Linear Unit Part 1: Solving Equations

Solving 1 step equations with addition and subtraction	A) $x + 9 = 12$ B) $x - 3 = 11$ C) $-12 = 12 + x$ D) $-15 = -13 + x$ E) $14 + x = -7$ F) $7 = x + 10$

Solving 1 step equations with multiplication and division.	A) $4x = 16$ B) $30 = -5x$ C) $-3x = -60$ D) $\frac{x}{5} = 3$ E) $\frac{x}{-4} = 5$ D) $\frac{3}{4}x = 5$ E) $\frac{-5}{3}x = -2$

Solving 2 step equations Adding or Subtracting First	1. $4x+6=14$ 2. $-p+7=-13$ 3. $9=\frac{r}{-3}+4$ 4. $\frac{x}{4}-5=10$ 5. $5=-6+\frac{x}{2}$ 6. $3x+5=32$

Solving 2 step equations Getting rid of fractions first	1. $9=\frac{x}{2}+4$ 2. $9=\frac{x}{2}+4$ 3. $\frac{x}{-3}-2=5$ 4. $\frac{x}{-3}-2=5$

Multi-Step Equations with distributive property (no negative coefficients) - Do 2 with Distributive Property First - Do 2 with Dividing First	1. $5(3x + 3) = 75$	2. $3(2x + 4) = 30$
	3. $3(5x – 4) = 48$	4. $2(3x – 2) = 26$
Multi-Step Equations with distributive property (negative coefficients)	1. $-5(4x + 4) = 80$	2. $4(-5x + 4) = 76$
	3. $-3(-4x – 4) = 24$	4. $2(-2x – 3) = 24$

Solving equations with the distributive property and fractions	1. $\frac{2}{3}(x-5)=6$ 2. $\frac{5}{4}(x-1)=10$	1. $\frac{2}{3}(x-5)=6$ 2. $\frac{5}{4}(x-1)=10$

Multi-Step Equations with like terms on the same side(no negative coefficients)	1. $-12 + 3x + 2x = 3$	2. $x - 6 + 2x = 3$
	3. $3x - 2 - x = 4$	4. $x + 3x - 16 = 4$
Multi-Step Equations with like terms on the same side(negative coefficients)	1. $-1 + x - 3x = 5$	2. $-x - 9 + 3x = 3$
	3. $-3x - 23 + 2x = 7$	4. $-x - 3x + 16 = 4$

Multi-Step Equations with distributive property and like terms on the same side(no negative coefficients)	1. $4x + 7(x - 3) = 34$	2. $2x + 3(2x - 4) = 44$
	3. $3x + 2(x + 2) = 49$	4. $2x + 7(x - 2) = 31$

Multi-Step Equations with distributive property and like terms on the same side(negative coefficients)	1. $-4x + 5(-x + 4) = 34$	2. $-2x + 4(-2x – 2) = 44$
	3. $-3x - 2(2x + 3) = 48$	4. $4x - 7(x – 2) = 31$

Multi-Step Equations with like terms on both sides without distributive property	1. 5x = 3x - 8	2. 6x = 4x - 12
	3) $7x-2=5x+10$	4) $-7x+15=-3+2x$
	5) 3x - 21 = - 2x + 9	6) 2x – 9 = -3x + 6
	7) -23 + 2x = - 3x + 7	8) - 6 + 2x = 3 - x

Multi-Step Equations with like terms on both sides with distributive property	1. $2(x - 5) = 3x + 1$ 2. $5(x + 3) = 2x - 9$ 1. $4(x+3)=2(x-6)$ 2. $3(x+2)=4(x-10)$ 3. $-9(x-4)=-(x+20)$

Multi-Step Equations anything goes	1. $4x-3+2x=8x-3-x$ 2. $8y+6-12y=2y+9-3y$

Multi-Step Equations anything goes	3. $9(w-4)-7w=5(3w-2)$ 4) $5-3(x-7)=2(2-x)-8$

Solving Proportions

Solve the following proportions.

1. $\frac{3}{4}=\frac{x}{8}$ 2. $\frac{2}{5}=\frac{8}{x}$ 3. $\frac{x}{6}=\frac{10}{3}$ 4. $\frac{3}{x}=\frac{9}{5}$

Solve the following proportions.

