

Thursday 6 June 2019 – Morning

GCSE (9–1) Mathematics

J560/02 Paper 2 (Foundation Tier)

Time allowed: 1 hour 30 minutes



You may use:

- geometrical instruments
- tracing paper

Do not use:

- a calculator



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

Centre number

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Candidate number

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First name(s)

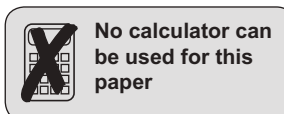
Last name

INSTRUCTIONS

- Use black ink. You may use an HB pencil for graphs and diagrams.
- Answer **all** the questions.
- Read each question carefully before you start to write your answer.
- Where appropriate, your answers should be supported with working. Marks may be given for a correct method even if the answer is incorrect.
- Write your answer to each question in the space provided.
- Additional paper may be used if required but you must clearly show your candidate number, centre number and question number(s).

INFORMATION

- The total mark for this paper is **100**.
- The marks for each question are shown in brackets [].
- This document consists of **16** pages.



No calculator can be used for this paper

Answer **all** the questions.

1 (a) Work out.

(i) £4.25 + £5.18

$$\begin{array}{r} 4.25 \\ + 5.18 \\ \hline 9.43 \end{array}$$

(a)(i) £ **9.43** [1]

(ii) $-8 + 11$

$$11 - 8$$

(ii) **3** [1]

(iii) -6×-9

(iii) **54** [1]

(b) Use one of these symbols $<$, $>$ or $=$ to make each statement true.

(i) $4.5 > 4.34$ [1]

(ii) $\frac{3}{4} < 0.8$ [1] $\frac{3}{4} = 0.75$

(iii) $\frac{3}{5} = 0.6$ [1] $\frac{3}{5} \stackrel{\times 2}{=} \frac{6}{10} \stackrel{\times 2}{=} 0.6$

2 By rounding each value to one significant figure, estimate the cost of 3.9kg of apples at 87p per kg.

$$3.9 \approx 4 \text{ kg}$$

$$87 \approx 90 \text{ p}$$

$$4 \times 90 = 360 \text{ p}$$

$$\downarrow \div 100$$

$$£3.60$$

£ **3.60** [2]

3 (a) Complete each statement.

$$(i) \frac{3}{7} = \frac{12}{28} \quad [1]$$

$$(ii) 4\frac{1}{2} = \frac{9}{2} \quad [1]$$

(b) Work out.

$$\frac{2}{3} - \frac{1}{5}$$

$$\frac{2}{3} \times 5 = \frac{10}{15} \quad \frac{10}{15} - \frac{3}{15} = \frac{7}{15}$$

$$\frac{1}{5} \times 3 = \frac{3}{15}$$

(b) $\frac{7}{15}$ [2]

4 Work out.

(a) 0.7×0.3

$$7 \times 3 = 21 \div 100 = 0.21 \quad (a) \quad 0.21 \quad [1]$$

(b) $0.48 \div 6$

$$6 \overline{) 0.48} \quad (b) \quad 0.08 \quad [1]$$

5 (a) Complete the following.

(i) $5^2 = 25$ 5×5 [1]

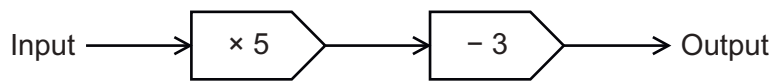
(ii) $\sqrt[3]{64} = 4$ $_ \times _ \times _ = 64$ [1]

(b) Work out $2^3 \times \sqrt{49}$.

$$2^3 = 2 \times 2 \times 2 = 8 \quad \sqrt{49} = 7$$

$$8 \times 7 = 56 \quad (b) \quad 56 \quad [2]$$

6 Here is a function machine.



(a) (i) Find the output when the input is 7.

$$7 \times 5 = 35$$

$$35 - 3 = 32$$

(a)(i) **32** [1]

