Lights Out at Home Challenge - Activity Guide

Purpose:
Experiment with electricity conservation to find out how much of a difference it makes to change our energy-use habits both at school and at home.

Instructions:
Hold a discussion during class time about the importance of turning off unnecessary lights. Energy saving habits don't need to change when you get home from school. Hold a competition to see who can save the most energy! Participants will go home and turn off as many unnecessary lights as possible without impacting their daily activities. Students can track the information on the worksheet. To calculate energy savings, we will look at a) how many light bulbs were turned off, b) how long each light was off, and c) how many watt-hours each light bulb has then saved. Remember to check how many watts are used by each light bulb! With that information you can calculate how much money has been saved.

First the students should collect the information, and then calculate the energy savings:

_____ number of lightbulbs x 40 W x _____ number of hours off = _____Wh

_____ number of lightbulbs x 60 W x _____ number of hours off = _____Wh

_____ number of lightbulbs x 100 W x _____ number of hours off = _____Wh

_____ number of lightbulbs x ____ W x _____ number of hours off = _____Wh

_____Wh TOTAL divided by 1000 W/kWh = _____kWh TOTAL SAVED

_____kWh x $0.15/kWh = $_____ SAVINGS!

The next day, the students can report their findings to the group and compare their 'lights out' savings. The person who has saved the most money wins the challenge.

This activity can be run multiple days in a row to see if savings change over one week, or simply use this activity for a single night.

Lights Out at Home Challenge - Worksheet

1. How many light bulbs did you turn off? List them by number of watts they consume: 40W, 50W, 60W, 100W, or specify other. Remember to be safe and use gloves if you are handling light bulbs.

40W _____ 100W _____

50W _____ Other W _____

60W _____ Other W _____

2. How many hours was each light bulb turned off? Add up the hours for each watt type.

40W _____ hours 100W _____ hours

50W _____ hours Other W _____ hours

60W _____ hours Other W _____ hours

3. How many watt hours (Wh) have been saved in total?

_____ number of lightbulbs x _____W x _____ number of hours off = _____Wh

_____ number of lightbulbs x _____W x _____ number of hours off = _____Wh

_____ number of lightbulbs x _____W x _____ number of hours off = _____Wh

Total _____Wh divided by 1000 Wh/kWh = _____kWh

_____kWh x $0.15/kWh = $_____ saved/day

4. Try the calculation to see how much your new energy-saving habit can save over a whole YEAR:

$_____saved/day x 365 days/year = $_____saved/year

Lights Out at Home Challenge: Example

How many 40W, 50W, 60W, 100W, or other wattage light bulbs did you turn off?

40W _____2 light bulbs____

50W _____

60W _____3 light bulbs___

100W _____

Other W _____

Other W _____

How many hours was each light bulb turned off? (total for each watt type)

Example:
One day John turned off three 60W light bulbs and two 40W light bulbs. Three 60W light bulbs were turned off for five hours and two 40W light bulbs were turned off for six hours.

How many hours were the light bulbs off?

40W _____6 hours_____

50W _____

60W _____5 hours_____

100W _____

Other W _____

Other W _____

How many watt hours (Wh) have been saved in total?

3 light bulbs x 60 W x 5 hours = 900 Wh

2 light bulbs x 40 W x 6 hours = 480 Wh

900 Wh + 480 Wh = 1,380 Wh in total

Now, lets calculate the savings:

Example:

1,380 Wh / 1000 = 1.38 kWh

1.38 kWh and $0.15/kWh = $0.21/per day

Try the calculation over a YEAR:

$0.21 x 360 days = $75.60

CURRICULUM LINKS SUMMARY

Grade 7 Mathematics
SCO N02: Students will be expected to demonstrate an understanding of the addition, subtraction, multiplication, and division of decimals to solve problems (for more than one-digit divisors or more than two-digit multipliers, the use of technology is expected).

- **B14** solve and pose problems that utilize addition, subtraction, multiplication, and division of integers
- **D3** develop and use rate as a tool for solving indirect measurement problems in a variety of contexts

Grade 7 Science
GCO 1: Students will develop an understanding of the nature of science and technology, of the relationships between science and technology, and of the social and environmental contexts of science and technology.

Grade 8 Mathematics
N04 Students will be expected to demonstrate an understanding of ratio and rate.
N07 Students will be expected to demonstrate an understanding of multiplication and division of integers, concretely, pictorially, and symbolically.

Grade 9 Mathematics
Students are expected to communicate in order to learn and express their understanding of mathematics (Communication [C])

- Connect mathematical ideas to other concepts in mathematics, to everyday experiences, and to other disciplines (Connections [CN])

GCO: Students will demonstrate operation sense and apply operation principles and procedures in both numeric and algebraic situations.

- **B1** model, solve, and create problems involving real numbers.
- **B2** add, subtract, multiply, and divide rational numbers in fractional and decimal forms using the most appropriate methods

Grade 9 Science: Use of Electrical Energy

- Relate electrical energy to domestic power consumption costs: Watt as a unit of power (1W = 1J/s) (308-18)
- Make informed decisions and propose a course of action on science, technology, and social issues, including human and environmental needs for electricity and energy (113-9, 113-13)

Grade 10 Mathematics: Performance Indicators

- **N01.01** Compare the unit price of two or more given items.
- **N01.02** Solve problems that involve determining the best buy, and explain the choice in terms of the cost as well as other factors, such as quality and quantity.

Grade 11 Mathematics: Performance Indicators

- **A03** Students will be expected to solve problems by applying proportional reasoning and unit analysis.
- **A03.01** Explain the process of unit analysis used to solve a problem (e.g., given km/h and time in hours, determine how many kilometers; given revolutions per minute, determine the number of seconds per revolution).
- **A03.02** Solve a problem, using unit analysis.
- **A03.03** Explain, using an example, how unit analysis and proportional reasoning are related (e.g., to change kmh to km/min., multiply by 1 h/60 min because hours and minutes are proportional [constant relationship]).
- **A03.04** Solve a problem within and between systems using proportions or tables (e.g., km to m or km/h to ft/sec).