Energy and Work

- Energy is the ability of an object to accomplish a _________.
- Work is the process of transferring __________ from one _________ to ____________________.
- In order for an object (i.e. fly swatter) to accomplish a job (______________________), the object must have __________. And, to have energy, the object must have __________ and __________.
- Ergo, the only "true" form of energy is the energy of _________, called _________ _______ (___).
- So, work must really be the transferring of ___________ ________ from one object to another (____=______). Work done on the squatter is __________, because the speed of the fly squatter __________, while work done on the fly is __________, because the speed of the fly's exoskeleton ___________. (Note: Sound and heat energy are also released. So, $|\Delta KE_{swatter}|$ ___ $|\Delta KE_{fly}|$.)
- For the squatter and fly system the total change in energy = _________. Energy is ___________.

Work Quirks

- Only forces that are parallel to the __________/____________/____________ can do work. So,
  1. Normal force __________ does work, except in an ______________.
  2. Frictional force usually does _________ work when it causes an object to _______, but can do __________ work if it is used to make an object ________________.
  3. Centripetal force ___________does work, because it is _______________ to the motion.

Work Example

A 0.5kg ball is thrown into the air with an initial velocity of 20 m/s.

1. What is the starting KE of the ball?
2. What is the ball's KE at the top of its arc?
3. What is the ball's KE when it reaches the ground again?
4. What is work is done by gravity on the ball going up? Going down?
5. When does a force do positive vs. negative work?
6. What height does the ball rise to?
7. At the top of its arc, what amount of energy can gravity potentially give to the ball?

Power

- Power is rate that _____________ is transferred. Thus, its equation is ___=_______, but looking at units gives this alternative equation: __________.
- Note: Because the definition of power equation deals with a largish period of _________, it can only be used to measure ___________ power. The corollary equation has time built into _____, though, so it can calculate all five flavors of power (______________________________________) Just make certain that the type of _____ matches the type of ____.

Work and Power Graphs

U3P1b

On a _________ vs _______________ graph,
work is _______, because F is the _________,
d is the __________, and ________ = _____.

On a _________ vs _______________ graph,
power is _______, because ___ is _________,
___ is __________, and ________ = ________.

Inversely,

Examples:

Momentum and Impulse U3P1c

- _______________ tells how difficult it is to bring a moving object to a ________.
- _______________ is the ______________ of momentum from one object to ______________.
- Impulse is transferred over ________ by applying a _________ to an object. So, the formula is ______________. In units this is ____________ = ___________ = _________. Yielding the alternative formula ______________.
- Based on this formula, if an object starts with zero velocity, then its total momentum = ___=_____
- Momentum comes in 5 flavors: ____.
- A big difference between energy and momentum is that v in momentum is ___________________. So, ____________ momentum is possible. In other words, energy is a __________, while momentum is a ______________ – so ______________ counts.

F vs. t Graphs

Comparing W, E, I, and ρ