

## Lighting for Smarties

### USING ENERGY-EFFICIENT LIGHTING

#### *A note to teachers:*

*In order to ensure that future generations also have the power to live, it is important for children of all ages to learn about energy efficiency-starting right now-with lighting.*

*This teaching guide, full of educational activities for you to use in order to get young people interested, involved and thinking, complements the brochure,*

#### **Lighting for Smarties.**

*These ideas and activities can stand-alone or can enhance a K-8 curricula. Our goal is for you and your students to have fun while learning about an important matter.*

*Good luck and thanks for caring!*

LA-Language Arts

MA-Math

SC-Science

PJ-Project

HC-Home Connection

AN-Answers

## PRIMARY GRADES

LA-How many of each vowel can students identify in the title (or on the cover)?

*(Title-a=1, e=1, i=3, o=1, u=0)*

*Cover-a=1, e=5, I=8, o=1, u=1)*

LA-How many syllables do students hear in the title? Clap it out. *(5 syllables)*

LA-Have students unscramble the following words: ltgih (*light*), rceyrmu (*mercury*), gryene (*energy*), cifetnfei (*efficient*), ripeg (*price*), opctacm (*compact*), ssnsoer (*sensors*).

MA-Have students number the pages of the brochure.

PJ-Students draw a picture of a sheep properly disposing of a CFL in one of the ways suggested on the last page.

PJ-Students identify the colors in the brochure.

## TEACHING ENERGY SOLUTIONS TO CHILDREN

HC-Students count how many light bulbs are used in their homes. How many are CFLs? How many are incandescent bulbs?

## INTERMEDIATE-MIDDLE SCHOOL

LA-Before reading the brochure, create a KWL on chart paper to guide future lessons. Update the chart after reading brochure.

Lighting for Smarties		
K	W	L
WHAT	WHAT	WHAT
DO	DO	HAVE
I	I	I
KNOW?	WANT	LEARNED?
	TO	
	KNOW?	

LA-Copy brochure. Cut headlines from paragraphs and place a pile of each in separate envelopes. Students work individually or in small groups to match the headlines to the correct paragraphs.

LA-Students rewrite facts so they are opinions. *(In my opinion, I believe, Some people say, It is believed, etc.)*

LA-Copy paragraphs, white out the colored-bold words. Students work together to figure out, and come up with similar (or exact) words that have the same meaning of the missing word (s).

SC -Discussion. What would life be like if the light bulb were never invented?

MA- Students count the total number of incandescent light bulbs used in their homes. If they switched to CFLs, how many incandescent bulbs would they NOT have to purchase over the life each CFL? How many would they NOT have to purchase for the entire house?

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#### INTERMEDIATE-MIDDLE SCHOOL

**MA**-According to the Department of Energy, on average, we spend 5-10% of our electric bill on lighting. How much would a family spend on lighting if their total electric bill was:

- \$1,200.00 (*\$60.00-\$120.00*)
- \$ 960.00 (*\$48.00-\$96.00*)
- \$1,630.00 (*\$81.50-\$163.00*)
- \$2,250.00 (*\$112.50-\$225.00*)

**MA**-Students transfer the information in the “Equivalency Guide In Watts” (pgs 3-4) to a different format (bar graph with side-by-side comparison or a plot graph).

**SC**-Use the brochure as a tie-in to a science unit.

**HC**-Students write a letter to their parents asking them to read the brochure. In the letter, students include 3 important details that they have learned from reading the brochure.

**PJ**-Students pretend they are Mayor of Smart-Town, USA. The Mayor knows that residents will save money in the long run by using CFLs, but the people of Smart-Town love incandescent lighting! How can the Mayor convince the people that using CFLs would be good for:

- the economy (*people spend less on lighting and more on fun things in town, for example shop more*),
- their wallets (*sure they'll pay more initially for the CFL, but it saves them more money over the life of the bulb because they don't have to buy more incandescent bulbs*),
- the environment (*CFLs use less energy to operate, so less electricity needs to be produced at the power plant*).

