

Name \_\_\_\_\_

SOL 4.2 Simple and Compound Machines

**NOTE - Simple machines are NOT included in the 5<sup>th</sup> REVISED Science Standards**

## Simple Machine:

A machine with few or no moving parts. Simple machines make work easier.

**Examples:** Screw, Wheel and Axle, Wedge, Pulley, Inclined Plane, Lever



## Compound Machine:

Two or more simple machines working together to make work easier.

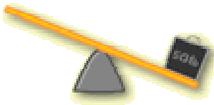
**Examples:** Wheelbarrow, Can Opener, Bicycle



### Inclined plane:

A sloping surface, such as a ramp. Makes lifting heavy loads easier. The trade-off is that an object must be moved a longer distance than if it was lifted straight up, but less force is needed.

**Examples:** Staircase, Ramp



### Lever:

A straight rod or board that pivots on a point known as a fulcrum. Pushing down on one end of a lever results in the upward motion of the opposite end of the fulcrum.

**Examples:** Door on Hinges, Seesaw, Hammer, Bottle Opener



### Pulley:

A wheel that usually has a groove around the outside edge for a rope or belt. Pulling down on the rope can lift an object attached to the rope. Work is made easier because pulling down on the rope is made easier due to gravity.

**Examples:** Flag Pole, Crane, Mini-Blinds



### Screw:

An inclined plane wrapped around a shaft or cylinder. This inclined plane allows the screw to move itself or to move an object or material surrounding it when rotated.

**Examples:** Bolt, Spiral Staircase



### Wedge:

Two inclined planes joined back to back. Wedges are used to split things.

**Examples:** Axe, Knife



### Wheel and Axle:

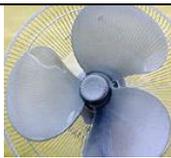
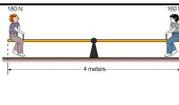
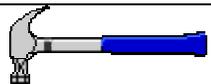
A larger wheel (or wheels) connected to a smaller axle. When the axle is turned, the wheel moves a greater distance than the axle, but less force is needed to move it. **Example:** Door Knob, Wagon, Toy Car, screwdriver

## Simple Machines

NAME THE SIMPLE MACHINE	WHAT IT IS	HOW THEY MAKE WORK EASIER	EXAMPLES – Fill in the examples from the list below
<b>__LEVER__</b>	A stiff bar that rests on a support called a <b>__FULCRUM__</b>	Lifts or moves loads	shovel seesaw crowbar bottle opener
<b>__INCLINED PLANE__</b>	A slanting surface connecting a lower level to a higher level	Makes lifting easier	stairs slide sloped driveway wheelchair ramp
<b>__WHEEL AND AXLE</b>	A wheel with a rod, called an <b>__AXLE__</b> , through its center: Both parts move together	Lifts or moves loads	skateboard doorknob bike wheel pencil sharpener crank
<b>__SCREW__</b>	An inclined plane wrapped around a pole	Holds things together or lifts	corkscrew screw jar lid bolt
<b>__PULLEY__</b>	A grooved wheel with a <b>__ROPE__</b> or cable around it	Moves things up, down, or across	tow truck chain mini-blind cord flag pole rope crane
<b>__WEDGE__</b>	An object with at least one slanting side ending in a sharp edge	<b>CUTS__</b> or spreads an object apart	nail pin axe knife

bolt, shovel, nail, mini-blind cord, screw, pencil sharpener crank, flag pole, slide, ax, doorknob, pin, seesaw, crowbar, corkscrew, skateboard, bottle opener, bike wheel, sloped driveway, jar lid, tow truck, stairs, knife, wheelchair ramp, crane

Under each item, write the name of the simple machine it uses

				
lever	wheel & axle	lever	pulley	wedge
				
screw	screw	wheel & axle	inclined plane	wedge
				
wedge and wheel & axle	inclined plane	lever	lever	wheel & axle
				
inclined plane	lever	wheel & axle	wedge	lever



The wheelbarrow is a compound machine. Which two simple machines does it use?

lever  
wheel and axle



The bike is a  
 \_\_\_ compound \_\_\_  
 machine. Name and circle at  
 least four simple machines in  
 this bike.

