Name _____ Class _____ Date _____

Investigating the Velocity of a Sinking Marble

In this lab, you will graph the motion of a marble falling through shampoo.

Problem What does a distance-time graph look like for a marble falling through shampoo?

Materials

- clear shampoo
- 100-mL graduated cylinder
- 2 small marbles
- stopwatch
- forceps
- masking tape
- metric ruler
- 10-mL graduated cylinder
- long glass stirring rod
- dropper pipet
- graph paper

Skills Measuring, Observing, Using Tables and Graphs

Procedure

1. Wrap a small amount of masking tape around the tips of the forceps. This will allow you to grip the marble with it.
2. Measure the distance between the 10-mL gradations on the 100-mL graduated cylinder. Record the new distance in the first row of the data table.

DATA TABLE

Distance (mm)	First Marble Time (s)	Second Marble Time (s)

3. Multiply this distance by 2 and write the result in the second row of the data table. For the third row, multiply the distance by 3. Continue until you have written distances in 10 rows.
4. Slowly pour 100 mL of clear shampoo into the 100-mL graduated cylinder.
5. Be ready to observe the marble as it falls through the shampoo. Grasp the marble with the forceps and hold the marble just above the shampoo-filled graduated cylinder.

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6. Say "Go!" as you drop the marble into the shampoo. At the same moment, your partner should start the stopwatch.
7. Each time the lower edge of the marble reaches a 10-mL mark on the cylinder, say "Now." Your partner should note and record the time on the stopwatch.
8. Continue calling out "Now" each time the marble reaches a 10-mL mark until it comes to rest on the bottom of the cylinder. Say "Stop!"
9. Use the 10-mL graduated cylinder to add about 8 mL of water to the 100-mL graduated cylinder. Use the glass stirring rod to mix the water and shampoo gently but thoroughly.
10. With the dropper pipet, remove enough liquid from the graduated cylinder to decrease the volume to 100 mL.
11. Repeat Steps 5 through 8, using another marble.
12. Wash all supplies as instructed by your teacher.

Analyze and Conclude

1. **Using Tables and Graphs** Use the data you collected to make a distance-time graph for each of the two marbles.

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2. **Observing** Explain the motion of the marbles as they fell through the shampoo. How did you show this motion on your graph?

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3. **Inferring** Based on your graph, were the marbles accelerating? Explain your answers.

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4. **Calculating** Use the data table to calculate the average speed of each marble.

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