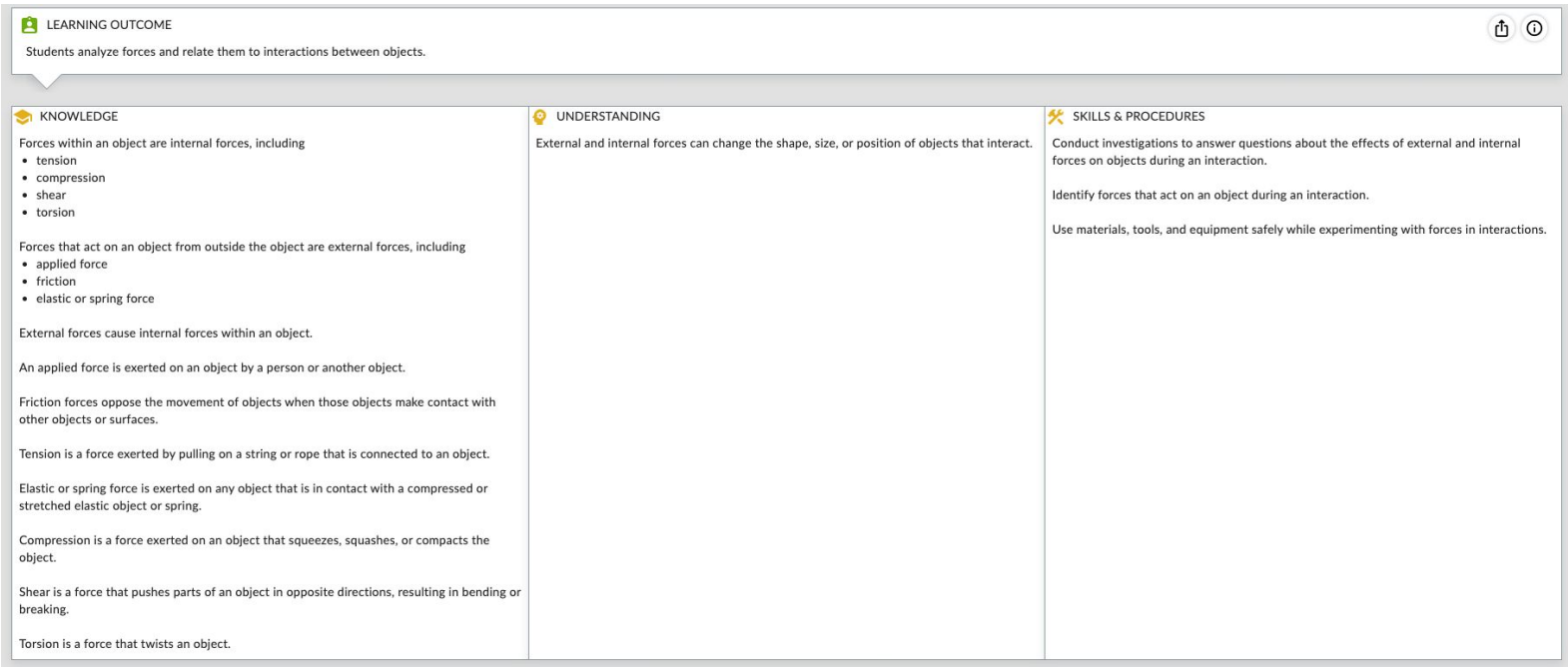
Gr.6 Energy: Introduction to Forces

Learning Guide

Introduction

In this Grade 6 lesson, students are introduced to internal and external forces through clear examples and discussion, then explore these forces in a hands-on investigation using everyday objects to observe tension, compression, shear, and torsion. Students rotate through station activities to classify forces, explain evidence of internal vs. external forces, and demonstrate understanding through formative assessments such as observation checklists, sorting tasks, and exit tickets.

This activity is designed to help cover the 1st KUSP of grade 6 in the Energy Organizing idea.



LEARNING OUTCOME

Students analyze forces and relate them to interactions between objects.

