OCR
Oxford Cambridge and RSA

Monday 7 November 2022 – Morning

GCSE (9–1) Mathematics

J560/03 Paper 3 (Foundation Tier)

Time allowed: 1 hour 30 minutes

You must have:
- the Formulae Sheet for Foundation Tier (inside this document)

You can use:
- a scientific or graphical calculator
- geometrical instruments
- tracing paper

F

Please write clearly in black ink. **Do not write in the barcodes.**

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

First name(s) _____

Last name _____

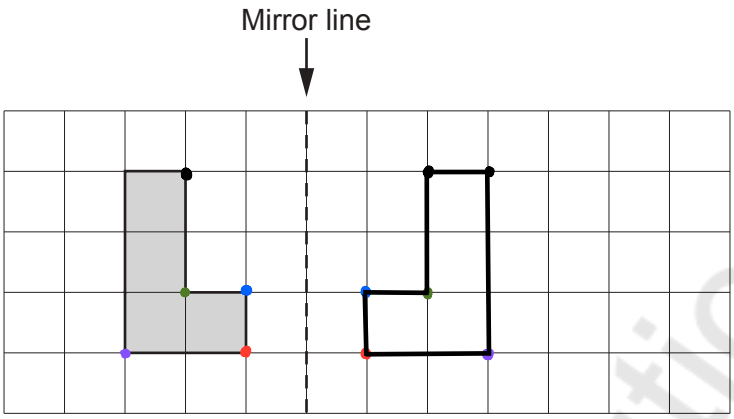
INSTRUCTIONS
- Use black ink. You can use an HB pencil, but only for graphs and diagrams.
- Write your answer to each question in the space provided. If you need extra space use the lined pages at the end of this booklet. The question numbers must be clearly shown.
- Answer **all** the questions.
- Where appropriate, your answer should be supported with working. Marks might be given for using a correct method, even if your answer is wrong.
- Use the π button on your calculator or take π to be 3.142 unless the question says something different.

INFORMATION
- The total mark for this paper is **100**.
- The marks for each question are shown in brackets **[ ]**.
- This document has **24** pages.

ADVICE
- Read each question carefully before you start your answer.

Answer **all** the questions.

1 Reflect this shape in the mirror line.



[2]

2 **(a)** Write these numbers in order of size, starting with the smallest.

-20 10 0.351

(a) -20 , 0.351 , 10 **[1]**

smallest

(b) Find the difference between the largest and the smallest of these numbers.

34 304 3.04 300.4

↑ largest ↑ smallest

304 - 3.04 = 300.96

(b) 300.96 **[2]**

3 **(a)** Insert brackets to make this calculation correct.

$$(5 - 5) \times 5 = 0$$

[1]

(b) Insert **two** of these symbols $+$, $-$, $\times$ or $\div$ to make this calculation correct.

