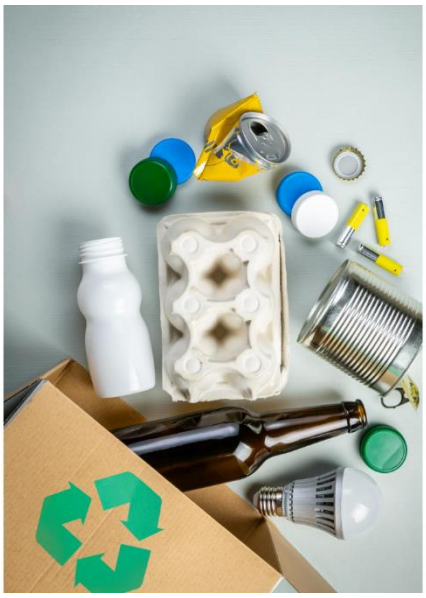
Creative Recycling Science Project


Dearborn County 4-H

Recycling Science Project

(Not a State Fair Project) (Recycling Science Record Sheet)

Recycling is the manufacture of goods from waste materials. Glass bottles and jars, aluminum cans and bottles, steel, paper and cardboard can be recycled in Dearborn County. Recycling can mean shredding old cans and cars and melting the pieces to make new metal from new cans and new cars. It can also mean crushing bottles into tiny glass bits and melting these bits to make new glass.

Exhibit Requirements:

Beginner (grades 3-5)

Select ONE of the following to exhibit. Do a different one each year.
On a poster or in a three-ring notebook, exhibit: *Poster and Reference Requirements are in Appendix A.*

- Recycling Center in your home
- Take a tour of your local recycling center and write a report
- Explain how the three R's decrease waste
- Explain the recycling symbol
- Read a magazine article on recycling and write a one-page report
- Cut the top off several 2-liter bottles and fill with dirt. Bury 6 or 8 items such as table scraps, plastic bags, toothpicks, aluminum cans, etc., the bottles. Observe the bottles for 6 months and write a report about what happened to the items.
- Plan and have a zero waste picnic or party with your family

Intermediate (grades 6-8)

Select ONE of the following to exhibit. Do a different one each year.
On a poster (refer to Appendix A for poster guidelines) or in a three-ring notebook, exhibit:

- How to identify plastics for recycling
- How to make paper from recycled paper
- How to prepare cardboard for recycling
- Identify excessive packaging and how to reduce
- How to make a compost pile or vermicomposting bin
- Identify items that can be recycled locally
- Create a diagram of your house and list out items for each room that can be recycled and where you would place recycling bins

Advanced (grades 9-12)

Select one of the following to exhibit. Do a different one each year.
On a poster (refer to Appendix A for poster guidelines) or in a three-ring notebook, exhibit:

- Make a list of household hazardous waste, how to dispose of them, and what they are recycled into
- List of items that can be recycled on a farm
- Recycling batteries – why they need to be recycled and the process

- Cloth vs. disposable diapers
- Diagram a landfill
- Recycling of old tires and items that they are made into
- Recycling of electronics and appliances
- Disposing of farm chemical wastes
- Living a zero-waste life
- Explain the process of a composting (choose from vermicomposting, barrel composting, or pile composting)
- Make a diagram of a recycling MRF (Materials Recycling Facility) and explain the sorting process starting when recyclables are picked up from the curb
- Explain how recycling conserves natural resources

Recycling Basics

Recycling is the process of collecting and processing materials that would otherwise be thrown away as trash and turning them into new products. Recycling can benefit your community and the environment.

Benefits of Recycling

- Reduces the amount of waste sent to landfills and incinerators
- Conserves natural resources such as timber, water and minerals
- Prevents pollution by reducing the need to collect new raw materials
- Saves energy
- Supports manufacturing in the United States
- Helps create jobs in the recycling and manufacturing industries in the United States

Recycling started as a relatively easy concept — converting discarded resources into reusable material. But over time, communities across the country began using different recycling guidelines and accepted different materials. As a result, many people today are unsure about what to recycle, what not to recycle, and how to recycle.

