<http://www.goscienceseven.com/SciMethod/sciquestions.html>

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| **Scientific (Testable Questions)** | **Name \_\_\_\_\_\_\_\_** |
|  | [**http://www.science-house.org/nesdis/gulf/guide.html**](http://www.science-house.org/nesdis/gulf/guide.html) | **Period \_\_\_\_** |

The answers to good scientific questions over the years have lead to important discoveries. Scientists are particularly good at developing simple, yet elegent, questions that can be tested. Then, in a perfect world, scientists, engineers, architects, and other people use the knowledge gained from the answers to these questions to make life on Earth better. (Sadly this isn't always the case!)

Good questions are stated in a way that frame, or describes, a problem, and are able to be tested using accepted scientific methods.

There are 3 main types of Questions. Each asks, or requires, a different type and amount of prior knowledge and build until the researcher creates an Experimental question.

**1. Verification questions.**These are basic data collecting questions. They are useful in building knowledge.

Examples are: Is it cold today? Is the sun still out? Is a flame hottest when it is blue?

**2. Significant/Theory questions require an explanation and prior knowledge.**

Examples are: Why should you point a car's wheels toward the curb when parking on a hill? Do clouds have to be in the sky for it to rain? Why do you add acid to water instead of water to acid? These questions increase knowledge of the subject, but need prior knowledge to be asked.

**3. Experimental questions require explanations, prior knowledge, and are testable.**

Example: If salt is added to water, would the solution still boil at the same temperature? or If Suntan lotion is put on ultraviolet detecting beads, will the beads still change color? Experimental questions require a more in depth answer that requires testing. Experimental questions are what researchers use.

**Using a lined sheet of paper, please tell what type of scientific question is listed below.**

a. Number the paper 1-8, with a space between the numbers.

b. Next write Verification, Significant, or Experimental after each number.

c. Finally explain why you answered what you did.

1. Will there be a full moon tonight? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

2. Why is it important that the desert plants get rain in spring? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

3. Why is the desert hot? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

4. What is the significance of red sky at nightfall? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

5. Why does lightening come before thunder? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

6. How can the time delay between lightening and thunder be used to tell how far away a storm is? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

7. Can stars be red? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

8. If salt is added to water, will the water boil at a different temperature?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Part 2 - Creating scientific questions.**Developing questions is a skill that requires practice, just like hitting a baseball. Over time you will master this skill. Later on you will be able to recognize all three types of scientific question and then use this knowledge to help solve just about any problem.

Let's take a look at four basic guidelines for writing scientific questions.

**1. A good scientific question is one that can have an answer and be tested.**

"Why is that a rock?" is not as good a question as "What are rocks made of?"

**2. A good scientific question can be tested by some experiment or measurement that you can do.**

In this case "Where does the Sun come from?" is not as good as, "How will human skin, covered with SPF 30 suntan lotion, react to solar radiation compared to skin not covered with suntan lotion?"

**3. A good scientific question builds on what you already know.**"Will fertilizer make grass grow greener?" is not as good as, "What types of fertilizer will make grass grow greener and not cause harm to the environment?"

**4. A good scientific question, when answered, leads to other good questions.** "What is HIV?" does not lead to as many other questions as, "How does the HIV virus cause the human immune system to malfunction?

**The questions above ask What and How in a way that focuses in on the specific problem to be studied. These questions frame a problem in a way that can be tested.**

**For example**, an example of a good scientific question about salmon might be:

"What is causing the forest bordering the streams to be unhealthy and no longer support salmon runs?"

Q's 9-14: Use the Guidelines above to tell which of each pair of questions below is a better scientific question and then clearly explain why you think this is so. Use the same separate paper as Q's 1-8.

9. a. What are the different things that make up air?

b. What is air?

10. a. Why is the sun out today?

b. What atomic elements make up stars?

11. a. What is the reason that collies have bad hip sockets?

b. What causes grass to turn brown during the summer?

12. a. How does the space shuttle keep from burning up?

b. Why is the International space station in orbit?

13. a. What is Influenza?

b. How does Influenza change (mutate) to make so many new strains each year?

14. Finally create and write your own (good) experimental scientific question.