Vernon Township High School
Algebra II/Trig Honors
Summer Assignment

This material is a review of the basic Algebra I concepts that students need to recall and master in order to succeed in Algebra II/Trig Honors. All work must be shown for each problems in the packet. This assignment is due on the first day of school. Late assignments will not be accepted. Internet resources and notes from previous Algebra classes may be used to aid in the completion of this packet. After a brief review, students will be tested on the material included in this packet.

Have a great summer and see you in September!

Solved Examples

I. Solving equations in one variable.

Example 1: Solve $\frac{1}{3}x+2=9$

Solution:

$$\begin{aligned} \frac{1}{3}x + 2 &= 9 \\ -2 \quad &\; -2 \\ \frac{1}{3}x &= 7 \\ 3\left(\frac{1}{3}x\right) &= (3)\ 7 \\ x &= 21 \end{aligned}$$

Eliminate the +2 by subtracting 2 from both sides of the equation.

Eliminate the $\frac{1}{3}$ by multiplying by its reciprocal, 3, on both sides.

Example 2: Solve $3(y+8)-7=11$

Solution:

$$\begin{aligned} 3(y+8)-7 &= 11 \\ 3y+24-7 &= 11 \\ 3y + 17 &= 11 \\ -17 &= -17 \\ \frac{3y}{3} &= \frac{-6}{3} \\ y &= -2 \end{aligned}$$

Use the distributive property and combine to simplify the left side of the equation.

Eliminate the +17 by subtracting 17 from both sides.

Eliminate the 3 by dividing both sides by 3.

Example 3: Solve $7(a-2)-6=2a+8+a$

Solution:

$$\begin{aligned} 7(a-2)-6 &= 2a+8+a \\ 7a-14-6 &= 2a+8+a \\ 7a - 20 &= 3a+8 \\ -3a \qquad &\quad -3a \\ 4a - 20 &= 8 \\ +20 &\quad +20 \\ \frac{4a}{4} &= \frac{28}{4} \\ a &= 7 \end{aligned}$$

Use the distributive property and combine to simplify both sides of the equation.

Eliminate the variable term on the right by subtracting 3a.

Eliminate the –20 by adding 20 to both sides.

Eliminate the 4 by dividing both sides by 4.

Example 4: Solve $3(1-n)+5n=2(n+1)$

Solution:

$$\begin{aligned} 3(1-n)+5n &= 2(n+1) \\ 3 - 3n + 5n &= 2n+2 \\ 3 + 2n &= 2n+2 \\ -2n &\quad -2n \\ 3 &= 2 \end{aligned}$$

$\therefore$ no solution or $\emptyset$ or $\{\ \}$

Continue as in the previous example.

Correct steps have resulted in a false statement.
Conclude that the equation has no solution.

Solved Examples

II. Solving inequalities in one variable.

Example 5: Solve $-4x+3 \ge 23+6x$

Solution:

$-4x+3 \ge 23+6x$ $\underline{-6x \qquad -6x}$	Subtract 6x from both sides of the inequality.
$-10x+3 \ge 23$ $\underline{\quad -3 \quad -3}$	Subtract 3 from both sides of the inequality.
$\dfrac{-10x}{-10} \ge \dfrac{20}{-10}$ $x \le -2$ $\{x \mid x \le -2\}$	Divide both sides of the inequality by −10. Remember to reverse the inequality symbol when multiplying or dividing by a negative number.

Example 6: Solve $\frac{2}{5}x+3 < \frac{1}{4}(-8x+4)$

Solution:

$\frac{2}{5}x+3 < \frac{1}{4}(-8x+4)$	Distribute $\frac{1}{4}$.
$\frac{2}{5}x+3 < -2x+1$ $\underline{+2x \qquad +2x}$	Add 2x to both sides of the inequality.
$\frac{12}{5}x+3 < 1$ $\underline{-3 \qquad -3}$	Subtract 3 from both sides of the inequality.
$\frac{12}{5}x < -2$ $x < -\frac{5}{6}$ $\left\{x \mid x < -\frac{5}{6}\right\}$	Multiply both sides of the inequality by $\frac{5}{12}$.

Example 7: Solve $3x+10 > 1+5x-(2x-8)$

Solution:

$3x+10 > 1+5x-(2x-8)$ $3x+10 > 1+5x-2x+8$	Use the distributive property and combine to simplify both sides of the inequality.
$3x+10 > 3x+9$ $\underline{-3x \qquad -3x}$ $10 > 9$ $\therefore \{x \mid x \text{ is all real numbers}\}$	Subtract 3x from both sides of the inequality. Correct steps have resulted in a true statement. Conclude that the solution is all real numbers.

Solved Examples

III. Linear Equations

A. Graphing a linear equation

Example 8: Find the slope and the y-intercept of the line whose equation is $3y = 2x + 9$ and use them to graph the equation.

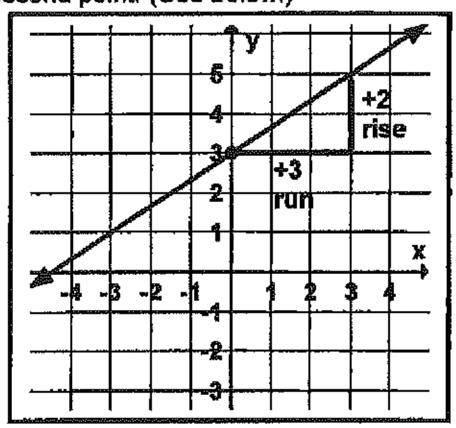
Solution:

$$3y = 2x + 9$$

$$\frac{3y}{3} = \frac{2x}{3} + \frac{9}{3}$$ Divide by 3 to solve for y.

$$y = \frac{2}{3}x + 3$$ Now the equation is in the familiar form $y = mx + b$.

