

# PRICE COMPARISON ACTIVITY- GUIDE



Moving forward lets account for the cost of purchasing efficient light bulbs and their **payback**, also known as a **return on investment**.

Return on investment in this case is when the energy savings found on your power bill equal the amount you paid for your bulbs. Let's do a **price comparison** for incandescent bulbs, CFLs and LEDs.

You have 12 sockets in your home that need to be filled with light bulbs to last 10,000 hours.

You can purchase a 24 pack of 60W incandescent bulbs for \$11.87 (or \$0.50 a bulb).

$$\$0.50 \times 12 = \$6.00$$

However, incandescent bulbs only last 1,000 hours on average. Yet, we need our bulbs to last 10,000 hours which means the bulbs will be replaced.

$$10,000 \text{ h} / 1,000 \text{ h} = 10$$
$$\$6.00 \times 10 = \$60.00$$

You can purchase an 8 pack of 23W CFLs for \$14.98 (or \$1.87 a bulb).

$$\$1.87 \times 12 = \$22.44$$

However, CFLs last 4,000 hours on average, but again, we need to 10,000-hour life span, meaning yet again bulbs will be replaced.

$$10,000 \text{ h} / 4,000 \text{ h} = 2.5$$
$$\$22.44 \times 2.5 = \$56.10$$

You can also purchase a single 8.5W LED for \$7.47.

$$\$7.50 \times 12 = \$90.00$$

However, LEDs have an average lifespan of 25,000 hours.

$$10,000 \text{ h} / 25,000 \text{ h} = 0.4$$
$$\$90.00 \times 0.4 = \$36.00$$

This means that to fill 12 sockets in your home for 10,000 hours you would spend **\$60.00** for incandescent bulbs, **\$56.17** for CFLs, and **\$36.00** for LEDs.

Now, lets add in the energy consumption costs!

We need to run 12 bulbs for 10,000 hours making our total consumption 120,000 hours.

$$60W \times 12bulb \times 10,000h = 7,200,000Wh$$
$$7,200,000Wh / 1000 = 7,200 kWh$$

A 60W incandescent will use 7,200 kWh of energy over 120,000 hours.

With our energy price of \$0.148/kWh we get:

$$7,200 kWh \times \$0.148 = \$1065.60$$

To run 23W CFLS for 120,000 hours, 1,560kWh will be consumed.

$$23W \times 120,000 h = 2,760,000Wh$$
$$2,760,000Wh / 1000 = 2,760kWh$$

With our energy price of \$0.148/kWh we get:

$$2,760kWh \times \$0.148 = \$408.48$$

To run 8.5W LEDs for 120,000 hours, 1,020 kWh will be consumed.

$$8.5W \times 120,000 h = 1,020,000Wh$$
$$1,020,000Wh / 1000 = 1,020kWh$$

With out price of energy at \$0.148/kWh we get:

$$1,020kWh \times \$0.148/kWh = \$150.96$$

Let's total it all up!

	Incandescent	CFL	LED
Purchase Cost (for 10,000 hours of use)	\$60.00	\$56.10	\$36.00
Usage	\$1065.60	\$408.48	\$150.96
<b>TOTAL</b>	<b>\$1,125.60</b>	<b>\$464.58</b>	<b>\$186.96</b>

So as we can see, although per bulb, LEDs may be more expensive to purchase, their energy efficiency and their payback actually make them the cheapest, and cleanest option in terms of electricity consumption.

## CURRICULUM LINKS

### 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.
- **N01.03** Compare, using examples, different sales promotion techniques.
- **N01.04** Determine the percent increase or decrease for a given original and new price.

### 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 kmh and time in hours, determine how many kilometres; 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  $1\text{ h}/60\text{ min.}$  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 kmh to ft./sec.).

### Grade 12 Mathematics

- **N03.03** Generate options that might improve the profitability of a small business