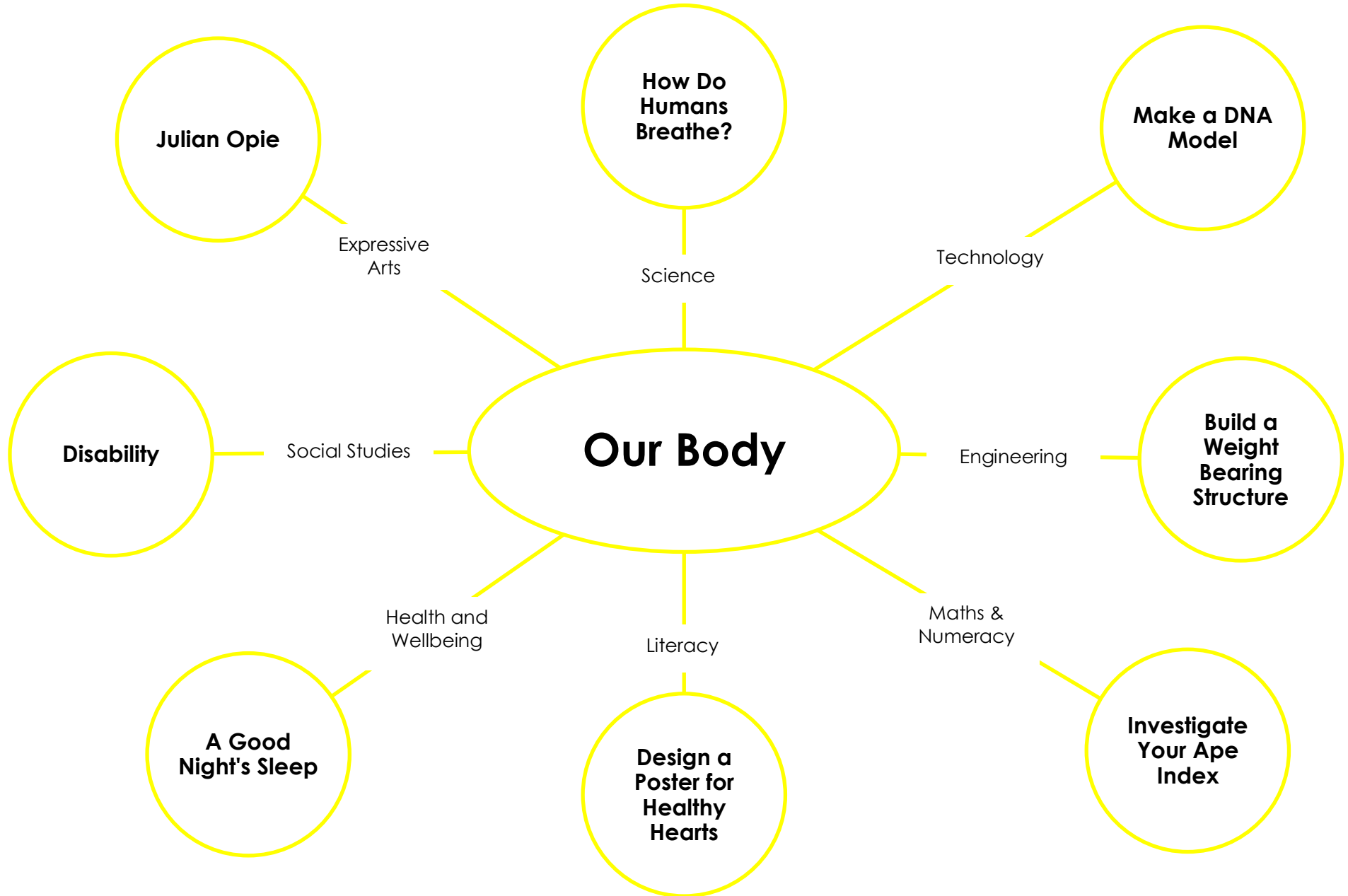


Learning from Home



Science Challenge



How Do Humans Breathe?

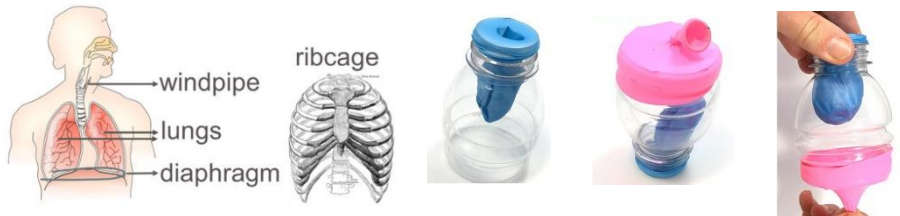
Adult support and supervision required!

