Name _____ Date _____

Lesson 10: Linear Models

Exit Ticket

Suppose that a cell phone monthly rate plan costs the user 5 cents per minute beyond a fixed monthly fee of $\$20$. This implies that the relationship between monthly cost and monthly number of minutes is linear.

1. Write an equation in words that relates total monthly cost to monthly minutes used. Explain how you found your answer.

2. Write an equation in symbols that relates the total monthly cost in dollars (y) to monthly minutes used (x).

3. What is the cost for a month in which 182 minutes are used? Express your answer in words in the context of this problem.

Name _____ Date _____

Lesson 11: Using Linear Models in a Data Context

Exit Ticket

According to the Bureau of Vital Statistics for the New York City Department of Health and Mental Hygiene, the life expectancy at birth (in years) for New York City babies is as follows.

Year of Birth	2001	2002	2003	2004	2005	2006	2007	2008	2009
Life Expectancy	77.9	78.2	78.5	79.0	79.2	79.7	80.1	80.2	80.6

Data Source: http://www.nyc.gov/html/om/pdf/2012/pr465-12_charts.pdf

a. If you are interested in predicting life expectancy for babies born in a given year, which variable is the independent variable, and which is the dependent variable?

b. Draw a scatter plot to determine if there appears to be a linear relationship between the year of birth and life expectancy.

c. Fit a line to the data. Show your work.

d. Based on the context of the problem, interpret in words the intercept and slope of the line you found in part (c).

e. Use your line to predict life expectancy for babies born in New York City in 2010.

Name _____ Date _____

Lesson 12: Nonlinear Models in a Data Context (Optional)

Exit Ticket

The table shows the population of New York City from 1850 to 2000 for every 50 years.

Year	Population	Population Growth (change over 50-year time period)
1850	515,547	–
1900	3,437,202	
1950	7,891,957	
2000	8,008,278	

Data Source: www.census.gov

1. Find the growth of the population from 1850 to 1900. Write your answer in the table in the row for the year 1900.

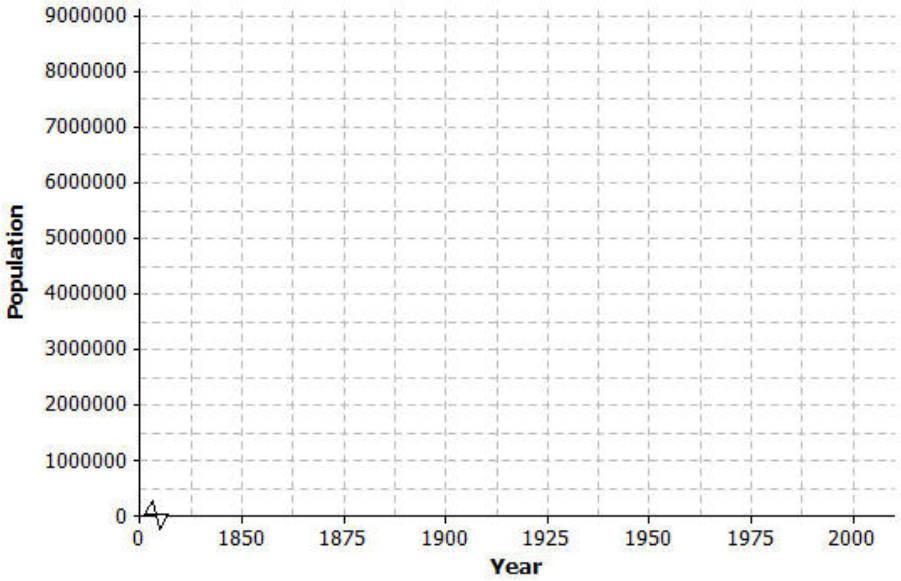
2. Find the growth of the population from 1900 to 1950. Write your answer in the table in the row for the year 1950.

