Algebra 1: 2.1 Homework **Name** _____ **Period** _____
Modeling Linear Situations

The E & W Light Company charges their customers $0.14 per kilowatt-hour used. The E & W Company sends the customers their bills monthly.

1. Use the scenario to complete the following questions.

a. Identify the independent and dependent quantities and their units for this problem situation. Explain your reasoning.

IQ = monthly electricity usage in Kilowatt-hours

DQ = monthly cost in dollars

The cost depends on how much electricity is used.

b. Write the independent and dependent quantities and their units in the table. Then calculate the total cost for each of the given kilowatt-hours used. In the last row of the table, write an expression to represent the dependent quantity.

	Independent Quantity	Dependent Quantity
Quantity	monthly electricity usage	cost
Units	Kilowatt-hours	dollars
	0	0 × 0.14 = 0
	1000	140
	1200	168
	1400	196
	1600	224
	1800	252
	2000	280
Expression	x	$0.14x$

c. Calculate the unit rate of change between three different pairs of points. What do you notice about the rates?

(1000, 140) and (1400, 196)

$$\frac{\Delta y}{\Delta x} = \frac{196-140}{1400-100} = \frac{56}{400} = \frac{0.14}{1}$$

(1400, 196) and (1800, 252)

$$\frac{\Delta y}{\Delta x} = \frac{252-196}{1800-1400} = \frac{56}{400} = \frac{0.14}{1}$$

(0, 0) and (1000, 140)

$$\frac{\Delta y}{\Delta x} = \frac{140-0}{1000-0} = \frac{140}{1000} = \frac{0.14}{1}$$

The unit rate is constant = $\frac{\$0.14}{\text{Kilowatt hours}}$.

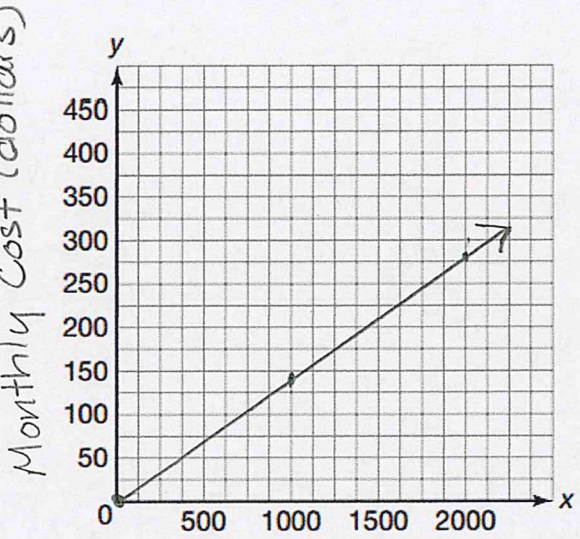
2. Consider the function in the form c(x) to describe the cost after using x kilowatt-hours of electricity.

a. Write the function. What function family does this represent?

$c(x) = 0.14x$

The function family is linear.

b. Use the function to create a graph representing the change in the cost as a function of electricity usage. Be sure to label your axes with the correct units and write the function.



$C(x) = 0.14x$

c. What is the slope of this graph? Describe the slope in terms of the problem situation.

Slope = $0.14/1$

The slope is the cost of a kilowatt-hour of electricity used.

d. Identify and describe the x- and y-intercepts in terms of the problem situation.

The x- and y-intercepts are both zero. That means that \$0 are being spent since no electricity is being used.

3. Determine the cost of a monthly electric bill when 1550 kilowatt-hours are used. Explain your answer in terms of the problem situation. $x = 1550$

$C(1550) = 0.14(1550) = \$217$

1550 Kilowatt hours of electricity cost \$217

4. Determine the amount of electricity used for an electricity bill that is \$300.02. Explain your answer in terms of the problem situation.

$C(x) = 300.02$

$$\frac{300.02}{0.14} = \frac{0.14x}{0.14}$$

$2143 = x$

2,143 Kilowatt hours of electricity costs \$300.02