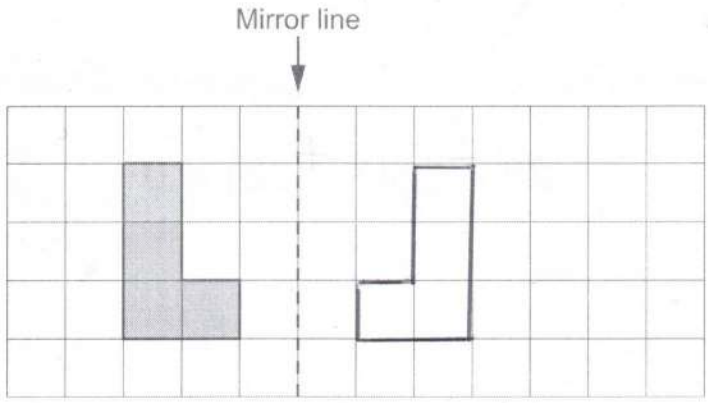
OCR-F Nov'22 3-Calc

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

304 - 3·04

(b) 300·96 [2]

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

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

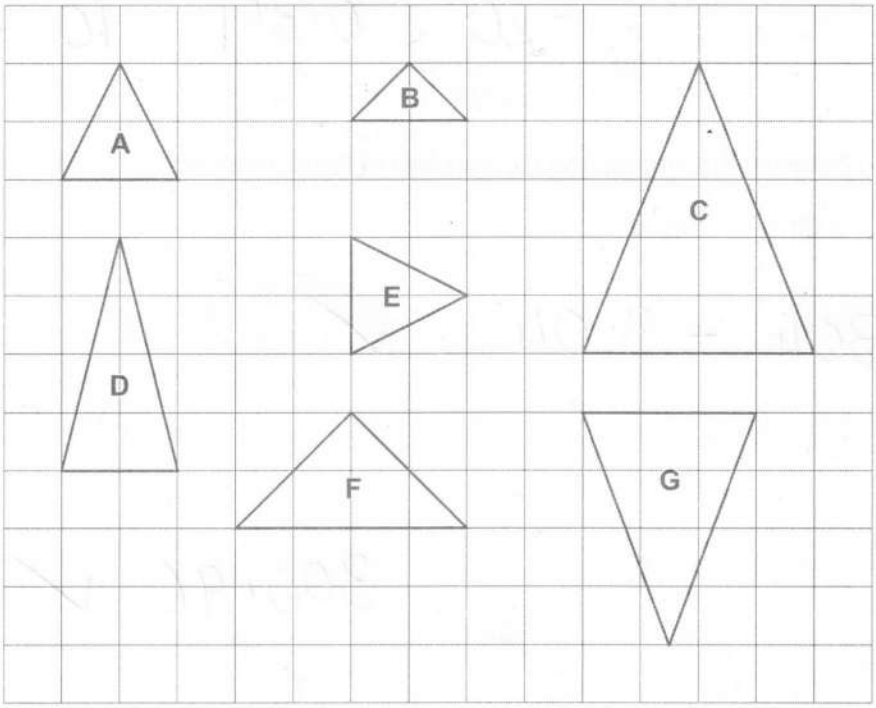
[1]

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

$$20 \;\underline{-}\; 5(1 \;\underline{+}\; 3) = 0$$

[1]

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]**

5 Solve.

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

$x = 8 \times 4$

(a) $x =$ 32 ✓ [1]

(b) $8 - x = -2$

$8 = x - 2$

$x = 8 + 2$

(b) $x =$ $= 10$ ✓ [1]

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

14 : 35 ✓

(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.

8 : 100 ✓

÷8 ↓ 1

÷8 ↓

(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.

30 ÷ 1·25 ✓✓

24 ✓

..... [3]

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

$$\frac{2}{\boxed{4}} = \frac{\boxed{4}}{8}$$ ✓ ✓

[2]

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

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

[2]

or 4

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

12

✓✓ All

✓ 5 new

[2]

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

$\frac{4}{12}$ ✓ etc

(b) ..... [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.

