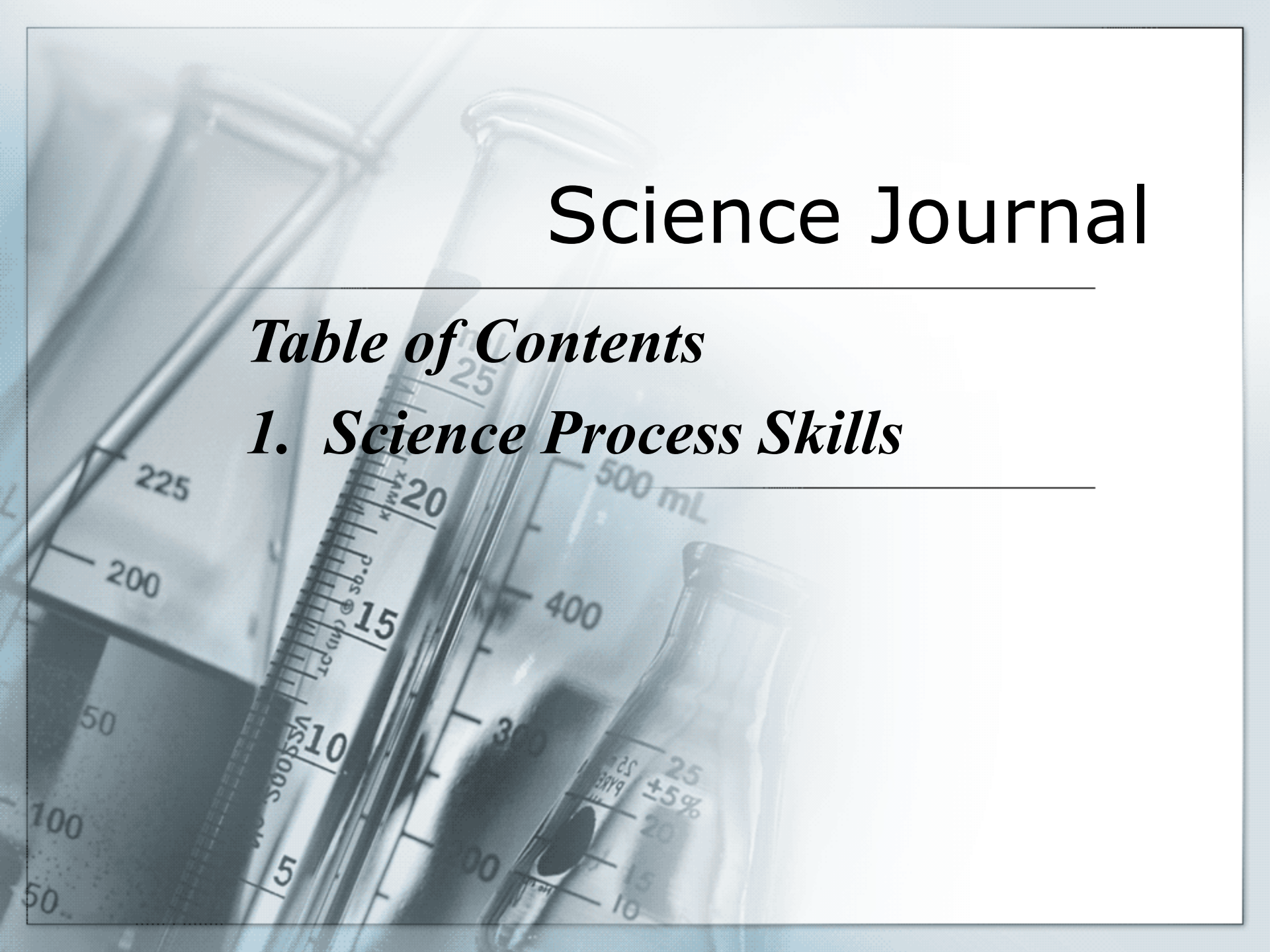
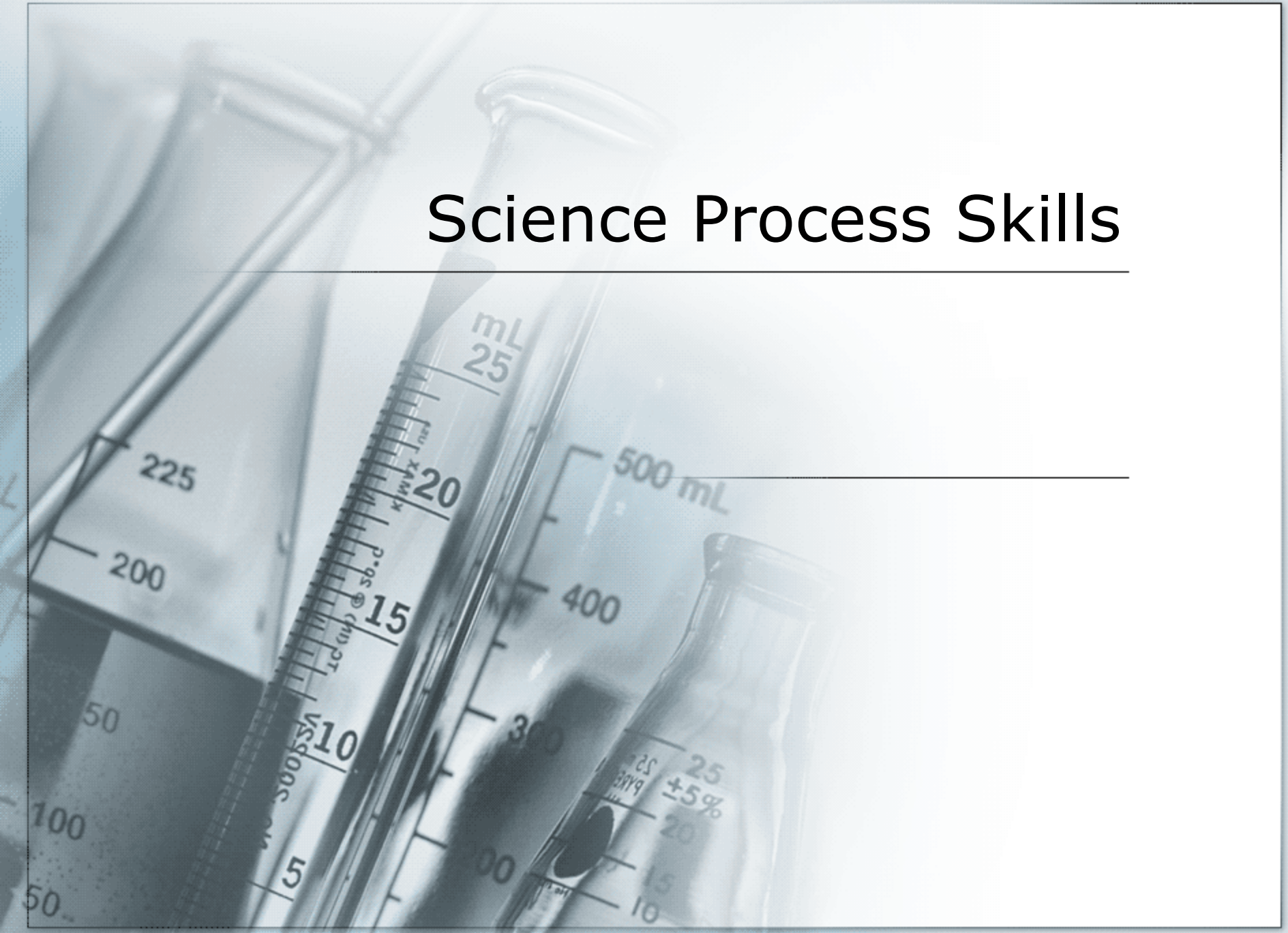
Science Journal

