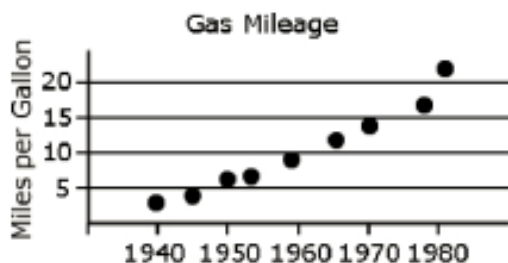


## Week 2 Thursday Course 3 Warm-up

What happened to automobile gas mileage from 1940-1980?



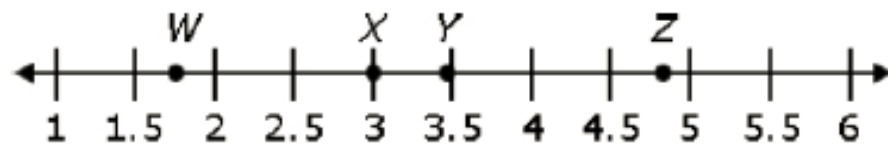
- A) It increased.
- B) It decreased.
- C) It stayed the same.
- D) It decreased, then increased.

Which of the following is equivalent to the expression below?

$$\frac{4^5}{4^2}$$

- A)  $4^{2.5}$
- B)  $4^3$
- C)  $4^7$
- D)  $4^{52}$

A part of the real number line is shown below.



Which letter represents the location of  $\sqrt{12}$ ?

- A) *W*
- B) *X*
- C) *Y*
- D) *Z*

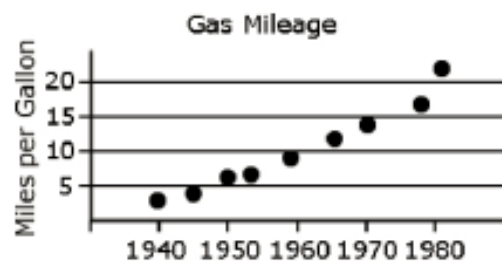
Alyssa drew a trapezoid congruent to the trapezoid below. Which figure did she draw?



- A)
- B)
- C)
- D)

## Week 2 Thursday Course 3 Warm-up

What happened to automobile gas mileage from 1940-1980?



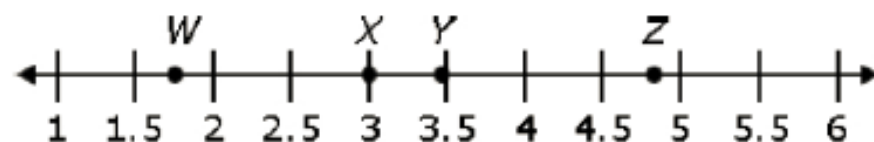
- A) It increased.
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Which of the following is equivalent to the expression below?

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A part of the real number line is shown below.



Which letter represents the location of  $\sqrt{12}$ ?

- A) W
- B) X
- C) Y
- D) Z

Alyssa drew a trapezoid congruent to the trapezoid below. Which figure did she draw?




- A)
- B)
- C)
- D)

## Lesson 10.2 Scatter Plots Day 4

# Objective

## TSW

- Understand line of best fit.
- Write a linear equation for a line of best fit.
- Use and equation for a line of best fit.



▶ A line of best fit can be used to model the linear association of bivariate quantitative data. A two-way table displays the relative frequencies of categorical data.

## Common Core State Standards

*8SP.2– Know that straight lines are widely used to model relationship between two quantitative variable 8.SP.3 Use the equation of a linear model to solve problems in the context of bivariate measurement data*

**Mathematical Practices** 1. Solve problems/persevere. 2. Reason. 4. Model mathematics

# Lesson 10.2 Scatter Plots Day 4

TSW

- Understand line of best fit.
- Write a linear equation for a line of best fit.
- Use an equation for a line of best fit

