Bodies and skeletons

Introduction

Much of this material is based on the book *Ourselves stages 1 & 2: a unit for teachers*, from the Science 5/13 Series (Roy Richards 1976, Macdonald Educational, Hemel Hempstead). Children are always interested in their bodies—in their weight, height, eye colour, leg length and in who can do something more quickly or more skilfully than others. In order to satisfy this interest they will have to question one another, take measurements, get one another to perform certain tasks, carry out tests, record information and make their findings intelligible to others. A number of these activities can be linked up with simple issues of health.

Key concepts of bodies and skeletons

Through studying bodies, students can be introduced to a range of measurement skills, and they can gain an idea of the normal range of human traits and an increased understanding of their bodies and how they function. However, one problem concerns the effect of comparisons on the obviously different child.

The activities in this topic are designed to explore the following key concepts:

Early years

- People vary a lot in each characteristic.
- Breathing is necessary for life.
- We need to breathe more when we exercise.
- Sight is an important sense.
- Having two eyes is necessary for judgment of depth.
- We use our ears to hear.
- Bones give our bodies shape.
- Bones provide places for muscles to attach.
- Bones protect important organs from damage.
- Bones and muscles allow us to walk, run and move, and to change our facial expressions.

Middle years

- The body contains numerous organs that function together to maintain life.
- The body contains organs that work together in systems (e.g. the skeletal, respiratory and excretory systems).

- Our breathing rate and pulse increase with physical activity.
- Fingerprints are unique.
- We use both ears to locate the source of sounds.
- To be able to smell the presence of an object, bits of that object must enter your nose.
- Genes from parents can determine some characteristics you have.
- Many animals have skeletons.
- Some animals have skeletons on the outside (exoskeletons) while other animals have skeletons on the inside (endoskeletons).
- Some skeletons are made up of bones.
- The shape of a bone can be used to identify its likely position in the skeleton.
- It is possible to gain information about how an animal may have moved by looking at the skeleton.
- The skeletons of particular types of animals are very similar to each other.
- It is possible to gain information about what the animal may have eaten by looking at the teeth in the skeleton.
- It is possible to gain information about the possible shape of an animal by looking at the skeleton.
- By comparing the skeletons of other animals to the human skeleton, it is possible to gain information about how the animals may have differed from or been similar to humans.
- The brain is essential for all human behaviours.

Students' alternative conceptions of bodies and skeletons

Research into student' ideas about this topic has identified the following non-scientific conceptions:

- Young children give egocentric explanations for parts of the body, as in 'my hair is for washing'.
- Young children imagine their bodies as hollow skin bags that are all 'stomach' (a reservoir in which blood, food and wastes are somehow contained).
- For young children, the stomach is related to breathing, blood, strength and energy.
- For young children, food vanishes after it is eaten.
- Young children don't associate the ear with hearing.
- Young children don't think of the brain being needed for overt behaviour, such as physical actions or for telling a story, or that it is concerned with emotions or sensations.
- The brain is not essential for all human behaviours.
- Young children believe that skeletons are only to give us shape.
- Muscles are not related to meat.
- Light does not need to enter an observer's eye to see something.
- We see because we look; it has nothing to do with light.
- The scent or odour from an object is something different to the particles that make up the object.

- The fingerprints on each finger of one's hands are identical.
- Daughters inherit their characteristics from their mothers and sons from their fathers.

Activities

Measuring ourselves

Teaching note: Many of the following activities are suitable for Kindergarten to Year 6. However, informal units should be used when working with young students.

ACTIVITY:**Teaching note:** The streamer represents an informal length unit for youngMEASURINGstudents. A graph can be readily produced if the streamers are hung on the wallOURSELVESwhere one end of each streamer begins at the same level.

Key idea: Humans vary in each characteristic they have.

You will need:

- streamers
- rulers
- graph paper
- a table for recording data.

Measure height of students using streamers; these can be hung on a wall. Measure foot length, height, and arm span (when two arms are outstretched) and enter the measurements on the table. Plot the measurements for the whole class on a graph.

