

WISE ABOUT WASTE

CURRICULUM GUIDE • 3RD & 4TH GRADE

Minnesota
Children's
Museum
Smart Play



WISE ABOUT WASTE

GRADE LEVEL(S):

3rd and 4th grade

The unit can be adapted for higher or lower grades depending on the needs of the individual students. This unit was developed for third and fourth graders and was tested in third grade classrooms.

DESCRIPTION OF UNIT:

Wise About Waste is a two-week interdisciplinary unit with lessons on reducing, reusing, and recycling. Students put their learning into action by creating a robot using reused materials. The unit has a science and art focus with connections to language arts, social studies and math. It can be extended to a longer unit if desired. Each lesson is approximately one hour in length. There is an optional extension to the unit which incorporates electricity and movement into the robots.

The unit was developed by an elementary teacher, an environmental educator and an artist. The teachers in the pilot project recommend doing the ecology-focused lessons followed by the art-focused lessons on creating a robot. The electricity lessons are optional, but motivational, for the students. The lessons on electricity and movement of the robots are closely tied to the 4th grade science standards and benchmarks for energy.

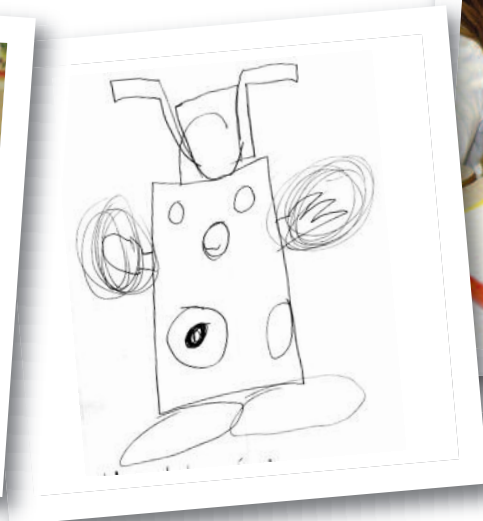
MINNESOTA ACADEMIC STANDARDS:

This unit was designed to work towards meeting Minnesota Academic Standards in the areas of science, art, language arts, social studies and math. Each set of weekly lesson plans lists the Standards/Benchmarks that are addressed in the lessons.

OBJECTIVES:

Wise About Waste incorporates lessons about the natural environment and visual art.

- Students will explore the different ways our society addresses recycling, landfills, and garbage.
- Students will increase their knowledge base about waste reduction and recycling.
- Students will learn about form, texture, balance, color, line, unity, and movement.
- Students will investigate how to transform recycled objects into a new form.



MINNESOTA ACADEMIC STANDARDS:

ART ACADEMIC STANDARDS FOR K-3 AND 4-5

STRAND 1: ARTISTIC FOUNDATIONS

Standard 1: Demonstrate knowledge of the foundations of the art area.

Art Area: Visual Art

- Demonstrate knowledge of the elements of color, line shape, form, texture, value and space.

Standard 2: Demonstrate knowledge and use of the technical skills of the art form including technology when applicable.

Art Area: Visual Art

- Identify and use the basic tools and materials of a variety of two- and three-dimensional media such as drawing, printmaking, ceramics or sculpture.

STRAND 2: ARTISTIC PROCESS: CREATE OR MAKE

Standard 1: Create or make in a variety of contexts in the art area using the artistic foundations.

Art Area: Visual Art

- Create original two- or three-dimensional artworks to express ideas, experiences, or stories.

STRAND 3: ARTISTIC PROCESS: RESPOND OR CRITIQUE

Standard 1: Respond to and critique a variety of creations or performances using the artistic foundations.

Art Area: Visual Art

- Compare and contrast the characteristics of a variety of works of visual art.

SCIENCE ACADEMIC STANDARDS FOR GRADE 3

THE PRACTICE OF SCIENCE

Standard 1: Scientists work as individuals and in groups emphasizing evidence, open communication, and skepticism.

