



Chapter 2 Project

Bone Length and Height

Your bones tell a lot about your body. Archaeologists and forensic scientists study bones to estimate a person's height, build, and age. These data are helpful in learning about ancient people and solving crimes. The lengths of major bones, such as the humerus, radius, and tibia, can be substituted into formulas to estimate a person's height.

Throughout this project, you will collect data from your classmates and from adults. You will use the formulas to analyze the data and predict heights. Then you will decide how to organize and display your results in graphs and tables.

Needed Materials:

- Calculator
- Tape measure or ruler
- Graph paper

Activity 1: Graphing

- Measure the length of your radius bone to the nearest half inch.
- Collect the measurements taken by your classmates. Make sure to note whether each measurement is that of a male or female. Display the data in a graph.
- Find the mean, median, and mode of the data. Write a description of the data in your graph.

Activity 2: Calculating

Scientists use the formulas in the table at right to approximate a person's height H , in inches, when they know the length of the tibia t , the humerus h , or the radius r .

- Use your tibia, humerus, and radius bone lengths to calculate your height. Are the calculated heights close to your actual height? Explain.
- An archaeologist found an 18-inch tibia on the site of an America colonial farm. Do you think it belonged to a man or a woman? Why?
- Choose one radius measurement from the data you collected for Activity 1. Calculate the person's height. Can you tell whose height you have found? Explain.

Male
$H = 32.2 + 2.4t$
$H = 29.0 + 3.0h$
$H = 31.7 + 3.7r$
Female
$H = 28.6 + 2.5t$
$H = 25.6 + 3.1h$
$H = 28.9 + 3.9r$

Activity 3: Analyzing

When predicting height, scientists use different formulas for men and women.

- Review the data collected in Activity 1. Organize the data by male and female.
- Organize and display data to see if there are differences between the heights of male and female.

Activity 4: Creating

In this activity, you will analyze data from adults.

- Measure the tibia, humerus, and radius bones, and the heights of three adults to the nearest half inch. Create a table or spreadsheet to organize the measurements. Use the formulas for Activity 2 in your spreadsheets to predict the heights of the adults.
- Compare the predicted heights with the measured heights. Does one of the formulas predict height better than the other formulas? Explain.

Finishing the Project

Your answers from the four activities should help you complete your project. Assemble all the parts of your project in a folder. Include a summary of what you have learned about using the height formulas. What difficulties did you have? Are there ways to avoid these difficulties? What advice would you give an archaeologist or forensic scientist about predicting heights from bone length? This should be about one page, typed, double-spaced.

Your project must be typed and have great grammar, punctuation, and spelling. Take care to label your graphs accurately and make sure your calculations are accurate. Ensure that your explanations are clear and correct.

Project Due Date: _____

Grading Rubric

85 – 100	Appropriate types of graphs and charts are chosen. Graphs are labeled correctly and completely, and show accurate scales. Formulas and calculations are accurate. The spreadsheet or table presents data clearly and is easy to follow. Explanations are clear and correct.
70 – 84	The spreadsheet or table is complete and clear. The graph and formulas are appropriately chosen and used. There are minor errors in scale or computation. Reasoning and explanations are essentially correct, but sometimes awkward or unclear.
60 – 69	Graphs and selected formulas are somewhat correct. Calculations contain many errors. Explanations are not adequate.
Below 60	Major elements of the project are incomplete or missing