Grade 5

Title: "Paper Maché Masks" **Subject/Course:** Art **Time:** 2 Periods of 60 Minutes
Strand: Visual Arts **Grades:** 5

Lesson Description

This lesson can be applied to each of the junior grades. Students will use paper maché masks using recycled materials (newsprint, magazines, paper, etc). The teacher may also wish to integrate this lesson with Drama, using the masks for a role play activity. This mask activity can be tailored to any unit the class is working on as a mask theme (ex. Animals, literary characters, self-portraits, etc.)

Stage 1: Desired Results

Fundamental Concepts/Skills

Students will complete their masks by the use of the element of design: Texture (textures created with a variety of tools, materials, and techniques, patterning) and Color (the color wheel, tertiary colors, colors for expressive purposes; color for creating naturalistic images

Big Ideas/Essential Question

- Students will apply the elements of design in order to communicate the idea of reusing our waste

Ontario Curricular Overall Expectation

D1. **Creating and Presenting**: apply the creative process to produce a variety of two- and three-dimensional art works, using elements, principles, and techniques of visual art to communicate feelings, ideas, and understandings

Ontario Curricular Specific Expectation

D1.1 Students will be able to create two- and three-dimensional art work that express feelings and ideas inspired by their own and others' points of view.

Lesson Goals

- Students create an art piece by using recycled materials
- Students realize that paper materials can be used again for useful purposes (in art or other areas) instead of simply being thrown away

Key concepts and/or skills to be learned/applied:	Background Knowledge:
• Students will extend their exploration of personal experiences in their own world to produce works of art • There is so much paper waste each day, we need to be more conscious of the paper we use	• Students will use their background knowledge of art in previous grades (texture and colour) • Students will use their own creativity to turn create a mask using paper maché

Stage 2: Planning learning experience and instruction

Student Groupings	Instructional Strategies
• Students will work on their masks independently, but may work alongside friends (in order to share paper maché materials)	• Teacher-directed: teacher will demonstrate paper maché process, have completed mask as a visual aid
Materials	**Considerations**
• Newsprint and other paper materials, wallpaper paste (or white glue with water), balloons, tape, plastic tablecloth, paints, paintbrushes, water containers, decorations, ribbon	• Pictures from which to model ideas for mask (photographs of animals, etc.)

Stage 3: Learning experience and instruction
Motivational Hook (5 MINS.):
Teacher will introduce paper maché activity (and theme of the project if applicable). Teacher will allow students to think about the animal or character they wish to portray as their mask.
Open (10 MINS):
The teacher will demonstrate how to start paper maché activity. Start by blowing up balloon to the size of student's face (this will act as the support while mask is being constructed and allow mask to dry correctly). The balloon will be secured to the table with tape. The table will be covered with the plastic tablecloth to prevent messes. Next, shred newsprint and paste on balloon in strips. Students will do so in the shape and size they please.
Body (100 MINS):
• (Part One): 60 minutes. Students will sit in groups to complete activity (and share resources more easily) and follow the teacher-directed instructions. • When students are satisfied with their design, they may set their mask and balloon in a safe place to dry. Students who finish early may begin thinking about how they will paint their mask in part two. • (Part Two): 40 minutes. Students will use paints to paint their mask as they wish. After letting the mask dry, further decorations may be applied (more recycled materials: ribbons, buttons, fabrics, etc.) • When masks are completed, teacher may puncture holes in each side to attach ribbon
Close (5 MINS):
Students may wear masks and do a gallery walk, looking at their classmates' work.
Link to Future Lessons
• These masks can be used for future Drama lessons in role play, tableau or play
Assessment
• Students will be assessed on their ability to make use of elements of design (texture and colour)

Title: "Junkyard Art" **Subject/Course:** Art **Time:** 60 Minutes
Strand: Visual Arts **Grades:** 5

Lesson Description

Students will work in small groups (2 to 4 students) to create a portrait of a person consisting entirely of recycled materials. Teacher will supply some materials (and ask students to bring in and use their own also).

Stage 1: Desired Results

Fundamental Concepts/Skills

Students will complete their art by the use of the element of design: Texture (textures created with a variety of tools, materials, and techniques, patterning) and Color (the color wheel, tertiary colors, colors for expressive purposes; color for creating naturalistic images

Big Ideas/Essential Question

- Students will apply the elements of design in order to communicate the idea of reusing our waste

Ontario Curricular Overall Expectation

D1. **Creating and Presenting**: apply the creative process to produce a variety of two- and three-dimensional art works, using elements, principles, and techniques of visual art to communicate feelings, ideas, and understandings.

Ontario Curricular Specific Expectation

D1.1 Students will be able to create two- and three-dimensional art work that express feelings and ideas inspired by their own and others' points of view.

