**Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Per.\_\_\_\_\_\_\_**

**U7 CW #2** *Trend Line and Prediction Functions*

Most real-world data does not fall perfectly on a line. However, if the data on a scatter plot resembles a line, we can fit a line to the data, write a function (equation) for the line, and use this equation to solve problems and make predictions.

The line that you use to represent the data is called **the trend line***.* We will refer to the equation you write for the trend line as the **prediction function**. The most common way to find the line of best fit is to use the “eye-balling” technique. Simply try to draw a straight line that best fits the data (USE A RULER TO HELP YOU!)

**Directions:** In #1 and 2, observe the data sets and take note of any associations you see, draw a trend line, write a prediction function, and use your equation to predict the value of *y* when *x* = 12 and when *x* = 100.

|  |  |
| --- | --- |
| 1. 1. Observations:
	2. Using a ruler, draw a line of best fit through the data points that captures the general trend of the data.
	3. Estimate the slope and *y-*intercept of your line.

 *m* $≈$ \_\_\_\_\_\_ *b* $≈$ \_\_\_\_\_\_* 1. Write a prediction function for the data set.
	2. Use your prediction function to find the value of *y* when *x* = 12 and when *x* = 100.
 | 1. 1. Observations:

 * 1. Using a ruler, draw a line of best fit through the data points that captures the general trend of the data.
	2. Estimate the slope and *y-*intercept of your line.

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	2. Use your prediction function to find the value of *y* when *x* = 12 and when *x* = 100.
 |

Let’s apply what we just did to a real world problem. Use the scatterplot and the context (story) to answer the questions following the scatterplot.

* + 1. The scatter plot below shows the weight, in pounds, of a person who is on a strict diet.



**Weight (lbs.)**

 Observations: describe any associations, trends or patterns you see in the scatterplot.

**Time (weeks)**

* 1. Using a ruler, draw a line through the data points that captures the general trend of the data.
	2. Estimate the slope and *y-*intercept of your line.

 *m* $≈$ \_\_\_\_\_\_\_ *b* $≈$ \_\_\_\_\_\_\_\_

* 1. What does the slope represent in this context?
	2. What does the *y­*-intercept represent in this context?
	3. Write a prediction function (equation in slope-intercept form) for the data set.
	4. Predict this person’s weight after 18 weeks if this trend continues. Show your work.
1. The following scatter plot shows the burn time for candles of various weights.



Observations:

1. Draw a trend line on the scatter plot that matches the trend of the data.

b. Write a prediction function for the trend line.

c. Explain the meaning of the slope and y-intercept in this context.

d. Use your prediction function to predict the burn time for a candle that weighs 40 ounces. Show your work.

e. If candle burns out at 500 hours, predict how much the candle weighs. Show your work.

1. Steven and his family are taking a road trip. The graph below shows the total distance the family traveled over an eight-hour period.



 Observations:

* 1. Using a ruler, draw a trend line through the data points that captures the general trend of the data.
	2. Estimate the slope and *y-*intercept of your line.

 *m* $≈$ \_\_\_\_\_\_\_ *b* $≈$ \_\_\_\_\_\_

* 1. Write a prediction function for the data set.
	2. What does the slope represent in this context?

* 1. What does the *y­*-intercept represent in this context?
	2. Predict how far Steven and his family will have driven after 10 hours if this trend continues. Show your work.
1. Use the table of data shown below to answer the questions that follow.

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **x** | 1 | 1 | 1 | 2 | 2 | 3 | 3 | 3 | 4 | 4 | 4 | 5 |
| **y** | 5 | 6 | 8 | 8 | 10 | 9 | 10 | 12 | 11 | 12 | 15 | 14 |

* 1. Create a scatter plot of the data on the grid below. Label and number your graph appropriate to the data.
	2. Using a ruler, draw a trend line through the data points that captures the general trend of the data.
	3. Estimate the slope and *y-*intercept of your line.

 *m* $≈$ \_\_\_\_\_\_ *b* $≈$ \_\_\_\_\_\_\_\_

* 1. Write a prediction function for the data set.
1. Use the table of data shown below to answer the questions that follow.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **x** | 0 | 1 | 1 | 2 | 2 | 3 | 3 | 4 | 4 | 5 | 5 | 6 | 6 | 7 | 7 |
| **y** | 16 | 15 | 12 | 13 | 12 | 11 | 10 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 0 |

* 1. Create a scatter plot of the data on the grid below.



* 1. Using a ruler, draw a line of best fit through the data points that captures the general trend of the data.
	2. Estimate the slope and *y-*intercept of your line.

 *m* $≈$ \_\_\_\_\_\_\_ *b* $≈$ \_\_\_\_\_\_\_

* 1. Write a prediction function for the data set.
1. Software programs and graphing calculators can be used to trend lines. Izumi used technology to generate a trend line for her data on assists and rebounds. The graph below shows the trend line generated by the technology.



After creating this line of best fit, Izumi thought that it might be best to drop the outlier (3, 26) from her data set. Is it reasonable for Izumi to drop the outlier from her data set? Why or why not? Assume this player joined the team midway through the season



After dropping the outlier, Izumi used the calculator to generate a new line of best fit.

Analyze the differences in the two lines. What did the outlier do to the trend line generated by the technology?

* 1. Write a prediction function for the trend line generated by technology with the data set that does **not** include the outlier.
	2. Explain the meaning of the slope and y-intercept in this context.
	3. Use your function to predict the number of rebounds a random player would have if they made 110 assists throughout the season? 150 assists? Explain the limitations that the data exhibits.
	4. Similarly use your function to predict the number of assists a random player would have if they made 150 rebounds throughout the season.