Bones of the Foot Lab

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 _____. Which group is in the heel and ankle? _____

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

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 _____ phalanx. Your hand has _____ bones and your foot has 26. Which group does the foot have fewer of? _____

5. Press **Real X-ray**. This is a living person's foot. Name the bone at each letter.

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. Use the **Inside**, **Outside**, **Back** and **Front** buttons to turn the foot. 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 _____. 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? _____ Use your table in 6 to explain how you know.

_____

9. The bump on the **inside** of your ankle is the end of the _____. The bump on the **outside** is the end of the _____.

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

_____

Part 3. The arch (Tab 3)

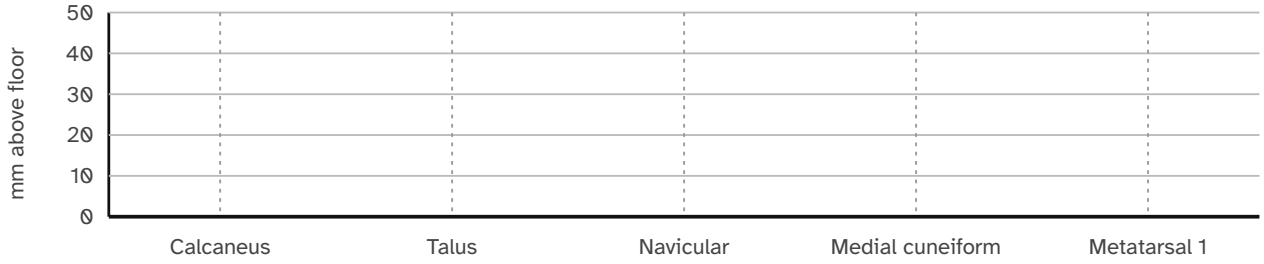
SEP 2 Developing and Using Models · CCC 6 Structure and Function

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**. Name two bones that touch the floor: _____ _____



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

13. Your graph makes a low, high, low shape. This curve is called an _____. The inside arch is higher than the outside arch. Which two numbers in 11 show that? _____ mm and _____ mm.

14. Press **Footprints**. The flattest foot made print _____. In a flat foot, what happens to the navicular, and why does the footprint fill in?

15. Model check (SEP 2). This lab is a model of a real foot. (a) The arch is held up by more than bones. Name one thing the model leaves out that helps hold it up. _____ (b) Look at letter E on the real X-ray. What does the model miss? _____

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)	
The science idea (how the bones' shapes and the arch fit the job)	
How the evidence shows it (use two numbers from this lab)	

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.