

In your notebook...

Title your notes
“Scientific Method and
Controlled Experiment”

For this assignment you will...

- USE PENCIL
- Use the examples you picked up from the back.
- illustrated (draw) beneath the example you pasted.
- Answer questions.
- Check your work and make appropriate corrections.
- Take required and additional notes.
- Show me for credit.

Paste example #1 into your book

		I am growing 2 batches of tomatoes. In both batches, I planted the same type of tomato seeds, the same number of tomato seeds, I used the same type of soil, I'm watering both batches with 100 mL faucet water. In one batch however one is given a mixture of sugar water.	

DRAW EXAMPLE #1 IN YOUR NOTEBOOK.

- I am growing 2 batches of tomatoes. In both batches, I planted the same type of tomato seeds, the same number of tomato seeds, I used the same type of soil, I'm watering both batches with 100 mL faucet water. However, batch 2 is given a mixture of sugar water to see if the sugar will produce sweeter tomatoes.

Batch 1

Batch 2

1. Describe the control group.
2. Describe the experimental group.
3. Identify the controlled variables of the experiment.
4. Identify the independent variable of the experiment.
5. Identify the dependent variable of the experiment.

Example #1

- I am growing 2 batches of tomatoes. In both batches, I planted the same type of tomato seeds, the same number of tomato seeds, I used the same type of soil, I'm watering both batches with 100 mL faucet water. In one batch however one is given a mixture of sugar water to see if the sugar will produce sweeter tomatoes.

Paste example #2 into your book

		<p>Fish require oxygen to live. You've learned that plants photosynthesize to make their own food and release oxygen as a result. You have designed an experiment to see adding plants to your aquarium will produce bigger fish. In one aquarium you have 5 goldfish. In another aquarium you have 5 goldfish with 20 branches of elodea plants. You feed both aquariums of goldfish 20 flakes. You keep the water of both tanks at the same temperature. You change the water of the fish tanks every 5 weeks. Both are placed in the same spot in the room next to the window.</p>		

Draw example #2 in your notebook

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Tank 1



Tank 2



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Paste example #3 into your book

	I design an experiment to test the effectiveness of various household cleaners on grape juice stains. I take a large piece of carpet and spill 250 mL of grape juice. I do this 3 more times for a total of 4 stains. Every stain diameter. Using just a sponge and water, I rub the first stain with water for 3 minutes. Using just a sponge and lysol, I rub the second stain for 3 minutes. Using just a sponge and simple green, I rub the third stain for 3 minutes. Using just a sponge and Mr. Clean, I rub the fourth stain for 3 minutes.	

Draw example #3 in your notebook

- I design an experiment to test the effectiveness of various household cleaners on grape juice stains. I take a large piece of carpet and spill 250 mL of grape juice. I do this 3 more times for a total of 4 stains. Every stain is 6 inches in diameter. Using just a sponge and water, I rub the first stain with water for 3 minutes. Using just a sponge and lysol, I rub the second stain for 3 minutes. Using just a sponge and simple green, I rub the third stain for 3 minutes. Using just a sponge and Mr. Clean, I rub the fourth stain for 3 minutes.

Does your drawing look something like this?

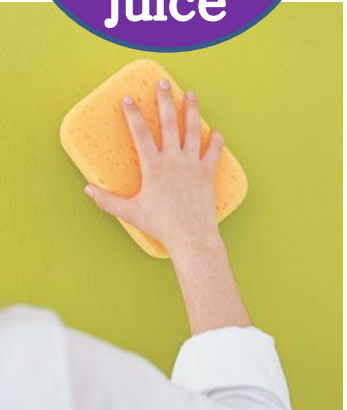
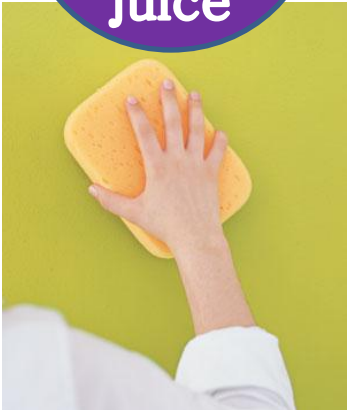
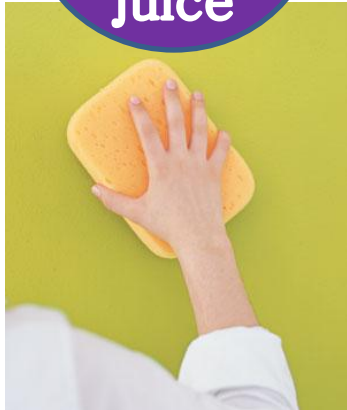


250mL
grape
juice

250mL
grape
juice

250mL
grape
juice

250mL
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juice



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Paste example #4 into your book

		I design an experiment to see what environment preserves white bread the best. I go to the store and buy 4 loaves of white bread. I set one loaf of bread on the kitchen counter where it normally sits. I then place the other loaves of bread in the microwave oven, refrigerator, and freezer. All the loaves of bread stay in their positions for 1 month without being moved or disturbed. After the 1 month, I observe to see which bread has been preserved the best.	

DRAW example #4

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Example #4

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Paste example #5 into your book

	<p>Does tire pressure have an effect on gas mileage? Your manual for your car recommends your tires to have a tire pressure of 22 psi. You design an experiment to see if tire pressure affects gas mileage. You fill your car up with gas, check the tire pressure to make sure it is at 22 psi, reset the odometer trip to "zero", and drive your car until your tank of gas is empty. To have an accurate reading, you</p>	

No need to draw.

