Unit 8, Lesson 2

Playing with Probability

Let's explore probability.

2.1 Taking Names

Your teacher will give your group a bag containing slips of paper with names on them. It is important not to open the bag to reveal all of the slips at any time. Record your group's data in writing.

Follow these steps to collect data about the names in the bag:

- Shake the bag, then draw out only 1 slip of paper.
- Read the name you drew out loud so that everyone in the group can keep track of the results in the table.
- Return the slip of paper to the bag and pass the bag to the next person in the group.
- Repeat these steps until each person in the group has had a chance to draw at least 3 names or the group has drawn at least 15 times.

Clare	Mai	Priya	Elena	Jada	Han	Andre	Diego	Noah

1. How many times did your group draw a name from the bag?

2. What name did you draw most frequently?

3. For the name you drew most frequently, estimate the probability of drawing that name on the next draw.

2.2 Who Was Helpful?

Use the data your group collected in the *Warm-up* to answer the questions.

1. Based on the data you collected, estimate the probability of drawing each of these names from your bag. Explain or show your reasoning.

name	Clare	Mai	Priya	Elena	Jada	Han	Andre	Diego	Noah
probability									

2. There are 15 slips of paper in the bag. What names do you think are written on the slips? How sure do you feel about that answer? Explain your reasoning.

3. With more time, you could draw names from the bag 100 times. How might the additional results change your confidence about what names are in the bag?

4. The next month, the bag contains 15 slips as well. Lin's name is included 5 times, Clare's name 4 times, Han's name 3 times, Diego's name 2 times, and Jada's name 1 time. The teacher draws names one at a time, replacing them each time. What might the teacher's list of names drawn look like if she draws 10 times? Is this the only list of names drawn that is possible? Explain your reasoning.

2.3 Probability Words

Take turns with your partner coming up with words that have the probabilities given when selecting a letter at random from the word. Each person should try to come up with one word for each situation.

1. $P(\text{vowel}) = \frac{1}{3}$. $P(\text{consonant}) = \frac{2}{3}$.

2. $P(\text{vowel}) = \frac{2}{3}$. $P(\text{consonant}) = \frac{1}{3}$.

3. $P(\text{vowel}) = 0.5$. $P(\text{T}) = \frac{1}{4}$.

4. $P(\text{S}) = 0.5$. $P(\text{vowel}) = 0.25$.

5. Think of a word, and give your partner at least 2 clues about the word, using the probability of certain letters or types of letter.

Are you ready for more?

Each of the whole numbers from 1 through 25 is written on a slip of paper and placed in a bag. Select 1 number from the bag.

1. Calculate each probability.
   a. $P(\text{prime})$

   b. $P(\text{divisible by 3 but not 2})$

c. $P(\text{multiple of 5})$

d. $P(\text{greater than 20})$

e. $P(\text{multiple of 12 and less than 20})$

2. Use this situation to create two of your own probability questions that give a probability of $\frac{1}{25}$ as the answer.

3. Use this situation to create two of your own probability questions that give a probability of $\frac{3}{25}$ as the answer.

Lesson 2 Summary

Some probabilities are estimated by doing an experiment, or sometimes by simulating the experiment many times and collecting data about how often outcomes come up. For example, a radio show holds a contest in which callers are entered for a chance to win a ticket to a concert in town. The probability of each caller winning is estimated by considering previous similar contests and comparing the number of callers to the number of ticket winners. If a previous contest had 327 callers and 5 ticket winners, then the probability of winning a ticket can be estimated by:

$P(\text{winning a ticket}) = \frac{5}{327}$ or $P(\text{winning a ticket}) \approx 0.015$

This means that each caller has about a 1.5% chance of winning a ticket to the concert.

Other probabilities can be determined by recognizing the expected relative likelihood of outcomes among all possible outcomes. For example, we know that the probability of rolling a 2 on a standard number cube is $\frac{1}{6}$ because there are 6 equally likely outcomes in the sample space for each roll, and the event of rolling a 2 is one of those outcomes. This can be written as $P(\text{rolling a 2}) = \frac{1}{6}$. Similarly, $P(\text{rolling a 1 or 2}) = \frac{2}{6}$ or $\frac{1}{3}$ because there are 2 outcomes in the event.

