

- 2) Kevin has designed an experiment to determine the quickest way to create usable compost. Composting breaks down organic material into matter that is beneficial to soil and gardens. To make composting happen faster, the compost pile needs to be turned.

Kevin wants to find out if turning a compost pile twice a day will create usable compost faster than turning a pile just once a day. How many sets of compost piles would be best for Kevin to include in his experiment?

- A. two: one that is turned once a day and one that is turned twice a day
- B. three: one that will never be turned, one that is turned once a day, and one that is turned twice a day
- C. seven: one for each day of the week
- D. fourteen: one for each of the days of the week over a two-week period

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3) Katarina's class was studying worm systems. They had two separate, identical worm bins with 1,000 worms in each bin. They want to determine how to best feed the worms. They fed the worms in Bin 1 chunks of fruits and vegetables. For the worms in Bin 2, the class put the fruits and vegetables in a blender before feeding the worms.

After a month, Bin 1 contained 947 worms, while Bin 2 contained 1,249 worms. Why did Katarina's class include two methods of feeding in their experiment?

- A. to create a variable to test
- B. to include a constant for the other variables
- C. to offer more explanations for the differences
- D. to ensure at least some of the worms survive

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- 4) Jenny was conducting an experiment in her science lab and had to mix several chemicals. She wrote down the first three chemicals she added, but she was then interrupted and forgot to write down the last two chemicals that were part of the solution. What impact will this have on her results?
- A. Her teacher will value the results of her experiment regardless of her notes.
 - B. The results of her experiment will be valid as long as she gets the expected results.
 - C. If her records are not accurate, then her results will be inconclusive and unreliable.
 - D. If she doesn't write every step down, her results will not be the same when she repeats the investigation.

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- 5) Sam is conducting an experiment with pendulums; he thinks that more massive objects will swing faster. He is testing whether the mass of the swinging object has an effect on how long it takes to make one swing. He tests two different masses and collects the data shown in the table.

What should Sam do based on these results?

Trial	Mass	Time for one swing (in seconds)
1	100 g	1.93 s
2	100 g	2.10 s
3	100 g	1.98 s
Average for 100 g		2.00 s
1	200 g	2.09 s
2	200 g	2.05 s
3	200 g	1.98 s
Average for 200 g		2.04 s

- A. Throw out the data because it doesn't support his hypothesis.
- B. Do more trials to see if the difference in time really is significant.
- C. Conclude that less massive objects always take more time to swing.
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1) Colleen waters the plants in her greenhouse once every day. She wants to find out if the plants will grow more leaves if they are watered more often. She counts the number of leaves on each plant before she starts. She then continues to water half of each type of plant once daily, but she waters the other half of each type twice a day.

What is the dependent variable in Colleen's experiment?

- A. the type of plant being grown
- B. the number of leaves the plants grow
- C. the amount of light the plants receive
- D. the number of times the plants are watered

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2) Christy wants to find out if the birds that visit the bird feeders in her backyard would rather build nests in birdhouses or in trees. She puts a birdhouse next to the feeder containing sunflower seeds and hangs a feeder containing cracked corn from a tree.

She observes the birds' nesting activities over the next two weeks and records her observations. Which of the following would improve Christy's investigation?

- A. putting more food in both bird feeders
- B. setting the feeders up closer to each other
- C. putting the same kind of food in both bird feeders
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3) Randy's science teacher is giving a demonstration to show how a metal reacts with different acids. He places a small piece of the metal in each of three beakers containing a solution of a different acid. He adds a piece of the metal to a fourth beaker that contains only water. What is the purpose of the fourth beaker?

- A. It ensures that the hypothesis will be correct.
- B. It provides more data to include in a lab report.
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4) The science club at Tracy's school is researching how temperature affects fish reproduction. They conducted a study to find out if raising the water temperature would decrease the number of bass eggs that hatched.

They gathered bass eggs from a local lake and put half of them in each of ten small aquariums in the lab. Half of the aquariums were kept at room temperature, and the other half were placed in a sunny window.

One student recorded that nearly 80% of the room temperature eggs hatched, while only 50% of the eggs kept in the window hatched. Another student found no difference in the hatch rate. What should their next step be?

- A. The science club should ignore the results of the second student.
- B. The science club should conduct an experiment with another type of fish egg.
- C. The science club should repeat the experiment again and compare the two sets of results.
- D. The science club should use the results to conclude that an increase in temperature decreases the hatch rate of the eggs.

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5) Carol is doing a science fair project for her science class. She wants to investigate how the amount of water given to a plant affects its growth. She tests 30 plants and is careful to record how much water each plant gets. She also controls the type and amount of soil in each pot and the number of seeds in each pot. She uses 1 cup of water each day for her control group, giving 1 cup of water to ten plants and she gives 2 cups of water to ten plants, and 3 cups of water to ten plants.

