Scientific Method
&
Inquiry

Qualitative Tools

1. What is qualitative tools?

tools that allow scientists to make observations that do not involve measurement or numbers

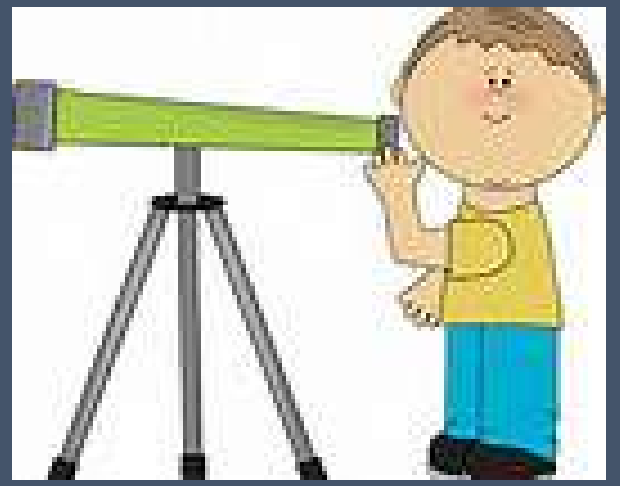
2. What are some examples of qualitative tools?

a) **forceps** – helps one pick up or hold small objects.

b) **hand lens** – makes objects look larger and helps one see more detail

c) binoculars – used to see long objects far away.

d) telescope – instrument designed to make distant objects appear nearer



e) dropper – tool used to drop small amounts of liquid to a certain place.

f) microscope – is a tool that makes small objects appear larger

Quantitative Tools

3. What are quantitative tools?

tools that allow scientists to make observations that do involve measurement or numbers

4. What does the word "reasonable" mean in science?

a measurement that makes sense

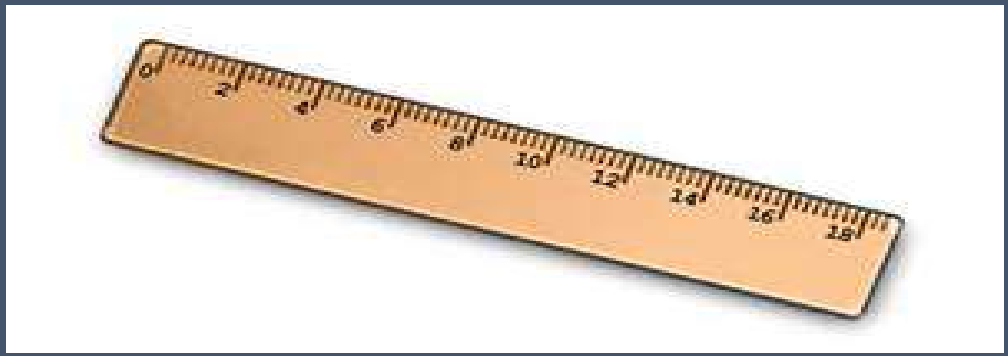
5. What are some examples of quantitative tools?

a) **thermometer -** measures the temperature of liquids and the air.

b) spring scale – measures forces such as weight or friction

c) measuring cup- measures the volume of liquids

d) ruler – measures the length and width of objects in centimeters, inches, or millimeters



e) measuring tape – measures the length of curved irregular surfaces.

f) graduated cylinder – measures the volume of a liquid.

g) balance – measures the amount of matter in an object; measures mass

Use your sense of sight to observe the following picture. Write down as many observations as possible in 1 minute.

Safety in the Lab

6. What are the safety rules in science?

a. Pull long hair back and roll up long sleeves to keep them out of the way.

b. Never eat or drink during a science activity.

c. Don’t drink from lab equipment.

d. Never work in the lab by yourself.

e. Wash your hands with soap and water after cleaning up your work area.

Inquiry Skills

7. Explain the term *investigation*.

a procedure that is carried out to gather data about an object or event.