Lesson Goals

- Students create an art piece by using recycled materials
- Students realize that materials can be used again for useful purposes (in art or other areas) instead of simply being thrown away

Key concepts and/or skills to be learned/applied:	**Background Knowledge:**
• Students will extend their exploration of personal experiences in their own world to produce works of art • There is so much waste produced all the time and something needs to be done about it	• Students will use their background knowledge of art in previous grades (texture and colour) • Students will use their own creativity to turn objects into a human portrait

Stage 2: Planning learning experience and instruction

Student Groupings	**Instructional Strategies**
• Teacher may create groups of students who work well together or allow students to make their own groups	• Teacher will introduce activity by use of direct instruction before students work independently
Materials	**Considerations**
• Any recycled materials (paper plates, old clothing, wrapping paper, newspaper, etc.), Large sheets of enviro-paper, Markers, Glue, Scissors	• Leaving examples of "Junkyard Art" for visual examples for students • Extra time if students require it to complete their portraits

Accommodations

- Allowing students to work with the group of their choosing (especially for students who are self-conscious of their art skills)

Stage 3: Learning experience and instruction
Motivational Hook (3 MINS.):
• Show students an example of "Junkyard Art" and ask "What do you notice about this piece of art?" Students will describe piece as being made out of garbage.
Open (5 MINS):
• Teacher will emphasize the idea that we produce an access amount of waste each day and begin a discussion (have students think about their waste at lunch and at home, etc). • Teacher will challenge class to make their Junkyard Art entirely out of recycled material (excluding glue, markers, and the paper it is mounted on).
Body (42 MINS):
• Students will work together in groups to complete their portraits, using teacher-supplied materials and their own. Students may share and swop their materials if they wish. Teacher will spend time observing and making suggestions about students' art.
Close (10 MINS):
• Have students post their work around the room and take a gallery walk (examine their classmates' work) • After walk, lead a discussion of how we can reuse of waste, think of different ways to reuse them (ex. Reusing old food containers to wrap up leftovers from meals)
Link to Future Lessons
• Students learn to be wiser of the waste they create and what waste they can reuse
Assessment
• Students will be assessed on their ability to make use of elements of design (texture and colour)

Grade 6

Title: *Personal Landfill Site* **Subject/Course:** *Science and Technology* **Time:** *60 Minutes*
Strand: *Understanding Life Systems: Biodiversity* **Grades:** *6*

Lesson Description

Students will create their personal landfill site in the classroom. Have students make a prediction indicating whether or not the items will decompose and if they will, what is the time span it would take to decompose. They will monitor this landfill site daily or every third day and will be required to record their observations. Once the unit is over, have student write a summary of their observations.

Stage 1: Desired Results

Ontario Curricular Overall Expectation

- Assess human impacts on biodiversity, and identify ways of preserving biodiversity;

Ontario Curricular Specific Expectation

- Analyze a local issue related to biodiversity taking different points of view into consideration propose action that can be taken to preserve biodiversity, and act on the proposal
- Assess the benefits that human societies derive from biodiversity and the problems that occur when biodiversity is diminished
- Use a variety of forms to communicate with different audiences and for a variety of purposes

Stage 2: Planning Learning Experience and Instruction

Materials	**Considerations**
Shoe box or Large juice/milk carton Scissors, Pencil, Eraser, Markers Material Chart Soil, Orange Peel, Cherry Seed, Foil, pop can tab, juice box straw, paper. (enough for each student's landfill site) Newspapers String	• Have students work in groups of threes if space is limited. • Create one large class landfill site in a large shoe box or even a small indoor inflatable children's swimming pool.

Open (10 MINS):

Have students complete the first activity sheet which allows them to fill out a chart of all the items in their landfill site and make predictions indicating whether or not they will decompose or not.

Body (30 MINS):

Have students fill the box with soil ¾ of the way to the top. Have students place each item in the landfill site in an orderly fashion (see diagram for details).
Once this is completed, students should fill out the landfill chart which shows the corresponding item to the section is it planted in.
Use the string to divide the box in 6 squared sections. (this will help students differentiate the location of each material)
This activity may get messy- place newspapers around the area where soil will be.

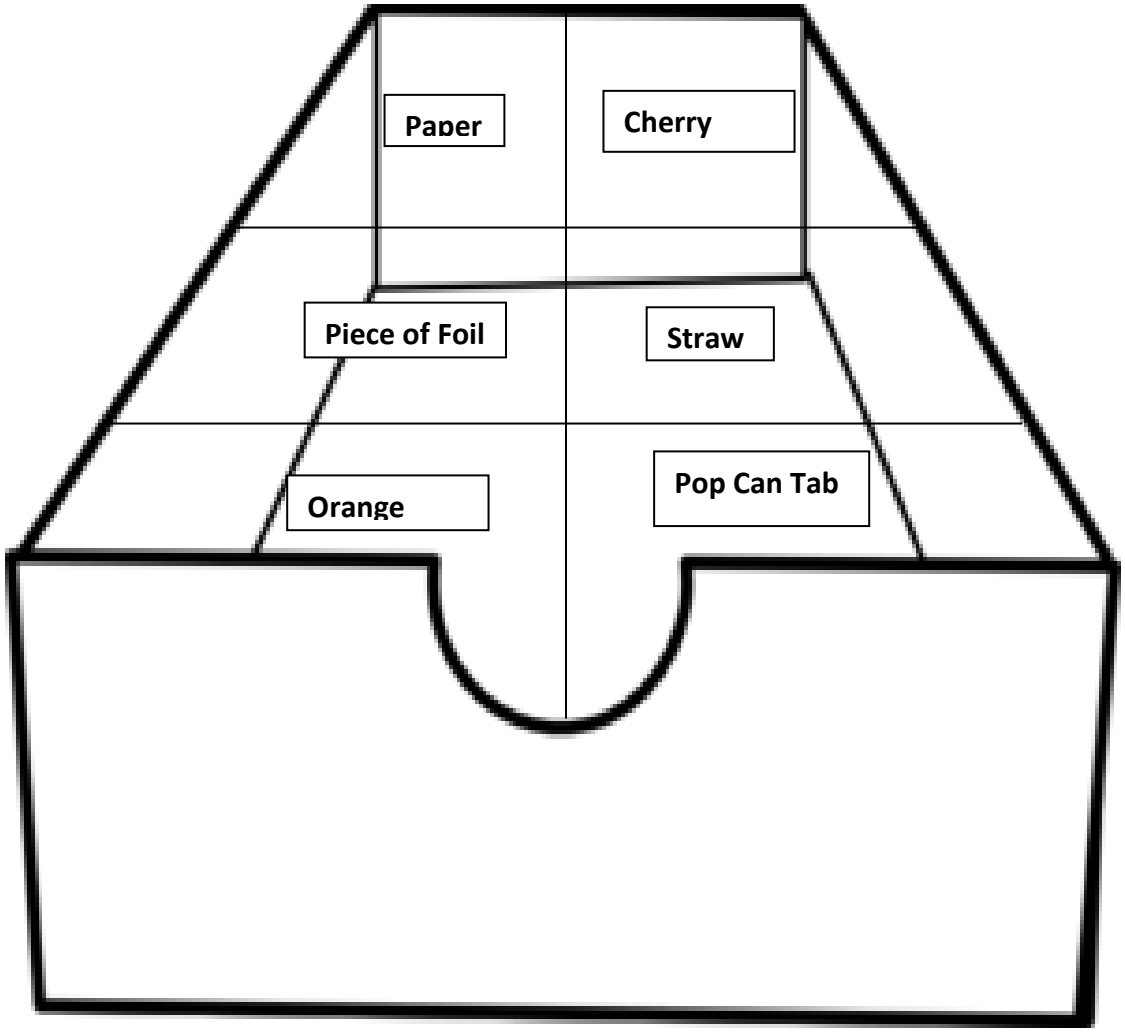
Close (5 MINS):

