LESSON MAKER PRO

Probability in Motion

Use data to predict what may happen over many trials.

GRADE 7 · 7.PR.6.2

7.PR.6.2 "Approximate the probability of a chance event by collecting data on an event and observing its long-run relative frequency will approach the theoretical probability."

NAME _____ DATE _____

RELATIVE FREQUENCY

Experimental probability is the number of times an event happens divided by the total number of trials. As you collect more data, the experimental probability usually gets closer to the theoretical probability.

WORKED EXAMPLE

A jar has 3 red tiles and 5 blue tiles. What is P(red), and about how many red tiles should appear in 80 draws with replacement?

1. Total tiles = 3 + 5 = 8.
2. P(red) = 3/8.
3. 80 x 3/8 = 30.

Answer: P(red) = 3/8, about 30 red draws.

PRACTICE 5 problems

1 A basketball player makes 14 of 28 free throws. What is the experimental probability of making a free throw?

ANSWER _____

2 A fair coin is tossed 70 times. About how many tails should you expect?

ANSWER _____

3 A bag has 7 green beads and 4 yellow beads. What is the theoretical probability of choosing a yellow bead?

ANSWER _____

4 A game bonus appears 16 times in 64 rounds. If the same rate continues, about how many bonuses will appear in 128 rounds?

ANSWER _____

5 Which experiment is more likely to have an experimental probability close to the theoretical probability, 12 trials or 120 trials?

ANSWER _____

APPLY IT Show your work

1 A music app has 10 favorite songs in a playlist of 40 songs. After 60 shuffled plays, a favorite song plays 13 times. What are the theoretical and experimental probabilities of playing a favorite song? Is the experimental probability above or below the theoretical probability?

WORK SPACE

ANSWER _____

2 At an esports event, 7 of 28 reward codes unlock a game skin. In 56 opened codes, how many game skins should be expected? If 11 skins appear, is that result above or below the expected number?

WORK SPACE

ANSWER _____

3 Collect your own event data with teacher support. Toss a fair coin 60 times and tally every head or tail on separate paper. At totals of 10, 20, 40, and 60 tosses, enter the cumulative head count and heads/total relative frequency. Calculate each distance from the theoretical probability 1/2. Explain whether your observed frequencies became closer overall; they do not have to get closer at every checkpoint. Compare with another group or pooled class results if available.

YOUR CUMULATIVE COIN RESULTS

Total tosses	Total heads	Heads / total	Distance from 1/2
10	_____	_____	_____
20	_____	_____	_____
40	_____	_____	_____
60	_____	_____	_____

ANSWER _____

CHALLENGE One step up

A fair die is rolled 48 times, and a 6 appears 11 times. Later, the die is rolled 132 times, and a 6 appears 23 times. Which experimental probability is closer to the theoretical probability of rolling a 6? Explain using the differences.

WORK SPACE AND ANSWER

ANSWER KEY

Probability in Motion

GRADE 7 · 7.PR.6.2

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	A basketball player makes 14 of 28 free throws. What is the experimental probability of making a free throw?	**1/2**
2	A fair coin is tossed 70 times. About how many tails should you expect?	**35 tails**
3	A bag has 7 green beads and 4 yellow beads. What is the theoretical probability of choosing a yellow bead?	**4/11**
4	A game bonus appears 16 times in 64 rounds. If the same rate continues, about how many bonuses will appear in 128 rounds?	**32 bonuses**
5	Which experiment is more likely to have an experimental probability close to the theoretical probability, 12 trials or 120 trials?	**120 trials**

PART 2 · APPLY IT

1. **Theoretical: 1/4. Experimental: 13/60. The experimental probability is below the theoretical probability.** There are 10 favorite songs out of 40 total, so the theoretical probability is 1/4. Use 13/60 for the data-based probability and compare it with 1/4.
2. **14 game skins should be expected. Eleven is below the expected number.** The theoretical probability is 7/28, or 1/4. Find 1/4 of 56, then compare that result with 11.
3. **Results vary. Require 60 actual outcomes, cumulative counts at all four checkpoints, heads divided by total tosses, correct absolute distances from 1/2, and a conclusion supported by the observed results. Accept fluctuations or a final frequency farther away when accurately reported.** Teacher provides a coin and supports tossing or recording as needed. Use the fair-coin model P(heads) = 1/2. Larger samples tend to stabilize relative frequency across repeated experiments, but this particular run need not approach 1/2 monotonically or end closer.

CHALLENGE

The 132-roll result is closer. 11/48 is 1/16 above 1/6, while 23/132 is 1/132 above 1/6.

Accept equivalent fractions. For comparison items, accept correct statements that a larger number of trials is more likely to produce a relative frequency close to the theoretical probability. Apply It 3 requires actual event collection and cumulative relative-frequency analysis; accept evidence-based fluctuations rather than forcing a particular outcome.