Essential Questions

- How do scientists collect data and use it to gather evidence?
- What is observation and how is it different from inference?

Learning Targets:

- I can explain the difference between data and evidence.
- I can explain the difference between observation and inference.

What is observation?

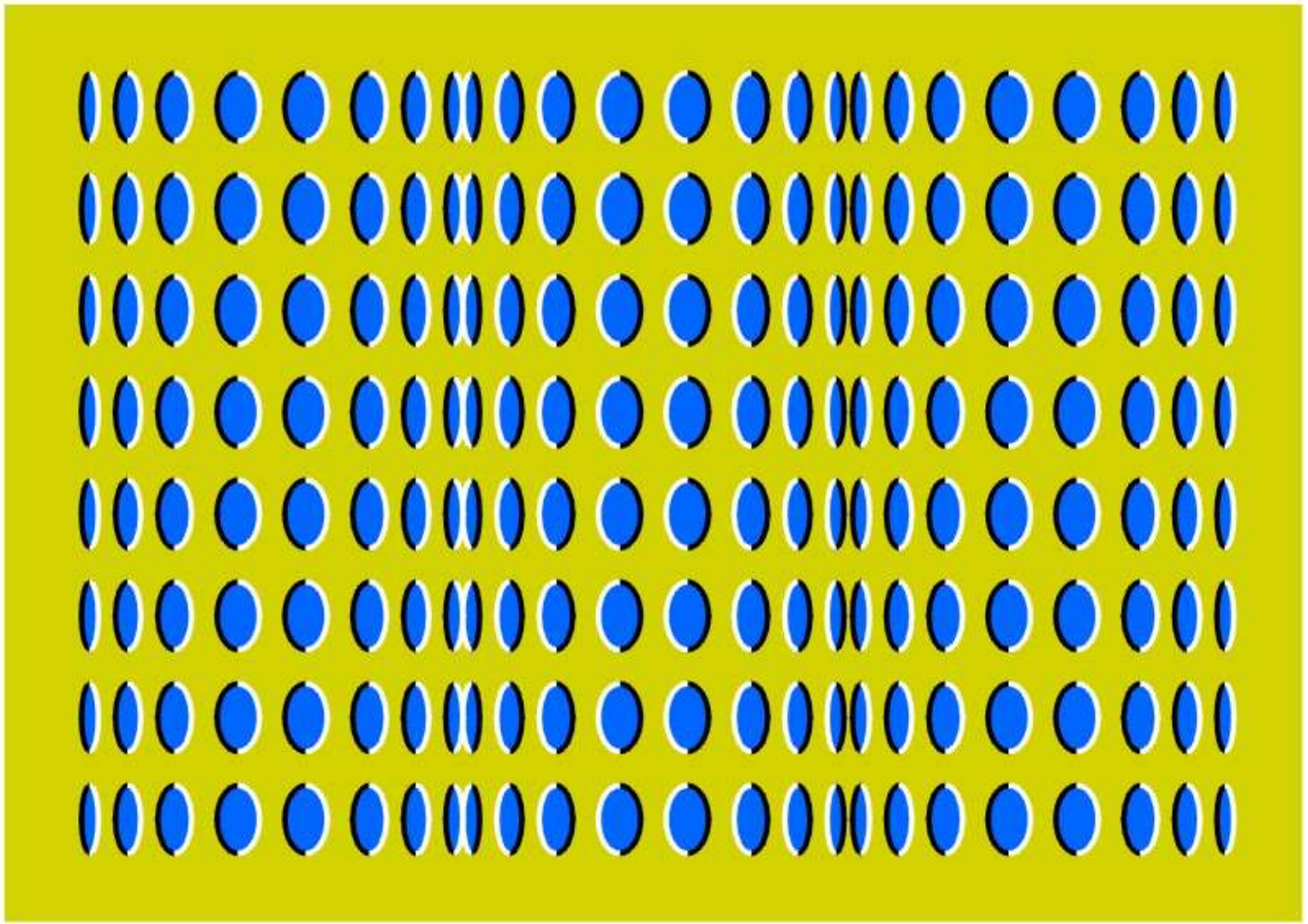
- Observations are made in science. They are made by using:
- Senses
- Tools
  - increase accuracy & precision
- Facts not opinions.

What do you see?

Can you pick the tallest soldier?

They are all the same height!

Are these dots moving?



Observations

- Use one or more of the 5 senses to gather information
- Noting and recording **FACTS**

- Ex. There is one projector screen in front of the room.

