

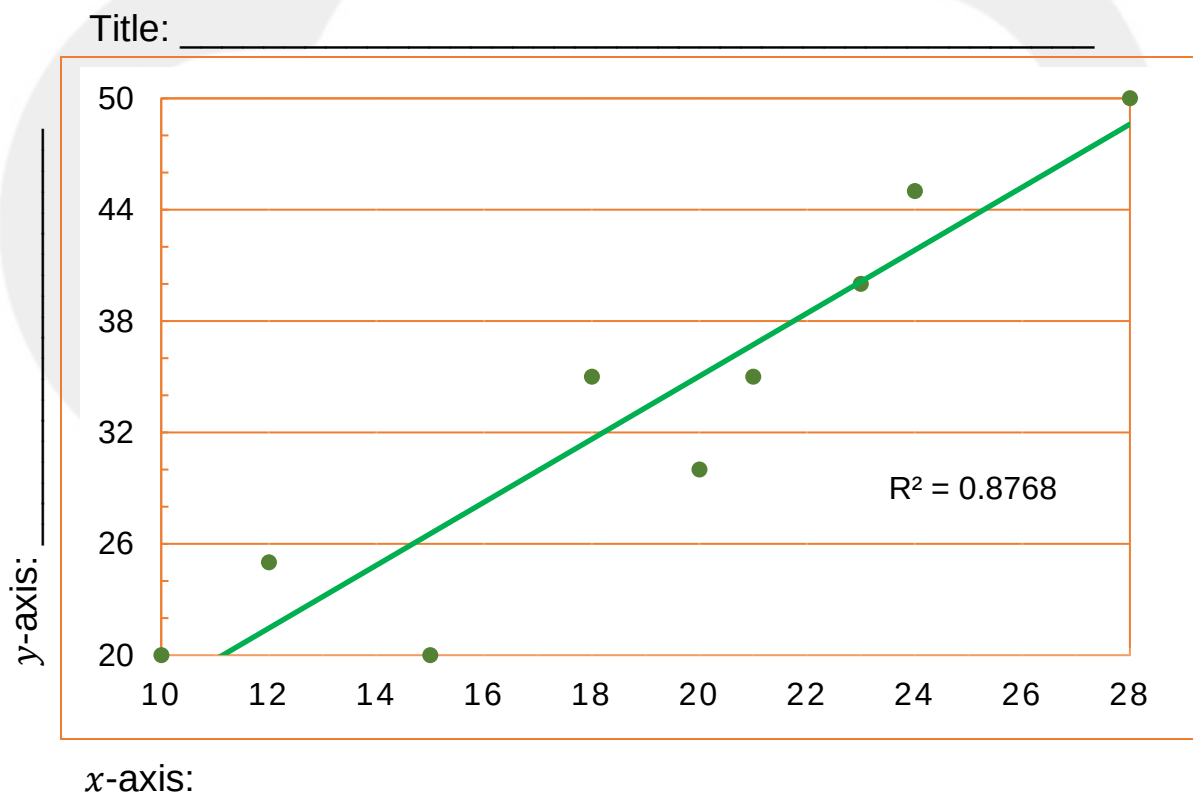
Scatter Plots

Cricket Chirps

As crickets are cold-blooded insects, they take on the temperature of their surroundings. Temperature has an effect on their chirping, mobility and activity (all temperature-dependent phenomenon).

In the scatter plot below,

- Name the graph and the axes
- *Note: Each data set represents two data values, the number of cricket chirps (per 15s) as a function of temperature ($^{\circ}\text{C}$). The line of best fit drawn indicates an R^2 value of approximately 0.88.*



RECALL: R^2 values measure how close a data set fits a regression line.

- R^2 value < 0.3 = no relationship or weak relationship
- $0.3 < R^2$ value < 0.5 = moderate relationship
- $0.5 < R^2$ value < 0.7 = strong relationship
- R^2 value > 0.7 = very strong relationship



Questions

1. What type of data association is depicted in the scatter plot?
Explain your answer.

2. Determine the line of best using a graphics calculator.
STAT → EDIT → L1/L2 columns → STAT → CALC → LinReg(ax+b)
Use this regression to calculate the number of times a cricket chirps
every 15 seconds at a temperature of 20°C. Round to a whole number.

3. (a) Calculate the rate of chirping to temperature ratio for each data
point and fill in the table below. Round to one decimal.

Rate of chirping to temperature ratios

(b) Find the mean chirping to temperature ratio.

(c) As temperature increases, how will the ratio of chirping to
temperature change?



4. A cricket chirps 120 times in 45 seconds. Using the line of best fit, find the temperature at which this occurs.

5. Using the line of best fit, determine the number of times a cricket will chirp in three minutes at a temperature of 21°C.

6. Describe the expected effect of temperature on cricket mobility and activity. Give reasons for your answer.

7. Male crickets produce high-pitched sounds when trying to attract female mates. Discuss and compare the mating efficiency of male crickets during colder and warmer seasons.



