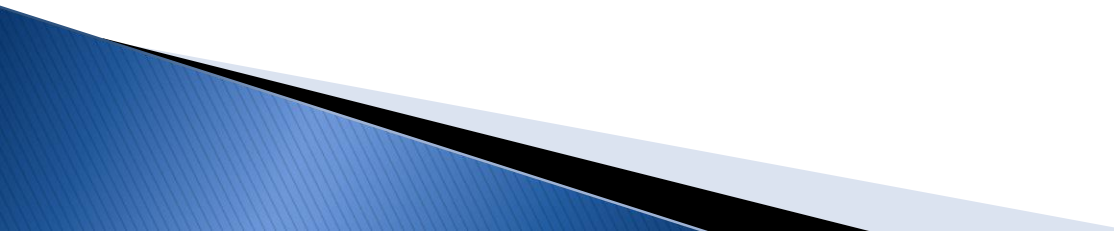


The Scientific Method & Reading Graphs

Objectives!

- A. Define basic terms associated with science
 - B. Define the scientific method
 - C. List & describe the steps of the scientific method
 - D. Identify variables, constants, and controls in an experiment
 - E. Construct, label, and discern different types of graphs
- 

A. Define basic terms associated with science

SCIENCE

- ▶ Is a creative process that changes and progresses.

A. Define basic terms associated with science

OBSERVATIONS

- ▶ Things you can See!

A. Define basic terms associated with science

PATTERNS

- ▶ Happen over & over again

INFERENCE

- ▶ A CONCLUSION drawn on the basis of FACTS
 - Example:



All areas of science involve
posing questions about nature!



A. Define basic terms associated with science

THEORY

▶ – explain patterns

Ex– Big Bang Theory

A. Define basic terms associated with science

FACTS

- ▶ Data or **EVIDENCE** that can be **OBSERVED** repeatedly
 - Example:

A. Define basic terms associated with science

HYPOTHESIS

- ▶ – An EDUCATED guess – based on observations, patterns, and inferences
 - Example:

A. Define basic terms associated with science

LAW

- ▶ **Describes** what happen
Example: Law of Gravity

A. Define basic terms associated with science

▶ **SUPERSTITION**

- ▶ -- A BELIEF that is NOT based on evidence
 - Example:



AIDS

B. Define the Scientific Method

Scientific Method

- ▶ An orderly approach to answering questions and solving problems.



C. List & describe the steps of the scientific method

- ▶ **Scientific Method**
- ▶ 1. Stating a problem – something is considered a problem if its solution is not obvious. Some crucial information is missing. Solving the problem involves finding this missing information.

C. List & describe the steps of the scientific method

- ▶ 2. Collecting information on the problem -- the more you know about the problem the more precisely you can state the problem and the less time you will waste looking for solutions.

C. List & describe the steps of the scientific method

- ▶ 3. Making a **hypothesis**–
 - a. Use what you know about the problem to **predict** a solution and try it.
 - b. Look for **patterns** that will help you make predictions about the problem.

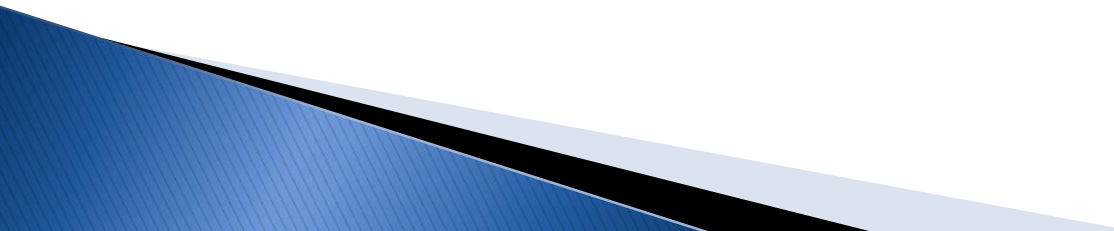
C. List & describe the steps of the scientific method

- ▶ 3. Making a **hypothesis**–
 - c. Make a **model**, or a representation, of what you're working with.
 - d. Break the problem **down** into smaller, simpler problems.

