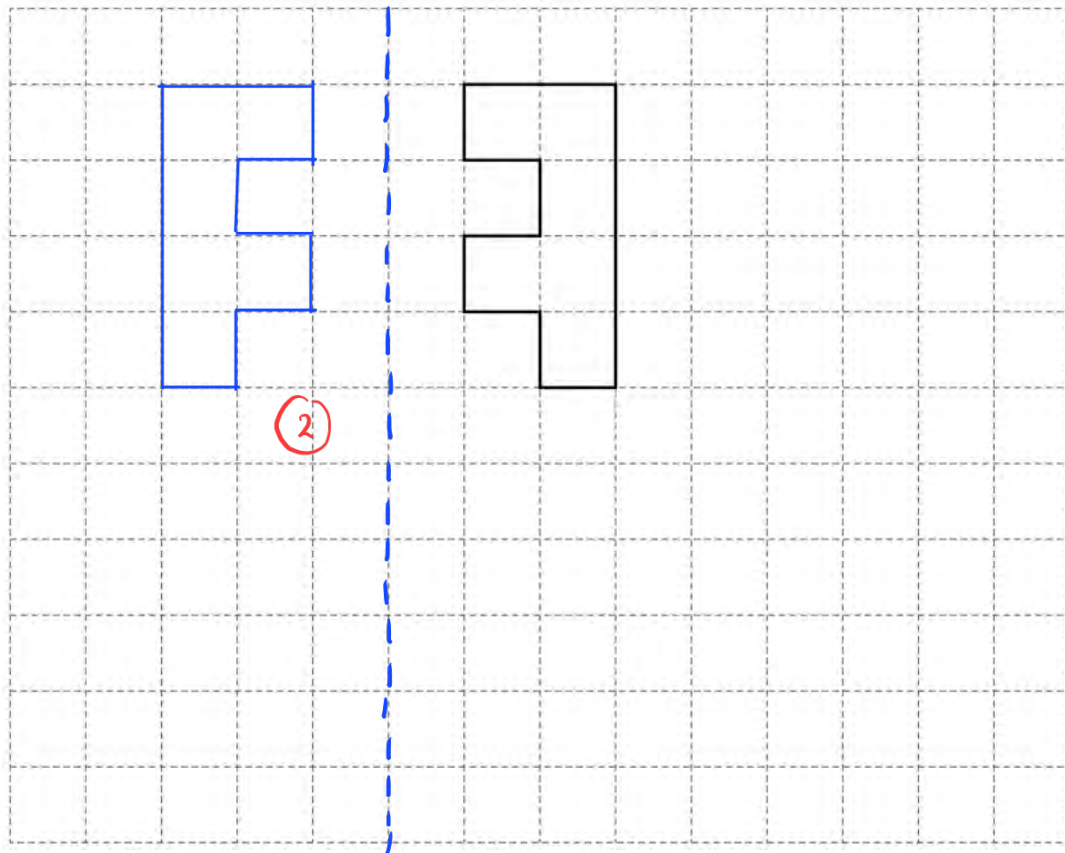
3 (c) Which **two** shapes fit together to make a rectangle?

[1 mark]

Answer     C     and     E    

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

[2 marks]



