The 5 R’s:
Recycle, Reduce, Rethink, Reuse and Recreate

By: Emily Scott, Ashley Fisher, Cat Costa, Bella Flammia & Kiloran Fensom
Part 1: Essential Question

We have created a unit plan based around the essential question that asks students to consider if their actions are merely one drop in the ocean? We would like students to leave this unit with an understanding that their individual actions can and do make a large difference, whether they be for a positive or negative end effect. We want students to deeply understand the fact that they really can change the world through one conscious action at a time.

This unit plan has been prepared for a Grade 6 Science and Technology class and is based on the strands named Understanding Matter and Energy and Understanding Life Systems. Our essential question requires knowledge and understanding of the five R’s: Recycle, Reduce, Rethink, Reuse and Recreate. Our essential question follows Cooper’s suggestions in that “the meaning of texts often goes beyond the words on the page” and that “there are as many interpretations of a text and there is no one "right" interpretation” (p. 222). According to this idea, we are prepared for students to interpret this idea of far reaching consequences of actions in a variety of ways, and we will encourage them to express what they have learned in a way that feels right to them. Further, this essential question is curriculum based, requiring students to think critically and rationally about the world they live in and about the reality that they do to affect it, for better or worse.

Monday students will gain understanding of composting and knowledge of the green bin. On Tuesday there will be a focus on reducing consumption which initiates student thinking toward the integrated nature of earth’s systems and how alterations of a single part of that system has reverberating effects, which can be detrimental to biodiversity, including human survival. Next, Wednesday’s class will focus on Rethink. As global warming is a local and global issue, students are taught that their individual choices such as decreasing energy consumption have a rippling effect in their local community and worldwide. Thursday’s lesson conceptualizes the idea of Reusing materials in students’ own lives. By sensitizing students to Freganism, the art of re-using things and the life cycle of an object, they become more conscious of the interconnectedness of the actions they pose and the sustainability of the world that they live in. By Friday, students will have learned about the four R’s preceding Recreate. By this point they can start to see different options for what they may have previously regarded as “junk.” This lesson encourages them to get creative and resist the consumerist mentality that is so aggressively popular in contemporary western society.

Finally, the Ministry of Education writes that “students not only can look for ways in which people might come to agreement on how to minimize the negative impact of their actions, but also will be able to make more informed decisions about their own positions and about action they can take” (2007). This idea alone is reason enough to conduct this unit.
1. What actions do I take part in that affect the natural environment? Students should take note of anything that would answer this essential question throughout the unit.
2. It is important that students know the 5 R’s and can provide a basic example about each of them.
3. Students should be able to be able to understand how their everyday actions can promote positive change in their environment

Overall Expectations Met:

Understanding Life Systems
1. Assess human impacts on biodiversity, and identify ways of preserving biodiversity
3. Demonstrate an understanding of biodiversity, its contributions to the stability of natural systems, and its benefits to humans

Understanding Matter and Energy
1. Evaluate the impact of the use of electricity on both the way we live and the environment
3. Demonstrate an understanding of the principles of electrical energy and its transformation into and from other forms of energy
Specific Expectations Met:

**Understanding Life Systems**
1.1 Relating science and technology to society and the environment

1.2 Assess the benefits that human societies derive from biodiversity and the problems that occur when biodiversity is diminished

2.1 Follow established safety procedures for outdoor activities and field work

3.2 Demonstrate an understanding of biodiversity as the variety of life on earth, including variety within each species of plant and animal, among species of plants and animals in communities, and among communities and the physical landscapes that support them

3.5 Describe interrelationships with species, between species, and between species and their environment and explain how these interrelationships sustain biodiversity

3.6 Identify everyday products that come from a diversity of organism

**Understanding Matter and Energy**
1.1 Assess the short- and long-term environmental effects of the different ways in which electricity is generated in Canada (e.g., hydro, thermal, nuclear, wind, solar), including the effect of each method on natural resources and living things in the environment

1.2 Assess opportunities for reducing electricity consumption at home or at school that could affect the use of non-renewable resources in a positive way or reduce the impact of electricity generation on the environment

2.4 Design, build, and test a device that produces electricity

2.5 Use technological problem-solving skills (see page 16) to design, build, and test a device that transforms energy into another form of energy in order to perform a function

2.6 Use appropriate science and technology vocabulary

3.4 Describe how various forms of energy can be transformed into electrical energy

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Part 2: Determine Acceptable Evidence

**Diagnostic Assessment**

For everyday of the unit, the children will be introduced to the appropriate R word (recycle, reduce, rethink, reuse, and recreate). All the words will be displayed each day and the word of the day will be highlighted (See R Word Sheet). The teacher will ask students if they can explain what the concept means to the remainder of the class. If it appears that the students are not familiar with the concept the teacher can spend more time introducing the concept and the terms relating to it.
The 5 Rs:
Rethink
Reduce
Reuse
Recycle
Recreate
Formative Assessment

Throughout the second lesson, the students will participate in partnered discussions and complete an assignment either in class, or at home if not completed during class – See Tuesday’s Lesson, Lesson 2 Appendices A-C. This assignment is devised as a formative assessment to demonstrate students’ understanding of the interconnectivity between human actions, environmental sustainability and biodiversity. The work submitted by students will help the teacher determine whether or not the unit and/or lesson plans require reiteration or modification prior to continuing forward.

Formative Assessment Rubric

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Level 1</th>
<th>Level 2</th>
<th>Level 3</th>
<th>Level 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Draws From Lesson</td>
<td>Limited reference to reduce lesson</td>
<td>Some reference to reduce lesson</td>
<td>Considerable reference to reduce lesson</td>
<td>Thorough reference to reduce lesson</td>
</tr>
<tr>
<td>Makes Interconnections</td>
<td>Limited ability to connect consumption, environment and biodiversity</td>
<td>Some ability to connect consumption, environment and biodiversity</td>
<td>Considerable ability to connect consumption, environment and biodiversity</td>
<td>Thorough ability to connect consumption, environment and biodiversity</td>
</tr>
<tr>
<td>Demonstrates Understanding</td>
<td>Limited understanding of why we should reduce</td>
<td>Some understanding of why we should reduce</td>
<td>Considerable understanding of why we should reduce</td>
<td>Thorough understanding of why we should reduce</td>
</tr>
</tbody>
</table>

Culminating Assessment: Assessment of Learning

The following assessment tool has been developed to assess student’s learning of the Unit which presents the five R’s, that is Recycle, Reduce, Rethink, Reuse, and Recreate. Additionally, let us note that this assignment will be given to the students on Friday at the end of class. Monday through Friday students will engage in activities to further their knowledge and understanding of the concepts which form the foundation for conscious, environmentally aware students.

In order to assess what and how students learned from the lessons over the course of the week they will be presented with the task of designing and producing a brochure for Grade 5 students across Canada. The brochure will be used as an educational tool to inform younger students about how and why they should work towards having a positive impact on minimizing waste. It should contain words, pictures, references and anything else the student can think of to deepen its impact. Students will be presented with the following assignment outline:
Dear Class,

After hearing about the fantastic, recycled instruments you made the Government of Canada has decided to give you a special task. You have been hired as Recreating Engineers. Your mission is to create a brochure for Grade 5 students in other provinces. The brochure is intended to teach them what you have learned in the past unit, incorporating such ideas as Recycle, Reduce, Rethink, Reuse and most recently Recreate. It is not your job to explain absolutely everything you know on these subjects, but the students should be able to pick out the basic ideas and it should definitely motivate them to want to learn more.