The one constant is that people genuinely want to recycle. They understand how important it is in protecting our environment. This commitment has, unfortunately, led to an increase in "wish-cycling". For many people, this means placing an item in a recycling container that does not belong, or an item that is soiled with food, in the hope or mistaken belief that it can be recycled. While there are good intentions behind "wish-cycling", it leads to contamination that can harm equipment in sorting facilities. Contamination refers to including non-recyclable materials such as clothing in a recycling container as well as placing food-soiled items like used paper plates in the container – but the latter has far more harmful consequences.

Every community has its own rules and requirements concerning how and where recyclables are collected, as well as what items are accepted. The following list contains items that are accepted in Dearborn County.

What can you recycle in Dearborn County?

Type	Items	Place to recycle
General Recyclables 	cardboard pizza boxes office paper mail envelopes paper newspaper paper boxes magazines aluminum cans and bottles metal cans empty aerosol cans cartons plastic bottles and jugs glass bottles and jars	curbside pick-up Dearborn County Recycling Center (DCRC) 24/7 Trailers
Metals 	scrap metals	DCRC Drive-Thru Aurora Recycling
Bags 	plastic bags shrink wrap bubble wrap bread bags	Entrance to WalMart, Kroger, or Lowe's
Specialty  	electronics batteries fire extinguishers hardcover books light bulbs appliances freon appliances televisions tires	DCRC Drive-Thru
Household Hazardous Waste (HHW)  	paints mercury products motor oil and filters garden chemicals oven cleaners drain cleaners automotive chemicals gasoline and kerosene solvents nail polish perfumes	DCRC Drive-Thru

Steps to Recycling Materials

Recycling includes the three steps below, which create a continuous loop, represented by the familiar recycling symbol.

Step 1: Collection

There are several methods for collecting recyclables, including curbside collection, drop-off centers, and deposit or refund programs. After collection, recyclables are sent to a Materials Recovery Facility (MRF) to be sorted, cleaned and processed into materials that can be used in manufacturing. Remember not all kinds of recyclables may be collected in your community so be sure to check with your local recycling program before you buy.

Step 2: Manufacturing

More and more of today's products are being manufactured with recycled content. Common household items that contain recycled materials include the following:

- Newspapers and paper towels
- Aluminum, plastic, and glass soft drink containers
- Steel cans
- Plastic laundry detergent bottles

Recycled materials are also used in new ways such as recovered glass in asphalt to pave roads or recovered plastic in carpeting and park benches.

Step 3: Purchasing New Products Made from Recycled Materials

You help close the recycling loop by buying new products made from recycled materials. There are thousands of products that contain recycled content. When you go shopping, look for the following:

- Products that can be easily recycled
- Products that contain recycled content

Some of the common products you can find that can be made with recycled content include the following:

- Aluminum cans
- Carpeting
- Comic books
- Glass containers
- Motor oil
- Newspapers
- Steel products
- Car bumpers
- Cereal boxes
- Egg cartons
- Laundry detergent bottles
- Nails
- Paper towels
- Trash bags

What can be made from recyclables: before and after?

BEFORE	AFTER
Paper and cardboard 	food boxes, such as cereal or cracker boxes tissues pencil barrels egg cartons paperback books shopping bags newspapers (from newspapers) notebook paper
Aluminum cans and bottles 	new cans pots, cookie sheets, and other cooking equipment foil wrap barbecue grills baseball bats and lacrosse sticks license plates electronic wiring cars
Steel cans 	new cans construction beams automotive parts roadway guard rails appliances lighting fixtures and other home furnishings roofing materials
Plastic bottles and jugs 	insulation for sleeping bags, ski jackets, etc. shoes and clothing backpacks carpeting playground equipment bike racks car bumpers park benches snowboards toys kitchenware, such as mixing bowls and cutting boards countertops traffic cones
Glass bottles and jars 	glass bottles glass jars kitchen tiles counter tops wall insulation

Composting Basics

Compost is organic material that can be added to soil to help plants grow. Food scraps and yard waste together currently make up more than 28 percent of what we throw away and should be composted instead. Making compost keeps these materials out of landfills where they take up space and release methane, a potent greenhouse gas.

