



CELf Summer Institute '10

Subject: Math/Pre-Algebra Grade: 7-8th
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 Energy Audit Project: Energy Efficiency in your Home
 Handout and Rubric

Handout and Rubric

Name: _____ Date: _____
 Period: _____

1. Choose a household item that uses electricity. Some common items are refrigerators, washers, dryers, microwaves, ranges, vacuum cleaners, dishwashers, televisions, stereos, computers, lamps, gaming systems, hair dryers, and small kitchen appliances like coffee makers.

My item is _____.

2. Determine the number of watts used by the item. This is often times found on the item itself or can be found on the internet. If the number of watts is not given sometimes the Volts and Amps are given instead. Use the following conversion to determine the watts:
 $\text{Watts} = \text{Volts} \times \text{Amps}$.

The # of watts in my item is _____.

3. To calculate the cost per day of the item complete the following table (modified from Creativechange.net Energy Audit Part 1 Lesson)

A	B	C	D	E
# of Watts	# of Kilowatts (A) \times 0.001	# of hours used per day	Massachusetts electricity costs	Energy costs per day (B) \times (C) \times (D)
			\$0.0811 kWh (courtesy of www.nationalgridus.com)	

4. Write an equation to represent the cost of the item over time. Let y equal the cost and let x equal number of days. (Hint: cost = energy cost per day \times number of days)

The equation for my item is: _____

5. Research a comparable model of the same item that uses less energy. To find this use store websites or go to stores which sell your item.

The new model is _____

Store or website used: _____

Cost of new model: _____

Watts used by new model: _____

6. Complete the table for the new model:

A	B	C	D	E
# of Watts	# of Kilowatts (A) \times 0.001	# of hours used per day	Massachusetts electricity costs	Energy costs per day (B) \times (C) \times (D)
			\$0.0811 kWh (courtesy of www.nationalgridus.com)	

7. Write an equation to represent the cost of the new model over time. Let y equal the cost and x equal number of days. (Hint: cost = cost of new model + energy cost per day \times number of days)

The equation for the new model is: _____

8. Find the percent savings in energy costs for one day.

$$\frac{\text{Difference in energy costs for new model and old model}}{\text{Energy costs for new model}} \times \frac{100}{1} = \text{Percent Savings}$$

$$\frac{\text{_____}}{\text{_____}} \times \frac{100}{1} =$$

9. Solve the equations from part 4 and 7 as a system of equations by graphing on the same coordinate plane. (Use a separate sheet of graph paper)

10. Solve the two equations using the substitution method.

11. What does the solution to the equation represent?
12. Write a paragraph summarizing and analyzing the data. Include the following:
- Daily percent savings.
 - An explanation of the solution and what it represents.
 - How a household might use this information to influence its decisions in electrical purchases.
 - Some factors that a household may also need to take into consideration when making electrical purchasing decisions.
 - How this information might help you to positively affect your ecological footprint?
13. Create a poster to present your data. The specifications for the poster are:
- Use a 14 in. by 22 in. poster board
 - Draw a two inch border at the top. Center your poster title in this border and write your name, due date and section in the upper right hand corner as shown below:

Your Name Due Date Section #	
Place Your Title Here	
Your work will go here	

- State the two items you are analyzing, a picture of the two items and include the two equations and what they represent. Don't forget to define your variables.
- State the percent energy savings for one day. Include your calculations.

- Include both methods for solving the equations as a system. You should include your hand-drawn graph (don't forget to label your axes and title your graph) and also include your calculations for solving using substitution. Include an explanation of the solution in the context of the situation.
- Include your summary paragraph. Type this and attach it to the poster.

The Poster Presentation:

Each student will give a brief (3-5 minute) presentation of their poster to their class. Your oral presentation should include:

- A description of the items you analyzed.
- The percent energy savings per day.
- The solution to your system of equations and what it represents.
- The big ideas from your summary.

Due Dates:

The poster is due on _____.

I will present my poster on _____.

Grading Rubric

Category	3	2	1	0
Poster Board/ Heading	The poster is the correct size and includes an interesting title and the heading in the correct place.	The poster is the correct size and includes a title and the heading in the correct place.	The poster is the correct size but the heading is incorrect or the title is missing or in the wrong position.	Poster is incorrect size and/or heading or title are missing or incorrectly placed.
Graphics	All graphics are related to the topic and make it easier to understand. All borrowed graphics have a source citation.	All graphics are related to the topic and most make it easier to understand. All borrowed graphics have a source citation.	All graphics relate to the topic. Most borrowed graphics have a source citation.	Graphics do not relate to the topic or several borrowed graphics do not have a source citation.
Neatness/ Craftsmanship	The poster is exceptionally attractive in terms of design, layout, and neatness.	The poster is attractive in terms of design, layout and neatness.	The poster is acceptably attractive though it may be a bit messy.	The poster is distractingly messy or very poorly designed. It is not attractive.
Equations w/ Explanation	Equations are correct and explanation shows a complete understanding.	Equations are correct and explanation shows some understanding.	One of the equations is incorrect and/or the explanation shows a limited understanding.	Both equations are incorrect and no explanation is given.
% Energy Savings	Work has no math errors. Explanation shows complete understanding.	Almost all of the steps have no math errors. Explanation shows some understanding.	More than half of the steps have math errors. Explanation shows very little understanding.	All the work is incorrect. Explanation shows no understanding.
Solve the System of Equations by Graphing	The axes have clear, neat labels that describe the units used for the variables. All units are appropriately sized for the	The axes have clear labels that describe the units used for the variables. Most units are appropriately sized for the data set. All	The axes have labels. All units are not appropriately sized for the data set. Some points are plotted correctly.	The axes are not labeled. None of the units are appropriately sized for the data set. Most if not all of the points are plotted

	data set. All points are plotted correctly and are easy to see. A ruler is used to neatly connect the points.	points are plotted correctly and are easy to see.		incorrectly.
Solve the System of Equations by Substitution/ Explanation of Solution.	Work has no math errors. Explanation shows complete understanding. All work is shown.	Almost all of the steps have no math errors. Explanation shows some understanding. Most work is shown.	More than half of the steps have math errors. Explanation shows very little understanding. Some work is shown.	All the work is incorrect. Explanation shows no understanding. Most work is not shown out.
Paragraph/ Summary	Summary describes the skills learned, the information learned and some future applications to real life situations.	Summary describes the information learned and a possible application to a real life situation.	Summary describes the information learned.	No summary is written.
Presentation	Student is completely prepared and has obviously rehearsed. Student stays on topic all of the time and shows a full understanding of the topic.	Student seems pretty prepared but might have needed a couple more rehearsals. Student stays on topic most of the time and shows a good understanding of the topic.	The student is somewhat prepared, but it is clear that rehearsal was lacking. Student stays on topic some of the time and shows a good understanding of parts of the topic.	Student does not seem at all prepared to present. It is hard to tell what the topic is and student does not seem to understand the topic very well.