

Frequency Trees

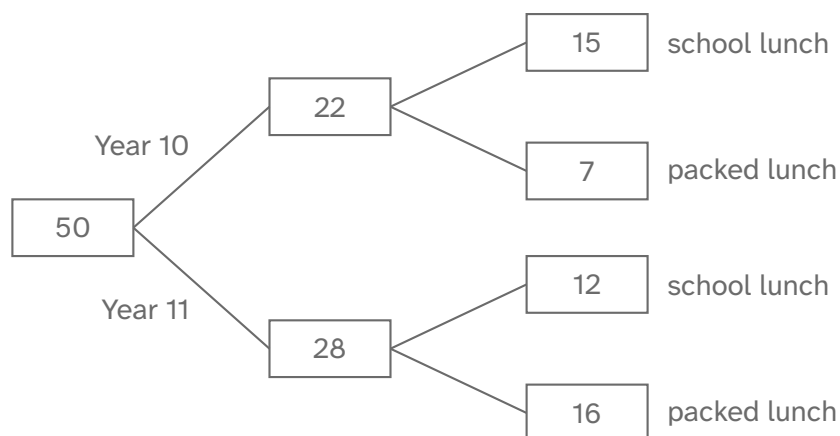
Solutions

For Pearson Edexcel GCSE Mathematics (1MA1) • Foundation tier

Each question is shown in grey, followed by the working, one step per line. The final answer is in a box. *Marks* shows how the marks are usually given in the exam, and **Tip** points out a common mistake.

1 (3 marks)

The frequency tree shows information about the lunches of 50 students.



(a) How many of the students have a packed lunch?

Add both “packed lunch” boxes:

Year 10: 7, Year 11: 16

$$7 + 16 = 23$$

Answer: 23

(b) One of these students is chosen at random.

Write down the probability that this student is in Year 11 and has a school lunch.

Year 11 **and** school lunch: 12 students.

The student is chosen from all 50 students.

Answer: $\frac{12}{50}$

- (c) What fraction of the Year 11 students have a packed lunch?

This time we only look at the 28 Year 11 students.

16 of them have a packed lunch.

Answer: $\frac{16}{28} \left(= \frac{4}{7} \right)$

Tip: Check who you are choosing from. In (b) it is all 50 students. In (c) it is only the 28 Year 11 students.

2 (5 marks)

A library lent 90 books on one day.

Each book was fiction or non-fiction.

52 of the books were lent to adults. The rest were lent to children.

29 of the books were non-fiction.

18 of the books lent to adults were non-fiction.

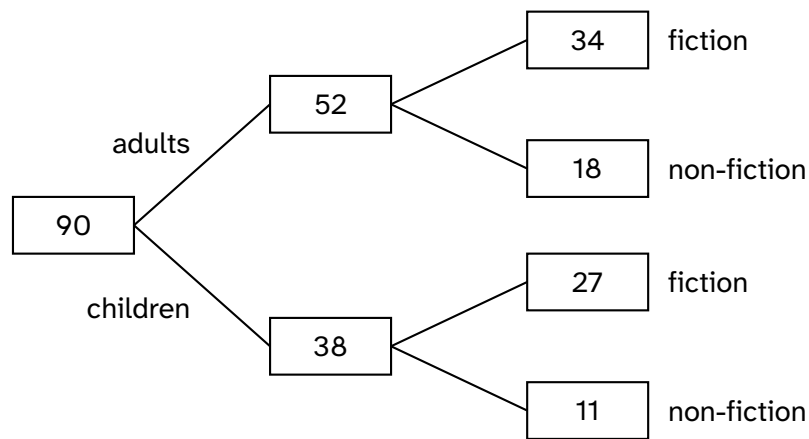
- (a) Use this information to complete the frequency tree.

Adults: 52. Children: $90 - 52 = 38$

Adults, non-fiction: 18. Adults, fiction: $52 - 18 = 34$

Children, non-fiction: $29 - 18 = 11$

Children, fiction: $38 - 11 = 27$



Answer: See tree

Tip: The 29 non-fiction books were lent to adults **and** children. Take away the 18 adult ones to find the children's non-fiction books.

Marks: 3 marks for a fully correct tree. 2 marks for 4 or 5 correct numbers. 1 mark for 2 or 3 correct.

- (b) One of these books is chosen at random.
Find the probability that it is a fiction book.

Fiction books: $34 + 27 = 61$

There are 90 books altogether.

$$P(\text{fiction}) = \frac{61}{90}$$

Answer: $\frac{61}{90}$

Marks: 1 mark for $34 + 27$ (or $90 - 29$). 1 mark for $\frac{61}{90}$.

