High school Math Review

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Mathematical Symbols

	Statement	Algebraic Symbol
1	X is at least 50, X is Minimum 50	$x \geq 50$
2	X is no more than 50. X is Maximum 50	$x \leq 50$
3	X is between 10 and 50 inclusive or X is at least 10 but no more than 50	$10 \leq x \leq 50$
4	2 consecutive odd or even integers	$x, x+2$
5	Product of X and 3.	3x
6	Quotient of a and b	$\frac{a}{b}$
7	Sum of x and 3	X+3
8	Difference of X and 3	X-3

Equations

Examples:
Solve:

1) If $\frac{3n}{5}$ +3=18, what is the value of n?

Solution:

"=" sign tells you the problem is an equation

$\frac{3n}{5}$ +3=18, subtract 3 from both sides.

$\frac{3n}{5}$ =15

Make 15, 15/1 so you can cross multiply.

$\frac{3n}{5}=\frac{15}{1}$

3n=75

Answer: n=25

Solve:

2) Solve 8y-6=6.8

Solution:

8y-6=6.8
Add 6 to both sides.
Divide both sides by 8
y=12.8/8
Answer: y=1.6

Equations (continued)

3) Solve:

$$\frac{-2}{5}x = 9$$

Solution:

When the coefficient of x is negative, take opposite of both sides of the equation.

$$\frac{2x}{5} = -9$$

Make -9 a fraction

$$\frac{2x}{5} = \frac{-9}{1}$$

Cross Multiply

2x=-45

Divide both sides by 2

X=-45/2

Answer: X=-22 ½

Absolute Value Equations

Example 1:
Solve: $|2x-1|=5$

Solution:

Set 2x-1=5, and solve for x
2x=6
X=3
Set 2x-1=-5, and solve for x
2x=-4
X=-2

Solution: 3 or -2

Absolute Value inequalities

Example 1:
Solve $|2x-3|>7$

Solution: Solve for 2 inequalities:

2x-3>7
And
2x-3 < -7
You get x > 2 or x < -3
Or: $(-\infty, -3) \cup (2, +\infty)$

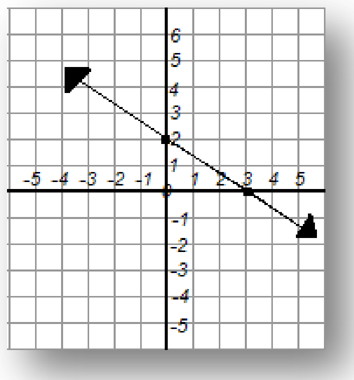
Example 2: Solve: |3x-2|<7
Solution: Set 3x -2 between -7 and +7, and solve for x

-7 < 3x -2 < 7 Add 2 to each side:
-5<3x<9
Divide each side by 3
-5/3 < x < 3
x is between -5/3 and 3 exclusive.

Equation of a line

Procedure: To find the equation of any line, you need both the coordinates of 2 points, or the slope and the coordinates of 1 point, The Formula is

$y\text{-}y_1 = m(x\text{-}x_1)$



Example 1:
Which of the equations represent line AB?

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

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

c) $y= -2x + 3$

d) $y= 3x+2$

Solution: Get the coordinates of any 2 points on the line. Example (0, 2) and (3, 0) are on the line. Label the first point (x_1 y_1) and the second one (x_2, y_2). Find the slope m = $\frac{y_2 - y_1}{x_2 - x_1}$

$$m= \frac{0-2}{3-0} = \frac{-2}{3}$$

Substitute in

$$y - y_1 = m(x - x_1)$$

$$y - 2 = \frac{-2}{3}(x - 0)$$

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

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

Choice A is correct.

Equation of a line (continued)

Example 2:

Which of the following is an equation of the line passing through (-2,4) and (6,0)?

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

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

C) $y = -2x + 3$

D) $y = -\frac{1}{2}x + 6$

Solution: Label (-2, 4) and (6, 0)
X_1 Y_1 X_2 Y_2

m= $\frac{y_2 - y_1}{x_2 - x_1} = \frac{0-4}{6-(-2)} = \frac{-4}{8} = \frac{-1}{2}$

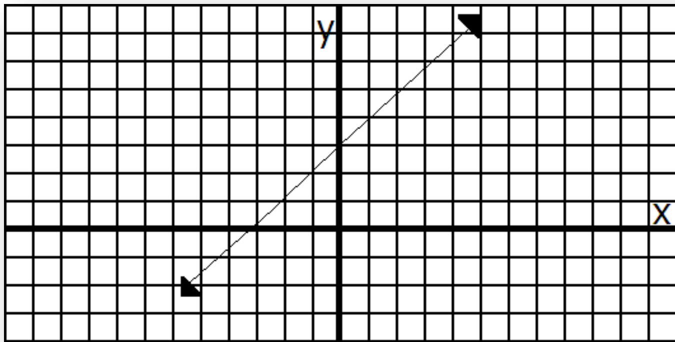
Formula is: $y - y_1 = m(x - x_1)$

$y - 4 = \frac{-1}{2}(x - (-2))$

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

It is Choice B!

