What is Science?

Limitations:

- What <u>can</u> it be used for? Why we get old. How to cure a disease. *Things you can measure*

- What <u>can't</u> it be used for? - Is these an afterlife why doest someone like you? *Nothing to measure (opinion)*

How Scientists Work - The Scientific Method

Designing an Experiment

The basic steps of designing an experiment are? We covered these on the vocab sheet.

1. Observation - *noticing something you don't understand.*
2. Problem - *a question you need to answer*
3. Hypothesis - *Your guess based on some info*
4. Experiment - *Anything that gathers data about hypothesis* *check social media* | *Talk to them* / *Stalk them* |
5. Analysis - *look at all data*
6. Conclusion - *decide if hypothesis right or wrong*

- <u>Now, how do you perform each of these steps so that you get answers you can trust.</u>

1. Make useful observations

   Qualitative – *Words (adjectives)*

   Quantitative – *numbers*

2. Ask a <u>focused</u> question- *Be specific, measure*

3. Compose an educated and testable hypothesis- *If (Ind Var) than (Dep Var) – True or False*

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4. Design a controlled experiment-
   - What makes it controlled?

   You control as many of the
   conditions as possible

   - _____

   What two groups are needed?
   - _____

      Control Group –
      • Kept as "Normal" as possible
      • Shows what usually happens

   - _____

      _____

      Experimental Group –
      The same as control except for
      one different variable (Indep. Var)

      _____

5. What are constants (or controlled variables) in a controlled experiment?
   All of the thing the same between Exp & Control.

6. What are the two variables that we care most about?

   1. *Independent (Manipulated) variable*

   _____

   _____

   2. *Dependant (Responding) Variable*

   _____

7. What is the point of trying an experiment more than once (repeatability)?

   _____

8. There are different types of measurement?

- Direct vs. Indirect
  - ○

  _____

  - ○

  _____

9. Random sample

  _____

10. Bias & Blind Experiments

_____

11. Evidence vs. Inference
    - Evidence:

    _____

    - Inference:

_____

12. Record the data you get from an experiment in the best format?
    - ○ A table- good for two linked measurements (Age vs. Height)
    - ○ A graph- things that change over time (seasonal temperature)
    - ○ A diagram- for qualitative data

13. Analyze the data to understand its meaning.

_____

14. Decide on a conclusion.
    - What exactly is a conclusion?

_____

    - What may be used to draw a conclusion?

_____

15. Experimental Error

_____

Degrees of Certainty

1. Hypothesis

2. Theory

3. Law