The slope is the coefficient of the x-term, $\frac{2}{3}$, and the y-intercept is the constant term, 3. To graph the line, plot the y-intercept, (0 , 3). Then, since the slope is $\frac{2}{3}$, move 2 units up(rise) and 3 units right (run) to locate a second point. (See below.)



III. Linear Equations

B. Finding the slope.
C. Writing a linear equation.

Example 9: a) Find the slope of the line passing through the points (-2 , 5) and (4 , 8).
b) Given that the y-intercept is 6, write an equation for the line.

Solution: a) $\text{slope} = \frac{y_2 - y_1}{x_2 - x_1} = \frac{8-5}{4+2} = \frac{3}{6} = \frac{1}{2}$

b) In a linear equation of the form $y = mx + b$, the slope is the coefficient of the x-term or linear term, namely m. The numerical term or constant term is the y-intercept, namely b.
So, starting with $y = mx + b$, substitute ½ for m and 6 for b.

Therefore, the equation is $y = \frac{1}{2}x + 6$

Solved Examples

III. Linear Equations

D. Writing a linear equation of parallel and perpendicular lines.

Example 10: a) Write an equation of a line in slope-intercept form ***parallel*** to $y=\frac{2}{3}x-3$ and passes through the point (3, –2)

b) Write an equation of a line in point-slope form ***perpendicular*** to $y=\frac{2}{3}x-3$ and passes through the point (3, –2)

Solution: a) The slope $=\frac{2}{3}$ since parallel lines have the same slope. Use the values for slope and the given coordinate, and substitute the values for m, x, and y in the equation $y=mx+b$ to solve for b.

$$\begin{aligned} y &= mx+b \\ -2 &= \frac{2}{3}(3)+b \\ -2 &= 2+b \\ \underline{-2} & \underline{\ -2} \\ -4 &= b \end{aligned}$$

subtract 2 to solve for b

Therefore the equation parallel to $y=\frac{2}{3}x-3$ and passes through the point (3, –2) is:

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

b) The slope $=-\frac{3}{2}$ since perpendicular lines have opposite reciprocal slopes. The point-slope form is much easier to use. It requires substituting in the values for the slope and the point.

The form is $y-y_1=m(x-x_1)$. Substitute m with $-\frac{3}{2}$ and the x_1 with 3 and y_1 with –2 taken from the given coordinate (3, –2).

Therefore the equation in point-slope form of the line perpendicular to $y=\frac{2}{3}x-3$ and passes through the point (3, -2) is:

$$y+2=-\frac{3}{2}(x-3)$$

Solved Examples

IV. Solving a system of linear equations.

A. Graphing method.

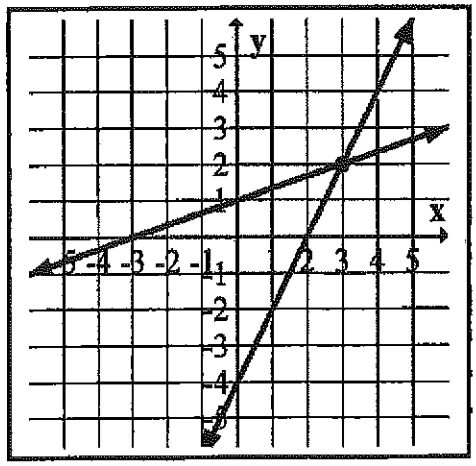
Example 11: Solve the following system by graphing.

$$y = \frac{1}{3}x + 1$$
$$y = 2x - 4$$

Solution: To solve the system of equations by graphing, you need to graph both equations carefully and then locate the point of intersection. ***The point of intersection is the solution to the system.***

Since both equations are already in slope-intercept form it is easy to extract the slope and y-intercept of each equation and use that information to graph each accordingly as shown previously in the section on page 3 called III. **Linear Equations** A. **Graphing a linear equation**.

The solution (the point of intersection) is (3 , 2)



Example 12: Solve the following system by graphing.

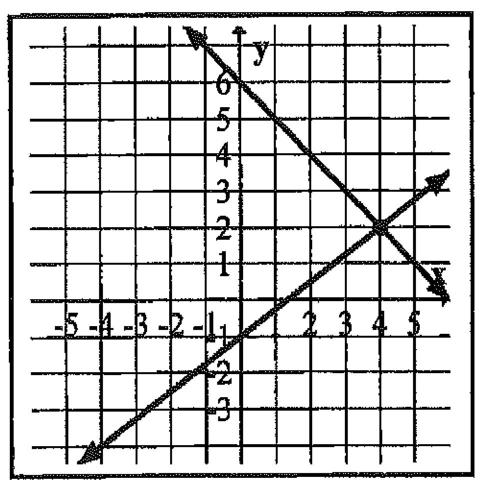
$$x + y = 6$$
$$3x - 4y = 4$$

Solution: Put each equation into slope-intercept form.

