SKELETAL AND MUSCULAR SYSTEMS

WHAT MOVES YOU!
WHAT ARE THE MAIN FUNCTIONS OF THE SKELETAL SYSTEM?
THE SKELETAL SYSTEM

▪ The skeletal system is the organ system that supports and protects the body and allows it to move.

▪ Movement – bones play an important role in movement by providing a place for muscles to attach.

▪ Its jobs include storing minerals and producing red blood cells.

▪ The compact bones store minerals and these minerals are necessary for nerves and muscles to work properly.
5 FUNCTIONS OF THE SKELETAL SYSTEM

1. Framework gives shape & support to body
5 FUNCTIONS OF THE SKELETAL SYSTEM

2. Bones protect the internal organs
   For example – your ribs protect your heart and lungs, your vertebrae protect your spinal cord and your skull protects your brain
5 FUNCTIONS OF THE SKELETAL SYSTEM

3. Major muscles of body are attached to the bones

Muscles are attached to bones at two points to allow for movement
5 FUNCTIONS OF THE SKELETAL SYSTEM

4. Blood cells are formed in red marrow of some bones

At the center of these bones, such as the long bones of the leg, the soft tissue called marrow.

Red marrow, the type that makes red blood cells, is found in flat bones like the ribs or the pelvis.
5 FUNCTIONS OF THE SKELETAL SYSTEM

5. Skeleton is a place where major quantities of calcium and phosphorus compounds are stored.

Minerals such as calcium are deposited by bone cells called osteoblasts. 99% of calcium is stored in bones.

Calcium makes the bones strong and hard.
WHAT ARE THE OTHER PARTS OF THE SKELETAL SYSTEM?

- Ligaments – tough and flexible strands of connective tissue that holds bones together.
  - Allow movement, and are found at the end of bones. Attaches bone to bone.

- Cartilage - tough, flexible and smooth connective tissue found at the end of bones.
  - Allows bones to move smoothly across each other; located at the end of joints
  - Tip of your nose and your ears are soft because they have only cartilage
Your skeleton begins as cartilage, which is gradually broken down and replaced with bone which is why babies have more bones (about 300) than adults (which have 206).
Bone: a type of connective tissue that makes up the endoskeleton of vertebrates.

**COMPOSED OF FOUR TYPES OF CELLS:**

- **Osteoclasts:** destroy bone
- **Osteoblasts:** build bone
- **Osteocytes:** hold bone together
- **Lining cells:** protection of bone
**Bone Structure: From the Outside In —**

1. **Surface - Periosteum**: thin membrane that *covers* and protects; contains blood vessels and nerves that are important for growth and repair.

2. **Compact bone (under periosteum)**: hard bone that provides structure to bones; contains elastic fibers to keep bone flexible.

3. **Spongy or Cancellous bone**: porous bone; contains blood vessels and marrow. The spaces make it lightweight.

4. **Marrow**: soft, jelly-like center of bones. Two types:
   - **Yellow**: contains fat cells
   - **Red**: manufactures platelets, and red (2-3 million per second) & white blood cells
LABEL YOUR PICTURE

- 1. Periosteum
- 2. Compact bone
- 3. Spongy/cancellous bone
- 4. Marrow cavity
The porous nature of bones allows for them to be strong, yet flexible. Bones can bend a little before they break…

That’s why hard hits and falls in sports and other activities don’t always leave you with broken bones!
**Joint:** any place where two or more bones come together
TYPES OF JOINTS

1. **Fixed joint**
   Allows little movement:
   Ex. joints of the bones in your skull

2. **Pivot Joint**
   One bone rotates around another bone:
   Ex. turning your head; rotating your wrist
3. **Ball-and-socket joint**
   The ball end of one bone fits into a cuplike cavity on another bone.
   Ex: Shoulder or hip joint

4. **Hinge joint**
   Back and forth
   Ex: knee or elbow joint
5. **Sliding joint**
   One part of a bone slides over another bone.
   Ex: Bones of wrist or ankle
COMMON MEDICAL CONDITIONS:

1. Osteoporosis
   - If someone has osteoporosis (oss-tee-oh-puh-RO-sis), the person's bones are now weakened because of this loss of bone density. Weak bones can break easier and the person may have other problems such as a stooped-over posture.
   - Older people — especially women, who are generally smaller and have bones that are lighter and less dense — are more likely to develop osteoporosis.

2. Arthritis (arth-ry-tiss) is a disease that causes swelling, stiffness, and pain in a person's joints. Joints are where two bones meet, allowing our bodies to move — the hips, knees, ankles, elbows, shoulders, etc. Joints contain synovial fluid, which acts as a lubricant to help them move easily. Arthritis can keep joints from working properly.
   - But isn't arthritis something that only old people get?
   - Actually, kids can get a kind of arthritis called **juvenile idiopathic arthritis** or **JIA** (it's also called **juvenile rheumatoid arthritis**, or **JRA**).
HOW TO GROW A BONE - VIDEO

WHAT ARE MAIN FUNCTIONS OF THE MUSCULAR SYSTEM?
 FUNCTIONS OF THE MUSCULAR SYSTEM

1. Muscles are the motors that move body parts and allow for flexibility

   a) Muscles always pull, they never push

   b) Pairs of skeletal muscles work together: 1 muscle contracts while the other muscle relaxes
FUNCTIONS OF THE MUSCULAR SYSTEM

2. Maintain homeostasis by keeping body temperature constant

   a. When muscles contract, chemical energy (glucose) is converted to thermal energy (heat)
**Muscle**: an organ that can relax and contract, which moves your body.

There are two movement types:

**Voluntary muscles**: muscles you can control (ex. bicep)

**Involuntary muscles**: muscles you cannot control (ex. heart)
THREE TYPES OF MUSCLE TISSUE

1. Skeletal muscle: moves bones
   a. Voluntary
   b. Tendons connect muscle to bone
   c. Contract quickly and tire more easily
   d. Look striped or striated
   e. Bicep, quadriceps, pectoral
Movement

You move because **pairs** of muscles **work together**
- a. One end of the muscle attaches at the end of a bone by a tendon
- b. The opposite end of the muscle attaches to an adjacent bone
- c. Muscles **always pull** against the opposite bone
2. **Smooth Muscles:**

- responsible for regulating blood pressure, digestion, and other internal functions
  
  a. Involuntary
  
  b. Muscles in internal organs, such as the stomach, bladder, blood vessels
  
  c. Slow, sustained and tireless
3. **Cardiac Muscle:** Found only in the **heart**

   a. Involuntary

   b. Can beat independently of input from the brain

   c. Striated (striped)
MUSCLE FATIGUE LAB

▪ There are 5 different Muscle Fatigue Lab Stations. Rotate to as many as you have time for. You must complete ____________ stations by reading the information box, completing the “Do This” section, and then the questions for each of the stations that you complete.

▪ Please leave the supplies at the appropriate stations.