

Name: \_\_\_\_\_ Period \_\_\_\_\_

## Unit 4B:

# Describing Data

Resources and Information at:

[www.tinyurl.com/9dayson](http://www.tinyurl.com/9dayson)

# Student Learning Map



**LEARNING-FOCUSED**  
Solutions That Work!

## Unit 4B

### Unit 4B: Describing Data

**Unit Essential Question:** How is data gathered, displayed, summarized, examined, and interpreted to discover patterns and deviations from patterns.

Concept:

Concept:

Lesson Essential Questions:

Lesson Essential Questions:

Vocabulary:

Vocabulary:

Additional Information/Resources:

[www.usatestprep.com](http://www.usatestprep.com)

school: newmanchesterga  
code: newton58

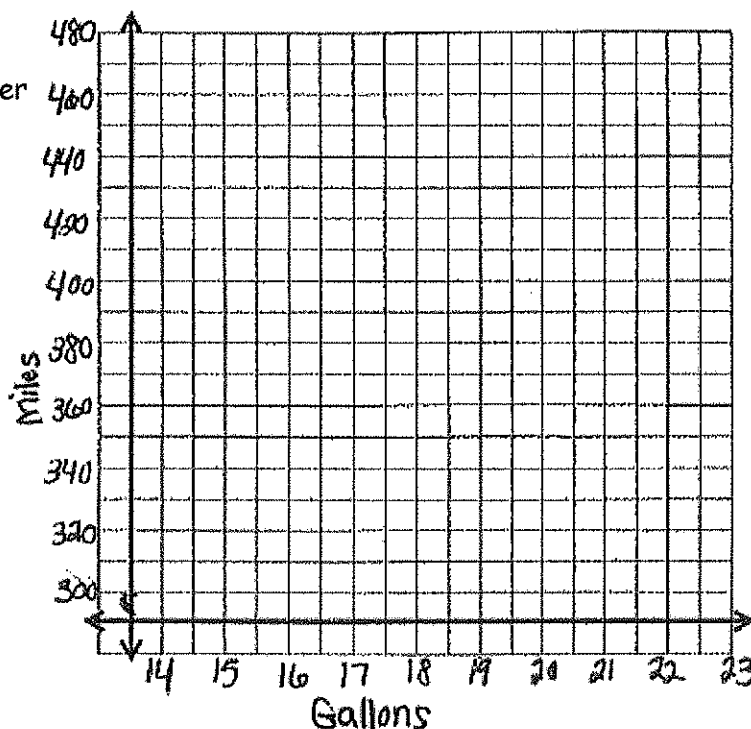
## Lesson 4.5 - Functions Fitted to Data

- A \_\_\_\_\_ is a graph of data on a coordinate plane, where each data pair is represented by a point.
- Graphing a function on the same coordinate plane as a scatter plot for a data set allows us to see if the function is a \_\_\_\_\_ estimation of the relationship between the two variables in the data set.
- The graph and the equation of the function can be used to \_\_\_\_\_ coordinate pairs that are not included in the data set.

### Example 1

Andrew wants to estimate his gas mileage, or miles traveled per gallon of gas used. He records the number of gallons of gas he purchased and the total miles he traveled with that gas.

| Gallons | Miles |
|---------|-------|
| 15      | 313   |
| 17      | 340   |
| 18      | 401   |
| 19      | 423   |
| 18      | 392   |
| 17      | 379   |
| 20      | 408   |
| 19      | 437   |
| 16      | 366   |
| 20      | 416   |



1. Create a scatter plot showing the relationship between gallons of gas and miles driven.
2. Would a linear or exponential function be a better estimate for the data? Explain.

3. Which function is a better estimate for the function that relates gallons to miles:  
 $y = 15x$  or  $y = 22x$ ?

a. Graph  $y = 15x$  (since it's linear, you only need two points)

b. Graph  $y = 22x$  (since it's linear, you only need two points)

c. Identify which function comes closer to the data values (this function is the better estimate for the data). \_\_\_\_\_

4. Interpret the equation in the context of the problem.

a. Determine the units of slope and the y-intercept. Slope: \_\_\_\_\_ Y-intercept: \_\_\_\_\_

b. Describe what the slope and y-intercept mean in the context of the problem.

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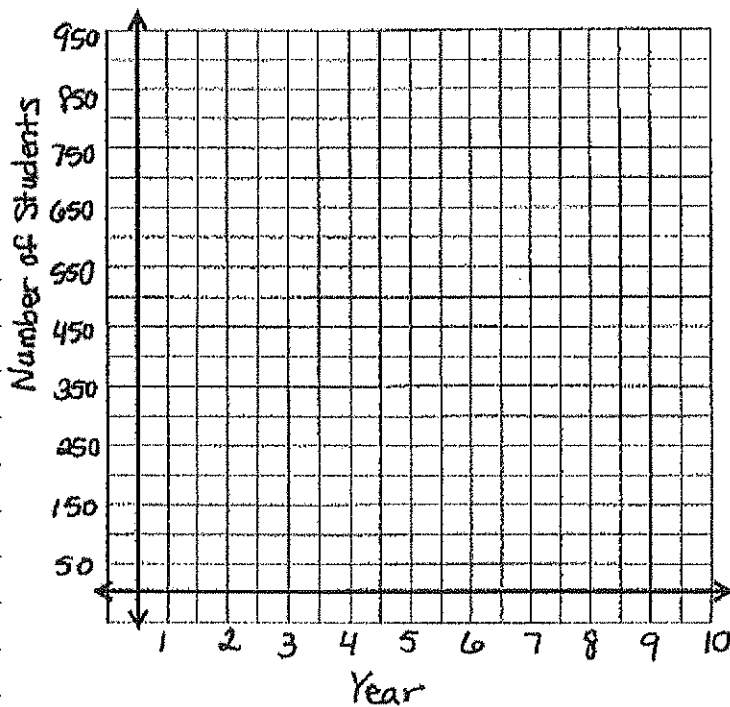


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**Example 2**

The principal at Park High School records the total number of students each year. The table below shows the number of students for each of the last 8 years.

| Year | Number of students |
|------|--------------------|
| 1    | 630                |
| 2    | 655                |
| 3    | 690                |
| 4    | 731                |
| 5    | 752                |
| 6    | 800                |
| 7    | 844                |
| 8    | 930                |



1. Create a scatter plot showing the relationship between the year and the total number of students.

2. Would a linear or exponential function be a better estimate for the data? Explain.

3. Show that the function  $y = 600(1.05)^x$  is a good estimate for the relationship between the year and the population.

a. Graph  $y = 600(1.05)^x$  Make a table of points

| x | y |
|---|---|
|   |   |
|   |   |
|   |   |
|   |   |
|   |   |

b. Compare the graph of the function to the scatter plot of the data.

