

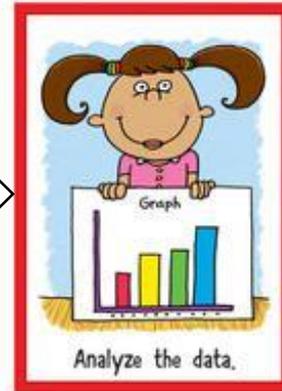
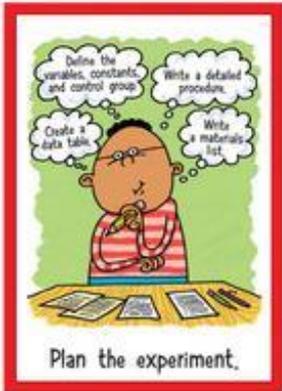
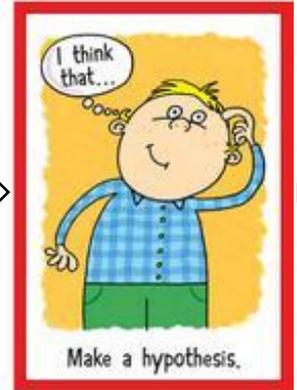
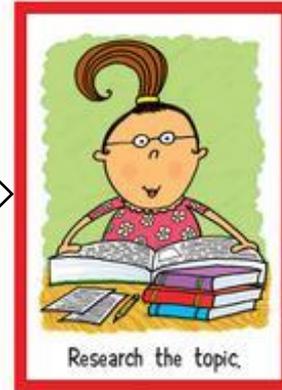
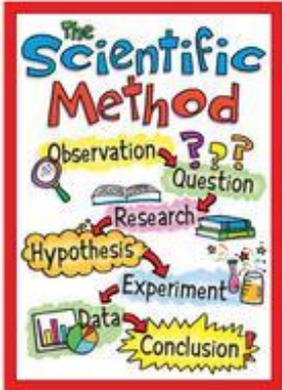
INITIAL OBSERVATION



WONDER

RESEARCH

HYPOTHESIZE



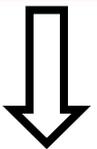
PLAN

EXPERIMENT
ADDITIONAL
OBSERVATIONS

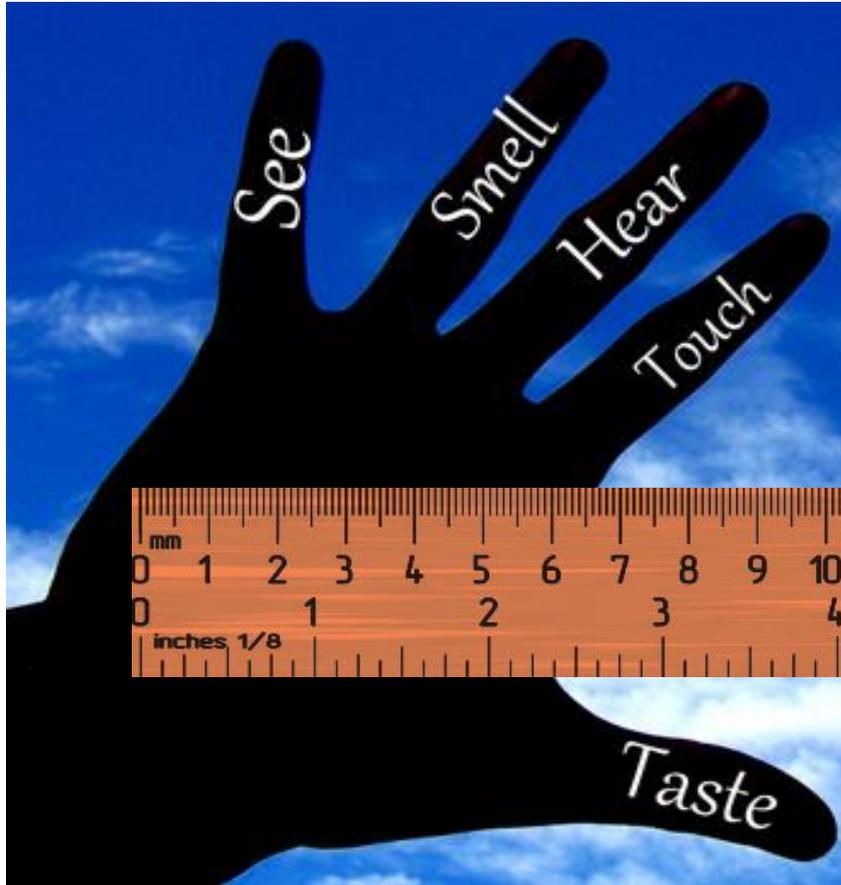
DATA

ANALYSIS

CONCLUSION!



