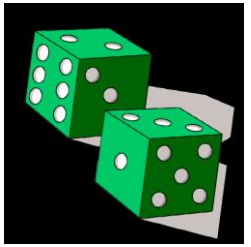
15.3

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** 1/2.

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

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

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 _____.

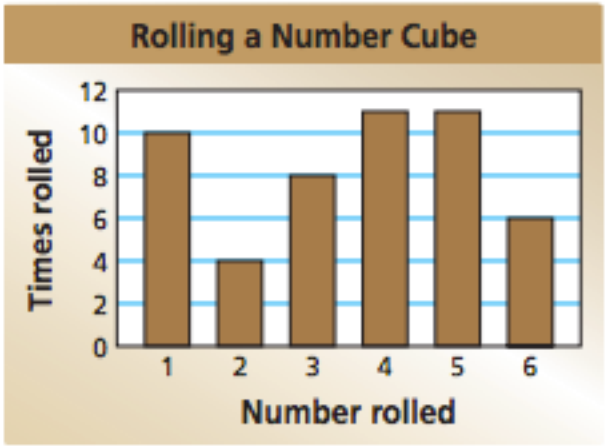
$$\text{relative frequency} = \frac{\text{number of times the event occurs}}{\text{total number of times you conduct the experiment}}$$

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?**

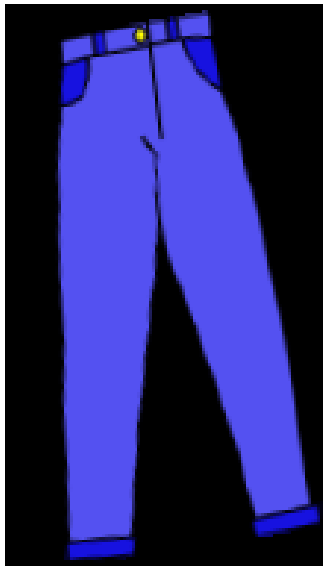
Making a Prediction

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.

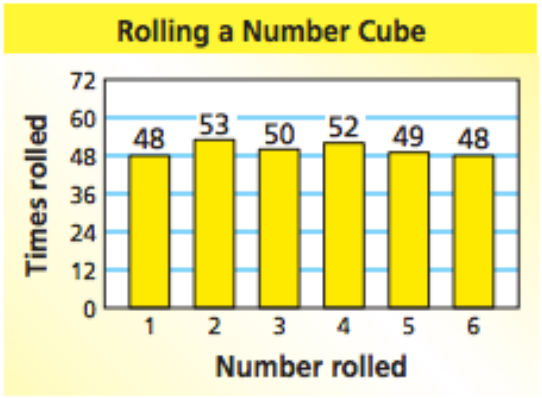
To make a prediction, multiply the probability of a rainy day by the number of days in April.

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.

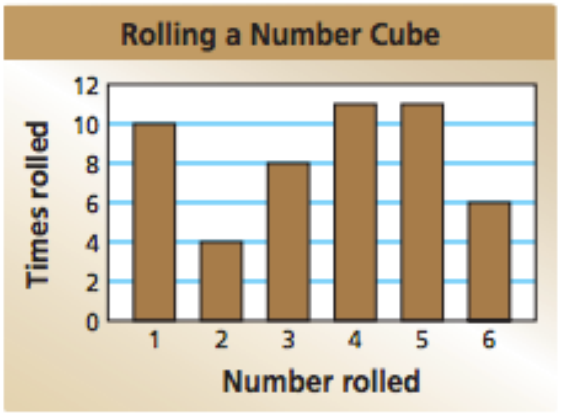
a) What is the experimental probability of rolling an odd number?

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

(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



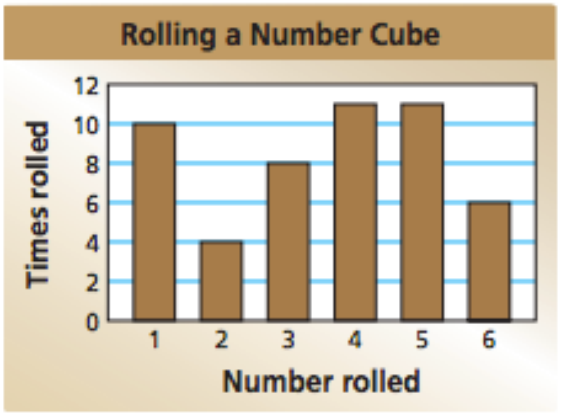
5) The bar graph shows the results of rolling a number cube 50 times.

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.