$$\begin{aligned} x + y &= 6 \\ -x \quad &\quad -x \\ y &= -x + 6 \end{aligned}$$

$$\begin{aligned} 3x - 4y &= 4 \\ -3x \quad &\quad -3x \\ \frac{-4y}{-4} &= \frac{-3x}{-4} + \frac{4}{-4} \\ y &= \frac{3}{4}x - 1 \end{aligned}$$

The solution is (4 , 2)



Solved Example

IV. Solving a system of linear equations.

A. Graphing method.

Example 13: Solve the following system by graphing.

$$3x+6=7y$$
$$x+2y=11$$

Solution: Put each equation into slop-intercept form.

$$\frac{3x+6}{7}=\frac{7y}{7}$$
$$\frac{3}{7}x+\frac{6}{7}=y$$

$$x+2y=11$$
$$-x \qquad -x$$
$$\frac{2y}{2}=\frac{-x+11}{2}$$
$$y=-\frac{1}{2}x+\frac{11}{2}$$

The y-intercepts for the two equations are not nice whole number, thus making it difficult to graph those points. Now make a table of x and y values and find nice points to graph. Only two points are needed to graph a line.

$y=\frac{3}{7}x+\frac{6}{7}$

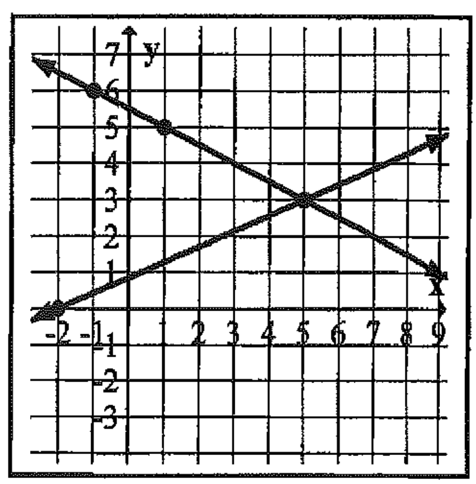
x	y
-2	0
-1	0.42
0	0.85
1	1.29
2	1.71
3	2.14
4	2.57
5	3

Use these two points to graph (-2, 0) and (5, 3)

$y=-\frac{1}{2}x+\frac{11}{2}$

x	y
-2	6.5
-1	6
0	5.5
1	5

Use these two points to graph (-1, 6) and (1, 5)



The solution is (5 , 3)

Solved Example

IV. Solving a system of linear equations.

B. Substitution method.

Example 14: Solve the following system by using substitution.

$$x+3y=13$$
$$-3x+2y=27$$

Solution: To solve the system of equations by substitution, you need to solve for x or y with one of the equations. Your choice here can save time. Let's choose to solve the 1st equation for x. This will require only 1 step.

$$\begin{aligned} x+3y &= 13 \\ -3y\ \ &\ \ -3y \\ x &= -3y+13 \end{aligned}$$

Substitute the equivalent expression for x into the other equation.

$$\begin{aligned} -3x + 2y &= 27 \\ -3(-3y+13)+2y &= 27 \\ 9y-39+2y &= 27 \\ 11y-39 &= 27 \\ +39\ \ &\ \ +39 \\ \frac{11y}{11} &= \frac{66}{11} \\ y &= 6 \end{aligned}$$

Continue to solve for y accordingly.

At this point substitute the solution for y into either of the two original equations.
Again your choice here can save time.
Let's choose equation1.

$$\begin{aligned} x+3y &= 13 \\ x+3(6) &= 13 \\ x+18 &= 13 \\ -18\ \ &\ \ -18 \\ x &= -5 \end{aligned}$$

The solution is (-5 , 6)

Solved Example

IV. Solving a system of linear equations.
C. Elimination method.

Example 15: Solve the following system by using substitution.

$$3x + 5y = -4$$
$$2x - 3y = 29$$

Solution: To solve the system of equations by elimination, you need to write equivalent equations containing the same coefficient for either x or y. Multiply the first equation by 3 and the second by 5. Then the variable y can be eliminated by adding the two equations.

$$\begin{array}{l} 3x + 5y = -4 \\ 2x - 3y = 29 \end{array} \quad \xrightarrow[\text{Multiply by 5}]{\text{Multiply by 3}} \quad \begin{array}{rl} & 9x + 15y = -12 \\ (+) & 10x - 15y = 145 \\ \hline & 19x \qquad = 133 \\ & \qquad x = 7 \end{array}$$

Find y by substituting 7 for x in either equation. Let's use the 1st one.

$$\begin{array}{rl} 3(7) + 5y &= -4 \\ 21 + 5y &= -4 \\ -21 \qquad & \ \ -21 \\ \hline 5y &= -25 \\ \frac{5y}{5} &= \frac{-25}{5} \\ y &= -5 \end{array}$$

The solution is (7 , –5)

Solved Examples

V. Graphing a system of linear inequalities.

Graphing a Linear Inequality
Slope- intercept form: $y < mx + b$

1st graph the y-intercept
2nd use the slope to graph one or more points.

