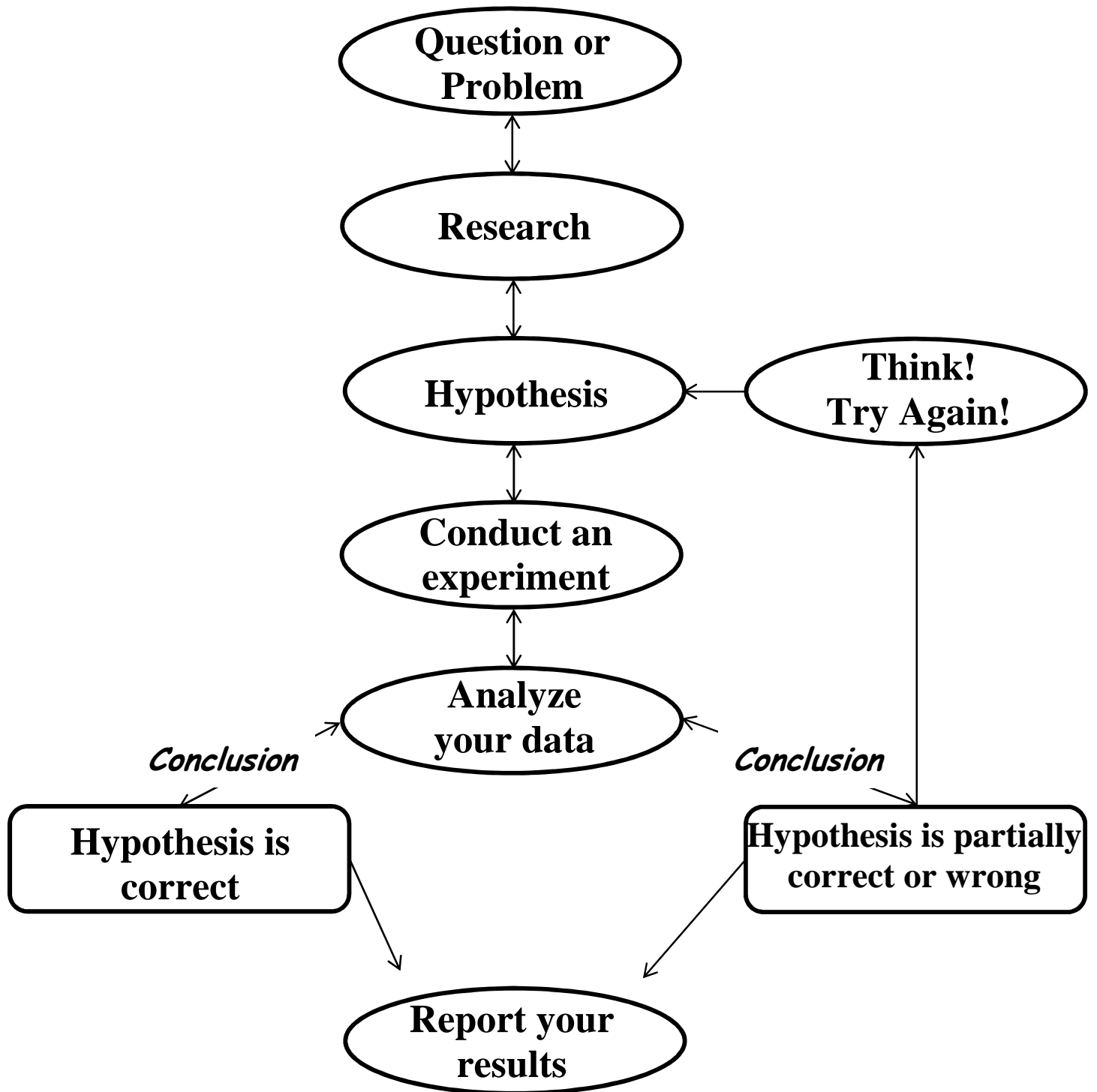


Objective: Understand the Nature of Science

- Understand that science investigations use a variety of methods and do not always use the same set of procedures; understand that there is not just one "scientific method."
- Science findings are based upon evidence.

