Common Core Math I   **Linear Regression**

Best Fit Line

You have learned how to find and write equations for lines of fit by hand. Many calculators use complex algorithms that find a more precise line of fit called the best-fit line.

One algorithm is called linear regression. We can find the linear regression.

To enter the data: ☐ STAT   EDIT L_1 is independent variable; L_2 is dependent variable

Calculator Steps: ☐ STAT ☐ CALC   4: LinReg   ☐ VARS   Y-VARS   FUNCTION   1: Y_1 ☐ Enter

Your calculator may also compute a number called the correlation coefficient. This number will tell you if your correlation is positive or negative and how closely the equation is modeling the data. The closer the correlation coefficient is to 1 or -1, the more closely the equation models the data.

To turn the correlation coefficient on: ☐ 2nd   ☐ 0   DiagnosticOn   ☐ Enter

- If the correlation coefficient is close to 1 or -1, the fit is _____.

- The farther away from 1 or -1, the _____ the fit.

- If the scatterplot appears random, there is _____.

- If the correlation coefficient is positive, the slope will be _____.

- If the correlation coefficient is negative, the slope will be _____.

We will often need to interpret the slope and y-intercept in the context of the problem.

Slope can often follow this pattern:

(Topic of data)   (increases/decreases)   (slope)   (y-units)   per   (x-units).

The y-intercept is the starting value, or what the dependent variable is when the independent variable is 0.

EXAMPLE: The average lifespan of American women has been tracked, and the model for the data is $y = 0.2t + 73$, where $t = 0$ corresponds to 1960.

INTERPRETATION:

Real World Example 1: Box Office
The table shows the amount of money made by movies in the United States. Use a graphing calculator to write an equation for the best-fit line for that data.

Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Income ($ billion)	7.48	8.13	9.19	9.35	9.27	8.95	9.25	9.65	9.85	10.21

1. Enter the data into a list using the graphing calculator.
    Let x = the number of years after 2000.

2. Find the best fit line using the graphing calculator. _____

r = _____   Describe the fit. _____

Interpret the slope. _____

_____

Interpret the y-intercept. _____

_____

3. EXTRAPOLATION: Use the equation and the table in the graphing calculator to predict what the box office income will be in 2013. State your answer as a complete sentence.

_____

_____

_____

4. INTERPOLATION: Use the equation and the table in the graphing calculator to predict what the expected box office income was in 2008. How does the compare to the actual box office income given in the table? What is the difference?

_____

_____

_____

_____

REAL WORLD EXAMPLE 2: HOCKEY

The table below shows the number of goals scored by the Mustang Girls Hockey Team per year. Let x represent the number of years after 2003.

Year	2003	2004	2005	2006	2007	2008	2009	2010
Goals	63	44	55	63	81	85	93	84

1. Find the best fit line using the graphing calculator.

_____

r = _____   Describe the fit. _____

Interpret the slope. _____

_____

Interpret the y-intercept. _____

_____

2. ANALYSIS: If this were your hockey team, would you want to use this model to predict the number of goals expected in 2013? Why or why not?

_____

_____

_____

_____

Did you know that Minnesota was the first state to establish women's hockey as a varsity high school sport in 1994?

Women's hockey first appeared in the Winter Olympics in 1998.