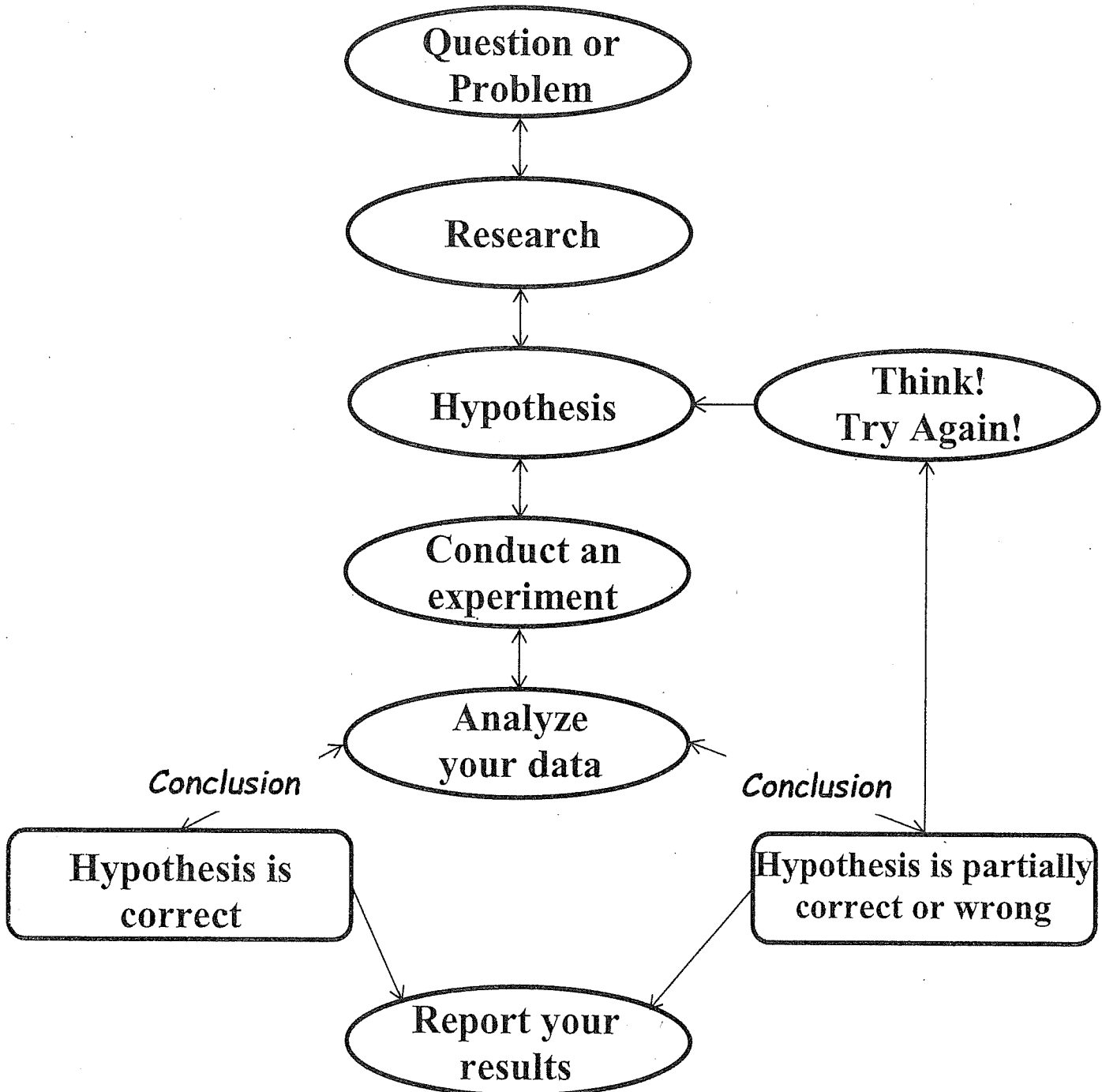


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### Understand the Nature of Science

