

# The Effect of Submersion Time on Absorption

## Materials

Paper towel  
Beaker

Stop watch  
Scissors  
Metric ruler

Pencil  
Water

**Objective:** The purpose of this investigation is to determine the effect of submersion time on the absorption of liquid in a paper towel strip and the mean rate (speed) that the water rises.

**Introduction:** The absorption is the distance the water travels or rises up the paper towel. The rate that the water raises is its speed. Speed is calculated by the following mathematical expression:

**Speed =  $d/t$**  where d equals the distance the water rises from the line (the height) and t equals the time the water rises.

**The mean is the mathematical average. Example:** trial 1 = 1.0cm, trial 2 = 1.2cm, and trial 3 = 1.4cm. Mean =  $(1.0 + 1.2 + 1.3)/3$ . The mean is 1.2 cm.

## Procedure

1. Cut a paper towel into 18 strips, each strip measures 2 cm wide by 14 cm long. Mark the strip with line 2 cm from the bottom of the paper towel
2. Half fill a container (cup or beaker).
3. Place the paper towel strip 2 cm into the colored water for the predetermined time interval.
4. At the end of each time interval, **quickly** mark the water levels with a pencil. Then, measure the height the liquid rose in **centimeters (cm)** and record the data in the data table.
5. Repeat Steps 1 through 4 for a total of 3 trials.
6. Calculate the mean height the liquid rose (cm) and record in.
7. Determine the mean rate (the speed) that the water rises by calculating the speed (divide the mean distance by the time).
8. Graph the time and distance (height) and determining the slope of the line (the slope equals speed). Begin your graph at zero,

## Data Table

Construct a data table, **using a pen**, in your lab book using the following guidelines.

- > Make a table containing vertical columns for the independent variable, dependent variable, and derived quantity (mean height).
- > Subdivide the column for the dependent variable to reflect the number of trials.
- > Record the values of the dependent variable that correspond to each value of the independent variable.
- > Calculate the derived quantities and enter these values into the table.

## Hypothesis

Write a hypothesis under the data table in the format: If the \_\_\_\_\_ is \_\_\_\_\_ then the \_\_\_\_\_ will \_\_\_\_\_

## Questions: Write the questions and answers the in your lab book

1. What is the independent variable?
2. What is the dependent variable?
3. Name two factors that should be controlled (kept constant).

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## Rubric

- The title of the experiment must be entered in the top margin of the first page for this experiment and entered in the table of contents of your lab book.
- **Your conclusion & lab questions must be included in your lab book.**

**The data table must be done in ink**

**Otherwise, 10 points will be deducted from your score for each missing item.**

1. **Data table must have (5 points each. 20 points total):**
  - a) Column headers are labeled.
  - b) Column headers have units indicated in parenthesis
  - c) Mean distance is calculated
  - d) Mean speed is calculated
  - e) Numbers are neatly 'lined up'
2. Answer lab questions after the conclusion. (5 points each, 15 points)

Write the Hypothesis in this form (5 points):

If the \_\_\_\_\_ is \_\_\_\_\_  
(independent variable) (explain how the independent. variable is changed)

then the \_\_\_\_\_ will \_\_\_\_\_.  
(dependent variable) (explain how the dep. variable will change)

3. Graph must contain the following (5 points each, 30 points)
  - a. x axis is labeled with the name of the IV found in the data table.
  - b. y axis is labeled with the name of the **DV** found in the data table.
  - c. Title: The effect of \_\_\_\_\_ (the IV) \_\_\_\_\_ on \_\_\_\_\_ (the DV) \_\_\_\_\_.
  - d. Scale the axes (numbers)
  - e. Plot the points
  - f. Draw a best fit line (trend line)
4. Conclusion, (6 POINTS EACH, 30 point)
  - a. Restate the objective
  - b. Describe the lab
  - c. Restate the results (effect of time on absorption, mean speed)**
  - d. Explain the findings
  - e. Report errors & discuss how errors could have been prevented.

## The Effect of Submersion Time on Absorption on a Paper Towel Strip

Time paper towel submerged (s)	Distance the liquid rose in towel (cm)			Mean Distance (cm)	Mean speed (cm/s)
	Trials				
	1	2	3		
	<div><div>COPY THIS DATA TABLE INTO YOUR LAB BOOK.  <u><b>WRITE IN INK!</b></u></div></div>				

**Note: Absorption is measured by the distance the water travels up the paper towel.**

Hypothesis (5 points) :

If the \_\_\_\_\_ is \_\_\_\_\_  
(independent variable) (explain how the ind. variable is changed)

then the \_\_\_\_\_ will \_\_\_\_\_.  
(dependent variable) (explain how the dep. variable will change)

### **Graph with the following indicated on the graph , 30 points**

- x axis is labeled with the name of the IV found in the data table.
- y axis is labeled with the name of the **DV** found in the data table.
- Title: The effect of \_\_\_\_\_ (the IV) \_\_\_\_\_ on \_\_\_\_\_ (the DV) \_\_\_\_\_.
- Scale the axes (numbers)
- Plot the points
- Draw a best fit line (trend line)

### **Conclusion , 30 points**

- Restate the objective
- Describe the lab
- Explain the findings
- Report errors
- Discuss how errors could have been prevented.

### **Lab Questions 1-3, 15 points**

### **Participation, 20 points**