Have students record their observations under "Day 1".
Keep the boxes by a window where sunlight may shine. Boxes should be kept open.

Link to Future Lessons

This activity can help students understand the impact humans and animals have on our environment and educated them on how to make our environment a better place.

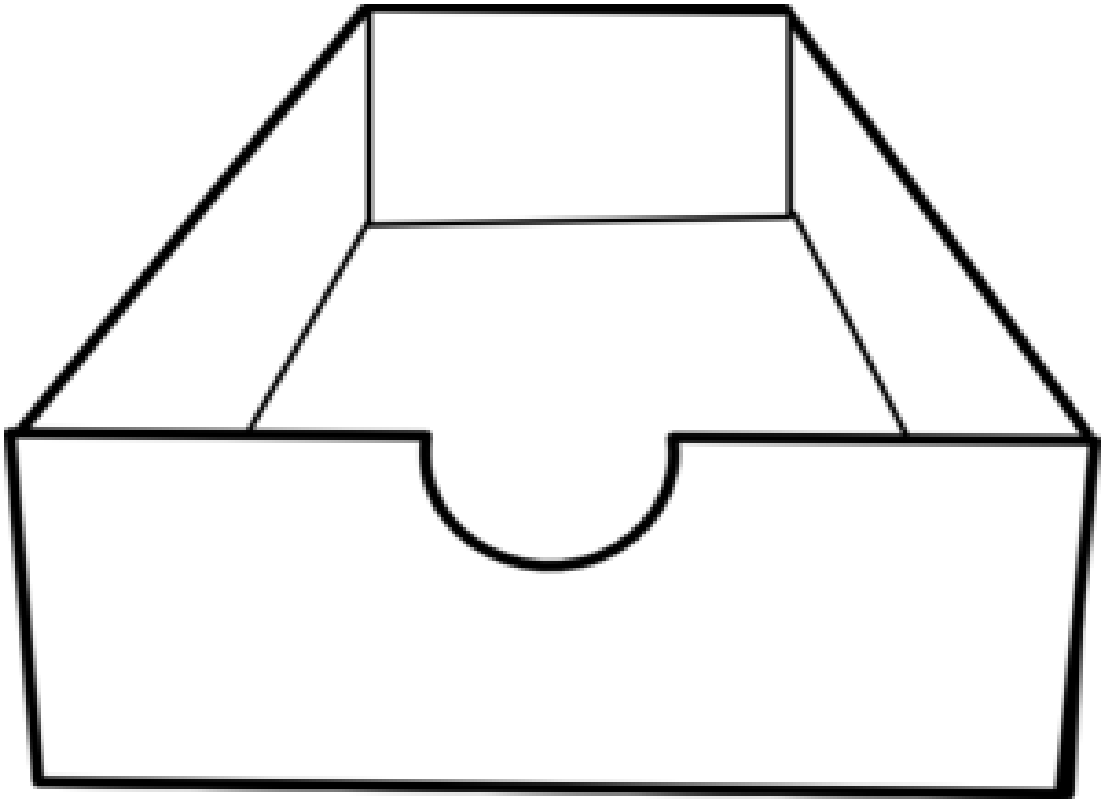
Landfill Site Diagram (exemplar)



Landfill Correspondence Chart

Paper	***Cherry Seed***
Piece of Foil	***Straw***
Orange Peel	***Pop Can Tab***

Landfill Site Diagram



Landfill Correspondence Chart

Observation Chart

	Week 1	**Week 2**	**Week 3**	**Week 4**
Orange Peel				
Foil				
Paper				
Pop Can Tab				
Straw				
Cherry Seed				

Title: *Pollution's Solution* **Subject/Course:** *Science & Technology* **Time:** *1 Hour & 45 Minuts*
Strand: *Understanding Life Systems: Biodiversity* **Grades:** *6*

Lesson Description

Students will rotate through 4 stations which would educate them on pollution and its effect in our society. The activities will focus on pollutions and plastics effect on wildlife, reuse, renew and recycle. The lesson will help students understand the amount of garbage that is produced and describe how recycling saves energy and resources while minimizing pollution.