When it is time to present her project, she concludes that the plants getting 3 cups of water a day grew better than the control group that received 1 cup of water a day or the plants receiving 2 cups of water each day.

Which additional piece of information is most important to include if someone wants to reproduce Carol's experiment?

- A. the color of the pots
- B. the school she attends
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Ethan is observing chemical and physical properties of a substance. He heats a substance and observes that the substance turns from a brown solid to a black powder. He refers to several chemistry journals that claim this represents a chemical reaction. From his observation and research, he concludes that the substance goes through a chemical change when heated. How can Ethan best defend his conclusion?

- A. by demonstrating that the substance will eventually melt if the temperature continues to increase
- B. by verifying that the substance is now made up of different molecules than before it was heated
- C. by verifying that the substance is made up of only one type of element
- D. by demonstrating that the substance is less dense after it is heated

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A scientist performs an experiment and asks other scientists around the world to replicate it. Why would other scientists **most likely** try to perform the same experiment?

- A. to find out if weather of various regions of the world would affect the results
- B. to see if the experiment would be less expensive in another part of the world
- C. to confirm the results of the experiment conducted by the scientist
- D. to verify that the hypothesis of the experiment is a scientific law

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Why might a theory or scientific law change after it has reached general acceptance?

- Peer reviewers might find fault with the theory prior to publication.
- One scientist may become jealous of another's success.
- Further scientific research may lead to conflicting information.
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An explanation of a phenomenon that reaches general acceptance

- dependent variable
- hypothesis
- observation
- theory

An explanation of a phenomenon that reaches general acceptance

dependent variable

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The process of using the senses to obtain information

- dependent variable
- theory
- independent variable
- observation
- hypothesis

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A general statement that explains how the natural world behaves under certain conditions, for which no exceptions have been found

- theory
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An idea or explanation that is based on observations and that can be tested

- theory
- scientific law
- hypothesis
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An idea or explanation that is based on observations and that can be tested

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How is science different from other forms of human endeavor?

- The goal of science is to explain art and history.
- Science is no different than any other human endeavor.
- The goal of science is to explain natural phenomena.
- Science is the only human endeavor that requires thought.

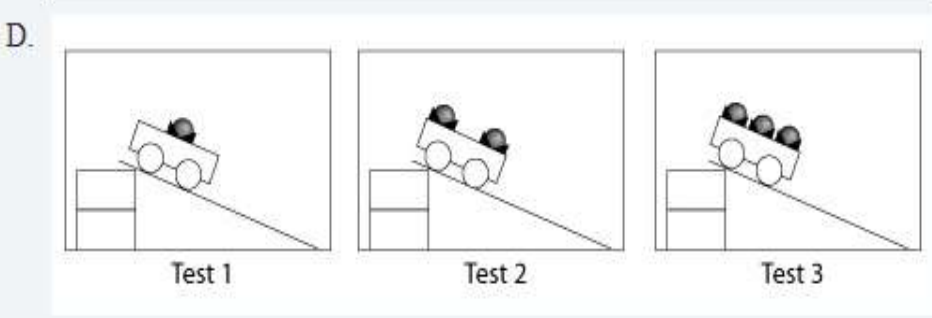
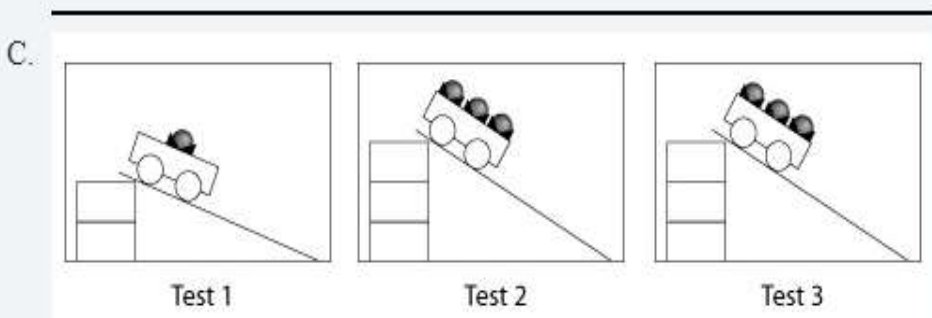
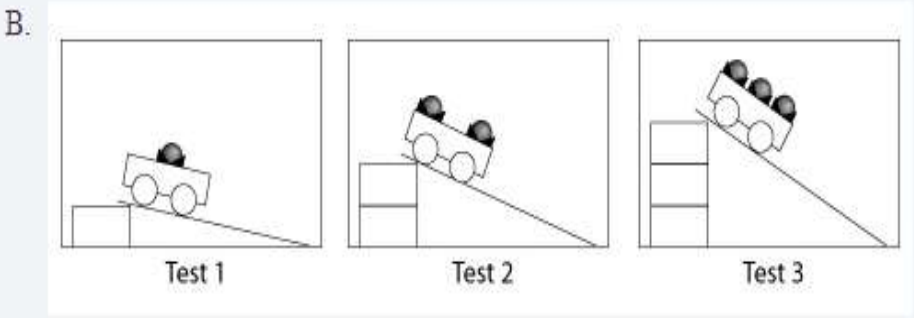
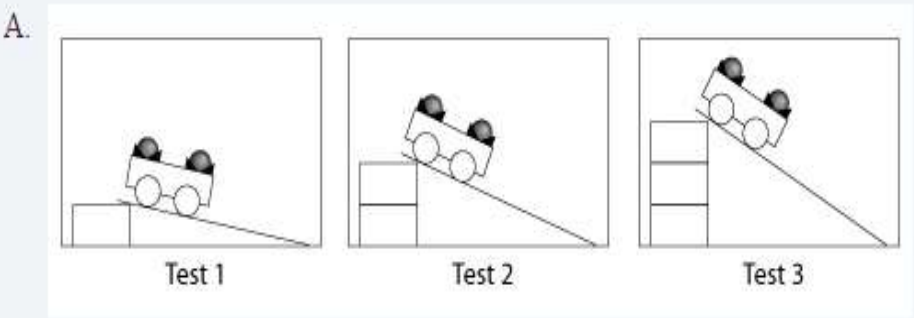
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A student wants to know if the weight of a cart affects its speed at the bottom of a ramp.

