Model Answer

OCR
Oxford Cambridge and RSA

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Thursday 05 November 2020 – Morning

GCSE (9–1) Mathematics

J560/02 Paper 2 (Foundation Tier)

Time allowed: 1 hour 30 minutes

You can use:
- geometrical instruments
- tracing paper

Do not use:
- a calculator

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. You can use extra paper if you need to, but you must clearly show your candidate number, the centre number and the question numbers.
- 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.

INFORMATION
- The total mark for this paper is **100**.
- The marks for each question are shown in brackets **[ ]**.
- This document has **20** pages.

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

Answer **all** the questions.

1 **(a)** Work out.

(i) $-1 + 6$

$6 - 1 = 5$

(a)(i) 5 **[1]**

(ii) $7 - -3$

$7 - (-3)$

$7 + 3 = 10$

(ii) 10 **[1]**

(b) Write down two prime numbers between 10 and 20.

13, 17

(b) 13 and 17 **[2]**

2 **(a)** **(i)** Write 350 centimetres in metres.

cm ⟶ m ÷ 100

$350\text{ cm} \div 100 = 3.5\text{ m}$

(a)(i) 3.5 m **[1]**

(ii) Write 1.52 litres in millilitres.

$1.52\text{ l} \times 1000 = 1520\text{ ml}$

(ii) 1520 ml **[1]**

(b) Work out.

5.7 cm + 30 mm.

Give your answer in centimetres.

$30\text{ mm} \div 10 = 3\text{ cm}$

$5.7\text{ cm} + 3\text{ cm} = 8.7\text{ cm}$

$5.7\text{ cm} + 3.0\text{ cm} = 8.7\text{ cm}$

(b) 8.7 cm **[2]**

3 **(a)** Complete each statement by writing the missing value in the box.

(i) $\frac{1}{3} = \frac{2}{\boxed{6}}$ **[1]**

(ii) $1\frac{1}{7} = \frac{\boxed{8}}{7}$ **[1]**

(b) Work out.

(i) $0.8 \div 2$

$$2 \overline{)0.8} = 0.4$$

(b)(i) 0.4 **[1]**

(ii) 1.7×2

$$1.7 \times 2 = 3.4$$

(ii) 3.4 **[1]**

4 **(a)** Write 0.16 as a fraction in its simplest form.

$0.16 \rightarrow \frac{16 \div 4}{100 \div 4} = \frac{4}{25}$

(a) $\frac{4}{25}$ **[2]**

(b) Write $\frac{7}{20}$ as a decimal.

$\frac{7 \times 5}{20 \times 5} = \frac{35}{100} = 0.35$

change denominator to 100

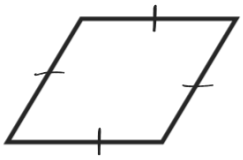
(b) 0.35 **[2]**

5 **(a)** Write down the mathematical name of each of these shapes.

(i) A triangle with 3 equal sides.

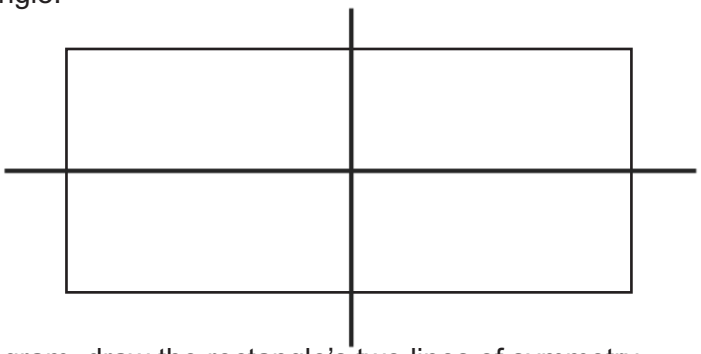
(a)(i) equilateral triangle **[1]**

(ii) A quadrilateral with 4 equal sides and no right angles.



(ii) Rhombus **[1]**

(b) Here is a rectangle.



