

RAMP UP – LIFTOFF Lesson Plan

Title of Lesson:	3,2,1 LIFTOFF! – Learning about the Forces of Push and Pull
Grade Level:	Kindergarten
AL COS Standard:	<p>SC15.K.1 - Investigate the resulting motion of objects when forces of different strengths and directions act upon them (e.g., object being pushed, object being pulled, two objects colliding).</p> <p>SC15.K.2 - Use observations and data from investigations to determine if a design solution (e.g., designing a ramp to increase the speed of an object in order to move a stationary object) solves the problem of using force to change the speed or direction of an object.</p>
NGSS:	<p>K-PS2-1 - Plan and conduct an investigation to compare the effects of different strengths or different directions of pushes and pulls on the motion of an object.</p> <p>Clarification statement includes:</p> <ul style="list-style-type: none">● Examples of pushes or pulls could include a string attached to an object being pulled, a person pushing an object, a person stopping a rolling ball, and two objects colliding and pushing each other.
Learning Targets/Objectives:	<ul style="list-style-type: none">● I can identify a push or a pull.● I can tell how hard I push or pull something makes it go faster or slower.● I can recognize how the shape of something can change how it moves.

<p>Materials Needed:</p>	<ul style="list-style-type: none"> ● Book <ul style="list-style-type: none"> ○ <i>Motion: Push and Pull, Fast and Slow</i> by Darlene R. Stille ● Videos <ul style="list-style-type: none"> ○ Hokey Pokey Song - https://www.youtube.com/watch?v=B7sEtc326kM ○ Different Things Move in Different Ways Jack Hartmann - https://www.youtube.com/watch?v=-eIDIUNtP38 ● Other Materials <ul style="list-style-type: none"> ○ chart paper ○ pencils ○ tug-of-war rope ○ thin foam ○ tissue paper ○ construction paper ○ magazines ● RAMP UP LIFTOFF Kit <ul style="list-style-type: none"> ○ All materials needed for the LIFTOFF experiment are included in the kit. <p>Links to the videos and the book can also be found on the LIFTOFF Kit Resources page https://uahrampup.org/liftoff/</p>
<p>Preparation:</p>	<ul style="list-style-type: none"> ● Assemble the launchers used in the LIFTOFF activity ● Locate an open area for testing the straw rockets ● For kindergarten, it might be helpful to place the stoppers (ear plugs) in the straw. Directions for doing this step are in the LIFTOFF guide.

<p>Lesson Logistics:</p>	<ul style="list-style-type: none"> ● Whole class lesson ● LIFTOFF experiment conducted in an open area ● 5-day lesson <ul style="list-style-type: none"> ○ phases can be combined to reduce time or can be covered in more than one day at a time to extend the time
<p>Vocabulary:</p>	<ul style="list-style-type: none"> ● potential energy ● kinetic energy ● push ● pull ● force ● motion ● direction ● investigate
<p>Safety Considerations:</p>	<p>See RAMP UP LIFTOFF guide for safety considerations.</p>
<p>Engage: Day 1</p>	<p>Opening Activity - Assess Prior learning/Ask Questions</p> <ol style="list-style-type: none"> 1. Watch the following videos: <ul style="list-style-type: none"> ● Different Things Move in Different Ways Jack Hartmann ● Hokey Pokey Song <p>We are going to be investigating how things move.</p> <ol style="list-style-type: none"> 2. Begin the lesson by engaging the students in thinking about force and motion.

What is force? (a push or a pull on an object) What is motion? (changing place or position)

3. Have the students give examples of things that need a push and objects that need a pull. Create a T chart that can be added to throughout this lesson. Students may draw pictures or copy words from the class chart.

Pushes	Pulls
balls	tug of war
swings	the pull cord on blinds
toy cars	zippers
push door closed	pull a door open

4. Demonstrate pushes and pulls with the class by playing a quick game of tug of war. Have a few students a time participate so the others may observe how one side pushes while the other pulls. Switch groups and play again until all have had a turn participating.

<p>Explore: Day 2</p>	<p>Complete Task/Clarify Questions</p> <ol style="list-style-type: none"> 1. Begin the lesson by revisiting the T Chart that lists the examples of pushes and pulls. Does anyone have an example to add to the list? 2. Students will construct straw rockets and explore the paths their rockets take depending on the angle at which the rocket is launched. 3. Follow the LIFTOFF guide to help the students prepare their rockets for launch. 4. Have the students move to an open space once the rockets have been constructed. Students will then explore. 5. Ask: “What would happen if.....” as they explore with the angles and force of the plunger. 6. Challenge students to redesign their rockets to see if the results are the same or different. 7. Have the students draw their rocket and what it looked like as it was launched.
<p>Explain: Day 3</p>	<p>Concepts Explained/ Vocabulary Defined</p> <ol style="list-style-type: none"> 1. Read: <i>Motion</i> by Darlene Stille 2. Have the students recall the events from the rocket launches. 3. Ask the students what started the rockets in motion? (You could introduce potential and kinetic energy or continue to describe the launchers’ actions as pushes and pulls.) 4. What rocket designs flew the highest? Farthest? Fastest? 5. What role did the angle play in the distance or speed? 6. Were you surprised by anything?

Extend: Day 4	<p>Extend the Concepts</p> <ol style="list-style-type: none">1. Today the students will create new rockets using different materials as their fins. (foam, tissue paper, construction paper)2. Test the newly designed rockets.3. Compare the results in a class discussion.4. Have the students conduct investigations to see who can launch their rockets the farthest? Highest? Can you make your rocket collide with someone else's?5. Have the students complete a magazine picture sort of examples of Pushes and Pulls. Students should fold a piece of construction paper in half. Label one side "Push" and the other side of the paper "Pull". Have the students look through magazines for picture examples of each. Glue the pictures in the correct column.
Evaluation: Day 5	<p>Options for Evaluating Students</p> <ul style="list-style-type: none">● Formative Assessment<ul style="list-style-type: none">○ observations○ participation○ asking and answering questions throughout the activities● Summative Assessment<ul style="list-style-type: none">○ design drawing○ magazine sort