Year 8 Science: Home Learning Week 10

Hello Year 8, more from the BBC Bitesize lessons this week and an optional practical to make a robotic hand. As always, follow the instructions carefully, get permission from an adult before doing anything and clean up after yourself when you're finished!

Take care & stay safe

Miss Johnston ☺

Task	Description
1	Watch the BBC Bitesize lessons on Tuesday (biology), Wednesday (chemistry) and Thursday (physics). Here's a link to the daily lessons page: https://www.bbc.co.uk/bitesize/tags/zvdbbdm/year-8-and-s2-lessons If you have trouble watching online, you can access the Bitesize lessons via the red button on your TV remote. Just switch the TV to BBC1, press the red button and the Bitesize options should come up…
2	**Biology** a) Visit BBC Bitesize and read the information and complete the quiz on the skeletal system: https://www.bbc.co.uk/bitesize/guides/zpkq7ty/revision/1 b) Answer the following questions: i State four functions of the skeletal system. ii Name the tissue that attaches muscles to bones. iii Name the tissue that supports joints and holds bones in place. iv Where is synovial fluid found and what is its purpose? v Which tissue covers the ends of bones at a joint and prevents wear and tear? c) Write a short explanation, using terms that a year 4 pupil could understand, explaining how the muscles in your legs work together to help us to walk and run. Remember to use your own words and the names of the muscles and bones involved.
3	**Chemistry** a) Watch this video clip about neutralisation: https://www.youtube.com/watch?v=gOB-q3xwhrE b) Which numbers on the pH scale would you associate with substances that are: i. acids ii. alkali iii. neutral c) Use your understanding of neutralisation to explain how alkali indigestion tablets help to remedy excess indigestion caused by excess stomach acid.
4	**Physics** a) Visit BBC Bitesize and read the information and complete the quiz about density: https://bbc.in/30cdlfi and: https://www.bbc.co.uk/bitesize/guides/zbg7hyc/revision/1 b) Answer the following questions: i. What is density the measure of? ii. What is the equation used to calculate density? iii. Why does oil float on water? iv. How can we measure the volume of irregular shaped objects? c) Watch this video clip about Archimedes: https://www.youtube.com/watch?v=ijj58xD5fDI Q. How did Archimedes know that the crown was not pure gold? It's thought that this was not actually the true story – you can find out more about the huge ship that Archimedes had to design and the more likely version of the story here: https://www.youtube.com/watch?v=0v86Yk14rf8

Practical Details

Build a Robotic Hand

About this activity

Have you ever wondered how your hand works when you hold something? Have you ever wanted to build a robotic hand of your own? This engineering activity will show you how the bones and tendons in your hands work together to grip things.

Safety note

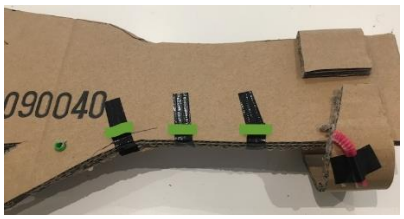
- Take care when using scissors.

Equipment & materials

- Corrugated cardboard
- Sticky tape
- Drinking straws
- String
- Scissors

Method

1. Draw the shape of your robotic hand on the cardboard. You can simply trace your own hand or draw a bigger, “more robotic” hand.
2. Below the wrist, continue to cut out a forearm, which will attach to your own, like a glove.
3. Mark the joints of the fingers on the cardboard (2 joints for the thumb, 3 for the other fingers). You can use a ruler to fold the joints more easily.
4. Cut the straws into 20, 1cm-long pieces and 5 longer pieces of about 3-4 cm. Tape them onto the cardboard hand as shown by the green and red markings in the picture.
5. Make a hole at the tip of each finger and at the base of the thumb.
6. Thread a piece of string through each fingertip, tying a knot on the back to keep it from slipping through.
7. Thread a piece of string through the straw pieces on each finger and make a loop for your fingers at the bottom.
8. Thread a piece of string through the straw pieces on the thumb, then through the hole at the base of thumb so that the string runs down the back of the “hand”. Make a loop for your thumb.
9. Using a spare piece of cardboard, cut out a 2cm wide strip to form and arm brace to support the hand when you use it. Attach this near the end of the cardboard arm, as shown in the pictures.



The back of the hand & thumb

Threading the string

The completed project

Expected observations and results

Unlike other parts of the body, which rely on muscles for movement, our hands move because of tendons pulling on our finger bones. In this activity, the cardboard acts as the bones of the hand. The string

represents the tendons on the inside of the fingers and palm, which contact (squeeze together) when you grip something and relax (stretch out) when you let go. In this model, you can pull on the strings to move each finger independently, unlike in our hands where the middle and ring fingers share a tendon and so cannot move very far on their own – have a go and see!

Questions & possible further investigation

If you have enough cardboard, you could make other models to try to find the perfect design for a robot hand:

- Does adding more fingers improve grip?
- Are shorter fingers easier to control than larger fingers?
- What happens when you add more joints?