

# Push Tasks



*Every question requires reasoning or justification. Find a line's equation from two points, then predict.*

**1.** A line of best fit passes through  $(0, 20)$  and  $(10, 70)$ . Find its equation, then predict  $y$  at  $x = 6$ .

**2.** A line of best fit passes through  $(5, 30)$  and  $(15, 90)$ . Find its equation, then predict  $y$  at  $x = 20$ . State whether this is interpolation or extrapolation.

**3.** A gym's data (sessions attended,  $x = 0$  to  $30$ ) gives the line  $y = 0.5x + 2$  (kg lost). Predict weight lost for 50 sessions, and explain two reasons this prediction may be unreliable.

**4.** Explain the difference between interpolation and extrapolation, and state which one is generally more reliable and why.

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*Every question requires reasoning or justification. Discuss what affects confidence in a prediction.*

**5.** A weak correlation gives the line  $y = 2x + 10$ ; a strong correlation gives the same line for different data. Explain which prediction you would trust more for  $x = 5$ , and why.

**6.** A line of best fit is calculated using only 4 data points. Explain why a prediction from this line might be less reliable than one from a line calculated using 40 data points.

**7.** A scatter plot of temperature vs ice-cream sales gives the line  $y = 15x + 50$  for temperatures from  $10^{\circ}\text{C}$  to  $30^{\circ}\text{C}$ . A student uses it to predict sales at  $-5^{\circ}\text{C}$ . Explain two problems with this prediction.

**8.** Two variables have a strong linear correlation, and a student claims “ $x$  causes  $y$ .” Explain why correlation does not necessarily imply causation, using an example.

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*Every question requires reasoning or justification. Interpret the model, and work backwards from  $y$  to  $x$ .*

**9.** A line of best fit for  $x = 0$  to 50 is  $y = -2x + 300$ . State its gradient and  $y$ -intercept, and interpret what the  $y$ -intercept means in context.

**10.** Using the line in Question 9, find the value of  $x$  when  $y = 200$ .

**11.** A company uses a line of best fit from 5 years of sales data to predict sales 20 years into the future. Explain at least two reasons this long-range extrapolation is risky for a business decision.

**12.** A line of best fit has equation  $y = 4x + 12$ . A more recent set of data suggests a better fit is  $y = 4.5x + 8$ . Explain what this change might indicate about the relationship between the variables.