Interpreting data from scatter plots (TARSOG)

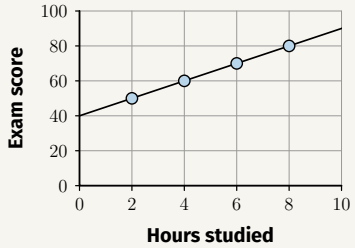
Read specific values off each scatter plot, then quantify the trend, an outlier, or a prediction.

Name _____ **Date** _____

Reading a scatter plot

A scatter plot shows two measurements for the same items. Look for the **trend** (linear/non-linear) and **association** (positive/negative), judge the **relationship** strength from how closely points cluster around the line of best fit, and spot any **outliers**. A prediction within the plotted range is *interpolation*; beyond it is *extrapolation*, and is less reliable.

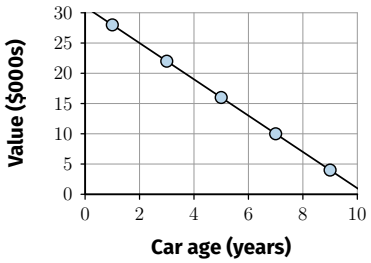
Worked example What score does the line of best fit predict for 5 hours of study? Is this interpolation or extrapolation?



Predicted score: $50 + 5 \times (5 - 2) = 65$.
This is **interpolation** – 5 hours sits within the plotted range (2 to 8).

1. Using the line of best fit, estimate the car's value at 6 years old.

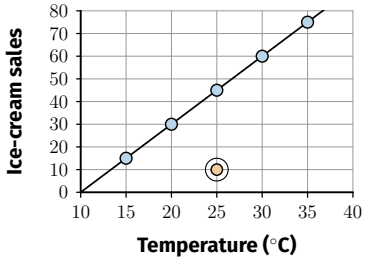
Solution: $28 - 3 \times (6 - 1) = 13$ ($13,000).



Working

2. Identify the outlier's coordinates and suggest a possible real-world cause.

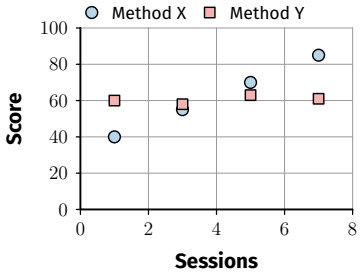
Solution: Outlier: (25, 10) – much lower than the predicted 45. Possible cause: a sudden storm on an otherwise hot day.



Working

3. Compare the strength of the relationship shown by Method X and Method Y.

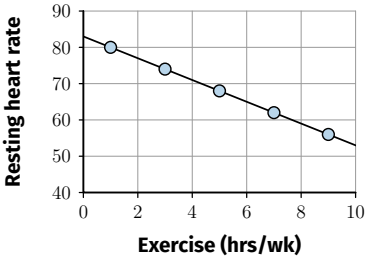
Solution: Method X: strong (points sit almost exactly on an increasing line). Method Y: weak (scores stay near 58–63 with no clear pattern).



Working

4. Which variable is explanatory and which is response? Predict the heart rate at 6 hours of exercise.

Solution: Exercise (hrs/wk) is explanatory; resting heart rate is response. Predicted: $80 - 3 \times (6 - 1) = 65$.



Working

Interpreting data from scatter plots (TARSOG) (continued)

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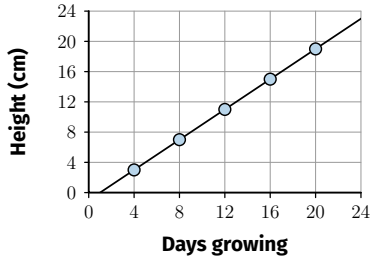
5. Predict the plant's height at 24 days. Is this interpolation or extrapolation?

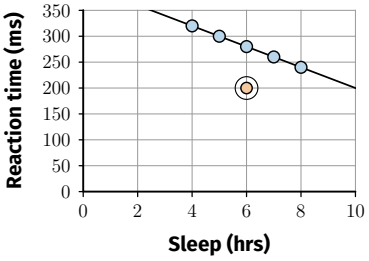
Solution: $24 - 1 = 23$ cm. Extrapolation – 24 days is beyond the plotted range (4 to 20).



Working

6. Find the outlier's coordinates. By how much is its reaction time faster than the trend predicts?

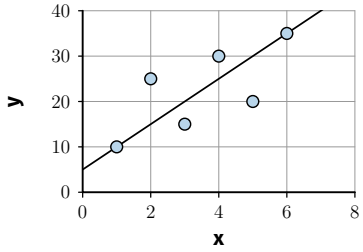
Solution: Outlier: (6, 200 ms). Predicted at 6 hours: $320 - 20 \times (6 - 4) = 280$ ms. Difference: $280 - 200 = 80$ ms faster.



Working

7. Judge the strength (weak/moderate/strong) of this relationship. Justify your answer.

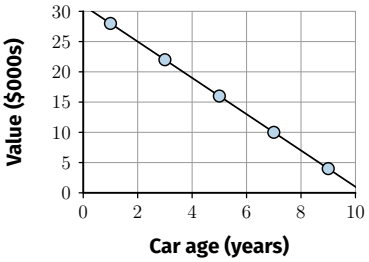
Solution: Weak – points scatter up to 10 units above or below the line of best fit, in a range of only 40, so the line is not a reliable predictor.



Working

8. Predict the car's value at (a) 4 years and (b) 15 years. Which is interpolation, and which prediction would you trust?

Solution: (a) $28 - 3 \times (4 - 1) = 19$ ($19,000) – interpolation. (b) $28 - 3 \times (15 - 1) = -14$ – extrapolation, and a negative value is impossible, showing why it's unreliable. Trust (a).



Working