Activity Sheet

Heights, Jumps, and Sports

Ms. K's class is interested in exploring the relationship between a person's height and his/her ability to jump vertically as well as the relationship between their gender and whether they like sports. To do this, the class decides to measure the height and vertical jump ability of each student in the class using a specific test procedure. The procedure consists of taping measuring tapes to the wall and measuring the height of a person as well as how high they jump. To reduce measurement variation and increase accuracy, the same person will measure all the vertical jumps. Additionally, each student will jump 3 times and their biggest jump of the three will be recorded.

After completing the jump measurement, each student is asked to record their gender and answer the question: "Do you like to play sports?" The data collected from one class are given in the table.

Gender	Height (in)	Vertical Jump Height (in)	Likes Sports
male	72.5	22.5	Yes
female	70	18.5	Yes
male	71	17	No
female	64	17	No
female	69	16.5	Yes
male	72.5	27.5	Yes
female	64.75	12.5	Yes
male	70	16	Yes
female	67.5	5.5	No
female	66	12	Yes
male	65.5	20.5	Yes
female	66.75	13.5	No
female	59.25	11	No
male	69.25	16	No

1. Represent Height and Vertical Jump on a scatter plot.

2. Looking at your data, does there appear to be a pattern? If so, describe it.

3. Would you consider the pattern to be strong, moderate, or weak?

4. Sketch what you consider to be the "line of best fit" for the data. Find the approximate equation of this line algebraically. Do NOT use the computer for this step.

5. When you drew the "line of best fit", how did you decide to draw the line?

6. Why don't all the data points lie on the line of best fit?

7. Enter your data into data software and create a scatterplot. Find the equation of the least-squares line using data software.

8. Explain the meaning of the value of the slope in the context of the problem.

9. Find the average of the x values. Find the average of the y values. Plot the point: (average of x values, average of y values). Does it fall on the line?

10. Based on the equation of the line you found in #7, compute the estimated jump for a student that is 69 inches tall.

11. There was a student in the data set who is was 69 inches tall. Find the **residual** associated with that student and explain what the residual means in the context of the problem.

12. Fill in the following table with the predicted values and the residuals:

Height (in)	Vertical Jump Height (in) (Actual Value)	Predicted Y value by your equation	Residual (Predicted value – Actual value)
72.5	22.5		
70	18.5		
71	17		
64	17		
69	16.5		
72.5	27.5		
64.75	12.5		
70	16		
67.5	5.5		
66	12		
65.5	20.5		
66.75	13.5		
59.25	11		
69.25	16		

13. What is the sum of the residuals?

14. Use data software to make a residual plot. What does the plot display? How is the display related to the values in the table? How is the display related to the original scatterplot?