KILOWATTS TO DOLLARS

Saving energy not only helps minimize our impact on the environment, it also helps save money! In this activity, you're going to do some simple calculations to show the dollar impact of making energy-efficient upgrades and choices.

CURRENT RATES (RESIDENTIAL)	
Natural gas: 20.55¢/m^3	Electricity: 9.324¢/kWh

Note: Taxes and other charges are added on top of these prices, so the money savings we'll calculate would likely be even more in real life!

Note: The natural gas rate used for this exercise assumes 100% of gas comes from a primary (rather than supplemental source) and includes transportation and distribution costs.

QUESTION 1

Let's say you have a freezer in your garage that's plugged in year-round but only really used in the summer for freezies and popsicles. This old freezer uses a whopping 1,200 kWh per year! How much money can you save annually by unplugging your freezer and removing it from your home?

Hint: For this question (and every other question), you'll need to convert the electricity rate noted above to dollars per kilowatt-hour, or $/kWh).

QUESTION 2

Your family has decided to upgrade your old kitchen fridge to a new ENERGY STAR® certified model. Your old fridge used 1,450 kWh per year while the new energy-efficient fridge, which cost $1,400 to purchase, uses 430 kWh per year.

a) How much electricity will your family save every year?

b) How much money will your family save on their energy bills each year?

c) How many years will it take for this new fridge to pay for itself based on the energy savings alone?

QUESTION 3

Did you know that the average gaming system, when left idle (i.e. in standby mode), uses 90 watts of power? For this question, let's assume your gaming system is left idle for 20 hours per day.

a) How much electricity would your gaming system use per day (in kWh)?

   i. **Note: 1000 watts (W) = 1 kW (kilowatt)**

b) How much electricity would your gaming system use per year?

c) How much would it cost per year to leave your gaming system in standby mode?

QUESTION 4

A home has 20 light bulbs: 13 are incandescent bulbs and seven are CFL bulbs. The incandescent bulbs are used for four hours per day, and the CFL bulbs are used for seven hours per day. The homeowner decides to upgrade all 20 of these bulbs to LEDs.

The following chart shows how much power (in watts) each type of bulb uses:

TYPE OF BULB	POWER RATING
Incandescent	60 watts
CFL	13 watts
LED	9 watts

a) How much electricity do the 13 incandescent bulbs use per year?

b) How much electricity do the seven CFL bulbs use per year?

c) How much electricity do all 20 bulbs use per year?

d) Let's say the 13 incandescent bulbs have now been replaced with LED bulbs. How much electricity would these LED bulbs use per year?

e) The seven CFL bulbs have also been replaced with LED bulbs. How much electricity would these LED bulbs use per year?

f) How much electricity would all 20 LED bulbs use per year?

g) How much electricity would be saved per year by upgrading the 13 incandescent bulbs and seven CFL bulbs to LED bulbs?

h) How much money would be saved per year on energy bills?

QUESTION 5

When you conducted the review of your home, you measured the flow rate of your showerhead. You also collected data about your home's shower usage, including the number of showers taken by your household per week and the average length of everyone's showers. We're going to use that data in this exercise.

Assume your family decides to upgrade your existing showerhead to one that uses only 5.7 litres per minute.

a) How many LPM would your family save by making this upgrade?

b) How many showers does your family take per year?

c) What's the average amount of time your showerhead is being used each year?

d) How much water can you save per year by making this change?

e) Using the following formula, determine how much energy you'll save by upgrading your showerhead. If you have a natural gas water heater, multiply your result by 0.12 to determine the cubic metres you'll save.

Energy saved (kWh) = Litres of water saved * 30°C * 0.00116 kWh/L·°C

Where:

- Litres of water saved = the result you got in part D
- °C = an assumed average difference between the temperature of the water coming into your home (approximately 10°C) and the temperature of your shower water (approximately 40°C).
- 0.00116 kWh/L·°C = a constant that expresses the amount of energy required to heat water by 1°C