

8th Grade Science
Introductory Concepts
Unit Test

Name: _____

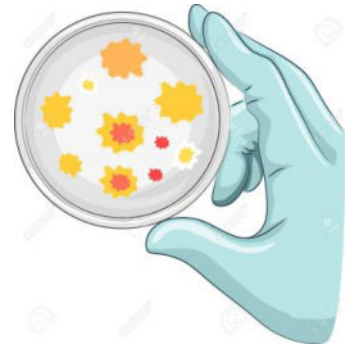
Date: _____

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, 2mL of each of the brands of soap were added to dishes B, C, and D. 2mL of water were added to dish A. The dishes were all kept at 37°C for 24 hours to allow the bacteria to grow. At the end of the investigation, 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. Derk 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. Derk had all of his classes participate in the experiment. There were four 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 2 pieces of candy if they did well on the quiz. The fourth group was promised 3 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. Group #4 got an average of 95% on the quiz. Mr. Derk then decided that the more candy a group was promised, the better they did on quizzes.

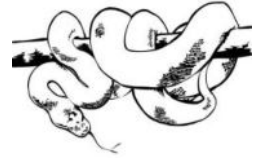
1. What is Mr. Derk hypothesis? (Write it as an IF/THEN statement!)
2. Why is Mr. Derk's hypothesis not just a random guess?



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. Derk to keep constant and why? Name and discuss TWO.

Scenario 3:

The following paragraph is the abstract from a research paper published by professors and students at my alma mater, Dickinson College.



Many species of snakes use **constriction**—the act of applying pressure via loops of their trunk—to subdue and kill their prey. Constriction uses a great amount of energy and snakes must therefore constrict their prey just long enough to ensure its death. However, it remains unknown how snakes determine when their prey is dead.

Here, we demonstrate that boas (*Boa constrictor*) have the remarkable ability to detect a heartbeat in their prey and, based on this signal, adjust the pressure and duration of constriction accordingly. We monitored the pressure generated by snakes as they struck and constricted warm but dead rats that were implanted with a simulated heart that could be turned on and off. Snakes responded to a beating heart by squeezing the rats longer and with greater total pressure than when squeezing rats with no heartbeat. When the heart was stopped midway through the constriction, snakes stopped squeezing shortly after the heartbeat ceased.

Furthermore, snakes that were usually given dead prey also still responded to the simulated heart, suggesting 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.

1. What is the question that this research is asking?
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?
4. What is the control “group”? What are the experimental “groups”?
5. 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. In early July, the scientists set up four research plots on forested sections at a park that had large populations of spotted lanternfly nymphs, the life stage before adulthood. The plots all contained Tree of Heaven — the insect's preferred host — and other species of trees that are attractive food sources, including walnut and bittersweet trees.

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

Dead spotted lanternflies were tested at Penn State Berks in Reading to determine if the *Beauveria* fungus caused their demise. The scientists were encouraged to see 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. 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.

1. What is the question that guided this experiment?
2. What is the researchers' hypothesis?
3. What is the independent variable that the researchers tested?
4. What is the dependent variable?
5. What is the control group? What is the experimental group?
6. How will the researchers need to adjust their experimental procedure if they are trying to kill the adult lanternflies?