(ii) Find the input when the output is 42.

$$42 + 3 = 45$$

$$45 \div 5 = 9$$

(ii) **9** [2]

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

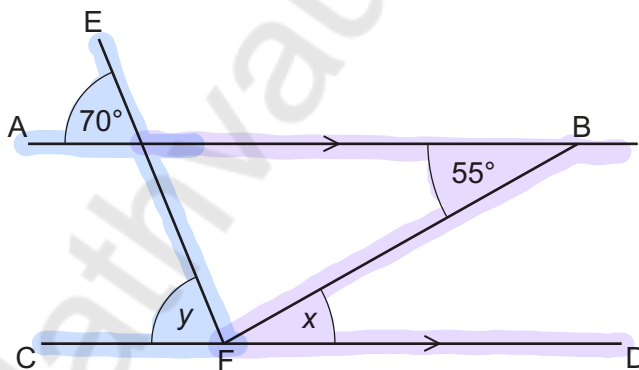
Write an equation for y in terms of x .

$$x \times 5 = 5x$$

$$5x - 3 = y$$

(b) **$y = 5x - 3$** [2]

7 AB and CD are parallel lines.
EF and FB are straight lines.



Not to scale

Complete the following statements.

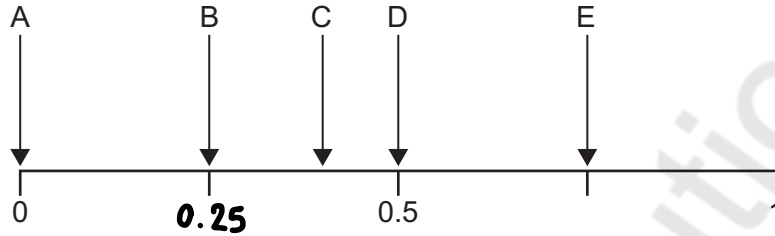
$x = 55^\circ$ because **alternate angles are equal**

$y = 70^\circ$ because **corresponding angles are equal** [2]

8 Darren has these 20 crayons in a box:

- 8 blue
- 4 red
- 5 black
- 3 green.

(a) He chooses a crayon at random from the box.



Which arrow shows the probability that this crayon is

(i) blue, $\frac{8}{20} = \frac{4}{10} = 0.4$ (a)(i) Arrow **C** [1]

(ii) yellow, (ii) Arrow **A** [1]

(iii) not black. $\frac{15}{20} = \frac{3}{4} = 0.75$ (iii) Arrow **E** [1]

(b) Darren buys 16 more crayons that are either blue or red. He puts these in the box with the 20 crayons he already has.

He now picks a crayon at random from the box. The probability that he picks a blue crayon is evens. $\frac{1}{2}$

How many red crayons did he buy?