1. $\frac{3}{4}=\frac{x-2}{8}$ 2. $\frac{2}{5}=\frac{8}{x-4}$

3. $\frac{2x-3}{3}=\frac{9}{3}$ 4. $\frac{4}{3x-2}=\frac{2}{5}$

Solve the following proportions.

1. $\frac{3x}{4} = \frac{x-5}{3}$

2. $\frac{2}{2x} = \frac{3}{x-4}$

3. $\frac{4x-3}{3} = \frac{5x}{3}$

4. $\frac{4}{3x-20} = \frac{2}{5x}$

Solve the following proportions.

1. $\frac{3x+1}{x-5}=\frac{4}{3}$

2. $\frac{2}{3}=\frac{2x+3}{x-4}$

3. $\frac{4x-3}{5x+2}=\frac{2}{3}$

4. $\frac{4x+1}{3x-20}=\frac{2}{5}$

Set up a proportion to solve each problem, show all work, and label all answers.

1. The ratio of boys to girls is 4 to 3. If there are 36 boys, how many girls are there?

2. At a recent party, it cost $11.50 for refreshments for 6 guests. At this rate, how much would it cost to have refreshments for 80 guests?

3. Mr. Johnson was paid $2250 for a job that required 30 hours of work. At this rate, how much should he be paid for a job requiring 45 hours of work?

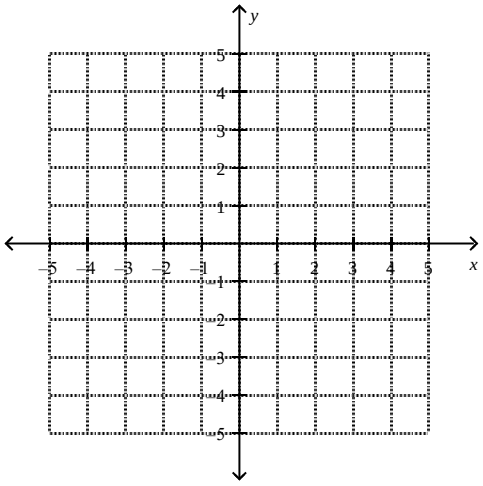
4. If a jogger runs 3 miles and burns 221 calories, how many calories would he burn jogging 4 miles?

5. Central High School has 1675 students. The student to teacher ratio is 21 to 1. How many teachers are at Central High School?

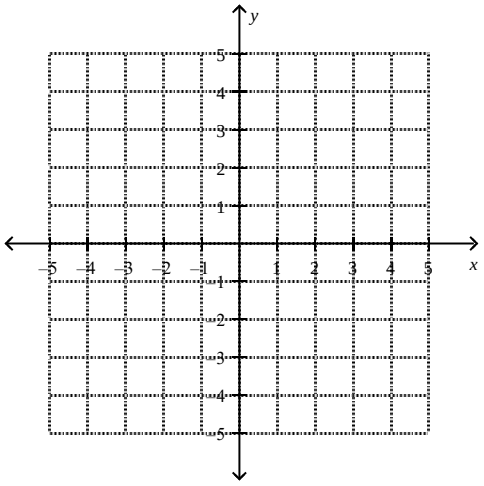
6. A recipe calls for $2\frac{3}{4}$ cups of flour to make 2 dozen cookies. How many cups of flour would be required to bake 11 dozen cookies?

Graph the linear equations: (Hint: identify the slope and *y*-intercept)

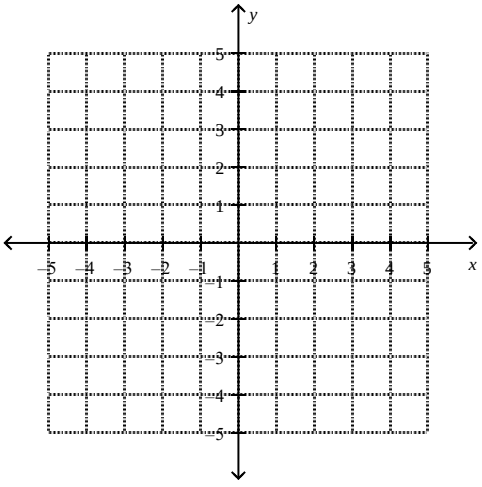
1. Graph: $y = \frac{1}{3}x - 2$.



