

ENV: MEL 3E - Budgeting for Energy Efficiency (CLA)

| Contact Information | |
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| Board | Waterloo Catholic District School Board |
| Development date | August 25, 2011 |
| Contact person | Melissa Novakovich and Frank Wittmann |
| Position | Teachers |
| Phone | (519) 621 - 4050 xt. 625; xt. 621 |
| Fax | (519) 621 - 4051 |
| E-mail | melissa.novakovich@wcdsb.ca; frank.wittmann@wcdsb.ca |
| SHSM sector | Environment |
| Course code and course title | MEL 3E - Mathematics for Work and Everyday Life |
| Name of CLA | Budgeting for Energy Efficiency |
| Brief description of CLA | This activity is designed to teach students how to budget for monthly living expenses, as well as how to decide if they should invest in items that would make their house more energy efficient. In addition to researching ways to make their house more efficient, they will also do a cost recovery analysis to help them make a better informed decision. |
| Key Search Terms (Do not use SHSM, CLA, Course Code or Sector) | Budgeting; Energy Efficiency; Cost Recovery |
| Duration | 8 hours |
| Overall expectations | A2. demonstrate an understanding of payroll deductions and their impact on purchasing power; A3. demonstrate an understanding of the factors and methods involved in making and justifying informed purchasing decisions. |

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| <p>Specific expectations</p> | <p><u>Earning</u> 1.3 describe the effects of different remuneration methods and schedules on decisions related to personal spending habits (e.g., the timing of a major purchase, the scheduling of mortgage payments and other bill payments);</p> <p><u>Describing Purchasing Power</u> 2.1 gather, interpret, and describe information about government payroll deductions (i.e., CPP, EI, income tax) and other payroll deductions (e.g., contributions to pension plans other than CPP; union dues; charitable donations; benefit-plan contributions); 2.2 estimate and compare, using current secondary data (e.g., federal tax tables), the percent of total earnings deducted through government payroll deductions for various benchmarks (e.g., \$15 000, \$20 000, \$25 000) Sample problem: Compare the percentage of total earnings deducted through government payroll deductions for total earnings of \$15 000 and \$45 000;</p> <p><u>Purchasing</u> 3.1 identify and describe various incentives in making purchasing decisions (e.g., 20% off; 1/3 off; buy 3 get 1 free; loyalty rewards; coupons; 0% financing); 3.10 make and justify a decision regarding the purchase of an item, using various criteria (e.g., extra costs, such as shipping costs and transaction fees; quality and quantity of the item; shelf life of the item; method of purchase, such as online versus local) under various circumstances (e.g., not having access to a vehicle; living in a remote community; having limited storage space); Sample problem: I have to take 100 mL of a liquid vitamin supplement every morning. I can buy a 100 mL size for \$6.50 or a 500 mL size for \$25.00. If the supplement keeps in the refrigerator for only 72 h, investigate which size is the better buy. Explain your reasoning.</p> |
| <p>Catholic graduate expectations (if applicable)</p> | <p>CGE Develops attitudes and values founded on Catholic social teaching and acts to promote social responsibility, human solidarity and the common good.</p> <p>CGE 1d</p> <p>CGE Thinks reflectively and creatively to evaluate situations and solve problems.</p> <p>CGE 3c</p> <p>CG Examines, evaluates and applies knowledge of interdependent systems (physical, political, ethical, socio-economic and ecological) for the development of a just and compassionate society.</p> <p>CGE 3f</p> <p>CGE7i Respects the environment and uses resources wisely.</p> |

Essential Skills and work habits

Essential Skills

- ✓ Reading Text
- ✓ Writing
- ✓ Computer Use
- Numeracy
- ✓ Money Math
- ✓ Scheduling or Budgeting and Accounting
- ✓ Measurement and Calculation
- ✓ Data Analysis
- Thinking Skills
- ✓ Job Task Planning and Organizing
- ✓ Decision Making
- ✓ Problem Solving
- ✓ Finding Information

