

SIDB6a

Fit a function to the data; use functions fitted to data to solve problems in the context of the data. Use given functions or choose a function suggested by the context. Emphasize linear, quadratic, and exponential models.

So far, we have learned how to write equations of lines given various pieces of information (slope, points, graph, etc.).

We can also collect data, plot that data and (possibly) come up with the line that best fits that data. We can then use that line to make predictions.

Key Vocabulary

Scatter plot:

- a **Graph** used to plot data
- used to determine whether there is a **correlation** between paired data (two variables)
- can show possible **trends** in the data

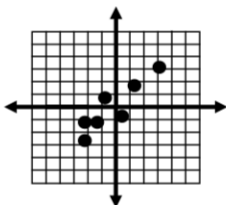
Correlation:

- the **relationship** between paired data (two variables)
- can be **strong**, **moderate** or **weak**

Line of Best Fit:

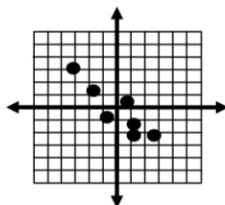
- the line that most closely follows a trend in data

Correlations:



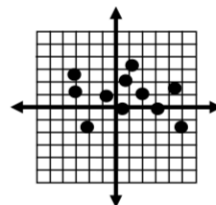
positive and strong

as x increases
y increases



negative and strong

as x increases
y decreases



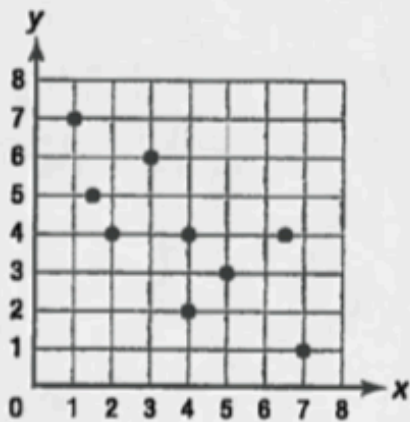
weak

x and y have no
apparent relationship

Finding the Line of Best Fit:

1. If given a scatter plot and multiple choice answers:
 - a. Use what you know!
 - slope (positive, negative)
 - y-intercept
 - b. Eliminate answer choices you know are wrong.
 - c. Enter the equations into "y =" and check the graph and the values in the table.
Pick the equation that most closely represents the data.

Which is the best equation of a line of best fit for this scatterplot?



- A. $y = x + 8$
- B. $y = -x + 8$
- C. $y = 8x$
- D. $y = -8x$

Slope appears to be negative,
so we can eliminate A and C.

about 8

Estimate the y-intercept: _____

Enter the equations into y= and check graph/table.

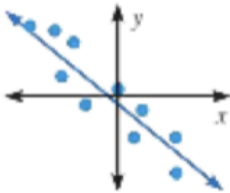
$$Y = -x + 8$$

Quick Practice

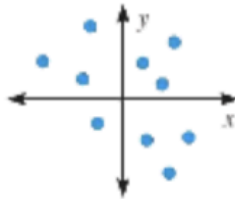
Before you start the Skills Practice, check to see if you can accurately predict the fractions that need to be multiplied to the problems below.

Describe the correlation of data:

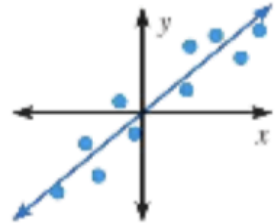
a.



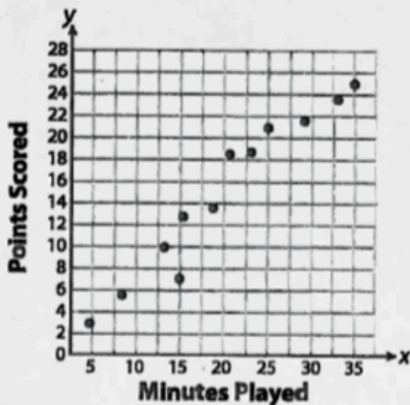
b.



c.



