OCR Oxford Cambridge and RSA

Model Solutions

F

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 | | | | | | Candidate number | | | | |

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

£ 4.25
+ £ 5.18
£ 9.43

(a)(i) £ ..... 9.43 ..... **[1]**

(ii) $^{-}8 + 11$

11 − 8

(ii) ..... 3 ..... **[1]**

(iii) $^{-}6 \times {}^{-}9$

+(6×9) = +54

'−' × '−' equals '+'

(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 $\frac{3}{4} = 0.75$ **[1]**

(iii) $\frac{3}{5}$ ..... = ... 0.6 $\frac{3}{5} = \frac{6}{10} = 0.6$ (×2) **[1]**

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

Total cost = kg of apples × price per kg for apples.

= 3.9 × £0.87

↳ 9 > 5 round up ↳ 7 > 5 round up

= 4.0 × £0.90 (1 sf)

0.90
+0.90
+0.90
+0.90
3.60

= £3.60

£ ..... 3.60 ..... **[2]**

3 **(a)** Complete each statement.

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

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

$4\frac{1}{2} = \frac{(4\times2)+1}{2} = \frac{8+1}{2} = \frac{9}{2}$

(b) Work out.

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

$\frac{2\times5}{3\times5} - \frac{1\times3}{5\times3} = \frac{10}{15} - \frac{3}{15} = \frac{10-3}{15} = \frac{7}{15}$

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

4 Work out.

$0.7 = \frac{7}{10}$

(a) 0.7×0.3

$\frac{7}{10} \times \frac{3}{10} = \frac{21}{100}$

(a) 0.21 [1]

(b) $0.48 \div 6$

$\frac{0.48}{6} = \frac{0.24}{3} = 0.08$

(b) 0.08 [1]

5 **(a)** Complete the following.

(i) $5^2 =$ 25 [1]

$5 \times 5 = 25$

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

$(64)^{1/3} = (4^3)^{1/3} = 4$ $\quad (a^b)^c = a^{b\times c}$

$64 = 4^3$

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

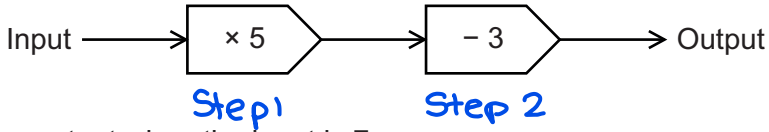
$2^3 = 2\times2\times2 = 8$

$\sqrt{49} = \sqrt{7\times7} = 7$

$\therefore 8\times7 = 56$

(b) 56 [2]

6 Here is a function machine.



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

Step 1 $7 \times 5 = 35$

Step 2 $35 - 3 = 32$

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

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

Do steps in reverse.

Step 2 $42 + 3 = 45$ } Do reverse operations

Step 1 $45 \div 5 = 9$ } eg: $- \rightarrow +$, $\times \rightarrow \div$

(ii) 9 **[2]**

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

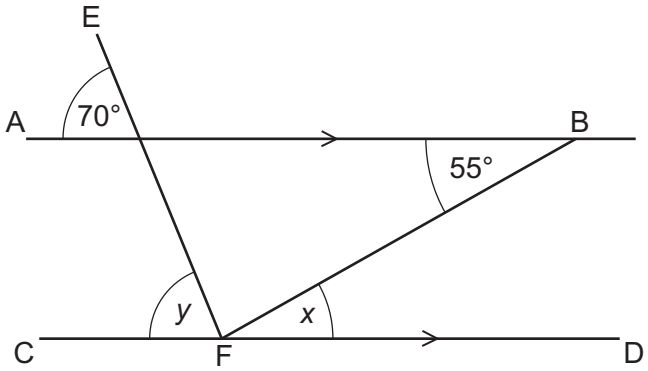
Write an equation for y in terms of x.

Step 1 $x \times 5 = 5x$

Step 2 $5x - 3 = y$

(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.