KNOWLEDGE	UNDERSTANDING	SKILLS & PROCEDURES
Forces within an object are internal forces, including • tension • compression • shear • torsion Forces that act on an object from outside the object are external forces, including • applied force • friction • elastic or spring force External forces cause internal forces within an object. An applied force is exerted on an object by a person or another object. Friction forces oppose the movement of objects when those objects make contact with other objects or surfaces. Tension is a force exerted by pulling on a string or rope that is connected to an object. Elastic or spring force is exerted on any object that is in contact with a compressed or stretched elastic object or spring. Compression is a force exerted on an object that squeezes, squashes, or compacts the object. Shear is a force that pushes parts of an object in opposite directions, resulting in bending or breaking. Torsion is a force that twists an object.	External and internal forces can change the shape, size, or position of objects that interact.	Conduct investigations to answer questions about the effects of external and internal forces on objects during an interaction. Identify forces that act on an object during an interaction. Use materials, tools, and equipment safely while experimenting with forces in interactions.

The Consortium
Alberta Professional Learning Consortium

Acknowledgement: This guide was developed by The Consortium (Alberta Professional Learning Consortium) to support implementation. It is freely provided in support of improved teaching and learning under the following Creative Commons license: CC BY-NC-SA 4.0

Resources and Instruction

Learning Guide

Lesson Resources

- Slide document is available in Canva or as google slides
- Student Handout
- Force Cards
- Formative assessment: Wayground and Blooket

Added Materials

- Print off Student Handout
- Print off Force Cards
- Paper Towel
- *Optional*: chromebooks for formative assessments

Learning Path:

1. **Open and save all the resources.**
2. **Suggested Anticipatory Set:**
    - Once class is settled, Grab a piece of paper towel and be sure to demonstrate the following without talking. Over-emphasize each:
        - Tension: pull it apart
        - Compression: crumple it into a ball
        - Shear: rip it in half by putting pulling one hand forward and pulling one hand back
        - Torsion: wring it out like a wet paper towel
    - Finally throw it in the garbage
    - Tell students that we are going to learn about EVERYTHING you just did to the paper towel!

1. **Open up Slide document and pass out student handout**
    - Go through slides while discussing. Students have a few key words they need to fill in the blanks

1. **Paper Towel Competition**
    - Step 1: Demonstrate the 4 internal forces with a piece of paper towel
        - Tension: rip paper towel by pulling on opposite ends
        - Compression: crumple up the paper towel up in a ball
        - Shear: rip paper towel by pulling one hand towards you and one hand away.
        - Torsion: rip paper towel by twisting it in opposite directions

The Consortium
Alberta Professional Learning Consortium

Acknowledgement: This guide was developed by The Consortium (Alberta Professional Learning Consortium) to support implementation. It is freely provided in support of improved teaching and learning under the following Creative Commons license: CC BY-NC-SA 4.0

- Step 2: Put every student's name in a bowel. Call 2 students up. Hand both students a piece of paper towel.
  - Countdown: 3,2,1, and then shout out one of the internal forces (tension, compression, shear, or torsion)
  - Whoever does the correct action to the paper towel first stays up at the front of the room. The other student sits back down
  - Call a new students up to play the previous winner. If someone stays up for 3 rounds, have a small prize for them.

5. **Station Activity**
   - Print and cut out cards on cardstock. Laminate if possible to use again. Tape up around room. For each card, students need to classify BOTH the external and internal forces present.
   - When students are done all the stations, the key is found on slides 16 and 17.
   - Extra cards can be used write your own examples.

5. **Formative assessments**
   - Click on links provided under the lesson resources.
     - WAYGROUND
       - Click on link, and then click on the pink PLAY button
       - Ensure your class sees this screen. Have them login to a chromebook and follow the instructions (go to joinmyquiz.com and enter the code)
       - When everyone is in, click start!
     - BLOOKET
       - Click on link, and then click the teal 'HOST GAME' button
       - Select a live game mode. Then press HOST
       - You can adjust the length of the game. You can also adjust other settings here. Once everything looks good to you, click 'host now'
       - Ensure your class sees this screen. Have them login to a chromebook and follow the instructions (go to play.blooket.com and enter the code)
       - When everyone is in, click start

Acknowledgement: This guide was developed by The Consortium (Alberta Professional Learning Consortium) to support implementation. It is freely provided in support of improved teaching and learning under the following Creative Commons license: CC BY-NC-SA 4.0