

Foundation GCSE: Probability from Experiments

Name: _____

Class: _____

Instructions: Answer all questions. Questions are ordered from easiest (1) to hardest (20). Working out should be shown where appropriate.

1. A coin is flipped 50 times and lands on heads 28 times. Calculate the relative frequency of heads.
2. A die is rolled 100 times. The number 6 appears 23 times. What is the relative frequency of rolling a 6?
3. The relative frequency of a drawing pin landing point up is 0.4. Estimate the number of point-up landings in 200 drops.
4. A spinner is spun 80 times. It lands on Red 20 times. Find relative frequency of landing on Red.
5. Why is an experiment with 1000 trials generally more reliable than one with 10 trials?
6. A biased coin has relative frequency of heads = 0.65. How many heads are expected in 300 flips?
7. A die is rolled 60 times. Results: 1 (8), 2 (11), 3 (9), 4 (12), 5 (10), 6 (10). Calculate experimental probability of an even number.
8. Using Q7, state whether the die appears fair and give a reason.
9. An archer hits the bullseye 36 times out of 50 shots. Find relative frequency as a percentage.
10. If $P(\text{train is late}) = 0.15$ based on trials, how many late trains expected in 60 trips?
11. A factory samples 500 lightbulbs and finds 15 defective. Find experimental probability of a bulb being defective.
12. Using Q11, estimate the number of defective bulbs in a batch of 4000.
13. Tom flips a coin 20 times (14 heads). Sarah flips it 200 times (108 heads). Whose experiment gives a better estimate of $P(\text{Heads})$?
14. A spinner lands on Green 42 times out of 120 spins. Express relative frequency of Green as a fraction in simplest form.
15. In a survey, 80 out of 120 people prefer tea to coffee. Estimate how many people in a group of 450 prefer tea.
16. A machine tests 800 components. $P(\text{faulty}) = 0.025$. How many components were faulty?
17. A seed packet claims 85% germination rate. How many seeds are expected to germinate from 240 seeds?
18. A biased 6-sided die is rolled 500 times. The table shows frequencies: 1 (50), 2 (80), 3 (70), 4 (90), 5 (60), 6 (k). Find k .
19. Using Q18, find the experimental probability of rolling a score greater than 4.
20. A weather forecaster states $P(\text{rain}) = 0.3$ per day in April. How many rainy days expected in April (30 days)?

Answers & Worked Solutions

1. $0.56 - \frac{28}{50} = 0.56.$
2. $0.23 - \frac{23}{100} = 0.23.$
3. $80 - 0.4 \times 200 = 80.$
4. $\frac{1}{4} - \frac{20}{80} = \frac{1}{4} = 0.25.$
5. More trials reduce effect of chance/anomaly (Law of Large Numbers).
6. $195 - 0.65 \times 300 = 195.$
7. $\frac{11}{20} - \text{Evens: } 11 + 12 + 10 = 33. \frac{33}{60} = \frac{11}{20} = 0.55.$
8. Yes – Frequencies are all close to expected frequency of 10.
9. $72\% - \frac{36}{50} = \frac{72}{100} = 72\%.$
10. $9 - 0.15 \times 60 = 9.$
11. $0.03 - \frac{15}{500} = \frac{3}{100} = 0.03.$
12. $120 - 0.03 \times 4000 = 120.$
13. Sarah – Larger sample size gives a more accurate relative frequency.
14. $\frac{7}{20} - \frac{42}{120} = \frac{7}{20}.$
15. $300 - \frac{80}{120} = \frac{2}{3} \cdot \frac{2}{3} \times 450 = 300.$
16. $20 - 0.025 \times 800 = 20.$
17. $204 - 0.85 \times 240 = 204.$
18. $150 - 500 - (50+80+70+90+60) = 500 - 350 = 150.$
19. $\frac{21}{50} - \text{Score} > 4 \text{ means } 5 \text{ or } 6. \text{ Freq} = 60+150 = 210. \frac{210}{500} = \frac{21}{50}.$
20. $9 - 0.3 \times 30 = 9.$