

Simple Machines: 4.G.1

Introduction to Simple Machines

Grade Level	4
Sessions	1 – 50 minutes each
Seasonality	N/A
Instructional Mode(s)	Whole class
Team Size	Whole class
WPS Benchmarks	04.SC.TE.03
MA Frameworks	3-5.TE.1.3
Key Words	Simple machines, complex machines, work, wheel, axle, inclined plane, wedge, screw, lever, pulley

Summary

The students will be introduced to the seven types of simple machines and their functions. The students will be challenged to identify simple machines they come in contact with everyday.

Learning Objectives

2002 Worcester Public Schools (WPS) Benchmarks for Grade 4

04.SC.TE.03 Identify and explain the difference between simple and complex machines (e.g., hand can opener that includes multiple gears, wheel, wedge gear, lever).

Additional Learning Objectives

1. **3-5.TE.1.3** Identify and explain the difference between simple and complex machines (e.g., hand can opener that includes multiple gears, wheel, wedge gear, lever).

Required Background Knowledge

None

Essential Questions

1. What are the types of simple machines?
2. What are simple machines used for?

Introduction / Motivation

Ask the students what they think a simple machine is. Explain that a simple machine is a device that makes work easier. Tell the students what a complex machine is. A complex machine is made up of simple machines to create a device that makes work easier.

Procedure

The instructor will:

1. Pass out ***What are Simple Machines?*** to the class and/or display the information to the class on an overhead.
2. Ask the class for examples of simple machines they have seen. Lead a discussion on why they're important or how life would be different if we didn't have simple machines.
3. Ask the students to think about complex machines. Ask them if they can think of any that they have seen. Some examples are bicycles and elevators.
4. Pass out any of the attached handouts as in class assignments or homework.

Materials List

Materials per class	Amount	Location
None	N/A	N/A

Materials per student	Amount	Location
Handouts	1	Lesson Plan

Vocabulary with Definitions

1. *Complex Machine* – A complex machine is made up of simple machines to create a device that makes work easier.
2. *Gear* – This simple machine is a toothed wheel. Two toothed wheels fit together so that one wheel will turn the other. Gears are used to control speed and direction of motion.
3. *Inclined Plane* – A simple machine with a flat surface that is higher on one end.
4. *Lever* – A simple machine that has an arm that “pivots” against a fulcrum.

5. *Pulley* - This simple machine is made up of a wheel and a rope. The rope fits on the groove of the wheel. One part of the rope is attached to the load. When you pull on one side of the pulley, the wheel turns and the load will move. Pulleys let us move loads up, down, or sideways.
6. *Screw* – A simple machine used to raise, press, or fasten things. It is an inclined plan wrapped around a cylinder.
7. *Simple Machine* – Explain that a simple machine is a device that makes work easier.
8. *Wedge* – A simple machine is a kind of inclined plane where the pointed edges are used to do work.
9. *Wheel and Axle* – A simple machine that is a kind of inclined plane that moves objects distances. The axle is a rod that goes through the wheel.
10. *Work* – Physical or mental effort or activity directed toward the production or accomplishment of something.

Assessment / Evaluation of Students

The instructor may assess the students in any/all of the following manners:

1. Check worksheets

Lesson Extensions

This lesson could be taught as an introduction to the other lessons in the Simple Machines Unit.

Attachments

1. **What are Simple Machines?**
2. **What do you think?**
3. **Simple Machines Worksheet**
4. **Simple Machines are Hidden Everywhere**

Troubleshooting Tips

None

Safety Issues

None

Additional Resources

None

Key Words

Simple machines, complex machines, work, wheel, axle, inclined plane, wedge, screw, lever, pulley

What are Simple Machines?

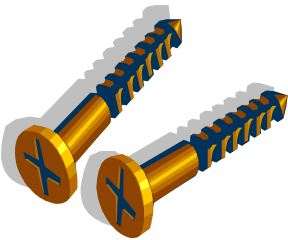
Simple machines are devices that make doing work easier. They have few or no moving parts.

