Unit 6 Lessons 7 - 9 Study Guide

Unit 6 Lesson 7-9 Vocabulary

Lesson	Term	Definition
8	Fulcrum	the pivot point of a simple machine, the lever, where the bar balances or moves up or down
8	Inclined Plane	a flat surface (plane) set at an angle (inclined); a simple machine used to reduce the force needed to lift or lower things by lengthening the distance
8	Input Force	the amount of force applied to a simple machine
8	Lever	a bar balanced on a fulcrum, or pivot point; a simple machine used to help move or lift objects.
8	Machine	a device that changes the force used to do a given amount of work, and the distance over which the force is applied
8	Output Force	the amount of force a simple machine applies to an object
8	Pulley	a grooved wheel in a fixed location that keeps a rope or cable in place as it moves through it; a simple machine used to lift objects by changing the direction of the force
8	Screw	an inclined plane wrapped around a post; a simple machine that converts rotational force into linear force
8	Simple Machine	any type of the following: lever, pulley, inclined plane, screw, wedge, wheel and axle
8	Wedge	a two-sided inclined plane used to separate; a simple machine that converts downward input force into sideways output force
8	Wheel & Axle	two cylinders of different sizes—the larger is the wheel, and the smaller is the axle—connected so that force applied to one causes the other to turn; a simple machine used to reduce the amount of force needed to rotate or move an object
9	Compound Machine	a machine formed from two or more simple machines

Lesson 7: Using a Lever

****NOTE: refer to Unit 6 Lesson 7 OLS lesson and the Mechanical Advantage video on the Science class website and the class connect session for Using a Lever.**

TEACHER NOTE: https://www.youtube.com/watch?v=AiGiNAnWgig&feature=c4-overview&list=UUCahwwtTNfK_aRSLoy_Pbog

Lesson 8: Simple Machines

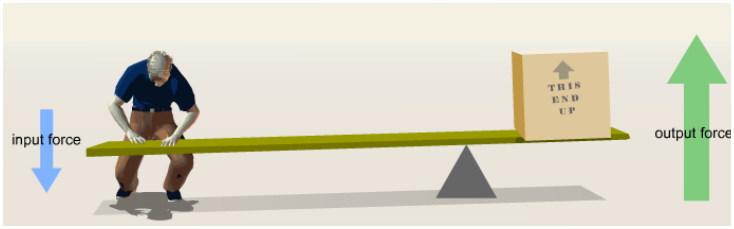
What is a Machine?

- **Remember,** WORK is applying a force to move an object over a distance. … *W*=Fd (force x distance)
- A **machine** is a device that changes the _____ used to do a given amount of work, and the distance over which the force is applied.
    - Machines do not _____ the amount of work that needs to be done; they just make the work easier.

Simple Machines

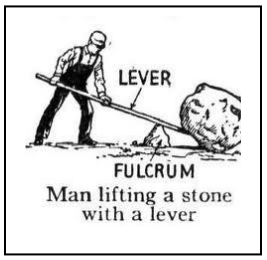
- A **simple machine** is a machine that makes work easier when a _____ force is applied.
  - Simple machines cannot do work by themselves; _____ must be applied to the machine.

Input and Output Forces

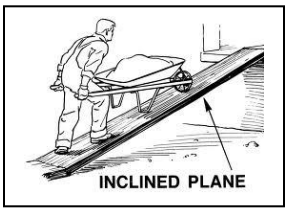


- **Input Force –** the amount of _____ applied a simple machine
  - Machines "magnify" the input force resulting in a greater output force
- **Output Force -** the amount of force a simple machine applies to an _____
  - The work applied to a simple machine is always _____ to the work the simple machine applies to the object.

Six Simple Machines

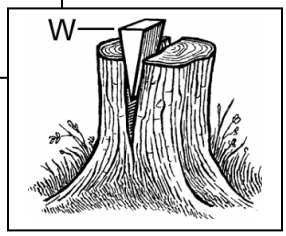


1. **Lever -** a _____ balanced on a fulcrum, or pivot point; a simple machine used to help move or lift objects
   - Levers can change the direction (up/down) or strength of a _____
   - **Fulcrum** - the pivot point of a simple machine where the bar balances or moves up or down
   - **Examples:** see-saw, shovel, crowbar, rake, broom, fork, hammer