Analyse the data to answer the following questions: Do tall people have the longest feet? Is your arm span the same as your height?

ACTIVITY:**Teaching note:** It is not possible to expel all the air from our lungs. In this activity,MEASURINGto calculate the actual lung capacity, add 20% to the results for males, and 26% forLUNG VOLUMEfemales. What would be the possible causes of the variation in capacity?

Key idea: People breathe in different amounts of air.

You will need:

- a bucket or measuring cylinder
- water
- plastic tubing
- a clear plastic bottle.

Fill a bucket of water or a measuring cylinder to the brim with water. Insert one end of the plastic tubing into the water. Now breathe in deeply and blow into the other end of the tubing. Measure the amount of water that is left; this will give some indication of the student's lung capacity.

(Note: it might be useful to do this in a sink or a bucket to catch the excess water.)

bucket	plastic tubing	clear plastic bottle
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ACTIVITY: MEASURING	Key idea: Humans vary in each characteristic they have.				
FEET	You will need:				
	• paper and pens for drawing				
	• rulers.				
	Measure <i>one</i> foot of each student by drawing around the foot on a piece of paper. Work out the size (length) of the students' feet, starting at the smallest and going to the biggest.				
	Is the order of 'foot size' (length) the same order as 'height'? What do you predict? Test by measurement.				
ACTIVITY: MEASURING	Key idea: Humans vary in each characteristic they have.				
HEIGHT	You will need:				
	• rulers and string for measuring.				
	Measure the height of each student sitting in a chair. Will the students line up in the same order as their standing height? Test the prediction by lining up students in order of their sitting heights.				
	What tentative generalisation can you make about your data? How accurate was your original prediction?				
ACTIVITY: COUNTING	Key idea: Breathing is necessary for life.				
BREATHS	You will need:				
	• a watch or clock				
	• a stethoscope.				
	Count the number of breaths you take in one minute. What can you do to change your breath rate?				
	Find your pulse and count how many beats there are in one minute. Now put the stethoscope over your heart and count again. Is the answer the same? How can you change your pulse rate? How long does it take to return to normal, after you have increased or decreased it?				
	Record the pulse rates of the students in the class. Does pulse rate depend on age, or sex?				

ACTIVITY: MEASURING HAIR	Teaching note: Human hair varies in width from 40 to 120 microns (one micron = one-thousandth of a millimetre).Key idea: The thickness and strength of human hair varies with colour.			
	You will need:			
	hair of different colours			
	a magnifying glass			
	a yoghurt container			
	• metal washers.			
	Find a way of measuring the width of a human hair. Compare with the hair of other people in the room. Record your results.			
	Inspect hairs under a magnifying glass. Put them into groups. What keys could you use to classify hairs?			
	Are hair colour and eye colour related? How could you find out?			
	The strength of a hair can be measured by hanging a yoghurt carton with washers off it. Test the strength of different coloured hair. What colour hair is strongest?			
ACTIVITY: FINGERPRINTS	Key idea: Fingerprints are unique.			
	You will need:			
	• ink pads			
	• paper.			
	Using the ink pads, make a record of fingerprints. What similarities and differences can you find:			
	between people			
	between fingers			
	between thumbprints?			
ACTIVITY: Sketching	Key idea: Humans vary in each characteristic they have.			
FACES	You will need:			
	• a projector			
	butcher's paper			
	• drawing pens or pencils.			
	Sketch the faces of the students in the class and sort them into groups. What keys could be used?			

Use the projector to obtain a silhouette of a number of people—sketch each one. Then try to identify who is who.

