Lesson Title	Physics Rewind
Length of Lesson	One (50 minute) class period
Created By	Rob Thornton, Will McBryde
Subject	Physical Science
Grade Level	8th grade
State Standards	8th: 1d (Inquiry); 2c,f (Physical Science)
DOK Level	DOK 3
DOK Application	Identify, Recall, Define, Cause/Effect, Explain Phenomena in Terms of Concepts
National Standards	5-8: A (Inquiry); B (Physical)
Graduate Research Element	Physics principles are important to the basics of meteorology

Student Learning Goal:
MS 8th Grade:
1(d) Analyze evidence that is used to form explanations and draw conclusions; questions in the lesson will help students achieve this 2(c) Distinguish the motion of an object by its position, direction of motion, speed and acceleration; topics covered in the lesson will aid students with this goal (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 participate in a class review of Newton's Laws of Motion, speed, velocity, acceleration, forces and see a dimensional analysis demonstration. They will also be asked questions.

B: Physical Science: Motions and Forces; Students will be reviewed on Newton's Laws of Motion and will be asked to give examples of each law. Definitions and examples of speed, velocity, vectors, acceleration and forces will be given

Materials Needed (supplies, hand-outs, resources):
Dry erase pen and board; Copies of class handouts for students to use in groups; The instructor could make a class set and have the students put the answers on their own paper. ("Science Tutor: Physical Science" by Gary Raham: Mark Twain Media, Inc: Carson Dellosa – 404045; pp. 6,7,9,10)

Lesson Performance Task/Assessment:
The instructor will ask and answer questions regarding the lesson. (Note: This lesson can serve both as a regular lesson or a review). The topics include Newton's Laws of Motion, speed, velocity, acceleration, forces and a dimensional analysis example. (See Teacher Notes for more information). The instructor will also use the dry erase board to demonstrate some of the concepts. Finally, the students will be asked to get into groups to

work on the class handouts, which cover some of the topics in the lecture. Some additional material is covered that will challenge the students further.

Lesson Relevance to Performance Task and Students:
The lesson/review will help the students to understand the material covered. This will give students some examples from the real world. The material covered on the class handout will also reinforce the concepts of Newton's Laws of Motion. In addition, the questions on the handouts will help the students learn the material as well.

Anticipatory Set/Capture Interest:
To begin the lesson the instructor could ask "What is the definition of speed and how is it calculated?" At this point, a student could be called on to come to the board to give the equation/ definition for speed. Ex: Speed=Distance/Time. The instructor could also give the example of a line of storms 30 miles west of a given location, moving east at 30 miles per hour. The instructor could then ask the students how long it would take the storms to arrive at the location. In this case it would be one hour.

Guided Practice:
The instructor will lead the class in a discussion of the topics covered in the lesson. This will include questions and student answers.

Independent Practice:
The students will work on class handout sheets in groups. During this group work, the students will answer questions on the handouts.

Remediation and/or Enrichment:
Remediation – Individual IEP; Make definitions and examples available to resource teacher; class handouts can also be provided.

Enrichment- Outside homework on the topics could be assigned including additional handout sheets with exercises.

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

Closure:
Ask students questions.

Question 1: What are some examples of Newton's Laws of Motion?

Question 2: Compare and contrast speed and velocity.

Possible Alternate Subject Integrations:
Math, Physics

Teacher Notes:
This lesson can serve both as an introductory lesson on physics or a review of topics already covered.

Terms/Definitions:
How is speed calculated? Speed=distance/time; examples of units of speed… mi/hr, m/s and km/s; Compare and contrast speed and velocity…They both include how fast the object is moving; velocity also includes the direction. What does a vector represent? Speed and direction…Ex: slow to east vs. fast to east

slow fast

Acceleration formula…

$$a = \Delta velocity / \Delta time$$

What causes acceleration?
Speeding up, slowing down, change of direction

What is a force?
A push or a pull

Examples of forces on a playground…
Kickball, see saw, zipline, pushing someone down a slide, pushing someone on a swing

Newton's Laws of Motion…
1st Law: An object at rest will stay at rest…An object in motion will stay in motion unless acted upon by an unbalanced force. Example: bowling ball rolling down lane and then hitting pins or wall at end of lane.

2nd Law: f=ma…where force equals mass times acceleration. Example: the energy it takes to get a motorcycle to move versus a truck. It takes more for the truck.

3rd Law: For every action there is an equal, but opposite reaction. Example: jumping on a trampoline. When a person lands on the trampoline it pushes them back up.

Dimensional analysis example…

If a person is traveling at 55 mph, what is their speed in feet per second?
Hint: 1 mile = 5,280 feet

$$\frac{55 miles}{hour} \times \frac{5280\, ft.}{1 mile} \times \frac{1 hour}{60 \min.} \times \frac{1 \min.}{60 \sec.} = \frac{55 \times 5280}{60 \times 60} = \frac{290400}{3600} = 80.6\, ft./\sec.$$

Website for physics:

http://www.physics4kids.com/