TAKS OBJECTIVE ONE REVIEW - Scientific Method

Directions:
Follow the simple rules for problems about Scientific Method and Experiments and answer the following:

Steps of the Scientific Method:

1. Question

Why is something that way? What is that used for? Where does that animal live? There will always be a question that starts the method.

2. Hypothesis

This is a working statement. It usually comes out as "I think…" or "If…., then….." statements. You use these all the time and don't think you are making a hypothesis.

3. Experiment

There are several types of experiments. The TAKS test usually centers around one type of experiment.

Control and Experimental group experiments. In this, you leave one group alone (**control group**) and change some factor in the other group (**experimental group**). The thing you change is called the **independent variable** because it is changed, what happens because you changed it is called the **dependent variable** (depends on what you change)

4. Analysis

The data you collect from your experiment will need to be worked through and graphs or charts made so that you can present your information, or so you can answer your question.

5. Conclusion

You wither prove your hypothesis right, or wrong with a conclusion statement.

Rules:

1. What are they asking?

Questions on the TAKS with the scientific method usually have a loot of information that will not help answer the question. Eliminate it. ~~Cut it out~~, or cover it.

2. Look for the "buzz words"

Looking for the words of scientific method in the question and answer choices is a good way to figure out what type of question it is (**highlighted** in the steps of the method)

1 An advertisement claims that patients can be cured of the common cold in 48 hours by vitamin C tablets with secret mineral supplements. In a scientific experiment to test these claims, which data can be considered irrelevant?

A The amount of vitamin C in each tablet
B The severity of the patients' cold symptoms
C The chemical formula for vitamin C
D The amount of time before symptoms Improve

Hint: What are they asking? Is the formula?

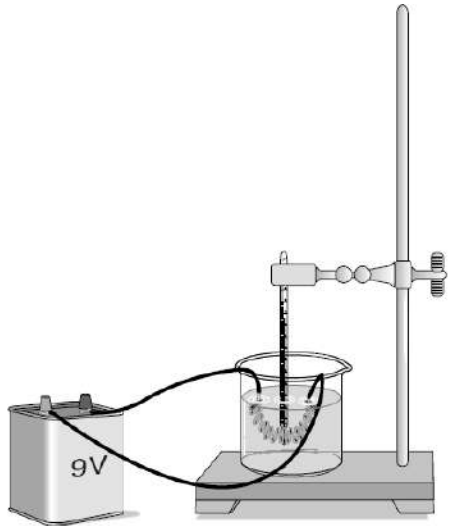
Time Required for Water Evaporation

Container	A	B
Volume of Water (mL)	25	25
Temperature (°C)	–15	25
Time Required (h)	72	24

2 The table shows times required for water to evaporate from identical containers. Which of these is the best question to ask before developing a reasonable hypothesis to explain the data?

F Why does a lower temperature slow the rate of evaporation?
G What is the boiling point of the water after both samples are heated?
H Why does water exist as a solid at 15°C and as a liquid at 25°C?
J How does the rate of evaporation change when a different container is used?

Hint: Did the question state anything about the type of container, or the freezing point of water?



3. This experiment probably was set up to determine —

A how much mechanical energy the battery produces
B the pH of water during electrolysis
C the pressure created by an electric current
D how much energy is converted to heat

4 An herbal company advertises that its product will help people lose weight if they take a tablespoon of the product with a glass of water at bedtime each night. Weight loss is guaranteed if a person does not eat for at least 3 hours before bedtime, gets moderate exercise, and drinks 8 glasses of water each day. Why is the company's claim difficult to verify?

F The company has yet to disclose the identity of its special herb.
G Numerous uncontrolled variables are involved in evaluating results.
H Fasting lessens the absorption rate of the herb.
J The advertisement lacks data from before and after the weight loss.

A scientist has hypothesized that the existence of life on Mars is likely because Mars's atmosphere is 95% carbon dioxide.

5. Which question is valid in testing this hypothesis?

F Do most other scientists agree with the hypothesis?
G Could abiotic processes account for the carbon dioxide?
H What is the percent of argon compared to carbon dioxide in the Martian atmosphere?
J Have the scientist's other predictions about Mars been validated?

Conclusion: Hearing aids are an effective way to treat hearing loss.

6. A study was conducted to test the effectiveness of hearing aids. People with different types of hearing loss were included in the study. Which question would help in determining whether the conclusion above is valid?

A What was the average age of the people in the study?
B What was the most common occupation of people in the study?
C How many people were included in the study?
D How many people in the study had vision problems?

7. Two science students discovered that the mass of a sample of acetone in an open beaker decreased within a few minutes. One student hypothesized that the acetone reacted with oxygen to form a gaseous compound that escaped. The other student believed that the acetone evaporated into the air. What should the students do to test these hypotheses?

F Combine the hypotheses so they give valid predictions of the acetone's behavior
G Conduct a study of original papers describing the experiments leading to acetone's discovery
H Perform an experiment that attempts to identify the gas above the open beaker
J Ask a classmate's opinion about the chemical and physical properties of acetone

- *Mycobacterium tuberculosis* causes tuberculosis in humans.
- When treated with antibiotics, most *M. tuberculosis* bacteria are killed, but some have genes that allow them to survive.
- *M. tuberculosis* bacteria that survive the antibiotic treatment may reproduce.

8. Which of the following conclusions is supported by the information above?

F Antibiotics have intensified the symptoms of *M. tuberculosis* infections.
G *M. tuberculosis* is becoming extinct because of antibiotics.
H Antibiotics have caused *M. tuberculosis* to reproduce at a faster rate.
J *M. tuberculosis* has developed resistance to antibiotics.

Time of Day	Average Sorting Time (s)
8:00 A.M.	130
12:00 NOON	105
4:00 P.M.	122
8:00 P.M.	127

9. Which of the following conclusions is supported by these data?

A Alertness is directly related to level of distraction.
B Shuffling methods can affect alertness.
C Alertness levels vary during the day.
D Long periods of rest improve alertness.

A De-Icing Experiment

Some species of plants that commonly grow near roadways are used in an experiment. The plant species are divided into control groups and experimental groups. All groups are grown under identical conditions except that the experimental groups are given daily applications of a de-icing solution that is used on roadways in winter. At the end of one month, the growth of the control and experimental groups is compared.

10. Which of the following is the most likely hypothesis for the experiment described above?

A Vegetation that grows near roadways requires more water than vegetation in other areas.
B De-icing solution causes roadways to have more space for vegetation.
C Vegetation near roadways changes the effectiveness of de-icing solution.
D De-icing solution affects some types of vegetation that grow near roadways.