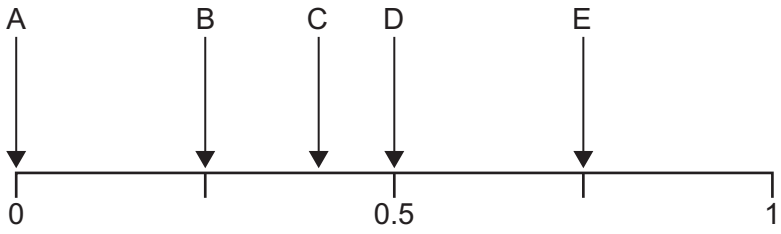
$x = 55°$ because $\hat{ABF}$ and $\hat{BFD}$ are alternate angles.

$y = 70°$ because 70° and y are corresponding **[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,

blue → $\frac{8}{20} = \frac{4}{10} = 0.4$ (÷2)
Total → 20

(a)(i) Arrow ..... C ..... **[1]**

(ii) yellow,

0 yellows → $\frac{0}{20} = 0$
Total → 20

(ii) Arrow ..... A ..... **[1]**

(iii) **not** black.

5 black, so 20 − 5 not black. → $\frac{20-5}{20} = \frac{15}{20} = \frac{7.5}{10} = 0.75$ (÷2)

(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.

How many **red** crayons did he buy?

P(blue) → 0.5 after adding;
half of total crayons are blue.

$\frac{16+20}{2} = \frac{36}{2} = 18$

He had 8 already:

