Lab 1-1
Kaleidoscope Milk Lab

**Use this information to help you complete your Pre-Lab and conduct your experiment in class.

Background Information

  The role of milk in nature is to nourish and provide immunological protection for young mammals. Milk has a very high nutritional value and is a very complex food. Milk's general composition consists mostly of water with equal parts of fat, protein, and sugars. Milk also contains important vitamins and minerals. Milk is classified into different types based upon the amount of fat. Skim milk contains 0g fat per 250mL serving; 2% milk contains 2g fat per 250mL serving, whole milk contains 8g fat per 250mL serving; half-and-half cream contains 8g fat per 2T serving. The cream is called half-and-half because it is half cream and half milk.

  If raw milk is left to stand, the fat will separate from the milk, rise, and form a cream layer. To prevent this from happening to the milk you buy at the store, the milk goes through a process called homogenization. Homogenization of milk breaks up the fat into small fat globules and spreads them throughout the milk. The fat globules (0.1 to 15 µm in diameter) are basically suspended in the milk.

  Milk is a complicated substance made up of many parts that are attracted to some substances while repelling others. These interactions cause milk to act in an interesting way when mixed with substances such as dishwashing soap. Soap cleans dishes by breaking up fat or grease and allowing it to flow in the water down the drain. Food coloring is mostly water with added dye particles. We will discover an interesting property of milk by mixing different types of milk (skim, 2%, whole, and half-and-half) with food coloring and dishwashing soap. We will examine the amount of movement of the milk/food coloring before and after soap is added.

Procedure
1. Place the four petri dishes on your lab table. Use scrap paper to label each dish: skim, 2%, whole, or half-and-half.
2. Fill each petri dish half full with the appropriate milk.
3. Equally space 4 drops of food coloring (any or all colors) in each dish. **Record your observations of the movement of the food coloring in the milk. How far does the food coloring spread? Do you notice any other interactions between the milk and food coloring?**
4. Dip a toothpick into the liquid dishwashing detergent. Then, touch the toothpick into the middle of each dish. Try again with more detergent, touching the milk in different areas. **Record your observations of the food coloring movement when soap was added. How did the food coloring move? How fast did the food coloring move? What else do you notice about the interactions between the milk, soap, and food coloring?**
5. Pour the used milk down the drain with lots of water. Clean each petri dish with lots of water and completely dry with paper towels. Return all materials to the tray and completely clean your lab area. ***Leave your lab area <u>CLEANER</u> than how you found it!*** Wash your hands before leaving lab!!!

Lab 1-1 Report   Name_____

Kaleidoscope Milk Lab   Period_____

The Pre-Lab (Purpose, Pre-Lab Questions, Hypothesis, Data Table set-up) is <u>before</u> you plan to conduct the experiment. Use the Background Information and Procedure (copied on the back of Discovery 1-1) to help you complete the Pre-Lab.

Purpose Statement: *What is the purpose of this lab?*

Pre-Lab Questions:
1. a. What are the major components (ingredients) in milk?

    b. What is/are the major component(s) in food coloring?

2. What are the differences between the four types of milk you will test in lab?

3. In your own words, explain the process of homogenization.

4. In your own words, explain how dishwashing soap cleans your dirty dishes.

5. In your own words, briefly (2-3 sentences) explain what you will do in the experiment.
    Include what you will test, how you will test it, and the types of observations/measurements
    you will make.

Hypothesis:
*   Predict what will happen (same movement, more movement, less movement) when you add
    the food coloring to the different types of milk. Rank the milks from least to most
    movement. Provide an explanation for your prediction.
        Rank:_____
        Explanation:

*   Predict what will happen (same movement, more movement, less movement) when you place
    the soap in the different types of milk. Rank the milks from least to most movement.
    Provide an explanation for your prediction.
        Rank:_____
        Explanation:

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Data Table:
Look back at the procedure and find the data you will need to record. Create a blank data table to record your observations for each type of milk. You will record your actual observations *during* the lab.

Data Analysis/Conclusion:
1. a. Based on the observations in your data table, rank the types of milk in increasing activity (least to most movement of food coloring) when the food coloring was added.

   b. Was your hypothesis supported or rejected by the data?_____
   c. Describe the difference in the water content of the four kinds of milk to explain any differences you noted for the different types of milk.

2. a. Based on the observations in your data table, rank the types of milk in increasing activity (least to most movement of food coloring) when the detergent was added.

   b. Was your hypothesis supported or rejected by the data?_____
   c. Describe the difference in the fat content of the four kinds of milk to explain any differences you noted for the different types of milk.

3. a. Predict the food coloring movement for 1% milk. Explain.

   b. Predict the food coloring movement for heavy whipping cream. Explain.

4. Based on the results of your lab, what can you infer about the structures of water, fat, and soap? (i.e. which have similar structures, which have different structures)