Two types of Observation

- Qualitative
- Quantitative

Qualitative Observations

- Hard to measure
- Describes the qualities of something
  - Color
  - Taste
  - Sound

Quantitative Observations

- Can be expressed in numbers
- Can be counted or measured
  - Amounts
  - Temperature
  - Mass
  - Length
- Allow us to communicate specifics
- Tools are used to communicate data
- Observations are collected in data tables

Inferences

- Logical interpretation based upon prior experiences and data
- Drawing a conclusion from available information

Observation

- That plant is extremely wilted.
- The car stopped running

Inference

- That plant is extremely wilted due to a lack of water.
- The car stopped running because it was out of gas.

Inference

Practice:

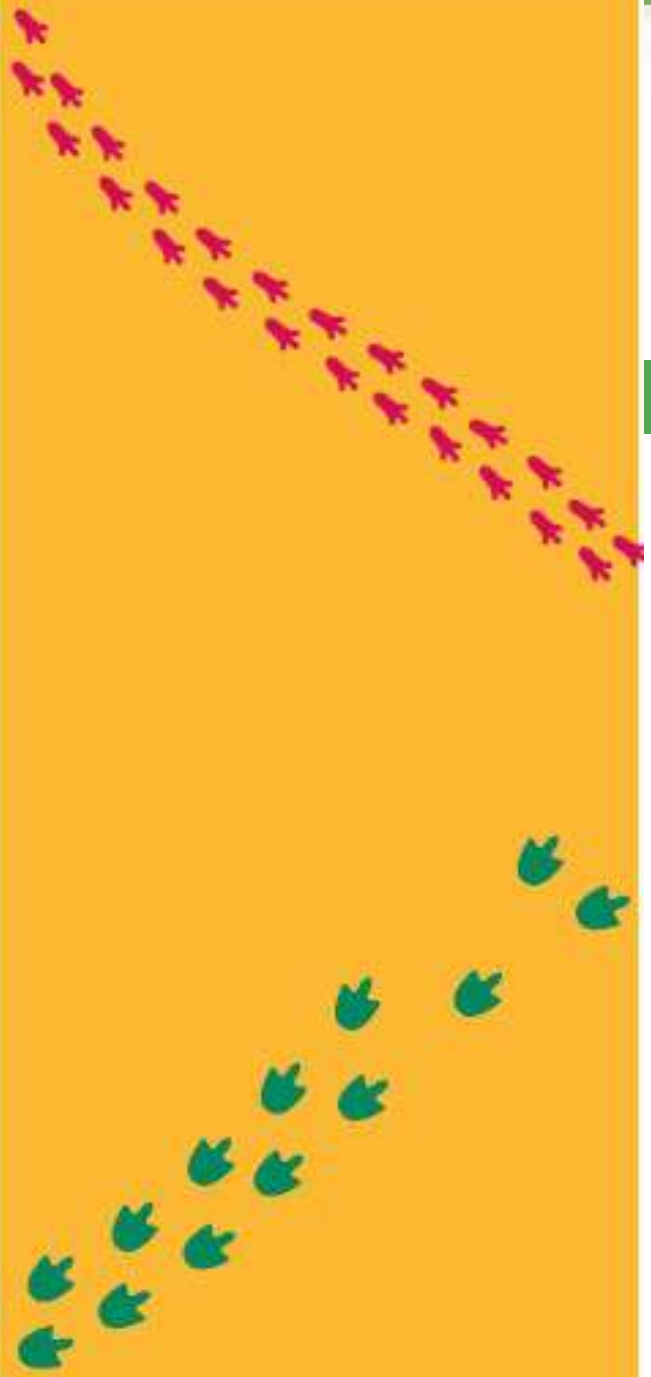
- **Observations**:
  - I hear people screaming
  - I smell cotton candy, popcorn, and hamburgers
  - I see a lot of people

Note the differences:

- When collecting data record **observations**
  - In labs, you record observations
- **Inferences** may be used when interpreting the data you collect
  - Or for you, when writing your conclusions for a lab

Observation or Inference?

1. There is a representation of a face on one side of the coin.
2. The Latin word "Dei" means "God."
3. The coin was made by deeply religious people.
4. The date 1722 is printed on one side of the coin.
5. The coin was made in 1722.
6. The face on the coin is a representation of the nation's president

