

PreCalculus Linear Project Body Measurement Relationships

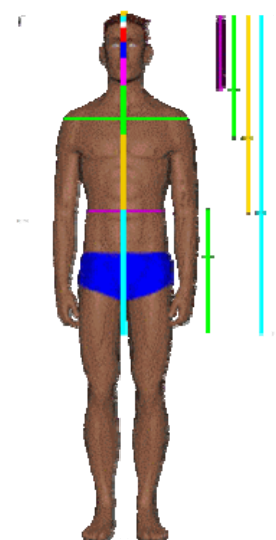
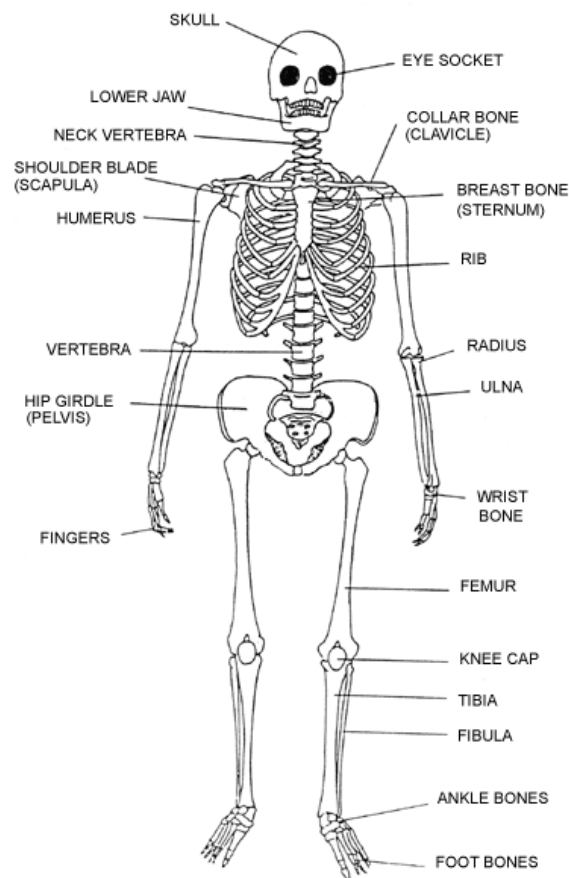
Relationships between body measurements are used in forensic anthropology to predict values for unknown body measurements. Artists also use relationships between body measurements to create realistic images. In this project, we will measure many people, analyze relationships between different variables and make conclusions about the validity of our predictions.

Measure five people (yourself and four others) and fill out the attached body measurements record. Record all measurements in centimeters. Aim for a variety of ages. No overlap allowed (find someone else.)

We will analyze height compared to arm span in class as an example project. Each group of two will compare the relationship between two different variables. Your *typed* report (not a list of answers) should include the following:

- Description of your project.
- Scatter plot of your two variables, with a graph of your linear regression equation (least squares line) and residual plot.
- Descriptions of what
 - the slope and
 - the y-intercept *mean* for your equation.
- Use UNITS and values in your description!
- Description of what the residual plot says about your data and your linear regression.
- Description of any outliers and what effect they have on your linear model.
- The correlation coefficient (r , not r^2) and a description of what it says about your data and your linear regression.
- If there are outliers due to measurement error, see me to approve deletion. Include your new scatter plot and linear regression model. Compare the new correlation coefficient to the previous one.
- Set the y-intercept to zero for another linear model. . Include your new scatter plot, linear model and residual plot. Explain the meaning of the slope for this model. Compare the slopes between the linear regression model and the y-intercept set to zero model.
- One value interpolated for each model. Show steps. Compare results.
- One value extrapolated for each model. Show steps. Compare results.
- Conclusion – Which model is better? Can your model predict an unknown measurement accurately?

Read the rubric before handing in your report. This is my checklist for grading your report.



Name _____

Grade _____

PreCalculus Linear Project: Body Measurements Rubric

0	-	$\sqrt{-}$	$\sqrt{}$	$\sqrt{+}$	+
Not done	Below standard on a major point or a major mistake	Below standard on a minor point or a small mistake	Meets standard, all areas correctly performed	Above standard on a minor point or in small way	Above standard on a major point or in an impressive way
-10	-5	-3	0	+2	+4
Your report: organized, clearly written, spelling, neatness					
Introduction: description of your project and goal					
Scatter plots: plot, accurately labeled, includes line of best fit and residual plot					
Identify the slope for your line. What does the slope of this line mean? Use values and units to explain.					
Identify the y-intercept from your equation. What does the y-intercept mean in this experiment? Does this match what you think it should be?					
Discuss your residual plot . What does it tell you about the data and the line of best fit?					
Outliers: Description of any outliers and what effect they have on your linear model.					
Discuss your correlation coefficient . What does it tell you about your data and the line of best fit?					
Outlier deletion model: scatter plot, linear regression graph and equation, residuals and correlation coefficient. Compare the correlation coefficient with the previous model.					
Zero y-intercept linear model: line on scatter plot, equation, residual plot					
Identify the slope for your line. What does the slope of this line mean? Use values and units to explain. Compare this slope to the linear regression slope.					
Interpolate a value for each model. Show your steps. Compare your results.					
Extrapolate a value for each model. Show your steps. Compare your results.					
Conclusion Which model is better? Can your model be used to predict an unknown measurement accurately?					
Timeliness you will lose points if your report is late					

