

Newton's Laws Mini Stations

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GK-12 Teacher: Luke Spencer

Date of Lesson: Fall 2011

Grade Level: _ 7th Grade X 8th Grade

Content Area & Topic:

<input type="checkbox"/> Agriculture	<input type="checkbox"/> Chemistry	<input type="checkbox"/> Health
<input type="checkbox"/> Animals	<input type="checkbox"/> Engineering	<input checked="" type="checkbox"/> Physics
<input type="checkbox"/> Astronomy	<input type="checkbox"/> Environment	<input type="checkbox"/> Plants
<input type="checkbox"/> Cells	<input type="checkbox"/> Genetics	
<input type="checkbox"/> Other:		

Lesson Overview:

Newton's laws are hard for students to understand that they describe how objects behave in motion. Here the middle school students can apply, analyze, and evaluate Newton's laws through these four classroom activities (Whacky Washers, Mouth to Mouth, Newton's Race, and Balloon Rally).

Length of Lesson:

50 to 90 minutes

Iowa Core Statement (See Content Map for your grade level on intranet):

- Understand and apply knowledge of motions and forces

Content Objectives (SEE Content map for guidelines):

- Recognize that the motion of an object can be described by its position, direction of motion and speed
- Explain how an object that is not being subjected to a force will continue to move at a constant speed in a straight line
- Describe how unbalanced forces cause changes in speed or direction of an object's motion
- Understand that the acceleration of an object is determined by the mass of the object and the force

Materials:

- Bag of Balloons
- Pencils
- Bendy straws
- Straight Pins
- Cars
- Ramps
- Meter Sticks
- Washers (30)
- Tape
- Bottles
- Dollar Bills

Lesson Procedures:

Whacky Washer's

- Stack 4 washers and place them on a smooth surface
- Aim 1 washer at the bottom of the stack give it a good hard flick with your finger
- Now try to flick a stack of 2 washers into the stack of 4
- Flick a stack of 4 washers into the stack of 4

Mouth to Mouth

- Take two bottles and place a dollar bill between the mouths of the bottles.
- Now try to take the dollar out from between the bottles with out the top bottle falling.

Newton's Race

- Step 1: Set up a ramp using meter sticks and several books. Place one end of the ramp on the books and line up the other end with a piece of masking tape on the floor.
- Step 2: Place the vehicle at the top of your meter stick and roll it down the ramp. Use a meter stick to measure how far the vehicle rolls. Repeat this step for Trials 2 & 3.
- Step 3: Add five washers to the vehicle and repeat the process from Step 2. Record your measurements in the chart. Be sure all the washers remain on the vehicle! Repeat this step for Trials 2& 3.
- Step 4: Add ten washers to the vehicle and repeat the process from Step 2. Record your measurements in the chart. Be sure all the washers remain on the vehicle! Repeat this step for Trials 2 & 3.

Balloon Rally

- Step 1: Attach a balloon to the end of a flexible straw with tape. Choose the end that is furthest away from the bend.
- Step 2: Push a straight pin through the straw about halfway between the balloon and the bend in the straw. Fasten the pin in the eraser of a pencil.
- Blow up the balloon and bend your straw to a 90° angle before allowing the air to escape.
- Blow up the balloon and bend your straw to a 45° angle before allowing the air to escape.
- Blow up the balloon, but leave your straw straight (180° angle). Release the air in the balloon.
- Remove the pin and hold on to the straw as you blow up the balloon. Release the straw.

Evaluation/Assessment:

The data collected and the questions answered are the assessment of the students.

Whacky Washer's

- What happens after each step?
- Write Newton's 1st law from page 44.
- Explain your observations in terms of Newton's 1st Law.

Mouth to Mouth

- Give details on how you need to go about accomplishing the experiment. What happens each time you try?
- Write Newton's 1st law from Page 44
- Explain how this relates to Newton's 1st Law.
- How does this activity relate to the "pull the tablecloth" trick used by magicians?

