

Curve Fitting with Linear Models, Linear Regression

A scatter plot is helpful in understanding form, direction and strength of a relationship between two variables.

	<p>Positive correlation Positive slope</p>	<p>Negative correlation Negative slope</p>	<p>Relatively No Correlation</p>
STRONG			
WEAK			

Properties of the Correlation Coefficient r

r is a value in the range $-1 \leq r \leq 1$. ← strong +
 strong -

If $r = 1$, the data set forms a straight line with a positive slope.

If $r = 0$, the data set has no correlation.

If $r = -1$, the data set forms a straight line with negative slope.

CAUTION! Don't confuse slope with the value of r . Whether a line has a slope of 10 or a slope of $\frac{1}{10}$, it can have an r -value of 1. The r -value and the slope have the same sign.

Anthropologists use known relationships between the height and length of a woman's humerus bone, (the bone between the elbow and the shoulder) to estimate a woman's height.

Bone Length and Height in Women

Humerus Length	35	27	30	33	25	39	27	31
Height (cm)	167	146	154	165	140	180	149	155

- (a) Use your graphing calculator to make a scatter plot for the data with the humerus length as the independent variable.
- (b) Find the correlation coefficient r and the line of best fit. Interpret the slope of the line of best fit in the context of the problem.
- (c) A humerus 32 cm long was found. Predict the woman's height.

Dave's Deli Sandwiches Nutritional Information

Fat (g)	5	9	12	15	12	10	21	14
Calories	360	455	460	420	530	375	580	390

- (a) Use your graphing calculator to make a scatter plot for the data with the Fat(g) as the independent variable.
- (b) Find the correlation coefficient r and the line of best fit. Draw the line of best fit on your scatter plot.
- (c) Predict the amount of fat in a sandwich with 500 calories. How accurate do you think your prediction is?

GLUE HERE

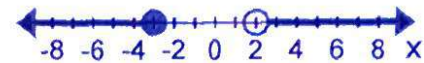
GLUE HERE

Robert Collier
 OUT
 IN A DAY
 REPEATED DAY
 EFFORTS,
 SMALL
 THE UM OF
 SUCCESS

Compound Inequalities

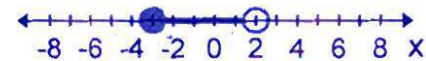
- Made up of more than one inequality
- **Disjunction** is a compound statement that uses the word OR.

$$x \leq -3 \text{ OR } x > 2$$



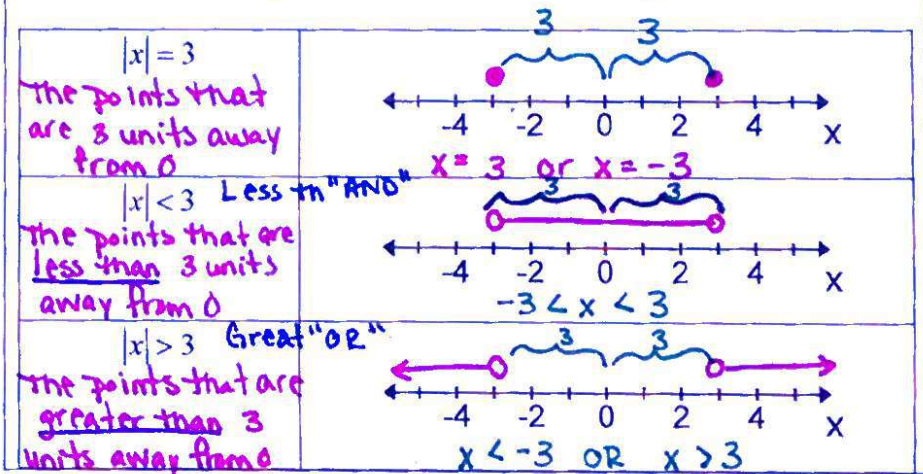
- **Conjunction** is a compound statement that uses the word AND.

$$x \geq -3 \text{ AND } x < 2 \rightarrow -3 \leq x < 2$$



ABSOLUTE VALUE

- Absolute value is the **distance from x to 0 on the number line**.
- Absolute Value of any number is **NON NEGATIVE (+)** because it represents a distance without regard for direction

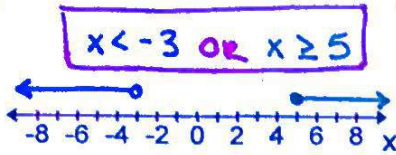


SOLVING COMPOUND INEQUALITIES

$$2x - 3 \geq 7 \text{ OR } x + 5 < 2$$

$$\begin{array}{r} 2x - 3 \geq 7 \\ +3 \quad +3 \\ \hline 2x \geq 10 \\ x \geq 5 \end{array}$$

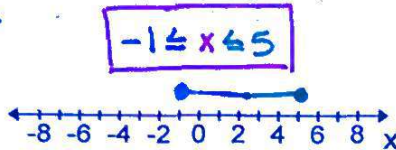
$$\begin{array}{r} x + 5 < 2 \\ -5 \quad -5 \\ \hline x < -3 \end{array}$$



$$3x + 6 \leq 21 \text{ AND } 4x - 2 \geq -6$$

$$\begin{array}{r} 3x + 6 \leq 21 \\ -6 \quad -6 \\ \hline 3x \leq 15 \\ x \leq 5 \end{array}$$

$$\begin{array}{r} 4x - 2 \geq -6 \\ +2 \quad +2 \\ \hline 4x \geq -4 \\ x \geq -1 \end{array}$$