Every living thing needs oxygen to survive, and we get our oxygen through breathing with our lungs. Today we are going to make a lung in a jar so we can see this in action.

Click here to watch a video of the instructions: <https://www.youtube.com/watch?v=WJ06mrNliC0>

You will Need:

- Hard plastic bottle (300 - 475ml)
- 2 balloons
- Craft knife
- Scissors



Instructions:

1. Ask an adult to cut the bottom off the bottle using the knife.
2. Hang a balloon inside the bottle. (See picture)
3. Cut off a third off the bottom of the second balloon.
4. Make a knot in the neck of this balloon.
5. Stretch the wide opening of the cut balloon over the wide opening of the bottle.
6. Pull the knot in the balloon back, then release the knot...what happens to the balloon inside the bottle? How is this like breathing in and out?

Take care: parts may have sharp edges!

The Science:

When we breathe in, our chest muscles move upwards and outwards. The **diaphragm** (a muscle under the **lungs**) moves down. This makes more space for the lungs which fill up with air from the mouth and nose. The air moves through tubes in the lungs to tiny air sacs called **alveoli**. **Oxygen** passes from these into the blood, which carries the oxygen to all the cells in the body.

When we breathe out, the alveoli absorb **carbon dioxide** from the blood. the chest muscles move down and inwards and the diaphragm moves up. This squeezes the lungs and forces air out. Carbon dioxide from the alveoli flows up through the lungs and out through the mouth and nose.

Click here to find out more about how breathing works:

<https://www.bbc.co.uk/bitesize/topics/zv9qhyc/articles/zdfs47h>

Talk to an adult about how your model is like a human lung and how is it different?

Activity idea and images from: www.sciencebuddies.org/

Technology Challenge



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Make a DNA Model

What do a person, a daisy, a fish, and a beetle have in common? They're all made of cells! But if all living things are made of cells, what makes each one unique? You're different from a snail, a tree, and even your best friend because of your **DNA**, the unique genetic code found in every cell in your body. DNA looks a bit like a spiral staircase, but you can't see it with the naked eye. Today we will make a DNA model.



You Will Need: some coloured paper (thicker paper is better), scissors, pencil, a box of toothpicks, felt pens, ruler, string or masking tape, glue

Safety Tips:

1. Toothpicks can be very sharp, so be careful poking those holes!
2. As you poke each toothpick through the paper, keep your fingers away from the hole.
3. Don't poke any holes while the paper is on your lap.

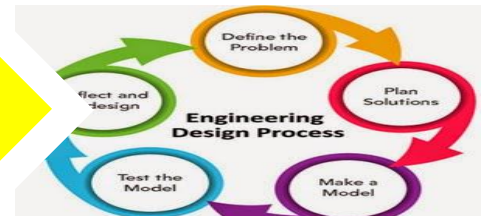
Instructions:

1. First, make the sides of the ladder. Cut two strips of coloured paper that are at 62 cm long and about 2½ cm wide. (If your paper is not long enough, tape some strips together.)
2. Use a pencil and a ruler to mark every 2½ cm along one strip.
3. Next, make the steps or rungs of the ladder. In DNA, these steps are made of four bases: adenine (A), thymine (T), cytosine (C), and guanine (G). Choose four colours from your felt pens to represent the four bases. Write the colours you choose for each base here:
A: _____ T: _____ C: _____ G: _____
4. Take 10 toothpicks. For each one, colour half the toothpick the colour you chose for A. Colour the other half the colour you chose for T. Take ten more toothpicks and do the same thing with the colours you chose for C and G. (It's important that A is always paired with T and C is always paired with G.)
5. Now construct your double helix! Grab both strips of paper, put one on top of the other, and tape them together at each end.
6. Using the pencil marks as a guide, poke a toothpick through the middle of the strips at every mark. You can add toothpicks in any order you want.
7. Keep going until your strips are filled up. Be sure to leave some room at the ends of the strips. Make sure all the toothpicks are pushed halfway through the holes.
8. Gently spread the two strips apart until your model looks like a ladder. This is what DNA would look like if it weren't twisted. (Hint: If any toothpicks fall out, you could put a drop of glue on the hole, stick the toothpick back in, and let the glue dry. You could also wrap a piece of tape around the toothpick.)
9. Now for the twist: Tape one end of your model to a wall or shelf or wherever you want to hang your DNA model. (Ask an adult first before hanging up your model)
10. Then, carefully holding the DNA model, twist it at least once around until it looks like a double spiral. Tape the other end to a flat surface.

Activity from: www.amnh.org/ Image from www.clipart-library.com



Engineering Challenge



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Build a Weight Bearing Structure

One of the functions of the skeleton is to provide support. In this activity you're going to be investigating out how a structure can support a load effectively.

