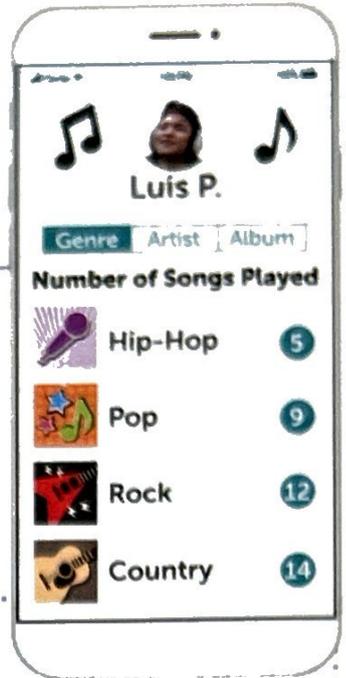## Develop Using Experimental Probability to Make Predictions

▶ **Read and try to solve the problem below.**

One day, Luis sets his music app to play a certain playlist on shuffle. His app tracks how many songs are played in each genre, as shown.

The next day, Luis plays the same playlist on shuffle again and this time plays 130 songs. Based on the previous day's results, predict the number of country songs that will play.

**Luis P.**

Genre · Artist · Album

**Number of Songs Played**

Hip-Hop · 5
Pop · 9
Rock · 12
Country · 14

**TRY IT**

✎ **Math Toolkit** grid paper, number lines, sticky notes

$$\begin{array}{r} 5 \\ +\ 9 \\ \hline 14 \\ +\ 12 \\ \hline 26 \\ +\ 14 \\ \hline 40 \end{array}$$

$$\frac{14}{40} = \frac{}{130}$$

$$1820 \div 40 = 45.5$$

About 45 or 46 songs will be country.

**DISCUSS IT**

**Ask:** What strategy did you use to make your prediction?

**Share:** The strategy I used was . . .

**DISCUSS IT** *continued*

➤ **Explore different ways to use experimental probability to make predictions.**

One day, Luis sets his music app to play a certain playlist on shuffle. His app tracks how many songs are played in each genre.

| Genre | Hip-Hop | Pop | Rock | Country |
|---|---|---|---|---|
| Number of Songs Played | 5 | 9 | 12 | 14 |

The next day, Luis plays the same playlist on shuffle again and this time plays 130 songs. Based on the previous day's results, predict the number of country songs that will play.

## Model It

You can use the data to find the experimental probability.

There were $5 + 9 + 12 + 14$, or **40**, songs played.

$$\text{Probability of a country song} = \frac{\text{number of country songs played}}{\text{number of trials}}$$

$$= \frac{14}{40}$$

Then use the experimental probability to predict future results.

About $\frac{14}{40}$ of the 130 songs should be country songs.

$$\frac{14}{40} \cdot 130$$

## Model It

You can use an equation to make a prediction.

The experimental probability for 40 songs is $\frac{14}{40}$. You can use that to make a prediction for 130 songs.

$c =$ number of country songs played in 130 trials

$$\frac{14}{40} = \frac{c}{130}$$

➤ **Use this page to deepen your understanding of using experimental probability to make predictions.**

## 1 Talk About It

a. Look at the **Model Its**. How is finding $\frac{14}{40} \cdot 130$ like solving $\frac{14}{40} = \frac{c}{130}$ for $c$?

b. Why are both 45 and 46 reasonable predictions for the number of country songs played in 130 songs?

c. When 40 songs were played, 30% were rock songs. Why should you not expect exactly 30% of the 130 songs played to be rock songs?

## 2 Show What You Know

a. Can you use Luis's results to predict how many times another person's playlist will play country songs? Explain.

> No. Someone else may not have any country songs so they wouldn't show up on their play lists

b. How can you use data from an experiment to make a prediction about how often an event will occur in a future experiment with more or fewer trials?

> You can scale up or down to the new total to help with your prediction

## 3 Reflect
Think about all the models and strategies you have discussed today. Describe how one of them helped you better understand how to make predictions using experimental probability.

## Apply It

➤ **Use what you learned to solve these problems.**

4 A floor in Kofi's and Yen's house is covered with black and green tiles that alternate. Kofi and Yen roll marbles on the floor to see whether they stop on a black tile, a green tile, or in a groove between the tiles. They find that 30 marbles stop on a black tile, 35 on a green tile, and 55 in a groove. Suppose Kofi and Yen roll 20 more marbles. Predict the number of those marbles that will stop in a groove. Show your work.
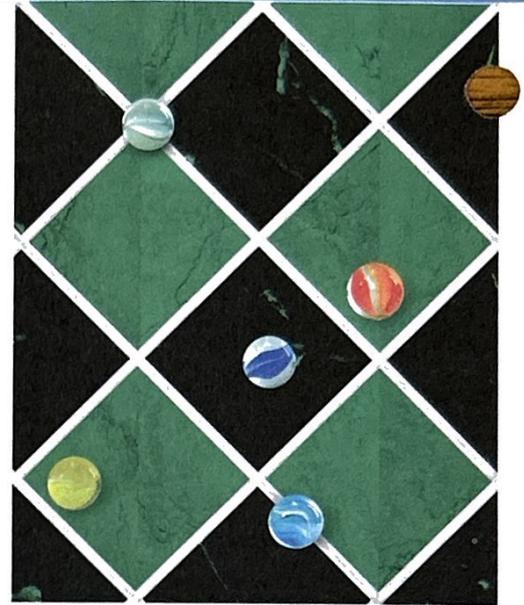


$$\begin{array}{r} {}^1 30 \\ 35 \\ + 55 \\ \hline 120 \end{array}$$

$$\frac{55}{120} \overset{\div 6}{\underset{\div 6}{=}} \frac{9.1\overline{6}}{20}$$

**SOLUTION** About 9 marbles out of 20 will stop in a groove.

5 Last basketball season, Erik made 21 of the 35 free throws he attempted and missed the rest. Suppose he attempts 50 free throws this season. What is the most reasonable prediction of the number of free throws he will miss?

Made

$$\frac{21}{35} = \frac{3}{5} = \frac{30}{50}$$

A  28

B  11

C  20  Missed

D  30

6 A taco stand lets the first customer every Monday select the type of taco that will be discounted for the week. The table shows the number of times each type of taco has been discounted so far. Based on these results, predict about how many times carne asada tacos will be discounted in the next 10 weeks. Show your work.

$$\begin{array}{r} 6 \\ 10 \\ 7 \\ + 9 \\ \hline 32 \end{array}$$

$$\frac{6}{32} = \frac{3}{16} = \frac{1.875}{10}$$

$$30 \div 16$$

| Type of Taco | Weeks Discounted |
|---|---|
| Carne Asada (Grilled Beef) | 6 |
| Carnitas (Pork) | 10 |
| Nopales (Cactus) | 7 |
| Pollo Asado (Grilled Chicken) | 9 |

**SOLUTION** Carne Asada will be discounted about 2 times in the next 10 weeks