- Understand that one's prior knowledge and experience sometimes influences observations that are made.

Standard 2: Scientific Inquiry is a set of interrelated processes used to pose questions about the natural and engineered world and investigate phenomena. There are multiple sequences that can be used for the process of inquiry.

- Generate questions that can be answered when scientific knowledge is combined with one's own observations and investigations.
- Make notes in order to maintain a record of observations, procedures, and explanations.
- Use data to construct reasonable explanations.

INTERACTIONS AMONG SCIENCE, ENGINEERING, TECHNOLOGY AND SOCIETY

STRAND 3: Men and women throughout history of all cultures, including Minnesota American Indian tribes and communities, have been involved in engineering design and scientific inquiry.

- Understand that everybody can use science to learn about the natural world and identify natural patterns.
- Understand that people – alone or in groups – use engineering design to invent new products and ways to solve problems.
- Recognize that the practice of science and/or engineering involves many different kinds of work and engages men and women of all ages and backgrounds.

SCIENCE ACADEMIC STANDARDS FOR GRADE 4

THE PRACTICE OF ENGINEERING

STRAND 1: Engineers design, create and develop structures, processes and systems that are intended to improve society and may make humans more productive.

- Describe the positive and negative impacts that the designed world has on the natural world as more and more engineered products and services are created and used.

DAY ONE ● ○ ○ ○ ○

DEVELOP A JOURNAL**Duration:** One hour**Description of lesson:**

Using 8 x 11 paper that would otherwise be recycled, students will create journals.

Objective:

- Students will have the opportunity to create journals out of materials that would otherwise be recycled or thrown away.

Materials:

- Supply of raffia, ribbons, yarn, etc.
- 3-hole punch (several)
- Large amount of paper unused on one side which would otherwise be recycled
- Heavy card stock in a variety of colors
- Magazines (nature, science, etc)
- Glue sticks
- Scissors (many)

Procedures:

1. Students work ahead of time to clip pictures from magazines. These could be nature scenes, science pictures, etc.
2. Students decorate the cover of their journals with glue sticks and magazine clippings. Be sure each student writes his/her name on the journal.
3. After the covers are complete, students may get a stack of paper (seven-10 sheets should be plenty) and one additional piece of card stock for a "back cover."
4. Students work with adults to punch holes in their paper and covers. Then they bind them together with yarn, raffia, etc.
5. Journals will be used throughout the two weeks for recording observations, questions, making sketches, etc.



CREATE A MURAL

Adapted from United States Environmental Protection Agency's Source Reduction curriculum available on www.epa.gov

Duration: One - 3 hours

Description of lesson:

Students will collect a variety of "trash" and recycling materials and work together to develop and create an artistic mural.

Objectives:

- To encourage students to think about what kinds of materials they throw away.
- To introduce a variety of objects, packaging, and materials that are frequently thrown away and provide an alternative use for them.
- To organize materials by size, shape, color, or other criteria as determined by the students.

Materials:

- Clean "trash" or recycled items brought in by the students (examples: packaging, boxes and wrappers, odds and ends, toy pieces, etc.)
- A large box or bin in the classroom for collecting the materials
- A few dozen magazines (for pictures of things that would normally be thrown away at the end of each use)
- Large tarp or sheet
- Glue sticks (enough for each student)
- Scissors (enough for each student)
- Long pieces of butcher paper (10-12 feet per classroom)

Procedures:

1. Lead a discussion of what garbage is and where it comes from. Ask students if they know how to identify garbage. What makes something "garbage?" How do we know when it is time to throw something away? Challenge the students' thinking on these topics. Generate questions and ideas.
2. Lay the tarp on the floor and have the students sit in a circle around it.
3. Arrange items by color rainbow of items. They can be cut, trimmed, or altered in any way. Students affix them to the mural paper with glue.
4. Spread out the garbage and ask the students to go around and discuss what they brought. Explore how they knew it was garbage; ask them to describe the item's purpose before it was garbage. Encourage them to compare and contrast shapes, colors, and sizes.
5. Have the class brainstorm different ways of organizing it, such as by color, size, shape, function, etc.
6. Arrange items as appropriate.
7. Items may be cut, trimmed, altered in any way.
8. Students work together as a group to affix them to the mural paper w/glue.

