# Skin Lab: NYSSLS Alignment

Teacher guide for the student worksheet at mrsajdak.com/skin (two pages, 14 questions; a low-write version has the same numbers). Anatomy & Physiology, Hole's Essentials 6.1 to 6.4: Parts and Functions of the Integumentary System (AP.3.6.1). © 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.

## Objectives

The same two statements are printed at the top of the worksheet, each with a box to tick. They are the lesson's own statements for objective AP.3.6.1: identify the parts of the integumentary system and describe their functions. The sweat test (Q8 to Q11) is one of the five jobs, temperature control, studied in depth.

| I can | Questions |
|---|---|
| name the parts of the integumentary system and match the skin's five jobs to their parts. | 1 to 3, 8 to 14 |
| plan and run a fair test of how well two areas of skin sense touch. | 4 to 7 |

## Performance expectations: building toward

The lab and worksheet give students evidence for these performance expectations. They are one step on the way, not a full assessment of any one of them.

> **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 take the skin apart as a system of tissues and accessory structures (Q1), then tie each part to the job it does (Q12, Q13).

> **HS-LS1-3**
> *"Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis."* Worksheet link: a fair touch test with a one-point check for guessing (Q4, Q5), and a sweat investigation where the glands turn up as the core warms and pull it back toward 37 °C, until the air stops the sweat from evaporating (Q8 to Q11).

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." "Feedback mechanisms maintain a living system's internal conditions within certain limits and mediate behaviors, allowing it to remain alive and functional even as external conditions change within some range."*

The plan book tags this lesson HS-LS1-1 and HS-LS1-3. The lab does not target HS-LS1-1 (DNA to proteins); keratin and melanin are named only in passing.

## Part by part

| Part | Science and Engineering Practices | Disciplinary Core Ideas | Crosscutting Concepts | What students do |
|---|---|---|---|---|
| **1. Inside the skin**<br>Q1 to 3 | SEP 2 Developing and using models<br>SEP 5 Using mathematics | LS1.A hierarchical organization | Systems and System Models; Scale, Proportion, and Quantity | Find nine parts in a model slice and sort each as a layer of the skin, beneath the skin, or an accessory structure. Compute skin weight (16%) and area (Mosteller formula), and see that doubling the weight raises the area only about 1.4 times. |
| **2. Touch map**<br>Q4 to 7 | SEP 3 Planning and carrying out investigations<br>SEP 4 Analyzing and interpreting data | LS1.A structure and function | Structure and Function | Run the same two-point test as the paper-clip activity at ten sites, including ones you can't test in class (back, sole, lip). Use a one-point check to catch a guesser. Explain the fingertip's 17.5-fold |

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| | | | | advantage with receptor patches, and apply it to Braille. |
| **3. Sweat test** Q8 to 11 | SEP 3 Planning and carrying out investigations<br>SEP 4 Analyzing and interpreting data | LS1.A feedback mechanisms | Stability and Change | Run a 30-minute model runner in dry, humid and breezy air, with sweat glands off, and with a towel. Only evaporated sweat cools. This answers the lesson's misconception (“sweat cools because it is cold”) with numbers. |
| **4. Five jobs** Q12 to 13 | SEP 6 Constructing explanations | LS1.A | Structure and Function | Nine real moments: click the part, then pick one of the five jobs (Hole's 6.4). Two traps: the paper cut (no vessels in the epidermis) and the fat layer (a skin-system job done beneath the skin). |
| **Wrap it up** Q14 | SEP 6 Constructing explanations<br>SEP 7 Engaging in argument from evidence | LS1.A | Structure and Function | Claim, evidence and reasoning that the skin is built for its jobs, with evidence from two tabs. |

## Using it with the lesson

- **As the whole period:** Do Now, then the lab in pairs (about 35 minutes), then the exit ticket from the lesson plan. The exit ticket cases (a lifeguard's tan, vessels narrowing in the cold) are not in the lab, so it still checks transfer.
- **Beside the planned lesson:** Tab 2 extends the paper-clip test to sites you can't test in class, and gives any student who opts out of being touched a full data set. Tab 3 can replace the “Why sweat cools you” and “Sweat is not cold” slides. Tab 4 can replace the three Elaborate cases.
- **Later lessons:** Tab 1 sets up Layers of the Skin; Tab 3 is a first look at Thermoregulation (vessels and shivering are left for that lesson).

## Also in play

- **Key terms:** integumentary system, epidermis, dermis, subcutaneous layer, accessory structure, sebaceous gland, sweat gland, sensory receptor, keratin, evaporation, negative feedback.
- **Real numbers:** touch gaps are rounded typical adult values after Weinstein (1968); fingertip 2 mm and forearm 35 mm sit inside the ranges the lesson plan expects (2 to 5 mm and 30 to 40 mm). The runner uses a 70 kg body, 700 W of heat from running, and 2,430 J to evaporate each gram of sweat. Humidity and breeze set how much sweat the air can take.
- **Simplified on purpose:** one runner, one air temperature (27 °C), no blood-vessel or shivering responses. The page says so.

Standards text quoted from the New York State P-12 Science Learning Standards, High School Life Science (NYSED). The answer key is a separate file, kept off the public site.