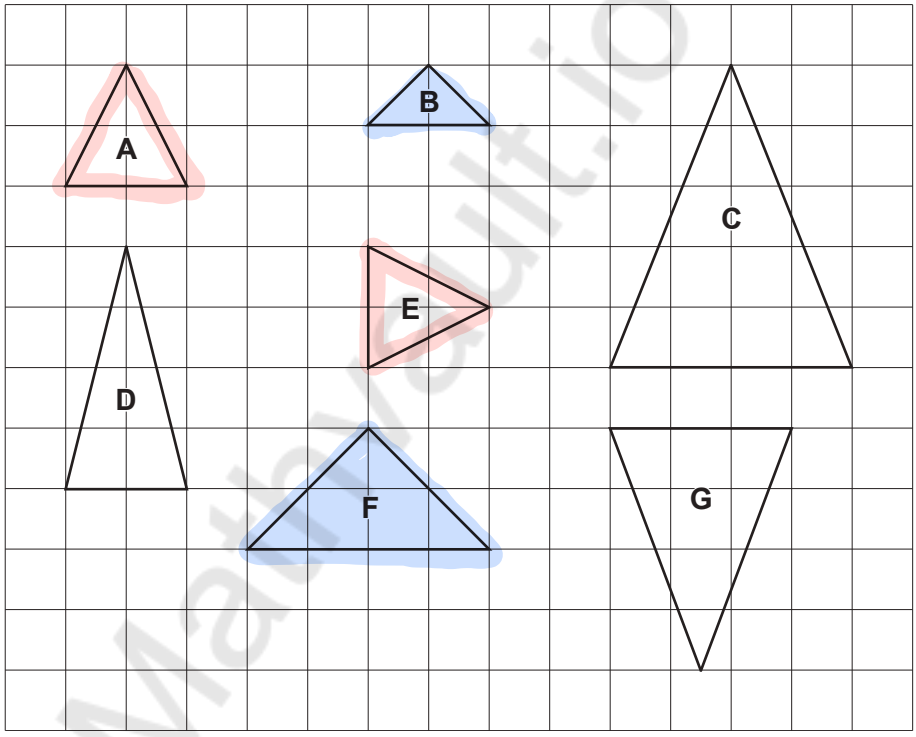
$$20 \div 5(1 + 3) = 0$$

[1]

$20 - 5(4)$

$20 - 20 = 0$

4 On the grid are seven triangles, labelled **A** to **G**.



Complete each statement by writing the letter of the correct triangle.

Triangle **A** is congruent to triangle ..... E .....

Triangle **B** is mathematically similar to triangle ..... F ..... **[2]**

scale factor

5 Solve.

(a) $\frac{x}{4} = 8$

×4 ×4

$x = 32$

(a) $x =$ 32 **[1]**

(b) $8 - x = -2$

$8 + 2 = x$

$10 = x$

(b) $x =$ 10 **[1]**

6 **(a)** Write 28 : 70 as a ratio in its simplest form.

÷7 ÷7

4 : 10

÷2 ÷2

2 : 5

(a) 2 : 5 **[2]**

(b) A map has a scale of 8 centimetres represents 1 metre.
The scale can be written as a ratio in the form 1 : *n*.

Find the value of *n*.

1m = 100cm

8cm : 1m

8cm : 100cm

÷8 ÷8

1 : n

1 : 12.5

(b) $n =$ 12.5 **[2]**

7 It takes a librarian $1\frac{1}{4}$ minutes to put a plastic cover on a book.

Work out how many books the librarian can cover in $\frac{1}{2}$ hour.

$1\frac{1}{4}$ mins = 1.25 mins

$\frac{1}{2}$ hour = 30 mins

$30 \div 1.25 = 24$

1.25 mins = 1 book (×24)

30 mins = 24 books (×24)

24 ..... **[3]**

8 **(a)** Complete this statement by writing a positive whole number in each box to make two different but equivalent fractions.

$\frac{2}{16} = \frac{1}{8}$ (÷2 on 2 and 16)

[2]

(b) Complete this statement by writing a possible positive whole number in the box.

$\frac{1}{5} < \frac{3}{10} < \frac{1}{2}$

0.2 0.3 0.5

[2]

9 A meal deal consists of a burger, a side dish and a drink chosen from these lists.

Burgers	Side dish	Drink
Hamburger (H)	Baked beans (B)	Cola (C)
Veggie burger (V)	Fries (F)	Lemonade (L)
	Sweetcorn (S)	

(a) Some of the possible meal deals are shown in this table.

Complete the table to show all the possible meal deals.
You may not need all the rows.

Burger	Side dish	Drink
H	B	C
H	B	L
H	F	C
H	F	L
H	S	C
H	S	L
V	B	C
V	B	L
V	F	C
V	F	L
V	S	C
V	S	L

[2]

(b) Write down the fraction of the meal deals that include baked beans (B).

(b) ..... $\frac{4}{12}$ ..... **[1]**

10 Two supermarkets, A and B, have special offers on the same packet of biscuits.

Supermarket A	Supermarket B
Normal price: £1.50 for each packet Special offer: Buy two packets at the normal price and get a third packet for half price	Normal price: £1.60 for each packet Special offer: 10% off the normal price

(a) Dan buys **one** packet of these biscuits.

Which supermarket is best value for Dan?
Show how you decide.

10% of £1.60 = £1.60 ÷ 10 = £0.16

£1.60 - £0.16 = £1.44

Supermarket B because £1.44 < £1.50

[3]

(b) Darcy buys **three** packets of these biscuits.

Which supermarket is best value for Darcy?
Show how you decide.

A) 2 x £1.50 = £3.00

£1.50 ÷ 2 = £0.75

Total = £3 + £0.75

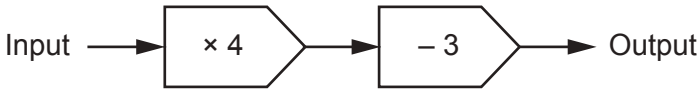
= £3.75

B) £1.44 x 3 = £4.32

Supermarket A because £3.75 < £4.32

[3]

11 Here is a function machine.



(a) **(i)** Find the output when the input is 10.