$$20 + 16 = 36 \text{ crayon}$$

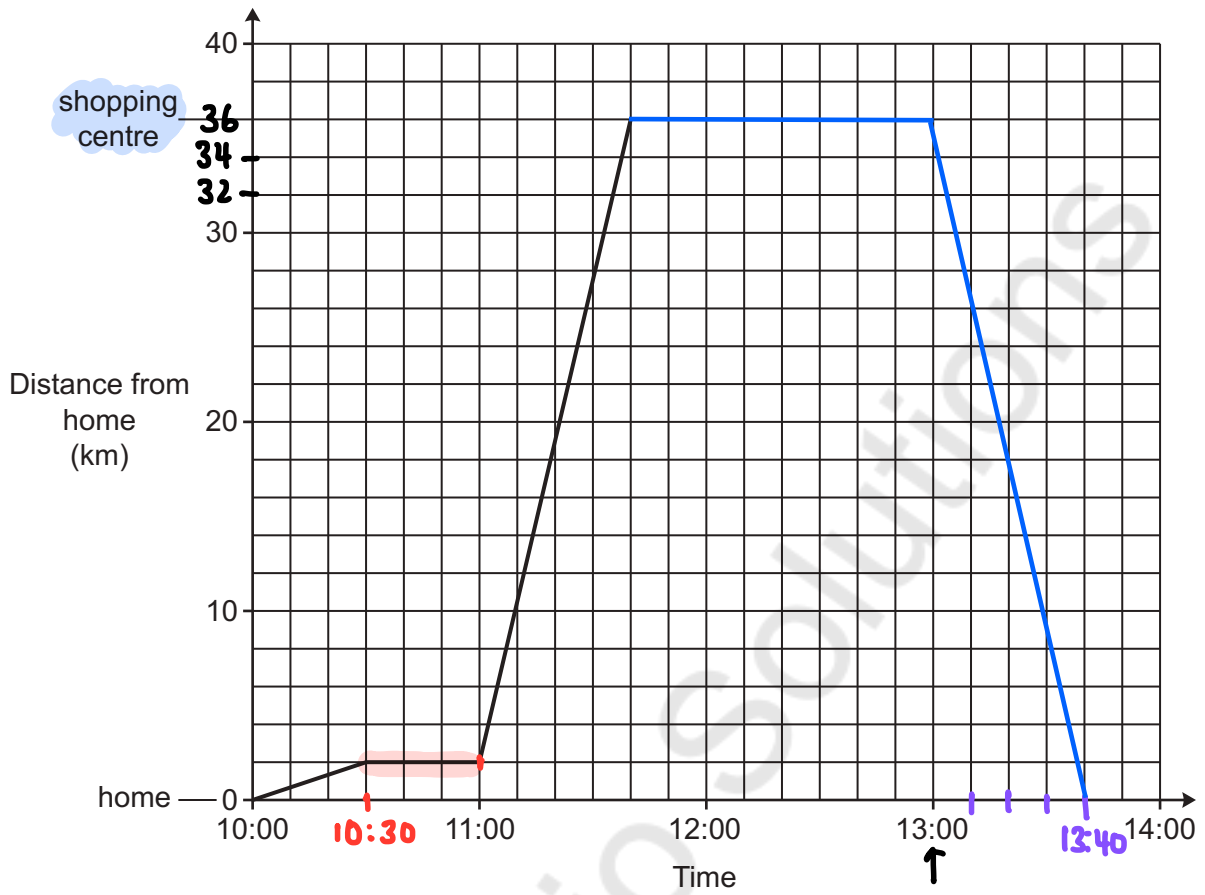
$$\frac{1}{2} \text{ of } 36 = 18 \text{ blue}$$

$$18 - 8 = 10 \text{ blue added}$$

$$16 - 10 = 6 \text{ red added}$$

(b) **6** [3]

- 9 The graph shows Sarah's journey from her home to a shopping centre.



- (a) State an assumption that has been made when the graph was drawn.

..... She travels at constant speeds.

[1]

- (b) What is the distance from Sarah's home to the shopping centre?

(b) 36 km [1]

- (c) Between which two times did Sarah stop?
Explain how the graph shows this.

From 10:30 to 11:00 shown on the graph by the distance
..... from home staying the same.

[2]

- (d) (i) Sarah stays at the shopping centre until 13:00. She then travels home without stopping. Her journey home takes 40 minutes.

Complete the graph to show this information. [3]

- (ii) Work out Sarah's average speed for her journey home. Give your answer in kilometres per hour.

$$S = \frac{D}{T}$$

$$D = 36 \text{ km}$$

$$T = 40 \text{ mins}$$

$$\downarrow \div 60$$

$$\frac{40}{60} = \frac{4}{6} = \frac{2}{3}$$

$$\begin{array}{c} D \\ S \quad T \\ 60 \text{ mins} = 1 \text{ hr} \\ \quad \quad \quad \div 60 \end{array}$$

$$S = 36 \div \frac{2}{3}$$

$$S = \frac{36}{1} \times \frac{3}{2} = \frac{108}{2} = 54 \text{ (d)(ii)} \dots\dots\dots 54 \dots\dots\dots \text{ km/h [3]}$$

- 10 (a) Simplify fully.

