

Lesson Plan

NEUROHEADWAY

Neuroscience Into Education

At the end of the module, the students are expected to be able to:

- Feel with their own fingers some superficial bones
- Describe the shape of some of these superficial bones
- Classify bones according to their shape
- Correlate the functions with the shapes of bones

One-hour lesson plan:

Slide	Activities	Description	Time (min)
	Introduction	-Teacher talks about the learning outcomes -Teacher talks about why knowing the shapes of the bone can help understanding their functions	5
	Activity 1	-Aims: let students practice feeling a very superficial bone using their fingers; discover the shape of some of the bones in our limbs -Teacher guide them in the following task(s). Students work individually [a: task for lower ability students in the allotted time; a+b: task for most students in the allotted time; a+b+c: task for gifted and talented students in the allotted time] a. Put your index and middle fingers of one hand on the front of the leg (also called the shin; either left or right shin is fine). Press lightly on the skin of the shin. The pressure on the skin should be light and not cause any discomfort on the shin or the fingers at any time. Move the fingers up and down, left and right, dragging the skin under the fingertips. When you do so, your fingertips should feel the hard surface of the bone just under the skin. This method of feeling the shape and consistency of structures (a bone in this case) deep to the skin is called palpation. Now palpate along the whole length of the shin. What is the shape of this bone in the shin? b. Palpate along the back of the forearm. What is the shape of the bone under the skin there? c. Palpate along the top of the front of the chest, at the base of the neck. Start from the midline, and move out horizontally. At no time should be pressure of the finger cause any discomfort.	10
	Discussion	a. The bone in the shin is tibia. It is long and straight. It is thus a long bone. b. The bone in the forearm is the ulna. There are two bones in the forearm: radius and ulna. Radius is usually covered by a lot of muscles and is not easy to palpate. Ulna however is usually just under the skin. It can be felt to extend all the way from the elbow to the write. It is again a long bone.	5

		c. The horizontal bone in the top of the chest is the clavicle (the collar bone). It is also a long bone, but it is not as straight as the tibia and ulna. It is in fact s-shaped. -These long bones are all in the limbs. Even the clavicle is part of the shoulder. Their function is to support and movement of the limbs and the body. Muscles are attached to them, so that the limbs and the body can move.	
	Activity 2	-Aims: discover the shapes of other bones in the body; classify bones according to their shapes -Teacher guide them in the following task(s). Students work individually [a: task for lower ability students in the allotted time; a+b: task for most students in the allotted time; a+b+c: task for gifted and talented students in the allotted time] a. Palpate the skull underneath the scalp. Knowing that the brain is situated inside the skull, describe the shape of these skull bones. b. Palpate the back of the hand. Find out the shape of the bone connecting the wrist to each of the 5 fingers. c. Palpate the heel. Describe the shape of the bone inside the heel.	10
	Discussion 2	a. The skull is made up of many bones. Many of them, especially those under the scalp, are flat, in contrast to the long bone students palpated in activity 1. They serve mainly to protect the important organ (i.e., the brain) inside. The joints between their skull bones are not mobile, except for the bone between the upper and lower jaw bones (that's why we can open and close our mouth). b. For each finger, there is a palm bone (called metacarpal) connecting the wrist to the base of that finger. It is shorter than the long bones students palpated in activity 1. Therefore they are called short bones. The teacher can ask students why they cannot be palpated in the palm (because of the many muscles and tendons covering these metacarpals in the palm, while in the back of the hands, there are no muscles and the tendons are thinner). c. The bone in the heel is called the calcaneus (the heel bone). It is irregular in shape, unlike the other bones students have palpated so far. -In managing this part of the class, the teacher needs to see if there are gifted and talented students, who will be able to complete task a, b, and c. If there are none, the teacher may need to give a little more time to the whole class, so that at least some students will complete task c (in addition to a and b). The aim is have at least a few students completed task c, so that the class can discuss irregular bone after completing the activity.	5

