May 22, 2018

6th Grade Simple Machines Review

***Vocab***

* **Machine**: any device that helps you do work
* **Work:** using a force to move an object a distance
	+ *Work = force x distance*
* **Force:** a push or pull on an object
* **Load force:** the weight of the object being moved
	+ *Load force = mass x gravity*
* **Load distance:** the distance over which a load is moved
* **Effort force:** the amount of force required to move a load
* **Effort distance:** the distance over which effort is applied
* **Joule (J):** the unit used to measure energy and work
* **Mechanical advantage:** describes the relationship between a load and the effort needed to move the load
	+ Simple machines do not reduce the total amount of work done, but they make the same amount of work seem easier
	+ Simple machines increase mechanical advantage by making work feel easier
* **Simple machine**: machines that do not do work on their own
	+ Require input (force or effort) from a person
	+ Do not use electricity
	+ Have one or fewer moving parts
	+ Change the force, direction, or speed of a movement
* **Pulley**: a grooved wheel with a rope in the groove that is used to raise, lower, or move a load
	+ Pulleys change the direction of the force
	+ Ex. elevators, flag poles, construction cranes
* **Lever**:  a stiff bar that rests on a support called a fulcrum which lifts or moves loads
	+ Ex. scissors, wheelbarrow, tongs
* **Inclined plane**: a flat surface tilted at an angle, with one end higher than the other, that is used for raising or lowering a load
	+ Also known as a ramp
	+ Gentler slopes increase mechanical advantage because less force will be needed to move an object up or down the slope
	+ Inclined planes do not need to be straight to increase mechanical advantage
	+ Ex. slide, spiral ramp in a parking garage
* **Wedge**: triangle-shaped tool that is made up of two inclined planes joined together
	+ Used to separate two objects or portions of an object, to lift up an object, or to hold an object in place
	+ Longer wedges with thinner tips have greater mechanical advantage
	+ Ex. axe, doorstop, teeth
* **Screw**: long, narrow inclined plane wrapped around a cylinder
	+ Used to hold things together or to move objects from lower to higher positions
	+ The grooves around the shaft or cylinder is the *thread*
	+ The closer the threads are, the greater the mechanical advantage
	+ Ex. jar lid, faucet, drill, light bulb
* **Wheel and axle**: a large disc and a small cylinder, both joined at the center, that is used to move a load
	+ The larger disc is called the wheel, and the smaller rod is referred to as the axle
	+ A wheel alone or an axle alone is not a simple machine – they must be joined to be called a simple machine!
		- Ex. doorknob, screwdriver, ceiling fan, Ferris wheel

***Focus Questions***

* **What are the six simple machines?**
	+ The six simple machines are the wheel and axle, the pulley, the lever, the inclined plane, the wedge, and the screw.
* **How can simple machines change the force needed to lift a load?**
	+ Simple machines can change the force needed to lift a load *by offering a mechanical advantage*.
* **How does mechanical advantage relate to effort and load forces?**
	+ If the load force is much greater than the effort force, then there will be a mechanical advantage because less effort will be needed to move the heavy load.
* **What are the three parts of a lever?**
	+ *Fulcrum*: point on a lever which turns, balances, or pivots
	+ *Effort*: force used to do the work
		- A handle or bar of the lever that you push or pull on
	+ *Load*: work needed to be done
		- The object to be moved or lifted

  

* **What are the three classes of levers?**
	+ *First-class*: the fulcrum is located between the effort force and the load
		- Ex. crowbar, scissors, see-saw
	+ *Second-class*: the load is located between the effort force and the fulcrum
		- Ex. nutcracker, wheelbarrow
	+ *Third-class*: the effort force is applied between the load and the fulcrum
		- Ex. tweezers, tongs, broom, bicep
* **How does the relationship between the fulcrum, effort, and load affect the force needed to lift a load?**
	+ Changing the position of the fulcrum, effort, and load in relation to one another changes how a lever works. This can affect the distance over which a load can be lifted, the distance over which effort must be applied, and/or the effort force needed to move the load.