

Teaching News Is Elementary May 27, 2016

Each week, this lesson will share some classroom activity ideas that use the newspaper or other NIE resources. You are encouraged to modify this lesson to fit the needs of your students. For example, some classrooms may be able to use this as a worksheet and others might need to ask and answer the questions in a class discussion.

Materials you will need for this lesson: The Seattle Times e-Edition, pencil and paper, dictionary, and materials for your own experiment about force

Article: “Tracks are for trains”

Page: Main, A10

Date: Wednesday, May 25, 2016

Pre- Reading Discussion Questions:

How do objects move? What makes them move? What makes them stop? How does a train move differently than a car? What happens if a moving object collides with another moving object?

Vocabulary:

Read the following quotes and determine the meaning of the word based on how it’s used in the sentence:

“Tracks are designed to handle heavy trains moving at high speeds, and to minimize the amount of **friction** for the train. Friction is the **force** that holds back a sliding object.”

Friction: The resistance of motion when one object rubs against another. Anytime two objects rub against each other, they cause friction. For example, friction is created when you rub your hands together to make heat.

Force: Something that causes a change in the motion of an object, often by pushing or pulling it, such as gravity. A ball can be thrown upward but eventually the force of gravity will pull it back down to the earth.

“As the train travels along, it also starts to gather **momentum**. The faster and bigger an object is (the more **velocity** and **mass** it has) the more momentum it will have.”

Momentum: This is the strength or force that something has when it is moving. It can grow stronger as something continues to move.

Velocity: The speed of something in a certain direction.

Mass: How much matter (or stuff) an object is made out of. Often, an object’s mass is measured by how much that object weighs.

“Trains are going so fast they can create a **slipstream**, which is similar to the **wake** created by a boat.”

Slipstream: an area of reduced air pressure and forward suction immediately behind a rapidly moving vehicle

Wake: the track of waves left by a ship or other object moving through the water or other substance

“Trains can also be hard to hear because their movement creates overlapping ripples **of sound waves**. This is also known as **the Doppler effect**, and it is why police car or ambulance sirens sound different as they move closer or farther away from you.”

Sound waves: a wave that is formed when a sound is made and that moves through the air and carries the sound to your ear

The Doppler effect: a noticeable change in the frequency of sound, light or water waves as the source and the observer move

Journal Writing Prompts:

If momentum = velocity x mass, calculate the momentum of the following:

- a) **A train traveling at a velocity of 55 mph, and has a mass of 654 tons (there are 2,000 lbs in one ton)**
- b) **A car traveling at a velocity of 35 mph, and has a mass of 3,680 lbs**

How do these two velocities compare? Which will win in a collision? How do you know? See if you can figure out the velocity that the train and car would have to be traveling at in order to have the same momentum? How likely is this scenario? Explain your answers.

Discussion Questions:

“The more momentum something has, the harder it is for it to stop. Think about being hit by a small ball. Now think about being hit by either a bigger or a faster ball. Which one takes more force to stop?”

Which ball do you think would take more force to stop? Why? What other factors might affect the amount of force it takes to stop a ball? What sort of forces might cause a ball to stop? How? If a force does not stop the ball, will it just keep moving? What if you throw the ball from a farther away distance, how will that affect the force needed to stop it?

Small Group Discussion and Activity:

In a small group or as a class, design your own experiment to explore a hypothesis that you have about force. What will you test? What materials will you need? What procedure will you follow? What kind of results/data do you plan to have? How will you collect your data? What are some possible errors that might affect your data? After you have finalized your experiment design, gather the materials and conduct your experiment! Make sure to record your observations/data and reflect on what you learn about force after your experiment is complete!

Extensions

1. Do you think a spider web could stop a train? Why or why not? What kind of information would scientists need to figure this out? Check out the real answer to the question here: <http://www.smithsonianmag.com/smart-news/could-spider-silk-stop-a-moving-train-29344557/> then discuss.
2. There is still some disagreement in the science community about whether or not the slipstream of a train will pull or push an individual that is standing too close (however, in either case the individual will likely be injured). Conduct your own research to see what you

can find on this issue. Which side do you believe? Why? Why do you think that there might be disagreement? What kinds of things might affect the behavior of a train's slipstream?

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