Marking guide | Probability

Year 8 Probability - Topic test

15 questions | 36 marks | 45 minutes

Progressive questions combine techniques, interpretation and reasoned applications. All practice data are supplied.

Equivalent correct methods earn the corresponding marks.

1. If $P(A) = 0.37$, find $P(\text{not } A)$. [1 mark]

$1 - 0.37 = 0.63$.

Answer: 0.63.

2. A bag has 5 red,2 blue,3 yellow counters. Find $P(\text{not blue})$. [2 marks]

Eight of ten counters are not blue.

Answer: $\frac{4}{5}$.

3. List outcomes for two ordered coin tosses. [2 marks]

Pair each first outcome with both second outcomes.

Answer: HH,HT,TH,TT.

4. A fair coin then an independent fair 1,2,3 spinner is used. Find $P(\text{head and spinner } 2)$. [2 marks]

H2 is one of six equally likely outcomes.

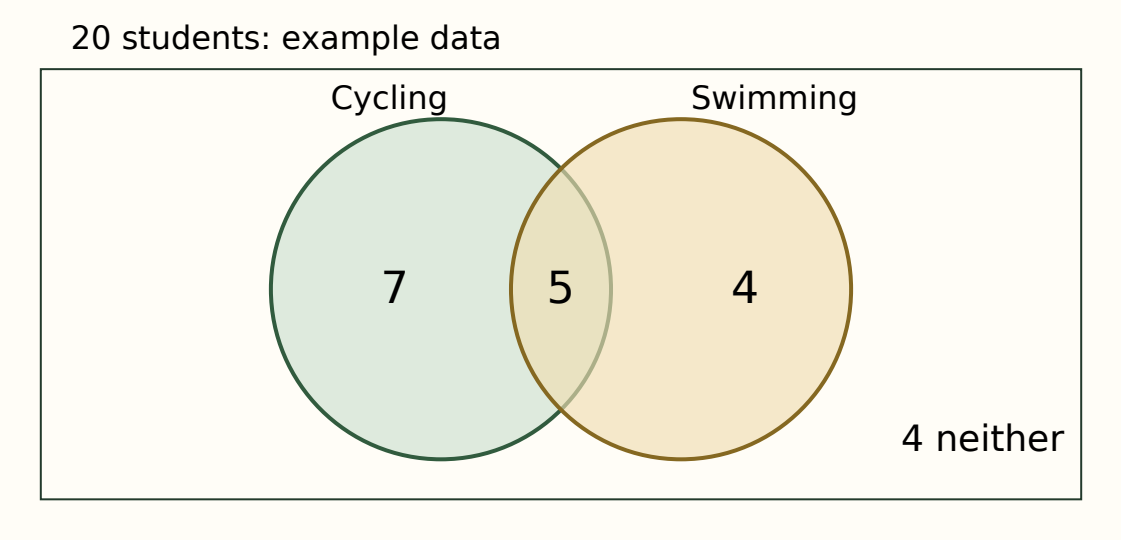
Answer: $\frac{1}{6}$.

5. Two independent fair spinners each show 1,2,3. List sum-4 pairs and their probability. [3 marks]

Three favourable pairs out of nine.

Answer: $(1,3),(2,2),(3,1)$; probability $\frac{1}{3}$.

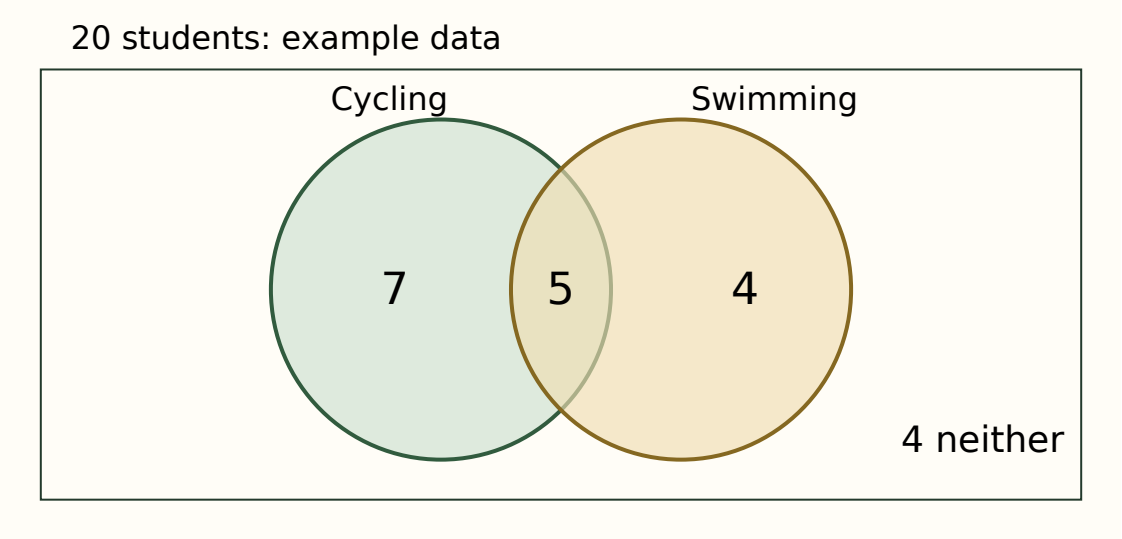
6. Use the Venn diagram. Find $P(\text{swimming but not cycling})$. [2 marks]



The swimming-only region has 4 of 20.

