

The Forces of Pool	Grade 3 – Understanding Matter and Energy
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<h2 style="margin: 0;">Lesson Plan</h2>	Cross Curricular	N/A
	Safety Notes	Make sure to discuss safe use of scissors with students before starting.

<p>Big Ideas</p> <p>Forces cause objects to speed up, slow down, or change direction through direct contact or through interaction at a distance.</p>	<p>Specific Expectations</p> <p>2.2 investigate forces that cause an object to start moving, stop moving, or change direction</p> <p>2.3 conduct investigations to determine the effects of increasing or decreasing the amount of force applied to an object</p> <p>2.4 use technological problem-solving skills, and knowledge acquired from previous investigations, to design and build devices that use forces to create controlled movement.</p> <p>2.5 use appropriate science and technology vocabulary, including push, pull, load, distance, and speed, in oral and written communication.</p> <p>3.3 describe how different forces applied to an object at rest can cause the object to start, stop, attract, repel, or change direction.</p>
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Description

We build a small pool table and use it to study the forces at play. The pool table is built out of a box. By playing pool with marbles students can observe how objects start moving, change direction and stop moving.

<p>Materials</p> <p>For each team:</p> <ul style="list-style-type: none"> • One shoe box (or similar) • Felt pad • Tape • 6 to 10 marbles • Dowel • Scissors 	<p>Accommodations/Modifications</p> <p>N/A</p>
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Introduction

What do you know about forces so far? (Review what you know – may include that forces can get things moving, change their direction).

Today we want to look at how forces can accelerate an object, change its direction, and slow it down too. What better way to do it than with a game?

- Can you think of a game where forces are important? (Sports, bowling, pool, toy cars, etc., etc.)
- We will play pool to study forces. But first we have to build a pool table!

Action

In groups of 2 will work well.

Making the Pool Table

- Use attached images as a guide
- Carefully cut the lid off of your box.
- Cut holes into the bottom of the box in each corner and in the middle along one side. Make sure the holes are large enough to fit the marbles you are using.
- Use some extra cardboard to make for corner supports for the playing surface. They should be about an inch shorter than the height of the box. Tape the supports into each corner.
- If necessary, cut off small strips from your lid so that it snugly fits into the box and sits on the supports.
- Glue/tape felt to one side of the lid to make your playing surface.
- Cut pool table holes into the playing surface (each corner and in the middle of the long sides)
- Put your playing surface into the box and onto the supports. Make sure it fits well and stays flat everywhere. If necessary, tape it down or gently bend to flatten it.

Playing Pool

Now that we've built the pool table it's time to try it out. Before analyzing the forces let's just have some fun and get the hang of how it works.

- Make each player pick an equal number of marbles (3 or 5) that look similar enough that you can remember which ones they are. Choose a "cue" marble that is different again (white would be perfect!)
- Arrange the marbles in a triangle on one side. Keep the cue marble on the other side.
- Use the dowel to give the cue marble a good shove. Smash it into the triangle of marbles.
- Follow the rules of pool to keep playing the game, trying to sink your own marbles.

After students have had a chance to get the hang of it a bit it's time to analyze the forces more carefully.

- Then have students fill in the attached worksheet with their observations.

Consolidation/Extension

Closing discussion:

- What did you observe? (Marbles go in different directions, speed up when hit, slow down as they travel, etc.).
- Why do the marbles slow down? (Friction on the felt. If you had no felt, by the way, it would be very hard to see what's happening as there would be so much bouncing around. It would also be hard to even just line up the marbles at the beginning without them rolling away).

Additional Resources

See separate worksheet



Supports for playing surface



Holes in the bottom of the box



Ready to play!



Time to figure out the forces involved!