10 × 4 = 40

40 – 3 = 37

(a)(i) 37 **[1]**

(ii) Find the input when the output is 17.

17 + 3 = 20

20 ÷ 4 = 5

(ii) 5 **[2]**

(b) The input is x and the output is y.

Write an equation for y in terms of x.

$x \times 4 = 4x$

$4x - 3 = y$

(b) $y = 4x - 3$ **[2]**

12 Kai has a bag of marbles that are red or blue or green or yellow.

Kai takes a marble at random, records the colour and returns the marble to the bag.
Kai does this 800 times.

The table shows some of the results.

Colour	Red	Blue	Green	Yellow
Frequency	48	80	296	376
Relative frequency	0.06	0.10	0.37	0.47

(a) Complete the table to show the number of times a yellow marble is taken. **[2]**

0.47 × 800 = 376

(b) (i) There are 40 marbles in the bag.

Work out how many blue marbles are likely to be in the bag.

0.1 × 40 = 4

(b)(i) ..... 4 ..... **[2]**

(ii) Is your answer to **part (b)(i)** likely to be the actual number of blue marbles in the bag?
Give a reason for your answer.

..... Yes ..... because ..... there was a large sample size so relative frequency is more accurate. ..... **[1]**

13 **(a)** All of the loaves in a baker's shop cost the same price.
Rowan buys 3 loaves and pays £3.78.
Azmi buys 5 loaves.

Work out how much Azmi pays.

£3.78 ÷ 3 = £1.26 each

£1.26 × 5 = £6.30

(a) £ 6.30 **[3]**

(b) Alex and Ling travel the same distance to school.

Alex walks to school in 20 minutes.
Ling runs to school at twice the speed that Alex walks.

Find how many minutes it takes Ling to run to school.

20 ÷ 2 = 10

(b) 10 min **[2]**

14 **(a)** An integer between 70 and 80 is written as the product of its prime factors as $2 \times 3 \times f$.

Find the value of f and the integer.

$2 \times 3 \times f = 6 \times f$

$6 \times 12 = 72$

$12 = 4 \times 3$

$4 = 2 \times 2$

$6 \times 13 = 78$

(a) $f =$ 13

Integer = 78 **[3]**

(b) 98 and 147 are written as the product of their prime factors.

$98 = 2 \times 7^2$ $147 = 3 \times 7^2$

Work out the highest common factor (HCF) of 98 and 147.

$HCF = 7^2$

$= 49$

(b) 49 **[2]**

15 **(a)** 10^2 is written in words as 'one hundred'.

Write 10^4 in words.

$10^4 = 10^2 \times 10^2$

$= 100 \times 100$

$= 10,000$

(a) Ten thousand **[2]**

(b) Work out $(3.5 \times 10^{-1}) \times 100$, giving your answer in standard form.