Why is it a good estimate of the data? \_\_\_\_\_

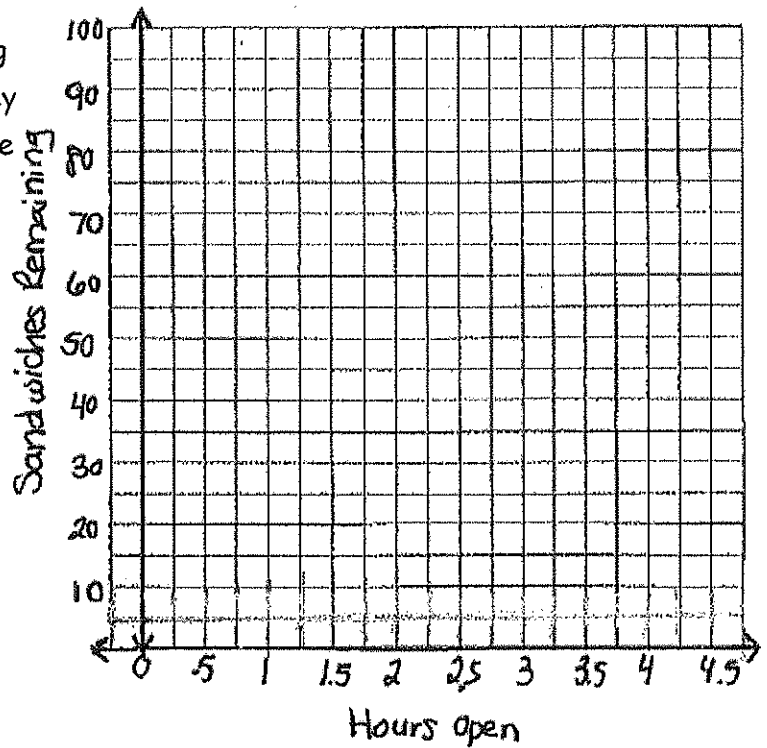
4. Approximately how many students will attend the high school in year 9? \_\_\_\_\_

(Hint: Use the function to estimate the population in year 9 by using  $x = 9$  in the function.)

**You Try!**

A sandwich shop makes 100 sandwiches each morning to prepare for the day's orders. Each half hour, they record the number of sandwiches remaining. Use the data to answer the questions that follow.

| Hours open | Sandwiches remaining |
|------------|----------------------|
| 0          | 100                  |
| 0.5        | 95                   |
| 1          | 94                   |
| 1.5        | 92                   |
| 2          | 85                   |
| 2.5        | 85                   |
| 3          | 82                   |
| 3.5        | 81                   |
| 4          | 73                   |
| 4.5        | 68                   |



1. Create a scatter plot showing the relationship between how many hours the shop has been open and the number of sandwiches remaining.

2. Would a linear or exponential function be a better estimate for the data? Explain.

3. Which function is a better fit for the data:  $y = -3.8x + 92$  or  $y = -5.8x + 99$ ?

a. Graph  $y = -3.8x + 92$  (since it's linear, you only need two points)

b. Graph  $y = -5.8x + 99$  (since it's linear, you only need two points)

c. Identify which function comes closer to the data values (this function is the better estimate for the data). \_\_\_\_\_

4. Interpret the equation in the context of the problem.

a. Determine the units of slope and the y-intercept. Slope: \_\_\_\_\_ Y-intercept: \_\_\_\_\_

b. Describe what the slope and y-intercept mean in the context of the problem.

5. Fifteen minutes after the shop opened, approximately how many sandwiches were remaining? \_\_\_\_\_

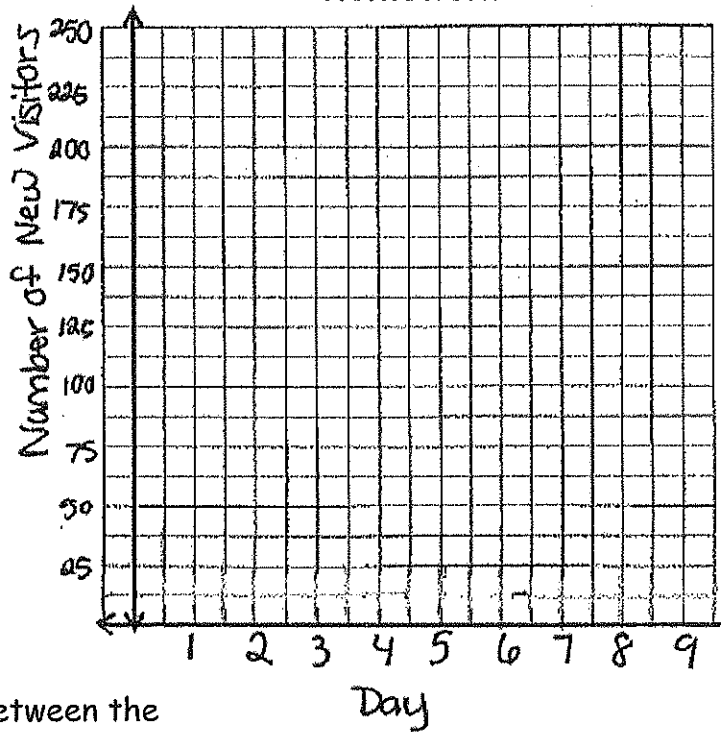
6. Approximately how long will it take for all the sandwiches to be sold? \_\_\_\_\_

Lesson 4.5 HW - Functions Fitted to Data

#1-3 Use the table of data below.