*Answers will vary.*

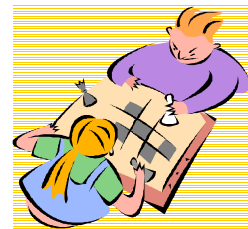
## TEACHING ENERGY SOLUTIONS TO CHILDREN

**PJ**-Students create their own game, TRUE OR FALSE, using brochure information.

### Lighting for Smarties

#### GAME RULES

1. Students highlight key facts and concepts detailed throughout the brochure.
2. On 10 index cards or business card sheets, students write brochure facts as is OR they rewrite them so they're false.
3. The correct response (True/False) is written in small print on the backside.
4. Students verify accuracy of each other's statements by switching cards with each other.
5. All cards can be placed in a deck to be used as a center or they can be copied and distributed for students to take home and play with parents.



## Lighting for Smarties

### USING ENERGY-EFFICIENT LIGHTING

#### INTERMEDIATE-MIDDLE SCHOOL

**LA**-Students write 3 questions not answered in the brochure and switch with another student. Each student researches answers to given questions and then meet in small groups to discuss responses.

**LA**-Students research the reasons for the low use of CFLs by the general population. What can be done to persuade more people to use CFLs?

**LA**-Students select another animal or character for the brochure. Explain your choice and write new headings to go along with it.

**MA/HC** -Using a calendar (week or month), students record how many lights in their homes are on for 3 hours or more at a time every day. Students then calculate the amount of money their parents could save if they switched to CFLs.

**PJ**-Experiment with lumen output. Bring in light bulbs that have the same wattage but different lumen output and discuss differences noticed in color and brilliance.

Websites worth surfing for more information...

[www.energystar.gov](http://www.energystar.gov)  
[www.brainpop.com](http://www.brainpop.com)  
[www.doe.gov](http://www.doe.gov)  
[www.panasonic.com](http://www.panasonic.com)  
[www.thereslink.com](http://www.thereslink.com)

## TEACHING ENERGY SOLUTIONS TO CHILDREN

**PJ**-Students write and act out their own public service announcement for the school website and local television stations.



### Lighting for Smarties using energy-efficient lighting

STUDENTS' MESSAGES COULD INCLUDE ALL-  
OR SOME - OF THE FOLLOWING  
INFORMATION:

- At least 3 ways that people save money with energy efficient lighting
- Key information about using CFLs and how they have improved
- Motion sensors, timers, photocells
- Proper disposal of CFLs

Students' messages can be heard on local television and radio stations. Students establish creative guidelines, but should include:

Technology  
Art Design  
Language Arts  
Science

What's your **slogan** going to be?

NAME: \_\_\_\_\_

DIRECTIONS: CIRCLE YOUR ANSWERS.

1. Monique has three lamps in her home that have compact fluorescent light bulbs (CFL) in them. If Pam wanted to change all three lamps to incandescent light bulbs instead, about how many would she have to buy over the life of the 3 CFLs?
  - a. 15
  - b. 30
  - c. 22
  - d. 3
2. John is trying to convince his mother that using CFLs instead of regular incandescent bulbs is better for the environment and would save her money. Which of the following would be best for John to share with his mother.
  - a. CFLs cost more to buy but save you money over the life of the bulbs.
  - b. Incandescent bulbs use more electricity so they cost more to operate.
  - c. Incandescent bulbs use more electricity so they create more pollution.
  - d. All of the above
3. If every household in the U.S. made the switch to energy-efficient lighting in just one room of their homes, the annual energy saving could power more than 4 million U.S. homes for:
  - a. One year
  - b. One week
  - c. One month
  - d. Five years
4. To see how closely the light of a CFL will match that of an incandescent, check the:
  - a. Temperature and life expectancy
  - b. Color temperature and color-rendering index
  - c. Size and color
  - d. Coloring and lighting index
5. Jane is finally replacing her CFL with a new one because it has burned out. What is the best way for Jane to discard the old CFL?
  - a. Put it in the regular trash wrapped in plastic
  - b. Keep it in the basement wrapped in a plastic bag
  - c. Take it to local hazards waste collection site
  - d. A and C
6. Thanks to technology, we can control how often our lights go on and off even when we're not home or when we're sleeping. Some examples include:
  - a. Timers
  - b. Motion sensors
  - c. Occupancy sensors
  - d. All of the above

Name: \_\_\_\_\_

Directions: See how many of the words listed below the puzzle you can find.

