

Grade 5 Science
Week of November 23 – November 27

Musculoskeletal System

Introduction

Living things support and move their bodies against the pull of Earth's gravity in many different ways. Tree trunks, lobster shells, floating lily pads and snake backbones all represent different solutions to this problem.

An animal's support structure depends upon the size and shape of its body and also the environment in which it must live. Support structures can be inside (internal) or outside (external of the body). In this unit, we will focus on the **internal support structures** of the human body, the **skeletal system**, and the **muscular system**.



Before you become a musculoskeletal expert, check out the video below for a quick introduction to this system: <https://youtu.be/ynVRDsDC-84>

Skeletal System



Every single person has an **endoskeleton** made up of many bones. These bones give your body structure, let you move in many ways, protect your internal organs and much more.

The average adult human body has **206 bones** which make up their **skeletal system**. Did you know that on average your skeleton comprises **30-40%** of your body weight? That's a lot for one system!

If you have ever seen a skeleton or a fossil in a museum you might think that all bones are dead. Although the bones in museums are dry, hard, and crumbly the bones in your body are different. The bones that make up your endoskeleton are all **very much alive, growing and changing** all the time like other parts of your body. Your skeletal system has several different functions. Here are the **3 main functions** of this system:

Three Main Functions of the Skeletal System

1. **Movement:** The skeletal system provides points of attachment for muscles. Your bones make it so that you aren't just a blob on the ground that can't go anywhere!
2. **Protection:** Your bones protect your delicate organs. For example, your skull protect your brain and the ribs protect your lungs and heart from injury.
3. **Make Blood:** Red and White blood cells are made from bone marrow, which is found in the center of the bone.



Bones: Fun Facts



Did you know that human babies are born with more bones than an adult? Human babies have more than **270 bones**. Human adults have **206 bones**. What's the reason for the difference? Many baby bones **fuse together** (join together) as they develop and grow to **become one single bone**. Bones will stop growing in length during puberty.

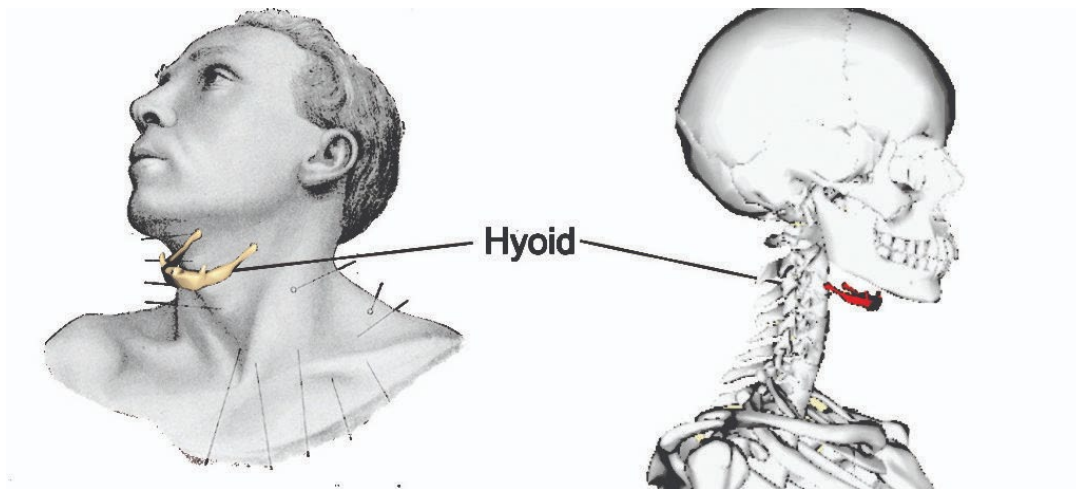
More than half of the 206 bones found in an adult human can be found in the **limbs** (the arms and legs) and most of these are in the **hands and feet**. Out of all of these bones can you take a guess where the biggest bone and the smallest bone might be located?

The **biggest bone** (in length) in a human body is called the **femur**. This is the long bone found in your **thigh**.

As for the **smallest bone**, well there are actually 3 bones! These bones are called **the ossicles** and they are found in the **middle of your ear**. Look at how small they are compared to a penny!