(i) $3t + 5u - 2t + 3u$

$$t + 8u$$

(a)(i) $\dots\dots\dots t + 8u \dots\dots\dots$ [2]

(ii) $6a \times 2a^2$

$$6 \times 2 = 12$$

$$a^1 \times a^2 = a^3$$

(ii) $\dots\dots\dots 12a^3 \dots\dots\dots$ [2]

- (b) Make x the subject of the formula $y = x^2 - 1$.

$$\begin{array}{cc} y & = & x^2 & - & 1 \\ +1 & & & & +1 \end{array}$$

$$\begin{array}{cc} y+1 & = & x^2 \\ \sqrt{\quad} & & \sqrt{\quad} \end{array}$$

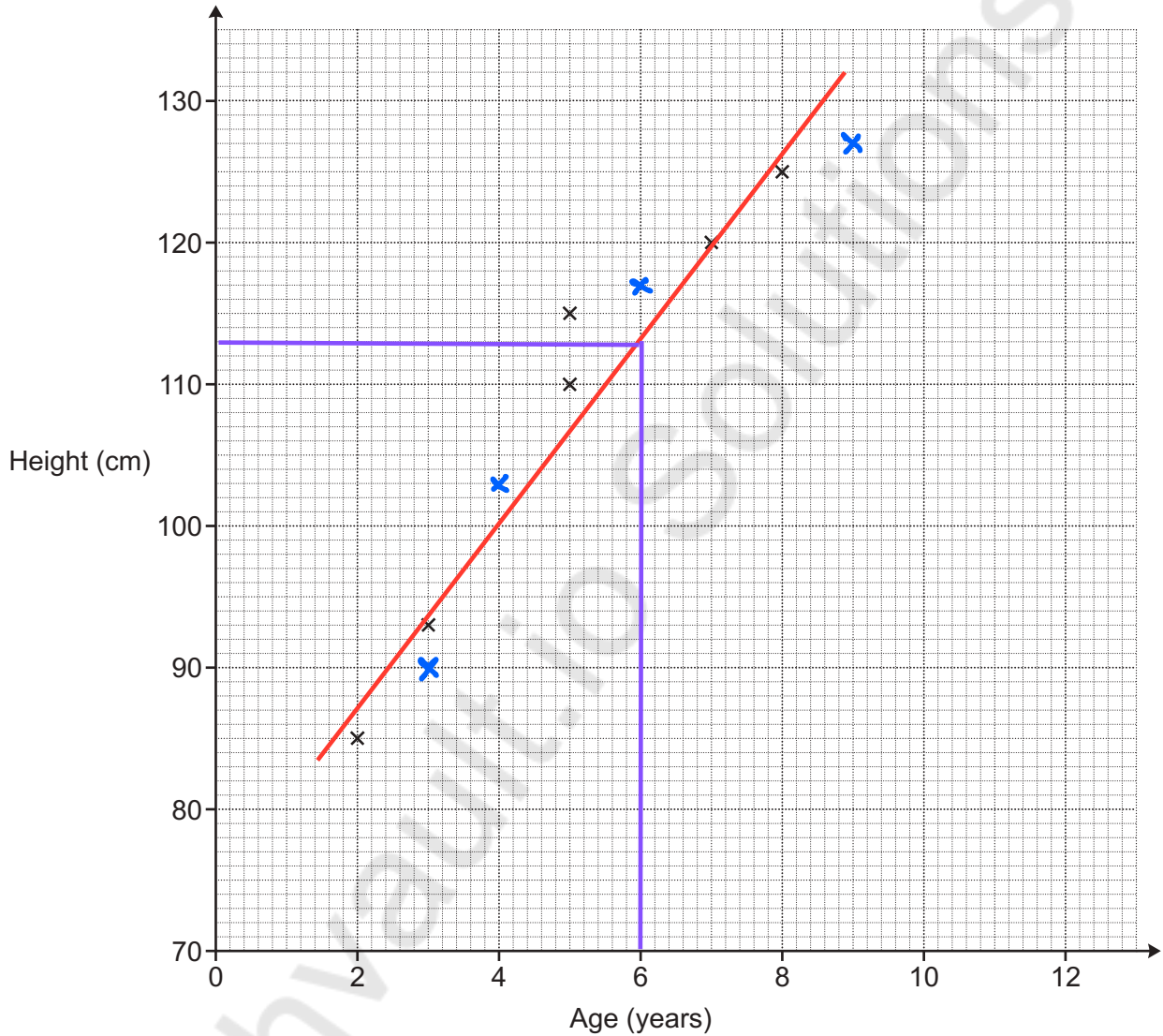
$$\sqrt{y+1} = x$$

(b) $\dots\dots\dots x = \sqrt{y+1} \dots\dots\dots$ [2]

- 11 A doctor records the ages, in years, and the heights, in centimetres, of 10 girls.

Age (years)	2	5	3	7	5	8	3	6	9	4
Height (cm)	85	115	93	120	110	125	90	117	127	103

The points for the first six girls are plotted on the scatter diagram.



- (a) Plot the points for the remaining four girls. [2]
- (b) Describe the type of correlation shown in the scatter diagram.

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

- (c) The doctor says that by using a line of best fit on the scatter diagram, the height of a 6-year-old girl is around 95 cm.

Does the scatter diagram support the doctor's statement?
Explain your reasoning.

..... No, it is too low of an estimate [2]

- (d) Explain why the scatter diagram and line of best fit should not be used to estimate the height of a 12-year-old girl.

