

Review

Slope-Intercept

Standard

Review

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

Parallel to that line? Through (2, 16)

Review

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

Perpendicular to that line? Through (2, 16)

5-7

Scatter Plots and Trend Lines

© Content Standards

S.ID.6.c Fit a linear function for a scatter plot that suggests a linear association.

Also N.Q.1, F.LE.5, S.ID.6.a, S.ID.7, S.ID.8, S.ID.9

I can write an equation of a trend line and of a line of best fit.

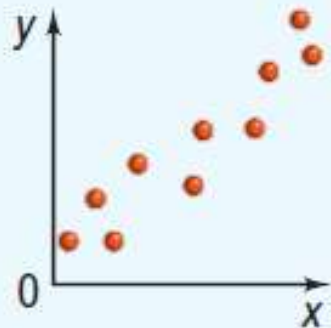
I can use a trend line and a line of best fit to make predictions.

scatter plot – a graph that relates two different sets of data by displaying them as ordered pairs

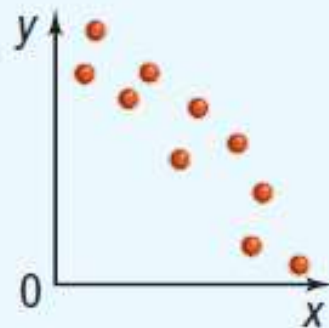
I can write an equation of a trend line and of a line of best fit.
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A **scatter plot** is a graph that relates two different sets of data by displaying them as ordered pairs. Most scatter plots are in the first quadrant of the coordinate plane because the data are usually positive numbers.

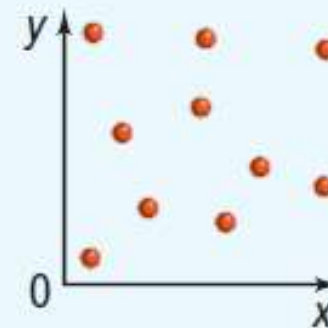
You can use scatter plots to find trends in data. The scatter plots below show the three types of relationships that two sets of data may have.



When y tends to increase as x increases, the two sets of data have a **positive correlation**.



When y tends to decrease as x increases, the two sets of data have a **negative correlation**.



When x and y are not related, the two sets of data have **no correlation**.

I can write an equation of a trend line and of a line of best fit.
I can use a trend line and a line of best fit to make predictions.



Problem 1 Making a Scatter Plot and Describing Its Correlation

Temperature The table shows the altitude of an airplane and the temperature outside the plane.

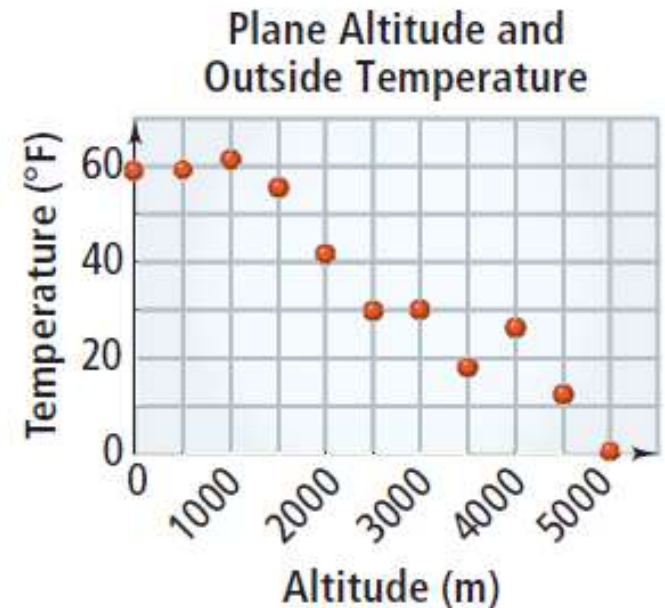
Plane Altitude and Outside Temperature

| Altitude (m) | 0 | 500 | 1000 | 1500 | 2000 | 2500 | 3000 | 3500 | 4000 | 4500 | 5000 |
|------------------|------|------|------|------|------|------|------|------|------|------|------|
| Temperature (°F) | 59.0 | 59.2 | 61.3 | 55.5 | 41.6 | 29.8 | 29.9 | 18.1 | 26.2 | 12.4 | 0.6 |

A Make a scatter plot of the data.