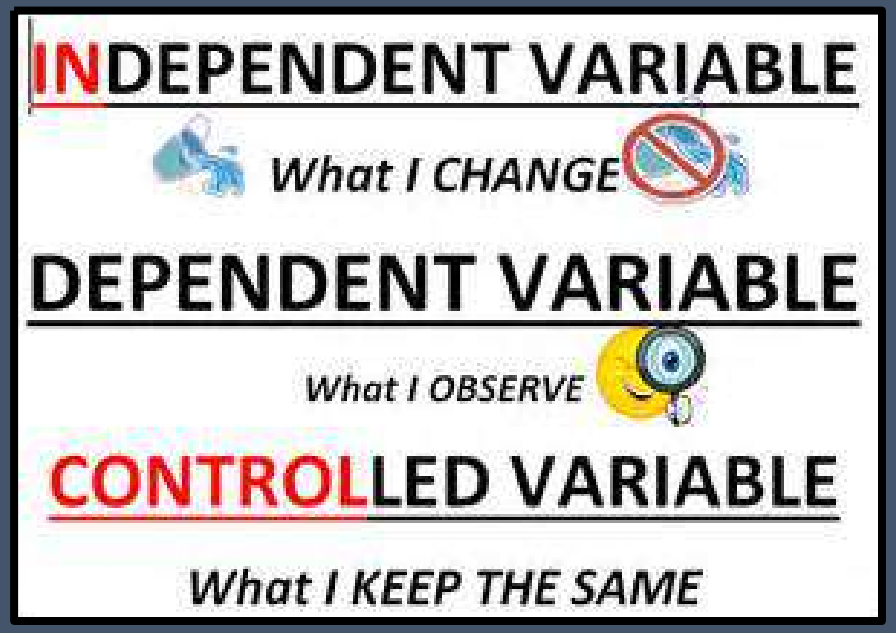
8. Explain the term *inquiry*.

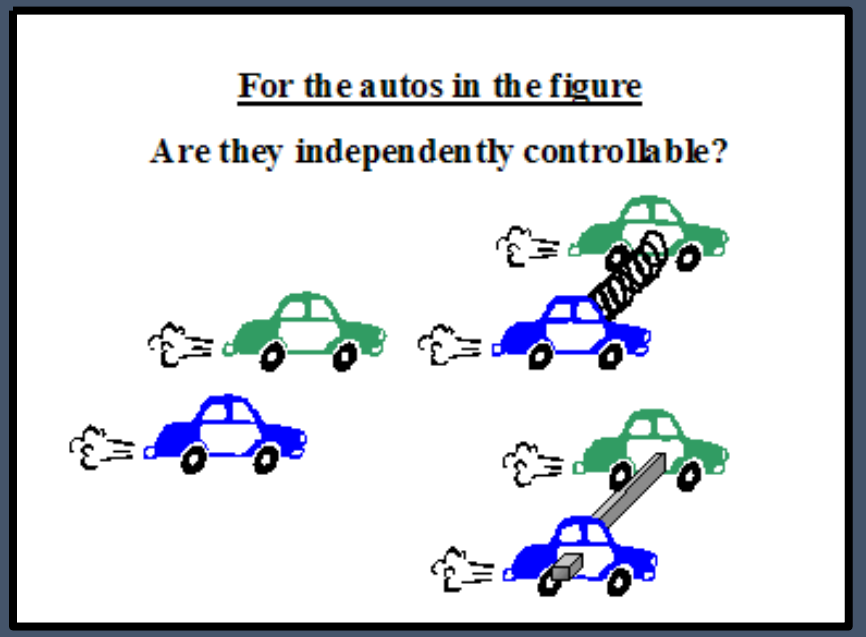
An organized way to gather information so one can answer questions.

9. Explain the difference between a *dependent variable* & *controlled variable*.

a. dependent variable – a variable that may change because of the way one sets up an experiment.

b. controlled variable – a variable that remains the same.