Your task: Design and build a structure that will support a ball as high above a tabletop as possible. The structure should be stable but may not be fixed to the table.

Plan it: What kind of structure do you think will work well? How can you use the materials to produce something strong? How can you make it stable? Draw some sketches of your ideas.

Build it: Use recycled materials from home plus - a tennis ball (or similar), ten sheets of A4 paper, sticky tape

Test it: When you've made a structure test it to see if it can support the ball. What features do you think your structure needs to work well? Did you use tubes? Was the structure broader at the top where it supports the ball? How was it made stable? Did it have a wider base than top?

Reflect: Now use books and /or the internet (ask permission first) to look at pictures of a skeleton and identify what makes bones such as the legs, pelvis and backbone effective at providing support. **Think about these features:**

- Tubular structure (such as the backbone) being light and strong
- Broader structure (such as pelvis and feet) providing stability

Improve it: Use information from your reflection to make any changes to the structure.

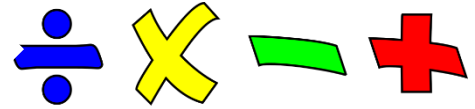
Extension: Is building a structure like this a good way of seeing how a skeleton provides support? In which ways was your structure trying to do the same thing as a skeleton does in supporting a weight? In which ways was your structure not working as a skeleton does?

To find out more about the skeleton click here: <https://www.youtube.com/watch?v=vRuh9aBwUdM>

Activity and image from: www.stem.org.uk/



Maths & Numeracy Challenge



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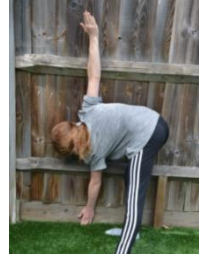
Investigate Your Ape Index

Today, you will be carrying out a maths investigation. Did you know arm span (also known as wingspan or reach) is approximately equal to height?

Task: Can you measure your arm span and calculate your ape index?

To calculate your arm span **You will need:**

A vertical flat surface like a wall to lean against, chalk, measuring tape (with cm), paper, pencil, calculator (optional), a partner



Activity and photo from
www.science-sparks.com/

Instructions:

1. Stand against a flat surface, stretch out your arms, one down the way so the tip of your fingers touch the floor, and the other arm up, against the wall, as far as you can.
2. Ask your partner to make marks using chalk showing the furthest point your fingertips reach.
3. Next, stand with your back next to the wall and ask your partner to mark your height in a different colour. Do the marked lengths measure the same?

Note:

1. You should make sure you measure from fingertip to fingertip and not have a flat hand when you stretch to the ground.
2. Your partner may need to be taller than you or have something to stand on.
3. Measure to the nearest cm.

What is Ape Index?

Ape index is the ratio of arm span relative (compared) to height. When a person's arm span matches their height, they are said to have an Ape index of 1.

How to Calculate Ape Index:

An arm span greater than height is thought to give an advantage in some sports such as swimming, as longer arms may give greater propulsion (push force). A shorter arm span is useful for weightlifters as they don't have to lift the weights up as high.

Extension: Measure the length of other body parts: handspan, head circumference, length of foot etc.

METHOD 1: Wingspan ÷ Height

If ape index is greater than 1 then wingspan is greater than height. If ape index is less than one height is greater than wingspan.

E.g., Joe has a wingspan of 150cm and is 140cm tall.

$$150\text{cm} \div 140\text{cm} = 1.07 \text{ (Ape index } > 1)$$

> means greater than so a positive number

METHOD 2: Wingspan – Height

Ape index calculated this way is either a positive or negative number.

E.g., Sam has a wingspan of 120cm and is 125cm tall.

$$120\text{cm} - 125\text{cm} = -5\text{cm}.$$

-5 is less than 0 so it is a negative number.

Literacy Challenge



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Design a Poster for Healthy Hearts

Adult Support Required

According to the British Heart Foundation (www.bhf.org.uk/) The heart is a muscle, about the size of your fist. It is located in the middle of your chest tilted slightly to the left. It works like a pump sending blood around your body to keep you alive.

Heart disease is a leading cause of death in Scotland and the rest of the UK, so today's challenge is to create a poster persuading people to look after their hearts.

You will need to carry out some research first to learn how people can adopt heart friendly lifestyles. You may have some information books or leaflets at home and / or you can use the internet. **(Remember to ask for permission first)** It will probably help to write down some notes on what you find out. Try to write your notes under headings so you can find this information again easily. (Examples of note headings: Diet, Exercise, Good Habits, Bad Habits, etc.)