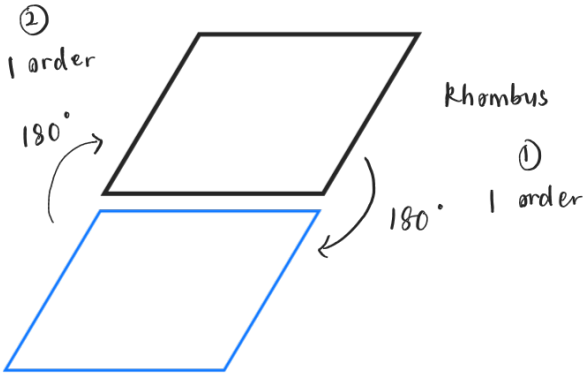
(i) On the diagram, draw the rectangle's two lines of symmetry. **[1]**

(ii) The rectangle has rotation symmetry of order 2.

Amaya says

A rectangle is the only quadrilateral that has rotation symmetry of order 2.

Is she correct?
Show how you decide.

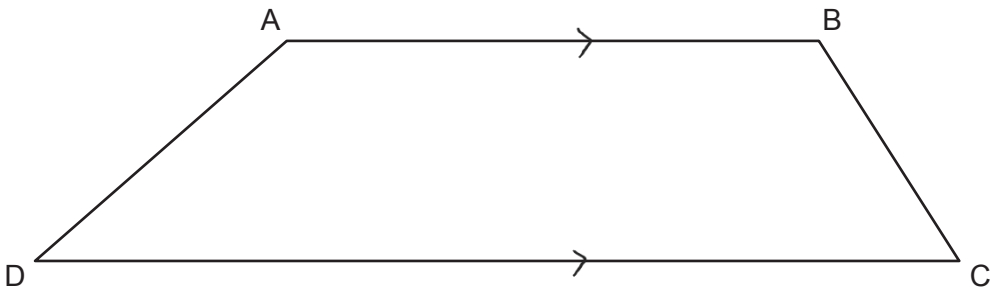


Take other quadrilateral as an example

Amaya is wrong since Rhombus also has a rotation symmetry of order 2

[2]

(c) Add the correct symbols to this diagram to show that line AB is parallel to line DC.



[1]

6 Clara travels from her home to Stoke.

The distance from her home to Stoke is 100 miles.
She travels at an average speed of 50 miles per hour.
She stops for 20 minutes on the journey.

Clara arrives in Stoke at 10:10 am.

At what time did she leave home?