..... Only data for heights up to age 9. [1]

- 12 Kate is 5 feet 2 inches tall.
Alice is 1.57 metres tall.
Alice says that she is taller than Kate.

Use the conversions below to decide if Alice is correct.

$12 \text{ inches} = 1 \text{ foot}$ $1 \text{ inch} = 2.5 \text{ centimetres}$

$\xrightarrow{\times 12}$
 $\xrightarrow{\times 2.5}$

Kate

$$5 \text{ feet} \times 12 = 60 \text{ inches}$$

$$60 + 2 = 62 \text{ inches tall}$$

$$62 \times 2.5$$

$$\begin{array}{r} 62 \\ \times 25 \\ \hline 310 \\ 1240 \\ \hline 1550 \end{array}$$

$$1550 \text{ centimetres} \div 10 = 155 \text{ cm}$$

Alice

$$100 \text{ cm} = 1 \text{ m}$$

$$\xrightarrow{\times 100}$$

$$1.57 \times 100 = 157 \text{ cm}$$

..... Alice is correct. $157 > 155$ [4]

13 Rashid is making cupcakes using these ingredients.

Cupcake ingredients
<i>Makes 20 cupcakes</i>
120 g flour
140 g butter
4 eggs
60 g cocoa powder
50 ml of water

(a) How many eggs does he need to make 60 cupcakes?

$$20 \times 3 = 60$$

$$4 \times 3 = 12$$

(a) **12** [1]

(b) How much butter is needed to make 5 cupcakes?

$$20 \div 4 = 5$$

$$140 \div 4 = 35\text{g}$$

(b) **35** g [2]

(c) Rashid has 210 g of cocoa powder and plenty of the other ingredients.
He says that he can make at least 75 cupcakes.

Is he correct?

