Name: _____ Date: _____ Period: _____

LENGTHY RELATIONSHIPS

Look around at people's feet. You will notice that some people have longer feet than others. Do the individuals with longer feet also have longer legs? Are people with longer legs taller? Are the number of strides a person takes in a given distance different when he/she is running or walking? Does the person's stride length change with speed?

You will gather data from classmates to determine if there is a relationship between foot length, leg length, and height. You will also measure your stride while walking and running. Use the following terms when taking your measurements:

- **foot length:** distance from back of heel to toe tip (without shoe)
- **leg length:** distance from the base of the heel (calcaneus) to the hip joint (acetabulum)
- **hip joint:** top of femur on the outside of the hip joint (To find this spot, lift your knee until your thigh is parallel to the floor. Feel for the hip joint in your buttocks area, put your leg down, and measure from that point to the floor.)
- **height:** distance from floor to the top of the head (without shoes on)
- **stride length:** usually the distance from the back of the heel of one footprint to the back of the heel of the next footprint of that same foot; in other words, the distance of **TWO** steps.

OBJECTIVES: To find the relationships between:
- A. Foot Length and Leg Length
- B. Foot Length and Height
- C. Leg Length and Height
- D. Stride Length and Leg Length
- E. Stride Length and Speed

PART A:
1. In your lab group, gather the following data from each member and record them in your Data Table 1: **foot length, leg length, height** (all measurements must be in centimeters)
2. Calculate the ratio of **leg length** (L) to **foot length** (F) for each group member and record in Data Table 1. Leg length will be divided by foot length.
3. Calculate the ratio of **Height** (H) to **foot length** (F) for each group member and record in Data Table 1.
4. Plot your data on a graph. Do this by placing **foot length** on the x-axis, and **leg length** on the y-axis. Draw a line of best fit through the middle of that group of data points.

Data Table 1					
Person	**Height (H)**	**Foot Length (F)**	**Leg Length (L)**	**L/F Ratio**	**H/F Ratio**
You					

PART B:

1. Outside of the classroom I've marked off a 20m distance (D).
2. Have each member of your group walk the length while counting the **number of strides** (Nw). Record in Data Table 2.
3. Run the length while counting the **number of strides** (Nr). Record in Data Table 2.
4. Calculate the **stride length** (S) by dividing the **distance** (D) by the **number of strides** (N). **Walking**: Sw = 2,000cm / Nw;   **Running**: Sr = 2,000cm / Nr
5. Use your **leg length** from Data Table 1 to calculate the ratio of your **stride length** to **leg length** (S/L). Record in Data Table 2.
6. Draw a graph using the data showing the relationship between walking stride length and leg length. Make a scatter graph for this, placing **stride length walking** on the x-axis and **leg length** on the y-axis. Draw a line of best fit through the data points.

Data Table 2						
Person	**Walking Strides (Nw)**	**Running Strides (Nr)**	**Stride Length Walking (Sw)**	**Stride Length Running (Sr)**	**Sw/L Ratio**	**Sr/L Ratio**
You						

DISCUSSION AND CONCLUSION:

1. Describe the pattern you see in the graph of foot length vs. leg length. Explain the relationship that you see (negative, positive, random).

2. Describe the pattern you see in the graph for stride length walking vs. leg length. Explain the relationship you see (negative, positive, random).

3. Why did you count your stride over a 2,000 cm length rather than make only one stride measurement?