WAMC Lab Template
Math Concept(s):
Source / Text: Financial Algebra 10-1
Developed by: Len Kelly   E-Mail: kellyl@csdk12.org   Date: Summer In-service 2013
Clarkston Educational Opportunity Center

Attach the following documents:
Lab Instructions: Log into to computers, open excel program

Student Handout(s) : Worksheet

Rubric and/or Assessment Tool: Application Problems pgs. 486-488 Probs. 1-19 and 10-1
Workbook Problems

Short Description (Be sure to include where in your instruction this lab takes place):

Lab Plan
Lab Title: Utility Related Costs 10-1

This lab should occur before the Applications are started and before workbook worksheets are assigned.

Prerequisite skills: Understand Excel; Inputting data on a worksheet, be able to create a new column and new row, be able to use auto sum function for average calculation, and be able to create bar graph.

Lab objective: Students will be able to calculate average, create spreadsheet, and create a bar graph in Excel, brainstorm factors that affect utility costs

Standards:
CCSS-M:
- N-Q1 – Use units as way to understand problems and to guide the solution of multistep problems

- N-Q2 – Define appropriate quantities for the purpose of descriptive modeling

- A-SSE1a – Interpret parts of an expression, such as terms, factors, and coefficients

- A-SSE 1b – Interpret complicated expressions by viewing one or more of their parts as a single entity

Standards for Mathematical Practice:

- Compute the cost of electric, gas, oil, and water at home
- Compute the cost of using specific lengths of time
- Compute the time it takes an energy-saving appliance to pay itself

State Standards addressed (2008 Washington State Mathematics Standards):

- Math

  1.1 Understand and apply concepts and procedures from number sense

  1.2 Understand and apply concepts and procedures from measurements

  2.1 Investigate problems

  2.2 Apply strategies to construct problems

  3.3 Verify results

  4.1 Gather information

Reading:

- Integrate and evaluate multiple sources of information presented in different media or formats(e.g., visually, quantatively as well as in words in order to address a question or solve a problem

Writing:

- 1.1 Develop concept and design: develop a topic or theme; organize written thoughts with a clear beginning, middle, and end; use transitional sentences and phrases effectively
- 1.2 Use style appropriate to the audience and purpose; use voice, word choice, and sentence fluency for intended style and audience

Leadership/21st Century Skills:

21st Century Interdisciplinary themes (Check those that apply to the above activity.)
☒ Global Awareness   ☒ Financial/Economic/Business/Entrepreneurial Literacy   ☐ Civic Literacy
☐ Health/Safety Literacy   ☐ Environmental Literacy

21st Century Skills (Check those that students will demonstrate in the above activity.)

LEARNING AND INNOVATION
Creativity and Innovation
☒ Think Creatively
☒ Work Creatively with Others
☐ Implement Innovations
Critical Thinking and Problem Solving
☒ Reason Effectively
☒ Use Systems Thinking
☐ Make Judgments and Decisions
☒ Solve Problems
Communication and Collaboration
☒ Communicate Clearly
☐ Collaborate with Others

INFORMATION, MEDIA & TECHNOLOGY SKILLS
Information Literacy
☒ Access and Evaluate Information
☒ Use and manage Information
Media Literacy
☐ Analyze Media
☐ Create Media Products
Information, Communications and Technology (ICT Literacy)
☒ Apply Technology Effectively

LIFE & CAREER SKILLS
Flexibility and Adaptability
☒ Adapt to Change
☒ Be Flexible
Initiative and Self-Direction
☒ Manage Goals and Time
☒ Work Independently
☐ Be Self-Directed Learners
Social and Cross-Cultural
☒ Interact Effectively with Others
☐ Work Effectively in Diverse Teams

Productivity and Accountability
☒ Manage Projects
☐ Produce Results
Leadership and Responsibility
☒ Guide and Lead Others
☐ Be Responsible to Others

Teacher Preparation: (What materials and set-up are required for this lab?)

Materials
- Computer, Overhead Projector or Document Camera, Worksheet

Set-Up Required:
- Computers logged in, Overhead and Document Camera should be working and functional

Lab Organization Strategies:

Grouping/Leadership/Presentation Opportunities:

- 1.1 Student will analyze, refine & apply decision-making skills through classroom, family, community, and business and industry experiences.
- 1.4 Student will be involved in activities that require applying theory, problem solving, and using critical & creative thinking skills while understanding outcomes of related decisions

Expectations:
- Students will be able to effectively input data on a excel spreadsheet, calculate averages, create a bar graph in excel, and reason why utility expenses are affected by outside factors in fully completed sentences.

Timeline:
- 1 day

LAB 10-1

Input the following data on a worksheet in Excel.

Utility Costs	Jan	Feb	Mar	Apr	May	June
Electricity	210	200	190	200	200	150
Natural Gas	45	45	35	30	30	30
Heating Oil	140	140	120	110	90	90
Water	30	30	30	30	30	30

1. Find the Average of each utility cost for each month and for each utility. (Create new column labeled called Mean and new row labeled Mean). (Print Worksheet)

2. Construct a bar graph using the information on Utility-related costs (Print Bar Graph)

3. What factors would show why utility costs decline in certain months(Explain in fully completed sentences)

LAB 10-1

1. ANS:

	Jan	Feb	March	April	May	June	Mean
Electricity	210	200	190	200	200	50	175.00
Natural Gas	45	45	35	30	30	30	35.83
Heating Oil	140	140	120	110	90	90	115.00
Water	30	30	30	45	45	45	37.50
Mean	106.25	103.75	93.75	96.25	91.25	53.75	

2.