Explain your reasoning.

$$210 \div 60$$

$$= 21 \div 6$$

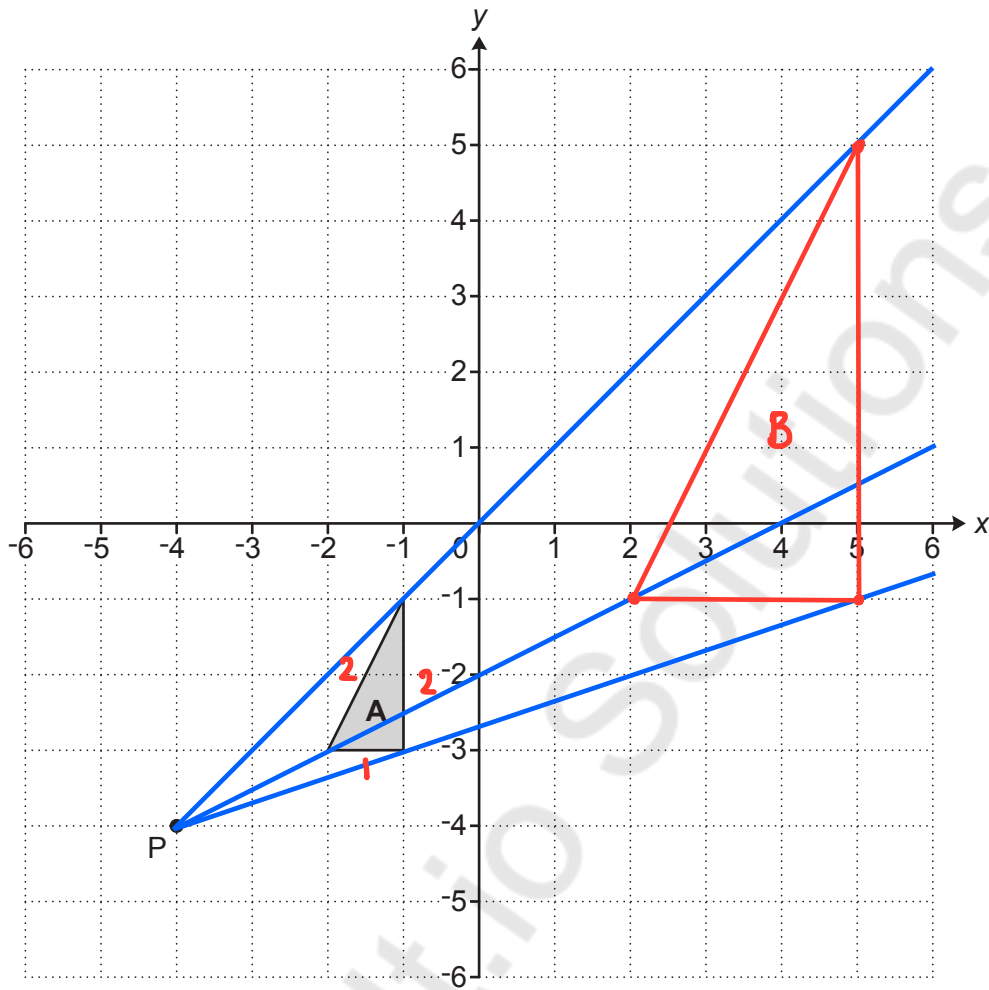
$$\begin{array}{r} 3.5 \\ 6 \overline{) 21.30} \end{array}$$

$$20 \times 3.5$$

$$\begin{array}{r} 20 \\ \times 35 \\ \hline 100 \\ 600 \\ \hline 700 \end{array} \div 10 = 70$$

..... **No, he can only make 70.** [3]

14 Triangle A is drawn on the grid below.



- (a) Enlarge triangle A with scale factor 3 from the centre of enlargement P. Label the image B. [3]

- (b) Describe fully the **single** transformation that maps triangle B onto triangle A.

..... Enlargement, scale factor $\frac{1}{3}$, centre $(-4, 4)$

..... [3]

15 Ed has a card shop.

- (a) He buys a particular card for £1.20 and sells it for £1.68.