1 pack { A = £1·50
B = 1·60 × 0·9 = £1·44 ✓✓

Supermarket B because 1·44 < 1·5 ✓

[3]

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

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

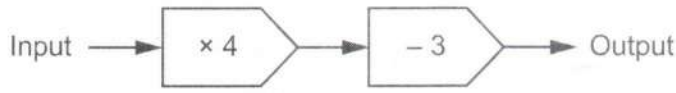
A = 1·50 + 1·50 + 0·75 = £3·75 ✓

B = 1·44 × 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.

40

37 ✓

(a)(i) ..... [1]

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

17 + 3 = 20

20 ÷ 4 = 5

(ii) ..... [2]

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

Write an equation for y in terms of x.

$y = 4x - 3$

(b) ..... [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]**

800 x 0.47 ✓

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

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

40 x 0.1 ✓

4 ✓

(b)(i) ..... **[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's a large number of trials ✓

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

OR

No → it's an estimate.

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.

2x3 = 6

72 ÷ 6 = 12 not prime

78 ÷ 6 = 13

m ✓

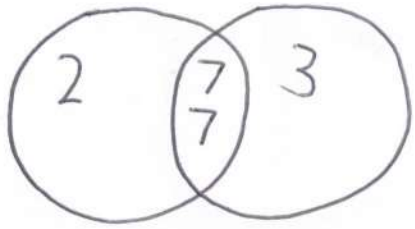
(a) $f =$ 13 ✓

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.



✓

7x7 = 49 ✓

(b) **[2]**

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

Write 10^4 in words.

10,000 ✓

(a) ten thousand ✓ **[2]**

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

3·5 ÷10 x10 x10 ✓

(b) 3.5×10^1 ✓ **[2]**

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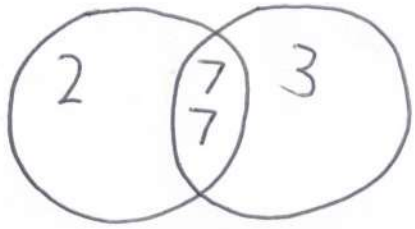

✓

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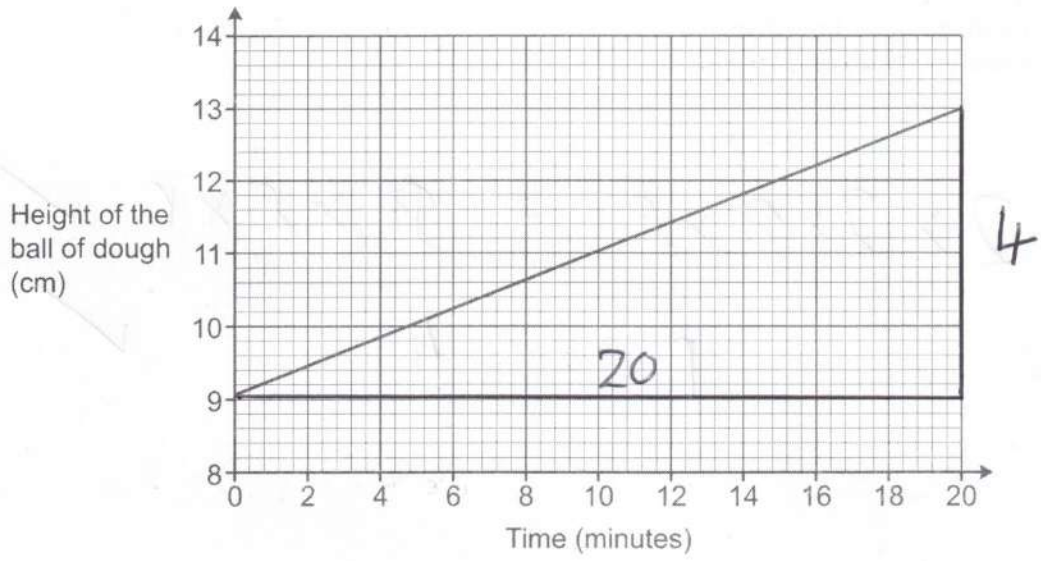
16 A ball of dough is left to rise before it is baked.
The graph shows the height of the ball of dough over the first 20 minutes.



