4.1 Drawing Area Models to Find the Sample Space

Focus Question How can an area model represent a situation to help analyze probabilities?

Launch

In this Problem, students will consider area in a new light. Students will see the connection between area models and probability.

For Question A, conduct a whole class discussion on how to analyze a two-stage outcome using an area model. Once you are confident that they understand the area model, ask them to work in pairs to find the answers in Question B, monitoring the pair's discussion for understanding.

- *What does each partition of the side of the square represent?*
- *What does each section of the square represent?*

Key Vocabulary

- area model

Materials

Labsheet
- 4.1: Area Model and Probabilities

Explore

As students work in pairs, listen to how they talk about each section of the area model.

- *How many regions/sections are there?*
- *What does each region/section represent?*
- *Why is the probability of getting a RB $\frac{1}{12}$, while the probability of getting a GB is $\frac{1}{6}$?*
- *Why is the probability of drawing at least one green the highest?*
- *Drawing one marble from each bucket, what is the probability of drawing at least one blue or one yellow? Explain.*

Summarize

You may want to repeat the Suggested Questions from the Explore section. In addition, ask students to explain their reasoning for each question, particularly for Question B, part 2.

ACE

Assignment Guide for Problem 4.1

Applications: 1–6 | Connections: 23–28
Extensions: 46–49

Answers to Problem 4.1

A. 1. Miguel subdivided the square into three equal rows. This is reasonable since this subdivision represents the probability of drawing a red or green marble from Bucket 1.

2. There will be four columns to represent the marbles in Bucket 2.

Bucket 2

Bucket 1	R	B	G	Y
R				
G				
G				

3.

Bucket 2

Bucket 1	R	B	G	Y
R	RR	RB	RG	RY
G	GR	GB	GG	GY
G	GR	GB	GG	GY

B. 1. a. $\frac{1}{12}$

b. $\frac{1}{12}$

c. $\frac{1}{12}$

d. $\frac{1}{12}$

e. $\frac{1}{6}$

f. $\frac{1}{6}$

g. $\frac{1}{6}$

h. $\frac{1}{6}$

i. 0

2. a. $\frac{6}{12} = \frac{1}{2}$

b. $\frac{3}{12} = \frac{1}{4}$

c. $\frac{9}{12} = \frac{3}{4}$

d. $\frac{3}{12} = \frac{1}{4}$

C. 1. If the square is 100 square units, then RY = 10 square units, RB = 10 square units, GY = 40 square units, GB = 40 square units

2. $RY = RB = \frac{10}{100} = \frac{1}{10}$

$GY = GB = \frac{40}{100} = \frac{4}{10}$

3. The probabilities of each section are equal to the fractions of the areas of those sections.

4. All of these color combinations are possible. They all show that the ratio of red to green blocks in one bucket is 1:4, and the ratio of yellow to blue in the other bucket is 1:1. The *numbers* of blocks are not as important as the *ratios* of blocks in determining probabilities.