



Kate Shelley And The Midnight Express

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Author: Margaret K. Wetterer
Illustrator: Karen Ritz
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Program Description: LeVar visits the Amtrak yard to see how trains are maintained before he boards the Coast Starlight for a train ride along the California coast. He meets the engineer as she's driving the train and finds out what engineers do. Film clips of early trains show how things have changed.

Letting Off Steam

Key Words: steam, forces, push, pull

Concept: Steam can be used as a force to push objects.

Most modern trains use diesel or electrical power, but the very first trains used steam to power their mighty engines. They burned wood or coal to heat water that produced steam. The steam then pushed the pistons that drove the engine.

Materials: Tea kettle with a whistle, hot plate, water, meter stick, 2" x 6" strip of waxed paper, tape, a cooking mitt.

1. Have students tape a strip of waxed paper to the end of a meter stick.
2. Place several cups of water in a cool teakettle, set it on a hot plate and turn on the heat. Explain that as the water heats up, it will change to water vapor and steam, which will rise from the kettle. Remind students to stay back from the hot plate, the kettle, and the steam because all will be very hot and could cause burns.
3. After the whistle on the kettle indicates that the water is heated, turn off the hot plate, put on a cooking mitt and remove the kettle. Ask students to share their thoughts on what caused the whistle to sound. (The rising steam was forced out of the kettle whistle causing it to sound in much the same way as when they blow in a whistle.)
4. Turn the hot plate back on. Before putting the kettle on the hot plate, latch open the kettle spout lid (remember to wear a cooking mitt for this). To show how steam can be used to push objects, ask a student to hold one end of the meter stick and position the end with the waxed paper strips over the steam escaping from the kettle. Ask students to describe what happens to the paper strip. (The force that is created by the hot water changing to steam is pushing them. This is the same force that moved steam engines.)

Rolling Down The Railroad

Key Words: momentum, mass, speed, trains

Concept: Trains take a long time to stop because of their great mass and speed.

Anyone who works around trains will caution children never to play near railroad tracks because trains take a very long time to stop. Trains have a great deal of momentum. Momentum is the scientific measure of an object's mass and speed. The more momentum something has, the longer it takes it to slow down and stop. Because trains generally travel at high speeds and are so large and heavy, their momentum is great. It takes a very, very long time for a train to stop.

Materials: A child's roller skate with wheels that turn easily, two similar large soup cans—one empty & one full and unopened, several books, a piece of plywood or other thin wood that is about 24" x 6", a hallway or other open area with a hard smooth floor-covering, large rubber bands, masking tape, meter stick (optional).

1. On a smooth hard surface floor have students create a ramp by slanting a piece of wood from the top of a 4" or 5" stack of books.

2. Have them fasten an empty soup can to a roller skate using rubber bands or masking tape. Then have them release the skate from the top of the ramp and observe as it rolls down the ramp and across the floor until it comes to a stop on its own. Use masking tape to mark the point where the can stopped and/or measure the distance using a meter stick.

3. For the next trial, have students fasten a full, unopened soup can on the skate. Before they release the skate have them predict whether they think it will go a longer or shorter distance than the skate with the empty can. Have them release the skate and mark or measure the point where it stops. Ask them why this skate went further. (This skate carries a heavier load/mass and its momentum is greater so it will travel a longer distance. Because of the mass it carries, a train will take a very long time to stop, even with strong brakes.)

Extension: Measure how far the skate travels with other objects attached to it.