He can change the weight of the cart by adding different numbers of balls, and he can change the height of the ramp by using different numbers of blocks.

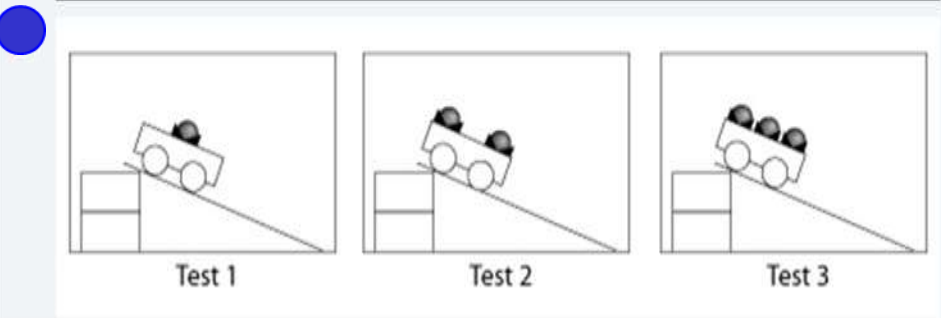
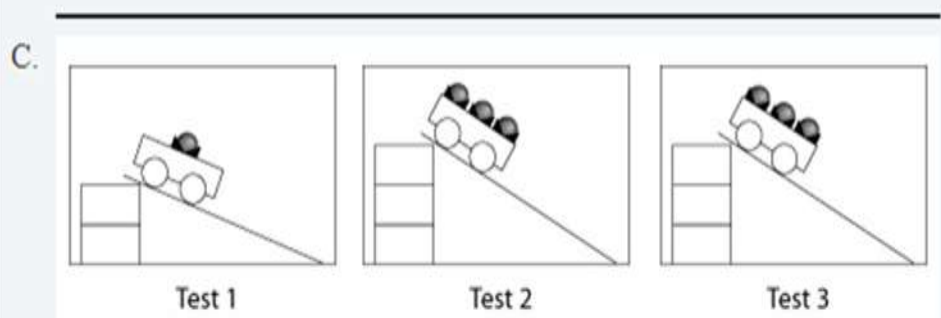
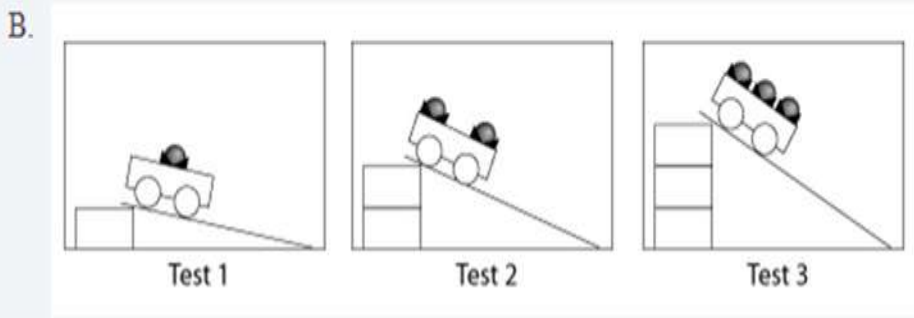
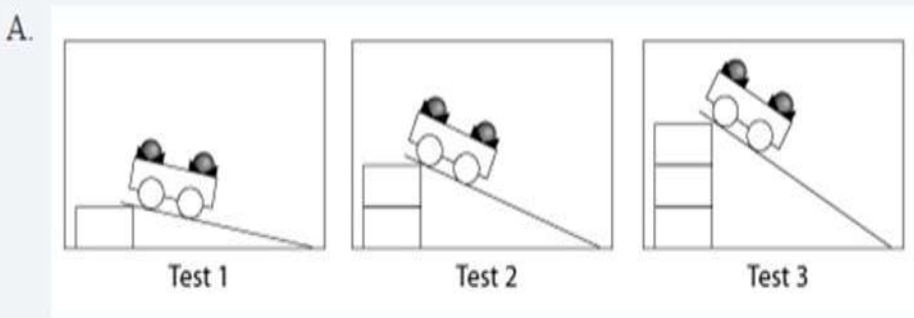
Which set of tests should he compare (set A, B, C, or D)?



