

**Tell me who you are**

Name: Brian Minchen

Grade level(s)/Subject taught: Chemistry—11<sup>th</sup> grade

Objectives: Create a working model of an internal combustion engine

Be able to discuss why a car needs gasoline and oil

Answer questions about potential vs. kinetic energy

1. *Write the Mathematical Concept or “key idea” that modeling will be used to teach*

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and/or...

*Write the Science Concept or “key idea” that modeling will be used to teach*

The discussion of chemical changes to heat or motion is difficult for students to relate to life. The combustion engine in every car (almost) on the streets do this every day. The discussion will help students relate chemical potential and change to everyday life, and spur them on to investigate more changes that they see. It also involves a powerful program to visualize how an engine works. It's important to understand the basics of an engine, since our country is designed with the car in mind. The forces involved with an engine are a great example of how forces are at work in an everyday machine and interactive physics is a program that allows students to see an engine working which would be very difficult to do in real life.

Materials:

Interactive Physics

LCD Projector

Overhead projector

Possible parts from a real engine

“...a rich **one-page, single-spaced**, description or a *vision* of your best thinking...”

Prompts:

1. How will you assess the prior knowledge of the student?
2. How will you begin the lesson?
3. What are the teacher and students doing every 5-10 minutes? (Teacher Actions and Student Actions)
4. How will you assess the learning for the lesson?

Using \_\_\_\_\_ I plan on having my students...  
(software / modeling package(s))

My vision for this lesson (or set of lessons) is that students will be “hooked” by the applicable nature of automobiles. Most students are around the age where cars are becoming a real part of their lives. It is my hope that this “hook” will help them apply the concept of force, friction, chemical change and torque to a real life application. It is the goal to have them investigate the complexity of the automobile engine, and the many factors that make them work as well as they do.

I will assess the prior knowledge and begin the lesson by asking the following:

Does everybody know what an engine is?

Where have we heard it before?

How does it work?

Why do we add gasoline to the car?

How in the world does an engine turn a chemical like gasoline into rotational force?

The lesson will proceed as follows:

Explain how an engine works, with its basic parts, such as a piston, connecting rod and crankshaft. A basic model will be demonstrated using interactive physics. Students will be asked to recreate the model and apply force “tracking” to their model and comment on the various forces on the major parts of an engine. Students will be encouraged to explore modifying their model and noting the effects on the forces involved.

Assessment will be as follows:

1. Have students summarize the basic function of an engine, and how—in their own words—how an engine works.
2. Describe how the energy flows from the chemical potential energy of gasoline is converted to rotational torque to move wheels on a car.