Lesson Title	Newton's Laws of Motion
Length of Lesson	One (50 minute) class period
Created By	Rob Thornton, Will McBryde
Subject	Physical Science
Grade Level	8th grade
State Standards	8th: 1b,d (Inquiry); 2f, (Physical Science)
DOK Level	DOK 3
DOK Application	Investigate, Identify, Make Observations, Categorize, Compare, Cause/Effect, Distinguish, Explain Phenomena in Terms of Concepts
National Standards	5-8: A (Inquiry); B (Physical)
Graduate Research Element	Newton's Laws of Motion are important to understanding and applying meteorological concepts dealing with motion and forces

Student Learning Goal:

MS 8th Grade:

1(b) Make inferences based on observations of activities demonstrating Newton's Laws of Motion (d) Analyze evidence that is used to form explanations and draw conclusions
2(f) Recognize Newton's Three Laws of Motion and identify situations that illustrate each law.

National Science Education Standards of Content 5-8:

A: Inquiry: Understandings about scientific inquiry; Students will both observe and participate in different activities concerning Newton's Laws of Motion.
They will also be asked questions along the way as well.

B: Physical Science: Motions and Forces; Students will participate in various activities demonstrating Newton's Laws of Motion and will be asked which law goes with each activity.

Materials Needed (supplies, hand-outs, resources):

Activity #1 – Demonstrates Newton's 1st Law – drinking glasses, index cards and clothespins; Activity #2 - Demonstrates Newton's 2nd Law – book cart of some sort and heavy objects. For heavy objects several books could be used. Activity #3 – Demonstrates Newton's 3rd Law – two students, drinking straw, string, balloon, masking tape; Sheet used for group reading/class handout (see ("Science Tutor: Physical Science" by Gary Raham: Mark Twain Media, Inc: Carson Dellosa – 404045; p.10)

Lesson Performance Task/Assessment:

The students will be asked to read aloud from a class handout on Newton's Laws (see INSPIRE_Thornton_12.01.10_Sheet). The instructor will ask and answer questions regarding the class handout. Next, the class will observe/participate in class activities

demonstrating Newton's Three Laws. The instructor will ask and answer questions regarding these Newton's Laws with each of the class activities. Finally, the students can be paired-up (if time permits) to answer questions at the bottom of the class handout (see INSPIRE_Thornton_12.01.10_Sheet) or instructor can go over questions with the whole class and do the problems on the board.

Lesson Relevance to Performance Task and Students:
The activities used to demonstrate Newton's Laws of Motion will help the students visualize the Law and how it works. The material covered on the class handout will also reinforce the concepts of Newton's Laws of motion. In addition, the questions at the bottom of the handout will help the students learn the material as well.

Anticipatory Set/Capture Interest:
All of the activities are hands-on and designed to engage the students. Therefore, most all of the lesson could be considered an "anticipatory set."

Guided Practice:
The instructor will verbally and visually demonstrate activities to help students perform task independently. (See **Independent Practice** for step-by-step instructions) The instructor will NOT disclose which Law goes with each activity. The instructor will ask the students this later.

Independent Practice:
Activity #1 – Demonstrates Newton's 1st Law – Take an index card and place it over the mouth of a glass; Next, put the clothespin on top of the index card by standing it on one end; Then forcefully flick /thump the index card forward with your finger. When done properly, the card should move away very quickly and the clothespin should fall down into the glass due to gravity.

Activity #2 - Demonstrates Newton's 2nd Law – Take an empty book cart and roll it across the room; Then load up the cart with heavier objects like several books (a box of books) and roll cart across room; Ask students which cart (loaded vs. unloaded) took more force to move? And then ask why? The loaded cart takes more force because it has more mass.

Activity #3 – Demonstrates Newton's 3rd Law – Select two students to each hold one end of a piece of string (about 8 feet long); Next, the students will tape drinking straw to a blown up balloon (don't tie end of balloon, just twist it closed and hold with hand); Students will then thread the end of the string through the straw taped to balloon and position balloon on one of the string; Make sure string is tight and have student release the balloon! This shows that when an object is pushed, it pushes back.

Remediation and/or Enrichment:

Remediation – Individual IEP; Make activity directions and materials available to resource teacher; The class handout can also be provided

Enrichment- Students could be assigned for homework to find other examples of Newton's Laws of Motion in the world.

Check(s) for Understanding:
Observe students during the activities and ask them questions. The class handout could also be reviewed by instructor.

Closure:
Ask students questions.

Question 1: Match the activities with Newton's Laws.

Question 2: Can you think of other examples of Newton's Laws.

Possible Alternate Subject Integrations:
Math, Physics

Teacher Notes:
This is an introductory lesson to spark student interest in physics. This paves the way for future physics lessons.

Website on Newton's Laws:

Teachertech.rice.edu/Participants/louviere/Newton/