Table of Contents

1. Science Process Skills



Science Process Skills



Observing

- We observe when we use one or more of our senses to find out about objects, events, or living things
- An observation is a FACT learned directly through the senses.
  - Sight
  - Touch
  - Smell
  - taste

Observing

How do I make accurate observations?

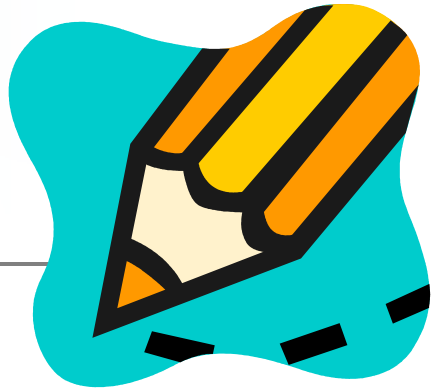
1. Use as many senses as you can when you observe. Never taste unless you are told to taste something

2. Think about how you can use your senses to obtain information about an object or event. Pick up an object, feel it, smell it.

3. Describe only what you observe directly with you senses.

4. Notice things that are changing. Include observations before, during, and after the change.

Observing



What it is	How we observe
•Fact •5 Senses: •Sight •Touch •Smell •Taste •sound	•Use as many senses as possible •Never taste unless told! •Describe only what you observe with your senses. •Notice changes. Describe Before, during and after changes.

Observing
MINI-LAB

- Materials: Cup w/water, plastic spoon, paper towel, sugar cube, ruler
- OBSERVE the cube using the sense of sight: describe the cube, color and shape (white and square is NOT GOOD ENOUGH!)
- Use the ruler to make observations about the size of the cube
- Observe the cube using the sense of touch. Describe the texture. (the word ROUGH is NOT GOOD ENOUGH!)
- Drop the cube on the table and observe the sound
- Use your sense of smell to describe the cube
- Place the cube in the cup of water and stir. Record your observations

Communicating

We communicate when we give or receive information. Precise language is needed for describing an observation, reporting a measurement, or interpreting data.

Communicating

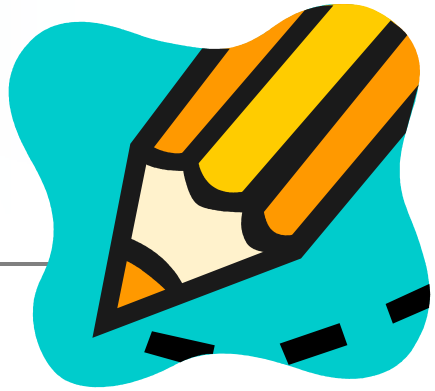
How do I communicate?

