

Algebra 1

Refresher Packet

Contains refresher problems for the following Algebra 1 skills:

- Order of operations
- Evaluating algebraic expressions
- Properties of real numbers
- Solving 1-and 2- step equations
- Solving equations containing distributive property
- Solving equations with variables on both sides
- Solving absolute value equations
- Solving inequalities
- Graphing a line in slope intercept form

- Graphing a line in standard form using intercepts
- Find the slope given 2 points
- Write the equation of a line given a point and the slope
- Write the equation of a line given 2 points
- Graphing linear inequalities
- Function Notation
- Systems of Equations (graphing, substitution, and elimination)
- Factoring

This packet is highly recommended. All Algebra 2 Honors students will take a test on these skills at the end of the first **full** week of school. The exact date of the test will be given when students return to school.



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Order of Operations



P.E.M.D.A.S.

Parenthesis | **E**xponents | **M**ultiplication | **D**ivision | **A**ddition | **S**ubtraction

1. Perform the operations inside a parenthesis first
2. Then exponents
3. Then multiplication and division, from left to right
4. Then addition and subtraction, from left to right

$$\begin{aligned} &\text{Simplify } 4 + [-1(-2 - 1)]^2 \\ &= 4 + [-1(-3)]^2 \\ &= 4 + [3]^2 \\ &= 4 + 9 \\ &= 13 \end{aligned}$$

$$\begin{aligned} &\text{Simplify } 4 - 3[4 - 2(6 - 3)] \div 2 \\ &= 4 - 3[4 - 2(3)] \div 2 \\ &= 4 - 3[4 - 6] \div 2 \\ &= 4 - 3[-2] \div 2 \\ &= 4 + 6 \div 2 \\ &= 4 + 3 \\ &= 7 \end{aligned}$$

$$\begin{aligned} &\text{Simplify } 16 - 3(8 - 3)^2 \div 5 \\ &= 16 - 3(5)^2 \div 5 \\ &= 16 - 3(25) \div 5 \\ &= 16 - 75 \div 5 \\ &= 16 - 15 \\ &= 1 \end{aligned}$$

$$\begin{aligned} &\text{Simplify } 16 + 2[8 - 3(4 - 2)] + 1 \\ &= 16 + 2[8 - 3(2)] + 1 \\ &= 16 + 2[8 - 6] + 1 \\ &= 16 + 2[2] + 1 \\ &= 16 + 4 + 1 \\ &= 20 + 1 \\ &= 21 \end{aligned}$$

Try these (without a calculator):

1. $[-2 + 4^2 - 10(2)] \div 2$
2. $5[4 + 3(2)] + 10$
3. $10 - (9 - 5)^2 \div (-3)$
4. $100 \div 25 - 8 + 3^3$
5. $(-2 + 10)(4 + 2) \div 12 + 8$

Evaluating Algebraic Expressions



Evaluate $ab^2 - ac$
 $a = 2$, $b = -4$, and $c = \frac{1}{2}$

$$\begin{aligned} &(2)(-4)^2 - (2)\left(\frac{1}{2}\right) \\ &(2)(16) - 1 \\ &32 - 1 \\ &31 \end{aligned}$$

Evaluate $\frac{4xy^2}{-z+10}$

$x = 5$, $y = \frac{1}{2}$, and $z = -15$

$$\frac{(4)(5)\left(\frac{1}{2}\right)^2}{-(-15)+10} = \frac{(4)(5)\left(\frac{1}{4}\right)}{15+10} = \frac{5}{25} = \frac{1}{5}$$

Evaluate $|2bc + 4a|$
 $a = -8$, $b = 4$, and $c = 2$

$$\begin{aligned} &|2(4)(2) + 4(-8)| \\ &|16 + -32| = |-16| = 16 \end{aligned}$$

Evaluate $-2|-9xy - z^2|$

$x = -3$, $y = 4$, and $z = 5$

$$\begin{aligned} &-2|-9(-3)(4) - (5)^2| \\ &-2|108 - 25| = -2|83| = -2(83) = -166 \end{aligned}$$

Try these without a calculator:

6. Evaluate $bc^3 - ad$ for $a = -2$, $b = 3$, $c = -4$, and $d = 4$.

7. Evaluate $|a(b + d)^2 + c|$ for $a = 4$, $b = -7$, $c = 5$, and $d = -1$.

8. Evaluate $\frac{x-y}{y^2+7}$ for $x = 15$ and $y = -1$

9. Evaluate $\frac{1}{2}|a + 3b^2| + 8$ for $a = 7$ and $b = -3$

10. Evaluate $5x^4 + 2x^3 - 8x + 8$ for $x = -1$

Properties of Real Numbers



Commutative Property of Addition: You can add a group of numbers in any order

$$1 + 4 + 7 = 7 + 1 + 4$$

Commutative Property of Multiplication: You can multiply a group of numbers in any order

$$2 \cdot 4 \cdot 6 = 6 \cdot 2 \cdot 4$$

Associative Property of Addition: numbers can be added in any order by using grouping symbols

$$6 + (9 + 3) = (6 + 9) + 3$$

Associative Property of Multiplication: numbers can be multiplied in any order by using grouping symbols

$$(4 \cdot 6) \cdot 2 = 4 \cdot (6 \cdot 2)$$

Additive Identity: When you add 0 to a number, the answer is always the number

$$4 + 0 = 4$$

Multiplicative Identity: When you multiply a number by 1, the answer is the number

$$7 \times 1 = 7$$

Multiplicative Property of Zero: When you multiply a number by 0 the answer is always 0

$$9 \times 0 = 0$$

Distributive Property: Multiply the outside number by each term on the inside of the parenthesis.

$$a(b + c) = ab + ac$$

$$3(2x - 8) = 6x - 24$$

Substitution Property: Replacing an expression with an equal quantity.

$$(3 + 7) m = 10m$$

$$\text{If } 3^2 + 4g = 12, \text{ then } 9 + 4g = 12$$

Reflexive Property: Two identical expressions will be equal.

$$4 + 5 = 4 + 5$$

$$3a = 3a$$

Symmetric Property: A statement of equality is also true if written backwards.

$$\text{If } a = b, \text{ then } b = a$$

$$\text{If } 4x + 2 = 10, \text{ then } 10 = 4x + 2$$

Transitive Property: (see examples)

$$\text{If } a = b, \text{ and } b = c, \text{ then } a = c$$

$$\text{If } 2x + 1 = 7, \text{ and } 7 = 5x - 8, \text{ then } 2x + 1 = 5x - 8$$

Multiplicative Inverses: Two numbers whose product is 1

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

$$-\frac{2}{7} \cdot -\frac{7}{2} = 1$$

Try these:

Name the property shown by each statement.

