

Identifying Common Forces, Part 1

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Big Idea for Physical Education		Big Idea for Science	
Movement Competency		Forces and Changes in Motion	
Standards			
<p>SC.5.P.13.1: Identify familiar forces that cause objects to move, such as pushes or pulls, including gravity acting on falling objects.</p> <p>PE.5.M.1.7: Catch a variety of objects while traveling and being defended.</p>			
Learning Goal for integrated lesson plan			
<p>The student will</p> <ul style="list-style-type: none"> investigate familiar forces acting on objects. 			
Vocabulary common to both disciplines			
<ul style="list-style-type: none"> force push pull gravity friction 		<ul style="list-style-type: none"> stationary catch throw defend 	
Common Misconceptions			
<ul style="list-style-type: none"> Some students may have the misconception that gravity is a push. While students may be familiar with using friction to observe heat, they may not understand friction as a force that opposes motion. 			
Teacher Notes			
<p>This lesson is geared toward introducing the science lesson first. Students will become familiar with the PE activity, thus allowing the science concepts to be integrated.</p>			
Summary of Physical Education Activity		Summary of Science Investigation	
<p>Students will be able to identify examples of force in the Slam Ball activity, which were taught in the Science classroom. If students are attending PE prior to Science, students will be exposed to the PE activity. Then, in Science they can make a connection between what forces were used in the PE activity.</p>		<p>Lesson will move through the 5E Model of science instruction. Students will rotate through stations observing and describing forces that might be acting on objects.</p>	
Assessment Tools - PE		Assessment Tools - Science	
<p>Teacher will observe students' progress using rubric and a formative assessment (see attached).</p>		<p>Qualitative observation data sheet (attached)</p>	

Physical Education: Slamball

Duration of Lesson

In this lesson, the science content lesson is started before the first PE class. The duration of the PE lesson is 5 class periods. Lessons are not consecutive as science lessons will be integrated. Also note, the activity wheel per school.

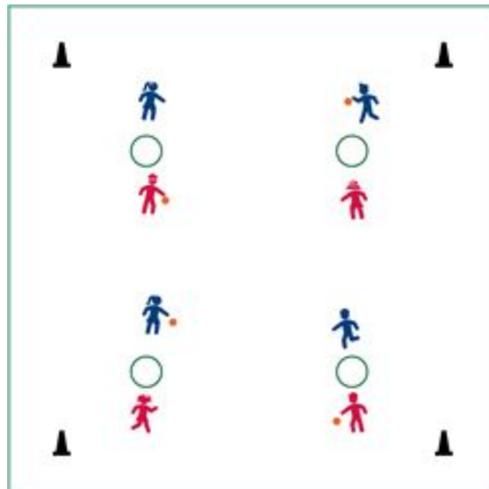
Setup/Materials

Setup:

1. Two players stand on opposite sides of a hoop at least one step away.
2. The third player is the scorekeeper and umpire.
3. One player starts with the ball.

Materials:

- 1 poly spot or hoop per 3 players
- Offer at least 3 different ball choices- balls must be able to bounce (i.e. small playground balls, tennis balls, beach balls)
- small spots, quarters, or shaped poly spots (for differentiation)
- Slam Ball Force Observations (attached)
- Slam Ball Formative Assessment (attached)



Teacher Notes

Wrap up discussion HOT (Higher Order Thinking Questions): Describe what forces are we encountering today in SLAM BALL.

Safety

Make sure you have adequate space for activity so that the groups do not run into each other. Students should be properly dressed for physical activity.

Procedure

Lesson 1: Post EQ (Essential Questions)

If students attended PE **before** they engaged in the science lesson, pose the following question:

1. How many types of forces can you name? (gravity, push/pull etc.)

**If students have already had science, use the following question:

1. Can you list the types of forces you discussed in Science today?

Procedure:

Today's activity is called Slam Ball. The object of the game is to successfully throw and catch the ball using a hoop/spot as a target.

LEVEL 1 - When I say "GO!" the first player throws the ball into the hoop. The second player attempts to catch it.

1. Scoring:
 - a. Ball does not hit inside the spot/hoop (point for receiving player)

- b. Ball hits inside hoop, receiver successfully catches the ball (point for receiving player)
- c. Ball hits inside hoop and bounces over the head of the receiver (point for receiving player)
- d. Ball is not successfully caught by receiving player (point for throwing player)
- e. SWAP RULE: When a player wins 3 points, they switch roles with the scorekeeper/umpire.

LEVEL 2 - When I say "Go" the first player throws the ball into the hoop/spot. The second player attempts to catch it. The third player tries to defend and catch the ball.

1. Scoring:

- a. Ball does not hit inside the spot/hoop (point for receiving player)
- b. Ball hits inside hoop, receiver successfully catches the ball (point for receiving player)
- c. Ball hits inside hoop and bounces over the head of the receiver (point for receiving player)
- d. Ball is not successfully caught by receiving player or caught by defender (point for throwing player) AND defender-receiver switch roles

LEVEL 3 - When I say "GO" the first player will strike the ball with an open hand. The second player will attempt to catch it. The third player will act as scorekeeper/umpire.