ACTIVITY: GENETIC	Key idea: Some characteristics of parents are passed on to their children.				
DIFFERENCES	Compare:				
	• your ability to roll your tongue				
	right or left-handedness				
	which thumb dominates in clasping hands				
	• eye colour				
	• number of teeth.				
	How many in your class have the same ability? How many in your family have the same ability?				
ACTIVITY: WHOLE BODY	Key idea: The body contains organs that work together in systems.				
	You will need:				
	butcher's paper				
	• textas.				
	Get a student to lie on their back on a large piece of butcher's paper. Ask another student to trace around their outline with a texta. Then fill in the outline by drawing and writing in the major organs of the body in the correct locations.				
	Draw in and label the skeleton, inferring details from moving and feeling your bones.				
ACTIVITY: FINDING OUT	Key idea: Humans vary in each characteristic they have.				
ABOUT MYSELF	You will need:				
	• a stopwatch				
	• a metre rule				
	ten film canisters				
	a pack of playing cards				
	• a container of marbles				
	• graph paper				
	• an ink pad				
	• paper.				

Use the student worksheet that follows. Complete the tasks.

Student worksheet: Finding out about myself

My name is

My age in days is

Dominant thumb

Clasp your hands together so that the fingers on one hand are between the fingers on the other. Which thumb (left or right) is uppermost?

Now reclasp your hands so that your other thumb is uppermost. Does this feel as comfortable as before?

Your dominant thumb is the one that is uppermost when you clasp your hands together in the most comfortable way. My dominant thumb is ______

Dominant hand

Your dominant hand is the one you can do most things better with. For example, handwriting. What is you dominant hand

for handwriting? _____

Trial	Time for right hand	Time for left hand
1		
2		

Now, have your partner record the time it

takes you to write the numbers from one to twenty for each hand. Place your results in the table above. Do this twice for each hand. Is there a big difference in times between your left and right hands?

How do your results compare to those of your partner?

A person who can write fairly well with both hands is 'ambidextrous'. Was there anybody in the class you could describe as ambidextrous?

Reaction time

You will need a metre rule and a table to record reaction time versus distance conversion. The goal of this activity is to work out your reaction time. That is, the time it takes between you seeing something happen and you reacting to it. Follow the procedure below:

- 1 Hold a metre rule by the top out in front of you, with the 100 cm end at the top. Have your partner place their thumb and fingers on either side of the ruler at the bottom, without touching it. The partner needs to have their hand resting on the tabletop.
- 2 Let go of the ruler and have your partner catch the ruler as soon as you let it go. Record the mark in centimetres where your partner catches the ruler.
- 3 Convert the distance in centimetres to a time in seconds using the conversion table below.
- 4 Repeat this three times for both hands. Convert the distances into times and record in the table below.

		Left	hand	Right	hand
	Trial	Distance (centimetres)	Reaction Time (seconds)	Distance (centimetres)	Reaction Time (seconds)
	1		(,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,		
	2				
	3				

Did your reaction time improve with each new trial?_____ Why do you think this? _____

Are your reaction times around the same value for each hand?

Is there a connection between your dominant hand and your reaction times?

Conversion table: dropping distance and reaction times					
Dropping distance (centimetres)	Reaction time (milliseconds)	Dropping distance (centimetres)	Reaction time (milliseconds)		
1	45	26	230		
2	64	27	235		
3	78	28	239		
4	90	29	243		
5	101	30	247		
6	111	31	252		
7	120	32	256		
8	128	33	260		
9	136	34	263		
10	143	35	267		
11	150	36	271		
12	156	37	275		
13	163	38	278		
14	169	39	282		
15	175	40	286		
16	181	41	289		
17	186	42	293		
18	192	43	296		
19	197	44	300		
20	202	45	303		
21	207	46	306		
22	212	47	310		
23	217	48	313		
24	221	49	316		
25	226	50	319		

Dominant eye

Few people use both eyes equally. Unconsciously, they depend more heavily on one eye, which is known as the dominant eye. You can identify your dominant eye in the following way.

Use a sheet of paper to make a tube 3 to 4 cm in diameter, and look through it with both eyes at some object across the room. Keeping the tube steady, close first one eye, then the other.

Which is your dominant eye?

How do you know?