Calculate his percentage profit on this card.

$$\begin{array}{r} 1.68 \\ - 1.20 \\ \hline \pounds 0.48 \text{ profit} \end{array}$$

$$\frac{48\text{p}}{120\text{p}} = \frac{4}{10} = 0.4 \times 100 = 40\%$$

(a) 40 % [3]

- (b) Ed's profit on "Good Luck" cards in 2018 was £360. This was a decrease of 20% on his profit in 2017.

Work out Ed's profit on "Good Luck" cards in 2017.

$$\begin{array}{l} \pounds 360 = 80\% \\ \div 4 \qquad \qquad \div 4 \\ \pounds 90 = 20\% \\ \times 5 \qquad \qquad \times 5 \\ \pounds 450 = 100\% \end{array}$$

(b) £ 450 [3]

- 16 (a) A sunflower grows at a rate of 4 cm each day.

How many days does it take to grow from a height of 80 cm to more than 1.06 m?

$$\begin{array}{l} 1\text{m} = 100\text{cm} \\ \quad \quad \quad \times 100 \\ 1.06 \times 100 = 106\text{cm} \\ \begin{array}{r} 106 \\ - 80 \\ \hline 26 \text{ cm} \end{array} \end{array}$$

$$\begin{array}{l} 26 \div 4 \\ = 13 \div 2 \end{array}$$

$$\begin{array}{r} 6.5 \\ 2 \overline{)13.0} \end{array}$$

$$6.5 \text{ days} = 7 \text{ days}$$

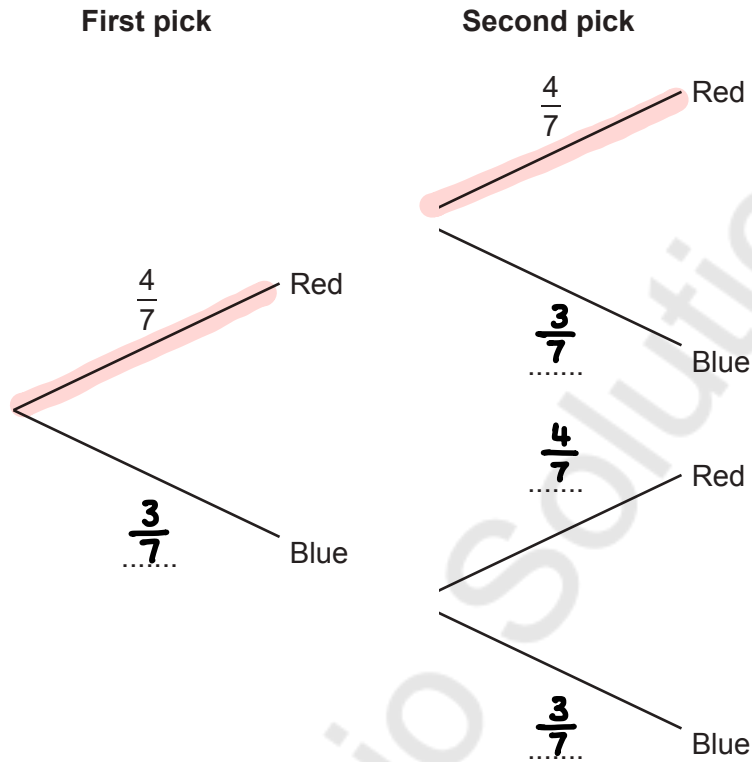
(a) 7 [3]

- (b) If the sunflower grows at a faster rate, how would this affect your answer to part (a)?

..... Fewer days [1]

- 17 A bag contains 4 red counters and 3 blue counters only. Jack picks a counter at random and then replaces it. Jack then picks a second counter at random.

(a) Complete the tree diagram.



[2]

- (b) Work out the probability that Jack picks two red counters.

$$\frac{4}{7} \times \frac{4}{7} = \frac{16}{49}$$

(b) $\frac{16}{49}$ [2]

- 18 Adam buys some theatre tickets in a sale.