T B T D H S Y D U T J S T E E  
 S N S E T A I G O R R B S C N  
 K C E T M S Z R R E L A E I E  
 N G A I C P C A M E G S N R R  
 I W N A C H E I R E N N S P G  
 V L R I I I T R S D M E O E Y  
 A D I E T X F U A A S M R S S  
 S R R G C H O F N T O U S A T  
 B E H O H H G E E N U L H H A  
 S W L W N T D I E Y B R E C R  
 E O R E K A Y Y L L G X E R A  
 R P E Y R U C R E M S R P U C  
 P R Y G O L O N H C E T E P H  
 G W P I N C A N D E S C E N T  
 V U Z R E P L A C E B L U B E

BULB  
 ENERGY  
 SHEEP  
 WATTS  
 GREENHOUSE GAS  
 TORCHIERE  
 MERCURY  
 TEMPERATURE  
 INCANDESCENT

COLOR  
 LIGHT  
 KWH  
 TIMER  
 LUMENS  
 EFFICIENT  
 PURCHASE PRICE  
 UPGRADE  
 LIGHTING

DISCARD  
 MONEY  
 POWER  
 SAVING  
 TECHNOLOGY  
 HAZARDS  
 SENSORS  
 ENERGY STAR  
 REPLACE

# Lighting For Smarties

## SHOPPING LIST

USING ENERGY EFFICIENT LIGHTING

NAME: \_\_\_\_\_

DIRECTIONS: SEE FOR YOURSELF JUST HOW MUCH YOU CAN SAVE BY USING CFLS INSTEAD OF INCANDESCENT BULBS. AN EXAMPLE HAS BEEN DONE FOR YOU IN BLUE.

1. IN THE INCANDESCENT COLUMN, ENTER THE NUMBER OF INCANDESCENT LIGHT BULBS USED IN YOUR OWN HOME (ON FOR 3 OR MORE HOURS AT A TIME).
2. IN THE CFL COLUMN, WRITE IN THE SAME NUMBER.
3. CHECK LOCAL RETAILER FLYERS FOR CURRENT PRICES OF BOTH TYPES OF LIGHT BULBS.
4. DO THE MATH AND SEE HOW MUCH MONEY YOUR FAMILY CAN SAVE JUST ON LIGHTING!

Bulb Type	Incandescent 100W	CFL 23W	Incandescent Light Bulb	Compact Fluorescent Light Bulb (CFL)
(A) Purchase Price	\$0.75	\$ 11.00	\$ _____	\$ _____
Bulb's Life Expectancy	750 hours	10,000 hours	_____	_____
Hours burned each day	4 hours <i>(3 plus hours required)</i>	4 hours <i>(3 plus hours required)</i>	4 hours <i>(3 plus hours required)</i>	4 hours <i>(3 plus hours required)</i>
(B) Number of bulbs needed over 3 years	6 (about)	1	6 (about)	1
Total cost of bulbs (A x B)	\$4.50	\$11.00	\$ _____	\$ _____
(C) Total cost of electricity	\$35.04 (\$ .11/kWh)	\$8.06 (\$ .11/kWh)	\$ _____ (\$ .11/kWh)	\$ _____ (\$ .11/kWh)
Total cost over 3 years (B + C)	\$39.54	\$19.06	\$ _____	\$ _____
Total Savings Over 3 years		\$20.50		\$ _____

NAME: \_\_\_\_\_

DIRECTIONS: THE TABLE BELOW CONTAINS LIGHTING WORDS AND TERMS. FIND THE PIECES THAT FIT TOGETHER AND WRITE THEM IN THE ANSWER AREA BELOW.

escent	fixt	allast	ures
incand	tbulb	ligh	lity
rep	rade	ricity	sty
effi	cient	ene	les
tity	lace	self-b	elect
qua	quan	rgy	upg

Place your answers here:

1. \_\_\_\_\_

2. \_\_\_\_\_

3. \_\_\_\_\_

4. \_\_\_\_\_

5. \_\_\_\_\_

6. \_\_\_\_\_

7. \_\_\_\_\_

8. \_\_\_\_\_

9. \_\_\_\_\_

10. \_\_\_\_\_

11. \_\_\_\_\_

12. \_\_\_\_\_