Is there a relationship between your dominant eye and dominant hand? Ask ten other students if their dominant eye is the same side as their dominant hand. What do you conclude? ______

Superimposed images

Since each eye receives a separate image, one function of the brain is to fuse these two images into a single image. Make a tube about 3 to 4 cm in diameter using a piece of paper. Hold the tube close to your left eye. Hold your right hand palm open and facing you next to the tube in front of your right eye. Keep both eyes open.

What do you see? _____

How can you explain this phenomenon?

Now hold your hands at arm's length, palms towards you and fingers touching but slightly spread. Look through the spaces between your fingers and focus on a distant object. How do your fingertips look?

Explain your observation.

Testing your thinking powers

The goal of this activity is to determine the time it takes to perform a number of tasks of varying difficulty. You will require a pack of cards and a stopwatch. Work in teams of two. One person performs the task and the other records the time.

Task 1: Shuffle the pack of cards. Hold the pack of cards with the face up for this task and all others. Deal the pack of cards into two piles (one card at a time), alternating between the piles. Record the time it takes to do this task._____

Task 2: Shuffle the pack of cards. Repeat the task, dealing into two piles (one card at a time), one pile with red cards and one pile with black cards. Record the time it takes to complete this task.

Subtract the result of Task 1 from Task 2 to obtain discrimination time.

Record this value.

My discrimination time is _____

Task 3: Shuffle the pack of cards. Now deal the deck of cards into four piles without regard to suit (i.e. hearts, clubs, spades and diamonds). Record the time to complete this task.

Task 4: Shuffle the pack of cards. Now deal the deck of cards (one card at a time) into four piles with regard to suit (i.e. one pile hearts, another diamonds, another spades and another clubs). Record the time._____

Subtract the time it took to do Task 3 from the time for Task 4 to obtain the discrimination time.

My discrimination time is ______ How does the reaction time differ for the four tasks? ______

Why are there differences?

How big are your hands?

You will need a container of marbles, and graph paper.

Place your hand flat (fingers closed) on graph paper and trace around the outside of your hand. Estimate the area of your hand (in square centimetres) by counting the squares inside the tracing of your hand.

The area of my hand is _______ square centimetres.

Now using just one hand, determine how many marbles you can hold in your hand.

The number of marbles I can hold is _____

Do you expect bigger hands to pick up more marbles?

Ask five other students their results. Is your answer to the previous question true?

Agility test

You will require ten film canisters and a stopwatch per pair of students. Place each of the film canisters in a line so that they each stand vertically with the lid on top. Have your partner find the time it takes for you to turn each canister (one at a time) upside down. You are to use only one of your hands. Repeat the task again. Now try it two more times using your other hand. Record your measurements in the table below.

Were your times for the left hand different from the times for your right hand?

Trial	Time for left hand	Time for right hand	Can you give any reasons why?
1			
2			

Fingerprints

You will need an ink pad. In the space below, use the ink pad to make a fingerprint of your thumb and several of your fingers.

The major features of a fingerprint are described as arches, loops, whorls or

composites (as shown in the figure below).

Are your fingerprints all the same?____

How would you describe your fingerprints? (Use the features described in the figure below.)



My fingerprints:

	The human senses Sight			
ACTIVITY: USING SIGHT	Key idea: Sight is our most important sense.			
	 You will need: 'feely' bags of objects blindfolds. 			
	Explore objects with and without sight. A good way to do this is by using 'feely' bags or boxes containing the objects, or by blindfolding students.			
ACTIVITY: FISH IN THE	Key idea: The brain combines the images it receives from each eye.			
BOWL	 You will need: two pieces of cardboard a stick sticky tape or glue. 			
	Draw a fish on one piece of cardboard and a bowl on the other. Join the two pieces of cardboard together with the stick in between. By rapidly rubbing the stick back and forwards between your hands, the fish should appear to be in the fishbowl.			
	Explanatory note: We retain images of things we see for a short amount of time before a new image is processed. Spinning the stick provides the eye with a series of images that the brain combines into one image.			
ACTIVITY: Lining up two	Key idea: Having two eyes is necessary for judging depth.			
OBJECTS	You will need: • two pencils.			
	Hold a pencil in each hand in front of you. Now, close one eye, and see if you can bring the pointed ends of the pencils together. Now try the same thing again but with both eyes opened. What did you find? Now change the background to another colour or pattern. Does this change things?			
ACTIVITY: COLOUR	Key idea: People with colour blindness can't distinguish between certain colours.			
VISION	You will need:			
	colour vision test books.			
	See if you can read the numbers and letters in colour vision test books. Assess yourself or other students if they are willing.			
	Explanatory Note: Different types of vision cells are present in the retinas of our eyes. Some cells react to colour (for daytime viewing) and others react to shades of grey (for night-time viewing). There are three types of colour vision cells. Each react to red, green and blue. However, for some people the same colour vision cells react to different colours. Red–green colour blindness is the most common issue			

