

Waste timeline activity



Background information

In New Zealand, all of the rubbish we create is buried in landfills. This is a problem because we don't have enough existing landfills to cope with the increasing volume of rubbish we keep throwing away and because there is increasing resistance to developing new landfills.

Over half of what we throw away is organic and could be recycled by setting up a composting system. The more of this we do, the less we will see landfills used as a 'final' solution to rubbish.

Rubbish doesn't break down very well in a landfill. One of the worst kinds of rubbish that we send to landfills is organic waste. While beneficial when composted in your garden or by a commercial composting facility, organic waste is a major concern when it becomes buried in a landfill. This is because when organics are sealed from the air in a landfill, they decompose into a toxic liquid called leachate. This leachate threatens groundwater quality and produces methane gas. Methane gas can cause explosions and fires, has an unpleasant smell, and contributes significantly to the greenhouse effect. Leachate has to be collected, pumped and treated in order to protect streams and ground water from contamination. Methane gas has to be captured and stored, or burned.

There are over 100 landfills operating in New Zealand, collecting over 3 million tonnes of rubbish each year. Through the following activities, students can gain a real understanding of the length of time that different kinds of rubbish take to break down in a landfill. Note that the breakdown times for the different kinds of rubbish mentioned below are estimates only. Conclusive studies on the breakdown times of waste in New Zealand landfills have yet to be done. The importance of the following activities is to highlight the fact that we should all be 'reducing, reusing and recycling'!

There are three parts to this activity

1. Burying waste:
 - » Students will monitor change over time by discovering which items are biodegradable and which are not.

2. Waste timeline:
 - » Students will create a visual representation of the time it takes for various waste items in a landfill to breakdown.
 - » Students will identify items that could be reduced, reused and recycled in order to prevent them ending up in a landfill.

3. Digging up waste:
 - » Students will dig up their buried waste and find out what has biodegraded and what has not biodegraded.
 - » Students will learn that decomposition is the breakdown of biodegradable materials by the action of insects, worms, fungi and bacteria.

Visit www.createyourowneden.org.nz for more information, facts and additional learning activity ideas, as well as a guide to setting up a school compost, worm farm or bokashi system.

This activity was adapted with permission from the 'Enviroschools Teachers' Manual' found at www.enviroschools.org.nz

Part 1: Burying waste

Students will monitor changes over time in order to discover which items are biodegradable and which are not.

Equipment needed

- » An area within the school grounds for burying waste. If this is not available, then you could reuse ice cream containers or something similar.
- » Items of waste to bury
- » Burying waste record sheet
- » Class recording chart
- » Scales
- » Gloves

Activity instructions

1. Use gloves to collect different pieces of waste from around the school or from the classroom bin. Try to collect a selection of different types of waste, such as plastic, glass, metal, food, paper, cardboard and food packaging (e.g. gladwrap or snack food packets).
2. Work in pairs. Take a piece of waste, weigh it and record any observations you have on the first part of the burying waste record sheet.
3. Bury the waste either outside or in the ice-cream containers (kept outside too), in a location where they can be easily monitored. It is important to bury the waste in soil that has been dug out of the ground, not in potting mix.
4. Use markers to identify where each piece of waste is buried.
5. Create a class recording sheet so each piece of waste can be named and students can make individual predictions about:
 - a. Which pieces of waste are biodegradable and which are non-biodegradable?
 - b. How long each piece will take to break down?
6. As a class, decide how you will check on the buried waste each week for a period of about four weeks.
7. Over the next four weeks, fill out the second part of the recording sheet. This will be used again in the third part of this activity – Digging up waste.
8. Remember to keep the soil damp.

Key questions

- » Which pieces of waste do you think will breakdown easily?
- » Which pieces of waste do you think will stay the same?
- » What conditions are needed for the pieces of waste to breakdown?

During the next part of the waste timeline activity, students will learn about the decomposition rates of different pieces of waste in a landfill.

Burying waste record sheet

1. Use this sheet (or make your own) to record your predictions about your piece of waste.

My piece of waste is: _____

My piece of waste weighs: _____

It looks like this at the moment:

In four weeks time I think it will look like this:

2. Use this section to record any changes that you observe over the next four weeks. Draw and write about these changes. Also record any changes to the area surrounding the piece of waste (this will help you with the third part of the activity).

| | Week 1 | Week 2 | Week 3 | Week 4 |
|-----------------------------|--------|--------|--------|--------|
| Drawings of the differences | | | | |
| I noticed... | | | | |
| This tells me... | | | | |

Part 2: Waste timeline

Students will create a visual representation of the time it takes for various waste items in a landfill to breakdown.

Students will identify items that could be reduced, reused and recycled to prevent them ending up in a landfill.

Equipment needed

- » 10m string or a piece of chalk
- » A metre ruler or tape measure
- » Clothes pegs or labels (marked with 100, 200, 300, 400 etc up to 1000 years)
- » Different types of waste products from the list below
- » "Today" label
- » Key question cards for each group
- » Cards marked with the name of each waste item and how long each takes to break down

Activity instructions– creating a timeline

1. Place the 10m length of string across the classroom or along a wall, or alternatively, draw a 10m line on the concrete.
2. Use the pegs or labels to measure out each 1m (1m = 100 years). At each interval, place one of the markers.
3. Label the beginning of the line with "Today".
4. In groups, students can discuss the following key questions.

