

Work, Power and Machines

Work

- Definition
 - force applied over a distance
 - distance must be in the same direction as the force
 - SI Unit of Joules
- Equation (Linear)
 - Work = Force x Distance
 - $W = F \times D$

Power

- Definition
 - the rate at which work is done
- Unit of Measure
 - Watt (W)
- Equation (Linear)

$$\Rightarrow P = \frac{\text{Work}}{t} = \frac{F \cdot d}{t} = F \cdot v$$

Why Do We Use Machines?

- To decrease the amount of force needed to move an object or to change the direction that the force is applied
- Machines give us a mechanical advantage
 - Mechanical Advantage - number of times a machine multiplies the effort force

Efficiency

- Definition
 - how well the machine works by comparing the useful work done by a machine to the work put into the machine
- Equations

$$\% \text{ Efficiency} = \frac{\text{Work Out}}{\text{Work In}} \times 100\%$$

or

$$\% \text{ Efficiency} = \frac{P_{\text{out}}}{P_{\text{in}}} \times 100\%$$

Compound Machines

- Two or more simple machines linked so that the resistance force of one machine is the effort force of the next machine.
- To determine the mechanical advantage of a compound machine, multiply the mechanical advantages of all the simple machines.

Return to Honors Physics
Notes