Your task is to create a brochure that educates, explains, and instructs Grade 5 students on such ideas as recycling, waste management, waste reduction, reinventing junk, and whatever else you think is important from the last unit. In addition to what your brochure says, you will be in charge of deciding the best format to present your information. You remember being in Grade 5 last year, so try and think about what would have appealed to you a year ago. Keep in mind that different formats work best for brochures with a lot of text, a lot of pictures, small sections of text, lists, charts, or maps. It will be up to you to decide on a format that works best for your information and the style in which you choose to present it.

As project manager you will be expected to keep a log book detailing the progress of this assignment. It does not have to follow any certain format and can be as detailed or loose as you like. The only requirement is that you do make some note of your thought process throughout the course of the assignment. Consider the following steps:

1. First, determine what you need to accomplish with your brochure. What are you hoping to explain? What task should the grade 5 students be able to accomplish after reading it?
2. Next, make point form notes describing what you know about the topic(s) off the top of your head.
3. Look at sample brochures that we have collected in class while learning about the 5 R’s. Note what kind of style appeals to you most.
4. Research. Use the materials provided in the classroom, your own knowledge, as well as information from other sources to start organizing what you know about the topics you will be presenting. If you are explaining a process (such as recycling), will grade 5 students need any background information? If describing a task, such as reinventing uses for junk, will you need to list parts, supplies, or steps in a chronological order?
5. Consider the consequences of going against the information you are providing. What effects would this have on biodiversity and the environment? Why is the content of this brochure important?
6. Sketch out some rough ideas of how you want your brochure to look. Brainstorm. Edit your text to fit your chosen layout. Experiment. Use your colourful imagination!
7. Put it together! Make changes as you see fit. You are the boss. Make this something you are proud of and believe will make a difference.

8. Once you have submitted your brochure, we will schedule a time to have a short one on one conversation with one another. You will be encouraged and expected to verbally reflect on the process of making your brochure and on what you have learned. Come having thought about such questions as what you would do differently next time? What do you think you did best this time?

Remember, the purpose of the brochure is to teach students about something they do not know about but instead of reading an entire textbook, they want an overview of the subject. You will be assessed on how well you have presented the information you deemed to be most important and if you met all the required criteria (see below). While there are many different ways of doing this successfully, as long as most grade 5 students would agree that your brochure gives them the information they were looking for, was easy to follow, and was interesting enough to make them want to know more information, then you have successfully accomplished your mission.

The brochure should be an informative, educational, motivating read that presents the information in a clear, visually appealing, and organized manner. Present the students with the most significant facts. If done properly, it should be enough to make them want to follow the resources you have included to find out more.

You do have creative control, but your brochure MUST adhere to the following checklist:

- have a creative cover that includes an eye catching title
- be interesting for the reader to look at [consider your placement of information, sizing, and colours]
- include a “Did you Know?” section
- address the consequences of ignoring the notions of the 5 R’s
- include visual and written components
- be easy to read, visually appealing, and well organized
- include a minimum of three suggestions for reusing products that are commonly thrown away. For example, suggest to students that they reuse cans to store pens and pencils. They can even paint the cans or cover them in recycled paper to decorate them.
- include a minimum of three items that are often NOT recycled, but that actually can be
- include at least one link [either a book, organization, or website] that can be referred to for more information
## Rubric

### Science & Technology- Grade 6

<table>
<thead>
<tr>
<th>Categories</th>
<th>Level 1 Limited</th>
<th>Level 2 Some</th>
<th>Level 3 Considerable</th>
<th>Level 4 Thorough</th>
<th>Comments/Reflections</th>
</tr>
</thead>
<tbody>
<tr>
<td>Student displays knowledge and understanding of content they are presenting in the brochure through clear, concise, thoughtful statements</td>
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<tr>
<td>Thinking and Investigation: Student uses initiative to plan and strategize (identifying the problem, formulating statements and questions to provoke thought in readers)</td>
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<tr>
<td>Student demonstrates thought processes and brainstorming in their log book</td>
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<tr>
<td>Student uses critical/creative thinking processes, skills, and strategies to effectively communicate their point</td>
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<tr>
<td>Communication: Student is able to express and organize their ideas and information in a clear, logical, appealing manner in their brochure</td>
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<tr>
<td><strong>Student is able to express their ideas and information in visual forms with effectiveness</strong></td>
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<tr>
<td><strong>Student is able to communicate their learning process with clarity and effectiveness</strong></td>
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<tr>
<td><strong>Application:</strong> <strong>Student is able to make connections between science, society, and the environment</strong></td>
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<tr>
<td><strong>Student proposes courses of practical action to deal with problems relating to science, technology, society, and the environment</strong></td>
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<tr>
<td><strong>Student has met all the requirements of the aforementioned checklist</strong></td>
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</table>

*You are expected to adhere to the above checklist and rubric.*

Overall, the purpose of this unit is to get students thinking critically about the environment and how their everyday actions affect its sustainability. We believe that this assignment will be effective in making these ideas last because students have to decide on what the most important information from the unit is in order to create an effective brochure. Further, students have a chance to demonstrate their understanding in a variety of mediums.
Monday: Lesson 1: Recycling Earth Worm Mini Composts

Title: Recycling: Earth Worm Mini Composts  
Subject/Course: Science and Technology  
Time: 1 hour  
Strand: Understanding Life Systems  
Grades: 6

Lesson Description

Students will test their knowledge of the recycling bin system. In doing so they will be introduced further to the green bin and composting. In a teacher led class discussion, the students will discuss what they know about earth worms and view images and videos about moulding food and composting. They will investigate the worm’s (the decomposer’s) composition and habitat through looking at worms and building earthworm mini composts. Through these mini composts the students will better understand different habitats that can occur but may not be discussed or observed as much such as the worm’s habitat.

Students will gain knowledge on the habitats of worms and can extrapolate this knowledge to understand how composting works. Although the green bin composting is industrial and thus composes other organic materials such as meat and cat litter, this lesson will give the basic knowledge to the students so they can analyze industrial composting and its environmental affects in a later lesson.

Stage 1: Desired Results

Fundamental Concepts/Skills

- Understand the importance of the green bin in reducing the amount of organic waste at the dump and giving nutrients to the soil
- Identify and re-create the habitat of earthworms
- Basic knowledge of composting

Big Ideas/Essential Question

- How does composting work and why is it important?

Ontario Curricular Overall Expectation

1. assess human impacts on biodiversity, and identify ways of preserving biodiversity

Ontario Curricular Specific Expectation

- 2.1 follow established safety procedures for outdoor activities and field work
- 3.5 describe interrelationships within species, between species, and between species and their environment, and explain how these interrelationships sustain biodiversity

Lesson Goals

- Understand the importance of the green bin in reducing the amount of organic waste at the dump and giving nutrients to the soil (what is to be put in the green bin and why)
- Identify and re-create the habitat of earthworms
- Gain basic knowledge of composting (bacteria and insects such as worms decompose organic material)

Key concepts and/or skills to be learned/applied:  
- New words or words that may need to be reviewed: organic, inorganic, decompose, bacteria, aerate, worm castings
- Apply the knowledge that a habitat consists of an animal’s needs

Background Knowledge:

- Concept of habitat
- Knowledge of what plants need to grow (i.e. food=compost)
- Basic knowledge of the recycling bin system
- Knowledge of food chains
### Stage 2: Planning learning experience and instruction