among colourblind persons.

	Hearing
ACTIVITY: SINGING IN A	Key idea: The bucket acts like an echo chamber to enhance the sound.
BUCKET	You will need:
	• a bucket.
	Sing into a bucket. What can you hear? Why does it sound so loud?
	Explanatory note: The reflected sound from the bucket (echoes) adds to the incoming sound to make a louder sound.
ACTIVITY: Tapping up to	Key idea: We use two ears to locate where sounds come from.
A WALL	You will need:
	• a blindfold
	• a stick or a metre rule.
	Blindfold a student and give them a stick or metre rule to tap the ground. Point them in the direction of the wall and ask them to listen to the tapping sound the stick makes. Does the tapping sound change as the student gets closer to the wall?
	Explanatory note: As you get closer to the wall, the sound you produce at the floor reaches your ears in addition to the sound that is reflected off the wall. There is a slight delay between receiving the direct sound, and the reflected sound, so each tap on the floor will sound a little longer. Theatres are designed to make sounds come to the audience as well as reflect off barriers. This increases the quality of the sounds made by the performers or the musical instruments on the stage.
ACTIVITY: LOCATING	Key idea: We use two ears to locate where sounds come from.
SOUNDS	You will need:
	• a blindfold
	• a stick or a metre rule.
	Blindfold a student, and get them to identify the direction from which tapping sounds appear to come. Try with one and then two ears. What is the advantage of having two ears?

Explanatory note: We have what is called 'binaural' hearing. This means we hear with both ears. This helps us to determine the direction of the sound source. A source to the left of you will produce sound that reaches your left ear before it reaches your right ear. The brain interprets this time delay as a sound source to your left. Incidentally, you can't, using just your hearing, determine whether a sound is coming from directly in front of you or directly behind. Try your own experiment.

ACTIVITY:Key idea: We use the sense of hearing to understand interactions we have in the
world.A TINWorld.

You will need:

- tin cans with lids
- rice
- beads
- blocks and other small, common objects.

Place different objects (e.g. rice, beads, blocks, etc.) into different tins with lids. See if you can determine what is inside the tins simply by shaking them.

Smell

ACTIVITY: RECOGNISING SCENTS **Teaching notes:** Students commonly think that the scent or odour they smell is something different to the matter that makes up the source of the scent or odour. If you smell perfume, then actual perfume particles are entering your nose and activating smell (olfactory) receptors. These are connected to nerves which lead to the brain.

Key idea: The odours or scents we smell are small pieces of the source of the odour or scent that go up our nose.

You will need:

• small unlabelled containers that contain various scents (essential oils such as peppermint, jasmine, rose, lavender, etc., or you could use camphor, cinnamon, rosemary, basil, pepper, etc.).

See if you can pick what the scents are in four unlabelled bottles.

Skeletons and bones

Children are naturally interested in skeletons and bones. Such interest is a great resource that you can use in the classroom.

The following activities will help students to develop skills in:

- classifying
- drawing
- inferring
- measuring.

ACTIVITY: **Teaching note:** A great deal of insight can be gained from allowing students to ask questions, from finding out what they know, and don't know, about a topic, and tapping into their areas of interest.

These are examples of questions asked by primary students:

- How much pressure can bones take without breaking?
- What's inside bird's bones?
- What's inside bones?

