

134. Theoretical vs Experimental Probability

Practice Questions

1. What is the difference between theoretical probability and experimental probability?
2. A dice is rolled 600 times, and a 6 appears 120 times. What is the experimental probability of rolling a 6?
3. The theoretical probability of rolling a 3 on a fair six-sided dice is $\frac{1}{6}$. If the dice is rolled 300 times, how many times would you expect to roll a 3?
4. A spinner has 5 equal sections. What is the theoretical probability of landing on any one section?
5. A student flips a coin 500 times, and it lands on heads 240 times. What is the experimental probability of landing on heads?
6. A school records 200 test scores. If 50 students score an A, what is the experimental probability of a student scoring an A?
7. A bag contains 4 red balls and 6 blue balls. What is the theoretical probability of picking a red ball?
8. A basketball player takes 100 shots and scores 40 times. What is their experimental probability of scoring?
9. A factory produces 1,000 bulbs, and 30 are faulty. What is the probability of selecting a working bulb?
10. A survey shows that 120 out of 500 people prefer coffee over tea. What is the experimental probability of choosing coffee?

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Scenario Questions

1. A footballer takes 250 penalty kicks and scores 180 times. How does this experimental probability compare to the theoretical probability of scoring if they have a 70% chance per shot?
2. A fair coin is flipped 1,000 times and lands on heads 480 times. How does this experimental probability compare to the theoretical probability of 0.5?
3. A die is rolled 360 times, and a 4 appears 80 times. How does this experimental result compare to the expected number of times?
4. A train arrives on time 290 times out of 365. What is the experimental probability of it being late?
5. A school has 900 students, and 300 students prefer Science. What is the experimental probability of selecting a student who prefers Science?
6. A spinner with 8 equal sections is spun 400 times and lands on red 60 times. Compare this experimental result with the theoretical probability of $\frac{1}{8}$.
7. A factory produces 10,000 batteries, and 250 are defective. What is the probability of picking a working battery?
8. A raffle has 500 tickets. If a ticket wins with a probability of $\frac{1}{50}$, how many winners would be expected?
9. A survey records 150 people choosing tea and 250 choosing coffee out of 500 people. What is the experimental probability of selecting tea?
10. A student rolls a dice 1,200 times and gets a 6 exactly 180 times. How does this experimental result compare to the theoretical probability?

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Practice Questions

1. **Theoretical probability** is based on theory, while **experimental probability** is based on actual experiments or observations.
2. $\frac{120}{600} = 0.2$
3. 50 times
4. $\frac{1}{5}$
5. $\frac{240}{500} = 0.48$
6. $\frac{50}{200} = 0.25$
7. $\frac{4}{10} = 0.4$
8. $\frac{40}{100} = 0.4$
9. $\frac{970}{1000} = 0.97$
10. $\frac{120}{500} = 0.24$

Answers

Scenario Questions

1. **Experimental probability:** $\frac{180}{250} = 0.72$, **Theoretical probability:** 0.7
2. **Experimental probability:** $\frac{480}{1000} = 0.48$, **Theoretical probability:** 0.5
3. **Experimental result:** $\frac{80}{360} \approx 0.222$, **Expected result:** $\frac{1}{6} \approx 0.167$
4. $\frac{75}{365} \approx 0.205$
5. $\frac{300}{900} \approx 0.333$
6. **Experimental result:** $\frac{60}{400} = 0.15$, **Theoretical probability:** $\frac{1}{8} = 0.125$
7. $\frac{9750}{10000} = 0.975$
8. 10 winners
9. $\frac{150}{500} = 0.3$
10. **Experimental result:** $\frac{180}{1200} = 0.15$, **Theoretical probability:** $\frac{1}{6} \approx 0.167$