**Lesson 6: Budget, Purchasing, and Construction, oh my!**

**Problem statement:** How does a budget affect material choice?

**Learning objectives:** I can do multiplication of decimals by using standard algorithm to complete a budget for their package, having taken into consideration material choices and cost.

**Lesson standards (NGSS, CCSS, CTE):**

[CCSS.Math.Content.5.NBT.B.7](http://www.corestandards.org/Math/Content/5/NBT/B/7/)

Add, subtract, multiply, and divide decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used.

3-5-ETS1-1. Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.

**Soft skills:**

Creativity in considering how their design could be simplified to use the least amount of cost of materials

Communication of trade offs, coming to consensus on a budget decision

**Locally and/or personally relevant for students:**

Students are learning how to use real-world skills such as following a budget to plan for the future. This is a practical skill for students in their every-day life such as shopping, saving for a major purchase, as well as problem-solving with others about priorities in budgeting.

**Connections to career and educational pathways:**

Students will be using a real-world budget to plan for the materials they will need for their package.

**Materials:**

Budget worksheet for each group/student (Appendix A)

(Graph) Paper for calculations

Calculator (as needed)

All construction materials

**Lesson preparation:**

Copy Budget Worksheet for each group/student

Review [budget video](https://www.bing.com/videos/search?q=what+is+a+budget+for+kids&&view=detail&mid=5A3A6782E4CF8A2F5F835A3A6782E4CF8A2F5F83&&FORM=VDRVRV) prior to lesson: <https://www.bing.com/videos/search?q=what+is+a+budget+for+kids&&view=detail&mid=5A3A6782E4CF8A2F5F835A3A6782E4CF8A2F5F83&&FORM=VDRVRV>

Set up “Materials Facility” for students to access in second part of lesson

Load Eco-friendly materials page to share with students/ send link to students (Appendix C)

**Time required:** Two 45-minute segments

**Grouping of students for instruction:**

Students will continue to stay in group assigned in lesson 1

**Understanding the Problem**

Budgeting

|  |  |
| --- | --- |
| **Teacher** | **Student** |
| **Intro and review:** 3 minutes  Connect to prior lesson: Pose to students what considerations they may have to make for the design of the package regarding materials.  Intro to problem: **:** How does a budget affect material choice?  Vocabulary questions to access prior knowledge: what is a budget? Ask 2-3 students to share examples of where they have seen or experienced a ***budget.*** | Students gathered in design groups in area where they can watch video. Students will discuss what a budget is and and share out with class. |
| **Video**: 5 minutes  (Optional; review of what a budget is)  Share video on budgeting with students: [What is a Budget? By: BuckleDownFinance.com](https://www.bing.com/videos/search?q=what+is+a+budget+for+kids&&view=detail&mid=5A3A6782E4CF8A2F5F835A3A6782E4CF8A2F5F83&&FORM=VDRVRV)  Follow up questions: How were budgets used in this video? | Students observe video and share out answer to question with whole class |
| **Pose problem:** 10 minutes  Pose to students that they have a limit of **$5.00** to spend on the packaging of their egg. Model filling out the budget worksheet for students using a sample prototype and identify each column’s role (packing material, cost per unit, etc.)  Teacher models how to multiply decimals (ex. $0.37 for 50cm² of bubble wrap; the group would like 3 sheets of bubble wrap.  $0.37←cost per unit  X 3← number of units  $1.1 1  Give special attention to place value and use estimation to determine if product is reasonable! ($11.10 would not be a reasonable answer for the above example).  *Teacher may model other strategies such as partial products, repeated addition, etc. to support students’ needs.* | Students support teacher in completing first row of sample worksheet |
| Remind students that there are often trade-offs for recycled/recyclable materials as they discussed in prior lesson.  (Optional) Review Eco-friendly material list website *(Appendix C).*  Remind students that they must use their technical design to guide their budget and if they choose to modify their design, they must demonstrate *why* they are modifying their design (materials constraints, price, etc).  Remind students that they may want to make an initial budget, purchase materials, begin construction, and then use any remaining money to buy additional packaging materials that the group notices are needed. | Students observe eco-friendly material list |
| **Work Time:** 15 minutes (or more)  Share with students they initially have 15 minutes to work in groups to complete a budget worksheet. Support groups with multiplication of decimals. | Students work with groups to calculate budget worksheet.  Students must show all calculations on (graph) paper.  Students must double-check all calculations and keep total budget under $5.00 |
| After 15 minutes, check in with groups. Share out with the class questions that different groups are having or common considerations that groups are making.  Provide students with additional time, as needed. | Students completely stop working on budget during check-in. |
| **Reflection**: 5-10 minutes  Ask students to reflect and then share out with the class “What was challenging about creating a budget?” | Students share in group and then share out with class. |