All composting requires three basic ingredients:

- Browns - This includes materials such as dead leaves, branches, and twigs.
- Greens - This includes materials such as grass clippings, vegetable waste, fruit scraps, and coffee grounds.
- Water - Having the right amount of water, greens, and browns is important for compost development.

A compost pile should have an equal amount of browns to greens. It should also have alternate layers of organic materials of different-sized particles. The brown materials provide carbon for the compost, the green materials provide nitrogen, and the water provides moisture to help break down the organic matter.

Benefits of Composting

- Enriches soil, helping retain moisture and suppress plant diseases and pests.
- Reduces the need for chemical fertilizers.
- Encourages the production of beneficial bacteria and fungi that break down organic matter to create humus, a rich nutrient-filled material.
- Reduces methane emissions from landfills and lowers your carbon footprint.

Vermicomposting

Vermicomposting is an efficient and fun way to compost food is with worms. During vermicomposting, worms break down food and create an enriching source of nutrients called castings. Castings are a fancy way for saying worm poop. Castings, or compost, are full of microbes and nutrients that can be used as a beneficial additive to a garden or potted plant.

A vermicompost bin is a small ecosystem that can be kept in a home, and only requires a bin, bedding, food and red worms. Bedding, or the "browns", can include shredded newspaper and dead leaves. The "greens" include fruit and vegetable scraps, breads and grains, coffee grounds, and eggshells. Meat, dairy and processed foods should not be added to a vermicomposting bin. After a few months, the bin will contain usable compost.

Vocabulary Terms

America Recycles Day - (proper noun) a holiday observed on November 15th to celebrate and learn about waste reduction, reuse, recycling, composting and buying recycled products and packaging.

Bales (noun) – Large blocks – pressed, compacted, and bound – usually of a single recyclable material so it is ready for transport.

Biodegradable (adjective) - Organic materials – such as wood, food scraps, paper, and grass clippings – that decompose or decay under normal conditions.

Buy Recycled (concept) - Purchasing products and packaging made from post-consumer materials.

Closing the recycling loop (concept) - Purchasing products made from recycled materials. Recycling is a cycle. It is not enough simply to collect recyclables for manufacture into new products. People must then buy products made with recycled content, thus closing the loop.

Combustion/ incineration (verb) - A rapid chemical process that produces heat, gas, ash, and usually light through burning. This process is one option for the disposal of municipal solid waste. It can also be used as a treatment or disposal option for hazardous waste.

Compost (noun) – A natural soil fertilizer and conditioner made from a mixture of plant and other organic wastes, decomposed under controlled conditions.

Conservation (concept) - protection (from harm or destruction) or wise use of natural resources that ensures their continuing availability to future generations; the intelligent use of natural resources for long-term benefits.

Contaminant/contamination (noun) – A substance, or the addition of a substance to another substance, that produces a harmful effect on the second substance and makes it unfit for its intended use. For example, motor oil is a contaminant of water. In recycling, food residue would be a contaminant of plastics, paper, etc.

Decompose (verb) - The process of materials being broken down into basic components, making nutrients more available to plants; refers to materials such as food and other plant and animal matter. Decomposition happens all the time in nature and in human-managed systems, such as compost bins.

Disposal (verb) - The throwing away of unwanted materials. These materials are placed in a landfill or combusted (burned) rather than recycled, reused, or composted.

Dump Site (noun) - where garbage is disposed of in an unmanaged, uncovered area. Landfill requirements and restrictions have made dumps illegal in the U.S.

Environment (noun) - The external conditions that influence and affect the development and survival of organisms and populations; usually refers to air, water, land, plants, and animals.