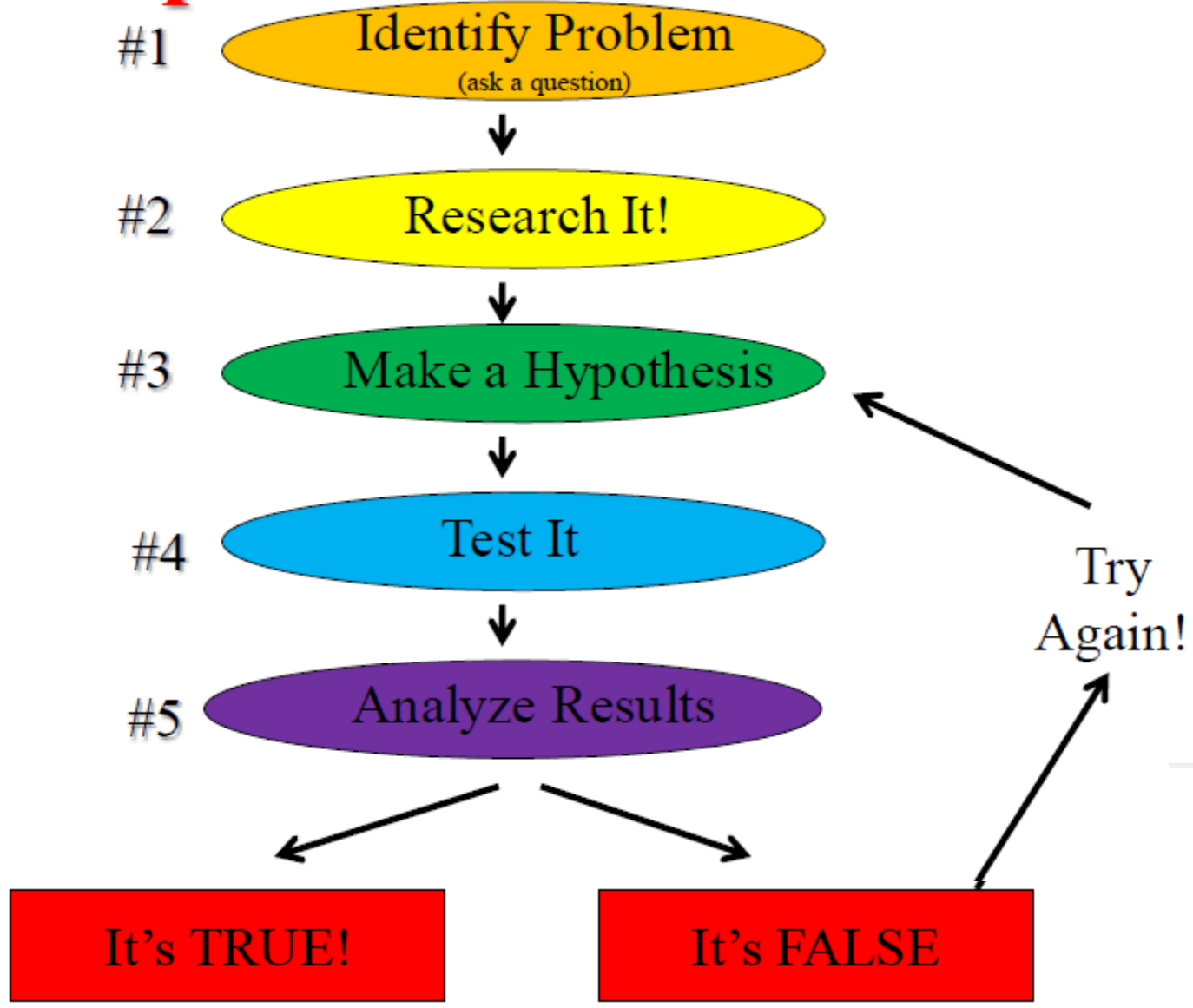
C. List & describe the steps of the scientific method

