

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 _____

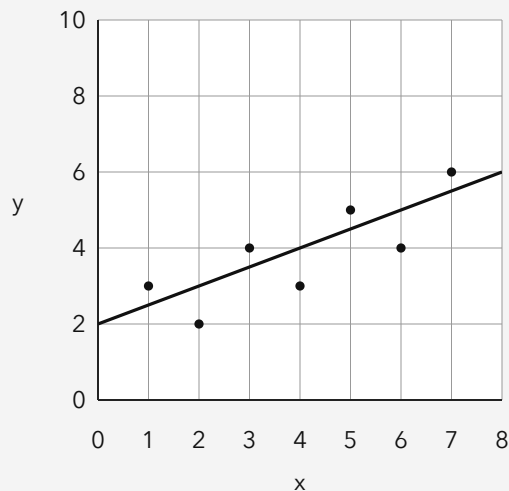
DATE _____

FIT A LINE

First inspect the scatter plot for a roughly linear pattern. Draw a line through the middle of the cloud, with points on both sides. Choose two convenient points **ON YOUR LINE**, which need not be data points. Use their coordinates to find the slope and intercept. Many reasonable lines may fit; do not connect the data point to point.

WORKED EXAMPLE

The dots are simulated observations. A reasonable fitted line is already drawn. Use the line, not any two arbitrary dots, to find a linear model.

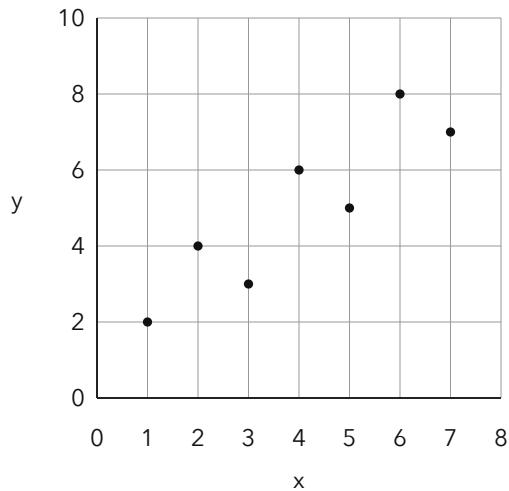


1. The points follow a rising, roughly linear pattern. The line runs through the middle.
2. Two convenient points on the line are (0,2) and (6,5).
3. $m = (5 - 2) / (6 - 0) = 0.5$; the intercept is 2.

Answer: One reasonable model is $y = 0.5x + 2$. It is an approximate fit, not an exact rule for every dot.

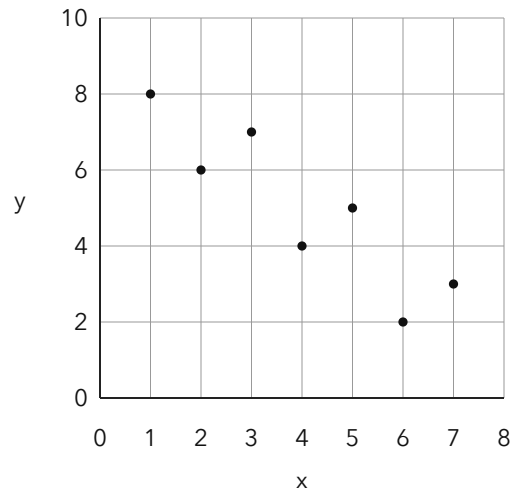
PRACTICE 4 problems

- 1** Inspect this scatter plot. Draw your own reasonable line of fit. Mark two points on YOUR line, then use them to write its equation.



ANSWER _____

- 2** Inspect this second scatter plot. Draw a reasonable line of fit. Mark two points on YOUR line and calculate its equation.



ANSWER _____

- 3** For your model in question 1, predict y when $x = 4.5$. Explain why the prediction need not equal a measured value.

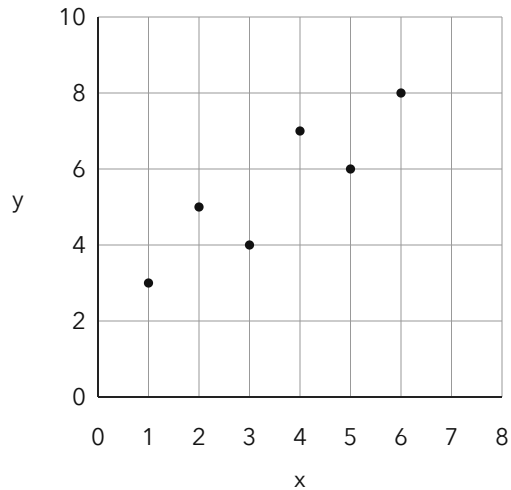
ANSWER _____

- 4** A student always draws a fitted line through the first and last dots. Why might that give a poor fit? Describe a better check.

ANSWER _____

APPLY IT Show your work

- 1** Simulated players: x is practice sessions and y is successful throws. Draw a reasonable fitted line and find its equation using two points on your line. Predict y for 4 sessions.

