

Force and Motion Activities

Many of these activities (*) were presented using the Activity-Before-Concept Approach (Konicek-Moran & Keeley, 2015.) This approach allows students to investigate before a concept is introduced in order to allow students to build upon a personal reference point.

Activity	Goal	Materials	Safety	Possible Assessments
*Force and motion at school- students will investigate how they use the push/pull action daily in the classroom	Understand push and pull	Classroom materials such as chairs, doors, pencils, etc.	Be aware of possible trip hazards, mobility issues	Exit ticket
*Let's play ball – students will sit in a circle to roll a playground ball to one another	Understand how force can cause an object to stop/start	Playground ball	Review rules of how the ball will be pushed while students are sitting in a circle. Make sure the demonstration area is large and free of debris.	Discussion Exit ticket
*Go the distance – students will investigate how far toy cars travel when various materials are placed on a ramp	Friction	Toy cars, rulers, data sheet, books to create a ramp, various materials (sandpaper, fabric, bubble wrap, etc.)	Each student group should have a clear area, be aware of possible trip hazards as cars roll	Data sheet with friction inference and then friction definition
*Marshmallow Poppers – students will use popper devices to investigate speed and direction by applying varying	Speed, direction, gravity	Small cups, balloons, marshmallows (scissors to cut the tip of the balloon in order to place over the cup – tie the	Students will need to wear safety goggles, make sure the area in which the marshmallows are being	Discussions Exit tickets

force to device when popping the marshmallow and positioning the popper different ways to observe changes in direction		other end of the balloon)	popped is clear of individuals	
Wind Powered Boats – In groups students will construct the sails for boats to create maximum wind power	Using conceptual knowledge of force and motion to design sails to maximize wind power	Per group: Pool noodle boats (cut into 2 inch pieces), 12 inches of masking tape, 2 foam sheets, scissors, 6 popsicle sticks, 4 straws, fan, tub of water (to test boats)	Review scissor safety, where to stand when testing boats (away from the fan and do not touch the water), teacher is only individual to touch the fan, tub of water is placed on a steady table (have towels ready to quickly mop up any spills)	Short answer questions regarding engineering process and possible application to real-life, and diagram of successful wind sails and/or what they would change
Emaptic toy discussion – students Skye called partner class to demonstrate and discuss how force is used when playing with recess toys	Using conceptual knowledge of how force can be applied to toys to achieve desired results	Recess toys, equipment for Skye call	Be aware of any projectiles and/or hazards the toys can create (may need safety goggles), create a safe area for demonstrations	Discussions Short answer questions
Zip Line – students will construct baskets with the goal of successfully moving from the	Students will use conceptual knowledge of force, motion, and friction to design baskets to efficiently	Per student: Paper cup, 12 inches of masking tape, jumbo straw, 3 small straws, 2 pipe cleaners,	Review scissor safety, safe area for students to sit during demonstration	Discussion Short answer questions

start area to the finish area	travel along a zip line	and 4 popsicle sticks		
Windmills – students will use the K’nex renewable energy sets to alter the design of a windmill to create maximum wind power	Students will use conceptual knowledge of wind force to redesign windmills to create maximum wind power	K’nex renewable energy sets, cardstock paper, popsicle sticks, tape, straws, fan	Review scissor safety and to not force any pieces into the design as that will pose a projectile risk. Also remind students to pick up any dropped pieces to prevent a trip hazard.	Short answer questions and diagram explanation

Force and Motion with Toys: USA

Name of Group Members: _____

Please answer the following questions about the toy your group has chosen:

Within the given formats, you may draw pictures with explanations or describe what is going on as a team member demonstrates using the toy.

1. What toy did you choose?
2. When using the toy, is the force balanced or unbalanced? How do you know? Explain.
3. How is force applied? Explain.
4. What are the desired results? Explain.

Question	0	1	2	Total
Name of toy	Did not name toy		Named toy	
Balanced/Unbalanced	Did not answer the question	Stated if force was balanced/unbalanced	Stated if force was balanced/unbalanced and explained how force was balanced/unbalanced	
How is force applied	Did not answer question	Provided what type of force was used but did not explain	Provided what type of force was used and explained using an example	
Desired results	Did not answer question		Explained desired results of the toy	

Force and Motion with Toys: MEXICO

Name of Group Members: _____

Please answer the following questions about the toy your group has chosen:

Within the given formats, you may draw pictures with explanations or describe what is going on as a team member demonstrates using the toy.)

1. What toy did you choose? BALERO or TROMPO
2. When using the toy, is the force balanced or unbalanced? Explain.
3. How is force applied? Explain.
4. What are the desired results? Explain.
5. How did you use your knowledge of observed patterns of other toys to help you answer the questions?

Question	0	1	2	Total
Name of toy	Did not name toy		Named toy	
Balanced/Unbalanced	Did not answer the question	Stated if force was balanced/unbalanced	Stated if force was balanced/unbalanced and explain how force was balanced/unbalanced	
How is force applied	Did not answer question	Provided what type of force was used but did not explain	Provided what type of force was used and explained using an example	
Desired results	Did not answer question		Explained desired results of the toy	
Patterns	Did not answer question		Described how observed patterns of another toy using force and motion helped the group to answer the questions	

COMMENTS:

3-PS2-2 Motion and Stability: Forces and Interactions

<https://www.nextgenscience.org/pe/3-ps2-2-motion-and-stability-forces-and-interactions>

Performance Expectation: Make observations and/or measurements of an object's motion to provide evidence that a pattern can be used to predict future motion.

Dimension	Connections to Classroom Activity
Science and Engineering Practice	
Planning and Carrying Out Investigations: Make observations and/or measurements to produce data to serve as the basis for evidence for an explanation of a phenomenon or test a design solution.	Students will observe various toys used by peers to determine how force and motion are used.
Disciplinary Core Idea	
PS2.A: Forces and Motion: The patterns of an object's motion in various situation can be observed and measured; when the past motion exhibits a regular pattern, future motion can be predicted from it.	Students will observe how toys use force and motion based upon previous observations and predict how new toys would use force and motion.
Crosscutting Concept	
Patterns: Patterns of change can be used to make predictions.	Based upon prior knowledge of force, motion, and friction students will describe the movement of various toys.

Connections to the *Common Core State Standards* (NGAC and CCSSO 2010):

ELA: W.3.8: Recall information from experiences or gather information from print and digital sources: take brief notes on sources and sort evidence into provided categories.	Students will answer questions based upon previously learned information and observations to predict movement of objects by answering questions
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	Students will learn about other cultures through nonfiction texts and apply that information to their work.
Mathematics	