Heights vs. Wingspan

Content Standard: S-ID.7 - Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data.
Standards for Mathematical Practice:

MP.2 Reason abstractly and quantitatively.
MP.4 Model with mathematics.

1. Measure your height and wingspan in cm. My height:_____ My wingspan:_____

2. Record your class' data.

Height (cm)																		
Wingspan (cm)																		

3. Make a scatterplot on graph paper, with height as the independent variable, and wingspan as the dependent variable.

4. Sketch a line of best fit and write an equation that represents the line you sketched.

5. What is the slope of your equation? How would you interpret that slope?

6. What is the value of your y-intercept? How would you interpret that y-intercept?

7. Does the point representing your height and wingspan fall on the line? Count how many other points fall on the line of best fit. Can you explain what it means when a particular point doesn't fall on the line?

8. How tall is the shortest person in your class? Can you predict the height of someone that is 30 cm shorter? How tall is the tallest person in your class? Can you predict the height of someone that is 30 cm taller?

Heights vs. Wingspan (Solution)

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The first four questions in this task do not have a correct answer. The class will use their own data to answer them. I would recommend doing these questions as a class.

5. What is the slope of your equation? How would you interpret that slope?
The slope is [the coefficient of x]. It means that for every 1 cm you grow, your wingspan will increase by [that number].

6. What is the value of your y-intercept? How would you interpret that y-intercept?
The y-intercept is [the constant term]. It is the expected wingspan of a person who is 0cm tall. This intercept doesn't really make sense in the context of this problem, since people do not have heights of 0 cm. Hopefully it will bring up a good class discussion about the relationship between the domain of a function and the specific modeling context.

7. Does the point representing your height and wingspan fall on the line? Count how many other points fall on the line of best fit. Can you explain what it means when a particular point doesn't fall on the line?
Most students' points will not be on the line. Again, this will hopefully drive home the point that lines of best fit represent what we EXPECT or predict, not what we actually OBSERVE.

8. How tall is the shortest person in your class? Can you predict the height of someone that is 1 foot shorter? How tall is the tallest person in your class? Can you predict the height of someone that is 1 foot taller?
Here the students would examine the data to find the tallest and shortest person in the class. They would then use the equation to predict a person with height [shortest – 30 cm] and [tallest + 30 cm].

<u>Fun Extension Questions</u>

1. Use technology (such as a CAS or a spreadsheet program like Excel) to plot a line of best fit to your height and wingspan data.

2. Now find the average height, and the average wingspan for the members of your class.

3. Plot the coordinate (average height, average wingspan). Does this coordinate fall on your line of best fit? Will it always happen that the coordinate represented by the average of the x and y values is on the line of best fit? Make a hypothesis and justify your answer.