

# Variables & Hypothesis

Scientific Method

Designer Planes and The Effect of  
Time on Absorption

# Cause and Effect

Every experiment has a **cause** and an **effect**.

1. What “thing” did you investigate (hint, what is the title of the experiment?)

The effect of submersion time on absorption.

2. What did you **change** during the experiment?

The amount of time the paper towel was dipped (submerged) in the water.

# Cause and Effect

Every experiment has a **cause** and an **effect**.

3. What **effect** did the submersion time have on the distance the water moved?

The distance the water went up the paper towel (**absorption**) increased the longer the paper towel was in the water.

4. The **effect** that the water is being absorbed by the towel  
(what is the towel doing ?)

is caused by the time paper the towel is submerged.

# Cause and Effect

1. We investigated the effect of sub. time on absorption
2. I (we) changed the amount of time the paper towel was submerged.
3. The absorption of water increased the longer the The time the paper towel was submerged.
4. The effect that the water is being absorbed by the paper towel is caused by Submersion time.

# Variables

- Conditions, observations, and measurements that **change** during an experiment are called **variables** because *they do not stay the same*. *These conditions vary.*
- **Variables are any experimental conditions that change that are measured.**
- A condition you change in an experiment is known as the **manipulated variable**.
- **The manipulated variable is called the independent variable.**
  - *The independent variable = the “I change” variable.*

- The response to the changes you made is known as the responding variable.
- The responding variable is called the  
**dependent variable.**
  - *The dependent variable depends on what I change.*

# Answer 1

**1. Which variable is the “I change” variable?**

- a. The independent variable**
- b. The dependent variable**
- c. All of the above**
- d. None of the above**

# Answer 2

**2. Which variable is the “depends on what I change” variable?**

**a. The independent variable**

**b. The dependent variable**

**c. All of the above**

**d. None of the above**



# Variables

- All experiments involve a cause and an effect.
- **The independent variable (IV) causes the dependent variable (DV).**
- Which variable is the cause?  
*The independent variable.*
- Which variable is the effect?  
*The dependent variable.*

## Variables are measured..

Time paper towel submerged (s)	Distance the liquid rose in towel (cm)			Mean Distance (cm)	Mean speed
	Trials				
	1	2	3		
10					
20					
30					
40					
50					
60					

What is the independent variable (the cause)?

**Time paper towel submerged (time).**

What is the dependent variable (the effect)?

**Distance the liquid rose/ distance (absorption).**

# Hypothesis

- In an experiment some sort of **effect** is observed.
- That effect is **caused** by something.
- When we perform an experiment we try different “**causes**” in the hopes of getting a desired “**effect**.”
- The prediction that a certain cause will result in a certain effect is called a **hypothesis**.

Example: **If** water is heated, **then** the water will become hot.

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

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

# Hypothesis

4. If the **submersion time** is **increased**  
(independent variable) (explain how the independent is changed)  
then the **absorption** will \_\_\_\_\_.  
(dependent variable) (explain how the dependent will change)

**increase/ decrease**

# Controlling an Experiment

- In an experiment, **usually one condition is changed** or varied **to cause the subject to respond**.
  - **This cause is called the independent variable.**
- If the experiment is successful, **the subject will respond to the cause**.
  - **This response is called the dependent variable.**
- In order to determine the cause of the response **we usually change just one condition** and we do not change anything else.
- In this way we are **controlling the experiment**. The things we do not change are called constants.
- Experimental controls are the experimental conditions that remain constant.

# Controlling the Experiment with Constants

- **In an experiment anything that is not a variable is a constant.**
- **Controlling the variables** means I (we) keep all conditions the same except for the **independent variable.**
- *(if the experiment is successful the dependent variable changes when we change the IV)*
- **Name some things in our experiment we did not change.**

# Controlling the Experiment with Constants

- **In an experiment anything that is not a variable is a constant.**
- **Controlling the variables** means keeping all conditions the same except for the independent variable.
- Constants:
  - Amount of water
  - Type of water (tap water)
  - Temperature of the water
  - Type of paper towel
  - Size of paper towels



# The Control

- Another term for changes to an experimental conditions is the independent variable.
- **The control** - The independent variable is not changed or is not applied to the experimental subject.
  - the part of the experiment that is designed without variables to support the hypothesis.

# Graphing

- X axis: independent variable.
- Y axis: dependent variable.

## Variables are measured..

Time paper towel submerged (s)	Distance the liquid rose in towel (cm)			Mean Distance (cm)	Mean speed
	Trials				
<b>IV</b>	1	2	3	<b>DV</b>	
10					
20					
30					
40					
50					
60					

**What is the independent variable?**

**Time paper towel submerged (time).**

**What is the dependent variable?**

**Mean distance the liquid rose (distance).**

## Variables are measured..

Time paper towel submerged (s)	Mean Distance the liquid rose in towel (cm)	Mean speed
<b>X</b>	<b>y</b>	
10	1.5	
20	2.3	
30	2.8	
40	3.5	
50	3.6	
60	4.0	

**What is the x axis label?**

**Time paper towel submerged (time).**

**What is the y axis label?**

**Mean distance the liquid rose (distance).**