LESSON MAKER PRO

Chance Versus Results

Compare what should happen with what did happen.

GRADE 6 · 6.D.2.3

6.D.2.3 "Demonstrate simple experiments in which the probabilities are known and compare the resulting relative frequencies with the known probabilities, recognizing that there may be differences between the two results."

NAME _____ **DATE** _____

THE BIG IDEA

To find a known probability, divide the number of favorable outcomes by the number of equally likely outcomes. To find a relative frequency, divide the number of times an event happened by the number of trials. The two results may differ, even when the experiment is fair.

WORKED EXAMPLE

A box holds 25 equally likely slips, and 11 say STAR. A slip is picked, replaced, and mixed 100 times. STAR is picked 48 times. Find the known probability and relative frequency of STAR, then compare them.

1. Known probability: 11/25 = 44/100 = 0.44.
2. Relative frequency: 48/100 = 0.48.
3. Compare: 0.48 is greater than 0.44.

Answer: The relative frequency is greater than the known probability by 0.04.

PRACTICE 6 problems

1 You flip a fair coin 12 times and get heads 7 times. Find the known probability and relative frequency of heads. Is the relative frequency above, below, or equal to the known probability?

ANSWER _____

2 A spinner has 6 equal sections, including 2 orange sections. In 30 spins, it lands on orange 9 times. Find the known probability and relative frequency of orange. Which is greater?

ANSWER _____

3 You roll a fair six-sided number cube 24 times. It lands on 6 three times. Find the known probability and relative frequency of rolling a 6. Which is greater?

ANSWER _____

4 A bag has 5 tiles: 2 blue and 3 red. After each draw, the tile is returned to the bag. Use the table to find the known probability and relative frequency of blue. Is the relative frequency above, below, or equal to the known probability?

TILE DRAWS

Color	Draws
Blue	14
Red	16

ANSWER _____

5 A spinner has 4 equal sections, including 3 marked MUSIC. It lands on MUSIC 18 times in 24 spins. Find the known probability and relative frequency of MUSIC. Do they match?

ANSWER _____

6 A fair six-sided number cube was rolled 36 times. Use the table to find the known probability and relative frequency of rolling an even number. Is the relative frequency above, below, or equal to the known probability?

NUMBER CUBE RESULTS

Number rolled	Times rolled
1	4
2	7
3	5
4	6
5	8
6	6

ANSWER _____

APPLY IT Show your work

1 A mystery sticker machine has 5 equally likely designs, including 2 animal designs. It gives an animal sticker 18 times in 40 uses. Find the known probability and relative frequency of getting an animal sticker as decimals. Which is greater?

WORK SPACE

ANSWER _____

2 For a playground game, a spinner has 8 equal sections, including 2 marked DOUBLE POINTS. It lands on DOUBLE POINTS 13 times in 40 spins. Find the known probability and relative frequency as decimals. Which is greater?

WORK SPACE

ANSWER _____

CHALLENGE One step up

On a fair six-sided number cube, rolling a 1 or 2 counts as a hit. One group gets 5 hits in 12 rolls. Another gets 12 hits in 30 rolls. Which group's relative frequency is closer to the known probability? Show how you know.

TWO GROUPS' RESULTS

Group	Rolls	Hits
First	12	5
Second	30	12

WORK SPACE AND ANSWER

ANSWER KEY

Chance Versus Results

GRADE 6 · 6.D.2.3

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	You flip a fair coin 12 times and get heads 7 times. Find the known probability and relative frequency of heads. Is the relative frequency above, below, or equal to the known probability?	**Known probability: 1/2. Relative frequency: 7/12. The relative frequency is above the known probability.**
2	A spinner has 6 equal sections, including 2 orange sections. In 30 spins, it lands on orange 9 times. Find the known probability and relative frequency of orange. Which is greater?	**Known probability: 2/6 = 1/3. Relative frequency: 9/30 = 3/10. The known probability is greater.**
3	You roll a fair six-sided number cube 24 times. It lands on 6 three times. Find the known probability and relative frequency of rolling a 6. Which is greater?	**Known probability: 1/6. Relative frequency: 3/24 = 1/8. The known probability is greater.**
4	A bag has 5 tiles: 2 blue and 3 red. After each draw, the tile is returned to the bag. Use the table to find the known probability and relative frequency of blue. Is the relative frequency above, below, or equal to the known probability?	**Known probability: 2/5. Relative frequency: 14/30 = 7/15. The relative frequency is above the known probability.**
5	A spinner has 4 equal sections, including 3 marked MUSIC. It lands on MUSIC 18 times in 24 spins. Find the known probability and relative frequency of MUSIC. Do they match?	**Known probability: 3/4. Relative frequency: 18/24 = 3/4. Yes, they match.**
6	A fair six-sided number cube was rolled 36 times. Use the table to find the known probability and relative frequency of rolling an even number. Is the relative frequency above, below, or equal to the known probability?	**Known probability: 3/6 = 1/2. Relative frequency: (7 + 6 + 6)/36 = 19/36. The relative frequency is above the known probability.**

PART 2 · APPLY IT

1. **Known probability: 2/5 = 0.4. Relative frequency: 18/40 = 0.45. The relative frequency is greater.** Divide 2 by 5 for the known probability and 18 by 40 for the relative frequency. Compare 0.4 and 0.45.
2. **Known probability: 2/8 = 0.25. Relative frequency: 13/40 = 0.325. The relative frequency is greater.** Divide 2 by 8 and 13 by 40. Then compare 0.25 and 0.325.

CHALLENGE

The second group's relative frequency is closer. The known probability is 2/6 = 1/3. The first group's 5/12 is 1/12 away from 1/3. The second group's 12/30 = 2/5 is 1/15 away, and 1/15 is less than 1/12.

Accept equivalent fractions or decimals when they show the correct comparison. In the challenge, students may compare accurate decimal distances instead of fractions.