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A student wants to find out if a particular kind of plant grows better in the sun or in the shade. She has two identical plants. She places one plant in sand and sets the plant in the sunlight. She adds minerals and water to the sand.

Which of the following conditions should she use for the second plant to determine the effect of light?

Sunlight



Water and minerals

Plant 1

A. Sunlight



Water and minerals

B. Sunlight



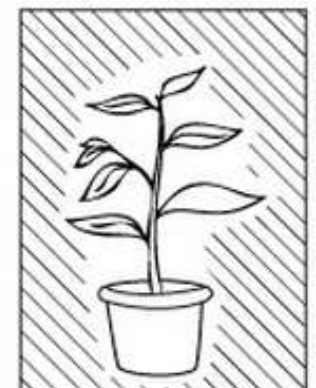
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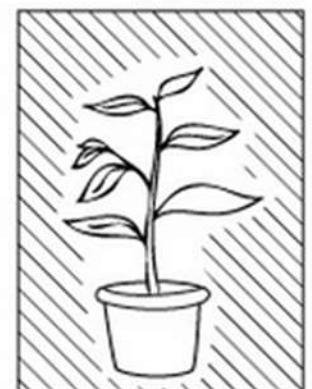
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Water and minerals

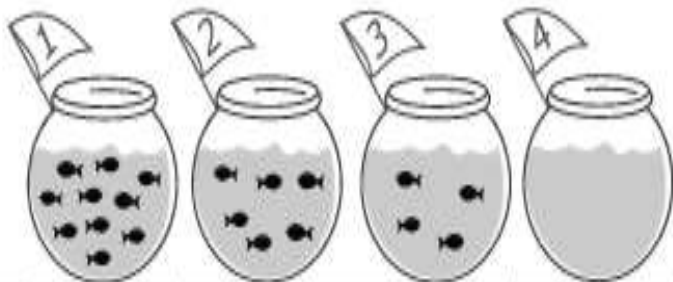
D. Shade



Water

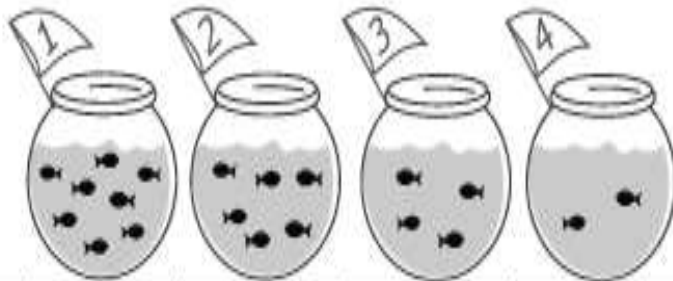
A student wants to find out if temperature affects the behavior of goldfish. He has four fish bowls and 20 goldfish. Which of the following experiments should he do?

A.



Number of fish	10 fish	6 fish	4 fish	0 fish
Temperature	70°F	70°F	70°F	70°F

B.



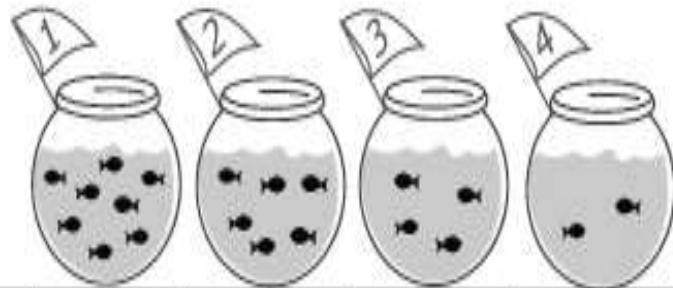
Number of fish	8 fish	6 fish	4 fish	2 fish
Temperature	65°F	70°F	75°F	80°F

C.



