ILLAWARRA TUTORING

This worksheet is designed to help you understand how experimental probability is interpreted as relative frequency through your own investigations. You will work through a series of questions ranging from basic computations of relative frequency to more in-depth analysis and experimental design. Remember that in all experiments, the relative frequency is given by $\frac{\text{number of occurrences of the event}}{\text{total number of trials}}$.

Easy Questions

1. In your own words, explain what relative frequency is and compute the relative frequency if an event occurred 25 times out of 50 trials.
2. Calculate the relative frequency when an event occurred 8 times in 20 trials.
3. Determine the experimental probability as a percentage if an event occurred 15 times during 60 trials.
4. Describe a practical example of how you could use relative frequency in a real-life investigation.
5. In an experiment, a coin is tossed 10 times and lands on heads 7 times. Compute the relative frequency of heads.

Intermediate Questions

6. A survey records that event A occurred 15 times out of 45 trials. Calculate the relative frequency of event A.
7. A fair die is rolled 60 times and the outcome 4 appears 12 times. What is the relative frequency for obtaining a 4?
8. In a spinner experiment, after 40 spins the spinner lands in the red section 18 times. Compute the relative frequency for landing on red.
9. In a bag of marbles, an experiment with replacement is performed 80 times and a blue marble is drawn 20 times. Calculate the experimental probability of drawing a blue marble.
10. A researcher observes that event X occurred 10 times in 50 attempts. Calculate the relative frequency of event X.
11. In an experiment with 200 trials, if event B occurred 50 times, compute the relative frequency for event B.

12. A student records 18 heads in 30 coin tosses. What is the experimental probability of obtaining heads?

13. In a chemistry experiment, a desired outcome is observed 25 times in 100 experiments. Compute the relative frequency.

14. A weather station notes that it rained on 40 out of 120 days. Determine the relative frequency of rainy days.

15. An investigation recorded 30 successes in 150 trials. Calculate the relative frequency of success.

16. In 90 attempts, event C occurred 36 times. Compute the relative frequency and briefly discuss what this suggests about the underlying probability.

17. Given the following data: Outcome: Success, Frequency: 22; Outcome: Failure, Frequency: 78. Compute the relative frequency for success.

18. An experiment is halted after event D has occurred 10 times, with a total of 50 trials recorded. What is the experimental probability of event D?

19. A study is divided into two phases. In phase one, the event occurred 15 times out of 70 trials; in phase two, it occurred 25 times out of 100 trials. Calculate the overall relative frequency.

20. In a repeated experiment with 120 trials yielding 60 occurrences, calculate the relative frequency and comment on its proximity to 0.5.

Hard Questions

21. An experimenter collected data over 500 trials where the event occurred 195 times. Calculate the relative frequency and discuss two potential reasons for any discrepancy between this value and a known theoretical probability of 0.4.

22. Given two independent experiments: Experiment A had 350 trials with 140 occurrences and Experiment B had 150 trials with 70 occurrences, calculate and compare the relative frequencies for each experiment.

23. A student reports that after 1000 experiments the relative frequency of an event is 0.35. Determine the number of occurrences and state what this suggests about the probability of the event.

24. In a long-term study, a rare event has a relative frequency of 0.02 over 2000 trials. How many times did the event occur? Additionally, list two potential issues that might affect the reliability of this measurement.

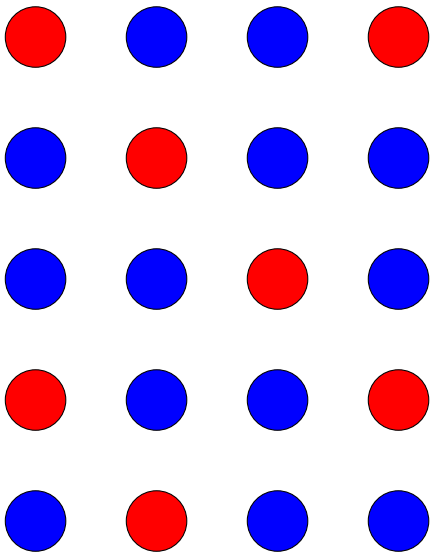
25. An investigation yields 134 successes in 500 attempts. Compute the relative frequency and express this probability as a percentage.

26. A student threw a die 240 times and recorded the number 6 a total of 50 times. Calculate the relative frequency for obtaining a 6 and compare it with its theoretical probability.

27. Explain how increasing the sample size in an experiment is likely to affect the observed relative frequency, and support your answer with a brief description of one investigation you might perform.

28. Design an experiment to measure the relative frequency of a particular real-world event (for example, the frequency of phone calls received in an hour). Write down the steps you would take and describe the data you would collect.

29. Refer to the diagram below. Identify the portion of outcomes marked in red and compute the relative frequency of these outcomes.



30. A researcher collects data from three experimental runs with the following results: Run 1: 100 trials with 35 successes; Run 2: 150 trials with 70 successes; Run 3: 200 trials with 80 successes. Calculate the overall relative frequency and discuss two potential sources of error in such experiments.