Aging Skin Lab: NYSSLS Alignment

Teacher guide for the student worksheet at mrsajdak.com/aging-skin (two pages, 18 questions; a low-write version has the same numbers). Anatomy & Physiology, Aging of the Integumentary System, Day 1 of 2 (AP.3.6.9). Hole's Essentials 6.2 (Layers of the Skin, pp. 199 to 207), 6.4 (Skin Function, pp. 211 to 218) and 20.4 (Aging: The Human Life Span, pp. 928 to 934). The answer key is kept off the website; write to rsajdak@buffaloschools.org for it. © 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

Four tabs in one page, no login. Every run gives the same numbers, so the key is exact. The lab mirrors the hands-on Explore in the lesson (pinch test, hair-tie model mat, age-group data cards) and agrees with it: the age-16 trials are the plan's sample student (0.5, 0.9, 0.7 s, average 0.7 s), every average sits inside the range on the matching data card, and the hair tie and string numbers are the plan's sample data (new tie 7.0 to 7.1 cm, worn tie 8.2 to 8.8 cm, string 20.0 cm, gives about 1 mm).

What is real: the days for a new cell to cross the outer layer of the epidermis (forearm 19.8 days under 35 and 28.1 over 60; upper inner arm 17.7 and 25.5; Grove and Kligman 1983, as tabled in a 2024 Journal of Cosmetic Science review). Shallow wounds closing about 1.9 days later in healthy adults over 65 (Holt and colleagues 1992, Surgery 112:293). The trend in Tab 1, slower recovery after a stretch with age, measured in 300 adults aged 20 to 74 (Luebberding, Krueger and Kerscher 2014). **What is made up to show a pattern:** the exact snap-back seconds (the data card bands come from a widely reprinted pinch chart, not a published study), the bent-hand penalty (+1.7 s, the plan's "over 2 seconds usually means the hand was bent"), the spring-scale pulls in Tab 2, the counts in the Tab 3 drawings, and the pull and hold units in Tab 4. The note at the foot of the lab page and the worksheet footer say so.

Aging is normal biology. The lab names changes in structure and function, never "before and after" looks, and the patient in Tab 4 is a care scene.

Objectives

The two statements printed on the worksheet are the plan's I-can statements for the objective AP.3.6.9 (describe how the integumentary system changes with age), the same objective that runs on both days.

I can	Questions
describe how the collagen, elastic fibers, epidermis, fat and blood vessels of the skin change with age.	6 to 18
use snap-back data to show that older skin springs back more slowly, and explain why.	1 to 5, 7, 10

Performance expectations: building toward

HS-LS1-1 Construct an explanation based on evidence for how the structure of DNA determines the structure of proteins which carry out the essential functions of life through systems of specialized cells. **HS-LS1-3** Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.

Worksheet link: collagen and elastic fibers are proteins made by fibroblasts, and their structure (ropes that hardly stretch, springs that recoil) is their function; with age fewer, stiffer and broken fibers change what the skin can do (Q6 to Q10, HS-LS1-1, touched through specialized cells and the proteins they build, not through DNA). Students run a fair test with controlled variables and averaged trials (Q1 to Q5) and see protective functions of the skin weaken with age: slower renewal, easier bruising, less insulation (Q11 to Q17). HS-LS1-3 is touched only lightly here; Day 2 takes older adults' temperature control. This is practice toward both, not a full assessment of either. **DCI LS1.A:** Structure and Function.

Opening: pick a phenomenon

The slideshow opens with a menu. Pick one opener per class, or run two back to back. All three end at the same Observe, Wonder, Predict slide and the same driving question, and the revisit at the end works with any of them.

Option	What happens
A. Video 21 Years, One Face, 2 to 4 min	1. 21 years in 2 minutes: “7777 Days”, Noah Kalina, 0:00 to 2:12 (youtube.com/watch?v=DC1KHAxE7mo); 2. The news story: “20 Years Of Selfies?”, CNN 10, 0:00 to 1:15 (youtube.com/watch?v=KvLjnZhrybE); 3. Under a UV camera: “How the sun sees you”, Thomas Leveritt, 0:00 to 1:00 (youtube.com/watch?v=o9BqrSAHbTc). Clip 1 has no narration. Each second is about two months. Do not name collagen or elastic fibers yet. Ask: "Is he drying out, or is something inside changing?" and leave it open for Part 2. Aging is normal biology: no jokes and no

	beauty talk. Clip 3 (a UV camera, "How the sun sees you", Thomas Leveritt) stops at 1:00 on purpose; after that it turns into a sunscreen message. Save it for Day 2 on sun damage if you like.
B. Try it Raisin Rescue, 4 min	Look at a grape and a dry raisin side by side. A raisin is a dried grape. Now look at raisins that soaked in water overnight. Compare them with a dry raisin. Pinch the back of your hand for 5 seconds and let go. Watch it go flat. Think: if water smooths a raisin, would water or lotion smooth a grandparent's wrinkles? **You need:** A few grapes; a few dry raisins; raisins soaked in water overnight (start the day before); paper towels. No eating in the lab.. This is the misconception the lesson names: wrinkles are dryness. A raisin wrinkles because it lost water, so water undoes it. Skin wrinkles because its collagen and elastic fibers become fewer, stiffer and broken, so water and lotion do not undo them. Do not say this yet. Take a vote and leave it up; Part 2 of the lab settles it.
C. Photos Two Hands, Sixty Years Apart, 3 min	A baby's hand and a grandparent's hand in the same shot. The original opener: a quiet minute to look, then Observe, Wonder, Predict.

