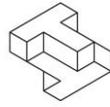


Hunt for Simple Machines

Lab Related Activity: *From Here to There*



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Introduce students to the exciting world of simple machines. Students take a scavenger hunt around their classroom or school to identify different simple machines being used all around them.

Grades K-2 | Estimated Time: 20-45 Minutes

Student Outcomes

Students will be able to:

- Define the six types of simple machines
- Identify simple machines around their classroom
- Plan a way to move a heavy box using simple machines

Next Generation Science Standards

Motion and Stability **Grades K-2:** K-PS2.A

Engineering Design **Grades K-2:** K-S-ETS1-1

California State Science Standards

Physical Sciences **Grade K:** 4.b; **Grade 2:** 1.d

Investigation and Experimentation **Grade 2:** 4.a, g; **Grade 3:** 5.d,e

Common Core ELA Standards

Writing Standard **Grade K-2:** 8

Vocabulary

Familiarity with these terms and concepts will enhance students' experience in the activity.

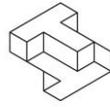
- **Simple Machines:** mechanical device that changes the direction or magnitude of a force. They make it easier to do a task.
- **Mechanical advantage / Leverage:** the increase in force gained by using a tool (i.e. a tool that makes a job easier for the user – i.e. a cart, a lever, a ramp, etc.)
- **Lever:** Any tool that pries something loose is a lever. Levers can also lift objects. A lever is an arm that “pivots” (or turns) against a fulcrum (the point or support on which a lever pivots). Think of the claw end of a hammer that you use to pry nails loose; it's a lever. A see-saw is also a lever.
- **Wheel and axle:** Makes work easier by moving objects across distances. The wheel (or round end) turns with the axle (or cylindrical post) causing movement. On a wagon, for example, a container rests on top of the axle.
- **Pulley:** Instead of an axle, a wheel could also rotate a rope, cord, or belt. This variation of the wheel and axle is the pulley. In a pulley, a cord wraps around a wheel. As the wheel rotates, the cord moves in either direction. Attach a hook to the cord, and now you can use the wheel's rotation to raise and lower objects, making work easier. On a flagpole, for example, a rope is attached to a pulley to raise and lower the flag more easily.
- **Inclined plane:** A flat surface (or plane) that is slanted, or inclined, so it can help move objects across distances. A common inclined plane is a ramp
- **Wedge:** Instead of using the smooth side of the inclined plane to make work easier, you can also use the pointed edges to do other kinds of work. When you use the edge to push things apart, this movable inclined plane is called a wedge. An ax blade is one example of a wedge.
- **Screw:** When you wrap an inclined plane around a cylinder, its sharp edge becomes another simple tool: a screw. If you put a metal screw beside a ramp, it may be hard to see similarities, but a screw is actually just another kind of inclined plane. One example of how a screw helps you do work is that it can be easily turned to move itself through a solid space like a block of wood.

Materials (one set per group of 4 students)

- Heavy box (cardboard box with folders or books inside)
- Video player with digital connection (proxima, projector, etc.)
- Class set of handout
- Writing utensils

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Teaching points:

1. *I have this heavy box on the floor at the front of the classroom and I want to move it to the back of the room. It is too heavy for me to want to lift it or ask a student to move it. What can I do to make it easier to move?*
(Possible answers: get a cart and roll it; hand truck where it helps lift the box and then roll it; a few of us could push it together; put it on a mat and pull it; etc.)
2. Give students an opportunity to try different ways to move the box by making it as easy as possible to move.
3. *Those are good solutions. Today we are going to learn more about devices we use to help us achieve our goals and to make work easier. These devices are called simple machines.*

Procedure:

4. Show a video introducing simple machines. Consider one of the following:
 - a. "Simple Machines for Kids: Science and Engineering for Children" www.youtube.com/watch?v=fvOmaf2GfCY
 - b. "Bill Nye the Science Guy SO1E10 Simple Machines" www.youtu.be/yOxc3Bmr60A
5. Discuss what the students saw in the videos.
 - a. *What are the 6 different types of simple machines?*
 - b. *What can we do with simple machines?*
6. Give each student a simple machine handout (the last page of this lesson) and discuss the 6 types of simple machines.
 - a. Tell students the definition and have them fill in the missing word.
 - b. Have students identify the 2 examples for each simple machine and identify the components.
7. Now that we know a little more about simple machines we are going to use our knowledge to conduct a scavenger hunt where we use our eyes to find more examples of simple machines in our classroom (or around our school).
 - a. Model how to look for simple machines.
 - b. Discuss any rules or agreements to follow while looking around the classroom or school.