1. Observe, then describe enough of the properties of an object or event so someone can identify it.

2. Describe and order changes in the properties of an object or event.

3. Use diagrams, charts, graphs, writing, speaking, visuals and photos to communicate.

Communicating



What it is	How we Communicate
•Giving or receiving information •Types •Verbal •Written •Pictures •Graphs/charts	•Observe and then describe well enough that someone else can identify •Describe and order changes in an object or event.

Communicating
MINI-LAB

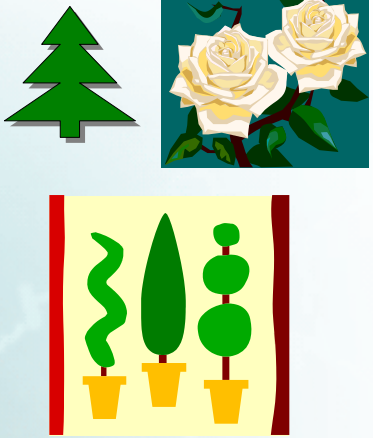
- Materials: Popped popcorn, kernel of popcorn, paper towel
- Use observations to describe the properties of the popcorn and the kernel (size, shape, color, texture, etc.)
- Describe the differences between the piece of popcorn and the kernel of corn.
- Draw pictures in the boxes to show someone how to make popcorn.
- Study your pictures, did you forget any steps? Write them below.

Classifying

We classify when we use observations to group objects or events according to similarities and differences.

- One category
- Two categories
- Many categories

Producers



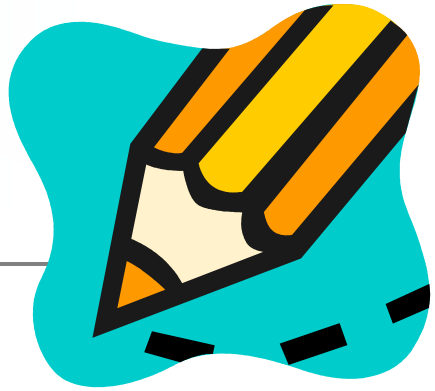
Consumers

Classifying

How do I classify?

1. Observe a set of objects or events. Think about their properties.
2. Divide the set into 2 or more groups based on one observable property.
3. Divide the groups on the basis of a second observable property.
4. Continue to divide the groups on the basis of observable properties.
5. Put the properties used into an outline or diagram.

Classifying



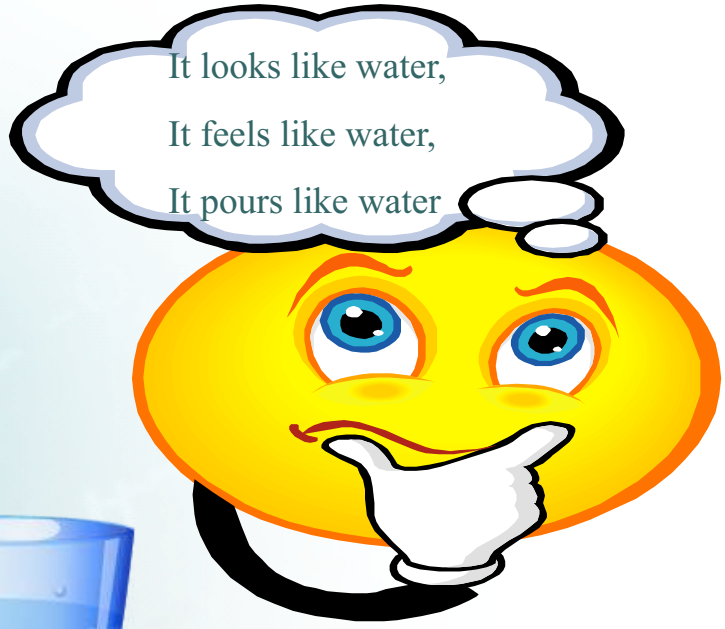
What it is	How we classify
•Grouping objects or events based on similarities or differences	•Divide a set of objects into 2 or more groups based on 1 property •Continue to divide the groups based on more observations •Create diagram or chart of groups

CLASSIFYING MINI-LAB

- Materials: cup of beans, classifying sheet, colored pencils/crayons
- Place 8 different beans in the big box at the top
- Trace around the beans and color them
- Divide the beans into two groups in the boxes below the large box
- Trace around the beans and color them. In the boxes, write the property you used to sort the beans (round beans, oval beans) (tall beans, short beans)
- Repeat grouping the beans from each box into the two boxes below each box.
- Trace around the beans and color them. Write the property you used to sor the beans
- Place one bean in each of the boxes at the bottom
- Trace around each bean and color it. Write the property you used to sort each bean in the box.