Number of fish	5 fish	5 fish	5 fish	5 fish
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A group of students is making paper airplanes. They think that the kind of paper and the design of the airplane may affect how far each paper airplane flies.

The students first test if the kind of paper affects how far the airplane flies. They make several airplanes out of different kinds of paper, using the same design.

Why is it important that all the airplanes have the same design?

- A. By using the same design, the students can learn about both the effect of the design and the effect of the paper.
- B. By using the same design, the students can learn about the effect of the design.
- C. If they do not use the same design, the students cannot learn about the effect of the paper.
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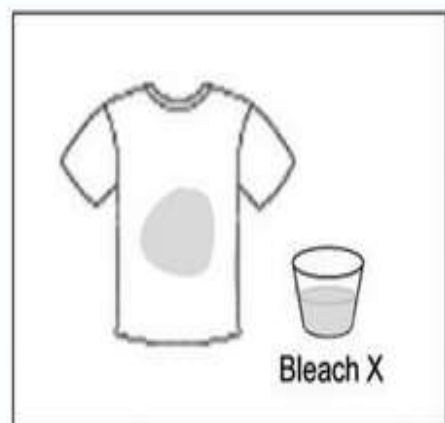
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A student wants to find out if Bleach X or Bleach Y is better at removing stains.

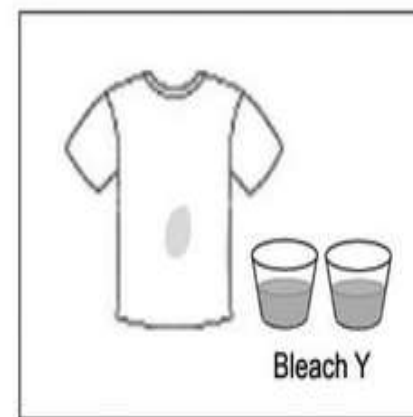
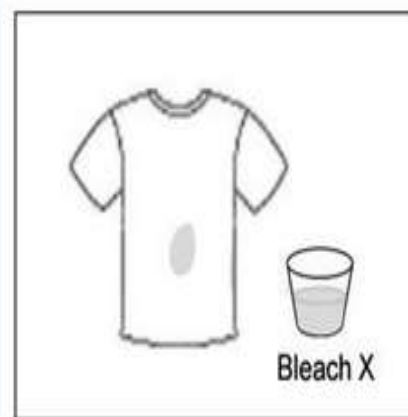
He plans to use two white shirts, stain each of them with mustard, and then wash each of them using bleach. He can change the size of the stain on the shirt and the amount of bleach he adds to the water.

Which two tests should the student set up, the tests in A, B, C, or D?

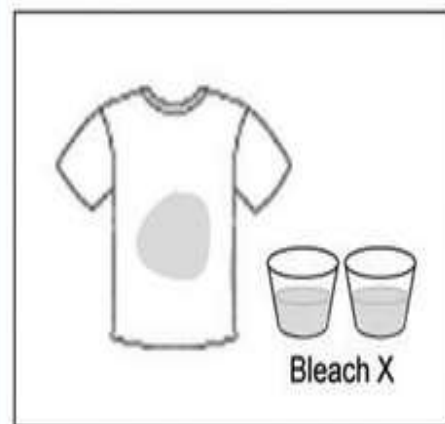
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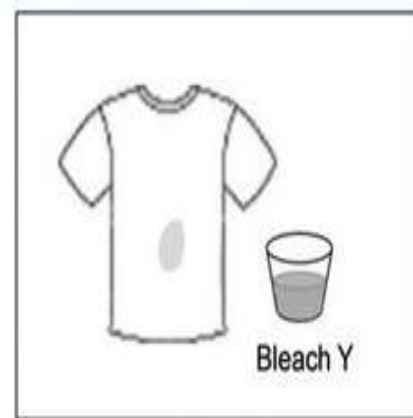
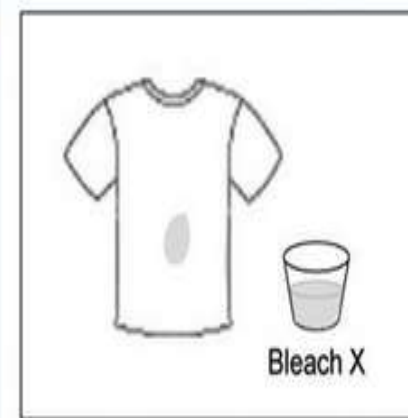
C.



