

8th Grade Science
Introductory Concepts
Unit Test

Name: _____

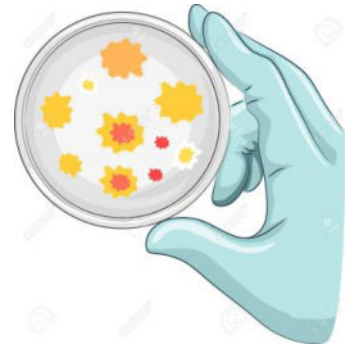
Date: _____

Read each of the four scenarios. Using the information in the paragraphs, answer the questions that follow.

Scenario 1:

An investigation was carried out to determine which of three antibacterial soaps is most effective. Four petri dishes labeled A, B, C, and D were set up. The same amount and type of bacteria were added to each dish. Next, a small amount of each brand of soap was added to dishes B, C, and D. Only water was added to dish A. The dishes were all kept at 37°C for 24 hours to allow the bacteria to grow. After 24 hours, the amount of bacteria in each dish was counted. Dish D had the least bacteria. It was concluded that the soap in dish D was the most effective soap to use against bacteria.

1. What is the question in this investigation? (write it as a question!)
2. What is the independent variable?
3. What is the dependent variable?
4. Name two factors that the researcher kept constant.
5. Which petri dish was the control group, and how do you know?



Scenario 2:

Mr. Belonus wanted to know whether or not his students would do better on a quiz if he promised them candy. He went to the library and read several studies about the effect of giving food to lab animals. He found out that if animals were given food as a reward for doing something, they usually did better the more reward they were given. He guessed that the more of a reward that his students were promised, the better they would do on their quizzes.

Mr. Belonus had all of his classes participate in the experiment. There were three groups in all. The first group was not promised any candy if they did well on the quiz. The second group was promised 1 piece of candy if they did well on the quiz. The third group was promised 5 pieces of candy if they did well on the quiz.

Group #1 got an average of 70% on the quiz. Group #2 got an average of 80% on the quiz. Group #3 got an average of 90% on the quiz. Mr. Belonus then decided that the more candy a group was promised, the better they did on quizzes.

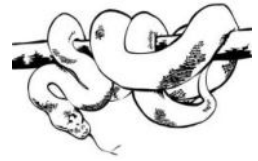
1. What is Mr. Belonus' hypothesis? (Write it as an IF/THEN statement!)
2. Why is Mr. Belonus' hypothesis not just a random guess?



3. Who is the control group in this experiment?
 4. What is the independent variable here?
 5. What is the dependent variable?
6. What factors do you think would be important for Mr. Belonus to keep constant and why? Discuss **TWO**.

Scenario 3:

The following information is a summary from a research paper published by professors and students at my alma mater, Dickinson College. Answer the questions using the information in each paragraph.



Many species of snakes use **constriction**—the act of applying pressure using loops of their trunk—to control and kill their prey. Constriction uses a large amount of energy and so snakes only constrict their prey just long enough to be sure it is dead. However, we do not yet know how snakes determine when their prey is dead.

1. What is the question that the researchers are trying to answer?

In this experiment, we demonstrated that boa constrictors have the ability to detect the heartbeat in their prey and they adjust the amount of constriction accordingly. Warm but dead rats were implanted with an artificial heart that could be turned on and off by the researchers. We measured the pressure generated by snakes as they struck and constricted these rats.

2. What is the independent variable that the researchers controlled in this experiment?
3. What is the dependent variable that the researchers recorded in this experiment?

When the snakes were given rats whose “hearts” were beating, the snakes responded by squeezing the rats longer and with more pressure than they used when squeezing rats with no heartbeat. When the heartbeat was stopped while the snakes were constricting, snakes stopped squeezing shortly after the heartbeat ended.

4. What is the control “group”?

5. What are the experimental “groups”?

It is interesting that snakes that were usually given dead prey also responded to the simulated heart. This suggests that this behavior is at least partly natural and automatic. These results are an example of how snakes use body cues from their prey to adjust a complex and ancient behavior pattern.

6. How did the researchers determine that this behavior might be an automatic instinct, instead of a learned behavior?

Scenario 4:

The following experiment is from a Penn State article describing research that was done in the summer of 2019 in Berks County.



The spotted lanternfly is being described as the worst invasive pest in 100 years. Researchers from Cornell University and Penn State are investigating the possibility that a fungus called *Beauveria* (bow-very-a) might be useful for killing the insect without harming native trees.

1. What is the question that guided this experiment?

2. What is the researchers' hypothesis?

In early July, the scientists set up four research areas in a forest that had many spotted lanternfly nymphs, the life stage before adulthood. The plots all contained Tree of Heaven — the insect's preferred food — and other species of trees that are also attractive food sources.

Using hydraulic sprayers that reach up to 30 feet in the air, the trees in two areas were treated with water, while trees in the other two areas were sprayed with a solution containing the *Beauveria* fungus. Trays were placed to collect falling insects to compare levels of death between the water plots and the *Beauveria* plots.

3. What is the independent variable that the researchers tested?

4. What is the dependent variable?

Dead spotted lanternflies were tested at Penn State to determine if the *Beauveria* fungus caused their death. The scientists found that, two weeks after spraying, the number of live lanternflies in the fungus-treated areas was about half as many as those in the water-treated areas.

5. What is the control group?

6. What is the experimental group?

They now are replicating their experiments, this time on adult lanternflies, which will be more challenging because adults tend to gather higher in the tree canopies.

7. How will the researchers need to adjust their experimental procedure if they are trying to kill the adult lanternflies?

Question:

What is the scientist trying to find out?

Hypothesis:

What does the scientist think is the answer?

Independent variable:

a factor the scientist **CHANGES**. What is being changed, or what is different during the experiment?

Dependent variable:

a factor the scientist **MEASURES**. What is being counted, or what is being observed during the experiment?

Constant:

Something that is kept the same for all groups during the experiment

Control group:

This is the **NORMAL** group. Which group in the experiment shows how things usually are?

Experimental group:

This group has something done to it. Which group did we change something for?