Key questions

- » Approximately how long are most people expected to live? (80 years)
- » How does this age compare with the total length of the time line? (Less than 10%)
- » What key competencies did you use to create the timeline? (Thinking, managing self, participating and contributing etc)

Activity instructions– how long to rot?

1. Put students in groups and give them a range of waste items selected from the list below.
2. Let them discuss and decide how long they think it will take each item to breakdown in ideal conditions.
3. Place or clip their waste onto the time line to show their estimates.
4. Let students discuss the following key questions in their groups.

Key questions

- » How did you decide where to place the waste items on the time line?
- » What do you think are ideal conditions for waste to breakdown?
- » Is there anything you don't think will breakdown?

Activity instructions – the real deal with waste

1. Give out cards to students marked with the real breakdown times for each item they placed on the time line.
2. Get students to refer to the cards in order to move their waste item from the breakdown time they predicted to the real breakdown time on the time line.
3. Compare any differences
4. Let students discuss the following key questions in their groups.

Key questions

- » What items have a breakdown time that surprised you?
- » What have you learned from this activity?
- » What waste will breakdown in our lifetime?
- » What waste will outlive us?

Activity instructions– what can be reduced, reused and recycled?

1. Ask students to collect their waste items from the time line and return to their groups.
2. Let students discuss the following key questions in their groups.

Key questions

- » How could your waste items be reduced, reused and recycled?
- » What materials were left on your line?
- » Are there any alternative uses for these pieces of waste left on your line to be reduced, reused and recycled?

In the next activity, students will dig up the waste that they buried in order to find out which pieces of waste are biodegradable and which are non-biodegradable.

Waste items and their approximate breakdown times

| Item | Breakdown time | Item | Breakdown time |
|------------------|----------------------|------------------------|----------------|
| Apple core | 2 months (in water) | Orange or banana peel | Up to 2 years |
| Aluminium can | 200-500 years | Plastic bag | 500+ years |
| Cardboard box | 2 months (in water) | Plastic bottle | Forever |
| Disposable nappy | 450 years (in water) | Plastic coated paper | 5 years |
| Fishing line | 600 years (in water) | Plastic film container | 20-30 years |
| Glass bottle | Forever | Styrofoam | Forever |
| Leather | Up to 50 years | Tin can | 50 years |
| Nylon fabric | 30-40 years | Wool socks | 1-5 years |

Key question cards

Key questions – creating a time line

1. Approximately how long are most people expected to live?
2. How does this age compare with the total length of the time line?
3. What key competencies did you use to create the timeline?

Key questions – how long to rot?

1. How did you decide where to place the waste items on the time line?
2. What do you think are ideal conditions for waste to breakdown?
3. Is there anything you don't think will breakdown?

Key questions – the real deal with waste

1. What items have a breakdown time that surprised you?
2. What have you learned from this activity?
3. What waste will break down in our lifetime?
4. What waste will outlive us?

Key questions – what can be reduced, reused and recycled?

1. How could your waste items be reduced, reused or recycled?
2. What materials were left on your line?
3. Are there any alternatives to these pieces of waste that could be reduced, reused and recycled?

Part 3: Digging up waste

Students will dig up their buried waste to find out what was biodegradable and what was non-biodegradable.

Students will learn that decomposition is the breakdown of biodegradable materials by the action of insects, worms, fungi and bacteria.

Equipment needed

- » Waste that has been dug up
- » Gloves
- » Class recording sheet from the Burying waste part of the activity
- » Burying rubbish recording sheet from the Burying waste activity

Activity instructions

1. Revisit the predictions that the students made on the class recording sheet in the Burying waste activity. Refer back to these when answering the following questions:
 - a. Which pieces of waste are biodegradable and which are non-biodegradable?
 - b. How long does each piece of waste take to break down?
2. Reflect back on the waste timeline activity and on individual recording sheets. Encourage students to share their reasons for why they might have changed their minds since making their initial predictions.
3. Use gloves to look for changes in the pieces of dug-up waste. Changes may be in shape, colour, texture, weight or smell.
4. Look around the waste and through the dirt in order to identify which organisms are helping to decompose the waste.
5. Write or draw any final changes on the recording sheet.
6. Discuss final findings and collate these. Findings can be used as material for a presentation to the school. Educate your school on the importance of reducing, reusing and recycling, including the importance of recycling organic waste through composting (with the use of a compost bin, worm farm or bokashi system).

Key questions

- » What was the result of burying the different pieces of waste?
- » How does this relate back to the waste timeline?
- » How has the waste affected the surrounding land?
- » What makes good food for the earth?
- » What would not return nutrients to the earth?
- » What other types of inorganic, non-biodegradable waste are there?
- » How many generations will it take for your waste to break down?

| | |
|--|---|
| <p>Apple core 2 months (in water)</p> | <p>Aluminium can 200-500 years</p> |
| <p>Cardboard box 2 months (in water)</p> | <p>Disposable nappy 450 years (in water)</p> |
| <p>Fishing line 600 years (in water)</p> | <p>Glass bottle Forever</p> |
| <p>Leather Up to 50 years</p> | <p>Nylon fabric 30-40 years</p> |
| <p>Orange/banana peel Up to 2 years</p> | <p>Plastic bag 500+ years</p> |
| <p>Plastic bottle Forever</p> | <p>Plastic coated paper 5 years</p> |
| <p>Plastic film container 20-30 years</p> | <p>Styrofoam Forever</p> |
| <p>Tin can 50 years</p> | <p>Wool socks 1-5 years</p> |