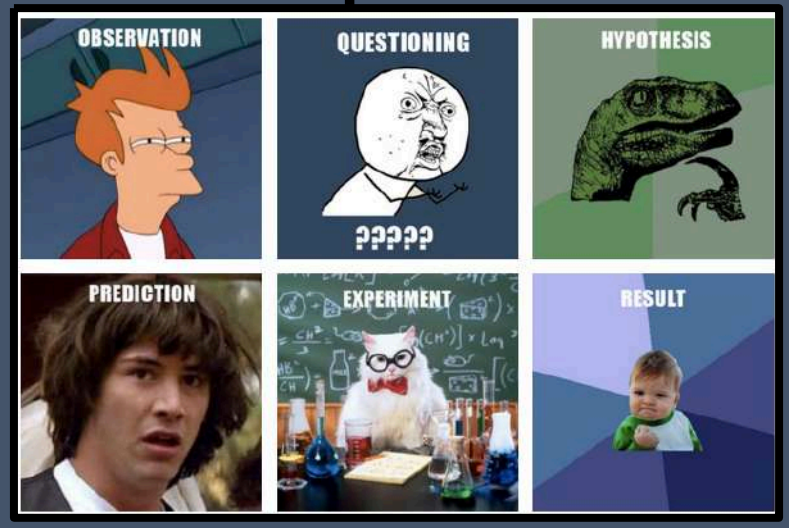


10. Explain the Inquiry Skills.

a. Develop a Testable Question - ask a question that can be answered by conducting a simple investigation.

b. Hypothesize- suggest an outcome or explanation that can be tested in an experiment.

c. Experiment – design a procedure to test a hypothesis under controlled conditions.



d. Controlled Variables – identify and control the factors that can affect the outcome of a experiment.

e. Draw Conclusions – use data and experimental results to decide if your hypotheses is supported.

f. Communication – share results and information visually, orally, or electronically.

Recording and Interpreting Data

11. Why would scientists want to use a criteria in classifying objects?

so that they know how to group **(classify)** certain objects together by their special qualities.

12. How can tables help you draw conclusions?

they present data in a way that makes it easy to see patterns, which can help you draw conclusions.

13. Define the term *conclusion*.

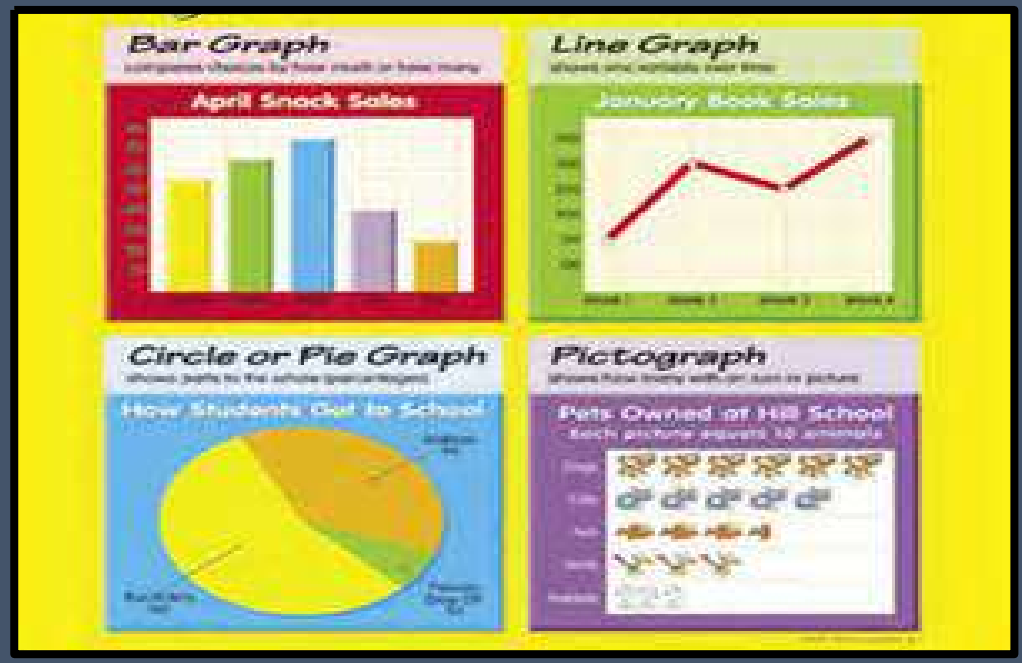
a decision you make based on information.