Part by part

Part	SEP	CCC	What students do
1. The pinch test Tab 1, Q1 to 5	SEP 3 Planning and carrying out investigations SEP 4 Analyzing data SEP 5 Using mathematics	Patterns	Pinch, hold 5 s, time the snap-back, three trials and an average at six ages. Age 16 averages 0.7 s; 65 averages 12.4 s (about 18 times as long); 80 averages 41.1 s. The biggest jump is 65 to 80. A bent hand raises age 16 to 2.4 s: why the hand stays flat.
2. A model of the dermis Tab 2, Q6 to 10	SEP 2 Developing and using models SEP 3	Structure and Function	Stretch a new tie, a worn tie and a cotton string on the model mat. New tie 7.0, 7.1, 7.0 cm (yes); worn tie 8.2, 8.8, 8.5 cm (slowly); string 20.0 to 20.1 cm under a 20 N pull (strong, hardly stretches). After Learn It, label the lanes (two distractor cards) and fix the dryness misconception.
3. Inside at 20 and 80 Tab 3, Q11 to 14	SEP 4 Analyzing data	Stability and Change Structure and Function	Count what is drawn in two windows of forearm skin; run the cell clock (19.8 vs 28.1 days, 17.7 vs 25.5); bump both arms (only the 80-year-old bruises). Then the change-and-consequence table.
4. A patient, age 84 Tab 4, Q15 to 18	SEP 3 SEP 6 Constructing explanations	Cause and Effect	Peel tape off her forearm four ways and off her grandson's once. Only soft silicone tape peeled slowly is safe on her (pull 2, hold 4). Explain it in the A&P three-part frame.

Running it

One 40-minute period, one device per student or pair, or on the board as the class follows along. In the lesson the hands-on pinch, hair ties and data cards come first; the lab then serves as the same Explore for a student who will not pinch, a student who was out, a make-up day, or a class short of hair ties. Suggested times: phenomenon and prediction slides (5 min) · Part 1, Q1 to 5 (11 min) · Part 2, Q6 to 10 (10 min) · Part 3, Q11 to 14 (8 min) · Part 4, Q15 to 18 (8 min). Students pinch only their own hand, gently; a student who would rather not uses Tab 1.

A link can open a tab directly: mrsajdak.com/aging-skin/#pinch (also #fibers, #inside, #patient).

Explore, then explain, then apply. Each part starts with data questions (Q1 to 4, Q6 and 7, Q11 to 13, Q15 and 16). A READ FIRST line then sends students to the green **Learn It** box under the lab drawing, which opens once they have the data, before Q5 (elasticity, the dermis, controlled variables, averages), Q8 to 10 (collagen, elastic fibers, fibroblasts, fewer stiffer broken fibers, wrinkles as a fold that stays, dryness only at the surface), Q14 (thinner epidermis, slower stratum basale, less subcutaneous fat, fewer thinner vessels) and Q17 and 18 (skin tear, pull against hold, soft tape peeled low and slow, slower healing). The label cards in Tab 2 only open after its Learn It box. The slideshow has matching Learn It slides at each point.

The misconception to plan for. "Wrinkles happen because skin dries out, so lotion fixes them" and "aging only changes how skin looks." Q10 fixes the first; Part 3 and Part 4 answer the second (slower healing, bruising, colder, skin tears). One

true nuance: dehydration does slow skin recoil, which is why nurses pinch for it in children; in older adults the hand pinch is not trusted for hydration, because slow recoil there comes from lost elastic fibers whatever the water.

Where students get stuck: Q1 (the average shows in the lab after the third trial; they can check their division); Q3 (the age-16 card has no range: it is the class average card); Q4 (12.4 ÷ 0.7 = 17.7, about 18 times); Q6 (the string is too short for the 15 cm mark, so it gets a firm pull instead); Q11 (pick each thing in the Count list; the drawing numbers each one); Q16 (her hold is 4, his is 10).

District curriculum and additions

In the BPS A&P unit doc, Chapter 6 sits in Unit 2 (Support and Movement) with rows for 6.1 to 6.4 and a wrap-up; aging has no row of its own, and Hole's Essentials has no aging section in Chapter 6. Section 20.4, Aging: The Human Life Span (pp. 928 to 934), is in the district's Unit 6, and its chapter project, The Fountain of Youth (p. 946), is an inquiry on aging. The district pacing guide puts Chapter 6 in week 6 (October 5 to 9). **Additions beyond the district list:** the whole aging-skin topic as a Chapter 6 lesson; the pinch test, the hair-tie model and the tape test; every number listed under The model; and the words skin tear, silicone tape and controlled variable. Collagen, elastic fibers, fibroblasts, stratum basale and the subcutaneous layer are the book's own (6.2, and Chapter 5 for the fibers).

Day 2 (sun damage and time, sweat and oil glands, hair and nails, skin care) has its own hands-on barrier test and is not part of this lab.