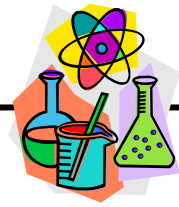


Grade 8 Unit D: Mechanical Systems



Simple Machines

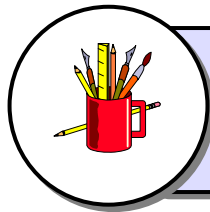
A simple machine is any basic tool or device that makes work easier.

- Simple machines have few parts.
- Simple machines reduce the amount of effort required to do work.
- Simple machines make work easier by increasing the force or speed of an action.



1. Create and fill in a KWL Chart about simple machines. Write notes about what you know about simple machines in the space provided, then use these notes to fill in the first column of your chart.

Add questions you have about simple machines. As you work through this unit, try to find answers to these questions.

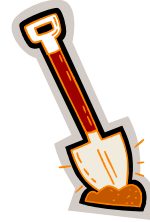


Use Tool [KWL Chart](#).

What I Know
about Simple
Machines

Types of simple machines:

Levers have a part that rests against a fulcrum (pivot point). Levers include seesaws, shovels and scissors.



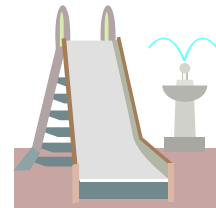
Pulleys make it easier to lift things up and move things across. Pulleys include flagpoles, water wells and clotheslines.



Wheels and axles are made of circular objects fastened together. The larger object is called the wheel and the smaller object is called the axle. The wheel turns on the axle. Wheel and axle machines include door knobs and paint rollers.



Inclined planes are straight, slanted surfaces (ramps) that decrease the effort needed to move a load. Inclined planes include slides and wheelchair ramps.



Screws are cylinders or rods with a groove cut in a spiral. Screws include wood screws, jar lids and corkscrews.



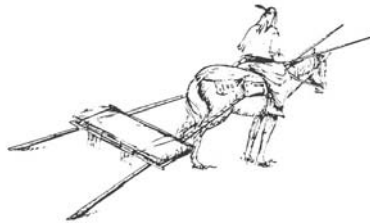
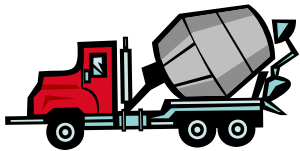
Wedges are objects that taper from thick to thin and are forced into another object to cut it or separate its parts. The longer the wedge, the less effort required. Wedges include door stops, axes and knives.



2. Identify simple everyday machines used in homes, communities or workplaces. With your class, brainstorm ideas. Create a chart to classify the simple machines. For each machine, note the source of energy that the machine uses (e.g., humans, batteries, electricity).

Types of simple machines

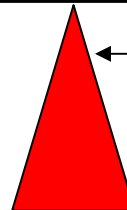
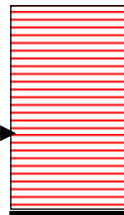
Levers	Inclined planes	Wedges
shovel	travois	axe
Screws	Pulleys	Wheels and axles
cork screw	outdoor clothesline	paint roller



Work: The force that acts on an object and results in moving the object. Pushing, pulling and lifting are common forms of work. Work is measured in joules (J).

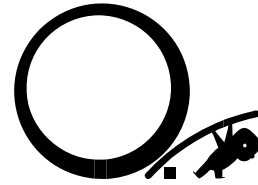
Force: The amount of effort required to move a load.

Load: The mass/weight to be moved, or what the machine is working against.



Fulcrum: The pivot point in a simple machine.

3. Work with a group to investigate several different types of levers. Fill out the chart below based on the information you found.

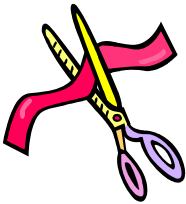


Lever	Fulcrum	Load	Force

4. Examine the role of the fulcrum in a simple machine. Create a seesaw, centre the fulcrum and place a load on one end. Push down on the opposite end. Remember the force used. Now move the fulcrum to the right of centre and repeat the procedure. Next, move the fulcrum to the left of centre and repeat the procedure. To help record your observations, answer the following questions.

- How much force is used to lift a load when the fulcrum is placed in different locations under the plank? When is it easier to lift the load and when is it the most difficult?
- What conclusions can be made about the role of the fulcrum in a simple machine?

5. Working with a group, describe the load of three different simple machines. Think about what the machine is working against. Respond to questions like these.



- What do you think would be the maximum (biggest, heaviest) load these machines could handle?
- What would happen if you increased the load more than the machine could handle?

For example, scissors work against the paper they cut, so the paper is the load. Could scissors cut through metal or thick cardboard? What would happen if you tried?



Use Tools [Preparing for Group Work](#), [Reflecting on Group Work I](#) and [Reflecting on Group Work II](#).

6. To see how different types of simple machines can help lift loads, complete the three activities below. In each activity, connect a spring scale to measure force.

- Use bare hands to lift a load 0.5 m. Record the force required to move the load.
- Construct a ramp using materials from recycle bins or other sources, and move the load 0.5 m. Record the force required to move the load.
- Construct a pulley system using materials from recycle bins or other sources, and lift the load 0.5 m. Record the force required to move the load.

Fill in the following chart as you complete the activities.

Activity	Force
a) Bare Hands	
b) Ramp	
c) Pulley System	

Compare the different amounts of force required in each situation and answer the following question.

Which simple machine made the job easiest for you?