Derrick started a new website. He tracks the number of new visitors to the site each day. The number of new visitors each day is listed in the table below.

| Day | Number of new visitors |
|-----|------------------------|
| 1   | 3                      |
| 2   | 10                     |
| 3   | 26                     |
| 4   | 79                     |
| 5   | 244                    |



1. Create a scatter plot showing the relationship between the day and the number of new visitors.
2. Show that the function  $y = 3^x$  is a good estimate for the relationship between the day and the number of new visitors by graphing  $y = 3^x$ .

a. Make a table of points

| x | y |
|---|---|
|   |   |
|   |   |
|   |   |
|   |   |
|   |   |
|   |   |

b. Compare the graph of the function to the scatter plot of the data. Why is it a good estimate of the data?

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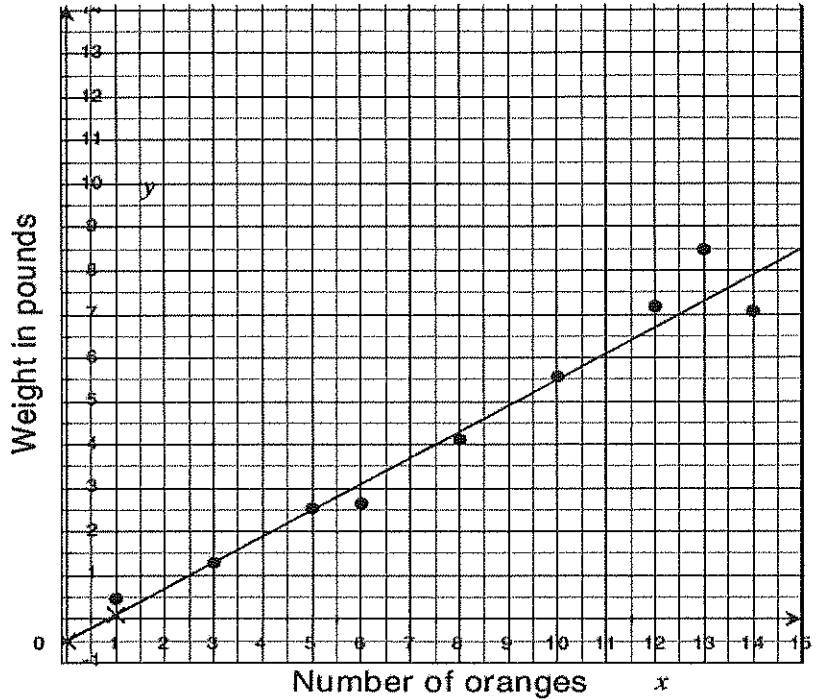


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3. Using the graph, on which day will Derrick's site have approximately 200 visitors? \_\_\_\_\_

#4-5 Use the graph and the info below to answer the following questions.

The weights of oranges vary. Maria wants to come up with a way to estimate the number of oranges given a weight. She weighs oranges and makes the graph to the right. She finds that the function  $y = 0.6x - 0.5$  is a good fit for the data.



4. If there are nine oranges in a bag, approximate the weight. \_\_\_\_\_

5. Interpret the equation in the context of the problem.

a. Determine the units of slope and the y-intercept. Slope: \_\_\_\_\_ Y-intercept: \_\_\_\_\_

b. Describe what the slope and y-intercept mean in the context of the problem.

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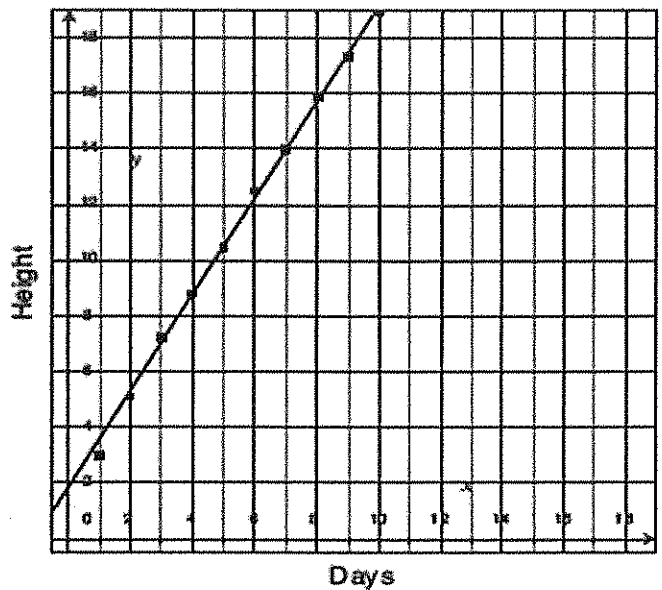
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# GO Best Fit Line

| Steps | Example |
|-------|---------|
| 1.    |         |
| 2.    |         |
| 3.    |         |
| 4.    |         |

## Intro

Pablo's science class is growing plants. He recorded the height of his plant each day for 10 days. The plant's height, in cm, over time is in the scatter plot.



(If linear, complete)

Slope value: \_\_\_\_\_ Slope units: \_\_\_\_\_ per \_\_\_\_\_

Slope Interpretation: \_\_\_\_\_

Y-intercept value: \_\_\_\_\_ Y-intercept unit: \_\_\_\_\_

Y-intercept Interpretation: \_\_\_\_\_



## Lesson 4.6 - Best Fit Line

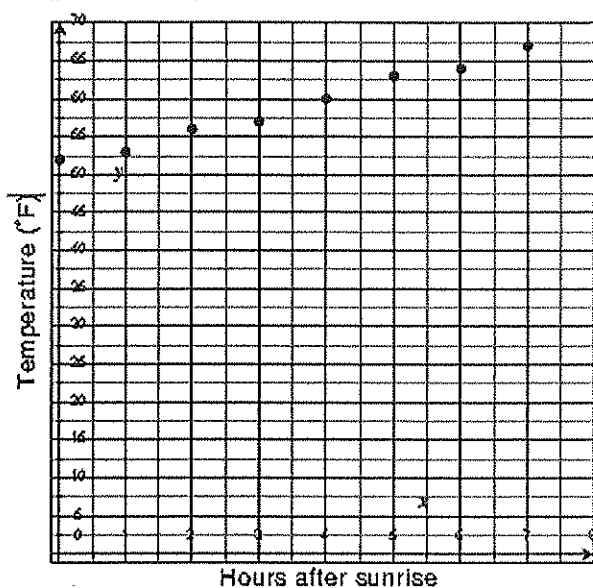
### Example 1

A weather team records the weather each hour after sunrise one morning in May. The hours after sunrise and the temperature in degrees Fahrenheit are in the table below.

