P.3 ✦LINEAR✦ Equations and Inequalites
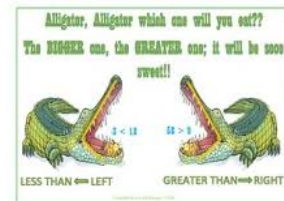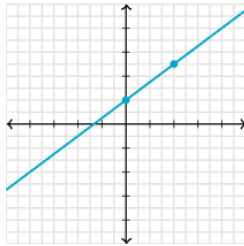
Objectives: 1) I can determine if an equation is linear.

2) I can solve multi-step linear equations.

3) I can solve linear inequalites.

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What makes a linear equation?

A *linear equation* in 1 variable- is an equation that has one unknown and the unknown is written to the first power.

$$ax + b = 0$$

Examples

$$4x - 3 = 12$$

$$\frac{2}{3}y + \frac{1}{5} = \frac{2}{15}$$

$$\frac{2}{X} = 20$$

Not

$$2x^{-1} = 20 \quad Linear!$$

$$x^{2} - 3 = 27$$

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Solving Linear Equations

Ex 1 which of the following numbers are a solution.

$$3(x - 1) = -2x + 12$$

a) x=5　　　　　　　　b) x=3

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More examples (use *inverse operations*!)
Ex. 1

$$3y - 2 + 5y = 2y + 5 + 4y + 3$$

$$8y - 2 = 6y + 8$$
$$-6y \quad +2 \quad -6y \quad +2$$
$$\frac{2y}{2} = \frac{10}{2}$$
$$y = 5$$

Ex. 2

$$4(x + 3) = x - 3(x - 2)$$

$$4x + 12 = x - 3x + 6$$
$$4x + 12 = -2x + 6$$
$$+2x - 12 \quad +2x - 12$$
$$\frac{6x}{6} = \frac{-6}{6}$$

$$x = -1$$

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Ex. 3

$$\cancel{6}\left(\frac{x+3}{6}\right)=(2x)6$$

$$x+3=12x$$
$$\underline{-x \qquad -x}$$
$$\frac{3}{11}=\frac{11x}{11}$$

$$\boxed{x=\frac{3}{11}}$$

Ex. 4

$$\frac{^9\cancel{3}y}{\cancel{2}6}+\frac{y}{6}=\frac{\cancel{10}^{20}}{\cancel{3}6}$$

$$^6\left(\frac{9y}{6}+\frac{y}{6}\right)=\left(\frac{20}{6}\right)6$$
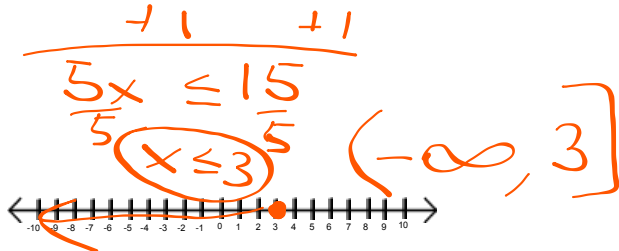
$$9y+y=20$$

$$10y=20$$
$$y=2$$

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$$\frac{3y}{2}+\frac{y}{6}=\frac{10}{3}$$

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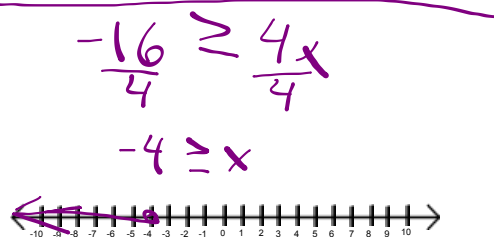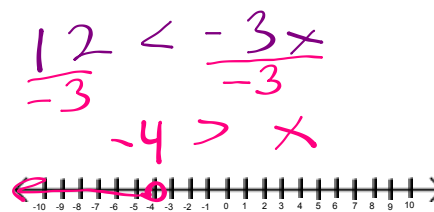## Solve the inequalities and graph the solution.

$$5x - 1 \leq 14$$
$$+1 \qquad +1$$
$$\frac{5x}{5} \leq \frac{15}{5}$$
$$\boxed{x \leq 3} \qquad (-\infty, 3]$$

$$5x - 1 \geq 3x + 8$$
$$-3x + 1 \quad -3x + 1$$
$$\frac{2x}{2} \geq \frac{9}{2}$$

$$x - 4 \geq 5x + 12$$
$$-x+4 \, 12 \quad -x \; -12$$
$$\frac{-16}{4} \geq \frac{4x}{4}$$
$$-4 \geq x$$
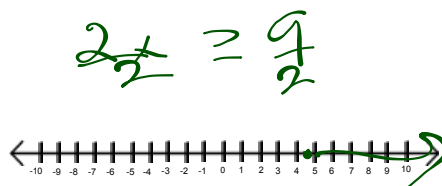
$$3 < -3x - 9$$
$$+9 \qquad +9$$
$$\frac{12}{-3} < \frac{-3x}{-3}$$
$$-4 > x$$

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Representing Inequalities Using a Real Number Line and Interval Notation

Table 7

Interval	Inequality Notation	Graph
The open interval (a, b)	$\{x \mid a < x < b\}$	
The closed interval $[a, b]$	$\{x \mid a \leq x \leq b\}$	
The half-open interval $[a, b)$	$\{x \mid a \leq x < b\}$	
The half-open interval $(a, b]$	$\{x \mid a < x \leq b\}$	
The interval $[a, \infty)$	$\{x \mid x \geq a\}$	
The interval (a, ∞)	$\{x \mid x > a\}$	
The interval $(-\infty, a]$	$\{x \mid x \leq a\}$	
The interval $(-\infty, a)$	$\{x \mid x < a\}$	
The interval $(-\infty, \infty)$	$\{x \mid x \text{ is a real number}\}$	

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Solve the *compound inequalities* and graph.

$$-2 < 3x + 1 < 10$$
$$-1 \qquad -1 \quad -1$$

$$\frac{-3}{3} < \frac{3x}{3} < \frac{9}{3}$$

$$-1 < x < 3$$

$$(-1, 3)$$

$$-3 < -4x + 1 < 13$$
$$-1 \qquad\qquad -1 \quad -1$$

$$\frac{-4}{-4} < \frac{-4x}{-4} < \frac{12}{-4}$$

$$1 > x > -3$$

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Mathman
B7
P.3

a) $x = -3$ 1. $2x^2 + 5x = 3$

b) x $2(-3)^2 + 5(-3) = 3$

c) $18 + -15 = 3$

Hi myrue!

Aug 23-11:58 AM