Bones of the Foot Lab Low-write

Name _____
Date _____
Period _____

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Do Now Four people stepped in ink, then on paper. These are their footprints. 2 minutes, before you open the lab

A. Look at the print on the far left. Which part of the foot left no ink?
☐ The toes ☐ The middle of the inside edge ☐ The heel

B. Why might part of a foot not touch the floor?

_____

☐ I can locate and name the bones of the foot.

☐ I can explain how the shape of the foot's bones fits their job of holding up the body.

Part 1. Name the 26 (Tab 1)

CCC 4 Systems and System Models

Click every bone on the photo. The lab names it and counts it. Turn on **Color the groups**. Copy from **Your bones**.

1. How many bones are in each group?

Group	Tarsals	Metatarsals	Phalanges	Total
Number of bones				

2. Click the toe bones one at a time. The big toe has _____ phalanges. The second toe has _____. The group in the heel and ankle is the ☐ tarsals ☐ metatarsals ☐ phalanges.

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

Example (not this one): 30 of 120 marbles are red. 30 ÷ 120 = 0.25. 0.25 × 100 = **25%**.

3. SEP 5. Two feet have _____ bones. Your whole body has 206. What percent of your bones are in your feet? _____ ÷ 206 × 100 = _____ %

4. Metatarsal 1 is on the ☐ big-toe side ☐ little-toe side. The tip bone of each toe is the ☐ proximal ☐ middle ☐ distal phalanx. Your hand has _____ bones and your foot has 26. The foot has one fewer ☐ ankle bone ☐ toe bone.

5. Press **Real X-ray**. Name the bone at each letter. Two names are not used.

WORD BANK Talus · Cuboid · Metatarsal 1 · Navicular · Calcaneus · Sesamoid bone · Distal phalanx (big toe)

Letter	A	B	C	D	E
Bone					

Part 2. The ankle and heel (Tab 2)

CCC 6 Structure and Function

Click the tibia, fibula, talus, calcaneus and navicular. Turn the foot with the view buttons. Copy from **Your bones**.

6. Fill in the table. "Touches" means the gap between the bones is 2 mm or less.

Bone	Volume (cm^3)	Touches
Tibia	not measured	
Fibula	not measured	
Talus		
Calcaneus		
Navicular		

7. SEP 5. The biggest bone in your table is the ☐ talus ☐ calcaneus ☐ navicular. Calcaneus ÷ navicular = _____ ÷ _____ = _____. So the heel bone is about _____ times bigger.

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

8. Which foot bone carries all of your weight from the leg? ☐ talus ☐ calcaneus

I know because the tibia and fibula touch only _____.

9. The bump on the **inside** of your ankle is the end of the ☐ tibia ☐ fibula. The bump on the **outside** is the end of the ☐ tibia ☐ fibula.

10. CCC 6. The calcaneus is the biggest foot bone. Tick one job that needs a big, strong heel bone.

☐ It hits the ground first in each step. ☐ It helps you wiggle your toes. ☐ It makes the bump on your ankle.

Also, the Achilles tendon pulls on it to _____.

Part 3. The arch (Tab 3)

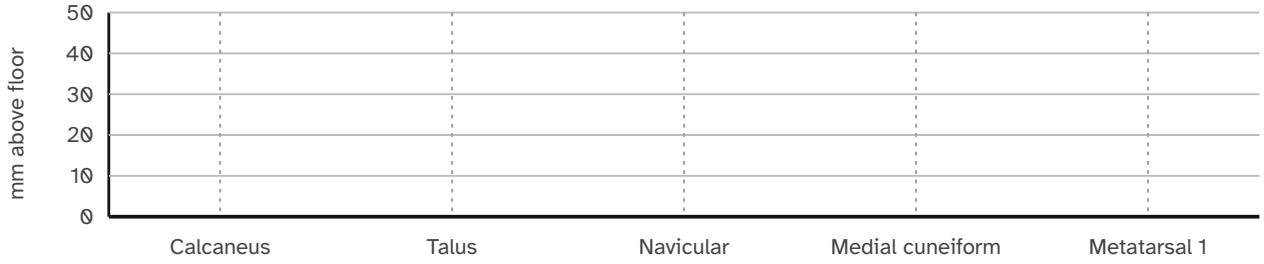
SEP 2 Developing and Using Models · CCC 6 Structure and Function

Click each bone below. Use **Inside** for the first five and **Outside** for the cuboid. The lab shows how high each bone's lowest point is above the floor.

11. Copy the heights from **Your heights**. The inside bones go in order from heel to toe.

Bone	Calcaneus (heel)	Talus	Navicular	Medial cuneiform	Metatarsal 1	Cuboid (outside)
Height (mm)						

12. Plot the five inside heights as dots, heel on the left. Connect them. Then press **Show what touches the floor** and try **From above**. Tick the bones that touch the floor: ☐ calcaneus ☐ talus ☐ navicular ☐ metatarsals



READ FIRST. In the lab, find the green **Learn It** box and read it. Then answer 13 to 16.

WORD BANK arch · joint · ligament

13. Your graph makes a low, high, low shape. This curve is called an _____. The inside arch is higher than the outside arch. Use 11: the navicular (inside) is _____ mm up, the cuboid (outside) is _____ mm up.

14. Press **Footprints**. The flattest foot made print _____. In a flat foot, the navicular ☐ drops toward the floor ☐ rises higher.

So the footprint fills in because the middle of the foot _____.

15. Model check (SEP 2). This lab is a model of a real foot. (a) The arch is held up by more than bones. Tick each thing the model leaves out that helps hold it up. ☐ ligaments ☐ the talus ☐ the plantar fascia (b) Look at letter E on the real X-ray. The model has no ☐ sesamoid bones ☐ toe bones ☐ heel bone.

16. Explain it (SEP 6). How can 26 small bones hold up your whole body? Build the explanation in three parts.

Part	Your explanation
What happens (where your weight goes into the foot and down to the floor)	My weight goes from the tibia into the _____, then down to the ...
The science idea (how the bones' shapes and the arch fit the job)	The bones make an arch, so ...
How the evidence shows it (use two numbers from this lab)	The calcaneus is _____ mm up, but the navicular is _____ mm up, which shows ...

NYSSLS: HS-LS1-2 (a model of a system and its parts) and HS-LS1-1 (structure and function). Hole's Essentials 3e, Section 7.12 Lower Limb (pp. 264 to 269) (AP.4.7.3). Bones: the right foot of a 26-year-old man, CT scan from the Virtual Skeleton Database (SMIR), CC BY-NC-SA 4.0; all lengths, volumes, gaps and heights measured from the scan. X-ray: Mikael Häggström, CC0. Footprints: Juan Carlos Fonseca Mata, CC BY-SA 4.0. SEP = Science and Engineering Practice, CCC = Crosscutting Concept.