Worked answers | Probability

Theoretical and relative-frequency estimates

6 questions | 12 marks

Equivalent correct methods earn the corresponding marks.

1. An event occurs 16 times in 80 trials. Find its relative frequency. [1 mark]

$\frac{16}{80} = 0.20$.

Answer: 0.20

2. An equal four-section spinner has one red section. Find $P(\text{red})$. [1 mark]

One of four equally likely sections is red.

Answer: $\frac{1}{4}$

3. Using probability $\frac{1}{4}$, predict the number of reds in 240 spins. [2 marks]

$240 \times \frac{1}{4} = 60$.

Answer: 60 expected reds.

4. A game is won 21 times in 70 plays. Estimate the wins in another 150 similar plays. [2 marks]

$\frac{21}{70} = 0.3.$

$150 \times 0.3 = 45.$

Answer: About 45 wins.

5. A fair coin gives 14 heads in 20 tosses. Does this prove bias? Explain. [3 marks]

The expected head count is 10, not a guaranteed 10.

More controlled trials would help assess the model.

Answer: No; an uneven short run can occur by chance.

6. A spinner gives green 60 times in 200 spins and 84 times in another 300. Find the combined relative frequency. [3 marks]

Successes: $60 + 84 = 144.$

Trials: $200 + 300 = 500.$

$\frac{144}{500} = 0.288$; do not average the rates without weighting.

Answer: 0.288