#kids2030 Plastics Challenge

Data science and plastic pollution

#kids2030Challenge

Hour of Code 2020

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Introduction

The #kids2030 Challenge is a guided introduction to data science and the UN's Sustainable Development Goals (SDGs). It will lead the participants to re-invent a world with less disposable plastic through coding, self-reflection and journaling.

Specifications

Learning Objectives

- Introduction to data science concepts, different data visualisations, estimates and predictions
- Using creative thinking, inquiry, problem-solving to design innovative solutions to a problem
- Using Scratch to visually represent data

Recommended ages

10–14 years old **OR** Grades 5 to 8 (Secondary 2)

Recommended duration

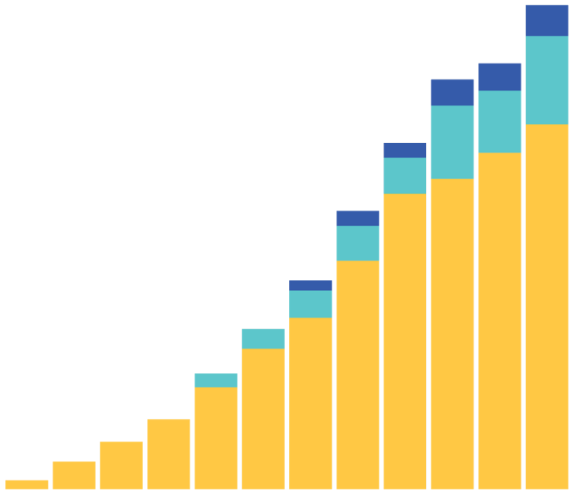
60 minutes

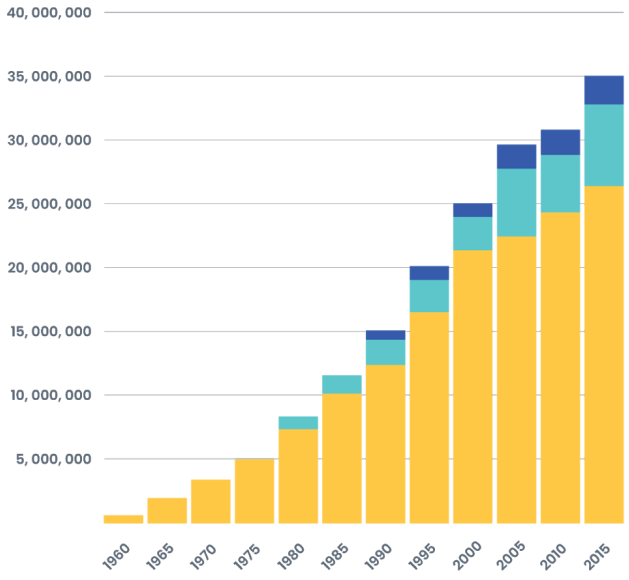
UN SDGs

#12 Responsible consumption and production
#13 Climate action
#14 Life Below Water
#15 Life on Land

Discovering Plastic - Graph reveal and reflection (5 min.)

The graph below depicts real data that was collected in the world—data related to something you are about to explore in detail in this activity. Looking only at the visual features of the graph, what do you notice? (Colours, shapes, sizes, lines, etc.)
Write your answer here:



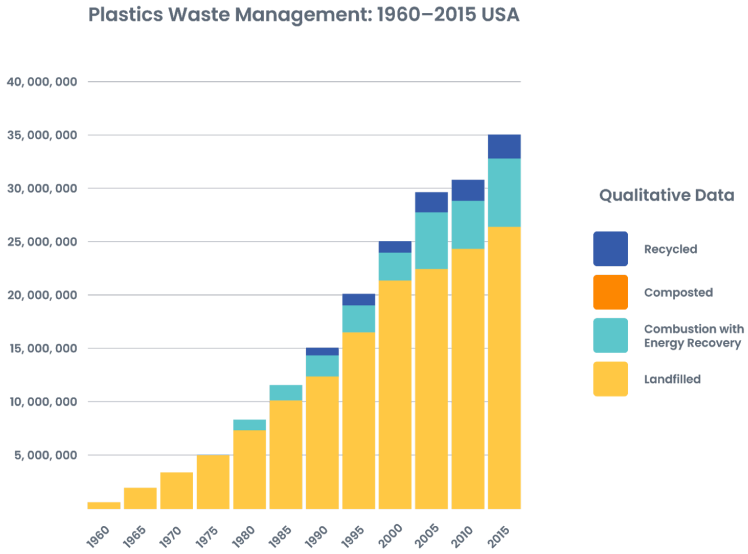


How about this, with a bit more detail added? What do you think the x-axis (horizontal) and the y-axis (vertical) represent?

Write your answer here:

Here's the full graph, with all the context added. It represents the different ways plastic waste has been handled in the United States from 1960 to 2015. It shows you the **Recycled** vs. **Composted** vs. **Combustion with Energy Recovery** vs. **Landfilled** plastics.

How would you summarize the story that this graph shows? What is clear, and what is subtle or hidden? Write your answer here:



Investigating the global story behind the plastic problem (5 min.)

Today, plastic is everywhere in everything we buy. Two things are certain: plastic is light and cheap (advantage) but it creates pollution (disadvantage).

Most of the plastic in the world is not recycled. Most of it is mismanaged and ends up as garbage — and it is deposited directly in rivers or on land (where some of it ends up in the sea).

