Investigating the Velocity of a Sinking Marble

**Problem:** What does a distance time graph look like for a marble falling through shampoo? In this lab you will graph the motion of a marble falling through shampoo.

**Materials:** clear shampoo, 100mL graduated cylinder, small marble, stopwatch, forceps, tape, ruler, 10mL graduated cylinder and a stirring rod.

**TEAM ROLES:**

A. **Timer:** this person will record the time for the lab
B. **Starter:** This person will gather materials, hold the marble, let the marble go and then retrieve the marble
C. **Watcher:** This person will watch as the marble sinks. Every time it reaches a 10cm mark, the watcher will shout “now” to the timer.
D. **Recorder:** This person will record the times given by the timer for the team

**Procedure PART 1**

1. Wrap a small amount of masking tape around the tips of the forceps. This will allow you to grip the marble.
2. Measure the distance between the 10mL marks on the graduated cylinder. Record the distance in millimeters (mm) in row one of the data table under “distance”
3. Multiply this distance by 2 and write the result in the second row, multiply the distance by 3 and write it in the third row... and so on for all 10 rows.
4. The starter will slowly pour 100mL of shampoo into the 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 cylinder.
6. The timer will say “go” and start the timer. When the timer says “go” the starter will drop the marble.
7. Each time the lower edge of the marble reaches a 10mL mark on the cylinder the watcher says “now”, the timer shouts the time and the recorder will enter the data.
8. When the cylinder reaches the bottom of the cylinder the watcher will say “stop” and the timer will stop timing.

**Procedure: PART 2**

1. Remove the marble from the cylinder with the forceps
2. Use a 10mL graduated cylinder to add 10mL of water to the shampoo
3. Use a long stirring rod to very gently stir the water and shampoo together, it must be completely mixed (about 30 seconds)
4. Pour 10mL of the water/soap mixture back into the 10mL cylinder to have the starting soap/water mixture be 100mL.
5. Repeat part 1 steps and record the second set of time data.
Data Table:

<table>
<thead>
<tr>
<th>Distance (mm)</th>
<th>Time- Pure Shampoo (seconds)</th>
<th>Time-Shampoo w/10mL water (seconds)</th>
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GRAPH: be sure to title the graph and label both the x and y axis

Post-lab Questions:

1. Use the data you collected to find the average speed of each marble:
   a. Shampoo ______________________
   b. Shampoo and water ______________________
2. Which marble had the greater average speed?