GCSE Mathematics

Two-Way Tables & Frequency Trees

Questions

Pearson Edexcel GCSE & iGCSE Mathematics

Section A — Foundation

Worked Examples

[Fluency]

A class of 30 students: 15 play sport, 18 play an instrument, 10 do both. Complete a two-way table.

Only sport=15−10=5. Only instrument=18−10=8. Neither=30−5−8−10=7

P(plays sport) = 15/30 = **1/2**

[Reasoning]

60 students surveyed on pet ownership and gender. Use a two-way table to find P(has a pet).

Read directly from table: total with pets ÷ total students.

[Problem Solving]

40 students. 25 do sport. Of sport students, 20 also do art. Of non-sport students, 9 do art. Complete a frequency tree.

Sport: 25. Art∩sport=20. No art∩sport=5.

No sport: 15. Art∩no sport=9. No art∩no sport=6.

P(does art)=29/40

[Fluency]

1. 30 students were asked whether they liked Maths and Science.
8 liked both. 12 liked Maths in total. 15 liked Science in total.

Complete the two-way table and find:

(a) P(likes Maths) **(b)** P(likes both) **(c)** P(likes at least one)

(4 marks)

[Fluency]

2. A group of 50 people were asked about coffee and tea preferences.
30 drink coffee, 25 drink tea, 10 drink both.

(a) Draw a two-way table. (2)

(b) How many drink neither? (1)

(c) Find P(drinks tea but not coffee). (1)

(4 marks)

[Fluency]

3. 40 students were asked if they play a sport and a musical instrument.
25 play a sport. Of these, 20 also play an instrument.
Of the 15 who don't play sport, 9 play an instrument.

Draw a frequency tree and find:
(a) P(plays an instrument) **(b)** P(plays sport and instrument)

(4 marks)

[Reasoning]

4. A two-way table shows data on 100 students' grades and gender:

Pass: Male 42, Female 38 Fail: Male 10, Female 10

A student is chosen at random. Find:
(a) P(passes) **(b)** P(female) **(c)** P(passes and female)

(3 marks)

[Reasoning]

5. Using the table in Question 4, find:
(a) P(passes | female) **(b)** P(female | passes) **(c)** Are gender and result independent? Show your working.

(5 marks)

[Problem Solving]

6. 200 people were tested for a medical condition.
120 were male, 80 were female.
Of the males, 36 tested positive. Of the females, 20 tested positive.

(a) Complete a frequency tree. (3)
(b) Find P(positive). (2)
(c) Find P(male | positive). (2)

(7 marks)

[Problem Solving]

7. A bus company surveys 80 passengers on two routes, A and B.
On route A (50 passengers): 30 were on time, 20 were late.
On route B (30 passengers): 24 were on time, 6 were late.

(a) Draw a two-way table. (2)
(b) Find P(late). (1)
(c) Find P(route A | on time). (2)

(5 marks)

Section B — Higher

Worked Examples

[Fluency]

ε=50. n(A)=28, n(B)=19, n(A∩B)=8. Find P(A|B) and P(A'∩B).

A only=20, B only=11, Both=8, Neither=11

$$P(A|B) = \frac{n(A \cap B)}{n(B)} = \frac{8}{19} \qquad P(A' \cap B) = \frac{11}{50}$$

[Reasoning]

P(A)=0.6, P(B|A)=0.7, P(B|A')=0.3. Draw a frequency tree for 100 trials. Find P(B) and P(A|B).

A: 60. Of 60: B=42, B'=18. A': 40. Of 40: B=12, B'=28

$$P(B) = \frac{54}{100} = 0.54 \qquad P(A|B) = \frac{42}{54} = \frac{7}{9}$$

[Problem Solving]

Use a two-way table with algebra: total=200, male=120, pass=140, male∩pass=84. Find P(pass|female).

Female fail=80–(140–84)=80–56=24. Female pass=56.

$$P(\text{pass}|\text{female}) = \frac{56}{80} = \frac{7}{10}$$

[Fluency]

1. ε = 50. n(A) = 28, n(B) = 19, n(A∩B) = 8.

(a) Complete a Venn diagram. (2)

(b) Find P(A∪B). (1)

(c) Find P(A|B). (2)

(d) Find P(A'∩B). (1)

(6 marks)

[Fluency]

2. P(A) = 0.6, P(B|A) = 0.7, P(B|A') = 0.3.

(a) Draw a frequency tree for 100 trials. (3)

(b) Find P(B). (2)

(c) Find P(A|B). (2)

(7 marks)

[Reasoning]

3. 200 students: 120 male, 80 female. 140 pass, 60 fail. 84 males pass.

(a) Complete a two-way table. (2)

(b) Find P(pass | female). (2)

(c) Find P(male | pass). (2)

(6 marks)

[Reasoning]

4. Using the table from Q3, test whether gender and pass/fail result are independent. Show your working clearly.

(3 marks)

[Problem Solving]

5. A factory produces items from two machines A and B.
Machine A produces 60% of items. Machine B produces 40%.
P(defective | A) = 0.05 and P(defective | B) = 0.08.

(a) Draw a frequency tree for 1000 items. (3)

(b) Find P(defective). (2)

(c) Find P(from machine A | defective). (3)

(8 marks)

[Problem Solving]

6. A school has 300 students. The two-way table below shows data on transport and year group:

Year 10: Bus=45, Walk=35, Car=20. Total=100
Year 11: Bus=60, Walk=80, Car=60. Total=200

(a) A student is chosen at random. Find P(Year 10 and walks). (1)

(b) Given the student takes a bus, find P(Year 11). (2)

(c) Are year group and taking the bus independent? (3)

(6 marks)