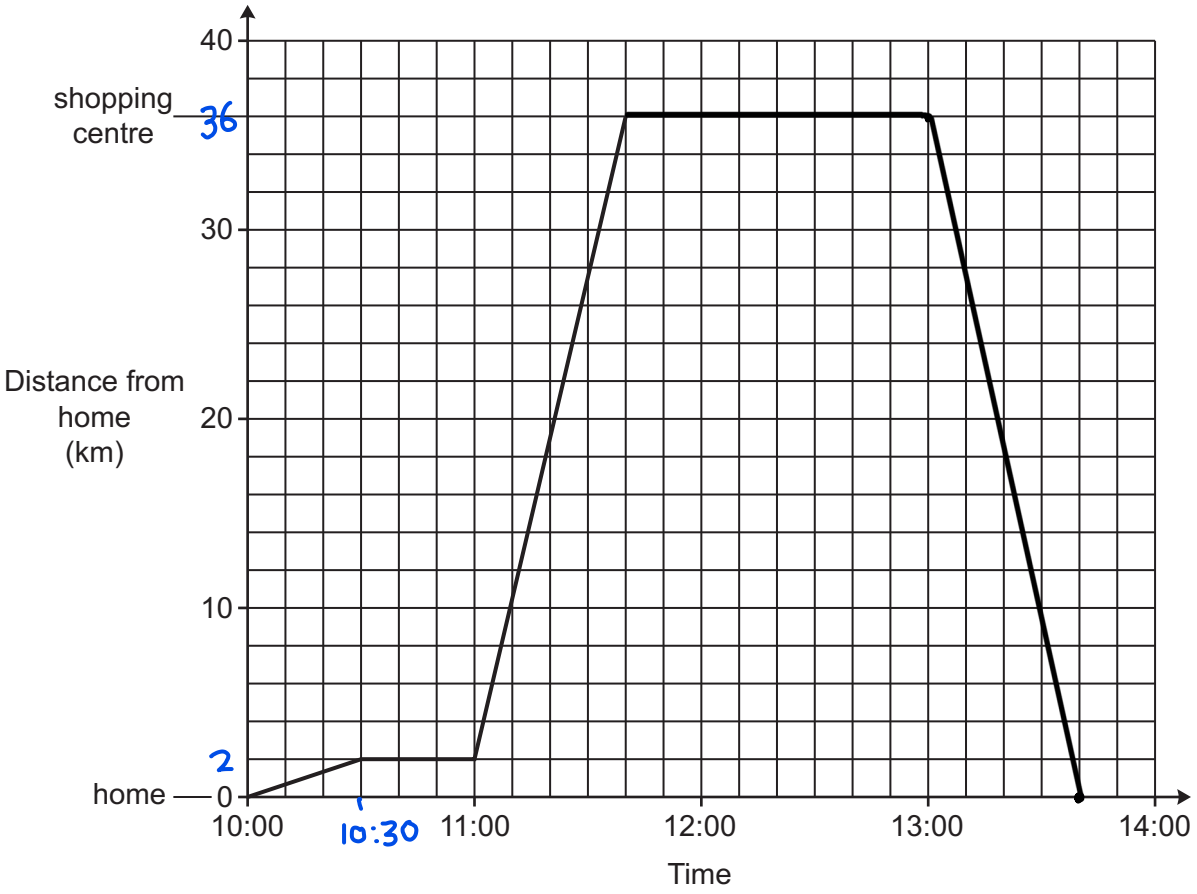
= 18 − 8
= 10 blue purchased

blue + red

∴ 16 − 10 = 6 red

(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 Horizontal line with zero gradient.

.....

.....

[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.

Average speed = Total distance / Total time

Total distance = 36 km

$18 \times 3 = 24 + 30 = 54$

Total time = 40 minutes
$= \frac{40}{60}$ hours $= \frac{2}{3}$ hrs

Avg speed $= 36 \div \frac{2}{3} = 36 \times \frac{3}{2}$

$= 18 \times 3 = 54$

(d)(ii) 54 km/h **[3]**

10 (a) Simplify fully.