Extensions:

- Choose a theme for the mural ahead of time (for example, food packaging).
- Have each student develop their own mural or poster, using castaway items from their household.
- Develop awards for the strangest item, most colorful, biggest, etc.
- Have older students create a 3-D sculpture from the items.
- Guess or estimate how many pieces of trash are in the mural. If this many items were thrown away by one class in a week (for example) and there are 4 classes in this school, how many items are thrown away in one year? Create other math problems as a group.

DAY THREE ○ ○ ● ○ ○

A PEEK AT PACKAGING

Adapted from "Project Learning Tree"

Duration: One hour

Description of lesson:

Students identify different purposes of packaging, determine the pros and cons of each type, and discuss ways to package materials and goods. If time allows, students will have the opportunity to create or adapt packaging to make it better.

Objectives:

- Students will identify different purposes of packaging, the pros and cons of each type of packaging, and determine which packaging is recyclable or biodegradable.
- Students will ask questions about packaging and make responsible purchasing decisions based on the available information.

Background Information:

Some form of packaging is needed to hold items together in the size or amount desired. The earliest forms of packaging were animal skins, clay pots, and woven baskets. Glass bottles and leather were also used. In addition to its role of holding goods together, packaging also preserves and protects items. For example: cans and jars help keep items fresh and lengthen their shelf-life. Cartons, jugs, and bottles keep items fresh and allow for pouring and storage. Large boxes allow consumers to purchase a large quantity of an item at one time. Packaging also prevents contamination and protects items. Finally, packaging provides a surface for display of information about the contents, and for advertising space.

Manufacturers and consumers are becoming more aware of packaging's impact on the environment, as well as the financial benefits of conservation of natural resources, energy, and waste management.

In many instances, the need for packaging and the kind of materials needed are self-evident (for example, baby food in small glass jars). Sometimes, however, it may be difficult to understand why a certain package has been used.

Materials:

- Examples of different kinds of packaging used for different purposes (include packaging used for advertising, freshness, tamper resistance, convenience, etc)
- "Consumer Choices" worksheet

Procedures:**(Day before lesson)**

1. Ask students to bring two consumer product packages from home. Suggest that they find one item that is properly packaged and one item that is overly packaged. Products may be unopened in their original packaging material, or in clean, empty containers.

(Lesson day)

1. Have students work in teams and select a few items to evaluate.
2. Give each team a worksheet for each item.
3. Set out the examples of packaging that you brought in. Ask students why they think each product is packaged the way it is.
4. Have each team work together to complete the worksheets for their items.
5. Have each team share its findings with the group.

Extensions:

- Have students create an ideal package for one of the products they evaluated.
- Have students draw or create the packaging out of art materials or recycled items.
- Have students categorize packages based on criteria they develop (for example, overly packaged, insufficient packaging, recycled materials, etc).

CONSUMER CHOICES WORKSHEET

Observe your product closely. Discuss the questions with your team. Answer the questions as best you can.

Product name:

Type of product:

Where the product was made:

Describe all parts of the packaging.

What materials make up the packaging? (Paper, plastic, metal, glass, etc.)

Is the product or package made of recycled materials? How do you know?

After the product has been used, what is thrown away?

Can the packaging be recycled in your community? How do you know?

What purpose does the packaging serve? (portion size, health, safety, nutrition information, advertising, etc.)
How do you know?

How would you improve the packaging of your product?

LIFE CYCLE OF A PENCIL

Adapted from Project Learning Tree's "Resource Go Round" activity

Duration: One hour

Description of lesson:

Students explore and identify natural resources used to create everyday objects, such as pencils. They learn about product "life cycles" and discuss consumption and energy use in those life cycles. Later, students work in teams to select an object and research the sources of its various components.