## **Vocabulary**

Interpolate-

Extrapolate-

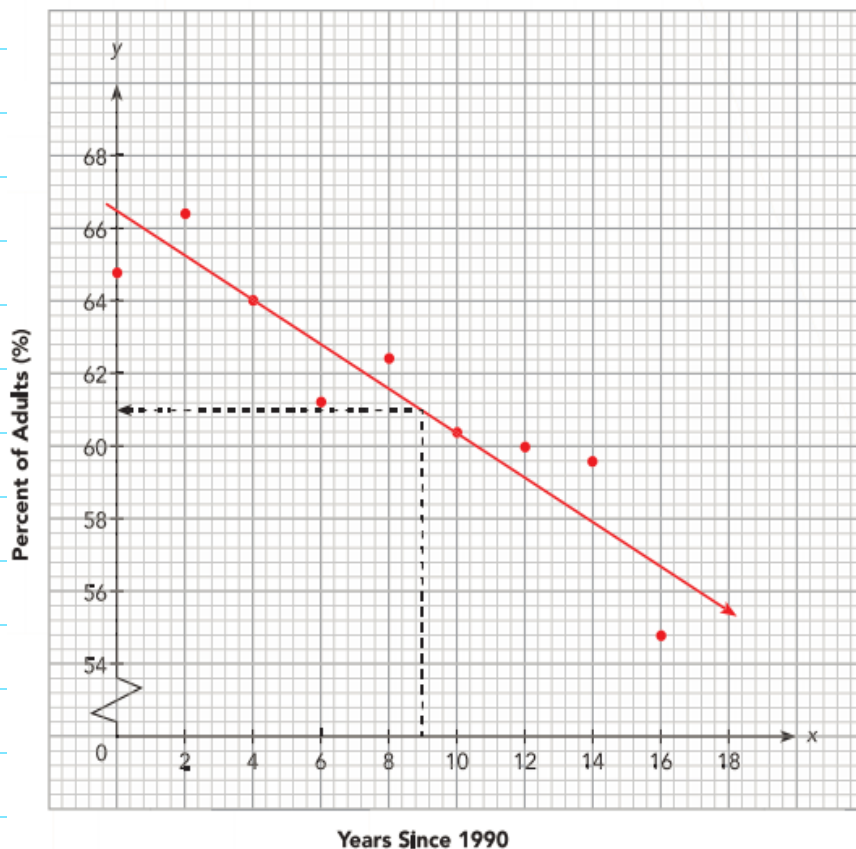
## Use an Equation for a Line of Best Fit.

You can use an equation of a line of best fit to make estimates or predictions. When you use a line of best fit or its equation to estimate a value between data points that you already know, you **interpolate** to get the estimated value. When you make a prediction that is outside of the range of the data, you **extrapolate** to get the predicted value.

### Example 6 Use a line of best fit to estimate data.

The diagram below shows the scatter plot of data in Example 5.

Newspaper Readership

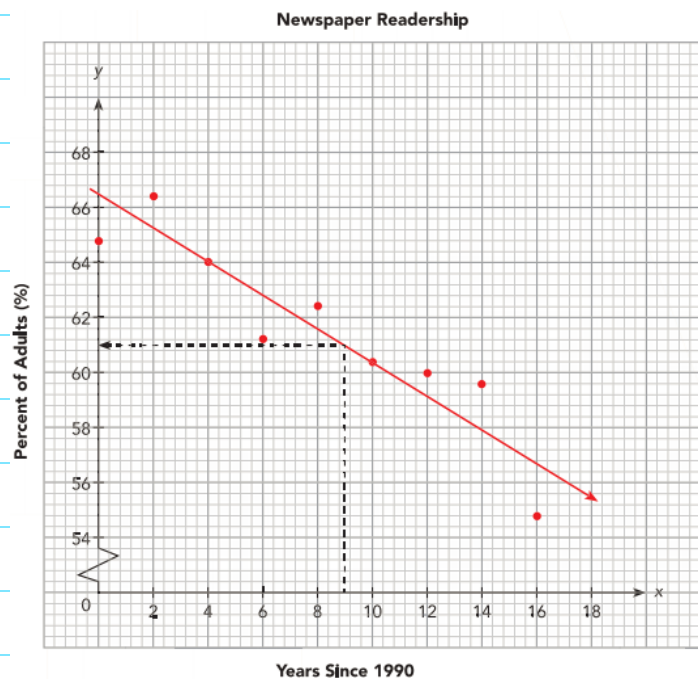


- a) Use the graph to estimate the percent of adults who got their news from newspapers in the year 1999.

