Springdale First School

Imagine, Believe, Achieve

Year 3 Science: Skeletons and Muscles

Children's prior learning in this area

In Reception:

Children learnt about simple body parts that can be seen of humans and other animals and drawing animals and humans.

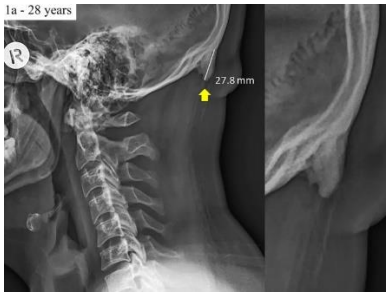
In Year 1: Children learnt about the body parts you can see of humans and other animals. They learnt that humans have the same body structure and parts but there can be differences in how humans look. They learnt about other animals and how their body structures compare.

In Year 2: Children learnt about looking after their bodies by eating the right amounts of foods, having exercise and having good hygiene. They learnt that animals including humans need food, water and air to survive. (This prior learning will link more explicitly with the Year 3 unit – nutrition, which follows the skeletons and muscles unit).

Cultural Capital Opportunities

Invite a visitor e.g. a parent who is a doctor, radiographer or a personal trainer that could share how their career relates to the scientific knowledge of skeletons and muscles.

Learn how modern life is changing the human skeleton – e.g. spiky growths on base of skull perhaps due to craning over mobile phones and other devices; elbows are thinner perhaps due to less exercise than before.



Key vocabulary and glossary

bones

skeleton

muscles

pairs

support

protection

movement

skull

ribs

spine

contract

relax

joints

vertebrates

invertebrates

endoskeleton

exoskeleton

hydrostatic skeleton

Enquiry Question How do animal skeletons compare?	**Enquiry Questions** What are the functions of a vertebrate's skeleton? Which skeleton functions the best?	**Enquiry Question** What do muscles do?
Concept Interpret results – answer the question **Enquiry type:** Identify and classify	**Concept** Interpret results – answer the question **Enquiry type:** Identify and classify	**Concept** Interpret results – answer the question
Pupils will know that animals, including humans have skeletons. Skeletons are the structural framework of animal's body. A skeleton is what keeps an animal's an shape. They will know that there are different types of skeleton. They will know that animals can be classified as either vertebrates or invertebrates. Vertebrates have a backbone and their skeleton is inside the body. *(Include snakes and fish as examples as children often think these don't have bones). Some children will be able to recall this as an endoskeleton.* **They will know** that invertebrates do not have a backbone. They will know that invertebrates can be further classified by their skeleton. Some invertebrates have skeletons on the outside of their body made of a hard material. *Some children may recall this as an exoskeleton.* Some invertebrates have soft bodies with a fluid filled compartment inside their bodies which is their skeleton. *Some children will recall this as a hydrostatic skeleton. (Include a worm and snake as misconception that they are both invertebrates. Also include fish).* **Pupils will know how to** interpret their results (their images they have classified into groups) to answer the enquiry question by identifying differences and differences. They will explain which characteristics have caused them to identify or classify living things by their skeletons. ***Remember:*** *Naming external body parts of a human – give image and ask children to label – group activity. Then, discussion: compare the external body structure of a human, bird and lizard. Consider similarities and differences. Link to Yr 1 learning.* ***Practise:*** *Classify images of animals - vertebrates or invertebrates. (Group activity – photos for books)Orally explain why they have classified something, e.g. I classifed this as an invertebrate because I can see it has a hard skeleton/a shell/a soft body that doesn't have a rigid shape. I classified this as a vertebrate because I can't see a hard material on the outside but it has a rigid shape.* ***Apply:*** *Write sentences to answer the enquiry question using comparative language – but, whereas, both, similar, different and vocabulary related to skeletons: backbone, hard material, shell, fluid-filled compartment, skeleton, frame… have three images of animals with different skeletons to compare.* ***Deepen:*** *Discussion: If you could choose a skeleton, which would you pick? Why?*	**Pupils will know** that the skeletons of vertebrates have three important functions: Support – keeps the body upright and provides a framework for the body Protection – protects vital organs from injury Movement – bones are rigid and cannot bend but the points at which bones meet are called joints and at the joints movement can happen **Pupils will know how to** answer the enquiry question in a scientific way by using scientific vocabulary and referring to simple scientific facts when describing processes and observations. ***Practise:*** *Have a human skeleton image with arrows pointing to parts, e.g. the skull, elbows, hips, spine. Stick the appropriate labels by the arrows – e.g. Protects the brain; supports the body; allows movement of the arms by bending; allows movement of the hip by rotating.* ***Apply:*** *Have a skeleton of another animal with arrows pointing to different parts, e.g. ribs, spine, knees, neck. Children label appropriately the main function with brief explanation in own words, using the practise task as a model.* ***Deepen:*** *Show 3 images of animals – one each of endo skeleton, exoskeleton and hydrostatic skeleton. They are competitiors in the competition – Who has the best skeleton? Three rounds – as a class, judge who wins each round and keep score – Round 1 – Protection; Round 2: Movement; Round 3: Support. (Type up for books).*	**Pupils will know** muscles are essential for an animal's movement. Some muscles inside the body work without the animal having to think about it but animals have control over some muscles. A vertebrate controls movement with muscles that are connected to bones by tendons. These are called skeletal muscles. Muscles control movement by pulling the bone that needs to move. Because they cannot push to move the bone back, they work in pairs. When a muscle contracts, the muscle gets shorter and pulls the bone to move it. The other muscle in the pair relaxes, getting longer. Example videos: Science KS2: How do muscles and bones work? - BBC Teach and/or BBC Two - Science Clips, Moving and Growing, Muscles needed for movement. Pupils will know that to answer the enquiry question in a scientific way that they must use some scientific vocabulary and refer to simple scientific facts when describing processes and observations. ***Practise:*** *Label a diagram of an arm with contracted and relaxed on the appropriate muscles. Label a second diagram where the muscles are doing the opposite movement. Cloze procedure to explain how the arm muscles straighten and bend the arm at the elbow joint.* ***Apply:*** *Refer to diagrams of thigh muscles to show how to bend and straighten the leg at the knee joint. Use this as an example to explain what muscles do. Use a word bank.* ***Deepen:*** *Show a teaching model of an arm muscle, e.g. MAKE! arm muscle model (youtube.com). Orally evaluate what is successful about the model to teach how muscles work. Discuss flaws in the model - only one muscle can be seen moving. How could this model be improved?*

