

**Phenomenon:** An air hockey puck moves quickly into a goal.

**Students figure out:** The hockey puck was pushed hard to cause it to move quickly. The puck may have collided with the side wall, which pushed on the puck and caused it to change direction and move into the goal.

**How they figure it out:**

#### **Lesson 1: Let's Get Moving**

Students use observations as evidence to explain that objects start moving when they are pushed or pulled.

#### **Lesson 2: Move That Ball**

Students draw models to show how a push or a pull starts an object's motion. They explain that the hockey puck was pushed before it went into the goal.

#### **Lesson 3: Faster, Faster!**

Students use observations as evidence to explain that a bigger push or pull causes objects to move faster than a smaller push or pull. Students conclude that the puck was pushed hard to cause it to move fast.

**Problem:** Ada wants a hockey game that she can play at home or at school.

**Students solve the problem:** Students design and build a tabletop hockey game.

**How they solve the problem:**

#### **Lesson 4: Paddle Tests**

Students test three objects to identify which is best to push the ball hard and fast into a goal.

#### **Lesson 5: Let's Change Our Direction**

Students observe the direction that the puck was moving when it went into the goal. Students observe how the direction of a push impacts the direction of an object's motion. Students change the direction of a ball's motion by pushing it in a new direction.

#### **Lesson 6: Collisions**

Students figure out the direction the puck was pushed from to cause it to move into the goal and conclude that the puck may have collided with a wall. Students observe how a collision with a wall changes the direction of a ball's motion. They explain that the puck may have collided with a wall, changed its direction of motion, and moved into the goal.

#### **Lesson 7: Wall Tests**

Students use what they learned about collisions to figure out that their hockey game needs a wall around it. Students test six materials to identify which will allow a ball to move toward the goal after a collision.

#### **Lesson 8: Design My Hockey Game**

Students design and build a hockey game that will keep the ball in the game and allow a goal to be scored after a collision with a side wall.

#### **Science Challenge**

**Phenomenon:** A golf ball moves into a mini golf feature and comes out of the mini golf feature moving in a different direction.

**Students figure out:** The ball collided with one or multiple objects inside the Mini Golf feature, causing the ball to change its direction of motion.

**How they figure it out:**

#### **Lesson 9: Mini Golf Mystery Part 1**

Students share initial ideas and develop a 2-D model of what they think is inside the Mini Golf feature. Students develop 3-D models that they can test.

#### **Lesson 10: Mini Golf Mystery Part 2**

Students test their 3-D model and observe and hear about how their classmates' 3-D models worked. Using their observations as evidence, students explain that the ball collided with one or multiple objects inside the Mini Golf feature, causing the ball to change its direction of motion. Students develop revised 2-D models of the Mini Golf feature.