Physics 11 Unit 3 Energy Year end Review sheet

Name: _____

- $KE = E_K = \frac{1}{2} mv^2$
- $PE = E_p = mgh$
- $W = F\,d$
- $P = W/t$
- $E_i = E_f$
- Eff = useful/total

- Total cost = # of kilowatt hours x cost per kilowatt hour

1. How much power does it take to lift a 57 kg box up 1.4 m in 1.5 seconds.

$$P = \frac{W}{t} = \frac{(57)(9.8)(1.4)}{1.5} = 521 \text{ Watts}$$

2. How much useful power does a 1200 W motor produce if it is 60% efficient?

useful power = total x eff

$= 1200 \times .6 = 720$ Watts

3. What is the KE of a 1150 kg car travelling at 25 m/s?

$$KE = \frac{1}{2} mv^2 = (.5)(1150)(25)^2 = 359{,}375 \text{ Joules}$$

4. How much energy in Joules does a 100 W bulb use in 3 hours? $= 10{,}800$ sec

$E = \text{Power} \times \text{time} = 100 \times 10{,}800 = 10{,}800{,}000$ J.

10.8 MJ

5. How many kilowatts is 2000 W?

2 KWatts.

6. How many kilowatts is 60 W?

$\frac{60}{1000} = .06$ KWatts

7. How many kilowatt hours of energy does a 60 W light bulb use in 8 hours?

.06 KW x 8 hours = 0.48 Kw hours.

8. If you use your 1600 W toaster 30 mins a day, how many kilowatt hours of energy does it use in a month? If you pay 7 cents for a kilowatt hour of energy, how much does it cost to run your toaster?

1.6 KWatts x 15 hours = 24 KW hours

time = (.5) x 30 days = 15 hours

x 7¢ = $1.68

9. How much does it cost to leave the front porch light on each night for a month. Assume a four 13 watt bulbs, 8 hours a night, 30 days, and 7 cents per kilowatt hour.

52W = .052 KW

240 hrs.

.052 KW x 240 hrs = 12.48 KW hr

x 7¢ = $0.87

10. A 1500 kg car starts rolling (from rest) down a 16 m high hill. Assuming no energy is lost on the way down, how fast is the car going at the bottom?

$$E_i = E_f$$

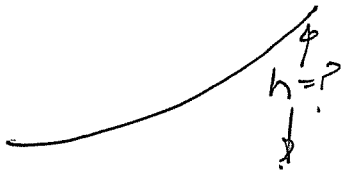
$$PE = KE$$

$$(1500)(9.8)(16) = \tfrac{1}{2}(1500)(V)^2$$

$$V = 17.7 \text{ m/s}$$

11. A 2800 kg car travelling at 120 km/hr approaches a hill and rolls to the top. During the journey to the top, 900,000 J of energy are converted to heat. How far up the hill does the car roll?

$33.\overline{3}$ m/s.



$$KE_i = PE_f + \text{Heat}$$

$$\left(\tfrac{1}{2}\right)(2800)(33.\overline{3})^2 = (2800)(9.8)(h) + 900{,}000$$

$$h = 23.9 \text{ m}$$

12. How much energy is needed to raise the temp of a 56.8 Kg of water by 15 C

$$E = mc\Delta T$$

$$= (56.8)(4200)(15)$$

$$= 3{,}578{,}400 \text{ J}$$