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

4 ÷ 20 ✓✓

0·2 ✓

(a) ..... [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]

$h = 0.2 \times 25 + 9$ ✓

$= 5 + 9$ ✓

$= 14$

(ii) What assumption has the baker made?

Continues to rise at 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.

✓ $2 \times 2 \times \pi \times r = \pi \times r \times r$ ✓

$r = 4$ ✓

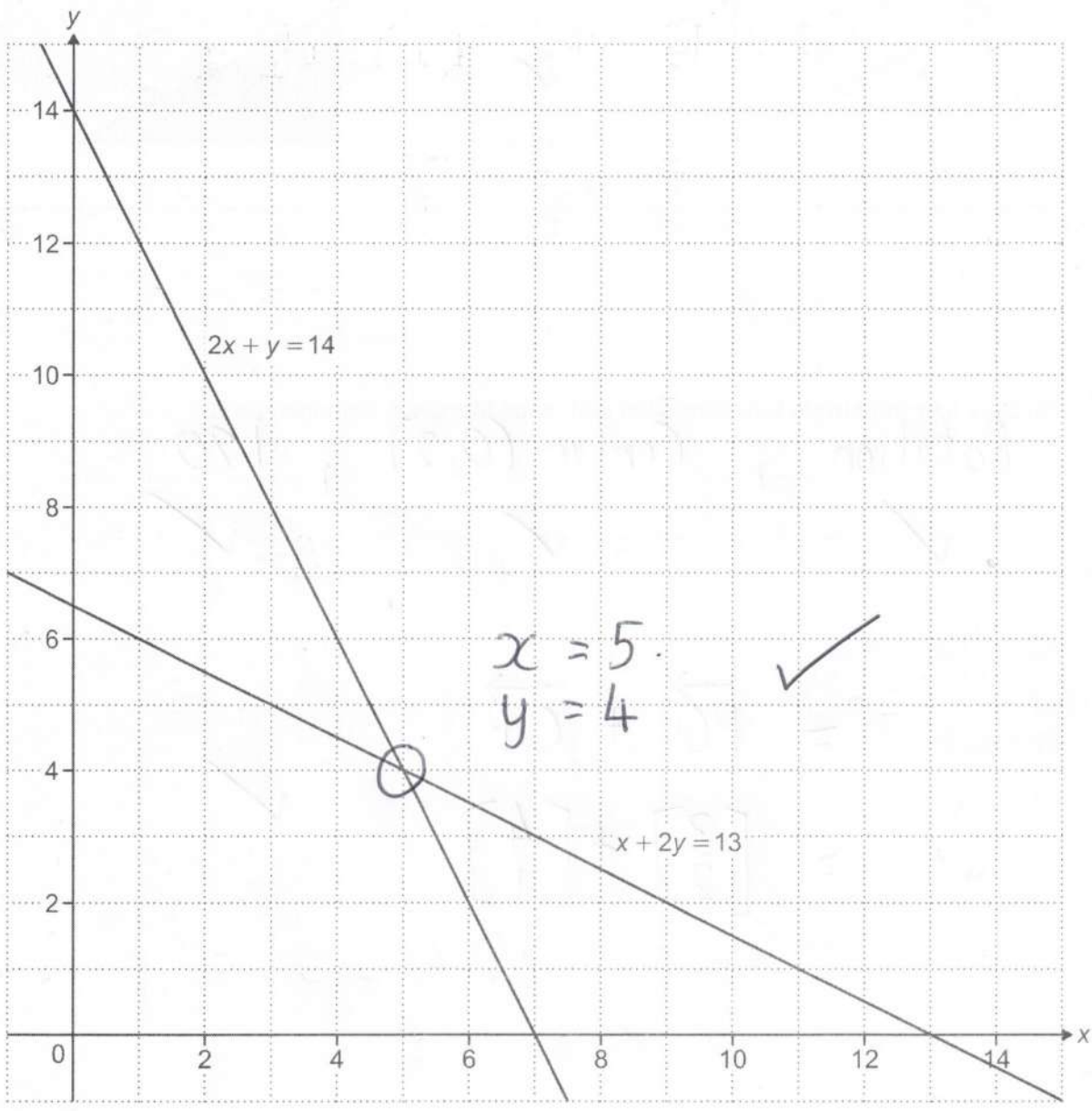
$d = 8$ ✓

..... 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.

