Forces and Motion

Vocabulary
- **force** a push or a pull
- **gravity** the force that pulls objects toward each other
- **mass** the amount of matter in an object

Inquiry Focus
**Predict** When students predict, they use what they know and observe to tell what they think will happen.

Learn by Reading
For additional content area reading see the Houghton Mifflin Science eBook: Grade 2, Unit F, pages F8–F11 and F14–F15.

Also see: Measure the Motion, a Houghton Mifflin Science Leveled Reader.

Concepts and Skills
- Students know that motion is a change in position over time.
- Students know that force can cause a change in motion.
- Students know that the more mass an object has, the more it resists a change in motion.
- Students know that an object that is not moving will remain still unless a force acts on it.
- Students know that a moving object keeps on moving unless a force stops the object.
- Students know that gravity is a force that makes objects fall to Earth.
- Students know that force, mass, and speed are related.
- Students predict and observe the effect of a force on a set of objects.
- Students conduct car races to compare the effects of force and mass on speed.

Planning
**Materials**
- aluminum pie tin
- boards, 12” × 20” × 1/8”
- *books, text, heavy, about the same size
- *broom
- *cardboard tube (from bathroom tissue)
- *facial tissue
- *hard-boiled egg
- index card
- marble
- *masking tape
- metric rulers
- *penny
- plastic “magnet” car
- plastic cup
- plastic jar, wide-mouth
- rubber band, short and thick
- toy cars
- *water
*Not provided in kit

**Student Resources**
- 1.1 Vocabulary
- 1.2 Staying Still
- 1.3 Stay Egg-stra Still
- 1.4 Car Race
- 1.5 Section 1 Assessment
Newton's first law of motion relates force and motion. It states that an object that is not moving stays still and an object that is moving keeps on moving unless a force acts on it. This tendency of a still object to remain still and a moving object to remain in motion is known as inertia. A more massive object has more inertia than a less massive object.

Gravity is a force of attraction between any two objects. The force of gravity is based on the mass of the objects and the distance between them. The greater the mass of the objects, the greater the force of gravity between them. Objects that are closer together have more gravitational attraction than more distant objects of the same mass. Because Earth’s mass is so great, the force of gravity between it and objects on or near it is very strong. That’s why objects fall to Earth.

Newton’s second law explains the relationship between force, mass, and acceleration. It says that if you apply the same force to two different objects, the one with less mass will accelerate more than the one with more mass. It also says that if you apply more force to one object than to another object of equal mass, the object with more force applied will accelerate more.