Newton's Race

# of Washers	Distance (cm)			Average Distance
	Trial 1	Trial 2	Trial 3	
0				
5				
10				

- How does increasing mass (adding more washers) affect the force of objects in motion (the distance the vehicle rolls)? Explain your answer using data from the chart.
- What would happen if you added fifteen washers to the car? Predict how far the car would roll.
- Explain the results of your experiment in terms of Newton's 2nd Law.
- What is Newton's Second Law of Motion? Write it down from Page 47

Balloon Rally

- Explain your observations in terms of Newton's 3rd Law.
- What is Newton's Third Law of Motion?
- What happens after each test?

References:

http://www.ehow.com/way_5479276_newtons-motion-labs-physical-science.html

Deliverables:

Here are the slides from the Newton's Mini Lab activity presentation.

Whacky Washer's

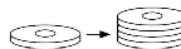
Newton's Laws Mini Stations

- Stack 4 washers and place them on a smooth surface
- Aim 1 washer at the bottom of the stack give it a good hard flick with your finger

1. What happens?

- Now try to flick a stack of 2 washers into a stack
2. What happens?

- Flick a stack of 4 washers into the stack
3. What happens?



4. Write Newton's 1st law from page 44.

5. Explain your observations in terms of Newton's 1st Law.

Mouth to Mouth

- Take two bottles and place a dollar bill between the mouth of the bottles.
- Now try to take the dollar out from between the bottles without the top bottle falling.

1. Give details on how you need to go about accomplishing the experiment. What happens each time you try?

2. Write Newton's 1st law from Page 44

3. Explain how this relates to Newton's 1st Law.

4. How does this activity relate to the "pull the tablecloth" trick used by magicians?



Newton's Race

1. What is Newton's Second Law of Motion? Write it down from Page 47

- Step 1:** Set up a ramp using meter sticks and several books. Place one end of the ramp on the books and line up the other end with a piece of masking tape on the floor.

- Step 2:** Place the vehicle at the top of your meterstick and roll it down the ramp. Use a meter stick to measure how far the vehicle rolls. Repeat this step for Trials 2 & 3.

- Step 3:** Add five washers to the vehicle and repeat the process from Step 2. Record your measurements in the chart. Be sure all the washers remain on the vehicle! Repeat this step for Trials 2 & 3.

- Step 4:** Add ten washers to the vehicle and repeat the process from Step 2. Record your measurements in the chart. Be sure all the washers remain on the vehicle! Repeat this step for Trials 2 & 3.

Data Table for Newton's Race

# of Washers	Distance (cm)			Average Distance
	Trial 1	Trial 2	Trial 3	
0				
5				
10				

Questions for Newton's Race

2. How does increasing mass (adding more washers) affect the force of objects in motion (the distance the vehicle rolls)?

Explain your answer using data from the chart.

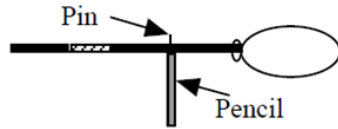
3. What would happen if you added fifteen washers to the car? Predict how far the car would roll.

4. Explain the results of your experiment in terms of Newton's 2nd Law.

Balloon Rally

1. What is Newton's Third Law of Motion?

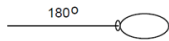
- Step 1: Attach a balloon to the end of a flexible straw with tape. Choose the end that is furthest away from the bend.
- Step 2: Push a straight pin through the straw about halfway between the balloon and the bend in the straw. Fasten the pin in the eraser of a pencil.



Balloon Rally Continued

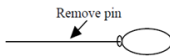
- Blow up the balloon, but leave your straw straight (180° angle). Release the air in the balloon.

4. What happens?



- Remove the pin and hold on to the straw as you blow up the balloon. Release the straw.

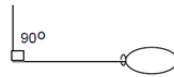
5. What happens?



6. Explain your observations in terms of Newton's 3rd Law.

Balloon Rally Continued

- Blow up the balloon and bend your straw to a 90° angle before allowing the air to escape.
2. What happens?



- Blow up the balloon and bend your straw to a 45° angle before allowing the air to escape.
3. What happens?

