

Linear Model for Scatter Plots



Form the equation of a line of best fit, then use it to predict.

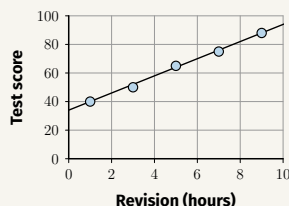
Name _____

Date _____

Show your method

The line of best fit has equation $y = mx + c$: m is the gradient, c is the y -intercept. Find the gradient with $m = \frac{y_2 - y_1}{x_2 - x_1}$, substitute a point to find c , then substitute a known x to predict y .

Worked example This scatter plot shows revision hours (x) against test score (y), with a line of best fit through $(1, 40)$ and $(9, 88)$. Find the equation of the line, then predict the score for 6 hours of revision.



$$\text{Gradient: } \frac{88 - 40}{9 - 1} = \frac{48}{8} = 6$$

$$y\text{-intercept: } 40 = 6(1) + c \Rightarrow c = 34$$

$$\text{Equation: } y = 6x + 34$$

$$\text{Predict: } y = 6(6) + 34 = 70$$

1. A line of best fit has equation $y = 2x + 10$. Predict y when $x = 5$.

2. A line of best fit has equation $y = 3x + 5$. Predict y when $x = 10$.

3. A line of best fit has equation $y = 1.5x + 20$. Predict y when $x = 8$.

4. A line of best fit has equation $y = 4x - 2$. Predict y when $x = 6$.

5. A line of best fit has gradient 2 and y -intercept 15. Write its equation.

6. A line has equation $y = 3x + 8$. State its gradient and y -intercept.

7. A line has equation $y = 0.5x + 40$. Predict y when $x = 20$.

8. A line has equation $y = 5x$. Predict y when $x = 12$.

9. A line of best fit passes through $(0, 20)$ and $(10, 70)$. Find its gradient.

Linear Model for Scatter Plots (continued)



Apply the method to word contexts and reliability.

Name _____

Date _____

10. Using the line from Question 9 (through $(0, 20)$), write its equation.

11. Use the equation from Question 10 to predict y at $x = 6$.

12. Hours studied (x) vs test score (y) has line $y = 6x + 40$, based on data for $x = 0$ to 10. Predict the score for 7 hours.

13. Using the same line, predict the score for $x = 25$. Explain why this prediction is less reliable.

14. A line of best fit passes through $(2, 14)$ and $(6, 26)$. Find its gradient, then its equation given the y -intercept is 8.

15. Use the equation from Question 14 to predict y when $x = 10$.

16. A weak correlation means points scatter widely around the line. Explain how this affects confidence in a prediction.

17. Explain the difference between interpolation and extrapolation.

18. A line of best fit is $y = -2x + 300$ for $x = 0$ to 50. Find x when $y = 200$.

