

## Financial Literacy: Grade 5 Science and Technology Understanding Matter and Energy

### Lesson 1 – A Closer Look at Cell Phones

Students will examine the rationale for buying electronic products – typically a cell phone, and look at some of the environmental, social and financial implications of these purchases.

#### Connections to Financial Literacy

The financial literacy knowledge and skills which will be addressed and assessed in this lesson include:

- consumer awareness of why we make purchases the way we do
- examining the cost savings if the life of a product (cell phone) were extended
- examination of some of the environmental and social implications of our purchases

<b>Lesson 1: Why Did We Buy That?</b>	<b>Science and Technology – Grade 5 Understanding Matter and Energy</b>
<b>Curriculum Expectations</b>	<b>Learning Goals</b>
<p><b>Overall Expectation</b></p> <p>1. evaluate the social and environmental impacts of processes used to make everyday products</p> <p><b>Specific Expectations</b></p> <p>1.2 assess the social and environmental impact of using processes that rely on chemical changes to produce consumer products, taking different perspectives into account, and make a case for maintaining the current level of use of the product or for reducing it.</p> <p><b>Mathematics Expectations</b></p> <p><b>Overall Expectations</b></p> <ul style="list-style-type: none"> <li>• solve problems involving the multiplication and division of multi-digit whole numbers...</li> </ul> <p><b>Specific Expectations</b></p> <ul style="list-style-type: none"> <li>• solve problems that arise from real-life situations and that relate to the magnitude of whole numbers up to 100 000</li> </ul>	<p>This lesson will take approximately 2-3 periods, depending largely on the time given to discussions.</p> <p>At the end of this lesson, students will have taken into account some of the reasons people give for making the purchasing decisions they do. They will also be able to describe where some of the electronic purchased they make come from.</p> <p>Sample Learning Goal. I will be able to describe, from someone else’s perspective, the reasons for making certain purchases.</p>
<b>Instructional Components and Context</b>	
<p><b>Readiness</b></p> <p>Prior to this lesson students should have:</p> <ul style="list-style-type: none"> <li>• an awareness that many of the things we use in daily life have multiple components</li> <li>• an understanding that the life cycle of a product: includes manufacture, transport, purchase, use, and disposal of the product</li> </ul> <p><b>Terminology</b></p> <p>properties, matter, physical/reversible changes, chemical/irreversible changes</p>	<p><b>Materials:</b></p> <ul style="list-style-type: none"> <li>• BLM 1. The Cell Phone Questionnaire</li> <li>• BLM 2. Cell Phone Fact Sheet – From Purchase to Disposal</li> <li>• BLM 3. Cell Phones: What Do You Think?</li> <li>• large map of the world (e.g., roll-down type)</li> </ul> <p>Note: the lesson can continue without the map but having the map creates a much stronger visual.</p>

Minds On	
<p><b>Description:</b> A quick think-back to purchases made</p> <p><u>Think-Pair-Share (times two)</u></p> <ul style="list-style-type: none"> <li>• Optional: begin by telling students of a silly purchase you made</li> <li>• Ask students if they or anyone else in their family ever made that kind of purchase -- one they thought was going to be useful, but as it turned out was not.</li> <li>• Give them about 30 seconds to think on their own, then share, first with a partner then in small groups.</li> <li>• In a similar fashion, ask them if they or anyone in their family ever made a purchase that other family members thought was silly, but it turned out to be a very good purchase after all.</li> <li>• Following the discussions, let students know that they are going to begin looking more closely at one type of purchase made by many households – the cell phone. Let them know that they will be looking at cell phones from 3 different points of view: financial, environmental, and social.</li> </ul> <p><b>Notes to Teacher:</b></p> <ul style="list-style-type: none"> <li>• Sensitivity is required to avoid placing students in any kind of embarrassing situation when discussing purchases made.</li> <li>• Although the survey and lesson which follow use the cell phone as the device to be examined, it is possible to use other electronic devices (e.g., game systems, computer, television, etc.) or even allow students a choice of 2 or 3 devices. Doing so makes the follow-up questions somewhat more complicated, but “still do-able”.</li> </ul>	<p><b>AOL</b> Assessment <b>for</b> learning: Teachers use the Minds On portion of the lesson to assess students’ prior knowledge and misconceptions. This helps inform instruction for the Action and Consolidation phases. No formal evaluation required.</p>
Action!	
<p><b>Description:</b> Activity A – The Cell Phone Questionnaire (first day)</p> <p><u>Whole class</u></p> <p>First day – to prepare students for the questionnaire they will complete at home with an adult family member.</p> <ul style="list-style-type: none"> <li>• Hand out copies of BLM 1. The Cell Phone Survey</li> <li>• Read it over with students and ask if they have any questions.</li> <li>• Emphasize to them that the survey does not ask any personal information such as the price of the cell phone or what kind it is.</li> </ul>	<p> <b>DI</b> - It is essential to not inadvertently stigmatize students whose family may not have a cell phone. A strategy to use might be: “If your family does not have a cell phone, just answer imagining that you did, or answer with a different electronic device in mind such as a game system or a television.”</p>

