

# Liquid Nitrogen Rockets and Newton's Third Law



Students will apply Newton's third law of motion to a variety of objects to demonstrate its principles. Students will describe and explain Newton's third law.

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## Procedure

1. Remind students of who Isaac Newton is and what his first and second laws state.
2. Read and display Newton's third law of motion, and ask, "Can any one explain what that might mean?"
3. Share and clarify as needed. Ask students to copy the law into their notebooks, and jot down any examples of the law that they can think of. Encourage them to take guesses by beginning prompts with "I wonder if.." or "I wonder why?"

### Materials:

- Two marbles per group

4. Tell students to get up out of their chairs and jump up and down a few times. Ask students to explain, clarifying as necessary, how Newton's third law causes them to lift into the air when they jump.
5. Working in pairs, tell students to stand about a foot away from their partners, facing one another and touching hands. Ask what will happen when students push their hands toward one another forcefully. Students should predict that they will both be pushed backward a bit. Alternately, students can push against a wall in the classroom.
6. Ask why some students moved farther backward than their partners (the force may not have been equal).
7. Direct students to their lists of examples of Newton's third law in real life. Ask a few students to share, and let students know that they will see an example of the law being used to make rockets work.
8. Show students Impossible Science video, pausing at 3:14 to ask a student to recap how the liquid nitrogen water rocket works, and respond to any question.
9. Tell students to experiment with rolling one marble over a flat surface toward another marble. Ask students to record what happens when they touch and to explain why.

## Vocabulary:

Newton's Third Law of Motion: For every action, there is an equal and opposite reaction.

Mass: how much matter is in an object.

Gravity: the force of attraction between two objects.



### Assessment:

Students should draw a picture of something exhibiting Newton's third law of motion in everyday life. They should write an explanation of how the image shows an equal and opposite reaction.

### Safety Note:

Safety Note: DO NOT TRY THIS AT HOME.

Watch the companion video here:



Lesson Plan by Whitney Gallagher based on the "Impossible Science" series.

Find more at [impossiblescience.com](http://impossiblescience.com)