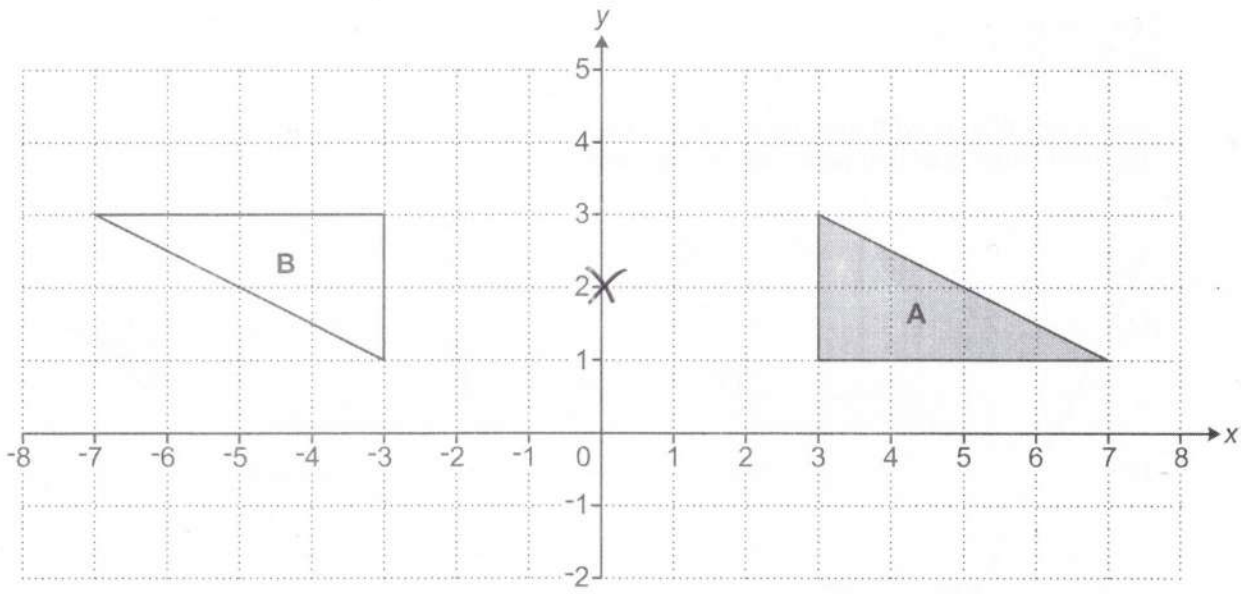


$x = 5$ ✓
$y = 4$

$= 3 \times 5 + 4$ ✓
$= 15 + 4$

$3x + y =$ 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 , Centre (0, 2) , 180 ✓ ✓ ✓

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

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

Work out $\overrightarrow{PR}$.

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

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

$\begin{bmatrix} 7 \\ 3 \end{bmatrix}$ ✓

[2]

21 Solve.

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

You must show your working.

$(x + 11)(x - 15)$ ✓✓

$x =$ -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 +2 5
1.5

X 8
24 +16 40
12

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.

