



Tuesday, Aug 29, 2017

- Pick up: none
- Today you will:
- Review for your quiz by discussing some ppt slides and visiting some stations.
- HOMEWORK: Study!

DSQ-Under your definitions of qualitative and quantitative, write and answer the following question.

- What do you think is more important for scientists to collect, qualitative or quantitative data?

What is the difference between a theory and a law?

- Theory – A system of ideas explaining many related observations and supported by scientific investigation. A theory gives an explanation of why something happens. **A THEORY WILL NEVER BECOME A LAW!**
- Law – A general statement that explains how the natural world behaves. Does not answer “why”. It states what happens every time. Ex: Law of gravity.

How do earth scientists determine the causes of natural events?

- Earth scientists assume that the causes of natural events or phenomena can be determined by careful observation and experimentation.

Investigations are used to answer questions

- **Scientific investigation** is the way in which **scientists** and researchers use a systematic approach to answer questions about the world around us.
- Empirical evidence is information that is acquired by observation, experimentation, or investigations. This evidence is used to inform society's decision making. For example, evidence in polar ice caps have informed scientists that the Earth is warmer today than in the past (co2 levels).

Experimental Design

Hypothesis – Testable idea or explanation that leads to scientific investigation.

All experimental designs must have an independent variable, a dependent variable, and a control group.

Independent variable – Factor manipulated in an experiment. The “if” part of the hypothesis.

Dependent variable – Factor that changes because of the independent variable. The “then” part of the hypothesis.

Control group – Test group not subjected to the independent variable. “Normal conditions”

For Example

Example: What effect does blue light have on plant growth?

Hypothesis?

Independent variable?

Dependent variable?

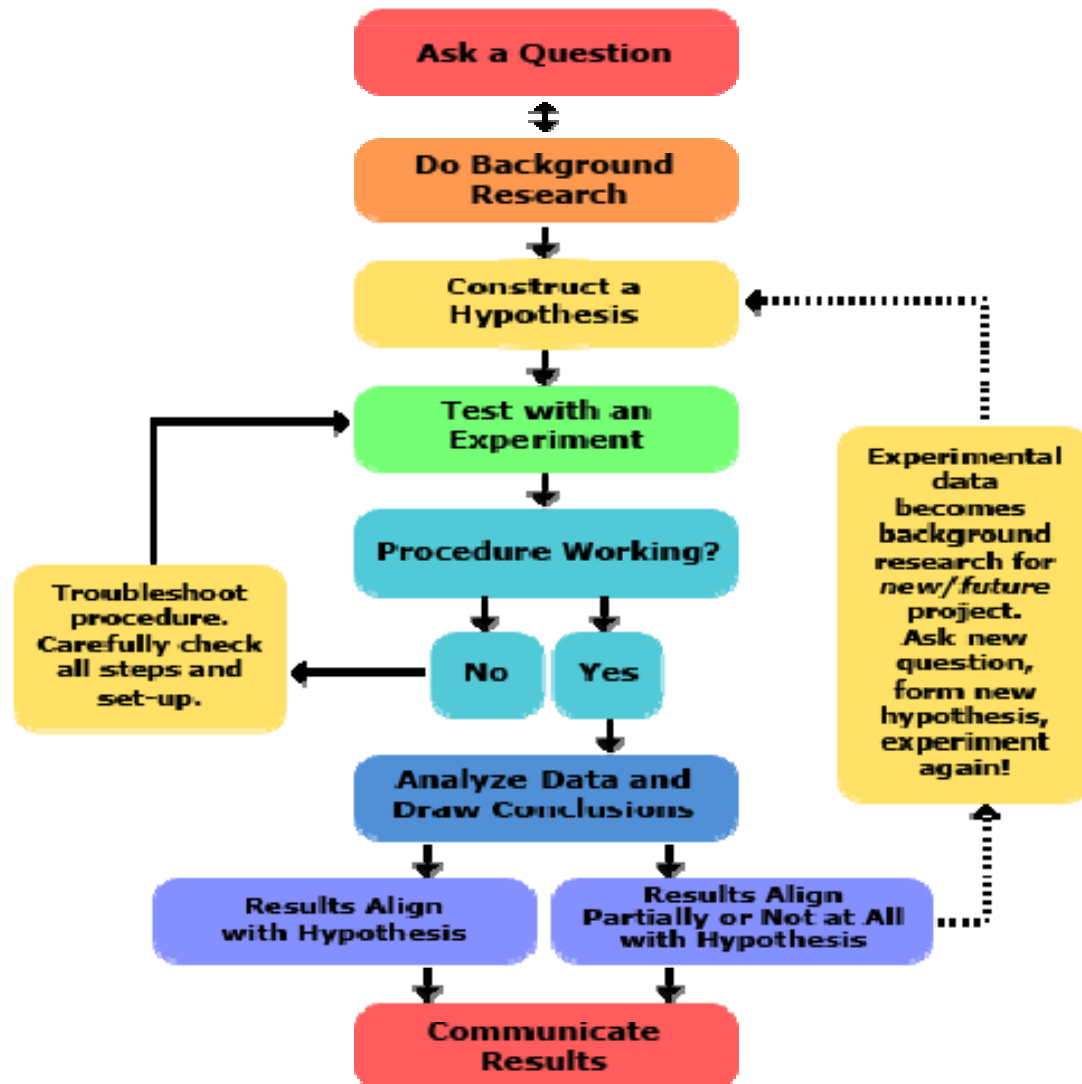
Control group?



