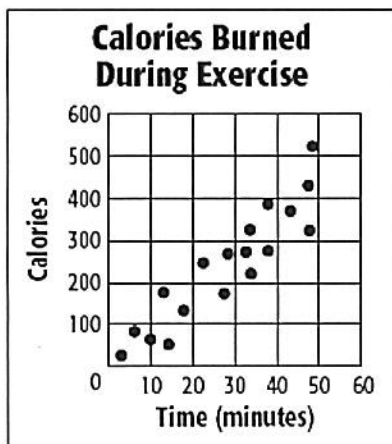


8 Algebra CC

Essential Question: How can we represent a data set with a linear model?

Do Now: Does the graph show a positive correlation, negative correlation, or no correlation?
If there is a positive or negative correlation, describe its meaning in the situation.



positive correlation

as the number of minutes exercising increases ↑, the number of calories burned increases ↑

Is there a linear association? Do the points appear to form a line?



Line of Fit

When a **bivariate data** set displays a *strong positive or negative correlation*, you can use a linear equation to represent the data. The process is called finding a **line of fit** for the data. This line is referred to as a **trend line** or **linear regression model**.

Drawing a Line of Fit for Data

Draw a line that passes as close as possible to the plotted points.

- Your line does not necessarily have to pass through any of the plotted points.
- You should try to have about the same number of points above and below the line.

Finding the Equation of the Line of Fit

Choose two points on the line of best fit. $(2, 70)$ $(4, 85)$

Find the slope

$$\begin{aligned} \frac{\Delta y}{\Delta x} &= \frac{85 - 70}{4 - 2} \\ &= \frac{15}{2} \\ &= 7.5 \end{aligned}$$

7.5 points higher (increase) for every hour worked

Find the y-intercept

$$\begin{aligned} y &= mx + b \\ 70 &= 2(7.5) + b \\ 70 &= 15 + b \\ 55 &= b \end{aligned}$$

grade with no hours working (studying)

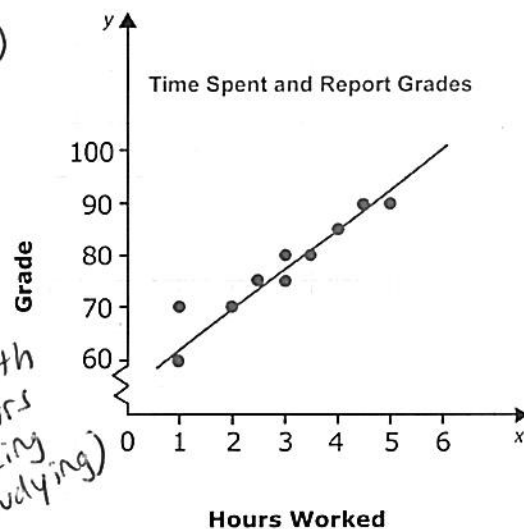
Equation of Best Fit Line

$$y = 7.5x + 55$$

final grade

slope

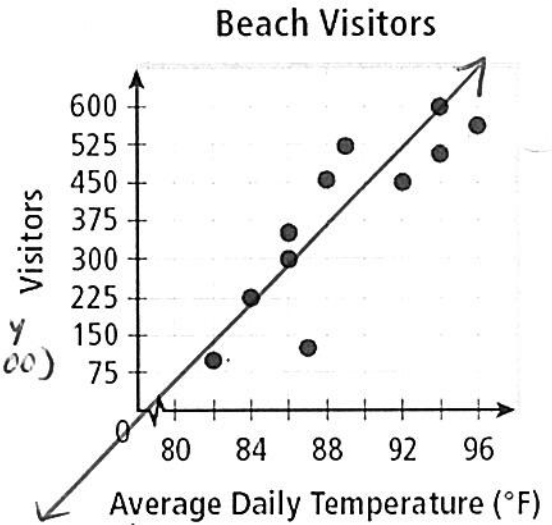
y intercept



Let's Try Another!

- > Draw a line of best fit.
- > Choose two points on the line. (86, 300) (94, 600)
- > Find slope and the y-intercept.

$m = \frac{\Delta y}{\Delta x} = \frac{300 - 600}{86 - 94}$ $= \frac{-300}{-8}$ $= 37.5$	$b =$ $y = mx + b \quad (94, 600)$ $600 = 94(37.5) + b$ $600 = 3525 + b$ $-2925 = b$
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- > Write the equation of the line of fit. $y = 37.5x - 2925$

Using the Line of Fit to Make Predictions

When you use a trend line or its equation to predict a value within the data points, you interpolate the predicted value.

When you make a prediction that is outside the data, you extrapolate the predicted value.

Using the equation of the line of fit for the beach visitors,

- (a) Predict the number of beach visitors if the temperature is 90° (interpolation).

$$y = 37.5x - 2925$$

$$y = 37.5(90) - 2925$$

$$y = 3375 - 2925$$

$$y = 450$$

*predict
450 beach
visitors when
the temp is 90*

- (b) Predict the number of beach visitors if the temperature is 102° (extrapolation).

$$y = 37.5x - 2925$$

$$y = 37.5(102) - 2925$$

$$y = 3825 - 2925$$

$$y = 900$$

*predict
900 beach visitors
when the temperature
is 102*