Study Island

Generation Date: **06/09/2017**
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1. Ed has two citrus trees at his home. He keeps one outside on a shaded patio, and the other indoors near a large window and a lamp. The indoor tree receives more light and experiences more stable temperatures than the outdoor tree.

He noticed that the indoor tree grew faster and produced bigger oranges than the outdoor tree. He installed a grow-lamp near the outdoor tree so that it would receive as much light as the indoor tree, but there was no change: the indoor tree continued to outgrow the outdoor tree.

Based on this investigation, what would be the next logical question that Ed should address?

- **A.** How does the amount of watering affect the growth of citrus trees?
- **B.** How does the weight of a citrus tree relate to its height?
- **C.** How does the amount or type of soil affect the growth of citrus trees?
- **D.** How does temperature affect the citrus trees?

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2. Dr. Peterson does an experiment to research the growth rate of mice. He has two groups of mice. He feeds one group a type of food and adds chemical A, which is supposed to increase growth rate. The other group he feeds the same food without chemical A added. His research shows that chemical A increases growth rate by 30%. He does the experiment 4 times and comes up with the same result each time.

Dr. Peterson concludes that chemical A does increase the growth rate of mice. Is Dr. Peterson's conclusion supported by scientific knowledge?

- **A.** Yes; any study that involves a percentage is based on scientific knowledge.
- **B.** Yes; his conclusion is supported by evidence from his experiment.
- **C.** No; scientific knowledge never comes from research or experiments.
- **D.** No; science cannot be used to research small animals such as mice.

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3. A new diet pill is advertised on television. The ad claims that a study of 100 people proved that participants who took the pill and exercised three times a week lost 50% more weight than individuals who did not.

What is a problem with this study?

- **A.** Participants only lost 50% more weight.
- **B.** The people who took the pill also exercised three times a week.
- **C.** Too many participants were used in the study.
- **D.** Both groups should have taken the pill.

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4. Johnny has to go get his flu shot today. The flu shot is a vaccine used to protect people from the flu virus, and is recommended by many doctors and schools. However, Johnny's mother is not sure if he should get the shot today. To help with her decision, the doctor provides her with the following information about the flu shots:

I. Flu shots were developed by doctors and scientists.
II. Experimental data shows that flu shots can keep people from getting the flu.
III. If enough people get the flu shot, spread of the flu can be reduced.

Which of the following is a valid scientific explanation for why Johnny should get the shot?

- **A.** Johnny likes shots because he can get candy afterward.
- **B.** Johnny wants to become a doctor one day.
- **C.** Johnny will be less likely to catch the flu.
- **D.** Johnny's mother thinks he should get the shot.

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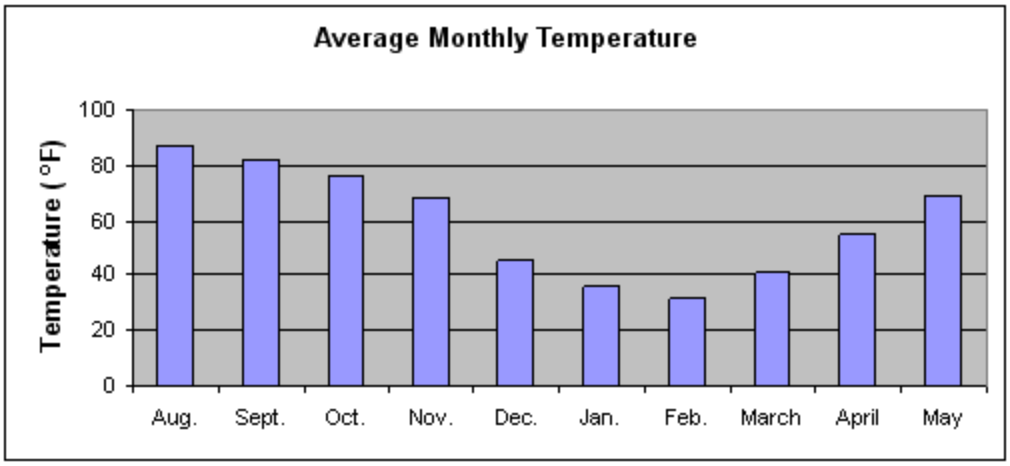
5. Mr. Swanson's science class used a thermometer to measure the outside temperature each day throughout the school year.

