# The Human Skeleton: NYSSLS Alignment

Teacher guide for the student worksheet at mrsajdak.com/skeleton (two pages, 14 questions; a low-write version has the same numbers). Anatomy & Physiology, Hole's Essentials Chapter 7: The Skeletal System. The answer key is kept off the website. © 2026 Ryan Sajdak. Free to use, share and change under CC BY-NC-SA 4.0 (creativecommons.org/licenses/by-nc-sa/4.0): give credit, do not sell it, share your version the same way.

## The model

All 206 bones of one adult man, each a real surface built from scans: Z-Anatomy (CC BY-SA 4.0), built on BodyParts3D from the Database Center for Life Science. Students can turn it, zoom to any bone, color it four ways, take it apart, and quiz themselves. Each bone's card gives its name, axial or appendicular, its shape, its region and one plain-language fact. It runs in any current browser. It's about a 2.5 MB download, so load it once before class on a slow connection.

Things students may ask: the pelvis is male (a female pelvis is wider with a rounder inlet). The sternum is three clickable pieces but one bone. Teeth, costal cartilage and the two sesamoids under each big toe are shown but are not in the 206. This adult has 28 teeth (no wisdom teeth).

## Objectives

The same two statements are printed at the top of the worksheet, each with a box to tick.

| I can | Questions |
|---|---|
| find and name major bones on a model and sort them as axial or appendicular. | 1 to 3, 8, 9, 11 to 13 |
| sort bones by shape and explain how a bone's shape fits its job. | 4 to 7, 10, 14 |

## Performance expectation: building toward

**HS-LS1-2** Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.

Worksheet link: students use the 3D model to sort the skeleton into its two divisions and nine regions (Q1, Q2, Q8). They take the hand and foot apart into their parts (Q12) and tie bone shape to function (Q5 to Q7, Q14). This is one step toward the PE, not a full assessment of it.

**DCI LS1.A:** Multicellular organisms have a hierarchical structural organization, in which any one system is made up of numerous parts and is itself a component of the next level.

## Part by part

| Part | SEP | CCC | What students do |
|---|---|---|---|
| **1. Two skeletons** Q1 to 3 | SEP 2 Developing and using models | Systems and System Models | Color the model axial vs. appendicular, count 80 + 126, and sort eight bones. The trap: the clavicle, scapula and hip bone sit in the trunk but belong to the girdles. |
| **2. Sort by shape** Q4 to 7 | SEP 4 Analyzing and interpreting data | Structure and Function | Read the five shape counts (90 / 30 / 33 / 51 / 2) and classify nine bones. The trap: a fingertip bone is a long bone, because shape is not size. Then tie flat bones to protection. |
| **3. Count them** Q8 to 10 | SEP 5 Using mathematics | Scale, Proportion, and Quantity | Read region counts and find that 106 of 206 bones (51%) are in the hands and feet, then explain why with joints and movement. |
| **4. Find the bone** Q11 | SEP 8 Obtaining and evaluating information | Structure and Function | Use search and the bone cards to match eight clues. "See it alone" shows the stapes and sphenoid, which hide inside the skull. |

| | | | |
|---|---|---|---|
| **5. Take a hand and a foot apart** Q12 | SEP 2 Developing and using models | Systems and System Models | Pull the model apart and count 27 bones in a hand and 26 in a foot. Shape coloring separates the short carpals and tarsals from the long bones. Then check against Part 3. |
| **6. Find the bone** Q13 | (retrieval practice) | Structure and Function | Two 10-question rounds. Only first clicks score; three misses show the answer. |
| **Wrap it up** Q14 | SEP 6 Constructing explanations<br>SEP 7 Engaging in argument from evidence | Structure and Function | Claim, evidence and reasoning that a bone's shape fits its job, using evidence from two parts. |

## Running it

One device per student or pair, about 35 to 45 minutes. Parts 1 to 3 build on each other. Part 4 can be a starter or a homework task. Part 6 makes a good closing competition on the board. Students are likely to get stuck on Q2 (the girdles) and Q6 (long bones are about shape, not size). Both are worth a whole-class discussion.

- **Explore, then explain, then apply:** Parts 1 to 3 each start with data questions (Q1 and 2, Q4 and 5, Q8 and 9). A READ FIRST line on the sheet then sends students to the blue **Learn It** box under the model, which opens once they have the data, before the questions that use the ideas (Q3, Q6 and 7, Q10). The box for each part shows when that Color by mode is on. The slideshow has a matching Learn It slide at each of those points. Taught there: the axial and appendicular skeletons and the girdles (Part 1); shape not size, long bones as levers, short, flat, irregular and sesamoid bones and their jobs (Part 2); joints, more bones meaning more joints, and sutures that do not move (Part 3). Parts 4 to 6 are reading, counting and recall, so they need no Learn It; Q14 uses the Part 2 ideas.

Shape sorting follows the usual five-way textbook split. The page tells students that books disagree on a few bones. Here the frontal, parietal, temporal and occipital bones are flat. The sphenoid, ethmoid and hip bone are irregular, and the pisiform is short. The sheet only asks about bones every textbook sorts the same way (the parietal bone in Q5 is flat in all of them), so a different textbook will not change the answers.