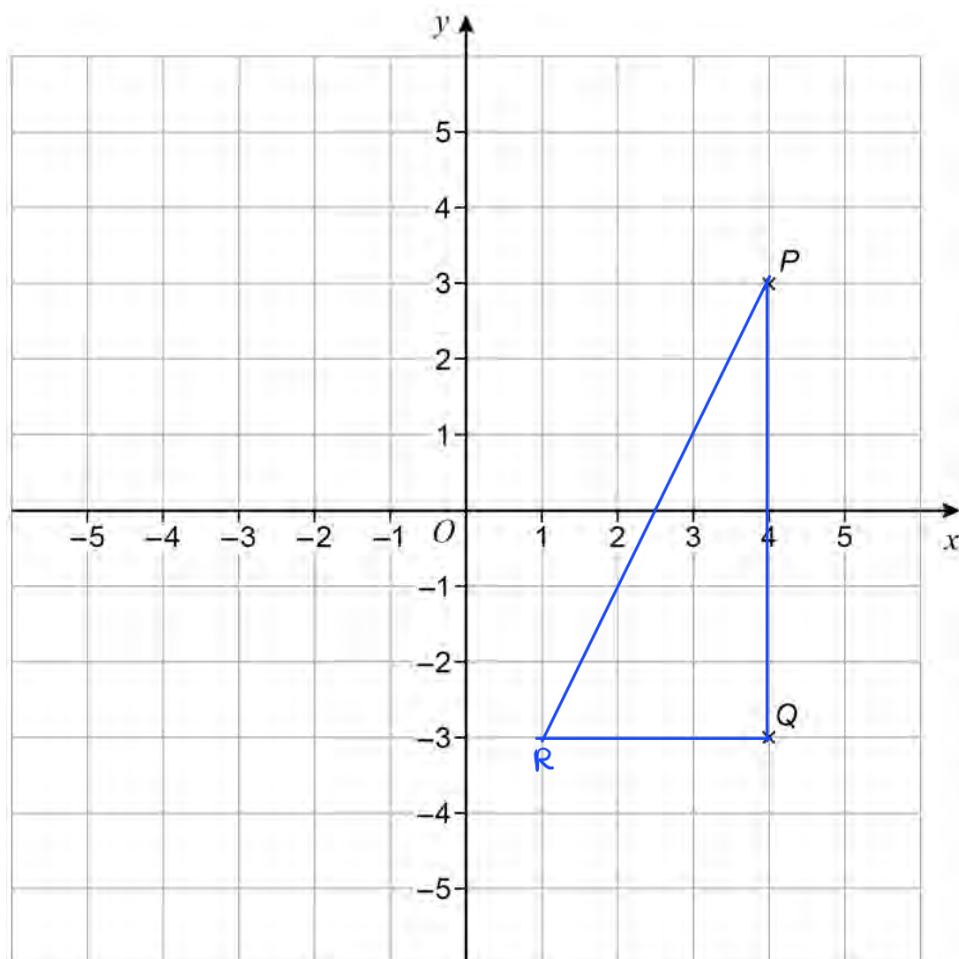
Turn over for the next question

Turn over ►



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

Do not write  
outside the  
box



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

[1 mark]

Answer ( 4 , 3 )

- 4 (b) Angle  $PQR$  is a right angle.

Work out possible coordinates for  $R$ .

[1 mark]

Answer ( 1 , -3 )



- 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]

$$£5 = 500 \text{ p}$$

$$500 \text{ p} \div 75 \text{ p} = 6.677$$

$$\textcircled{1} = 6 \text{ bottles}$$

Answer

6  $\textcircled{1}$

- 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]

$$X : \frac{24}{4} = 6 \times 2.50$$

$$= 15$$

$\textcircled{1}$

$$0.9 \times 15 = 13.50 \textcircled{1}$$

$$Z : \frac{24}{12} = 2 \times 7 = 14 \textcircled{1}$$

Answer

X  $\textcircled{1}$



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

(2)

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

[2 marks]

$$\boxed{2} + \boxed{4} + \boxed{21} + \boxed{19} = 46$$

(2)

Do not write  
outside the  
box





Do not write  
outside the  
box

- 7 (b) Complete the boxes using  
a factor of 12  
and  
a factor of 40

[2 marks]

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

(1)                      (1)

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

[2 marks]