Distance : 100 miles

Speed : 50 miles/hour

$\text{Speed} = \frac{\text{distance}}{\text{time}}$

$50 = \frac{100}{x}$

$x = \frac{100}{50}$

$x = 2$ hours

stops during journey

Total time she takes : 2 hours + 20 mins

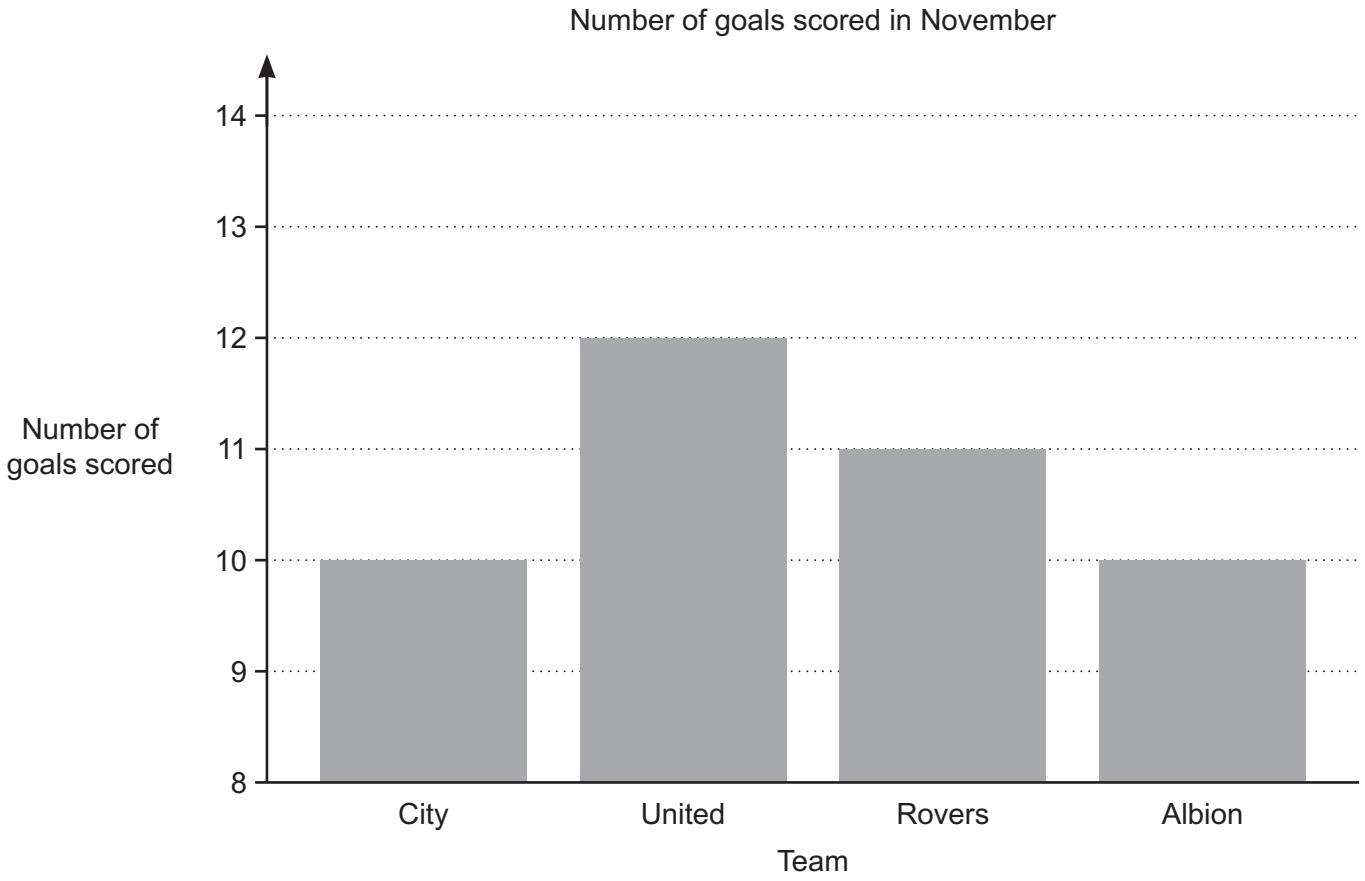
$$\begin{array}{r} 9 \quad 70 \\ \not{10} : \not{10} \\ -\ \ 2 : 20 \\ \hline 7 : 50 \end{array}$$

She leaves home at 7:50

7:50 am

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

7 This is Nadia's bar chart to show the number of goals scored by four teams during November.



(a) Blake says

Nadia's bar chart shows that United scored twice as many goals as City.

Is Blake correct?
Give a reason for your answer.

No because United only scores 2 more goals than City

[1]

(b) Give one way in which Nadia can improve her bar chart.

She can start her vertical scale from 0.

[1]

(c) Kareem says

Out of these four teams, United achieved the highest mean number of goals per game during November.

What assumption has Kareem made?

All the teams played the same number of games

[1]

8 **(a)** Write $3 \times 3 \times 3 \times 3$ as a power of 3.

(a) 3^4 **[1]**

(b) Show that the answer to $2^6 \times 4^{-1}$ is a square number.

$= 2^6 \times 4^{-1}$

$= 2^6 \times (2^2)^{-1}$

$= 2^6 \times 2^{-2}$

$= 2^{6-2}$

$= 2^4$

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

$= 16$

16 is a square number

16 is a square number

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

9 Write each of the following ratios in their simplest form.

(a) 12 : 15

$\div 3$ (12 : 15 = 4 : 5) $\div 3$

(a) 4 : 5 **[1]**

(b) 600 g : 1.8 kg

600 g : 1.8 kg $\times 1000$

$\div 600$ (600 g : 1800 g = 1 : 3) $\div 600$

(b) 1 : 3 **[3]**

10 Simplify.

(a) $\frac{5b^6}{b^2}$

$5b^6 \times b^{-2} = 5b^{6-2} = 5b^4$

(a) $5b^4$ **[1]**

(b) $(x^4)^3$

$(x^4)^3 = x^{4 \times 3} = x^{12}$

(b) x^{12} **[1]**

11 Theo invests £500 at a rate of 6% per year simple interest.

(a) Work out the interest he receives in one year.

