

Algebra 1 4.5

Investigate relationships between quantities by using scatterplots ← graph

Use lines of fit to make and evaluate predictions

bivariate data *measured 2 things* (x, y)

line of fit (prediction equation) - *write eq.*

independent variable (x)

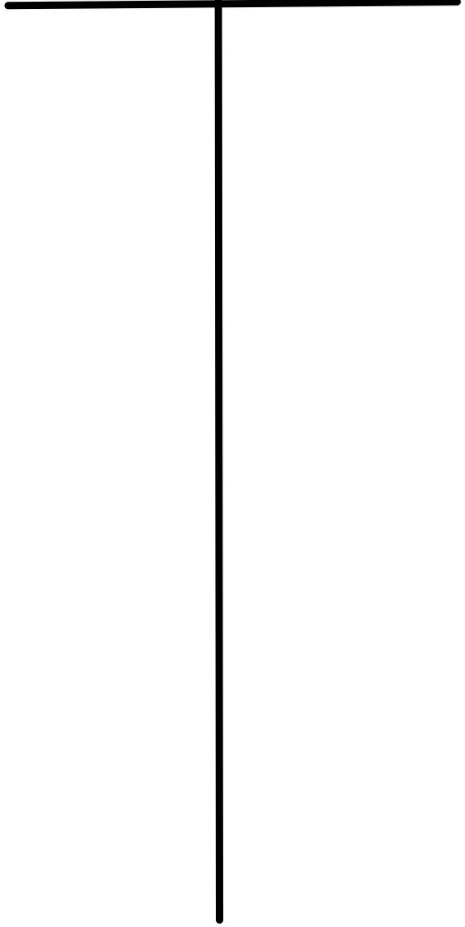
Dependent variable (y)

interpolation

extrapolation

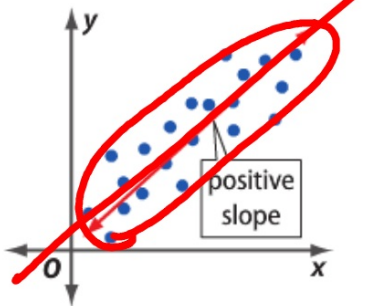
correlation

Height (cm) | Wingspan (cm)