- ▶ 4. **Performing** an experiment
 - design an experiment that will provide a means for you to make a solid **conclusion** about your hypothesis

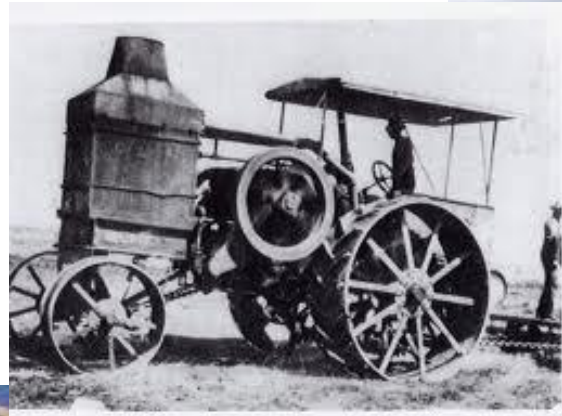
C. List & describe the steps of the scientific method

- ▶ 5. Make a **conclusion** – a solid conclusion is related to the hypothesis and based on the **results** of a well designed experiment.
- 

Steps to the Scientific Method



So WHY is Science Important to Agriculture?



D. Identify variables, constants, and controls in an experiment

- ▶ A science experiment is designed so that only ONE variable is being tested at a time.

D. Identify variables, constants, and controls in an experiment

- ▶ A **VARIABLE** is something that is changed to study how this change effects the thing being studied.

D. Identify variables, constants, and controls in an experiment

- ▶ By changing only one variable, when you make your conclusion you can be assured that it is only that one variable that is causing the EFFECT.

D. Identify variables, constants, and controls in an experiment

VARIABLES


▶ Independent variable (IV)

–the variable that is **CHANGED**
–(what is being tested)

▶ Dependent variable (DV)

–the variable that **RESPONDS** and is **MEASURED**.

D. Identify variables, constants, and controls in an experiment

- ▶ **Control** – the item being tested with NO CHANGES
– used to compare
 - ▶ **Constant (C)** – all factors that are kept the same during the experiment.
- 

D. Identify variables, constants, and controls in an experiment

▶ **REPEATED TRIALS**

- the NUMBER of objects / organisms undergoing treatment for each IV...
- or the number of times the experiment is repeated.

Scenario #1

IV:	Type of Fertilizer		
Treatment:			
Trials:			
DV:			
Constants:			

Scenario #1

IV:	Type of Fertilizer		
Treatment:	Comm. Fert	Compost	None
Trials:			
DV:			
Constants:			

Scenario #1

IV:	Type of Fertilizer		
Treatment:	Comm. Fert	Compost	None
Trials:	25 plants	25 plants	25 plants
DV:			
Constants:			

Scenario #1

IV:	Type of Fertilizer		
Treatment:	Comm. Fert	Compost	None
Trials:	25 plants	25 plants	25 plants
DV:	Height of plants in cm		
Constants:			

Scenario #1

IV:	Type of Fertilizer		
Treatment:	Comm. Fert	Compost	None
Trials:	25 plants	25 plants	25 plants
DV:	Height of plants in cm		
Constants:	Soil, type of plants, sunlight, water, amount of fertilizer, number of days		

Scenario #2

IV:	Type of Metal			
Treatment:				
Trials:				
DV:				
Constants:				

Scenario #2

IV:	Type of Metal			
Treatment:	Iron	Aluminum	Magnesium	Lead
Trials:				
DV:				
Constants:				

Scenario #2

IV:	Type of Metal			
Treatment:	Iron	Aluminum	Magnesium	Lead
Trials:	1 Nail	1 Nail	1 Nail	1 Nail
DV:				
Constants:				

Scenario #2

IV:	Type of Metal			
Treatment:	Iron	Aluminum	Magnesium	Lead
Trials:	1 Nail	1 Nail	1 Nail	1 Nail
DV:	Amount of Rust (small, med., large) color of water			
Constants:				

