Name _____

Lesson 12: Relationships Between Two Variables

Warm Up: Regents Prep

1. The formula for the volume of a cone is $V = \frac{1}{3}\pi r^2 h$. The radius, r, of the cone may be expressed as

(1) $\sqrt{\dfrac{3V}{\pi h}}$

(3) $3\sqrt{\dfrac{V}{\pi h}}$

(2) $\sqrt{\dfrac{V}{3\pi h}}$

(4) $\dfrac{1}{3}\sqrt{\dfrac{V}{\pi h}}$

2. Factor the expression $x^4 + 6x^2 - 7$ completely.

A scatter plot is an informative way to display numerical data with two variables. The two numerical variables are denoted by x and y, the scatter plot of the data is a plot of the (x, y) data pairs.

Thinking about Linear Relationships

Below are three scatter plots. Each one represents a data set with eight observations.

The scales on the x and y axes have been left off these plots on purpose so you will have to think carefully about the relationships.
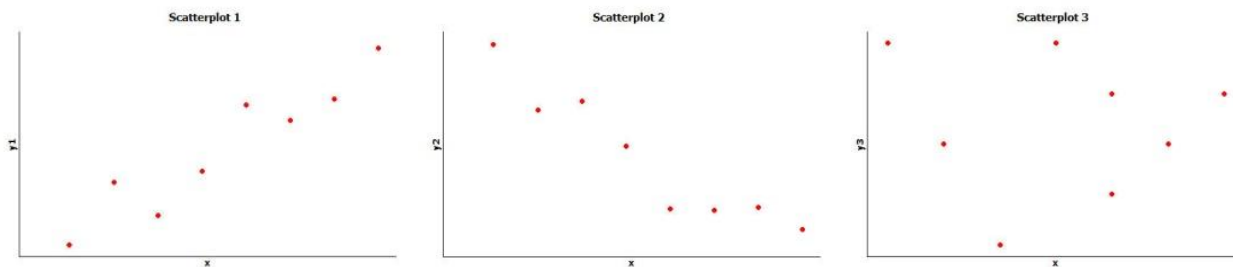
1. If one of these scatter plots represents the relationship between height and weight for eight adults, which scatter plot do you think it is and why?

2. If one of these scatter plots represents the relationship between height and SAT math score for eight high school seniors, which scatter plot do you think it is and why?

3. If one of these scatter plots represents the relationship between the weight of a car and fuel efficiency for eight cars, which scatter plot do you think it is and why?

4. Which of these three scatter plots does not appear to represent a linear relationship? Explain the reasoning behind your choice.

**Not Every Relationship is Linear**

When a straight line provides a reasonable summary of the relationship between two numerical variables, we say that the two variables are *linearly related* or that there is a *linear relationship* between the two variables.

Take a look at the scatter plots below and answer the questions that follow.
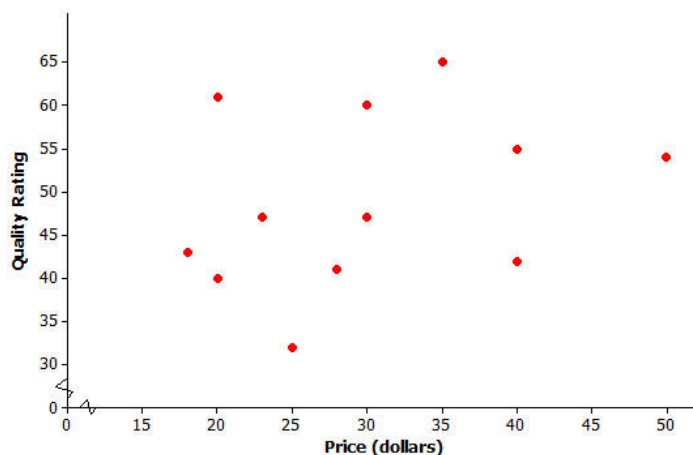
Scatter Plot 1:
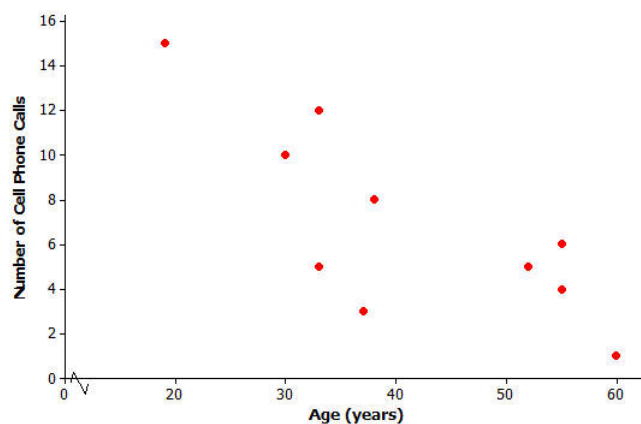
5. Is there a relationship between number of cell phone calls and age, or does it look like the data points are scattered?

