NAME:_____ Math _____, Period _____

Mr. Rogove Date:_____

Learning Objective: We will study linear models and explain their meaning in context. (G8M6L8)

Concept Development:

From the last lesson:

Slope means…

…the effect that the explanatory variable has on the response variable.
…how much the *y*-variable responds to changes in the *x*-variable.
…the impact that increasing the value of the explanatory variable by one unit has on the response variable.

y-Intercept means…

…the starting point for y.
…the value of the response variable when the explanatory variable has no effect.

	Exact Linear Models	**Linear Models**
Scatter plot forms a straight line?	Yes!	Not exactly But there MIGHT be a linear rel.
Line of Best Fit is…	The line of the graph	A model that helps us make predictions
Slope will be exact?	Yes!	No!
y-intercept always makes sense?	It should!	No, not always!
Real World?	Often yes.	Yes.

We introduced our concepts with exact linear models, and will continue with linear models that are NOT exact.

NAME:_____ Math _____, Period _____

Mr. Rogove Date:_____

Guided Practice:

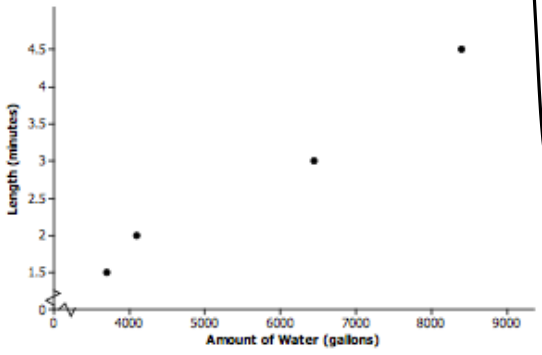
Old Faithful is a geyser in Yellowstone Park. The following table offers some rough estimates of the length of eruptions (in minutes) and the amount of water (in gallons) in that eruption.

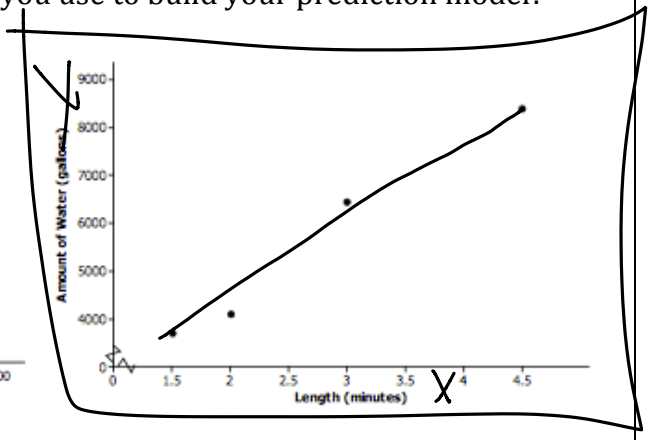
Length (min)	1.5	2	3	4.5
Amount of Water (gal)	3,700	4,100	6,450	8,400

a. If you want to predict the amount of water in an eruption based on the length of the eruption, what should you use as a dependent variable?

Dependent variable - Water
Independent Variable - time

b. Which of the two scatterplots would you use to build your prediction model?





c. Use the first and last data points in the table to create a linear prediction model.

$\frac{8400-3700}{4.5-1.5} = \frac{4700}{3} = 1566\frac{2}{3}$ ← slope

equation:

$3700 = (1.5)(1566\frac{2}{3}) + b$ $3700 = 2350 + b$ $1350 = b$

$y = 1566.\overline{6}x + 1350$

d. If your friend told you that Old Faithful produced about 3,000 gallons of water for every minute that it erupted, what would you tell them?

No, model predicts 1566 gpm.

e. Using the model from part (c), does it make sense to interpret the y-intercept in the context of this problem? Explain.

No, You can't 1350 gallons erupt in 0 minutes

NAME:_____ Math _____, Period _____

Mr. Rogove Date:_____

The following table gives the times of the gold, silver, and bronze medal winners for the men's 100 meter race (in seconds) for the past 10 Olympic Games.