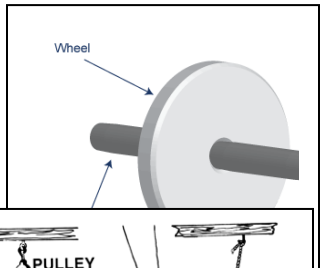


2. **Inclined Plane -** a flat surface (plane) set at an angle (inclined); a simple machine used to reduce the force needed to lift or lower things by lengthening the _____
   - Inclined Planes change the _____ of a force
     - The longer the incline the less force is required to move an object upward
   - **Examples:** ramp, sliding board, ladder, steps

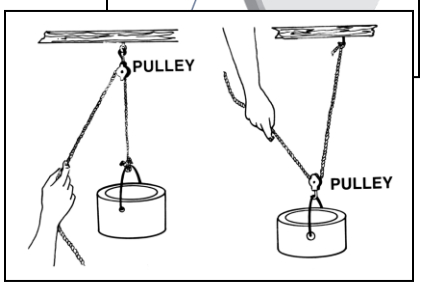
3. **Screw -** an inclined plane wrapped around a post; a simple machine that converts rotational force into linear force
   - Screws change the _____ of the force
   - **Examples:** screw, drill bits, lid on a jar, meat grinder



4. **Wedge -** a two-sided inclined plane used to separate; a simple machine that converts downward input force into sideways output force
   - Wedges change the _____ of a force
   - **Examples:** axe, knives, chisels, teeth, door stop



5. **Wheel & Axle -** two cylinders of different sizes—the larger is the wheel, and the smaller is the axle—connected so that force applied to one causes the other to turn;
   - Wheel & Axles change _____ of a force
   - **Examples:** Ferris wheel, electric fan, door knob



6. **Pulley -** a grooved wheel in a fixed location that keeps a rope or cable in place as it moves through it; a simple machine used to lift objects by changing the direction of the force
   - Pulleys change direction or strength of a _____
   - **Examples:** rope system on a flag pole, loading cargo onto a ship

Lesson 9: Compound Machines

Simple vs. Compound Machines

- **Remember**, a SIMPLE machine makes work easier when _____ force is applied; the work is done with _____ movement.
- **Compound Machines -** a machine formed from _____ simple machines.
  - Compound machines make work easier by changing the strength or direction of a force
  - Compound machines may involve more than one movement and more than one force
  - **Examples: bicycles, zippers, can opener, scissors, wheel barrow**

Using the SAME Simple Machine

- A **zipper** is made up of three _____
  - Zip Up: You slide the metal clasp up.
  - Two wedges inside the clasp push the teeth of the zipper closed as it slides up.
  - Unzip: One wedge inside the metal clasp splits the teeth of the zipper apart as you slide it down.

Using DIFFERENT Simple Machines

A **can opener** is made up of _____ different simple machines

- _____ - The blade is a wedge that cuts through the metal as the can opener moves.
- _____- To move the can opener, you turn a wheel. The wheel turns an axle. The axle turns gears that keep the can opener gripped to the can and help it move. The gears also turn the wedge that cuts the can.
- _____ - The arms of a can opener's handle act as levers. When you squeeze them over the lid of a can, a blade attaches to the lid's edge.

- **Scissors** – use two _____ and two _____
- **Wheel barrows – use two simple machines: (1) _____ and (2) wheel and axle**

Bike Parts are Simple Machines

- A **bicycle** also combines several different types of simple machines to do work.
  - _____ **-** The wheels of a bicycle are wheels and axles.
  - _____ **-** The pedals are part of a lever. The gearshifts and brake controls on the handlebars are levers, too.
  - _____ **-** The lever with the pedals turns a pulley that holds the bicycle's chain.

- What happens if one of the simple machines is not working in a compound machine, like a bicycle? **If one of the simple machines is not working on the bike, the bike won't move or it will not be safe to ride the bike.**

Work, Force, & Distance in Compound Machines

- **Work** is represented by the equation $W = Fd$.
  - To complete the same amount of work, you can _____ the amount of force you need to use by spreading it over a longer distance.
  - Or, you can decrease the amount of distance you need to cover by _____ the amount of force you use.
- In COMPOUND MACHINES, for example:
  - If you use a pair of scissors, like the top photo, with **long blades and a short handle to cut an object**. The force of the blades coming together is spread along the blades' length. Therefore, you can make a long cut, but the force of the cut is weak. This tool is good for cutting paper and fabric.
  - Now suppose you use a pair of scissors, like the bottom photo, with a **short blade and a long handle to cut an object**. The force of the blades coming together is spread over a short distance. Therefore, the cut is short, but the force is strong. This type of scissor is good for cutting sheet metal and heavy materials.