Objectives:

- Students will learn to identify natural resources in common objects.
- Students will research and discuss the processes by which natural resources are turned into products, and the energy involved in those processes.

Background Information:

Most of the products we use every day are actually comprised of a variety of materials. The pencil is an example of a product that uses resources from many places around the world. A single pencil may be made from cedar from California, pumice (stone) from Italy, rubber from Brazil, copper from Canada, and graphite from Sri Lanka! The cycle of producing and distributing a product like a pencil requires natural resources and energy each step of the way.

In our decisions as consumers, we can be aware of the cycle of natural and/or human resources and the flow of energy throughout the environment. Every material and every form of energy used to make a product comes from a renewable or nonrenewable resource. Renewable resources, like trees, animals, and plants can all be replaced by humans. On the other hand, nonrenewable resources, such as graphite, gold, and other minerals, are finite and cannot be replenished naturally. Once these materials are taken from the earth, they cannot grow back or be replaced.

Energy is required to produce the materials that go into a product. The engine that powers a steam shovel used to mine a metal consumes energy in the form of gasoline. Gasoline comes from fossil fuels, a nonrenewable resource. The process of transporting metal to a refining plant requires energy. Combining the metal with wood and other raw materials to make a finished product – in this case, a pencil – consumes even more energy. Producing packaging for the product, shipping and storing the product, and even selling and using the product requires energy. Finally, disposing of the product or recycling it completes its life cycle, but it will never return 100% of either the resource consumed or the energy consumed back to nature. Nothing can be created or used without expending energy in the process.

To make a pencil, an incense cedar log is cut into seven-inch long slats. A machine cuts grooves into the slats. Into each groove is cut a writing core, where the "lead" goes (actually, a mixture of graphite and clay) a second grooved slat is glued onto the other slat, making a sandwich. A machine shapes each side of the sandwich and then cuts it into individual pencils. After being sanded smooth, each pencil is painted and a recess is cut into the other end which will hold the metal ring that holds the eraser. The eraser may be made from rubber, gum, or synthetic rubber (from petroleum) and blended with pumice.

No matter where the resources and materials are found, they are all a part of the earth's resources and energy cycles.

LIFE CYCLE OF A PENCIL - continued

Materials:

- Video streaming of "Let's Make a Pencil"
- <http://www.pencils.com/pencil-information/lets-make-pencil-video>
- Pencil for every student
- World map on chalkboard, dry erase board or smartboard
- Small paper world maps for groups of students

Procedures:

1. A cycle is defined as a course of events or operations that recur regularly and that usually lead back to a starting point. Have students describe a cycle that occurs in their own lives. (The school year for example: buying supplies, finding their classrooms, attending classes, taking tests, getting report cards, having seasonal breaks, summertime, etc.)
2. Have each student handle and observe a pencil. Challenge students to identify all the materials that make up a pencil, along with the natural resources from which they are derived. Review where these natural resources originated. Locate them on a map.
3. Watch the short video, "Let's Make a Pencil."
4. Have the students consider the life cycle of a pencil. Draw and label a large diagram of "A pencil's life cycle" on the board.
5. Divide the class into small groups. Each student should think of an item that is in some way a product of a forest. (Consider something made of wood, for simplicity's sake.)
6. Have each group discuss the steps necessary to create each item. Things to think about: How did the materials get from one place to another? Is there a more energy-efficient way to create this product? Where might pollution result during this process?
7. Each group will present their item to the class for discussion.





LUSCIOUS LAYERED LANDFILL

Adapted from <http://www.epa.gov/osw/education/quest>

Duration: One - two hours

Description of lesson:

Students will construct edible models of a landfill to learn about its different layers and their functions.

Objectives:

- Students will understand how a modern landfill functions (that is, how its many layers contain garbage and prevent leakage into soil or groundwater.)