11. $1 \cdot 4 = 4$ _____

12. $(-3 + 4) + 5 = -3 + (4 + 5)$ _____

13. $3 \cdot (8 \cdot 0) = (3 \cdot 8) \cdot 0$ _____

14. $2 + 0 = 2$ _____

15. $np = pn$ _____

16. $\frac{1}{3} \cdot 3 = 1$ _____

17. $f + g = g + f$ _____

18. $a + (b + c) = a + (c + b)$ _____

19. If $8 = 2x$, then $2x = 8$ _____

20. $19 \cdot 0 = 0$ _____

21. $4 + 6 \cdot 2 = 4 + 12$ _____

22. $9 = 9$ _____

23. If $2 \cdot 3 = 6$, and $6 = 12 \div 2$,
then $2 \cdot 3 = 12 \div 2$ _____

24. $2(x + 6) = 2x + 12$ _____

25. $(x - 7)3 = 3x - 21$ _____

Solving 1- and 2-step equations



$$x + 4 = -10$$
$$\frac{x}{5} = 8$$

$$\underline{-4 \quad -4}$$

$$x = -14$$

$$y - 22 = -52$$

$$\underline{+22 \quad +22}$$

$$y = -30$$

$$-6x = 27$$

$$\underline{-6x = 27}$$

$$\underline{-6 \quad -6}$$

$$x = -\frac{9}{2} \text{ or } -4.5$$

$$(5) \frac{x}{5} = 8 (5)$$

$$x = 40$$

$$3x + 7 = 73$$

$$\underline{-7 \quad -7}$$

$$3x = 66$$

$$x = 22$$

$$\frac{1}{2}x - 12 = 98$$

$$\underline{+12 \quad +12}$$

$$(2) \frac{1}{2}x = 110(2)$$

$$x = 220$$

$$\frac{2x}{9} = 10$$

$$(9) \frac{2x}{9} = 10(9)$$

$$2x = 90$$

$$x = 45$$

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

$$x + 1 = 6$$

$$x = 5$$

Try these without a calculator:

26. $x + 11 = -30$

27. $x - 21 = 54$

28. $\frac{x}{4} = -9$

29. $-7x = -56$

30. $2x - 9 = 51$

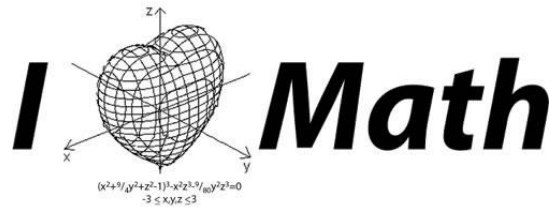
31. $-\frac{x}{7} + 5 = 6$

32. $5(x - 9) = 20$

33. $-6x + 12 = 85$

34. $\frac{2x}{5} = \frac{6}{50}$

35. $5 - 3x = 29$



Solving Equations Containing Distributive Property

$$2(x + 9) = 13$$

$$2x + 18 = 13$$

$$2x = -5$$

$$x = -\frac{5}{2}$$

$$10 - 4(x + 8) = 28$$

$$\begin{array}{r} -10 \qquad \qquad -10 \\ \hline \end{array}$$

$$-4(x + 8) = 18$$

$$-4x - 32 = 18$$

$$\begin{array}{r} \qquad \qquad +32 \quad +32 \\ \hline \end{array}$$

$$-4x = 50$$

$$x = -\frac{25}{2} \text{ or } -12.5$$

Try these without a calculator:

36. $6(2x - 8) = 15$

37. $11 + 4(x + 9) = 0$

38. $2(x - 1) + 3(x + 5) = 7$

39. $32 = 8 - 5(x + 8)$

40. $-9(3x + 10) = 20$

Solving Equations with Variables on Both Sides

$$\begin{array}{r} 3x + 2 = 4x - 1 \\ -4x \quad -4x \\ \hline -x + 2 = -1 \\ \quad -2 \quad -2 \\ \hline -x = -3 \\ x = 3 \end{array}$$

$$\begin{array}{r} 8y - 9 = -3y + 2 \\ + 3y \quad + 3y \\ \hline 11y - 9 = 2 \\ \quad +9 \quad +9 \\ \hline 11y = 11 \\ y = 1 \end{array}$$

$$\begin{array}{r} 3(x + 4) = 2(x - 1) \\ 3x + 12 = 2x - 2 \\ -2x \quad -2x \\ \hline x + 12 = -2 \\ \quad -12 \quad -12 \\ \hline x = -14 \end{array}$$

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

$$\begin{array}{r} 3(6x - 10) = 2(9x - 15) \\ 18x - 30 = 18x - 30 \\ -18x \quad -18x \\ \hline -30 = -30 \end{array}$$

No Solution

Variables cancelled out
Remaining statement is untrue

Infinitely Many Solutions

Variables cancelled out
Remaining statement is true

Try these:

41. $6x + 7 = 8x - 13$

42. $3 - 4x = 18 + x$

43. $-3 + 12x = 12x - 3$

44. $-8(4 + 9x) = 7(-2 - 11x)$

45. $-8(x + 1) + 3(x - 2) = -3x + 2$

Solving Absolute Value Equations

$$|x + 2| = 7$$

$$\begin{array}{l} x + 2 = 7 \quad \text{or} \quad x + 2 = -7 \\ x = 5 \qquad \qquad \quad x = -9 \end{array}$$

$$|2x - 3| - 4 = 3$$

$$|2x - 3| = 7$$

$$\begin{array}{l} 2x - 3 = 7 \\ 2x = 10 \\ x = 5 \end{array}$$

$$\begin{array}{l} 2x - 3 = -7 \\ 2x = -4 \\ x = -2 \end{array}$$

$$3|4x - 2| - 8 = 22$$

$$2|x + 7| + 10 = 4$$

$$3|4x - 2| = 30$$

$$2|x + 7| = -6$$

$$|4x - 2| = 10$$

$$|x + 7| = -3$$

$$\begin{array}{l} 4x - 2 = 10 \quad \text{or} \quad 4x - 2 = -10 \\ 4x = 12 \qquad \qquad 4x = -8 \\ x = 3 \qquad \qquad \quad x = -2 \end{array}$$

No Solution
Absolute value cannot be negative.

Try these:

46. $|3x - 6| = 21$

47. $2|5x + 20| = 80$

48. $-6|2x - 14| = -42$

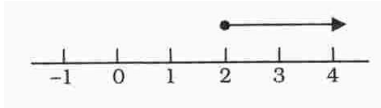
49. $|2x + 9| = 30$

50. $-3|x + 7| = 36$

Solving Inequalities

Remember: If you multiply or divide by a negative, you need to turn the inequality around.

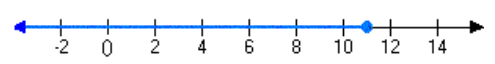
$$\begin{array}{r} x + 3 \geq 5 \\ -3 \quad -3 \\ \hline x \geq 2 \end{array}$$



$$\begin{array}{r} 3x - 7 < -16 \\ +7 \quad +7 \\ \hline 3x < -9 \\ x < -3 \end{array}$$



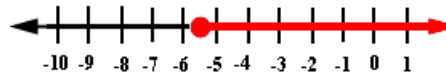
$$\begin{array}{r} -5x + 10 \geq -45 \\ -10 \quad -10 \\ \hline -5x \geq -55 \\ x \leq 11 \end{array}$$



$$\begin{array}{r} 3(2x + 10) - 8 < 7 \\ 6x + 30 - 8 < 7 \\ 6x + 22 < 7 \\ 6x < -15 \\ x < -2.5 \end{array}$$

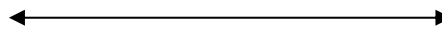


$$\begin{array}{r} 3x + 12 \leq 7x + 34 \\ -7x \quad -7x \\ \hline -4x + 12 \leq 34 \\ -12 \quad -12 \\ \hline -4x \leq 22 \\ x \geq -5.5 \end{array}$$

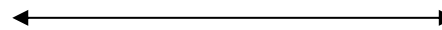


Try these:

51. $-4 + x \leq 12$



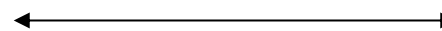
52. $-2x + 10 > 22$



53. $2x + 7 < x - 4$



54. $6(x + 5) \leq 15$

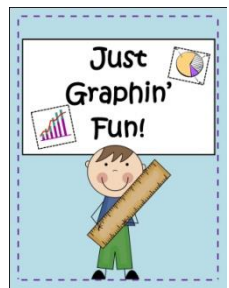


55. $4(x - 7) \leq 3(2x - 1) + 3$

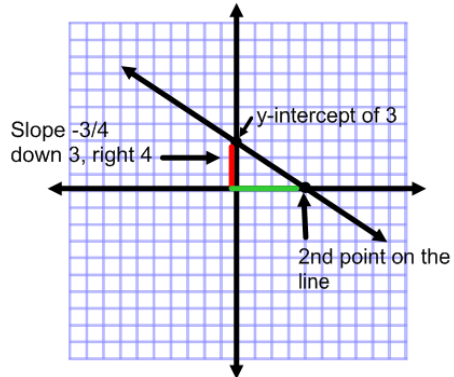


Graphing a Line in Slope Intercept Form

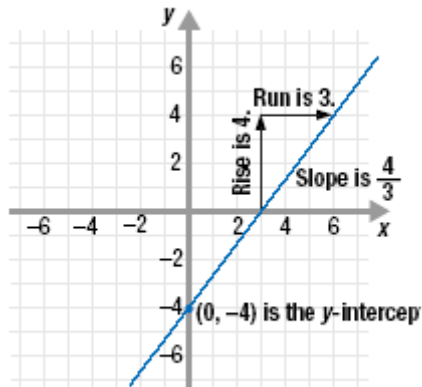
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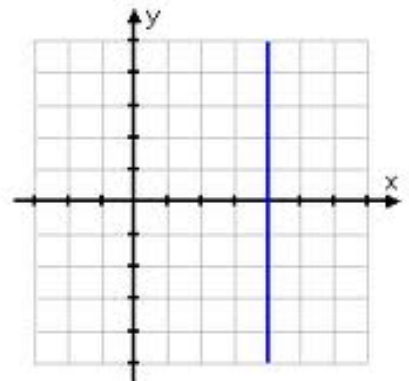
Graph $y = -\frac{3}{4}x + 3$



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



Graph $x = 4$



Try these:

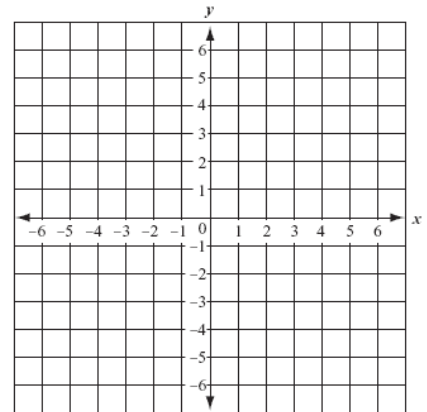
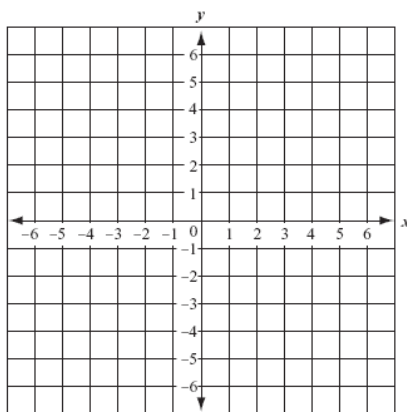
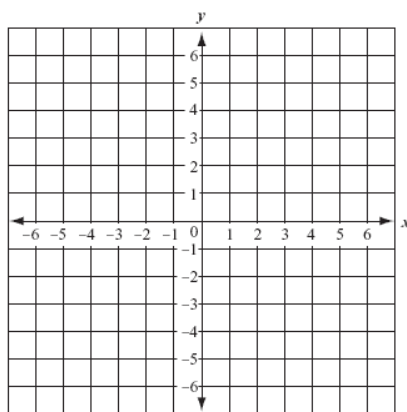
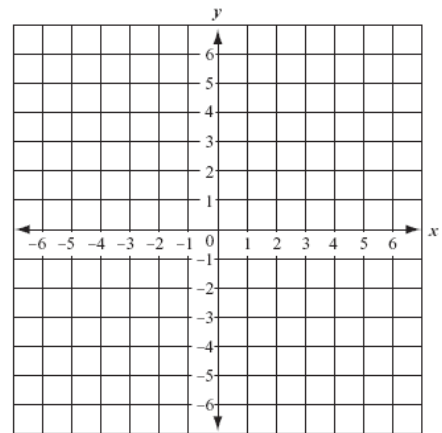
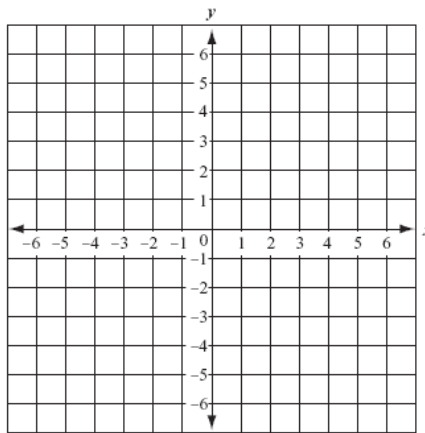
56. $y = \frac{1}{2}x + 3$

57. $y = -3x + 5$

58. $y = -\frac{1}{4}x - 2$

59. $y = -1$

60. $x = 3$



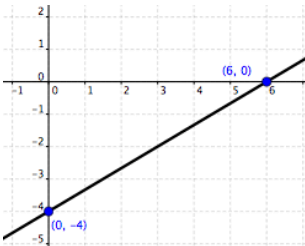
Graphing a Line in Standard Form Using Intercepts

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$$-2x + 3y = -12$$

$$\begin{aligned} \text{x-int: } -2x + 3(0) &= -12 \\ -2x &= -12 \\ x &= 6 \end{aligned}$$

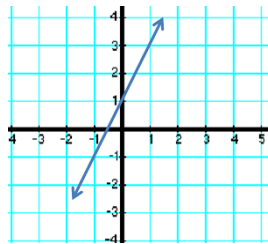
$$\begin{aligned} \text{y-int: } -2(0) + 3y &= -12 \\ 3y &= -12 \\ y &= -4 \end{aligned}$$



$$-2x + y - 1 = 0$$

$$\begin{aligned} -2x + y &= 1 \\ \text{x-int: } -2x + 0 &= 1 \\ -2x &= 1 \\ x &= -\frac{1}{2} \end{aligned}$$

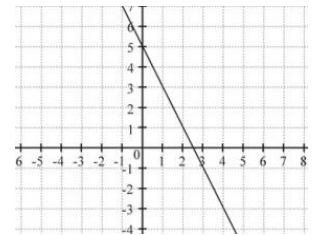
$$\begin{aligned} \text{y-int: } -2(0) + y &= 1 \\ y &= 1 \end{aligned}$$



$$4x + 2y = 10$$

$$\begin{aligned} \text{x-int: } 4x + 2(0) &= 10 \\ 4x &= 10 \\ x &= 2.5 \end{aligned}$$

$$\begin{aligned} \text{y-int: } 4(0) + 2y &= 10 \\ 2y &= 10 \\ y &= 5 \end{aligned}$$



Try these:

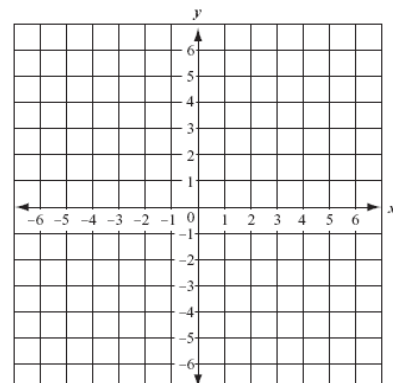
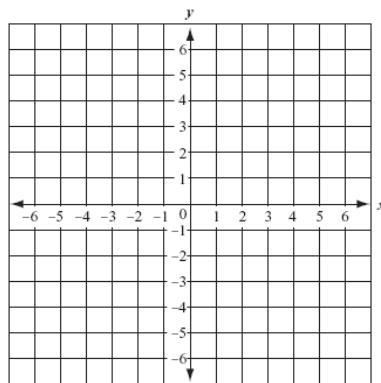
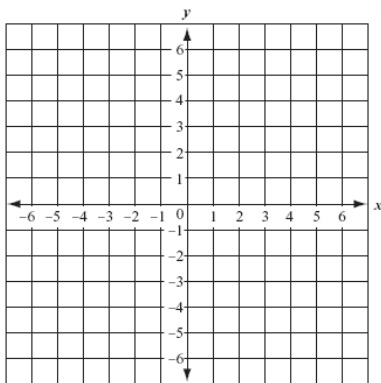
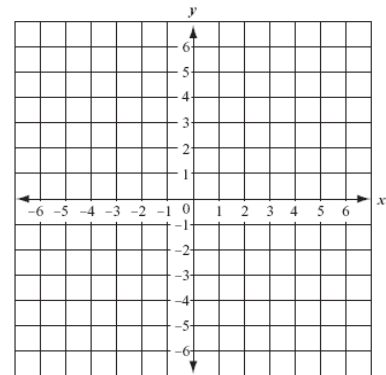
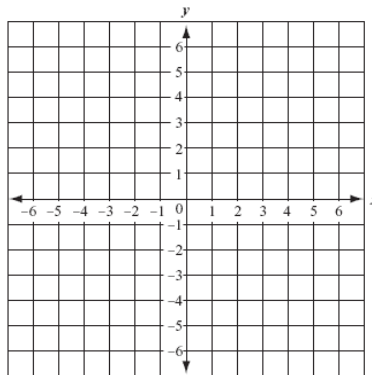
61. $3x - 4y = -12$