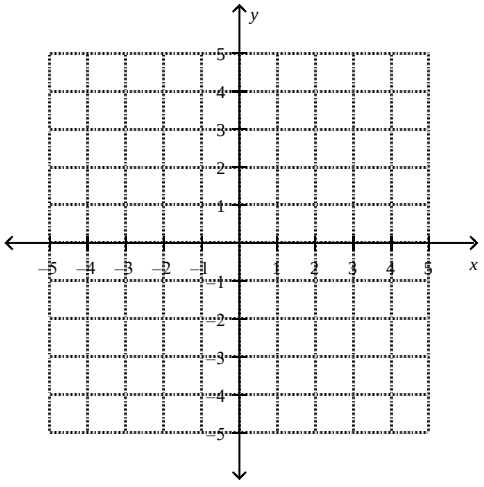
2. Graph: $y = -x + 5$.



3. Graph: $y = -\frac{3}{2}x + 3$



4. $y = 3x - 1$



Rewrite the equation so that y is a function of x Give the slope, y-intercept, and graph the equation	A) $-4x + y = 9$	B) $-19x + 9y = 8x - 9$
	C) $-3x + 7y - 7 = -1 - 8y$	D) $8x + 2(y + 13) = 10$

Rewrite the equation so that y is a function of x Then use the result to find y when x = -5, -1, 2, 4	1. $y - 4x = 9$	2. $6y - 6x = 15$
	3. $4 - y = 7x$	4. $5y - 5 = 6x$
	5. $2x + y = 4$	6. $5x - 5y = 15$

Rewrite the equation so that y is a function of x	1. $\frac{1}{3}y - 5 = 6x$ 2. $\frac{4}{5}y - 2 = -3x$ 3. $\frac{7x}{2} + \frac{1}{9}y = -5$ 4. $\frac{11}{3}x - \frac{2}{7}y = 2$

Rewrite the following equations in slope intercept form (y = mx + b)	1. y – 2 = 5(x - 1) 2. y – 1 = -4(x + 1) 3. y + 4 = -3(x - 1)

Solve $C = 2\pi r$ for r 1. If a circular pool is 100 ft around, what is the pools radius. Solve $A = lw$ for l 1. If the width of a rectangular sandbox is 20 feet, what length is required to obtain an area of 300 square feet.	For each of the following geometric formulas, Solve for the stated variable and answer the questions.

2. If the width of the sandbox was to decrease and the area was to remain 200 square feet, how would the length change? Solve P = 2l + 2w for l 1. If you have 100 feet of lumber to construct the sides of a sandbox, and the width is set at 25 feet, how long can the sandbox be? 2. If the width of the sandbox was to increase, but the perimeter was to remain at 100 feet, how would the length have to change?	

Solve V=lwh for w

1. In designing a box to have a volume of 500 cm3, length 10, and height 15, what is the width?

2. If the volume of the box was to increase, but the length and height were to remain unchanged, how would the width have to change?

Solve $A=\frac{1}{2}bh$ for h

a. If a triangle has an Area of 100 cm and a base of 20 cm what will the height of the be.

Solve $A=\frac{1}{2}h(b_1+b_2)$ for b_2

a. If a trapezoid has an area of 200 cm, a height of 10 cm, and a base of 5 cm, how big must the other base be.

Solving Inequalities

Vocabulary:

Inequality is a mathematical sentence that compares two unequal expressions.

Here is a chart of words or phrases associated with the inequality symbols:

$<$	$\leq$	$\geq$	$>$

Open dot means the number is _____ of the solution set, thus it is not shaded.

Closed dot means the number _____ of the solution set, thus it is shaded.

Solving Inequalities

Solve and graph the solution set for the following problems.

A. **5x > 25**

B. x + 5 ≤ 4

B. −2*x* > 6

C. $-\frac{1}{2}n \leq 5$

D. $3 \geq 4d + 7$

E. $-4p + 28 \geq 8$

F. $2h - 13 < -23$

Practice: Solve and graph the following inequalities, make your own number line.

1. $-5m < 20$

2. $\frac{j}{6} \leq 0$

3. $5a > -10$

4. $\frac{c}{-3} \geq 6$

5. $m + 6 > 2$

6. $y - 3 < -4$

7. $4x + 11 \geq 19$

8. $6 < \frac{x}{-2}$

9. $27 \geq -0.9r$

10. $5m - 3 > -18$

Multi-Step Inequalities

Solve and graph the solution set for the following problems.