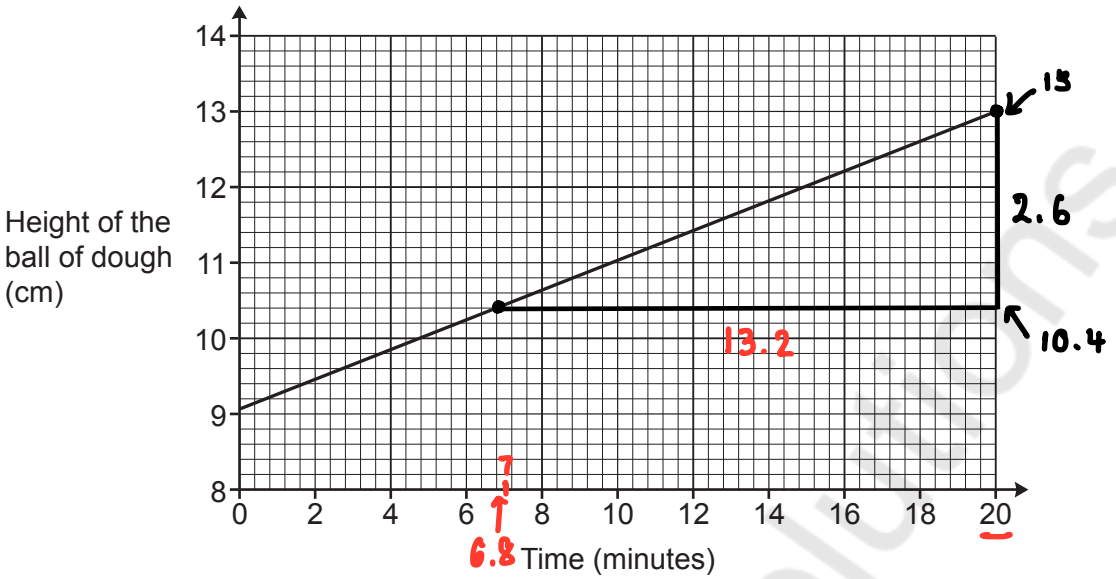
$3.5 \times 10^{-1} \times 10^2$

$3.5 \times 10^{-1+2}$

3.5×10^1

(b) 3.5×10^1 **[2]**

16 A ball of dough is left to rise before it is baked.
The graph shows the height of the ball of dough over the first 20 minutes.



(a) Work out the gradient of the line as a decimal, giving the units of your answer.
Show how you work out your answer.

$m = \frac{2.6}{13.2}$

$= 0.19\dot{6}$

(a) $0.19\dot{6}$ **[3]**

(b) A baker works out the height of the ball of dough at the end of 25 minutes as 14 cm.

(i) Use your gradient to show that the baker could be correct. **[2]**

$(0.19\dot{6} \times 5) + 13 = 13.98\dot{4}$

(ii) What assumption has the baker made?

The dough continues to rise at the same rate.

[1]

17 Frankie draws a circle and works out its area, in cm^2, and circumference, in cm.
The answer for the area is two times the answer for the circumference.

Work out the diameter of the circle.
You must show your working.