Once you have some information design your poster. You should include text and pictures but try to keep your message short by avoiding too much writing. You may make your poster using ICT or you can make it by hand – writing neatly in large bold writing – you may want to use a variety of colours. Take your time to create colourful drawings that will attract your audience.

Share your poster with your family. Would it persuade them to look after their hearts if they don't already?

Click here for an NHS website with tips on how to look after your heart:

<https://www.nhs.uk/live-well/healthy-body/>



Images from www.clipart-library.com

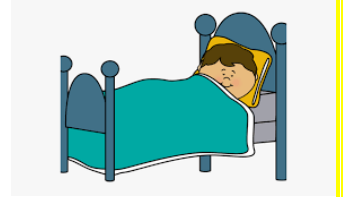




Health & Wellbeing Challenge

A Good Night's Sleep

Task 1: Research the benefits of sleep and how we can get a good night's rest.



Task 2: Prepare and give a short talk about what you have learned to an audience at home. (Adults, brothers, sisters etc.) You might also want to ask your audience to record /video you so you can watch it back after you have finished.

Your talk should last no longer than 1 minute. Think about how you can best engage your audience. Try to make eye contact, speak clearly and not too quickly. Maybe you can prepare some pictures to go along with your talk. Offer your audience the opportunity to ask questions at the end.

Ask for some feedback. Did you include any information they didn't know? How could you improve your talk?

Click here to find out more about sleep:

<https://www.bbc.co.uk/cbbc/findoutmore/help-me-out-sleep>

Click here to watch a video about why sleep is so important:

<https://www.youtube.com/watch?v=aAmaCeq9v4>



Did You Know:

1. At age 10, children are recommended to get around 10 hours of sleep each night.
2. The average person spends 9,582 days of their lifetime asleep.
3. A good night's sleep can improve a person's mood, memory and health.
4. You spend roughly one third of your life asleep!



Images from www.clipart-library.com

Social Studies Challenge



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Disability

What Is a Disability?

A person with a disability may be limited in terms of their movement, senses or activities. There are many different types of disabilities.



What Does a Disability Look Like?

Sometimes disabilities are hidden. This means that you might not be able to tell that somebody has a disability just by looking at them. What does this mean - can you think of a disability that might be hidden?

People with disabilities may or may not look different, act differently or just might not be able to do things as well or as quickly. However, they are still people, just like everybody else and many disabled people have achieved great things.

Task 1: Talk to an adult about disability: Do you know the names of any disabilities? Perhaps someone you know has a disability - are there any things that they have to do in a different way? How do you think people view disability? Do you think people with disabilities should be treated any differently? Can you find out about any famous people with disabilities?

Task 2: Click here to watch Archie's Story:

<https://www.bbc.co.uk/teach/class-clips-video/pshe-ks2-cerebral-palsy/zir9jhw>

How does Archie's disability affect him in everyday life? Why do you think Archie liked playing wheelchair basketball?



Archie has some very good school friends – do you think that is important? Why? Do you think it is important that Archie gets to join in with activities?

Note:

People with disabilities are still just people and they should be treated with the same respect as everybody else. As Archie says in the video, "I'm the same but on wheels."



To find out more about disability click here: <https://www.bbc.co.uk/teach/class-clips-video/pshe-ks2-same-but-different/zn87vk7>

Images from www.clipart-library.com



Expressive Arts Challenge



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Julian Opie

About the Artist:

Julian Opie was born in London in 1958. He is part of the **Pop Art** genre. He works with both digital art and sculpture. Many of his works depict faces, and people pictured in a state of movement.

Features of Julian Opie's Portraits:

Minimal colour palette – only uses 2 or 3 colours at a time.
 Colours are flat (all the same shade) with bright backgrounds
 Reduced amount of detail in the facial features, hair and clothing

Portrait Characteristics - Let's look closely at each feature:

The Nose - Nostrils only
 The Eyes - Pupils only and simple eyebrows
 The mouth - The shadow under the mouth and the line where the top and bottom lip meet



The features in this picture are in proportion and correctly placed. The lines are the same thickness as Julian Opie's. It is recognisably in the style of Julian Opie.



← This is the cover of a music album by the band Blur. It was created by Opie.

Your Task: Create your own self portrait (picture of your own face) or a portrait of someone at home. Keep the style simple – avoid details for eyes, nose and mouth. Focus on the shapes that you are using and the colours – try to make them contrast. (Stand out when used next to each other) **Use any media you like, although paint is best!**

Extension: Create 4 different small portraits and put them together like the Blur album cover.

Tip: If you have tracing paper, you might want to trace over a photo of yourself – including only the main shapes. (Not details)

Click here to find out more: <https://www.youtube.com/watch?v=sgO2NHHjcA8>

Images from and activity adapted from TES and <https://classroom.thenational.academy/>