- Connect points to make a solid or dashed line.
- Shade above or below

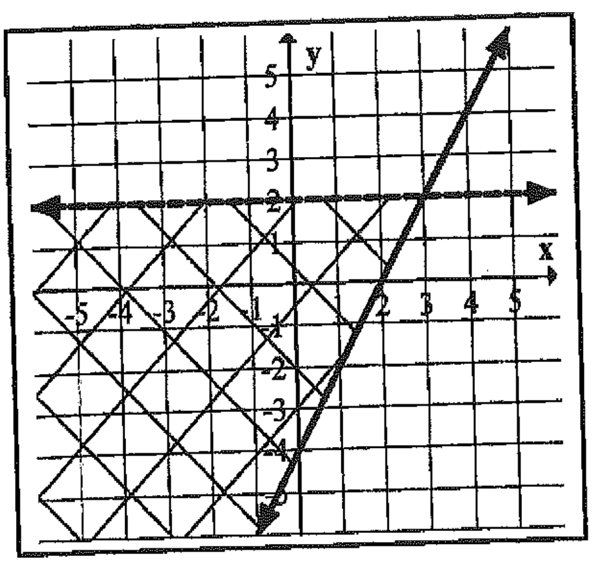
	line		shading	
	solid	dashed	above	below
≤	•			•
≥	•		•	
<		•		•
>		•	•	

Special lines:	Horizontal lines				Vertical lines			
	Shade in above or below				Shade in left or right side			
	$y > 2$	$y \geq 2$	$y < 2$	$y \leq 2$	$x > 2$	$x \geq 2$	$x < 2$	$x \leq 2$
shading	above	above	below	below	right	right	left	left
line	dashed	solid	dashed	solid	dashed	solid	dashed	solid

The solution to a system of inequalities is the common area that is shaded.

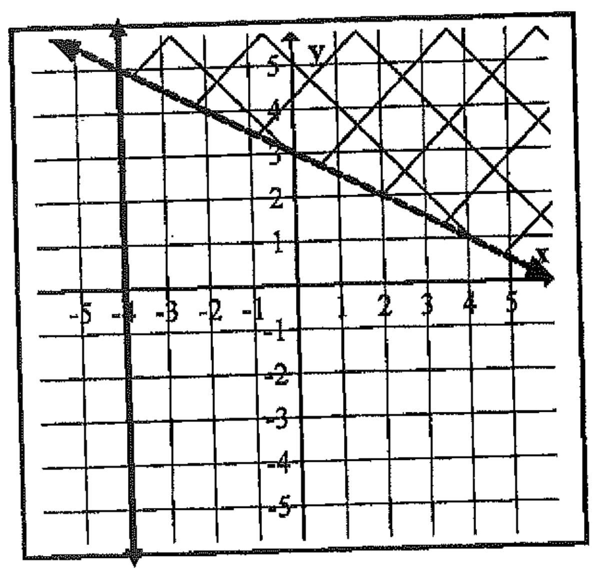
Example 16: Graph the solution to

$$y \geq 2x - 4$$
$$y < 2$$



Example 17: Graph the solution to

$$x \geq -4$$
$$y > -\frac{1}{2}x + 3$$



Solved Examples

VI. Factoring

Factoring (Common Monomial Factor)

Example 18: Factor $15x^3y^2z - 20x^2yz^2$

Solution: Find the *greatest common factor* on the terms in the polynomial.
GCF is $5x^2yz$. Divide each term in the polynomial by the GCF to find the other factor.

$$\frac{15x^3y^2z}{5x^2yz} = 3xy \quad \text{and} \quad \frac{20x^2yz^2}{5x^2yz} = 4z$$

$$15x^3y^2z - 20x^2yz^2 = 5x^2yz(3xy - 4z)$$

Factoring (Difference of Squares)

Example 19: Factor $16x^2 - 25$

Solution: A term is a *square* if the exponents on all variables in it are even and the coefficient is the square of an integer. Both $16x^2$ and 25 are squares. This will only factor if the two squares are subtracted – thus a difference of squares. In particular, $16x^2 = (4x)^2$ and $25 = (5)^2$. The binomial factors as the sum and the difference of the *squares roots*:

$$16x^2 - 25 = (4x + 5)(4x - 5)$$

Factoring (Perfect Square Trinomials)

Example 20: Factor $4x^2 - 20xy + 25y^2$

Solution: A *perfect square trinomial* is a polynomial with three terms that results from squaring a binomial. In other words, perfect square trinomial = (some binomial)^2. To factor, we must first check that the trinomial is a perfect square by answering the following three questions:

1. Is the first term a square? Answer: Yes, $4x^2 = (2x)^2$
2. Is the last term a square? Answer: Yes, $25y^2 = (5y)^2$
3. Ignoring the sign at this time, is the middle term twice the product of 2x and 5y? Answer: Yes, $20xy = 2\,(2x \cdot 5y)$

Having established that the trinomial is a perfect square, it is easy to find the binomial of which it is a square; its terms are in the parenthesis above.

$$4x^2 - 20xy + 25y^2 = (2x - 5y)^2$$

Since the middle term in the trinomial is negative, the factored result is a subtraction.

Factoring (Product – Sum)

Example 21: Factor $y^2 + 14y + 40$

Solution: If, as above, the trinomial is in standard form, the product number is the numerical term, 40, and the sum number is the coefficient of the linear term, 14. The unique pair of number whose sum is 14 and product is 40 is 4 and 10. Therefore, the trinomial factors as

$$y^2 + 14y + 40 = (y + 4)(y + 10)$$

(Note: all factoring problems can be checked by multiplying out)

Solved Examples

VII. Simplifying Radicals

HERE ARE THE FIRST TWENTY square numbers and their roots:

Square numbers	1	4	9	16	25	36	49	64	81	100	121	144	169	196	225	256	289	324	361	400
Square roots	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20

We write, for example, $\sqrt{25} = 5$. "The square root of 25 is 5."

