Marking guide | Probability

Probability - Practice test 1

16 questions | 40 marks | 60 minutes

Compound outcomes, counting and conditional probability.

Equivalent correct methods earn the corresponding marks.

1. List all complete outcomes for two fair coin tosses. [2 marks]

Keep the first and second toss distinct.

Answer: HH, HT, TH, TT.

2. Two fair coins are tossed. Find $P(\text{exactly one tail})$. [2 marks]

HT and TH give 2 favourable outcomes out of 4.

Answer: $\frac{1}{2}$.

3. A fair die is rolled. Find $P(\text{even or greater than } 4)$. [2 marks]

The union is $\{2, 4, 5, 6\}$; $\frac{4}{6} = \frac{2}{3}$.

Answer: $\frac{2}{3}$.

4. Two fair dice are rolled. Find $P(\text{sum } 8)$. [3 marks]

Favourable ordered pairs: $(2,6), (3,5), (4,4), (5,3), (6,2)$.

There are 36 equally likely pairs.

Answer: $\frac{5}{36}$.

5. Choose one of 4 meals,3 drinks and 2 desserts. How many meal combinations? [2 marks]

$4 \times 3 \times 2 = 24$.

Answer: 24.

6. How many three-letter codes use distinct letters from A,B,C,D,E? [2 marks]

$5 \times 4 \times 3 = 60$.

Answer: 60.

7. Evaluate $\frac{5!}{3!}$. [2 marks]

Cancel $3!$, leaving 5×4.

Answer: 20.

8. Six students are available for captain and deputy. How many ordered assignments? [2 marks]

$6 \times 5 = 30$.

Answer: 30.

9. Use the supplied travel table. [4 marks]

Invented survey of 60 students; every student is in exactly one travel category.

Travel	Girl	Boy	Total
Cycle	12	8	20
Walk	18	22	40
Total	30	30	60

(a) Find $P(\text{girl})$. [2 marks]

$\frac{30}{60} = \frac{1}{2}$.

Answer: $\frac{1}{2}$.

(b) Find $P(\text{girl and cycle})$. [2 marks]

$\frac{12}{60} = \frac{1}{5}$.

Answer: $\frac{1}{5}$.

10. From the travel table, find $P(\text{walk} \mid \text{girl})$. [2 marks]

Invented survey of 60 students; every student is in exactly one travel category.

Travel	Girl	Boy	Total
Cycle	12	8	20
Walk	18	22	40
Total	30	30	60

18 of 30 girls walk; $\frac{18}{30} = \frac{3}{5}$.

Answer: $\frac{3}{5}$.

11. From the travel table, find $P(\text{girl} \mid \text{walk})$. [2 marks]

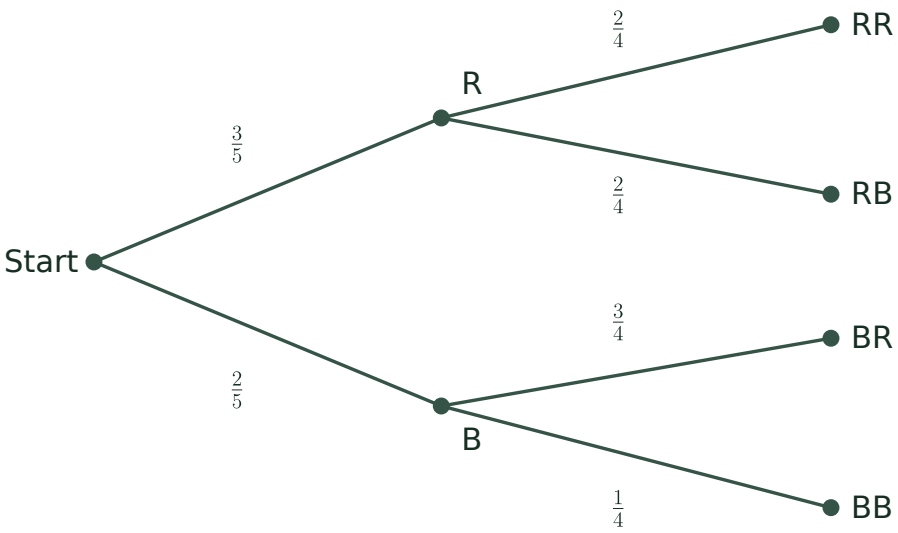
Invented survey of 60 students; every student is in exactly one travel category.

