

**Section A: Senses Lab**

Students will use the scientific method to determine whether sight, touch or sound is the fastest reflex. Create a hypothesis before doing the experiment. Hypothesis: \_\_\_\_\_

*Procedure:*

1. Partner with another student. One student will drop the ruler and one will catch the ruler.
2. The student dropping the ruler holds the top of the ruler vertical at the 30 cm end. The student catching the ruler puts the top of their index finger and thumb at the 0 cm mark.
3. Once the student drops the ruler, the catcher tries to catch the ruler. Record the measurement of the top part of their index finger. Repeat this three times.
4. Touch – Student closes eyes and the student dropping the ruler taps their partner as the ruler is released.
5. Sound – Student closes eyes and the student dropping the ruler says “now” as the ruler is released.

*Data:*

Trial	Sight	Touch	Sound
1			
2			
3			
4			
Average			

*Analysis and Conclusion:*

- Why were the results averaged? \_\_\_\_\_
- What variable did you change in the experiment? \_\_\_\_\_
- What happened when you changed the variable? \_\_\_\_\_

**Section B: Spontaneous Generation Theory**

1. For centuries, people based their beliefs on the interpretations of what they saw going on in the world around them without testing their ideas to determine the validity of these theories – in other words, they didn’t use the scientific method. Among these ideas, people believed that simple living organisms could come into being by spontaneous generation. This was the idea that non-living objects can give rise to living organisms. **OBSERVATION:** Every year in the spring, the Nile River flooded areas of Egypt along the river, leaving behind nutrient-rich mud that enabled the people to grow crops. However, along with the muddy soil, large numbers of frogs appeared that weren’t around in drier times. **CONCLUSION:** It was perfectly obvious to people back then that muddy soil gave rise to frogs.

Suppose you are the scientist wanting to disprove this theory. After creating your hypothesis, what would you do next to disprove this theory? \_\_\_\_\_

**Section C: Animation**

Click on “Animation” under “Websites-Cells” page. Watch the animation. Answer these questions.

1. What are the steps of the scientific method? \_\_\_\_\_
2. Francesco Redi experiment: What factor did he change (independent variable)? What was the result from the change (dependent variable)? \_\_\_\_\_
3. Louis Pasteur experiment: What factor did he change (independent variable)? What was the result from the change (dependent variable)? \_\_\_\_\_

**Section D: Vocabulary**

Match the correct vocabulary word with the definition.

- a. constant
- b. data
- c. independent variable
- d. experimental group
- e. control group
- f. experiment
- g. hypothesis
- h. dependent variable

1. \_\_\_\_\_ a testable explanation of a situation
2. \_\_\_\_\_ a procedure that tests a hypothesis by collecting information under controlled conditions
3. \_\_\_\_\_ in an experiment, the group that is the standard against which results are compared
4. \_\_\_\_\_ in an experiment, the group that is exposed to the factor being tested
5. \_\_\_\_\_ the factor that remains fixed in an experiment
6. \_\_\_\_\_ the condition being changed
7. \_\_\_\_\_ the factor that results from or depends on the changed variable
8. \_\_\_\_\_ information gained from observation

**Section E: Ants That Count!**

Click on "Ants That Count!" under "Websites-Cells" page. Watch the video and answer these questions.

1. How are the desert ants different from other ants? \_\_\_\_\_
2. What is the hypothesis being tested? \_\_\_\_\_
3. What is the independent variable? \_\_\_\_\_
4. What is the dependent variable? \_\_\_\_\_

**Section F: Scenarios – Read the scenarios.**

1. Hypothesis: Plants will grow taller when given Miracle Grow. Experiment: Plants A and B are both given the same amount of light, water and are stored at the same temperature. Plant A is given Miracle Grow.
  - a. Control group = \_\_\_\_\_
  - b. Experimental group = \_\_\_\_\_
  - c. Independent variable = \_\_\_\_\_
  - d. Dependent variable = \_\_\_\_\_
  - e. What are the constants in this experiment? \_\_\_\_\_



2. Can blueberries slow down aging? A study indicates that antioxidants found in blueberries may slow down the process of aging. In this study, 19-month old rats (equivalent to 60-year old humans) were fed either their standard diet or a diet supplemented by either blueberry, strawberry or spinach powder. After eight weeks, the rats were given memory and motor tests. Although all supplemented rats showed improvement, those who received the supplement showed the most notable improvement. (<http://www.apa.org/monitor/dec01/blueberries.html>)
  - a. Control group = \_\_\_\_\_
  - b. Independent variable = \_\_\_\_\_
  - c. Dependent variable = \_\_\_\_\_

3. Elodea, a water plant commonly found in aquariums, gives off bubbles of oxygen when placed in bright light. Students in a biology class noted that if a light were placed at different distances from the plant in an aquarium, the rate of bubble production varied. The following data table shows the average results from several trials.