| Hours after sunrise | Temperature in °F |
|---------------------|-------------------|
| 0                   | 52                |
| 1                   | 53                |
| 2                   | 56                |
| 3                   | 57                |
| 4                   | 60                |
| 5                   | 63                |
| 6                   | 64                |
| 7                   | 67                |

1. Create a scatter plot of the data.

Let the x-axis represent the hours after sunrise and the y-axis represent the temperature in degrees Fahrenheit.



Best fit line:

*(If linear, complete)*

Slope value: \_\_\_\_\_ Slope units: \_\_\_\_\_ per \_\_\_\_\_

Slope Interpretation: \_\_\_\_\_

Y-intercept value: \_\_\_\_\_ Y-intercept unit: \_\_\_\_\_

Y-intercept Interpretation: \_\_\_\_\_

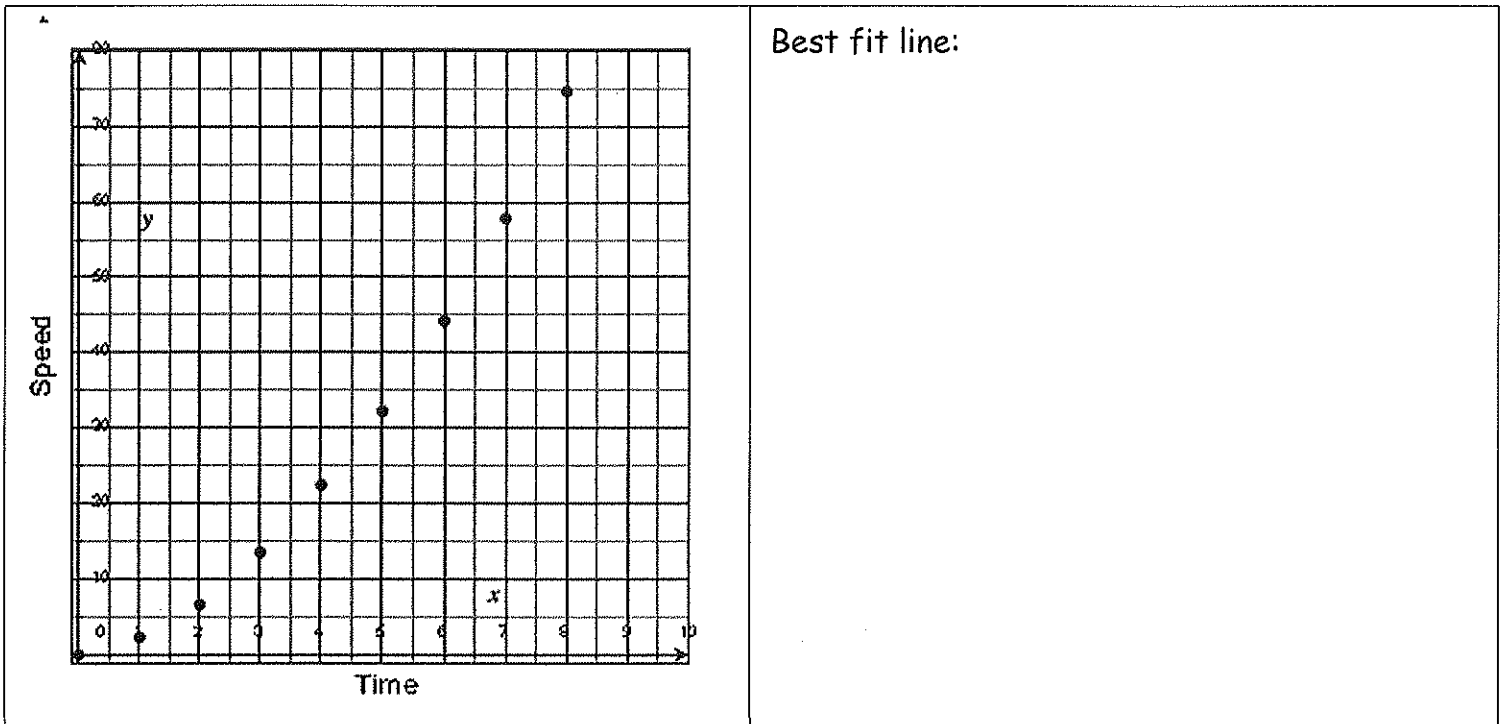
## Lesson 4.6 - Best Fit Line

### Example 2:

To learn more about the performance of an engine, engineers conduct tests and record the time it takes the car to reach certain speeds. A car starts from a stop and accelerates to 75 miles per hour. The table below shows the time, in seconds, after the car starts to accelerate and the speed it reaches at each time.

| Time in seconds | Speed in miles per hour |
|-----------------|-------------------------|
| 0               | 0                       |
| 1               | 2.3                     |
| 2               | 6.6                     |
| 3               | 13.5                    |
| 4               | 22.4                    |
| 5               | 32.2                    |
| 6               | 44.2                    |
| 7               | 57.8                    |
| 8               | 74.6                    |

Can the speed between 0 and 8 seconds be represented by a linear function? If yes, find the equation of the function.



