**The Scientific Method**

**Question or Problem**

**Research**

**Think!
Try Again!**

**Hypothesis**

**Conduct an experiment**

**Analyze your data**

***Conclusion***

***Conclusion***

**Hypothesis is partially correct or wrong**

**Hypothesis is correct**

**Report your results**

**Key Vocabulary**

***Analyze*** – Examine data collected in an experiment to determine what it means.

***Conclude*** – Reach a decision based on the analysis of data.

***Data*** – Information collected during an experiment.

***Experiment*** – A test that is done to determine if a hypothesis is correct or not.

***Hypothesis*** – Your proposed answer to the question or solution to the problem.

***Inference (Infer)*** – Coming to a conclusion based on your existing knowledge. (Example – seeing a student wearing a sports team jersey and concluding the student likes that team.)

***Observe*** – Watch something carefully.

***Qualitative data*** – Data dealing with descriptions; data is observed (colors, textures, smells, tastes, appearance, beauty, etc.).

***Quantitative data*** – Data which can be measured (length, height, area, volume, weight, speed, time, temperature, etc.).

***Results*** – Outcome of an experiment.

***Tentative*** – Basic results that may or may not be accurate; basic results.

***Variable*** – Something that can be changed.

**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 I 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. | A. Recognize a problemB. Form a hypothesisC. Test the hypothesis with an experimentD. Draw conclusions |

**Observation and Inference Worksheet**

Suppose you are a paleontologist and you have just discovered a layer of rock with many fossils in it, both petrified bones and tracks.



Decide whether the following statements are observations or inferences.

|  |  |
| --- | --- |
| 19. \_\_\_\_\_ There are tracks from three different animals in the rock.20. \_\_\_\_\_ One animal was chasing another animal.21 \_\_\_\_\_. Two different animals died in this spot.22. \_\_\_\_\_ When the animals walked here the ground was wet.23. \_\_\_\_\_ One of the animals that died here had bony plates.24. \_\_\_\_\_ One of the animals that died here had sharp teeth.25. \_\_\_\_\_ The animal that had sharp teeth ate meat. | A. ObservationB. Inference |

**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.\_\_\_\_\_2. The temperature outside is 250o C.\_\_\_\_\_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. | A. QualitativeB. Quantitative |

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***Across***

3. Reach a decision based on the analysis of data.

10. Data which can be measured (length, height, area, volume, weight, speed, time, temperature,

 etc.).

11. A test that is done to determine if a hypothesis is correct or not.

12. Watch something carefully.

***Down***

1. Data dealing with descriptions; data is observed (colors, textures, smells, tastes, appearance,

 beauty, etc.).

2. Basic results that may or may not be accurate; basic results.

4. Your proposed answer to the question or solution to the problem.

5. Outcome of an experiment.

6. Coming to a conclusion based on your existing knowledge. (Example, seeing a student wearing

 a sports team jersey and concluding the student likes that team.)

7. Examine data collected in an experiment to determine what it means.

8. Information collected during an experiment.

9. Something that can be changed.