Scenario #2

IV:	Type of Metal			
Treatment:	Iron	Aluminum	Magnesium	Lead
Trials:	1 Nail	1 Nail	1 Nail	1 Nail
DV:	Amount of Rust (small, med., large) color of water			
Constants:	same water, same type of nail, equal amounts of metal, 5 days			

Scenario #3

IV:	Type of Perfume			
Treatment:				
Trials:				
DV:				
Constants:				

Scenario #3

IV:	Type of Perfume			
Treatment:	A	B	C	D
Trials:				
DV:				
Constants:				

Scenario #3

IV:	Type of Perfume			
Treatment:	A	B	C	D
Trials:	1 test	1 test	1 test	1 test
DV:				
Constants:				

Scenario #3

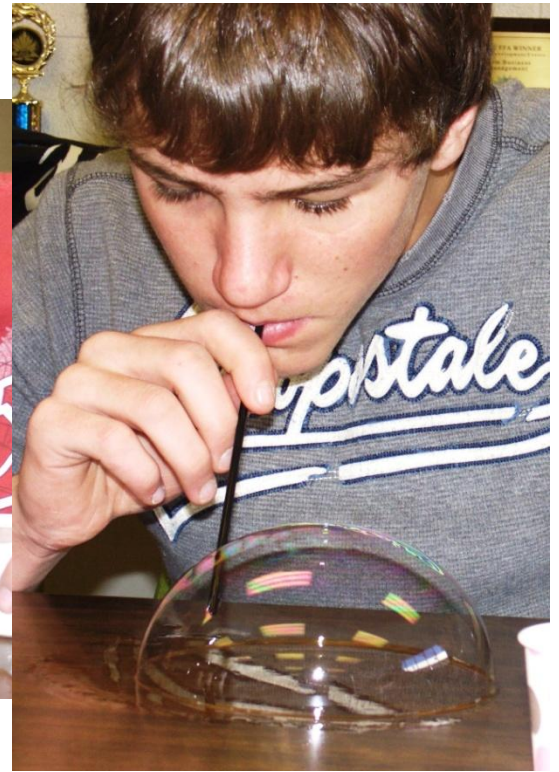
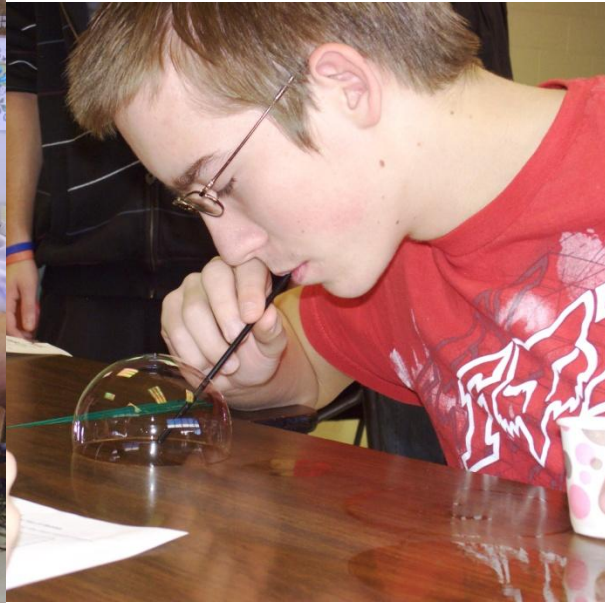
IV:	Type of Perfume			
Treatment:	A	B	C	D
Trials:	1 test	1 test	1 test	1 test
DV:	Number of bees emerging, behavior observations			
Constants:				

Scenario #3

IV:	Type of Perfume			
Treatment:	A	B	C	D
Trials:	1 test	1 test	1 test	1 test
DV:	Number of bees emerging, behavior observations			
Constants:	Same day, weather conditions, same bees, 30 min. interval, amnt. of perfume, distance from hive			



BUBBLES EXPERIMENT



E. Construct, label, & discern different types of graphs

Why use graphs & tables in science??

