M9

Data Trends

5.4

A Correlation Coefficient is a number that is used to show how closely or loosely a data set or a scatter plot follow a trend; this number is always between $\pm$ 1.

Symbol for a correlation coefficient: _____

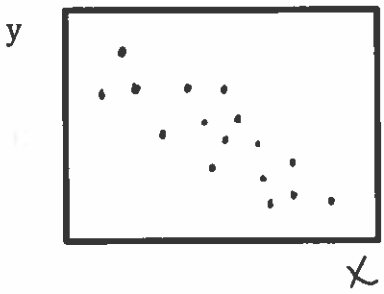
$$-1 \leq r \leq 1$$

Q: How does it work?

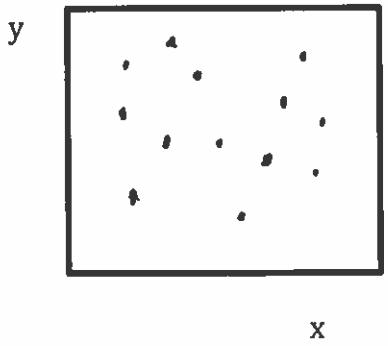
- When r is close to $\pm$ 1, data follows a trend very closely = it is possible to draw a best-fit line.
- When r is close to 0, data does not follow a trend at all = it is not possible to draw a best-fit line.
- When r is close to $\pm$0.5, data follows a trend rather loosely = there is a trend but data points are quite spread = it is possible to draw a best-fit line.
- When r is close to -1, data shows negative correlation = line of best fit is decreasing.
- When r is close to +1, data shows positive correlation = line of best fit is increasing.

Example1: A) Estimate the value of the correlation coefficient.
B) Determine whether data shows positive, negative, or no correlation.

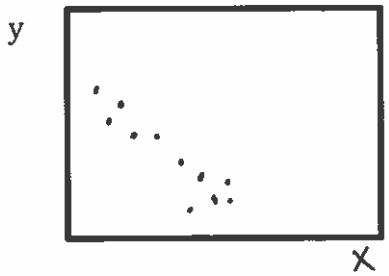
I.



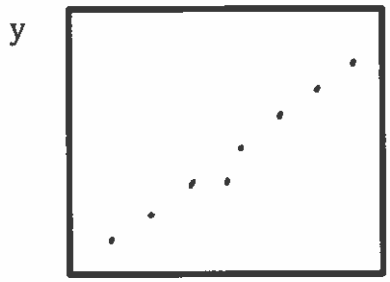
II.



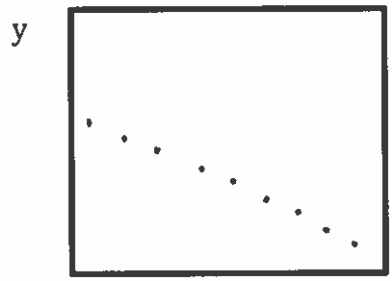
III.



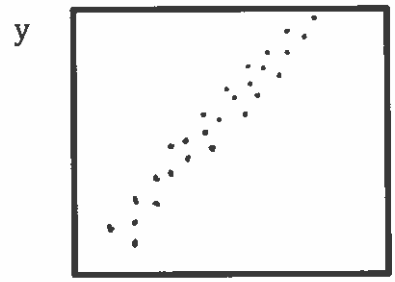
IV.



V.



VI.