## Example 6

## Use a line of best fit to estimate data.

The diagram below shows the scatter plot of data in Example 5.



- a) Use the graph to estimate the percent of adults who got their news from newspapers in the year 1999.

### Solution

1999 is 9 years after 1990, so find the point on the line of best fit that has an  $x$ -value of 9.

The estimate is reasonable because the linear trend followed through the year 1999. Usually, interpolating data is more accurate than extrapolating data.

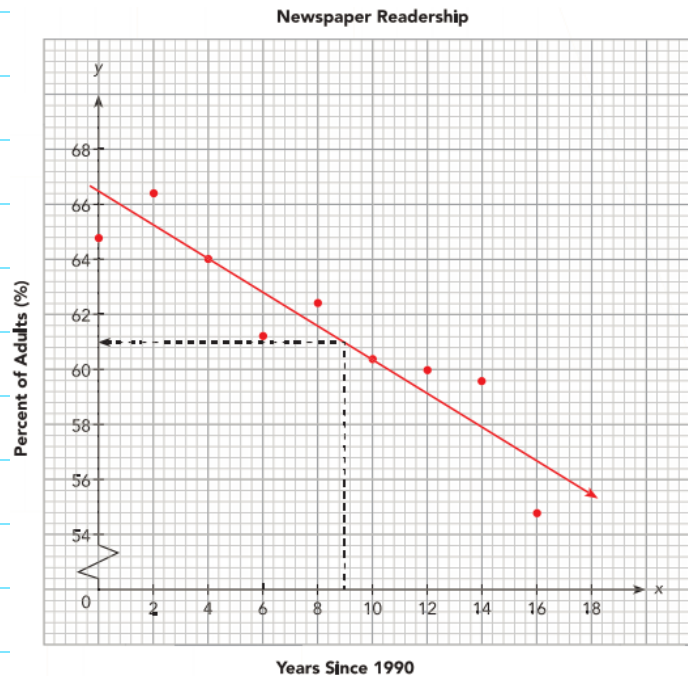


The point is approximately  $(9, 61)$ , so the percent of adults who got their news from newspapers in 1999 was about 61%.

## Example 6

## Use a line of best fit to estimate data.

The diagram below shows the scatter plot of data in Example 5.

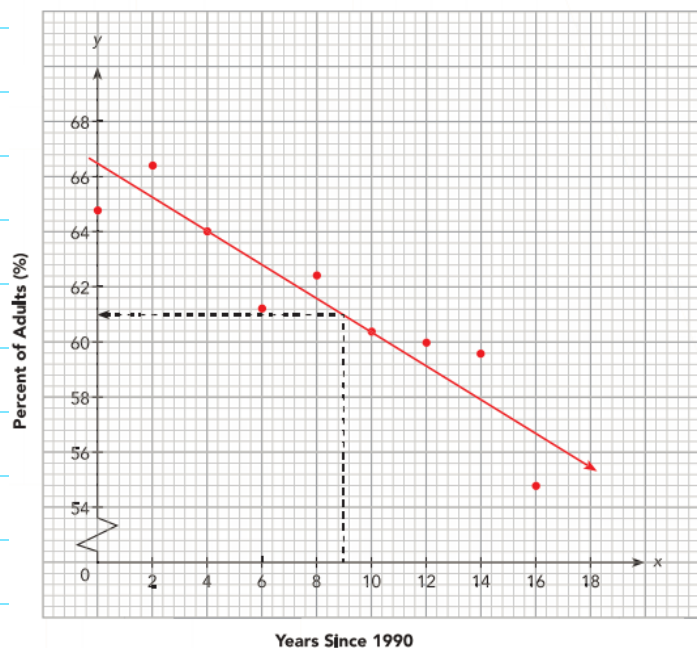


- b) Use the equation in Example 5 to estimate the percent of adults who got their news from newspapers in the year 2010.

## Example 6

## Use a line of best fit to estimate data.

The diagram below shows the scatter plot of data in Example 5.



- b) Use the equation in Example 5 to estimate the percent of adults who got their news from newspapers in the year 2010.

### Solution

The data were collected through year 2006. You can use the equation of the line to extrapolate a prediction for 2010.

Using  $y = -0.6x + 66.4$ , substitute 20 for  $x$ .

$$y = -0.6(20) + 66.4 = 54.4\%$$

From the trend observed in previous years, about 54.4% of adults got their news from newspapers in year 2010.

