

# 15.3

## Experimental & Theoretical Probability

### Do Now

1. Explain how to find the probability of an event.



2. Can the probability of an event be 1.5? Explain.

3. Give a real-life example of an event that is impossible.  
Give a real-life example of an event that is certain.

### Do Now

Probability is the likelihood that a particular event or occurrence will take place. Probability is expressed as a ratio in fraction form. The probability ratio compares the number of favorable outcomes to the total possible outcomes.

**Example:** What is the probability of a coin landing heads up on one toss?  
There are **two** sides to the coin so there are **two** possible outcomes to the toss. There is **one** favorable outcome – heads!  
The probability is 1 out of 2 or  $\frac{1}{2}$ .

The letters of the word "probability" are put in a bag. Find the probability of picking each letter.

- |            |            |
|------------|------------|
| 1. P _____ | 6. I _____ |
| 2. R _____ | 7. L _____ |
| 3. O _____ | 8. T _____ |
| 4. B _____ | 9. Y _____ |
| 5. A _____ |            |

### Learning Target:

- I can find relative frequencies.
- I can use experimental probabilities to make predictions.
- I can use theoretical probabilities to find quantities.
- I can compare experimental probabilities and theoretical probabilities.

When all possible outcomes are likely, the **theoretical probability** of an \_\_\_\_\_ is the \_\_\_\_\_ of the \_\_\_\_\_ of \_\_\_\_\_ to the \_\_\_\_\_ of \_\_\_\_\_. The **theoretical probability** of an event is written as **P(event)**.

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

## Experimental Probability

When you conduct an experiment, the relative frequency of an event is the \_\_\_\_\_ or \_\_\_\_\_ of the time that the event \_\_\_\_\_.

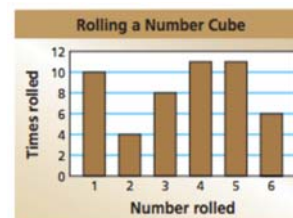
$$\text{relative frequency} = \frac{\text{number of times the event occurs}}{\text{total number of times you conduct the experiment}}$$

The experimental probability is based on the \_\_\_\_\_ of an \_\_\_\_\_.

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

## Application

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



1) The bar graph shows the results of rolling a number cube 50 times.

a) What is the experimental probability of rolling an odd number?

b) What is the experimental probability of rolling an even number?

## Making a Prediction

2) It rains 2 out of the last 12 days in March. If this trend continues, how many rainy days would you expect in April?

Find the experimental probability of a rainy day.



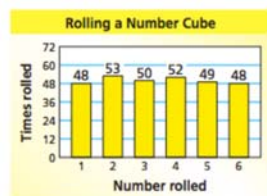
To make a prediction, multiply the probability of a rainy day by the number of days in April.

## Making a Prediction - PRACTICE



3) At a clothing store, an inspector finds 5 defective pairs of jeans in a shipment of 200. If this trend continues, about how many pairs of jeans would you expect to be defective in a shipment of 5000?

## Comparing Experimental vs Theoretical



4) The bar graph shows the results of rolling a number cube 300 times.

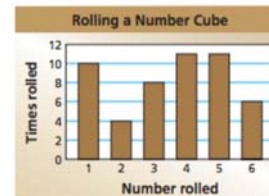
a) What is the experimental probability of rolling an odd number?

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

(b) How does the experimental probability compare with the theoretical probability of rolling an odd number?

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

## Comparing Experimental vs Theoretical



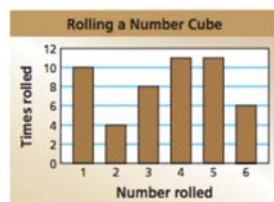
5) The bar graph shows the results of rolling a number cube 50 times.

a) What is the experimental probability of rolling an odd number?

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

b) Compare this experimental probability with the one from part (a) from #4 on the previous page. What would you conclude?

## On Your Own



6) The bar graph shows the results of rolling a number cube 50 times.

a) What is the experimental probability of rolling a number greater than 1?

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

b) Compare the experimental probability to the theoretical probability of rolling a number greater than 1.