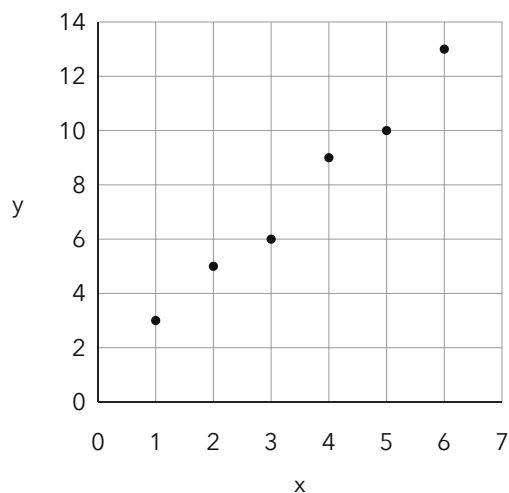
**REASONING AND ANSWER**

- 2** Using your fitted line from the practice-session plot, would you trust a prediction for 40 sessions as much as one for 4 sessions? Explain.

WORK SPACE**REASONING AND ANSWER**

CHALLENGE One step up

Fit a line to this new scatter plot and write its equation. Explain why a line is reasonable. A classmate says $y = 2x - 2$ fits well. Use the plotted points to assess that claim.



WORK SPACE AND ANSWER

PRACTICE 3

For the sample $y = x + 1$, $y = 5.5$. Other predictions follow the learner's reasonable model. The model approximates a pattern with variation.

PRACTICE 4

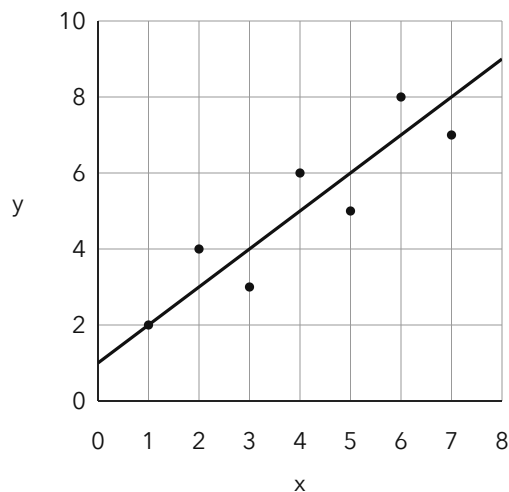
Those two dots may be unusual and miss the middle of the cloud. Inspect all the observations and choose a line that follows the overall linear pattern with points on both sides.

APPLY IT 2

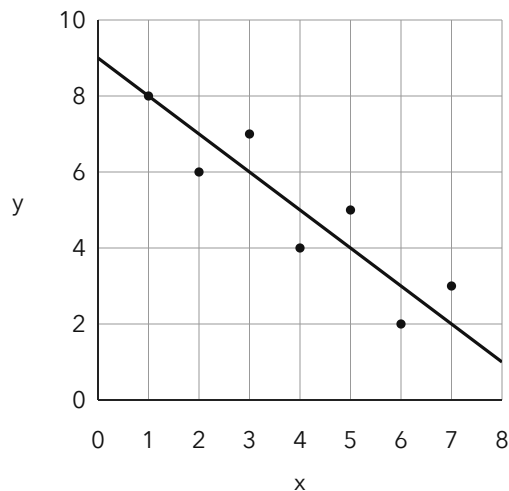
No. Four sessions is within the observed 1-6 session range; 40 is far outside it, where the linear pattern may not continue. Interpret the model within the range supported by the plotted observations.

PRACTICE 1

Sample: $y = x + 1$, using (0,1) and (6,7). Accept other reasonable lines through the cloud with correctly calculated slope and intercept.

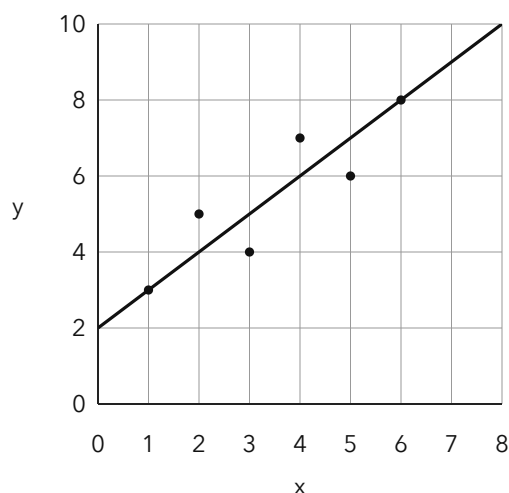
**PRACTICE 2**

Sample: $y = -x + 9$, using (1,8) and (7,2). Slope -1, intercept 9. Accept other reasonable fits.



APPLY IT 1

One reasonable model is $y = x + 2$, using (0,2) and (6,8). It predicts 6 successful throws at $x = 4$. Accept other reasonable fitted lines with consistent calculations. The slope is 1 and intercept 2 for this sample line. These observations show association; they do not prove that practice caused the difference.

**CHALLENGE**

Sample: $y = 2x + 1$, using (1,3) and (5,11) on the fitted line. The dots follow a rising linear pattern. $y = 2x - 2$ lies below every dot, missing the center.

Fitting is an estimation task: accept different reasonable lines that follow the center of each cloud. Check slopes/intercepts using points actually on the chosen line. Example key lines are not unique answers or required least-squares regressions. Predictions must follow the student's model; scatter points remain unconnected. All data are simulated.