62. $-5x + 3y = -15$

63. $4x - 8y = 12$

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

65. $6x - 4y + 10 = 2$



Find the Slope Given 2 Points

$$(-3, 6) (15, -6)$$

$$\frac{-6-6}{15- -3}$$

$$(2, -4)(8, -4)$$

$$\frac{-12}{18}$$

$$-\frac{2}{3}$$

$$(5, -8) (5, 10)$$

$$= \frac{10- -8}{5-5}$$

$$= \frac{18}{0}$$

Undefined:

These points create
a vertical line.

Given two points:

$$(x_1, y_1) (x_2, y_2)$$

Slope Formula:

$$\frac{y_2 - y_1}{x_2 - x_1}$$

$$= \frac{-4- -4}{8-2}$$

$$= \frac{0}{6} = 0$$

$$= \frac{0}{6} = 0$$

Try these: Reduce all answers if possible.

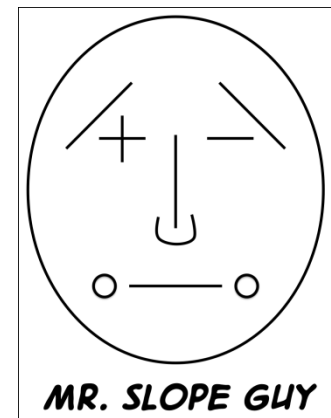
66. $(-5, -7) (10, 4)$

67. $(4, 10) (6, 10)$

68. $(-4, 12) (8, 11)$

69. $(1, 0) (7, -2)$

70. $(-14, 6) (-14, 9)$



Write the equation of a Line Given a Point and the Slope

slope = 2
point(-4, 7)

$$y = mx + b$$

$$7 = 2(-4) + b$$

$$7 = -8 + b$$

$$15 = b$$

$$y = 2x + 15$$

slope = $-\frac{2}{3}$
point (5, -3)

$$y = mx + b$$

$$-3 = -\frac{2}{3}(5) + b$$

$$-3 = -\frac{10}{3} + b$$

$$b = \frac{1}{3}$$

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

slope = 0
point(8, -13)

$$y = mx + b$$

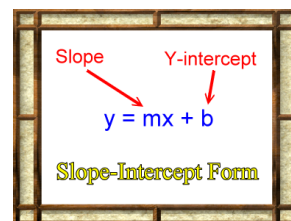
$$-13 = 0(8) + b$$

$$-13 = 0 + b$$

$$-13 = b$$

$$y = -13$$

(do not write 0x for slope)



Try these:

71. slope = -2
point (5, 8)

72. slope = $\frac{1}{5}$
point (10, -7)

73. slope = 8
point (-9, 0)

74. slope = $\frac{3}{4}$
point (-6, 3)

75. slope = 0
point (15, -12)

Write the Equation of a Line Given 2 Points

$$(-2, 5)(3, 1)$$

$$\text{Find Slope: } \frac{1-5}{3-(-2)} = -\frac{4}{5}$$

$$\begin{aligned}\text{Find y-int: } y &= mx + b \\ 1 &= -\frac{4}{5}(3) + b \\ 1 &= -\frac{12}{5} + b \\ \frac{17}{5} &= b\end{aligned}$$

$$\text{Equation: } y = -\frac{4}{5}x + \frac{17}{5}$$

$$(2, 5)(-10, 2)$$

$$\frac{2-5}{-10-2} = \frac{3}{12} = \frac{1}{4}$$

$$\begin{aligned}y &= mx + b \\ 5 &= \frac{1}{4}(2) + b \\ 5 &= \frac{1}{2} + b\end{aligned}$$

$$\begin{aligned}4.5 &= b \\ y &= \frac{1}{4}x + 4.5\end{aligned}$$

$$(4, -2)(4, 6)$$

$$\frac{6-(-2)}{4-4} = \frac{8}{0}$$

undefined

so, the equation will be
x = 4

Since the slope is undefined,
the line is vertical and passes
through x = 4 only.