This lesson is most effective if the 4 activities are split within 2 science periods.

Courtesy of Shirley A. Knight - Chicago IL

Stage 1: Desired Results

Ontario Curricular Overall Expectation

Assess human impacts on biodiversity, and identify ways of preserving biodiversity;

Ontario Curricular Specific Expectation

Analyze a local issue related to biodiversity

Stage 2: Planning Learning Experience and Instruction

Materials

Rubber bands, brown paper bag, tape, crayons, scissors,
1 gallon glass jar, measuring cup (250ml), red food coloring,
1 gallon jug water,
paper plate, glass/china plate, paper towel, J-cloth dish towel, plastic bag, plastic foam cup, glass, plastic wrap,
Reusable refrigerator container, carrots in a plastic bag,
carrots out of plastic bag.

Accommodations

Instead of each individual student completing an activity booklet, the teacher can have one activity booklet per group.

Stage 3: Learning Experience and Instruction

Motivational Hook: (15 Mins)

Begin this lesson by conducting a Better or Worse: A Recycling Test.

On chart paper, or the blackboard, create a T-Chart labeled 'Better or Worse'

Hold up the listed items and allow students to hypothesize as a class, whether the items are better for our environment or worse.

-Paper Plate vs. **Glass/China Plate** -Paper Towel vs. **J-Cloth**

-Plastic Bag vs. **Paper Bag** -Plastic Foam Cup vs. **A Glass** -Carrots in a Bag vs. **Carrots out of a Bag**

(Items which are bolded are better for the environment)

Open: (20 Min)

Review the T-Chart and discuss with students why certain items are better for our environment and the effects the others have.

Promoting Questions: How can we eliminate the use of plastic bags at grocery stores? *(Look for: Use paper bags, biodegradable bags).* List some ways we bring snacks to school without using plastic bags. *(Look for: Tupperware)*

Body: (15 Min per Activity)

Explain each centre/station to students. Introduce them to the activity instruction card and show them the correct way to use the materials.

Split students up in groups of 4-6. Rotate the student groups in 10-15 minutes intervals per station. While some students are at the stations, others should be working on an activity booklet.

Activity 1:

Materials: Jug of water (about 7 cups of water), gallon jar, food coloring, Activity Booklet

Objective: exposing students to the effects of pollution on wildlife.

Goals: Students will become aware of the reality of pollution in our water systems. As the red food coloring 'disappears' it represents Pollution spreading throughout the water streams rather than disappearing.

Activity 2:

Materials: Rubber bands, Activity Booklet

Objective: Students will tie the rubber band around their fingers/hand following these steps: tie the rubber band around a pinky finger, Stretch the rubber band to the back of the hand and tie the other end to the thumb.

Goals: Students must try to untangle their fingers from the rubber band without using their available hand or help from their group members. This activity will give students incite on how plastic materials limit sea animals when they are caught in it. It also give student the inconvenience of trying to get free with just their one hand just as sea animals have limited to no assistance and obviously no hands.

Activity 3:

Materials: Pencil, Eraser, Activity booklet

Objective: Students will practice the song 'Recycle Now' (sung to the tune of Three Blind Mice). Their task is to compose a new verse.

Goals: Display their understanding on the positive aspect of recycling.

Recycle Now

Recycle Now, Recycle Now, For earth's own sake, For earth's own sake, We cannot bury our trash today, Our landfill can't handle it anyway, To recycle is smart for everyone, To save our earth, So recycle now.

Recycle Now Recycle Now, For earth's own sake, For earth's own sake, We know how to save a tree every day, To keep our papers in every way, I'll tell my parents to save them too, So we'll save a tree.

Recycle Now, Recycle Now, For earth's own sake, For earth's own sake, We know that aluminum and glass are good, To throw away plastic-we never should, I'll tell my parents to save them too, So we'll save our earth.

Activity 4:

Materials: Newspapers, plastic bags, Brown bag

Objective: Students will be required to construct a Science Folder using reusable materials throughout the classroom.

Goals: An effective way to recycle and reuse material for other purposes other than its primary intended purpose.

Folder 1. Unglue and unfold the bottom of a large brown bag, preferably one that is a single thickness of paper 2. Flatten bag by placing the advertising toward you. Pull the front edge with your left hand, and the back folded edge with your right hand. 3. Cut off the bottom at the last fold. 4. Tape the top edges of the bag together. Tape the bottom edges of bag together. 5. Measure 30 cm. down from the top edge, and then fold the bottom edge up. 6. Tape edges only. You may want to use staples or glue instead. 7. Fold in half and decorate.
Close: (10 Min)
Allow 10 minutes before the period ends for clean up. Discuss the student's findings with in a think-pair share. Try to mix up group members in case observations vary from group to group.
Assessment
The T-Chart should assist in assessing the student's prior knowledge. Use the observations from each individual activity booklet to evaluate student's knowledge and understanding of pollution and effects it holds in our society.