Work Habits

- ✓ Reliability
- ✓ Organization
- ✓ Working Independently
- ✓ Initiative

Instructional/Assessment Strategies

Teacher's notes

- Prior knowledge that would be beneficial to have before performing this CLA:
 - a review of addition, subtraction, multiplication and division
 - calculating percents
- This CLA has been designed to cover 8 periods, with 2 of those being formative lessons, introducing new concepts. The 2 lessons will cover information pertaining to budgeting, how to improve costs, and cost recovery.
- *The intended method of delivery of this CLA is an independent cumulative project that is teacher facilitated. However, it would not be unreasonable to have students complete this activity as an independent study.*
- It is recommended that students are only given one activity at a time, and frequent check-ins ensure that immediate feedback can be given to students as they work through them.
- Computers and calculators will be required to complete this activity.
- Should teachers wish to use the rubrics included with the assignment, they should review the content, so that it matches what was covered during the classes.
- Have all handouts copied prior to starting unit. *(All handouts, lessons, and teacher keys/ exemplars can be found at the end of this document)*

Context

This set of activities will provide students with an opportunity to budget for monthly expenses in a realistic context. To be able to organize, manage, and analyze data is an important skill, with many uses later in life.

It will also allow them to deepen their understanding of ways to reduce energy use, as well as become more aware of how they can respect the environment and use resources more wisely. Students will be given the opportunity to investigate the cost of monthly living, and ultimately learn that they can successfully reduce their impact on the environment, while saving money at the same time.

Strategies

1. Lesson on budgeting;
- 2.a) Activity on budgeting;
b) Budget calculation;
- 3.a) Discussion of how to decrease costs associated with energy use;
b) Using chosen items, calculate monthly savings of introducing new windows, furnace, roof and appliances;
c) Mini-lesson on cost recovery;
d) Calculation of cost recovery;
4. New budget calculation based on improvements;
5. PowerPoint presentation/ research project on a plan for reducing energy use.
6. Rubric
7. Teacher keys/ exemplars

*see list of attachments at the end of this document for all lessons, student worksheets, teacher answer keys and rubric

How will the learning be designed?

- learning is designed to be implemented in chunks, so as not to overwhelm the student
- each learning activity and assessment is built on the previous one so as to help paint a more complete picture of how to properly calculate a monthly budget, as well as how it can be linked with energy efficiency and cost savings
- teachers are encouraged to provide ongoing feedback throughout the duration of the assignment in order to help facilitate student success.

- for students who are not progressing, it is recommended that teachers work through the worksheets in a step by step manner with students individually
- extension/ enrichment activity suggestions are provided in the 'Teachers note' section of this document

Assessment and Evaluation of Student Achievement

Assessment and evaluation strategies include:

- diagnostic assessment before the lesson occurs, to ensure that they have a working knowledge of the basic operations and percentages (assessment for learning)
- formative feedback and check-ins throughout the duration of the tasks (assessment as learning)
- exercises to show competency and learning throughout (assessment as learning)
- summative feedback in the form of a rubric at the end of the task (assessment of learning)

*All handouts, assignments, exercises, and rubrics are attached at the bottom of this document.

The attached activity kept the following important considerations in mind:

| How will we know students are learning? | How will we know students have learned? |
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| • How will students demonstrate progress towards the desired learning? | • How will students demonstrate achievement of the desired learning? |
| • What criteria will be used to determine whether students are learning? | • What criteria will be used to determine that students have learned? |
| • What assessment strategies/tools will best gather evidence during learning? | • What assessment strategies/tools will best gather evidence that students have learned? |
| • Will the assessment tasks provide opportunities for students to demonstrate the full range of their learning in a variety of ways? | |

| Strategies/Tasks | Purpose |
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| 1. Lesson on budgeting. | -for students to have a general idea of how and why a monthly budget would be beneficial to them -teachers can then assess for learning based on student engagement and responses to the lesson in a formative manner |
| 2. a) Activity on budgeting; b) Budget calculation; | -students are now able to put into practice what they have learned, using a guided budget activity and calculation sheet -teachers can use this as an assessment of learning as part of their final summative project for the unit |