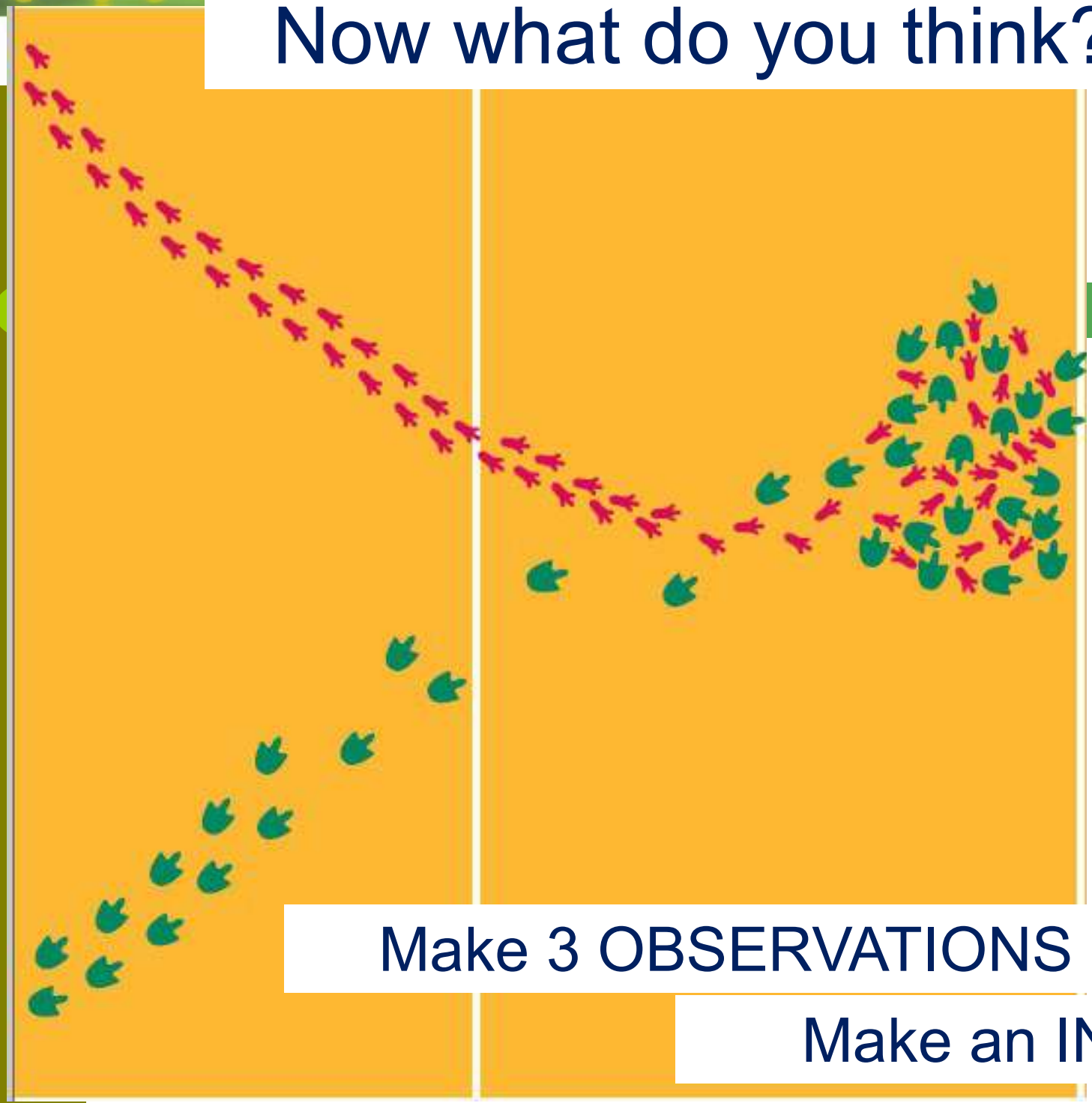


Look at these two sets of animal tracks.

