Skin Color Lab low-write

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Name _____

Date _____

Period _____

DAY 1 Skin has three pigments. The main one, **melanin**, is made by cells called **melanocytes**.

☐ I can explain what makes one person's skin darker than another's, using melanocytes and melanin.

☐ I can name the three pigments of skin and tell which one changed in a case.

Part 1. Inside the epidermis (Tab 1)

SEP 2 Models · SEP 4 Data · CCC Patterns · Structure and Function

Each skin: click every **melanocyte** (pale, with arms), a bottom-layer skin cell, then cells higher up. Press **Record this skin**.

1. Copy the numbers from **Three skins**. Tick the highest layer that still has granules.

Skin	Melanocytes	Cells in the bottom layer	Granules in one bottom cell	Stratum spinosum	Stratum granulosum	Stratum corneum
Light				☐	☐	☐
Medium				☐	☐	☐
Dark				☐	☐	☐

2. Tick one for each.

In the three skins, this is	The same	Different
The number of melanocytes	☐	☐
The number of melanin granules in a cell	☐	☐
How high up the granules last	☐	☐

3. (Like 40 cells ÷ 4 = 1 in every 10.) _____ cells ÷ _____ melanocytes = _____. About 1 cell in every _____ is a melanocyte.

4. Granules: dark _____ ÷ light _____ = _____ times as many. Melanocytes: dark has ☐ more ☐ the same number ☐ fewer

READ FIRST. In the lab, find the **Learn It** box under the drawing and read it. Then answer 5 and 6.

5. Zoom in on one cell. The granules sit ☐ under the nucleus ☐ in a cap over the nucleus ☐ all around the edge

The cap shades the cell's DNA from _____. **WORDS** sunlight · sweat · cold

6. A friend says, "People with darker skin have more melanocytes." The friend is ☐ right ☐ wrong

Because every skin had _____ melanocytes. Darker skin has more _____.

Part 2. Three pigments (Tab 2)

SEP 2 Models · SEP 6 Explanations · CCC Cause and Effect

7. Move one slider at a time. Write the letter of the color and the place. **COLOR** A. red · B. brown to black · C. yellow-orange

PLACE X. blood in the dermis · Y. the living epidermis · Z. the stratum corneum

Pigment	Color (A, B or C)	Place (X, Y or Z)
Melanin		
Carotene		
Hemoglobin (in blood)		

8. Solve the six cases. Test your idea with the sliders first. Tick what changed.

Case	More melanin	More carotene	More blood near the surface	Less blood near the surface	Blood low in oxygen	A different pigment
1. After a sprint	☐	☐	☐	☐	☐	☐
2. Two weeks at the beach	☐	☐	☐	☐	☐	☐
3. Cold pool	☐	☐	☐	☐	☐	☐
4. A lot of carrots	☐	☐	☐	☐	☐	☐
5. About to faint	☐	☐	☐	☐	☐	☐
6. Yellow eyes	☐	☐	☐	☐	☐	☐

READ FIRST. In the lab, find the **Learn It** box under the drawing and read it. Then answer 9 to 11.

9. Case number: **cyanosis** (bluish) _____ · **pallor** (pale) _____ · **jaundice** (yellow skin and eyes) _____

10. Case 6 is NOT carotene because of the: ☐ yellow palms ☐ yellow eyes ☐ warm skin

11. Blood at 9: the flush shows more with melanin at ☐ 1 ☐ 9 Nurses check lips for cyanosis: the skin there is ☐ thin ☐ thick

DAY 2 **Ultraviolet (UV) light** can break the DNA in living skin cells. Melanin soaks it up first.

☐ I can plan a fair test and use its numbers to explain how melanin and sunscreen protect skin from UV light.

☐ I can explain why a tan is a sign of damage, and why skin needs some UV but not too much.

Part 3. Time in the sun (Tab 3)

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

12. Plan. Question: *does melanin change how fast skin burns?* Tick one box in each row.

In my test	I change this	I keep this the same
Skin (Light, Medium, Dark)	☐	☐
UV index	☐	☐
Sunscreen	☐	☐
Minutes outside	☐	☐

13. Run it: UV index 8, no sunscreen, 20 minutes outside. Copy from **Your runs**.

Skin	Minutes to burn	Dose after 20 minutes	Burned: yes	Burned: no
Light			☐	☐
Medium			☐	☐
Dark			☐	☐

Example: one skin burns in 30 minutes and another in 90. 90 ÷ 30 = 3, so it lasts 3 times as long.

14. Dark _____ ÷ light _____ = _____ times as long. Light skin, SPF 15: _____ ÷ _____ = _____ times. More: ☐ melanin ☐ SPF 15

15. Light skin, no sunscreen. Change only the UV index.

UV index	2	4	8	10
Minutes to burn				

16. UV index doubles: time to burn ☐ doubles ☐ halves ☐ same Dark skin can burn: ☐ yes ☐ no UV 10: _____ min

Part 4. Grow a tan (Tab 4)

SEP 4 Data · CCC Stability and Change

17. Light skin. Run each amount of sun for 8 weeks. The sun shines on days 1 to 14 only.

Sun a day	Melanin first rises (day)	Peak: which day	Back to the start (day)	Burn days	Tan = sunscreen ×
10 minutes					
20 minutes					
40 minutes					

READ FIRST. In the lab, find the **Learn It** box under the drawing and read it. Then answer 18.

18. The sun stopped on day 14. The melanin kept rising until day _____. A "base tan" is ☐ good protection ☐ weak protection The best tan here works like SPF _____ and cost _____ burn days.

Part 5. The balance (Tab 5)

SEP 2 Models · SEP 6 Explanations · CCC Cause and Effect · Stability and Change

19. UV breaks down **folate**. Skin needs UV to make **vitamin D**. Circle every level that keeps BOTH bars green (70% or more).

Place	UV	Levels that work	Folate kept	Vitamin D made
Near the equator		1 2 3 4 5 6		
Halfway (30°)		1 2 3 4 5 6		
Far north (60°)		1 2 3 4 5 6		

READ FIRST. In the lab, find the **Learn It** box under the drawing and read it. Then answer 20 and 21.

20. Two people move. Set each one. Write the two numbers, then tick what would help.

Person	Folate	Vitamin D	Vitamin D from food or a pill	Shade, clothing, sunscreen
Level 6, living far north			☐	☐
Level 1, living at the equator			☐	☐

Wrap it up

SEP 6 Explanations · SEP 7 Argument · CCC Structure and Function

21. Claim: melanin is a sunscreen the body makes, but it is a weak one, and it comes with a trade-off.
Evidence: dark skin lasted _____ times as long as light skin, but SPF 15 lasted _____ times as long.
Trade-off: more melanin protects _____ but makes it harder to make _____. (folate · vitamin D · carotene)

NYSSLS: building toward HS-LS1-2 and HS-LS1-3. Hole's Essentials 6.2, skin color (AP.3.6.6). Burn times use rounded real sunburn doses. The tan, folate and vitamin D numbers are from a model made to show the pattern; they are not medical values. SEP = Science and Engineering Practice, CCC = Crosscutting Concept.