<table>
<thead>
<tr>
<th>Student Groupings</th>
<th>Instructional Strategies</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Whole class</td>
<td>• Cooperative learning</td>
</tr>
<tr>
<td>• Small groups</td>
<td>• Discussion (teacher led)</td>
</tr>
<tr>
<td>• Individual</td>
<td>• Experimental learning</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Materials</th>
<th>Resources/References</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Images of different types of household waste</td>
<td>• The Ontario Curriculum Grades 1-8 Science and Technology 2007 Grade 4</td>
</tr>
<tr>
<td>• 1 of each: blue bin, green bin, grey bin, garbage or alternatively 4 containers marked as such</td>
<td>• Nature’s Recyclers Activity Guide: <a href="http://dnr.wi.gov/org/aw/wm/publications/anewpub/WA1425.pdf">http://dnr.wi.gov/org/aw/wm/publications/anewpub/WA1425.pdf</a></td>
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<tr>
<td>• Jars (one for each group of students)</td>
<td>• What goes in the Green Bin?: <a href="http://www.toronto.ca/greenbin/pdf/infocard/card.pdf">http://www.toronto.ca/greenbin/pdf/infocard/card.pdf</a></td>
</tr>
<tr>
<td>• Soil</td>
<td>• Earthworm overview: <a href="http://www.youtube.com/watch?v=Xmtdm-tfnCA">http://www.youtube.com/watch?v=Xmtdm-tfnCA</a></td>
</tr>
<tr>
<td>• Newspaper or paper shredding</td>
<td>• Earthworms hatching: <a href="http://www.youtube.com/watch?v=OR5Pcg86RdA">http://www.youtube.com/watch?v=OR5Pcg86RdA</a></td>
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<tr>
<td>• Magnifying glasses (one per group if possible)</td>
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<td>• Spoons</td>
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<td>• Water</td>
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<td>• Thermometer</td>
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<tr>
<td>• Worms (either from a previous worm hunt at recess but if the conditions are not right, from a bait shop)</td>
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</tbody>
</table>

### Accommodations
- Small groups can be created across ability levels to place stronger students with weaker students
- For advanced classes: a discussion surrounding the temperature of the composts can occur thus encouraging them to do the extra step of checking the temperature of their mini composts

### Stage 3: Learning experience and instruction

**Motivational Hook (15 MINS):**

Ask students to discuss the 5 *R*-words. Display the five R-words (rethink, reduce, reuse, recycle and recreate) on the overhead and highlight recycle (See 5 R’s Sheet). Ask if students can define this word. Introduce this word as today’s lesson theme

Recycling Bin Game: place the images of waste in the appropriate container (ie. blue bin, grey bin, green bin, or garbage bin). Can be played as a team relay as well.

After a quick class discussion about where students placed the items and why, the teacher can know more about the student’s knowledge about recycling and in particular, the green bin.
Open (_10_MINS):

- What does decompose mean?
- What animals are decomposers? (Possible answers: vultures, wolves, worms, dung beetles, etc.).
- Today we will be focusing on worms as decomposers.
- Where do worms live?
- Does anyone know what worms eat? (Possible answers: soil, rotten food. Real answer: bacteria that is decomposing the rotten food).
- Besides decomposing the waste food and dead plants, what is another positive thing that worms do for the soil?
- Watch the first minute of Earthworm overview. Pause when it mentions aerate and explain. Ask the children what are three things they learnt from the film.
- Watch the first two minutes of Earthworms hatching. This film will explain to the students how earthworms are born and that direct sunlight hurts them. Ask the children what are three things they learnt from the film.

Body (_25_MINS):

- In small groups or individually students can examine the worms.
- In small groups allow the students to brainstorm how they would create a habitat for worms. (Some students may have done this at home so when making groups put more knowledgeable children who answered the questions in the opening with children who may not have known much about worms or who are having trouble with the material). Allow the students to see the material they will be working with so they can make an informed hypothesis about what should be included in their compost.
- See the attached activities Earthworm Castles and Mini-Composts in Nature’s Recyclers Activity Guide for further information and instruction.
- Individually the students will rationalize in writing how they constructed their compost and why that way. This activity can be taken home to complete if running out of time.

Close (_10_MINS):

- Suggest that the groups create a system of how they would like to monitor the compost. Do they want to do it as a group or have a schedule of one group member monitoring each day?
- As a class, have a brainstorming session about what sorts of items should be monitored?
- Have a sharing circle where every child says one thing they learnt in the lesson.
- Pose the question: What is different between what goes into the green bin and what goes into composts? The students are to ponder this and ask their parents at home.

Link to Future Lessons

- As a part of Reduce, Reuse, Recycle, and Rethink Unit
- Further investigation into the soil as a habitat
- Become involved in creating vermin composters at the school for in the classrooms if there is no cafeteria

Assessment

- Formative: observation
- Entries into the compost monitoring journal: After you have finished constructing your compost I would like the members of your group to come up with a plan to monitor the compost for the next week. What kind of things will you be looking for?
- Written report: Individually, please write a short report describing how your group constructed the compost and explain why you did it that way. In your report include three sentences explaining why composting is good for the environment.

### Extension Activities

If students are finished the activity with extra time left, an extra activity can be posed. Students can create a public service announcement or advertisement about green bins, in particular what should go in them and why.

The announcements can be in the form of an oral presentation, podcast, or video. The advertisements can be posters which can be posted over the green bins in the school or sent to the city or municipal offices to be used if the green bin is adopted.

If the green bin has not yet been adopted by the students’ city or municipality, students should use their knowledge of compost and its positive effects on the environment to write persuasive letters. The letter will practice persuasive, formal writing and have an authentic meaning attached as it will have an effect outside the classroom.

### Reflective Notes

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The 5 R’s: Recycle, Reduce, Rethink, Reuse & Recreate

Publication Year: 2010
Appendix A: Images for Recycling Bin Game
Tuesday: Lesson 2: Reducing Global Consumption

Title: Reducing Global Consumption
Subject/Course: Science
Grade: Six
Time: 60 minutes
Strand: Understanding Life Systems: Biodiversity

Lesson Description
The lesson will begin with a read-a-loud to get students thinking about reducing consumption. Through guided-learning, students will be introduced to key terms – See Appendix A Below. Each student will go online and follow the prompts to complete the task and print out their results. In pairs students will compare and contrast their footprints, and discuss the energy-savers suggested in the book and connect them to their individual footprints – See Appendix B Below. Students will partake in an activity, demonstrating how to reduce their own consumption and explain how this will help the environment – See Appendix C Below. From this lesson, students will gain understanding of how over-consumption negatively affects the environment and biodiversity, as well as build insight into the ways they can reduce their own consumption patterns.

Stage 1: Desired Results

Fundamental Concepts/Skills
Understanding Life Systems: Sustainability and Stewardship. Because all living things are connected, maintaining diversity is critical to the health of the planet; humans make choices that can have an impact on biodiversity.

Big Ideas/Essential Question
- How can we reduce our consumption, and therefore endorse environmental sustainability and biodiversity?

