

Balloon Rockets and Newton's Third Law

Name: _____ Date: _____

LEARNING OBJECTIVE

Students will build and test a simple balloon rocket to demonstrate Newton's Third Law and measure the effect of thrust on distance traveled.

MATERIALS NEEDED

- balloon (long or round)
- string (10-15 feet)
- plastic straw
- tape
- 2 chairs or fixed points to tie string between
- tape measure or ruler
- notebook paper and pencil

HANDS-ON ACTIVITY

1. Thread your string through the plastic straw, then tie the string tightly between two chairs (or other fixed points) so it is taut and roughly horizontal at a consistent height.
2. Blow up the balloon fully (do not tie it off) and, while pinching the end closed, tape it to the straw along the string.
3. Release the balloon and observe/measure how far the straw (and balloon) travels along the string before stopping. Record the distance.
4. Repeat the test 2 more times, varying the amount of air in the balloon (e.g., half-full, fully full), and record the distance traveled for each trial in a simple data table.
5. Calculate the average distance across trials with similar air amounts and identify a trend between the amount of air (thrust) and distance traveled.

QUESTIONS

1. Which direction did the air rush out of the balloon, and which direction did the balloon travel? How does this relate to Newton's Third Law?

2. What trend did you observe between the amount of air in the balloon and the distance it traveled?
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3. How does this balloon rocket model relate to how real rockets launch into space?

4. Real rockets need to carry oxidizer (not just fuel) to burn in space. Why can't they rely on air from the atmosphere like a jet engine does?