### Caution

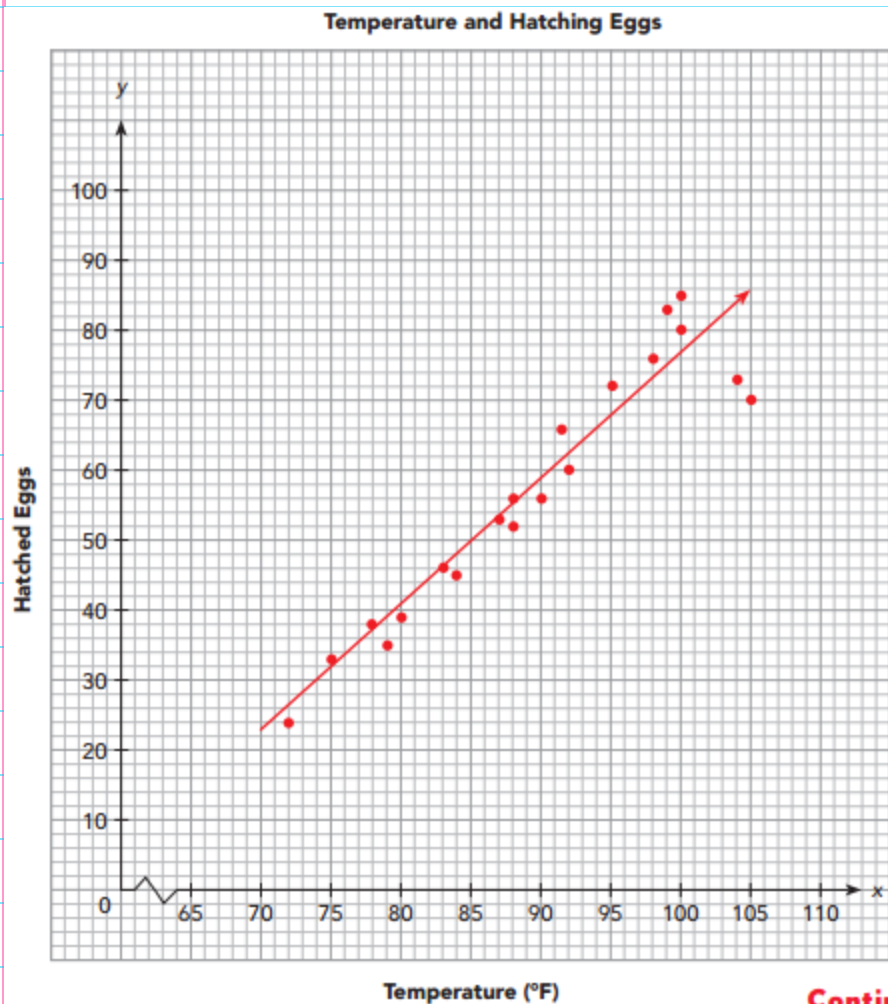
Extrapolations can be misleading, because they assume that the linear trend continues outside the range of the data collected. The farther out from the data you predict, the less reliable your prediction will be.



## Guided Practice

Solve.

- 3 The scatter plot below shows the number of eggs hatched,  $y$ , per 100 eggs in an incubator with varying temperatures,  $x^\circ\text{F}$ .



