Lower Elementary Power Bill Activity

Power Bill Analysis

Objective

- To become familiar with energy bills and how consumption is measured by a utility company.

Materials

- Electric bills (for past year or several months)
- Graph paper
- Rulers
- Calculators
- Paper and pencil

Question

- One bill that adults pay each month is for the electricity used in their home. Do you think your power bill stays the same each month? Does everyone have the same power bill? What factors might help determine the size of a power bill?

Preparation

1. Copy or print one year's electricity bill for your area. (Most power companies allow you to view and print one year's history online.) Be sure to use actual cost bills, rather than budgeted averages for the year.
2. Instruct students to bring in a copy of their own power bill. Print or request a copy of your own bill or an average bill for students who cannot produce their own. (This can also be used for the whole class.)
3. Project or copy the analysis questions you will use to assess your students.

Procedure

1. Review with students the best type of graph to show the cost of electricity for a year, steering them towards a bar graph. If needed, review how to decide on the range for your vertical axis.
2. Have students graph each month's data and work on the questions. Depending on the level of your students, you may want to make this a partner activity, pairing students of differing ability levels.

Analysis

1. During which months was the power bill the highest? What factors might cause this?
2. During which months was the power bill the lowest? What factors might cause this?
3. Do you think the power bill in other areas of the country would look the same as this one? Why or why not?
4. Find the mode of your data.
5. Find the median of your data.
6. Find the range of your data.
7. Find the mean of your data.
8. A family is moving to your area and is curious about the power bills they will be paying. Would the mode, median, range, or mean be the best measure to give them? Why do you think that is the best measure to tell them about a typical power bill for your area?
9. Do you think this is the best measure no matter where you live in the country? Explain.
10. Is there anything you could do to lower your power bill? Make a plan to show your parents.

Extensions

1. Give students two different power bills to make a double bar graph.
   - What patterns do you notice about the two bills?
   - What might account for these patterns?
   - These bills are not identical, but are both for our area. What might explain the differences in the bills?
2. Go to www.weather.com. Enter your zip code. Click on "Monthly" on the left menu. Select "Averages" from the bottom tabs. This will give you a month by month line graph for the high and low temperatures for your zip code. Make a handout for the students or write the information on the board in chart format. You may choose to give them handouts of the line graphs or have them create their own, depending on student levels. Direct your students to either put the two line graphs (high and low temperatures for your area) on top of their bar graphs or on a separate sheet of graph paper.
   - What patterns do you notice when you compare the temperature graph with the power bill graph?
   - Try to explain these patterns.
   - You cannot change the outdoor temperature. Is there anything you can do to work with the outdoor temperature to lower your power bill?

Sample School Electric Bill

Nov 27, 2010 (1)

Customer Bill

ABC Elementary School
Anytown, USA

Your Electric Company

Billing and Payment Summary

Account # 000-1234 (2) **Due Date: Jan 02, 2011** (3)

Total Amount Due: $ 7,462.61 (4)

To avoid a Late Payment Charge of 1.5% please pay by Jan 02, 2011.

Previous Amount Due:	$ 8,152.93
Payments as of Nov 27:	$ 8,152.93

Meter and Usage

Current Billing Days: 34

Billable Usage

Schedule 130	*10/23 - 11/26* (12)
Total kWh	12192
Dist Demand	61.0 (10)
Demand	57.0
Schedule 130	*10/23 - 11/26*
Total kWh	69888
Dist Demand	272.0 (10)
Demand	259.0

Measured Usage (5)

Meter: 000-1234	*0/23 - 11/26*
Current Reading	4147
Previous Reading	4020
Total kWh	12192 (6)
Current Reading	.60
Demand	57.60 (11)
Multiplier: 96	
Meter: 111-4567	*0/23 - 11/26*
Current Reading	51746
Previous Reading	51382
Total kWh	69888 (6)
Current Reading	1.35
Demand	259.20 (11)
Multiplier: 192	

