WEP Practice Test (Pre-AP Physics) Name:_____

Short Answer (18 pts.)

1. The Conservation of Energy says…(at least one form please)

The total amount of energy at any time is the same as at any other time.

2. Work changes energy.

3. We discussed a form of potential energy in class—namely gravitational potential energy. For PE_g to be considered in solving an energy problem, what must change about an object?

elevation

4. In the lab we did to find the power of a person, how did we find the amount of work the person did by climbing the stairs? (Don't give an equation. What principle did we use?)

Work equalled the gravitational energy change

5. As your physics teacher drops a bowling ball on the floor, the ball's potential energy transforms into kinetic energy until all of it is transformed into kinetic energy right before it hits. What happens to this kinetic energy when the ball hits the floor? (Name at least two things.)

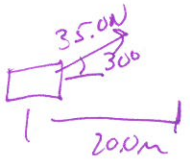
→ transforms into acoustic & thermal energy

6. Work/Energy is measured in Joules Power is measured in Watts (J/s)

Force is measured in Newtons Mass is measured in kilograms

Puzzles (Answer the following using ideas of work, energy, and power. 16, 18, 16, 16, 16 pts.)

7. As you are moving into your dorm room at college your little brother uses a rope to tug a small wagon of belongings along the hallway floor. If he tugs with a force of 35.0 N at an angle of 30.0 degrees above the horizontal for a distance of 20.0 m, calculate the work he does.



* $W = F x \cos\theta$

$W = (35.0N)(20.0m)(\cos 30°)$

$1050 Nm \cdot .866... = 909.32667$

Ans: 909 J

8. A 1.20×10^3 kg car, starting from rest, accelerates for 5.00 seconds. The magnitude of the acceleration is 4.60 m/s^2. Determine the final speed of the car, the change in the car's energy, and the power generated by the car's engine.

a) * $a = \frac{v_f - v_0}{t}$

$v_f = v_0 + at$

$v_f = 0 + \left(4.60 \frac{m}{s^2}\right)(5.00 s)$

$v_f = 23.0 m/s$

b) $\Delta K = K_f - K_i$

* $= \frac{1}{2} m v_f^2 - \frac{1}{2} m v_i^2$ (0)

$= \frac{1}{2}(1200kg)(23)^2$

317,400 J

c) * $P = \frac{\Delta E}{t}$

$= \frac{317,400 J}{5 s}$

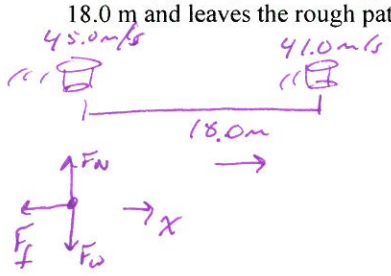
63,480

Ans: 23.0 m/s

Ans: 317,000 J

Ans: 63,500 W

10. A hockey puck (m = 0.162 kg) with an initial velocity of 45.0 m/s slides across some rough ice for a distance of 18.0 m and leaves the rough patch with a speed of 41.0 m/s. Find the force of friction that acted on the puck.



$* W = \Delta E$

$W = \Delta KE = KE_f - KE_i$

$F x \cos\theta = \frac{1}{2} m v_f^2 - \frac{1}{2} m v_i^2$

$F_f (18\text{m}) \cos 180^\circ = \frac{1}{2}(.162\text{kg})(41\text{m/s})^2 - \frac{1}{2}(.162\text{kg})(45\text{m/s})^2$

$-18 F_f = 131.161 - 164.025$

$-18 F_f = -27.864$

$F_f = \frac{-27.864}{-18}$

1.548

Ans: 1.55 N

11. Imagine that a bullet with a mass of 6.0×10^{-3} kg leaves a rifle at 320 m/s and experiences an average air drag force of 1.2×10^{-3} N. How high can the bullet rise if fired straight up?

$* W = \Delta E = E_f - E_i$

$W = (KE_f + PE_{gf}) - (KE_i + PE_{gi})$ ($KE_f \to 0$)

v_f at top $= 0$

h_i at bottom $= 0$

$F x \cos\theta = mgh_f - \frac{1}{2} m v_i^2$ $\quad x = h_f$

$(1.2E^{-3})(x)\cos 180^\circ = (6E^{-3})(9.8)(x) - \frac{1}{2}(6E^{-3})(320)^2$

$-1.2E^{-3}x = .0588x - 307.2$

$-.0012x = .0588x - 307.2$

$-.0588x \quad -.0588x$

$\frac{-.06x}{-.06} = \frac{-307.2}{-.06}$

$x = 5120\text{m}$

Ans: 5100 m

12. You throw something at 5.0 m/sec, and it hits the ground at 9.0 m/sec. How far above ground level are you?

$E_i = E_f$

$* KE_i + PE_{gi} = KE_f + PE_{gf}$

$\frac{1}{2} m v_i^2 + mgh_i = \frac{1}{2} m v_f^2 + mgh_f$

$\frac{1}{2}(5)^2 + 9.8(h_i) = \frac{1}{2}(9)^2 + 9.8(0)$

$12.5 + 9.8h_i = 40.5$

$-12.5 \qquad -12.5$

$9.8h_i = 28$

$\frac{9.8h_i}{9.8} = \frac{28}{9.8}$

2.8571

Ans: 2.9 m