**Chapter 2: Our Skeletal System**

**LEARNING OUTCOMES**

At the end of this lesson, learners will be able to:

* **describe** the various parts of the human skeleton.
* **explain** about joints, their positions and functions.
* **recognise** the importance of muscles and bones.
* **learn** to take care of bones and muscles.

**Recap Time**

Write whether the given organs are external or internal. Write one function of each to complete the table.

| **Organ** | **External/Internal** | **Function** |
| --- | --- | --- |
| Heart | Internal | Pumps blood in the body |
| Lungs | Internal | Helps in breathing |
| Stomach | Internal | Helps digest food |
| Eyes | External | Help see things |
| Bones and Muscles | Internal | Give shape to the body |
| Legs | External | Help walk |
| Ears | External | Help hear |

**Let’s Start**

**Observe the given pictures that show how a wooden toy is made.**

In order to make this toy, first a frame was made.  
The frame was made of sticks and thread. Once the frame was ready, it was covered with paper. The paper was glued to the frame and allowed to dry. It was then painted and the toy was ready.

**Think and discuss:**

* What gives the toy its shape?
* What makes the toy stand erect?

**Vertebrates and Invertebrates**

Many animals have a framework of bones inside their bodies. This framework of bones is known as **skeleton**. The bones are arranged inside the body in a definite manner.

Animals that have a framework of bones are called **vertebrates**.  
All kinds of fish (sharks and goldfish), amphibians (frogs and toads), reptiles (snakes and lizards), birds (sparrows, crows) and mammals (lions, dogs) are vertebrates.

Animals that **do not have a framework of bones** are called **invertebrates**.

**Skeleton and Shape of an Animal’s Body**

The shape of an animal depends on its skeleton. We can recognise an animal by its skeleton. For example, all elephants have the same kind of skeleton. Similarly, all ostriches have exactly the same kind of skeleton. The size of the skeleton varies according to the age of the animal.

*Most of the knowledge we have about dinosaurs is from their skeletons, which were dug out from various places.*

**The Human Skeleton**

The human skeletal system is a framework of bones. Bones are hard on the outside. The inner portion of a bone is filled with a spongy bone marrow. Red blood cells and white blood cells are produced inside the bone marrow. There are **206 bones** in an adult human skeleton. However, the size of the bones differs. A tall person has longer bones, while a shorter person has shorter bones.

The skeleton has three main functions:

* It **supports** the body and helps it maintain its shape.
* It **protects** the internal organs of the body.
* It **helps** the body to move.

*Bones have nerves and are richly supplied with blood vessels.* (Myth or Fact)

**In Class**

**Tick (✓) the true statements. Cross (✗) the wrong ones.**

1. Bones are soft structures. ✗
2. The total number of bones in an adult human skeleton is 200. ✗
3. Blood cells are produced in the bone marrow. ✓
4. The human skeleton protects internal organs. ✓

**Parts of the Human Skeleton**

**Skull**

The bony framework of the head is called the **skull**. It is made up of several flat, extremely hard and strong bones. These bones join with each other to form an immovable shell. Except for the lower jaw, all bones in the skull are fixed. The movable lower jaw enables us to talk and eat. The upper jaw and the lower jaw have teeth.

The extremely strong skull bones protect the brain, eyes, tongue and the inner parts of the ears.

**Vertebral Column**

We are able to bend our back because it has a strong, flexible column of bones. This column of bones in our back is called the **vertebral column** or spine. The vertebral column is a hollow tube-like structure made up of 33 bones. Each of these bones is called **vertebra**.

The spinal cord passes through the vertebral column. The spinal cord is a part of our nervous system. The vertebral column protects the delicate spinal cord. This strong, flexible column of bones also protects our head from shocks and jerks as we walk, run or jump.

*Locate the vertebral column — feel the central part of your back.*

**Rib Cage**

The rib cage is an enclosed structure of bones present in the chest region. Several flexible, curved bones called ribs join the sternum at the front and the vertebral column at the back to form the rib cage. The sternum is the long bone present at the centre of the chest. The human skeleton has twelve pairs of ribs. The rib cage protects the lungs and heart.

**Bones of Arms and Legs**

Each arm and leg has **three long bones** and several small bones. The long bones of the arms and legs are hollow, tube-like structures. These bones are light yet extremely strong and are able to hold weight and tolerate pressure. That is why we are able to carry our own weight and lift additional weight and walk.

*The thigh bone, called the femur, is the longest bone in our body. The smallest bone in our body, called the stirrup, is in the ear. It is as small as a rice grain.*

**Joints**

A **joint** is formed where two or more bones meet. Strong and elastic tissues, called **ligaments**, connect the bones at the joints. Most joints allow movement. We can move our body parts at the joints. Such joints are called **movable joints**. Joints that do not allow any movement are called **immovable joints**. For example, the bones in the skull.

**Types of Joints:**

* **Ball and Socket Joint:** Allows movement in every direction. The shoulder and the hip joints are ball and socket joints.
* **Hinge Joint:** Found in elbows, knees, fingers and toes. Allows back and forth movement.
* **Pivot Joint:** The first vertebra and the skull bone form a pivot joint. The neck moves due to the pivot joint. It allows side-to-side, back and forth movement and rotation.
* **Gliding Joints:** Wrists and ankles have gliding joints that enable sideways and back and forth movement. Gliding joints between vertebrae allow them to slide against each other.

