* Be able to list the 5 points of the **Particle Theory of Matter** (see ‘**Viscosity and Density Overview’**).
* Know the results and conclusion sections of three labs: ‘Sink or Float’, ‘Layered Liquids’ and ‘Flow Rate of a Liquid’.
* Be able to calculate Density, Mass or Volume given 2 out of 3 of the variables (refer to ‘**Density Review Sheet’**). **D=M/V**
* Be able to explain the effect that temperature has on density of a fluid.
* Know whether a substance will sink or float in fresh water based on its density.
* The density of fresh **water** at sea level is **1.0 g/mL.**
* Be able to rank a fluid’s viscosity level based on its flow rate.
* **Viscosity** is the resistance of a fluid to flow.

**Example Questions:**

**1**. Using the particle theory of matter, explain how temperature will affect a fluid’s density.

**2**. If fluid A has a faster flow rate than fluid B, then the fluid A is more or less viscous than fluid B?

**3**. An unknown object has a density of 3.5 g/cm3 and a mass of 175 g. What is its volume?

**4**. An unknown object has a mass of 250 g and a volume of 12.95 cm3. Which of the following materials is it?

Granite (2.7 g/cm3), Cork (0.25 g/cm3), Wood (0.5 g/cm3)

Will this material float or sink in fresh water?

**5**. List three reasons why viscosity of a liquid is important (explain why).

**6**. Which of the following is a **testable scientific question**:

**a**. How does the temperature of a fluid affect its density?

**b**. Why are some fluids denser than others?

**c**. Are particles constantly in motion?

Explain what is wrong with the other two choices.

**7**. Using the particle theory of matter, explain in detail what happens to the viscosity of maple syrup as it is heated.

**8**. Anna wanted to know if the viscosity of molasses was affected by its temperature. She measured the time it took 15 mL of molasses to run down 10cm at three temperatures and obtained the following results:

|  |  |  |
| --- | --- | --- |
| Molasses temperature | Time(s) to run down 10cm | Flow Rate (s/cm) |
| 80c | 6.0 |  |
| 200c | 4.0 |  |
| 400c | 1.5 |  |

a. Determine the Flow Rate of molasses at each temperature above.

b. How does temperature affect viscosity?

c. List two variables Anna would have held constant for the experiment (controlled).

d. What was Anna’s **independent variable**?

e. Write a testable scientific question that Anna could investigate next based on this experiment.