The coach for a girls' basketball team recorded the number of minutes each girl played and the number of points she scored. This is shown in the scatterplot.



Which equation most closely defines the line of best fit for the data?

F $y = \frac{3}{4}x - \frac{1}{3}$

G $y = \frac{1}{2}x - 1$

H $y = -\frac{1}{2}x + \frac{3}{4}$

J $y = -x + \frac{2}{3}$

Slope appears to be _____,
so eliminate _____.

Estimate the y-intercept: _____

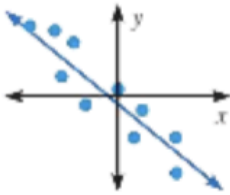
Enter in $y =$ and check graph/table.

Quick Practice

Before you start the Skills Practice, check to see if you can accurately predict the fractions that need to be multiplied to the problems below.

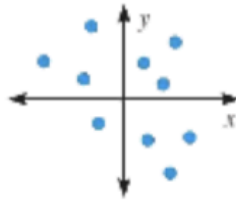
Describe the correlation of data:

a.



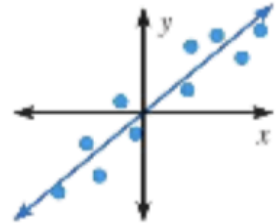
Negative and strong

b.



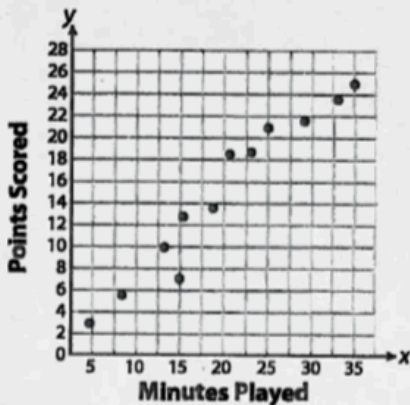
weak

c.



Positive and strong

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Which equation most closely defines the line of best fit for the data?

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J $y = -x + \frac{2}{3}$

Slope appears to be positive,
so eliminate H and J.

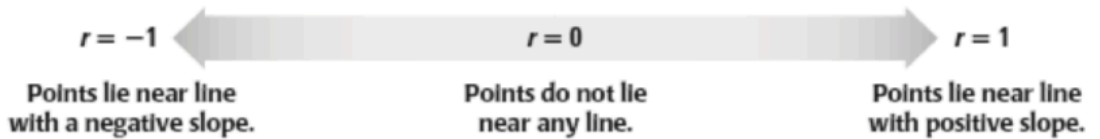
Estimate the y-intercept: About +1

Enter in $y =$ and check graph/table.

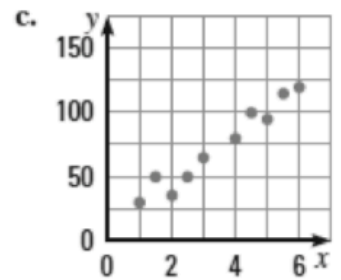
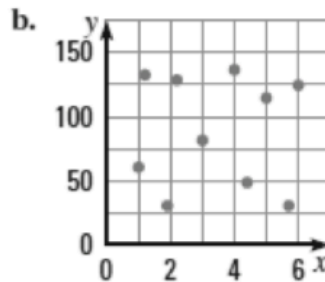
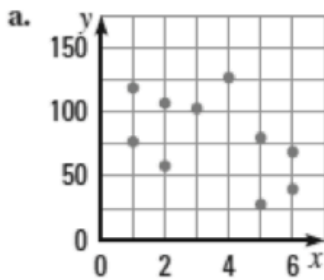
$y = \frac{1}{2}x + \frac{3}{4}$

