Fitting a Line to Data

Explore ideas and representations

Name _____ **Date** _____ **Score** _____ / 6

QUICK REVIEW

A fitted line summarizes the center of a roughly linear scatter pattern. It need not pass through every observation. Once two points on the selected line are known, calculate $m = (y_2 - y_1)/(x_2 - x_1)$ and then $b = y - mx$. For line points $(0, 3), (6, 15)$, $m = 12/6 = 2$ and $\widehat{y} = 2x + 3$; the hat marks a prediction.

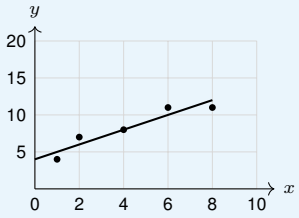
Worked example

Example for form 1: recover the selected line. Use the fitted line through $(0, 4)$ and $(8, 12)$.

1. The selected line has slope $m = (12 - 4)/(8 - 0) = 8/8 = 1$ and intercept $b = 4$.

2. Its equation is $\widehat{y} = 1x + 4$. The scattered observations need not lie exactly on this fitted line.

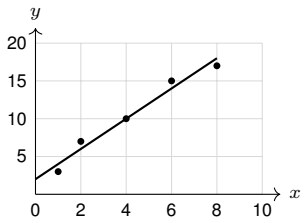
Answer: $\widehat{y} = 1x + 4$



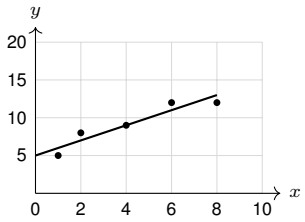
Practice Problems

Show your thinking.

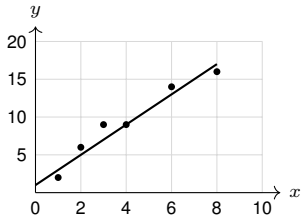
1. Recover the equation of the shown fitted line. Use the fitted line through $(0, 2)$ and $(8, 18)$.



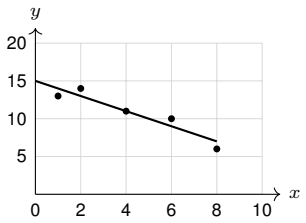
2. Use the selected line to estimate a value. Predict the output at $x = 5$. Use the fitted line through $(0, 5)$ and $(8, 13)$.



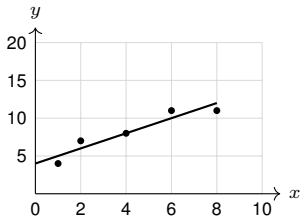
3. Measure one vertical prediction error. At $x = 3$, an observed output is 9. Find observed minus predicted. Use the fitted line through $(0, 1)$ and $(8, 17)$.



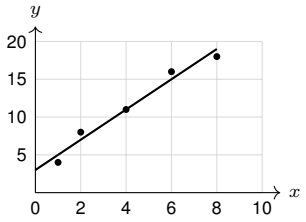
4. Recover a decreasing fitted equation. Use the fitted line through $(0, 15)$ and $(8, 7)$.



5. Choose the closer summary of these measurements. Compare line A, $\widehat{y} = 1x + 4$, with line B, $\widehat{y} = 1x + 7$, using total absolute vertical error. Use the fitted line through $(0, 4)$ and $(8, 12)$.



6. Find the input for a target prediction. At what input does the model predict 13? Use the fitted line through $(0, 3)$ and $(8, 19)$.



Answer Key

1. $\widehat{y} = 2x + 2$
2. $\widehat{y}(5) = 10$
3. Residual 2.
4. $\widehat{y} = -1x + 15$
5. Line A; total errors 4 versus 15.
6. $x = 5$

Step-by-Step Solutions

Follow each calculation, then check your own work.

Problem 1

1. The selected line has slope $m = (18 - 2)/(8 - 0) = 16/8 = 2$ and intercept $b = 2$.

2. Its equation is $\widehat{y} = 2x + 2$. The scattered observations need not lie exactly on this fitted line.

Problem 2

1. The selected line has slope $m = (13 - 5)/(8 - 0) = 8/8 = 1$ and intercept $b = 5$.

2. Substitute the requested input: $\widehat{y}(5) = 1(5) + 5 = 10$. This is a model estimate, not a guaranteed observation.

Problem 3

1. The selected line has slope $m = (17 - 1)/(8 - 0) = 16/8 = 2$ and intercept $b = 1$.

2. The prediction is $2(3) + 1 = 7$. Subtract predicted from observed: $9 - (7) = 2$. The observation lies above the line.

Problem 4

1. The selected line has slope $m = (7 - 15)/(8 - 0) = -8/8 = -1$ and intercept $b = 15$.

2. Its equation is $\widehat{y} = -1x + 15$. The scattered observations need not lie exactly on this fitted line.

Problem 5

1. For line A, absolute errors at inputs $1, 2, 4, 6, 8$ are $1, 1, 0, 1, 1$, totaling 4.

2. For line B they are $4, 2, 3, 2, 4$, totaling 15. Since $4 < 15$, line A fits better by this stated criterion.

Problem 6

1. The selected line has slope $m = (19 - 3)/(8 - 0) = 16/8 = 2$ and intercept $b = 3$.

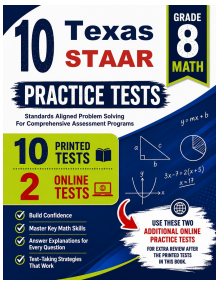
2. Solve $13 = 2x + 3$: $10 = 2x$, so $x = 10/2 = 5$. Substituting gives the required predicted output 13.

TESTINAR

Keep Building Grade 8 Math Skills

Choose the practice book matched to your state assessment and turn worksheet practice into a complete test-prep plan.

All Grade 8 books



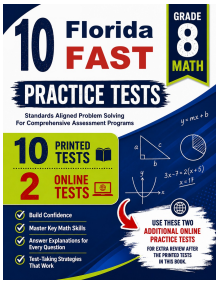
TEXAS STAAR

10 Full-Length Math Practice Tests

Build Grade 8 accuracy, confidence, and test stamina with 10 printable practice tests.

Printable eBook • Instant PDF access

View eBook



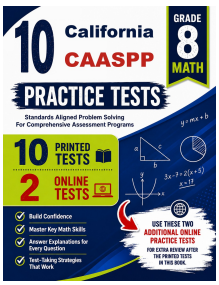
FLORIDA FAST

10 Full-Length Math Practice Tests

Build Grade 8 accuracy, confidence, and test stamina with 10 printable practice tests.

Printable eBook • Instant PDF access

View eBook



CALIFORNIA CAASPP

10 Full-Length Math Practice Tests

Build Grade 8 accuracy, confidence, and test stamina with 10 printable practice tests.

Printable eBook • Instant PDF access

View eBook

Need a different state?
Testinar has Grade 8 math practice books for state assessments across the country.

TESTINAR.COM/GRADES/8