

Trend Line Detectives

Use lines of best fit to make data-based predictions.

GRADE 8 • 8.FGR.6.4

8.FGR.6.4 "Use appropriate graphical displays from data distributions involving lines of best fit to draw informal inferences and answer the statistical investigative question posed in an unbiased statistical study."

NAME _____

DATE _____

READ THE TREND

A line of best fit shows the overall pattern in a scatter plot. Use a point on the line, or its equation, to estimate a typical y -value for a given x -value. Predictions inside the data range are usually more reliable than predictions far outside the data range.

WORKED EXAMPLE

A scatter plot has the line of best fit $y = 7x + 9$. Estimate y when $x = 8$.

1. Start with $y = 7x + 9$.
2. Replace x with 8: $y = 7(8) + 9$.
3. Multiply and add: $y = 56 + 9 = 65$.

Answer: $y = 65$

PRACTICE 6 problems

- 1** A scatter plot has the line of best fit $y = 3x + 4$. Estimate y when $x = 5$.

ANSWER _____

- 2** On a scatter plot, a line of best fit passes through $(0, 12)$ and $(4, 20)$. Use the line to estimate y when $x = 3$.

ANSWER _____

- 3** A data set has x -values from 2 to 10. Its line of best fit is $y = -2x + 30$. Estimate y when $x = 6$.

ANSWER _____

- 4** A scatter plot includes data for x -values from 1 to 6. Its line of best fit is $y = 4x + 5$. Is using the line to predict y when $x = 10$ interpolation or extrapolation?

ANSWER _____

- 5** A scatter plot of x and y has a line of best fit that rises from left to right. As x increases, what does y tend to do?

ANSWER _____

- 6** An unbiased random sample of students reports reading minutes, x , and vocabulary scores, y . The scatter plot has the line of best fit $y = 2x + 11$. Estimate the vocabulary score for a student who reads 5 minutes.

ANSWER _____

APPLY IT Show your work

1

A gaming club randomly selects 36 members for a study. The investigative question is, "How is the number of strategy guides read, x , related to tournament points, y ?" The scatter plot has a line of best fit $y = 4x + 15$. Estimate the tournament points for a member who has read 3 strategy guides. Then state whether the association is positive or negative.

WORK SPACE

ANSWER _____

2

A library randomly selects 40 students for a study. The investigative question is, "Is there a relationship between books read during a month, x , and reading quiz score, y ?" The line of best fit is $y = 6x + 22$. Estimate the quiz score for a student who reads 4 books. Does this study prove that reading books causes a higher quiz score?

WORK SPACE

ANSWER _____

CHALLENGE One step up

CHALLENGE

An unbiased study has data with x -values from 1 to 6, and its line of best fit is $y = 3x + 14$. A student uses the line to predict y when $x = 20$. The equation gives 74. Explain why 74 is not a reliable prediction.

PART 1 • PRACTICE

#	PROBLEM	ANSWER
1	A scatter plot has the line of best fit $y = 3x + 4$. Estimate y when $x = 5$.	19
2	On a scatter plot, a line of best fit passes through (0, 12) and (4, 20). Use the line to estimate y when $x = 3$.	18
3	A data set has x -values from 2 to 10. Its line of best fit is $y = -2x + 30$. Estimate y when $x = 6$.	18
4	A scatter plot includes data for x -values from 1 to 6. Its line of best fit is $y = 4x + 5$. Is using the line to predict y when $x = 10$ interpolation or extrapolation?	Extrapolation
5	A scatter plot of x and y has a line of best fit that rises from left to right. As x increases, what does y tend to do?	y tends to increase.
6	An unbiased random sample of students reports reading minutes, x , and vocabulary scores, y . The scatter plot has the line of best fit $y = 2x + 11$. Estimate the vocabulary score for a student who reads 5 minutes.	21

PART 2 • APPLY IT

- 27 tournament points; positive association.** Substitute 3 for x : $y = 4(3) + 15 = 27$. Because the coefficient of x is positive, the line rises and shows a positive association.
- 46; no, the study shows an association but does not prove causation.** Substitute 4 for x : $y = 6(4) + 22 = 46$. A line of best fit can show a relationship, but it cannot prove that one variable causes the other.

CHALLENGE

74 is not reliable because $x = 20$ is far outside the data range of 1 to 6. This is extrapolation.

Accept equivalent wording for positive association, increasing trend, and extrapolation. For the causation question, accept answers stating that an association does not prove cause and effect.