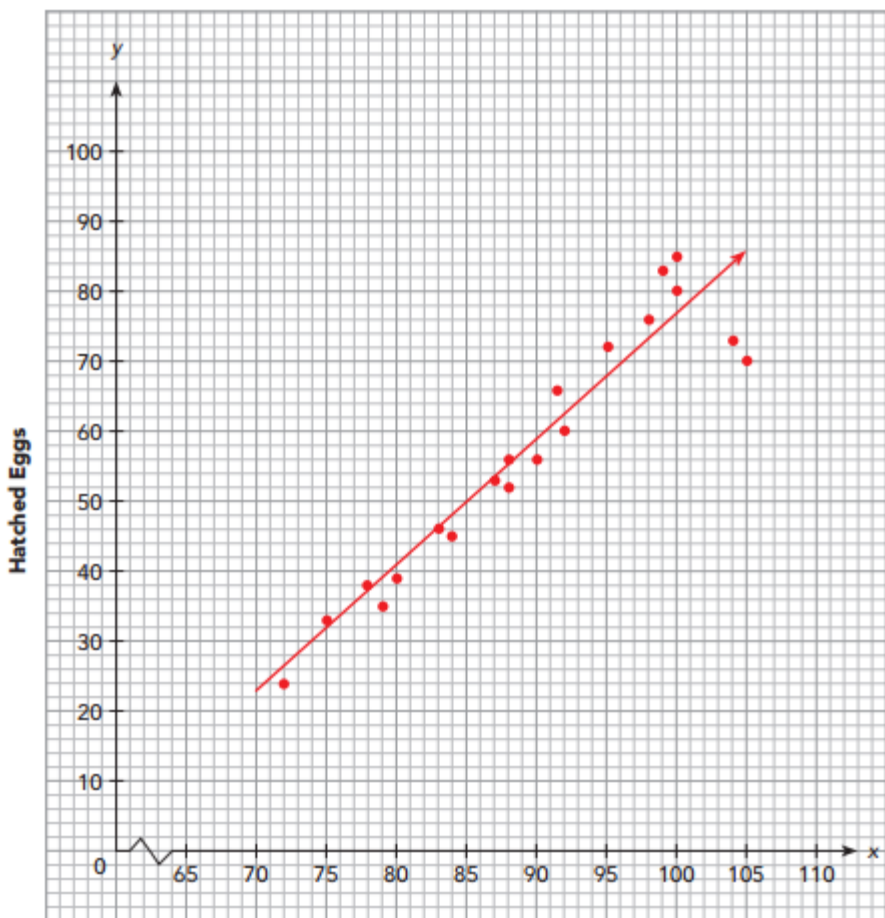
Contin

# Guided Practice

Solve.

- 3 The scatter plot below shows the number of eggs hatched,  $y$ , per 100 eggs in an incubator with varying temperatures,  $x^\circ\text{F}$ .

Temperature and Hatching Eggs



- a) Given that the line of best fit passes through  $(80, 41)$  and  $(95, 68)$ , find the equation of the line of best fit.

First find the slope of the line of best fit that passes through the points  $(80, 41)$  and  $(95, 68)$ .

$$m = \frac{? - ?}{? - ?} = \frac{?}{?} = \underline{?}$$

Next find the  $y$ -intercept using the equation in slope-intercept form.

$$y = mx + b \quad \text{Use slope-intercept form.}$$

$$\underline{?} = \underline{?}(\underline{?}) + b \quad \text{Substitute for } m, x, \text{ and } y.$$

$$\underline{?} = \underline{?} + b \quad \text{Multiply.}$$

$$\underline{?} - \underline{?} = \underline{?} + b - \underline{?} \quad \text{Subtract } \underline{?} \text{ from both sides.}$$

$$\underline{?} = b \quad \text{Simplify.}$$

Finally, write an equation in slope-intercept form,  $y = mx + b$ .

$$y = \underline{?}x + \underline{?} \quad \text{Substitute } \underline{?} \text{ for } m \text{ and } \underline{?} \text{ for } b.$$

The equation of the line of best fit is  $\underline{?}$ .