$A = \pi r^2$ $C = \pi d$ or $2\pi r$

$\pi r^2 = 2 \times 2\pi r$

$\pi r^2 = 4\pi r$

$\div \pi$ $\div \pi$

$r^2 = 4r$

$\div r$ $\div r$

$r = 4$

$d = 4 \times 2$

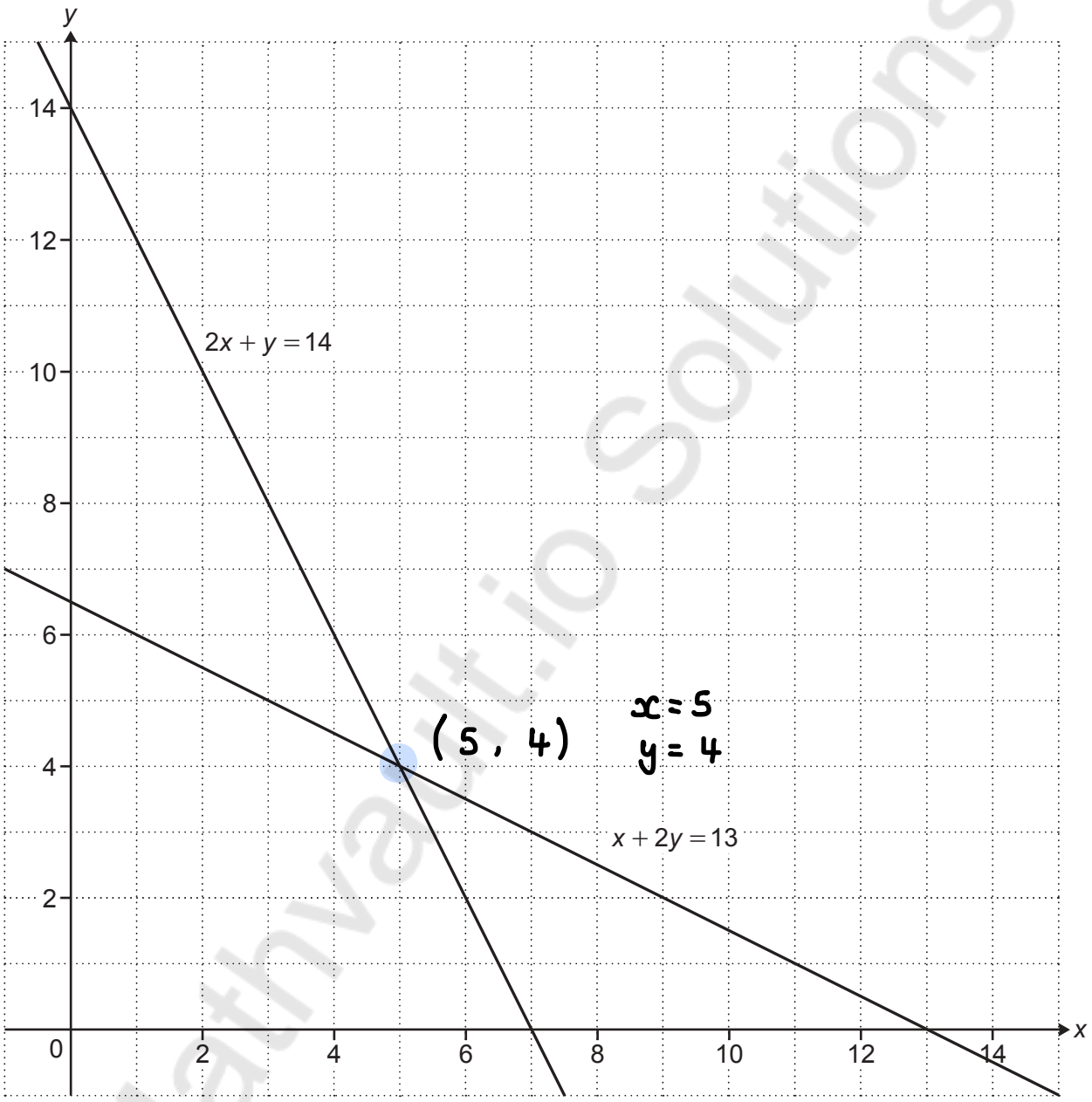
$= 8$

8 cm **[4]**

18 The graph shows the solution to this pair of simultaneous equations.

$2x + y = 14$
$x + 2y = 13$

Use the solution to work out the value of $3x + y$.
You must show how you work out your answer.



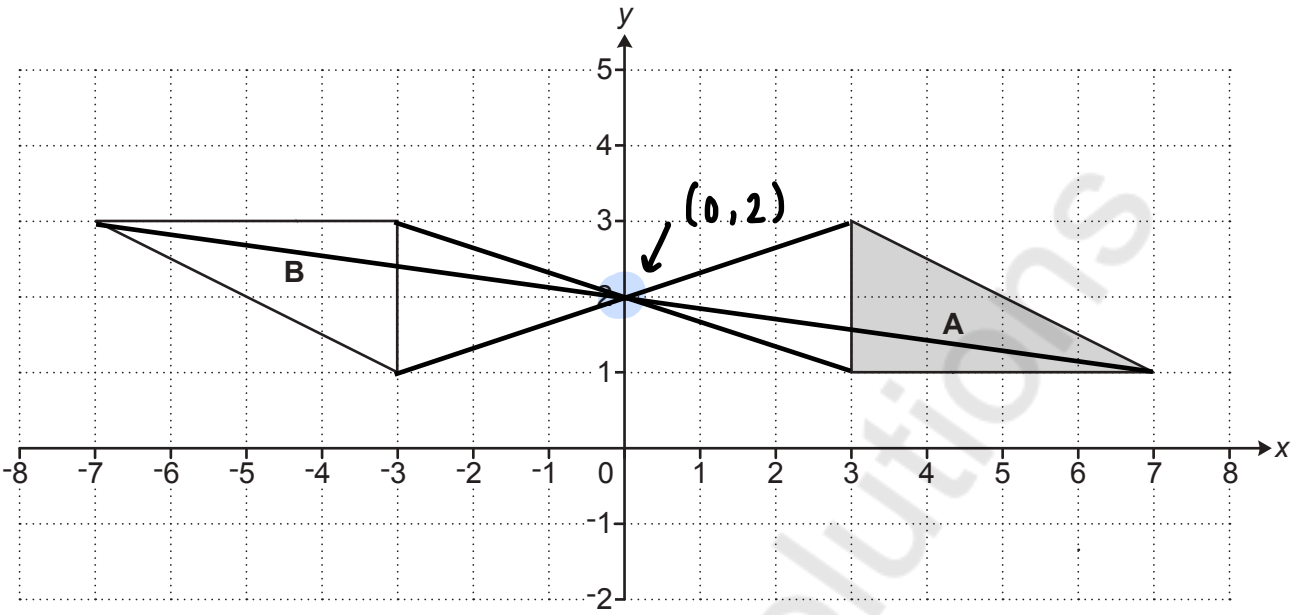
$3x + y$

$3(5) + 4$

$15 + 4 = 19$

$3x + y =$ 19 **[3]**

19 Triangle **A** and triangle **B** are drawn on the coordinate grid.



Describe fully the **single** transformation that maps triangle **A** onto triangle **B**.