- What are bones made of?
- How many bones are there in a human skeleton?
- Do spiders have bones?
- Which insects have bones?
- How do joints work?
- What living things do not have bones?
- What makes bones grow?
- How many bones do fish have?
- Do head lice have bones?
- Which is the thickest bone in your body?
- What keeps the backbone together?
- What happens when you dislocate a bone?
- What points do jaws have?
- Do snakes have bones?
- What is the weakest bone in your body?
- How do you know when a bone is broken?
- Do snails have bones?
- How do babies' bones come together?
- Do bones ever wear out?
- How do all of your bones grow at once?
- How many bones do birds have?
- How do broken bones 'stick' back together again?
- What use is cartilage?
- Are your teeth bones?
- Why does a nose have cartilage instead of bone?
- How many ribs do you have?

Questions may also arise after getting students to look at pictures and a human skeleton model.

For example, the following questions were asked by primary school students:

- Why are there cracks on the skull?
- Which animal has the fewest bones in its skeleton?
- How many bones in a skeleton of a human being?
- How long does it take the flesh to go off the skeleton?
- Why doesn't the heel part, which sticks out, show up on your skin?
- How can you tell if a skeleton is a girl or boy?
- What happens to the eyes when a person dies?
- How many bones are there in the spine?
- How come there is no nose on the skeleton?
- Which part of the body has the smallest bones?
- What happens to the skin?

Key idea: Bones have a number of functions. They allow us to move, they protect our organs, and they give us shape.

You will need:

- a model skeleton
- pictures of bones.

Think up questions you would like to know about bones.

ACTIVITY: FUNCTION OF SKELETONS **Teaching note:** The following answers were given by primary-school students for reasons why animals have skeletons:

- Support
 - Because if they didn't they'd be all jelly and wouldn't be able to stand.
 - To hold their bodies together in place.
 - If they didn't have a skeleton they would go plop!
 - To hold them up.
 - Keeps most of the body stronger.
 - To hold the body in shape.
 - If they were wool they would look like a rug because they would collapse.
 - To help them stand up.
- Movement
 - Because if they didn't have a skeleton they wouldn't be able to move around.
 - They would not be able to walk.
 - To help them bend.
- Protection
 - To help protect them when they have a hard fall.
 - To protect organs of the body.

Key idea: Skeletons have three functions: giving the body shape, assisting in movement, and providing protection for internal organs.

You will need:

- a model skeleton
- pictures of skeletons and animals.

Why do animals have skeletons?

ACTIVITY: WHAT'S IN A	Key idea: Your hand contains many bones connected by joints.
HAND?	You will need:
	• a sheet of paper and pens.
	Trace around your hand and wrist, fingers outstretched, on a sheet of paper. Feeling the bones of your hand carefully, draw the bones inside your outline.
ACTIVITY: MODELLING	Key idea: Your hand contains many bones connected by joints.
BONES	You will need:
	• modelling clay.
	Model the bones in one or more of your fingers, using modelling clay.
ACTIVITY: How your Hand works	Key idea: Bones connect together through joints. Muscles are attached to bones to allow the hand to move and grip.
HAND WORKS	Write a brief description of how your hand 'works' (stays together, grips, etc.)
ACTIVITY: Your head	Key idea: Your neck contains a series of connected bones called 'vertebrae'.
AND NECK	You will need:
	• paper and pens for drawing.
	Have a partner draw an outline of your head and neck in profile. Fill in your skull and neck bones.
ACTIVITY: DRAWING A	Key idea: Your skeleton consists of many connected bones.
SKELETON	You will need:
	• a body outline on a sheet of A4 paper.
	• a model skeleton.
	Draw a skeleton within the body outline. Make it as complete as you can. Compare your drawing with the model skeleton. How did you go? Correct any errors you have made on your diagram.
ACTIVITY: SKELETON	Key idea: The skeleton consists of many connected bones.
JIGSAW	You will need:
	• a skeleton puzzle sheet, as shown below.
	• scissors
	• sticky tape.
	Cut out the pieces of the skeleton and see if you can piece the skeleton back together

properly. Stick the pieces in place once you have put the jigsaw together.