Purchasing Materials and Construction of package

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| --- | --- |
| **Teacher** | **Student** |
| **Connect to prior lesson:**  2 minutes  Pose to students what considerations they may have to make for the design of the package regarding materials and their budget | Students gathered in design groups. Students will discuss what how a budget impacts design of package. |
| **Model:** 5 minutes  Model for students how to access the materials table and to use budget when taking materials  Student voice says: “I would like to purchase 1 sheet of bubble wrap, 1 set of popsicle sticks, 1 strips of tape, and 2 sheets of cardboard”  Teacher voice says: “Your order has been received. What is your total calculated cost of your order?”  Student voice says: “I have calculated a budget of $3.92 for my materials, with $1.08 left over.  -----  Teacher asks if students have questions before beginning their purchasing and construction process. Remind students that they can return to purchase additional materials later, if needed. | Students observe model process of purchasing materials and ask follow-up questions |
| **Package Construction Work Time:** 30 minutes  Teacher releases students to work with groups, and to remind students to send their buyer to the materials facility. | Groups will send up one *buyer* to purchase materials; group may begin construction of package.  Students work in groups to build package and buy additional materials as needed. |
| **Clean up & Reflection:** 8 minutes  If students need additional time for construction, provide designated space for design groups to keep their package and materials.  Pose question to students: What challenges did you experience in purchasing or constructing your package? | Students clean all materials  Students respond to question aloud to class. |

**Accommodations:**

Paper-money/plastic coins can be used for groups that need support in calculating exact budget.

**Extensions:**

**-**Paper-money/plastic coins can be provided to students

-Groups can use different materials and research the real cost per unit and complete the blank Budget worksheet**.**

Groups who run out of money may need to write a grant proposal for additional materials they need to build their package

**-**Groups can determine what materials they would use if they had a lower or higher budget, or no budget at all! Students can then write an explanation of why they choose certain materials over others.

**Assessment:**

**Formative Assessment in the Lessons:**

Observe students completing budget in groups; what strategies are students using to calculate decimals (repeated multiplication, standard algorithm, partial products, etc.)

**Summative Assessment for the Unit**

Groups will submit completed Budget Worksheet at the end of class with calculations attached.

*Appendix A*

[Budget Worksheet](https://docs.google.com/document/d/1Ii-OGOiCAzvVWMs1DoYxqJZxv07vUykC9MF5nrcLZBQ/edit)

Provided budget: $5.00

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| --- | --- | --- | --- | --- | --- |
| Packing  Material | Cost  per unit | Number of units | Total  Cost (multiply units by cost per unit) | What is it  made of? | Recyclable?  Yes or No |
| Bubble wrap  50cm² | $0.37 |  |  |  | No |
| Cardboard  25cm² | $1.15 |  |  |  | Yes |
| Styrofoam peanuts  100 gram | $0.79 |  |  |  | No |
| Aluminum Foil 24cm² | $0.44 |  |  |  | Yes |
| Seran Wrap  24cm² | $.25 |  |  |  | No |
| Recycled Paper (grocery bag)  25cm² | $.39 |  |  |  | Yes |
| Paper 25cm² | $0.25 |  |  |  | Yes |
| Packing Tape 100cm | $0.99 |  |  |  | No |
| Popsicle Sticks (x10) | $0.26 |  |  |  |  |
| Q-tips (x5) | $0.15 |  |  |  |  |
| Alt. material | $ |  |  |  |  |
| Total cost of materials: | | | | | |

Sample blank worksheet (extension for students/classes that want to use different materials or research the real cost )

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| --- | --- | --- | --- | --- | --- |
| Packing  Material | Cost  per unit | # of units  (x by cost) | Total  cost | What is it  made of? | Recyclable?  Yes or No |
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| Total cost of materials: | | | | | |

Appendix C:

[Eco-friendly materials list](https://www.uline.com/CustomerService/ULINE_FAQ_Ans?FAQ_id=147&pricode=WQ787&utm_source=Bing&utm_medium=cpc&utm_term=eco%20friendly%20shipping%20packaging&utm_campaign=Shipping%20%26%20Packaging%20Supplies&AdKeyword=eco%20friendly%20shipping%20packaging&AdMatchtype=p&&msclkid=44cda489bfd615ffc9b8f9cadd8e10b7&gclid=COPlzZ3X4uMCFciYxQIdnVsCkg&gclsrc=ds)

<https://www.uline.com/CustomerService/ULINE_FAQ_Ans?FAQ_id=147&pricode=WQ787&utm_source=Bing&utm_medium=cpc&utm_term=eco%20friendly%20shipping%20packaging&utm_campaign=Shipping%20%26%20Packaging%20Supplies&AdKeyword=eco%20friendly%20shipping%20packaging&AdMatchtype=p&&msclkid=44cda489bfd615ffc9b8f9cadd8e10b7&gclid=COPlzZ3X4uMCFciYxQIdnVsCkg&gclsrc=ds>