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| <p>3. a) Discussion of how to decrease costs associated with energy use; b) Using chosen items, calculate monthly savings of introducing new windows, furnace, roof and appliances; c) Mini-lesson on cost recovery; d) Calculation of cost recovery.</p> | <p>-for students to learn in a collaborative manner how to reduce energy use in the house, which would be beneficial both to the environment and their budget -using 4 fixed items, students would then calculate projected monthly savings after installation of the items into their house, as well as determine how long it would take them to pay for said items</p> |
| <p>4. New budget calculation based on improvements;</p> | <p>-by using the same budget activity that was previously used, but imputing savings that they would incur based on their new implemented items, students can get a better perspective of benefits</p> |
| <p>5. PowerPoint presentation/ research project on a plan for reducing energy use.</p> | <p>-this will allow students to consolidate information learned about monthly budgets, as well as how they can respect the environment and use resources more wisely -this will be the final part of their summative assignment and can be put into a perspective that they can apply to their own lives</p> |
| <p>Assessment tools</p> <ul style="list-style-type: none"> -rubric for final summative unit evaluation -formative on-going feedback to ensure that students are on the right track -final checklist for all completed tasks to ensure that everything is completed | |
| <p>Differentiation</p> <p>-Examples of Differentiated instruction and evaluation can be found in the accommodations section below.</p> | |
| <p>Differentiation will be based on:</p> <p>Readiness <input type="checkbox"/> Interest <input type="checkbox"/></p> <p>Differentiation will take place through:</p> <p>Content <input type="checkbox"/> Process <input type="checkbox"/> Product <input type="checkbox"/></p> | |

Additional Notes/Comments/Explanations

[Provide additional suggestions for teachers that will help them deliver the CLA.]

- When teaching the first lesson on Budgeting, it may be complicated for students to understand the framework for marginal tax rates. If you have a weaker class, they could just assume that all income is taxed at 20%. Stronger classes are encouraged to use the simplified income tax brackets provide in the lesson table 1. *Please keep in mind that percentages have been rounded for simplicity.*

Resources

-handouts: Budgeting Activity
Initial Monthly Budget
House Improvement Energy Savings and Cost Recovery
Revised Monthly Budget
Energy Reduction PowerPoint
Rubric

-lessons: Budget Lesson (can be given as a handout)
Cost Recovery mini-lesson

-computer (with internet); enrichment activity will require microsoft excel

-calculators (enough for one per student)

Authentic workplace materials

Keeping the Heat In - Ministry of Natural Resources Document (ecoEnergy an ecoACTION initiative)

Look for ENERGY STAR to identify the most energy-efficient products - Ministry of Natural Resources Document (ecoEnergy an ecoACTION initiative)

Energy-Efficient Residential Windows, Doors and Skylights - Ministry of Natural Resources Document (ecoEnergy an ecoACTION initiative)

Human resources

Business and Education Partnership: BET (could use a guest speaker to speak about budgeting)

Print resources

Mathematics for Everyday Life 11 (text)

Video resources

Software

- microsoft powerpoint
- microsoft excell

Websites

-these additional websites may be helpful for more background information for students

http://www.energyhog.org/pdf/No-Cost_Low-Cost_Ultimate-Checklist.pdf

http://oee.nrcan.gc.ca/calendarclub/teachers/teachers_guide.cfm?attr=0

<http://greenhomeguide.com/know-how/article/9-ways-to-make-your-home-more-energy-efficient>

<http://greenhomeguide.com/know-how/topic/4?gclid=CNvh0eTG5aoCFUFo4Aod2HyP7g>

<http://tlc.howstuffworks.com/home/how-to-make-your-home-energy-efficient.htm>

http://www.ehow.com/how_2015900_energy-efficient-home.html

Other resources

Accommodations

[List instructional, environmental, and assessment accommodations.]

[What adjustments must be made to the instructional and assessment strategies to accommodate different learning needs?]

-Possible enrichment activities could include:

- *If any students are done early, they can produce excel spreadsheets of their budgets as an extension activity.*
- *An enrichment activity box can be found on the 'Home Improvement Energy Savings and Cost Recovery' handout.*
- *It is also optional to have students present their PowerPoint presentation to the rest of the class to allow for better understanding of the ways to reduce home energy use and cost.*
- *Another extension activity could involve researching the amount of tax rebates on the home improvements prescribed in this assignment.*

-In the Budgeting Activity, the teacher may choose to further extend this activity by asking students to separate the expenses section into fixed and variable categories.

-As stated in the 'Additional Notes section', a possibly way to simplify the beginning part of the activity could be:

- *When teaching the first lesson on Budgeting, it may be complicated for students to understand the framework for marginal tax rates. If you have a weaker class, they could just assume that all income is taxed at 20%. Stronger classes are encouraged to use the simplified income tax brackets provide in the lesson table 1. Please keep in mind that percentages have been rounded for simplicity.*

List of Attachments

1. Lesson on budgeting;
- 2.a) Activity on budgeting;
b) Budget calculation;
- 3.a) Mini-lesson on cost recovery;
b) Calculation of cost recovery;
4. New budget calculation based on improvements;
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