# **Force and Motion Discussion Guide (for use during or after reading)**

1. Why do you think the author chose to show force and motion as a team? (Force and Motion, p. 4-5)
   1. Force and motion are likely shown as a team because they work together. Objects cannot move without a force.
2. What is a force? Describe forces highlighted in the text. (What Is a Force?, Forces All Around Us, p. 6-9)
   1. A force is a push or pull. Mechanical force acts when two objects touch each other. Gravity is an invisible force that pulls everything toward the ground. Magnetism is another kind of invisible force that can push or pull to cause motion.
3. What is motion? What two factors does it include? (What Is Motion?, p. 10-11)
   1. Motion is a change in position. Motion includes two factors: speed, which is the distance traveled in a certain amount of time; and direction, which describes the way an object is going.
4. Describe the vocabulary term acceleration. (Changing Motion, p. 12-13)
   1. Acceleration is a change in motion caused by a force. Acceleration is a change in speed or direction. Many people think of acceleration as speeding up, but it can also describe slowing down or changing direction.
5. Describe the concept of inertia. (Staying In Motion, p. 14-15)
   1. Inertia is the term we use to describe the idea that objects tend to either stay in motion or stay at rest.
6. What is mass and how is it related to inertia? (Staying In Motion, p. 14-15)
   1. Mass is a measure of how much matter an object contains. It is related to inertia because the more mass sometime contains, the more inertia it has. Objects with a lot of mass, like a heavy boulder, are hard to move because they have more inertia than objects with less mass, like a light pebble.
7. Explain two ways friction plays a role in slowing down a moving bicycle. (Friction, p. 16-19)
   1. Friction is the rubbing of one object or substance against another, which creates resistance between the two surfaces. Pushing the brakes on a bicycle causes the brake pads to push against the moving tire. The friction created here causes the bicycle to slow down. Bicycles can slow down without brakes, too! The tires rub against the street, causing friction. This friction will eventually cause the bicycle to slow down.
8. Consider what you know about friction. Why do people use oil as a lubricant for their cars? (Friction, p. 16-19)
   1. People use oil as a lubricant in their car engines to help the machine move more easily. Lubrication is used to reduce friction. When using lubrication in a car engine, you are helping the machine convert less heat.
9. Think like a physicist: What is work? (Doing Work, p. 20-21)
   1. In physics, work is considered the amount of force used to move an object a certain distance. Work is done when a force moves an object or causes it to change direction.
10. What are simple machines? Name the six basic types of simple machines. (Simple Machines, p. 24-27)
    1. Simple machines are basic tools that change the way force is used to do work. They include the inclined plane, level, pulley, wheel and axle, screw, and wedge.