LESSON MAKER PRO

Predict and Check

Use regression lines and correlation to judge predictions.

HIGH SCHOOL · A1.D.1.3

A1.D.1.3 "Make predictions based upon the linear regression, and use the correlation coefficient to assess the reliability of those predictions using graphing technology."

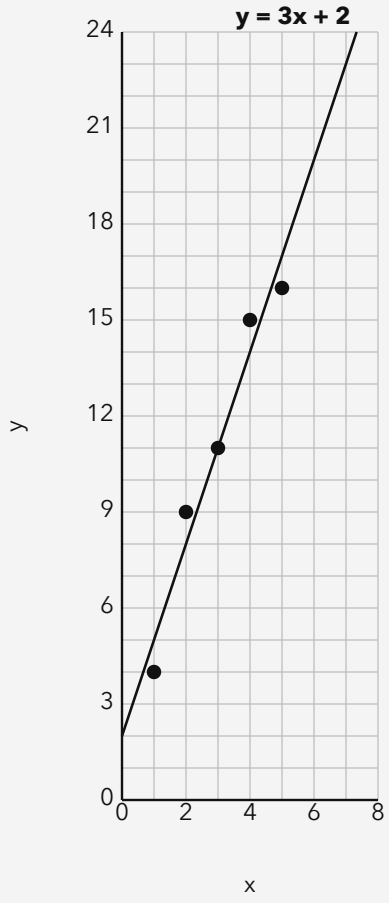
NAME _____ DATE _____

THE BIG IDEA

A graphing tool can find a regression line, y = mx + b, and a correlation coefficient, r. Substitute an x-value into the line to predict y. An r-value near 1 or -1 shows a strong linear fit, but a prediction outside the data's x-range can still be uncertain.

WORKED EXAMPLE

Use the regression line on the graph to predict y when x = 4. The graphing tool reports r ≈ 0.98. How reliable is the prediction?

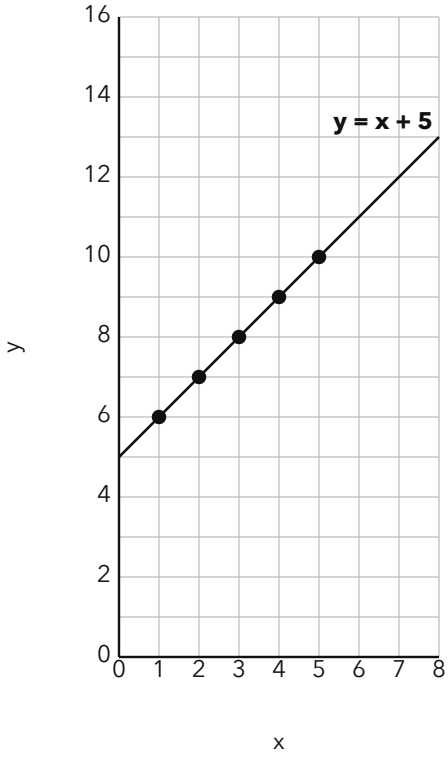


1. Read the regression line: y = 3x + 2.
2. Substitute x = 4: y = 3(4) + 2 = 14.
3. Since r is close to 1 and x = 4 is within the data's range, the prediction is reasonably reliable.

Answer: Predicted y = 14; reasonably reliable.

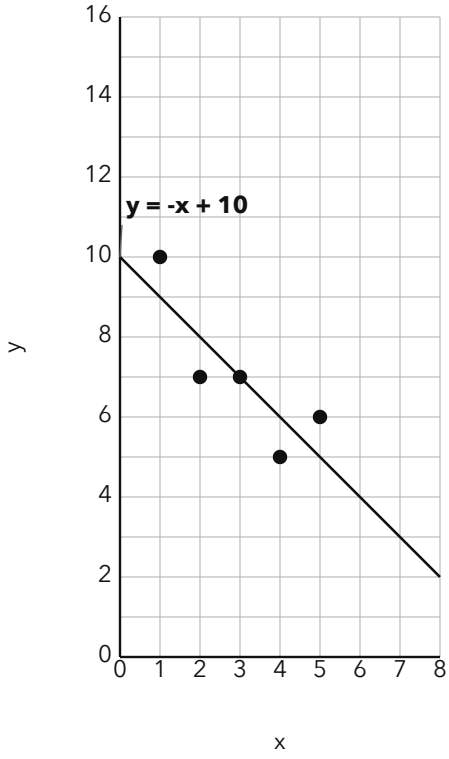
PRACTICE 6 problems

1 Use the line on the graph to predict y when x = 3. The graphing tool reports r = 1. How reliable is the prediction?



ANSWER _____

2 Use the line on the graph to predict y when x = 5. The graphing tool reports r ≈ -0.85. Is the linear fit strong or weak?



