Bone Cells Lab

Name _____

Date _____

Period _____

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Do Now Braces move a tooth through solid jaw bone, about 1 mm a month. No drill. No cut. 2 minutes, before you open the lab

A. How could a tooth move through solid bone?

B. After you stop growing, what do your bones do? ☐ Stay the same ☐ Keep being rebuilt ☐ Slowly die

☐ I can compare osteoblasts, osteocytes and osteoclasts.

☐ I can explain the steps of bone remodeling.

☐ I can use the three cells to explain how braces move a tooth.

Part 1. Meet the cells (Tab 1)

SEP 2 Developing and Using Models · CCC Structure and Function

Pick a cell. Look inside the yellow ring. Answer both questions for that cell.

1. Where does each cell sit? Tick one in each row.

Cell A	☐ in a scooped pit	☐ in a row on the surface	☐ inside the bone
Cell B	☐ in a scooped pit	☐ in a row on the surface	☐ inside the bone
Cell C	☐ in a scooped pit	☐ in a row on the surface	☐ inside the bone

2. How does each cell look? Tick one in each row.

Cell A	☐ huge, many nuclei	☐ small, one nucleus	☐ dark space, thin threads
Cell B	☐ huge, many nuclei	☐ small, one nucleus	☐ dark space, thin threads
Cell C	☐ huge, many nuclei	☐ small, one nucleus	☐ dark space, thin threads

READ FIRST. In the lab, find the green **Learn It** box and read it. Then answer 3 to 5.

3. Name each cell and write its job.

Cell	Its name	Its job
A		
B		
C		

4. What does each word ending mean? -clast _____ -blast _____ -cyte _____

5. Do the five clues in the lab. Write the cell for each.

Clue	Cell
1. Lets out acid that dissolves bone mineral	
2. Walled in, with thin arms	
3. Works in a row, lays down new bone	
4. About 9 out of 10 bone cells	
5. Many nuclei in one big cell	

Part 2. Move the tooth (Tab 2)

SEP 3 Planning and Carrying Out Investigations · CCC Cause and Effect

Set the buttons. Move the slider to 6 months. Press **Record**. Do all three settings.

6. Copy from **Your records** .

Setting	Tooth moved at 6 months (mm)	Gap at 6 months (mm)
A on, B on		
A off, B on		
A on, B off		

7. Plan check. Why change only one cell type at a time?

_____

READ FIRST. In the lab, find the green **Learn It** box and read it. Then answer 8 to 10.

8. Cell type A was the _____. Cell type B was the _____.

9. A brace pulls a tooth. Which cell works on each side?

Side	What happens to the ligament	Which cell works here	What it does
Front side			
Back side			

10. Model check. Tab 2 is a model. Name one thing about a real tooth that it leaves out.

Part 3. Run a site (Tab 3)

SEP 5 Using Mathematics · CCC Stability and Change

Pick a site. Move the slider slowly to day 180. Do all three sites.

11. Copy from **Your results** .

Site	Dug out (µm)	Filled back (µm)	Change (µm)
Site 1			
Site 2			
Site 3			

12. Use Site 1. The pit is deepest at day _____. Digging rate = depth ÷ days = _____ µm a day.

13. Filling starts at day 30 and ends at day 180. That is _____ days. Filling rate = _____ µm a day. Digging is about _____ times as fast as filling.

READ FIRST. In the lab, find the green **Learn It** box and read it. Then answer 14 to 16.

14. Number the steps of remodeling from 1 to 4. ___ Osteoblasts fill the pit. ___ Osteocytes sense load or damage. ___ Some osteoblasts get trapped and become osteocytes. ___ Osteoclasts dig a pit.

15. Do the three cases in the lab. Which site fits?

Case	Site
An adult who walks every day: the bone stays the same	
An astronaut after six months: the hip loses bone	
A tennis player: the racket arm bone gets thicker	

16. One patch of bone has 10 cycles in a row like Site 2. Total change = _____ µm. **Model check:** the three sites are made up. Why might real bone not change by the same amount each cycle? _____

Explain it

SEP 6 Constructing Explanations · CCC Structure and Function

17. How can a tooth move through solid bone? Explain in three parts.

What I saw or measured	
The science idea	
How it explains the tooth	

NYSSLS HS-LS1-2, touching HS-LS1-1. Hole's Essentials, Section 7.4, Bone Development, Growth, and Repair. SEP = Science and Engineering Practice, CCC = Crosscutting Concept. Tooth rate: Wazwaz and others (2023). Times: Clarke (2008). Tab 3 is a model with round numbers.