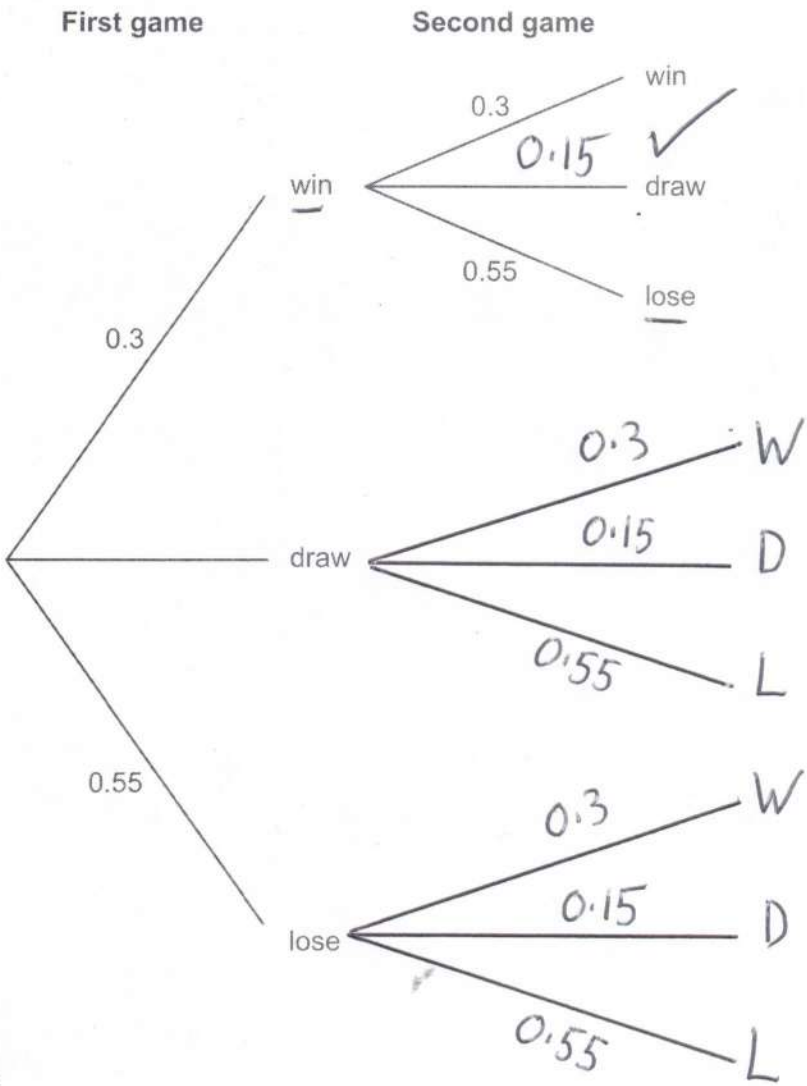
$0.3 + 0.75 > 1$ ✓

.....

..... [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.



✓ branches

✓ fully

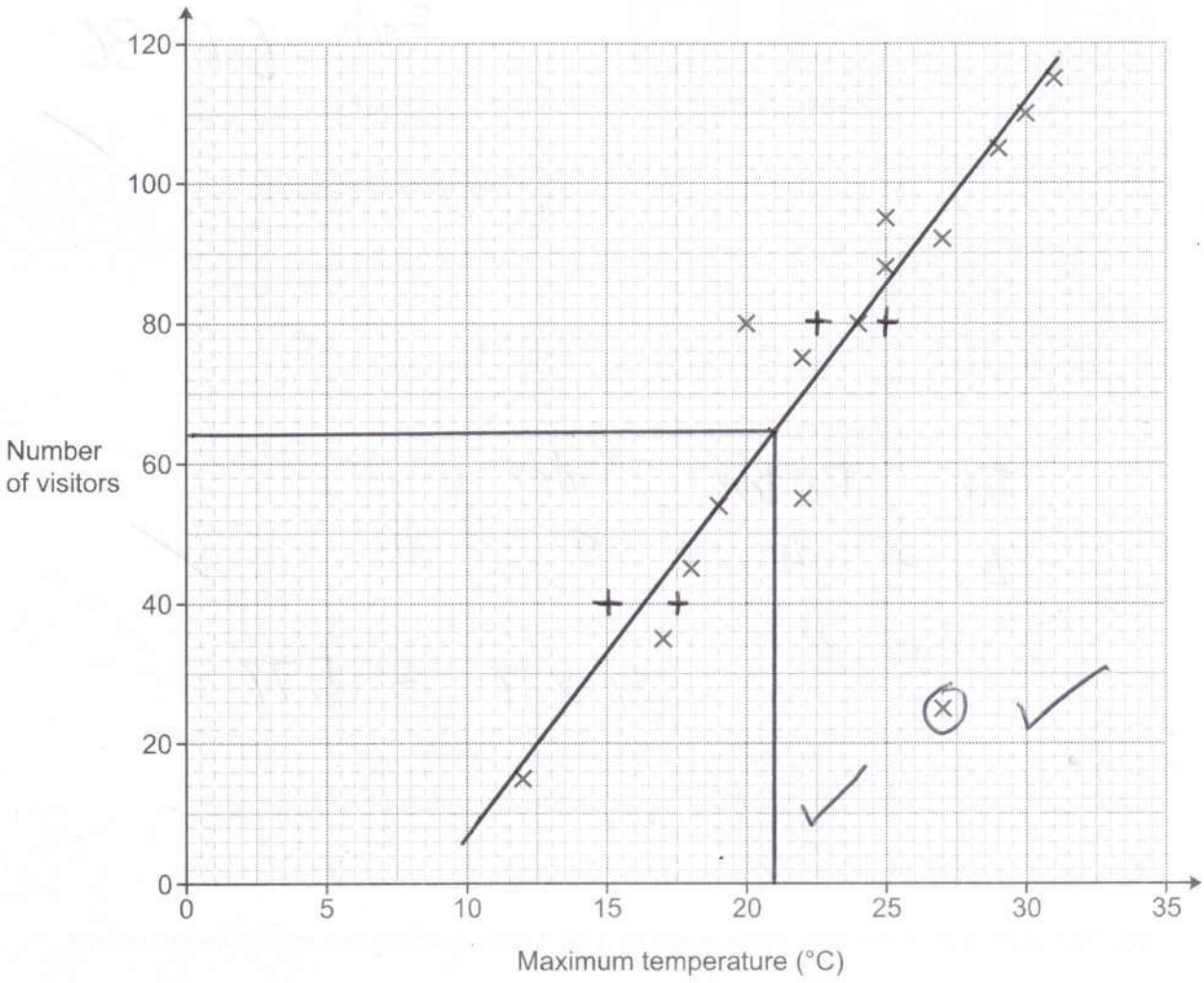
[3]