3 (5 marks)

A garage tested 200 cars.

$\frac{3}{5}$ of the cars were petrol cars. The rest were diesel cars.

25% of the petrol cars failed the test.

64 of the diesel cars passed the test.

(a) Complete the frequency tree.

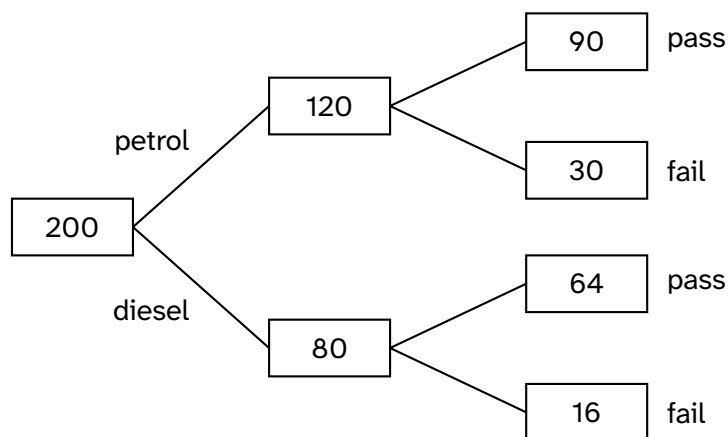
Petrol: $\frac{3}{5}$ of 200 = $200 \div 5 \times 3 = 120$

Diesel: $200 - 120 = 80$

Petrol that failed: 25% of 120 = $120 \div 4 = 30$

Petrol that passed: $120 - 30 = 90$

Diesel that passed: 64. Diesel that failed: $80 - 64 = 16$



Answer: See tree

Tip: The 25% is of the **petrol** cars (120), not of all 200 cars.

Marks: 3 marks for a fully correct tree. 2 marks for 4 or 5 correct numbers. 1 mark for 2 or 3 correct.

(b) What percentage of all the cars failed?

Cars that failed: $30 + 16 = 46$

Percentage = $\frac{46}{200} \times 100$

$$= 23$$

Answer: 23%

Marks: 1 mark for $\frac{46}{200} \times 100$ (from your tree). 1 mark for 23%.

4 (5 marks)

A café sold 150 hot drinks one morning.

Each drink was coffee or tea, and was small or large.

96 of the drinks were coffee.

$\frac{5}{8}$ of the coffees were large.

42 of the drinks were small.

(a) Use this information to complete the frequency tree.

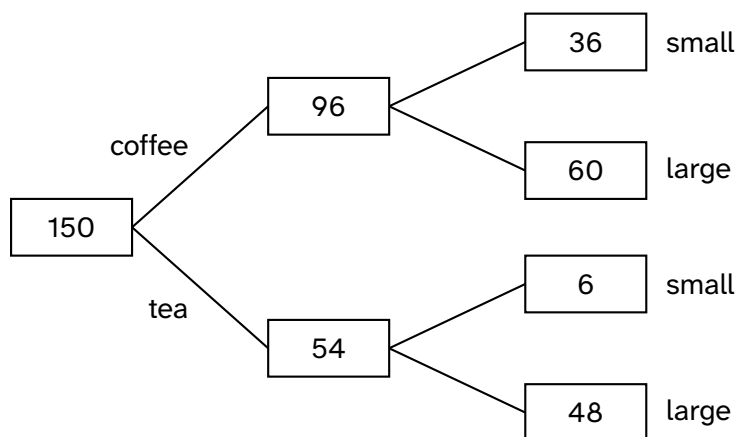
Coffee: 96. Tea: $150 - 96 = 54$

Large coffee: $\frac{5}{8}$ of 96 = $96 \div 8 \times 5 = 60$

Small coffee: $96 - 60 = 36$

Small tea: $42 - 36 = 6$

Large tea: $54 - 6 = 48$



Answer: See tree

Tip: The 42 small drinks include small coffees **and** small teas. Work out the small coffees first.

Marks: 3 marks for a fully correct tree. 2 marks for 4 or 5 correct numbers. 1 mark for 2 or 3 correct.

- (b) One of the large drinks is chosen at random.
Find the probability that it is a tea.

Large drinks: $60 + 48 = 108$

Large teas: 48

$$P(\text{tea}) = \frac{48}{108} = \frac{4}{9}$$

Answer: $\frac{48}{108}$ (or $\frac{4}{9}$)

Tip: Only the large drinks count here, so the bottom of the fraction is 108, not 150.

Marks: 1 mark for 108 large drinks. 1 mark for $\frac{48}{108}$ or an equivalent fraction.

5 (5 marks)

A hotel has 150 guests.

84 of the guests are on business. The rest are on leisure.