Elodea Bubble Production	
Distance from Light (cm)	Bubble Production Rate (bubbles/min)
10	40
20	20
30	10
40	5
50	3

- a. Independent variable = \_\_\_\_\_
  - b. Dependent variable = \_\_\_\_\_
  - c. Type of data represented = \_\_\_\_\_
4. If cows are given a growth hormone, then they will increase in size. One cow is fed a growth hormone and another cow is not. After a year, both cows are weighed.
  - a. Control group = \_\_\_\_\_
  - b. Independent variable = \_\_\_\_\_
  - c. Dependent variable = \_\_\_\_\_

5. Anna conducted an experiment using green algae. She put equal amounts of water into two identical containers and maintained the water level throughout the experiment. Next she added equal amounts of green algae to both containers. Container 1 received full sunlight while Container 2 was placed in the dark. After two weeks, what will Anna most likely find in Containers 1 and 2?
  - a. no algae in either container
  - b. abundant algae in both containers
  - c. no algae in Container 1 and abundant algae in Container 2
  - d. algae in Container 1, but no algae in Container 2
6. Should an experiment test only one variable at a time? Why or why not?
  - a. Yes, an experiment should only test one variable at a time. That way, the experiment will only have to be performed once.
  - b. Yes, an experiment should only test one variable at a time. This ensures that the experimental outcome is clearly due to one identifiable factor.
  - c. No, it is not necessary to test only one variable per experiment.
  - d. As long as the experiment is repeated, it doesn't matter how many variables are used.
7. Two garden plots were planted with corn. The soil was similar in each, and equal amounts of water were applied to each plot. One plot was fertilized and the other was not. The experimenter measured the yield as bushels of corn from each plot. The plot that did not receive the fertilizer was the \_\_\_\_\_.
  - a. Independent variable
  - b. dependent variable
  - c. experimental group
  - d. control group

**Section G: Crime Investigation LAB ---- Where Did Tony Drown? Was it an Accident?**

Adapted from: Rachel Lytle from F.H. LaGuardia High School in Manhattan

Notorious ex-mobster Tony LaGuardia was found drowned in the Atlantic Ocean off of Coney Island at 7 o'clock this morning. The coroner determined that the cause of death is drowning. Tony's son, Mario is in disbelief. Mario tells police that his father was a good swimmer and there is no way his father could have drowned by accident. Mario suspects foul play. If Tony's death was not an accident then who killed him? Your team has been given a sample of white powder found embedded under Tony's fingernails.

- Suspect #1- Johnny "Sack" Sacramonti, Tony's former organized crime partner, is upset that Tony has left the mob where they were trafficking illegal drugs.
- Suspect #2- Kris David, an artist Tony hired to make a plaster fresco in his dining room. Kris was heard by nosy neighbors fighting with Tony over payment for the work he completed.
- Suspect #3- Jennifer Melfi, Tony's ex-mistress, is a sultry woman with extremely smelly feet and is known for generously powdering her feet with foot powder. Jennifer is upset at Tony for breaking off their relationship.
- Suspect #4- Tony and Paulie Walnuts operated a car repair shop located near Central Park where there are freshwater ponds. Paulie has been overheard complaining that Tony was cheating her out of her share of the business profits. Paulie is known for her love of donuts covered in white powdered sugar.

**Test #1:** You will use chemical tests to identify the white powder found under Tony's nails.

1. Test one powder at a time. Place ¼ teaspoon of the known powder into a test tube.
2. Carefully pour 2 ml of acetic acid into a test tube. Record the results. (reaction or no reaction)
3. Repeat step 1-3 for each known powder and the unknown powder collected from the victim's nails.

Data Table 1:

Substance	Reaction with Acetic Acid
Drugs	
Plaster dust	
Foot powder	
Powdered sugar	
Unknown powder	

**Post Lab Questions:**

1. What is the independent and dependent variable in test #1?  
 IV = \_\_\_\_\_ DV= \_\_\_\_\_
2. Based on the evidence, who committed the crime?