



Math Worksheet for 8th Grade

Estimating lines of best fit

Name: _____

Due Date: _____

Teacher: _____

Parent Sign: _____

- Given points (1, 2), (2, 3), (3, 5), (4, 7), (5, 8). Using the end-point method (use the first and last points to estimate the trend line), write the estimated line $y = mx + b$ and predict y when $x = 6$.
- For the same points as in Q1, compute the residual for the point (3, 5) using the line from Q1.
- Given points (0, 10), (1, 12), (2, 15), (3, 16), (4, 20). Estimate the line of best fit using endpoints (0,10) and (4,20). Give equation and predict y at $x = 2.5$.
- For the set in Q3, is there an outlier? If (2, 30) were added, explain whether a linear model is still reasonable.
- Points: (2, 4), (3, 5), (4, 8), (5, 9), (6, 12). Estimate line by endpoints (2,4) and (6,12). Write equation and predict y at $x = 7$.
- Consider the scatter: (1, 8), (2, 7), (3, 6), (4, 5), (5, 4). Does this suggest a positive or negative linear trend? Provide the slope using endpoints and write the line.
- Given points (10, 100), (20, 180), (30, 260). Use endpoints (10,100) and (30,260) to find the line $y = mx + b$ and predict y at $x = 25$.
- A student plots weekly hours studied (x) vs. quiz score (y): (1, 60), (2, 65), (3, 70), (4, 78), (5, 83). Estimate trend line using endpoints and state the meaning of slope in words.
- Given points (0, 5), (2, 9), (4, 13), (6, 17). Find the line using endpoints and predict y at $x = 3$.
- Points: (1, 20), (2, 22), (3, 25), (4, 24), (5, 27). Estimate the line using endpoints and calculate the residual for (4,24).
- For this table of x and y : x : 1 2 3 4 5; y : 3 5 4 6 7. Sketch the trend in words (increasing, decreasing, roughly linear?) and estimate slope by taking (1,3) and (5,7).
- Points: (0, 50), (1, 55), (2, 58), (3, 64). Use endpoints to estimate line. If x represents years since start, what does the intercept represent in context?
- (Smoking context) Data for percent of adults who smoke (x = years since 1940): (0, 48), (5, 50), (10, 54), (15, 56). Using endpoints (0,48) and (15,56), write the trend line (with x measured as years since 1940). Interpret the slope.
- Using the line from Q13, predict the smoking percent in 1950 ($x = 10$).
- Using the same data as Q13, explain what the intercept (value at $x = 0$) means.
- If public health interventions after 1955 reduce the smoking percent so that the 1955 point is actually 50 instead of the 56 predicted, explain how that single point would affect a visually estimated line of best fit.
- Data: years since 1940 and cigarettes smoked per adult per year: (0, 2300), (5, 2600), (10, 2900), (15, 3100). Use endpoints to estimate slope in cigarettes per year per adult per year (change per year). What is slope per 5-year interval?
- (Estimating with linear models) Given points (1, 4), (2, 5), (3, 7), (4, 10), (5, 12). Fit a line using endpoints (1,4) and (5,12). Then predict y at $x = 3.5$.
- Given small dataset x : 0,1,2,3 and y : 2,3,5,7. Estimate trend line using endpoints and compute residual for (2,5).
- Points: (2, 6), (4, 11), (6, 17), (8, 22). The pattern looks roughly linear. Use endpoints (2,6) and (8,22) to find slope and intercept. Predict y at $x = 5$.
- A store records number of items sold vs. advertising dollars (in hundreds): (1, 12), (2, 20), (3, 27), (4, 34). Estimate the trend line by endpoints and interpret intercept in context.