Evidence is based on Observation



- Observation is describing an object or event using your five senses (*what you see, hear, smell, taste, touch*) or measurement (*numbers*).
- Modern science employs *sensors* and *detectors* to make observations.
- Information gathered during an observation is called **data** (singular form *datum*).

TONGUE



TOUCH

TASTE

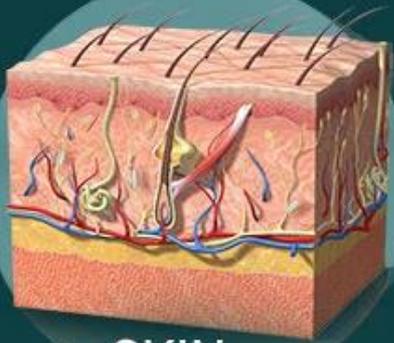
SMELL

SOUND

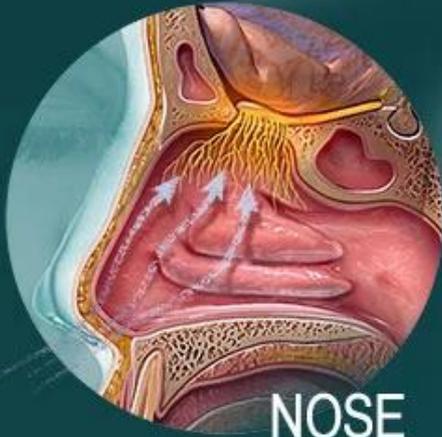
SIGHT



SKIN



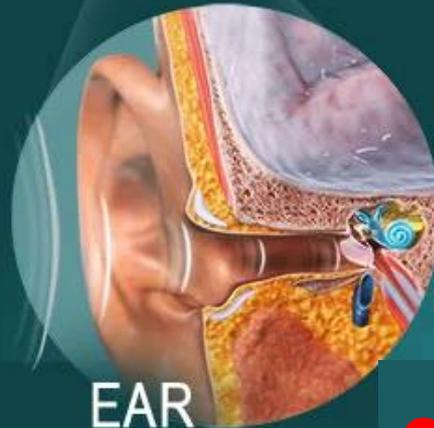
NOSE



EYE



EAR



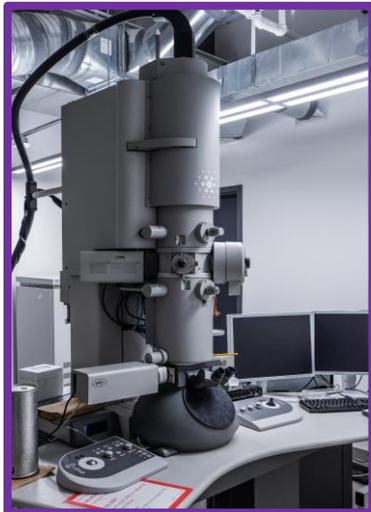
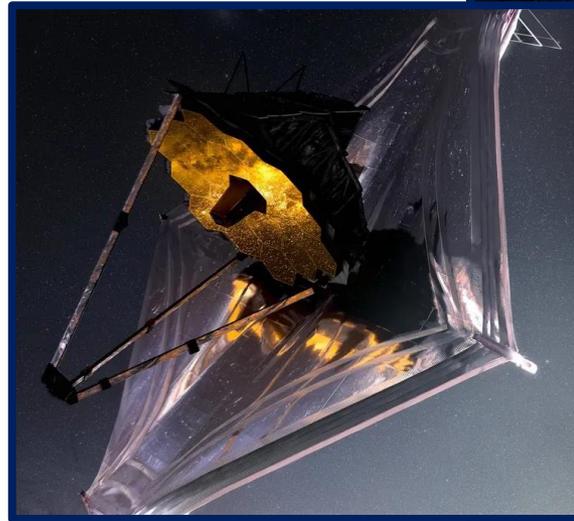
THE SENSES