Ontario Curricular Overall Expectation
1. Assess human impacts on biodiversity, and identify ways of preserving biodiversity
3. Demonstrate an understanding of biodiversity, its contributions to the stability of natural systems, and its benefits to humans

Ontario Curricular Specific Expectation
1.2 Assess the benefits that human societies derive from biodiversity and the problems that occur when biodiversity is diminished
3.2 Demonstrate an understanding of biodiversity as the variety of life on earth, including variety within each species of plant and animal, among species of plants and animals in communities, and among communities and the physical landscapes that support them
3.5 Describe interrelationships with species, between species, and between species and their environment and explain how these interrelationships sustain biodiversity

Lesson Goals
- Demonstrate understanding of consumption patterns
- Link consumption patterns to environmental degradation and diminishing biodiversity
- Explain importance of biodiversity
- Gain insight into why society should reduce consumption

Key concepts and/or skills to be learned/applied:
- Understand terminology surrounding consumption reduction
- Tabulate individual ecological footprints
- Discover different ways to reduce consumption

Background Knowledge:
- Awareness that the world has limited resources
- Can list the 5Rs – rethink, reduce, reuse, recycle and recreate
- Aware of groupings of biodiversity (i.e. plants)
### Stage 2: Planning learning experience and instruction

<table>
<thead>
<tr>
<th>Student Groupings</th>
<th>Instructional Strategies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Whole Class</td>
<td>Guided, Shared and Individual Learning</td>
</tr>
<tr>
<td>Paired Groupings</td>
<td>Discussion (teacher and student-directed)</td>
</tr>
<tr>
<td>Individual</td>
<td>Experiential Learning</td>
</tr>
<tr>
<td></td>
<td>Reflection</td>
</tr>
</tbody>
</table>

#### Materials

- *The Earth Book* by Todd Parr
- Overhead projector
- Template of key concept and related terms
- Computers with internet access and a printer
- Prompting questions template
- Activity template
- Writing and coloring utensils

#### Considerations

- *The Earth Book* is below grade six literacy levels, but excellent for instilling understanding of consumption impacts and reducing ecological footprints
- It is suggested that the teacher complete the Zero Footprint Kids Calculator task, prior to class

#### Accommodations

- Visually impaired students may require either a braille keyboard or human assistance in both using the computer and/or completing the written activity

### Stage 3: Learning experience and instruction

**Motivational Hook (5 MINS):**

- Ask students to discuss the 5 *R*-words. Display the five R-words (rethink, reduce, reuse, recycle and recreate) on the overhead and highlight *reduce* (See 5 R’s Sheet). Ask if students can define this word. Introduce this word as today’s lesson theme
- A read-a-loud is performed by the teacher of *The Earth Book* by Todd Parr. Students are allowed to sit in any comfortable space and/or position during the read-a-loud, as long as they are attentive

**Open (15 MINS):**

- Ask students to return to their individual seats
- Display the term template on the overhead, including concepts such as limited resources, consumption, ecological footprint, biodiversity and sustainability (See Appendix A)
- Go over each term, asking if students have heard it before and if so, to try to define it. Write definitions on the overhead and ask students to copy them into a notebook
- Take any questions students may have in regard to the key terms, prior to continuing the lesson

**Body (33 MINS):**

- Provide students with structure for the remaining portion of class: tabulating individual ecological footprints (10min), partnered discussion of results and connecting those results to reducing consumption (8min); activity on template demonstrating understanding of lesson (15min)
- Assign students to a computer and have them go to the Zero Footprint Kids Calculator website (See References). Each student is to follow the prompts on the website and answer questions honestly, in order to tally their individual ecological footprints. Pace throughout the classroom to monitor student progress, stopping where facilitation is required
Once students have completed all steps, click on the *Total* tab and have students print out the results. Put prompting questions template on the overhead to assist shared learning between students (See Appendix B)

- Partner students as results are printed, in whichever order the printed documents come out. Student pairs are to sit together and discuss their results, using overhead prompts
- While discussion is taking place, hand-out the activity template to each student (See Appendix C)
- Explain to students that they are to write a sentence or make illustrations in response to each question. If students choose to draw, then the illustration must demonstrate understanding
- For this portion of the lesson students can work alone or with partners, but each must complete and submit individual work

**Close (7 MINS):**

- Have students return to individual desks and initiate guided class discussion. Invite students to make comments on what they have learned today
- Prompt students to explain the impacts of over-consumption to the environment, how these impacts lead to environmental degradation, and how degradation negatively affects biodiversity
- If students have not completed Appendix Four, then they are required to finish it for homework and submit it the following day for grading
- If students finish early, then they can discuss their worksheets with others to compare examples

**Link to Future Lessons**

- Incorporate this lesson on *reducing* into lessons focusing on the other four *Rs* – *rethink, reuse, recycle and recreate*
- Have students visit other classrooms to talk about reducing consumption and ecological footprints
- Create a collage of class footprints by having students draw inside their individually traced feet
- Connect to Understanding Matter and Energy or Understanding Earth and Life Systems strand

**Assessment**

- Assessment would occur through observation of student partnered discussions, clarity of understanding on submitted worksheet, and demonstration of comprehending key concepts during closing discussions (Wiggins & McTighe, pp.1)
- During activity, take note of any observations that demonstrate learning and/or understanding
- Worksheet is to be submitted in class or the following day for assessment
Appendix A

Limited Resources:

Consumption:

Ecological Footprint:

Biodiversity:

Sustainability:
Discussion Question Ideas

1. How many earths does your consumption pattern require?

2. How does your footprint compare to the Canadian average? To your partner?

3. How would your consumption affect the environment?

4. How would your consumption affect global biodiversity?

5. How could you reduce your consumption?
Reducing My Ecological Footprint

* Use the space below to write sentences or make illustrations in response to each question. If you choose to draw, then the illustration must demonstrate understanding.*

1. How many earths does your ecological footprint require?
2. Based on the information you put into the Zero Footprint Calculator, what is one “bad-habit” you have, in terms of consumption patterns?
3. What is one way that your bad-habit negatively affects the environment?
4. How would this negative environmental impact affect biodiversity?
5. How could you reduce your consumption, or lower your ecological footprint?
### Wednesday: Lesson 3: Rethink Energy Consumption

| **Title:** Rethink: Energy Consumption | **Subject/Course:** Science | **Time:** 60 minutes 
| **Strand:** Understanding Matter and Energy | **Grades:** 6 |

#### Lesson Description

The students will be given an introduction into the environmental impacts related to high energy consumption and high rates of burning fossil fuels (coal, oil and gas). Students will be introduced to renewable and non-renewable resources for power. They will be introduced to alternative forms of energy and how using more renewable power sources may be more beneficial to the environment. Students will have the opportunity to observe wind power and investigate where they would place a wind turbine at their school.

#### Stage 1: Desired Results

<table>
<thead>
<tr>
<th><strong>Fundamental Concepts/Skills</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Energy</td>
</tr>
<tr>
<td>• Systems and Interactions (Other forms of energy can be transformed into electrical energy),</td>
</tr>
<tr>
<td>• Sustainability and Stewardship (Electrical energy plays a significant role in society, and its production has an impact on the environment, Society must find ways to minimize the impact of energy production on the environment)</td>
</tr>
</tbody>
</table>

#### Big Ideas/Essential Question

- Energy resources are either renewable or non-renewable
- Conservation (reducing or revaluing our use of energy and resources) is one way of reducing the impacts of using energy and resources, as well as shifting to more reliance on renewable resources
- Energy can neither be created nor destroyed, but it can be transformed

#### Ontario Curricular Overall Expectation

1. Evaluate the impact of the use of electricity on both the way we live and the environment;
2. Demonstrate an understanding of the principles of electrical energy and its transformation into and from other forms of energy

#### Ontario Curricular Specific Expectation

1.1 Assess the short- and long-term environmental effects of the different ways in which electricity is generated in Canada (e.g., hydro, thermal, nuclear, wind, solar), including the effect of each method on natural resources and living things in the environment
1.2 Assess opportunities for reducing electricity consumption at home or at school that could affect the use of non-renewable resources in a positive way or reduce the impact of electricity generation on the environment
2.4 Design, build, and test a device that produces electricity
2.5 Use technological problem-solving skills (see page 16) to design, build, and test a device that transforms energy into another form of energy in order to perform a function
2.6 Use appropriate science and technology vocabulary
3.4 Describe how various forms of energy can be transformed into electrical energy

#### Lesson Goals

- For students to be able to distinguish between renewable and non-renewable resources and to critically evaluate the various forms of energy (ex. Coal, nuclear, oil, wind, natural gas, solar, biomass, geothermal, water)
- For students to foster an understanding of renewable and non-renewable resources, understanding our present society requires a shift from non-renewable to renewable in order to be sustainable
- For students to feel like an engaged citizen and that they have the power to make a difference