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

$3t - 2t + 5u + 3u$

$t + 8u$

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

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

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

$12a^3$

$a^b \times a^c = a^{b+c}$

(ii) $12a^3$ **[2]**

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

$y = x^2 - 1$

$+1$: $y + 1 = x^2$

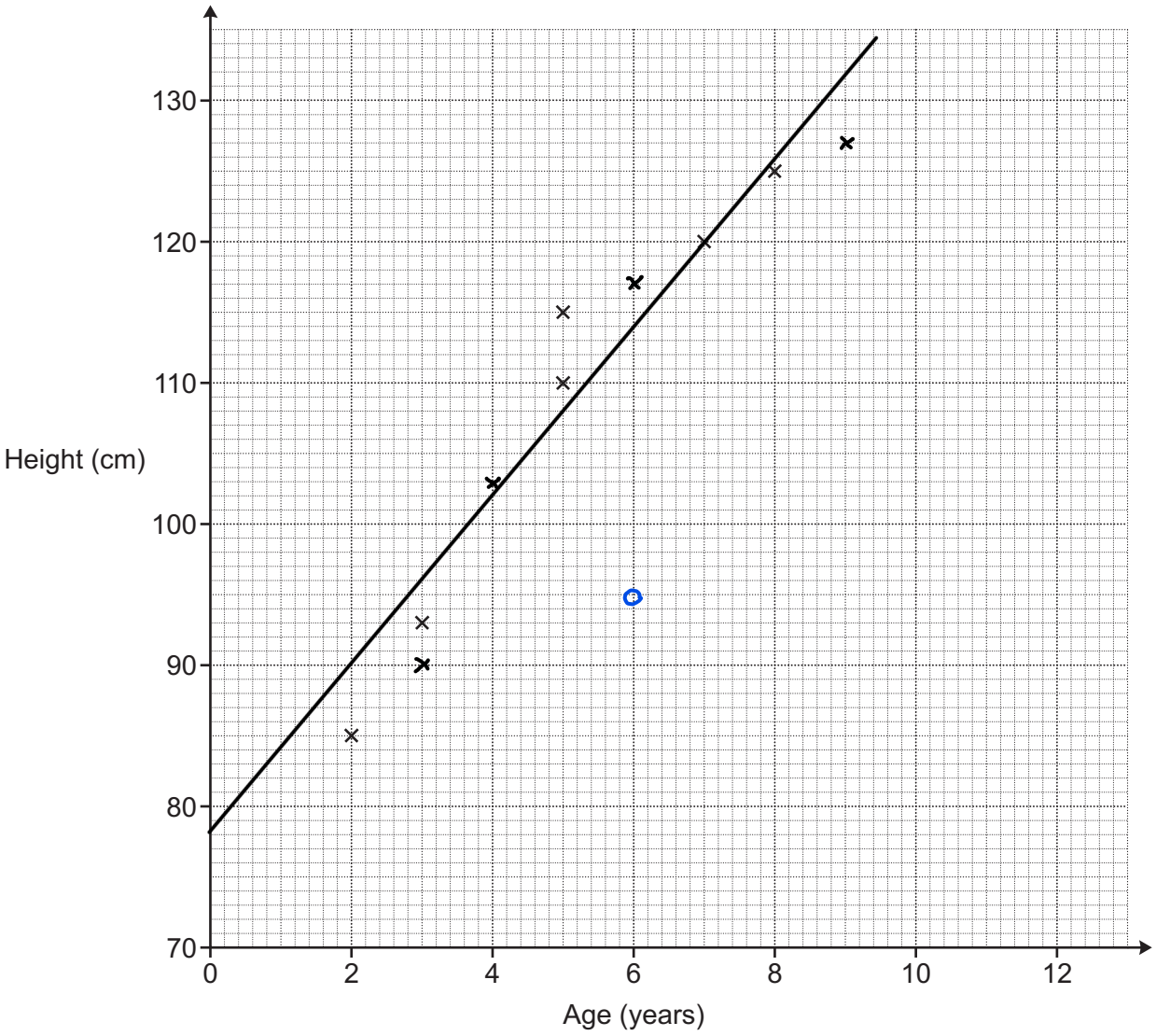
$\sqrt{\ }$: $\sqrt{y+1} = x$

(b) $x = \sqrt{y+1}$ **[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, 95 cm is too low from the line of best fit.

..... **[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.

The trend may not continue beyond the scope of data.

..... **[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 inches = 1 foot 1 inch = 2.5 centimetres

62
62
31
155

Kate : 5 feet + 2 inches

5(12) + 2 inches

62 inches.

$62 \times 2.5\,cm = 155\,cm = \frac{155}{100}\,m = 1.55\,m$

Alice : 1.57 metres

$1.57m > 1.55m$

Alice is correct

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

13 Rashid is making cupcakes using these ingredients.

Cupcake ingredients

Makes 20 cupcakes

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?

3 batches → 4(3) = 12

4 eggs per batch

(a) ..... 12 ..... **[1]**

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

$\frac{1}{4}$ batches → 140$\left(\frac{1}{4}\right)$ = 35g

140g butter per batch

(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.

For 75 cupcakes → $\frac{75}{20} = \frac{15}{4}$ batches (÷5)

cupcakes per batch (÷5)