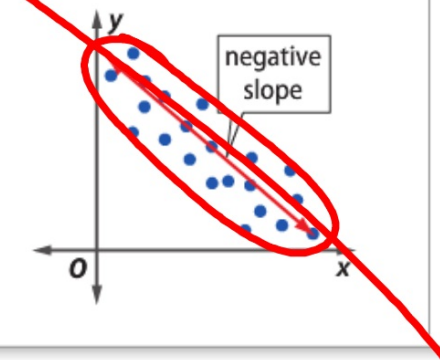
ConceptSummary Scatter Plots

Positive Correlation



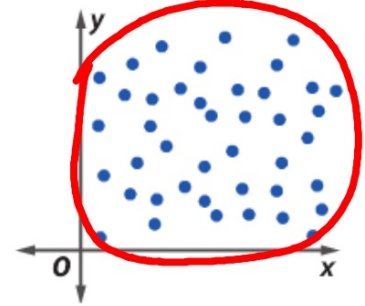
As x increases, y increases

Negative Correlation



As x decreases, y decreases

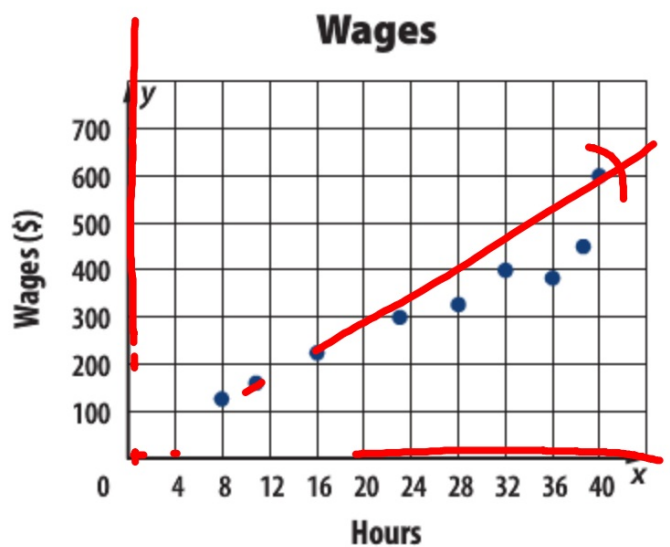
No Correlation



x and y are not related

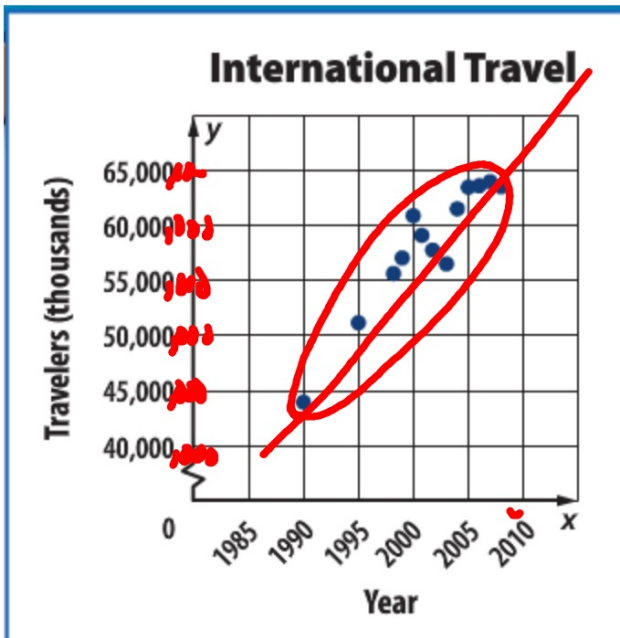
Real-World Example 1 Evaluate a Correlation

WAGES Determine whether the graph shows a *positive*, *negative*, or *no* correlation. If there is a positive or negative correlation, describe its meaning in the situation.



"It goes up" is not the kind of answer I am looking for.

1. Refer to the graph on international travel. Determine whether the graph shows a *positive*, *negative*, or *no* correlation. If there is a positive or negative correlation, describe its meaning.



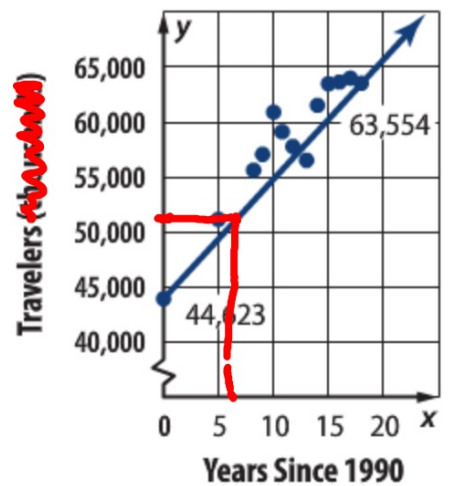
Real-World Example 3 Use Interpolation or Extrapolation

TRAVEL Use the scatter plot to find the approximate number of United States travelers to international countries in 1996.

52,000

↑

International Travel



Source: *Statistical Abstract of the United States*

Real-World Example 2 Write a Line of Fit

ROLLER COASTERS The table shows the largest vertical drops of nine roller coasters in the United States and the number of years after 1988 that they were opened. Identify the independent and the dependent variables. Is there a relationship in the data? If so, predict the vertical drop in a roller coaster built 30 years after 1988.