<table>
<thead>
<tr>
<th>Key concepts and/or skills to be learned/applied:</th>
<th>Background Knowledge:</th>
</tr>
</thead>
<tbody>
<tr>
<td>How our energy consumption habits and what types of energy we consume impact the environment</td>
<td>Can assess uses of energy at home, school and in the community</td>
</tr>
<tr>
<td>Students will explore devices that convert electricity to other forms of energy</td>
<td>Human activities have an impact on all habitats, communities and the overall health of our environment</td>
</tr>
<tr>
<td>How we use electricity and how we will continue to meet the demand for it</td>
<td>Electricity is a form of energy that students encounter every day</td>
</tr>
<tr>
<td>Energy conservation and alternate ways of producing it</td>
<td>Renewable vs Nonrenewable resources</td>
</tr>
<tr>
<td>Renewable vs Non-Renewable Energy</td>
<td>Understand that energy is something needed to make things happen</td>
</tr>
<tr>
<td>Compare and contrast nuclear energy to wind power</td>
<td>Different forms of energy are used in daily life</td>
</tr>
<tr>
<td>Determine areas of which the greatest wind power can be obtained</td>
<td>Interdependence of humans and their environment</td>
</tr>
<tr>
<td>Applying the scientific method</td>
<td>The health of our habitats and environment is directly related to our humans actions, and the health of those habitats and the environment effects our quality of life (we need plants, animals, habitats and our environment for survival)</td>
</tr>
<tr>
<td>Scientific method</td>
<td>Human actions impact the quality of air and water, and the quality of air and water has an impact on living things</td>
</tr>
<tr>
<td>Writing and oral literacy skills</td>
<td>Changes to habitats can affect plants and animals and the relationships between them</td>
</tr>
<tr>
<td>How society can become more sustainable</td>
<td>Plants receive energy from the sun, the sun produces heat (therefore, the sun can be used as an energy source)</td>
</tr>
<tr>
<td></td>
<td>Scientific inquiry/experimentation skills; Scientific vocabulary</td>
</tr>
</tbody>
</table>

**Stage 2: Planning learning experience and instruction**

<table>
<thead>
<tr>
<th>Student Groupings</th>
<th>Instructional Strategies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Begin as a large group</td>
<td>Open with a discussion about energy consumption</td>
</tr>
<tr>
<td>Break into groups of 4 (however each individual student must fill out their own worksheet)</td>
<td>Discuss where we receive our energy from</td>
</tr>
<tr>
<td>Come back together as a group to have a group discussion</td>
<td>Discuss various forms of renewable and non renewable energy sources; Discuss advantages and disadvantages to some forms</td>
</tr>
<tr>
<td>Finish individually for homework what was not completed in class</td>
<td>Have students make a windsock in groups of 4</td>
</tr>
<tr>
<td></td>
<td>To make Windsock: have sleeves of shirt cut off prior to lesson, have each group cut two small holes where the ‘mouth’ of their windsock will be (one at the top, one at the bottom), insert the stick through the holes so it is holding the sock open, tie the other end of the sock together with elastic, place rock...</td>
</tr>
</tbody>
</table>
inside the windsock
- Have students write their purpose and hypothesis before experimenting
- Have them go outside in groups and experiment where they think a wind turbine should be built at their school; complete worksheet (Appendix A)
- Come back together as a group and have an open oral discussion about each group’s findings

<table>
<thead>
<tr>
<th>Materials</th>
<th>Considerations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experiment worksheet (Appendix A)</td>
<td>Place stronger students with weaker students in groups so everyone is able to complete the experiment successfully</td>
</tr>
<tr>
<td>Materials for windsocks: a few old long sleeve shirts with sleeve cut off (about 6 sleeves or 3 shirts for a class of approx. 20), a small rock for each group, one stick for each group, elastics, scissors, wire and wire cutters (Make a Windsock, <a href="http://www.rcn27.dial.pipex.com/cloudsrus/windsock.html">http://www.rcn27.dial.pipex.com/cloudsrus/windsock.html</a>)</td>
<td>Use groups of 4 so less time is spent making the windsock and lesson can move quickly, but groups aren’t too large so everyone can comprehend what is being taught</td>
</tr>
<tr>
<td></td>
<td>Ensure students safety while using wire cutters and exploring the school grounds</td>
</tr>
</tbody>
</table>

**Accommodations**
- If the wind sock doesn’t work, place wire in the hem of the shirt so the edge of the opening is more rigid; teacher should have this available in case it is needed
- Students with special needs who may have difficulty with the proposed activity could have the opportunity to either complete the same activity with modifications (ex. Using a tape recorder to orally record the worksheet, having someone record their findings for them), or could complete a different task (ex. Research how school’s across Ontario are making changes to their infrastructure in terms of energy consumption, discuss the negative effects of our dependency on on-renewable resources, make a energy conservation poster or song)

**Stage 3: Learning experience and instruction**

**Motivational Hook (5 MINS.):**

Ask students to discuss the 5 R-words. Display the five R-words (rethink, reduce, reuse, recycle and recreate) on the overhead and highlight rethink (See 5 R’s Worksheet). Ask if students can define this word. Introduce this word as today’s lesson theme

Show students pictures of various forms of resources (ex. Coal, water, solar panels, wind turbine, nuclear energy plant) on an overhead or Smartboard and have them as a group identify the various types, making educated guesses. Display the pie graph last to show students visually the highly disproportionate use of non-renewable resources compared to renewable resources (Appendix B).

I will later return to these pictures when discussing the various renewable and non-renewable resources to allow for visual representation.
**Open (12 MINS):**

Discuss problems with our unsustainable energy use and dependency on non-renewable resources

Discuss alternatives, by teaching about various renewable and non-renewable resources, highlighting the benefits and drawbacks to some

Explain what will be required of students during the experiment (body), ex. That they will be assessing our school yard in order to find an ideal location for a wind turbine at their school

<table>
<thead>
<tr>
<th><strong>Body (35 MINS):</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Make a windsock (see “Instructional Strategies” above)</td>
</tr>
<tr>
<td>• Have students work in groups of 4 to explore the school yard and determine the best spot for a wind turbine to be built at their school (take into account trees, landscape, where wind the strongest, different heights, on the N/S/E/W side of the school); Have students use their windsock to determine how strong the wind is at various locations</td>
</tr>
<tr>
<td>• Come back in 15 minutes and have an open class discussion about where the class would collectively choose to build a wind turbine</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Close (8 MINS):</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Discuss how there are drawbacks to all forms of hydro, but moving towards using more renewable sources will bring about many benefits to the health of our environment.</td>
</tr>
<tr>
<td>Explain that to determine the best spot for a turbine we would have to do further research and experimentation, taking some other factors into consideration (cost, aesthetics, how the land is used).</td>
</tr>
<tr>
<td>Any students who have not completed their experiment worksheet must complete for homework.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Link to Future Lessons</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Students could write letters to their principal to ask for a wind turbine to be installed, explaining the benefits to this alternative and the drawbacks to continuing our reliance on non-renewable resources</td>
</tr>
<tr>
<td>• If any student finishes early they should complete the task idea above OR they can try making a windmill out of paper, a pin and a straw</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Assessment</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Have each student fill out a worksheet while they are performing the experiment, following the scientific method and grade this worksheet (Appendix A, See Appendix C for example of complete worksheet)</td>
</tr>
<tr>
<td>• Assess their oral communication skills during the class discussion about where to place the turbine</td>
</tr>
</tbody>
</table>
Appendix A: Wind Turbine Experiment

Problem:

Hypothesis:

Observations:

<table>
<thead>
<tr>
<th>Location</th>
<th>Observation (Ex. Limp, fluttering, full)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Conclusion:
Appendix B: Motivational Hook

1. Wind Turbine
2. Solar Power
3. Coal
4. Water
5. Nuclear

6. Geothermal

7. Natural Gas

8. Biomass

9. Oil
The 5 R's: Recycle, Reduce, Rethink, Reuse & Recreate

The Role of Renewable Energy in the Nation’s Energy Supply, 2009

Total = 94.578 Quadrillion Btu

- Petroleum 37%
- Natural Gas 25%
- Coal 21%
- Nuclear Electric Power 9%
- Renewable Energy 8%

Total = 7.744 Quadrillion Btu

- Solar 1%
- Geothermal 5%
- Biomass waste 6%
- Wind 9%
- Wood 24%
- Biofuels 20%
- Hydropower 35%

Note: Sum of components may not equal 100% due to independent rounding.
Appendix C: Completed Wind Turbine Experiment

**Problem:** To determine the most beneficial location to build a wind turbine on the school grounds.

**Hypothesis:** If the wind turbine is placed where it receives the most wind, than more energy will be produced and this would be the ideal location for building.