The Scientific Method



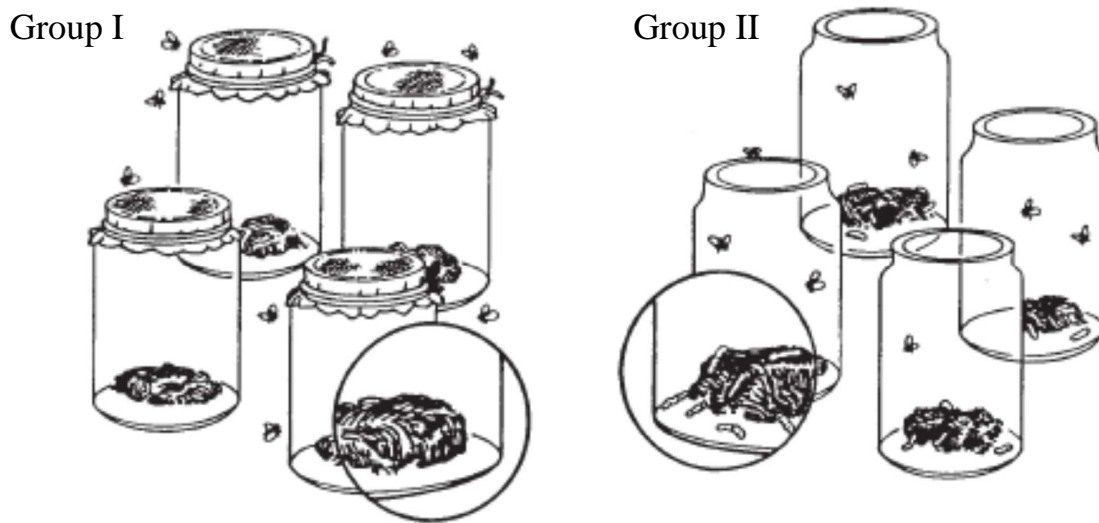
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Name: _____ Class: _____ Date: _____

Introduction to the Scientific Method Worksheet

Long ago, many people believed that living things could come from nonliving things. They thought that worms came from wood and that maggots came from decaying meat. This idea was called spontaneous generation. In 1668, an Italian biologist, Francesco Redi, did experiments to prove that maggots did not come from meat. One of his experiments is shown below.



Redi placed pieces of meat in several jars. He divided the jars into two groups. He covered the first group of jars with fine cloth. He left the second group of jars uncovered. Redi observed the jars for several days. He saw flies on the cloth of the covered jars, and he saw flies laying eggs on the meat in the uncovered jars. Maggots appeared only on the meat in the group of jars left uncovered.

Questions

1. Which is not a step in the scientific method?

- | | |
|-------------------------|----------------------------------------|
| a. Problem or question. | c. Ask other people for their opinion. |
| b. Research. | d. Arrive at a conclusion. |

2. What was the problem in Redi's experiment?

- How do maggots appear in meats?
- How do worms appear in wood?
- Is spontaneous generation a valid explanation for maggots in meats?
- All of the above are examples of problems.

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3. What do you think his hypothesis was?

- a. Maggots grow through spontaneous generation.
- b. Maggots come from eggs laid by flies.
- c. Maggots find their way into woods and meats.
- d. The problem cannot be solved.

4. How did he test his hypothesis?

- a. He placed food in two jars, covering one jar and leaving the other uncovered.
- b. He placed food in two jars and left both jars uncovered.
- c. He placed food in two jars and covered both jars.
- d. He put food in one jar and no food in a second jar.

5. What was the variable in his experiment?

- a. Covering both jars.
- b. Covering one jar and leaving the other uncovered.
- c. Leaving both jars uncovered.
- d. There was no variable in this experiment.

6. What do you think Redi's conclusion was?

- a. Living things come from other living things.
- b. Living things are created through spontaneous generation.
- c. He did not have enough data to arrive at a conclusion.

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Can You Spot the Scientific Method Worksheet

Each sentence below describes a step of the scientific method. Match each sentence with a step of the scientific method listed below.

____ 7. Stephen predicted that seeds would start to grow faster if an electric current traveled through the soil in which they were planted.