Try these:

76. (1, 4)(-2, 5)

77. (0, -4)(6, 8)

78. (3, -2)(9, -2)

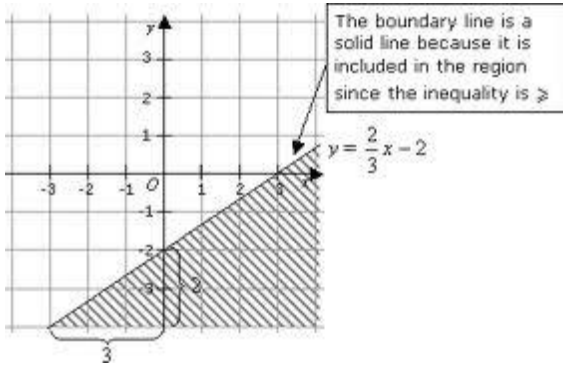
79. (8, 10)(-4, 8)

80. (10, 6)(10, -8)

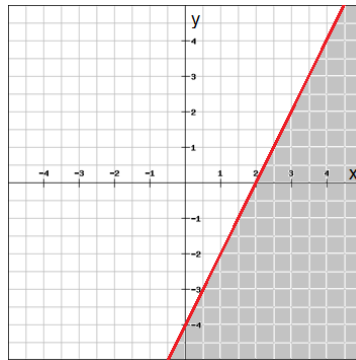
Graphing Linear Inequalities

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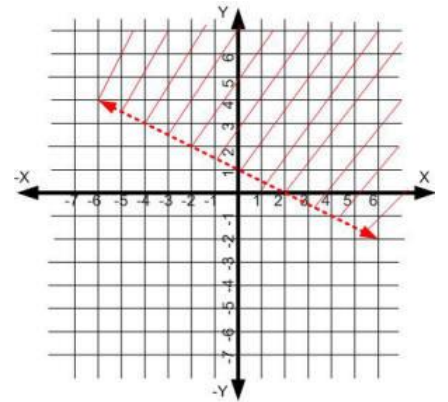
$$y \leq \frac{2}{3}x - 2$$



$$y \leq 2x - 4$$



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



Try these:

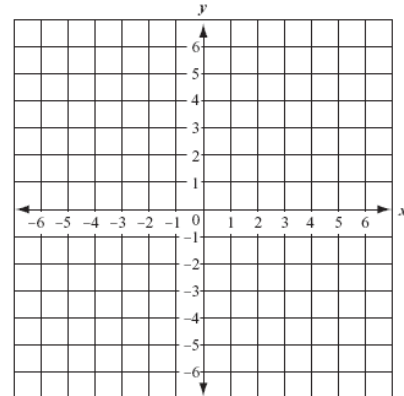
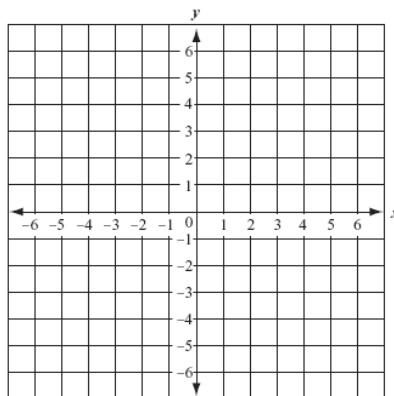
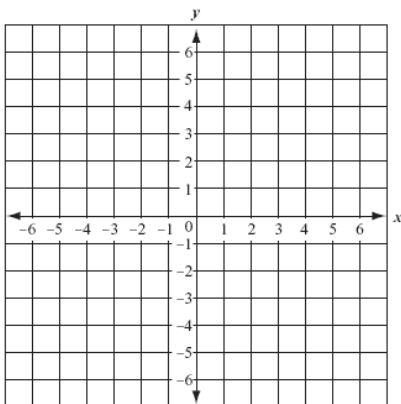
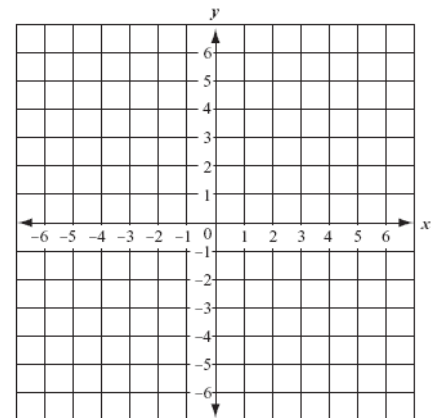
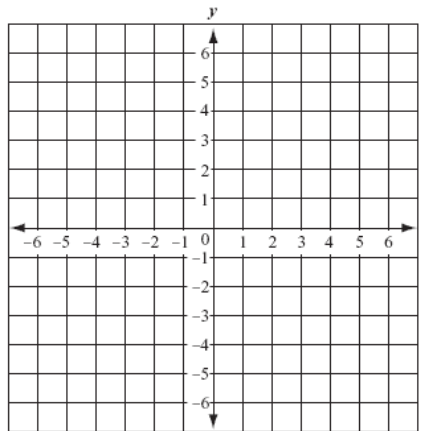
81. $y < \frac{1}{2}x - 4$

82. $y \geq -x + 2$

83. $y \leq 3$

84. $y > 4x$

85. $y + 5 < \frac{2}{3}x$



Function Notation

If you use x to represent your **domain values**, here's an example of function notation:

$$\mathbf{f(x) = x + 1} \quad (\text{You read } f(x), \text{ as "f of x".})$$

So $f(3)$ would look like this: $\mathbf{f(3) = 3 + 1}$

$$\mathbf{f(3) = 4}$$

What if we have $f(-5)$? $\mathbf{f(-5) = -5 + 1}$

$$\mathbf{f(-5) = -4}$$

Interpreting the final answer:

- f is not a variable. You do not solve for it.
- $f(-5)$ is simply an “announcement” that in function f you have plugged in a -5 .
- -4 is the solution.

Try these:

86. If $f(x) = -5x + 9$, then find $f(3)$.

87. If $f(x) = \frac{1}{2}x - 17$, then find $f(-10)$.

88. If $f(x) = x^2 + 19$, then find $f(2)$.

89. If $f(x) = 4x^2 + 2x - 1$, then find $f(6)$.

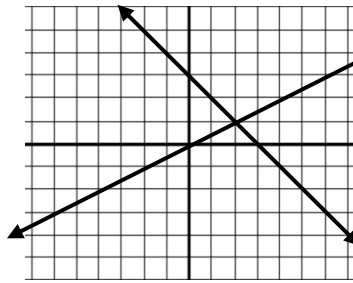
90. If $f(x) = -x^2 - 6x$, then find $f(-9)$.

