

Trend Line Toolkit

Build a linear model from a scatter plot.

HIGH SCHOOL • HSS-ID.B.6c

CCSS.Math.Content.HSS-ID.B.6c "Fit a linear function for a scatter plot that suggests a linear association."

NAME _____

DATE _____

FIT A LINE

When a scatter plot has a roughly straight pattern, draw or choose a reasonable line of fit. Use two points on that line to find $m = (y_2 - y_1) / (x_2 - x_1)$, then substitute one point into $y = mx + b$ to find b .

WORKED EXAMPLE

A reasonable line of fit for a scatter plot passes through (2, 9) and (6, 17). Find its equation.

1. Find the slope: $m = (17 - 9) / (6 - 2) = 8 / 4 = 2$.
2. Use (2, 9): $9 = 2(2) + b$, so $b = 5$.
3. Write the model: $y = 2x + 5$.

Answer: $y = 2x + 5$

PRACTICE 6 problems

- 1** A reasonable line of fit passes through (-3, 1) and (1, 13). Find the equation in $y = mx + b$ form.

ANSWER _____

- 2** A reasonable line of fit passes through (7, 3) and (11, 15). Find the equation in $y = mx + b$ form.

ANSWER _____

- 3** A line of fit passes through (0, -7) and (12, 29). Find its slope. Then state what the slope means.

ANSWER _____

- 4** A reasonable line of fit passes through (18, 12) and (23, -3). Find the equation in $y = mx + b$ form.

ANSWER _____

- 5** A reasonable line of fit passes through (21, 10) and (24, 11). Find the equation in $y = mx + b$ form.

ANSWER _____

- 6** A scatter plot has the line of fit $y = 3x - 11$. What y -value does the model predict when $x = 12$?

ANSWER _____

APPLY IT Show your work

- 1** A student council graphs x , the number of posters hung for a dance, and y , the number of ticket reservations. The scatter plot is roughly linear, and a line of fit goes through $(13, 20)$ and $(18, 35)$. Write a linear model, then estimate the number of reservations when 21 posters are hung.

WORK SPACE

ANSWER _____

- 2** A student media club graphs x , the days after a podcast episode is released, and y , the number of daily listens in tens. The scatter plot falls roughly along a line through $(11, 48)$ and $(15, 36)$. Write a linear model, then estimate the number of daily listens on day 19.

WORK SPACE

ANSWER _____

CHALLENGE One step up

CHALLENGE

A scatter plot includes the points $(1, 7)$, $(3, 13)$, $(5, 18)$, and $(7, 24)$. Two possible lines of fit are Line A: $y = 3x + 1$ and Line B: $y = 3x$. For each line, find the absolute residuals, the distances between actual and predicted y -values. Which line is the better fit based on the smaller total absolute residual? Explain your reasoning.

PART 1 • PRACTICE

#	PROBLEM	ANSWER
1	A reasonable line of fit passes through (-3, 1) and (1, 13). Find the equation in $y = mx + b$ form.	$y = 3x + 10$
2	A reasonable line of fit passes through (7, 3) and (11, 15). Find the equation in $y = mx + b$ form.	$y = 3x - 18$
3	A line of fit passes through (0, -7) and (12, 29). Find its slope. Then state what the slope means.	$m = 3$; y increases by 3 for each increase of 1 in x.
4	A reasonable line of fit passes through (18, 12) and (23, -3). Find the equation in $y = mx + b$ form.	$y = -3x + 66$
5	A reasonable line of fit passes through (21, 10) and (24, 11). Find the equation in $y = mx + b$ form.	$y = 1/3x + 3$
6	A scatter plot has the line of fit $y = 3x - 11$. What y-value does the model predict when $x = 12$?	25

PART 2 • APPLY IT

- $y = 3x - 19$; when $x = 21$, $y = 44$, so about 44 ticket reservations. The slope is $(35 - 20) / (18 - 13) = 3$. Substituting either point gives $b = -19$, and $y = 3(21) - 19 = 44$.
- $y = -3x + 81$; when $x = 19$, $y = 24$, so about 240 daily listens. The slope is $(36 - 48) / (15 - 11) = -3$, and substituting a point gives $b = 81$. The model predicts 24 tens of listens, which is 240 listens.

CHALLENGE

Line A. Its total absolute residual is 10, compared with 14 for Line B, so Line A is the better fit.

Accept equivalent forms of each equation, including equations with terms in a different order. For the challenge, accept Line A with a correct comparison showing that its total absolute residual is smaller.