Inferring

We infer when we use our past experiences to draw conclusions and make explanations about events not directly observed



Inferring Vs. Observations

OBSERVATIONS

- Any information collected with the senses.
  - **measureable or countable**
    - 3 meters long
      - 4 marbles
      - 50 kilograms
      - 35 degrees Celsius
  - **describable, not measureable**
    - red flowers
    - smells like fresh baked cookies
    - Tastes bitter
- The skill of describing scientific events

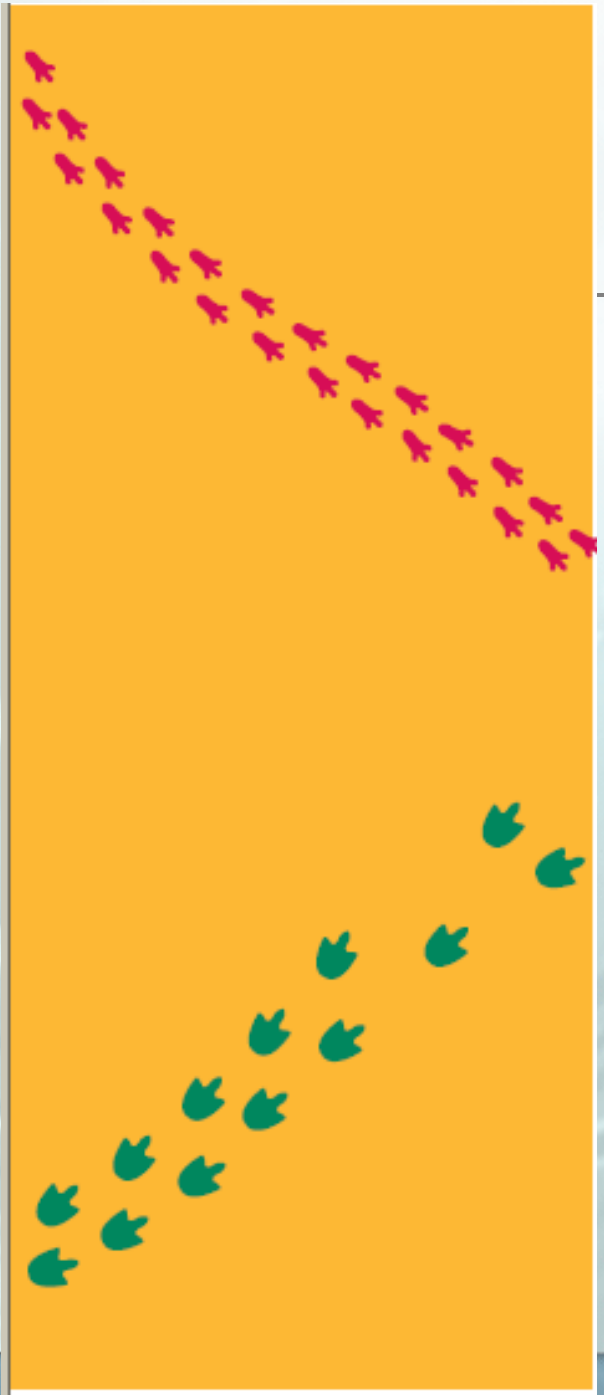
INFERENCE

- Conclusions or deductions based on observations.
- The process of drawing a conclusion from given evidence.

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

Examples

- Observations
  - That plant is extremely wilted.
  - The car stopped running
  - The Titans are leading their division
- Inferences
  - That plant is extremely wilted due to a lack of water.
  - The car stooped running because it was out of gas.
  - The Titans are leading their division because they are playing well right now.