Inclined Plane – An inclined plane is a flat surface that is higher on one end. You can use this simple machine to move an object to a lower or higher place. Inclined planes make the work of moving things easier. You would need less energy and force to move objects with an inclined plane.

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TIFF (LZW) decompressor
needed to see this picture.

Wedge – A wedge is a kind of inclined plane where the pointed edges are used to do some kind of work like tightening, securing or holding, or splitting things apart. An axe blade, a kitchen knife, a push pin, a nail, a fork, a saw are examples of a wedge. A nail secures things. A wedge under a door keeps the door from moving.

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Screw – A screw can raise weights or it can press or fasten objects. A bolt or a jar lid is a screw. The jar lid tightens onto the jar with a screw. Screws can be found on jar lids, light bulbs, key rings, and a spiral staircase.

Lever – A lever is an arm that “pivots” (turns) against a “fulcrum” (point). The “fulcrum” is the resting or balancing point upon which a lever turns. Someone or something has to push or pull on a lever to make it work. A light switch, scissors, garage gate, broom, toaster handle, oven or refrigerator door are examples of a lever.

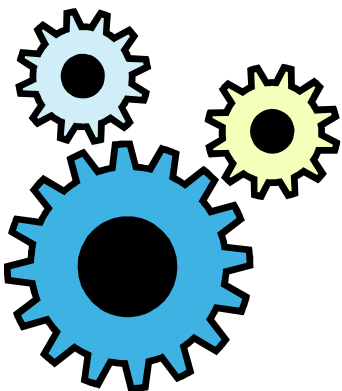
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Wheel and Axle – The wheel and axle is a kind of lever that moves objects across distances. The axle is a rod that goes through the wheel. This lets the wheel turn. The wheels of a car or bicycle are wheels and axles, which allow the car or bicycle to move easily although it is a heavy object. Roller skates, gears in clocks or watches are also examples of wheel and axles.

Pulley – This simple machine is made up of a wheel and a rope. The rope fits on the groove of the wheel. One part of the rope is attached to the load. When you pull on one side of the pulley, the wheel turns and the load will move. Pulleys let us move loads up, down, or sideways. Pulleys are good for moving objects to hard to reach places. It also makes the work or moving heavy loads a lot easier. A flagpole uses a pulley to raise or lower a flag. Blinds, a crane, and cloth lines are all examples of pulleys.

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Gear – This simple machine is a toothed wheel. Two toothed wheels fit together so that one wheel will turn the other. Gears are used to control speed and direction of motion. A good example of a gear set is the gears connected by the chain on your bike. When you pedal forward, the bike goes forward. When you change to a higher gear your bike will go faster if you continue pedaling at the same rate.