Title: *Graphing our Ecological Footprint* **Subject/Course:** Mathematics **Time:** *60 Minutes*
Strand: *Data Management and Probability* **Grades:** *6*

Lesson Description

Students will create a graph showing the ecological impact they have on the society. They're objective is to conclude whether or the Earth could sustain the human population if everyone lived as they do.

Stage 1: Desired Results

Ontario Curricular Overall Expectation

Data Management and Probability

- Collect and organize discrete or continuous primary data and secondary data and display the data using charts and graphs, including continuous line graphs;
- Read, describe, and interpret data, and explain relationships between sets of data;

Ontario Curricular Specific Expectation

Data Management and Probability

- Collect data by conducting a survey or an experiment to do with themselves, their environment, issues in their school or community, or content from another subject, and record observations or measurements;
- Collect and organize discrete or continuous primary data and secondary data and display the data in charts, tables, and graphs that have appropriate titles, labels and scales that suit the range and distribution of the data, using a variety of tools
- Select an appropriate type of graph to represent a set of data, graph the data using technology, and justify the choice of graph.
- Read, interpret, and draw conclusions from primary data and from secondary data presented in charts, tables, and graphs
- Compare, through investigation, different graphical representations of the same data

Stage 2: Planning Learning Experience and Instruction

Materials

Ecological Footprint Survey, Chart paper, Pencils, Erasers, Markers, Metre sticks

Stage 3: Learning Experience and Instruction

Motivational Hook (10 MINS.):

Together with the students, read the article "How Big is My Ecological Footprint" by Tim Turner.

Open (10 MINS):

Students should complete the "Personal Eco-Footprint Calculator". Have them complete all the calculations as well.

Body (30 MINS):

Once students are grouped, have them compare and contrast the data they formulated with their group.
Provide students with chart paper and have them construct a graph with the necessary labels and heading.
They're graph should present each individuals ecological footprint.
(One color = one student)
This would allow them to differentiate each student's data.

Close (10 MINS):

Have each individual write a paragraph on "Whether the Earth could sustain the human population if everyone lived as they do"

Assessment

Assess students ability to compare and contrast data
Evaluate the student's ability to work collaboratively and to transform their data into a graph.

How Big is My Ecological Footprint?

Measuring their dependence on nature on a typical day can give students a new understanding of the connection between personal lifestyle choices and the health of the planet

by Tim Turner

Subject areas: mathematics, science, social studies

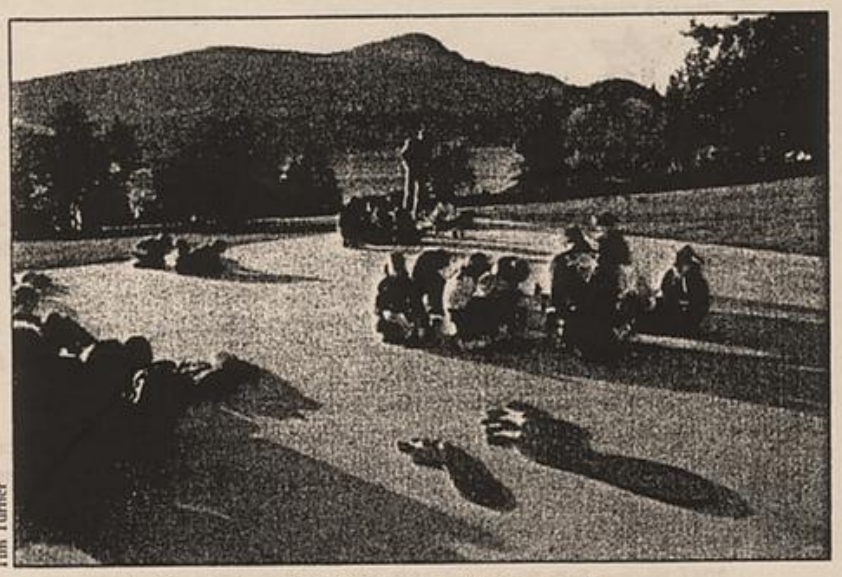
Key concepts: ecological footprint, lifestyle, sustainability

Skills: lifestyle analysis, critical thinking

Location: indoors

Time: 1 hour

Materials: chart paper, colored markers (blue, green, brown, and black), copy of Personal Eco-Footprint Calculator for each student



Tim Turner

Students calculating their ecological footprints at the Sea to Sky Outdoor School in British Columbia.

Each of us consumes some of the Earth's products and services every day. How much we take depends on the ways in which we satisfy our needs and wants — the many habits that together create our lifestyle. We can ask ourselves these questions to get a better sense of what these habits are: How much water do I use on a typical day? What do I eat and how much do I eat? How much food do I waste? How do I transport myself and how far do I go? How much clothing and footwear do I have and how often do I replace it? What and how much stuff do I buy? How much energy and materials are required to keep me dry and warm/cool? How much garbage do I produce? How much land and energy is used for my recreational activities?

Our answers to these questions reflect the demand that each of us places on nature. In the 1990s, sustainability gurus Mathis Wackernagel and Bill Rees coined the term "ecological footprint" to refer to the load or demand that we place on the Earth's resources. An ecological footprint is a measure of how much of the Earth's biologically productive land and water is needed to produce our food, material goods, and energy, and to absorb our waste.