Solving a system using graphing

$$y = -x + 3$$

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

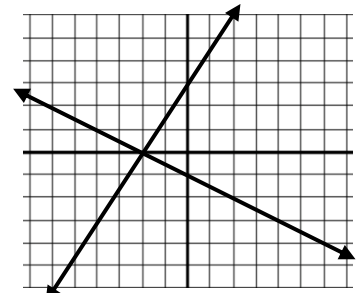
solution:
(2, 1)



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

$$y = \frac{3}{2}x + 3$$

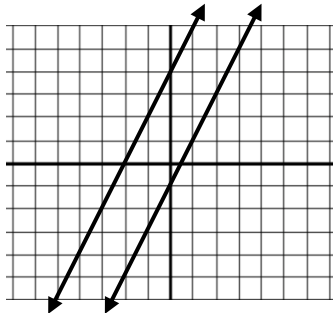
solution:
(-2, 0)



$$y = 2x + 4$$

$$y = 2x - 1$$

Parallel lines
have no
solution.



$$2x + 4y = 12$$

$$-2x + 3y = 9$$

Put in slope-intercept form:

$$2x + 4y = 12$$

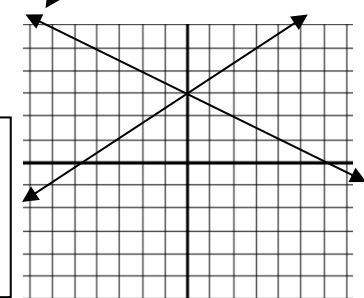
$$4y = -2x + 12$$

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

$$-2x + 3y = 9$$

$$3y = 2x + 9$$

$$y = \frac{2}{3}x + 3$$

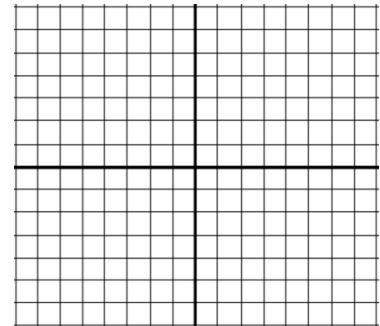
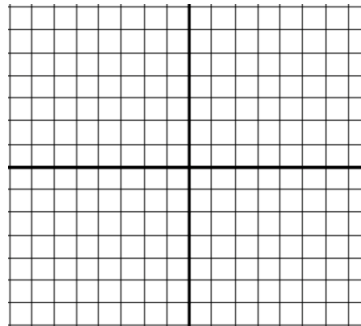


(0, 3)

Try these:

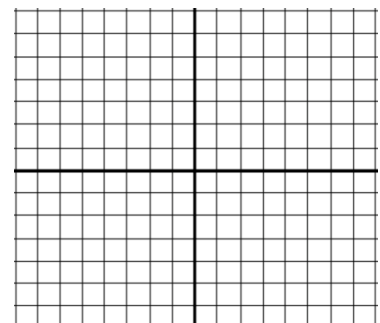
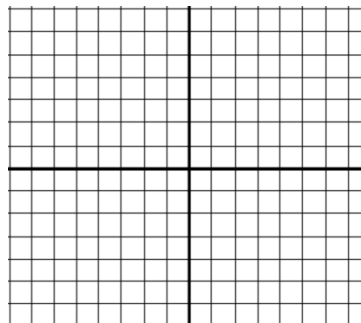
91. $y = 4x + 2$

$$y = -x - 2$$



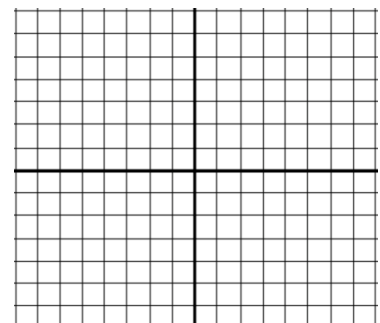
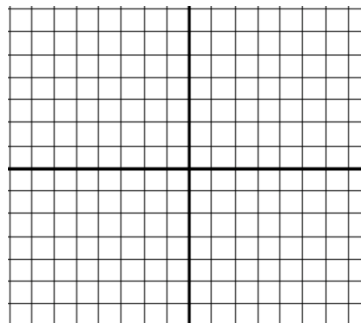
92. $y = -\frac{5}{3}x + 3$

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



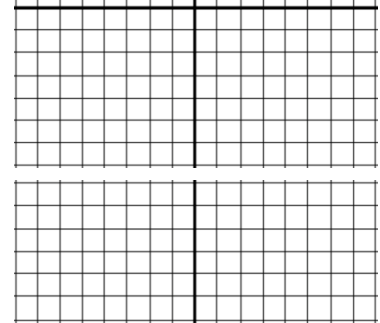
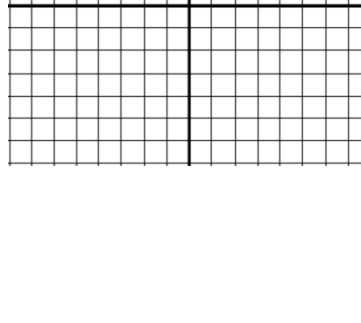
93. $y = 3x - 4$

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



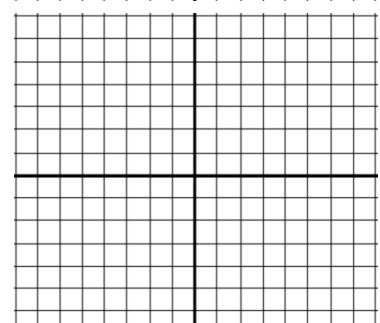
94. $y = 3x + 7$

$$y = 3x + 1$$



95. $x + 2y = -4$

$$3x + 2y = 4$$



Solving systems using substitution

$$\begin{aligned} 3x - 7y &= -14 \\ x &= 2y - 3 \end{aligned}$$

$$\begin{aligned} 3x - 7y &= -14 \\ x &= 2y - 3 \end{aligned}$$

$$\begin{aligned} 3(2y - 3) - 7y &= -14 \\ 6y - 9 - 7y &= -14 \\ -y - 9 &= -14 \\ -y &= -5 \\ y &= 5 \end{aligned}$$

$$\begin{aligned} x &= 2y - 3 \\ x &= 2(5) - 3 \\ x &= 7 \end{aligned}$$

Solution: (7, 5)

$$\begin{aligned} 10x + y &= 35 \\ 4x - 7y &= -23 \end{aligned}$$

Solve for the y in the first equation:

$$y = -10x + 35$$

Do not plug it back into itself!

