**EOG REVIEW**

**Motion and Design Study Guide**

**BIG IDEA: Objects move in specific ways which are planned, powered, and designed using concepts such as friction, air resistance, and energy.**

**Force** – a push or pull on an object

**Balanced Forces** – forces that are equal and cancel each other out, so motion does not change (ex: a tug of war game where the rope is staying in one place; ex: apple sitting on a desk)

**Unbalanced Forces** – forces that are unequal- one is greater than the other so motion occurs (ex: pushing a heavy box across the floor- your push on the box is greater than the box’s push back on you; ex: lifting something up- your pull up is greater than gravity’s pull down; another example of unbalanced forces is a car speeding up)

**Friction**- force that acts upon an object to slow or stop its motion (ex: a soccer ball rolling across a grassy field is stopped by the friction the grass causes; ex: add salt to slippery roads increases the friction b/t a car’s wheels and road)

**Gravity** – force that pulls all objects on Earth toward the center of the Earth ex: let a toy car go at the top of a ramp and gravity pulls it down the ramp; ex: jump up and you come down

**Inertia-**  tendency of an object to resist a change in motion- an object in motion will stay in motion until a force acts upon it and an object at rest will stay at rest until a force acts upon it; Newton’s 1st Law of Motion

**Distance** = speed multiplied by time

**Momentum-** Mass of object multiplied by velocity—an object that is bigger, or is going faster, is harder to stop than an object that is smaller or is going slower because it has greater momentum. Think of a big truck and a little Smartcar at same speed, both trying to brake for an accident- who has more momentum and thus will have a harder time braking?

**Stored and kinetic energy**- Stored energy is potential energy waiting to be released. If you stretch out a rubberband, you are giving it potential or stored energy. Once you release the rubberband, it has kinetic energy. Stored energy is what an object has right before it moves and kinetic energy is what an object has when it is moving.

Alternate sources of energy- wind, sun, nuclear, thermal

**Air resistance**- sometimes called “drag” this is a force that slows moving objects in the air ex: parachutes

Work is done on an object when you transfer energy to that object; work = force multiplied by distance

**Simple Machines-** tools that make **work** easier- they have few or no moving parts- 6 main types of simple machines

* Inclined plane: used to move something from low to high; ex: ramp
* Wedge- used to cut something in two; ex: knife
* Screw – used to attach two parts together; ex: bottom of a light bulb
* Lever: used to lift a large load by exerting a small force; ex: wheelbarrow
* Wheel and Axle- used to move or turn something by changing direction and strength of force; ex: knob, bike
* Pulley – used to lift and pull something ex: window blinds

**Design-** solves problem through a process- identify problem, visualize solutions, plan, build, test, redesign with improvements; ex: design of race cars, sailboats

**Variables-** Independent variable is the variable you can control in an experiment. Dependent variable is the one you observe and measure in an experiment. If you are testing the effect of light on plant growth, how much light you give the plant is the independent variable and how much the plant grows is the dependent variable.