Rotation 180° centre (0, 2)

..... **[3]**

20 $\overrightarrow{PQ} = \begin{pmatrix} 3 \\ 2 \end{pmatrix}$ and $\overrightarrow{QR} = \begin{pmatrix} 4 \\ 1 \end{pmatrix}$.

Work out $\overrightarrow{PR}$.

$$\overrightarrow{PR} = \overrightarrow{PQ} + \overrightarrow{QR}$$

$$= \begin{pmatrix} 3 \\ 2 \end{pmatrix} + \begin{pmatrix} 4 \\ 1 \end{pmatrix}$$

$$= \begin{pmatrix} 7 \\ 3 \end{pmatrix}$$

$\begin{pmatrix} 7 \\ 3 \end{pmatrix}$ **[2]**

21 Solve.

$x^2 - 4x - 165 = 0$

You must show your working.

165

11 -15

$(x + 11)(x - 15) = 0$

$x + 11 = 0$ or $x - 15 = 0$

$-11 \quad -11$ $\quad +15 \quad +15$

$x = -11$ $\quad x = 15$

$x =$ -11 or $x =$ 15 **[3]**

22 A recipe for a batch of jam needs 3 oranges, 5 lemons and 1.5 kg of sugar.
A cook uses the recipe to make lots of batches of jam.
They use 16 **more** lemons than oranges in total.

Find how much sugar the cook should use.

O : L : S

3 : 5 : 1.5

5 - 3 = 2 parts

2 parts = 16

1 part = 8

Sugar = 1.5 kg × 8

= 12 kg

..... 12 ..... kg **[3]**

23 Sam and Taylor are playing a game against a computer.
They can win, draw or lose the game.

Sam says

I think the probability of us winning the game is 0.3.

Taylor says

I think the probability of us losing the game is 0.75.

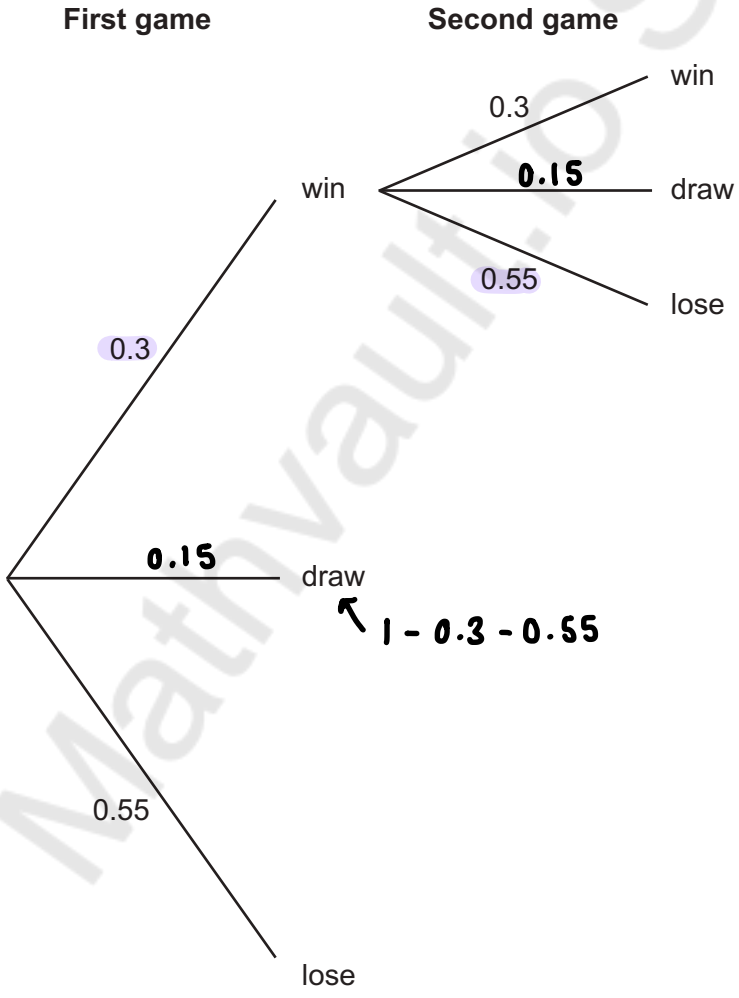
(a) Explain why Sam and Taylor cannot both be correct.

