Name: _____

Date: _____

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Calculating Energy Cost

Use these two equations to solve the following problems:

- **Electricity consumption** (in kWh) = **Power** (in kW) x **Number of hours of use (in hours)**
- **Electricity cost** (in $) = **consumption** (in kWh) x $0.09/kWh

Don't forget to convert your units BEFORE solving the problems (watt into kilowatts, minutes into hours, etc.)

1,000 W = 1 kW

60 minutes = 1 h

Q1 Martin has an 1,200-W hair dryer.
**If he uses it one hour a week, how much energy (kWh)
will he use in one year (52 weeks)?**

Calculation:

1) Unit conversion / **2**

$$\frac{1,200 \text{ W}}{1,000} = 1.2 \text{ kW}$$

$$\frac{1 \text{ hour}}{\text{week}} \times 52 \text{ weeks} = 52 \text{ hours}$$

2) Annual consumption calculation / **2**

Consumption (kWh) = Power (kW) X Number of hours (h)

Consumption (kWh) = 1.2 kW X 52 hours

Consumption (kWh) = 62.4 kWh

Answer: _____62.4 kWh_____ / **1**

/ **5**

Q2 On a rainy day, Judith uses her computer for 3 hours and 30 minutes.
If the computer has a power of 0.28 kW, how much energy (kWh) did it use that day?

Calculation:

1) Unit conversion / 2

$$\frac{30 \text{ minutes}}{60 \text{ minutes}} = 0.5 \text{ h}$$

Total time: 3.5 h

2) Consumption calculation / 2
Consumption (kWh) = Power (kW) X Number of hours (h)
Consumption (kWh) = 0.28 kW X 3.5 hours
Consumption (kWh) = 0.98 kWh

Answer: ___*0.98 kWh*___ / 1

/ 5

Q3 On Christmas, Peter roasted a turkey in a 2,000-W oven for four hours.
If every kilowatthour costs $0.09, how much did it cost to cook the turkey?

Calculation:

1) Unit conversion

$$\frac{2,000 \text{ W}}{1,000} = 2 \text{ kW}$$ / 1

2) Consumption calculation
Consumption (kWh) = Power (kW) X Number of hours (h) / 2
Consumption (kWh) = 2 kW X 4 hours
Consumption (kWh) = 8 kWh

3) Cost calculation
Cost ($) = Consumption (kWh) x Cost per kilowatthour ($/kWh) / 2
Cost ($) = 8 kWh x $0.09/kWh
Cost ($) = $0.72

Answer: ___*$0.72*___ / 1

/ 6

Q4 Laura wants to make a cup of tea, which involves boiling water using a kettle that has a power of 1.5 kW. The kettle will be on for three minutes.
How much energy (kWh) will Laura use?

Calculation:

1) Unit conversion / 1

$$\frac{3\ minutes}{60\ minutes} = 0.05\ h$$

2) Consumption calculation / 2

Consumption (kWh) = Power (kW) X Number of hours (h)

Consumption (kWh) = 1.5 kW X 0.05 hour

Consumption (kWh) = 0.075 kWh

Answer: ___0.075 kWh___ / 1

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Q5 To save money, Carl has decided to change some of the light bulbs in his house. He will replace five incandescent bulbs, at 100 W each (for a total of 500 W), with LED bulbs, at 12 W each (total of 60 W). He uses all these bulbs 1,000 hours a year.

To help Carl calculate his annual savings ($), answer the following questions.

a) What is the cost of using the five 100-W incandescent bulbs (totaling 500 W) for one year if he pays $0.09/kWh?

Calculation:

1) Unit conversion / 1

$$\frac{500\ W}{1,000} = 0.5\ kW$$

2) Annual consumption calculation / 1

Annual Consumption (kWh) = Power (kW) x Number of hours (h) per year

Annual Consumption (kWh) = 0.5 kW x 1,000 hours

Annual Consumption (kWh) = 500 kWh

3) Annual cost calculation / 2

Cost ($) = Annual consumption (kWh) x Cost per kilowatthour ($/kWh)

Cost ($) = 500 kWh x $0.09 /kWh

Cost ($) = $45

Answer: ___$45___

b) How much will it cost to use the five LED bulbs (12 W each, for a total of 60 W) for one year if he pays $0.09/kWh?

Calculation:

1) Unit conversion

$$\frac{60\ W}{1{,}000} = 0.06\ kW$$

/ 1

2) Annual consumption calculation

Annual Consumption (kWh) = Power (kW) x Number of hours (h) per year

Annual Consumption (kWh) = 0.06 kW x 1,000 hours

Annual Consumption (kWh) = 60 kWh

/ 1

3) Annual cost calculation

Cost ($) = Annual consumption (kWh) x Cost per kilowatthour ($/kWh)

Cost ($) = 60 kWh x $0.09 /kWh

Cost ($) = $5.40

/ 2

Answer: _____ *$5.40* _____

c) What is the cost difference between using five 100-W bulbs and using five 12-W bulbs for one year? The result is the amount of money saved ($).

Calculation:

Savings = Before Cost (100 W) - After Cost (12 W)

Savings = $45 - $5.40

Savings = $39.60

/ 2

Answer: _____ *$39.60* _____

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