

# Waste and materials inquiry:

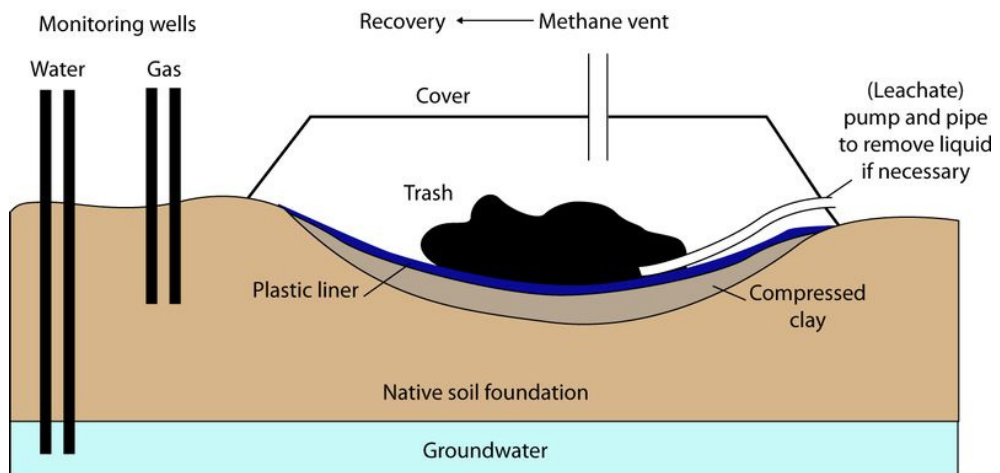


## How do materials break down in a landfill?

When you throw rubbish in the general waste bin, garbage or rubbish bin, it ends up in a **landfill**. What is a landfill?

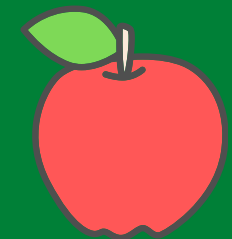
The word itself lets us know, it is an area of **land** that we **fill** with rubbish. Not just any area of land, it has to be assessed to make sure it is safe, none of the rubbish or decomposed liquids (called leachate) will get into the surrounding land or water systems. It is then prepared with a liner that may be compressed clay and plastic, to keep everything inside.

As rubbish creates gas as it decomposes (or rots), landfills also have to be equipped with pipes and other equipment to allow the gases (mostly **methane**) to rise from the landfill and be captured.



It's not as simple as digging a hole and leaving rubbish behind, as the above diagram illustrates. The groundwater, gases and leachate among other things have to be monitored and extracted (taken out) so they don't cause any harm. This continues for a few years after the landfill is closed.

**Let's investigate !**



# Landfill experiment



In this experiment, you will find out how different materials break down in a landfill. This is a long term enquiry, you will be making observations over a month.

## Equipment:

- An empty washed-out 2-litre bottle from your recycling bin (clear bottles will allow you to see the changes throughout this time, but milk bottles will work just as well). You do not need the lid.
- A paper bag big enough to cover the bottle, or you can make a big cone out of newspaper
- Dirt from the garden
- A little water, preferably also a spray bottle
- A funnel
- Different kinds of rubbish, including fruit or veggie scraps, plastic wrapping, aluminium foil, cardboard or paper and a carton or disposable coffee cup.

## Method design:

Remember, to make this a fair test:

**C**ows

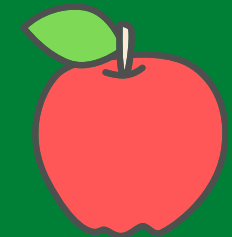
**M**oo

**S**oftly

We **C**hange one thing

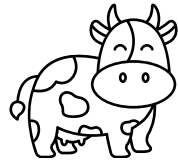
**M**easure one thing and

Keep everything else the **S**ame



# Method design:

## Cows/ Change



The one thing we are changing is the:

***types of rubbish***

They are made from different materials

## Moo / Measure

The one thing we are measuring is the:

***decomposition of the rubbish***

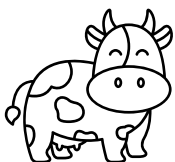


## Softly / Same

We are keeping the:

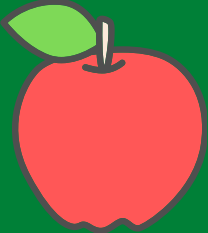
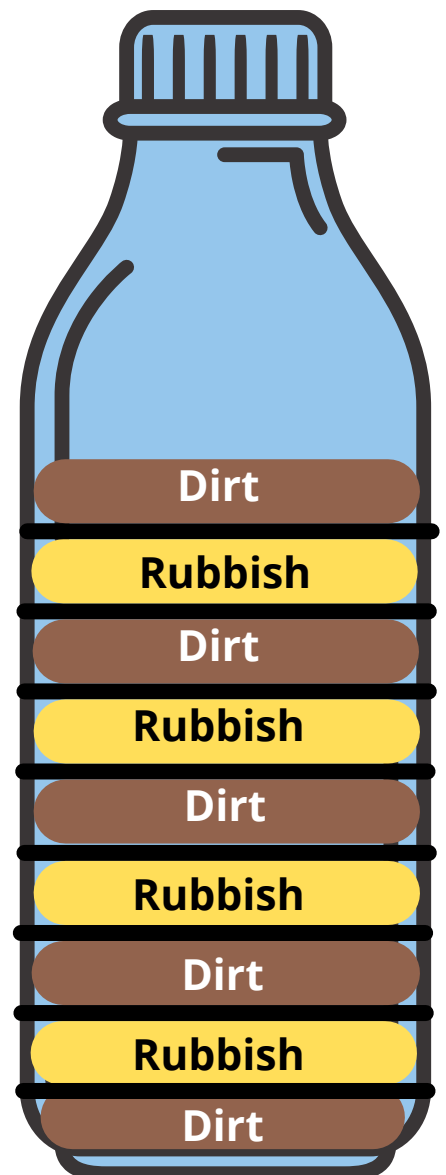
***"landfill" conditions, dirt, water and weather conditions***

the same



# Method:

1. Chop up your larger pieces of garbage so they are small enough to fit into the bottle top. Try to keep the sizes of all roughly the same, around 4cm<sup>2</sup> is a good size. Take a photo of the different materials with a label in the picture.
2. Using the funnel, pour about 3cm of dirt into the bottom of your bottle
3. Create a layer of garbage by putting in pieces of all materials
4. Cover this layer with 3cm of soil and sprinkle with water
5. Repeat 3 times, so you have 4 layers of rubbish
6. Sprinkle the entire "landfill" with water
7. Place the paper bag over the bottle and put in a warm spot
8. You will leave this "landfill" for four weeks in the same position, sprinkling it with water every few days to stop it drying from out. If it tlooks moist, you don't need to add any water.
9. At the end of this period, you will cut open the bottle and record your observations, compared to the photos you took at the beginning.



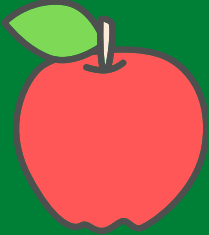


# Hypothesis: what do you think will happen?



We have different materials in our landfills, some further down and some near the surface. Which materials do you think will break down the faster and the slowest? Do you think there will be a difference between to top and bottom layers? Write your hypothesis below.

## My hypothesis:



# Results:

<b>Material:</b>	<b>Observations at the end of the month:</b>	<b>Compared to photos at the start of the experiment:</b>
<b>Paper</b>		
<b>Aluminium</b>		
<b>Plastic</b>		
<b>Fruit/ veggie peels</b>		
<b>Carton/ coffee cup</b>		
<b>Any other materials you used:</b>		





# Results:



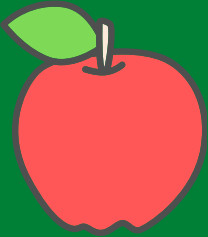
Which item/s decomposed (rotted) the most?



Which item/s decomposed the least?



Did this support your hypothesis? (Was it what you predicted would happen?)





# Questions:



If you are not sure of the answers, you can research.

If you were to continue your landfill, how long would it take for each material to decompose?

Paper:

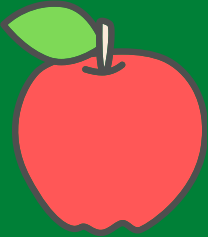
Aluminium:

Plastic

Fruit/ veggie peels:

Carton/ coffee cup:

Any other materials:







# Questions:



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Paper:

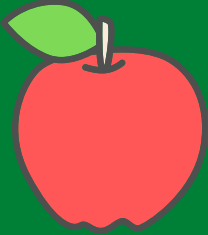
Aluminium:

Plastic

Fruit/ veggie peels:

Carton/ coffee cup:

Any other materials:



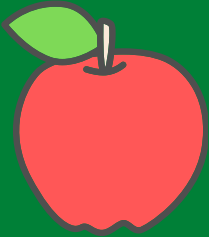


# Questions:



As we saw on the first page, when things decompose rot in a landfill we see a gas called methane produced. Why is methane bad for the environment?

Can you name some ways to recycle the materials you used in your landfill experiment? Your local council website should have answers.



# There are things we can all do to help!

Disposing of waste to landfills should be your last resort. Reduce, reuse, recycle, repurpose and compost.

There are small steps we can make every day to help. If everyone takes small steps, it makes a big difference!

- **Reduce the number of things you buy that you don't need.**
- **Take your own bags to the shops and buy foods with less packaging.**
- **Take a reusable lunch box and drink bottle to school with reusable containers for your food.**
- **Don't just throw things in the bin when you don't want them, stop and think- would they make a good present for someone else? Is there something you could make out of it, or find a different use?**
- **Recycle, buy things in packaging that can be recycled, and even clothes and toys can be made out of recycled items!**
- **Start a compost or worm farm. If you live in a council that has organic recycling bins, use those- make sure you visit the council website so you know what things should go in.**





# Doing my part!



What are some things you can do to help at home and school? You can write or draw them below.

A large, empty yellow rounded rectangle with a thick border, intended for students to write or draw their answers.