

# EXPERIMENTAL PROBABILITY MODELS

A **probability model** shows all of the possible outcomes of an event and the probability of each outcome.

**Let's make a probability model!** Josie spun the spinner below 20 times and recorded the results in the table. Develop a probability model for her experiment.



|                  | Gray | White |
|------------------|------|-------|
| Number of trials | 13   | 7     |

First, find all of the possible outcomes of the experiment. This is called the **sample space**.

$$S = \{\text{gray, white}\}$$

Then, write the experimental probability of each of the events in the sample space.

$$P(\text{gray}) = \frac{13}{20} \quad P(\text{white}) = \frac{7}{20}$$

You can use your experimental probability model to make predictions! For example, you can predict how many times the spinner would land on gray if Josie spun it 80 times. Write and solve a proportion using the experimental probability you found for gray.

$$\begin{aligned} \frac{13}{20} &= \frac{x}{80} \\ \frac{13}{20} \cdot 80 &= \frac{x}{80} \cdot 80 \\ 52 &= x \end{aligned}$$

So, based on this data, you could predict that the spinner would land on gray about 52 times if Josie spun it 80 times.

**Answer each question to develop a probability model and make a prediction. Write each experimental probability as a simplified fraction.**

1. Anthony spun a spinner with red, yellow, and blue sections 15 times. He recorded his data in the table.

|                  | Red | Yellow | Blue |
|------------------|-----|--------|------|
| Number of trials | 4   | 7      | 4    |

|                           |                                                                          |                                                                                                                 |
|---------------------------|--------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|
| What is the sample space? | What is the experimental probability for each event in the sample space? | Based on the data, how many times would you expect the spinner to land on yellow if Anthony spins it 150 times? |
|                           |                                                                          |                                                                                                                 |

# EXPERIMENTAL PROBABILITY MODELS

**Keep going! Answer each question to develop a probability model and make a prediction. Write each experimental probability as a simplified fraction.**

2. Derek chose cards from a unique deck at random. After picking each card, he recorded the color and shuffled it back into the deck. He recorded his data in the table.

|                  | Blue | Yellow | Red | Green |
|------------------|------|--------|-----|-------|
| Number of trials | 6    | 7      | 5   | 7     |

What is the sample space?

What is the experimental probability for each event in the sample space?

Based on the data, how many times would you expect Derek to pick a blue card if he picked 75 cards?

3. Anya has a bag of purple, green, and blue marbles. She randomly picks a marble from the bag, records its color, and puts it back in the bag. The table shows her data.

|                  | Purple | Green | Blue |
|------------------|--------|-------|------|
| Number of trials | 6      | 9     | 5    |

What is the sample space?

What is the experimental probability for each event in the sample space?

Based on the data, how many times would you expect Anya to pick a purple marble if she ran 90 trials?

4. Rivera Middle School is having a rock-paper-scissors competition. Rob is recording the hand signals Emilia uses. The table shows the hand signals she has used so far.

|                  | Rock | Paper | Scissors |
|------------------|------|-------|----------|
| Number of trials | 4    | 14    | 6        |

What is the sample space?

What is the experimental probability for each event in the sample space?

Based on the data, how many times would you expect Emilia to use rock in 120 rounds?