**Observations:**

<table>
<thead>
<tr>
<th>Location</th>
<th>Location (Limp, fluttering, full?)</th>
<th>Observation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ex. North side of school by flag pole</td>
<td>-took a minute to gather wind but eventually became full</td>
<td></td>
</tr>
<tr>
<td>Ex. South side of school by playground</td>
<td>-never gathered wind, stayed limp</td>
<td></td>
</tr>
</tbody>
</table>

**Conclusion:** Since the north side of the school by the flag pole receives the most wind and therefore would produce the most energy, I believe this would be the most ideal location for a wind turbine.
**Thursday: Lesson 4: Freganism: Junk or Treasure**

<table>
<thead>
<tr>
<th><strong>Title:</strong>  Freganism, Junk or Treasure</th>
<th><strong>Subject/Course:</strong>  Science and Technology</th>
<th><strong>Time:</strong>  10:00</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Strand:</strong>  Life Systems: Sustainability and Stewardship</td>
<td><strong>Grades:</strong>  6</td>
<td></td>
</tr>
</tbody>
</table>

**Lesson Description**

Present to the students a new life style on the rise in western countries in order to minimize one's carbon footprint; Freganism.

Bring the students to be familiar with what it means to be a Fregan, the 5 R and the impact of the fast food type of consumerism of material goods on the environment.

Sensitizing the students to the cycle of life of a manufactured product, recycling is not the end of the life cycle.

Through discussions and a read aloud the students will become more familiar with the interconnectedness of consumerism and the well being of the environment.

The students will get the chance to turn trash into treasures by giving a second life to the recycled objects the teacher brought.

**Fundamental Concepts/Skills**

- Distinguish between recycling and re-using.
- Understanding that recycling is not the end of the life cycle for an object.
- Being able to change the use of an object/ change it's purpose, giving it a second life.
- Understanding the impact of fast food type consumerism on the environment.

**Big Ideas/Essential Question**

- Is going Fregan the green way to go; an observation about life cycle of objects, recycling, re-using and reducing your carbon footprint.

**Ontario Curricular Overall Expectation**

- 1. Assess human impacts on biodiversity, and identify ways of preserving biodiversity;
- 3. Demonstrate an understanding of biodiversity, its contributions to the stability of natural systems, and its benefits to humans.

**Ontario Curricular Specific Expectation**

- 1.1 Relating science and technology to society and the environment
- 3.6 Identify everyday products that come from a diversity of organism
## Lesson Goals

- To be able to understand the importance to reduce our carbon footprint.
- To be able to transform trash into treasures and give objects a second life.
- Understand the interconnection between the environment and our actions.
- To understand where material goods come from.

## Key concepts and/or skills to be learned/applied:

<table>
<thead>
<tr>
<th>Key concepts and/or skills to be learned/applied</th>
<th>Background Knowledge</th>
</tr>
</thead>
<tbody>
<tr>
<td>To become creative about trash and critical about buying goods/things. To see the big picture of consumerism.</td>
<td>Notions of Geography, developing country/Industrialized country</td>
</tr>
<tr>
<td></td>
<td>Notions on Biodegradable products and toxic waste</td>
</tr>
<tr>
<td></td>
<td>Interconnectedness of all species</td>
</tr>
<tr>
<td></td>
<td>Notions of carbon footprint</td>
</tr>
<tr>
<td></td>
<td>Notions of Geography, resources produced in Canada</td>
</tr>
<tr>
<td></td>
<td>Notions of Science, primary resources provenance, before being transformed. Ex: paper comes from trees.</td>
</tr>
</tbody>
</table>

## Stage 2: Planning learning experience and instruction

### Student Groupings

- Activities are done in teams or as teacher lead discussion

### Instructional Strategies

- Cooperative learning
- Group discussions
- Teacher lead discussions
- Experiential learning

### Materials

- Recycled articles
- Story book: The Dumpster Diver
- Pictures for the quiz

### Considerations

- Might require two periods of 60 Mins to get through the whole lesson, the in class assessment might be time consuming so the group discussions if the kids really get into it.

### Accommodations

- In the classroom, sitting in a circle at times or in teams at others.

## Stage 3: Learning experience and instruction

### Motivational Hook (_10_ MINS.): The quiz about waste

Ask students to discuss the 5 R-words. Display the five R-words (rethink, reduce, reuse, recycle and recreate) on the overhead and highlight reuse (See 5 R’s Sheet). Ask if students can define this word. Introduce this word as today’s lesson theme.
Have the students sit in a circle and show them pictures while stating the following facts.

Every year 24 billion tons of trash is produced in Canada, it's the equivalence of 24 billion of 8 billion elephants. (Show a picture of a dumping site)

Every day, 426,000 cell phones in the US alone every day; enough to fill 4260 Olympic size swimming pools (Show a picture of a dumping site for cellphones)

Every year, 22 billion water bottles in a year enough to fill near 9 million Olympic size swimming pools (Show a picture of a developing country which landscape is polluted by many water bottles lying around)

500 billion of plastic bags each year (Show a picture of a developing where the landscape is polluted by many garbage bags lying around)

40 percent of all the food produced in the US is thrown out (Show picture of a food dumpster)

- Food waste accounts for more than a quarter of freshwater consumption and 300 million barrels of annually.
- Food is the third largest waste stream after paper and yard waste 8.3 million tonnes of food is thrown away by households in the UK every year. It's the equivalence in weight in that of 2 elephants.

Open (20mins)

Bring the topic of the day Freganism.

Ask the kids if they ever heard of the term

Have the kids do a quiz about Freganism (5 questions) in order to test their knowledge on Freganism and introduce the topic of the day. Students just raise their hand to vote for the answer they think is correct.

1) What are Fregans?
   a) People who don't eat meat
   b) People who are free to do what they want
   c) People who don't spend money on goods and food
   d) People who are afraid of frogs

2) Why do some people think that it is a good thing to be a Fregan?
   a) Because you can save a lot of mone
   b) Because it is good for the environment
   c) Because it reduces waste

3) Who can become a Fregan?
a) Poor people  
b) Cheap people  
c) Environmentalists  
d) Everyone  
e) Ingenious people  

Have a small discussion about Freganism, Carbon Footprint and the 5 R. (Re-use, Recycle, Rethink, Re-create, Reduce) What is the difference between Recycling and Re-using.  

Read aloud: The Dumpster Diver by Janet S. Wong and David Roberts.  

Body (25 MINS):  
Go over the understanding of the book with the students and ask the students to explain how the book ties to today's topic, Freganism.  
Put a few recycled objects in the middle of the circle: water bottles, cans, containers, cardboards, boxes, paper  
Split the kids into teams  
Ask each team to come up and pick one object up  
Ask the teams to think about the making of the objects they are holding and to answer these questions the best they can.  

