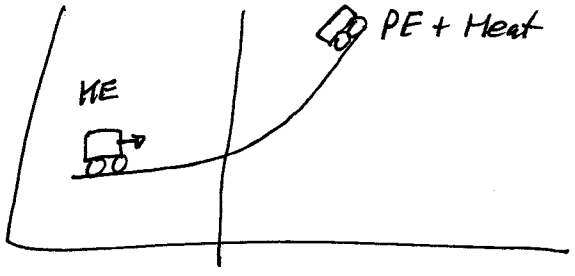
Physics 11 Unit 3 Energy Worksheet #3

Name: _____ Date: _____

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

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

1. A 3500 kg car travelling at 120 km/hr → 33.3 m/s approaches a hill and rolls to the top. During the journey to the top, 800,000 J of energy are converted to heat. How far up the hill does the car roll?



$E_i = E_f$

$KE_i = PE_i + Heat.$

$\frac{1}{2}(3500)(33.\overline{3})^2 = (3500)(9.8)h + 800{,}000$

$1{,}144{,}440 = 34{,}300h$

$h = 33.4\,m$

2. How much energy in Joules does a 100 W bulb use in 3 hours? 3600 x 3 = 10,800 sec.

$P = \frac{W}{T}$ $\quad W = P \cdot T = (100\,W)(10{,}800\,sec).$

$W = 1{,}080{,}000$ JOULES

3. How many kilowatts is 2000 W? → 1 Kilowatt = 1000 WATTS.

$2000 \div 1000 = 2\,KW$

4. How many kilowatts is 60 W?

$60 \div 1000 = .06\,KW$

5. How many kilowatt hours of energy does a 100 W light bulb use in 5 hours?

$100 \div 1000 = 0.1$ KW

$0.1\ KW \times 5\ hour = 0.5\ Kwhr$

6. If you use your 1800 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?

$1800 \div 1000 = 1.8$ KW

$30 = 0.5\ hours/day \times 30\ days = 15\ hours$

① How many Kwhr? $1.8\ KW \times 15\ hours = 27\ Kwhr.$

② Total cost = Kwhr × cost/Kwhr = $27\ Kwhr \times 7¢ = \$1.89$

7. How much does it cost to leave the front porch light on each night for a month. Assume a 60 watt bulb, 8 hours a night, 30 days.

0.06 KW

$8 \times 30 = 240\ hours.$

① $0.06\ KW \times 240\ hr = 14.4\ Kwhr$

② $Cost = 14.4\ Kwhr \times 7¢/Kwhr = \$1.01$

8. How much useful work will a 240 W motor due in 5 mins if it is 33 % efficient? How high could this motor lift a 70 kg human in that 5 mins?

Useful power $= 240 \times .33 = 79.2$ W

300 sec

① $W = P \cdot t = (79.2)(300) = 23{,}760$ Joules

② $W = F \cdot h.$ $\quad h = \frac{W}{F} = \frac{23{,}760}{686} = 34.6m.$

$F_g = 686N$