Unit 4A Moving and growing
Adapted from QCA Science Unit 4A

ABOUT THE UNIT

Through this unit children learn about how the skeleton is related to movement and support in humans and what happens to the skeleton and muscles as they move. They also compare human bones and skeletons with those of other animals.

Experimental and investigative work focuses on:

- turning questions into a form that can be investigated and collecting sufficient evidence
- making observations, measurements and comparisons
- interpreting evidence.

Work in this unit also offers opportunities for children to relate understanding of science to personal health.

This unit takes approximately 12 hours.

WHERE THE UNIT FITS IN

Builds on Unit 2A 'Health and growth' and Unit 3A 'Teeth and eating'

Children need:

- to know scientific vocabulary for some parts of their bodies
- to know vocabulary used to describe materials
- to use standard measures for length.

Links with Units 2E, 3C, 5A and physical education.

VOCABULARY

In this unit children will have opportunities to use:

- words relating to skeletons and muscles *eg ribs, spine, skull, contract, relax, vertebrate*
- nouns and related verbs *eg contraction, contract*
- words which have other meanings in other contexts *eg relax*
- expressions making generalisations.

RESOURCES

- model skeleton
- torso model
- posters
- real bones from different animals *eg chicken, fish, lamb, rabbit* (clear of all muscle tissue and sterilised),
- images from the internet and/or CD-ROM and video to provide pictures of skeletons
- model illustrating how muscles work
- X-rays of bones

EXPECTATIONS

at the end of this unit

most children will:	describe the main functions of their skeleton; describe observable characteristics of bones; recognise that their skeletons grow as they grow; state that movement depends on both skeleton and muscles; identify a question to be investigated and how to collect and interpret reliable evidence in order to answer the question
some children will not have made so much progress and will:	state that they have skeletons; describe some observable characteristics of bones and make measurements when investigating a question
some children will have progressed further and will also:	state that when one muscle contracts another relaxes and make an evaluation of the extent to which the evidence collected to answer a question supports the prediction made

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LEARNING OBJECTIVES CHILDREN SHOULD LEARN	POSSIBLE TEACHING ACTIVITIES	LEARNING OUTCOMES CHILDREN	POINTS TO NOTE
	Review what children know about their body by asking them to draw what they think they look like inside. Review their knowledge of the names, mains functions and locations of major organs. Review what children know about their skeleton by asking them to draw what they think their bones look like and to locate major bones on an outline of a human body. Suggest children explore what they can feel of their own bones *eg* – *Where are the ribs? Are they hard or soft? How many ribs can we feel? Where else can we feel bones?*		Teachers will need to take account of what children think about bones and skeletons in their short-term planning for later activities.
• that humans (and some other animals) have bony skeletons inside their bodies and to raise questions about different bony skeletons • to make and record relevant observations of bones and skeletons	♦ Use secondary sources including internet web pages, CD-ROMs, reference books which show skeletons of animals. Talk about the skeletons with the children. Ask them to suggest questions about similarities and differences between skeletons and bones of humans and another vertebrate *eg* – *Do fish have ribs?* – *What similarities are there between skeletons?* Encourage children to make comparisons.	• identify similar parts of the skeleton in some other species • list similarities *eg they all have spines (or backbones) and skulls,* and differences *eg the cat's bones are much smaller than the human bones*	Many children are interested in and familiar with some extinct animals and this could be used as the basis of comparison between the human and other vertebrate skeletons. Models of skeletons may be available locally to borrow (e.g. from The Wheldon School). **SAFETY** – All off-site visits must be carried out in accordance with LEA/school guidelines.
• to make observations and comparisons of relevant features	♦ Show children bones and ask them to describe what they are like *eg hard, strong, smooth, brittle (if chicken bones are used)* and to compare bones from different animals. ♦ Ask children to bring in X-rays of themselves if they have any. ♦ If available, show X-rays of human bones which illustrate that although bones are strong they may break. ♦ Label diagram of skeleton worksheet. ♦ Complete skeleton "jigsaw" worksheet.	• describe the characteristics of bones as materials *eg the bones are hard, strong* and identify differences between bones from different animals *eg the fishbones are much smaller and easier to break* • locate and name some bones *eg ribs, spine, skull*	At this stage children do not need to know the scientific names for most bones *eg tibia, fibula.* It is sufficient for them to recognise and name ribs, spine, skull and recognise that there are bones in limbs and other extremities. Children may notice ridges on bones to which muscles are attached. **SAFETY** – If animal bones are used they need to be thoroughly cleaned and sterilised.