Household Hazardous Waste (HHW) (noun) - leftover household products that can catch fire, react, or explode under certain circumstances, or that are corrosive or toxic. Products, such as paints, cleaners, oils, batteries, and pesticides can contain hazardous ingredients and require special care when you dispose of them.

Incineration (verb) – destruction of certain types of solid or liquid waste by controlled burning at high temperatures.

Inorganic (adjective) - Any material that is not composed of matter that was once living or produced by a living organism.

Landfill (noun) – A site where waste is managed to prevent or minimize health, safety, and environmental impacts; also referred to as a sanitary or modern landfill. Soil is excavated and an impermeable liner, made of plastic or clay is installed, to prevent the contamination of groundwater. Waste is deposited in different cells and covered daily. Modern landfills have monitoring systems to track performance and collection systems for leachate and methane gas. There are approximately 2,000 active municipal solid waste (MSW) landfills in the US, which are designed to accept primarily household waste. There are also other landfills specially designed to handle industrial waste or hazardous waste. Even after landfills are closed, they continue to be monitored for as long as 30 years as required by EPA regulations.

Landfill cell (noun) – A fixed area in a landfill where waste is disposed of, compacted into the smallest space possible, and then covered on a daily basis.

Leachate (noun) – Liquid that passes through and escapes from a landfill; it is created from rainfall and liquids present in the waste and collects contaminants as it seeps down through the soil and garbage. A sanitary landfill has a collection system for collecting and treating leachate to prevent it from contaminating groundwater.

Leachate collection system (noun) – System of layers and pipes designed to capture leachate and pump it to the surface for treatment.

Litter (noun, can also be a verb) - is unsightly, unsanitary, unappealing, can be hazardous and degrades the quality of our lives by degrading the environment.

Materials recovery facility (MRF) (noun) – Processing plant where recyclables are sorted and prepared as marketable commodities for manufacturing.

Methane (noun) – Colorless, odorless, flammable gas formed by the decomposition of organic waste in a landfill. Methane is also a greenhouse gas that contributes to global climate change. A sanitary landfill typically has a system for collecting methane gas, which may be sold as a source of energy for heating buildings, manufacturing products, or other uses.

Natural resources (noun) - naturally occurring items such as plants, animals, minerals, water, air, etc. which can be used to help make things for people.

Nonrenewable resource (noun)- Naturally occurring raw materials that are exhaustible and become depleted more quickly than they naturally regenerate. Some nonrenewable resources, such as petroleum and metals, take billions of years to form and are only available in limited quantities.

Municipal Solid Waste (MSW) landfill (noun)- Landfill site primarily designed to accept household waste. Some MSW landfills also receive nonhazardous commercial waste.

Organic waste (noun)- Wastes made of natural products such as food, leaves, and yard trimmings.

Pre-Consumer (adjective) - describing materials that are diverted from the waste stream that are generated during manufacturing.

Post-Consumer (adjective) - describing materials that are collected for recycling after having been purchased by a consumer, that would have otherwise gone to a landfill or incinerator.

Recyclable product (noun)- Products that can be collected, processed and manufactured into new products after they have been used. These products do not necessarily contain recycled materials.

Recycle/Recycling (verb) - Process of collecting, sorting, and processing used material and producing new products from that material; recycling also includes the process of remanufacturing used materials into new products. Some used materials can be made into new items of the same product, while others are used for making into entirely new items.

Recycled-content product (noun)- The product was manufactured with recycled materials either collected from a recycling program or from waste recovered during the normal manufacturing process. The label will sometimes include how much of the content was from recycled materials.

Recycling container (noun)- A bin or other type of container for placing recyclable items that will be collected and made into new products.

Recycling center/facility (noun)- Site where recyclable materials are sorted using sifters, optical sensors, magnets, and other specialized machinery, and then pressed into large bundles called bales.

Recycling loop (noun)- The cycle of collecting, processing, and producing new products using recycled material, and the purchase of these products. Consumers "close the recycling loop" when they buy items made with recycled materials.

