First Semester Study Guide for Algebra 1with Examples

1) Know the properties of real numbers

Closure $a+b$ is a number	Closure ab is a number
Associativety $a+(b+c)=(a+b)+c$	Associativety $a(bc)=(ab)c$
Commutativety $a+b=b+a$	Commutativety $ab=ba$
Identity Element $a+0=0+a=a$	Identity Element $a\cdot1=1\cdot a=a$
Inverse Property $a+(-a)=0$	$a(a^{-1})=1$
Distributive property $a(b+c)=ab+bc$	

2) Solve equations in 1 unknown

$$6x+3=2(x-4)$$
$$6x+3=2x-4$$
$$4x+3=-4$$
$$4x=-7$$
$$x=-\frac{7}{5}$$

3) Know how to do rate problems

A car travels at 40mph for 2 hours, how far has it gone?

$$40\text{mph} \cdot 2\text{hr} = 80\text{hr}$$

4) Know how to do ratio problems

A recipe specifies 3 eggs per cup of flower. If 4 cups are used, how many eggs are needed?

$$\frac{3eggs}{1cup}=\frac{xeggs}{4cups} \to \frac{3}{1}=\frac{x}{4} \to x=\frac{3\cdot4}{1}=12$$

5) Know how to do percent problems

A TV marked down 20% is selling for \$1400.00, what was its original price?

$$x\cdot(1-20\%)=1400 \to x\cdot\left(1-\frac{20}{100}\right)=1400 \to x\cdot\frac{80}{100}=1400 \to x=\frac{1400\cdot100}{80}=$$
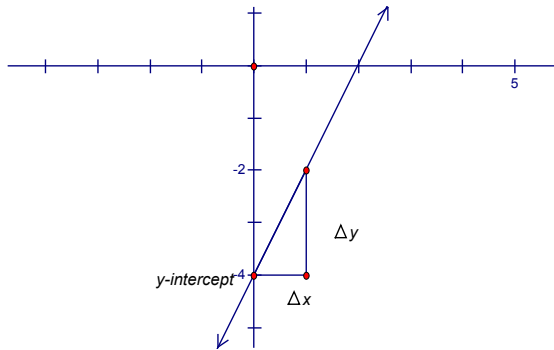
$$\frac{140000}{80}=\frac{14000}{8}=\$1750.00$$

6) Know how to put a line into slope intercept form

$$3x+4y=7 \to 4y=-3x+7 \to y=-\frac{3}{4}x+\frac{7}{4}$$

$$\text{slope}=-\frac{3}{4}, \text{ }y\text{-intercept}=\frac{7}{4}$$

7) Graph a line from the equation in slope intercept form *y=mx+b*

$$y = 2x - 4$$

8) Write an equation given a graph

From the above graph note that *b*=-4 and *m*= $\Delta y / \Delta x = 2/1 = 2$

So the equation is *y=2x+b*

9) Write the equation of a line given the slop and intercept, see 8)

10) Write the equation of a line given the slope and a point

Use the point slope form *y-k=m(x-j)* for the point *(j,k)*

$$\text{point} = (3,4), \ m\text{=-5} \rightarrow y - 4 = -5(x - 3)$$

Or write the equation as *y=mx+b,* plug in the point and solve for b.

$$\text{point} = (3,4), \ m\text{=-5} \rightarrow y = -5x + b \rightarrow 4 = -5(3) + b \rightarrow b = 4 + 15 = 19$$

y=-5x+19

11) Write the equation of a line given two points

Find the slope with the equation $\dfrac{y_2 - y_1}{x_2 - x_1}$ and then use the method described in 10

12) Write the equation of a line perpendicular to another line through a point

Remember that the slopes of perpendicular lines are negative reciprocals of each Each other

13) Solve and graph a linear inequality in one unknown

$3x - 2 \leq 13$ (Add 2 to both sides)

$3x \leq 15$ (Divide both sides by 3)

$x \leq 5$

15) Graph a linear inequality in two unknowns.

Graph the linear equation that is the boundary and then test a point on either side.