collecting evidence

Instrument collecting evidence

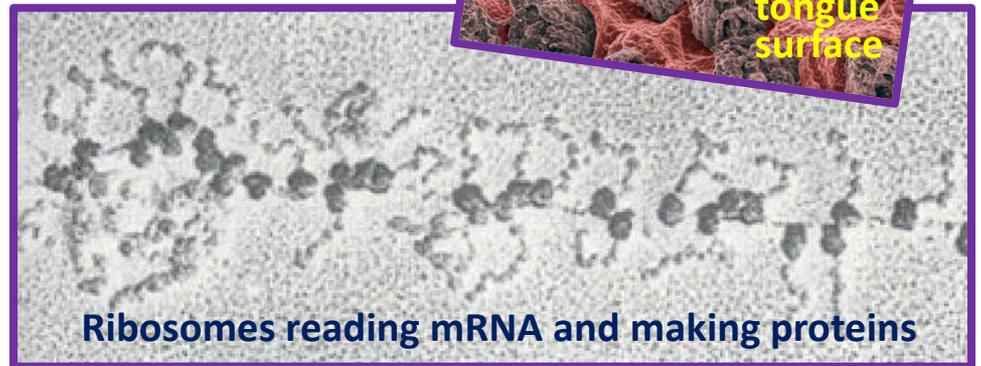
James Webb Telescope

helps observe VERY FAR AWAY objects



Electron Microscope

helps observe VERY SMALL objects



Describe the Elephant



*Observation
should NOT
include
opinion!*

It weighs 480 kilograms.

It has large ears and long trunk.

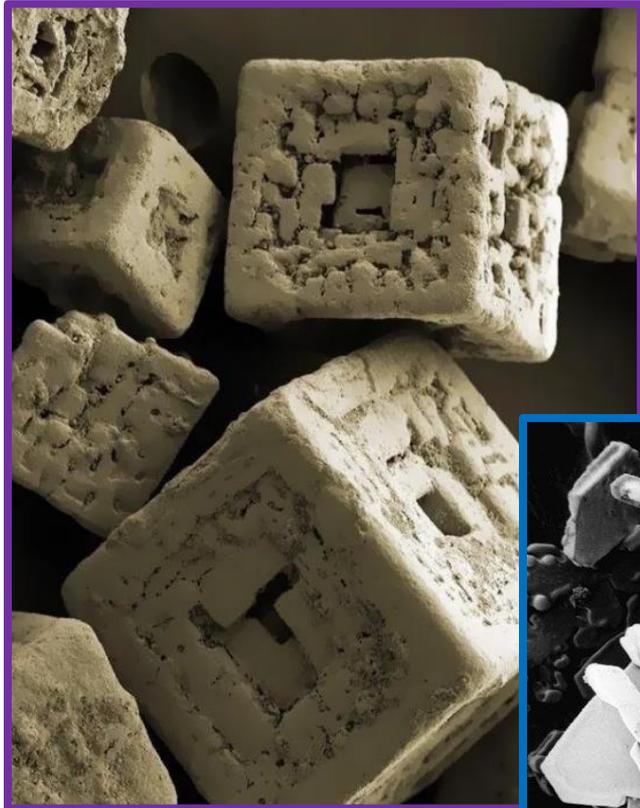
It has gray wrinkly skin.

~~**It is very cute!**~~

It is young.

It is about 1.5 yards tall.

Describe the Crystals



**TABLE
SALT**



SUGAR



SNOW

DIY: Monarch Butterfly

common form



rare Hawaiian
white form



Make one **qualitative** observation about each picture above.
Explain why this is a qualitative observation.

Make one **quantitative** observation about each picture above.
Explain why this is a quantitative observation.

DIY: Clouds



Qualitative vs Quantitative Data

Qualitative (letters)

- **Descriptions** using words.
- Data which can be **observed** but **not measured**.
- What the object is *like*: texture, smell, taste, appearance, etc.

