

Name: _____

Date: _____

Forces Student Pre- or Posttest (Answer Key)

As you answer the following questions, add labels, arrows, and other markings to the pictures to help explain your ideas.



A soccer ball is resting on the grass. A young girl kicks the ball, and it starts moving. The ball rolls across the grass and gradually slows down until it stops.

1. What **forces** caused the ball to start moving?

Ideal response:

The ball started moving because the girl kicked it, exerting a force by giving it a push.

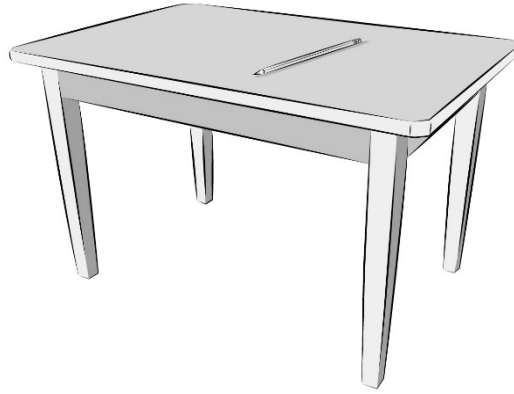
2. Why do you think the ball slowed down and stopped?

Ideal response:

The ball stopped moving because of friction exerting a force in the opposite direction of the ball's motion. Tiny bumps on the surface of the grass pushed against tiny bumps on the surface of the ball, causing the ball to slow down and eventually stop.

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A pencil is sitting on your desk, and you accidentally hit it with your elbow. The pencil starts rolling toward the edge of the table. Then it rolls off the table and falls to the floor.

3. Do you think any **forces** are pushing or pulling the pencil when it's sitting still on the table? Explain your answer.

Ideal response:

Yes, I think forces are acting on the pencil even when it's still. Gravity is pulling down on it, and the table is pushing up on it.

4. After the pencil started to move, why did it change direction from rolling across the table to falling to the floor?

Ideal response:

When the pencil rolled off the table, gravity was the only force pulling on the pencil, so it changed direction and fell to the floor.

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Your teacher asks you to push a heavy file cabinet across a carpeted classroom floor. You push and push, but the cabinet won't budge. Then the teacher asks your friend to push a file cabinet of the same weight and size across a smooth tile floor. Your friend pushes the cabinet, and it moves easily across the tile.

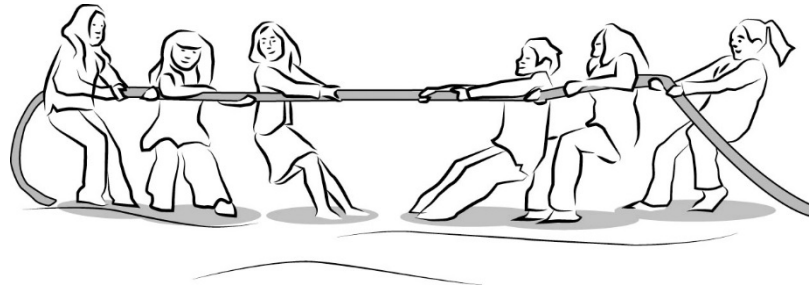
5. Why could your friend move the file cabinet she was pushing, but you couldn't budge the cabinet you were pushing?

Ideal response:

I couldn't move the cabinet I was pushing because there were more bumps on the surface that created more friction. My friend could move the cabinet she was pushing because the surface was smoother. Smoother surfaces have less friction than bumpier surfaces, so she was able to move the cabinet using less force.

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A group of 3rd graders are playing tug-of-war. The students on each side are pulling on the rope. They pull and pull, but neither the rope nor the students on either side move at all.

6. Why isn't anyone moving?

Ideal response:

No one is moving because both teams are pulling the rope with equal force.

7. What needs to happen for one side to win the tug-of-war?

Ideal response:

One side needs to pull harder than the other side to win the tug-of-war. When students on one side exert a greater force than the other side, the rope and the students on the other side will move in the direction the force is pulling.