Travel	Girl	Boy	Total
Cycle	12	8	20
Walk	18	22	40
Total	30	30	60

18 of 40 walkers are girls; $\frac{18}{40} = \frac{9}{20}$.

Answer: $\frac{9}{20}$.

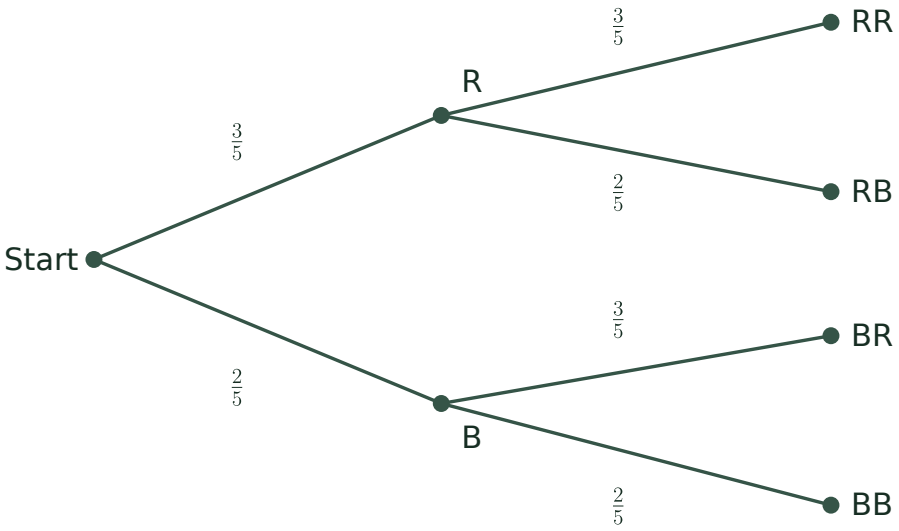
12. A bag has 3 red and 2 blue counters. Two are drawn without replacement. Find $P(\text{two red})$. [2 marks]



$(\frac{3}{5})(\frac{2}{4}) = \frac{3}{10}$.

Answer: $\frac{3}{10}$.

13. A bag contains 3 red and 2 blue counters. Draw twice at random with replacement. Find $P(\text{exactly one red})$. [3 marks]



$\text{RB} = (\frac{3}{5})(\frac{2}{5}) = \frac{6}{25}$.

$\text{BR} = \frac{6}{25}$;add to $\frac{12}{25}$.

Answer: $\frac{12}{25}$.

14. $P(A) = 0.4$, $P(B) = 0.6$ and $P(A \cap B) = 0.2$. Are A and B independent? Justify. [3 marks]

$P(A)P(B) = 0.24$, not 0.2.

Answer: No.

15. A simulation of a theoretical 0.6 success probability gives 284 successes in 500 trials. [4 marks]

(a) Estimate the success probability. [2 marks]

$\frac{284}{500} = 0.568$.

Answer: 0.568.

(b) Does the difference from 0.6 prove the simulation rule is wrong? [2 marks]

Finite random runs can differ from the theoretical probability.

Answer: No.

16. In the club table, find $P(\text{music or drama})$, showing how overlap is handled. [3 marks]

Invented membership data for 60 students.

Music membership	Drama	Not drama	Total
Music	8	12	20
Not music	10	30	40
Total	18	42	60

There are $20 + 18 - 8 = 30$ in at least one club.

$\frac{30}{60} = \frac{1}{2}$.

Answer: $\frac{1}{2}$.