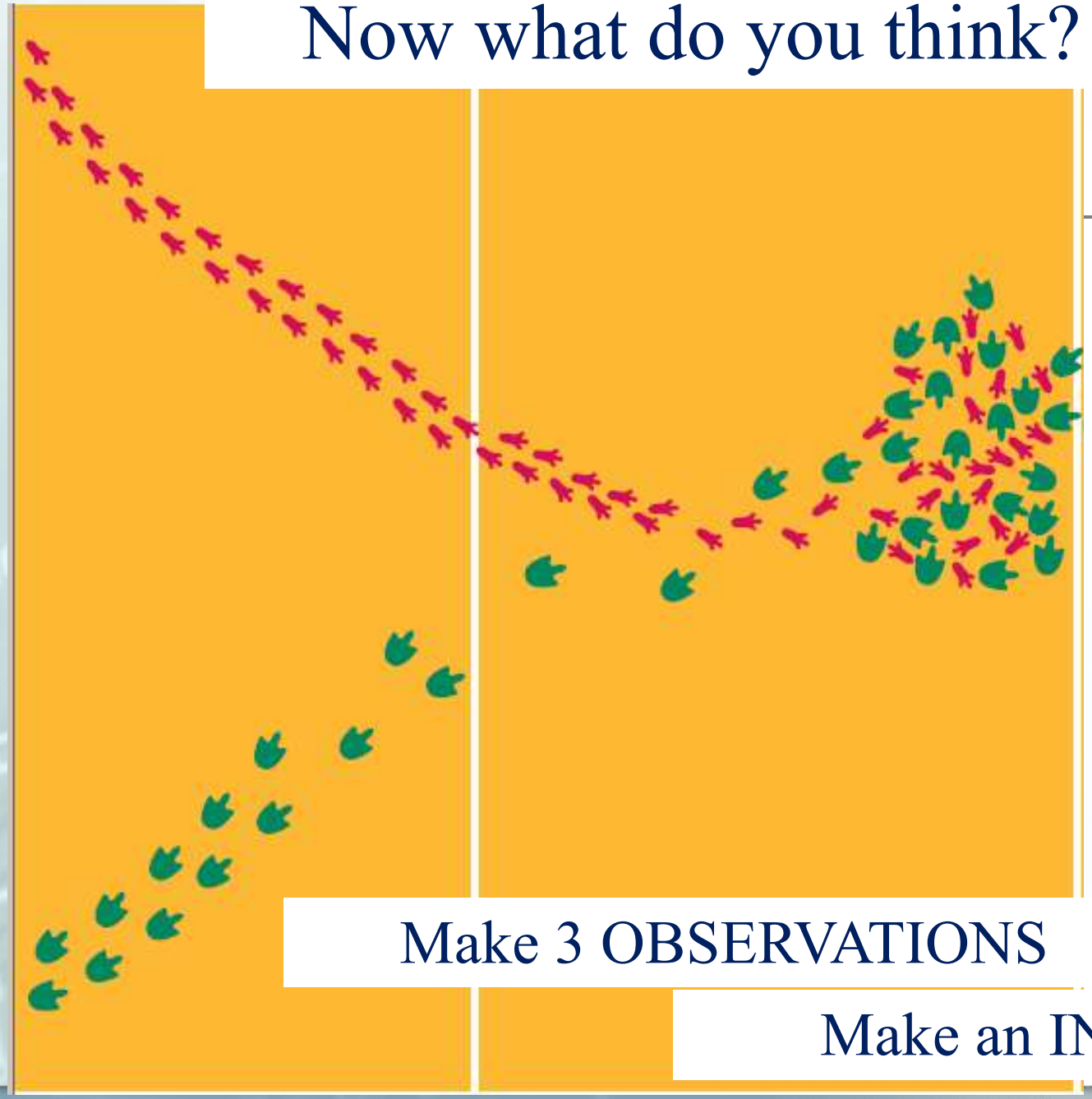


Look at these two sets of animal tracks.

List 3 OBSERVATIONS

Make an INFERENCE

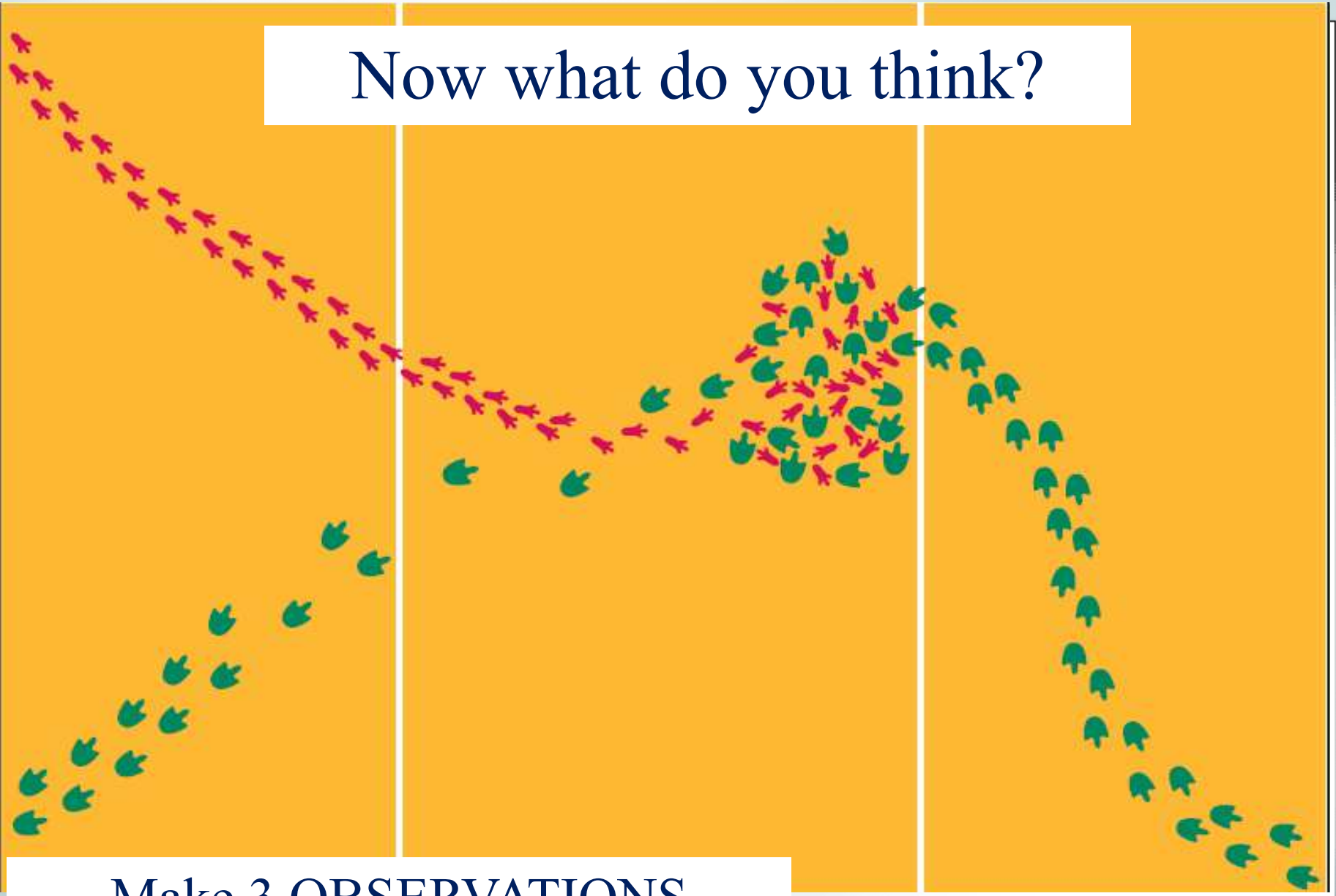
Now what do you think?



