SKELETAL AND MUSCULAR SYSTEMS

WHAT MOVES YOU!
FUNCTIONS OF THE MUSCULAR SYSTEM

1. Muscles are the motors that move body parts
   
a) Muscles always pull, they never push
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a) Muscles always pull, they never push

b) Pairs of skeletal muscles work together: 1 muscle contracts while the other muscle relaxes
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 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
f. You move because **pairs** of muscles **work together**

   i. One end of the muscle attaches at the end of a bone by a tendon

   ii. The opposite end of the muscle attaches to an adjacent bone

   iii. 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 the stomach, bladder, blood vessels
3. **Cardiac Muscle:** Found only in the **heart**

   a. Involuntary

   b. Can beat independently of input from the brain

   c. Striated (striped)
In a Blink...
Muscle Action Lab

Objective: To determine if blinking is voluntary or involuntary

Here’s What You’ll Need to Conduct This Experiment:
- Partner
- Transparent film such as saran wrap, a blank overhead transparency, or goggles
- Wadded up paper balls
- Stopwatch or timer

Hypothesis: Make a hypothesis about whether blinking is a voluntary or involuntary muscle action.

What You Do: You’re going to complete three different tasks during this lab to determine if blinking is a voluntary or involuntary muscle action.
In a Blink…

What You Do:

Part 1: Have your partner read a book or do an everyday activity. The point is to not think about blinking. Count the number of times your partner blinks in one minute. Record that information in the chart on your paper. Change roles. Complete this activity for a total of two trials.

Part 2: Record the length of time your partner can go without blinking. Record that information in the chart. Change roles.

Part 3: Obtain a transparent piece of saran wrap or an overhead transparency. Have your partner hold the transparency in front of their eyes, about 6 inches away from their face. Instruct them to try and keep their eyes open as you gently toss a wadded up piece of paper at the transparency. Watch their eyes carefully and record in the chart whether or not they blinked.
In a Blink...
Muscle Action Lab

What Happened?:
Now that you have completed each task, use your data to analyze your results and answer the questions that follow.

What did YOU find?
The Hip Bone’s Connected to the...

**Objective:** To learn the structure and function of the Skeletal System
5 FUNCTIONS OF THE SKELETAL SYSTEM

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3. Major **muscles** of body are **attached** to the bones
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4. **Blood cells** are formed in **red marrow** of some bones
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1. Framework gives shape & support to body
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3. Major muscles of body are attached to the bones
4. Blood cells are formed in red marrow of some bones
5. Skeleton is a place where major quantities of calcium and phosphorus compounds are stored
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!
Your skeleton begins as cartilage, which is gradually broken down and replaced with bone which is why babies have more bones (between 280-300) than adults (which have 206).
**JOINT**: any place where two or more **bones** come together

**CARTILAGE**: rubbery tissue that **cushions bones**; located at joints

**LIGAMENT**: attaches **bone to bone**
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
LABEL THE SKELETAL BONES
WHEN DONE, GLUE INTO JOURNAL
We All Need Something, to Pull On...

Objective: To identify various types of joints and to build a muscle and analyze muscle action

Here’s What You’ll Need to Create this Scienstructable:

Muscle Scienstructable template
Joint analogy sheet
Scissors
Single hole punch
Glue stick
Clear Tape
Two 12” long pieces of red or pink yarn
Metal brad
We All Need Something, to Pull On...

What You Do:
1. Cut out your Scienstructable Hand, Radius and Ulna, and Humerus. Be sure to cut along the solid black lines.
2. Fold each piece on the dotted lines provided.
3. Using the hole punch, punch a hole wherever there is a black dot on the Scienstructable.
4. Using a glue stick, place glue where indicated on the hand bones. Attach the hand to the inside of the radius and ulna piece, so that when folded, the bones are on the outside of the paper. The hand should look like it is attached to the radius and ulna.
What You Do: (continued…)

5. Attach the end of one piece of yarn to the “X” on the Radius, with the yard leading away from the hand.
6. Attach the end of the other piece of yarn to the “X” on the Ulna, with the yarn leading away from the hand.
7. With the radius and ulna folded, line up the holes at the end with the hole at the end of the humerus bone.
8. Lay the yarn pieces inside the humerus so that they emerge from the other end of the humerus.
9. Take the RADIUS yarn and thread it UP through the bottom BICEP muscle and DOWN through the top BICEP muscle. It should emerge from inside the humerus piece.
10. Take the ULNA yarn and thread it UP through the bottom TRICEP muscle and DOWN through the top TRICEP muscle. It should emerge from inside the humerus piece.
11. Now, fold the humerus so that it is closed and attach the humerus to the radius and ulna with the metal brad through the aligned holes.
What You Do: (continued…)
12. Holding on to the humerus, pull the bicep yarn to watch the bicep muscle flex and move the arm up. Then, pull the tricep yarn through the top of your humerus to see the tricep muscle flex and pull the arm down!
We All Need Something, to Pull On...

Now that you’ve made a working muscle, flex your brains and answer the following questions about your Scienstructable. Then, complete the joint analogy worksheet. Can you muscle your way through them?