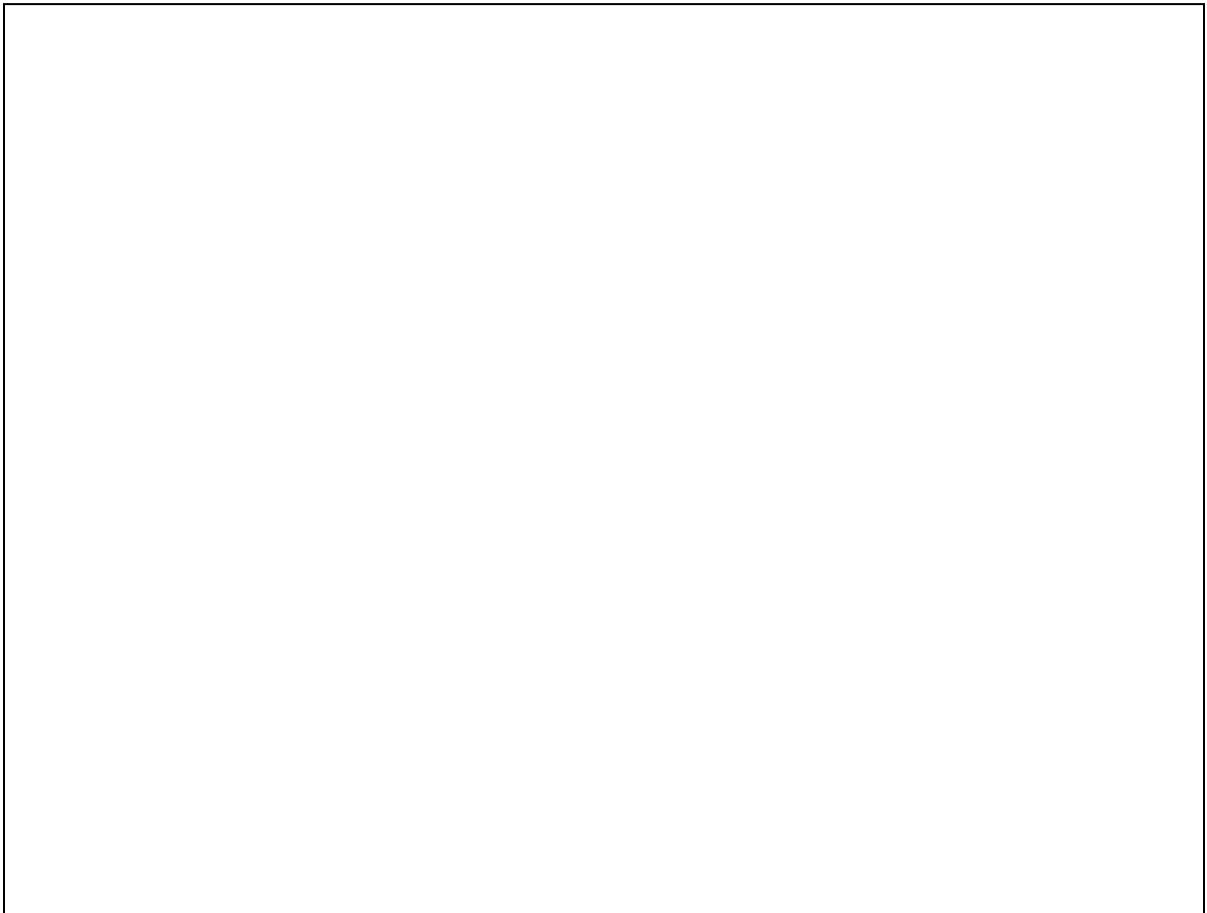
Name: _____

Date: _____

What do you think?

1. Think of a chore or task that you dislike doing and write it below. (Examples: making your bed, washing the dishes, or taking out the trash)
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2. Brainstorm ways you use simple and complex machines to make the task easier. Draw your design below.



3. Label all of the simple machines in the drawing of your design.

Name: _____

Date: _____

Simple Machines Worksheet

Directions: Write down what type of simple machine is used in each of the objects.

Object	Simple Machines
Flag Pole	
Broom	
Car's Windshield	
Saw	
Clock	
Pin	
Light Switch	
Jar Lid	
Staircase	
Skates	
Bathtub	
Scissors	
Garage Gate	
Crane	

Name: _____

Date: _____

Simple Machines are Hidden Everywhere

Riddle: What did the hungry lever say to the Wedge and Gear?

Find all the hidden words and then copy the letters that are left over to solve the riddle.

G	L	E	T	U	D	E	E	W	S
A	E	L	L	G	E	L	N	H	E
T	T	A	O	G	N	P	I	E	E
T	H	E	R	P	I	M	H	E	R
L	A	N	L	D	L	I	C	L	P
S	E	A	E	S	C	S	A	E	U
E	N	V	C	E	N	I	M	G	L
E	F	R	L	W	I	E	C	D	L
A	E	X	K	R	O	W	N	E	E
W	A	O	P	E	N	E	R	W	Y

AXLE
GEAR
INCLINED
LEVER
MACHINE
PLANE

PULLEY
SCREW
SIMPLE
WEDGE
WHEEL
WORK

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