*(If linear, complete)*

Slope value: \_\_\_\_\_ Slope units: \_\_\_\_\_ per \_\_\_\_\_

Slope Interpretation: \_\_\_\_\_

Y-intercept value: \_\_\_\_\_ Y-intercept unit: \_\_\_\_\_

Y-intercept Interpretation: \_\_\_\_\_

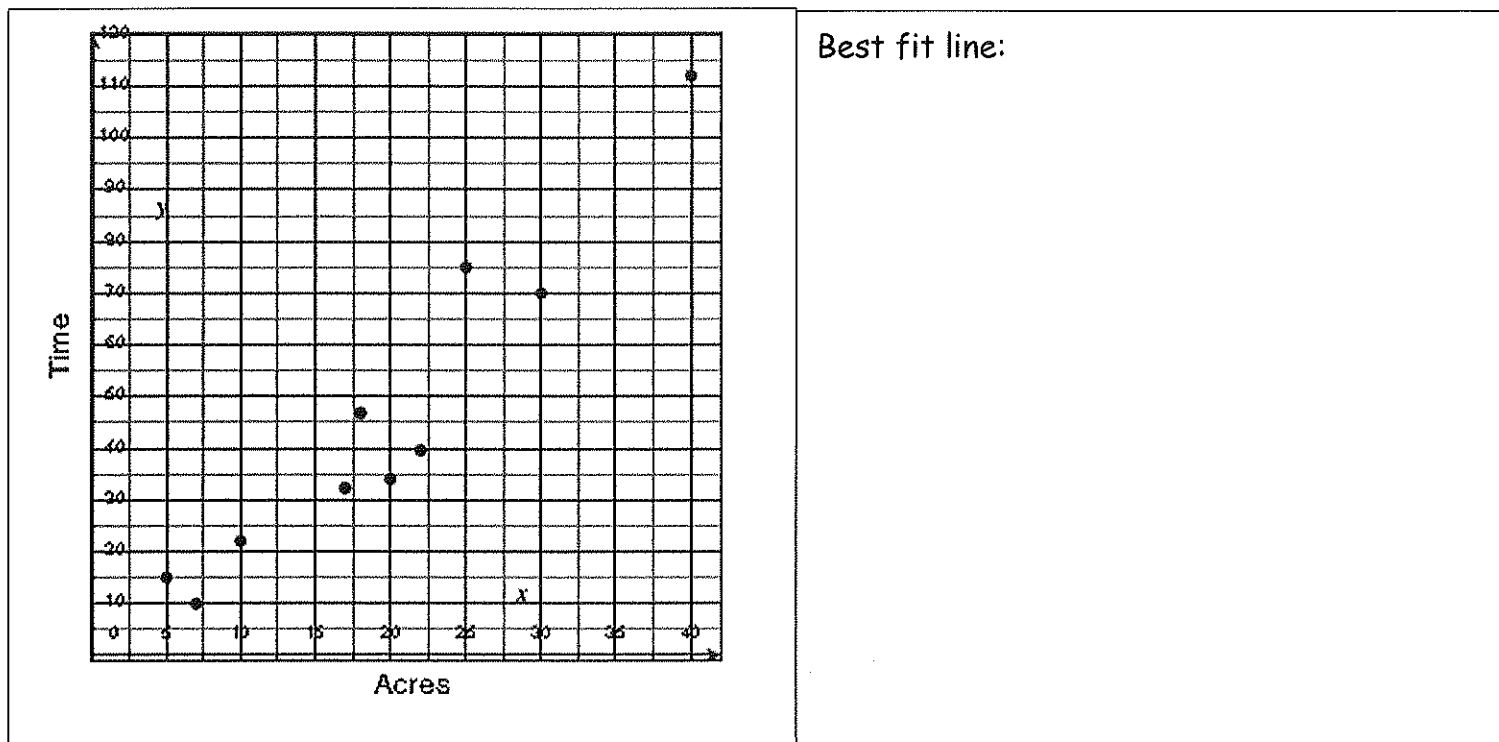
## Lesson 4.6 - Best Fit Line

### Example 3

Automated tractors can mow lawns without being driven by a person. A company runs trials using fields of different sizes, and records the amount of time it takes the tractor to mow each field. The field sizes are measured in acres.

| Acres | Time in hours |
|-------|---------------|
| 5     | 15            |
| 7     | 10            |
| 10    | 22            |
| 17    | 32.3          |
| 18    | 46.8          |
| 20    | 34            |
| 22    | 39.6          |
| 25    | 75            |
| 30    | 70            |
| 40    | 112           |

Can the time to mow acres of a field be represented by a linear function? If yes, find the equation of the function.



*(If linear, complete)*

Slope value: \_\_\_\_\_ Slope units: \_\_\_\_\_ per \_\_\_\_\_

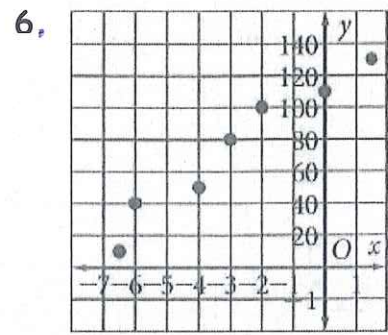
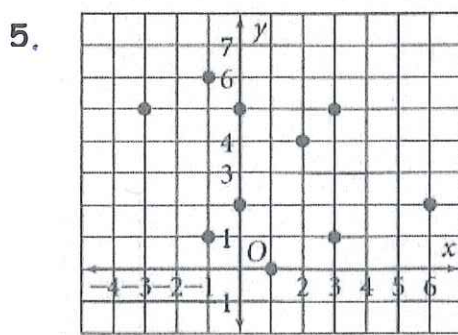
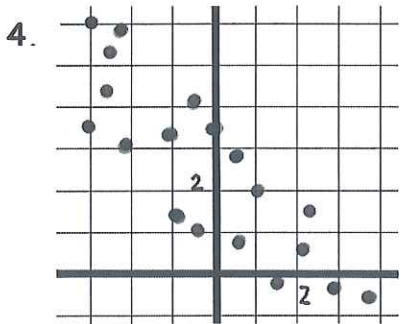
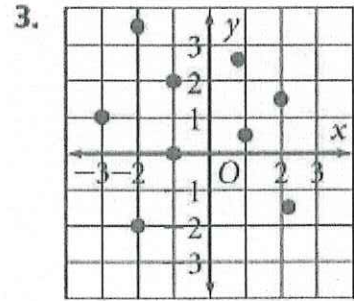
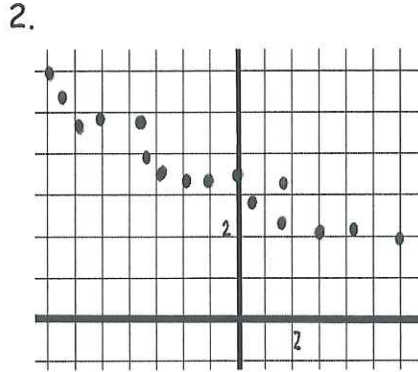
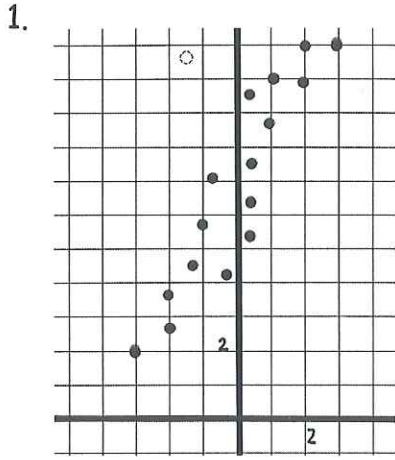
Slope Interpretation: \_\_\_\_\_

