Skin Color Lab

Name _____

Date _____

Period _____

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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. Fill in the table from **Three skins**.

Skin	Melanocytes in the strip	Cells in the bottom layer	Melanin granules in one bottom cell	Highest layer that still has granules
Light				
Medium				
Dark				

2. The same in all three skins: _____. Different: _____ and _____.

3. About 1 cell in every _____ in the bottom layer is a melanocyte. Show your division: _____ ÷ _____ = _____

4. Dark skin has _____ times as many granules in a cell as light skin (_____ ÷ _____). It has _____ times as many melanocytes.

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. Where do the granules sit, compared with the nucleus? Use the words **UV** and **DNA** to explain what that position protects.

6. A friend says, "People with darker skin have more melanocytes." Use your table to answer the friend.

Part 2. Three pigments (Tab 2)

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

7. Move one slider at a time and watch the drawing on the right.

Pigment	Its color	Where it is in the skin
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. Write the case number. **Cyanosis** (bluish skin): case _____. **Pallor** (pale skin): case _____. **Jaundice** (yellow skin and eyes): case _____.

10. In case 6, what is the clue that the yellow is NOT carotene? Use where carotene collects to explain.

11. Set blood to 9 with melanin at 1, then with melanin at 9. In which skin is the flush easier to see? Use where melanin sits to explain why nurses check the lips and nail beds for cyanosis.

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?* What is the ONE thing you will change? Name three things you will keep the same.

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

Skin	Minutes to burn	Dose after 20 minutes	Burned?
Light			
Medium			
Dark			

14. Dark skin lasts _____ times as long as light skin. Now give the light skin SPF 15: it lasts _____ minutes, which is _____ times as long as with no sunscreen. Which protects more, melanin or SPF 15? _____

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

UV index	2	4	8	10
Minutes to burn				

16. When the UV index doubles, the time to burn _____. Can dark skin burn? Give one number from the lab as evidence.

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: how high, 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 _____. Is a "base tan" good protection? Use the word **damage** and two numbers from your table.

Part 5. The balance (Tab 5)

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

Folate helps build healthy new cells. UV breaks it down. **Vitamin D** builds strong bones. Skin needs UV to make it. Safe = 70% or more.

19. For each place, find every melanin level that keeps BOTH bars in the green.

Place	UV	Melanin level or levels that work	Folate kept	Vitamin D made
Near the equator				
Halfway (30°)				
Far north (60°)				

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, then say which number is low and what would help.

Person	Folate	Vitamin D	What would help
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. Give **evidence** from Part 3 and Part 5. In your **reasoning**, use the word **trade-off**.

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.