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

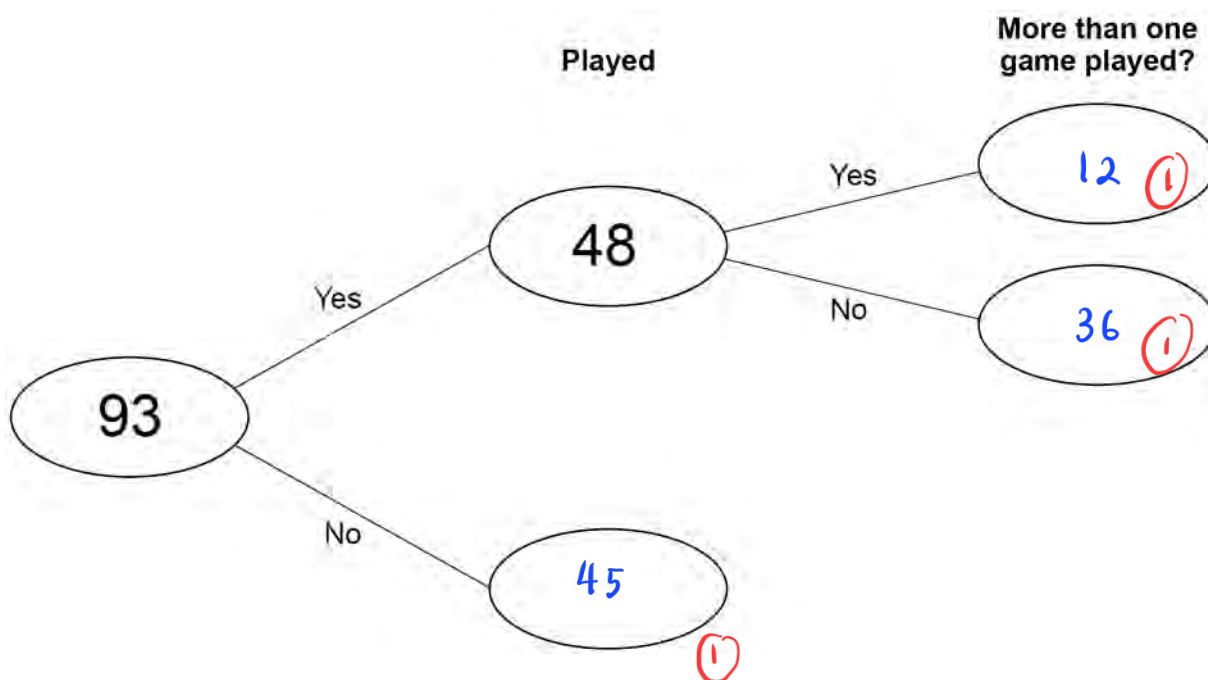
(1)                      (1)

Turn over for the next question

Turn over ►



- 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]

$$\frac{75}{100} \times 48 = 36$$

---



---



---



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]

$$0.68 \times 93 = 63.24$$
$$\approx 64$$

Answer 64

Turn over for the next question

5

Turn over ►



- 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.

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

[2 marks]

$$6 \times 4 + 11 \times 8$$

$$= 24 + 88$$

$$= 112$$

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]

$$9 \times 50 = 450$$

$$\frac{450}{60} = 7.5 \text{ hours}$$

$$= 7 \text{ hours } 30 \text{ minutes}$$

$$7 \text{ hours } 30 \text{ mins} + 1 \text{ hour } 42 \text{ mins}$$

$$= 9 \text{ hours } 12 \text{ mins}$$

Answer 9 hours 12 minutes



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]

$$\frac{2}{5} \times 1020 = 408$$

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]

$$\text{Total ratio} = 4 + 3 = 7$$

$$\frac{4}{7}$$

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]

$$\text{Total} = 220 + 30 = 250$$

$$\frac{220}{250} \times 100\% = 88$$

Answer 88 %

10

Turn over ►



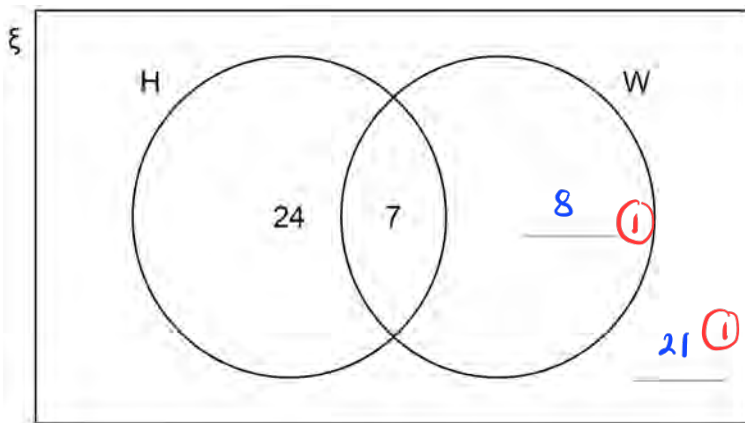
Do not write outside the box

11 Here is a Venn diagram.

$\xi = 60$  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]

---



---

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  $\frac{7}{60}$  1



- 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]

Needs bracket around  $35 - 19$ . (1)

Turn over for the next question

Turn over ►



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

①

Kai only

Jo only

Neither of them

Give reasons for your answer.

