

1. Controlled Experiments

Controlled Experiments



<https://www.youtube.com/watch?v=VhZyXmgIFAo>

- What is the **purpose** of Mark and Molly's experiment?

To see how much water their plants need

<u>Variable</u>	<u>Mark</u>	<u>Molly</u>
Sunlight	<i>Lots of sunlight (plant by window)</i>	<i>No sunlight (plant in closet)</i>
Water	<i>100mL water once a week</i>	<i>100mL of water 3 times a week</i>

Whose plant do you think will grow more? Why?
I predict that...

Because...

What were the results?

Mark's plant grew taller and healthier than Molly's

What is wrong with the experimental design?

*There were 2 different variables : amount of sunlight
amount of water*

When the same amount of sunlight is given...



*the plant responded better with the amount
of water that Molly gave. (watered 3 times a week)*

Controlled Experiment:

A scientific test where only one factor is changed at a time while the others remain the same.

Independent Variable:

- Definition: The variable that is changed in a scientific experiment to test the effects of the dependent variable
- The independent variable in Mark and Molly's experiment is:
Amount of water



Dependent Variable:

- Definition: The variable being tested & measured in a scientific experiment
- The dependent variable in Mark and Molly's experiment is:
Plant height

Control variable

Factors that stay the same in an experiment

Consider this scenario: Ex: type of plant, amount of sunlight

You have two fish – one goldfish and one Siamese fighting fish. You give them the same amount of food each day at the same time. One of the fish is in fresh water and the other is in saltwater. The objective of the experiment is to find out which type of fish consumes more food.

- What is the purpose of this experiment?
To find out which type of fish consumes more food
 - How would you redesign this experiment to make it controlled?
Have two fish that are both freshwater fish or saltwater fish
 - Identify the independent and dependent variable in your redesigned experiment:
 - Independent: Type of fish
 - Dependent: Amount of food consumed
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Practice 1:

You want to find out in which season plants grow faster. You take a cactus and measure its growth during one month in spring. In the autumn, you measure a fern's growth for one month and compare the results.

- What is the purpose of this experiment?

To find out in which season plants will grow faster

- How would you redesign this experiment to make it controlled?

Make the plants the same => either use just cacti or use just ferns

- Identify the independent and dependent variable in your redesigned experiment:

- Independent: Season

- Dependent: Height of plant

Practice 2:

On a cloudy Monday you have vanilla ice cream and it melts in 5 minutes. On a sunny Tuesday, you have frozen yogurt and it melts in 3 minutes. You conclude that frozen yogurt melts faster than ice cream.

- What is the purpose of this experiment?

To find out how quickly the desserts melt



- How would you redesign this experiment to make it controlled?

Have each type of dessert in the same weather at the same time

- Identify the independent and dependent variable in your redesigned experiment:

- Independent: Type of dessert

- Dependent: Melting rate

Scenario #1:

You and your friend are baking muffins. You both follow the exact same recipe but he only has whole-wheat flour in his house and you have white flour. He forgets to set the timer and bakes for an extra 15 minutes. Your muffins rise more than his. You determine that white flour is better for baking muffins.

- What is the purpose of this experiment?

To determine which type of flour is better for baking muffins

- How would you redesign this experiment to make it controlled?

Bake the two batches for the same amount of time.

- Identify the independent and dependent variable in your redesigned experiment:

- Independent: Type of flour

- Dependent: How much the muffins rise

Scenario #2:

You have an apple tree and an orange tree in your backyard and want to test the effect of fertilizer on tree growth. They get the same amount of rain and sunlight. You give special fertilizer to the apple tree only to see if it helps it grow faster.

- What is the purpose of this experiment?

To test the effect of fertilizer on tree growth.

- How would you redesign this experiment to make it controlled?

Have the same type of tree

- Identify the independent and dependent variable in your redesigned experiment:

- Independent: Amount of fertilizer given

- Dependent: Tree growth

Scenario #3:

You have an old Volkswagen and your brother drives a brand new Toyota. You are both driving safely to your cabin at the same speed starting with a full tank of gas. You run out of gas first. He says that it is because your car is older.

- What is the purpose of this experiment?

To see how the age of a car affects gas consumption

- How would you redesign this experiment to make it controlled?

Have the same type of car, but one older and one newer

- Identify the independent and dependent variable in your redesigned experiment:

- Independent: Age of car

- Dependent: How quickly the gas runs out