- 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



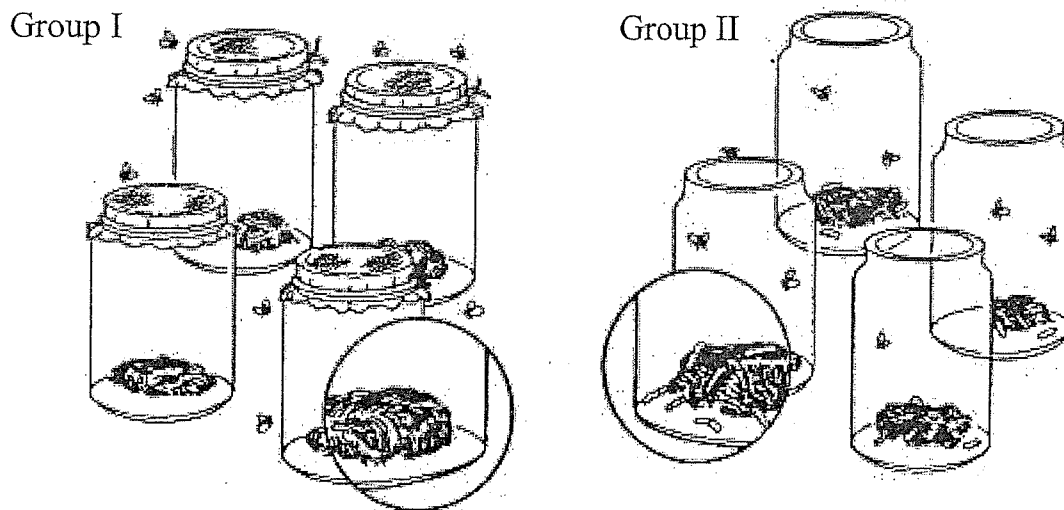
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## Introduction to the Scientific Method Worksheet

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

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

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

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3. What do you think his hypothesis was?

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

4. How did he test his hypothesis?

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

5. What was the variable in his experiment?

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

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

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

## 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.

A. Recognize a problem

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

B. Form a hypothesis

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

C. Test the hypothesis with an experiment

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

D. Draw conclusions

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

A. Recognize a problem

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\_\_\_ 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.

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

B. Form a hypothesis

C. Test the hypothesis with an experiment

D. Draw conclusions

## 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.

\_\_\_ 2. The camptosaurus is going to eat the stegosaurus.

\_\_\_ 3. The stegosaurus will run into the water to escape.

\_\_\_ 4. The camptosaurus is leaving tracks in the ground.

A. Observation

B. Inference

## HYPOTHESIS WRITING

Name \_\_\_\_\_

Date \_\_\_\_\_ Per \_\_\_\_\_

**Step 1: UNDERLINE** the Independent variable and **CIRCLE** the Dependent Variable in each of the questions below.

Step 2: Write a hypothesis for each question. Your hypothesis should be in the format of: “**IF** the (write the manipulated variable) ....., **THEN** the (responding variable) will.....”

1. How does the blade length of a paper helicopter affect its hang time (how long it's in the air)?
2. What effect does distance from a hoop have on the number of shots made (accuracy)?
3. What effect does liquid volume in a glass jar have on the pitch of the sound produced when the jar is struck?
4. What effect does the launch angle of a rubber band have on the distance the rubber band travels?
5. What effect does the mass of a pendulum have on the number of full back and forth swings (periods)?

6. What effect does the height of a ramp have on the distance a cup is pushed by a golf ball that is rolled down the ramp?

7. How does the number of drainage holes in a cup affect its draining time?

8. How does the volume of a jar placed over a candle affect its burning time?

9. How does the number of jumping jacks a person completes affect their heart rate?

10. How does ball drop height affect bounce height?

11. What effect does the mass of a car have on its speed at the bottom of a ramp?

12. What effect does ball type have on bounce height?