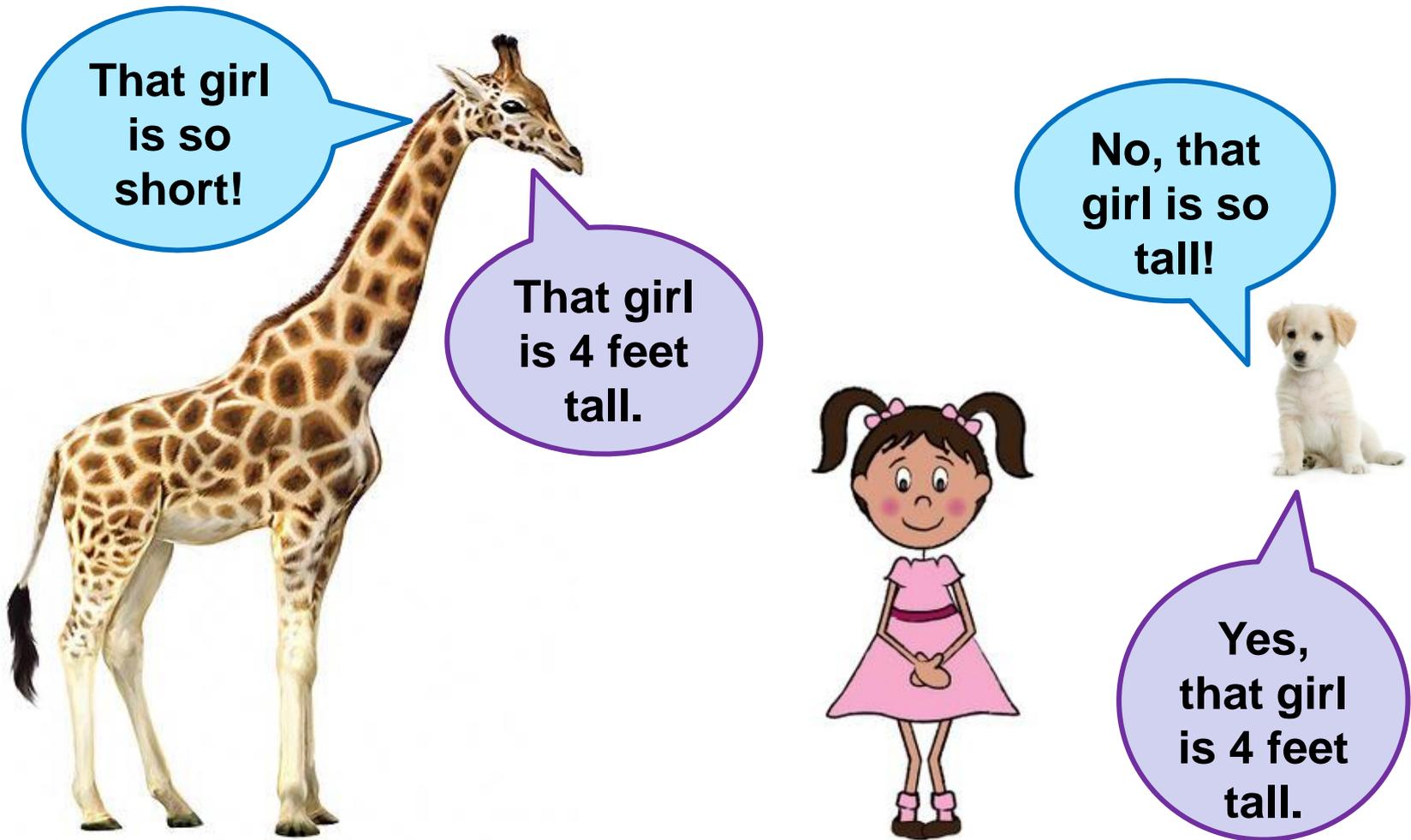
Subjective, relative

Quantitative (numbers)

- Specific **numbers**.
- Data which can be **measured**.
- Length, height, area, volume, weight, speed, time, temperature, humidity, sound levels, cost, age, etc.

Objective, specific

Qualitative observations are **subjective**



Quantitative observations are **objective**

Observation depends on observer

- Location and size of an observer
- Observer limitations



can only see visible light



can see ultraviolet light

