Math Lab:
Direct Variation with Arm Span Data

Materials: graphing calculator, tape measure, and ruler.

Directions:

• Stretch your arms as wide as you can. Have someone measure the length, in inches rounded to the nearest quarter inch, of your arm span from the tip of your fingers on one hand, across your back, to the tip of your fingers on your other hand. Have the person also measure your height, in inches rounded to the nearest quarter inch. Place a ruler horizontally on the top of your head to indicate the location of your maximum height (as not to include the height of your hair.) Now, measure your height by having someone extend the tape measure from the ruler to the floor vertically. Record this information in the appropriate rows in the table below. Switch places and measure the arm span and height of your partner. Record this information in the appropriate rows in the table below.

• Gather at least 8 arm span and height data pairs from your surrounding classmates. Record this information in the appropriate rows in the table below.

	You	Partner	CM 1	CM 2	CM 3	CM 4	CM 5	CM 6	CM 7	CM 8
Height (inches)										
Arm Span (inches)										
Ratio $\frac{rise}{run} = \frac{height}{arm\ span}$										

• What would the arm span be for a person with height 0 inches? This point is your y-intercept.

• Average the ratio of height to arm span. This is the slope of the line. Show your work.

• Use the slope and y-intercept to write an equation for the line of best fit.

• Use this equation to predict the arm span of a person who is 5 feet tall. Show your work.

• Use this equation to determine the height of a person who has an 8 foot arm span. Show your work.

• How reliable is this last prediction?   Explain.

• Olympic swimmer Michael Phelps is approximately 6 feet 4 inches tall. Using the equation, predict Michael Phelps' arm span. Show your work.

• Michael Phelps' arm span is one of the reasons for his success in the pool. His arm span is 6 feet 7 inches. His arms act more or less like paddles propelling him through the water. How does Phelps' real arm span compare to your prediction? What factors could make your prediction and his actual arm span different?