



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.

## Advice

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



JUN2383002F01

18/M/Jun23/E7

8300/2F



02

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

Do not write  
outside this  
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

## 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>	

2

Match each expression on the left with the simplified expression on the right.  
One has been done for you.

[4 marks]

$3a + 4a$	$12a$
$14a - 2a$	$7a$
$3a \times 3a$	$3a$
$6 \times 3a$	$18a$
$12a \div 4$	$9a^2$
	$6a$

Turn over for the next question

Do not write  
outside the  
box

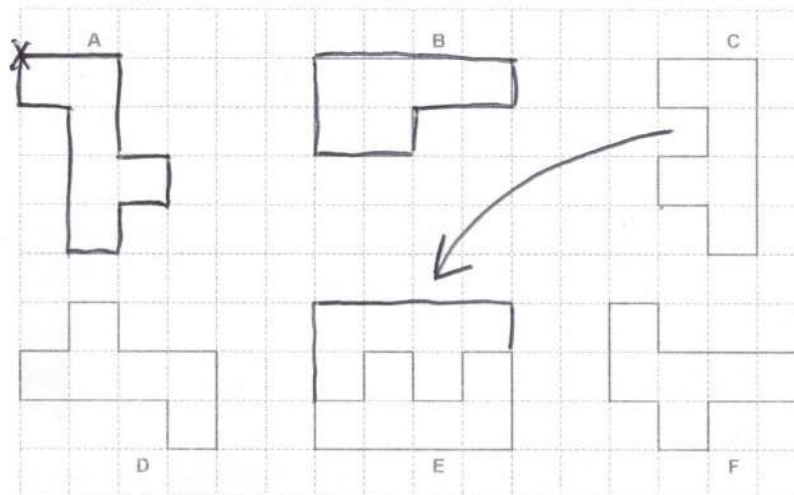
Turn over ►



3

Here are some shapes.

Each shape has an area of six square centimetres.

Do not write  
outside the  
box

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

[2 marks]

$$A = 14$$

$$B = 12$$

Answer

A

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

[1 mark]

Answer

D



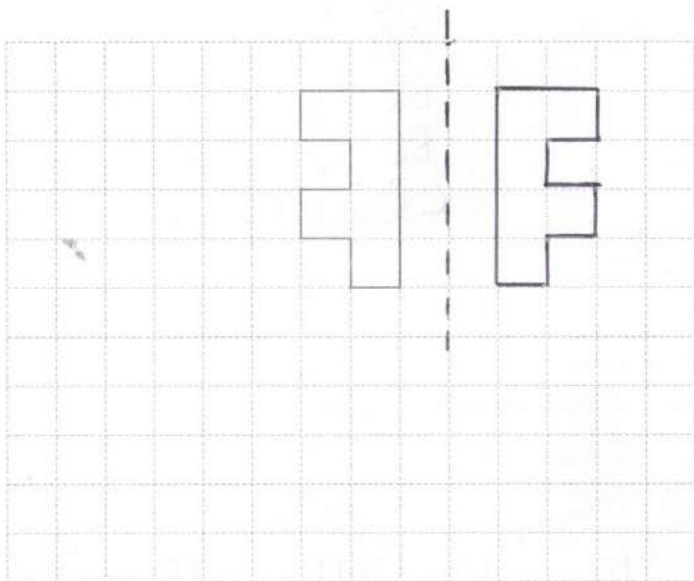
- 3 (c) Which **two** shapes fit together to make a rectangle?

[1 mark]

Answer C and F

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

[2 marks]



Turn over for the next question

6

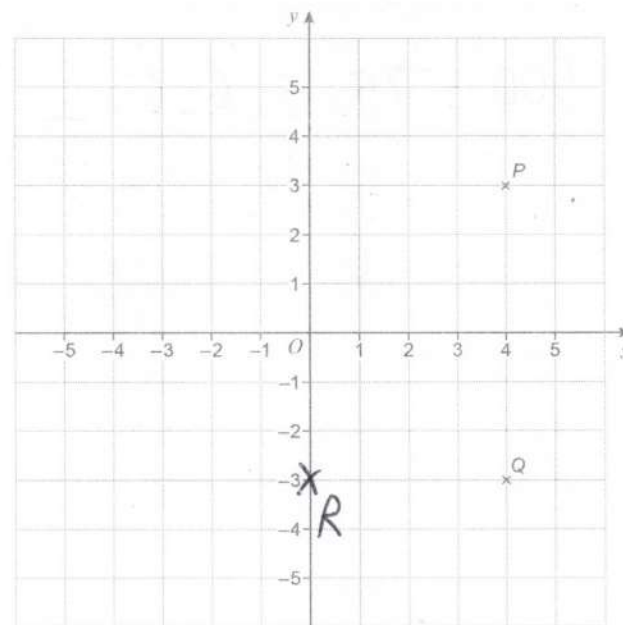
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0 5