0.3 + 0.75 = 1.05 , the sum should be 1.

..... **[1]**

(b) Sam is correct. The probability of them winning the game is 0.3.
Taylor is not correct. The probability of them losing the game is actually 0.55.

Complete this **partly drawn** tree diagram to show **all** the possible outcomes of playing the game twice.



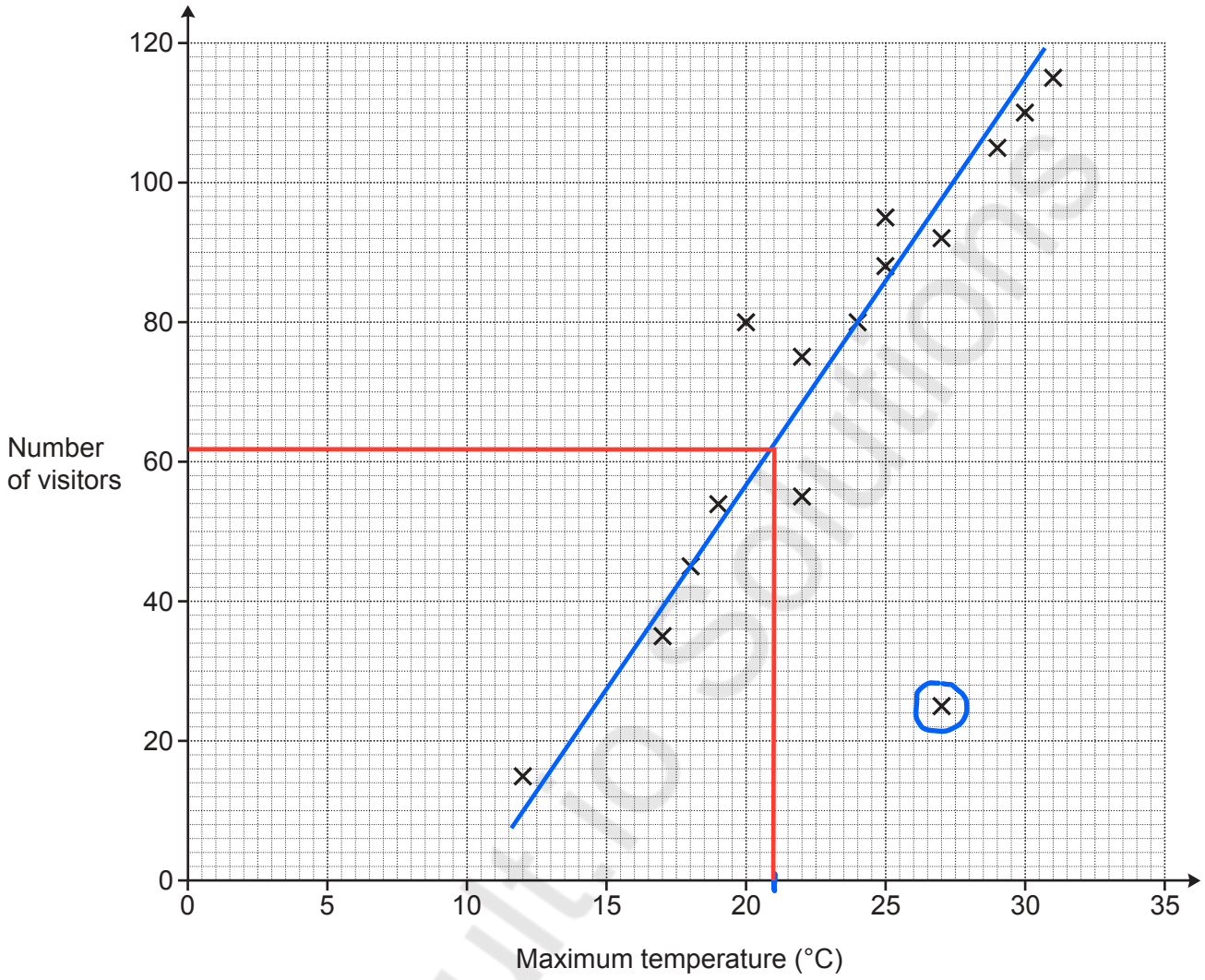
[3]

(c) Find the probability of them winning the first game and losing the second game.

$0.3 \times 0.55 = 0.165$

(c) 0.165 **[2]**

24 The scatter diagram shows the number of visitors to a children's playground and the maximum temperature on fifteen Saturdays in summer.