1: $9x + 4 \leq 3x - 14$

2: $-2(x - 4) - 3x < 23$

Practice: Solve and graph the solution set for the following problems

1. $5x + 3 < 2x + 15$

2. $2(3 + 3g) > 2g + 14$

Solve the following problems

3. $2(3b-2) < 4b+8$

4. $11y-2 \le 3y+14$

5. $3q+6 \le -5(q+2)$

6. $1 < 8+b$

7. $-4x-4 < 8$

8. $5-9c > -13$

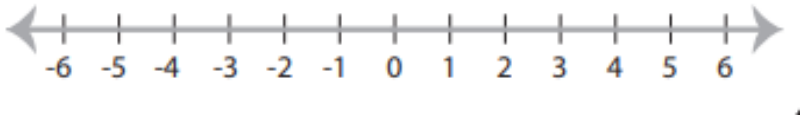
9. A high school class is planning its annual hayride. There is a flat fee of $50 plus $30 per hour to hire the hay wagon. The class has a budget of $280 for the hayride.

Part A: Write an inequality to find *h*, the number of hours they can hire the hay wagon and stay within budget.

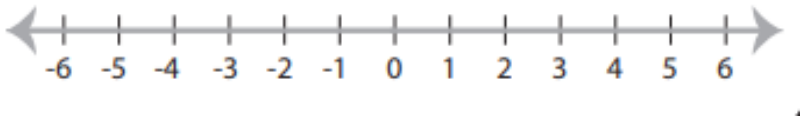
Part B: Solve the inequality.

Solving and Graphing Compound Inequalities	Graph the following compound inequalities and then write the solution in interval notation

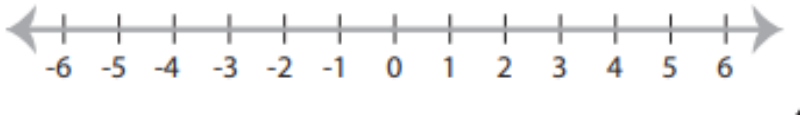
1. $x > 4$ or $x < -2$



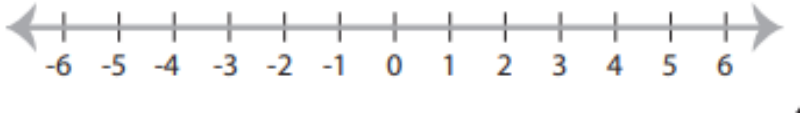
2. $x \geq 3$ or $x < -1$

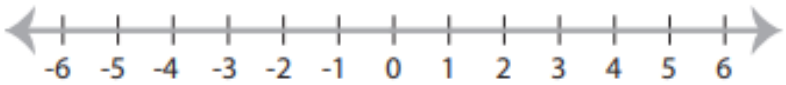


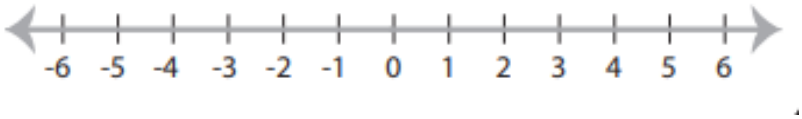
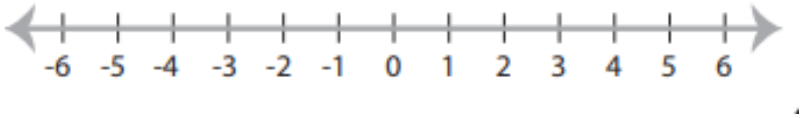
3. $x > -4$ and $x \leq 2$



4. $-5 \leq x \leq 4$



Solve the compound inequality, graph the solution and then write the solution in interval notation	1. $x+2\leq -3$ or $x-5>-2$  2. $\frac{x}{4}\geq 8$ or $x-16\leq 10$  3. $x+5>6$ or $-6x \geq 18$ 

Solve the compound inequality, graph the solution and then write the solution in interval notation	1. $x+5>6$ and $6x \leq 18$  2. $-15 \leq x-13 \leq 0$ 

3. $-11 < \frac{x}{3} < -9$

4. $-14 < -11 + x \leq -12$