Name _____ Class _____ Date _____

6-2

Scatter Plots and Predictions

COMMON CORE

CC.8.SP.2
CC.8.SP.3

Essential question: *How can you use a trend line to make a prediction from a scatter plot?*

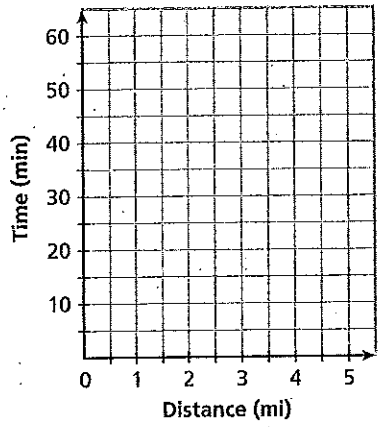
When a scatter plot shows a linear association, you can use a line to model the relationship between the variables. A **trend line** is a straight line that comes closest to the points on a scatter plot.

1 EXPLORE Drawing a Trend Line

Joyce is training for a 10K race. For some of her training runs, she records the distance she ran and how many minutes she ran.

Distance (mi)	Time (min)
4	38
2	25
1	7
2	16
3	26
5	55
2	20
4	45
3	31

A Make a scatter plot of Joyce's running data.



B To draw a trend line, use a straight edge to draw a line that has about the same number of points above and below it. Ignore any outliers.

C Use your trend line to predict how long it would take Joyce to run 4.5 miles.

_____

REFLECT

1a. How well does your trend line fit the data?

_____

_____

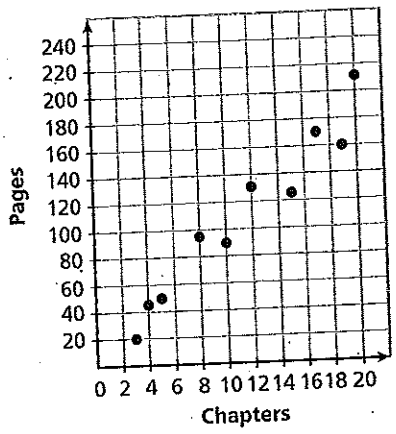
1b. Do you think you can use a scatter plot that shows no association to make a prediction? Explain your answer.

_____

_____

2 EXAMPLE Finding the Equation of a Trend Line

The scatter plot shows the relationship between the number of chapters and the total number of pages for several books. Draw a trend line, write an equation for the trend line, and describe the meanings of the slope and *y*-intercept.



A Draw a trend line. It will be easier to write an equation for the line if it goes through two of the data points. (Hint: Use (5, 50) as one of the points.)

Identify another point that the trend line goes through: (,).

B What type(s) of association does the scatter plot show?

C Do you expect the slope of the line to be positive or negative?

D Find the slope of the trend line.

$$m = \frac{\quad - 50}{\quad - 5} = \frac{\quad}{\quad} =$$

E Use the equation $y = mx + b$, the slope, and the point (5, 50). Substitute values for y, m, and x into the equation and solve for b.

$y = mx + b$

$= \quad \cdot \quad + b$ *Substitute for y, m, and b.*

$= \quad + b$ *Simplify on the right side.*

$= \quad + b$ *Subtract the number that is added to b from both sides.*

$\quad - \quad = \quad - \quad$

$= \quad b$

Use your slope and *y*-intercept values to write an equation in slope-intercept form.

$y = \quad x +$

F What is the meaning of the slope in this situation?

G What is the meaning of the *y*-intercept in this situation?

When you use a trend line or its equation to predict a value between data points that you already know, you *interpolate* the predicted value. When you make a prediction that is outside the data that you know, you *extrapolate* the predicted value.

3 EXPLORE Making Predictions

Refer to the scatter plot and trend line in 2.

A Use the equation of the trend line to predict how many pages would be in a book with 26 chapters.

Is this prediction an example of interpolation or extrapolation?

_____

$y =$ *Write the equation for your trend line.*

$y =$ *Substitute the number of chapters for x.*

$y =$ *Simplify.*

I predict that a book with 26 chapters would have _____ pages.

B Use the equation of the trend line to predict how many pages would be in a book with 14 chapters.

Is this prediction an example of interpolation or extrapolation?

_____

$y =$ *Write the equation for your trend line.*

$y =$ *Substitute the number of chapters for x.*

$y =$ *Simplify.*

I predict that a book with 14 chapters would have _____ pages.

REFLECT

3a. How well do your new points fit the original data?

_____

3b. Do you think that extrapolation or interpolation is more accurate? Explain.

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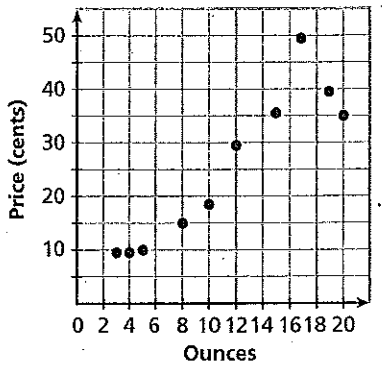
PRACTICE

Angela recorded the price of different number of ounces of bulk grains. She made a scatter plot of her data. Use the scatter plot for 1–5.



1. Draw a trend line for the scatter plot.

2. How do you know whether your trend line is a good fit for the data?

_____

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_____

_____

3. Write an equation for your trend line. _____

4. Use the equation for your trend line to interpolate the price of 7 ounces.

_____

5. Use the equation for your trend line to extrapolate the price of 50 ounces.

_____

6. A scatter plot shows the relationship between a baby's length and age. Why might an extrapolated data point not be very accurate?

_____

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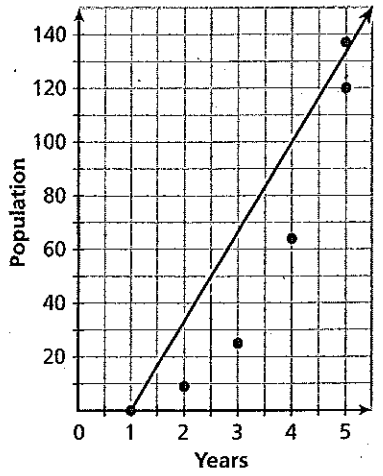
7. **Error Analysis** Carl graphed the data shown in the scatter plot and then drew a trend line. Why is a trend line not a good fit for this data?



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