This mark $\sqrt{\ }$ is called the radical sign (after the Latin radix = root). The number under the radical sign is called the radicand. In the example, 25 is the radicand.

Properties of Square Roots:		
Product Property	The square root of a product is equal to the product of each square root	$\sqrt{a \cdot b} = \sqrt{a} \cdot \sqrt{b}$; when $a \geq 0$ and $b \geq 0$
Quotient Property	The square root of a quotient is equal to the quotient of each square root.	$\sqrt{\frac{a}{b}} = \frac{\sqrt{a}}{\sqrt{b}}$; when $a \geq 0$ and $b > 0$

Simplify the following radical expressions.

Example 22: $\sqrt{45} =$

Solution $\sqrt{9 \cdot 5} = \sqrt{9} \cdot \sqrt{5} = 3\sqrt{5}$

Example 23: $\frac{\sqrt{32}}{\sqrt{4}} =$

Solution $\sqrt{\frac{32}{4}} = \sqrt{8} = \sqrt{4 \cdot 2} = \sqrt{4} \cdot \sqrt{2} = 2\sqrt{2}$

or $\frac{\sqrt{32}}{\sqrt{4}} = \frac{\sqrt{32}}{2} = \frac{\sqrt{16 \cdot 2}}{2} = \frac{\sqrt{16} \cdot \sqrt{2}}{2} = \frac{4\sqrt{2}}{2} = 2\sqrt{2}$

Rationalizing the denominator

Example 24: $\frac{3}{\sqrt{2}} =$

Solution $\frac{3}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} = \frac{3\sqrt{2}}{\sqrt{4}} = \frac{3\sqrt{2}}{2}$

Example 25: $\frac{2}{1+\sqrt{3}} =$

Solution $\frac{2}{1-\sqrt{3}} \cdot \frac{1+\sqrt{3}}{1+\sqrt{3}} = \frac{2(1+\sqrt{3})}{1-3} = \frac{2(1+\sqrt{3})}{-2} = -1-\sqrt{3}$

Solved Examples

VIII. Simplifying Expressions with Exponents

Integral Exponents

$b^n = b \cdot b \cdot b \cdot b....$ n times

b: base n: exponent

$3^2 = 3 \cdot 3 = 9$ $-3^2 = -3 \cdot 3 = -9$ $(-3)^2 = (-3) \cdot (-3) = 9$

$3^3 = 3 \cdot 3 \cdot 3 = 27$ $-3^3 = -3 \cdot 3 \cdot 3 = -27$ $(-3)^3 = (-3) \cdot (-3) \cdot (-3) = -27$

Rules of Exponents			
Product of Powers	**Quotient of Powers**	**Power of a Power**	**Power of a Product**
$b^m b^n = b^{m+n}$	$\frac{b^m}{b^n} = b^{m-n}$	$(b^m)^n = b^{m \cdot n}$	$(ab)^m = a^m b^m$
Power of a Quotient	**Zero Exponent**	**Negative Exponent**	
$\left(\frac{a}{b}\right)^m = \frac{a^m}{b^m}$	$b^0 = 1$	$b^{-n} = \frac{1}{b^n}$	$\left(\frac{a}{b}\right)^{-n} = \left(\frac{b}{a}\right)^n$

Simplify each expression.

Example 26: $(-8x^3y)(-2x^4) =$

Solution $(-8) \cdot (-2) \cdot x^3 \cdot x^4 \cdot y$ rearrange the product

$= 16x^7 y$ apply Product of Powers Rule

Example 27: $\frac{24c^6}{4c^{-2}} =$

Solution $\frac{6 \cdot c^6}{1 \cdot c^{-2}}$ reduce fraction

$= 6c^6$ apply Quotient of Powers Rule

Example 28: $\frac{(2a^3)(10a^5)}{4a^2} =$

Solution $\frac{2 \cdot 10 \cdot a^3 \cdot a^5}{4a^{-1}} = \frac{20a^8}{4a^2} = 5a^6$

Example 29: $\frac{128a^4(bc^2)^3}{32abc} =$

Solution $\frac{4a^4b^3c^6}{abc} = 4a^3b^2c^5$

Example 30: $\left(\frac{42x^{-7}y^4z^{-6}}{14x^{-7}y^{-2}z^{15}}\right)^0 =$

Solution $= 1$

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Summer Assignment

Date________________ Period____

Solve each equation.

1) $-4(x-7) = -2 - 2(1+x)$

2) $5(8x+2) + 5(4x-2) = 7x + 5x$

3) $\frac{5}{2}\left(\frac{1}{3}x + \frac{3}{2}\right) = x - \frac{1}{2}\left(\frac{5}{3}x + \frac{9}{2}\right)$

4) $-\left(n + \frac{7}{4}\right) = -\frac{3}{2}\left(\frac{2}{3}n + \frac{5}{2}\right) + 2$

Solve each equation for the indicated variable.

5) $k - x = v - w$, for x

6) $z = am - b$, for a

Solve each equation.

