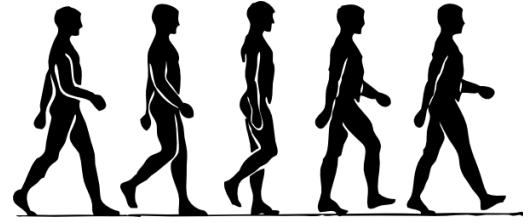


Name: _____

Investigation: What is the Relationships Between Stride Length and the Bones of the Leg?



Objectives:

- Gather data from classmates to determine the relationship between foot length, leg length, height and stride.
- Reinforce terms related to the skeletal system

Materials: Meter Stick or Tape Measure, Computer (Excel or Google Sheets) to Graph Data, or Graph Paper

Hypothesis: Write a statement that indicates which measurement (foot length, femur length, ulna length) can be used to predict height.

Measurements: All measurements should be done in **centimeters**. Gather data from 4 individuals, you can use data from your own group and share with another group to complete the table.

	Foot length	Femur Length	Ulna Length	Height
Subject 1				
Subject 2				
Subject 3				
Subject 4				

Foot length: distance from back of heel to toe

Femur length: distance from lateral epicondyle to acetabulum

Height: distance from floor to the top of the head

Ulna Length: distance between elbow and bulge of the styloid process at wrist

Assign each member of your group to graph one of the variables and height. Height should be on the Y axis, and the other bone lengths should be placed on the X axis. You will have one line for each subject.

Analyzing Data

1) After analyzing each of the graphs created, which two variables have the strongest correlation based on your data. Explain how you know this. (Attach all graphs to this page.)

2) A person has an ulna length of 26 centimeters. Use your graphs to estimate this person's height: _____

A person has a foot length of 22 centimeters. Use your graphs to estimate this person's height: _____

Part II What is the Relationship Between Foot Length and Stride Length

Instructions:

1. Mark a distance of 20 meters, your instructor may have done this already in the hallway.
2. Walk the length by counting the number of steps.
3. Calculate the stride length (Distance / Number of Strides)
3. Measure the leg length, distance from heel to hip
4. Use your data from the last exercise for foot length.
5. Calculate stride length to leg length ratio. (Stride / Leg)
6. Collect data from 6 different subjects.

	Foot length	Leg Length	Stride Length	Stride/Leg
Subject 1				
Subject 2				
Subject 3				
Subject 4				
Subject 5				
Subject 6				

Analyzing Data:

Create another graph showing the relationship between **stride length and leg length**. Place Stride length on the X axis and leg length on the Y axis. Create plot points for each of your subjects. This will not be a straight line, but should show a general relationship. Attach the graph to this page.

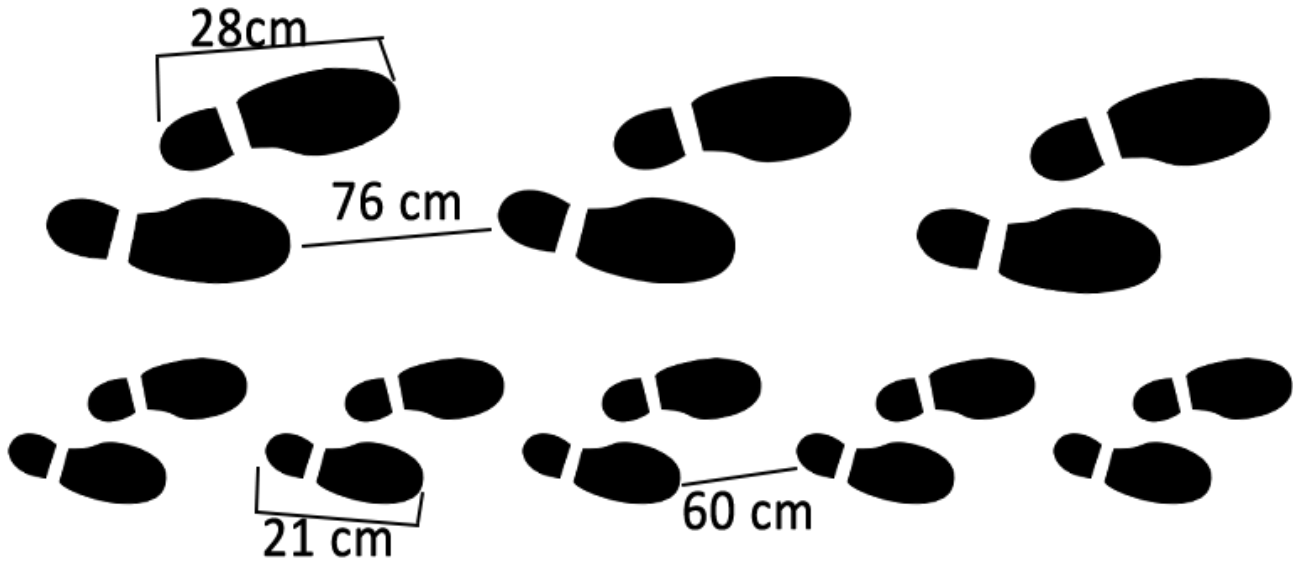
- 1) Do you see a pattern in the graphs? What seems to be the relationship between stride length and leg length? (Summarize in a complete sentence).

- 2) Using both sets of data, describe how you could determine a person's height if you know his stride length.

- 3) Of the variables tested, which one do you think is the most accurate for determining a person's height? Defend your choice using data from your experiments.

Extension Questions

4) A burglary occurred and police identified two sets of footprints at the scene of the crime. Use the graphic shown to estimate the height of the two burglars based on their foot length and stride length. Defend your estimate by referencing data from any of the graphs you created in this activity.



5) Forensic scientists can also estimate the weight of a person based on footsteps. Design an experiment where you could test whether footsteps and weight can be correlated.

6) Paleontologists find “footprint tracks” of apes, humans, and ancient hominids. Features of the tracks can provide information about size, gait, and even whether the animal was bipedal or quadrupedal. Compare the footprints shown of human (bipedal) and a chimpanzee (quadrupedal). List two similarities and two differences evident from the image.