Interest per year $= \frac{6}{100} \times £500 = £30$

(a) £ 30 **[2]**

(b) Work out the value of his investment after 5 years.

Total interest received in 5 years : £30 × 5 = £150

Total investment = Initial investment amount + interest

: £500 + £150

: £650

(b) £ 650 **[2]**

12 A jacket has its price reduced by 20% in a sale.
The sale price is £56.

Work out the price of the jacket before the sale.

£56 is the price for 80 % of the original price

$\frac{80}{100} \times$ original price = £56

original price = $£56 \times \frac{100}{80}$

$= \frac{£560}{8}$

$= £70$

$$\begin{array}{r} 70 \\ 8\overline{)560} \\ \underline{56} \\ 0 \\ \underline{0} \end{array}$$

£ 70 **[3]**

13 A bag only contains red, blue, yellow and white counters.
A counter is taken at random from the bag.
The table shows the probability it is red and the probability it is blue.

Colour	red	blue	yellow	white
Probability	0.24	0.34	0.28	0.14

There are twice as many yellow counters as white counters in the bag.

Complete the table. **[5]**

Total probability = 1

Assuming the total counters are 100.

White counters : x

yellow counters : $2x$

red counters : 24

blue counters : 34

Total counters : $24 + 34 + x + 2x = 100$

$58 + 3x = 100$

$3x = 100 - 58$

$= 42$

$x = \frac{42}{3}$

$= 14$

$100 - 58 = 42$

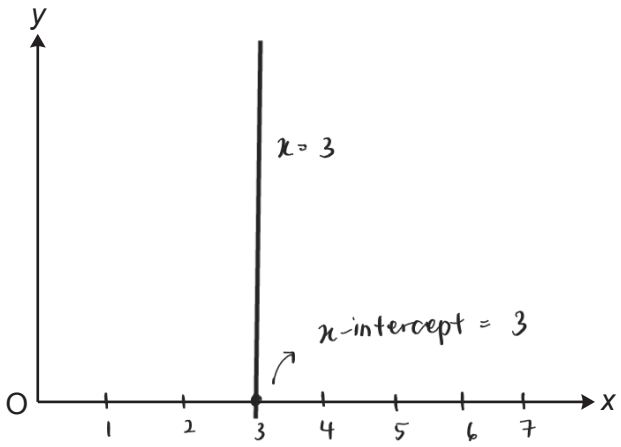
$42 \div 3 = 14$

$P(\text{white counters}) = \frac{x}{100} = \frac{14}{100} = 0.14$

$P(\text{yellow counters}) = \frac{2x}{100} = \frac{2(14)}{100} = \frac{28}{100} = 0.28$

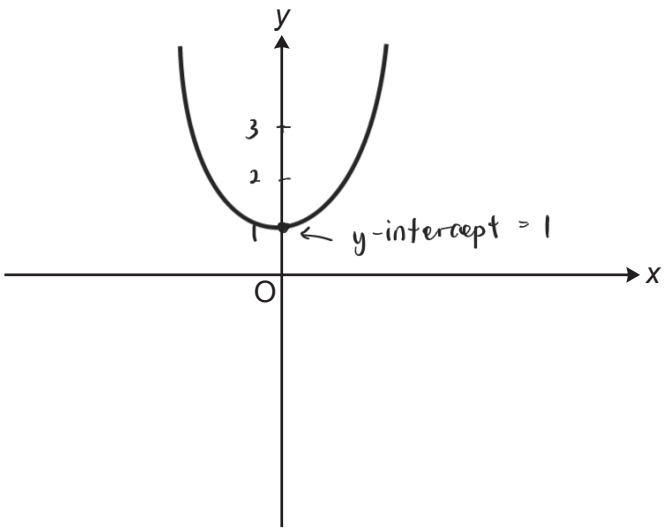
$14 \times 2 = 28$

14 (a) (i) Sketch the graph of $x = 3$.
Show clearly the value of any intercepts.