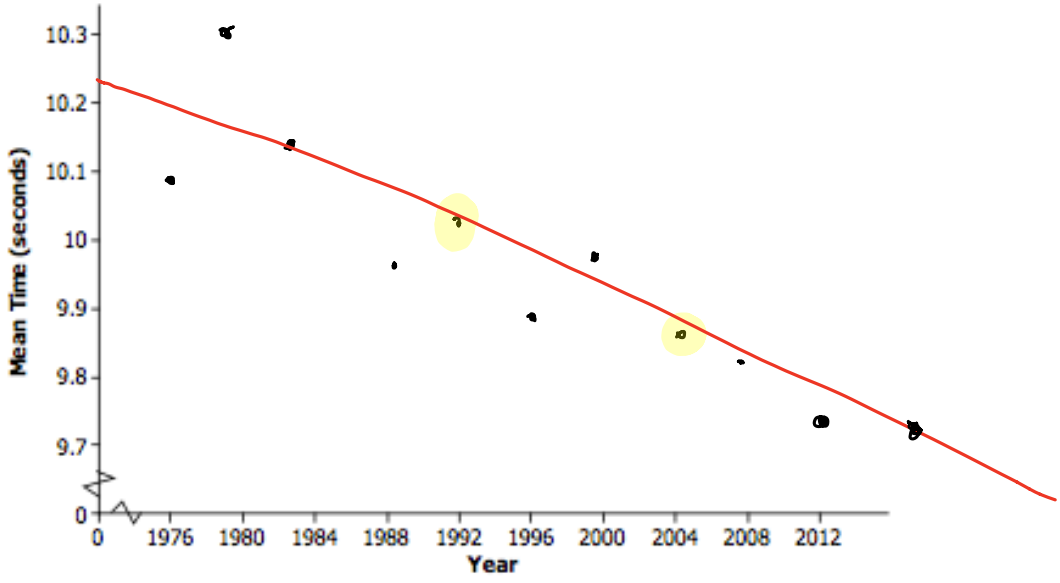
Year	2012	2008	2004	2000	1996	1992	1988	1984	1980	1976
Gold	9.63	9.69	9.85	9.87	9.84	9.96	9.92	9.99	10.25	10.06
Silver	9.75	9.89	9.86	9.99	9.89	10.02	9.97	10.19	10.25	10.07
Bronze	9.79	9.91	9.87	10.04	9.90	10.04	9.99	10.22	10.39	10.14
Mean time	**9.72**	**9.83**	**9.86**	**9.97**	**9.88**	**10.01**	**9.96**	**10.13**	**10.30**	**10.09**

a. If you wanted to describe how mean times have changed over the years, which variable would be the independent variable and what would be the dependent variable?

Mean time dependent (response)

Year independent (explanatory)

b. Draw a scatter plot and determine if the relationship between mean time and year appear to be linear.



NAME:_____ Math _____, Period _____

Mr. Rogove Date:_____

c. It looks like a reasonable line goes through the 1992 and 2004 data. Find the equation for that line.

(2004, 9.86) & (1992, 10.01)

$\frac{10.01-9.86}{1992-2004} = \frac{.15}{-12} = -.0125$ $(\frac{-1}{80})$

$y = -.0125x + 34.91$

$y = mx+b$

$9.86 = (-.0125)2004 + b$

$9.86 = -25.05 + b$ $b = 34.91$

d. Before he saw the data, Cole guessed that the mean time for the medal winners would decrease by about 0.05 seconds from one Olympic Games to the next. Does the prediction model you found in part (c) support his guess?

Yes, Olympic Games are every 4 yrs.

e. If the trend continues, what ~~mean race~~ time would you predict for the gold, silver, and bronze medal winners in the 2016 Olympic Games? Explain your answer.

$y = -.0125(2016) + 34.91$

$y = 9.71$

f. The data point (1980, 10.3) appears to have an unusually high value for the mean race time (10.3). Is there a possible explanation for this result?

US Boy Goth!

NAME:_____ Math _____, Period _____

Mr. Rogove Date:_____

Independent Practice:
Students will work on the problem set in pairs for independent practice. (Pages 93-94)

Activating Prior Knowledge:
Students will complete the Car Rental Quandary as an APK activity.

Closure:
Exit ticket for Lesson 11 as Closure possibly??

Notes:
Lesson 11 from Module 6, Grade 8