Make 3 OBSERVATIONS

Make an INFERENCE

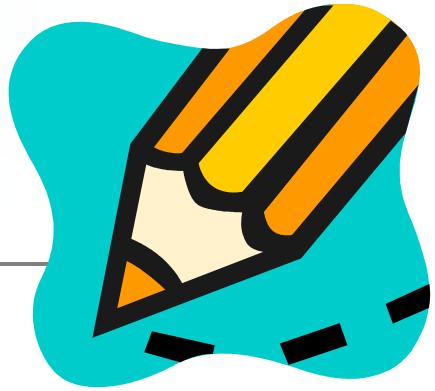
Now what do you think?



Make 3 OBSERVATIONS

Make an INFERENCE

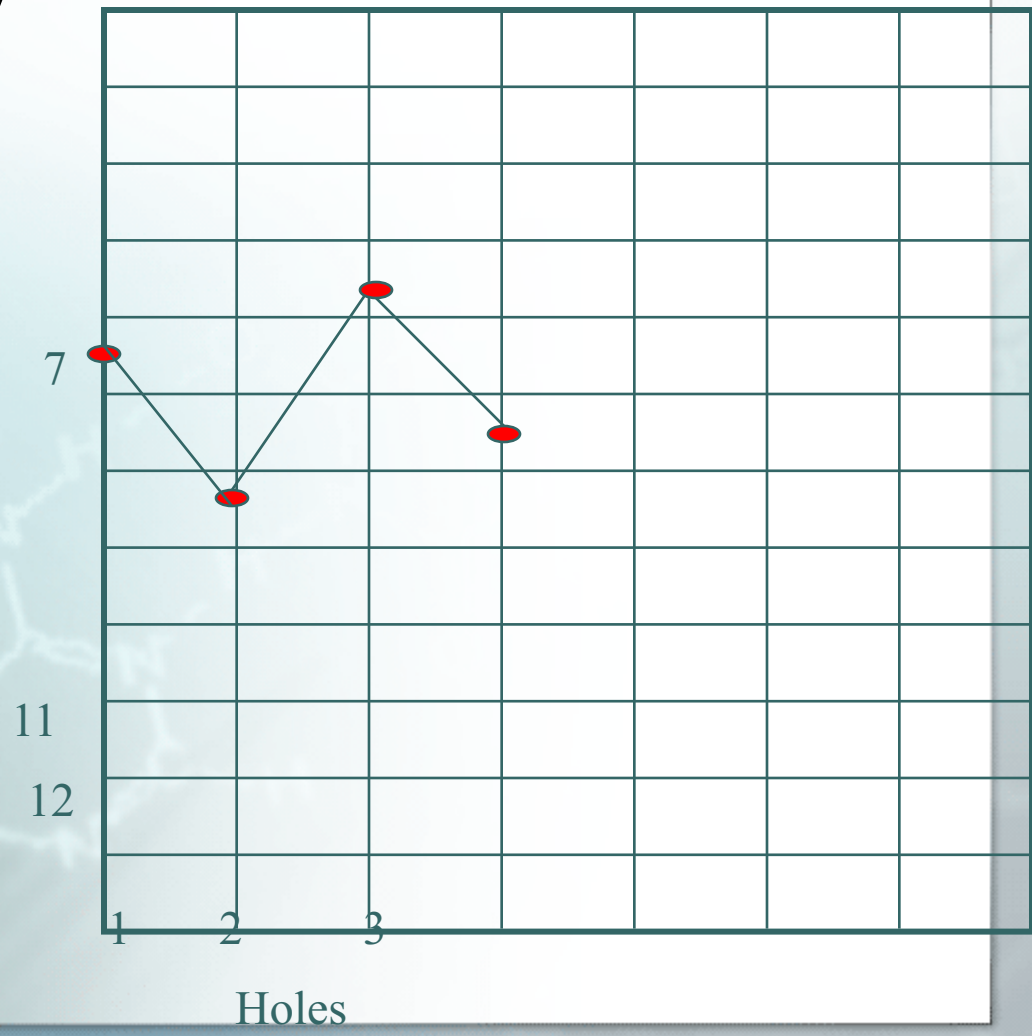
Inferring



What it is	How we infer
•Use past experiences to make explanations	•Observe object or event •Use past experiences to explain what you observed •Make new observations to decide if your inference is acceptable

Inferring Mini-Lab

- Materials: Box w/7 holes, Straw marked in CM, Lab Sheet
- Slide the straw marked in CM into each of the numbered holes in the shoebox lid. (Place the straw end with ZERO (0) in the box first)
- Record the distance to the bottom of the box from each of the holes in the graph below by placing a dot to indicate the depth of each hole and then connecting the dots



Inferring
Mini-lab

Based on your observations, make a drawing of what you infer the bottom of the box looks like

Remove the lid and compare your drawing to the bottom of the box. How does your drawing differ from the bottom of the box?

