Design and conduct your experiment: Testing Variables in Experiments - Video 3

When conducting a scientific experiment, it is important to change only one variable at a time. This helps ensure that your results are accurate and that you know exactly what caused any changes you observe. For example, if you want to find out which launch angle makes a glider fly the farthest, you should keep everything else (the glider type, launch force, and location) the same, and only change the angle. You should also repeat each trial several times at each angle to collect reliable data.

The same approach can be used to test other variables, like wing design. In all cases, you should organize your data clearly in tables, and possibly graphs, to help you see patterns and draw conclusions. It's also important to measure carefully, use the correct units, and record your data neatly in a log book. If something unusual happens during an experiment (like a broken thermometer or a cloudy day), make a note of it so you can explain any odd results. Good experimental design helps you make strong, scientific conclusions.

Fill in the Blank: Fill in the blank with the correct words.

1. In a good scientific experiment, you should change only the _____ variable at a time.
2. When testing different launch angles for a glider, the _____ should stay the same for each trial.
3. To make your data reliable, you should _____ each trial several times for each variable you test.
4. Data from your experiment should be organized in a _____ or a graph.
5. If something unusual happens during an experiment, you should make a _____ of it in your log book.

Multiple Choice Questions: Choose the correct answer from the choices for each question.

1. What is the main reason to change only one variable in a scientific experiment?
    - a) To finish the experiment quickly
    - b) To make it easier to get high scores
    - c) To know which variable caused the result
    - d) To use more materials

2. Which of the following is an example of a variable you could test in a glider experiment?
    - a) The color of the glider
    - b) The angle of launch
    - c) The type of pencil you use to take notes
    - d) The day of the week

3. Why should you repeat each trial multiple times in an experiment?
    - a) To use up more materials
    - b) To make the experiment more fun
    - c) To get more accurate and reliable data
    - d) To fill up your log book

4. If you want to test which window covering keeps a room coolest, which should be kept the same each time?
    - a) The window covering
    - b) The room and time of day
    - c) The measuring tape
    - d) The number of people in the room

5. What is an important step to do after collecting your experiment data?
    - a) Throw away your notes
    - b) Organize your data and look for patterns
    - c) Guess the answer
    - d) Change all your variables at once

Open-Ended Questions: Answer the following questions in complete sentences.

1. Why is it important to keep all variables except one constant in an experiment?

2. Describe a simple experiment you could do at home to test a variable. What would you keep the same, and what would you change?

3. If your results are different on a cloudy day than on a sunny day, how should you record this in your log book, and why?

ANSWER KEY

Teachers: Always review answer keys for accuracy, especially for open-ended questions.

Fill in the Blank Answers

1. one
2. glider
3. repeat
4. table
5. note

Multiple Choice Answers

1. c) To know which variable caused the result
2. b) The angle of launch
3. c) To get more accurate and reliable data
4. b) The room and time of day
5. b) Organize your data and look for patterns

Open-Ended Example Responses

1. It is important to keep all variables except one constant so you can be sure that any changes in the results are caused by the variable you are testing, not something else.
2. An example experiment is testing which paper towel absorbs the most water. I would keep the amount of water and the size of the paper towel the same, and change only the brand of paper towel.
3. If my results are different on a cloudy day, I should write a note in my log book explaining that the weather was cloudy. This helps explain why the data might be different and makes my experiment more accurate.