Lines of Best Fit and Predictions

Algebra 1 •Section 10.4

Name: _____	Date: _____	Score: _____ / 12

Quick Review and Helpful Hints

Data questions are about choosing the right summary. Read the labels carefully, identify the total or condition being used, and connect each statistic to what it tells about the data.

▷ **Example:** Find the mean of $6, 8, 10, 12$.
Work: Add the values to get 36, then divide by 4 values.

★ **Answer:** 9

Practice Problems

Solve each problem. Show enough work that another student could follow your thinking.

1. Use $y = 2x + 5$ to predict y when $x = 10$.

_____

2. Use $y = -3x + 40$ to predict y when $x = 7$.

_____

3. What does slope mean in a line of best fit?

_____

4. What does the intercept mean?

_____

5. Is predicting inside the data range interpolation or extrapolation?

_____

6. Is predicting beyond the data range interpolation or extrapolation?

_____

7. A best-fit line is $y = 4x + 12$. What is the slope?

_____

8. A residual is actual minus predicted. Actual 30, predicted 26. Find residual.

_____

9. If residuals are mostly positive for large x, what may be wrong?

_____

10. Use $y = 1.5x + 20$ to predict at $x = 8$.

_____

Word Problems

11. A plant model is $h = 3d + 4$. Predict height at day 12.

_____

12. A line of best fit predicts sales $S = 250 - 8p$. Interpret slope.

_____

Answer Keys

1. 25
2. 19
3. Average rate of change
4. Predicted value when $x = 0$
5. Interpolation
6. Extrapolation
7. 4
8. 4
9. The model may underpredict for large x
10. 32
11. 40
12. Sales decrease by about 8 for each 1-unit price increase

Step-by-Step Explanations

1. Predicting is just plugging in — swap x for 10 and compute $2(10) + 5 = 25$.
2. Drop 7 in for x and follow through: $-3(7) + 40$ lands on 19.
3. Slope tells you, on average, how much y shifts each time x goes up by one.
4. The intercept is where the model begins — the predicted y before x has moved at all.
5. Staying inside the range you actually collected data for is interpolation — the safer kind of prediction.
6. Reaching past the data you have is extrapolation, and it's riskier since the pattern may not hold out there.
7. In $y = mx + b$, the slope is whatever multiplies x — so it's 4 here.
8. A residual measures how far off the model was: $30 - 26 = 4$, so the prediction came in a bit low.
9. Positive residuals mean the real values sit above the line — the model is guessing too low up there.
10. Substitute 8 for x: $1.5(8)$ is 12, and adding 20 gives 32.
11. Let $d = 12$ and work it out: $3(12) + 4 = 40$ for the predicted height.
12. The slope of -8 is a rate — every dollar the price climbs, predicted sales slide down by about 8.

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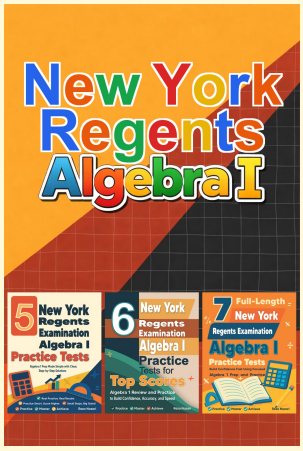

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