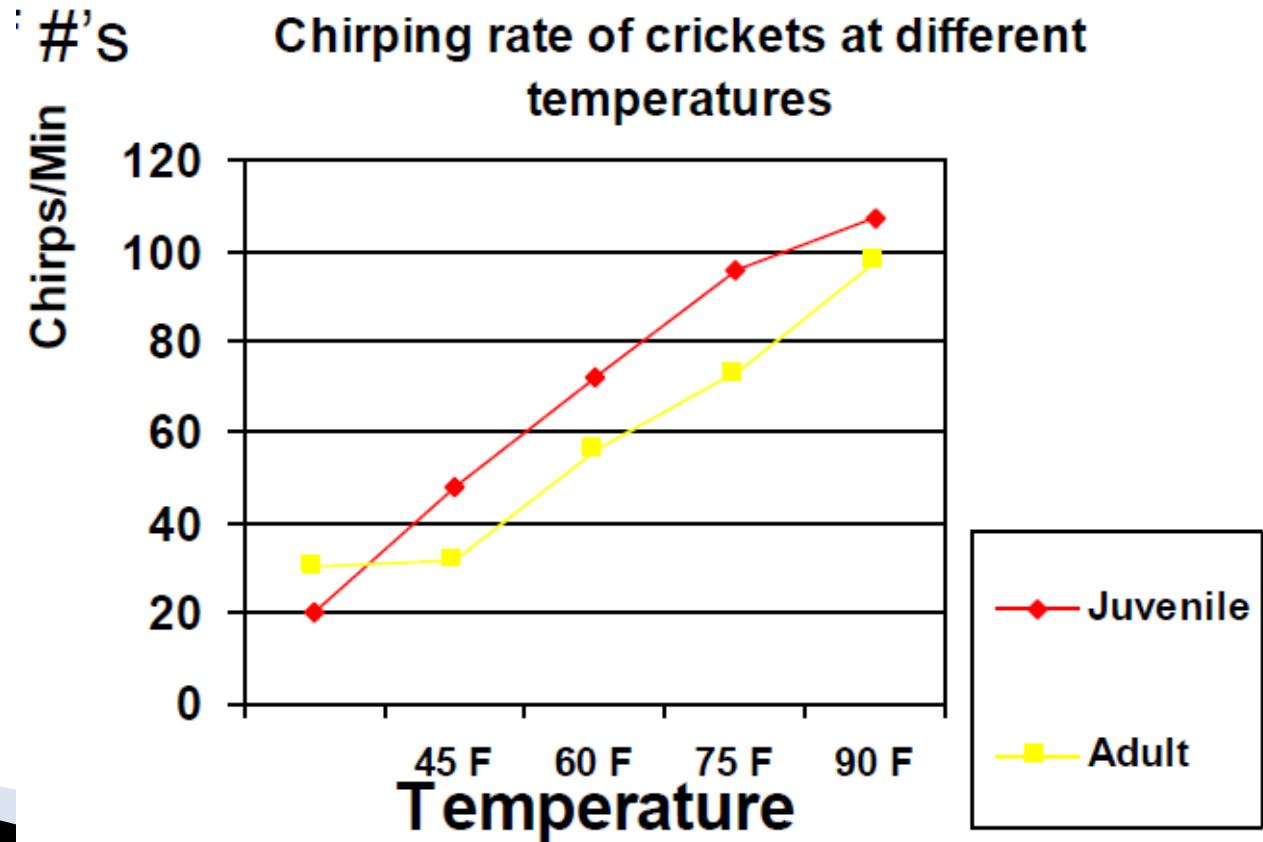
- ▶ To arrange data (numbers) so they are easy to compare
- ▶ **Makes numbers VISUAL!**

E. Construct, label, & discern different types of graphs

▶ Types of Graphs

□ Line Graphs

- 2 variables
- lots of #'s



E. Construct, label, & discern different types of graphs

▶ Bar Graphs

- Easy to compare results
- Easy to see an average

[My Poll](#)

E. Construct, label, & discern different types of graphs

□ Pie Charts

- Data usually equals 100%

Fast-food

