

# How Many Marbles?

## Purpose

Students will understand that probability can take any value between 0 and 1 and that outcomes can be expressed verbally and numerically.

## Materials

*For the teacher:* chalk, chalkboard, a bag of marbles of different colors (3 white, 3 black, 3 blue, 3 red), copy of Black Line Master (BLM) *How Many Marbles?*

*For each group of 3 or 4 students:* 2 white, 1 black, and 1 red marble in a bag; copies of BLM *How Many Marbles?*

## Activity

### A. Introduction

1. Discuss *probability* as a measure of how likely it is for an event to happen. Say: “We name a probability with a number from 0 to 1. If an event is certain to happen, then the probability is 1. If an event is certain not to happen, the probability is 0. If it may or may not happen, then the probability is some fraction between 0 and 1.”
2. Make a number line on the chalkboard and label the beginning “0” and the end “1” and the midpoint “ $\frac{1}{2}$ ”
3. Name a few events (e.g., the sun will come up tomorrow, it will be 0°F next August, the Hoosiers will win their next football game, etc.).
4. Have students decide where to place a checkmark on the number line to indicate the approximate probability of each of these events happening.

### B. Class Activity

1. Put three white marbles in your bag, and ask: “What is the probability that I will draw a white marble?” [Students should realize that the probability of drawing a white marble is  $\frac{3}{3}$  or 1 since there are only white marbles in the bag.]
2. Ask: “What is the probability that I will draw a blue marble?” [Since there are no blue marbles in the bag, students should respond that the probability is  $\frac{0}{3}$  or 0.]

(continued)

EXTENDING  
THE



ACTIVITY

Have students play the game of rock, scissors, paper. Talk about the probability of winning the game. Ask students to test the probability with 5 games and then compare their results for 20 games and 100 games.

connecting  
across the  
curriculum



### Social Studies

Have students bring in game pieces (e.g., relating to contests that come in the mail or lottery cards). Direct students to find the probability listed on the back and ask them to decide if any of these have a probability anywhere close to 1.

Standards Link  
5.2.4

## Activity (continued)

---

- Put one blue and one white marble in the bag and ask: “What is the probability that I will draw a blue marble?” [Students should answer  $\frac{1}{2}$ , because there are two marbles but only one is blue.]
- Put all 12 marbles in the bag and ask: “What is the probability that I will draw a red one?” [Students should answer  $\frac{3}{12}$ , which will reduce to  $\frac{1}{4}$ , because there are three red marbles in a bag of 12.]

### C. Group Activity

- Direct students into groups of three or four and give each group a bag of marbles with two white, one black, and one red.
- Direct students to work through the BLM.

## Questions for Review

---

### Basic Concepts and Processes

During the activity, discuss the following questions with your students:



How do you find the probability in this situation [indicate situation on the BLM]?



How many marbles are there altogether?



How many marbles are of the correct color?



What does a probability of one mean?



What does a probability of zero mean?

Name: \_\_\_\_\_



**Use your bag of 2 white, 1 black, and 1 red marble:**

1. What is the probability of drawing a black marble? \_\_\_\_\_
2. What is the probability of drawing a red marble? \_\_\_\_\_
3. What is the probability of drawing a white marble? \_\_\_\_\_

**Think of a the bag of marbles that has 3 white, 3 black, 3 blue, and 3 red marbles:**

4. What is the probability of drawing a blue marble from the bag? \_\_\_\_\_
5. What is the probability of drawing a black marble from the bag? \_\_\_\_\_
6. What is the probability of drawing a purple marble from the bag? \_\_\_\_\_

**Think of a bag that has 1 white marble, 2 red marbles, 3 black marbles, and 4 blue marbles:**

7. What is the probability that a red marble will be drawn? \_\_\_\_\_
8. What is the probability that a white marble will be drawn? \_\_\_\_\_
9. What is the probability that a black marble will be drawn? \_\_\_\_\_
10. What is the probability that a blue marble will be drawn? \_\_\_\_\_
11. What is the probability that a green marble will be drawn? \_\_\_\_\_

# How Many Marbles?

## Teacher Directions

---

Distribute one copy of the BLM *How Many Marbles?* to each student. Have students work in groups to find the probabilities in the various situations and record their answers on the BLM.

## Answer Key

---

1.  $\frac{1}{4}$
2.  $\frac{1}{4}$
3.  $\frac{2}{4} = \frac{1}{2}$
4.  $\frac{3}{12} = \frac{1}{4}$
5.  $\frac{3}{12} = \frac{1}{4}$
6.  $\frac{0}{12} = 0$
7.  $\frac{2}{10} = \frac{1}{5}$
8.  $\frac{1}{10}$
9.  $\frac{3}{10}$
10.  $\frac{4}{10} = \frac{2}{5}$
11.  $\frac{0}{10} = 0$