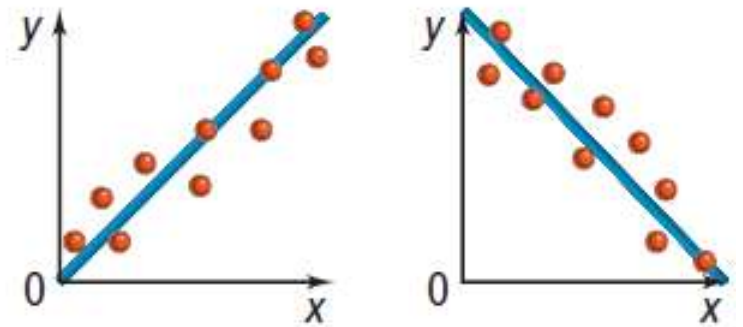
B What type of relationship does the scatter plot show?

The temperature outside the plane tends to decrease as the altitude of the plane increases. So the data have a negative correlation.



I can write an equation of a trend line and of a line of best fit.
I can use a trend line and a line of best fit to make predictions.

When two sets of data have a positive or negative correlation, you can use a trend line to show the correlation more clearly. A **trend line** is a line on a scatter plot, drawn near the points, that shows a correlation.



Why is a trend line useful?

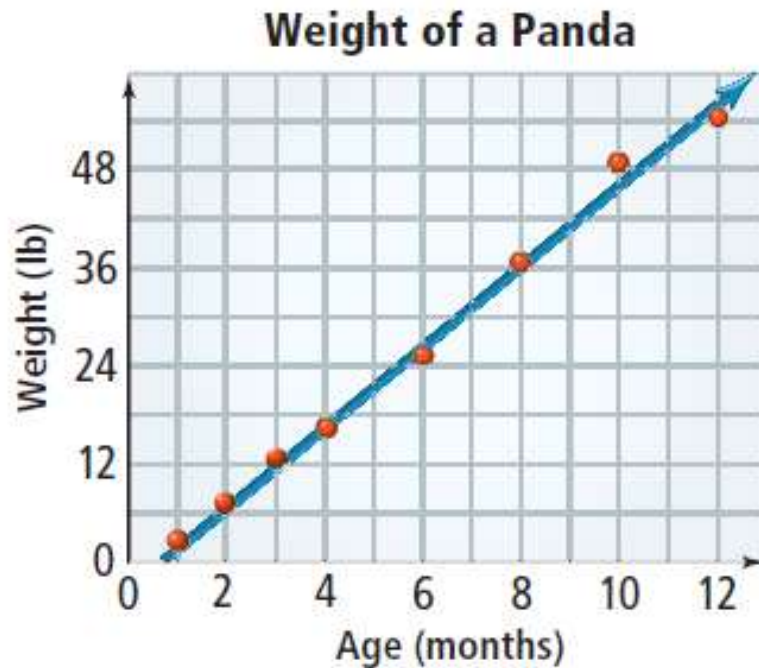
I can write an equation of a trend line and of a line of best fit.
I can use a trend line and a line of best fit to make predictions.



Problem 2 Writing an Equation of a Trend Line STEM

Biology Make a scatter plot of the data at the right. What is the approximate weight of a 7-month-old panda?

Step 1 Make a scatter plot and draw a trend line. Estimate the coordinates of two points on the line.



Weight of a Panda

| Age (months) | Weight (lb) |
|--------------|-------------|
| 1 | 2.5 |
| 2 | 7.6 |
| 3 | 12.5 |
| 4 | 17.1 |
| 6 | 24.3 |
| 8 | 37.9 |
| 10 | 49.2 |
| 12 | 54.9 |

Two points on the trend line are $(4, 17.1)$ and $(8, 37.9)$.

**I can write an equation of a trend line and of a line of best fit.
I can use a trend line and a line of best fit to make predictions.**

Two points on the trend line are $(4, 17.1)$ and $(8, 37.9)$.

