Chapter 1
The Science of Biology

WHAT IS SCIENCE?

OBJECTIVE:

Define science

FOCUS ON THIS:

You will be given a **KWL chart**. You are to complete the **KNOW** column writing down what you know about science. After which refer to your textbook and will be asked to scan through the first chapter. After scanning, fill out the **WANT TO KNOW** column.

WHAT SCIENCE IS AND IS NOT?

Science is…
✓ A way to investigate the natural world;
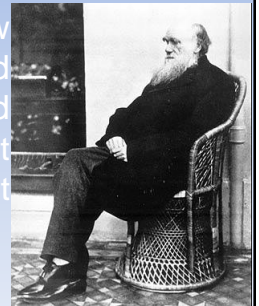✓ A way to explain the natural world and to use those explanations to make useful predictions.

Science is concerned with understanding how nature and the physical world work.

Science can prove anything, solve any problem or answer any question.

TRUE

False

Science is a process by which we try to understand how the natural and physical world works and how it came to be that way.

- Science actually attempts to disprove ideas (hypotheses).

- Science is limited strictly to solving problems about the physical and natural world.

- Explanations based on supernatural forces, values or ethics can never be disproved and thus do not fall under the realm of science.
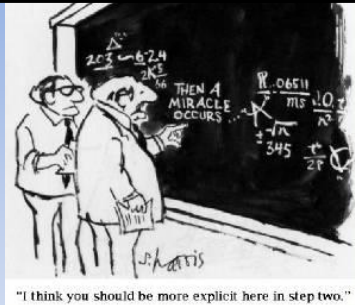

Think about this…

True or False ?

Any study done carefully and based on observation is scientific.

Science can be done poorly.
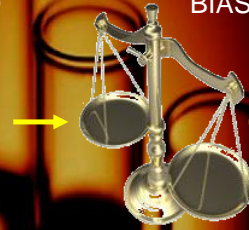
False

TRUE

- Science must follow certain rules.

"I think you should be more explicit here in step two."

- The rules of science make the scientific process as **objective** as is possible.

Objective VS. **Subjective**

Not influenced by feelings, interests and prejudices; UNBIASED

Influenced by feelings, interests and prejudices; BIASED
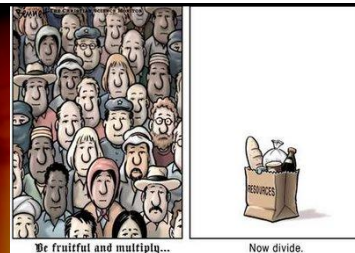

Think about this...

True or **False** (?)

Anything done scientifically can be relied upon to be accurate and reliable.

Different scientists may get different solutions to the same problem.

False

TRUE

Be fruitful and multiply...   Now divide.

- Science can be done poorly, just like any other human endeavor.
- Quality control mechanisms in science increase the reliability of its product.

- Results can be influenced by the race, gender, nationality, religion, politics or economic interests of the scientist.
- Sampling or measurement bias can result in different solutions to the same problem.

Think about this…

True or **False** (?)

Knowledge of what science is, what it can and cannot do, and how it works, is important for all people.

TRUE

People need to be able to evaluate scientific information in order to make informed decisions about:
- Health care
- Environmental issues
- Technological advances
- Public health issues

What is science?

Science is an organized way of using evidence lo learn about the natural world.

Try This!

- Your team will use pictures from magazines, to make a collage showing as many different situations where science is involved. At the back of it write down group's idea of what could be another definition of science for you and its advantages and disadvantages as they for see it.
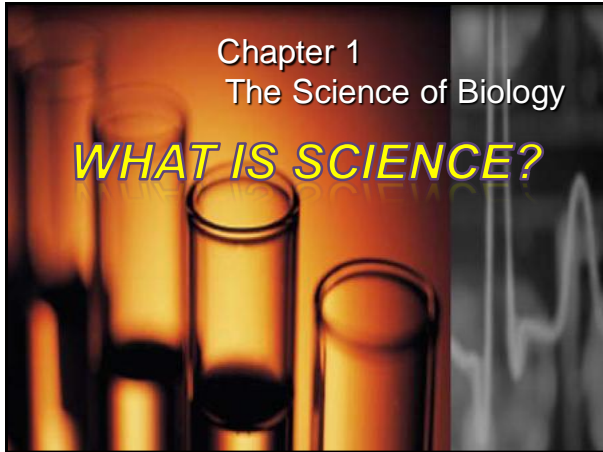
Try This!

Rubrics for Science Collage						
Criteria	Excellent 4	Good 2	Needs Improvement 1	Poor 0	Team Rating	Teacher Rating
Breadth of understanding what science is						
Connections of pictures with the group ideas of advantages and disadvantages of science						
Neatness and creativity of the collage						
Comment:					X30	X70
TOTAL						

SYNTHESIS:

At the end of this lesson, fill out the **LEARN** column. Writing down what you have learned in this part of the lesson.

HOMEWORK:

1. Use a biology textbook to unlock vocabulary terms:
Science, Observation, Data, Inference, and Hypothesis

Chapter 1
The Science of Biology
WHAT IS SCIENCE?

Apply behavioral qualities of a scientists that can help the world a better place to live in;

THINK ABOUT THIS:

Have visited the rivers in Pasig, Guadalupe and Quiapo?

THINK ABOUT THIS:

Learning the current state of these rivers and how sciences with other professionals and local environmentalists, including many students like themselves are working to reverse the decline in these rivers.

