

Rainbow Lab

Teacher Notes

Introduction

This lab is a perfect first day of class activity! It's a wonderful way to promote cooperative learning, communication, and teamwork. It requires students to practice their skills in taking measurements, following directions and using proper lab techniques. Best of all, it can be customized for a variety of age levels and abilities. Plus, it's easy to evaluate whether students correctly followed the instructions—no laborious grading of papers or quizzes.

Preparation:

You will need red, yellow, and blue food coloring and enough large plastic trays (such as cafeteria trays) so that every group of 4 students has its own tray.

Before class, mix up three large containers of colored water using the food coloring in these proportions for each 2-quart pitcher of water:

- ✓ 12 drops of red
- ✓ 8 drops of blue
- ✓ 60 drops of yellow

Prepare one tray for each team of 4 students with these items:

- ✓ 6 test tubes
- ✓ 1 test tube rack
- ✓ 3 pipettes
- ✓ 50 or 100 mL beaker with 40 mL of RED liquid
- ✓ 50 or 100 mL beaker with 40 mL of YELLOW liquid
- ✓ 50 or 100 mL beaker with 40 mL of BLUE liquid
- ✓ 2 - 25 mL graduated cylinders
- ✓ 2 - 10 mL graduated cylinders
- ✓ 2 empty beakers
- ✓ 1 wax pencil
- ✓ 4 pairs of safety goggles
- ✓ 4 aprons

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Teacher Tips

Use this lab to emphasize the importance of safety procedures when using chemicals. Students do not need to know that the three liquids are merely colored water. This is a chance to stress the need for caution during all future labs.

Remind students to rinse out their graduated cylinders and test tubes between measurements to avoid contamination.

Some teachers complete this lab in a single class period but it more commonly requires almost two full classes.

Be sure to have plenty of test tubes racks available so students can store their work until Day 2. Also, consider placing stoppers over the test tubes at the end of class so that no water evaporates, changing the results.

At the end of the lab, students should have 63 mL of liquid. Spillage, incorrect measurements, and excess water from rinsing are all factors that might change their total.

Once you set up the materials for students, the rest is a breeze! Be available to answer students' questions, but do not correct them if their measurements are inaccurate. You'll have a chance to determine which students work well together and assess which students may need additional time and/or help with lab technique.

Time period: 1 ½ to 2 classes (45 min each)

Teacher Answer Key

With one look, you will be able to tell if students have carefully followed the instructions. You should see a rainbow with the six liquids all at the same height in their test tubes.

Test Tube	Color of Water	Total mL of Water
A	Red	10
B	Orange	11
C	Yellow	10
D	Green	11
E	Blue	10
F	Purple	11

Introduction:

The purpose of this lab is to help you practice safe use of lab materials. You must follow the directions exactly, so make sure you read them carefully.

Safety:

- ✓ GOGGLES must be worn at all times when using glassware, chemicals, or fire.
- ✓ Make sure your backpacks, binders, jackets etc. are all stowed away before you begin.
- ✓ When mixing chemicals, remember to avoid cross contamination by cleaning your equipment every time you use a new chemical.
- ✓ Always carry lab equipment with two hands, to avoid accidentally dropping it.

Objectives:

- ✓ to develop your skills measuring chemicals with a graduated cylinder.
- ✓ to practice using the metric system.
- ✓ to test precision and your ability to follow directions.
- ✓ to practice lab safety procedures.

Materials:

- ✓ 6 test tubes
- ✓ 1 test tube rack
- ✓ 3 pipettes
- ✓ 1 beaker with RED liquid
- ✓ 1 beaker with YELLOW liquid
- ✓ 1 beaker with BLUE liquid
- ✓ 2 - 10 mL graduated cylinders
- ✓ 1 - 25 mL graduated cylinder
- ✓ safety goggles
- ✓ aprons

Procedure:

Part 1:

1. Label the six test tubes in order: **A, B, C, D, E,** and **F**.
2. Fill one of the empty beakers half full with water. Use this beaker to rinse your graduated cylinder and your test tubes as needed.
3. The second empty beaker is to be used for contaminated waste water.
4. Into test tube A, measure 25 mL of **RED** liquid.
5. Into test tube C, measure 17 mL of **YELLOW** liquid.
6. Into test tube E, measure 21 mL of **BLUE** liquid.

Part 2:

1. From test tube C, measure 4 mL and pour into test tube D.
2. From test tube E, measure 7 mL and pour into test tube D. Swirl.
3. From test tube E, measure 4 mL and pour into test tube F.
4. From test tube A, measure 7 mL and pour into test tube F. Swirl.
5. From test tube A, measure 8 mL and pour into test tube B.
6. From test tube C, measure 3 mL and pour into test tube B. Swirl.
7. Save your results. Measure the contents of each test tube and record how many mL of liquid were found in each test tube.
8. Answer the Analysis/Result questions on the next page and write a Conclusion.

Data:

Table 1: Test Tube Results

Test Tube	Color of Liquid	Amount of Liquid (mL)
A		
B		
C		
D		
E		
F		
Total Liquid in Test Tubes A-F		mL

Analysis/Results:

- Name the colors that you created. _____
- How many mL of liquid were in each test tube at the **start** of this lab? _____
- Why is it important to follow directions **exactly**?

- What would have happened if your measurements were not correct?

- Look at your hands. Do you have any stains on your hands? If so, those stains represent **chemicals** that would be on your skin **right now**!
- How many mL of liquid did you have at the end of the lab? How many should you have? What are some reasons why you may have more or less than when you started?

Conclusion:

On the back of this page, write 2-3 sentences on what you have learned from this lab.