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22. Given points (0, 1), (1, 3), (2, 5), (3, 6). Use endpoints to find line and predict y at $x = -1$. What does that negative x predict mean in context if x is years since a product launch?
23. Data: $x = 1, 2, 3, 4, 5$; $y = 2, 4, 5, 7, 9$. Estimate the best-fit line by endpoints and compute predicted y at $x = 6$.
24. Given points that are scattered with negative association: (1,9), (2,7), (3,6), (4,5). Use endpoints to find slope and state what a negative slope means in context.
25. (Interpreting a trend line) The trend line for temperature (degC) vs. altitude (km) is $y = -6.5x + 20$. Interpret slope and intercept. What is predicted temperature at 2 km?
26. The number of hours of sleep (x) vs. reaction time (y ms) has a fitted line $y = 15x + 250$. Interpret slope and intercept. Predict reaction time after 6 hours of sleep.
27. Given the line $y = 2x + 3$ estimated from data, and a point (4, 12), compute the residual.
28. For data points (1, 2), (2, 5), (3, 6), (4, 9) a student draws line $y = 2x + 0.5$ as trend. Compute residuals for each point and state which point has the largest absolute residual.
29. A line of best fit shows a slope of 0.8 for sales vs. price (x in \$). *If price increases by 5*, how much should sales change on average according to the line? (State direction and amount.)
30. You have points (0,0), (1,2), (2,4), (3,7). Use endpoints (0,0) & (3,7) to estimate line. Compute predicted value at $x = 2$ and residual for actual (2,4).
31. Dataset: $x: 1\ 2\ 3\ 4\ 5$; $y: 10\ 11\ 13\ 14\ 16$. Estimate line by endpoints and find x when $y = 20$ (extrapolate).
32. A scatter of weight vs. height shows a strong linear trend. If the fitted line has intercept 30 and slope 2.5 (weight = $2.5 \cdot \text{height} + 30$), explain whether the intercept (30) necessarily makes sense physically.
33. Points: (2,3), (4,7), (6,11), (8,15). Use endpoints to get line, then determine whether this line exactly fits all points; explain why.
34. Given points (1, 10), (2, 12), (3, 13), (4, 15), (5, 14). Estimate trend line using endpoints and comment whether the model over- or underestimates at $x = 5$.
35. (Linear models) A delivery driver records minutes to deliver (y) vs. number of stops (x): (1, 8), (2, 12), (3, 16), (4, 20). Use endpoints for trend line and interpret slope unit.
36. For the line $y = -4x + 100$ describing remaining battery (
37. (Interpreting) A trend line for exam score vs. hours studied is $y = 5x + 60$. A student who studies 2 hours scores 68. What is that student's residual from the trend line?
38. A line $y = 1.2x + 10$ is fit to data where x is years of experience and y is hourly wage in \$. Interpret slope and find predicted wage for 5 years experience.
39. Points: (0, 4), (1, 7), (2, 9), (3, 12). Fit trend line using endpoints and compute the sum of residuals for the four points (use predicted values from your line).
40. Data: $x: 1, 2, 3, 4, 5$; $y: 100, 98, 95, 91, 88$. Fit line using endpoints and interpret the slope per unit increase in x .
41. A scientist fits a trend line to temperature rise vs. CO₂ concentration: slope is 0.02 degC per ppm CO₂. If CO₂ rises by 50 ppm, how much temperature is predicted to rise?



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42. (Smoking dataset follow-up) Using the smoking percent line you found in Q13, if an anti-smoking campaign in 1947 ($x = 7$) reduces the observed percent to 49, compute the residual at $x=7$ using the Q13 line and explain if the actual is higher or lower than predicted.
43. Points: (1, 1), (2, 2.5), (3, 3.5), (4, 5). Use endpoints to fit a line and then find the x at which predicted $y = 4$.
44. A trend line for time (minutes) to run vs. distance (km) is $y = 6x + 20$. If a runner does 10 km, predicted time is what? If actual time was 75 minutes, what is the residual?
45. Which is better: a line with slope 0.01 and R-squared 0.8 or slope 5 with R-squared 0.2? Explain briefly in terms of strength and practical meaning.
46. Given points (1, 3), (2, 5), (3, 8), (4, 9), (5, 11). Fit a trend line using endpoints and predict y for $x = 0.5$.
47. A trend line for gas mileage (mpg) vs. car weight (1000s of lb) is $y = -8x + 40$. Interpret slope and find predicted mpg for a 2.5 (thousand lb) car.
48. You fit a line $y = 0.5x + 10$ to your data. One new observed point is (20, 30). Calculate the residual and say whether the model over- or under-predicted.
49. (Interpretation question) If the scatter is very spread out around the trend line, what does that say about the line's usefulness for prediction? Give two short reasons.
50. Given points (1, 14), (3, 20), (5, 26), (7, 32). If you use endpoints (1,14) and (7,32) to make the estimated line, write the equation and predict y at $x = 4$.