3. Find the growth of the population from 1950 to 2000. Write your answer in the table in the row for the year 2000.

4. Does it appear that a linear model is a good fit for the data? Why or why not?

5. Describe how the population changes as the years increase.

6. Construct a scatter plot of time versus population on the grid below. Draw a line or curve that you feel reasonably describes the data.



7. Estimate the population of New York City in 1975. Explain how you found your estimate.

Name _____ Date _____

Lesson 13: Summarizing Bivariate Categorical Data in a Two-Way Table

Exit Ticket

1. Explain what the term *bivariate categorical data* means.

2. Explain how to calculate relative frequency. What is another word for *relative frequency*?

3. A random group of students are polled about how they get to school. The results are summarized in the table below.

		School Transportation Survey			
		Walk	**Ride Bus**	**Carpool**	**Total**
Gender	**Male**	9	26	9	44
	Female	8	26	24	58
	Total	17	52	33	102

a. Calculate the relative frequencies for the table above. Write them as a percent in each cell of the table. Round to the nearest tenth of a percent.

b. What is the relative frequency for the Carpool category? Write a sentence interpreting this value in the context of school transportation.

c. What is the proportion of students who are female and walk to school? Write a sentence interpreting this value in the context of school transportation.

d. A student is selected at random from this school. What would you predict this student's mode of school transportation to be? Explain.

Name _____ Date _____

Lesson 14: Association Between Categorical Variables

Exit Ticket

A random sample of 100 eighth-grade students are asked to record two variables: whether they have a television in their bedrooms and if they passed or failed their last math test. The results of the survey are summarized below.

- 55 students have a television in their bedrooms.
- 35 students do not have a television in their bedrooms and passed their last math test.
- 25 students have a television and failed their last math test.
- 35 students failed their last math test.

1. Complete the two-way table.

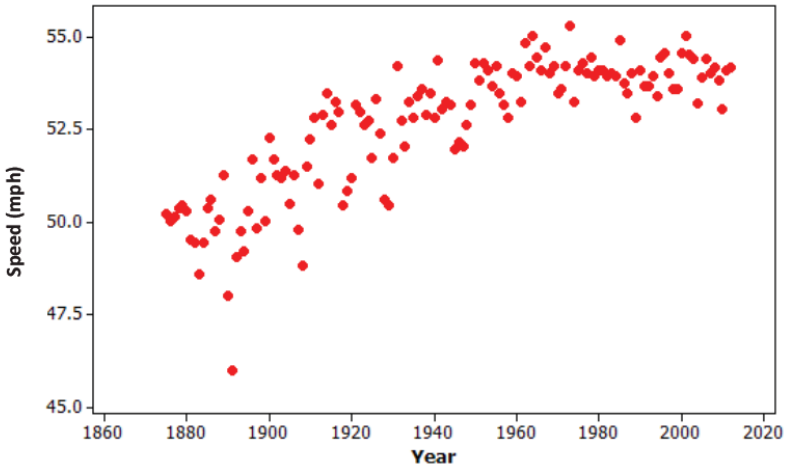
	Pass	Fail	Total
Television in the Bedroom			
No Television in the Bedroom			
Total			

2. Calculate the row relative frequencies, and enter the values in the table above. Round to the nearest thousandth.

3. Is there evidence of association between the variables? If so, does this imply there is a cause-and-effect relationship? Explain.

Name _____ Date _____

1. The Kentucky Derby is a horse race held each year. The following scatter plot shows the speed of the winning horse at the Kentucky Derby each year between 1875 and 2012.



Data Source: http://www.kentuckyderby.com/

(Note: Speeds were calculated based on times given on website.)

a. Is the association between *speed* and *year* positive or negative? Give a possible explanation in the context of this problem for why the association behaves this way considering the variables involved.

b. Comment on whether the association between *speed* and *year* is approximately linear, and then explain in the context of this problem why the form of the association (linear or not) makes sense considering the variables involved.