$$\begin{aligned} 4x - 7(-10x + 35) &= -23 \\ 4x + 70x - 245 &= -23 \\ 74x - 245 &= -23 \\ 74x &= 222 \\ x &= 3 \end{aligned}$$

$$\begin{aligned} y &= -10x + 35 \\ y &= -10(3) + 35 \\ y &= 5 \end{aligned}$$

Solution: (3, 5)

$$\begin{aligned} x + 2y &= 3 \\ 2x + 4y &= -6 \end{aligned}$$

Solve for the x in the first equation.

$$x = -2y + 3$$

$$\begin{aligned} 2(-2y + 3) + 4y &= -6 \\ -4y + 6 + 4y &= -6 \\ 6 &= -6 \end{aligned}$$

Not a true statement so,
No solution

Try these.

96. $\begin{aligned} y &= 6x - 11 \\ -2x - 3y &= -7 \end{aligned}$

97. $\begin{aligned} y &= -5x - 17 \\ -3x - 3y &= 3 \end{aligned}$

98. $\begin{aligned} -4x + y &= 6 \\ -5x - y &= 21 \end{aligned}$

99. $\begin{aligned} -3x + 3y &= 4 \\ -x + y &= 3 \end{aligned}$

100. $\begin{aligned} -2x - y &= -9 \\ 5x - 2y &= 18 \end{aligned}$

Solving systems using elimination

$$\begin{aligned} 2x + 3y &= 20 \\ -2x + y &= 4 \end{aligned}$$

$$\begin{aligned} 2x + 3y &= 20 \\ -2x + y &= 4 \\ \hline 4y &= 24 \end{aligned}$$

$$y = 6$$

Choose one of the original equations:

$$\begin{aligned} -2x + 6 &= 4 \\ -2x &= -2 \end{aligned}$$

$$x = 1$$

Solution: (1, 6)

$$\begin{aligned} 3x - 4y &= -5 \\ 5x - 2y &= -6 \end{aligned}$$

Multiply the 2nd equation by -2 so that the y's will add to zero.

$$\begin{aligned} 3x - 4y &= -5 \\ -2(5x - 2y &= -6) \end{aligned}$$

$$\begin{aligned} 3x - 4y &= -5 \\ -10x + 4y &= 12 \\ \hline -7x &= 7 \end{aligned}$$

$$x = -1$$

Choose one of the original equations:

$$\begin{aligned} 3x - 4y &= -5 \\ 3(-1) - 4y &= -5 \\ -3 - 4y &= -5 \\ -4y &= -2 \end{aligned}$$

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

Solution : (-1, ½)

$$\begin{aligned} 2x + 8y &= 6 \\ -5x - 20y &= -15 \end{aligned}$$

$$\begin{aligned} 5(2x + 8y &= 6) \\ 2(-5x - 20y &= -15) \end{aligned}$$

$$\begin{aligned} 10x + 40y &= 30 \\ -10x - 40y &= -30 \end{aligned}$$

$$0 = 0$$

Infinitely Many Solutions

Try these:

101. $\begin{aligned} -4x - 2y &= -12 \\ 4x + 8y &= -24 \end{aligned}$

102. $\begin{aligned} x - y &= 11 \\ 2x + y &= 19 \end{aligned}$

103. $\begin{aligned} 8x + y &= -16 \\ -3x + y &= -5 \end{aligned}$

104. $\begin{aligned} -7x + y &= -19 \\ -2x + 3y &= -19 \end{aligned}$

105. $\begin{aligned} 3x - 2y &= 2 \\ 12x - 8y &= 8 \end{aligned}$

FACTORING POLYNOMIALS

Any Polynomial

GCF

$$8x^6 + 14x^2 = 2x^2(4x^4 + 7)$$

$$12x^7 + 8x^5 + 28x^2 = 4x^2(3x^5 + 2x^3 + 7)$$

$$-18x^4y^7 + 24x^2y^3 + 42xy^2 = -6xy^2(3x^3y^5 - 4xy - 7)$$

Factor by finding the GCF.

106. $6a^3b^2 + 2ab =$

107. $18x^5 - 36x^3 + 45x^2 =$

108. $3ac - 6a^5c^7 =$

Binomials

Difference of Squares

$$x^2 - 49 = (x + 7)(x - 7)$$

$$1 - 9x^2 = (1 - 3x)(1 + 3x)$$

$$4g^6 - h^2 = (2g^3 - h)(2g^3 + h)$$

Factor using difference of squares.

109. $25x^2 - 49$

110. $144 - d^2$

111. $64a^2 - 121b^2$

Trinomials

a=1 and a≠1

$$x^2 - 6x - 40 = (x - 10)(x + 4)$$

$$x^2 + 11x - 60 = (x + 15)(x - 4)$$

$$x^2 - 10x + 21 = (x - 7)(x - 3)$$

$$8x^2 - 6x - 5 = (4x - 5)(2x + 1)$$

$$3x^2 - 7x + 4 = (3x - 4)(x - 1)$$

$$6x^2 - 17x + 10 = (6x - 5)(x - 2)$$

Factor using any trinomial method.

112. $x^2 - 12x + 35$

113. $h^2 - h - 20$

114. $x^2 + 16x + 28$

115. $10x^2 + 71x + 7$

116. $2x^2 - 11x - 21$