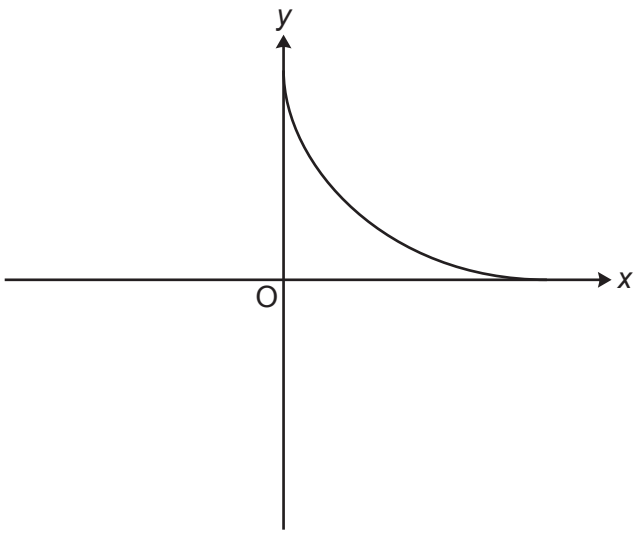
[2]

(ii) Sketch the graph of $y = x^2 + 1$.
Show clearly the value of any intercepts.



[2]

(b) Toby has sketched the graph of $y = \frac{1}{x}$ below.



Make two comments about the accuracy of his sketch.

1 The lines should not touch the axes

2 A curve should also be present in the third quadrant

[2]

15 **(a)** Simplify.

$4a - 2b - 2a + 5b$

$= 4a - 2a + 5b - 2b$

$= 2a + 3b$

(a) $2a + 3b$ ..... **[2]**

(b) **(i)** Multiply out.

$4(x + 3)$

$4x + 12$

(b)(i) $4x + 12$ ..... **[1]**

(ii) Multiply out and simplify.

$(x + 5)(x - 2)$

$= (x + 5)(x - 2)$

$= x^2 - 2x + 5x - 10$

$= x^2 + 3x - 10$

(ii) $x^2 + 3x - 10$ ..... **[2]**

16 The diagram shows a square.

Not to scale

By setting up and solving an equation, show that the perimeter of the square is numerically equal to the area of the square.

$4x - 10 = 11 - 2x$ (squares have same side)

$4x + 2x = 11 + 10$

$6x = 21$

$x = 21 \div 6$

$= 3.5$

$$6 \overline{)21.0} = 3.5$$

18

30

30

Side 1 $= 11 - 2x$

$= 11 - 2(3.5)$

$= 11 - 7$

$= 4$

Side 2 $= 4x - 10$

$= 4(3.5) - 10$

$= 14 - 10$

$= 4$

$3.5 \times 4 = 14.0$

Perimeter $= 2(4) + 2(4)$

$= 8 + 8 = 16$ cm

Area $= 4 \times 4$

$= 16\ cm^2$

Perimeter = Area = 16

Perimeter and area are both equal to 16.

[6]

17 Dora has the following number cards.

She takes a card at random, replaces the card and then takes a second card.
She adds the numbers on the two cards she has taken and records the total.

(a) Complete the following table to show all of her possible totals.

		First card				
	Total	2	2	3	5	6
Second card	2	4	4	5	7	8
	2	4	4	5	7	8
	3	5	5	6	8	9
	5	7	7	8	10	11
	6	8	8	9	11	12

[1]

(b) Find the probability that her total is

(i) an even number, (circled in blue)

13 even numbers.
total outcomes : 25
P(even number) = $\frac{13}{25}$

(b)(i) $\frac{13}{25}$ **[2]**

(ii) a multiple of 3 or 4. (circled in purple)

multiple of 3 or 4 = 14
total outcomes : 25
P(multiple of 3 or 4) = $\frac{14}{25}$

(ii) $\frac{14}{25}$ **[2]**

18 Charlie and Jasmine share cartons of apple juice.

Charlie drinks $\frac{1}{3}$ of a carton every day.

Jasmine drinks $\frac{2}{5}$ of a carton every day.

Any apple juice left in a carton at the end of the day is used the following day.

The cost of a carton is 70p.
Charlie and Jasmine buy just enough cartons to last them for 10 days.

How much do they spend in total for these cartons?
Give your answer in £.
Show your working.