3. Answers will vary

Post Lab Follow-Up/conclusions:

Discuss real world application of learning from lab

- Students will be able how to compute averages and understand why utility costs are different each month or stay the same. Students will be able to understand outside factors that affect utility expenses. Students will be able to discuss real world problems from the lab.

Career Applications

- Students will be able to understand the factors that could influence your costs in a business. Students will be able to evaluate expense factors in their business

Optional or Extension Activities

- Students can review this lab with other students, family, and business owners to see how utility expenses affect family and business needs.

WAMC Lesson Plan

Name(s): Len Kelly
Lesson Title: Utility Expenses 10-1
Date: 6/25/2013
Text: Financial Algebra   Lesson Length: 2 Days
Clarkston Educational Opportunity Center

Common Core State Standards:

N-Q1 Use units as way to understand problems and to guide the solution of multi-step problems

N-Q2 Define appropriate quantities for the purpose of descriptive modeling

A-SSE1a Interpret parts of an expression, such as terms, factors, and coefficients

A-SSE1b Interpret complicated expressions by viewing one or more of their parts as a single entity

Mathematical Practice(s):

Content Objectives:	*Language Objectives:*
Compute the cost of electric, gas, oil, and water at home *Compute the cost of using specific lengths of time* *Compute the time it takes an energy-saving appliance to pay itself*	*Peer teaching* *District provided aide*
Vocabulary:	*Connections Prior to Learning*
utility, meter, watt, watt-hour, kilowatt-hour, cubic foot, ccf, volume, previous reading, present reading	*Understanding decimals, conversions to metric*
Questions to Develop Mathematical Thinking: *Reason quantitatively and use units to solve problems – Use units as a way to understand problems and to guide the solution of multi-step problems;* *Choose and interpret units consistently in formulas;* *Choose and interpret the scale and the origin in graphs and data displays*	*Common Misconceptions:* *Reading a dial meter backwards, calculate the operating costs of an utility, reasons why utility costs higher or lower, how to recognize cost saving appliances*

Assessment (Formative and Summative):

- Application Problems Pgs 486-488 Probs. 1-18, Workbook problems 10-1, FA Quiz 10-1, Post Test
- Lab 10-1

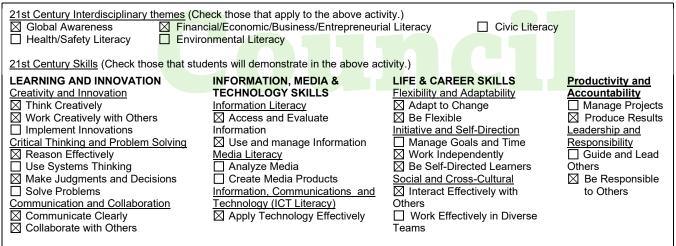## Materials:

- Textbook, Student Workbook, Lab assignment

Instruction Plan:

Launch: How much will it cost to run the utilities in your home monthly or yearly?
Explore: If you own a home or rent an apartment how do you prepare budget, understanding charges for using electricity, natural gas, heating oil, and water (utilities), monthly budget development, consideration of outside factors that can influence utility expenses

Career Application(s):

- Business owner, homeowner, accountant, building custodian/maintenance

21st Century Skills and Interdisciplinary Themes:

21st Century Interdisciplinary themes (Check those that apply to the above activity.)
- ☒ Global Awareness
- ☒ Financial/Economic/Business/Entrepreneurial Literacy
- ☐ Civic Literacy
- ☐ Health/Safety Literacy
- ☐ Environmental Literacy

21st Century Skills (Check those that students will demonstrate in the above activity.)

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- ☐ Create Media Products

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- ☒ Produce Results

Leadership and Responsibility
- ☐ Guide and Lead Others
- ☒ Be Responsible to Others

Name _____

"Show All Work"

Quiz Chapter 10-1
Len Kelly Clarkston Educational Opportunity Center

Define the following terms:
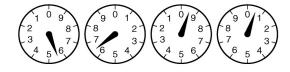
1. Watts-Hour

2. Cubic foot

3. Volume

Multiple Choice
Identify the choice that best completes the statement or answers the question.

_____ 4. Last month, Marybeth was charged $112 for 945 kWh of electricity. How much did the company charge her per kWh, to the nearest cent?
   a. $0.06   c. $0.10
   b. $0.08   d. $0.12

Short Answer

5. Manuel works for the water company as a meter reader. The meter below is the Jansen's water meter. What is the reading, in ccf, on the meter shown?

6. Last year, Maria spent $2,388 for natural gas. This year, she decided to use balance billing. What will her monthly payment be this year?

7. Michelle's last electric bill listed a previous reading of 17,934 kWh. This month, the electric meter reading is 18,796 kWh. If the electric company charges $0.09 per kWh, what is the charge for usage?

Quiz Chapter 10-1
Answer Section

MULTIPLE CHOICE

    2. ANS: D
       $112 \div 945 = \$0.12$

SHORT ANSWER

    3. ANS:
       5,690 ccf

    4. ANS:
       $\$199; 2,388 \div 12 = 199$

    5. ANS:
       $18,796 - 17,934 = 862; 862 \times 0.09 = \$77.58$

    Terms

      1. Watts-Hours – amount of electricity used

      2. Cubic Foot – amount of space the gas or water occupies

      3. Volume – Amount of space gas and water occupies