The normal prices are:

£80 for each adult
£40 for each child.

In the sale, the prices are reduced by 15%.

Adam buys 2 adult tickets and 1 child ticket at the sale price.

A 2% booking fee is then added to the total cost of the tickets.

Calculate the total amount that Adam must pay.



Adult

$$100\% = 80$$

$$10\% = 8$$

$$5\% = 4$$

$$15\% = £12$$

$$\begin{aligned} \text{Sale price} &= £80 - £12 \\ &= £68 \end{aligned}$$

Child

$$100\% = 40$$

$$10\% = 4$$

$$5\% = 2$$

$$15\% = £6$$

$$\begin{aligned} \text{Sale price} &= £40 - £6 \\ &= £34 \end{aligned}$$

Adam buys

$$2 \times 68 + 34$$

$$136 + 34$$

$$£170$$

Booking Fee

$$100\% = 170$$

$$1\% = 1.7$$

$$2\% = 3.4$$

$$£3.40$$

$$\begin{aligned} \text{Total} &= 170 + 3.40 \\ &= 173.40 \end{aligned}$$

£ 173.40 [6]

- 19 One day, a group of people had a driving test.
 40 of this group were men and the rest were women.
 $\frac{3}{5}$ of the men and $\frac{2}{3}$ of the women passed the driving test.
 The number of men and women that passed the driving test was the same.

Work out the number of women that took the driving test that day.

Men - passed

$$\frac{3}{5} \text{ of } 40$$

$$40 \div 5 = 8$$

$$8 \times 3 = 24$$

Women - passed = 24

$$\frac{2}{3} = 24$$

$$\div 2 \quad \frac{1}{3} = 12 \quad \div 12$$

$$\frac{1}{3} = 12$$

$$\times 3 \quad \frac{3}{3} = 36 \quad \times 3$$

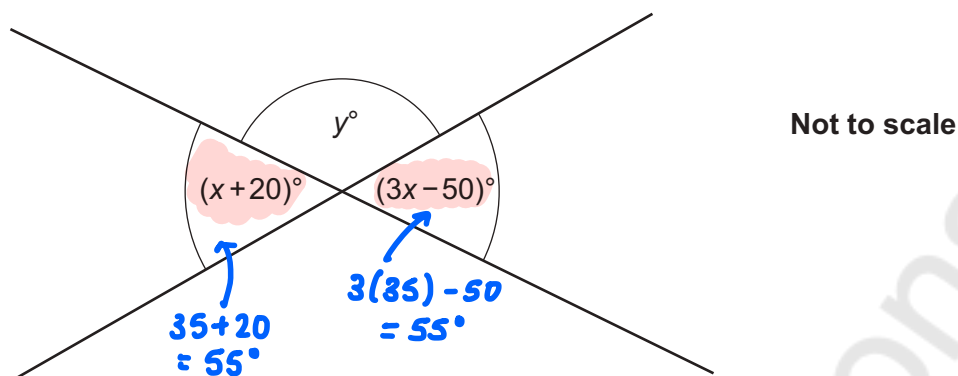
$$\frac{3}{3} = 36 \text{ women total}$$

..... 36

[5]

Turn over for question 20

20 The diagram shows two intersecting straight lines.



Find the value of y .

$$\begin{array}{r}
 x + 20 = 3x - 50 \\
 -x \qquad \qquad -x \\
 \hline
 20 = 2x - 50 \\
 + 50 \qquad \qquad + 50 \\
 \hline
 70 = 2x \\
 \div 2 \qquad \qquad \div 2 \\
 \hline
 35 = x
 \end{array}$$

$$\begin{array}{r}
 y = 180^\circ - 55^\circ \\
 = 125^\circ
 \end{array}$$

$$y = \dots\dots\dots 125 \dots\dots\dots [6]$$

END OF QUESTION PAPER

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