15 × 15 = 75 + 150 = 225

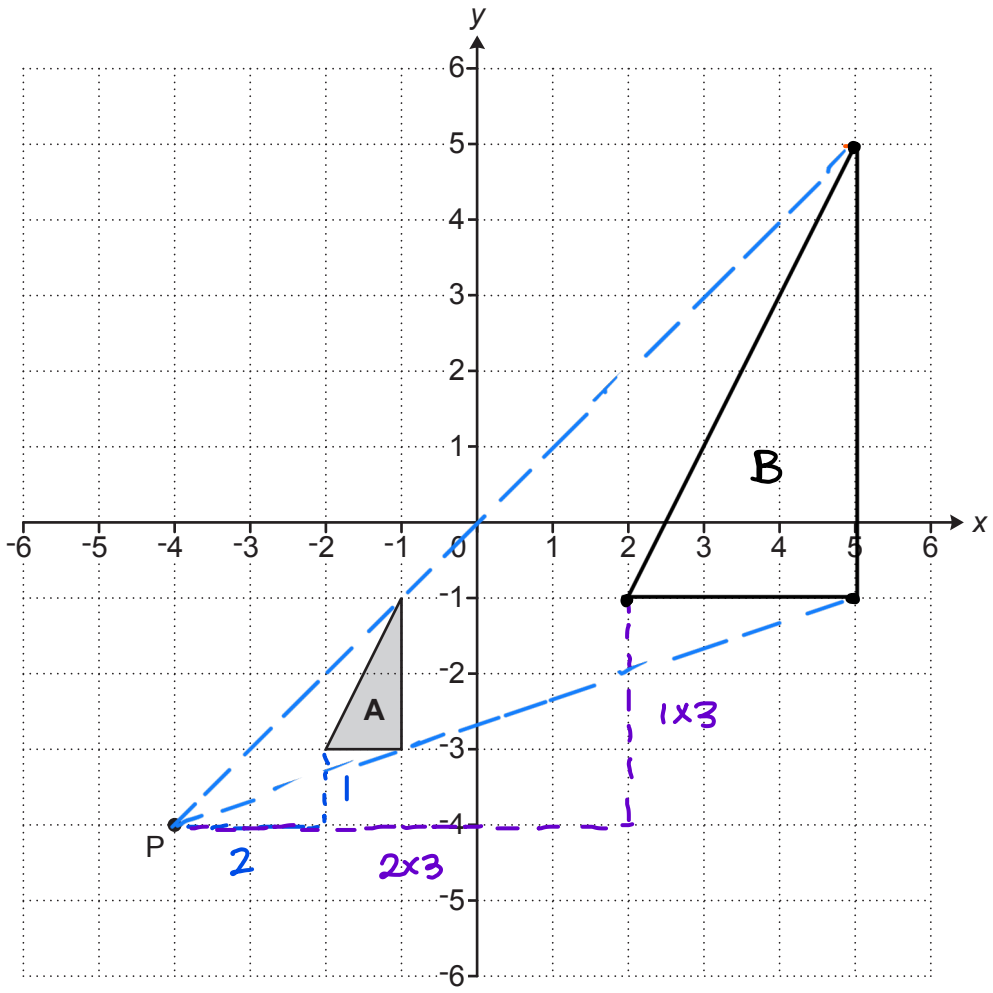
cocoa powder for $\frac{15}{4}$ batches = $60 \times \frac{15}{4} = 15 \times 15 = 225$g

225g needed for 75 cupcakes > 210g available

∴ He is wrong.

..... **[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 with scale factor $\frac{1}{3}$ with 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.

Profit = £1.68 − £1.20 = £0.48

% Profit = $\frac{£0.48}{£1.20} \times 100 = \left(\frac{0.48^{\times 100}}{1.20^{\times 100}}\right) \times 100$

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

$\frac{48}{120} = \frac{4}{10}$ (÷12)

(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.

80% → £360 (÷4)

20% → £90 (×5)

100% → £450

(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?

80cm → 1.06m (106cm) 1m = 100cm

length = 106 − 80 = 26cm

days = $\frac{\text{length}}{\text{change/day}} = \frac{26}{4} = \frac{13}{2} = 6.5 \approx 7$ days