6. If there is a relationship between number of cell phone calls and age, does the relationship appear to be linear?

Scatter Plot 2:
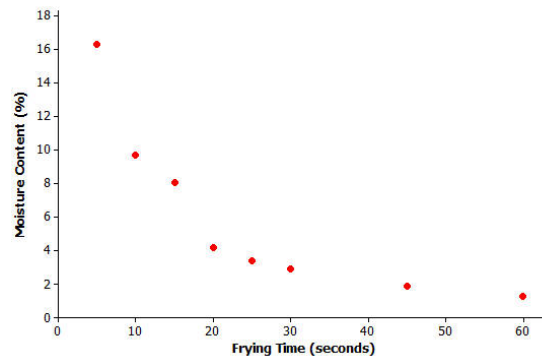
Data Source: *Journal of Food Processing and Preservation,* 1995

7. Is there a relationship between moisture content and frying time, or do the data points look scattered?

8. If there is a relationship between moisture content and frying time, does the relationship look linear?

Scatter Plot 3:

Data Source: www.consumerreports.org/health

9. Scatter plot 3 shows data for the prices of bike helmets and the quality ratings of the helmets (based on a scale that estimates helmet quality). Is there a relationship between quality rating and price, or are the data points scattered?

10. If there is a relationship between quality rating and price for bike helmets, does the relationship appear to be linear?
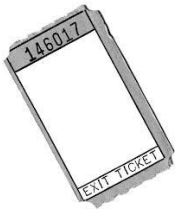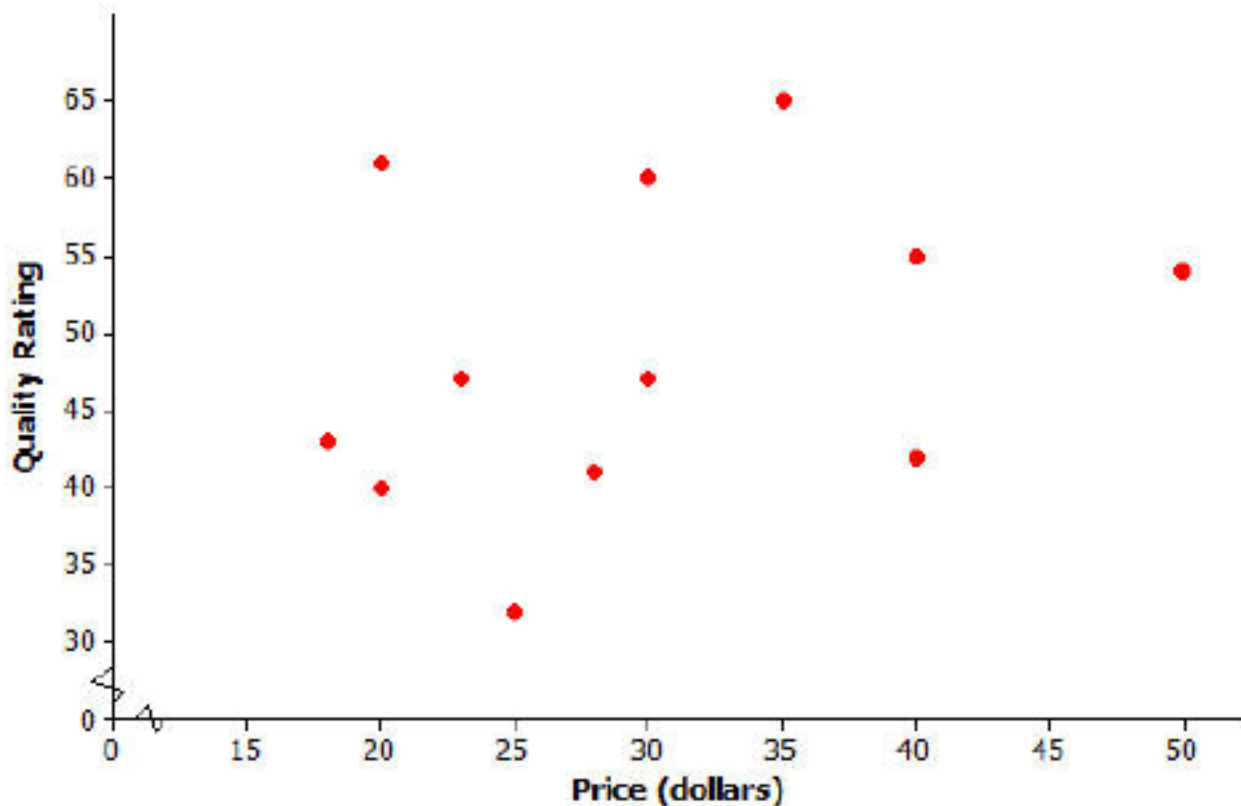
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Exit Ticket

You plan to buy a bike helmet. Based on data presented in the scatter plot below, will buying the most expensive bike helmet give you a helmet with the highest quality rating? Explain your answer.

Data Source: www.consumerreports.org/health