<table>
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<th>Grade 3</th>
<th>Lesson: “On the Move”</th>
<th>Reference to English 3rd Interconnections lesson Force in Motion pg. 72</th>
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<td><strong>Science Standard(s):</strong> Standard 3.2 Physical Science</td>
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<td><strong>Content Objective(s):</strong> Students will recognize the effects of force on objects during the pinball machine experiment by writing it on their My Force and Gravity Book as a whole group. <em>I can recognize the affect of force on objects while doing the pinball machine experiment by writing it on my paper as a whole class.</em></td>
<td><strong>Language Objective(s):</strong> Students will discuss the affects of force on objects during the pinball machine experiment in groups of 4. <em>I can discuss the affects of force on objects during the pinball machine experiment in my group.</em></td>
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<td><strong>Essential Questions:</strong> How does the strength of a force affect its impact on an object?</td>
<td><strong>Required Academic Vocabulary for Word Wall:</strong> Listen: Speak: force Read: force, push Write: force, push <strong>Sentence Frames:</strong> Force is ____________________________</td>
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<td><strong>Materials:</strong> • “My Force and Gravity Book” (1 per student) • Marble (1 per group) • Yardsticks or Rulers (2 per group) • Popsicle Sticks (several per group) • Straws (1 per student) • Variety of Objects (pattern blocks, clay, math manipulatives, etc.)</td>
<td><strong>Additional Lesson Vocabulary:</strong> pinball machine, push, pull, blow, tap, parallel, yard stick, popsicle sticks, straw</td>
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**Lesson: “On the Move”**

**Instructional Time: 40-50 min**

**Opening: (1-2 minutes)**

**T:** “Do you remember when we talked about FORCE?”
• Put the word force on the board.
• If you have a FORCE concept wall, refer to it.

**T:** “What is a type of force? Tell your neighbor.”

**S:** will respond with their ideas and knowledge of force to their neighbor, “force is ________.”

**T:** “That’s right. A force is a push, a pull, or both. Today we are going to do a PUSH force experiment with moving objects.”

**Guided Practice for Experiment - Classroom Pinball: (12 minutes)**

**T:** “For our first experiment, we are going to make a pinball machine.”
• Show students pictures and/or video of pinball machines.

**T:** “This is a pinball machine. Have you seen one before? Put your hands on your head if you have seen a pinball machine before.”
• Some of your students may have seen or played with a pinball machine.
• A pinball machine is a game where a small ball is trapped inside an obstacle course of objects. It bumps or is hit by objects as it travels and moves around the course.

**T:** “We are going to make our own pinball machine.”

1. “First we need a ball. We’ll use a marble.”
2. “Next we need a track for the ball to travel down. We’ll use two parallel yardsticks standing on edge.”

**T:** “I need two volunteers to hold the yardsticks in place.”

**S:** 2 students will come up and hold the yardsticks.
• Roll the marble several times down the track.

**T:** “The marbles’ track was pretty boring. What can we do to make it more difficult for the marble to make it from start to finish? Tell your neighbor 1 thing we can put on the track to make it harder for the marble to move from start to finish.”

**S:** will tell their neighbor one thing the can put on the track, for example “block, a pencil, a eraser”

**T:** “Raise your hand and tell me one thing we can put on the track.”
• Choose a student and allow them to put that object on the track.

**T:** “Let’s roll the marble down the track again. What effect did the object have on the marble on the track?”

**S:** will shout out answers.
• Let the students add a couple more objects to the path. Roll the marble through again.

T: “How did the object on the track change the path for the marble? Tell your neighbor.”

S: will turn to their neighbor and explain the effect of the objects on the track.

T: “What did you decide with your partner? Let’s make a list on the board.”

• Write the list the students say on the board.

S: possible student answers: “The objects got in the way.” “The marble could go in a straight line.” “Sometimes the objects made the marble stop.”

T: “Look at this picture of a pinball machine. Point at the parts of the pinball machine that keep the ball moving so it doesn’t stop.”

• Let a couple of kids and point out the flippers on the picture of the pinball machine.

T: “The students pointed at the flippers. Will everyone say flippers with me? FLIPPERS! Flippers keep the ball moving.”

• Give 2 students popsicle sticks to use as flippers. Have them stand on each side of the track.

• Be sure to model how to keep the flipper close to the desk or floor, so the marble is only flipped within the confines of the track. This is not baseball! 😊

T: “Our track now has objects and flippers. Let’s see what happens when the marble goes through the track.”

• Send the marble through the track at least 2 more times.

T: “Tell your neighbor how the flippers changed the track for the marble.”

S: will discuss the effect of the flippers on the marble in the track.

T: “When I was listening to your discussions I heard you say that the flippers helped PUSH the marble through the track. Let’s see if the same thing happens when you create your own track. You will be separated into groups of 4. Each group needs to collect the materials needed for the experiment.”

  o 2 yard sticks
  o 1 marble
  o 2 popsicle sticks
  o objects (at least 3)

T: “Try to use a variety of methods to get the marble down the track, blowing, different speeds, change the position of the objects and so on. When I clap 5 times in a row you can stand up with your group and get started.”

Independent Practice for Experiment - Classroom Pinball: (10 minutes)

• As you check on each group, have the students identify what force (push, pull, or both) they are using in their pinball machine.

• If time and space allow, you may even want to connect each individual pinball set up into one long machine and send several marbles through to see how they travel through the obstacles the students have created.

• When activity is over, get the students’ attention, have them clean up and come back to whole class instruction.

Closing (10 minutes)

T: “Your pinball machines were awesome! What type of force was used to move the marble?”

S: will say, “we had to push the marble.”

T: “You’re right, you had to push the marble. You used the push force.”

T: “Let’s do the ‘On the Move’ paper together. Go to your desk and get your ‘My Force and Gravity Book’ and then quietly come back.”

• Go over the questions on the “On the Move” paper together.

• Emphasize the PUSH FORCE.

• Emphasize how the strength of a force makes objects move at different speeds.

• Demonstrate what happened if the students don’t remember.

Closing: (5 minutes)

T: “Lastly, what made the marble move? Tell your neighbor.”

S: will tell their neighbor, “the push force made the marble move.”

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Assessment:

• Observe students during their experiments with the pinball machine and pendulum to check for understanding.

• Review the students “My Force and Gravity Books.”

Extra Ideas:

• Place the pinball machine supplies in a center area of the classroom for student to use again during center rotations, free time, or indoor recess.
Here are the predictions and results of my pinball machine experiment.

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<tr>
<th>Force</th>
<th>Prediction</th>
<th>Results</th>
<th>Why do you think this happened?</th>
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<tbody>
<tr>
<td>Put the marble down at the start of the track but don’t touch it.</td>
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<tr>
<td>Tap the marble lightly with your fingers at the start of the track.</td>
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<tr>
<td>Tap the marble strongly with your fingers at the start of the track.</td>
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<td>Blow on it with your mouth.</td>
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<tr>
<td>Blow on it through a straw.</td>
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