always round up as there are no fractions for no. of days

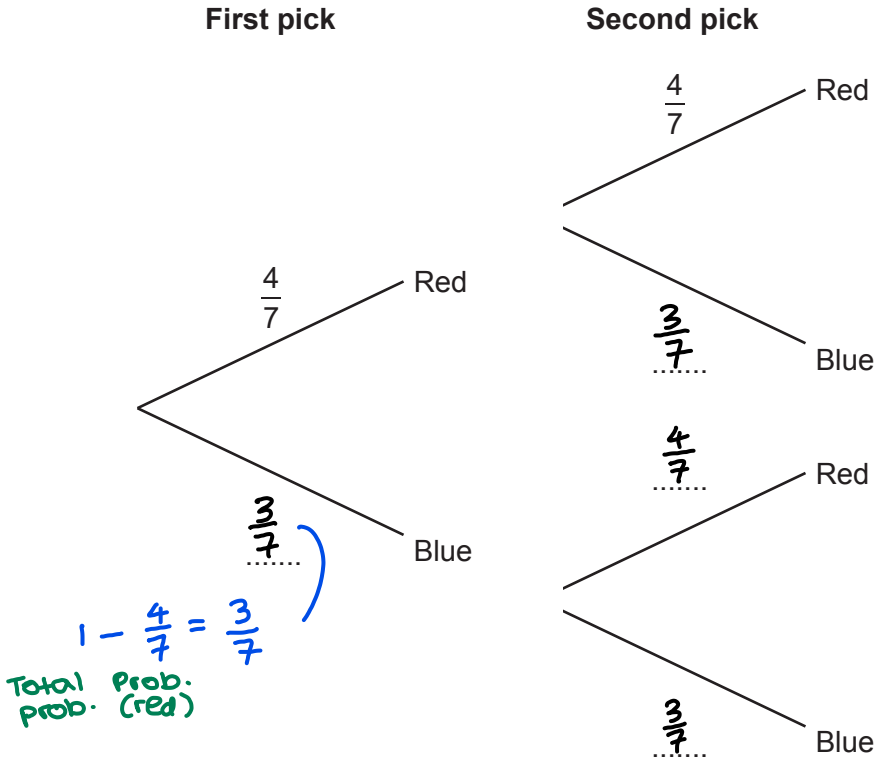
(a) 7 **[3]**

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

The time taken will be lower (less no. of 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.



$1 - \frac{4}{7} = \frac{3}{7}$

Total prob. − prob. (red)

$P(\text{red}) = \frac{4}{7}$

$P(\text{Blue}) = \frac{3}{7}$

Throughout as the counters are replaced.

[2]

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

$P(\text{red}) \times P(\text{red})$

Red AND Red

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

(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.

A - Adult
C - Child

Cost for 2A + C (pre sale and fee) = 2(£80) + £40
= £160 + £40 = £200

Cost after discount (pre fee) = 100% → £200 (÷100) → 1% → £2 (×85) → 85% → £170

Final cost = £170 + 2% of £170 (fee)
= £170 + $\frac{2}{100} \times 170$
= £170 + $2 \times \frac{170}{100}$
= £170 + 2 × 1.70
= £170 + 3.40
= £173.40

£ 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.

No. of men who passed the test. : $\frac{3}{5} \times 40 = 3 \times \frac{40}{5} = 3 \times 8 = 24$ men

24 men and 24 women passed the driving test

women:

$\frac{2}{3} \rightarrow 24$ ÷2

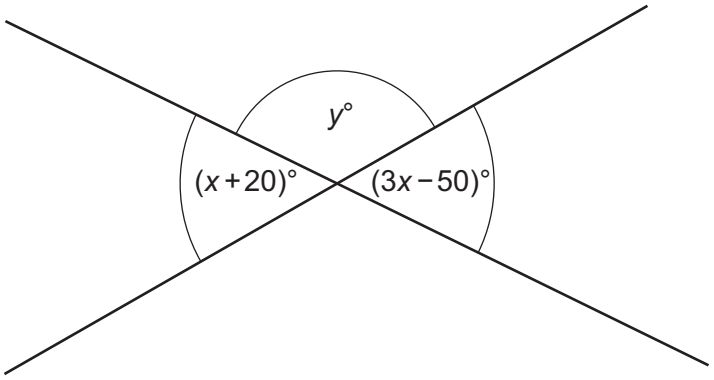
$\frac{1}{3} \rightarrow 12$ ×3

$1 \rightarrow 36$

36 **[5]**

Turn over for question 20

20 The diagram shows two intersecting straight lines.



Not to scale

Find the value of y.

$y + (3x - 50) = 180^\circ$ (Angles in a Straight line add up to 180°)

$+50$ $\quad y + 3x = 230^\circ$ — ①

$y + (x + 20) = 180^\circ$

-20 $\quad y + x = 160^\circ$ — ②

① − ② $\quad y + 3x - (y + x) = 230^\circ - 160^\circ$

$3x - x = 70^\circ$

$2x = 70^\circ$ $\div 2$

$x = 35^\circ$

Subs. ② $x = 35^\circ$ in : $y + 35^\circ = 160^\circ$ -35

$y = 125^\circ$

$y =$ 125 **[6]**

END OF QUESTION PAPER