IB/M/Jun23/B300/2F

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



- 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 ( 0 , -3 )  
(Any ≠ 4 , -3)



0 6

IB/M/Jun23/B300/2F

- 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]

$$500 \div 75 = 6.6$$

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) 6 packs  $\times$  2.25 = £13.50

(Z) 2 packs  $\times$  7 = £14

Answer

X

8

Turn over ►



0 7

IB/M/Jun23/8300/2F

- 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
BC
CD

- 7 (a) Complete the boxes using

two **different** even numbers

and

two **different** odd numbers.

[2 marks]

$$\boxed{10} + \boxed{12} + \boxed{11} + \boxed{13} = 46$$

22

24



0 8

IB/M/Jun23/8300/2F

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

1, 2, 3, 4, 6, 12  
1, 2, 4, 5, 8, 10, 20, 40

[2 marks]

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

OR  $6 \times 5$

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

1 4 9 16 25 36  
2, 3, 5

[2 marks]

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

Turn over for the next question

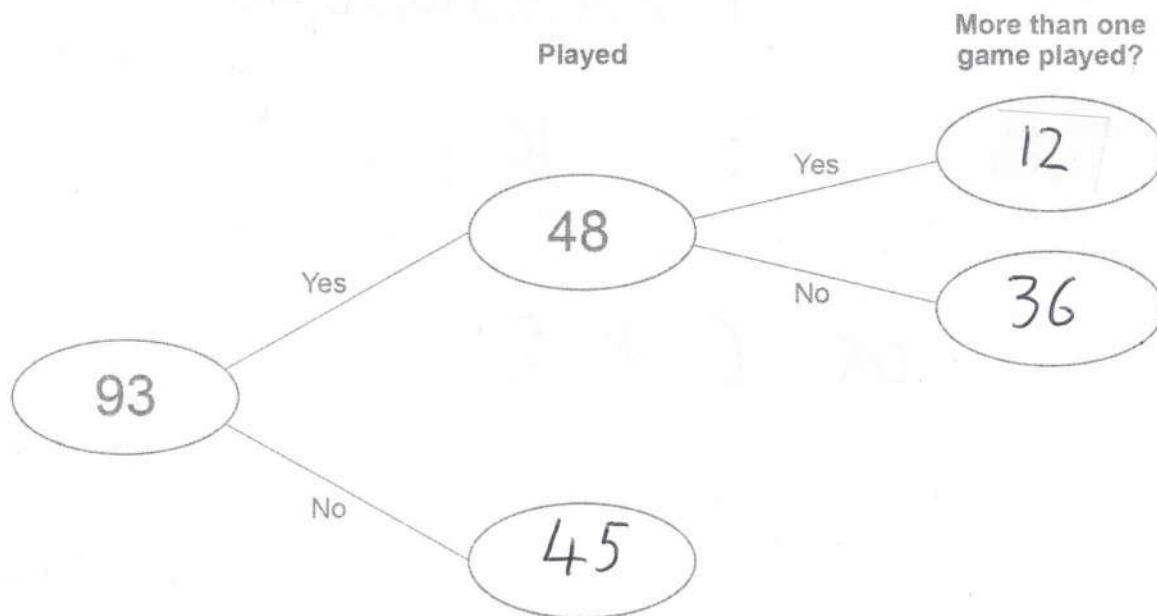
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8

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]

$$48 \times 0.75 = 36$$



- 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]

$$93 \times 0.68 = 63.24$$

Answer

64

Turn over for the next question



- 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.

$$6 \times 4 = 24$$

$$8 \times 11 = 88$$

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

[2 marks]

$$88 + 24$$

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]

$$\begin{array}{l} 9 \times 50 = 450\text{m} \\ 1\text{hr } 42 = 102\text{m} \end{array} +$$

$$= 552\text{m}$$

$$\frac{552\text{m}}{60} = 9.2\text{hr} \text{ or } 9\frac{1}{5}\text{hr}$$

Answer

9

hours

12

minutes





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

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

How many are blue?