Step 2 Write an equation of the trend line.

Step 3 Estimate the weight of a 7-month-old panda.

I can write an equation of a trend line and of a line of best fit.
I can use a trend line and a line of best fit to make predictions.

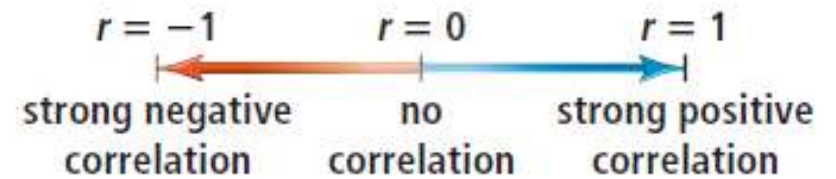
2. a. Make a scatter plot of the data below. Draw a trend line and write its equation. What is the approximate body length of a 7-month-old panda?

| | | | | | | | | |
|-------------------|-----|-------|------|------|------|------|------|------|
| Age (month) | 1 | 2 | 3 | 4 | 5 | 6 | 8 | 9 |
| Body Length (in.) | 8.0 | 11.75 | 15.5 | 16.7 | 20.1 | 22.2 | 26.5 | 29.0 |

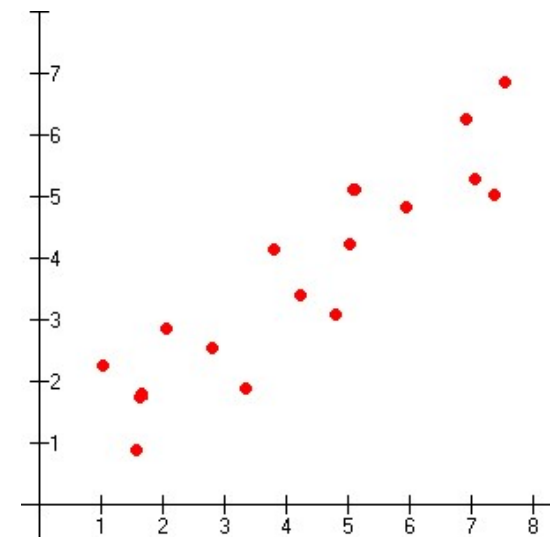
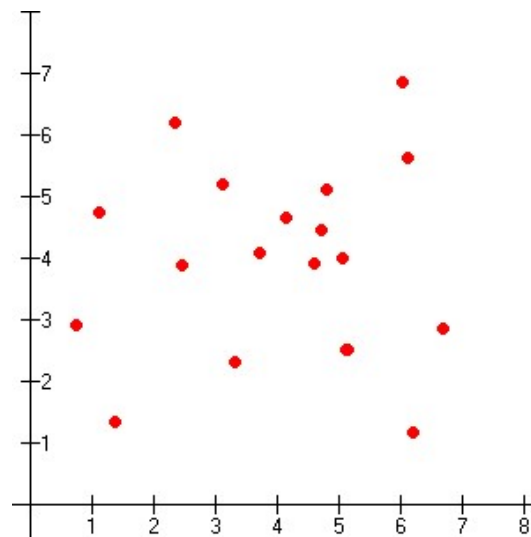
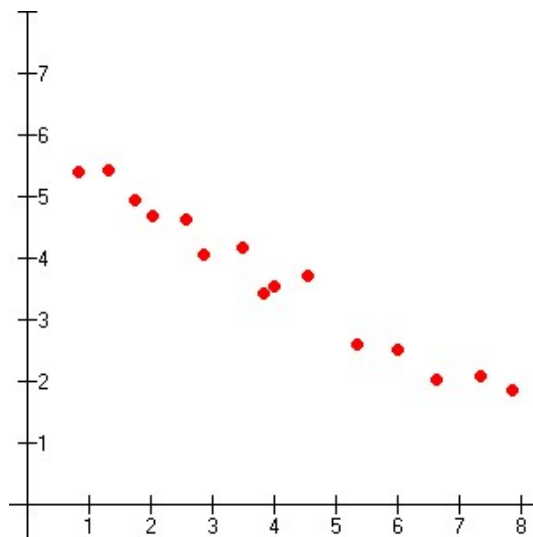
I can write an equation of a trend line and of a line of best fit.
I can use a trend line and a line of best fit to make predictions.