List 3 OBSERVATIONS

Make an INFERENCE

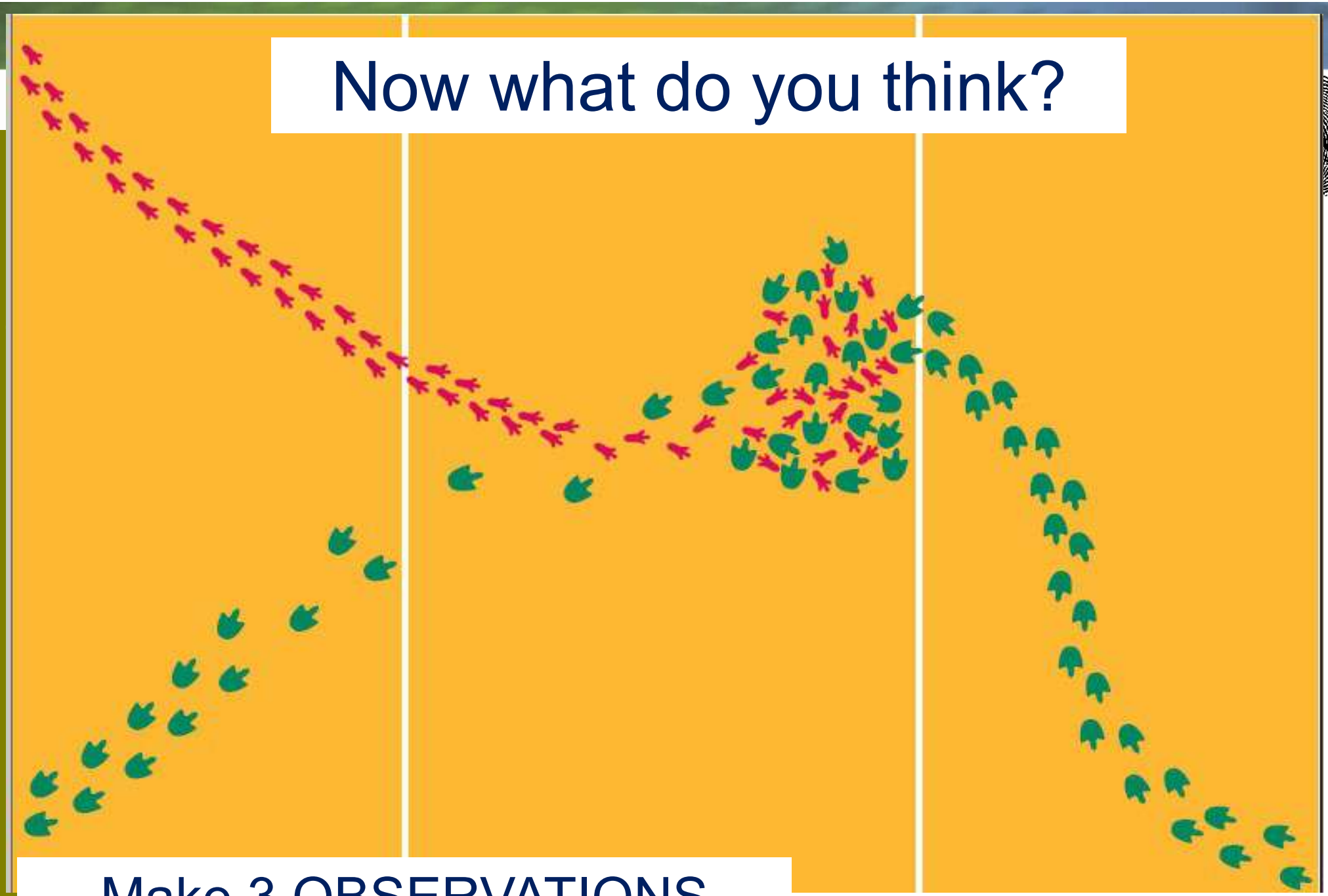
Now what do you think?



Make 3 OBSERVATIONS

Make an INFERENCE

Now what do you think?



Make 3 OBSERVATIONS

Make an INFERENCE

When to use observation & inference…

- During experiments, record observations *NOT inferences*

- Inferences may be used when writing the conclusion in your lab report.

- How can we use data and evidence to develop and support good claims?

Data

- Information observed and collected as a result of an investigation

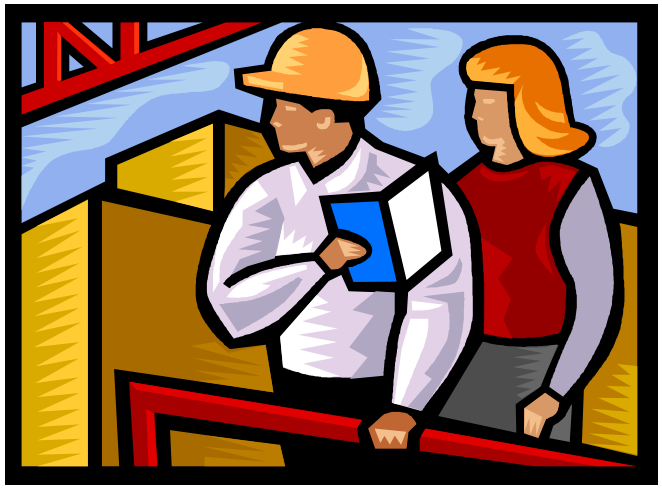
What do we know about evidence?

- Is organized and written in complete/accurate sentences.
- Uses information that is related to your drawing or model.
- Makes a direction connection between observations made during an investigation **and** current research
- Shows your thinking about how the evidence supports the claim

All data = evidence?

- Does every piece of information collected become evidence for a claim?
- If data and evidence were the same, then wouldn't every observation or piece of information be required to support a claim?
- How do you choose which data to use as evidence?

To construct evidence from data:



- Analyze
- Interpret
- Look for patterns
- Reason
- Think about the data with respect to the question we are trying to answer.

All evidence requires data, but not all data needs to be used for evidence