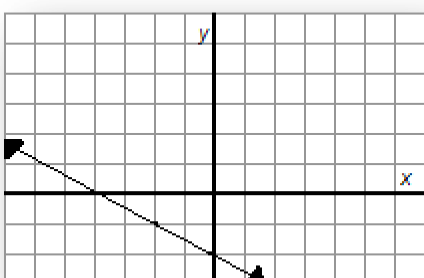
Equation of a line (continued)



Example: Find the equation of the top line.

Solution: To find the equation of any line, you need the slope (m), and the y-intercept (b). To find the slope, pick any 2 points on the line, go horizontally to the y-axis, and count the units, for the same 2 points, go down to the x-axis, count the units. Now divide the y-units by the x-units, you get $\frac{1}{1}$ = 1. The y-intercept is where the line crosses the y-axis, +3. Therefore the equation of the line is y=1x+3 or y=x+3.

1) Example: Find the equation of the line.



Solution: Since the line is going down, it has a (-) slope.

m= $\frac{-1}{2}$

b =-2

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

Equation of a line

1) Which equation describes a line parallel to the graph of y= $\frac{2x}{5}+1$?

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

G. $y=\frac{2x}{5}-3$

H. $y=2x+5$

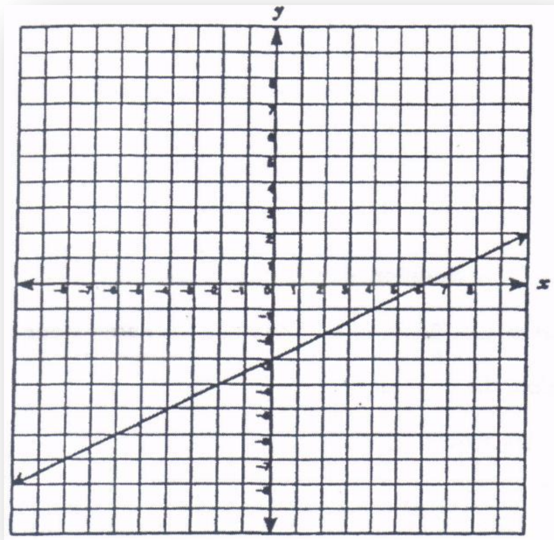
J. $y=\frac{-2x}{5}-1$

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

Solution: A line that is parallel to $y=\frac{2x}{5}+1$should have the same slope which is $\frac{2}{5}$. Therefore, the answer is "G"

Equation of a line (continued)

2) The graph of the function y=½x-3 is shown below.



If the line is shifted 2 units up, which of the following would best describe the graph of the new line?

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

B. $y=\frac{1}{2}(x+2)-3$

C. $y=x-3$

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

E. $y=x-6$

Solution: Since y=$\frac{1}{2}x-3$ is shifted 2 units up means, you have to add 2 to the y.

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

Therefore, the answer is "D"

System of Equations

Examples:

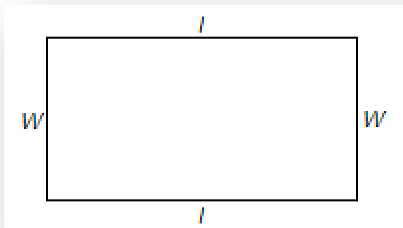
1) Solve:
   $x + y = 5$
   $x - y = 1$
   Solution: This problem wants you to find the value of x and y, You have to get rid of one of the variables. If we add both equations, we get 2x=6
   $$\frac{2}{2}x = \frac{6}{2}$$
   X=3
   To find y, replace x=3 in any of the top 2 equations.
   $$x + y = 5$$
   $$3 + y = 5$$
   $$-3 \quad -3$$
   Y=2
2) Solve:
   3x + 2y=5
   2x – y=1
   Solution: If we add both equations, none of the variables goes to zero. So, in order to get rid of one of the variables, multiply the second equation by 2.
   3x+2y=5
   2 (2x - y=1)
   The equations become
   $$3x + 2y = 5$$
   $$4x - 2y = 2$$
   Adding both equations, we get
   $$7x = 7$$
   $$\frac{7x = 7}{}$$
   $$x = 1$$
   To get y, replace x with 1 in the first equation.
   $$3x + 2y = 5$$
   $$3(1) + 2y = 5$$
   $$3 + 2y = 5$$
   $$-3 \quad -3$$
   $$2y = 2$$

   Divide both sides by 2

   y = 1

System of Equations (continued)

3) The length of a rectangle is twice the width; the perimeter is 90cm. What are the dimensions of the rectangle?
   Solution: The length is twice the width means
   L=2W



The perimeter is 90 means
2L+2W=90
Therefore, we have to solve for two variables, the easiest way is the substitution method. Replace L=2w in the second equation.
2(2w) + 2w=90
4w+2W=90
6w=90

$$\frac{6w}{6} = \frac{90}{6}$$

W=15
To find the length, it is twice the width, therefore L=30.