The trend line that shows the relationship between two sets of data most accurately is called the **line of best fit**. A graphing calculator computes the equation of the line of best fit using a method called linear regression.

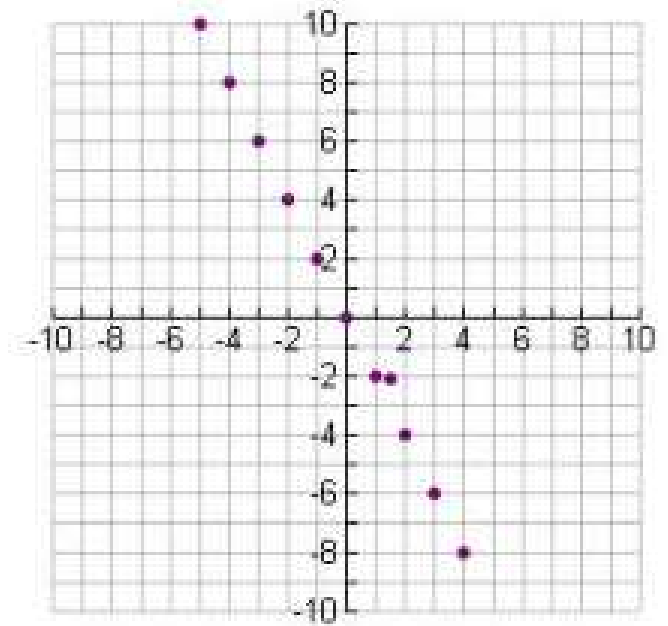
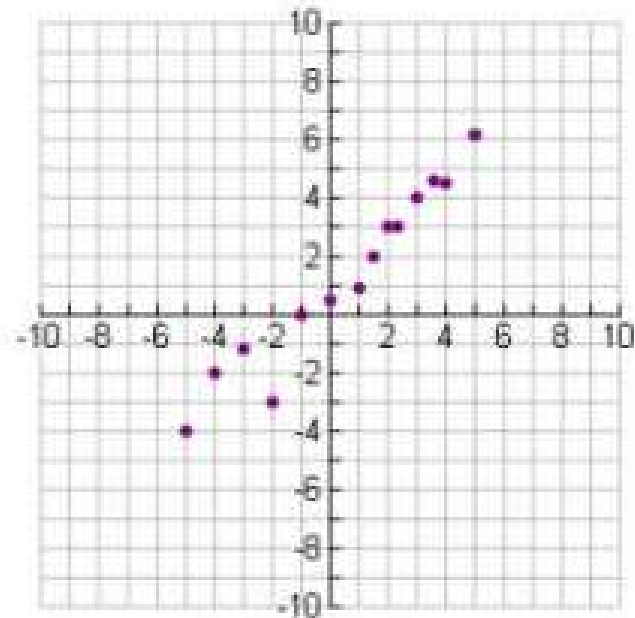
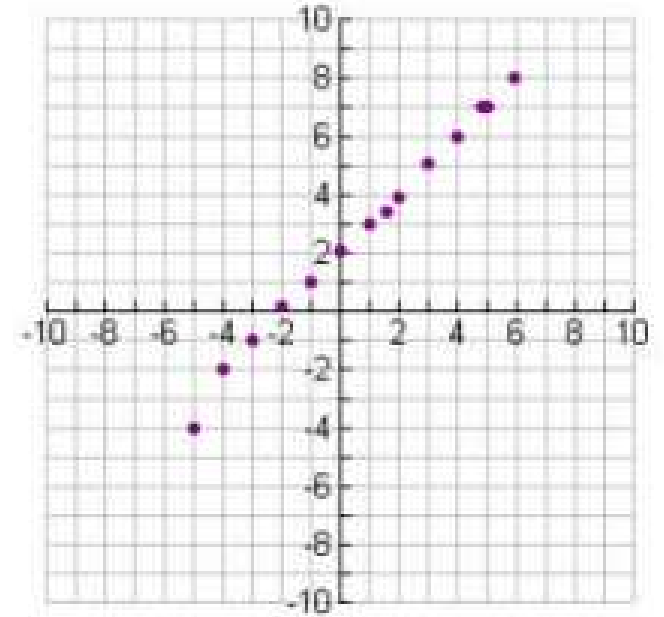
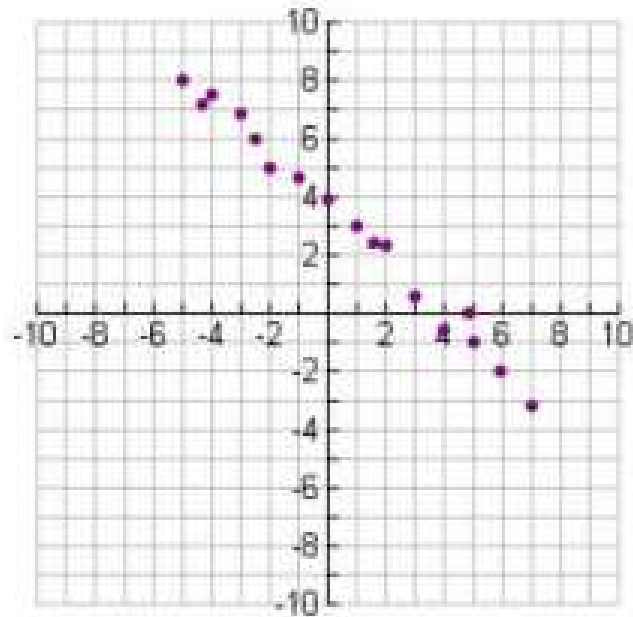
The graphing calculator also gives you the **correlation coefficient r** , a number from -1 to 1 , that tells you how closely the equation models the data.



