CHAPTER 8

Family Letter

Section A

What We Are Learning

Understanding Probability

Vocabulary

These are the math words we are learning:

complement a possible outcome that is not what you expect or hope to get

compound event an event made up of two or more simple events

event a set of one or more outcomes of an experiment

experiment any activity involving chance

experimental probability the ratio of the number of times an event occurs to the total number of trials

Fundamental Counting Principle if one event has m possible outcomes and a second event has n possible outcomes, then there are $m \times n$ total possible outcomes for the two events

outcome a possible result of an experiment

probability the measure of how likely an event is to occur

sample space the set of all possible outcomes of an experiment

Dear Family,

In this section, the student will be finding the probability of an event. **Probability** is defined as the measure of how likely an event is to occur. You can write a probability as a ratio, a decimal between 0 and 1, or a percent between 0% and 100%. If an event has a probability close to 1 or 100%, the likelihood of the event occuring is much greater than if that same event has a probability close to 0 or 0%.

The student will find the **experimental probability** of an event, which is the ratio of the number of times an event occurs to the total number of times the experiment is performed. In an experiment, the outcomes are the different results that may occur, while the sample space is a list of ALL possible outcomes.

During basketball practice, Nate made 12 out of 20 three-point shots. What is the experimental probability that Nate will make his next three-point shot? Write your answer as a ratio, as a decimal, and as a percent.

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

$$P(\text{3-point shot}) \approx \frac{\text{number of three-point shots made}}{\text{total number of shots attempted}}$$

$$= \frac{12}{20}$$

$$= \frac{3}{5} = 0.6 = 60\%$$

Theoretical probability is used to find the probability of an event when all the outcomes have an equal chance of occurring.

What is the theoretical probability of rolling a 4 on a number cube?

$$P = \frac{\text{number of ways the event can occur}}{\text{total number of equally likely outcomes}}$$

$$P(\text{rolling a 4}) = \frac{\text{1 way to roll a four}}{\text{6 equally likely outcomes}}$$

$$= \frac{1}{6}$$

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Section A continued

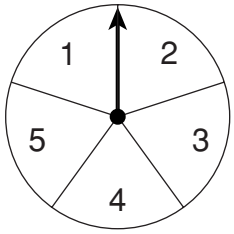
theoretical probability the ratio of the number of ways an event can occur to the total number of equally likely outcomes

trial each repetition or observation of an experiment

The student will also learn to find the probability of **compound events.** A compound event consists of two or more simple events.

Carole flips a coin and spins the spinner.

Find the probability of the spinner showing an even number and the coin showing heads.



First find the sample space. All the possible outcomes make up the sample space.

		Spinner				
		1	**2**	**3**	**4**	**5**
Coin	**H**	1, H	2, H	3, H	4, H	5, H
	T	1, T	2, T	3, T	4, T	5, T

There are 10 possible outcomes and all are equally likely.

Two of the outcomes have an even number and heads: 2, H and 4, H.

$$P(\text{even, heads}) = \frac{\text{2 ways event can occur}}{\text{10 possible outcomes}}$$

$$= \frac{2}{10}$$

$$= \frac{1}{5}$$ Write your answer in simplest form.

The information learned in this chapter has a direct connection to real-life events. Have the student share how probabilities may be used in real-life events.

Sincerely,

CHAPTER 8

Family Letter

Section B

What We Are Learning

Using Probability

Vocabulary

These are the math words we are learning:

dependent events the occurrence of one event affects the probability that a second event will occur

disjoint events two events that cannot occur in the same trial of an experiment

independent events the occurrence of one event has no effect on the probability that a second event will occur

prediction a guess about something in the future

Dear Family,

The student will learn how to apply the concepts of probability.

Disjoint events cannot occur in the same trial of an experiment. An example of disjoint events is rolling a 5 or rolling an even number on a number cube. Because 5 is an odd number, you cannot roll both a 5 and an even number at the same time.

To find the probability of either of two disjoint events occuring, add the probabilites of the individual events.

Find the probability of choosing a heart or a star from a bag containing only 5 hearts, 3 stars, and 8 circles.

$P(\text{heart}) = \frac{5}{16}$

$P(\text{star}) = \frac{3}{16}$

$P(\text{heart or star}) = P(\text{heart}) + P(\text{star})$

$= \frac{5}{16} + \frac{3}{16}$

$= \frac{8}{16} = \frac{1}{2}$

The probability of choosing a heart or a star is $\frac{1}{2}$.

To find the probability that two **independent events** occur, multiply the probability that the first event happens by the probability that the second event happens.

You have two hats. Each contains 26 cards on which each letter of the alphabet is written. If you choose a letter from each hat, what is the probability that you choose a vowel from each?

$P(\text{vowel from hat 1}) = \frac{5}{26}$ $P(\text{vowel from hat 2}) = \frac{5}{26}$

5 vowels, 26 letters 5 vowels, 26 letters

$P(\text{vowel and vowel}) = \frac{5}{26} \cdot \frac{5}{26} = \frac{25}{676}$

A prediction is a guess about something in the future. You can use experimental and theoretical probability to make predictions.

Based on a sample survey, an airline claims that its flights have a 94% probability of being on time. Out of 500 flights, how many would you predict will be on time?

$\frac{94}{100} = \frac{x}{500}$ Think: 94 out of 100 is how many out of 500?

$100 \cdot x = 94 \cdot 500$ The cross products are equal.

$100x = 47{,}000$

$\frac{100x}{100} = \frac{47{,}000}{100}$ Divide both sides by 100.

$x = 470$

You can predict that about 470 of 500 flights will be on time.

If you roll a number cube 30 times, how many times do you expect to roll a 2?

$P(\text{rolling a 2}) = \frac{1}{6}$

$\frac{1}{6} = \frac{x}{30}$ Think: 1 out of 6 is how many out of 30?

$6 \cdot x = 1 \cdot 30$ The cross products are equal.

$6x = 30$

$\frac{6x}{6} = \frac{30}{6}$ Divide both sides by 6.

$x = 5$

You can expect to roll a 2 about 5 times.

Making predictions based on probabilities is a useful skill. Discuss situations that may require using probabilities to make predictions.

Sincerely,