

Name:

Period:

## LAB 5. SINKING CARTONS.

### BACKGROUND

Mass is the property of an object that seems to cause it to sink in water. In the sinking-straw experiment, the straw and the BBs had mass. It would appear that the greater the mass of an object, the deeper it sinks. Are there any other properties that might help us determine the depth of sinking?

### PROBLEM

If the same amount of water is put into cartons of different sizes, how can you predict the depth to which each carton will sink?

### HYPOTHESIS

Remember that a hypothesis is a prediction about the relationship between the variables that you are comparing.

What variables are being compared here?

Independent Variable

Dependent Variable

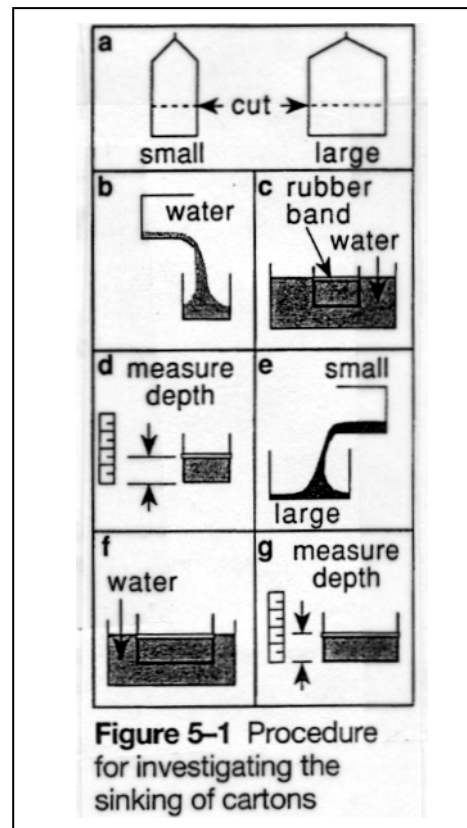
What is the predicted relationship between the variables?

### MATERIALS

1. half-gallon carton
2. half-pint carton
3. rubber bands
4. metric ruler
5. large plastic container
6. apron & goggles

### PROCEDURE

1. ~~Cut the tops off a half-gallon and a half-pint carton so you can pour water in and out easily. See figure 5-1a.~~ Put a rubber band around each carton. Fill the large plastic container with water so it is about 10 - 15 cm deep (make sure that the container is NOT full to the brim).
2. Fill the small carton about half-full of water as shown in figure 5-1b. The water is used as **ballast**. *Any material added to a floating object to make it sink is called ballast.*
3. Predict how deep the carton will sink when placed in water. Record your prediction in table 5-2.
4. Put the carton into the water. Move the rubber band to mark the depth to which the carton sinks when it is carefully held upright, as shown in figure 5-1c. **Do not** push the carton down.
5. Measure the actual depth of sinking from the bottom of the carton to the rubber band. See figure 5-1d. Record the depth.





6. Pour all the water **from the small carton into the large carton**. See figure 5-1e. *Predict* how deep the large carton will sink in a container of water. Record your prediction.
7. Move the rubber band to mark the depth you **predicted**. Put the large carton into the container of water. Holding the carton lightly, move the rubber band to mark the actual depth of sinking (see figure 5-1f).
8. Measure and record the actual depth the large carton sank. Pour the water out of the carton.
9. Fill the small carton three-quarters full with water. Try to predict how deep the carton will sink in a container of water. Record your prediction. Follow procedure steps 3 - 8 and record your results.
10. Clean up your lab station.

### DATA

Table 5-2: Data on sinking cartons

Amount of Water (ballast)	Size of Carton	Depth of Sinking (cm)		Other observations
		Predicted	Actual	
Equal to ~ 1/2 filled small carton	small			
	large			
Equal to ~ 3/4 filled small carton	small			
	large			

***Your Results and Summary & Challenge Questions must be typed or neatly written on a separate piece of paper.***

### RESULTS

Write a four to six sentence statement that describes how the results of this lab answer the problem statement. You must restate the problem statement in your response.

### SUMMARY

1. How are the cartons similar? How do they differ?
2. Refer to your data on sinking cartons, Table 5-2. Compare your predictions with your results. Were your predictions for each carton accurate?
  - a. If so, how did you make your predictions?
  - b. If not, how might you make better predictions next time?
4. Compare your data on the sinking of cartons. What are the relationships, if any, between the amount of ballast, the size of the carton, and the depth of sinking in water?
5. What kinds of things seem to affect the depth to which the cartons sink?

### CHALLENGE

1. When we graphed the mass of the straw and BB's vs the depth of the straw, we saw a direct relationship. In other words, as the mass increased, the depth also increased. In an inverse relationship, as one variable goes up, the other variable goes down. For instance, as the speed of a car increases, the time it takes to get to the destination decreases (speed up, time down). Think of at least one other example of an inverse relationship.