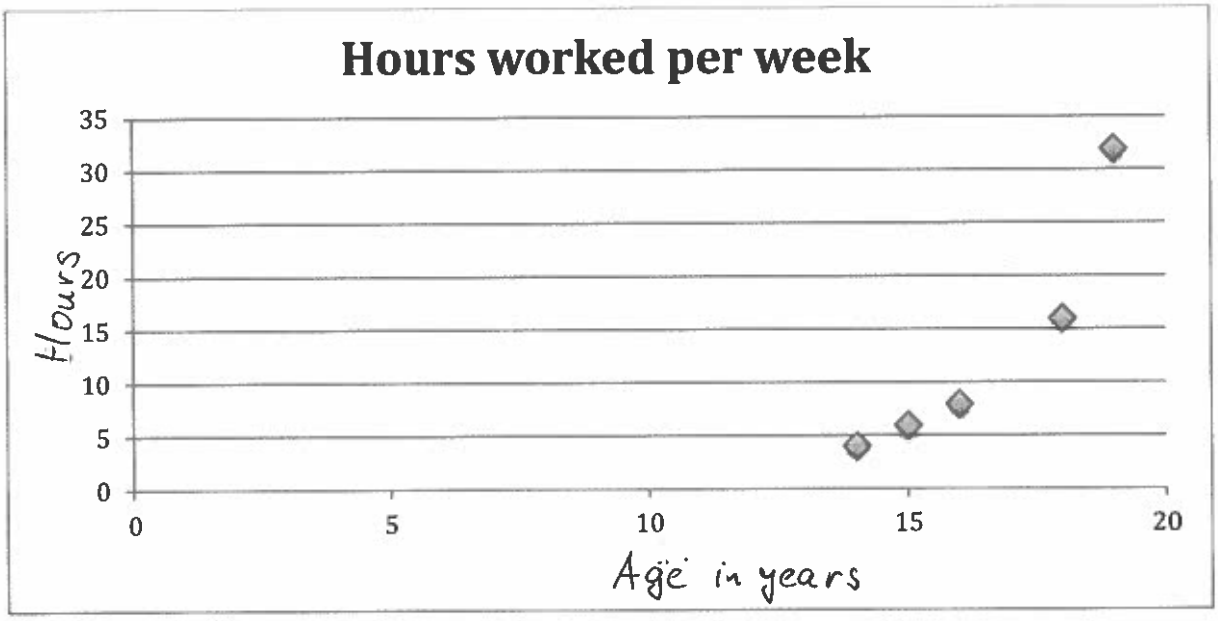
Interpolation

- Interpolation is a process of estimating values off a scatter plot and the line of best fit. During interpolation you look for a value that is between the smallest and the largest value on the graph.
- Generally, interpolation results in a high-confidence predictions or estimates.

Examples:

- Do you think the point associated with 19 years is an outlier? Why or why not?

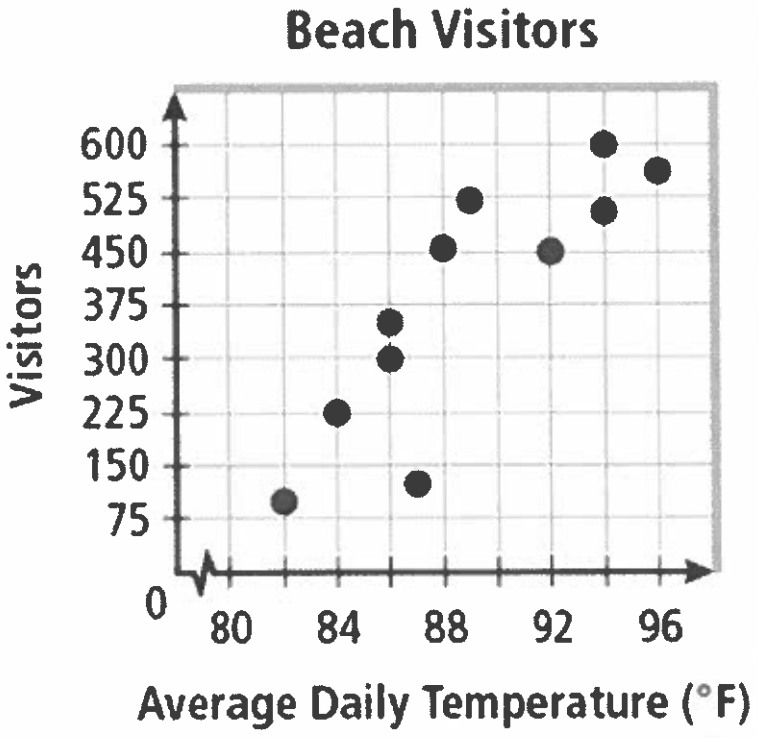
- Draw the line of best fit.
- Estimate the number of hours a 17-year old works per week. _____



Extrapolation

- Extrapolation is a process of estimating values off a scatter plot and the line of best fit. During extrapolation you look for a value that is <u>not</u> between the smallest and the largest value on the graph.

- The value you look at is either smaller than the smallest value on the graph or it is bigger that the largest value on the graph.
- It is very important to exercise caution when extrapolation because you cannot assume that a pattern or a trend exists for values that are not on the graph.
- This means that when extrapolating, you are allowed only in a very close neighbourhood of the smallest and the largest value on the graph.
- The further away from points on the scatter plot, the lower the confidence of your prediction or estimate.



- Draw the best-fit line
- Estimate the following:

Number of visitors when T = 97°F

_____

Number of visitors when T = 80°F

_____

Temperature when there are 625 visitors

_____

Temperature when there are 60 visitors

_____