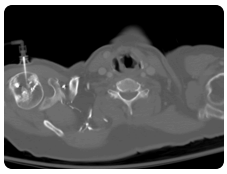
Inside a Long Bone Lab

Name _____

Date _____

Period _____

mrsajdak.com/longbone · © Ryan Sajdak · CC BY-NC-SA 4.0



Do Now A paramedic cannot find a vein. She drills a thin needle into a bone and pushes medicine in. This CT scan shows a needle in the top of a person's upper arm bone. 2 minutes, before you open the lab

A. How could medicine get from inside a bone into the blood?

B. What do you think fills the inside of a living bone?

☐ Nothing, it is hollow ☐ Soft living tissue ☐ Solid hard bone

☐ I can label the parts of a long bone.

☐ I can describe the function of each part.

☐ I can trace a needle from the skin to the marrow and explain why it reaches the blood.

Part 1. Find the parts (Tab 1)

SEP 2 Developing and Using Models · CCC Structure and Function

Pick a letter, or click a yellow spot. Look at it in the zoomed box. Visit all seven spots.

1. Spots A to C are on the real, cleaned bone. What do you see? Tick one in each row.

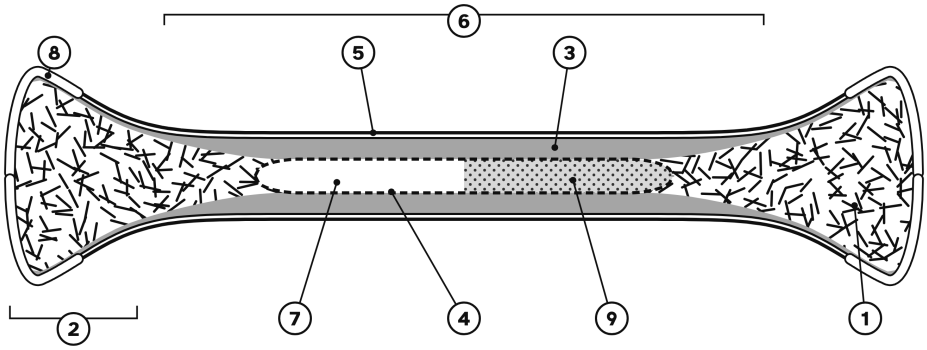
Spot C	☐ solid and pale ☐ net of thin plates ☐ dark empty space
Spot A	☐ solid and pale ☐ net of thin plates ☐ dark empty space
Spot B	☐ solid and pale ☐ net of thin plates ☐ dark empty space

2. Spots D to G are on the drawing of a living bone. What does each one do on the bone? Tick one in each row.

Spot F	☐ covers the end ☐ wraps the outside ☐ lines the channel ☐ fills the channel
Spot G	☐ covers the end ☐ wraps the outside ☐ lines the channel ☐ fills the channel
Spot D	☐ covers the end ☐ wraps the outside ☐ lines the channel ☐ fills the channel
Spot E	☐ covers the end ☐ wraps the outside ☐ lines the channel ☐ fills the channel

READ FIRST. In the lab, find the green **Learn It** box and read it. Then answer 3 to 4.

3. Label the bone in the lab (Step 2). Then write each part beside its number.



1		**4**		**7**	
2		**5**		**8**	
3		**6**		**9**	

4. Model check. The top picture is a real bone. The drawing is a model. Name two parts the real, cleaned bone has lost. Then name one thing the drawing does not show well.

_____

_____

Part 2. Test the shaft (Tab 2)

SEP 5 Using Mathematics · CCC Structure and Function

Measure lines **O** and **C**. Then set the slider to each cavity width in the table and press **Record this tube**.

5. The lab's numbers: outer width _____ mm. Cavity width _____ mm.

6. Wall = (outer − cavity) ÷ 2 = _____ mm.

7. Copy from **Your records** . The amount of bone is the same in every row.

Cavity width (mm)	Outer width (mm)	Wall (mm)	Strength (times a solid rod)
0			
11			
20			
30			

8. As the cavity gets wider, what happens to the strength? What happens to the wall?

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

9. Write one job for each part.

Part	Its job
Medullary cavity	
Periosteum	
Articular cartilage	
Red marrow	

10. Do the four cases in the lab. Which part failed in each?

Case	Part	Case	Part
1. The knee bones grind		3. Too few blood cells	
2. New bone grows from the outer sleeve		4. The cells lining the channel are damaged	

11. Model check. The 30 mm tube is the strongest in the table, but real femurs are not built that way. What might go wrong with a very thin wall?

Part 3. Trace the needle (Tab 3)

SEP 4 Analyzing and Interpreting Data · CCC Systems and System Models

Pick **Near the end**. Move the slider slowly to 25 mm. Do the same for **Middle of the shaft**.

12. Copy from **Your results** . Then find how thick Layer 3 is: drop depth − jump depth.

Site	Push jumps to 9 at (mm)	Push drops at (mm)	Layer 3 is (mm thick)
Near the end			
Middle of the shaft			

13. Which site has the thinner hard layer? ☐ near the end ☐ middle of the shaft

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

14. Name the layers in order, from the outside in: skin and fat → _____ → _____ → spongy bone and _____

15. In the study, the first try worked 91% of the time in the tibia and 43% in an arm vein. 91 ÷ 43 = _____. The tibia worked about _____ times as often.

Explain it

SEP 6 Constructing Explanations · CCC Systems and System Models

16. Why does a needle in a bone get medicine to the heart? Explain in three parts.

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

NYSSLS HS-LS1-2, touching HS-LS1-1. Hole's Essentials, Section 7.2, Bone Structure. SEP = Science and Engineering Practice, CCC = Crosscutting Concept. Data: Reades and others (2011). Tab 3 depths are a model.