

Bones and the Human Skeleton

FRAMEWORK

- I. Scientific and Engineering Practices 1,
- II. Cross-Cutting Concepts 2, 6
- III. Disciplinary Core Ideas PS 1, LS 1

SKILLS/OBJECTIVES

- Learn that bones are made of soft cartilage
- Learn some of the names of bones

MATERIALS

- 6% Hydrochloric or muriatic acid*
 - Chicken bones*
 - Water*
 - Baking soda*
 - Gloves
 - Fill in the bones worksheet (20 per day)
 - 20 Pencils
 - 5 pipe cleaners per student (100 per day)
 - 1 pair of scissors per student (20 total)
 - 17 brass fasteners per student (340 per day)
- *Will be needed before the lesson goes out in order to soften the chicken bones

NOTES

- **BEFORE THE LESSON PLAN GOES OUT perform the BONE SOFTENING PROCEDURE! (Soak chicken bone in acid overnight. Remove using a glove and neutralize the bones by rinsing with a solution of 1 cup water and 2 spoons of baking soda)**

BACKGROUND

- What do you know about bones?
- Why are bones important? What is their job? (structure and support)
- When you are born, your bones are soft and made of cartilage, like your nose is; the tip of your nose is what your bones feel like before they harden.
- As you grow, your bones harden.
- Can you think of something else on your head made of cartilage? (ears) How does cartilage compare to your arm?
- What do you need to eat or drink to make your bones strong? (minerals like Calcium found in milk, yogurt, broccoli, and kale)

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| Activity # 1 | Floppy bones |
| Materials | -Softened chicken bone -Regular chicken bone -Gloves |
| Worksheet | no |

- **Have everybody put on gloves**
- **Explain that we made the bones floppy by soaking it overnight in acid.**
- The acid removed the mineral salts, like calcium, and reduced the bone to its underlying cartilage material- just like how it was when you were born!
- **Compare and contrast the softened bone with regular bones.**
- **Try to tie both types of bones into a knot.**

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| Activity # 2 | Simon Says: Bones Edition |
| Materials | ○ Attached Worksheet |
| Worksheet | yes |

- **Share these fun facts about bones before you play the Simon Says game:**
 - There are 206 bones in the adult body
 - Smallest bones in the body are the ossicles (the bones in the middle ear, they help transmit sound waves allowing you to hear)
 - Femur – thigh bone - the largest bone in the human body
 - Phalanges – a group of bones that make up your fingers and toes
 - Scapula – shoulder bone – it is in the shape of a triangle
 - Humerus – upper arm – (when you hit your elbow/“funny bone”, not so funny)
 - Cranium – skull bones – fused/stitched together (kind like Frankenstein)
 - Dentals – your teeth – only set of replaceable bones (baby teeth fall out, adult teeth grow in)
 - Cartilage – Our nose and ears – are like shark bones!
 - Sternum – the bone in the center of your chest – the Tarzan bone (aiayayayaaaa!)
- **Use the following 8 bones for a game of Simon says, telling the kids, “Simon says, show me your ____.” When the instructor uses the phrase “Simon says,” the kids must point to the correct bone. If the instructor does not include the phrase “Simon says,” then any person who pointed to a bone is out.**
 - Femur
 - Phalanges
 - Scapula

- Humerus
 - Cranium
 - Dentals
 - Cartilage
 - Sternum
- After the game is done, have the kids fill out the worksheet with the names they learned

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| Activity # 3 | Pipe Cleaner Skeleton |
| Materials | -5 pipe cleaners per student -1 pair of scissors per student |
| Worksheet | no |



- Line up pipe cleaners at labeled edge, cut at marked positions, follow folding instructions to assemble skeleton.
 1. **Legs and Feet:** Cut the first pipe cleaner into 1/3 and 2/3 length pieces or line up edge of pipe cleaner with guide sheet and cut at marks. Bend 2/3 piece in half, and again at each “knee”. Cut 1/3 piece in half, these are the foot pieces. Bend foot pieces in 1/2, twist end of leg around bent foot piece, then twist foot piece around itself.
 2. **Arms and Shoulders:** Cut the second pipe cleaner into 1/3 and 2/3 length pieces. Use 2/3 piece: bend at shoulders and elbows. Cut 1/3 piece in half, these are the hand pieces. Wiggle hand pieces into fingers and wrap end of arm around pieces.
 3. **Face & Skull:** Cut the third pipe cleaner into 1/3 and 2/3 length pieces. Use 2/3 piece: bend a small loop for the mouth, and a wiggle for the nose, then make a loop for the head.