A SCIENTIFIC VIEW OF THE WORLD

1. The biological sciences are NOT a set of truths that never change.
2. Science is a way of knowing.

A SCIENTIFIC VIEW OF THE WORLD

3. Science is an ongoing process involving:
   a. Asking questions
   b. Doing observations
   c. Making inferences
   d. Testing hypotheses

A SCIENTIFIC VIEW OF THE WORLD

4. A good scientist is:
   a. Curious
   b. Honest
   c. Open-minded
   d. Skeptic and
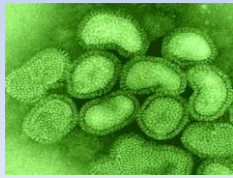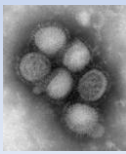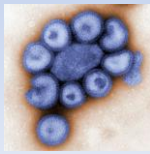   e. Recognize that science has limits

A SCIENTIFIC VIEW OF THE WORLD

Open minded – is a person who is willing to give up familiar ideas if the evidence demands it.

SCIENCE AND HUMAN VALUES

1. Science adds new information to issues on health and disease, relationships between humans and their environments.

SCIENCE AND HUMAN VALUES

2. Science studies how our lives are affected by: drugs, alcohol, AIDS, cancer, cloning, the use of fossil fuels, waste disposal.

SCIENCE AND HUMAN VALUES

3. Science only makes recommendations on these topics, *society makes the decisions.*

Try This!

- Make a list of things that your group need to understand to protect your life and the lives of others close to you. Create a chart of 2 columns; in the first column write down SITUATIONS; in the second column write down POSSIBLE QUESTIONS.

Example:

5 SITUATIONS:	POSSIBLE QUESTIONS:
Drugs / medicines	How can we best use antibiotics to make sure that those drugs can keep working for a long time?

SYNTHESIS:

What is the connection between our environment and the people that live in it?

HOMEWORK:

HL:
a. What are your impressions on how science can make our rivers alive?
b. How can scientific evidence help raise awareness regarding environmental issues?

DL:
Create a comics that will incorporate what you have learned today with our polluted river and how can we solve the garbage problem in our rivers.

OBJECTIVE:

Identify and analyze the steps used to answer questions in a scientific method;

THINKING LIKE A SCIENTISTS

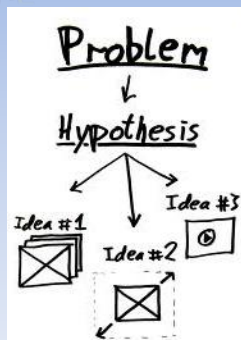Scientific information begins with observation.

THINKING LIKE A SCIENTISTS

Identify the problem

EXPLAINING AND INTERPRETING EVIDENCE

Propose one or more hypothesis (a proposed scientific explanation)

Problem
↓
Hypothesis

Idea #1   Idea #3
Idea #2

EXPLAINING AND INTERPRETING EVIDENCE

Testing A Hypothesis

EXPLAINING AND INTERPRETING EVIDENCE

Performs   the
experiment

THINKING LIKE A SCIENTISTS

The information you gather is called data.

Data can be:

quantitative: (numbers)
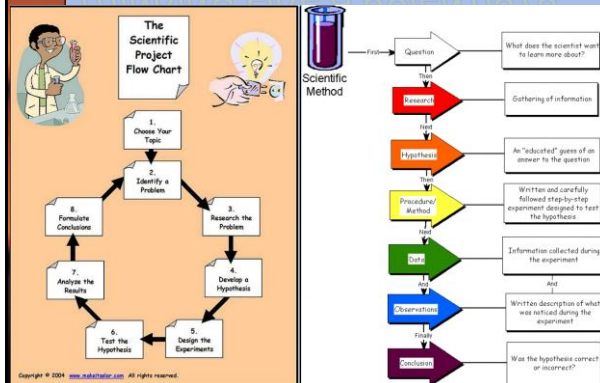qualitative: (descriptive)

THINKING LIKE A SCIENTISTS

Example:

Data	Quantitative	Qualitative
There are 7 birds at the feeder.	☑	
One of the bird has a red head.		☑
There 3 male birds and 4 female birds.	☑	

THINKING LIKE A SCIENTISTS

Communicate your results

Nature of Science

☐ **Science is a Product** ☐ **Science is a Process**
   (body of knowledge)   **(way of knowing / doing)**

- Facts
- Concepts
- Laws
- Principles
- Technologies

- Observing
- Comparing
- Classifying
- Measuring
- Predicting
- Questioning
- Experimenting
- Analyzing

Nature of Science

☐ **Science is Thinking**

   Why and how do things happen?

☐ **Science is Inquiry**

   What matter is?
   How it is
   transformed?

Features of Inquiry

- ☐ **Question**
- ☐ **Evidence**
- ☐ **Explanation**
- ☐ **Connection**
- ☐ **Communication**

SYNTHESIS:

Write a conclusion that summarizes the important parts of your experiment and the results.
   Can you formulate a theory of how to predict with almost 75% accuracy? Explain.

HOMEWORK:

Analysis: Listen to, view a commercial or read a newspaper for a product that addresses a medical problem such as constipation, allergies or bad breath. Record the following information:

a. What is the major claim made in the commercial?
b. Is the claim based on experimentation?
c. What data, if any, are used to support the claim?