M_____ – change direction or magnitude of an applied force – *makes work easier.* Work of a machine is always l_____ than the work done on the machine due to **f**____. All machines are less than 100% efficient.

Two forces when a machine does work:
1. **E**_____ **FORCE** (Fe) – force applied to machine
2. **R**_____ **FORCE** (Fr) – force applied by the machine

M_____ **A**_____ =

Fr (output force)   input distance
Fe (input force)   output distance

There are_____ **types of simple machines**:

1._____ which is a bar that is free to pivot about a fixed point. (*fulcrum*) MA= $\dfrac{De}{Dr}$ or $\dfrac{Le}{Lr}$

        3 groups of levels
            1st Class =

               R_____ **E**

          2nd Class =

               R___ **E**
          3rd Class-

2. _____ is a lever that rotates around a fixed point. It changes the direction of the *force* and provides mechanical advantage.

Single fixed pulley – MA=
Single movable pulley – MA=
Block & Tackle – MA = number of supporting
                                                                    Ropes

3. _____is a simple machine made up of two circles. (The Wheel is large the Axle is the smaller circle)
    Examples-

MA=$\underline{\textbf{Rw}}$ Radius of wheel
       Ra   Radius of axle

For gears - MA= **Re**   radius of effort gear
                        Ra   radius of resistance gear

4. _____ the simplest form is a ramp.