

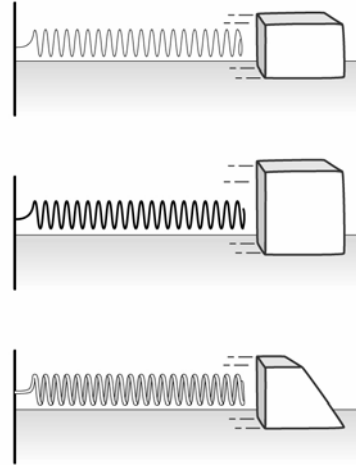
## InterActions Unit 1 Chapter 1 Sample Quiz

Use your Scientists' Consensus Ideas sheets for assistance.

Refer to the following situation:

A class was going to build a device that launched blocks by using a spring. They wanted to find out which spring of the three available would launch a block the furthest. They had three different shaped blocks they were testing, each with the same footprint. They kept the distance the spring was compressed the same. The blocks were launched on the same surface.

| Table: Results of spring launch experiment |                                     |
|--|-------------------------------------|
| Thickness of Spring                        | Average Distance of launched block. |
| thin spring                                | 20 cm                               |
| medium spring                              | 24 cm                               |
| thick spring                               | 31 cm                               |



1. Is the experiment a fair test?
  - a. This experiment is a fair test because all variables were carefully measured.
  - b. This experiment is a fair test because the spring was pulled back the same amount each time.
  - c. This experiment is not a fair test because the springs used were of different thickness.
  - d. This experiment is not a fair test because different shaped blocks were used.
  - e. This experiment is not a fair test because the launched blocks traveled different distances.

2. A fair test is

- a. an experiment in which only the manipulated and responding variables are allowed to change and all other variables and conditions are kept the same.
- b. a statement based on past experience that can be proved or disproved by experimental or observational evidence.
- c. a question about what happens when the manipulated variable changes.
- d. an experiment in which many variables are tested and involves a question, collection of data, and repeated trials.

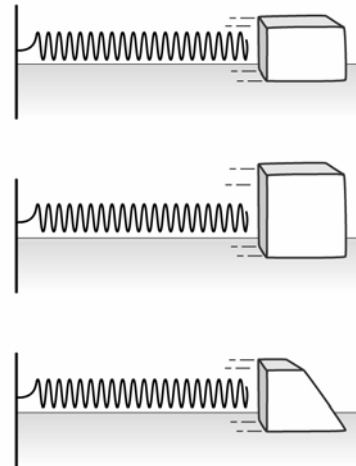
3. Evidence collected in an experiment is

- a. the data collected by the investigator.
- b. an experiment in which only one variable is tested at a time.
- c. a statement based on past experience that can be proved or disproved by experimental or observational evidence.
- d. a question about what happens when the manipulated variable changes.

Refer to the following situation:

A class is building a device that uses a spring to launch blocks. They have three different shaped blocks. They needed to choose one block to use in their device. They wanted the block that would slide the farthest. The students designed an experiment to measure how the block shape affected the distance the block traveled after it was launched. They conducted a fair test and obtained the following data.

4. Complete the table.



| Table 2: Distance traveled by launched blocks |                                      |                                      |                                      |
|---|--------------------------------------|--------------------------------------|--------------------------------------|
|   | Block 1<br>Distance traveled<br>(cm) | Block 2<br>Distance traveled<br>(cm) | Block 3<br>Distance traveled<br>(cm) |
| Trial 1                                       | 10.1                                 | 10.4                                 | 8.7                                  |
| Trial 2                                       | 9.5                                  | 10.2                                 | 7.9                                  |
| Trial 3                                       | 9.7                                  | 10.5                                 | 7.7                                  |
| Best Value                                    |                                      |                                      |                                      |
| Uncertainty                                   |                                      |                                      |                                      |

5. What is the manipulated (independent) variable?

- a. The block shape.
- b. The spring thickness
- c. The distance the launched block travels.
- d. The distance the spring is pulled back.
- e. The spring and the block shape.

6. What is the responding (dependent) variable?

- a. The block shape
- b. The spring thickness.
- c. The distance the launched block travels.
- d. The distance the spring is pulled back.
- e. The spring and the block shape.

7. Evaluate if Xie's conclusion is valid and if his reasons are good. Xie wrote:

Conclusion – I conclude that the block 2 travels the greatest distance when launched with the spring launcher.

Reason – Block 1 traveled between 9.6 and 10.2 cm. Block 2 traveled between 10.2 and 10.6 cm. Block 3 launched traveled between 7.6 and 8.6 cm. None of these ranges overlap, so the medium block travels the farthest when launched.

Xie's conclusion is:

- a. not valid because his supporting reason is not based on all the evidence.
  - b. not valid because his supporting reason is an opinion.
  - c. valid because the experiment is a fair test, his supporting reasons are not opinions, and are based on all of the available evidence (data).
  - d. There is not enough information to determine whether Xie's conclusion is valid or not.
8. Evaluate if Suzy's conclusion and reasons. Suzy wrote:

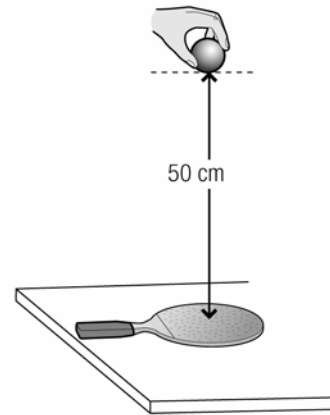
Conclusion – I conclude that block 1 travels the greatest distance when launched with the spring launcher.

Reason –Block 1 is the smallest and small blocks always travel the farthest.

Suzy's conclusion is:

- a. not valid because her supporting reason is not based on all the evidence.
- b. not valid because her supporting reason is an opinion.
- c. valid because the experiment is a fair test and her supporting reasons are based on all of the available evidence (data).
- d. There is not enough information to determine whether Suzy's conclusion is valid or not.
- e. Both a and b

9. Antonia is a ping-pong player. She wants to find out which brand of ping-pong ball is the best to use. She has three different brands of ping-pong balls. She devises an experiment in which she drops each ball from a height of 50 cm above her paddle, which is resting on the ping-pong table. She then measures the height of the bounce. The higher the bounced ball reaches, the better the ball. Below is her data.



| <b>Table 3: Height of bounced ping pong ball</b> |                               |                               |                               |
|--|-------------------------------|-------------------------------|-------------------------------|
|  | <b>Ball 1<br/>height (cm)</b> | <b>Ball 2<br/>height (cm)</b> | <b>Ball 3<br/>height (cm)</b> |
| <b>Trial 1</b>                                   | 48                            | 48                            | 49                            |
| <b>Trial 2</b>                                   | 47                            | 47                            | 48                            |
| <b>Trial 3</b>                                   | 47.5                          | 46                            | 49                            |
| <b>Best Value</b>                                | 47.5                          | 47                            | 48.7                          |
| <b>Uncertainty</b>                               | 0.5                           | 1                             | 0.5                           |
| <b>Range of Values</b>                           | 47 to 48                      | 46 to 48                      | 48.2 to 49.2                  |

What is the manipulated variable in Antonia's experiment?

What is the responding variable in Antonia's experiment?

What are some of the controlled variables in Antonia's experiment?

Is Antonia's experiment a fair test? Give your reasons.

Write an experimental conclusion with reasons for Antonia's experiment.