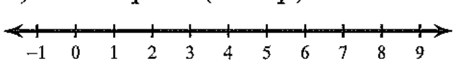
7) $\left|\frac{k}{4}\right| = 4$

8) $|10 + 9r| = 71$

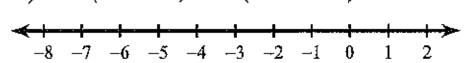
9) $8 + |-5 - v| = 14$

Solve each inequality and graph its solution.

10) $-6 - 4p < -(1 + 5p)$

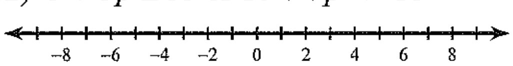


11) $-5(8 - 7b) + 6(-5b + 5) < 3b + 1 + 1 + 4b$

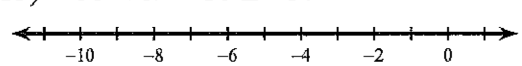


Solve each compound inequality and graph its solution.

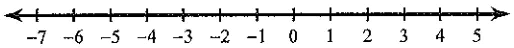
12) $3 + 8p \geq 35$ or $10 + 7p < -18$



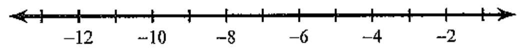
13) $-66 < 8r - 10 \leq -10$



14) $8x + 2 \geq 5x + 8$ or $4 + 6x < 3x - 2$

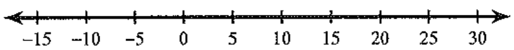


15) $7m - 7 < 8m + 3 < 3m - 7$

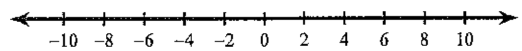


Solve each inequality and graph its solution.

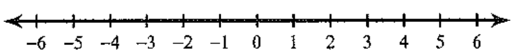
16) $|r - 8| > 18$



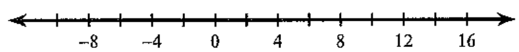
17) $\left|\frac{k}{3}\right| \leq 3$



18) $|1 - 3p| - 2 < 12$

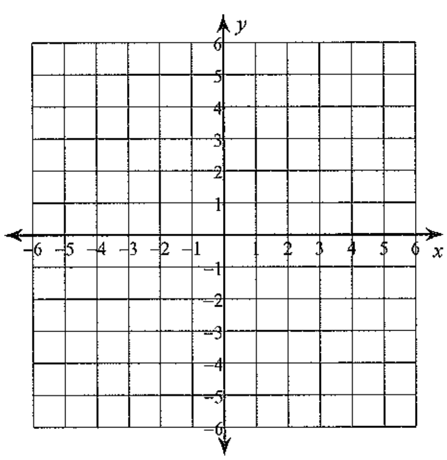


19) $6|4 - 2p| \geq 120$

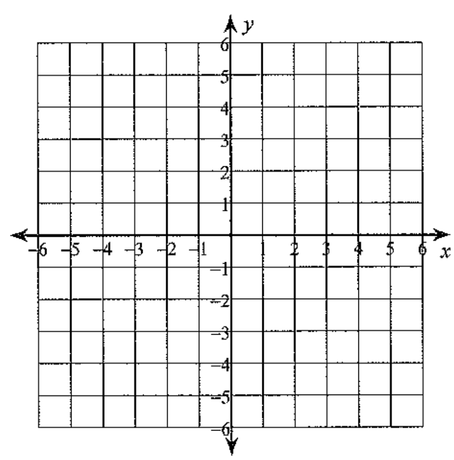


Sketch the graph of each line.