- \_\_\_ lever (brakes) \_\_\_
- \_\_\_ wheel and axle \_\_\_
- \_\_\_ screw \_\_\_
- \_\_\_ pulley (chain) \_\_\_

1. Machines help us work:
  - a. \*efficiently
  - b. frequently
2. Simple machines have:
  - a. \*few or no moving parts
  - b. many moving parts
3. Name the six types of simple machines.
  - a. wedge
  - b. lever
  - c. wheel and axle
  - d. inclined plane
  - e. pulley
  - f. screw
4. A lever: is used to lift or move things. Which is NOT a lever?
  - a. shovel
  - b. broom
  - c. \*ramp
  - d. bottle opener
  - e. hammer
5. An inclined plane: has a slanted surface. It is used to move things from a low place to a high place. Some are smooth and others have steps.
 

Which is not an inclined plane?

  - a. stairs
  - b. a ramp
  - c. a ladder
  - d. a roof
  - e. \*a knife
6. On a wheel and axle, the wheel is connected to a center post called an axle. Turning the larger wheel makes turning the axle easier.
 

Which is not a wheel and axle?

  - a. doorknob
  - b. screwdriver handle
  - c. pencil sharpener handle,
  - d. \*hammer
  - e. bike peddle
7. A wedge is made of two inclined planes joined together to make a sharp edge. It's used for cutting or spreading things. Some are pointed. Which is not a wedge?
  - a. knife
  - b. \*broom
  - c. axe

- d. needle
- e. nail



8. A screw is a twisted inclined plane. A screw:
  - a. \*can be used to hold two pieces of wood together
  - b. is used to cut or split things
9. A pulley can be used:
  - a. to hoist a flag
  - b. to tow a car
  - c. \*both
10. A machine that is a combination of two or more simple machines is a:
  - a. compound machine
  - b. \*complex machine
11. Machines that are made of many compound machines are:
  - a. \*complex machines
  - b. compiled machines
12. Which is not a compound machine?
  - a. bike
  - b. wheelbarrow
  - c. eggbeater
  - d. \*car
13. Which is not a complex machine
  - a. car
  - b. vacuum cleaner
  - c. \*wheelbarrow
  - d. airplane
14. Which ramp requires a greater distance but less force?
  - a. A
  - b. B
  - c. \*C
15. What is the purpose of a simple machine?
  - a. to change potential energy into kinetic energy
  - b. to produce inertia
  - c. \*to make work easier and use less force
  - d. to test force
16. What is the term used to describe the tendency of objects to remain at rest or in motion?
  - a. \*inertia
  - b. force
17. Which could cause an object to move?
  - a. friction
  - b. inertia
  - c. \*a force
18. Which has the greatest inertia?
  - a. a book
  - b. a car
  - c. \*a truck
19. An object with \_\_\_\_\_ will have more inertia.
  - a. greater volume
  - b. \*greater mass
  - c. greater height

20. Inertia--Unless acted on by a force, objects in motion tend to stay in motion and objects at rest remain at rest. What kind of force might stop or slow a moving object?
- friction
  - gravity
  - hitting another object
  - \*all of the above
21. If you are trying to push a wagon filled with bricks, the hardest part will be getting it started. Once it's moving it will be easier to push. This happens because of :
- friction
  - \*inertia
  - potential energy
  - kinetic energy
22. The resistance to motion created by two objects rubbing against each other is called:
- \*friction
  - inertia
23. True or False - Friction creates heat.
24. Why is oil added to a car's engine?
- to increase inertia
  - to reduce inertia
  - to increase friction
  - \*to reduce friction
25. Why do people put sand under a car wheel when it is spinning on ice?
- to increase kinetic energy
  - \*to increase friction between the tires and the ice
  - to make the wheel spin more
26. Which store chemical potential energy? Circle all
- \*fossil fuels
  - \*batteries
  - \*food
  - electricity
  - wind
27. Kinetic energy is:
- \*the energy of motion
  - stored energy
28. Which has more potential energy?
- \*an apple hanging from a high branch
  - a falling apple
29. Can energy be created or destroyed?
- yes
  - \*no
30. The source of all forms of energy is:
- electricity
  - lightning
  - \*the sun