$\frac{2}{3}$ of the leisure guests had breakfast.

33 of the business guests did not have breakfast.

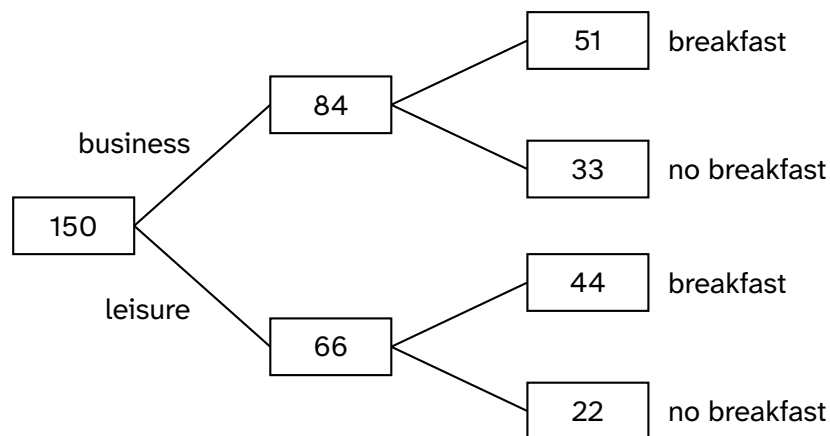
(a) Complete the frequency tree.

Business: 84. Leisure: $150 - 84 = 66$

Leisure with breakfast: $\frac{2}{3}$ of 66 = $66 \div 3 \times 2 = 44$

Leisure, no breakfast: $66 - 44 = 22$

Business, no breakfast: 33. Business with breakfast: $84 - 33 = 51$



Answer: See tree

Marks: 3 marks for a fully correct tree. 2 marks for 4 or 5 correct numbers. 1 mark for 2 or 3 correct.

(b) One of the guests is chosen at random.

Work out the probability that this guest had breakfast.

Had breakfast: business 51 + leisure 44 = 95

There are 150 guests altogether.

Answer: $\frac{95}{150}$

Marks: 1 mark for 95 (from your tree). 1 mark for $\frac{95}{150}$ or an equivalent.

6 (5 marks)

A garden centre sold 250 plants on Saturday.

40% of the plants were sold in the morning. The rest were sold in the afternoon.

$\frac{3}{5}$ of the plants sold in the morning were flowering plants.

90 of the plants sold in the afternoon were flowering plants.

(a) Use this information to complete the frequency tree.

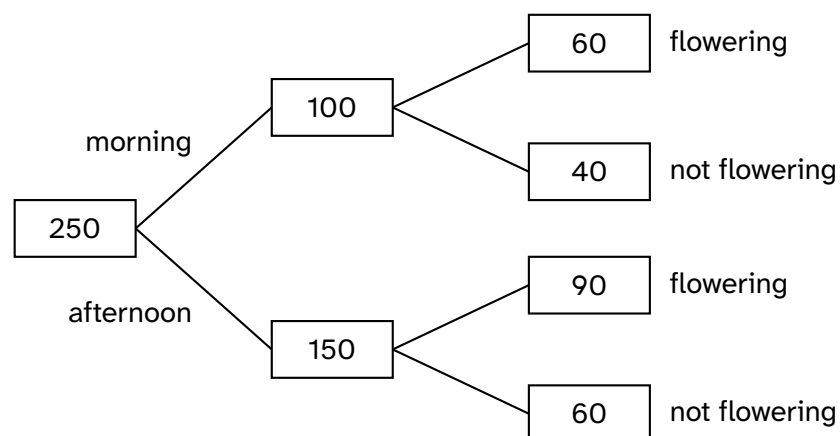
Morning: 40% of 250 = $0.4 \times 250 = 100$

Afternoon: $250 - 100 = 150$

Morning, flowering: $\frac{3}{5}$ of 100 = 60

Morning, not flowering: $100 - 60 = 40$

Afternoon, flowering: 90. Afternoon, not flowering: $150 - 90 = 60$



Answer: See tree

Tip: The $\frac{3}{5}$ is of the morning plants (100), not of all 250 plants.

Marks: 3 marks for a fully correct tree. 2 marks for 4 or 5 correct numbers. 1 mark for 2 or 3 correct.

- (b) What percentage of the flowering plants were sold in the afternoon?

Flowering plants: $60 + 90 = 150$

Sold in the afternoon: 90

$$\frac{90}{150} \times 100 = 60\%$$

Answer: 60%

Tip: The question is about the flowering plants only, so divide by 150 (all the flowering plants), not by 250.

Marks: 1 mark for $\frac{90}{150}$. 1 mark for 60.
