

Two-Way Tables

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 two-way table shows information about the lunches of 90 students.

	School dinner	Packed lunch	Total
Year 9	28	17	45
Year 10	21	24	45
Total	49	41	90

- (a) How many of the Year 10 students have a packed lunch?

Read across the Year 10 row to the Packed lunch column.

Answer: 24

- (b) How many of the students have a school dinner?

School dinner: Year 9 28 + Year 10 21 = 49

(This is the total at the bottom of the column.)

Answer: 49

- (c) One of the students is chosen at random.

Write down the probability that this student is in Year 9 and has a packed lunch.

Year 9 **and** packed lunch: 17 students.

The student is chosen from all 90 students.

Answer: $\frac{17}{90}$

2 (3 marks)

90 students went on a school trip to London, Paris or York.

40 of the students are boys.

12 of the boys went to London.

20 of the girls went to Paris.

26 students went to York.

15 of the boys went to York.

Use this information to complete the two-way table.

Put in the given numbers: 90, 40 boys, 12, 20, 26 and 15

Girls: $90 - 40 = 50$

Boys, Paris: $40 - 12 - 15 = 13$

Girls, York: $26 - 15 = 11$

Girls, London: $50 - 20 - 11 = 19$

London total: $12 + 19 = 31$. Paris total: $13 + 20 = 33$

Check: $31 + 33 + 26 = 90$ ✓

	London	Paris	York	Total
Boys	12	13	15	40
Girls	19	20	11	50
Total	31	33	26	90

Answer: See table

Tip: Check your finished table: every row and every column must add up to its total.

Marks: 3 marks for a fully correct table. 2 marks for 6 to 11 correct. 1 mark for 3 to 5 correct.

3 (4 marks)

150 people used a leisure centre one day.

Each person went for a swim, used the gym or went to a class.

The two-way table shows some information about these people.

(a) Complete the two-way table.

$$\text{Swim, 30 and over: } 40 - 18 = 22$$

$$\text{Gym, under 30: } 65 - 34 = 31$$

$$\text{Class, under 30: } 70 - 18 - 31 = 21$$

$$\text{30 and over total: } 150 - 70 = 80$$

$$\text{Class, 30 and over: } 80 - 22 - 34 = 24$$

$$\text{Class total: } 21 + 24 = 45$$

	Swim	Gym	Class	Total
Under 30	18	31	21	70
30 and over	22	34	24	80
Total	40	65	45	150

Answer: See table

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

- (b) One of these people is chosen at random.
Write down the probability that this person is aged 30 and over and went to the gym.

30 and over **and** gym: 34 people.

The person is chosen from all 150 people.

Answer: $\frac{34}{150}$

4 (4 marks)

There are 70 books on a library display.
Each book is fiction or non-fiction.
Each book is a paperback or a hardback.
 $\frac{3}{5}$ of the books are paperbacks.
30 of the fiction books are paperbacks.
11 of the hardbacks are non-fiction.

- (a) Use this information to complete the two-way table.

Paperbacks: $\frac{3}{5}$ of 70 = $70 \div 5 \times 3 = 42$

Hardbacks: $70 - 42 = 28$

Fiction hardbacks: $28 - 11 = 17$

Non-fiction paperbacks: $42 - 30 = 12$

Fiction total: $30 + 17 = 47$

Non-fiction total: $12 + 11 = 23$

Check: $47 + 23 = 70$ ✓

	Paperback	Hardback	Total
Fiction	30	17	47
Non-fiction	12	11	23
Total	42	28	70

Answer: See table

Marks: 3 marks for a fully correct table. 2 marks for 5 to 8 correct. 1 mark for 3 or 4 correct.

- (b) One of the books is chosen at random.

Write down the probability that this book is a non-fiction paperback.

Non-fiction paperbacks: 12 books.

The book is chosen from all 70 books.

Answer: $\frac{12}{70}$

5 (3 marks)

The two-way table shows information about the people at a concert.

	Men	Women	Children
Seated	20	35	18
Standing	12	13	22

Work out the percentage of the adults who are women.

Men: $20 + 12 = 32$

Women: $35 + 13 = 48$

Adults (men and women): $32 + 48 = 80$

Percentage of adults who are women = $\frac{48}{80} \times 100$

= 60

Answer: 60%

Tip: Children are not adults. Divide by the 80 adults, not by everyone at the concert.

Marks: 1 mark for 80 adults. 1 mark for $\frac{48}{80}$. 1 mark for 60%.

6 (5 marks)

240 members of a sports club were asked which sport they play most.

Each member chose tennis, squash or badminton.

$\frac{1}{3}$ of the members are juniors. The rest are seniors.

45 of the seniors chose tennis.

70 members chose squash.

22 of the juniors chose squash.

95 members chose badminton.

(a) Complete the two-way table.

Juniors: $\frac{1}{3}$ of 240 = 80

Seniors: $240 - 80 = 160$

Seniors, squash: $70 - 22 = 48$

Tennis total: $240 - 70 - 95 = 75$

Juniors, tennis: $75 - 45 = 30$

Juniors, badminton: $80 - 30 - 22 = 28$

Seniors, badminton: $95 - 28 = 67$

Check the Seniors row: $45 + 48 + 67 = 160$ ✓

	Tennis	Squash	Badminton	Total
Juniors	30	22	28	80
Seniors	45	48	67	160
Total	75	70	95	240

Answer: See table

Marks: 3 marks for a fully correct table. 2 marks for 6 to 10 correct. 1 mark for 3 to 5 correct.

- (b) One of the seniors is chosen at random.
Find the probability that this senior chose badminton.

Seniors who chose badminton: 67

The person is chosen from the 160 seniors only.

Answer: $\frac{67}{160}$

Tip: “One of the seniors” means the bottom of the fraction is the number of seniors (160), not all 240 members.

Marks: 1 mark for a fraction out of 160. 1 mark for $\frac{67}{160}$.

7 (4 marks)

120 students each chose one activity for an activities week: climbing, sailing or cycling.
50 of the students are in Year 8. The rest are in Year 9.
44 students chose climbing.
19 of the students who chose climbing are in Year 8.
Twice as many Year 9 students chose cycling as chose sailing.

One of the Year 9 students is chosen at random.
What is the probability that this student chose sailing?

Work with the Year 9 students only (a two-way table can help).

Year 9 students: $120 - 50 = 70$

Year 9 students who chose climbing: $44 - 19 = 25$

Year 9 students who chose sailing or cycling: $70 - 25 = 45$

Cycling : sailing = 2:1, so there are 3 parts.

Year 9 sailing: $45 \div 3 = 15$ (Year 9 cycling: 30)

The student is chosen from the 70 Year 9 students.

$$P(\text{sailing}) = \frac{15}{70}$$

Answer: $\frac{15}{70}$

Tip: “Twice as many chose cycling as sailing” splits the 45 in the ratio 2:1, not $45 \div 2$. “One of the Year 9 students” means the bottom of the fraction is 70.

Marks: 1 mark for 70 Year 9 students or 25 Year 9 climbers. 1 mark for 45. 1 mark for 15 Year 9 students who chose sailing. 1 mark for $\frac{15}{70}$ or an equivalent.