What resources are used to make the object they are holding and where does it come from?  
Are the resource used hard to find, are they rare, are they biodegradable?  
What would happen if the resources used to make this product became more rarefied or disappeared? Are the countries producing the resources being paid a fare price for their work?  
Have a discussion about the resources that come in the making of the objects and the environmental and social impact.  

Then, ask the teams to come up with an idea for the second life of that object and a speech to sell the object to the class. For example, an old can can become the best pencil holder ever. They can come up with a new name for the new invention as well.  

Close ( 5 MINS):  
When the students are done presenting their ideas for the object's second life, discuss of ways they can pose fregan actions in their day to day lives.  
Announce that next class, they need to bring recycled objects to class in order to participate to a special activity. Musical instruments will be made out of recycled materials and junk.
Link to Future Lessons

- Make musical instrument with recycled materials

Assessment

- Students create a new object out of recycled objects and present it in front of the class while providing some information about the life cycle of the objects that came into the making of their creations. What type of resources were involved, where do they come from, are they rare, expensive. The students will have to demonstrate in his presentation that he understands the link between consumerism and carbon footprints. The students are encouraged to start a class discussion after each presentation by asking questions or commenting.
- The assessment will take the form of assessment of performance and it will be categorized as an assessment of learning
- Students will know informed of when this assessment will take place
- This assessment is to measure overall understanding of the key concepts in this unit
- Students will be evaluated on 4 different criteria: Linking, applying, organizing and creativity, on scale from 1 to 5
Friday: Lesson 5: Recreate

<table>
<thead>
<tr>
<th>Title:</th>
<th>Recreate and Bash the Trash!</th>
<th>Subject/Course:</th>
<th>Science and Technology</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time:</td>
<td>60 min</td>
<td>Strand:</td>
<td>Understanding Life Systems: Biodiversity</td>
</tr>
<tr>
<td>Grades:Grade 6</td>
<td></td>
<td>Grades:</td>
<td>Grade 6</td>
</tr>
</tbody>
</table>

**Lesson Description**

To draw on student’s previous knowledge of activities that promote excessive waste and take it one step further by not only minimizing their waste but also recreating it into something new and useful. Students will be encouraged to look at other areas of their life and brainstorm about what they can reuse by recreating it rather than throwing it out. At this point in the unit students will be able to recognize that their actions have consequences and today we will further that knowledge by turning our own “junk” into musical treasures instead of waste in a landfill. Students will have the chance to create real instruments out of materials they may have previously thrown away.

**Stage 1: Desired Results**

**Fundamental Concepts/Skills**

- Environmental sustainability
- An understanding of human impact on the environment
- Ways of minimizing our impact on the environment

**Big Ideas/Essential Question**

- How can we recreate what we used to call “junk” in our everyday lives?
- Humans make decisions every day that affect the biodiversity, and thus the environment.

**Ontario Curricular Overall Expectation**

- assess human impacts on biodiversity, and identify ways of preserving biodiversity;
- demonstrate an understanding of biodiversity, its contributions to the stability of natural systems, and its benefits to humans.

**Ontario Curricular Specific Expectation**

1.1 analyze a local issue related to biodiversity (e.g., the effects of human activities on human biodiversity, flooding of traditional Aboriginal hunting and gathering areas as a result of dam construction), taking different points of view into consideration (e.g., the points of view of members of the local community business owners, people concerned about the environment, mine owners, local first nations, Métis, Inuit), propose action that can be taken to preserve biodiversity, and act on the proposal.

1.2 assess the benefits that human societies derive from biodiversity and the problems that occur when biodiversity is diminished

**Lesson Goals**

- By the end of the lesson students will be able to incorporate what they have learned about the important concepts of Rethink, Reduce, Reuse, and Recycle from the lessons in previous days to engage in a new notion of Recreating.
- Students will be able to identify materials that can be recreated rather than simply deposed of for recycling or waste.
- Students will build instruments using the materials they have all brought in over the course of the week.
- Students will write an extension onto Jack Johnson’s song called “The Three R’s” to include Recreate in order to broaden their ideas of what can be reused through recreating.

**Key concepts and/or skills to be learned/applied:**
- Fundamental concepts of sustainability and stewardship.
- Because all living things are connected, maintaining diversity is critical to the health of the planet.
- Humans make choices that can have an impact on biodiversity.

**Background Knowledge:**
- This lesson will take place on a Friday. Monday-Thursday students will engage in activities to further their knowledge and understanding of the concepts of Rethink, Recycle, Reduce, and Reuse, thereby setting the foundation to learn about Recreating.
- Awareness of environmental concerns about waste production and lack of recycling etc.

**Stage 2: Planning learning experience and instruction**

<table>
<thead>
<tr>
<th>Student Groupings</th>
<th>Instructional Strategies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small group brainstorming</td>
<td>Discussion (teacher led)</td>
</tr>
<tr>
<td>Each student will have the chance to build their own instrument but the activity will be done as a group</td>
<td>Discussion (student led)</td>
</tr>
<tr>
<td>Individual writing of extension to the song</td>
<td>Cooperative learning</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Materials</th>
<th>Considerations</th>
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<tbody>
<tr>
<td>Internet access to project Jack Johnson song and video onto smart board, or projector depending on availability</td>
<td>In case projector or smart board is unavailable, pass out a copy of the story worksheet to each group of students</td>
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<tr>
<td>Projector to put worksheet story up for the class to see</td>
<td>If internet access is not possible in the classroom, bring an ipod dock to play Jack Johnson through an ipod</td>
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<tr>
<td>Colouring pencils</td>
<td>Students may choose to draw or write out responses to the worksheet story</td>
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<tr>
<td>Paper</td>
<td>Before the students get to class, have written and visual instructions on how to build the instruments printed out and separated with appropriate materials so that when the time comes you can quickly and easily set up stations for different instrument construction</td>
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<tr>
<td>Tin (coffee) cans</td>
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<tr>
<td>rice</td>
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<tr>
<td>Rubber bands</td>
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<td>Pencils</td>
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<td>Masking tape</td>
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<tr>
<td>Cardboard tube</td>
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<td>Construction paper</td>
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<td>Paper towel tubes</td>
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<tr>
<td>Shoe boxes</td>
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<td>Imagination!</td>
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**Accommodations**
- At the beginning of the unit, on Monday, tell students that for the RECREATE lesson on Friday they will be building instruments out of recycled materials. Post the materials needed for each instrument and have the students bring materials in over the course of the week.
### Stage 3: Learning experience and instruction

**Motivational Hook (approximately 10 mins.):**

Ask students to discuss the 5 R-words. Display the five R-words (rethink, reduce, reuse, recycle and recreate) on the overhead and highlight *recreate* (See 5 R’s Sheet).

Play Jack Johnson’s “The Three R’s” for the class as it encapsulates the lessons from earlier in the week.

Lead a class discussion to extend the song to include verses for Rethink and Recreate.

Write some ideas on the board.

**Open (approximately 15 mins):**

Next, project the story “What a Wonderful World it Could Be...” for the entire class to see and ask for volunteers to read it aloud. Split the class into small groups and pass out blank and lined paper and colouring tools. Have the groups discuss materials that they have thrown out at home and come up with ways of reusing them. For example, a coffee tin could be used to store pens and pencils.

**Body (approximately 20 minutes):**

Tell the class it is finally time to build instruments out of recycled materials!

Have the students split off into different corners of the room according to instrument. There will be four stations, one for guitars, drums, shakers, and horns. The stations will be equipped with a few copies of visual and written directions on how to build each instrument, as well as all of the required materials.