8. Experimental controls were not specified in the collection of the data provided. Explain what factors may contribute to data variability.

9. (a) Write a linear equation for the regression line.

(b) A cricket chirps 204 times in 1.5 minutes. Using your equation, determine the temperature at which this occurs.

(c) Using your equation, determine the number of times a cricket will chirp in 4.2 minutes at a temperature of 13°C .

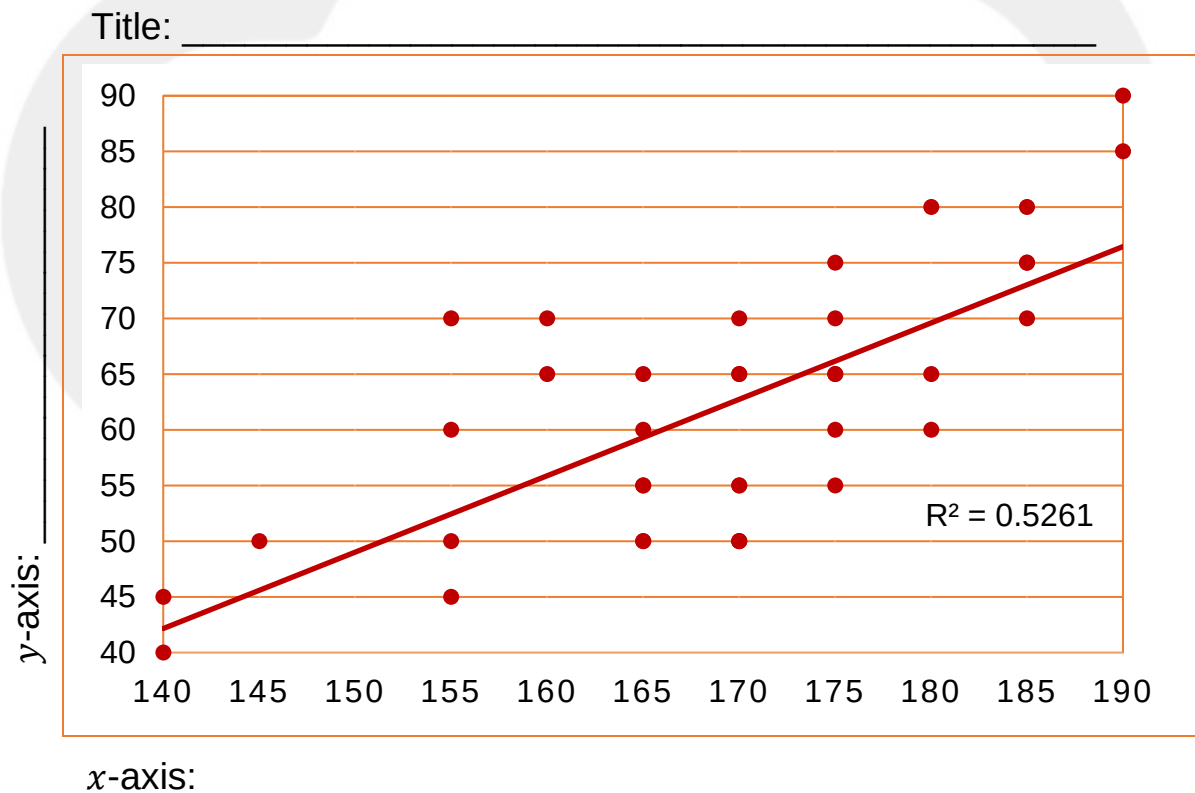
Scatter Plots

Student Measurements

The heights and weights of students in a Year 10 HPE class (22 girls:16 boys) were measured. The data collected is displayed in the scatter plot below. A line of best fit has been drawn to model this relationship.

In the scatter plot below,

- Name the graph and the axes
- *Note: Each data point represents two data values, height (cm) and weight (kg), for a single student. The line of best fit drawn indicates an R^2 value of approximately 0.53.*



RECALL: R^2 values measure how close a data set fits a regression line.

- R^2 value < 0.3 = no relationship or weak relationship
- $0.3 < R^2$ value < 0.5 = moderate relationship
- $0.5 < R^2$ value < 0.7 = strong relationship
- R^2 value > 0.7 = very strong relationship



Questions

1. What type of data association is depicted in the scatter plot?
Explain your answer.

2. Interpret and explain the R^2 value for the line of best fit.

3. Calculate the height to weight ratio for each student. Write each ratio in the boxes below, rounding to one decimal.

Year 10 HPE class

4. Find the percentage of students who have a height to weight ratio between above 2 and below 2.5.

5. Determine the average height to weight ratio in the class.



6. Determine the weight of a 173cm student using the average height to weight ratio in the class. Round to the nearest whole number.

7. Estimate the height of a 58kg student with a height to weight ratio of 1.25. Round to the nearest whole number.

8. Explain what factors may contribute to data variability.

9. Write a linear equation for the regression line and then use it to estimate the height of a 65kg student. Check your answer using the graph.