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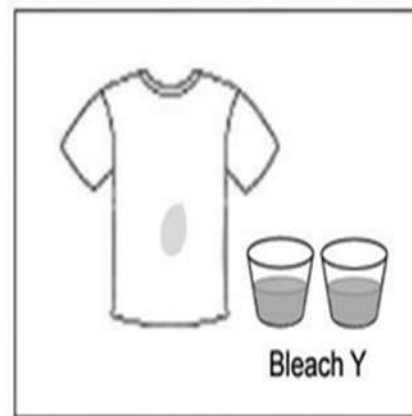
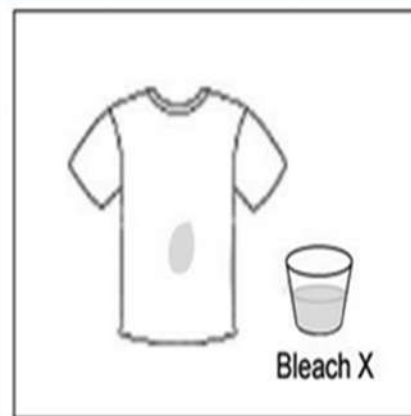
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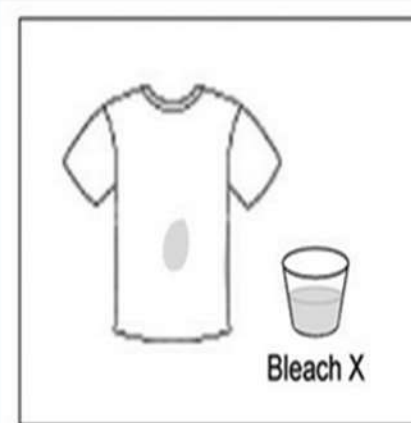
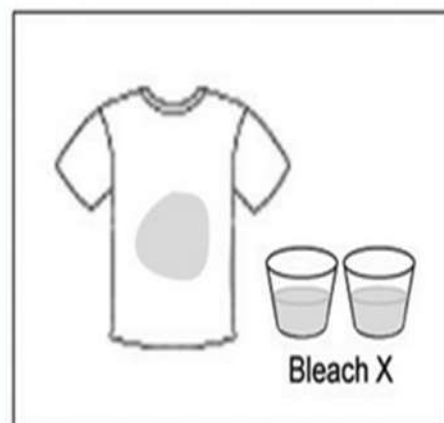
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C.

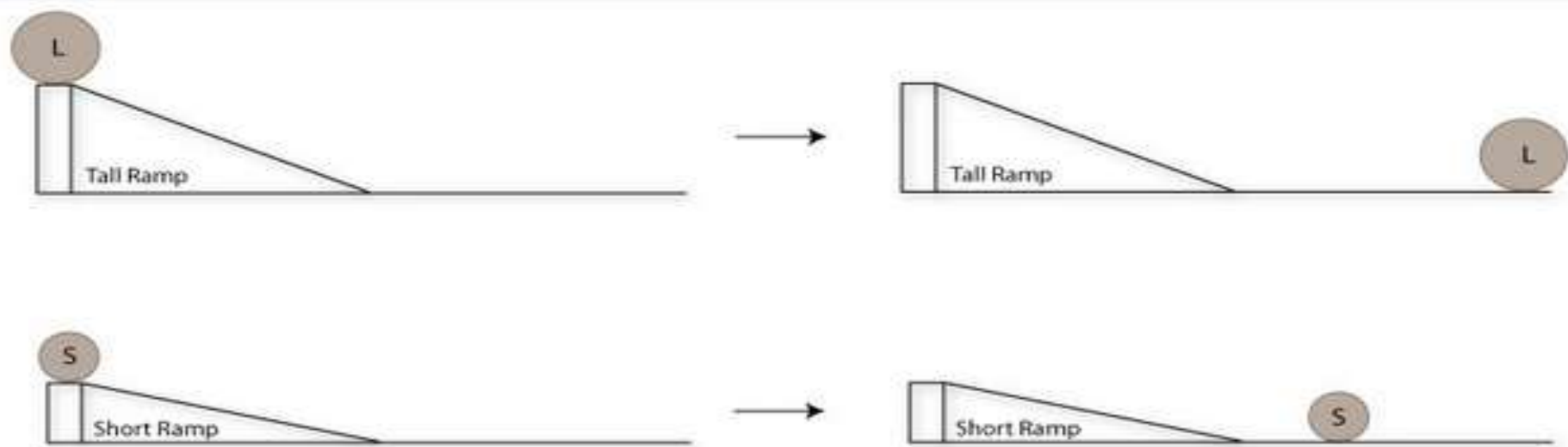


B.



Students have a small steel ball and a large steel ball, and they have a short ramp and a tall ramp.