Years Since 1988	1	3	5	8	12	12	12	13	15
Vertical Drop (ft)	151	155	225	230	306	300	255	255	400

Source: Ultimate Roller Coaster

$(1, 151)$ $(12, 300)$

Hint: extend the line...maybe write an equation?

$$m = \frac{300 - 151}{12 - 1} = \frac{149}{11} \approx 13.5$$

$$y = mx + b$$

$$151 = 13.5(1) + b$$

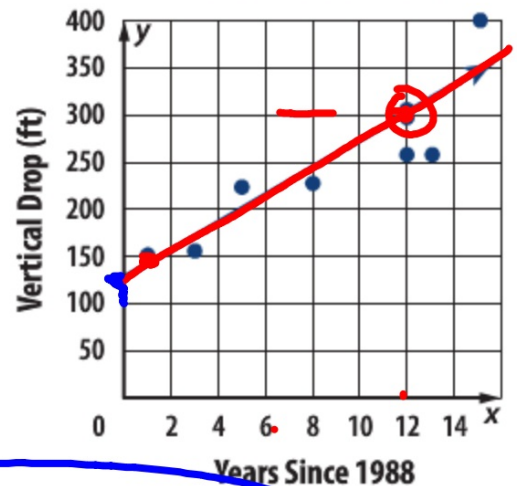
$$b = 137.5$$

$$y = 13.5x + 137.5$$

$$= 13.5(30) + 137.5$$

$$= 542.5$$

Vertical Drops of Roller Coasters



Guided Practice

2. **MUSIC** The table shows the dollar value in millions for the sales of CDs for the year. Make a scatter plot and determine what relationship exists, if any.

x	Year	2000	2001	2002	2003	2004	2005	2006	2007	2008
y	Sales	13,215	12,909	12,044	11,233	11,447	10,520	9373	7452	5471

$$y = mx + B$$

$$m = \frac{5471 - 12,909}{2008 - 2001} = \frac{-7438}{7} = -1062$$

$$m = -1062$$

$$12,909 = -1062(2001) + B$$

$$12,909 = -2,125,062 + B$$

$$B = +2,137,971$$

Graph the scatterplot

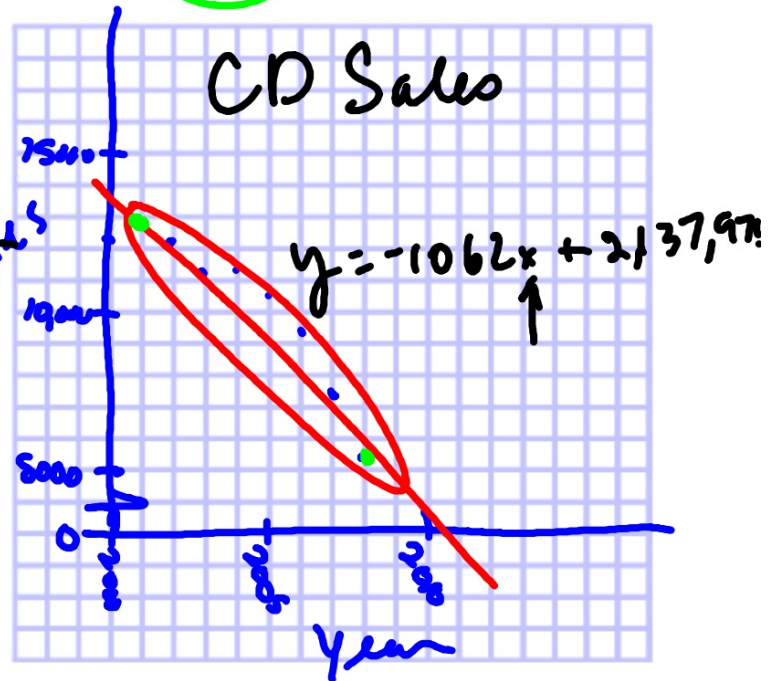
Where would a reasonable line go?

Use 2 points on the line:

far apart is better than close together

Write an equation

Sometimes follow-up question



▶ **Guided**Practice

- 3. MUSIC** Use the equation for the line of fit for the data in Guided Practice 2 to estimate CD sales in 2015.
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