Reduce (verb) - The preferred level of the waste management hierarchy – use less "stuff" and produce less waste.

Reuse (verb) - using something over and over again.

Renewable resources (noun)- Naturally occurring raw materials or forms of energy that have the capacity to replenish themselves within a relatively short amount of time (a human lifetime) through ecological cycles and sound management practices; examples include trees and agricultural crops.

Single-stream recycling (noun)- Collection system in which recyclables of different materials are fully intermixed in a single container and separated later.

Solid waste (noun)- Unwanted or discarded material, such as durable goods, disposable goods, containers, packaging, food scraps, etc., some of which is recyclable.

Sustainability (noun)- Social and environmental practices that protect and enhance the human and natural resources needed by future generations to enjoy a quality of life equal to or better than our own.

Trash (noun) - Material that is considered worthless and is thrown away; typically considered to have same meaning as garbage or rubbish.

Vermicomposting (noun) - a method of using worms to transform organic waste into a nutrient-rich fertilizer. It is a healthy and clean way to eliminate wastes going into our landfills, which improves the environment.

Waste (noun) - garbage or other material that is not used anymore.

Waste Stream (noun) - The complete flow of waste from domestic or industrial areas through to final disposal. The intervention of recycling may act to lessen the content of a waste stream as it moves down the line.

Wish-cycling (concept) - Placing items in a recyclables collection container that you hope are recyclable but are not.

Recycling Resources

Here is a list of resources to help get you started on your project. There are many more resources and books available.

Websites:

- berecycled.org
- Earth911.com
- www.epa.gov/recycle/reduce-reuse-recycle-resources-students-and-educators
- www.epa.gov/students
- enviroliteracy.org
- www.recycleacrossamerica.org
- www.recyclingsimplified.com
- www.recyclingpartnership.org
- kidsrecycle.org
- compostguy.com
- confessionsofacomposter.blogspot.com
- eartheasy.com
- nofoodwaste.com
- www.epa.gov/recycle/composting-home
- thecompost-gardener.com
- nrdc.org
- onegreenplanet.org
- www.thesca.org
- kids.niehs.nih.gov/recycle.htm

Books:

- *Worms Eat My Garbage* by Mary Appelhof
- *It's Easy Being Green* by Crissy Trask
- *Recycled Home* by Rebecca Proctor
- *Don't Throw It Out* by Lori Baird
- *The Everything Green Living Book* by Diane Gow McDilda
- *101 Ways to Go Zero Waste* by Kathryn Kellogg
- *Human Footprint: Everything You Will Eat, Use, Wear, Buy, and Throw Out in Your Lifetime* (National Geographic Kids) by Ellen Kirk
- *Recycled Science: Bring Out Your Science Genius with Soda Bottles, Potato Chip Bags, and More Unexpected Stuff* by Tammy Laura Lynn Enz and Jodi Lyn Wheeler-Toppen
- *Composting for a New Generation: Latest Techniques for the Bin and Beyond* by Michelle Balz and Anna Stockton
- *Let It Rot!: The Gardener's Guide to Composting* by Stu Campbell

Local Resources:

- Dearborn County Recycling Center: DearbornCountyRecycles.com
- Rumpke Recycling: www.rumpke.com/about-us/education/recycling-videos
- Indiana Department of Environmental Management
  www.in.gov/idem/recycle/

Recycling Science Project Record Sheet

Name: _____

Address: _____

Year in Club Work: _____ Present Age: _____

Leader's Signature: _____ Date: _____

Questions:

1. Why did you choose this project?_____

_____

_____

2. List at least 2 things you learned in this project. _____

_____

_____

3. Did you do any experiments or activities (like a tour)? ☐ yes ☐ no

4. If yes, please explain: _____

_____

5. Has this project changed the way you feel about recycling?_____

_____

6. What items does your family recycle?_____

_____

7. What did you like best about this project?_____

_____

8. What did you like the least about this project?_____

_____

9. How much time was required to complete this project?_____

10. What was the total cost of your project? _____

Your signature: _____ Date: _____