ANSWER _____

3 A graphing tool reports y = 0.5x + 6 and r = 0.10 for data with x-values from 2 to 18. Predict y when x = 10. Is the prediction reliable based on r?

ANSWER _____

4 A graphing tool reports y = -2x + 30 and r = -0.94 for data with x-values from 1 to 12. Predict y when x = 9. Is the prediction reasonably reliable?

ANSWER _____

5 Two groups each use data from x = 0 to x = 10. Group A gets y = x + 1 with r = 0.93. Group B gets y = 2x + 1 with r = 0.25. At x = 8, which group's prediction is more reliable, and what is that prediction?

ANSWER _____

6 A graphing tool reports y = 1.5x + 7 and r = 0.97 for data with x-values from 1 to 9. Predict y when x = 20. Why should you be cautious about this prediction?

ANSWER _____

APPLY IT Show your work

1 A gaming club compares daily practice time, x minutes, with a skill-test score, y points. Its graphing tool reports y = 4x + 25 and r = 0.92, using practice times from 5 to 25 minutes. Predict the score for 15 minutes of practice. Is this a reasonably reliable prediction?

WORK SPACE

ANSWER _____

2 Students compare the age of used phones, x months, with their resale price, y dollars. A graphing tool reports y = -15x + 520 and r = -0.31 for phones from 3 to 24 months old. Predict the price of a 12-month-old phone. Is this a reliable prediction based on r?

WORK SPACE

ANSWER _____

CHALLENGE One step up

A graphing tool reports y = 8x + 10 and r = 0.95 for data with x-values from 1 to 12. Find the predictions for x = 10 and x = 30. Which prediction is more dependable? Explain why a strong r-value does not make both equally dependable.

WORK SPACE AND ANSWER

ANSWER KEY

Predict and Check

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Use the line on the graph to predict y when x = 3. The graphing tool reports r = 1. How reliable is the prediction?	**8; very reliable for these data because r = 1 and x = 3 is within the data's range.**
2	Use the line on the graph to predict y when x = 5. The graphing tool reports r ≈ -0.85. Is the linear fit strong or weak?	**5; the linear fit is fairly strong.**
3	A graphing tool reports y = 0.5x + 6 and r = 0.10 for data with x-values from 2 to 18. Predict y when x = 10. Is the prediction reliable based on r?	**11; not very reliable because r is close to 0.**
4	A graphing tool reports y = -2x + 30 and r = -0.94 for data with x-values from 1 to 12. Predict y when x = 9. Is the prediction reasonably reliable?	**12; yes, r is close to -1 and x = 9 is within the data's range.**
5	Two groups each use data from x = 0 to x = 10. Group A gets y = x + 1 with r = 0.93. Group B gets y = 2x + 1 with r = 0.25. At x = 8, which group's prediction is more reliable, and what is that prediction?	**Group A; its prediction is 9.**
6	A graphing tool reports y = 1.5x + 7 and r = 0.97 for data with x-values from 1 to 9. Predict y when x = 20. Why should you be cautious about this prediction?	**37; x = 20 is outside the data's range, so the pattern may not continue.**

PART 2 · APPLY IT

1. **85 points; reasonably reliable.** Substitute 15 to get y = 4(15) + 25 = 85. The r-value shows a strong linear fit, and 15 minutes is within the observed range.
2. **$340; not very reliable.** Substitute 12 to get y = -15(12) + 520 = 340. Since r is fairly close to 0, the linear fit is weak.

CHALLENGE

At x = 10, the prediction is 90; at x = 30, it is 250. The prediction of 90 is more dependable because x = 10 is within the data's range, while x = 30 is far outside it. A strong r-value describes the fit to the observed data, not whether the pattern continues beyond them.

Accept 'strong negative fit' for problem 2 and equivalent wording about extrapolation for problem 6 and the challenge. The predictions use the regression lines, not individual plotted points.