mini scientist

intel

EVERYBODY KNOWS!

Humans, animals and plants all evolved in special ways to help them survive here on earth. Your skeleton and muscles work as an awesome team to help you do the things you love, like running a race or playing video games. Without this team your body would flop around like a soggy noodle! By building a working model of our muscles, we can understand how we move and see how amazing our bodies are.

INTRODUCTION

In this lesson the children will make a model of limbs to understand the internal workings of our muscles and skeletons. Humans have evolved over millions of years and our bodies move in very special ways to help us survive the best we can. We are still evolving! Ask the class if they think there's any way humans may change in the future....maybe we will grow an extra finger to type faster? Maybe if we colonise Mars the humans there will have bigger eyes because its darker?

Humans are not the only species on the planet with impressive movements. Plants and animals have also been evolving for millions of years to help them move and survive in the world. Petals on flowers open up to get more light and fish tails move in special ways to help them swim through the water. Fishtails would not work on land and that is why humans evolved legs!

Discuss prosthetics and robotics with the class. Intel help develop and build prosthetics and robots which "mimic" the movements of our bodies. Nature is the best inspiration for robotics as it has had millions of years to evolve the smartest design for motion.

The human body has more than 600 muscles. They do everything from pumping blood throughout the body to helping us lift heavy things. Have the class look at the way their hands and arms move. Explain their skeleton has joints at the parts that move, this is why we can only extend our arm straight and not bend it backwards in the opposite direction.

Our muscles work in pairs around these bones. When one muscle contracts - or pulls - its teammate relaxes. Have the class place their hand on their bicep and then move their arm (they may need to hold something weighted). They should feel their bicep contract as they pull their arm up.

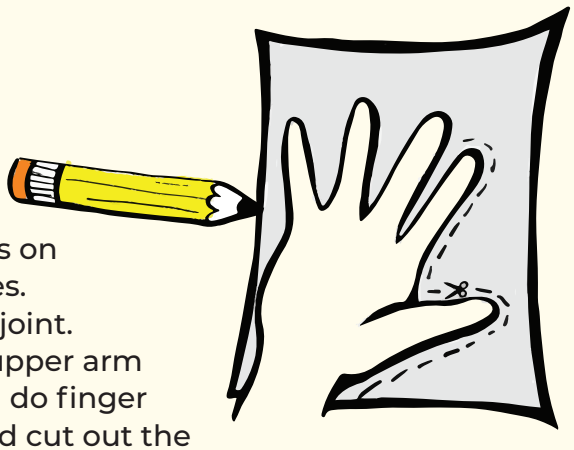
For the activity section of the class, younger classes will make a model of an elbow or knee joint while older classes will make a model of a hand.

Materials

Cardboard
Tape
String,
Split pin
Straws

Other art materials can be included to add an artisitic element to constructions

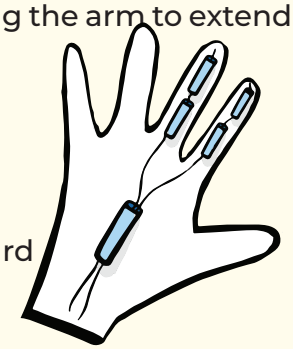
METHOD



1 Have the class trace out their own limbs on cardboard before cutting out the shapes. Younger classes will do a simple elbow joint. Have them cut out the lower arm and upper arm as two separate parts. Older classes will do finger movements and can therefore trace and cut out the shape of their hands.

2 For the elbow joint, secure a piece of straw along both edges of the cardboard forearm. Do the same with the upper arm. For the hand secure two pieces of straw on each finger where the bones are, leaving a space in between at the bends of the finger. Put one extra piece of straw/arched strip of cardboard on the palm of the hand.

3 For the elbow, secure the forearm and upper arm with a split pin so that they rotate. Loop some string through the forearm straw, around the pin and through the straw on the upper arm on the same side. When you pull the string, the arm will contract. Do the same on the other side, allowing the arm to extend when the string is pulled.



4 For the hand, pull string through the straws and tape them at the tip of the fingers. Pull all the strings in through the straw on the palm after they have been pulled through the fingers. When a string is pulled it will bend the cardboard hand fingers.

5 Now that your hand/arm is complete, test them out! Make a hook on the end of the arm and put a loop of string on a selection of objects. See if you can use the arm to pick them up. Try the same with the hand, or see how well the hand can grip objects.

RESULTS

Have the groups show off their creations to the class and appraise their finished model against their initial plan and intention. How effective were they with grabbing or picking up objects? Compare them to their own arms/hands and ask them to relate the parts of their models to their own bodies. Can they think of any ways they would change or improve their models?

Have them evaluate the suitability of the materials used. How could they improve the quality and stability of their model? What materials might work better and why do they think that?

CONCLUSION

The class should now have a better understanding of the internal structure of arms and hands, and how muscles, ligaments and bones work together to allow humans and animals to move their limbs and appendages. They should also be familiar with the basic functions of muscles and how the bicep and tricep muscles work together like a team to move the arm. They will also have explored beyond humans and seen how the same body structure has changed and adapted through evolution to accomplish a range of different tasks like swimming, flying and grabbing and how these biological structures are a source of inspiration for designers and engineers working in robotics and technology.

GOING FURTHER

The two examples here cover human motion functions. Extend this to animals and plants! Petals on a flower open and close in a unique way, animals move in different ways to us, particularly ones that live in the sea or sky! Have the class look up some different animal/plant limbs and investigate why their muscles and joints may function and move in different ways. Based on what you've learned today, design a model of an animal using the same materials. Perhaps a batwing, a seal flipper, or a snakes body, or a snapping turtle mouth?! You could even use your artistic skills to make it look like the real thing!

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Hi, I'm Stevie and I'm a robot developed by a company called Akara.

Intel supported Akara in making another robot adapted from my design. She is called Violet! Both of our jobs is to help out health-care workers.

Beep Boop Beep

RISE

RESPONSIBLE. INCLUSIVE. SUSTAINABLE. ENABLE.

Did you rememebr to work inclusively and use recycled materials during this exercise?