2.05 Science and You

Part 1:

Read the examples and answer the questions.

Remember to put each situation to the validity test by asking each of the following:

- Has it been tested and observed numerous times by more than one group of scientists?
- Is the study or data documented completely, and does it follow the scientific method?
- Does the information contain just the facts and avoid mixing in opinion and assumption?
- Is the information presented purely for public knowledge, avoiding being connected with a new product that is for sale?
- Does the information come from a third party that is not profiting from the results of the study?
- Is this information supported by any other studies that have been conducted by other companies or agencies?

Example 1 (5 points)

A team of researchers are working on a project to make a new kind of airplane fuel. During their experiment, there was an explosion that destroyed the lab. While they were cleaning up the debris, they discovered a number of pieces of frozen metal. The scientific community was amazed. The researchers were so excited to report that they had discovered a fuel that burns so hot that it becomes cold. They were not sure of the true importance of their discovery but they knew it was something that had never been seen before. The researchers quickly wrote up a report, created a press release, and applied for a patent. The news spread quickly through the world wide scientific community and soon other scientists were trying to replicate their experiment. Much to the relief of the original team or researchers, no other scientist could ever replicate their find.

Would this example be considered science or pseudoscience? Support your decision with at least three reasons.

Example 2 (5 points)

Researchers at a university want to know if higher levels of nitrogen in fertilizer will increase the production of tomatoes per plant. Twenty plants are given normal levels of nitrogen and twenty other plants are given ten percent higher levels throughout the growing season. The plants receive the same levels of sunlight, water and are planted in the same soil on one farm. At the end of the experiment the average number of tomatoes produced is the same for each group. The scientists repeat the experiment on two additional farms further south that season. The researchers conclude that increasing nitrogen levels by 10% in tomatoes is not beneficial.

Would this be a well designed reliable experiment? Support your decision with at least three reasons.

Example 3 (5 points)

There is a new brand of water on the market that has been proven to relieve headaches. It is selling like crazy! When the Food and Drug Administration asked for scientific proof that the water actually does what it claims to do, the owners of the company produced a scientific research study that they had paid a group of scientists to perform. In the study researchers gave this special water to a group of 50 people who claimed to have a headache. The people drank the special water whenever they felt thirsty over a period of 24 hours. After the 24 hours, 99% of the people reported that their headache was gone.

Should the Food and Drug Administration trust this scientific study and allow the company to sell the water with this claim? Would this be an example of Science or Pseudoscience? Support your answer with at least three reasons.

Example 4 (5 points)

A group of researchers from a local lab are trying to get funding for a research study to determine if the color blue is better than the color green. They have written a proposal and submitted to the company that could potentially give them the money needed to conduct the study. The researchers proposed to carry out their study in four different geographic locations and use variations of both the color blue and the color green to ensure that they will gather reliable information.

Should the company give the researchers the money to conduct this study? Support your decision with at least three reasons.

Example 5 (5 points)

The town of Seaside needs to build a new power plant. The old coal burning plant produces too much pollution and is no longer safe. The mayor decides that he will do some research on alternative forms of energy like nuclear power plants and solar power plants.

What types of resources should the mayor use to conduct his research? Why would these be considered reliable source of information and why? What types of resources are reliable? How can he use what he learns to make the best decision for the town?

Part 2: (35 points)

Design your own scientific experiment. Your experiment must follow the scientific method and meet the criteria described in the lesson in order to be considered scientific. You do not have to conduct your experiment; however, you are still responsible for including all the steps of the

scientific method. Since you will not be able to record data or draw a conclusion, for the last two steps please include a description of what each step involves.

Your points will be awarded as described below:

Topic chosen–is it testable?	5 points
Experimental design–are the variables controlled?	5 points
Includes all steps of the Scientific Method, as described in the lesson, in proper sequence.	10 points
Each step of the Scientific Method is appropriately used or fully explained as it applies to the experiment	15 points
Total	35 points

Question:

Hypothesis:

Materials:

Step by Step Procedure:

What measurements or other method of data collection would you use?

How could you form a statement about your hypothesis based on the data?