Chapter 17 General Science

Machines at Work

Words to Know

**machine**- a tool or device that makes work easier to do

**work**- what happens when a force moves something through a distance

**effort force**- a force that is applied when doing work

**resistance force**- a force that must be overcome when doing work

**load-** an object to be moved

**mechanical advantage**- a measure of how helpful a machine is

*17-1 All Kinds of Work*

Describe machines that you have seen used at construction sites.

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Describe machines that you have seen used in and around your living quarters.

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How do you think these machines work? Describe the outer and inner parts.

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\* Look around the class and name any machines that you see. Keep in mind that any tool or device that makes work easier to do is a **machine**, even if you are not used to thinking of them that way.

\* Glanville T. Woods, a 19th century African American, invented electrical machines in his machine shop. Woods sold some of his inventions to Bell Telephone System, General Electric, Westinghouse, and Thomas Edison.

\* His most important invention was his railway telegraph system in 1887. This system allowed crewmembers on trains to communicate with one another and with railroad stations. It made railroads safer by helping to avoid collisions.

\* In all machines, force and distance are connected.

\* Machines make work easier in three ways:

 1.) A machine can increase the amount of force put into a task.

 2.) A machine can change the direction of the force.

 3.) A machine can change the speed of the force.

\* Machines are used to do all kinds of work. Some work would be either very difficult or even impossible to do without them. Give some examples.

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\* Did you think about simple things like opening cans? How about cutting the lawn? How about safely getting from New Lenox to Australia?

\* There are many different kinds of machines. Some have lots of parts. Some have only one or two parts. All machines are really made from one or more of the six different *simple machines*.

\* A simple machine is a machine that changes the size or direction of an applied force. Most simple machines produce work with one movement.

\* There are two forces, **effort force** and **resistant force**, involved in work.

\* The **load** is the object to be moved.

\* Suppose you had to pick up a heavy sack of grain. The sack of grain is the load. Your lifting is the effort force. Gravity holding the bag down is the resistance force.

\* Now suppose you want to drag the load across the ground. Your pulling is the effort force. Friction on the ground is the resistance force.

\* Gravity affects all things. The more mass an object has, the greater will be the resistance force.

\* The **mechanical advantage** of a machine is a number. It is based on the number of times a machine multiplies an effort force.

\* If something has a mechanical advantage of four, this means you only need to exert ¼ of the force that you could need if you used just your bare hands.

**lever**- a simple machine made of a bar or rod that turns on a support

**fulcrum-** the support on which a lever turns

**pulley**- a wheel with grooves in its rim through which a rope or chain can run

**inclined plane**- a slanted surface used for raising objects to another level

**wedge**- a simple machine made of two inclined planes, back to back

**screw**- an inclined plane that is wrapped around a nail

**wheel and axle**- a wheel attached to a rod called an axle; as the axle turns, the wheel also turns

\* The inclined plane is an interesting type of machine. It has not moving parts.

\*\*\*We will now complete an online activity looking at simple machines. Please use the following link to answer the questions below.\*\*\*

<http://www.mikids.com/Smachines.htm>

You will make a poster with a partner about a specific simple machine. Directions and poster board will be handed to you upon completion of the activities below.

In order to begin your poster, you must look through all of the examples and then try the practice quiz. You will earn 4 points for getting the answer correct on the first try and two points for the second try. Record your score at the bottom. Be honest.

1.)

2.)

3.)

4.)

5.)

6.)

***Next, you will go to the inventor’s toolbox. After reading through this information, you will attempt the quiz on the Gadget Anatomy link.***

***See if you can get the correct answers on your first attempt.***

Next, you will complete a pre-test about simple machines.

Finally, you will complete Edhead’s Interactive Online activity page by going through all of the rooms in the house and tool shed.

<http://www.edheads.org/activities/simple-machines/index.shtml>

Finally, you will complete a post-test over the information.