Materials:

- one 8 oz. plastic cup per student
- 4 chocolate sandwich cookies per student ("Oreo" cookies)
- one 8 oz. box of raisins
- 1 fruit rollup per student
- 2 graham crackers per student
- 2 red licorice sticks per student
- 1 package of birthday candles
- 1 set of matches
- 1 container chocolate pudding per student
- 2 tbsp of whipped cream per student
- 1 plastic knife and 1 plastic fork per student
- 1 handful per student of a variety of small chewable candies (chocolate chips, fruit bits, Skittles, etc.)
- 1 copy of "Anatomy of a Landfill" handout per student





LUSCIOUS LAYERED LANDFILL - continued

Procedures:

1. Discuss the purpose of a landfill and how it works. Explain that students will be creating their own landfills in class.
2. Distribute one cup and four chocolate sandwich cookies to each student. Explain that the cup represents an excavated hole in the ground.
3. Have students carefully “unscrew” two of their cookies so that one half has white cream and the other is bare. Students should have two cookie halves with white cream and two cookie halves without cream. Crush the bare cookie halves into small pieces and put them into the cup. Explain that the crushed cookies represent a layer of soil that is placed in the bottom of real landfills.
4. Next, have the students take the cookie halves with white cream and break them up into two or three pieces. Direct students to place the pieces in the cup with the white cream face up. These pieces represent the clay that is put on top of soil in real landfills.
5. Have the students use the plastic knife to cut their fruit rollups to roughly fit the size of the top of the cup and slide them into place (will push up on sides) on top of the cookies, to represent a plastic liner. Plastic liners prevent leachate from escaping from a landfill into the ground. Leachate is liquid that is created when trash decomposes.
6. Have students crush and add their graham crackers to represent a sand layer. This layer is used in landfills to prevent liquid from seeping out.
7. Have students place their raisins on top of their sand to represent a layer of pebbles. Like the sand layer, pebbles provide further protection against leachate leaks.
8. Have students rip the licorice sticks in half and bite off both ends to represent leachate pipes. Stick pipes into pebble layer. These pipes collect any leachate that collects on top of the liners.
9. Ask students to sprinkle their candies on top of the raisins. The candies represent pieces of garbage. Ask students to think about what happens when a landfill or “cup” is filled up with “trash” or raisins. How can they reduce the amount of trash that they are sending to the landfill?
10. Give each student the pudding to pour on top of their candies. Then have students add one more layer of candies on top of the pudding. This pudding layer represents the seepage created from rain seeping through the garbage. Explain that in a real landfill, more layers of garbage or “candies” are placed on the landfill each day, so that the liquid from the decomposition of the trash is continually created.
11. Direct students to “unscrew” their two remaining cookies and crush another layer of the bare cookie halves, without the cream. Dump this on top of the candies and pudding to represent soil again. (students may eat the remaining cookie parts) This layer reduces the amount of water that reaches the garbage.
12. Each student should use a layer of whipped cream to cap the landfill or cover it (as would a plastic cap on a real landfill) in order to prevent rodent, insect, and odor problems.
13. In front of the class, stick a candle into your own edible landfill and light it. The flame represents methane gas recovery, which draws the methane produced as a result of decomposition, and generates energy from burning the gas.
14. Have students eat their landfills as a snack. When they get to the bottom of their cup, ask them to notice whether their cookie or “soil” layer is dry or whether the pudding or “leachate” leaked past the many layers and the fruit roll-up liner to the cookies. Remind the students that if they built their landfill correctly, their cookies will be dry, just as in a real landfill the soil remains protected from leachate.
15. After enjoying the snack, review the purpose of all the parts and what they represent.

MINNESOTA ACADEMIC STANDARDS:

ART ACADEMIC STANDARDS FOR K-3 AND 4-5

STRAND 1: ARTISTIC FOUNDATIONS

Standard 1: Demonstrate knowledge of the foundations of the art area.

Art Area: Visual Art

- Demonstrate knowledge of the elements of color, line shape, form, texture, value and space.

Standard 2: Demonstrate knowledge and use of the technical skills of the art form including technology when applicable.

