Muscle Map Lab: Teacher Guide

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Driving question. How can a muscle's name tell you where it is and what it does?

District section

BPS A&P Unit 2, Support and Movement, Chapter 8, Section 8.8 Major Skeletal Muscles (Student Edition pp. 320-336): identify and locate the major skeletal muscles of each body region, and identify their actions. Used from the district list: Labeling (Muscles of the Head; Shoulders and Back; Shoulder and Arm; Arm and Forearm; Thigh and Leg) as Tab 1 and Q1; Visual Literacy: Muscle Scramble (the name decoder in Tab 2); Demonstration Activity: Muscle Shirt (the hands-on lab); Use the Practices 8.8 Using Mathematics (the mass graph and Q13); Chapter 8 Laboratory Exercise 2, Muscles of the Hip and Lower Limb (Tab 3 leg data); Vocabulary Supports. **Additions** beyond the district list: real muscle masses from donated legs (Ward and others, 2009) and the Find It game.

NYSSLS alignment

HS-LS1-2. Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms (the body map as a model of the muscular system; muscles working in pairs with bones). **HS-LS1-1** (from the plan book) is touched only lightly here: muscle size and fiber number are the structure behind each muscle's job.

SEP 2 Developing and Using Models: Tab 1 and Question 15. **SEP 4** Analyzing and Interpreting Data: Questions 2, 7, 12. **SEP 5** Using Mathematics: Question 13. **SEP 6** Constructing Explanations: Question 16. **CCC 1** Patterns: the name clues in Tab 2. **CCC 4** Systems and System Models: the body regions in Tab 1. **CCC 6** Structure and Function: Tab 3 and Question 16.

Opening: pick a phenomenon

Option	What it is	Notes
Video	Painted Muscles: an artist paints the muscles onto a person, then the person moves (Insider Art, Danny Quirk). Backup: Alice Roberts paints the arm muscles onto a student (Science for Schools). Clip 3, for after Part 2: Naming Muscles (DeBacco University).	All three checked to embed. Not watched end to end: preview them. Do not name muscles yet. Clip 3 gives away the name clues, so save it for the wrap-up.
Activity	Clench, Shrug, Stand Tall: clench your teeth with fingertips on your cheeks; shrug with a hand on the top of the shoulder; stand on your toes with a hand on the calf. 2 minutes, no materials.	Same as the Do Now and Tab 3. Do not name the muscles yet.
Photos	Where Does It Hurt? A sprinter's legs at full stride, and a physical therapist pressing on a patient's thigh.	Real photos. A trainer has to name the exact muscle to treat it.

Part by part

Part 1, Tab 1. Questions 1 and 2 are explore. The Learn It opens after all 20 muscles are found. Questions 3 to 5 are apply, with the Find It game in the lab. Phones: the number buttons pick a muscle when the dots are small.

Part 2, Tab 2. Questions 6 and 7 are explore. The graph shows all 20 names after 8 are decoded. The Learn It opens when a student picks Location as the most common clue. Questions 8 to 10 are apply. Watch for: students reading "biceps" as "big". Bi means two.

Part 3, Tab 3. Questions 11 to 13 are explore. Students should really do each move and touch the muscle. The Learn It opens after 8 moves, 4 of them felt. Questions 14 to 16 are apply. The misconception to watch: muscles push. A muscle only pulls, so every joint needs a partner on the other side.

The model and its limits

The pictures are AI illustrations made for this lab, checked against Hole's figures, and simplified: they show only superficial muscles, and smaller muscles of the forearm, hand and foot are not labeled. The quadriceps femoris and hamstrings are groups (four and three muscles). Tab 3 masses are averages from 21 donated legs of older adults (average age 83), preserved in formaldehyde, so the grams differ from a teenager's; the pattern (the quadriceps about twice the hamstrings, the gluteus maximus the largest single muscle) holds. Group masses are the sum of their parts.

Sources

Hole's Essentials of Human Anatomy & Physiology, Chapter 8.8 and the teacher's manual. Ward SR, Eng CM, Smallwood LH, Lieber RL (2009). Are current measurements of lower extremity muscle architecture accurate? Clinical Orthopaedics and Related Research

467(4):1074-1082, Table 3. OpenStax Anatomy and Physiology 2e, Section 11.1 (naming skeletal muscles). Pictures are credited on the lab page.