Name _____ Date _____ Class_____

SKILL BUILDER

# *Determining Density*

The density of an object is its mass divided by its volume. But how does the density of a small amount of a substance relate to the density of a larger amount of the same substance? In this lab, you will calculate the density of one marble and of a group of marbles. Then you will confirm the relationship between the mass and volume of a substance.

## Collect Data

**1.** Use the table below to record your data.

### Data Table

| Mass of marble (g) | Total mass of marbles (g) | Total volume (mL) | Volume of marbles (cm³) | Density of marbles (g/cm³) |
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| MATERIALS |
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| • 100 mL graduated cylinder<br>• water<br>• 8 to 10 glass marbles<br>• paper towels<br>• metric balance<br>• graph paper |

**2.** Fill the graduated cylinder with 50.0 mL of water. If you put in too much water, twist one of the paper towels and use its end to absorb excess water.

**3.** Measure the mass of a marble as accurately as you can (to at least one-tenth of a gram). Record the marble's mass in the first column of the table. Write the same value in the second column.

**4.** Carefully drop the marble into the tilted cylinder, and measure the total volume. Record the volume in the third column. Fill in the rest of the row.

**5.** Measure and record the mass of another marble. Add the masses of the marbles together, and record this value in the second column of the table.

**Determining Density, continued**

**6.** Carefully drop the marble into the graduated cylinder without removing the previous marble. Complete the row of information in the table.

**7.** Repeat steps 5 and 6, adding one marble at a time. Each time, add the mass of the marble to the total mass from the row above. Stop when you run out of marbles, the water no longer completely covers the marbles, or the graduated cylinder is full.

## Analyze the Results

**8.** Examine the data in your table. As the number of marbles increases, what happens to the total mass of the marbles? What happens to the volume of the marbles? What happens to the density of the marbles?
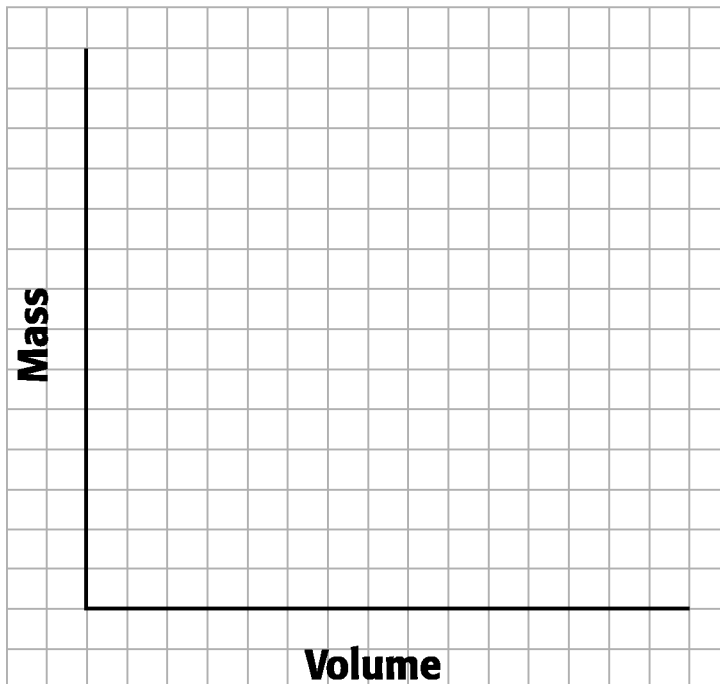
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**9.** Graph the total mass of the marbles (*y*-axis) versus the volume of the marbles (*x*-axis) in the grid on the next page. Is the graph a straight line or a curved line?

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## Draw Conclusions

**10.** Does the density of a substance depend on the amount of substance present? Explain how your results support your answer.

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▲ ▲ ▲ **CHAPTER 2**

**Determining Density, continued**

## Graph of Mass Versus Volume



### Going Further

Calculate the slope of the graph. How does the slope compare with values in the column of the data table titled "Density of marbles"? Explain.

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