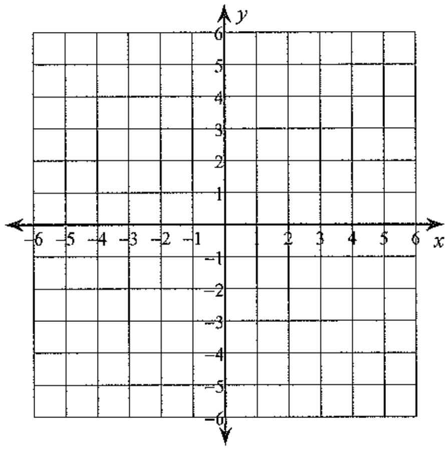
20) x-intercept = 4, y-intercept = −1



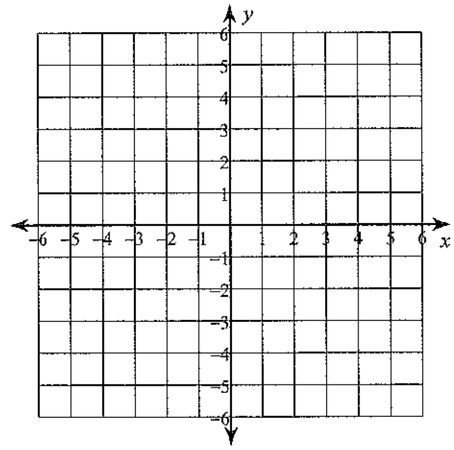
21) $y = -\frac{3}{4}x + 4$



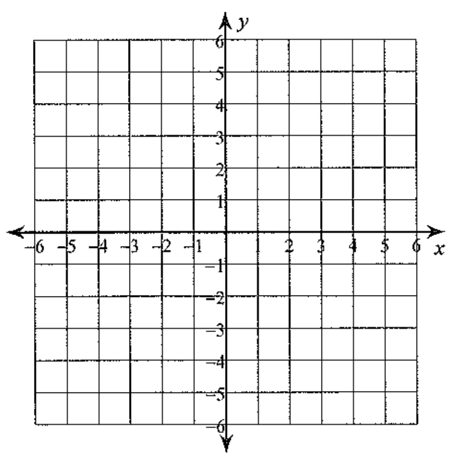
22) $y = \frac{5}{3}x - 5$



23) $8x + 3y = 12$

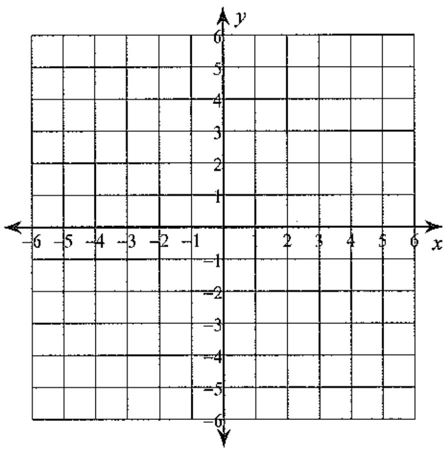


24) $2x + 3y = -3$

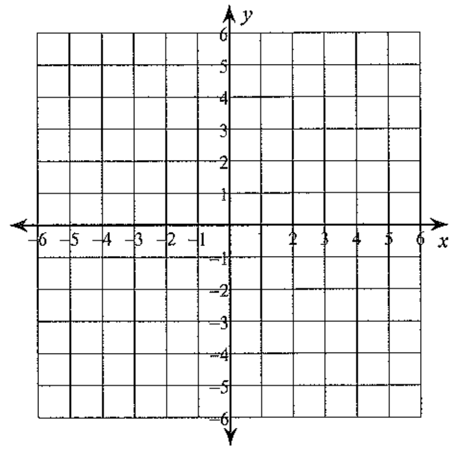


Sketch the graph of each linear inequality.

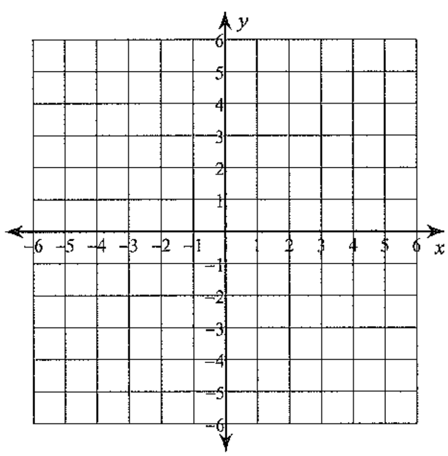
25) $y < -\frac{3}{4}x - 3$



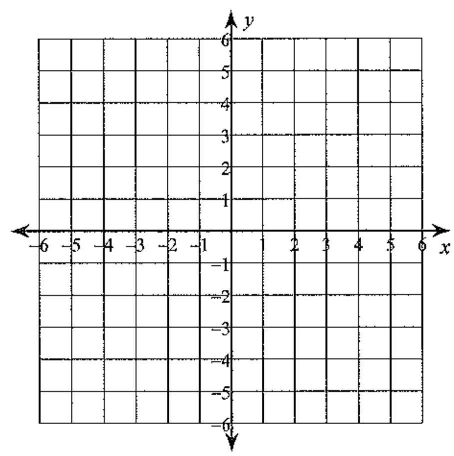
26) $y \le 5$



27) $2x + 3y > 6$



28) $7x - 4y < -20$



Write the slope-intercept form of the equation of the line through the given point with the given slope.

29) through: $(2, 2)$, slope $= 3$

Write the slope-intercept form of the equation of the line through the given points.

30) through: $(2, 4)$ and $(0, 0)$

31) through: $(4, 0)$ and $(-4, 0)$

Write the slope-intercept form of the equation of the line described.

32) through: $(-5, -5)$, parallel to $y = \frac{4}{5}x$

33) through: $(3, 5)$, parallel to $y = 4x - 3$

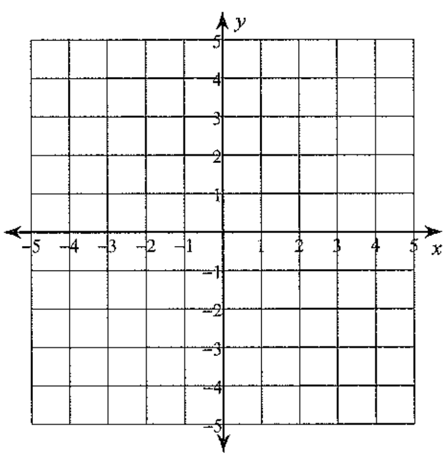
34) through: $(2, -3)$, perp. to $y = \frac{1}{6}x - 5$

35) through: $(2, 3)$, perp. to $y = 5x - 1$

Solve each system by graphing.