They used their results to make the graph below.



Which month had an average daily temperature of around 41 degrees?

- **A.** May
- **B.** December
- **C.** April
- **D.** March

6.

Alice is curious whether her pet iguana is more attracted to brightly colored insects or those with drab colors. She gets 20 drab-colored insects of the same species from the pet store and marks 10 of them with a red paste. All 20 insects are released in her iguana's tank at the same time, and she observes the lizard's response.

After five minutes, Alice notes that her iguana ate all of the marked insects and only 2 of the unmarked insects. She concludes that her iguana prefers brightly colored insects over those with drab colors.

What is another possible explanation for these results?

- **A.** The iguana prefers other species of insects to the one Alice used.
- **B.** The iguana only eats red insects.
- **C.** The insects should have been introduced at different times.
- **D.** The iguana was attracted to the scent of the red paste.

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7. Two scientists test soil fertility in a forest and a nearby field. Both scientists find that the soil fertility in the forest is higher than the soil fertility in the field.

Scientist A says that the forest's soil fertility is higher because the forest has more vegetation that keeps the topsoil from eroding. Scientist B says that the forest's soil fertility is higher because the forest's soil has a high count of decomposing bacteria.

Which of the scientists' conclusions is valid?

- **A.** Neither scientist's conclusion is valid because soil fertility is hard to test.
- **B.** Both scientists' conclusions could be valid.
- **C.** Only scientist B's is valid because bacteria increase soil fertility.
- **D.** Only scientist A's is valid because it is supported by evidence.

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8. James performed an experiment to see how adding different salts to water affects their freezing points. His data is shown below.

Concentration of Salt Solution (mol solute/kg water)	Freezing Point for NaCl Solution	Freezing Point for $MgCl_2$ Solution
0	0°C	0°C
2	-2.5°C	-2.8°C
4	-6.0°C	-7.5°C
6	-11.0°C	-15.0°C
8	-16.5°C	-35.0°C

How are the freezing points related to the concentrations of the salt solutions?

- **A.** For both salt solutions, as the concentrations increase, the freezing points decrease.
- **B.** For both salt solutions, as the concentrations increase, the freezing points increase.
- **C.** For the $MgCl_2$ solution only, as the concentrations increase, the freezing points decrease.

○ **D.** For the NaCl solution only, as the concentrations increase, the freezing points increase.

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9. Dr. Flora is doing an experiment to test which type of fertilizer makes her roses grow the fastest.

She separates 12 rosebushes into three equal groups and measures their height. She gives one group of rosebushes fertilizer A, she gives the second group fertilizer B, and she does not give fertilizer to the third group. She keeps everything else about the rosebushes' environment the same, including the amount of water and sunlight provided.

After a month, Dr. Flora measures the height of the rosebushes in all three groups. Her results are shown below.

	Average Growth of Roses
Fertilizer A	8 cm
Fertilizer B	12 cm
No Fertilizer	5 cm

Based on Dr. Flora's results, which of the following can she conclude?

○ **A.** Both fertilizer A and fertilizer B cause roses to grow at an increased rate.

○ **B.** Fertilizer B causes roses to live longer than fertilizer A.

○ **C.** Fertilizer A causes roses to die at an increased rate.

○ **D.** Neither fertilizer A nor fertilizer B affects the growth rate of roses.

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10. Annette is designing a very complex experiment that includes several complicated variables. How could Annette use a computer to help her with this advanced experiment?

○ **A.** Annette could use 3-D computer based modeling to help her design the experiment.

○ **B.** Annette could use mathematical software to help her interpret the results of the experiment.

○ **C.** Annette could use spreadsheets on the computer to organize her experimental data.

○ **D.** all of these