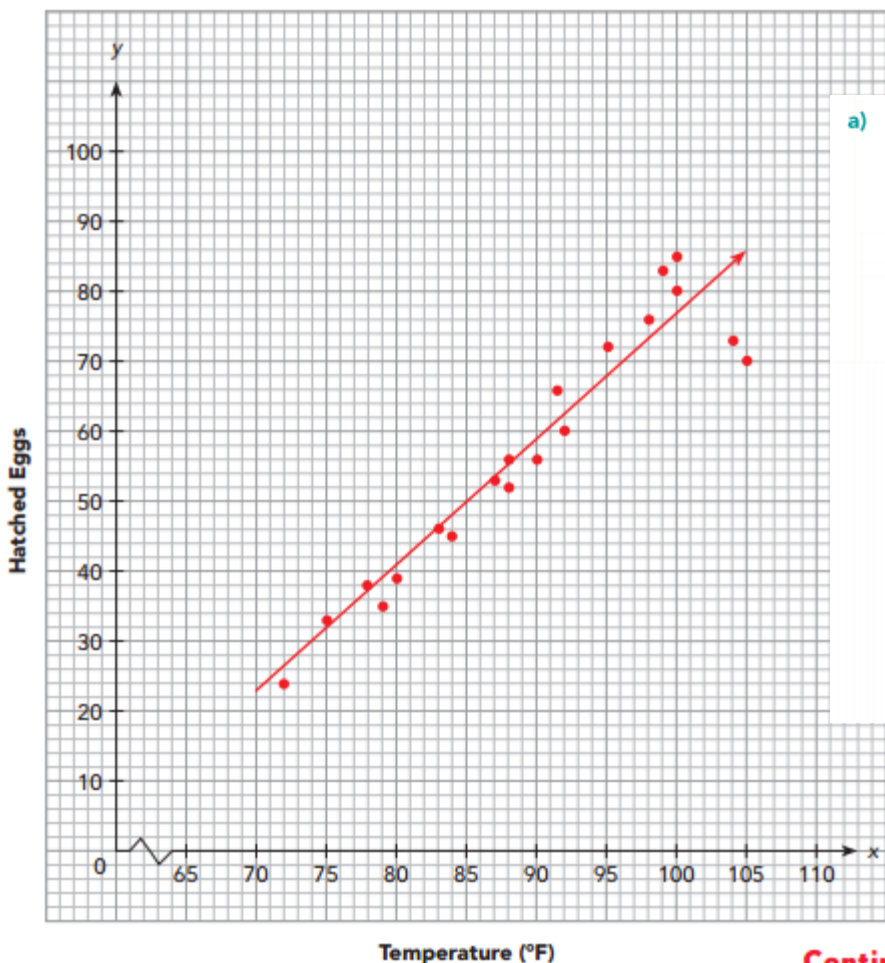
Contin

# Guided Practice

Solve.

- 3 The scatter plot below shows the number of eggs hatched,  $y$ , per 100 eggs in an incubator with varying temperatures,  $x^\circ\text{F}$ .

Temperature and Hatching Eggs



- a) Given that the line of best fit passes through  $(80, 41)$  and  $(95, 68)$ , find the equation of the line of best fit.

First find the slope of the line of best fit that passes through the points  $(80, 41)$  and  $(95, 68)$ .

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{? - ?}{? - ?} = \frac{?}{?} = \frac{68 - 41}{95 - 80}; \frac{27}{15}; 1.8$$

Next find the y-intercept using the equation in slope-intercept form.

$$y = mx + b \quad \text{Use slope-intercept form.}$$

$$\frac{?}{?} = \frac{?}{?} + b \quad \text{Substitute for } m, x, \text{ and } y. \quad 41; 1.8; 80$$

$$\frac{?}{?} = \frac{?}{?} + b \quad \text{Multiply.} \quad 41; 144$$

$$\frac{?}{?} - \frac{?}{?} = \frac{?}{?} + b - \frac{?}{?} \quad \text{Subtract } \frac{?}{?} \text{ from both sides.} \quad 41; 144; 144; 144; 144$$
$$\frac{?}{?} = b \quad \text{Simplify.} \quad -103$$

Finally, write an equation in slope-intercept form,  $y = mx + b$ .

$$y = \frac{?}{?}x + \frac{?}{?} \quad \text{Substitute } \frac{?}{?} \text{ for } m \text{ and } \frac{?}{?} \text{ for } b. \quad 1.8; -103$$

