

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

equally likely all outcomes have an equal chance of occurring

experiment any activity based on chance

experimental probability

The ratio of the number of times an event occurs to the total number of times the experiment is performed

fair an experiment with equally likely outcomes

outcome the possible results that can occur in an experiment

probability the measure of how likely an event is to occur

sample space the set of all possible outcomes in an experiment

theoretical probability

the ratio of the number of ways an event can occur to the number of possible outcomes

Dear Family,

In this section, your child will be finding how to determine 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 fraction, 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 to occur is much greater than if that same event has a probability close to 0 or 0%.

The greater the probability, the more likely the event will occur.

Write impossible, unlikely, as likely as not, likely, or certain to describe each event.

A. You roll an 8 on a standard number cube.

impossible

B. There are equal amounts of red and blue marbles in a bag and you pick a red marble.

as likely as not

C. There are 7 days in one week.

certain

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

Janie practiced her 3-point shot and recorded how many times she scored. Find the experimental probability that Janie will make a 3-point shot.

Outcome	Made the shot	Missed the shot
Frequency	IIII IIII IIII IIII IIII IIII IIII II	IIII IIII III IIII IIII IIII IIII IIII IIII

$$P(\text{makes a shot}) \approx \frac{\text{number of times the event occurred}}{\text{total number of trials}} = \frac{37}{50}$$

The experimental probability of Janie making a shot is $\frac{37}{50}$.

Your child will also learn to find the **theoretical probability** of an event. Theoretical probability is used when all the outcomes have an equal, or **fair**, chance of occurring. You can use this ratio to calculate the theoretical probability of an event.

$$\text{probability} \approx \frac{\text{number of ways an event can occur}}{\text{total number of possible outcomes}}$$

What is the probability of a 4 being rolled on a fair number cube?

There are six possible outcomes when rolling a fair number cube: 1, 2, 3, 4, 5, and 6. All are equally likely to occur.

$$P(\text{a 4 is rolled}) = \frac{?}{6 \text{ possible outcomes}}$$

There is only 1 way for a 4 to occur.

$$P(\text{a 4 is rolled}) = \frac{1 \text{ way to roll a 4}}{6 \text{ possible outcomes}}$$

$$P(\text{a 4 is rolled}) = \frac{1 \text{ way to roll a 4}}{6 \text{ possible outcomes}} = \frac{1}{6}$$

Knowing how to calculate probabilities is an important skill. Probabilities are used in many different jobs and situations. Have your child identify the many different scenarios where probabilities are being used or have been used.

Connecting these concepts to real life events will help your child to see how math is used everyday.

Sincerely,

CHAPTER **Family Letter**
12 **Understanding Probability**

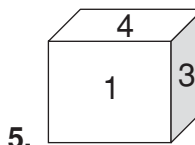
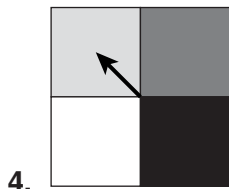
Write *impossible, unlikely, equally likely, likely, or certain* to describe each event.

1. You roll a seven on a standard number cube.

2. You correctly guess one winning number between 1 and 1,000.

3. August will come after July.

For each experiment, identify the outcome shown and the sample space.



Robert has a bag of marbles. He removes one marble, records the color, and places it back in the bag. He repeats this process several times and records the results in the table as shown.

yellow	≠	≠	
purple	≠	≠	
red	≠	≠	
green	≠	≠	

6. Find the probability that a marble selected from the bag is purple.

7. Find the probability that a marble selected from the bag will not be yellow.

Solve.