____ 8. Susan said, "If I fertilize my geranium plants, they will blossom."

____ 9. Jonathan's data showed that household cockroaches moved away from raw cucumber slices.

____ 10. Rene grew bacteria from the mouth on special plates in the laboratory. She placed drops of different mouthwashes on bacteria on each plate.

____ 11. Kathy used a survey to determine how many of her classmates were left-handed and how many were right-handed.

____ 12. Jose saw bats catching insects after dark. He asked, "How do bats find the insects in the dark?"

____ 13. Justin wondered if dyes could be taken out of plant leaves, flowers, and stems.

____ 14. Alice soaked six different kinds of seeds in water for 24 hours. Then she planted the seeds in soil at a depth of 1 cm. She used the same amount of water, light, and heat for each kind of seed.

____ 15. Bob read about growing plants in water. He wanted to know how plants could grow without soil.

____ 16. Kevin said, "If I grow five seedlings in red light, I think the plants will grow faster than the five plants grown in white light."

____ 17. Angela's experiment proved that earthworms move away from light.

____ 18. Scott said, "If acid rain affects plants in a particular lake, it might affect small animals, such as crayfish, that live in the same water."

____ 19. Michael fed different diets to three groups of guinea pigs. His experiment showed that guinea pigs need vitamin C and protein in their diets.

A. Recognize a problem

B. Form a hypothesis

C. Test the hypothesis with an experiment

D. Draw conclusions

A. Recognize a problem

B. Form a hypothesis

C. Test the hypothesis with an experiment

D. Draw conclusions

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____ 20. Kim's experiment showed that chicken eggshells were stronger when she gave the hen feed, to which extra calcium had been added.

Dinosaur Scene - Observation and Inference Worksheet

A time machine has been invented that travels into the past and takes pictures, sending them to the present. You are asked to look at one of the pictures and interpret what you see.

____ 1. The volcano is erupting.	A. Observation
____ 2. The camptosaurus is going to eat the stegosaurus.	B. Inference
____ 3. The stegosaurus will run into the water to escape.	
____ 4. The camptosaurus is leaving tracks in the ground.	
____ 5. The ground where the camptosaurus is walking is wet.	
____ 6. There are plants growing in the water.	A. Observation
____ 7. The camptosaurus is going into the water to eat the plants.	B. Inference
____ 8. There is a tree growing next to the river.	
____ 9. The tree looks like a palm tree.	
____ 10. The climate is warm.	
____ 11. The stegosaurus is eating the plant.	
____ 12. The stegosaurus is an herbivore.	
____ 13. There are bones from a dead animal by the shore.	
____ 14. The camptosaurus killed the animal.	
____ 15. Some more bones are in the water.	
____ 16. The camptosaurus can't swim and will drown.	
____ 17. Lava is coming down the sides of the volcano.	
____ 18. The camptosaurus has sharp teeth for eating meat.	

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Qualitative Observations vs. Quantitative Observations Worksheet

All of the observations in this worksheet were qualitative; that is, you observed a quality about an object (it smelled good, it was green, etc.). Another type of observation is quantitative, meaning that it can be described or measured in concrete numerical terms.

- The following observations are quantitative: There are 30 students in my class. I weigh 98 pounds. I ate a pound of potatoes.

Determine which of the following statements are quantitative and which are qualitative.

_____1. The cup had a mass of 454 grams.	A. Qualitative
_____2. The temperature outside is 250° C.	B. Quantitative
_____3. It is warm outside.	
_____4. The tree is 30 feet tall.	
_____5. The building has 25 stories.	
_____6. The building is taller than the tree.	
_____7. The sidewalk is long.	
_____8. The sidewalk is 100 meters long.	
_____9. The race was over quickly.	
_____10. The race was over in 10 minutes.	

Definition of Key Terms

- **Control** - A part of the experiment that is not being tested and is used for comparison.
- **Variable** - Any part of an experiment that can change.
- **Independent Variable** - The part of the experiment that is changed by the scientists or person performing the experiment.
- **Dependent Variable** - The part of the experiment that is affected by the independent variable.