1. Scoring:

- a. Ball does not hit inside the spot/hoop (point for receiving player)
- b. Ball hits inside hoop, receiver successfully catches the ball (point for receiving player)
- c. Ball hits inside hoop and bounces over the head of the receiver (point for receiving player)
- d. Ball is not successfully caught by receiving player (point for striking player)
- e. SWAP RULE: When a player wins 3 points, they switch roles with the scorekeeper/umpire

LEVEL 4 - When I say "Go" the first player strikes the ball with an open hand. The second player attempts to catch it. The third player tries to defend and catch the ball.

1. Scoring:

- a. Ball does not hit inside the spot/hoop (point for receiving player)
- b. Ball hits inside hoop, receiver successfully catches the ball (point for receiving player)
- c. Ball hits inside hoop and bounces over the head of the receiver (point for receiving player)
- d. Ball is not successfully caught by receiving player or caught by defender (point for throwing player) AND defender-receiver switch roles.

Exit Ticket: *What types of forces did you use today in PE? Did you use multiple forces at the same time?*

Science Investigation: Identifying Common Forces

Duration of Lesson

3 class periods of science (30 minutes each)

Setup/Materials

5 stations for students to investigate forces acting on objects. Suggested stations are:

- spinning tops
- yo yo's
- small ramp
- toy cars
- magnets
- paper clips on strings
- deck of cards for building a house of cards

Additional materials:

- poster paper
- markers for each group
- laptop for each student
- articles (The teacher will need to create a free Teacher Account on ReadWorks to access and print the articles.)
 - <https://www.readworks.org/article/How-Soccer-Can-Help-Us-Understand-Physics/6471285a-9014-40c5-8539-bca48a3adc29#!vocabularySection:friction/questionsetsSection:487/answerKey:false/articleTab:content/> (soccer - identify pushes and pulls)
 - <https://www.readworks.org/article/The-Simple-Physics-of-Soccer/f2a4252c-af7a-4f86-9fcd-b9cd7f186385#!articleTab:content/> (lower lexile soccer - identify pushes and pulls)
 - <https://www.readworks.org/article/Rocket-Ships/90870062-cd16-4fc2-9602-0d077de2e1bd#!articleTab:content/> (Apollo Mission - identify pushes and pulls)
 - <https://www.readworks.org/article/Whats-It-Like-in-Space/ada38d04-0bc1-4249-b2da-d492909f9037#!articleTab:content/> (Life in Space - identify pushes and pulls)

Procedure

Engage: (5 min) Teacher shows a video of the men's baseball homerun compilation and Womens softball homerun compilation. Essential question: *Can you identify types of forces that are can be observed in this video?*

Explore: (25 min) Set up lab stations that students can rotate through, investigating various pushes and pulls. Have at least three of the same objects at each station. Students will record their ideas of the force/forces acting on the objects at each station. Stations are:

1. Ramps and cars - set up a couple of different tracks so that students may observe differing levels of friction. You can use books to give height to the ramps.
2. Spinning Tops - have a small collection of various tops that students can spin.
3. Magnets and paperclip on a string - (Test this out to make sure your magnets are strong enough.) Have three sets of a small paperclip attached to a 6 inch string. Tape the string end to the table, leaving the end with the paper clip free. Students can use the magnet to try to get the paperclip to become suspended in the air by getting the magnet just close enough to the paper clip to keep in suspended without touching it.
4. Yo Yos - Have a collections of small yoyos available for students to investigate.
5. Deck of playing cards - Students will attempt to build a house of cards.

At the end of the stations, lead a class discussion on forces that were observed. Ask students if they can define force. At this time, don't confirm or deny the definition. Have students record their ideas in their science notebook.

Explore 2: PE class (see above)

Explain: (60 minutes over two periods) Students will use the CPALMS Tutorial to learn about the forces that can act on objects. <http://www.cpalms.org/Public/PreviewResourceStudentTutorial/Preview/126094> Give students time to use the tutorial (25 minutes). When the tutorial is complete, ask students to revisit their ideas about a definition of force. Students can briefly discuss what they have learned about the definition. At this time, correct any misconceptions of what a force is.

Next, put students into groups of 4. Give each group of students copies of each of the following articles (have a few extra on hand in case more than one member of the group wants the same article). Allow students to choose which text they would like to work with. Once students have selected the text they would like to read, group students according to the article they chose. Give students time to read. Students are now

experts on their article, and will design a poster teaching tool to use to explain the information from the text. When students have completed their posters, have the groups share out their information. Guide students to identify forces that require contact between objects and noncontact forces. Fix any misconceptions and teach vocabulary: force, gravity, friction, stationary.

Evaluate: During the last PE class after all science classes have been completed, students will play each round of slam ball, stopping to record the forces present in each round. See attached assessment document.

Elaborate: See *Identifying Common Forces, Part 2*.

Slam Ball Formative Assessment

Student Name	Applying rules of the game	Use of correct technique when catching	Use of correct technique when throwing or striking	Use of correct technique when defending	Sportsmanship

Slam Ball Force Observations	
Level	Force Observations
Level 1	
Level 2	
Level 3	
Level 4	