Steps of scientific method

1. question/problem/purpose
2. Background research
3. Hypothesis (if...then...)
4. Design experiment
5. Do the experiment
6. Collect data
7. Results
8. Conclusion
9. communication

Scientific Method



How is an investigation's reliability and validity?

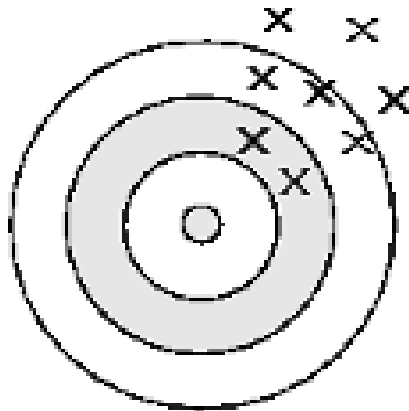
Reliability – The same results will happen during a different experiment. Experiments should be repeated over many times or many test samples should be used.

Validity – the measure of how accurate AND precise an experiment is.

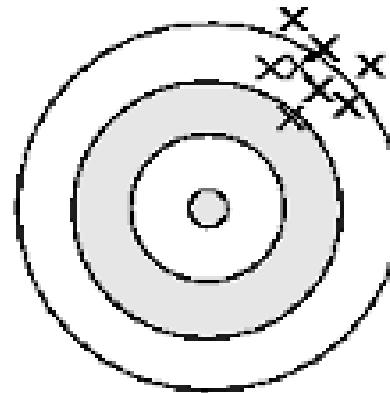
Accuracy – How close a measurement is to the true value.

Precision – how exact a measurement is.

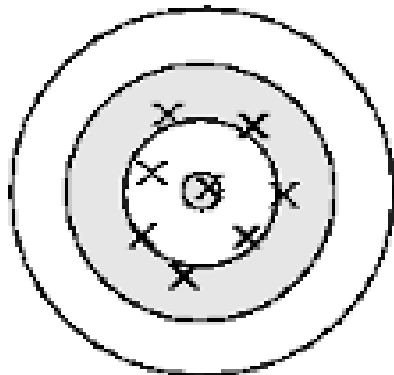
Precision and accuracy



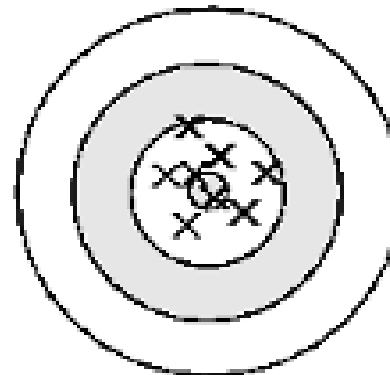
Not precise
Not accurate



Precise
Not accurate

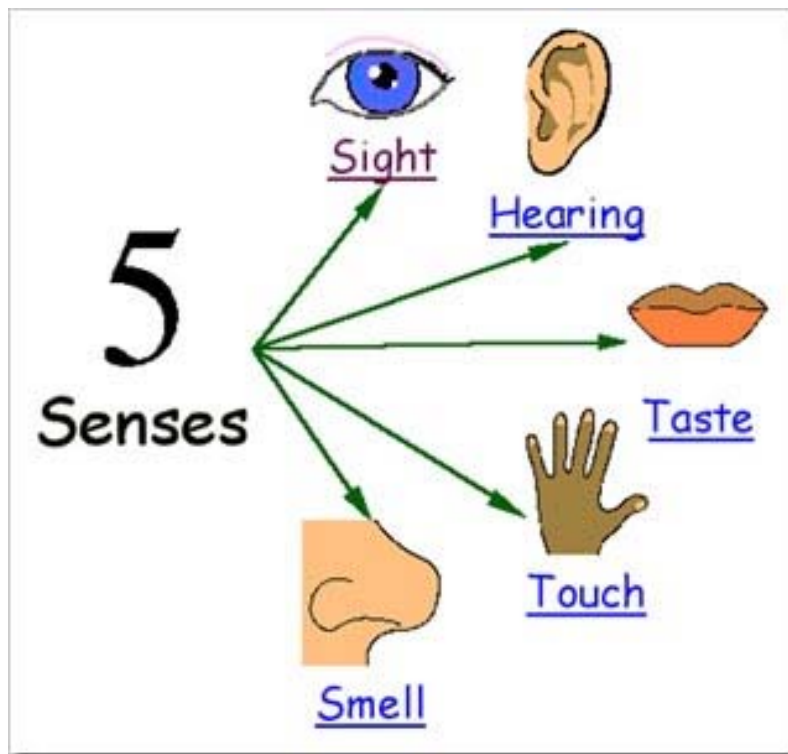


Not precise
Accurate



Precise
Accurate

Think of some ways scientists may collect qualitative and quantitative data.



International System of Units for quantitative measurements

Measurement	measures	Instrument used	SI unit
Volume	How much space an object takes up	Graduated cylinder/beaker	Cm ³ or liter
Length	How long an object is	Ruler/measuring tape	meter
Mass	The amount of matter in an object	Triple beam balance	grams
Temperature	Amount of heat	thermometer	celcius
Density D=M/V	How much matter is in a given space	Graduated cylinder/triple beam balance	g/l or g/cm ³

yellow

Write the following five times

Station:

Object:

Observations

Qualitative

Quantitative

1

1

2

2

3

3

Stations

- You will have 3 minutes at each station.
- At the station then make three additional observations about each object. Determine if the observation is qualitative or quantitative.
- Do not move to the next station until the timer goes off.