[2 marks]

$$\text{Kai : } 3 : 2 = 9 : 6$$

$$\text{Jo : } 1.5 : 1 = 9 : 6$$

①





13

28 is increased by 25%

40 is decreased by 15%

Which answer is bigger?

Show how you decide.

[4 marks]

$$1.25 \times 28 = 35$$

$$0.85 \times 40 = 34$$

Answer 28 increased by 25%

Turn over for the next question

Turn over ►



14 Factorise  $12a + 15b$ 

[1 mark]

$$3(4a + 5b) \quad (1)$$

Answer  $3(4a + 5b)$

15 Write down all the integers that satisfy the inequality

$$-3 \leq x < 2$$

[2 marks]

Answer  $-3, -2, -1, 0, 1 \quad (2)$

16 A linear sequence starts

7

10

13

16

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

[2 marks]

$$a = 7, d = 3$$

$$T_n = 7 + (n-1)3$$

$$= 7 + 3n - 3$$

$$= 4 + 3n \quad (2)$$

Answer  $4 + 3n$



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]**

$$2p : 45 \times 8 = 360 \text{ coins } \textcircled{1}$$

$$5p : 17.70 - (45 \times 0.10) - (360 \times 0.20)$$

$$: 17.70 - 4.50 - 7.20 \textcircled{1}$$

$$: 6.00 \textcircled{1}$$

$$2p : 7.20$$

$$2p : 5p = 7.20 : 6.00 \quad \downarrow \div 12$$

$$: 6 : 5 \textcircled{1}$$

Answer 6 : 5

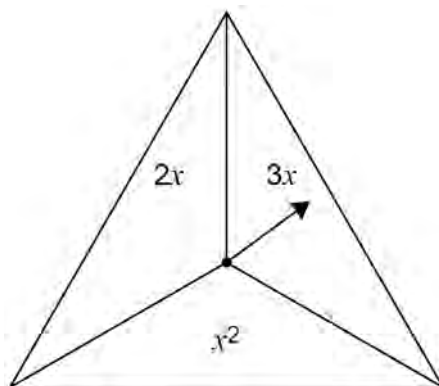
Turn over ►



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

②

---



---



---

Do not write  
outside the  
box



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]

$$\frac{8}{18}$$

Answer  $\frac{8}{18}$  (1)

- 18 (c) The game is played 711 times.

Estimate the number of games that are won.

[2 marks]

$$\frac{8}{18} \times 711 = 316$$

Answer 316

Turn over for the next question

Turn over ►



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



Not drawn accurately

Assume that the polygon is an octagon.

Work out the size of angle  $x$ .

[2 marks]

$$360 \div 8 = 135 \text{ (1)}$$

$$180 - 135 = 45 \text{ (1)}$$

Answer 45 °

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

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)

(1)

It is less than the answer to part (a)