Y-intercept value: \_\_\_\_\_ Y-intercept unit: \_\_\_\_\_

Y-intercept Interpretation: \_\_\_\_\_

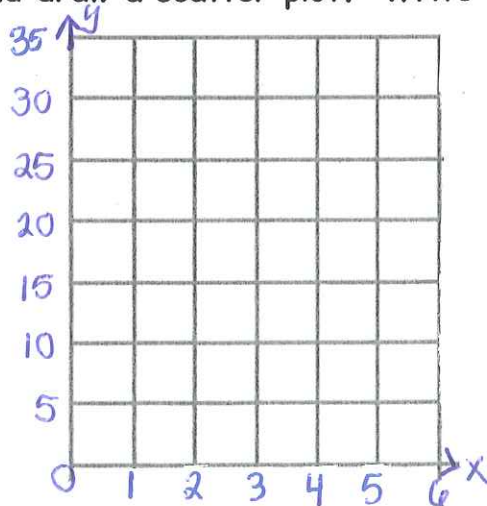
## Lesson 4.6 - Best Fit Line Homework

#1-6 Decide if the data in each scatter plot follow a linear pattern. If they do, find the equation of the trend line.



7. Plot the points and draw a scatter plot. Write the equation of the trend line.

| x | y  |
|---|----|
| 1 | 25 |
| 2 | 28 |
| 3 | 27 |
| 4 | 31 |
| 5 | 30 |
| 6 | 34 |

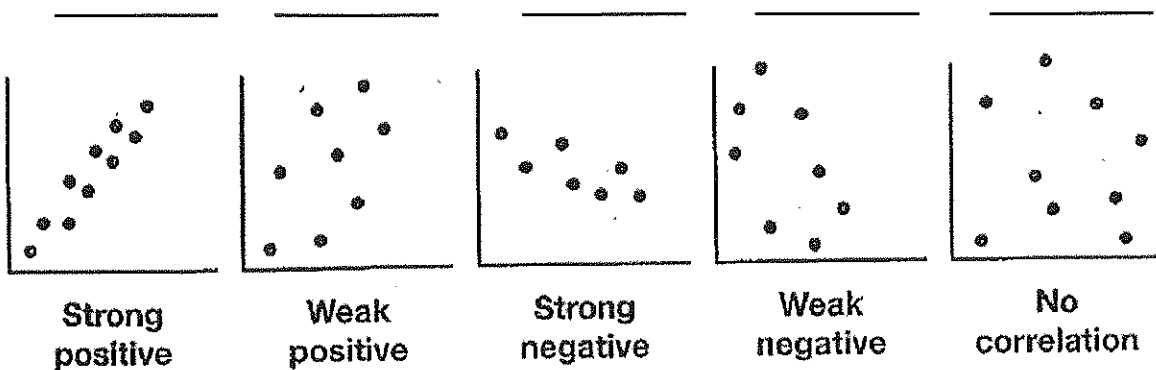


## Lesson 4.8 - Interpreting the Correlation Coefficient and Distinguishing between Correlation & Causation

### Vocabulary

- A \_\_\_\_\_ is a relationship between two events, such as  $x$  and  $y$ , where a change in one event implies a change in another event.
- The \_\_\_\_\_,  $r$ , is a quantity that allows us to determine how strong this relationship is between two events. It is a value that ranges from -1 to 1.

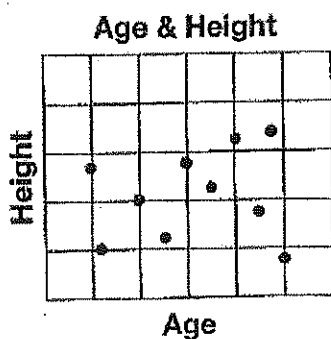
### Correlation Coefficient (r-value)



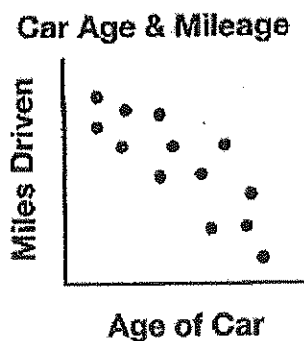
### Correlation vs. Causation

- Correlation does not imply \_\_\_\_\_, or that a change in one event causes the change in the second event.
- If a change in one event is responsible for a change in another event, the two events have a \_\_\_\_\_ relationship, or causation.
- \_\_\_\_\_ factors may influence and explain a strong correlation between two events.

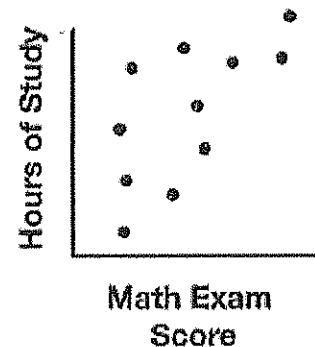
Let's Practice! For each scatter plot identify the correlation type and coefficient.



