

Probability

Maths

Level 2

Exam-style practice · 12 questions · 33 marks · Calculator allowed

Remember

Probability = number of ways it can happen ÷ total number of equally likely outcomes. Write it as a fraction, decimal or percentage – all are accepted unless the question specifies.

Scale: 0 = impossible, 1 = certain, 0.5 = even chance. Probabilities of all possible outcomes add to 1.

Not happening: $P(\text{not } A) = 1 - P(A)$. If $P(\text{rain}) = 0.3$, $P(\text{no rain}) = 0.7$.

Expected number: probability × number of trials. $P(\text{faulty}) = 0.02$, batch of 500 → expect 10 faulty.

Two events: list every combination (a sample space) and count.

Section A – Simple probability

1. A bag holds 5 red, 3 blue and 4 green counters. One is taken at random. Find the probability it is (a) blue (b) not green (c) red or blue. Give your answers as fractions in their simplest form.

(4 marks)

2. A spinner has 8 equal sections numbered 1 to 8. Find, as a decimal, the probability of spinning (a) an even number (b) a number greater than 6 (c) a 9. (3 marks)

3. The probability that a train is late is 0.15. What is the probability that it is on time? (1 mark)

4. A weather app says there is a 35% chance of rain tomorrow. Mark this on a probability scale from 0 to 1 and write it as a fraction. (2 marks)

5. The probabilities of a football match result are: home win 0.45, draw 0.3. What is the probability of an away win? (2 marks)

Section B – Expected results

6. A factory finds that the probability of a light bulb being faulty is 0.03. In a batch of 2,000 bulbs, how many would you expect to be faulty? (2 marks)

7. A dice is rolled 300 times. How many sixes would you expect? A student got 38 sixes. Is there any reason to think the dice is unfair? (3 marks)

8. A raffle sells 400 tickets at £2 each. There are 5 prizes. Ravi buys 8 tickets. (a) What is the probability that one of his tickets wins the first prize? (b) He says 'I have a 2% chance'. Is he right? (3 marks)

9. In a survey, 180 out of 750 shoppers said they had used the self-service tills. Estimate the probability that the next shopper has used them, and the number of users you would expect among 2,500 shoppers. (3 marks)

Section C – Two events

10. Two coins are flipped. List all the possible outcomes. What is the probability of getting two heads? (3 marks)

11. A café offers 3 sandwiches (cheese, tuna, egg) and 2 drinks (tea, coffee). A customer picks one of each at random. List the combinations and find the probability that they get tuna and coffee. (3 marks)

12. Two fair dice are rolled and the scores added. (a) How many possible outcomes are there? (b) What is the probability of a total of 7? (c) Which total is least likely? (4 marks)

Probability – Answers

Level 2 · Working shown so you can check your method, not just the final number.

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Section A

1. Total 12. (a) $\frac{3}{12} = \frac{1}{4}$ (b) $\frac{8}{12} = \frac{2}{3}$ (c) $\frac{8}{12} = \frac{2}{3}$.
2. (a) $\frac{4}{8} = \mathbf{0.5}$ (b) $\frac{2}{8} = \mathbf{0.25}$ (c) $\mathbf{0}$.
3. $1 - 0.15 = \mathbf{0.85}$.
4. 0.35 on the scale, just past a third of the way; as a fraction $\frac{7}{20}$.
5. $1 - 0.45 - 0.3 = \mathbf{0.25}$.

Section B

6. $0.03 \times 2,000 = \mathbf{60}$.
7. $300 \div 6 = \mathbf{50}$ expected. 38 is noticeably fewer, but with only 300 rolls that difference can happen by chance – you could not conclude the dice is unfair without many more rolls.
8. (a) $\frac{8}{400} = \frac{1}{50} = \mathbf{0.02}$. (b) **Yes**, for the first prize – 2%. (With 5 prizes, his chance of winning *something* is higher, roughly 10%.)
9. $180 \div 750 = \mathbf{0.24}$. $0.24 \times 2,500 = \mathbf{600}$.

Section C

10. HH, HT, TH, TT – 4 outcomes. $P(\text{two heads}) = \frac{1}{4}$.
11. 6 combinations: cheese-tea, cheese-coffee, tuna-tea, tuna-coffee, egg-tea, egg-coffee. $P(\text{tuna and coffee}) = \frac{1}{6}$.
12. (a) $6 \times 6 = \mathbf{36}$. (b) 7 can be made 6 ways (1+6, 2+5, 3+4, 4+3, 5+2, 6+1): $\frac{6}{36} = \frac{1}{6}$. (c) **2 and 12** (one way each, $\frac{1}{36}$).

Where Level 2 students lose marks on this topic

- Writing a probability as '3 out of 12' or '3 : 12'. It must be a fraction, decimal or percentage.
- Not simplifying, or giving a probability bigger than 1.
- Listing only some of the outcomes for two events. Use a systematic list or a grid so nothing is missed.