

The Standard: Plan and conduct a scientific investigation to test a hypothesis.

Learning Targets for the Unit (Items in bold are to be assessed)

- **Understand what a hypothesis is and how to design an experiment to test its accuracy**
- **Understand control and variable**
- **Understand how to gather data in an experiment**
- Make accurate measurements
- Demonstrate how to draw conclusions based on data gathered through experimentation

Designing an Experiment to Answer A Question



The Assignment: You observe that some metals rust under certain conditions and want to learn more about why. Create a hypothesis to answer the question: Does spraying water on a piece of metal cause it to rust faster? Then design an experiment with a control group and a variable which will test the accuracy of your hypothesis. Explain how you will collect data to answer the question.

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4	The hypothesis is related to the question. The student has identified a variable that will help lead to answering the question and has identified one or more items that need to be controlled to lead to an appropriate outcome. The design of the experiment will allow the student to collect data which will answer the question.
3	The hypothesis is related to the question. The student has identified a variable that will help lead to answering the question and has identified one or more items that need to be controlled to lead to an appropriate outcome. The design of the experiment is flawed and may not allow the student to collect data which will answer the question.
2	The hypothesis is related to the question. The student either misidentified the appropriate variable or has not identified item(s) that need to be controlled for the correct conclusion to be drawn. Thus, the experiment will not lead to a correct answer to the question asked.
1	The hypothesis isn't related to the question. The experimental design is flawed in one or more ways and will not solve the problem.

Student #1

Hypothesis: The more water sprayed on a piece of metal, the quicker it will rust.

Control: type of metal, keeping the metal inside so that the temperature is the same

Variable: amount of water sprayed

To find the answer to my problem I will conduct the following experiment:

I will take four pieces of the same metal (steel) and will keep them in the same conditions: temperature, sunlight, etc. I will spray one piece with water 4 times a day, one with water 2 times a day, one with water once a day, and I won't spray the fourth one at all. I will observe the metal for 3 weeks to determine how much each piece of metal rusts.

Student #2

Hypothesis: water sprayed on metal won't affect how quickly it rusts.

Control: How much water I spray on the metal

Variable: where I put the metal during the experiment

To find the answer to my problem I will conduct the following experiment:

I will put some metal in various dark places around the house. I will get each piece wet in the beginning and then watch to see if they rust. I will measure the metal every day to see if it is rusting.

Student #3

Hypothesis: The more water I spray on the metal the quicker it will rust.

Control: keeping the metal in the same place during the experiment

Variable: how much water is sprayed on the metal

To find the answer to my problem I will conduct the following experiment:

I will take a nail and put it in a place where there is no light or temperature change. On day one I will spray the nail with water one time. On day two I will spray it two times. On the third day I will spray the nail three times. On Thursday I will spray it four times and on Friday I will spray it five times. I will see more rust by the end of the week.

Student #4

Hypothesis: The amount of water sprayed on metal will not affect how fast it rusts.

Control: type of metal, amount of light, temperature of the room

Variable: amount of water sprayed

To find the answer to my problem I will conduct the following experiment:

Metal needs to be covered with water to rust. I will take a piece of metal and put it in water. I will take another piece of metal and keep it dry. I will measure how fast each piece of metal rusts.