4. **Ribs:** Using a whole pipe cleaner, make zig-zags so there are 3 “V”s on each side.
5. **Spine:** Cut the fifth pipe cleaner in 1/2. At one end, twist around the central bend in legs piece. Near the other end twist around the center part of the shoulders, then at end twist around bottom of skull.
6. **Twist the ends of the ribs around the spine.**
7. **Loop:** Using the other 1/2 of the fifth pipe cleaner, bend in half and secure to skull.

| Activity # 4 | Paper Skeleton |
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| Materials | -each of the 3 bones sheets - 1 pair of scissors per student -17 brass fasteners per student |
| Worksheet | no |

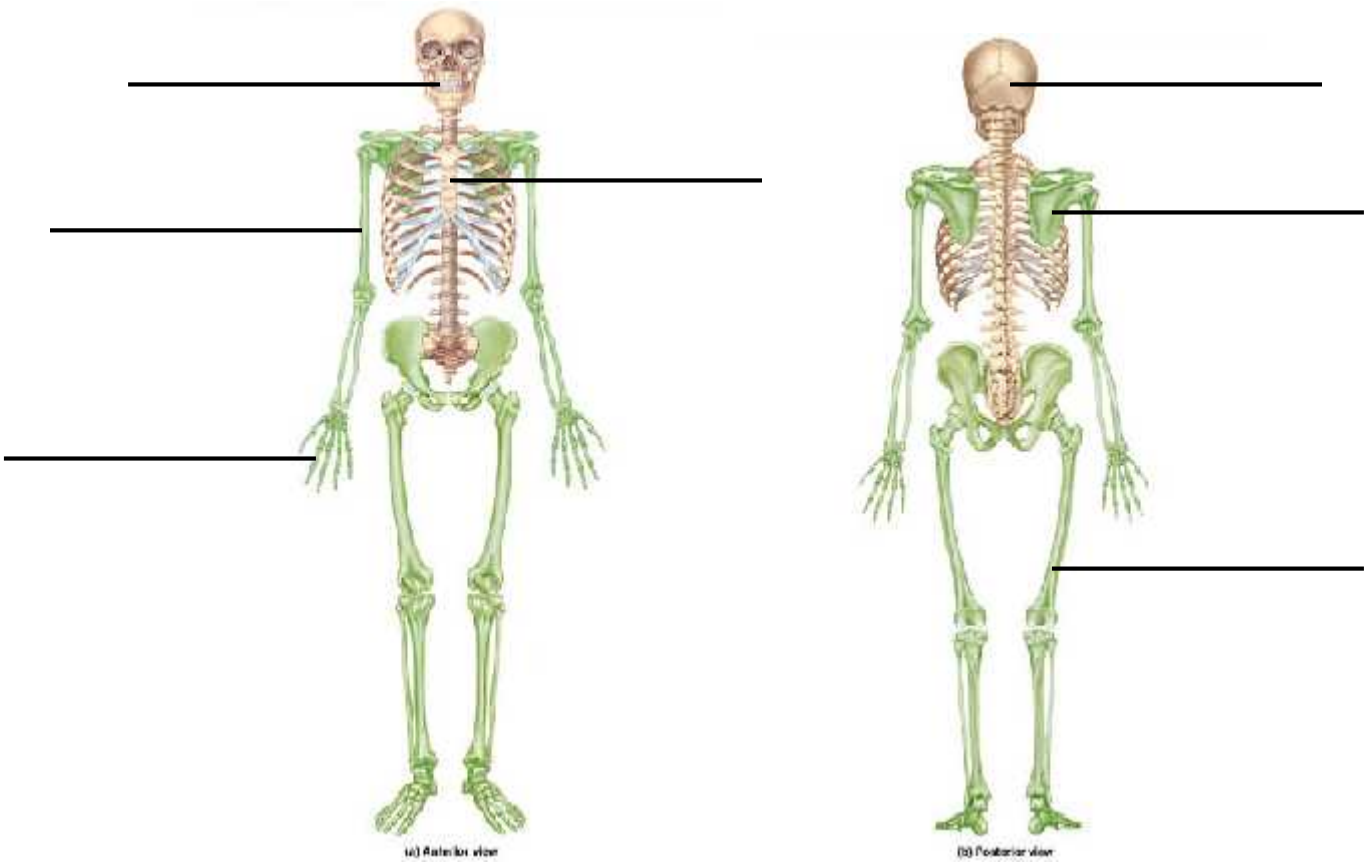
- **Cut out bones pieces on the bones sheets**
- **Poke holes on the dots**
- **Insert fasteners at joints to connect pieces**

Conclusions

- The human body is supported by over 200 bones!
- Each one has its own name and function.
- At their core, bones are made of cartilage—the same stuff in your ears and nose.
- Some animal species do not have a lot of bones. Animals that fall under the class chondrichthyes (sharks and some other fish) have skeletons made of cartilage. Only their teeth are made of bone. (chondrichthyes means “cartilaginous fish”)
- Your funny bone isn’t a bone at all! It’s a nerve!
- Bones are important in maintaining the structure of our bodies. Without them, we would be floppy like jellyfish.
- We can keep them healthy by giving them the right nutrients: calcium and vitamin D.

Bones and the Human Skeleton

Label your skeletons with the 8 words we learned!



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|----------------|------------------|------------------|----------------|
| Femur | Phalanges | Cranium | Humerus |
| Dentals | Sternum | Cartilage | Scapula |

Which word do YOU have, but a skeleton doesn't?