The nearer r is to 1 or -1 , the more closely the data cluster around the line of best fit. If r is near 1 , the data lie close to a line of best fit with positive slope. If r is near -1 , the data lie close to a line of best fit with negative slope.



Which graph would have a correlation coefficient closest to -1?



Match each correlation coefficient with the **most appropriate** scatterplot.

___ -.9

___ -.3

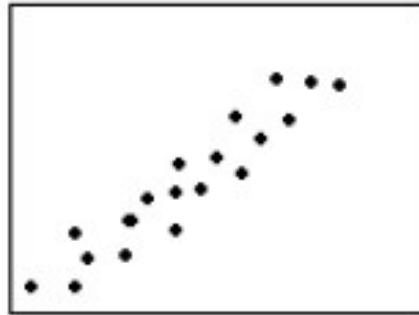
___ .3

___ .85

___ .1

___ -.7

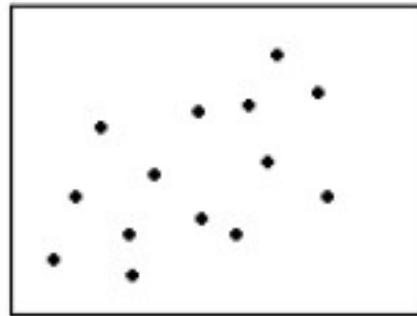
Degree of Correlation



A



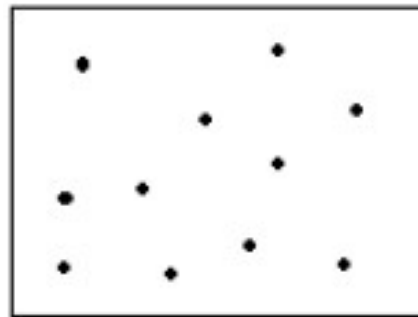
D



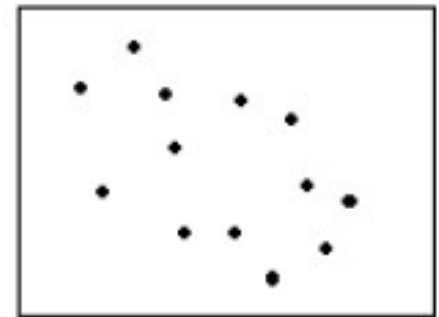
B



E



C



F