



## Scientific Inquiry

-process that uses a set of skills to answer questions or test ideas

There are many types of investigations, and the steps used in each investigation may vary. In general the steps are...

**Question-Observe-Infer**

**Hypothesize-Predict**

**Test (Experiment)**

**Analyze Results**

**Draw Conclusion**

**Communicate Results**

**Investigate Further**

# Question-Observe-Infer

Question  
Observe the world and  
ask a question

Why have the  
rivers eroded more this year  
than last year?

Observation  
the act of using one  
or more of your senses to  
gather information and  
noting what occurs

-banks eroded  
-rainfall increased

Infer  
to make a logical  
explanation of an  
observation that is drawn  
from prior knowledge

Perhaps the  
increased rainfall  
caused the erosion.



# Hypothesize-Predict

## Hypothesis

-possible explanation for an observation that can be tested by scientific investigation

## Prediction

-a statement of what will happen next in a sequence of events



If the amount, speed, and force of the river water has increased, then the riverbank will erode more.

Rainfall increasing will cause the river to move faster. Then erosion will increase.

# Test (Experiment)

- design an experiment
- make a model
- gather & evaluate research
- collect data/observations

## Variable

-any factor that can affect an experiment

## Independent Variable

-the factor that you want to test ("I change...")

## Dependent Variable

-the factor you observe or measure during an experiment



# Test (Experiment)

## Variable

-any factor that can affect an experiment

## Independent

## Variable

-the factor that you want to test ("I change...")

## Dependent Variable

-the factor you observe or measure during an experiment

The independent variable in our river model is going to be the amount of the water we pour into it.

Yes!  
That will affect the dependent variable which we will measure - the amount of soil collected at the bottom



# Test (Experiment)

## Controlled Experiment

-an experiment that has only one independent (changed, manipulated) variable, and everything else is kept the same

What if we change the amount of water AND put some salt in it too?

No! If we do that, then we won't know if a change was caused by the increase in water or the salt.



# Test (Experiment)

## Controlled Experiment

-an experiment that has only one independent (changed, manipulated) variable, and everything else is kept the same

### Independent Variable

-the factor that you want to test (“I change...”)

### Dependent Variable

-the factor you observe or measure during an experiment



# Analyze Results

## Data

-facts, figures, and evidence collected during an experiment

Data should be sorted, graphed, or classified.



Once all the data have been collected, scientists need to interpret, or find the meaning of, these data.

Interpreting data involves looking for patterns, trends, and relationships.

# Analyze Results

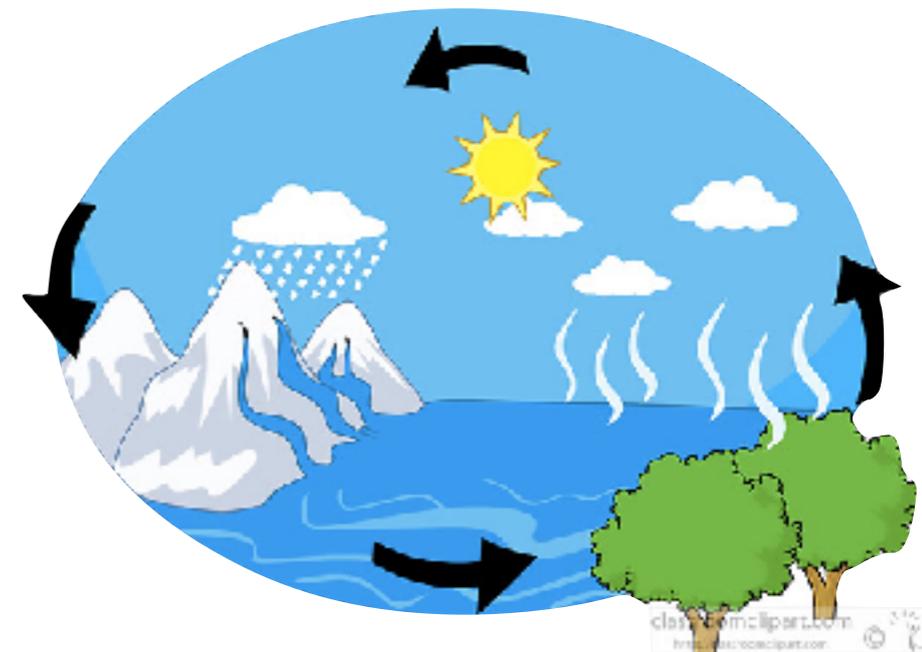
To find these patterns, trends, and relationships, scientists display data in:



**Graphs**

A 4x4 grid on a blue background. The top row contains four colored squares: red, orange, yellow, and green. The rest of the grid is empty.