Having students calculate their ecological footprint gives them a concrete understanding of their own personal impact on the Earth's systems and offers a means of assessing the sustainability of their lifestyles. More than that, engaging students in an ecological footprint analysis elicits curiosity, enthusiasm, and genuine interest in taking action to reduce the demand they place on nature. Students like the fact that the analysis focuses on their own lives, and they understand its clear message: that their choices — and hence they, themselves — can make a difference. Calculating one's ecological footprint reinforces the notion that sustainability is a journey and not a destination and that it is participatory, not a spectator sport. It serves as a simple guide to living, working, and playing in ways that don't cost the Earth.

How much Earth do we have?

Our "living" Earth has a surface area of 51 billion hectares, but less than one quarter of this — under 12 billion hectares — is biologically productive for human use. This is the amount of land available on the planet to

provide all of the food, water, and other materials that we need to support ourselves. To help students visualize this, create a pie graph that shows how the Earth's surface area is divided.

1. Begin by drawing a large circle on chart paper. Explain that the circle represents the surface area of the Earth.
2. Draw lines to divide the pie into land and water: 28 percent of the Earth's surface is land and 72 percent is water.
3. Focusing on the 28 percent of the pie that is land:
   - color about two-thirds of the land area green to represent the 19 percent of Earth's surface that is biologically productive for human use (i.e., land that is fertile enough to support agriculture, forests, or animal life).
   - color the other third of the land area brown to represent the 9 percent of Earth's surface that is marginally productive or unproductive for human use (e.g., land that is paved, covered by ice, lacks water, or has unsuitable soil conditions).
4. Explain that processes such as desertification, soil erosion, and urbanization are constantly reducing the amount of biologically productive land on Earth. To show this, draw small brown tentacles reaching from the border of the brown segment into the green segment.
5. Now, focusing on the water realm:
   - color about one-twentieth of the water section blue to show that 4 percent of the Earth's surface is lakes and oceans that are biologically productive for human use (i.e., yield more than 95 percent of the global fish catch).
   - color the remaining section black to show that 68 percent of the Earth's surface is ocean that is marginally productive or unproductive for human use (i.e, yields only about 5 percent of the global fish catch).
6. Draw black "tentacles" from the unproductive-water segment to the productive-water segment to represent processes that contribute to loss of fertility in lakes and oceans. These include the destruction of coral reefs, oil spills, overfishing (of both marine and lake species), and shoreline development.
7. This leaves a pie chart featuring four segments of varying sizes — an excellent picture of our "living" planet. Label the sections, noting the percentage of the Earth's surface that each represents and listing the forces represented by the "tentacles."

Wrap-up: Remind students that only the green and blue sections — about 23 percent of the Earth's surface — are biologically productive. This small percentage of land and water is all we have to produce all of our food, materials, and energy, and to absorb our waste. These precious slices of the Earth's surface are also needed by the other 10 million or more species with whom we share the planet.

Three Facts and One Inescapable Conclusion!

Fact #1: Of the 51 billion hectares of the Earth's surface, only 12 billion hectares are biologically productive and therefore capable of providing resources and treating waste. That's 10 billion hectares of land and 2 billion hectares of water.

Fact #2: The human population is 6.3 billion and climbing. Of the biologically productive land and water that is available, our average Earth share is 1.9 hectares per person (not including the needs of all other life forms). As our population grows, we must either reduce our average Earth share or find more Earths to inhabit.

Fact #3: The amount of biologically productive land on Earth is in decline owing to urbanization, overgrazing by livestock, deforestation, toxic contamination, poor agricultural practices, desertification, and global climate change.

Inescapable conclusion: Less is more: we all need to shrink our ecological footprint.

Calculating a footprint

Have students complete the Personal Eco-Footprint Calculator to estimate how much of the Earth's biologically productive land and water is needed to support their own lifestyles. The calculator is divided into eight categories that represent the many ways that we "consume" nature each day. Explain to students that it is not a scientific survey, but it does give a good approximation of the impact of one's lifestyle on a typical day. More detailed lifestyle analyses include other considerations that usually increase the size of one's ecological footprint. Therefore, the calculation derived from this calculator should be seen as a simplification and an underestimate of reality.

Students may point out that some lifestyle choices, such as the size of their house or the number of family cars, are not under their direct control. Explain that the calculator is meant to provide a snapshot of their lives at present, and that the baseline information they gather will help them to monitor the impact of changes they make in their lifestyles. They may, for example, make different choices if they purchase their own house or car in the future. The connection between these lifestyle considerations and their future ecological footprints is an important learning outcome of using the Footprint Calculator.

Personal Eco-Footprint Calculator

Procedure: Complete each of the charts for a typical day in your home community. Add the points on each chart to obtain a subtotal for that category, and transfer it to the summary chart. Use the grand total to calculate your ecological footprint.