"Plastic from overflowing trash cans, litter on the street and waste sitting in landfill can get blown into stormwater sewers or rivers and streams. Additionally, microplastics and microfibres from clothing and textiles are washed down the drain and are often too small to be filtered out at wastewater treatment facilities."
Source: https://oceana.ca/en

This all eventually carries into larger bodies of water, such as rivers. These rivers carry the plastic waste into the sea where through the fishes we eat, makes its way to our plate.

How long does it take to decompose?

"Of the 6.3 billion tonnes of plastic we've thrown away since we started mass-producing it in the 1950s, only 600 million tonnes has been recycled"

Source: https://advances.sciencemag.org/content/3/7/e1700782

The biggest issue with plastic is that it remains around as garbage for a **very, very long** time because plastic does NOT decompose like organic matter. Plastic decomposes very differently.

In the short term, while organic matter will be converted into something useful for the soil (biodegradation), plastic will break down and become little microplastic particles that are toxic both for wildlife and for us. We end up eating microplastic through the food chain. Unlike with organic matter, most bacteria cannot break plastic down. UV light from the sun can break plastic down, but it takes a very long time (photodegradation).

However, there is hope! Researchers have found a bacteria that does break down plastic. And new, biodegradable plastics are currently in development.

Plastic in your daily life (15 min.)

Defining the problem using data (facts or statistics)

How much plastic do you actually use? Look around you and name all the disposable plastic objects you can see. Write your answers here:

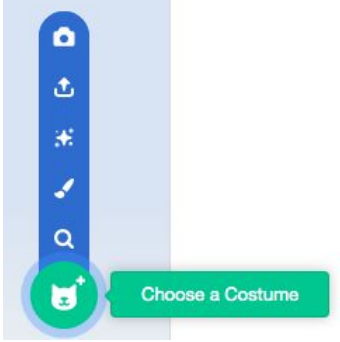
Head over to this Scratch project and click on the Sprite library icon.

- Can you find 4 other disposable plastic objects in the library?
- Do you know how much these objects weigh? Look up their weight online.
- Write the name of the object and its weight below:

When you find the weight you are looking for, click on a weight category sprite.

For example, if the object weighs 1500 grams, click on the "1000.1 to 2000 grams" sprite. Select the **Costume** tab and add the object as a costume. Add a **next costume** block and a **wait** block to the sprite's sequence. It will appear when the sprite will be clicked on.

1. 

2. 

3. 

Start creating a dataset (list) with plastic things you use on a regular basis that you either throw in the trash or recycle. Keep a journal for one week or more. The goal is to have a better idea of how much plastic you use in a year.

Consider this:

1. The weight (g): How much does each item weigh in grams (g)?
Look up the weights for each of the items you wrote. You can look at them, look it up online, or weigh the item yourself.
NOTE: 1 gram (g) is equal to 0.001 kilograms (kg).

1 g = (1/1000) kg = 0.001 kg

1 g = 0.00220462262185 lb (pounds)

2. The quantity: How many do you throw away per week/month/year?

3. Estimate: Estimates are useful in data science because they help you save time.

For example, we can estimate that, in a classroom, each student uses one juice box every day and each juice box has one disposable straw. If there are 20 students in the class, 5 days in a week, and 4 weeks in a month. So we estimate by calculating (1 straw) x (1 juice box) x (20 participants) x (5 days) x (4 weeks) = 400 plastic straws a month. 400 x (12 months) = 4800 straws per year (that's a HUGE amount!)

For your journal, use this spreadsheet *(or go to **bit.ly/k2030challenge-data-input**)*:

Object	Weight (g)	How much do you throw away in 1 week?	Estimate for 1 year (x 52 weeks)

Self-reflection and journaling go hand in hand. Take some time to write your thoughts about your plastic consumption. You can also build mind maps or illustrations (like the one below) in your journal, too.

What are good alternatives to plastic? (10 min.)

Ideas to reduce plastic production and waste

Look at some of the paths plastic follows in your life.

Can you figure out an alternative to one plastic object that you use on a regular basis? Ideas for plastic alternatives can come from the past, present or future. They can also be small or large-scale and realistic or imaginary!

Here are some examples of plastic alternatives:

- Deposit system
- Reusable wrapping paper or wax paper
- Edible or bamboo utensils

Challenge: which path will you choose?

First read the following descriptions, then choose a path.

Path #1: The **REDUCTION** path
Think of strategies you can use in your daily life to reduce your plastic consumption. Gather your ideas, talk to your parents or your friends about it. Which ideas would you like to apply in the next couple of days/weeks/years?

Path #2: The **IDEATION** path
Think of new inventions or alternatives that would help reduce plastic consumption. Gather your ideas, talk to your parents or your friends about it. Which ideas would you like to apply in the next couple of days/weeks/years?

Write your answers here:

Plastic solutions with Scratch! (30-60 min.)

In a fun and interactive way, you will learn how to make informed choices as a responsible consumer as it relates to the #kids2030 Challenge. What are your ideas to help solve the plastic waste problem?
https://scratch.mit.edu/projects/433709370/

When you take the time to draw connections between your own thoughts and those of others, you develop the ability to communicate and collaborate better. Now is the time to make a real difference: submit your ideas to the #kids2030 challenge!

Submitting your idea to the challenge online (20 min.)

Be part of the change—submit online!

Step 1 - Go to **bit.ly/k2030challenge-data-input** and **bit.ly/k2030challenge-solution**

Step 2 - Follow the instructions for each student:

- Fill out the information about your data and solution
- Upload a photo of solution drawing
- Describe solution
- Enter the plastic consumption data before and after solution

Step 3 - Submit solution

Step 4 - Celebrate — the Challenge is complete!

Thank you and great work!