Art Area: Visual Art

- Identify and use the basic tools and materials of a variety of two- and three-dimensional media such as drawing, printmaking, ceramics or sculpture.

STRAND 2: ARTISTIC PROCESS: CREATE OR MAKE

Standard 1: Create or make in a variety of contexts in the art area using the artistic foundations.

Art Area: Visual Art

- Create original two- or three-dimensional artworks to express ideas, experiences, or stories.

STRAND 3: ARTISTIC PROCESS: RESPOND OR CRITIQUE

Standard 1: Respond to and critique a variety of creations or performances using the artistic foundations.

Art Area: Visual Art

- Compare and contrast the characteristics of a variety of works of visual art.

SCIENCE ACADEMIC STANDARDS FOR GRADE 3

THE PRACTICE OF SCIENCE

Standard 1: Scientists work as individuals and in groups emphasizing evidence, open communication, and skepticism.

- Understand that one's prior knowledge and experience sometimes influences observations that are made.

Standard 2: Scientific Inquiry is a set of interrelated processes used to pose questions about the natural and engineered world and investigate phenomena. There are multiple sequences that can be used for the process of inquiry.

- Generate questions that can be answered when scientific knowledge is combined with one's own observations and investigations.
- Make notes in order to maintain a record of observations, procedures, and explanations.
- Use data to construct reasonable explanations.

INTERACTIONS AMONG SCIENCE, ENGINEERING, TECHNOLOGY AND SOCIETY

STRAND 3: Men and women throughout history of all cultures, including Minnesota American Indian tribes and communities, have been involved in engineering design and scientific inquiry.

- Understand that people – alone or in groups – use engineering design to invent new products and ways to solve problems.
- Recognize that the practice of science and/or engineering involves many different kinds of work and engages men and women of all ages and backgrounds.

SCIENCE ACADEMIC STANDARDS FOR GRADE 4

THE PRACTICE OF ENGINEERING

STRAND 2: Engineering design is the process of identifying problems, developing multiple solutions, selecting the best possible solution, and building the product.

- Generate ideas and possible constraints for solving a problem through engineering design.
- Test and evaluate solution, including advantages and disadvantages of the engineering solution, and communicate the results effectively.

ENERGY

STRAND 1: Energy appears in different forms, including heat and electromagnetism.

- Compare materials that are conductors and insulators of heat and/or electricity.

STRAND 2: Energy can be transformed within a system or transferred to other systems or the environment.

- Construct a simple electrical circuit using wires, batteries and light bulbs.

Objectives:

Wise about Waste incorporates lessons for the students about the environment and art.

- They will learn about how society deals with garbage, landfills and recycling.
- They will explore their creativity.
- They will learn about choice as a part of the creative process.
- They will learn about form, texture, balance, color, line, unity, and movement.
- They will explore how to transform recycled objects into a new form-a robot.
- Incorporating science with art will show the students that art can be integrated with other subjects.
- The students will build a circuit and learn about electricity using a battery, motor, wires and a switch.
- They will transform a stagnant sculpture into a kinetic sculpture.
- Students will learn new vocabulary words.

Duration: Six hours

- three hours to build the robot
- two hours to build the circuit
- one hour to write and draw in their journals
- optional hour for an art show of their robots

Materials:

- Low temperature hot glue machines
- Low temperature hot glue sticks
- Wire strippers
- D cell battery
- D cell battery holder
- 18 gauge wire - three feet per student
- Wire guards - 4 per student
- Small motor
- Switch
- Four plastic bottle caps
- Awl for poking holes into plastic bottle caps (exact size for shaft on motor)
- Utility knife
- Scissors
- Tin snips

WEEK TWO REUSE AND RECYCLE: BUILDING SCULPTURAL ROBOTS

Research:

Prior to building the sculpture of the robot students will research the art of assemblage (assembly of objects), robots, landfills and recycling, circuits and electricity through recommended books.