## Action! (continued)

### Whole Class - Second day

- Combine student responses so that the information can be seen by all (e.g., overhead projector, document camera, chart paper, white board)
- Gather data on where cell phone was made by asking students to print on a sticky note the name of the country where their product was made. Ask them to print large.
- Using the large world map, have them come up and place the sticky note on (or near) the country where the product was made, trying not to place their note on top of another's note. This will provide a visual anchor for future discussions.

### Think-Pair-Share

- Before proceeding to the questions which follow, ask students, "What is the difference between a 'want' and a 'need'? And ask them to be prepared to give some examples.
- After giving them some think time, ask them to share with a partner then a larger group or the class.

### Whole class

- Once all the information is displayed, engage students in examining some of the data, periodically sharing with a partner and/or small group first as appropriate. Be prepared to allow for answers that do not reach consensus. Some questions that might stimulate discussion are:
  - Is a cell a cell phone a want or a need? Justify your answer?
  - Research shows that most cell phones in the United States are replaced after 18 months (1 ½ years). How does our data compare?
  - Are most people buying their phones outright, or as part of a plan? Why do you think this is so?
  - Were most phones still working when they were replaced?
  - What was the main reason people gave for purchasing/getting a new phone?
  - What do you think is the biggest reason people get a new phone?
  - Where were most of the phones made? Why do you think that is so?
  - What kinds of jobs are directly related to our use of cell phones?
  - What questions would you like to ask looking at the data?
  - What questions would you like to have added to the survey? Why?
  - What pattern do you see related to where the phone was made?
  - What could be the influences to this pattern?

### **Notes:**

- Since there status is often assigned to various products, sensitivity is required to avoid placing students in an embarrassing situation when discussing purchases made.
- After the discussion, provide students with the fact sheet (BLM 2) and read it over with them, ensuring they understand the information.

**AOL** Assessment **for** learning  
As students explore these questions, the teacher will be able to determine a) whether they seem able to consider multiple points of view, and b) some actions that might be needed to increase student awareness of other perspectives.



**DI** Some students will require assistance in understanding the information on the fact sheet. The use of related visuals might aid understanding.

Action! (continued)	
<p>As an alternate to providing them with a fact sheet, students could be grouped in pairs or triads and be asked to research each of the areas indicated by the subheadings. They could then teach the others in the class in a modified Jigsaw activity.</p> <p>One site that is somewhat text-heavy, but contains considerable information at a level many grade 5 students could understand can be found in the Ontario Education Resource Bank at:  <a href="https://download.elearningontario.ca/repository/14/1403530000/GRD5SCI-BLEU03A05/overview.html">https://download.elearningontario.ca/repository/14/1403530000/GRD5SCI-BLEU03A05/overview.html</a>. Information is presented in an interactive manner.</p> <p><b>(Note:</b> the data presented on this site may be somewhat dated as it uses 2008 data in some cases.)</p>	
Consolidation	
<p><b>Description:</b>  <u>Small groups</u></p> <ul style="list-style-type: none"> <li>The following question is posted on chart paper for students to answer:  <i>Research shows that the average cell phone is replaced after 18 months of use. If that is true, how much money will this class have spent on cell phones by the time you are in grade 9? Make the following assumptions:</i> <ul style="list-style-type: none"> <li>Each family represented by the students in this class has only 1 cell phone at a time.</li> <li>They begin their purchases this year.</li> <li>The average price of a cell phone is \$300.00</li> </ul> </li> <li>Have students plan and do rough calculations on ledger or scrap paper.</li> <li>Add an additional question: <i>What would the class have spent if we all had kept our phones for 4 years?</i></li> <li>Provide students with a sheet of chart paper on which to show their work in an organized way.</li> <li>Use a Math Congress type of approach for sharing student answers.</li> </ul> <p><b>Note to Teachers:</b> This problem becomes more open-ended (and perhaps more of a challenge) if students are required to make most or all of their own assumptions. Each member of the group should be able to justify their assumptions.</p> <p><u>Small groups, then individually</u></p> <ul style="list-style-type: none"> <li>Hand out BLM 2 Cell Phone Fact Sheet.</li> <li>Students read over BLM 2 Cell Phone Fact Sheet together, and discuss the facts in small groups.</li> <li>Questions of clarification are then asked.</li> <li>Consider having students share their thoughts about BLM 3 question sheet with one another before writing.</li> <li>Individually, students complete and submit / present their responses to BLM 3 “So What Do You Think?”</li> </ul> <p><b>Note to Teachers:</b> Rather than providing students with a fact sheet, if time allows, students might research cell phone use and related issues themselves. This would enable the assessment of several Language expectations.</p>	<p><b>AOL</b> Assessment of learning:  Teachers can monitor and make anecdotal notes on students’ ability to problem solve and communicate their thinking mathematically.</p> <p> <b>DI</b> The use of paragraph frames might be of benefit for some (e.g., In my opinion we should/should not keep using cell phones the way we do. First of all, ...Secondly, ...Another reason is ... Therefore, ....)</p> <p><b>AOL</b> Assessment as learning:  Co-creating criteria for what a successful answer might look like will benefit many students. Allowing them time to have their work critiques by classmates (and critiquing the work of other students) will allow them to actively engage in assessment as learning.</p> <p><b>AOL</b> Assessment of learning:  Students will submit / present their responses to BLM 3</p>