The equation of the line of best fit is  $\frac{?}{?} y = 1.8x - 103$

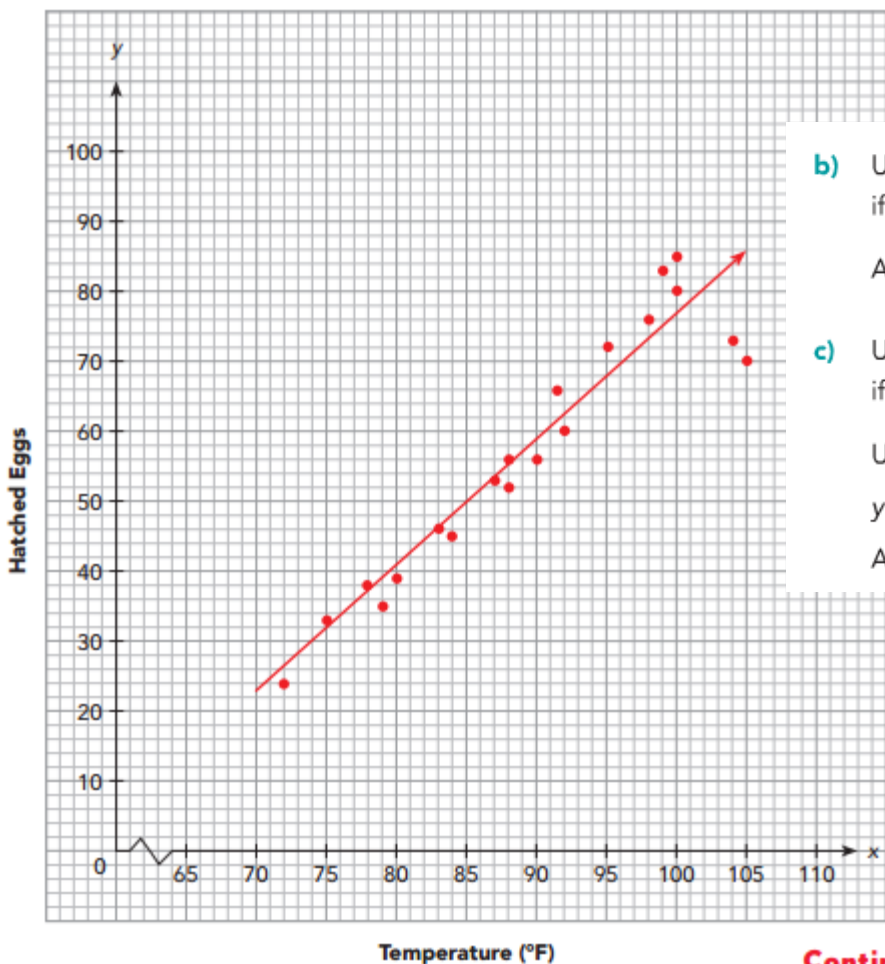
Contin

# Guided Practice

Solve.

- 3 The scatter plot below shows the number of eggs hatched,  $y$ , per 100 eggs in an incubator with varying temperatures,  $x^\circ\text{F}$ .

Temperature and Hatching Eggs



- b) Use the graph to estimate the number of eggs that would hatch per 100 eggs if the temperature of the incubator is kept at  $86^\circ\text{F}$ .

About ? eggs would hatch if the temperature of the incubator is kept at ?.

- c) Use the equation to predict the number of eggs that would hatch per 100 eggs if the temperature of the incubator is kept at  $65^\circ\text{F}$ .

Using the equation ?, substitute ? for  $x$ .

$$y = \underline{?} \cdot \underline{?} - \underline{?} = \underline{?}$$

About ? eggs would hatch if the temperature of the incubator is kept at  $65^\circ\text{F}$ .