Water Use — **My Score**

1. My shower (or bath) on a typical day is: _____
   - No shower / no bath (0)
   - 1–2 minutes long / one-fourth full tub (50)
   - 3–6 minutes long / half full tub (70)
   - 10 or more minutes long / full tub (90)
2. I flush the toilet: _____
   - Every time I use it (40)
   - Sometimes (20)
3. When I brush my teeth, I let the water run. (40) _____
4. I washed the car or watered the lawn today. (80) _____
5. We use water-saving toilets (6-9 liters/flush). (-20) _____
6. We use low-flow showerheads (-20) _____
7. I use a dishwasher on a typical day. (50) _____

Subtotal: _____

Food — **My Score**

1. On a typical day, I eat:
   - Beef (150/portion) _____
   - Chicken (100/portion) _____
   - Farmed fish (80/portion) _____
   - Wild fish (40/portion) _____
   - Eggs (40/portion) _____
   - Milk/dairy (40/portion) _____
   - Fruit (20/portion) _____
   - Vegetables (20/portion) _____
   - Grains: bread, cereal, rice (20/portion) _____
2. ____ of my food is grown locally. _____
   - All (0)
   - Some (30)
   - None (60)
3. ____ of my food is organic. _____
   - All (0)
   - Some (30)
   - None (60)
4. I compost my fruit/vegetable scraps and peels. _____
   - Yes (-20)
   - No (60)
5. ____ of my food is processed. _____
   - All (100)
   - Some (30)
   - None (0)
6. ____ of my food has packaging. _____
   - All (100)
   - Some (30)
   - None (0)
7. On a typical day, I waste: _____
   - None of my food (0)
   - One-fourth of my food (100)
   - One-third of my food (150)
   - Half of my food (200)

Subtotal: _____

Transportation — **My Score**

1. On a typical day, I travel by: _____
   - Foot (0)
   - Bike (5 per use)
   - Public transit (30 per use)
   - Private vehicle (200 per use)
2. Our vehicle's fuel efficiency is ____ liters/100 kilometers (gallons/60 miles). _____
   - less than 6 liters / 2 gallons (-50)
   - 6–9 liters / 2–2½ gallons (50)
   - 10–13 liters / 3–3½ gallons (100)
   - More than 13 liters / 3½ gallons (200)
3. The time I spend in vehicles on a typical day is: _____
   - No time (0)
   - Less than half an hour (40)
   - Half an hour to 1 hour (60)
   - More than 1 hour (100)
4. How big is the car in which I travel on a typical day? _____
   - No car (-20)
   - Small (50)
   - Medium (100)
   - Large (SUV) (200)
5. Number of cars in our driveway? _____
   - No car (-20)
   - 1 car (50)
   - 2 cars (100)
   - More than 2 cars (200)
6. On a typical day, I walk/run for: _____
   - 5 hours or more (-75)
   - 3 to 5 hours (-25)
   - 1 to 3 hours (0)
   - Half an hour to 1 hour (10)
   - Less than 10 minutes (100)

Subtotal: _____

Shelter — **My Score**

1. Number of rooms per person (divide number of rooms by number of people living at home) _____
   - Fewer than 2 rooms per person (10)
   - 2 to 3 rooms per person (80)
   - 4 to 6 rooms per person (140)
   - 7 or more rooms per person (200)
2. We share our home with nonfamily members. (-50) _____
3. We own a second, or vacation home that is often empty. _____
   - No (0)
   - We own/use it with others. (200)
   - Yes (400)

Subtotal: _____

Personal Eco-Footprint Calculator

Energy Use — **My Score**

1. In cold months, our house temperature is: _____
   - Under 15°C (59°F) (-20)
   - 15 to 18°C (59 to 64°F) (50)
   - 19 to 22°C (66 to 71°F) (100)
   - 22°C (71°F) or more (150)
2. We dry clothes outdoors or on an indoor rack. _____
   - Always (-50)
   - Sometimes (20)
   - Never (60)
3. We use an energy-efficient refrigerator. _____
   - Yes (-50)
   - No (50)
4. We use compact fluorescent light bulbs. _____
   - Yes (-50)
   - No (50)
5. I turn off lights, computer, and television when they're not in use. _____
   - Yes (0)
   - No (50)
6. To cool off, I use: _____
   - Air conditioning: car / home (30 for each)
   - Electric fan (-10)
   - Nothing (-50)
7. Outdoors today, I spent: _____
   - 7 hours (0)
   - 4 to 6 hours (10)
   - 2 to 3 hours (20)
   - 2 hours or less (100)

Subtotal: _____

Clothing — **My Score**

1. I change my outfit every day and put it in the laundry. (80) _____
2. I am wearing clothes that have been mended or fixed. (-20) _____
3. One-fourth of my clothes are handmade or secondhand. (-20) _____
4. Most of my clothes are purchased new each year. (120) _____
5. I give the local thrift store clothes that I no longer wear. _____
   - Yes (0)
   - No (100)
6. I buy hemp instead of cotton shirts when I can. (-10) _____
7. I never wear ___ % of the clothes in my cupboard. _____
   - Less than 25% (25)
   - 50% (50)
   - 75% (75)
   - More than 75% (100)
8. I have ____ pairs of shoes. _____
   - 2 to 3 (20)
   - 4 to 6 (60)
   - 7 or more (90)

Subtotal: _____

Stuff — **My Score**

1. All my garbage from today could fit into a: _____
   - Shoebox (20)
   - Large pail (60)
   - Garbage can (200)
   - No garbage created today! (-50)
2. I reuse items rather than throw them out. (-20) _____
3. I repair items rather than throw them out(-20) _____
4. I recycle all my paper, cans, glass, and plastic.(-20) _____
5. I avoid disposable items as often as possible. _____
   - Yes (-10)
   - No (60)
6. I use rechargeable batteries whenever I can. (-30) _____
7. Add one point for each dollar you spend in a typical day. _____
   - Today was a Buy Nothing Day (0) _____

Subtotal: _____

Fun — **My Score**

1. For typical play, the land converted into fields, rinks, pools, gyms, ski slopes, parking lots, etc., added together occupy: _____
   - Nothing (0)
   - Less than 1 hectare / 2½ acres (20)
   - 1 to 2 hectares / 2½ to 5 acres (60)
   - 2 or more hectares / 5 or more acres (100)
2. On a typical day, I use the TV or computer _____
   - Not at all (0)
   - Less than 1 hour (50)
   - More than 1 hour (80)
3. How much equipment is needed for typical activities? _____
   - None (0)
   - Very little (20)
   - Some (60)
   - A lot (80)

Subtotal: _____

Summary

Transfer your subtotals from each section and add them together to obtain the grand total.

