

Name: Katie Capener Hall

Grade Level: 9th Grade

Subject: Physics

Lesson Type: Content

Content Objective: Students will create an experiment to demonstrate their understanding of Isaac Newton's third law of motion.

Language Objectives:

Listening: Students will listen to each group present their project and be able to identify one thing they learned from the presentation.

Speaking: Students will orally present their project to the class, explaining how their experiment demonstrates the law of motion.

Reading: In small groups students will read an article entitled "Lesson 4: Newton's Third Law of Motion" on the website

<http://www.physicsclassroom.com/Class/newtlaws/U2L4a.html>. They will then check their understanding by answering the example problems together and checking their answers.

Writing: Students will write a one page paper on how their experiment demonstrates the law of motion, using an essay format.

Instructional Features:

Addressing Students' Background Knowledge

Students' background knowledge will be addressed by having a quick write at the beginning of the class, which states: Write about a time today when a physical action you made affected the way something moved. (Example: you may have... kicked a soccer ball, played tug-of-war, etc.)

The class will then discuss times in which they applied force to different objects and how they made the objects move in regard to Newton's third law of motion.

Activities & Procedures

- Students' attention will be drawn to the objectives on the board. One student will be asked to read the objective. Another student will be asked to put the objective in their own words for the class.
- Students will be placed in groups of four
- Students will be asked to look at the article entitled "Lesson 4: Newton's Third Law of Motion" on the website.
<http://www.physicsclassroom.com/Class/newtlaws/U2L4a.html>
- Students will be asked to look through the article and make predictions about what they think Newton's Third Law of Motion will be about. The teacher will prompt students by asking them to look at the pictures throughout the article and also by reminding them about the two previous laws of motion which students have studied.
- Predictions will be written on the board.
- Students will read the article entitled "Lesson 4: Newton's Third Law of Motion" on the website <http://www.physicsclassroom.com/Class/newtlaws/U2L4a.html>

- Then the class will look back at the predictions made earlier and decide which predictions were true and which were false.
- Students will come up with a definition of what Newton’s Third Law of Motion is. This definition will be written on the board.
- Students will look at the vignettes at the end of the end of the article and answer the questions in their groups. They will check their answers with the answers on the website.
- The teacher will then demonstrate an experiment for the class. The experiment will go as follows. A balloon will be blown up and taped to a straw and the straw threaded through a string. The teacher will then tie the string across the room. The air will then be allowed to escape from the balloon and the balloon will move forward.
- The teacher will explain how this experiment demonstrates Newton’s Third Law of Motion. (As the air coming out of the balloon exerts a force on the air in the class room an equal and opposite force pushes the balloon forward.)
- The teacher will provide several items such as balloons, ropes, strings, weights, etc. for the students to design their own experiment to demonstrate Newton’s Third Law of Motion.
- The students will then be asked to brainstorm an experiment in their groups. Writing down all ideas.
- The students will then come up with a simple experiment which they will demonstrate to the class.
- Each experiment will be demonstrated and explained to the class.
- For homework the students will be asked to write a one page paper with the following criteria (#1-5). They will also be given a rubric which outlines the requirements of the paper.
 1. Explain Newton’s Third Law of Motion in your own words.
 2. Describe how your experiment demonstrated Newton’s Third Law of Motion
 3. Describe how one other experiment demonstrated Newton’s Third Law of Motion.
 4. Name three situations in your day where you witnessed Newton’s Third Law of Motion in action.
 5. What do you think the world would be like if Newton’s Third Law of Motion was not in effect?

Adaptations

Language Proficiency	Adaptations
Pre-Emergent- Emergent	*Reading: Students will read the text as a whole class and discuss it together. A vocabulary sheet will be provided, which will contain pictures of the vocabulary terms. *Writing: Students will draw and label a picture of their experiment, using one-word labels. *Speaking: Students can use one word

	<p>descriptors to explain their experiment.</p> <p>*Listening: Students can identify what they learned from other students' experiments by using one word responses.</p>
Intermediate	<p>*Reading: A vocabulary sheet will be provided, which will contain pictures of the vocabulary terms.</p> <p>*Writing: Students will describe their experiment in sentence form.</p> <p>*Speaking: Students can use one-sentence descriptions to explain their experiment.</p> <p>*Listening: Students can identify what they learned from other students' experiments by using one-sentence responses.</p>
Advanced-Fluent	<p>*Reading: A vocabulary sheet will be provided, which will contain pictures of the vocabulary terms.</p> <p>*Writing: Students will write a paragraph describing their experiment.</p> <p>*Speaking: Students can use one-paragraph descriptions to explain their experiment.</p> <p>*Listening: Students can identify what they learned from other students' experiments by using one-paragraph responses.</p>

ELL Instructional Strategies

Cognitive Strategies:

- Summarizing: Students will be asked to summarize Newton's third law of motion in their paper, for the purpose of reviewing the information and putting it into their own words to help them remember it.

Metacognitive Strategies:

- Predicting: Students will preview the material before they read it in order to get them thinking about what they are going to read and bringing up background knowledge that they can build upon as they read.

Harrell and Jordan Strategies:

- Interactive Read Aloud: Students will read the book and stop periodically through their reading in order to talk about what they read and clear up any misunderstandings.
- Skills Grouping: Students will be grouped in such a way to progress their learning. The grouping strategies are listed below.

Grouping

Reading: While the students are reading the information they will be grouped homogeneous according to language proficiency. This will allow the students to use their L1 in discussing the reading if necessary and the teacher will be able to focus attention on

groups that need more help understanding the information. Also with homogeneous grouping it will be easier to provide adaptive texts.

Experiments & Presenting: While the students are developing their experiments and presenting them to the class they will be grouped heterogeneously according to language proficiency. This will allow them to share different ideas from their different adaptive texts. Also students who are more proficient in English will be able to model vocabulary relevant to the chapter for students who are less proficient in English. While presenting the project each member of the group will have a different part to present. These parts can be given out according to language proficiency. With heterogeneous grouping each group will be more likely to be able to fully explain their project as more proficient students will be able to help less proficient student convey their message.

Assessment

Formative Assessment

- Students will be assessed on their performance on the online questions. The teacher will observe how students do on these questions and offer further explanation as needed.
- The teacher will circulate to each group as they create their projects and discuss with each group how their experiment demonstrates Newton's third law of motion. The teacher will provide feedback on the experiments and guide students as needed.
- The teacher and other classmates will provide feedback to the students as they present their experiments to the class. Questions will be asked to check for understanding of the material.

Summative Assessment

- Students will be graded on their final reflection of the project. They will hand in a one page paper answering the questions listed in the Activities and Procedures portion of the lesson.