

This week students will:

1. Understand the waste management hierarchy.
2. Be able to identify different strategies to avoid, reduce, reuse, and recycle waste.
3. Be able to research and assess the life cycle of a product.
4. Compare and contrast the ecological impact of different products.

Learning outcomes**Year 3**

Digital Technologies ACTDIK007,
ACTDIK008

Year 4

Geography ACHGK024, ACHGK025,
ACHGS026

Digital Technologies ACTDIK007,
ACTDIK008

Year 5

Geography ACHGK033, ACHGS039

Science ACSHE081, ACSHE217, ACSIS218

Year 6

Science ACSHE098, ACSHE220

3. Renewable versus non-renewable resources
 - a. A renewable resource is one that can be replaced by nature eg sun, wind, water (and oranges!)
 - b. Non renewable resources cannot be replaced by nature once they have been used. eg: oil, coal, petroleum
 - c. In this activity you will be asked to consider the life cycle of two different products, an orange juice popper and an orange.
 - d. Complete the table Renewable vs non-Renewable worksheet, which looks at the life cycle of the popper and the orange.

Materials required:

1. A tablet or smartphone.
2. Habitat the Game installed on the device.
3. Print Renewable v Non Renewable worksheet in Appendix 6.

Activities:

1. Have students identify the different ways they can avoid, reduce, reuse and recycle waste.
 - a. Look at the list of Habitat the Game behaviors (Appendix 2) that are in the game and decide how you would class each action i.e. avoiding, reducing, reusing or recycling waste.
2. Perils of Plastic
 - a. Students learn about the world's largest "landfill", a collection of trash covering an estimated five million square miles of the Pacific Ocean. To connect this crisis to their own world students estimate what their recyclable trash is for the week. They extrapolate this number to make additional calculations.

Class Discussion:

1. Which product do you think has the lower environmental impact? Discuss your reasons why.
2. Could you answer all the questions about each product? What information is missing and where could we go to find this out?

Using all the information you have gathered as a class help piece together a product life cycle for both the popper and the orange. You could either draw pictures to represent the different stages in the products life or you might like to use the following headings.

1. Raw materials
2. Transport
3. Manufacturing and packaging
4. Distribution
5. Use by consumer
6. Disposal or recycling

At every stage be sure you consider both the inputs eg soil, air, water, fertilisers etc, and the outputs eg waste, emissions to air and water etc.

Discuss the differences between the two product life cycles. Which would you choose to buy? What could be done to reduce the environmental impact of the orange juice popper?

This activity will demonstrate that all products have life cycles that can be studied to estimate the ecological impact of the product. Students are challenged to research and analyse the life cycle of one product, the orange juice popper, compared to another that could meet the same need with a lower ecological impact, the orange.

Aim:

To be able use the waste hierarchy to categorise the various waste management strategies that can be implemented in their homes.

To conduct a life cycle analysis on two items that both produce the same product, but which have different life cycles. Students will compare the life cycle of an orange juice popper and an orange, and examine the ecological impact of each.

Week 9 — Waste Minimisation

Waste

Avoid, Reduce, Reuse and Recycle (ARRR) is often referred to as the waste management hierarchy. It says that the best way to manage your waste is to avoid it, reduce it, reuse it and then recycle it. By following this process the Coal Loader has dramatically reduced the amount of waste it sends to landfill.

The Waste Management Hierarchy is a nationally and internationally accepted guide for prioritizing waste management practices. It sets out the preferred order of waste management practices, from most to least preferred. The further the activity moves up the waste management hierarchy, the more greenhouse gases are avoided and the less water and energy consumed.



Looking at some examples of waste management in the hierarchy:

AVOID — the least energy intensive strategy:

1. growing your own herbs instead of purchasing from shops
2. making a conscious decision not to buy things you don't really need
3. disposable items
4. using home-made green cleaning products instead of buying commercial, packaged products
5. using a bicycle instead of a car whenever possible

REDUCE — requiring less energy than reusing or recycling:

1. Diverting organic material from landfill and reducing greenhouse gases through composting, worm farming for eg
2. A kitchen bench composting bin to recycle food waste. This reduces the amount of waste put out for garbage collection.
3. Buying goods in bulk
4. Using a calico bag rather than a plastic bag

REUSE — requiring more energy than reducing, however less energy than recycling.

1. Purchasing second hand items whenever possible such as computers, office chairs and photocopiers
2. Scrap paper for notes/phone messages

RECYCLE — when materials from waste streams are broken down into raw materials and reprocessed either into the same product (closed loop) or a new product (open loop).

1. Recycling all paper waste
2. Collecting plastic bottles and containers for reprocessing into outdoor furniture

Background Information:

What is a product life cycle?

Just as living things are born, get older, and die, products also complete a life cycle. Each stage of a product's life cycle can affect the environment in different ways.

Some products, such as an orange juice popper, have many different components for example the tetra box carton, the straw, the plastic wrap to encase the straw, the ink on the label, the lining, as well as the juice itself, each of which has its own life cycle. The stages of a product's life cycle usually include:

Design — A product's design can influence each stage of its life cycle and in turn the environment. Design affects which materials will be used to manufacture a product. For example, cheaper materials are often less durable, which means the product will have a short useful life. Product design can also prevent waste in many ways. Products can be designed with modular components that can be easily replaced so that the entire product does not have to be thrown away if only one piece breaks.

Materials Extraction — All products are made from materials found in or on the earth. "Virgin" or "raw" materials, such as trees or ore, are directly mined or harvested from the earth, a process that can create pollution, use large amounts of energy, and deplete limited natural resources. Making new products from materials that have already been used (recycled materials) can reduce the amount of raw materials we need to take from the earth.

Materials Processing — Once materials are extracted, they must be converted into a form that can be used to make products. For example, paper is made from trees, but the wood has to undergo several different processes before we can use it.

Manufacturing — Products that are made in factories require a great deal of energy and water to create. The manufacturing process can also produce pollution. Many products require the use of packaging as well, to prevent spoilage, damage, contamination, and tampering.

Packaging & Transportation — The use of packaging can protect products from damage and provide product information. However, packaging consumes valuable natural resources and when used excessively can be wasteful. Some packaging can be made from recycled materials. Finished products are transported in trucks, ships, planes, and trains to different locations where they are sold. All of these forms of transportation burn fossil fuels, which can contribute to global climate change.

Use — The way products are used can impact the environment. For example, products that are only used once create more waste than products that are used again.

Reuse/Recycling/Disposal — Using a product over and over again prevents the need to create the product from scratch, which saves resources and energy while also preventing pollution. Recycling or re-manufacturing products also reduces the amount of new materials that have to be extracted from the earth. Throwing a product away means that it will end up in a land-fill and will not be useful again.

Recycle plastic

Background

The world's largest trash "landfill" isn't on land — it's in the Pacific Ocean. The so-called "Great Pacific Garbage Patch" covers an estimated five million square miles of ocean waters. That's the size of the United States, Mexico, and Central America combined!

The trash is carried — and trapped — by a system of surface currents called the North Pacific Subtropical Gyre. A whopping 80% of the trash is plastic, carried from the shores of Asia and the Americas.