Teaching Points:

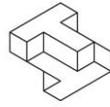
8. Review the handout with students. Have students identify the simple machines they found and have the students explain the components.
9. *What kinds of problems do these machines solve?*
(Possible answers: Hand carts (lever and wheel and axle) help lift and move heavy objects; ramps (inclined planes) to classrooms make it easier to walk or use a wheelchair to access the classroom; or screws in desks help hold them together; etc.)
10. *If we were to move the box now, which simple machines do you think we should use and why?*
11. Use classroom materials to try different ideas from simple machines to move the box to the back of the classroom.
(Possible solutions: create a ramp to push it down with a pulley to get the box to the top of the ramp; put wheel and axles underneath it; use a lever to slowly inch it across the floor.)

Taking it Further

- Have students create and use models of each simple machine to move a toy across their desk and then to move a toy from their desk to the floor. Then discuss as a class which simple machine worked best for the challenge.
- Have students identify problems around the classroom or school and have them design solutions using simple machines or more complex machines to solve the problem.
- Have students design a new utensil for eating.
- National Geographic – Simple Machine Challenge: <https://www.nationalgeographic.org/activity/simple-machine-challenge/>
- Museum of Science and Industry Chicago - Play the Simple Machines Game: <https://www.msichicago.org/play/simplemachines/>

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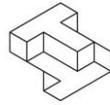
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References:

- "Bill Nye the Science Guy S01E10 Simple Machines." YouTube, 19 Oct. 2016, www.youtube.be/yOxc3Bmr60A. Accessed 18 Aug. 2017.
- Danek, Anna. "Simple machines in everyday life." Prezi.com, 19 Sept. 2013, prezi.com/5sdj50inqrhl/simple-machines-in-everyday-life/. Accessed 18 Aug. 2017.
- "The Six Types of Simple Machines." VEX Robotics, Innovation First International, Inc., 21 Sept. 2016, www.vexrobotics.com/vexiq/education/iq-curriculum/simple-machines-and-motion/six-types-of-simple-machines. Accessed 18 Aug. 2017.
- Watchfreeschool. "Simple Machines for Kids: Science and Engineering for Children - FreeSchool." YouTube, YouTube, 22 June 2016, www.youtube.com/watch?v=fvOmaf2GfCY. Accessed 18 Aug. 2017.

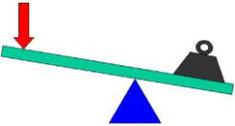
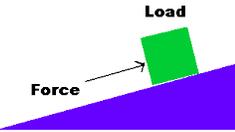
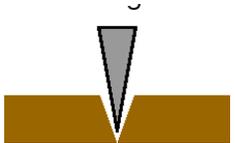
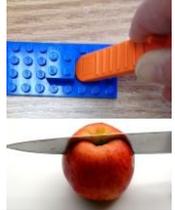
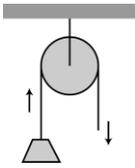
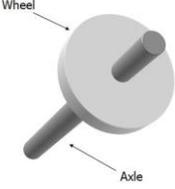
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Type of Simple Machine	Definition	Examples	Examples of simple machines at my school
<p>Lever</p> 	<p>A lever is an arm that pivots against a _____.</p>	 <p>Seesaw</p>	
<p>Inclined Plane</p> 	<p>A flat surface that is _____.</p>		
<p>Wedge</p> 	<p>Instead of using the slanted edge of an inclined plane you can use the _____ to push things apart.</p>		
<p>Pulley</p> 	<p>Instead of using an axle, a cord wraps around the _____. As the cord is pulled up an object is _____.</p>		
<p>Wheel and Axle</p> 	<p>Makes work easier by moving objects across a distance. The wheel rotates around the _____.</p>		
<p>Screw</p> 	<p>A screw is an inclined _____ that is wrapped around a cylinder.</p>		