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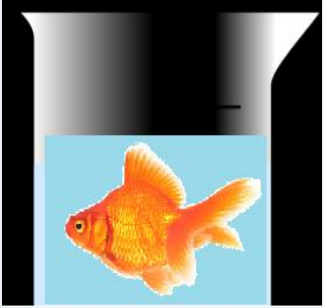
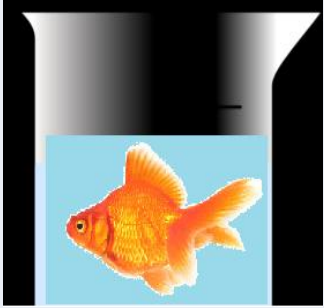

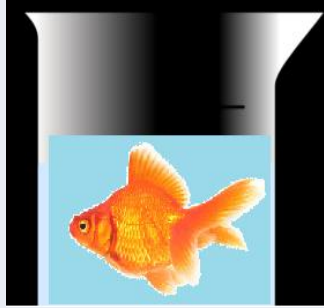
Example #5

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Paste example #6 in book and DRAW!

A controlled experiment was set up to identify the effects varying cold water temperatures on the respiration rate of goldfish (Respiration or breathing is the way organisms exchange gases with their environment). A gold fish was placed into a 1000mL beaker containing water at room temperature, 28 degree Celsius. In one minute a student counted the number of time the gills of fish open and closed. A second 1000 mL beaker with a water temperature of 23 degree Celsius was set up. The same gold fish was placed into the beaker. In one minute the student counted the number of time the gills of fish open and closed. The fish was removed from the second beaker and placed into the first beaker with the room temperature water. The fish stayed there for 5 minutes returning its respiration to normal. A third 1000 mL beaker with a water temperature of 18 degree Celsius was set up. The same gold fish was placed into the beaker. In one minute the student counted the number of time the gills of fish open and closed. The fish was removed from the third beaker and placed into the first beaker with the room temperature water. The fish stayed there for 5 minutes returning its respiration to normal. A fourth 1000 mL beaker with a water temperature of 15 degree Celsius was set up. The same gold fish was placed into the beaker. In one minute the student counted the number of time the gills of fish open and closed. The fish was removed from the fourth beaker and placed into the first beaker with the room temperature water. The fish stayed there for 5 minutes returning its respiration to normal.

Does your drawing look something like this?

Water at 28`C	Water at 23`C	Water at 18`C	Water at 15`C
Control group	Experimental group		
			

1. Describe the control group.
2. Describe the experimental group.
3. Identify the controlled variables of the experiment.
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Example #6

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Check your work!

Fix your incorrect answers

Answers to example #1

- Control group - The batch of tomatoes being watered with plain 100mL of water.
- The experimental group - The batch of tomatoes being watered with 100mL of sugar water.
- Controlled variables - Same type of seeds, number of seeds, same type of soil and 100mL
- Independent variable - Sugar water mixture
- Dependent variable – sweeter tomatoes

Answers to example #2

- Control group – the tank without the plants
- Experimental group – the tank with the plant
- Controlled variables – same tank, same type fish, same amount of fish, same location, same amount of food, water temperature, change water 5 weeks,
- Independent variable – elodea plants
- Dependent variable – bigger fish

Answers to example #3

- Control group - The stain being cleaned with using just a sponge and water for 3 minutes.
- Experimental group - The other 3 stains being cleaned with the sponge and various cleaners for 3 minutes.
- Controlled variables - The same type of carpet, 250 mL of grape juice, 6 inches in diameter stain, the sponge and the cleaning for 3 minutes.
- Independent variable - Type of cleaner.
- Dependent variable – effectiveness

Answers to example #4

- Control group - The bread on the kitchen counter
- Experimental group - The other 3 bread in the different storage areas (microwave, refrigerator, and freezer).
- Controlled variables - The same type of bread and sitting for 1 month undisturbed.
- Independent variable - Type of storage area.
- Dependent variable – preserved best

Answers to Example #5

- Control group – when the car was driven at 22psi
- Experimental group – when the car was driven at 32psi and 15 psi
- Controlled variables – same car, same type of gas, same gas station, driving the car until empty, checking tire pressure every 2 days.
- Independent variable – tire pressure
- Dependent variable – gas mileage

Answers to example #6

- Control group – when the gold fish was placed into the 1000mL beaker at room temperature
- Experimental group - when the gold fish was placed into the 1000mL beaker at 23, 18, and 15 degree Celsius .
- Controlled variables – same gold fish, 1000mL beaker, student counting for 1 minute, gold fish being returned to room temperature water for 5 minutes.
- Independent variable – water temperature
- Dependent variable – respiration rate



Scientific Method & Controlled

Experiment

- The scientific method is a guide used to **solve problems**. It involves asking questions, developing explanations, testing those explanations, making observations, in an orderly way.
- The **control** group provides a benchmark to test the effects of the variable. Think of it as the “normal” group.
- The **experimental** group that tests the independent variable in a controlled experiment. Think of it as the one that your “testing”.
- The **controlled variables** are the factors in an experiment that doesn't change between the control group and the experimental group.
- The **independent variable** is the factor in an experiment that differs between the control group and the experimental group.
- The **dependent variable** is the factor that is driven by or the result of the independent variable. Must be measurable.

Lab report format using the scientific method

- I. State the purpose or Identify the problem.
- II. Make a hypothesis
- III. Perform the experiment
 - A. Materials
 - B. Procedure
- IV. Organize the Data
 - A. Recorded (or “raw”) data
 - B. Processed data
 - C. Graphs
- V. Analysis
- VI. Conclusion