PHYSICS
REVIEW: WORK; ENERGY; SIMPLE MACHINES

TEST DATE = ___________________________

work
power
kinetic energy
potential energy (gravitational)
potential energy (spring)
Hooke's Law
spring constant
conservation of energy
elastic and inelastic collisions
rotational and translational KE

simple machines
effort force
effort distance
resistance force
resistance distance
work input
work output
efficiency
ideal mechanical advantage
actual mechanical advantage

work = F x d
kinetic energy = $1/2\ mv^2$
potential energy (gravitational) = mgh
potential energy (spring) = $1/2\ kx^2$
heat (from friction, etc.)
all the forms of energy listed above have units $kg\ m^2 /sec^2$ = Nm = joule
power = rate of doing work = $\frac{work}{time} = \frac{W}{t}$ unit of power = watt

in the systems we have dealt with, energy can be redistributed among the above forms, but not "created" or "destroyed"...energy is CONSERVED...there are forms of energy we have not considered in our work, that could be added to the list above, e.g. rotational kinetic energy (considered briefly, but not quantitatively), chemical energy, electrical energy, light energy, etc....

a collision in which both momentum and kinetic energy are conserved is said to be elastic...momentum will always be conserved in an isolated system, but kinetic energy may not (though total energy is)...

$Win = F_e d_e$ $Wout = F_r d_r$ %Efficiency = $\frac{\text{Work (out)}}{\text{Work (in)}} \times 100$

$AMA = \frac{F_r}{F_e}$ $IMA = \frac{d_e}{d_r}$ % Efficiency = $\frac{AMA}{IMA} \times 100$

output is never greater than input...efficiency is never more than 100%

simple machines do not give a "work advantage"...they most commonly give a "force advantage" at the expense of distance...you always put more work into a simple machine than you get out

rotational kinetic energy = $1/2\ I\ \omega^2$

$KE_{total} = KE_{translational} + KE_{rotational}$