Correlation type: \_\_\_\_\_  
Coefficient: \_\_\_\_\_



Correlation type: \_\_\_\_\_  
Coefficient: \_\_\_\_\_



Correlation type: \_\_\_\_\_  
Coefficient: \_\_\_\_\_

**Example 1**

2. Describe the relationship between data.

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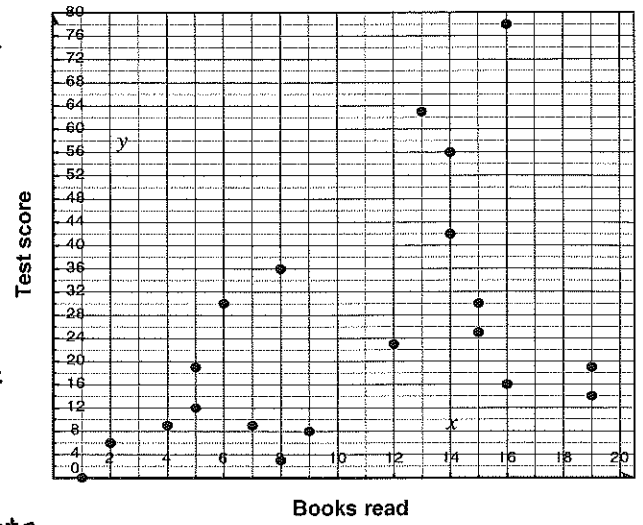
3. Correlation coefficient:  $r \approx 0.48$

4. Describe the strength of the relationship between the data. \_\_\_\_\_

5. Consider the casual relationship between the two events.

---

1.



**Example 2**

2. Describe the relationship between data.

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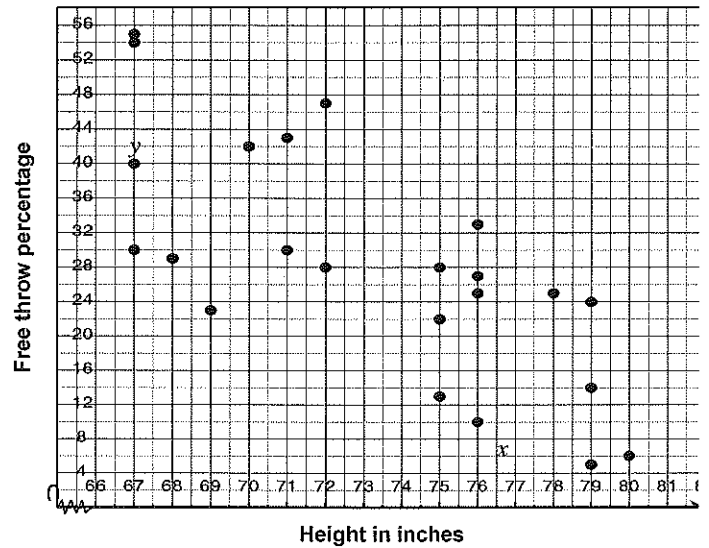
3. Correlation coefficient:  $r \approx -0.727$

4. Describe the strength of the relationship between the data. \_\_\_\_\_

5. Consider the casual relationship between the two events.

---

1.



**You Try!**

2. Describe the relationship between data.

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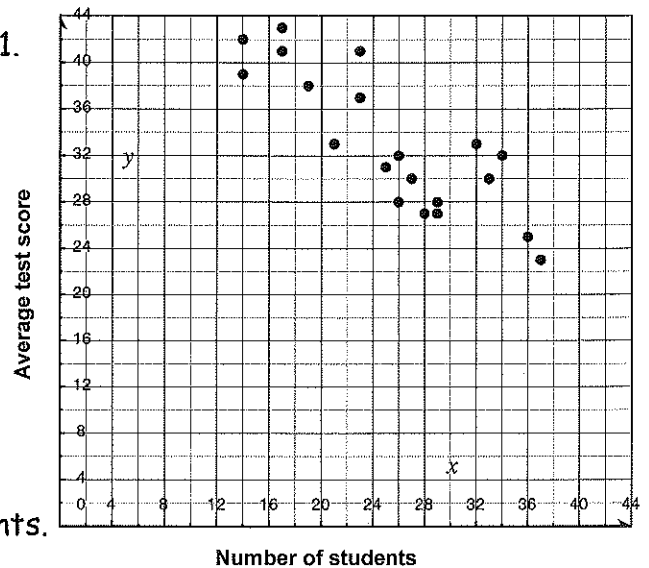
3. Correlation coefficient:  $r \approx -0.84$

4. Describe the strength of the relationship between the data. \_\_\_\_\_

5. Consider the casual relationship between the two events.

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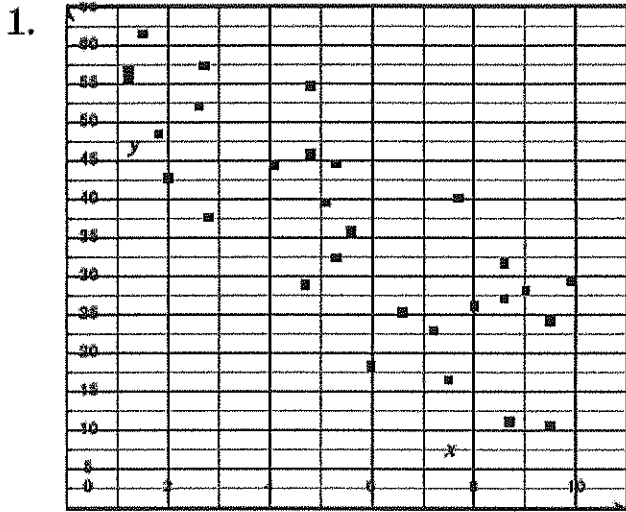
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Lesson 4.7 HW - Interpreting the Correlation Coefficient & Distinguishing between Correlation & Causation

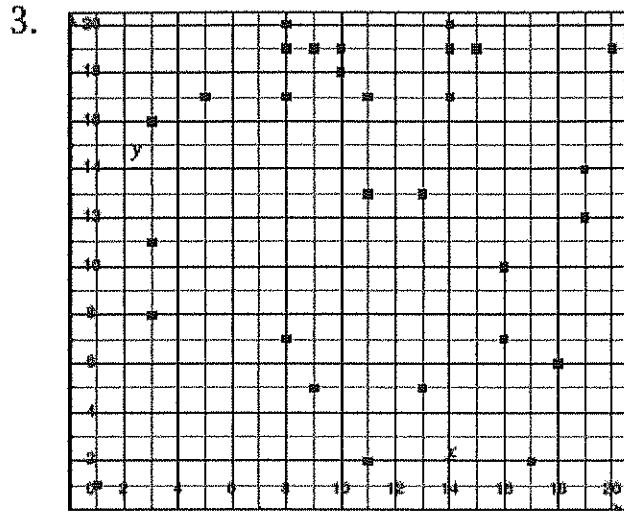
#1-4 For each of the following scatter plots:

- Describe the type of linear correlation between the two variables: strong positive, weak positive, strong negative, weak negative, or no correlation.
- State an approximate correlation coefficient (r-value).