(a) Describe the type of correlation shown in the scatter diagram.

(a) Positive **[1]**

(b) One Saturday was a hot but stormy day.

(i) Circle the most likely point on the scatter diagram for this Saturday. **[1]**

(ii) Explain why you chose this point.

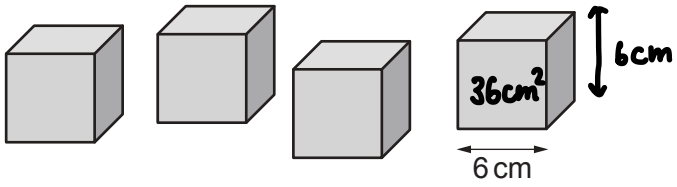
It was a hot day with fewer visitors.

[1]

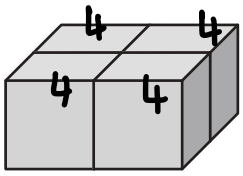
(c) Use a line of best fit to predict the number of visitors on a Saturday that has a maximum temperature of 21 °C.

(c) 62 visitors **[2]**

25 A child has four identical wooden cubes of side length 6 cm.



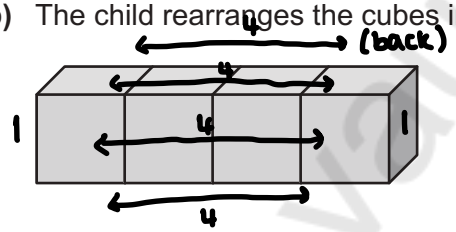
(a) They arrange the cubes in a 2 by 2 by 1 arrangement to form a cuboid.



Show that the surface area of the cuboid is 576 cm^2. **[2]**

$36\,cm^2 \times 16 = 576\,cm^2$

(b) The child rearranges the cubes in a 4 by 1 by 1 arrangement to form a different cuboid.



S.A. = $36\,cm^2 \times 18$

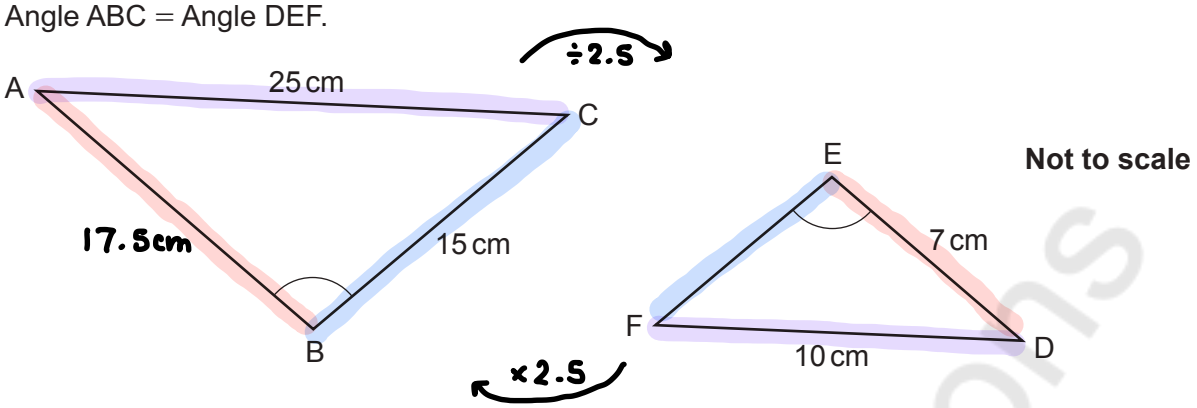
$= 648\,cm^2$

Calculate the percentage increase in surface area for this cuboid compared with the 2 by 2 by 1 cuboid.

$\frac{\text{change}}{\text{original}} \times 100$ $\quad \frac{648 - 576}{576} \times 100 = 12.5$

(b) ..... 12.5 ..... % **[4]**

26 Triangles ABC and DEF are mathematically similar.
Angle ABC = Angle DEF.



Calculate the perimeter of triangle ABC.

$SF = \frac{25}{10} = 2.5$

Side AB = 7 x 2.5
= 17.5 cm

Perimeter = 25 + 15 + 17.5
= 57.5 cm

..... 57.5 ..... cm **[4]**

END OF QUESTION PAPER

ADDITIONAL ANSWER SPACE

If additional space is required, you should use the following lined page(s). The question number(s) must be clearly shown in the margin(s).