Correlation Coefficient

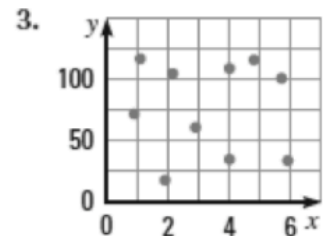
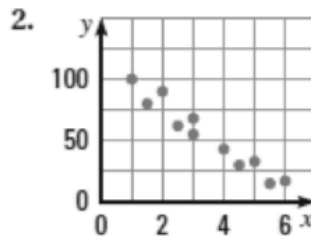
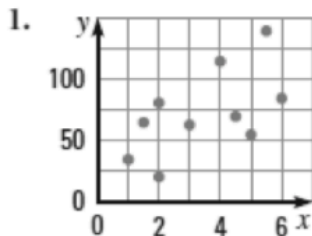
CORRELATION COEFFICIENTS A **correlation coefficient**, denoted by r , is a number from -1 to 1 that measures how well a line fits a set of data pairs (x, y) . If r is near 1 , the points lie close to a line with positive slope. If r is near -1 , the points lie close to a line with negative slope. If r is near 0 , the points do not lie close to any line.



Example: Tell whether the correlation coefficient for the data is closest to -1 , -0.5 , 0 , 0.5 , or 1 .

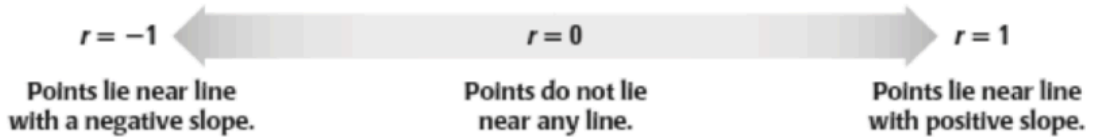


Practice: For each scatter plot, (a) tell whether the data have a *positive correlation*, a *negative correlation*, or *approximately no correlation*, and (b) tell whether the correlation coefficient is closest to -1 , -0.5 , 0 , 0.5 , or 1 .

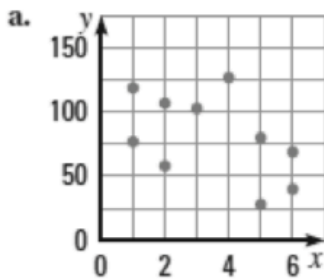


Correlation Coefficient

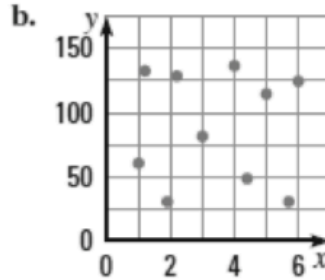
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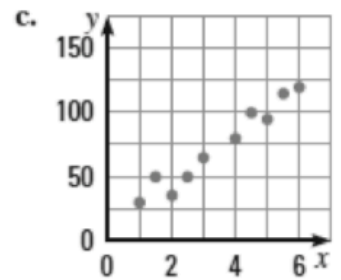
Example: Tell whether the correlation coefficient for the data is closest to -1, -0.5, 0, 0.5, or 1.



$r = -0.5$

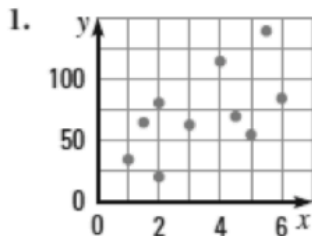


$r = 0$



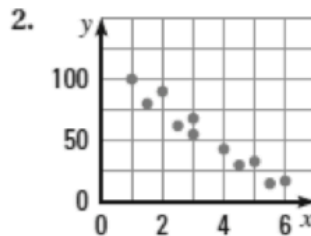
$r = 1$

Practice: For each scatter plot, (a) tell whether the data have a *positive correlation*, a *negative correlation*, or *approximately no correlation*, and (b) tell whether the correlation coefficient is closest to -1, -0.5, 0, 0.5, or 1.



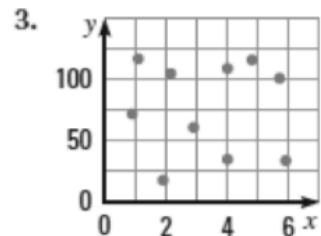
Positive Correlation

$r = 0.5$



Negative Correlation

$r = -1$



No Correlation

$r = 0$