Hypothesize

- A hypothesis is an educated guess
- A possible explanation for a set of observations or answer to a scientific question
- A hypothesis is something that can be tested
- BASED ON RESEARCH: You should be able to give reasons why you chose your hypothesis.
- Hypotheses can either be supported or disproved

Hypothesize

- A good hypothesis is worded as an "IF…..THEN statement……
  - If _____ happens, then _____happens

Example: If soil temperatures rise, then plant growth will increase.

Hypothesize

- What you THINK is the answer to a scientific question.
- EDUCATED GUESS
- Can be tested
- Worded as an “IF….THEN” statement
- Must be based on observations. You must be able to justify why you are making the hypothesis

Hypothesizing Mini-Lab

- Materials: 6 straws cut to various lengths, lab sheet
- Each person can chose one straw to test. You will blow into the cut end of the straw. Make sure that you do not totally cover the "V" shape that is cut out.
- The question you need to answer: How does the length of a straw affect the pitch of the sound produced?
  - What is PITCH????? The highness or lowness of a sound.
- Discuss with your group BEFORE BLOWING to determine a hypothesis. Write it as an "IF…THEN" statement. EX: If the length of the straw is long, then the pitch will be ……(high or low)
- Test your hypothesis
- Arrange the straws in your group in order from the highest to the lowest pitch. DRAW THEM IN THE BOX.
- Did your investigation prove your hypothesis correct?

Variables

Variables are things that vary and change

Variables

In any experiment there are 3 variables:

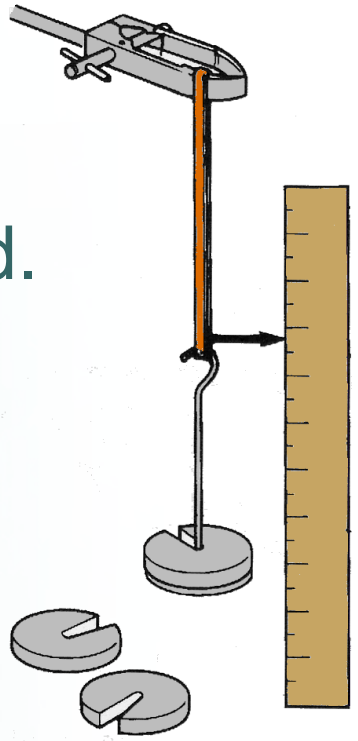
- an independent variable
- a dependent variable
- some control variables

Let's look at each type….

Independent variable

This is the thing that you decide to change.

Example 1
Investigating how a weight affects the length of an elastic band.



You decide the weight to apply, so:

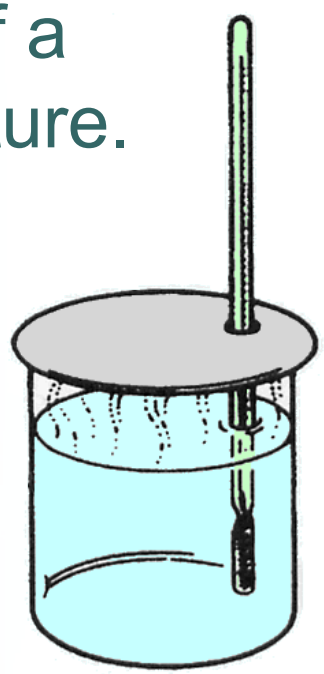
Weight is the independent variable.

Independent variable

This is the thing that you decide to change.

Example 2

Investigating how the rate of cooling of a beaker depends on the initial temperature.

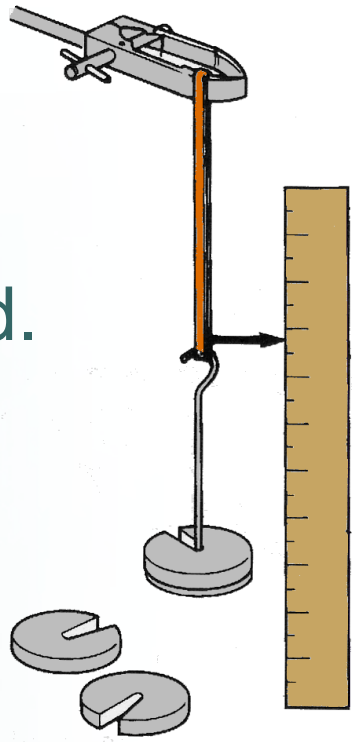


You decide the initial temperature, so:

initial temperature is the independent variable.

Dependent variable

This is the variable that changes as a result. It is the variable that you measure.



Example 1

Investigating how a weight affects the length of an elastic band.