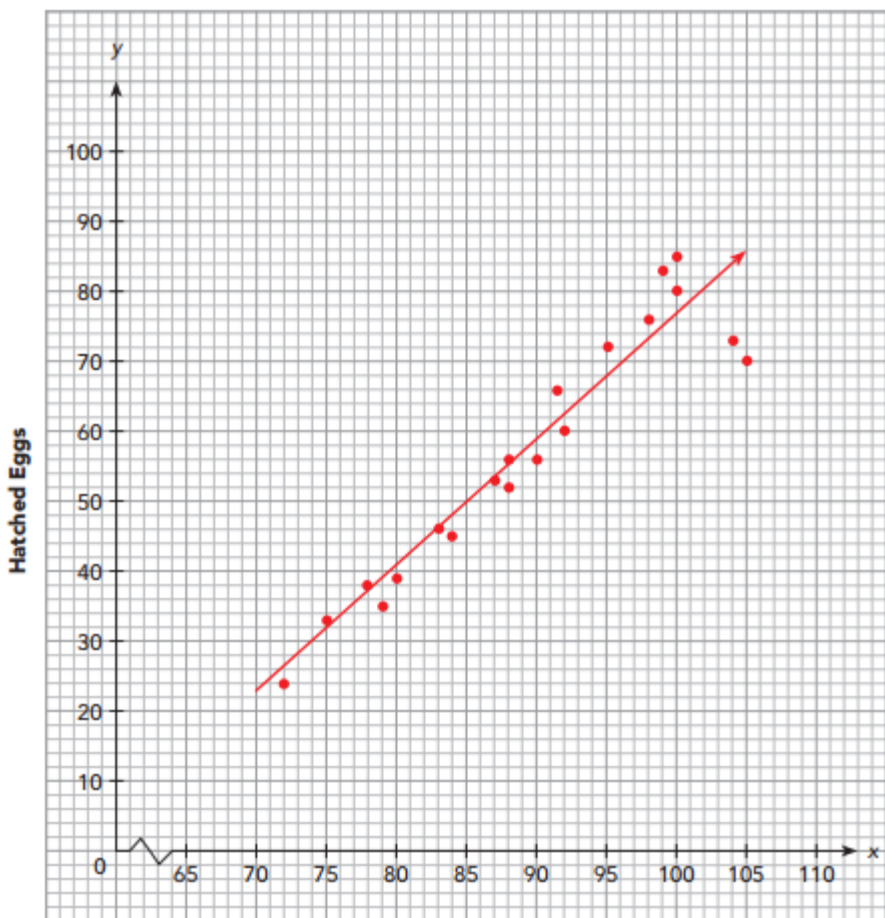
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# Guided Practice

Solve.

- 3 The scatter plot below shows the number of eggs hatched,  $y$ , per 100 eggs in an incubator with varying temperatures,  $x^\circ\text{F}$ .

Temperature and Hatching Eggs



- b) Use the graph to estimate the number of eggs that would hatch per 100 eggs if the temperature of the incubator is kept at  $86^\circ\text{F}$ .

About 52 eggs would hatch if the temperature of the incubator is kept at  $86^\circ\text{F}$ .

- c) Use the equation to predict the number of eggs that would hatch per 100 eggs if the temperature of the incubator is kept at  $65^\circ\text{F}$ .

Using the equation  $y = 1.8x - 103$ , substitute 65 for  $x$ .

$$y = \underline{1.8} \cdot \underline{65} - \underline{103} = \underline{14}$$

About 14 eggs would hatch if the temperature of the incubator is kept at  $65^\circ\text{F}$ .

Contin

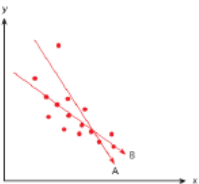
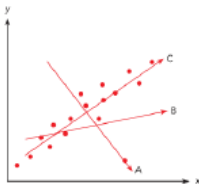
# Lesson 10.2 Scatter Plots Day 4

## Practice 10.2 #6-7

Name: \_\_\_\_\_ Date: \_\_\_\_\_

### Practice 10.2

State the line that represents a line of best fit for each scatter plot.

1  2 

Draw a scatter plot and a line of best fit for each table of bivariate data.

3 Use 1 centimeter on the horizontal axis to represent 1 unit. Use 1 centimeter on the vertical axis to represent 20 units.

x	4	1	2	3	5	6	3	6	2	7
y	72	12	32	164	88	112	52	88	40	136

4 Use 1 centimeter on the horizontal axis to represent 1 unit for the x interval from 80 to 87. Use 1 centimeter on the vertical axis to represent 10 units for the y interval from 200 to 300.

x	80	84	81	87	81	86	82
y	220	236	214	256	200	250	292

x	83	83	84	85	85	83	82
y	220	240	238	240	244	232	222

5 Use 1 centimeter on the horizontal axis to represent 0.1 unit. Use 1 centimeter on the vertical axis to represent 5 units for the y interval from 20 to 70.

x	0.1	0.9	0.3	0.4	0.4	1.1	1.0
y	69	59	66	65	64	58	61


x	0.8	0.5	0.7	0.7	0.6	0.2	0.5
y	59	65	63	60	30	68	62

Course 3

## Challenge-

- \*MangaHigh provides additional challenge
- \*Pick a Problem
- \*BuzzMath



 **Lesson Check #6**-can use the equation of a line of best fit to estimate and predict data

## Ticket Out the Door-



### **Ticket Out the Door**

**Explain the difference between interpolation and extrapolation. Give examples of each.**