8. What is the probability of rolling a number that is a multiple of 2 on a fair number cube?

9. Suppose there is a 35% chance of rain today. What is the probability that it will not rain?

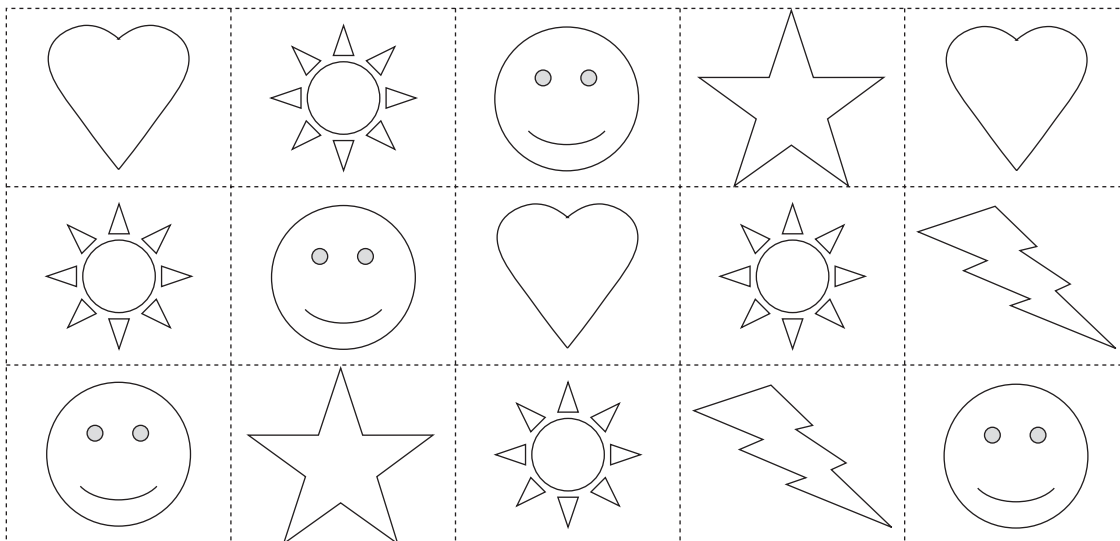
Answers: 1. impossible 2. unlikely 3. certain 4. outcome shown: lite gray; sample space: white, lite gray, dark gray, black 5. outcome shown: 4; sample space: 1, 2, 3, 4, 5, and 6 6. $\frac{6}{6}$ 7. $\frac{25}{7}$ 8. $\frac{25}{19}$ 9. $\frac{2}{1}$ 9. 65%

CHAPTER

12

Family Fun

What's Your Probability?








Materials

scissors
box/bag

Directions

- Cut the pictures out and put them in a box or bag.
- Select one piece of paper and record the outcome in the table. Place the paper back into the box or bag. Repeat this process 100 times.

1. What is the sample space of the experiment?

2. What is the experimental probability of pulling out a heart?

3. What is the theoretical probability of pulling out a heart?

4. How do the experimental and theoretical probabilities compare?

Answers: 1. sun, star, smiley face, lightning bolt 2. Possible answer: $\frac{1}{5}$ 3. $\frac{1}{5}$ 4. Possible answer: The probabilities should be about the same.

What We Are Learning

Using Probability

Vocabulary

These are the math words we are learning:

compound event

an event made of two or more single events

prediction a guess about something in the future

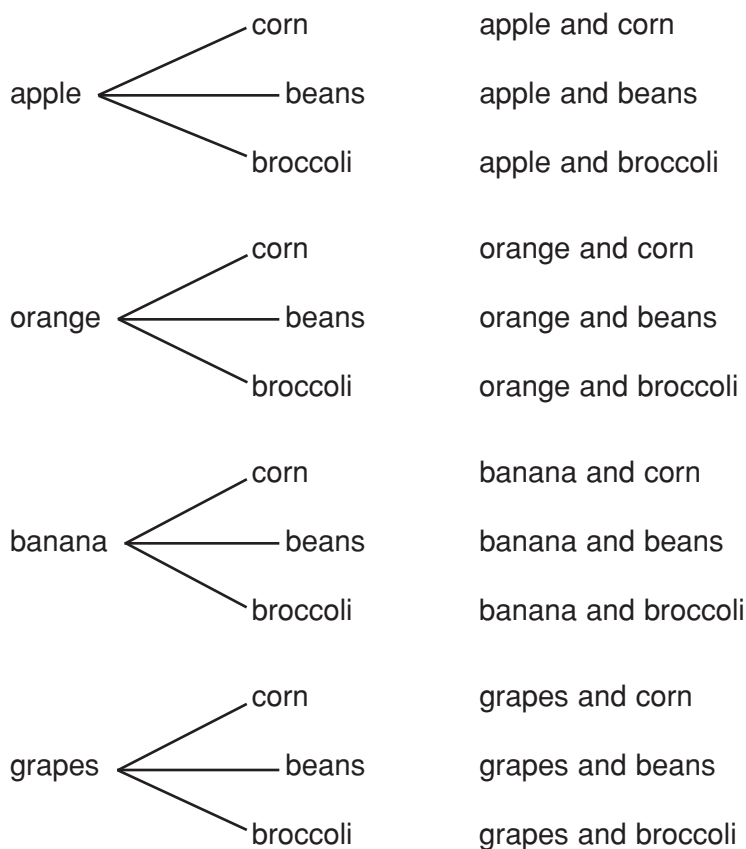
population the whole group being surveyed