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

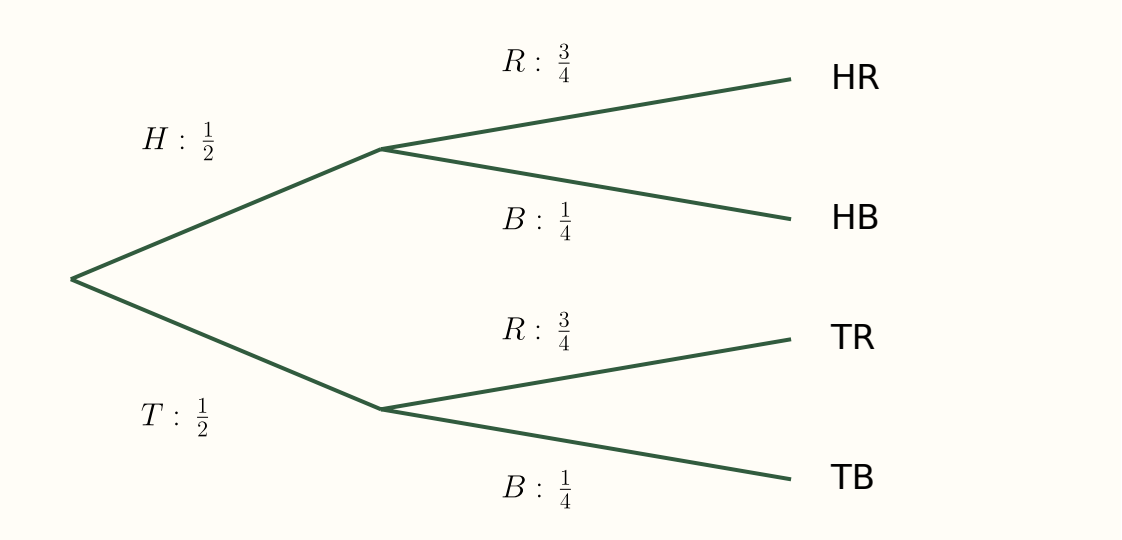
7. Use the Venn diagram. Find $P(\text{cycling or swimming})$. [2 marks]



$7+5+4=16$ of 20, counting overlap once.

Answer: $\frac{4}{5}$.

8. Use the tree. Find $P(\text{head and red})$. [2 marks]



$\frac{1}{2}\times\frac{3}{4}=\frac{3}{8}$.

Answer: $\frac{3}{8}$.

9. A bag has 2 red and 3 blue tokens. Draw a token at random, replace it, then draw again at random. Find $P(\text{two red})$. [2 marks]

$\frac{2}{5}\times\frac{2}{5}=\frac{4}{25}$.

Answer: $\frac{4}{25}$.

10. Draw two tokens at random without replacement from B1, B2 and G. Find $P(\text{one of each colour})$. [3 marks]

Four of six ordered physical pairs contain G and one blue.

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

11. Find $P(\text{odd or greater than } 4)$ for a fair die. [2 marks]

The union {1,3,5,6} has four outcomes.

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

12. A probability-$\frac{1}{4}$ event occurs 41 times in 160 trials. State expected frequency and experimental probability. [3 marks]

$160 \times \frac{1}{4} = 40$; the observed ratio is $\frac{41}{160}$.

Answer: Expected 40; experimental $\frac{41}{160}$.

13. An event occurs 16 times in 40 trials and 44 times in 160 more. Find the combined frequency estimate. [3 marks]

$\frac{16+44}{40+160} = \frac{60}{200} = 0.3$.

Answer: 0.3.

14. Use the simulation table to estimate $P(\text{exactly one head})$ and compare with theory. [3 marks]

Original practice simulation: 24 trials of two fair coins

Outcome	Count
HH	5
HT	7
TH	6
TT	6

HT and TH total 13, compared with 12 expected successes in 24 trials.

Answer: $\frac{13}{24}$ versus $\frac{1}{2}$.

15. Design a two-dice simulation and explain why drawing sums uniformly from 2 to 12 fails. [4 marks]

There is one pair for sum 2 but six for sum 7.

Answer: Draw two independent 1-6 results per trial. Uniform sums wrongly give 2 and 7 equal chance.