**Charts/Tables**



**Diagrams**

# Draw Conclusion

1. Find relationships

2. Make more inferences

3. Draw conclusion

## Conclusion

-a summary of the information gained from testing a hypothesis

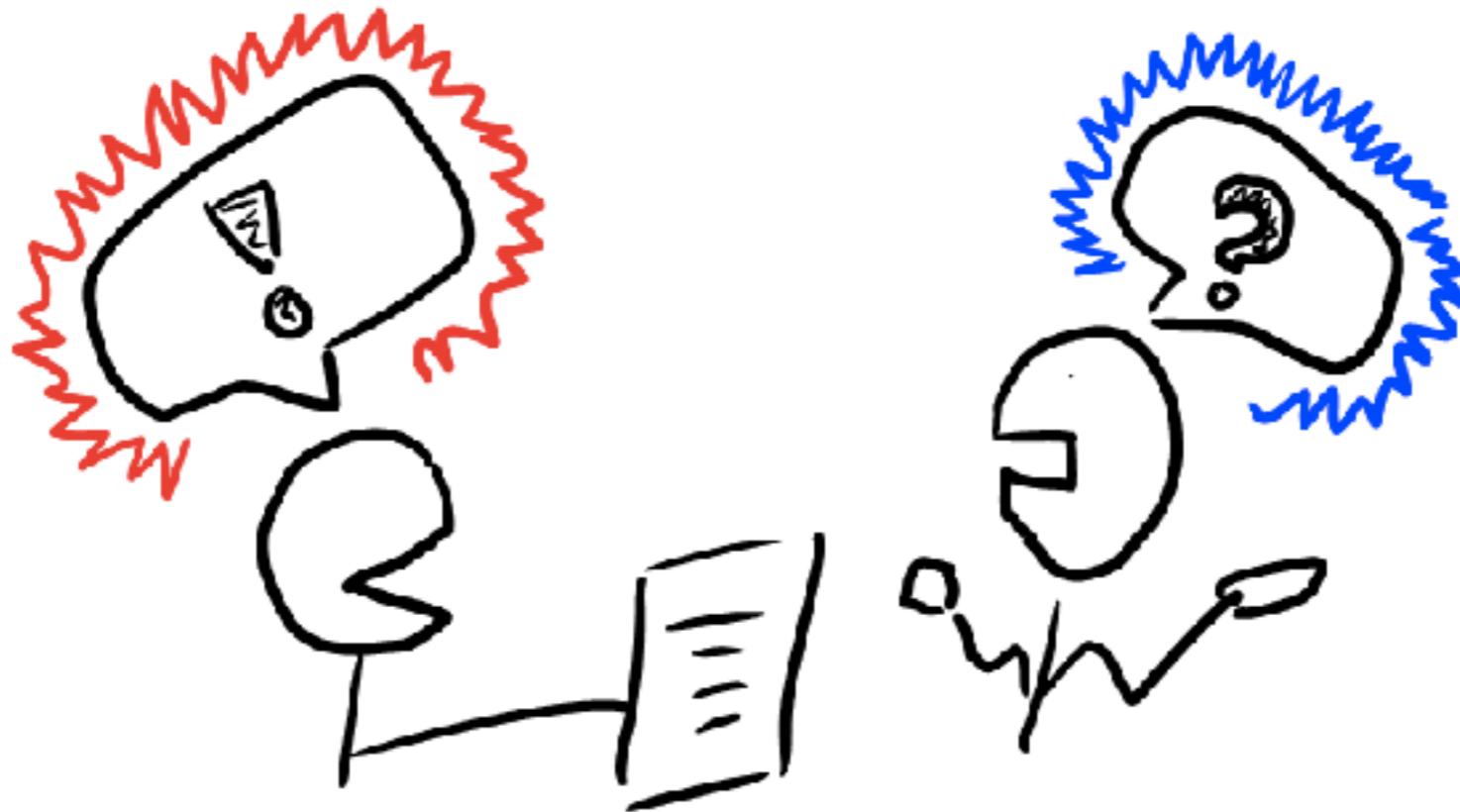
Sometimes the data will support the hypothesis. You were right!

Sometimes the data will disprove the hypothesis. You were wrong!

Sometimes no conclusion can be reached and new experiments are needed.



# Communicate Results



- Scientists communicate results by:**
- submitting results to scientific journals
  - give speeches
  - give experiment to others to “peer review”
  - exchange results with other scientists to apply to their own investigations

# Investigate Further



Usually any findings in an investigation will:

- need to be duplicated in more experiments,
- lead to new questions, and
- lead to hypotheses being revised.

**Scientific investigations are never “done!”**

# Scientific Inquiry



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# Reading Assignment

1. Each member of your group will be responsible for one section on your handout.
2. Assign a section to each member.
3. Each member read the assigned pages and answer the questions on the handout for your section.  
\*This part is homework if not finished.
4. If you finish while others are working, silently read pages 10-11.
5. When all are finished, take turns to share & discuss answers with each other.



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