Usage History

Explanation of Bill Detail

Your Electric Company 1-800-123-4567

Previous Balance	8,152.93	
Payment Received	8,152.93	
BALANCE FORWARD		0
Non-Residential Service (Schedule 130)		*10/23 - 11/26*
Distribution Service		
Basic Customer Charge		86.52
Distribution Demand		206.29
(13) Electricity Supply Service (ESS)		
ESS Adjustment Charge		83.93 CR
Electricity Supply kWh		214.94
ESS Demand Charge		558.85 (7)
Fuel Charge		353.81
Sales and Use Surcharge		2.68 (8)
Non-Residential Service (Schedule 130)		*10/23 - 11/26*
(14) Distribution Service		
Basic Customer Charge		86.52
Distribution Demand		919.87
Electricity Supply Service (ESS)		
ESS Adjustment Charge		374.243 CR
Electricity Supply kWh		909.41
ESS Demand Charge		2,539.36 (7)
Fuel Charge		2,058.15
Sales and Use Surcharge		13.38 (8)
TOTAL CURRENT CHARGES		7,463.61 (9)
TOTAL ACCOUNT BALANCE		7,463.61 (4)

For service emergencies and power outages, call 1-800-123-4567.

Mailed on Nov 28, 2010

Please detach and return this payment coupon with your check made payable to Your Electric Company.

Payment Coupon

Bill Date Nov 27, 2010 (1)

Please Pay by 01/02/2011 (3)
$ 7,463.54 (4)

Amount Enclosed

Account # 000-1234 (2)

Send payment to:

ABC Elementary School
123 Main Street
Anytown, USA 98765

Your Electric Company
PO BOX 123456
Anytown, USA 98765

01166005000 0000000009368 6868686 0001234 11272007

Sample School Natural Gas Bill

ABC Elementary School
Anytown, USA

NOTE: The bill you received on or around Friday, Nov. 2 was calculated using estimated usage instead of the actual meter reading. This invoice reflects your actual meter reading. If your new amount due is more than what was indicated on your previous bill, please remit payment for the difference. If it is less, and you've already paid, the difference will be credited to your account and shown on your next bill. We apologize for the inconvenience.

1 Account Number	2 Billing Date	3 Next Meter Reading	4 Next Billing Date
000-12345678	Nov 15, 2010	Dec 3, 2010	Dec 4, 2010

Visit our web site at www. yourgascompany.com

If you have any questions call 1-800-000-0000

Credits & Charges Since Your Last Bill

Payments Received - Thank You	$1,302.60 CR 5
Outstanding Balance	$0.00

Current Charges

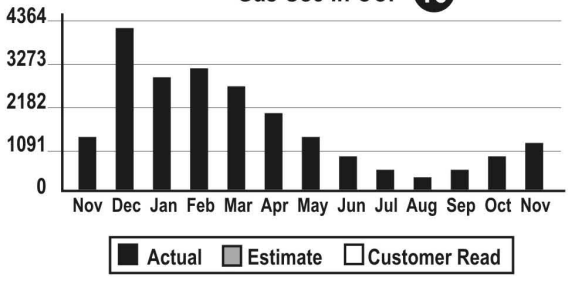
General Service

Delivery 6	282.14
Gas Supply 7	1,377.91
Total Current Charges	**$1,660.05**
Total Account Balance 8	**$1,660.05**

Monthly Usage Comparison

	2008	2009	NORMAL
Heating Degree Days For This Billing Period 9	160	51	138

Gas Use in CCF 10



Billing Period and Meter Readings

Date	Read Type	Reading
October 30, 2010	Actual	70320 11
October 01, 2010	Actual	68985

CCF used in 29 days: 1335 12

Meter Number 123456 13

For Gas Leaks, call 1-800-123-4567

Please pay by Dec 10, 2010, To Avoid A Late Charge of 1.5% Per Month

EnergyShare has helped customers pay heating bills of all kinds. You can help by adding $1, $2, $5, $10, $15, or $20 to your gas bill payment. 14

Please make checks payable to Your Gas Company and return this portion with your payment. Thanks!

YOUR GAS COMPANY
PO Box 123456 Anytown, USA 98765

PREVIOUS BALANCE	**$0.00**	
Total Current Charges	**$1,660.05**	**Pay By Dec 10, 2010** 15
Total Account Balance	**$1,660.05**	
Account # 000-12345678	Amount Enclosed	16

ABC Elementary School
123 Main Street
Anytown, USA 98765

Your Gas Company
PO BOX 123456
Anytown, USA 98765

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