LEARNING OBJECTIVES CHILDREN SHOULD LEARN	POSSIBLE TEACHING ACTIVITIES	LEARNING OUTCOMES CHILDREN	POINTS TO NOTE
• that human skeletons are internal and grow as humans grow	♦ Ask children how their skeleton has changed as they got older ♦ Discuss relative sizes of bones in people *eg the forearm in children within the class and adults (teachers, parents, helpers) or children in other classes.* Discuss how the size of parts of the body *eg length of forearm, circumference of head* changes as they grow. ♦ Class complete cloze activity about how skeleton grows and changes	• state that their skeleton grows from birth to adulthood • know that bones are living and need food and oxygen • know bones need calcium to be strong	Some children may be sensitive to being the tallest/shortest child in the class.
• to identify a question and turn it into a form that can be tested making a prediction • to decide precisely what body measurement to make, and to make it • to use bar charts or pictograms to present measurements • to say what the evidence shows and whether it supports the prediction	♦ Ask children to suggest ideas about differences and help them to turn them into a form that can be investigated *eg* – *Who has the longest arms, children or adults, boys or girls?* – *Are the adults' heads bigger than children's heads?* – *I think Year 6 children have longer arms than Year 4 children.* Discuss with children exactly how they make their measurements to make reliable comparisons and how they will present their results *eg by making tables, bar charts or pictograms of the two categories.* Talk with children about the bar charts asking them to describe what they show.	• decide how to investigate the agreed question *eg measure the forearm of 10 Year 4 children and 10 adults* • make measurements to the nearest centimetre and describe what they did • construct bar charts or pictograms and make comparisons between them describing what they show *eg adults usually have longer arms than children, there isn't much difference between the length of boys' and girls' arms* and explaining whether the prediction is supported	This activity offers children the opportunity to carry out a whole investigation. It may be helpful to concentrate on the aspects of investigation highlighted in the learning objectives. Measurements will need to be made to a degree of accuracy that will allow a sensible bar chart to be produced.

LEARNING OBJECTIVES CHILDREN SHOULD LEARN	POSSIBLE TEACHING ACTIVITIES	LEARNING OUTCOMES CHILDREN	POINTS TO NOTE
• that the skeleton supports the body	♦ Observe some invertebrates *eg snails and worms* and compare the body of the invertebrate (its lack of rigidity) with the human body. Use secondary sources *eg internet sites, CD-ROMs, reference books* to find out and write and draw about how bodies of animals without bony skeletons are supported.	• explain that all bodies need support, but that not all animals have an internal skeleton to do this	
• that the skeleton has joints which enable movement to take place	♦ Think about the different ways in which different part of the body move ♦ children classify joints by the type of movement they afford	• know that joints or necessary to allow the skeleton to move • explain there are different types of joints and that different joins allow different degrees of movement	

LEARNING OBJECTIVES CHILDREN SHOULD LEARN	POSSIBLE TEACHING ACTIVITIES	LEARNING OUTCOMES CHILDREN	POINTS TO NOTE
• that animals with skeletons have muscles attached to the bones • that a muscle has to contract (shorten) to make a bone move • that muscles act in pairs	♦ Use secondary sources *eg video, CD-ROMs* to illustrate muscles and movement. ♦ Explain muscle contraction as an active process and relaxation as being passive. ♦ Ask children to explore their own muscles moving *eg in their arms* and what this feels like. ♦ Demonstrate movement by using models illustrating muscles and ask children to explain what the models show. ♦ Class complete cloze activity about how a muscle works	• explain that in order to move *eg their arms and legs* a muscle, attached to a bone, has to contract • relate this to other parts of their bodies *eg the face (smiling and eating) and the back (bending and stretching)* • explain that as one muscle relaxes another contracts and this results in movement	Many children at this stage have concepts of the skeleton protecting and supporting internal organs *eg the brain* but not about its relationship with movement. Children will need to know that a muscle shortens when it contracts. When the muscle relaxes it returns to its original length. Only contraction produces movement of a bone. At this stage children do not need to remember the names of specific muscles, or the term 'antagonistic muscles'. Children should understand that an elastic band is NOT a good model of the way a muscle works.
• that when someone is exercising or moving fast, the muscles work hard • to make observations and comparisons relating to exercise and rest	♦ Ask children to compare what they feel like *eg tired, out of breath*, *hot,* when they have exercised for a long time or have exercised hard, with how they feel when sitting still.	• give descriptions showing they understand that their muscles work harder during exercise than when they are sitting still	**SAFETY** – Children should undertake normal PE activities, not attempt to 'test' their stamina or strength.
	Review work by asking children to construct a concept map using terms *eg skeleton, move, support, bone, exercise, human, snail, worm, spine, ribs, grow, muscle, contract, relax, tired, hot.* Talk to children about their ideas as shown by the maps.		A concept map shows the connection between different areas in a particular topic and is a useful source of information about children's understanding. Children may need help in making a concept map.