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

[2 marks]

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]

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]

$$\frac{220}{250} \times 100$$

Answer

88

%

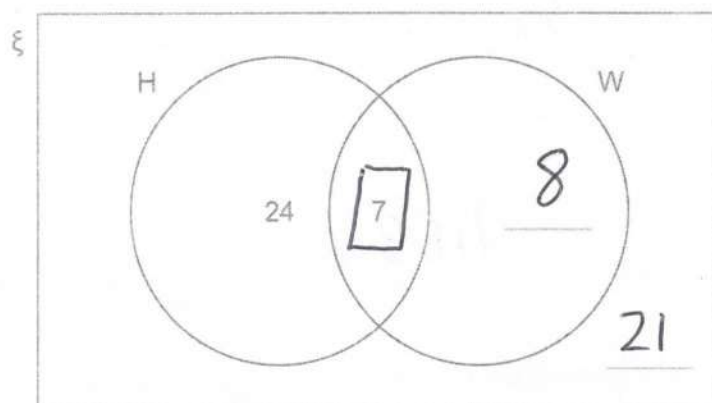


11 Here is a Venn diagram.

$\xi = 60$  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]

$$60 - 39 = 21$$

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

$$\frac{7}{60}$$



- 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]

$$35 - 19 = 16$$

$16 \div 2 = \underline{\underline{8}}$  is the true amount

His method gives £25.50

(oe)

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

☐

Kai only

☐

Jo only

☐

Neither of them

Give reasons for your answer.

[2 marks]

$$\begin{array}{ccc} 3:2 & & 1.5:1 \\ \textcircled{\times 3} & \textcircled{\times 3} & \textcircled{\times 6} \quad \textcircled{\times 6} \\ 9:6 & & 9:6 \end{array}$$



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

35

Turn over for the next question

Turn over ►



14 Factorise  $12a + 15b$ 

[1 mark]

Answer  $3(4a + 5b)$

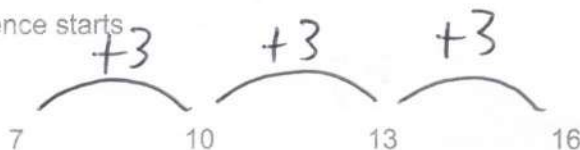
15 Write down all the integers that satisfy the inequality

$$-3 \leq x < 2$$

[2 marks]

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

16 A linear sequence starts

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

$3n$     3    6    9    12

[2 marks]

Answer  $3n + 4$



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.

$$45 \times 8 = 360$$

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

Give your answer in its simplest form.

[4 marks]

$$45 \times 10 = 450p$$

$$1770 - 450 = 1320p$$

$$2p \times 360 = 720p$$

$$1320 - 720 = 600p \text{ in } 5p$$

$$(2p) : (5p)$$

$$720 : 600$$

$$72 : 60$$

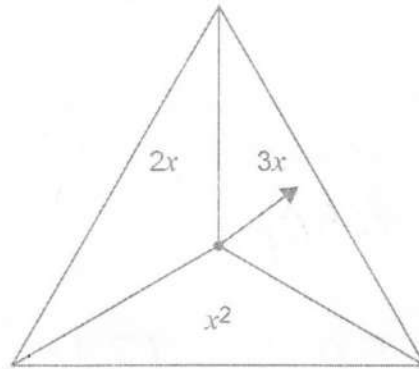
Answer  $6 : 5$



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





- 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]

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

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

Estimate the number of games that are won.

[2 marks]

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

Answer 316

Turn over for the next question



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



Not drawn  
accurately

Assume that the polygon is an octagon.

$= 8$

Work out the size of angle  $x$ .

