Keep It Moving

20 minutes

Objectives
- Students observe that an object in a moving vehicle keeps moving even when the vehicle stops.

Materials
For the teacher
1 index card
1 marble
1 plastic “magnet” car
1 rubber band, short and thick
*Not provided in kit

Inquiry Focus
- Observe

1. Set up the materials.
Place an index card on a plastic car to make a flat surface. Wrap a rubber band around the car as shown. Place a marble in front of the rubber band.

2. Perform the activity.
Place the car about 1 meter from a student. Give the car a push toward the student. Have the student catch the front of the car so that the car stops. Ask: What happens to the marble when the car stops? (It moves forward on the car.)

3. Help students draw conclusions.
Ask: Why do you think the marble kept moving forward even after the car stopped moving? (Students may notice that nothing stopped the marble, only the car.) Point out that the marble rolls forward because it was moving in that direction and no force acted on it to stop it. Explain that moving objects keep moving unless a force acts to stop them.

Assessment
Have students use their observations to predict what will happen to a ball in the middle of the back of a truck when:
- the truck starts to back up from a stopped position. (The ball rolls toward the front of the truck.)
- the truck moves forward from a stopped position. (The ball rolls toward the back of the truck.)
Car Races

Objectives
• Students observe that a car on a steeper ramp goes faster than the same car on a ramp that is less steep.

Materials
For each group
2 boards, Masonite™
2 metric rulers
2 toy cars

Student Resource
• 1.4 Car Race

Inquiry Focus
• Compare

1. Distribute the Resource page and materials.
   Make copies of Student Resource 1.4, Car Race, and distribute to students. Distribute materials to each group.

2. Explain the race.
   Tell students that they will race identical toy cars on ramps with different steepnesses to see which car reaches the bottom of the ramp first.

3. Students set up the materials for the race.
   Have students set up one ramp by holding a board at the 20-cm mark on a ruler. Have them set up another ramp by holding another board at the 10-cm mark on another ruler. Now have students place one of the two cars at the top of each ramp. Point out that because the cars are identical, their masses are the same. Ask: What is the same in these two setups? What is different? (Both cars are the same mass, but one ramp is steeper than the other.)

4. Students predict results.
   Have students predict which car will reach the bottom of the ramp first and record their predictions on their Resource pages.
5. Students perform the race.
Have students release both cars at the same time. If cars do not roll straight have students repeat until both cars do. Ask: **Which car reached the bottom of the ramp first?** *(the car on the steeper ramp)* Ask: **Why do you think one car went faster than the other car?** *(The ramp was steeper.)* Point out that the steeper the ramp, the greater the effect of the force of gravity on the car, making it accelerate more. Have students circle the picture on the Resource page that shows the faster car.

### Assessment

Ask: **Which car would win the race—a car on a ramp set at 20 cm or a car on a ramp set at 30 cm? Why?** *(The car on the ramp set at 30 cm would win because that ramp is steeper. The steeper the ramp, the faster the car moves.)*

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**Section Assessment**

<table>
<thead>
<tr>
<th>Name</th>
<th>Date</th>
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<tbody>
<tr>
<td><strong>Section 1 Assessment</strong></td>
<td></td>
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<tr>
<td><strong>Vocabulary</strong></td>
<td></td>
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<tr>
<td>1 What force pulls objects to the ground? Circle your answer.</td>
<td>mass</td>
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<tr>
<td><strong>Forces and Motion</strong></td>
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<tr>
<td>2 Suppose a truck carrying a ball in back hit a curb. What would happen to the ball? Circle the picture that shows the correct answer.</td>
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<tr>
<td><strong>Car Race</strong></td>
<td></td>
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<tr>
<td>3 Look at the two setups at the station. Which car will reach the bottom of the ramp first? Explain your answer.</td>
<td>The car on the higher ramp will reach the bottom first because the ramp is steeper.</td>
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**Materials**

For each station:
2 boards, 12” × 20” × ¹⁄₈”
2 metric rulers
2 toy cars

**Student Resource**

- 1.5 Section 1 Assessment

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1. Set up enough materials stations around the room to allow one-third of the class to work alone at a station during the hands-on portion of the assessment.

2. At each station, set up two ramps, one at 10 cm on the ruler and one at 20 cm. *(You can set the ramps up against a wall or a stack of heavy books.)* Tape one toy car to the top of each ramp.

3. Make copies of Student Resource 1.5, **Section 1 Assessment** and distribute to students.

4. Divide the class into three groups. While one group is working at the stations to complete the hands-on portion of the assessment, the other two groups can be completing the top part of the assessment. Rotate the groups through the stations until each has completed the hands-on portion of the assessment.

5. Discuss the answers as a whole-class activity.