

# Pipetman Challenge



## MATERIALS:

blue (food dye) solution 2.0 ml  
yellow (food dye) solution 2.0 ml  
disposal beaker  
p20  $\mu\text{l}$  micropipette  
p200  $\mu\text{l}$  micropipette  
p1000  $\mu\text{l}$  micropipette  
Pipette tips for micropipettes  
Microfuge tubes (2.0 mL)  
Balance reading to the hundredth gram, 0.00 g

## METHOD:

This activity includes the weighing of a microfuge tube before and after the Pipetman Challenge activity and requires some information on how to use a balance. A common digital balance is needed to the precision of 0.00g. The balance you will be using today should have this precision.

1. Tare the balance.
  - a. Press the balance on button.
  - b. When the numbers appear, press the ZERO or TARE button and allow the balance to adjust to zero. The balance should read 0.00 then it is ready to be used.

### Scout® Pro Balance



View of the balance display:

0.00 grams

2. Place your empty 2.0 mL microfuge tube on the balance pan.
  - a. Record the mass of the microfuge tube here: **mass =** **g**  
Record the pipetman's setting in the table below.
  - b. Aspirate each desired volume of colored solution as indicated in the table using the 2.0 mL microfuge tube. Add all volumes into the same microfuge tube.

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PIPETMAN CHALLENGE  
TABLE

<b>Add volume to the microfuge tube:</b>	<b>Use this color solution:</b>	<b>Record Pipetman used</b>	<b>Pipetman Setting</b>
62 $\mu$ L	Blue		
18 $\mu$ L	Yellow		
0.975 mL	Blue		
0.010 mL	Yellow		
130 $\mu$ L	Blue		
75 $\mu$ L	Yellow		
0.020 mL	Blue		
360 $\mu$ L	Yellow		
50 $\mu$ L	Blue		
0.300 mL	Yellow		

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## RESULTS:

3. Determine the mass of the 2.0 mL microfuge tube containing all of the colored solutions added from the activity above.

a. The mass of the fluid in the microfuge tube = \_\_\_\_\_ g

4. Determine the net mass of the combined solutions in the microfuge tube by weighing them and subtracting the mass of the tube itself. Record below.

a. Total mass of tube + solutions = \_\_\_\_\_ g

b. Subtract the mass of the tube - \_\_\_\_\_ g

c. Net mass of the solutions = \_\_\_\_\_ g

5. It is possible to find the actual volume in your microfuge tube by measuring the mass of all the colored solutions added to the tube and then solving the equation below to determine the actual volume:

$$\text{Density}^* = \frac{\text{Mass}}{\text{Volume}} \quad D = \frac{\text{g}}{\text{V mL}}$$

**\*(density of solutions = 1 g / 1 mL) hint: Solve for V**

a. Actual Volume = \_\_\_\_\_ mL

6. Calculate the total expected volume by adding the volumes listed on the pipetman in the first column of the table.

a. Expected Volume = \_\_\_\_\_ mL

7. Percent error can be calculated from the expected and actual volume values found are determined by using the following equation:

$$a. \frac{\text{Expected Volume} - \text{Actual Volume}}{\text{Expected Volume}} \times 100 = \% \text{ Error}$$

8. The winner of the Pipetman Challenge is the student with the lowest percent error.