[2 marks]

$$360 \div 8$$

45

Answer

- 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)

☒

It is less than the answer to part (a)

☐

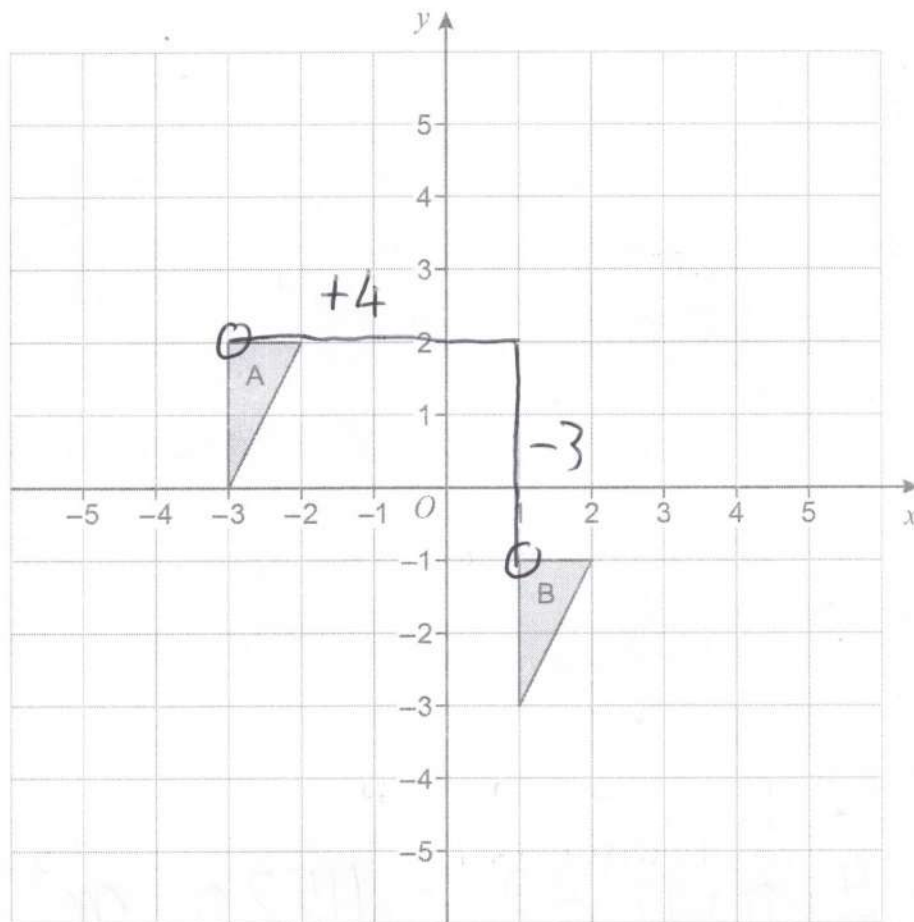
It could be any of the above



20

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

[2 marks]



$$\begin{bmatrix} 4 \\ -3 \end{bmatrix}$$

Answer

Turn over for the next question

Turn over ►

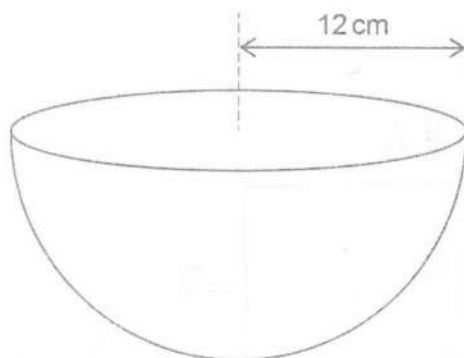


21

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

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.

$$V = \frac{4}{3} \times \pi \times 12^3 \div 2 = 1152\pi \text{ cm}^3 \quad [4 \text{ marks}]$$

$$70\% \text{ of } 1152\pi = 1152\pi \times 0.7 \\ = 2533.38, \dots$$

$$8 \times 325 = 2600$$

$$2600 > 2533 \quad \text{so YES}$$



22

Show that these two rectangles are similar.

[2 marks]

Not drawn  
accurately

$$\begin{array}{l} 8 \div 5 = 1.6 \\ 19.2 \div 12 = 1.6 \end{array} \left. \vphantom{\begin{array}{l} 8 \div 5 = 1.6 \\ 19.2 \div 12 = 1.6 \end{array}} \right\} \begin{array}{l} \text{same scale factor} \\ \text{so similar} \end{array}$$

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]

$$80x \text{ bags in } 1 \text{ hr} = 60 \text{ mins}$$

$$1 \text{ min} = \frac{80x}{60} = \frac{8x}{6} = \frac{4x}{3}$$

END OF QUESTIONS