All of the bones in your skeletal system are **connected together** so that they can give your body support and work as a team. However there is actually **one bone in the human body that isn't attached to all of the others!** This bone is called **the hyoid** and it is found at the top of your throat. Its job is to **keep your tongue in place!**

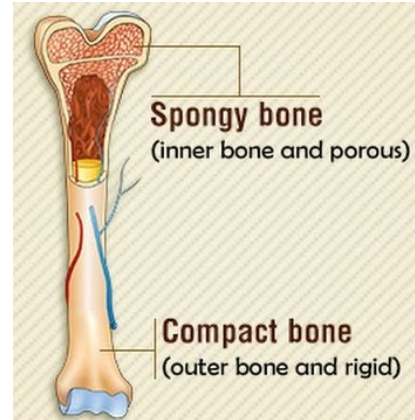


Structure of Bones

Bones come in many different shapes and sizes, but no matter what they are all made of the same materials. **Bones are actually organs!** Crazy right? But an organ is considered anything in your body that is **made up of two or more types of tissues**.

The two main types of bone tissue are **compact bone** and **spongy bone**.

- **Compact bone** is the outside part of a bone. This tissue is dense (compact, hard) and protects the spongy bone.
- **Spongy bone** is found at the center of the bone. This tissue and is lighter and more porous (not dense).



Remember one of the main functions of bones is to **produce blood cells**. In the circulatory system unit, you learned about red blood cells, white blood cells, and platelets; which are all found in the blood that circulates through your system. **Bone marrow makes these blood cells!** Your bone marrow is found in **the middle** of most of your bones, and it changes colour as your grow older!



Check out this video to learn more about bone marrow. Make sure you follow along in your learning guide! <https://youtu.be/9DuAU9QE3T8>

Broken Bones

Have you ever broken a bone? Ouch, they are not a fun experience! When you break a bone it's called a **fracture**. When you fracture a bone, you will end up going to the hospital to get a cast put on (usually). But this cast is not what heals your bone, it just helps keep everything in place while your body goes to work healing itself! Pretty cool. It can take as long as a few months for a broken bone to be fully healed and as strong as it was before the fracture.



Check out this video to see how your body fixes a fracture: <https://youtu.be/bkheTYBXI-U>

So how do bones break? Fractures can happen in many different cases, but they usually happen from falling or playing sports. Weak, brittle bones can break easier, so it's important that you do your best to keep your bones healthy and strong! Here are some things you can do to maintain your bone's health:

1. Calcium-rich food: Calcium is a mineral that is really important to many parts of our body! In terms of bones though, calcium keeps your bones healthy by building them and maintaining their strength. Over 99% of the calcium in your body is found in your bones!

- What are some calcium-rich foods you can eat? Yogurt, milk, tofu, beans and leafy greens are just some of the foods that will help your bones stay strong!

2. Vitamin D: Vitamin D is calcium's best friend! This amazing vitamin helps your body absorb calcium. Even if you're taking enough calcium, it would be going to waste if you weren't taking enough vitamin D!

3. Stay active: make sure that you are getting at least 30 minutes a day in physical activity. Stay active when you're young because it's much easier to be active when you are older if your body is used to consistent physical activity!



Types of Joints

Joints are where **two or more bones meet**. They make the skeleton flexible — without them, the movement would be impossible! If the joint is where 2 bones meet, it is called a **simple joint**. Your elbow would be an example of a simple joint. If it is a joint where 3 or more bones meet, it is called a **compound joint**. Your knee would be an example of a simple joint.

All joints are classified by their **range of movement**.

- **Immoveable:** Joints that don't move. An example is a skull.
- **Partially moveable:** Joints that move a little bit. An example is the elbows. Elbows can move up and down, but not side to side. This joint has a hinge-like the one that allows you to open and close a door.
- **Freely moveable:** Joints that move in many directions. These are the main joints in your body! An example is the shoulders. Your shoulders can move in all directions, roll around, move them side to side, up and down!

Muscles

Your bones cannot do much to move your body without muscles attached to move them. So now that we've talked about the skeletal system and its functions, let's talk about the **muscular system** and how it contributes to the form and movement of the human body.

Did you know that you have over **600 muscles** in your body? You control some of your muscles while others, like your heart, do their job without you thinking about them at all. Muscles are all made from the same material, a type of elastic tissue that's similar to a rubber band.

Muscles contract or get shorter and pull whatever they are attached to, closer together. They move your body by **pulling on the bones**. Together they form the muscular system.



Bones and Muscles



Check out this video to see how **muscles and bones work together to move** your body:

<https://youtu.be/FVlpeUlpFf0>

Tendons

So now you know how closely muscles and bone work together to help you move. But how are muscles and bones connected? With **tendons**!

Tendons are **tough bands of tissue** that connects muscles to bones. Tendons are kind of like really strong elastic bands. They can hold an incredible amount of weight without breaking! How strong are they *really*?



