6.2 Lesson

Key Vocabulary
experimental probability, *p. 475*
theoretical probability, *p. 476*
simulation, *p. 478*

Key Idea

Experimental Probability

Probability that is based on repeated trials of an experiment is called **experimental probability**.

$$P(\text{event}) = \frac{\text{number of times the event occurs}}{\text{total number of trials}}$$

Probability

Example 1 Finding an Experimental Probability

Heads	Tails
6	19

The table shows the results of spinning a penny 25 times. What is the experimental probability of spinning heads?

Heads was spun 6 times in a total of 6 + 19 = 25 spins.

Experimental probabilities are found the same way as relative frequencies.

pg. 464

$$P(\text{event}) = \frac{\text{number of times the event occurs}}{\text{total number of trials}}$$

$$P(\text{heads}) = \frac{6}{25}$$

← Heads was spun 6 times.

← There was a total of 25 spins.

▶ The experimental probability is $\frac{6}{25}$, 0.24, or 24%.

"probability of spinning heads"

denominator

Try It

The table shows the results of rolling a number cube 50 times. Find the experimental probability of the event.

Number Rolled	1	2	3	4	5	6
Frequency	10	4	8	11	11	6

how many times you rolled that #

1. rolling a 3

$\frac{8}{50} = 0.16$

16%

2. rolling an odd number

10 + 8 + 11 = 29

$\frac{29}{50} = 0.58$

58%

GO DIGITAL

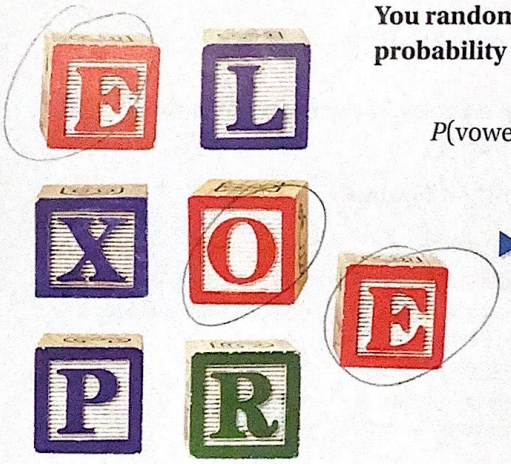
Key Idea

Theoretical Probability

When all possible outcomes are equally likely, the **theoretical probability** of an event is the quotient of the number of favorable outcomes and the number of possible outcomes.

$$P(\text{event}) = \frac{\text{number of favorable outcomes}}{\text{number of possible outcomes}}$$

Example 2 Finding a Theoretical Probability



You randomly choose one of the letters shown. What is the theoretical probability of choosing a vowel? A E I O U

$$P(\text{vowel}) = \frac{\text{number of favorable outcomes}}{\text{number of possible outcomes}} = \frac{3}{7}$$

There are 3 vowels.

There is a total of 7 letters

▶ The probability of choosing a vowel is $\frac{3}{7}$, or about 43%.

$\frac{3 \text{ vowels}}{7 \text{ total letters}} = 0.4285$

about 43%

Try It

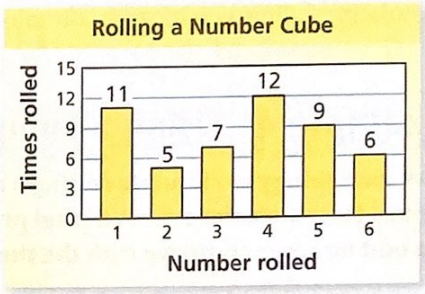
3. What is the theoretical probability of randomly choosing an X?

$\frac{1}{7} = 0.1428$

about 14%

Example 3 Comparing Probabilities

The bar graph shows the results of rolling a number cube 50 times. How does the experimental probability of rolling an odd number compare with the theoretical probability?



Step 1: Find the experimental probability of rolling an odd number.

The bar graph shows 11 ones, 7 threes, and 9 fives. So, an odd number was rolled $11 + 7 + 9 = 27$ times in a total of 50 rolls.

$$P(\text{odd}) = \frac{\text{number of times an odd number was rolled}}{\text{total number of rolls}}$$

$$= \frac{27}{50}, \text{ or } 54\%$$

experimental

$11+7+9=\frac{27}{50}=54\%$

Step 2: Find the theoretical probability of rolling an odd number.

$$P(\text{odd}) = \frac{\text{number of favorable outcomes}}{\text{number of possible outcomes}} = \frac{3}{6} = \frac{1}{2}, \text{ or } 50\%$$

theoretical

How many odd #s on a dice?

$\frac{3}{6} = 50\%$

▶ The experimental probability of rolling an odd number is 54%, which is close to the theoretical probability of 50%.

Try It

4. In Example 3, how does the experimental probability of rolling a number greater than 1 compare with the theoretical probability?

experimental - How many times we rolled greater than 1

$5+7+12+9+6=\frac{39}{50 \text{ total}} = 78\%$

theoretical - How many numbers are greater than 1 on a dice

2, 3, 4, 5, 6 $\quad \frac{5}{6} =$ about 83%

They are close to each other.