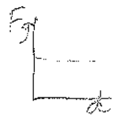
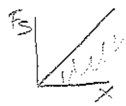
Unit Four: Energy, Work and Power

Work	Energy
$W = Fd$ Work against gravity $W = F_g d$ 	Potential Energy $PE = mgh$
Work on a frictionless horizontal surface $W = (F_{net})(d)$ 	$KE = \frac{1}{2}mv^2$ $KE = mad$ where $ad = \frac{1}{2}v_f^2$ causes increase speed
Work on a Spring $W = \overline{F_s}\, x$ 	$PE_s = \frac{1}{2}kx^2$
Work done against Friction $W = F_f d$ wast	Internal energy Q

Work done should cause an increase in energy. If it does not it is work against friction and causes internal energy (Q)

Equations

$W = Fd$ (direction of force and d must be the same)

$PE = mgh$

$KE = \frac{1}{2}mv^2$

$PE_s = \frac{1}{2}kx^2$ $F_s = kx$

Work done = Energy gained

work = area of F vs d graph

Remember that for springs the force is not constant (linear increasing) therefore $W = \frac{F_s}{2}x$ (average Force

Unit Four: Conservation of Energy and Work against friction

Key to problem solving is finding point where all energy is in a single form

Ex: $PE = E_T$ at top

$KE = E_T$ at bottom

Remember:

Unless work is done Total Mechanical energy is constant

	PE+KE	E_T
Top		
Mid		
Bottom		

☆ if an object is moving up hill at constant speed (constant KE) work must be done... therefore total Mechanical energy increases.

When friction or resistance is present

Negative work takes away from total mechanical energy

Internal Energy "Q" becomes heat

Equations

$E_T = KE + PE$ (frictionless)

$E_T = KE + PE + Q$ (friction/Heat)

graphs

For constant E_T (dropped object)