Cartons Charlie consumes in 10 days : $\frac{1}{3} \times 10 = \frac{10}{3} = 3\frac{1}{3}$

Cartons Jasmine consumes in 10 days : $\frac{2}{\cancel{8}_{1}} \times \cancel{10}^{2} = 4$

Total cartons needed = $4 + 3\frac{1}{3}$

$= 7\frac{1}{3} \approx 8$ cartons (round up to the nearest whole number)

Total cost of cartons = $8 \times £0.70$

$= £5.60$

$^{5}0.70$
$\times \quad 8$
5.60

£ 5.60 **[6]**

19 A clock chimes every 20 minutes.
A light flashes every 8 minutes.
The clock chimes and the light flashes together at 08:00.

How many times between 08:01 and 12:30 will the clock chime and the light flash together?
Show your working.

08:01 to 12:30 = 4 hours 29 minutes

= (4 × 60) + 29

= 240 + 29

= 269

Clock chimes during (multiple of 20): 20, 40, 60, 80, 100, 120, 140, 160, 180, 200, 220, 240, 260

Light flashes every 8 minutes (multiple of 8): 8, 16, 24, 32, 40, 48, 56, 64, 72, 80

The clock chimes and the light flashes together every 40 minutes. So, we calculate how many multiples of 40 are there from 08:01 to 12:30.

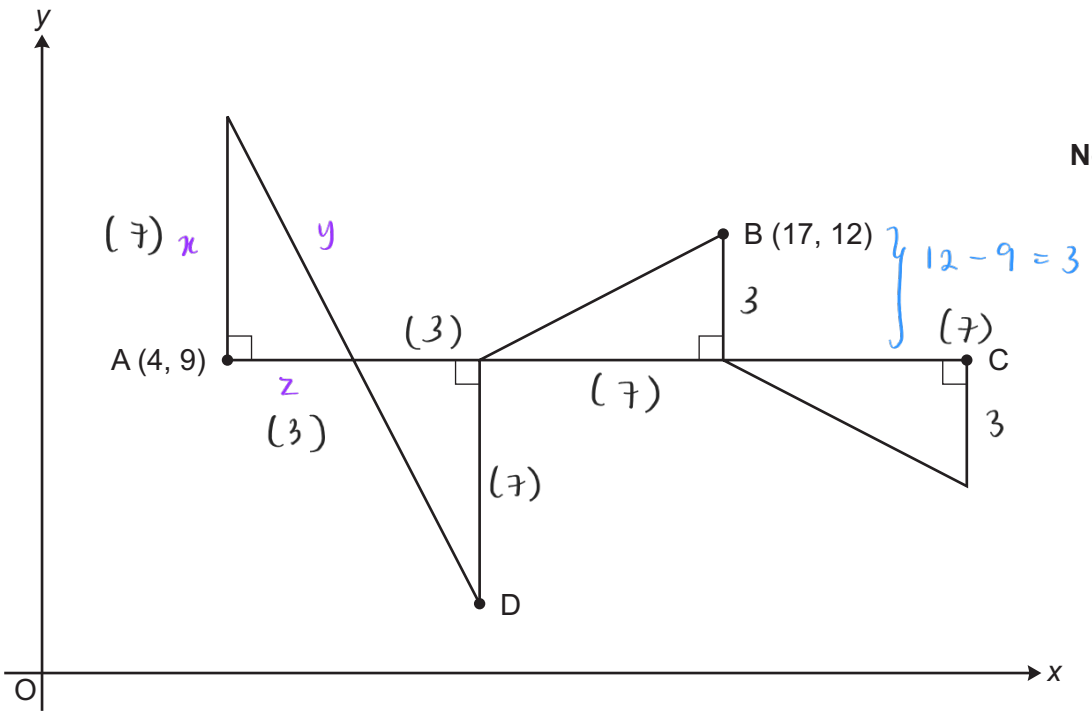
6.7... ≈ 6 times (round down)

$$\begin{array}{r} 6 \\ 40\overline{)269} \\ 240 \\ \hline 290 \\ 280 \\ \hline 10\ldots \end{array}$$

6 times.

..... **[5]**

20 A pattern is made from four congruent right-angled triangles.



Not to scale

The line AC is parallel to the *x*-axis.
The point A has coordinates (4, 9) and the point B has coordinates (17, 12).