The students want to find out if a ball's size affects how far it can roll. They also want to find out if the height of the ramp affects how far the ball can roll. They do the following experiment:

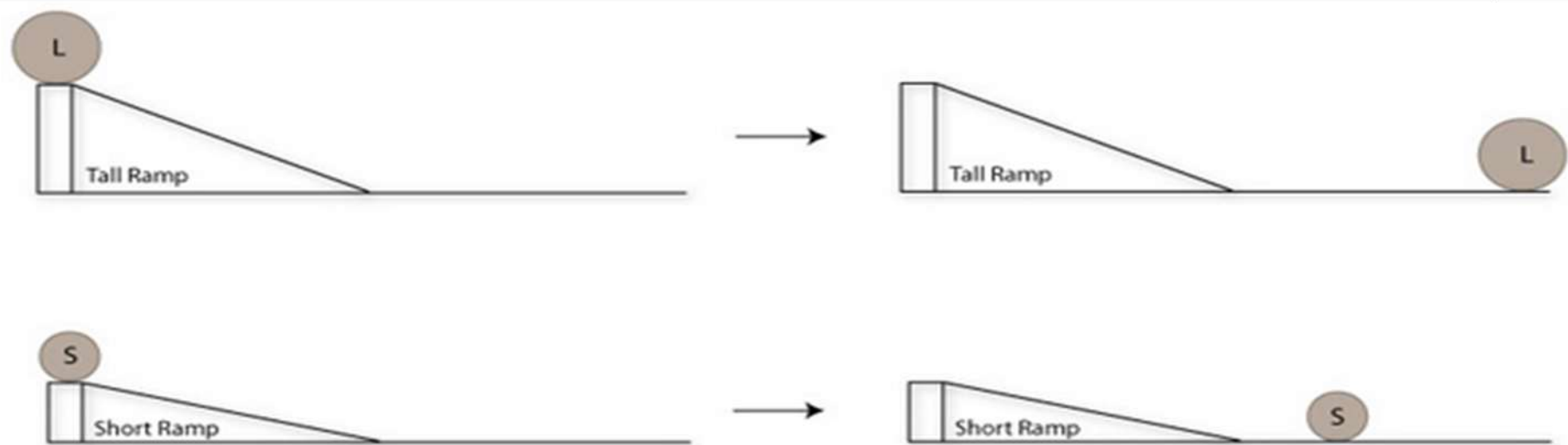


What can they conclude from this experiment?

- A. They can conclude that the size of the balls affects how far the balls roll.
- B. They can conclude that the height of the ramps affects how far the balls roll.
- C. They can conclude that the size of the balls affects how far the balls roll and that the height of the ramps affects how far the balls roll.
- D. It is not possible to conclude from this experiment if the size of the balls affects how far the balls roll or if the height of the ramps affects how far the balls roll.

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- B. They can conclude that the height of the ramps affects how far the balls roll.
- C. They can conclude that the size of the balls affects how far the balls roll and that the height of the ramps affects how far the balls roll.
- D. It is not possible to conclude from this experiment if the size of the balls affects how far the balls roll or if the height of the ramps affects how far the balls roll.

A consumer group wants to find out which of two new car models gets the best gas mileage. A car's gas mileage is the number of miles a car can go for each gallon of gas it uses.

They decide to fill the gas tanks of each car with the same amount of gas and compare how far each car goes. They use "regular" grade gas in both cars. Neither car gets the "premium" grade gas.

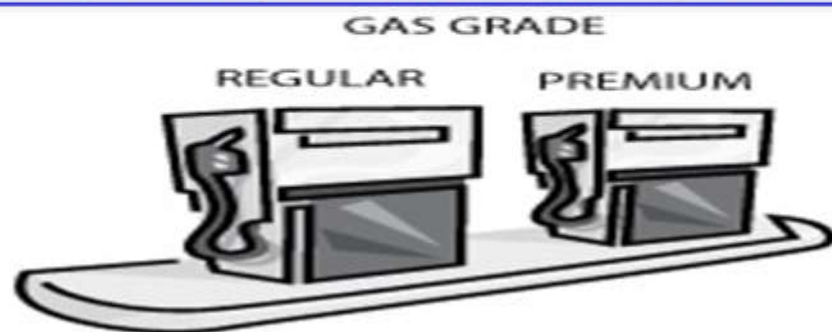


Why is it important that the two cars get the same grade of gas?

- A. By using the same grade of gas, the consumer group can learn both which car model gets the best mileage and which grade of gas gives the best mileage.
- B. By using the same grade of gas, the consumer group can learn which grade of gas gives the best mileage.
- C. If the cars do not get the same grade of gas, the consumer group cannot find out which car model has the best mileage.
- D. It is NOT important for both cars to have the same grade of gas because they are not testing which grade of gas gives the best mileage.

