Ch 6: Work & Energy name:

Format: 30 multiple choice; 5 lever class mc; 3 calculations

Study Guide

**Vocab**

*work kinetic E (KE) watt (W) energy (E)*

*power conservation of E machine kilowatt hour*

*potential E (PE) work-energy theorem efficiency law of conservation of E*

*fulcrum* (f) *load (l);* (Fl) *effort (e);* (Fe)

**Formulae**; (units)

Work: **W = Fd**; (N\*m) Power: **P = W/t**; (N\*m/s or J (joules))

Potential E: **PE=mgh**; kg\*m/s2\*m 🡪N\*m Kinetic E: **KE= ½ mv2**; (N\*m)

Efficiency = (Work output/E input  )x100%

**Things you MUST know:**

1. Be able to calculate Work; W formula.
2. Relationship between Work and Power.
3. Be able to calculate Power; P formula.
4. Kinetic E is only present when an object is in motion.
5. Machines can multiply F and change the direction of F; Since W=Fd, if a F is multiplied, the d is decreased by a similar factor. (eg. If a pulley system allows me to lift a 700N object with an input F of 100N, I must pull 7x the d on the rope that the object moves;

Fd=Fd)

1. Applications of the **law of conservation of E**: **Ideally**, no E is lost (to friction as heat or sound etc.); **Actually**, much of the E we put into machines is lost as heat or sound--but it is never truly utterly lost, it merely transforms into 'cheaper' unrecoverable/unusable E.
2. Machines can never multiply Work or E (this would create E & violate #6 above).
3. Applications of the KE formula:
   1. Changes in *speed* for same mass. (eg. if v doubles, KE quadruples)
   2. Changes in *stopping distances* for same mass. (eg. if v doubles, d quadruples­)

(KE= ½ mv2; note how E is not conserved because KE rises exponentially as speeds double, triple, and so on…)

1. Be able to apply the ***law of conservation of E*** to word problems and examples. Remember, you cannot get something from nothing--E for something (eg, work, "go", etc.) must come from somewhere.
2. For an object that has PEgravitational: PE is transformed into KE as the object falls (whether free falling or pendulum) so that: 1. PE is max at top; KE = 0 (rest)

2. KE is max at bottom; PE = 0 (object moves fastest just before it hits ground)

3. Between top & bottom: PE & KE add up to max & represent portions of their descent (eg. halfway they are equal)

11. Energy sources: See most as solar (even indirect sources such as wind, water, wood, coal, petroleum, natural gas; the rest are nuclear (nuclear fuel, geothermal).

12. Basic fuel efficiency of a car: 35% cooling losses (heat); 35% exhaust (heat); 30% "go"

13. Lever classes (1,2,3) ; Acronym: FLE ~ '**FL**orida **E**ducation'; determined by which is in the middle *fulcrum* (f), load (l), effort (e); "*If the fulcrum is in the middle, class 1; If the load is in the middle, class 2; If the effort is in the middle, class 3."*

14. Classify pictured objects (examples of levers) appropriately.

15. Free response calculations similar to multiple choice.