Water use _____
Food _____
Transportation _____
Shelter _____
Energy Use _____
Clothing _____
Stuff _____
Fun _____

Grand Total: _____

My ecological footprint is:
Grand Total divided by 100 = _____ hectares
(To convert to acres, multiply hectares by 2.47)

Title: Problem Solving about our Earth **Subject/Course:** Mathematics **Time:** 55 minutes
Strand: Number Sense and Numeration **Grade:** 6

Lesson Description

In this lesson students will be using their problem solving skills to tackle real life questions about our waste management habits.

Stage 1: Desired Results

Fundamental Concepts/Skills

- Problem based learning

Big Ideas/Essential Question

- How can we use math to solve environmental problems?

Ontario Curricular Overall Expectation

- Throughout grade six students will develop, select, and apply problem-solving strategies as they pose and solve problems and conduct investigations, to help deepen their mathematical understanding
- By the end of grade six students will solve problems involving the multiplication and division of whole numbers, and the addition and subtraction of decimal numbers to thousandths, using a variety of strategies;

Ontario Curricular Specific Expectation

- Solve problems that arise from real-life situations and that relate to the magnitude of whole numbers up to 1 000 000
- Solve problems involving the multiplication and division of whole numbers (four digit by two-digit), using a variety of tools (e.g., concrete materials, drawings, calculators) and strategies (e.g., estimation, algorithms);

Lesson Goals

- Students will be reinforcing the skills they acquire through problem based learning
- Students will be made aware of the significance of their actions when it comes to how they treat the environment

Background Knowledge:

- Problem solving methods
- Students should have some background on waste management issues and other environmental problems that exist

Stage 2: Planning learning experience and instruction

Student Groupings	**Instructional Strategies**
• Students will be sitting together as a class for the beginning of the class • Students will be divided into groups of 2-4 (up to discretion of the teacher) in order to create word problems and to later present them	• Direct Instruction • Experiential
Materials	**Considerations**
• Waste management Information sheets • Chart Paper • Markers	• Students who may have difficulty creating their own problems, can solve premade word problems

Stage 3: Learning experience and instruction

Motivational Hook (5 MINS.):

Ask students how they think that math and our waste management habits are connected.
Record student's answers on board or chart paper.

Open (5 MINS):
Students will be given a list of fact about the way we waste and the amount of waste we send to landfills. Go over the information as a class. Explain how word problems can be used with the information to create solutions. For example, If we see that we create x amount of waste each day, what would happen over 20 years if we decreased our amount of waste in half. How much waste would we eliminate?
Body (30 MINS):
• Students will use the information in the worksheets to create their own word problems as a group. • The problems should be relevant to their lives and should pose a solution that they can incorporate into their daily lives • They will then be required to solve the problem they created
Close (15 MINS):
Students will present their findings to the class and discuss how they came up with their answer and if what they learned surprised them. Students will also have the opportunity to discuss if what they learned will have an effect on their actions when it comes to waste management.
Assessment
Students will be assessed on their presentation, to see if they were able to use. The teacher can choose to use a rubric or to take anecdotal notes.

Problem Solving About our Earth

Information Sheet

Over 34 million tonnes of waste was handled in Canada handled during 2008 according to figures released by Statistics Canada - that translates to about 1031 kg of waste per Canadian.

More than three quarters (78%) of this ends up in landfills. Tones

On a per capita basis, Alberta sent the most waste for disposal in 2008, the equivalent of just over 1.1 tonnes per person. Conversely, Nova Scotia sent 378 kg per person for disposal.

Nationally, the quantity of materials diverted from disposal for recycling or composting increased by about 10% from 2006 to 2008.

Each Canadian produces 1.7kg of waste each day (roughly our body weight in garbage every single month!)

In 2000 Toronto households created 920, 000 tonnes of waste. 76% was sent to the landfill and 24% was recycled, composted or re-used.

As few as 50% of water bottles Torontonians consume everyday are actually being recycled.

From 2000 to 2004, the amount of organic waste composted by the waste management industry increased by 70% to 1.7 million tonnes. Close to two thirds of these organic wastes were generated by the residential sector.[1]

The average Canadian sent 51 kilograms of organic waste for composting in 2004, compared to 32 kilograms in 2000.

More statistics

http://www.gecdsb.on.ca/schools/elem/concord/1Waste_Related_Quick_Facts.pdf

Teachers can also feel free to use other information that they would like to focus on.

References

http://www3.sympatico.ca/dsloly/zerowaste/statistics.html

http://home.cc.umanitoba.ca/~thompso4/ZeroWaste.html

http://www.insidethebottle.org/canada-too-many-plastic-bottles-too-little-landfill