Enquiry Question How do scientists create investigations?	**Enquiry Question** Can we create our own investigations?	**Enquiry Question** What do scientists do after they have carried out an investigation and answered the question?
Concept ask scientific questions; plan, set up and perform an enquiry; interpret results – answer the question **Enquiry type** Pattern seeking or comparative testing	**Concept** ask scientific questions; plan, set up and perform an enquiry; interpret results – answer the question **Enquiry type** Pattern seeking or comparative testing	**Concept** Evaluate an enquiry; ask scientific questions; make a prediction
Pupils will know that scientists begin creating investigations by first thinking of a question about a scientific area that they would like to find an answer to and then plan an enquiry that will reach the answer. Pupils will know that some questions are testable in the form of an investigation in the classroom but that some are not. With guidance, Pupils will be able to take part in discussion about which type of scientific enquiry might be the most suitable for a question asked. With support such as scaffolded discussion and modelling, pupils will be able to plan and carry out simple practical enquires relevant to the questions or ideas they are investigating. Pupils will begin to identify some variables that need to be kept the same and begin to recognise when a test isn't fair and suggest improvements. ***Practise:*** *Show a photo of a group of different size/aged people. Model I see, I know, I wonder. Turn your wonder into a question. E.g. are adults heads bigger than children's heads? Do taller children have longer arms/feet etc. Do taller children have longer fingers? Then do we do/you do version of this.* *N.B: If the question is general, as the ones above, the enquiry type is pattern seeking. If it is specific, it is comparative testing. E.g. Is Fred's skull larger than Tom's skull?* ***Practise 2:*** *Small step modelling of planning enquiry – I do (with your question),We do – the class generated question – children have own sheet to record on after we do discussion alongside you.* ***Apply:*** *Carry out the enquiry in groups and record results.* ***Deepen:*** *Model interpreting results and answering the scientific question with made up data for modelled question, e.g. Looking at these results, I can see that…I know this because… We do – discuss results and answer question - - scribed by teacher for books or written by children.*	Sticky knowledge same as prior enquiry question – but more independence given in the planning stage. **Asessessment opportunity: Children ask a variety of scientific questions in groups, choose one and plan, set up and perform the enquiry.** ***Apply:*** *Apply knowledge from last lesson to create questions to investigate how the size/length/thickness of a body part/bone/muscle affects ther performance of an action. Plan the enquiry, set it up and perform it.* ***Deepen:*** *Interpret results and answer the scientific question (not a full conclusion, e.g. Looking at these results, I can see that…I know this because… (This could be written as a group response or individually).*	Pupils will know that scientists often work through an inquiry cycle. They will know that scientists will reflect on their enquiry. As part of a supported discussion, pupils in groups will recall what went well, what went wrong and why, why any results were unexpected and how you could avoid this in future. They will be able to suggest improvements. Pupils will know that scientists do not stop when the investigation is over. The results of the investigation can make them curious to ask another related scientific question. The results from the first investigation may support their predictions for what will happen in the next one. With some help, pupils will use their results to raise further questions for another investigation. They will consider if they can make predictions from what they found out in the first investigation. (The new investigations do not need to be carried out). ***Practise:*** *Identify what went well, wrong, unexpected results, improvements in a scenario of an enquiry given. This could be multiple choice to scaffold thought process.* ***Apply:*** *In groups, discuss the above relating to own enquiry from last lesson. Record this in writing.* ***Deepen:*** *Raise a further question stemming from previous enquiry. Make a prediction. Record in writing – group recording or individual.*