Work out the coordinates of point C and point D.

the length of z = difference in the y coordinate of point B and A

= 12 − 9

= 3

the length of x = AB − 3 − 3

= (17 − 4) − 6

= 13 − 6

= 7

length AC = 3 + 3 + 7 + 7

= 6 + 14 = 20

Coordinate C : (4 + 20, 9)

: (24, 9)

Coordinate D : (4 + 6, 9 − 7)

: (10, 2)

C (24 , 9)

D (10 , 2) **[5]**

21 Solve the simultaneous equations.

$2x + 3y = 10$ — ① ×3
$3x + 5y = 17$ — ② ×2

① ×3 $6x + 9y = 30$
② ×2 $6x + 10y = 34$ −

$-y = -4$ ÷−1

$y = 4$

Substitute into ①

$2x + 3(4) = 10$

$2x + 12 = 10$ −12

$2x = -2$ ÷2

$x = -1$

$x =$ −1

$y =$ 4 **[4]**

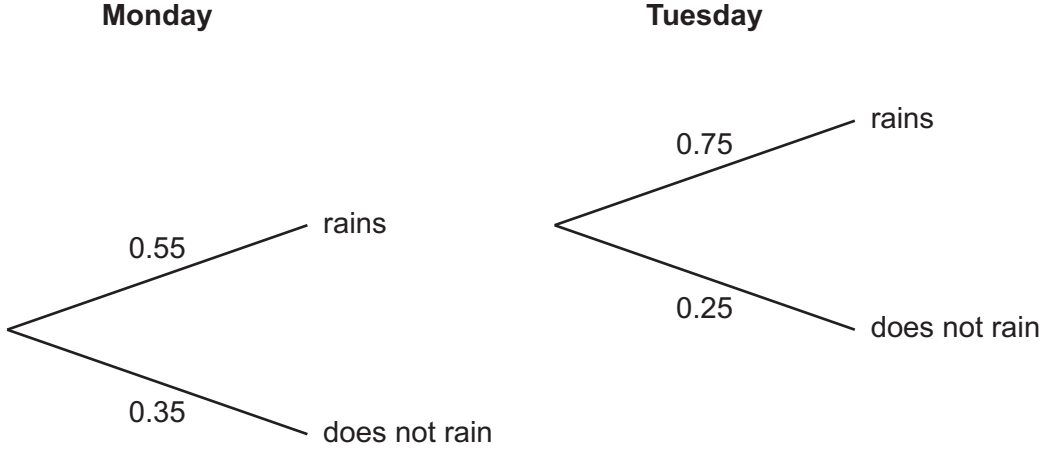
22 A weather forecast says

- the probability that it will rain on Monday is 0.55

and

- the probability that it will rain on Tuesday is 0.25.

Ella draws a tree diagram to show this information.



Write down three errors that Ella has made with her tree diagram.

1 For Tuesday, the 0.25 should be on the rains branch instead of the does not rain branch.

2 For Monday, the does not rain probability should be 0.45 instead of 0.35 because $1 - 0.55 = 0.45$.

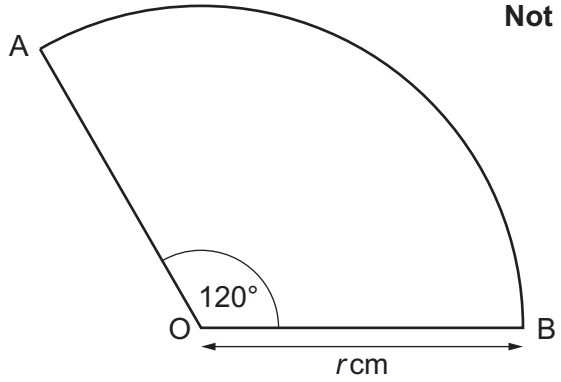
3 A pair of branches is missing on Tuesday after does not rain event on Monday

[3]

Turn over for Question 23

23 AOB is a sector of a circle, centre O.

Not to scale



The area of the sector is $8\,cm^2$.

Work out the exact value of the radius, r cm.

Area of sector $= \frac{120^\circ}{360^\circ} \times \pi r^2$

$8 = \frac{1}{3} \times \pi r^2$

$8 \times 3 = \pi r^2$

$24 = \pi r^2$

$\frac{24}{\pi} = r^2$

$r = \sqrt{\frac{24}{\pi}}$ cm

$r =$ $\sqrt{\frac{24}{\pi}}$ cm **[4]**

END OF QUESTION PAPER