**Study Skills**

**Remember the following:**

| **Joint Type** | **Example** |
| --- | --- |
| Ball and Socket | Shoulder, Hip |
| Hinge Joint | Elbows, Knees, Fingers, Toes |
| Pivot Joint | Neck |
| Gliding Joints | Wrists, Ankles |

**Muscles of the Body**

Bones and joints alone cannot make body parts move. The **muscles** and bones work together to move the parts of the body.

We have muscles all over the body. The body has a few hundred muscles. Muscles and bones impart shape to the body. To hold something in our hand, the muscles and bones of our fingers have to move. It is not possible to move a part of the body if a muscle or the bone of that particular part is injured.

Muscles are attached to the bones with the help of strong, tough tissues called **tendons**. Muscles contract and relax in order to make the bones move. They usually work in pairs — one muscle contracts (pulls) while the opposite muscle relaxes.

The muscles present at the front and rear side of the upper arm help with its movement. When you bend your arm, the front muscles contract (become short and thick) and the rear muscles relax (become long and thin). When the arm is moved downwards, the front muscles relax and the rear muscles contract.

**Healthy Bones and Muscles**

Proper food and regular exercise keep the muscles and bones healthy. When we play, we exercise our muscles and bones. That is why we must play outdoor games regularly.

Food items such as bean, gram, green gram, milk, cheese, wheat, eggs and fish are good for the muscles and bones. We must also eat all kinds of vegetables and fruits to keep our body healthy. Sunlight is good for bones and muscles.

**Keywords**

* **Bone marrow:** Spongy substance inside bones where red and white blood cells are produced.
* **Ligament:** Elastic tissue that connects bones at the joint.
* **Rib cage:** Enclosed bony structure in the chest.
* **Skeleton:** Framework of bones inside the body of animals.
* **Skull:** The bony framework of the head.
* **Tendons:** Strong tissues that attach muscles to bones.
* **Vertebrates:** Animals that have a skeleton made up of bones.
* **Vertebral column:** Flexible column of vertebrae protecting the spinal cord.

**Mind Map**

**OUR SKELETAL SYSTEM**

* **Parts:**
  + Skull
  + Vertebral Column
  + Rib Cage
  + Bones of Arms and Legs
* **Joints:**
  + Ball and Socket Joint (Shoulder, Hip)
  + Hinge Joint (Elbows, Knees, Fingers, Toes)
  + Pivot Joint (Neck)
  + Gliding Joints (Wrists, Ankles)

**Exercises**

**I. Write one word for each of the following:**

1. The framework of bones inside an animal: **Skeleton**
2. The region where the rib cage is found: **Chest**
3. The longest bone in the human body: **Femur**
4. Elastic tissue that holds bones at the joints: **Ligament**
5. Strong tissues that attach muscles to bones: **Tendons**

**II. Tick (✓) the correct options**

1. Joints of the fingers, elbows, knees and hips are: **Movable**
2. The skull protects the: **Brain, eyes, ears**
3. The joint at the knee is a/an: **Hinge joint**
4. The movable bones of the skull allow us to: **Eat and talk**
5. Number of pairs of ribs in human skeleton: **12**
6. Movement of the neck is due to: **Pivot joint**

Here’s the **extracted text** from the last 2 pages you attached — continuing **Lesson 2: Our Skeletal System** for easy copy-paste:

**EXERCISES (Continued)**

**III. Answer the following questions in one sentence**

1. What are vertebrates?
2. Where in the bone are blood cells formed?
3. What does the rib cage protect?
4. What is an immovable joint?
5. Where can we find the pivot joint?
6. How do muscles and bones help the body?

**IV. Describe the following in four to five sentences**

1. The human skeleton
2. The human vertebral column
3. The ball and socket joints of the skeletal system

**Think and Answer — Higher Order Thinking Skills**

1. Why do legs and arms have large tube-like bones?
2. The vertebral column is not made of a single bone. Why?
3. Why should we play outdoors every day for some time?
4. We cannot move our leg if the muscle or the bone of the leg is injured. Why?
5. ✅ Tick (✓) the correct posture and cross (✗) the wrong one.

[The image shows correct and incorrect sitting postures for good bone health.]

**Do-it-yourself Project**

**Human Skeleton**

Make a model of the human skeleton using sticks.

* Cut the sticks into different sizes to represent skeleton bones.
* Paste the pieces on a black card paper to represent different parts of the skeleton.
* Draw a human skull and paste it at the top of the spine.
* The skeleton is ready!
* You can place the arms and legs in different positions to create a dancing or a walking skeleton.

**Self-assessment**

**Tick (✓) the correct column**

| **I can…** | **Yes** | **No** | **Need help** |
| --- | --- | --- | --- |
| 1. List the functions of the human skeletal system. |  |  |  |
| 2. List the parts of the skeletal system and explain their functions. |  |  |  |
| 3. Discuss about different types of joints. |  |  |  |
| 4. Explain how muscles work. |  |  |  |
| 5. List ways by which we can have healthy bones and muscles. |  |  |  |
| 6. Follow instructions to do the activities. |  |  |  |
| 7. Answer contextual questions correctly. |  |  |  |