Hair, Nails and Glands Lab

Name _____
Date _____
Period _____

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DAY 1 Hair and nails are made the same way: living cells divide, fill with **keratin**, die, and are pushed out.

☐ I can identify the parts of a hair follicle and a nail and explain what each part does.

☐ I can use growth rates to explain how long hairs and nails grow.

Part 1. Build a hair (Tab 1)

SEP 2 Models · SEP 5 Math · CCC Structure and Function · Stability and Change

1. Name each pin in the lab. Then write the letter of each part's job. Two parts share a job.

JOBS A. is the hair (dead cells) · B. makes the hair · C. feeds the bulb · D. the tube it grows in · E. oils hair and skin · F. stands it up

Part	Job
Hair shaft	
Hair root	
Hair follicle	
Hair bulb	

Part	Job
Hair papilla	
Sebaceous gland	
Arrector pili muscle	

2. Watch each hair through a whole growing phase. Use the graph and the **Right now** card.

Hair	cm per month	Growing phase (months)	Longest (cm)	Check: rate × months
Scalp hair				
Eyebrow hair				

3. At month 36.5 the scalp hair is in the _____ phase. The resting phase lasts _____ months.

4. Scalp hair: at month 10 press **Cut it to 1 cm**. At month 12 it is _____ cm long. After the cut it grew _____ cm a month.

5. Tick **Cold or a scare**. What contracts? _____ What does the hair do? _____

READ FIRST. In the lab, find the **Learn It** box under the graph and read it. Then answer 6.

6. (a) Did cutting change the growth rate? Use the **hair bulb**. (b) Why does an eyebrow stay short? Use your Q2 numbers.

Part 2. Grow a nail (Tab 2)

SEP 4 Data · SEP 5 Math · CCC Scale, Proportion, and Quantity

7. Name all six pins. Then tick what each part is.

Part	Nail plate	Free edge	Lunula	Cuticle	Nail bed	Nail matrix
Living cells that make the plate	☐	☐	☐	☐	☐	☐
Dead, keratin-filled plate	☐	☐	☐	☐	☐	☐
Skin around or under the plate	☐	☐	☐	☐	☐	☐

8. Grow out the blue line. Record the distance from the cuticle.

Nail	Month	mm	Month	mm	mm per month	Months to the free edge
Fingernail	2		4			
Big toenail	5		10			

9. Case: grooves after a fever. Click each groove. Fingernail: _____ mm ÷ _____ mm a month = _____ months. Toenail: _____ mm ÷ _____ = _____ months. Same event? _____

Part 3. Hair evidence (Tab 3)

SEP 3 Investigating · SEP 7 Argument · CCC Structure and Function

10. Measure each sample with the blue lines. Medullary index = medulla ÷ hair width.

Sample	Hair width (µm)	Medulla width (µm)	Medullary index	Human, animal, or not a hair?
Hair from the scene				
Person A				
Person B				
The dog				
Car-seat fiber				

11. The scene hair's root is _____ (club or pulled), so it fell out in the _____ phase.

12. Your verdict: the scene hair is consistent with _____. Why can a microscope not prove whose hair it is?

DAY 2 Three kinds of gland sit in the dermis. Two make sweat and one makes oil. Find each one, then test which sweat glands switch on, and when.

☐ I can compare eccrine sweat, apocrine sweat and sebaceous glands by where they open, what they make and what they do.

☐ I can plan a fair sweat-print test and use its counts to explain what switches sweat glands on.

Part 4. Three glands (Tab 4)

SEP 2 Models · CCC Structure and Function · Stability and Change

Start with the **Armpit** at age 16. Click each gland and name it.

13. Fill in the table.

Gland	What it looks like	Opens onto the skin surface	Opens into a hair follicle	What it makes
Eccrine sweat gland		☐	☐	
Apocrine sweat gland		☐	☐	
Sebaceous gland		☐	☐	

14. Armpit, age 16. Try each setting. Tick every gland that releases something.

What is happening	Eccrine	Apocrine	Sebaceous
Cool and calm	☐	☐	☐
Exercise in a warm room	☐	☐	☐
Stress: giving a speech	☐	☐	☐

READ FIRST. In the lab, find the **Learn It** box and read it. Then answer 15 and 16.

15. Armpit, **Stress**, age 10 and age 16. Which two glands change, and how? Use the word **puberty**.

16. On the **Palm**, which glands are missing? Explain using where those glands empty and what **thick skin** lacks.

Part 5. Sweat-print test (Tab 5)

SEP 3 Investigating · SEP 4 Data · SEP 5 Math · CCC Patterns · Cause and Effect

17. Plan. Question: *is palm sweat for cooling or for grip?* Which runs answer it? List them, and name two things kept the same in every run.

18. Run the test. Count the dots in the window. Per cm^2 = dots × 20.

Site	Exercise, warm room: dots	per cm^2	Mental-math test: dots	per cm^2
Palm				
Upper back				

19. Switch to **Which site has the most sweat glands?** and use pilocarpine (every gland on).

Every gland on	Palm	Sole	Forehead	Forearm	Upper back	Thigh
Dots in the window						
Glands per cm^2						

Wrap it up

SEP 6 Explanations · SEP 7 Argument · CCC Cause and Effect

READ FIRST. In the lab, find the **Learn It** box on Tab 5 and read it. Then answer 20.

20. Claim: palm sweat glands are mostly for grip, and back sweat glands are for cooling. Give **evidence** from question 18 and your **reasoning**. Then say what the apocrine glands respond to.

NYSSLS: building toward HS-LS1-2 (DCI LS1.A Structure and Function) and HS-LS1-3 (feedback in temperature control). Anatomy & Physiology, Hole's Essentials 6.3: Accessory Structures of the Skin. Day 1: Hair and Nails (AP.3.6.4). Day 2: Glands of the Skin (AP.3.6.5). Tags: SEP = Science and Engineering Practice, CCC = Crosscutting Concept.