LESSON MAKER PRO

Predict and Check

Use fitted lines to predict, then judge how much to trust them.

HIGH SCHOOL · A2.D.1.3

A2.D.1.3 "Make predictions based upon the regression equation (linear, exponential, or quadratic), and use the correlation coefficient to assess the reliability of those predictions using graphing technology."

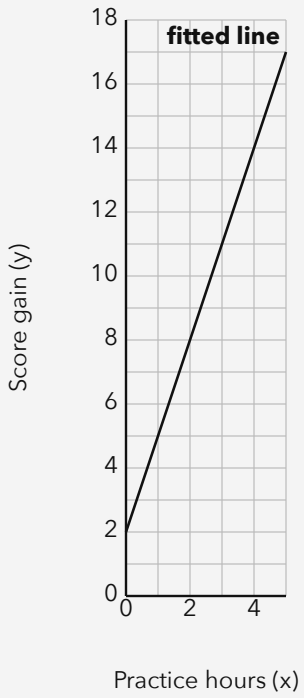
NAME _____ DATE _____

THE BIG IDEA

A linear regression equation predicts y from a value of x. Read the equation from the fitted line or use the equation given, then substitute the x-value. A correlation coefficient r near 1 or -1 shows a strong linear fit, but a prediction beyond the data's x-range is less dependable.

WORKED EXAMPLE

The graph shows a fitted line for score gain versus practice hours. Technology reports r = 0.96, and the data cover x = 1 to 5 hours. Use the graph to predict the score gain at x = 4 hours. Is the prediction well supported?

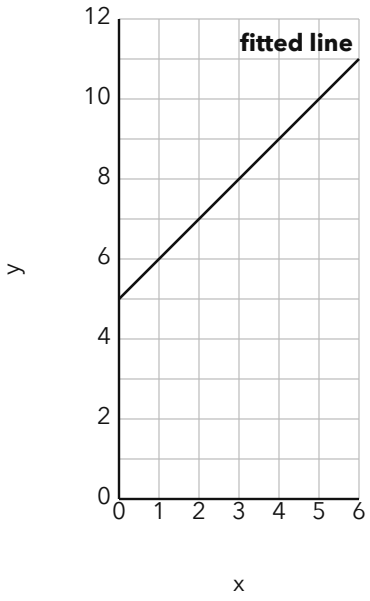


1. Read the line's equation from the graph: y = 3x + 2.
2. Substitute x = 4: y = 3(4) + 2 = 14.
3. |r| = 0.96 is near 1, and 4 is within the data's x-range.

Answer: The predicted score gain is 14 points. The prediction is well supported by the strong linear fit and the data's x-range.

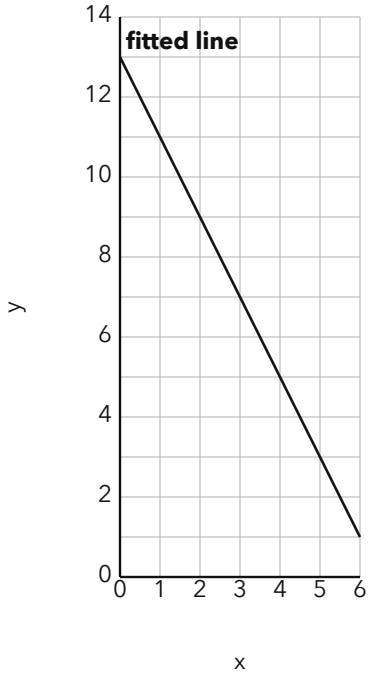
PRACTICE 6 problems

1 Use the fitted line to predict y when x = 6. Technology reports r = 0.99, and the data cover x = 1 to 6. Is the prediction well supported?



ANSWER _____

2 Use the fitted line to predict y when x = 5. Technology reports r = -0.94, and the data cover x = 1 to 5. Is the linear fit strong?



ANSWER _____

3 A fitted line has equation y = 5x + 7. Predict y when x = 6.

ANSWER _____

4 A fitted line has equation y = -4x + 42. Predict y when x = 8.

ANSWER _____

5 Two fitted lines model the same data, which cover x = 1 to 8. Model A is y = 2x + 9 with r = 0.40. Model B is y = 3x + 1 with r = 0.95. Use Model B to predict y at x = 6. Why is Model B's prediction more reliable?

ANSWER _____

6 A fitted line is y = 6x + 1. Technology reports r = 0.99, but the data cover only x = 1 to 5. Predict y at x = 10. Explain why this prediction needs caution.

ANSWER _____

APPLY IT Show your work

1 A student tracks views of a new video. A fitted line predicts hundreds of views using y = 4x + 12, where x is days after posting. Technology reports r = 0.93 for data from days 1 to 7. Predict the number of views on day 5. Is the prediction well supported?

WORK SPACE

ANSWER _____

2 A student tracks monthly spending on streaming services after changing a budget. The fitted line is y = -3x + 50, where x is the month after the change and y is spending in dollars. Technology reports r = -0.88 for months 1 to 6. Predict spending in month 4. Does the negative r mean the fit is weak?

WORK SPACE

ANSWER _____

CHALLENGE One step up

Two clubs use fitted lines to predict ticket sales when x = 8. Club A uses y = 7x + 20 with r = 0.99, based on x-values from 1 to 4. Club B uses y = 4x + 20 with r = 0.90, based on x-values from 5 to 10. Find both predictions. Which prediction is safer to use, and why?

WORK SPACE AND ANSWER

Predict and Check

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Use the fitted line to predict y when x = 6. Technology reports r = 0.99, and the data cover x = 1 to 6. Is the prediction well supported?	**y = 11. Yes, r = 0.99 shows a strong linear fit, and x = 6 is within the data's x-range.**
2	Use the fitted line to predict y when x = 5. Technology reports r = -0.94, and the data cover x = 1 to 5. Is the linear fit strong?	**y = 3. Yes, the fit is strong because |r| = 0.94 is near 1.**
3	A fitted line has equation y = 5x + 7. Predict y when x = 6.	**y = 37**
4	A fitted line has equation y = -4x + 42. Predict y when x = 8.	**y = 10**
5	Two fitted lines model the same data, which cover x = 1 to 8. Model A is y = 2x + 9 with r = 0.40. Model B is y = 3x + 1 with r = 0.95. Use Model B to predict y at x = 6. Why is Model B's prediction more reliable?	**Model B predicts y = 19. Its |r| is closer to 1 than Model A's, and x = 6 is within the data's x-range.**
6	A fitted line is y = 6x + 1. Technology reports r = 0.99, but the data cover only x = 1 to 5. Predict y at x = 10. Explain why this prediction needs caution.	**y = 61. Despite the strong linear fit, x = 10 is beyond the data's x-range.**

PART 2 · APPLY IT

1. **3,200 views. Yes, r = 0.93 shows a strong linear fit, and day 5 is within the data's range.** At x = 5, y = 4(5) + 12 = 32 hundreds of views, or 3,200 views. The strong fit and in-range x-value support the prediction.
2. **$38. No, |r| = 0.88 indicates a fairly strong linear fit; the negative sign shows that spending tends to decrease as x increases.** Substitute x = 4 to get y = -3(4) + 50 = 38. Judge the fit using |r|, not the sign of r.

CHALLENGE

Club A predicts 76 tickets, and Club B predicts 52 tickets. Club B's prediction is safer because x = 8 is within its data's range, while Club A's prediction is beyond its data's range despite its stronger fit.

Accept equivalent wording that uses both the strength of the linear fit and the data's x-range when judging a prediction. A negative r can still indicate a strong linear fit.