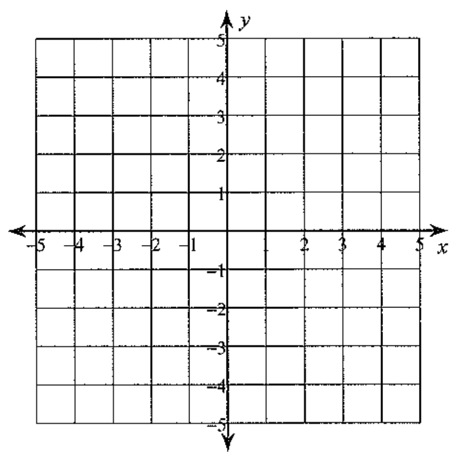
36) $y = -\frac{5}{3}x + 4$

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



37) $y = -\frac{5}{2}x - 1$

$y = -\frac{5}{2}x + 1$



Solve each system by elimination.

38) $7x + 7y = 14$
$14x + 5y = -8$

39) $-12x + 6y = 0$
$16x - 8y = 0$

40) $6x + 5y = 21$
$4x + 6y = 22$

Solve each system by substitution.

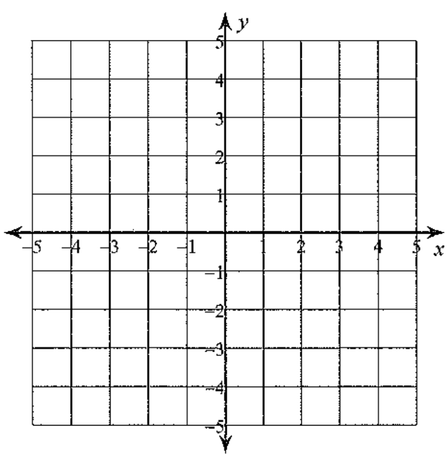
41) $14x + 2y = 7$
$y = -7x + 7$

42) $-3x + 8y = 12$
$x + y = -4$

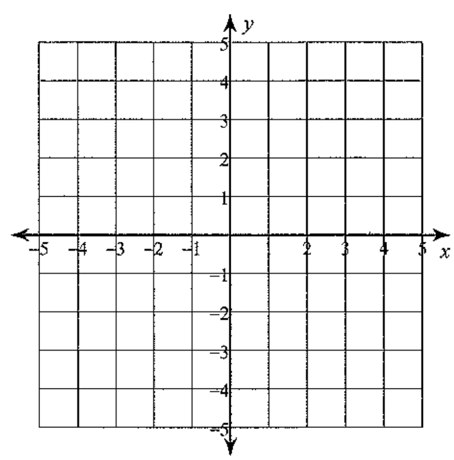
43) $-5x - y = -2$
$3x + 4y = 8$

Sketch the solution to each system of inequalities.

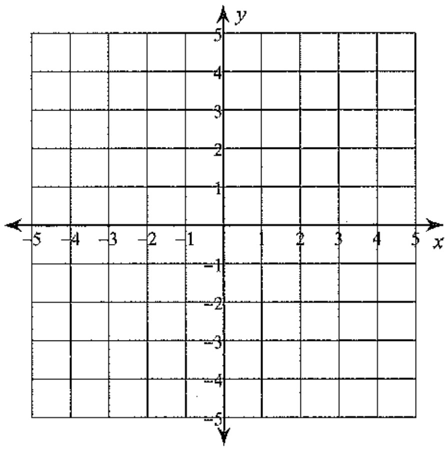
44) $y \geq \frac{5}{2}x - 3$
$y \geq -\frac{1}{2}x + 3$



45) $y \leq -\frac{3}{2}x + 2$
$y < x - 3$



46) $x + y > -3$
$4x - y \geq -2$



47) Wilbur and Kali each improved their yards by planting hostas and shrubs. They bought their supplies from the same store. Wilbur spent \$12 on 1 hosta and 1 shrub. Kali spent \$92 on 11 hostas and 1 shrub. Find the cost of one hosta and the cost of one shrub.

48) Julio's school is selling tickets to a choral performance. On the first day of ticket sales the school sold 4 senior citizen tickets and 7 student tickets for a total of \$125. The school took in \$225 on the second day by selling 3 senior citizen tickets and 14 student tickets. Find the price of a senior citizen ticket and the price of a student ticket.

Factor the common factor out of each expression.

49) $-12m + 24m^2 + 20m^3$

50) $7y^6z^{10} + 14y^2z^7x^2 + 56yz^5x^3$

Factor each completely.

51) $4b^3 - 3b^2 + 16b - 12$

52) $21x^3 + 24x^2 + 56x + 64$

53) $k^2 + 19k + 90$

54) $3n^2 + 25n - 18$

55) $5b^2 - 34b - 48$

56) $4x^2 + 4x - 35$

57) $10k^2 - 41k - 45$

58) $m^2 - 9$

59) $16n^2 - 25$

60) $12b^2 - 12b + 3$

Simplify.

61) $\sqrt{80}$

62) $\sqrt{32}$

63) $-2\sqrt{80}$

64) $2\sqrt{256}$

Simplify. Your answer should contain only positive exponents.

65) $n \cdot 4n^4$

66) $\dfrac{2x^{-1} \cdot x^4}{2x^{-3}}$

67) $\dfrac{4v^4 \cdot v^{-3}}{3v^0}$

68) $(b^{-1})^2 \cdot b^4$

69) $\dfrac{(2n^4)^3}{n^{-4}}$

70) $\dfrac{n^4 \cdot (n^{-3})^3}{2n \cdot 2n^4}$