ACTIVITY: JOINTS Key idea: Joints are devices that connect bones.

You will need:

- finger splints
- sticky tape.

Carry out the following activities in the table below:

- 1) with a splint taped to your forefinger
- 2) with a splint taping two of your fingers together
- 3) with your thumb taped to your palm.

Predict which of these activities you could do, record your prediction, test and record your observations. How did you go?

Action	Trial	Prediction	Observation
Do up a button.	1		
	2		
	3		
Trace a line.	1		
	2		
	3		
Turn a page.	1		
	2		
	3		
Use a pair of scissors	1		
50155015.	2		
	3		
Pull out a drawing pin from	1		
a board.	2		
	3		
Thread a needle.	1		
	2		
	3		
Turn on a tap.	1		
	2		
	3		
Write your name.	1		
	2		
	3		
Hold a mug.	1		
	2		
	3		

Comb your hair.	1	
	2	
	3	
Tie up shoelaces.	1	
	2	
	3	
Do up a buckle.	1	
	2	
	3	
Take coins from	1	
a purse.	2	
	3	
Play marbles.	1	
	2	
	3	
Do up a necklace.	1	
	2	
	3	
Pick up a teaspoon of sugar.	1	
	2	
	3	
Undo a screw lid.	1	
	2	
	3	
Hold a racket.	1	
	2	
	3	

ACTIVITY:**Teaching note:** Probably one of the best sources of bones is the countryside where
animals have died, the carcasses have rotted and the bones have been bleached by
the weather. Some bones may be obtained from the butcher (sheep bones seem an
appropriate size for primary school children to handle).

Children should be encouraged to collect, display and classify bones of various kinds. Sorting trays are useful for this purpose to keep bones safe and intact. These can be improvised from cartons, boxes or household trays. For those bones that children may not be able to identify, a 'mystery box' can be provided.

Key idea: Bones have a hollow centre.

You will need:

- a collection of animal bones
- plasticine.

Make a plasticine model of one of the bones. Will it be heavier or lighter than the actual bone? Try it. What is the result?

ACTIVITY: **Key ideas:** Animal bones can vary in shape. The shape of the bone assists the animal in some way (e.g. to move a limb, protect an organ and/or provide shape). BONES

You will need:

- a collection of animal bones
- a system of classifying bones, such as in the table below.

One system of classifying bones		
Long bones	have distinctive shaft and a slight curve to help them support a load better than if they were perfectly straight.	
Short bones	are about as wide as they are long.	
Irregular bones	are irregular in shape.	
Flat bones	are basically flat in shape but do not curve.	

Try to use this classification on the bones in your collection. Is it a classification you can use?

 ACTIVITY:
 Key idea: Animal bones can vary in shape.

 DESCRIBING
 ANIMAL BONES

 ANIMAL BONES
 You will need:

 •
 a collection of animal bones.

 Select one bone from the collection and write a description of it. See if someone can use your description to choose the bone you have described. Would you change your description in any way? How?

 ACTIVITY:
 Key idea: Animal bones can vary in shape.

 DRAWING
 You will need:

 •
 a collection of animal bones.

Draw a different bone from the collection (than you described previously) and then see if someone can use your drawing to choose the bone you have drawn. Was your drawing effective for this purpose? Why?

ACTIVITY:Key idea: The bones of an animal form an interconnected system to protect organs,
enable movement and give shape to the animal.DISPLAYImage: State of the system to protect organs,
enable movement and give shape to the animal.

You will need:

• an animal skeleton, or a collection of skeletons.

What can you tell about

- how the animal moved
- what the animal ate
- other aspects of the animal's lifestyle?

ACTIVITY:Key idea: The bones of an animal form an interconnected system to protect organs,
enable movement and give shape to the animal.ANIMALANIMAL

Design an animal that lives in a swamp on a planet where gravity is weak, and that eats plants only.