14. How are tables useful?

They organize data so that you and others can understand and interpret it.

15. How do diagrams make it easier to communicate?

They make complicated information easier to understand.

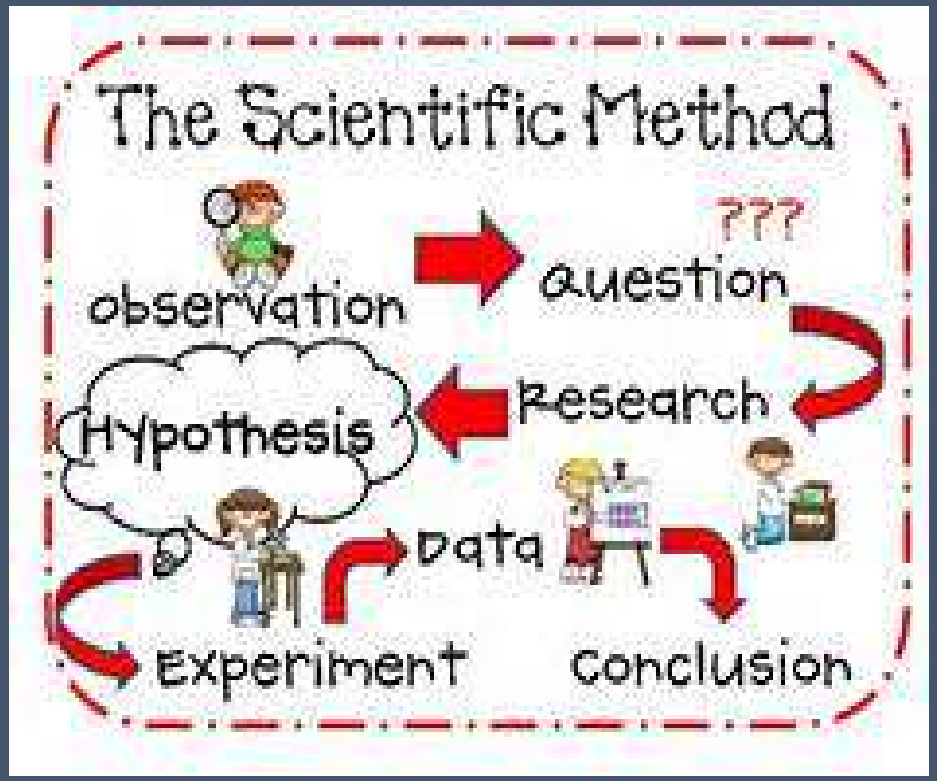


Make a graph

Scientific Method

16. Explain the five steps in the Scientific Method.

a. Observe, and ask questions
b. Form a hypothesis.
c. Plan an investigation.
d. Conduct the investigation.
e. Draw conclusion, and write a report.



17. What is a hypothesis?

a possible answer to a question; it is a statement and it must be testable.

18. What is the first step in planning an investigation?

deciding what variables to control

19. What must you do before you can carry out an investigation?

ask a question and propose a likely answer, decide how to test your hypothesis, write instructions for the procedure, choose materials, and plan how to gather and record data.

20. How can you organize your results?

one can use charts, tables, or graphs

21. Why is it important to write a report?

to communicate with others, this allows the investigation to be carried out by others to make sure that the conclusions are correct.

Technology in Science

22. How does technology benefit science?

it can help scientists be more precise in their observations and measurements.

23. What does it mean to have clear communication in science?

communication must be clear so that they can build on each others work; scientists need to communicate clearly with each other; they need to communicate directly and precisely their findings.

Example:

- There are many crayons in the container. → NOOOOO!
- There is 2 red, 4 black, 8 green, and 7 yellow in the brown cups. → Yes!

24. What does it mean to have a reliable source in science?

always important to look for trustworthy sources such as a science magazine, encyclopedias, and the latest information on the internet.