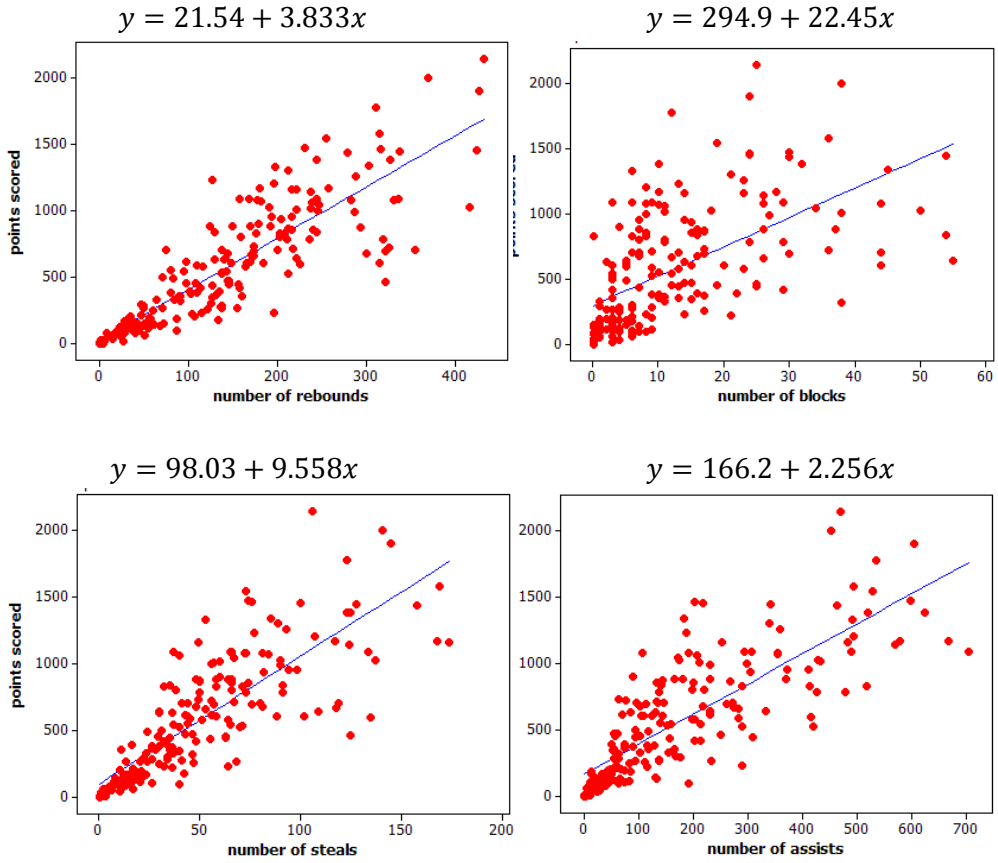
c. Circle an outlier in this scatter plot, and explain, in context, how and why the observation is unusual.

2. Students were asked to report their gender and how many times a day they typically wash their hands. Of the 738 males, 66 said they wash their hands at most once a day, 583 said two to seven times per day, and 89 said eight or more times per day. Of the 204 females, 2 said they wash their hands at most once a day, 160 said two to seven times per day, and 42 said eight or more times per day.

   a. Summarize these data in a two-way table with rows corresponding to the three different frequency-of-hand-washing categories and columns corresponding to gender.

   b. Do these data suggest an association between *gender* and *frequency of hand washing*? Support your answer with appropriate calculations.

3. Basketball players who score a lot of points also tend to be strong in other areas of the game such as number of rebounds, number of blocks, number of steals, and number of assists. Below are scatter plots and linear models for professional NBA (National Basketball Association) players last season.



a. The line that models the association between points scored and number of rebounds is $y = 21.54 + 3.833x$, where y represents the number of points scored and x represents the number of rebounds. Give an interpretation, in context, of the slope of this line.

b. The equations on the previous page all show the number of points scored (y) as a function of the other variables. An increase in which of the variables (rebounds, blocks, steals, and assists) tends to have the largest impact on the predicted points scored by an NBA player?

c. Which of the four linear models shown in the scatter plots on the previous page has the worst fit to the data? Explain how you know using the data.