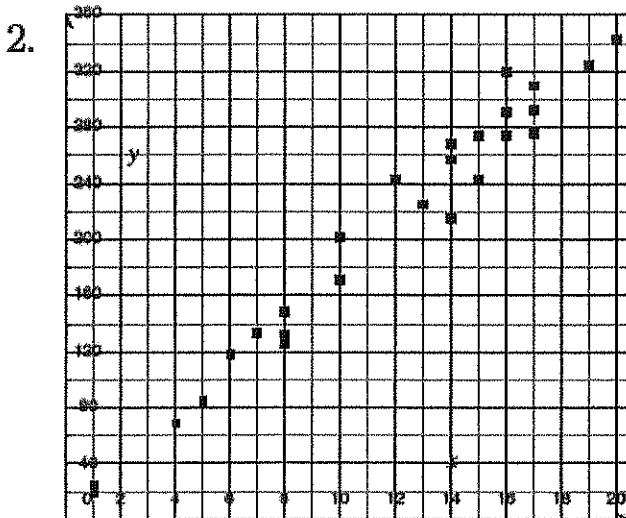
Correlation type: \_\_\_\_\_

Approximate r-value: \_\_\_\_\_



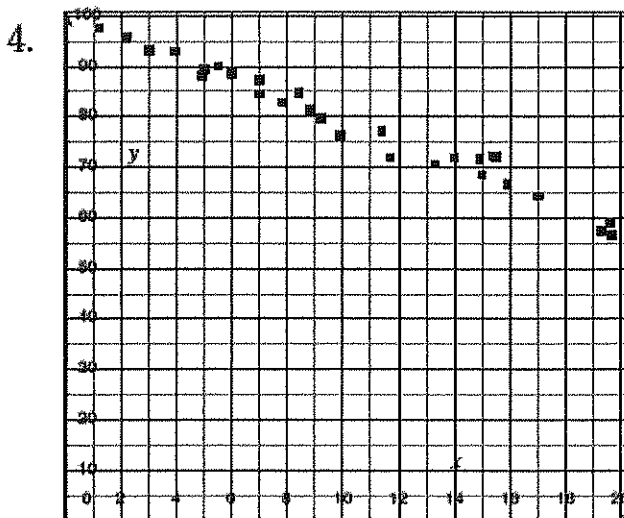
Correlation type: \_\_\_\_\_

Approximate r-value: \_\_\_\_\_



Correlation type: \_\_\_\_\_

Approximate r-value: \_\_\_\_\_

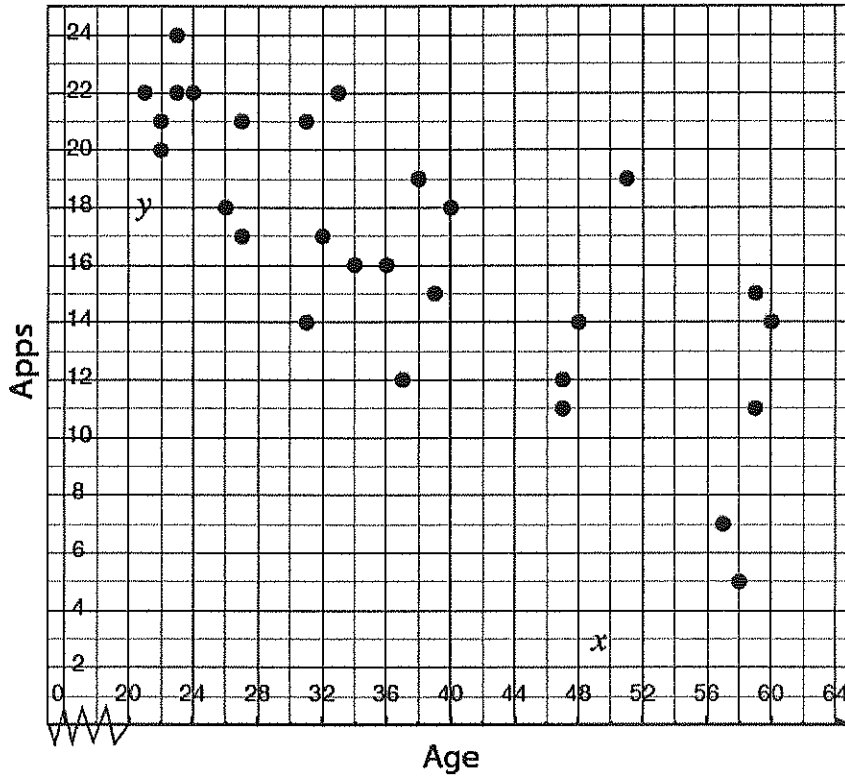


Correlation type: \_\_\_\_\_

Approximate r-value: \_\_\_\_\_

#5-7 Use the situation and scatter plot below.

A cell phone app developer conducts research about cell phone usage. The developer randomly surveys cell phone users, and asks each user to record his or her age and the number of apps the user has on his or her cell phone. The results are in the scatter plot below. Use this scatter plot for problems 9 and 10.



5. State the correlation type and approximate correlation coefficient (r-value).

Correlation type: \_\_\_\_\_ Approximate r-value: \_\_\_\_\_

6. Describe any possible correlation between age and the number of cell phone apps.

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7. Is it likely that there is a causal relationship between the age of cell phone users and the number of cell phone apps used? Explain.

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