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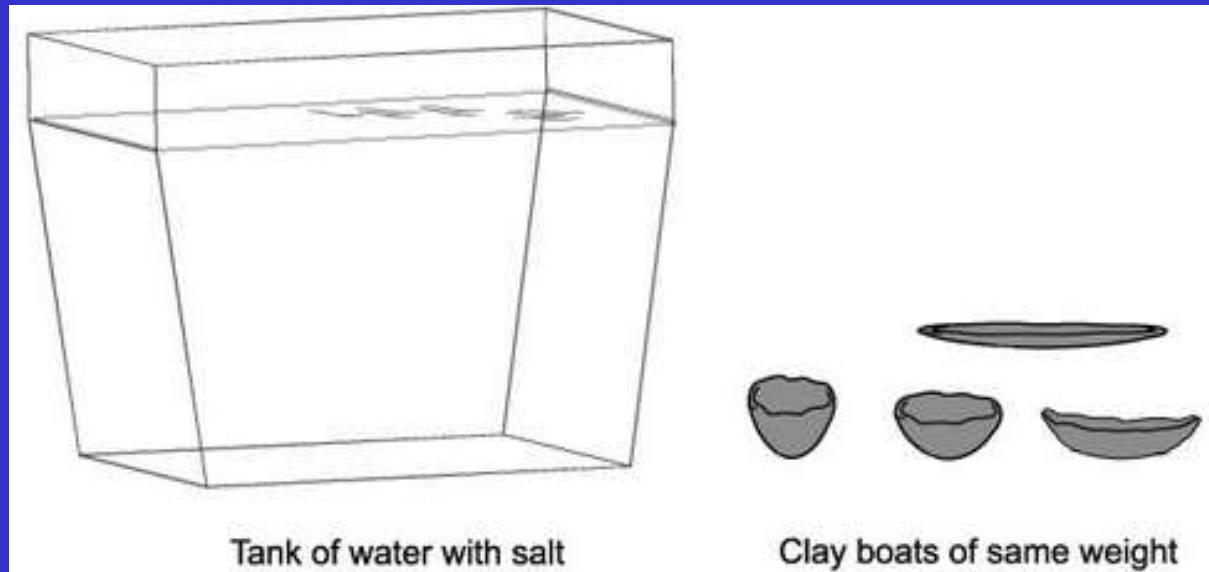
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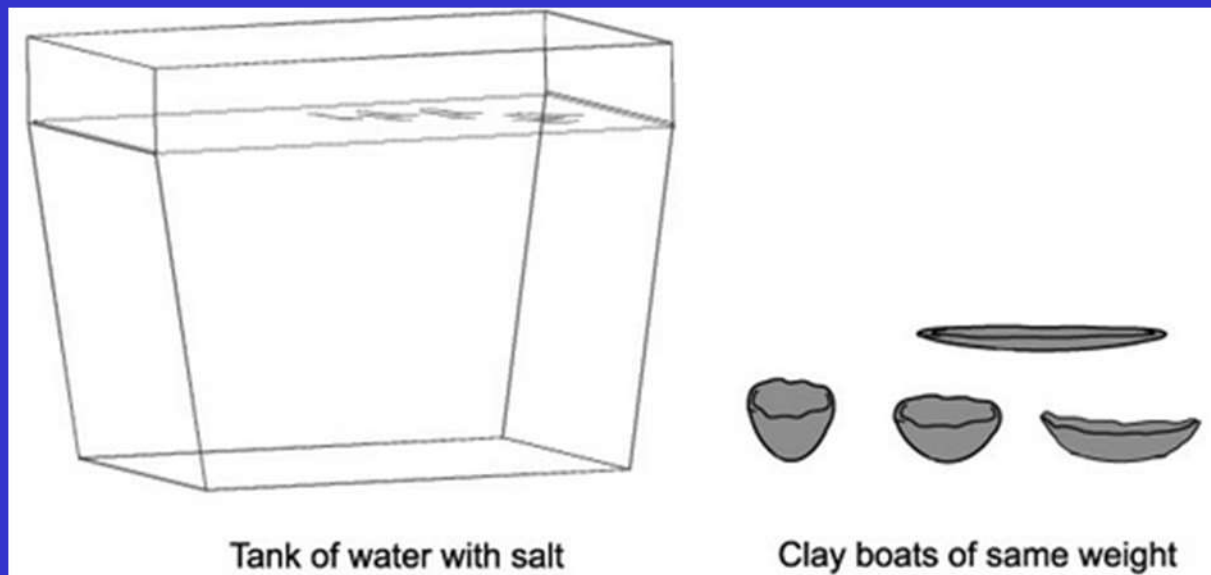
A group of students uses clay to make boats of different shapes. All the boats they make have the same weight. The students add four tablespoons of salt in the water in a tank and mix the water. They place the boats in the tank and see if the boats float or sink.



What can the students find out from doing just this experiment?

- A. If shape affects whether the boats float or sink.
- B. If weight affects whether the boats float or sink.
- C. If weight and the amount of salt in the water affect whether the boats float or sink.
- D. If shape, weight, and the amount of salt in the water affect whether the boats float or sink.

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