Recommended Book List:

Recycled Crafts Box by Laura C. Martin

Fun With Recycling: 50 Great Things for Kids to Make from Junk by Marion Elliot

Robot (Eyewitness Books) by Roger Bridgman

The Art of Robots by Amid Amidi and William Joyce

Science Wiz-Electricity by Penny Norman and Ann Einstein

Electricity (Eyewitness Books) by Steve Parker and Laura Buller

Garbage and Recycling (Young Discoverers: Environmental Facts and Experiments) by Rosie Harlow and Sally Morgan

Recycle: A Handbook for Kids by Gail Gibbons

Where Does the Garbage Go? by Paul Showers

Recycling by Rhonda Lucas Donald

How Children Make Art: Lessons in Creativity from Home to School by George Szekely

Assemblage is an artistic process in which a three-dimensional artistic composition is made from putting together found objects.

Assemblage Artist List:

Gordon Bennett	robots from found objects
Marcel Duchamp	considered the first assemblage artist
Louise Nevelson	wood assemblages
Dale Copeland	New Zealand found object artist
Alexander Calder	invented the mobile sculpture and wire circus shows
Jean Tinguely	sculptural machines or kinetic art known as Metamechanics
Joseph Cornell	boxes with photos and objects
Donald Lipski	master manipulator of the found object
Nancy and Ed Kienholz	environments comprised of found objects and elements culled from abandoned buildings
Grandma Prisbee's Bottle Village	
Mr. Imagination	uses paint brushes to create figurative works
Jason Mecier	found object portraits
Jean Dubuffet	French artist who coined the term assemblage
Pablo Picasso	
Betty Saar	African, Irish, American Indian assemblage recycler artist
Jan Elftmann	Corktruck ArtCar artist



WEEK TWO REUSE AND RECYCLE: BUILDING SCULPTURAL ROBOTS

Trash for Tomorrow:

Citizens of the United States generate 150 million tons of garbage annually—enough to fill a convoy of 10 1-ton trucks that would stretch five times around the equator and half way to the moon!

As we head for the trash barrel, it would be helpful to think of the time it takes for some common items of household waste to decompose.

One or two weeks before the residency, send the recycled object list home with each student to use as a guide for collecting objects for their robots. Each student will bring one paper bag of recycled objects.

Clean out your junk drawers, closets, the toy box, the basement or the garage! Do not bring glass or sharp objects.

Vocabulary List for Recycle/Reuse Residency:

Sculpture	Vibration
Kinetic	Object
Landfill	Reuse
Circuit	Robot
Battery	Machine
Motor	Balance
Electrons	Three Dimensional, 3-D
Flow	Two Dimensional, 2-D
Wire	Artist
Switch	Conductor
Recycle	Insulator
Transform	Twist
	Engineer

Robot Recycle List

Shoeboxes (for the robot body)	Straws
Cereal boxes (for the robot body)	Paper towel tubes
Oatmeal container	Toilet paper tubes
Tin cans (wash out)	Plastic film containers
Milk cartons (rinse out)	Old pens
Plastic pop bottles (rinse out)	Old pencils
Shampoo bottles (rinse out)	Broken or old jewelry
Dish soap bottles (rinse out)	Broken or old toys
Cottage cheese containers	Fast food toys
Yogurt containers and lids	Zippers
Egg cartons	Used keys
Used clean plastic silverware	Telephone wire
Used clean plastic plates	Old golf balls
Jar lids	Old ping pong balls
Plastic and metal bottle caps	Old computer parts
	Buttons

Decomposition times:

Paper3 months
Rope3-16 months
Milk cartons5 years
Plastic bags10-20 years
Soup cans100 years
Plastic rings1450 years
Styrofoamnever ever

DAY ONE



LEARNING ABOUT AND BUILDING A ROBOT

Students will discuss the definition of a robot - 20 minutes

- Students will brainstorm ideas for their robot's three jobs based on their personal interests.
- Students will use creative and critical thinking to design their robots in their journals. The students will be challenged to include in their design a robot with a brain and to keep it balanced.
- Students will identify the vocabulary of art related to their sculpture using the elements and principles of art: form, texture, balance, unity, and movement.
- The students will learn the difference between a two-dimensional robot and a three-dimensional robot.