		-So far, students should have seen long, short, flat and irregular bones. This is one way of classifying the bones in the human body, i.e., based on their shape. -The shape of the bones is related to their functions. Long and short bones are usually for movement, e.g., the tibia, ulna, and metacarpals. Flat bones are usually for protection of internal organs, e.g., some bones of the skull, the sternum (chest bone), and the ribs. Irregular bones can have a mix of functions. For example, the vertebrae is for support and movement, as well as for protection of the spinal cord running through them.	
	Activity 3	-Aims: find out that bones are joined together at joints. -Teacher guide them in the palpating the following parts of the body and in finding out how many bones are inside (s). Students work individually [a: task for lower ability students in the allotted time; a+b: task for most students in the allotted time; a+b+c: task for gifted and talented students in the allotted time] a. Index finger b. Thumb c. Forearm	10
	Discussion 3	a. 3 bones: they are called the proximal phalanx (the bone is in the segment closest to the palm), the distal phalanx (at the end of the finger), and the middle phalanx (between the proximal and distal phalanges). They are joined together at mobile joints. Identifying these joints help us to tell where a bone ends and another starts. b. 2 bones: they are called the proximal and distal phalanges. There is no middle phalanx. The evidence is that there is just one joint (unless other fingers, where there are two). c. 2 bones: apart from the ulna, which some students have palpated, there is another, i.e., the radius, much of which is covered by muscles. Can show an X-ray here.	5
	Summary	Summary Through activities 1 to 3, students learned to -feel with their own fingers some superficial bones: they learned to palpate superficial bone -describe the shape of some of these superficial bones: the long and straight tibia and ulna, the long and curved clavicle, the flat skull bones, the short palm bones, and the irregular heel bone -classify bones according to their shape: long, short, flat, and irregular bones -correlate the functions with the shapes of bones: long and short bones for support and movement; flat bones for protection of internal organs; irregular bones have mixed function	5

Power point Example

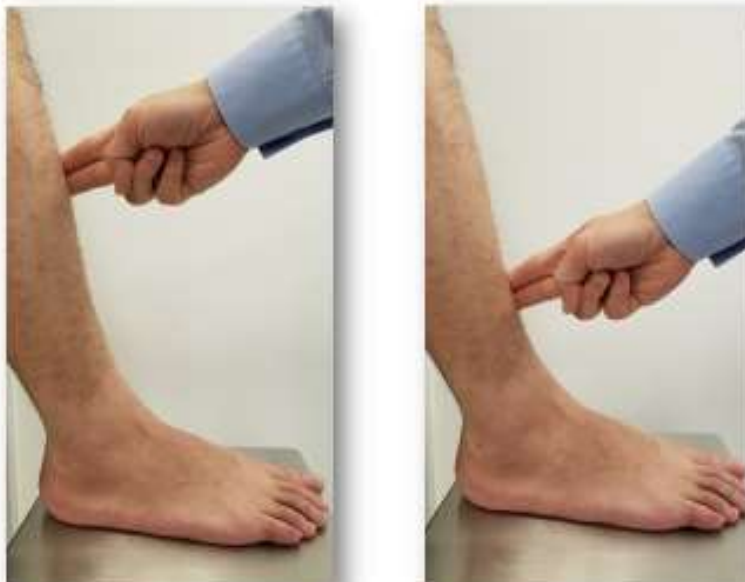
NEUROHEADWAY

Neuroscience Into Education

Activity 1: Feel a bone under the skin

- Put your index and middle **fingers** of one hand on the front of your leg (the shin).
- Press **lightly** on the skin of the shin (should not cause discomfort).
- Move the fingers up and down, left and right, dragging the **skin** under the fingertips.
- Your fingertips should **feel** the hard surface of the bone just under the skin.
- This is called **palpation**.
- Now palpate along the whole length of the shin.
- What is the shape of this bone in the shin?

Activity 1: Feel a bone under the skin



Activity 1: Feel a bone under the skin

-If you have time after finishing the shin, try the same method on the back of the **forearm**. What is the shape of the bone that you can palpate there?



Activity 1: Feel a bone under the skin

-If you still have time after the shin and the forearm, palpate the **collar bone** (at the base of the neck in the front). How is the shape of this bone different from that of the one in the shin and the forearm)?



Discussion 1



The shin bone
(tibia)



The forearm bones
(ulna and radius)



The collar bone
(clavicle)

Activity 2: Describe shapes of bones

- Palpate the bones underneath the **scalp**. What is the shape of these bones (remember that the brain is deep to these bones)?