Students will be able to make any instrument they choose and will have to follow instructions to assemble it. They can help the other students at their station and of course the teacher will be moving around the class to answer any questions or lend a hand.

**Close (approximately 15 minutes):**

Have students put their names on their instruments and clean up their stations. Once they have returned to their desks, have them write down the name of Jack Johnson’s song in their agendas and tell them to listen to it at home and write a few lines to add on to the song that connect with either rethink or recreate.

**Link to Future Lessons**

- If student’s finish early, they are encouraged to play their instruments.
- They will also be encouraged to write positive messages on their instruments about environmental sustainability using the markers and other craft items found in the classroom.
- They will be asked to write their own extension to Jack Johnson’s song. The extension should be a reflection of what they have learned in today’s lesson about recreating.
- If inspired to, students could learn the “The 3 R’s” song and play their instruments at a school event that the class could organize and put on.
- Students could create posters for the school to offer others suggestions on how to recreate old materials.
### Assessment

- **Assessment for learning:**
  - Is the student able to demonstrate an understanding of human impacts on biodiversity?
  - Is the student able to see what is waste, what is recyclable, what can be recreated and why?
  - Did the student follow directions and construct an instrument of their own?
  - Did the student write out some lines for an extension to the song which are coherent, and demonstrate that they understand the importance of the 5 R’s?
  - Did the student participate in class discussions?

### References:


### Comments/Reflections/Suggestions:
The 3 R's lyrics

Three it's a magic number
Yes it is, it's a magic number
Because two times three is six
And three times six is eighteen
And the eighteenth letter in the alphabet is R
We've got three R's we're going to talk about today
We've got to learn to
Reduce, Reuse, Recycle
Reduce, Reuse, Recycle
Reduce, Reuse, Recycle
Reduce, Reuse, Recycle
If you're going to the market to buy some juice
You've got to bring your own bags and you learn to reduce your waste
And if your brother or your sister's got some cool clothes
You could try them on before you buy some more of those
Reuse, we've got to learn to reuse
And if the first two R's don't work out
And if you've got to make some trash
Don't throw it out
Recycle, we've got to learn to recycle,
We've got to learn to
Reduce, Reuse, Recycle
Reduce, Reuse, Recycle
Reduce, Reuse, Recycle
Reduce, Reuse, Recycle
Because three it's a magic number
Yes it is, it's a magic number
3, 3, 3
3, 6, 9, 12, 15, 18, 21, 24, 27, 30, 33, 36
33, 30, 27, 24, 21, 18, 15, 12, 9, 6, and
3, it's a magic number
Stephen and Sarah were very excited as they walked to school. Today their class was going on a field trip to the town’s waste management facility, where they would actually get to see a real landfill for the very first time. When they arrived at school, their teacher organized the students to get on the bus to take them to the landfill. All the kids were talking about what they might see once they arrived. Their class had been learning about waste and how bad it is for the environment. They were learning about what they can do to reduce the amount of waste they produce and what sorts of things can be recycled in their community. They even started a paper reuse program in their classroom! As the bus pulled up to the landfill, Stephen and Sarah looked at each other in amazement. They had never seen so much garbage! “Wow!” exclaimed Stephen. “Can you believe that people put this kind of stuff in their garbage? I can see a lot of things that could have been recycled or reused. Some things look brand new…”

Pretend that you are Stephen or Sarah and finish the scene. Describe the types of things that you can see in the landfill that did not have to end up there. Discuss with your groups how they could have been saved from the landfill by recreating them for another purpose. Make a list of items you would like to save and recreate.
CAN DRUMS!


Gather a bunch of tin cans. Make sure that the cans are CLEAN and DRY. Also check to make sure that there are no sharp edges.

You can also wrap rubber bands around the cans or tape them together to make a drum set.

Your Can Drums will make the best sound if they are put on something soft, like a rug or a sweatshirt.

You can use pencils or chopsticks for your drumsticks. Pencils are best because they have two sides - hard wood and soft eraser.

TUBE HORNS
YOU WILL NEED -
A cardboard tube - a gift wrapping tube or paper towel tube is best.
A piece of construction paper or a file folder
Tape - Masking tape or duct tape is preferable.

PROCEDURE:
1. Shape the paper into a funnel with a hole just big enough for the tube to fit into.
2. Tape the funnel to the tube as shown:

   ![Diagram of the funnel and tube with tape]

   The tube shouldn't stick too far into the funnel - just enough to be secure.

That's it! Now to make some noise!

Rubber Band Box Guitar

YOU WILL NEED
- A BOX. If you use a cardboard box, a shoebox will do, but a small corrugated cardboard box (one with those little tiny spaces between the sheets of cardboard) will work better.

- RUBBER BANDS. You should try a variety of rubber bands to see which make the best sound. In general, the thicker the better (since there is more stuff vibrating it should be louder), but if you TOO thick a rubber band, it might collapse the box, especially with a shoebox.
PROCEDURE

1. First, just stretch a rubber band, pull it and then let it go. It should vibrate quite visibly. Notice, however, how quiet it is. That is because the only thing vibrating is that little piece of rubber.

2. Take the top off your box if it has one.

3. Take the rubber band and stretch it around the box so that it passes over the open top of the box.

4. Pluck the rubber band and you should hear the sound as much louder, especially with a corrugated cardboard or styrofoam box. You should be able to feel the box vibrating when the string vibrates.

5. Put more rubber bands on the box. Be careful, if you wrap TOO many rubber bands around it might collapse and/or break the box.

6. To tune your rubber band box guitar, you can make the strings tighter or looser across the open top. Take the rubber band at the side of the box and stretch it out and down to make it tighter. When you put it back against the box, the rubber will have enough "grab" to hold on the the tuning for a while. Experiment with the other rubber bands to find a tuning you like.
Optional: Paper Towel Tube Neck

(see picture on the top of this page)

Everybody knows a guitar isn't a guitar without a neck. So get a paper towel tube and trace the circle on one of the smaller sides of the box. Cut a hole slightly smaller than the traced circle (use a knife or sharp scissors - GET HELP FROM A PARENT ON THIS!) and slide the tube into the hole. If it doesn't fit just right you can cut the hole a bit bigger or tape it up a bit. Never mind that the strings don't go up the neck - the neck is just there to look cool....

The 4-in-1 Coffee Can

Materials:

Empty Coffee Can (make sure it is washed and has no sharp edges where the top was taken off)

Pencil

Rice or Beans (small amount)

Directions:

Put some rice or beans into the coffee can.

#1 - Shaker

Shake the can back and forth or up and down or all around. It's a maraca! Actually, just about every human culture has created shakers, mostly from those cool hollow vegetables called gourds (a pumpkin is a gourd). Try putting different stuff into the can, or using different containers. What happens to the sound?

#2 - Drum
Of course, it's also a drum. Take the pencil and hit the plastic top. The plastic part vibrates to make an instrument called a membranophone - or drums.

#3 - Metal Drum

Turn the can upside down and it becomes a metal drum. Just bang on it with your pencil. Try different sides of the pencil - wood or eraser.

#4 - Scraper

Take your pencil and scrape it up and down the ridges on the coffee can - it's a guiro! Although the guiro is a latin musical instrument, like the maracas it has been reinvented all over the world. Try scraping at the tip of the pencil or really close to where you are holding it - does the tone change? Also try scraping it with chopsticks or other long thin things.
Bibliography


Earthworms hatching http://www.youtube.com/watch?v=OR5Pcg86RdA

Earthworm overview http://www.youtube.com/watch?v=Xmtdm-tfnCA


The Ontario Curriculum Grades 1-8 Science and Technology 2007 Grade 6.

