Name: _____ Group: _____ Date: _____

LAB 25
EXPERIMENT

THE EFFECT OF FORCE AND SURFACE AREA ON PRESSURE

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Part I

Goal

Verify the relationship between force and pressure.

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 surface area on which force is applied and pressure.

1. What is the independent variable in this lab?

_____

2. What is the dependent variable in this lab?

_____

Hypothesis

I think that _____

because _____.

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Materials

- 5-mL glass syringe
- ring stand
- universal clamp
- flexible tubing
- aneroid gauge
- weights of 50 g, 100 g, 200 g and 500 g
- vernier scale *or* ruler
- 10-mL glass syringe
- 30-mL glass syringe

Procedure

Part I

1. Fill the 5 mL syringe with 5 mL of air.
2. Clamp the syringe plunger-up vertically in the ring stand.
3. Connect the syringe to the aneroid gauge with flexible tubing.
4. Place the weight of 50 g on the plunger and note the pressure.
5. Repeat step 4 in turn with the weight of 100 g, 200 g and 500 g.

Part II

1. Fill the 5 mL syringe with 5 mL of air.
2. Clamp the syringe plunger-up vertically in the ring stand.
3. Connect the syringe to the aneroid gauge with flexible tubing.
4. Place the weight of 200 g on the plunger and note the pressure.
5. Disconnect the syringe and remove the plunger.
6. Measure and note the inside diameter of the syringe.
7. Repeat steps 1 to 6 in turn with the10-mL syringe and the 30-mL syringe.
8. Clean up and put away materials.

Results

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

Part I

Title:

Mass (g)	Pressure (kPa)

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Part II

Title:

Syringe capacity (mL)	Syringe diameter (cm)	Pressure (kPa)

Analysis of the results

1. How is force applied on the syringe increased in this lab?

_____

_____

2. How does pressure vary when force applied is increased?

_____

3. How is surface area increased in this lab?

_____

_____

4. How does pressure vary when surface area is increased?

_____

5. What mathematical formula shows the relationship of pressure with force and surface area?

_____

6. If a weight of 100 g is placed on the plunger of a 30-mL syringe, what would be the pressure? Explain your answer.

_____

_____

_____

7. If a weight of 400 g is placed on the plunger of a 10-mL syringe, what would be the pressure? Explain your answer.

_____

_____

_____

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8. If a weight of 200 g is placed on the plunger of a syringe larger in diameter than a 30-mL syringe, would the pressure be greater or less?

_____

_____

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

_____

_____

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

_____

_____

Conclusion

1. Complete the following sentences:

a) When force applied increases, pressure _____.

b) When force applied decreases, pressure _____.

c) When surface area increases, pressure _____.

d) When surface area decreases, pressure _____.

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

_____

_____

Application

Why is the tip of a nail so small?

_____

_____