Building the Robot - 40 minutes

- The students will bring their paper bag of recyclable objects, and empty the contents onto the floor to create the landfill. If a student has brought in a special item for their robot, they can hold onto to it.
- Students will learn how to use a new tool: hot glue machine. The students will be instructed how to safely use a low temperature hot glue machine.
- The students will choose objects from the landfill and glue them together.

DAYS TWO & THREE



BUILDING AND WIRING A ROBOT

Students will learn how to use a new tool: wire stripper.

Students will learn how to build a circuit with:

Energy = battery Receiver = motor

Path = wire On/Off = switch

Each student will build three spinners to spin on the shaft of the motor.

1. Discuss what a circuit is. Discuss where electricity comes from.
2. Demonstrate how to use the wire stripper. Strip wires, motor wires and battery holder wires.
3. Cut 3' wire into 1' sections. Attach two of the three wire pieces to each of the two motor wires.
4. Attach third wire to the battery holder wire.
5. Attach wire from the battery and one wire from the motor to the switch.
6. Inquiry time: Ask student to figure out how to get the motor to work. They will need to attach two remaining wires from the battery and the motor.
7. Discuss insulator and conductors. Use the wire guard caps to insulate wire. Use masking tape to insulate the wires on the switch.
8. Have students put a piece of tape on the shaft of the motor. This is the big "A-ha" moment for them.
9. Demonstrate how the students can build three spinners for their shaft.

Materials:

- 1 "D" Battery Holder (Radio Shack)
- 1 Motor
- 1 "D" Battery
- 1 Switch
- 1 Wire (3' of 18 gauge)
- 4 Wire Caps
- 1 Wire Stripper

WEEK TWO REUSE AND RECYCLE: BUILDING SCULPTURAL ROBOTS

DAYS FOUR & FIVE ○ ○ ○ ● ● ○ ○

ASSEMBLING THE ROBOT

1. Teacher will work with each of the students one on one to assist them in putting their circuit into their robots to make it kinetic.
2. Students will make an "X" to mark the spot where they want the motor to be on their robot. The choices are the sides or top of the robot, not the bottom.
3. Students will draw where they want a door large enough for an adult hand to fit into.
4. Students will decide with the adult where the switch will fit.
5. The teacher will assist the student in making the best decision for putting the motor and switch into the robot: not too close to the bottom of the robot; no objects will interfere with the motion of the motor.
6. The other students will be self-directed to work on their robot and problem-solve to keep them balanced.
7. When students claim to be done, challenge them to add ten more objects to their robot, build a remote control, and baby robots.

DAY SIX ○ ○ ○ ○ ○ ● ○

WRITING AND DRAWING ABOUT A ROBOT

1. Students will draw their robot and label what each part on their robot does. The picture and text will go on display with the robot in an art show on the last day of the unit.
2. Students will draw the circuit they built.
3. Students will draw the wire stripper, hot glue machine, tin snips.
4. Students will write stories about their robot. It can be a documentary story about how it was made a fantasy story about how it came to be built, who created it and what the robot does every day.

DAY SEVEN (optional) ○ ○ ○ ○ ○ ○ ●

EXHIBITING A ROBOT

The picture and text will go on display with the robot in an art show on the last day of the unit.

Wise About Waste was funded by the Solid Waste Management Coordinating Board through a Community POWER (Partners on Waste Education and Reduction) Grant.

Wise about Waste authors:

Ann Boekhoff

Director of Special Projects, Minnesota Children's Museum

Mary Weiland

Exhibit Developer, Minnesota Children's Museum

Tami Staloch-Schultz

Magnet School Teacher on Special Assignment,
Glacier Hills Elementary School of Arts and Science

Jan D. Elftmann

Environmental Artist in Residence

Patty Born Selly

Environmental Educator in Residence

