

Project and Presentation - You may work in pairs

Leonardo da Vinci, the great painter and scientist of the late 15th and 16th centuries, studied human body and provided detailed accounts of the relationships among various body parts. Leonardo's work on how the size of one part is related to that another was for the purpose of instructing painters on how to paint the human body, but some of these relationships are of practical interest as well. (Shirt makers might be interested in the relationship between arm length and circumference of the neck for one example. Forensic scientists can estimate height from many bones in the human body for another example.) In this activity we will investigate the accuracy of some of your Leonardo's pronouncements by modeling relationships between the sizes of various body parts.

Objective: To collect data and use regression analysis to establish a relationship between two variables and to use this relationship to make predictions.

Activity:

1. Read the article on Leonardo's view of the human body and read the assignment.
2. Choose two of the relationships mentioned in the article to investigate. Clearly state what relationships you are studying listing the variables you need to measure in order to investigate the relationships you chose. You cannot use Height to wingspan. I suggest you do not choose any that requires measuring small distances. e.g upper lip as these are hard to get right.
3. Decide and document how you will measure these parts on a person. Accuracy and consistency are important. Describe what measures you will take to overcome common or special cause variation.
4. Collect your data from at least 30 students . It may be a good idea to record the names along with the measurements in case you need to remeasure.
5. Complete a correlation study on each ratio. There must be a relationship and $r > 0.5$.
6. Describe how well the LOBF models the ratios chosen and discuss any limitations of the model.
7. Calculate the average ratio of your sample and compare to the slope of your LOBF.
8. Plot Leonardo's stated ratio as a line on your plots. Compare your findings with Leonardo's statements. Pay particular attention to the ratios, and the slope and y-intercept of the regression line, and how these relate to Leonardo's conjectures.
9. Test your model by measuring an previously unmeasured person. Describe how well your model works.

You will have an opportunity to present your findings to the class.

Gallery Walk Grading Rubric

Use these categories when grading the presentations

Rate each of these on a scale of 1 to 4. Do not use decimals.

4 means they made it clear to you and it is correct.

1 means you had to work hard to find the answers and/or they are incorrect.

Do not use decimals.

A	Overcoming common or special cause variations or other sources of errors.
B	Scatterplots: Neatness, clarity, and graphing conventions, and description of patterns.
C	LOBF: Accuracy, work, and description.
D	Comparison to Leonardo's conjectures: especially connection to slope and intercept.
E	Testing the model, and description.

Teacher content grading

Leonardo's Model Bodies Rubric	points per study
Graphing Conventions	5
Scatter Plots	5
a, b, r	6
H-Test (5 steps)	10
LOBF - how well it works, limitations	5
Leo's comparisons (ratio, slope, y-int)	6
Test of random person	5
	38 per study for a grand total of 76