

## Lesson plan for *Forces and Motion Basics: Motion Activity 2 (Designed for second grade)*

By Anne Mason

### Prior Knowledge

Students need to have an understanding that an object needs a push or a pull (force) to get the object moving. A force can make an object move, make an object stop, change an object's speed, change an object's position or direction.

### Learning goals or targets

Students will predict how a force will change an object's motion or direction.

Students will understand the greater the force is, the greater the change in motion will be.

### Standards

Standard 1: Physical Science

GLE 1: Changes in speed or direction of motion are caused by forces such as pushes and pulls

EOa: Identify and predict how the direction or speed of an object may change due to an outside force (Depth of Knowledge 1-2)

EOb: Analyze and interpret observable data about the impact of forces on the motion of objects (Depth of Knowledge 1-2)

### Materials

- PhET Forces and Motion: Basics simulation:  
<https://phet.colorado.edu/en/simulation/forces-and-motion-basics>
- Desktop/Laptop/Chromebook/tablet for each student or pair
- Activity Recording sheet (see page 3)
- Pencil

### Pre-Lesson

Have simulation downloaded on the computers prior to lesson. Introduce students to the Forces and Motion: Basics simulation. Explain various tools to reset and movement of objects. During this time write and post definitions for Newtons, applied forces, and masses.

**Newtons**- the unit of force in the meter-kilogram-second system equal to the force required to impart an acceleration of one meter per second to a mass of one kilogram

**Applied force**- using a push or a pull to cause an object to move

**Masses**- relative heaviness of an object

### Lesson

Begin with stating the learning goals/targets. Pass out student activity recording sheet and ask students the first question. Students will explain their thinking (slight push or a big push). Share out a few ideas commenting on how much force will be applied to the object. Give students about 15 to 20 minutes to explore the different scenarios with the simulations. Remind them to fill out their explanations.

### Closure

Gather students up with their student activity sheets. Share out answers to the questions. Then ask the following questions:

- a. What happens if the crate is being pushed up a hill? What would change? Are there any forces that the crate is working against?
- b. What would happen if the crate was being pushed down a hill?
- c. What would happen if the surface was bumpy (rocks) or smooth (ice)? Would the pushing force be more or less?

### Follow up Sims

Students can continue to explore the Friction and Acceleration simulations to further their knowledge on Forces and Motion.

Name \_\_\_\_\_ Student Activity Sheet: Motion

1. Look at the simulation of the person and the crate. How much force does the person need to give to get the crate moving? Circle one and then explain your thinking.

Slight push      or      big push

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2. What will happen if another crate is added on top? Do you think the person will need to push more or less? Explain your thinking.

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3. a. Predict how much force the person needs to give to stop the moving crate? \_\_\_\_\_ Newtons

b. How much force did it actually take to stop the moving crate? \_\_\_\_\_ Newtons

4.a. Will it take more or less force to stop the crate if there is more weight (more objects)? Explain.

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b. What will happen if the crate is moving at a higher speed? Explain. \_\_\_\_\_

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