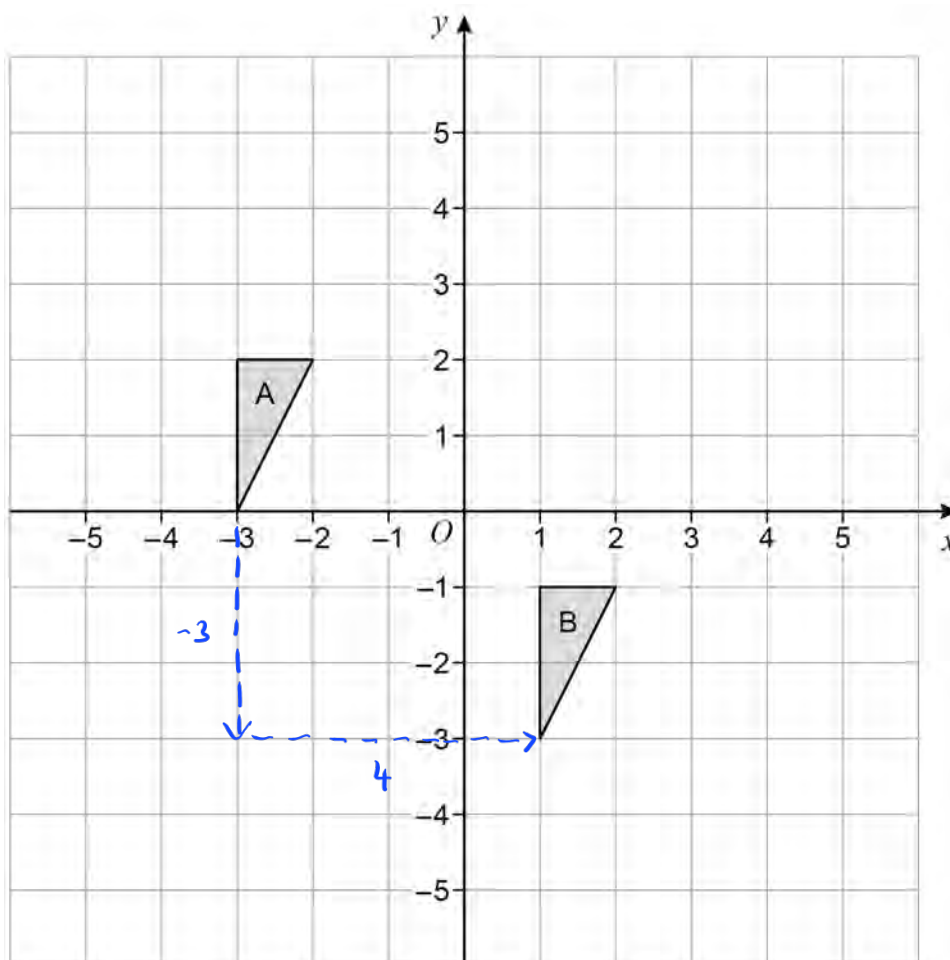
It could be any of the above



20

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

[2 marks]

Do not write  
outside the  
box

Answer  $\begin{pmatrix} 4 \\ -3 \end{pmatrix}$  (2)

Turn over for the next question

5

Turn over ►

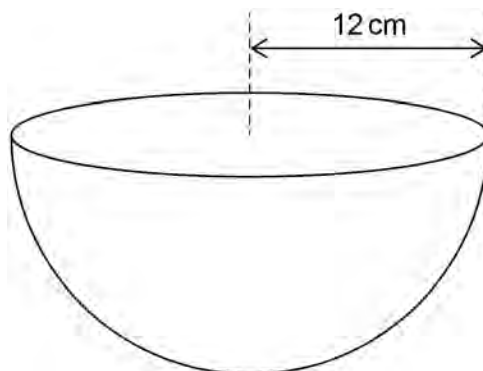


21

Do not write  
outside the  
box

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

A bowl is a hemisphere with radius 12 cm



Water is poured into the bowl  
at a rate of  $325 \text{ cm}^3$  per second  
for 8 seconds.

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

You **must** show your working.

[4 marks]

$$\text{Volume of water} = 325 \times 8 = 2600 \quad (1)$$

$$\text{volume of hemisphere} = \frac{1}{2} \times \frac{4}{3} \times \pi \times 12^3$$

$$= 3620 \quad (1)$$

$$\frac{2600}{3620} \times 100\% = 71.8\% \quad (1)$$

Yes. The water fills 71.8% of the bowl. (1)

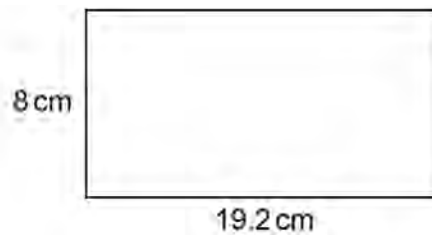
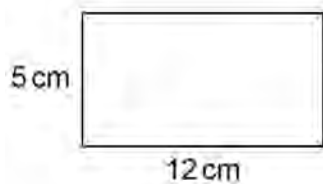




22 Show that these two rectangles are similar.

[2 marks]

Not drawn accurately



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

①

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

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

①

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]

$$80 \times x = 80x \quad \text{①}$$

$$\frac{80x}{1 \text{ hour}} \times \frac{1 \text{ hour}}{60 \text{ mins}} = \frac{80}{60} x \text{ per mins} \quad \text{①}$$

$$= \frac{4x}{3} \text{ per mins}$$

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**