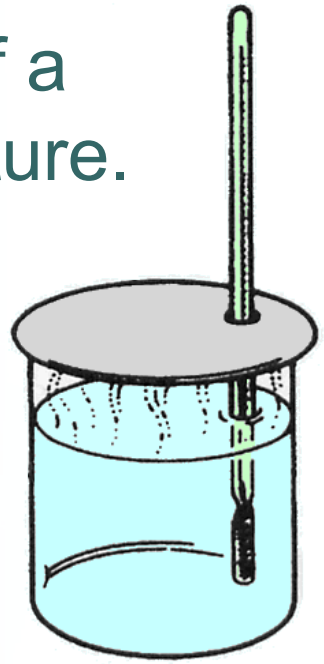
You measure the resulting length of the elastic band, so:

Length is the dependent variable.

Dependent variable

This is the variable that changes as a result.
It is the variable that you measure.
Example 2

Investigating how the rate of cooling of a beaker depends on the initial temperature.



You measure the temperature every minute as it cools, so:

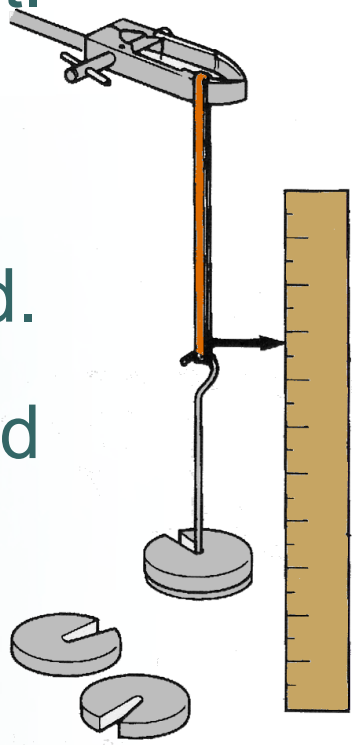
temperature is the dependent variable.

Control variables

These are all the variables that must not change, to make sure it is a fair test.

Example 1
Investigating how a weight affects the length of an elastic band.

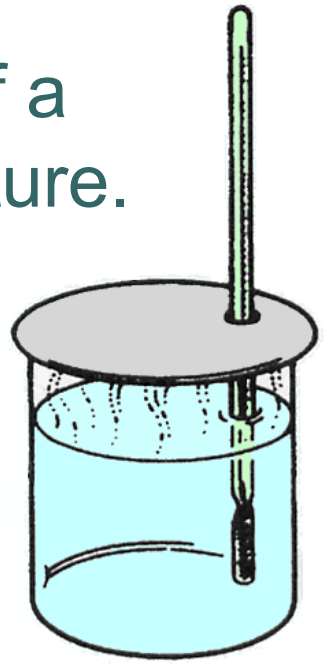
You must use the same elastic band all the time,
and the same scale etc,
so it is a fair test.



Control variables

These are all the variables that must not change, to make sure it is a fair test.

Example 2
Investigating how the rate of cooling of a beaker depends on the initial temperature.



You must use the same beaker, with the same amount of water, in the same position in the room, at the same room temperature, so it is a fair test.

Variables

3 types

- Independent- what YOU change
- Dependent variable- what you measure
- Control- what stays the SAME

Slimotosis

Sponge Bob notices that his pal Gary is suffering from slimotosis, which occurs when the shell develops a nasty slime and gives off a horrible odor. His friend Patrick tells him that rubbing seaweed on the shell is the perfect cure, while Sandy says that drinking Dr. Kelp will be a better cure. Sponge
Bob decides to test this cure by rubbing Gary with seaweed for 1 week and having him drink Dr. Kelp. After a week of treatment, the slime is gone and Gary's shell smells better.

What was the initial observation?
What is the independent variable?
What is the dependent variable?
What should Sponge Bob's conclusion be?

Variables
Mini-lab

- Materials: 6 different lengths of string with a pendulum tied, piece of tape, and pencil

- Tape the pencil to the table so that it hangs over the edge.
- Hang the longest pendulum from the pencil. Hold the pendulum even with the top of the table and release it.

- Count how many times it swings back and forth in 15 seconds and record the number of swings in the chart below.

- Answer the questions at the bottom of the data sheet

Investigating (Scientific Method)

How do I investigate?

1. State the question or problem.
2. Guess the answer to the question or problem (hypothesis)
3. Describe and design the investigation.
4. Carry out the investigation
5. Report the data in a table.
6. Construct a graph.
7. Compare your results to your hypothesis.

Scientific Method Investigation

- Brainpop

Investigating (Scientific Method)

How do I investigate?

1. State the question or problem.
2. Guess the answer to the question or problem (hypothesis)
3. Describe and design the investigation.
4. Carry out the investigation
5. Report the data in a table.
6. Construct a graph.
7. Compare your results to your hypothesis.

Drops on a Penny Lab

- Put ~~your name on the lab sheet~~
- Problem: Does adding soap to water affect how many drops of water one penny can hold before the water spills over?
- Hypothesis: "If you add soap to water then the penny will hold _____(more or less) drops."
- Use a water dropper to place water drops on the head of a penny one at a time. Use only the cup labeled water. Record each trial…..You MUST dry the penny before starting another trial
- After doing three trials with regular water, do the same thing with soapy water. Make sure you record the # of drops and dry the penny before starting a new trial.
- Construct a bar graph of your results.
- What is your conclusion?