Check out the experiment in this video: <https://youtu.be/8zp7LIDFfak>

Voluntary or Involuntary

Some muscles in our bodies are **under our conscious control** while others contract without our knowledge or control.

Voluntary muscle is the ones that you can control. Most of them move your bones around. If you want to run, walk, ride a bike, wave your arms around, or eat your favorite sandwich, it is your voluntary muscles that you are using.

Involuntary muscles are the ones that are **not under our conscious control**. These muscles are like the muscles found in your heart, the ones that constantly pump blood without you having to do anything.



Types of Muscles

Muscles only do work when they **contract**, they do not actively push things further apart when they stretch back out. Did you know that there are actually **3 different kinds of muscles** found in your body? Let's learn more about them.

Types of Muscles

1. **Skeletal Muscles** - These are the muscles we use to move around. They cover our skeleton and move our bones. These muscles are voluntary because we control them directly with signals from our brains.
2. **Smooth Muscles** - Smooth muscles are special muscles that don't connect to bones, but control organs within our body. These muscles are involuntary.
3. **Cardiac Muscle** - This is a special muscle that pumps our heart and blood through our body. This is an involuntary muscle.



How Your Muscles Grow

Everyone has the same muscles in their body, no matter how big or small they are. Did you know that the strongest muscle in your body is found in your jaw, and is used for chewing? So **how exactly can you make your muscles grow bigger and get stronger?** This is a complex process.



Watch the video for an introduction into how this happens: <https://youtu.be/Vnj9Ay6xmOk>

THE MUSCULOSKELETAL SYSTEM

1.) What are the two internal body support structures that you will be learning about in this unit?

Musculoskeletal System Video:

2) Watch the video “The Musculoskeletal System” and answer the following questions:

1. Is the muscular system or the skeletal system the active part of the musculoskeletal

system? _____

2. What join muscles to bones? _____

3. What gives us our shape that differentiates us from other living things?

4. What is the longest bone in the human body? _____

5. Give an example of an immobile joint: _____

3) How many bones does the average human body have? _____

4) Your skeleton comprises of _____ - _____ % of your bodyweight

5) What are the 3 main functions of your skeletal system?

1. _____

2. _____

3. _____

6) When do bones stop growing in length?

7) Where in the body are the ossicles found?

8) All bones in your body are connected, except for one. What is the name of this bone and where is it located?

9) True or False: If the statement is false, change it so that it becomes true.

1. Bones are not organs.

2. Bone marrow makes blood cells.

3. Bone marrow is found in the compact bone.

Operation Ouch- Bone Marrow Video:

10) Watch the video “Operation Ouch- Bone Marrow” and answer the following questions:

1. What does the centrifuge machine do?

2. How does bone marrow change in color as you get older?

11) True or False: If the statement is false, change it so that it becomes true.

1. A cast can heal your fracture.

2. Broken bones will heal in a few days.

3. Weak bones break easier.

4. Over 99% of the calcium in your body is found in your bones.

5. Calcium helps your body absorb Vitamin D.

12) What are joints?

13) What is the difference between a compound joint and a simple joint?

14) What kind of joint moves like a hinge on a door?

15) Now that you know the 3 kinds of joints, what kind of joint would your ankle be? Move it around to help you find the right answer.

16) How do muscles help move your body?

Science for Kids Video: Body Parts- Horse Tendon:

17) Watch the video “Science for Kids: Body Parts- Horse Tendon” and answer the following questions:

1. What two parts of your body does your Achilles (ah-ki-lees) tendon connect?

2. Explain how the experiment in this video tested the strength of the horse tendon.

3. Was the horse tendon able to hold Xander and Chris' body weight?

18) What is the difference between a voluntary and an involuntary muscle?

19) Name the type of muscle:

1. What kind of muscle pumps our heart?

2. What two kinds of muscles are involuntary?

3. What kind of muscles do we use to move around?

4. What kind of muscles control the organ within our body?

5. What kind of muscle is voluntary?

How your Muscles Grow Video:

20) Watch the video "How Your Muscles Grow" and answer the following questions:

1. What happens when you lift something that is heavy for your muscles?
How do they grow?

2. Other than exercises, what other things do your muscles rely on to grow?

21) As you know, part of keeping your body healthy and building our muscles means staying active. What kinds of physical activity do you do? What is your favorite way to exercise?

88) Label the different kinds of joints



The Skeletal System

- Word Bank**
- Freely Moveable Joint
 - Immovable Joint
 - Partially Moveable Joint

Upper Jaw

Wrist

Toes