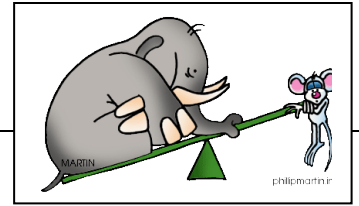


Week 30 – SCIENCE NOTE PAGE

Simple Machines



What is a Machine?

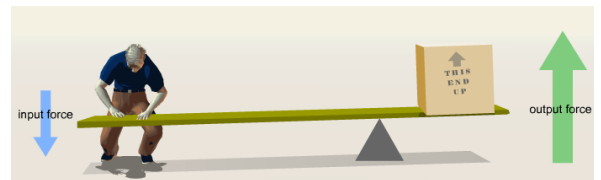
- **Remember, WORK** is applying a force to move an object over a distance. ... $W=Fd$ (Force x distance)
- A **machine** is a device that changes the **force** used to do a given amount of work, and the **distance** over which the force is applied.
 - Machines do **not** decrease the amount of work that needs to be done; they just make the work easier.
- A **machine** can **change** the **strength or direction of a force**.
 - To decrease the amount of force required to do work, you can increase the **distance** over which the force must be applied.

Simple Machines

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

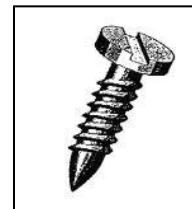
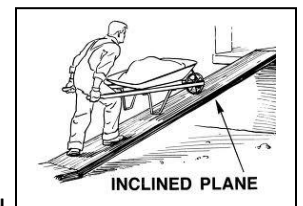
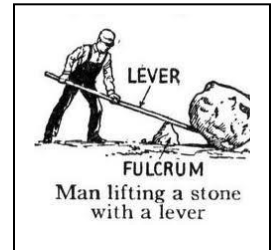
Input and Output Forces

- **Input Force** – the amount of force applied **to** 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 **object**
 - The work applied to a simple machine is always **equal** to the work the simple machine applies to the object.



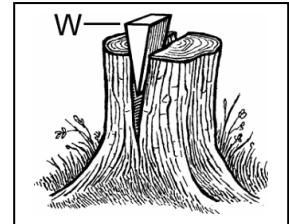
Six Simple Machines

1. **Lever** - a **bar** balanced on a fulcrum, or pivot point; used to help move or lift objects
 - **Levers** can change the direction (up/down) or strength of a **force**
 - **Fulcrum** - the pivot point of a lever; 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); used to reduce the force needed to lift or lower things by lengthening the **distance**
 - **Inclined Planes** change the **strength** 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; the screw converts rotational force into linear force
 - **Screws** change the **direction** of the force
 - **Examples:** screw, drill bits, lid on a jar, meat grinder



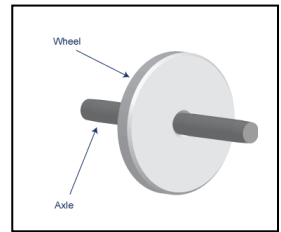
4. **Wedge** - a two-sided inclined plane used to separate; the wedge converts downward input force into sideways output force

- **Wedges** change the **direction** 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; used to reduce the amount of force needed to rotate or move an object

- **Wheel & Axles** change **strength** of a force
- **Examples:** Ferris wheel, electric fan, door knob, steering wheel of a car



6. **Pulley** - a grooved wheel in a fixed location that keeps a rope or cable in place as it moves through it; used to lift objects by changing the direction of the force

- **Pulleys** change direction or strength of a **force**
- **Examples:** rope system on a flag pole, loading cargo onto a ship