sample part of the group being surveyed

Dear Family,

In this section, your child will relate the concepts of probability to application problems. Sometimes your child may need to make an organized list to find all the possible outcomes of an event. One way to create an organized list is to make a tree diagram, as shown in this example.

Christine eats one fruit and one vegetable everyday at lunch. Her fruit choices are apples, oranges, bananas, and grapes. Her vegetable choices are corn, green beans, and broccoli. How many different combinations of fruits and vegetables can she have for her lunch?

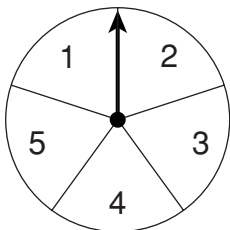


There are 12 different combinations of fruits and vegetables for Christine's lunch.

Your child will also learn to find the probability of **compound events**. A compound event consists of two or more single events.

Carole flips a fair coin and spins the spinner.

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



First find all the possible outcomes.

		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.

$$\begin{aligned}
 P(\text{even, heads}) &= \frac{2 \text{ ways event can occur}}{10 \text{ possible outcomes}} \\
 &= \frac{2}{10} \\
 &= \frac{1}{5} \quad \text{Write your answer in simplest form.}
 \end{aligned}$$

Your child will also learn to make predictions based on probabilities. The information learned in this chapter has a direct connection to real life events. Have your child share how probabilities are used in real life events.

Sincerely,

CHAPTER

12

Family Letter**Using Probability**

1. Central Middle School students wear uniforms every day. They have two choices of pants, navy or tan. They have three choices of shirts, white, red, or blue. How many different uniform combinations can the students wear?

2. Ms. Aylor's class is planning a class trip to the local museums and famous landmarks. The museums that they can visit are the Field Museum, History Museum, and the Aquarium. They also have the choice of visiting these famous buildings: the Capitol, the historical theater, and the governor's mansion. If they can visit only one museum and one landmark, how many different choices does the class have?

3. Three fair coins are flipped at the same time. What is the probability that two coins will show heads?

4. A bag contains six marbles: red, blue, green, black, white, and yellow. If you choose a marble and return it to the bag, what is the probability of picking green two times in a row?

5. You roll a fair number cube 50 times. How many times would you expect to roll a number that is a multiple of 2?

6. A survey of 150 people indicated that 45 of those surveyed eat five fruits or vegetables each day. Out of 1,250 people, predict how many people eat five fruits or vegetables each day.

Answers: 1. 6 2. 9 3. $\frac{8}{3}$ 4. $\frac{36}{1}$ 5. 25 times 6. 375 people

CHAPTER

12

Family Fun

100% Fun

Materials

- fair number cube
- deck of cards
- coin

Directions

- Cut out the cards and mix them up.
- Choose two cards and calculate the probability of each compound event.
- Add the probabilities after each round.
- The first person to reach 100% or have the greatest value after 5 rounds is the winner.

Challenge: Draw 3 or more cards and calculate the probabilities of the events occurring at the same time.

Coin Heads	Coin Not Tails	Coin Heads	Coin Tails	Coin Tails
Cards Drawing a red card	Cards Drawing a black ace	Cards Drawing a heart	Cards Drawing a black 3	Cards Drawing any face card
Fair number cube Rolling an even number	Fair number cube Rolling a number greater than 2	Fair number cube Rolling an odd number	Fair number cube Rolling an even number	Fair number cube Rolling any number but 3 or 4
Fair number cube Rolling a 7	Fair number cube Rolling a prime number	Fair number cube Rolling a 6	Fair number cube Rolling a 3	Fair number cube Rolling a 12