Name: _____ Group: _____ Date: _____

LAB 26
EXPERIMENT

LIQUID PRESSURE

STUDENT BOOK	Chapter 3, page 73
TOOLBOX	Page 22

Part I

Goal

Verify the relationship between pressure and volume mass of a liquid using a U-tube manometer.

1. What is the independent variable in this lab?

_____

2. What is the dependent variable in this lab?

_____

Hypothesis

I think that _____

because _____

Part II

Goal

Verify the relationship between pressure and volume depth of a liquid using a U-tube manometer.

1. What is the independent variable in this lab?

_____

2. What is the dependent variable in this lab?

_____

Hypothesis

I think that _____

because _____

Materials

- balance (accurate to 0.01 g)
- 50-mL graduated cylinder
- 3 containers each with more than 1 L of a different liquid: distilled water, methanol, glycol, saline solution, etc.
- 2 30-cm rulers
- 1000-mL graduated cylinder *or* container more than 40 cm in height
- U-tube manometer
- 30-cm glass stirring rod

Name: _____ Group: _____ Date: _____

Procedure

1. Measure the volume mass of each liquid.
- *a)* Weigh and record the mass of the empty 50-mL graduated cylinder.
- *b)* Pour into the graduated cylinder 50 mL of one liquid.
- *c)* Weigh and record the mass of the graduated cylinder and contents.
- *d)* Calculate the volume mass of the liquid (g/mL).
- *e)* Repeat steps a) to d) with each of the other two liquids.

2. Secure two rulers to the 1000-mL graduated cylinder to make a measuring scale of 40 cm—0 mark at the top and 40 mark at the bottom.

3. Pour into the 1000-mL graduated cylinder one liquid to the 0 mark.

4. Measure the pressure outside the liquid using the U-tube manometer—this reading corresponds to the 0 mark.

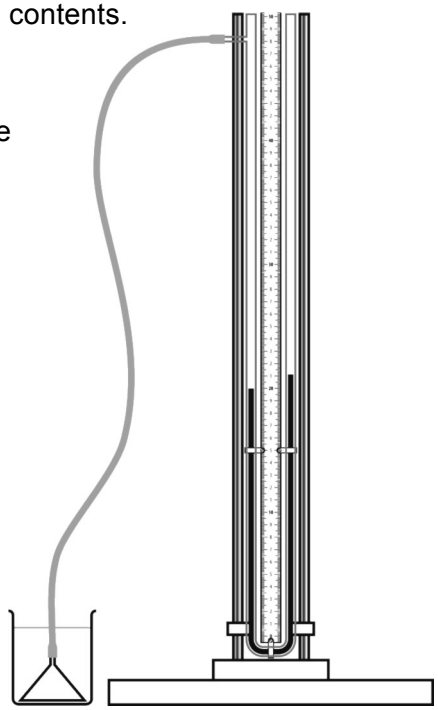
5. Place the funnel-shaped end of the manometer on the surface of the liquid and submerge it with the glass stirring rod.

6. Measure and record the pressure at every 10 cm of depth—this reading corresponds to the difference in height between the columns of liquid.

7. Empty, rinse and dry the graduated cylinder.

8. Repeat steps 3 to 7 for each other liquid.

9. Clean up and put away materials.



Results

Record your results in the tables below. Give each table a title.

Title:

Name of liquid	Mass (g)	Volume (mL)	Volume mass (g/mL)

Name: _____ Group: _____ Date: _____

Title:

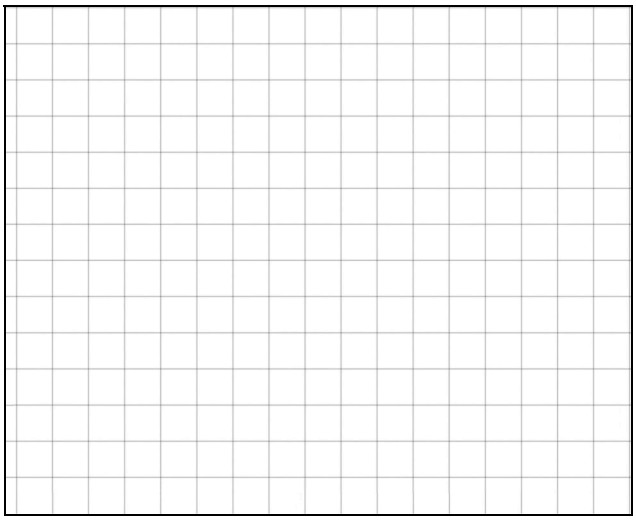
Depth of manometer (cm)	Pressure of liquid 1 (cm)	Pressure of liquid 2 (cm)	Pressure of liquid 3 (cm)

Graphs

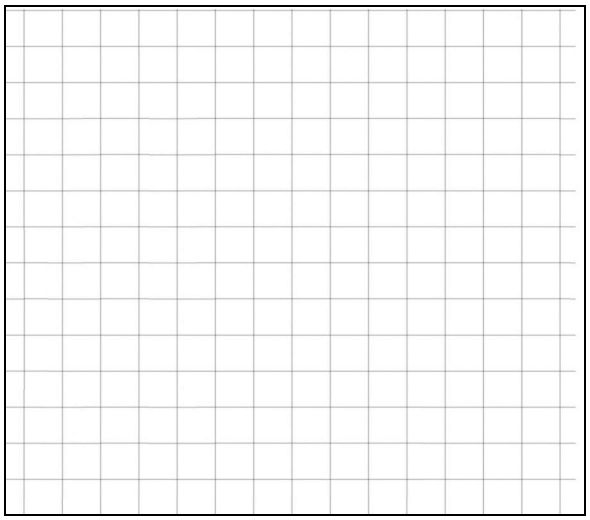
Plot the pressure of each liquid according to depth. (Plot one curve per liquid.) Give the graph a title.

Plot the pressure of the liquids according to volume mass. (Use the pressure reading at the greatest depth.) Give the graph a title.

Title:



Title:



Analysis of the results

1. Describe the shape of the curve of the graph illustrating pressure according to volume mass.

_____

2. How does pressure of a liquid vary according to volume mass?

_____

3. Describe the shapes of the curves of the graphs illustrating pressure according to depth.

_____

Name: _____ Group: _____ Date: _____

4. How does pressure of a liquid vary according to depth?

_____

5. Does pressure according to depth vary in the same way for all three liquids?

_____

_____

6. How is pressure measured with a U-tube manometer?

_____

_____

7. What are the possible sources of error in this lab?

_____

_____

8. How could you improve the protocol for this lab?

_____

_____

Conclusion

1. Complete the following sentences:

a) As volume mass increases, pressure of a liquid _____

b) As depth increases, pressure of a liquid _____

2. Were your hypotheses confirmed or not? Explain your answer.

_____

_____

Application

Why do your ears feel blocked as you swim to the bottom of a pool?

_____

_____