Solving Absolute Value Equations

$$|x - 7| = 5$$

$$\begin{array}{r} x - 7 = 5 \\ +7 \quad +7 \\ \hline x = 12 \end{array}$$

$$\begin{array}{r} x - 7 = -5 \\ +7 \quad +7 \\ \hline x = 2 \end{array}$$

$x = 12 \text{ OR } x = 2$

$$\begin{array}{r} |3x| + 5 = 14 \\ -5 \quad -5 \\ \hline |3x| = 9 \end{array}$$

$$3x = 9$$

$$x = 3$$

$$3x = -9$$

$$x = -3$$

$\{-3, 3\}$

$$\begin{array}{r} -2|6x| + 8 = 2 \\ -8 \quad -8 \\ \hline -2|6x| = -6 \\ -2 \quad -2 \\ \hline |6x| = 3 \end{array}$$

$$6x = 3$$

$$x = \frac{1}{2}$$

$$6x = -3$$

$$x = -\frac{1}{2}$$

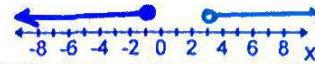
$x = -\frac{1}{2} \text{ OR } x = \frac{1}{2}$

$$x + 3 \leq 2 \text{ OR } 3x > 9$$

$$\begin{array}{r} x + 3 \leq 2 \\ -3 \quad -3 \\ \hline x \leq -1 \end{array}$$

$$\begin{array}{r} 3x > 9 \\ \hline x > 3 \end{array}$$

$x \leq -1 \text{ OR } x > 3$



$$-2x < 8 \text{ AND } x - 3 \leq 2$$

$$\begin{array}{r} -2x < 8 \\ -2 \quad -2 \\ \hline x > -4 \end{array}$$

$$\begin{array}{r} x - 3 \leq 2 \\ +3 \quad +3 \\ \hline x \leq 5 \end{array}$$

divide by neg
Flip symbol

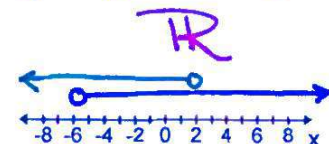
$-4 < x \leq 5$



$$x + 4 > -2 \text{ OR } x + 3 < 5$$

$$\begin{array}{r} x + 4 > -2 \\ -4 \quad -4 \\ \hline x > -6 \end{array}$$

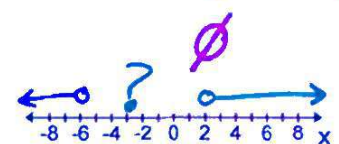
$$\begin{array}{r} x + 3 < 5 \\ -3 \quad -3 \\ \hline x < 2 \end{array}$$



$$x + 4 < -2 \text{ AND } x + 3 > 5$$

$$\begin{array}{r} x + 4 < -2 \\ -4 \quad -4 \\ \hline x < -6 \end{array}$$

$$\begin{array}{r} x + 3 > 5 \\ -3 \quad -3 \\ \hline x > 2 \end{array}$$

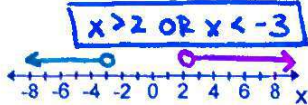


Solving Absolute Value Inequalities

$$|2x + 1| > 5$$

$$\begin{array}{r} 2x + 1 > 5 \\ -1 \quad -1 \\ \hline 2x > 4 \\ x > 2 \end{array}$$

$$\begin{array}{r} 2x + 1 < -5 \\ -1 \quad -1 \\ \hline 2x < -6 \\ x < -3 \end{array}$$



$$\begin{array}{r} |3x - 9| \leq 12(2) \\ \hline |3x - 9| \leq 24 \end{array}$$

$$\begin{array}{r} 3x - 9 \leq 24 \\ +9 \quad +9 \\ \hline 3x \leq 33 \\ x \leq 11 \end{array}$$

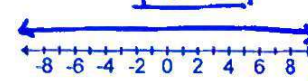
$$\begin{array}{r} 3x - 9 \geq -24 \\ +9 \quad +9 \\ \hline 3x \geq -15 \\ x \geq -5 \end{array}$$



$$|4x| + 16 > 8$$

$$\begin{array}{r} 4x > -8 \\ \hline x > -2 \end{array}$$

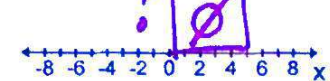
$$\begin{array}{r} 4x < -8 \\ \hline x < -2 \end{array}$$



$$\begin{array}{r} -4|x + 3| \geq 8 \\ -4 \quad -4 \\ \hline |x + 3| \leq -2 \end{array}$$

$$\begin{array}{r} x + 3 \leq -2 \\ \hline x \leq -5 \end{array}$$

$$\begin{array}{r} x + 3 \geq 2 \\ \hline x \geq -1 \end{array}$$



Great "OR" / Less th "AND"

Great "or"