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

0.3×0.55 ✓

(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.

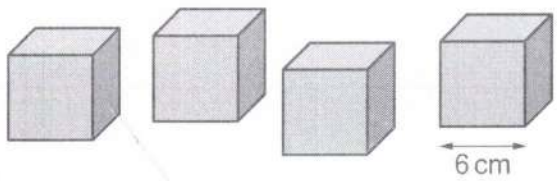
Hot with few visitors ✓
OR outlier
[1]

(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) 64 ✓ visitors **[2]**

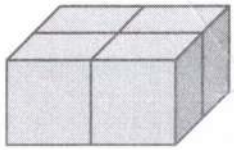
[52 → 78]

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



Each face $= 6 \times 6 = 36$ ✓

(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]**

Top Bottom Sides

$4 + 4 + 8 = 16$ ✓

$36 \times 16 = 576$

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

$= 4 \times 4 + 2 = 18$ faces

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

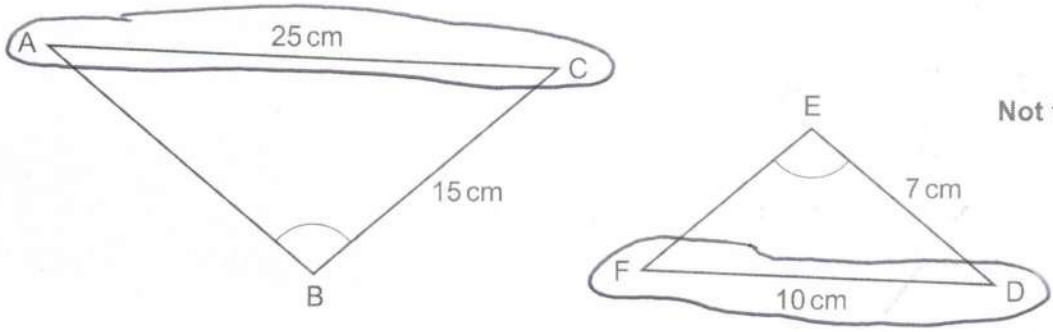
$18 \times 36 = 648$ ✓

$\frac{648 - 576}{576} \times 100$ ✓✓

12·5 ✓

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

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



Not to scale

Calculate the perimeter of triangle ABC.

$25 \div 10 = 2.5$ ✓

$AB = 2.5 \times 7 = 17.5$ ✓

$25 + 15 + 17.5$ ✓

$= 57.5$ ✓

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

END OF QUESTION PAPER