Name:

Date:

Power

Part 1: Concepts:

1. Take a sampling of a few of the objects that are used on a daily basis and complete the chart given below:

Device	Voltage	Current	Power	Hours used per day	Cost per day	Cost per Month

Part 2: Practice Problems:

MB Hydro rates 7.183¢

2. A basement light has a power of 75 W. How much money does it cost to run the light bulb for a year if you have it on for 10 minutes a day. What is the current drawn by the bulb?

$$\frac{75}{1000}\left(\frac{10}{60}\right)365 \times \$.07183 = \$0.33$$

$P = IV$

$75 = I(120)$ $\quad I = 0.625\ A$

3. Dancing Santa draws a current of 150 mA. What is Santa's power and how much does it cost to run him for 1 hour a day for the 12 days leading up to x-Mas?

$P = IV = (.150)(120) = 18\ W$

$$\text{Cost} = \left(\frac{18}{1000}\right)(1)12 \times \$.07183 = \$0.02$$

(4.) $P = IV$ $\quad P = \frac{W}{t}$ (Work is Energy)

$= (11)(120)$ $\quad 1320 = \frac{E}{10(60)}$

$= 1320\ W$

$E = 7.92 \times 10^5\ J$

(5) $E_k = \frac{1}{2} m v^2 = \frac{1}{2}(.225\ kg)(5)^2 = 2.8125\ J$

$P = \frac{E}{t} = \frac{2.8125\ J}{8s} = 0.352\ W$

$P = IV$

$.352 = I(4 \times 1.5\ V)$

$I = 0.059\ A$

(7) Assuming the "one time use" batteries last just as long as the rechargables (not quite true)

$2.99(500) = \$1495 - \$19.63 = \$1475.37$

This ignores the cost of recharging them. Assuming it takes 15 min with a current of 2000 mA to charge the batteries.

$P = (2000 \times 10^{-3}\ A)(120) = 240\ W$

Cost to recharge $= \left(\frac{240\ W}{1000}\right)\left(\frac{15\ min}{60}\right) 500 \times .07183 = \$2.15$

So total savings $1475.37 - 2.15 = \$1473.22$

(8) $\frac{6 \text{ hours}}{\text{day}} \times \frac{365 \text{ days}}{\text{year}} \times 10 \text{ years} = 21\,900 \text{ Hours}$

	Lamp 1	Lamp 2
Initial Cost	$22	$99
Number of bulbs	$\frac{21900}{1500} = 15$	$\frac{21900}{10000} = 3$
Cost of bulbs	$14 \times 5.97 = \$83.58$ (1 Free)	$3 \times 12.62 = \$37.86$
Cost of electricity	$\left(\frac{300W}{1000}\right) 21900 \times .07183 = \$471.92$	$\left(\frac{27W}{1000}\right) 21900 \times .07183 = \$42.47$
Total Cost	$577.50	$179.33