## Lesson 1 Black Line Master      Name(s): \_\_\_\_\_

### BLM 2 – Cell Phone Fact Sheet: From Purchase to Disposal

#### Cell Phones – How Many Are Out There?

- In 2002 there were about 1 billion cell-phone users. By 2010 there were about 5 billion (5 000 000 000) users.<sup>1</sup>
- Many jobs are created in the manufacturing, transporting, and sale of cell phones.
- The true cost of a cell phone is often hidden in complicated-looking phone plans.

#### From Chemical Changes to Cell Phones

- There are many chemical changes needed to turn raw materials into cell phones. Here are just a few of them:
  - Phone case or shell: petroleum products are turned into plastics
  - Metals components: chemicals are used to extract and refine the metals
  - Batteries: chemical reactions allow the battery to produce electricity and chemical reactions can cause harm when batteries leak
  - Of 36 phones tested by a non-profit group in 2011, 100% of them “contained chemical hazards such as lead and mercury”. Only 6 were rated as being of “low concern”. They also found newer phones were safer than older ones.<sup>2</sup>

#### E-Waste

- Where does your cell phone go after it is disposed of?
- Most go into landfills – the worst possible place. In 2008 about 90% of all phones disposed of ended up in landfills – over 126 million phones in the United States alone!
- Landfill operators are responsible for trying to make sure the landfill is operated safely.

#### Dismantling to Disease?

- Many that do get dismantled go to villages in Asia where they are taken apart for the metals they contain. Dismantling has been going on for over 10 years and in some cases the soil is now contaminated with many metal toxins that have likely come from cell phones. These metals cause chemical and physical changes to the body and have been linked to many serious health problems including cancer, birth defects, and damage to the nervous system.

#### Recycle and Reuse

- There are several programs to reduce the number of cell phones that wind up in landfill sites or are dismantled. These programs try to redirect phones to others that can use them. Bell Canada, Grameen Phone, and Canada’s Charitable Recycling Program are just a few.

#### Taking Action

- Consumers’ dissatisfaction with over-packaging convinced Nokia to reduce its cell phone packaging by over 50%, resulting in less garbage and less fuel needed for transportation.
- Samsung and some other companies are producing phone cases made without the use of petroleum products.<sup>2</sup> What might happen if consumers demanded even more?

Except where noted, source of information: “The Life Cycle of a Product”, (Ontario Education Resource Bank)

<sup>1</sup> (“Cellular Telephone.” *Grolier Multimedia Encyclopedia*. Grolier Online, 2013. Web)

<sup>2</sup> “Cell Phones All Contain Toxins: Older Ones the Most” Environment News Service (ENS) 2012. Web

**BLM 3 – Cell Phones: What Do You Think?**

Use the Cell Phone Fact Sheet, the discussions held in class, the problems we looked at and any other research you would like to do to complete the questions below:

1. Should people

- a) keep buying and using cell phones as much as they do?
- b) increase their use of cell phones?
- c) reduce their use of cell phones and the number of phones they buy?

Answer this question from **any 3** of the following perspectives:

- you are a teenager
- you are a parent of a teenager
- you are a cell phone manufacturer or sales person
- you are the operator of a landfill site
- you are a person who cares about the environment

2. Now, you are you. Answer the following questions from your own personal point of view. Give your answers careful thought and make as strong an argument for your case as possible.

- a) Should people keep buying and using cell phones as much as they do, increase their use of cell phones, or try to reduce their use of cell phones and the number of phones they buy? Justify your answer.
  
- b) Regardless of your answer to the above question, what other changes would you like to see people make to ensure that cell phones are made, used, and disposed of in responsible ways? Explain your reasoning?