Quadratic Equations:

1) Solve: $x^2 + 5x - 2 = 0$

Solution: This is *a* quadratic equation, the way to solve it is to factor it and make each term = 0.

However, since we cannot factor it, we have to use the quadratic formula

x= $\frac{-b \mp \sqrt{b^2 - 4ac}}{2a}$

a=1, b=5, c=-2

Replacing a, b, c in the formula, we get

x= $\frac{-5 \mp \sqrt{25 - 4(1)(-2)}}{2}$

x= $\frac{-5 \mp \sqrt{25 + 8}}{2}$

Answer: x= $\frac{-5 \mp \sqrt{33}}{2}$

More On Quadratic Equations

1) Solve: $x^2 + 5x + 6=0$

   Solution: This is a 2nd degree equation, therefore we have to factor it and make each term = 0.

   You have to come up with 2 numbers whose product = 6,and whose sum = 5.The numbers are +2 and +3.

   The factors are: (x+2)(x+3)

   Make each factor = 0

   x + 2 = 0

   <u> - 2   -2</u>

   x =-2

   x + 3 = 0

   <u> - 3   -3</u>

   x =-3

Quadratic Equations (continued)

2) An object is dropped from a tall building. The equation that describes the path of the object is
$H=144-16t^2$
Where h is the height, in ft, above the ground after t seconds. What is the height in feet after 2 seconds?
Solution: Replace t=2in $h=144-16t^2$
$h=144 – 16 (2)^2$
$h=144 – 16 (4)$
$h=144 – 64$
Answer: h=80 ft.

3) The equation that describes the path of a rocket after it is shot into the air is $h = 48t-6t^2$
where h is the height, in feet, above ground level after t seconds. After how many seconds will the rocket be at a height of 90m feet?

A t - 15
B t = 3 and t = 5
C t = 8 and t = 15
D t = 18 and t = 30
E t −8

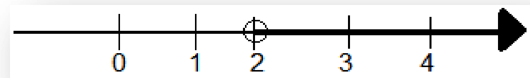
Solution:
Replace h with 90
$90=48t-6t^2$
Since it is a 2nd degree equation, the way to solve it is by making it = 0.
$90 – 48t + 6t^2 = 0$
Now factor it.
$6(15 - 8t + t^2) = 0$
$6(t-5) (t-3) = 0$
Make each factor = 0.

$t – 5 =0$
$+5 +5$
$t =5$: Answer

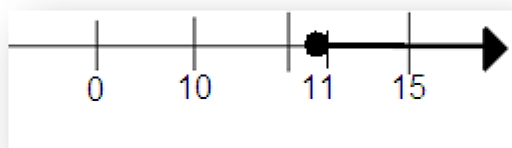
$t – 3 = 0$
$+3 + 3$
$t = 3$: Answer

Inequalities

1) Solve and Graph:
   $3x-1>5$
   Add 1 to both sides
   $3x > 6$
   Divide both sides by 3
   Answer: $x > 2$

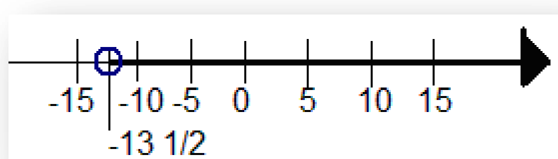


2) Solve and Graph:
   $\frac{5x}{6} \geq \frac{9}{1}$
   Cross Multiply
   $5x \geq 54$
   Divide both sides by 5
   $X \geq 54/5$



   Answer: $X \geq 10\ 4/5$

3) Solve:
   $\frac{-2x}{9} < -3$
   Since the coefficient of x is (-), take opposite of both sides including the inequality.
   $\frac{2x}{9} > 3$
   Make -3 a fraction
   $(\frac{-3}{1})$
   Cross multiply
   $2x > -27$
   Divide both sides by 2
   $X > \frac{-27}{2}$, $X > -13\frac{1}{2}$



Law of Exponents

1) Simplify: $\dfrac{24x^4y^3}{32xy^5}$

Solution: $\dfrac{{}^{3}\cancel{24}\times\cancel{x}\times x\times x\times x\times\cancel{y}\times\cancel{y}\times\cancel{y}}{{}_{4}\cancel{32}\times\cancel{x}\times y\times y\times\cancel{y}\times\cancel{y}\times\cancel{y}}$ Dividing both numbers by 8

Answer: $\dfrac{3x^3}{4y^2}$

2) Simplify: $\dfrac{(c^2d)^3}{(cd^2)^3}$

$(c\,d^2)^3$ means $c\,d^2$ is multiplied by itself 3 times.

$c\,d^2 \times c\,d^2 \times c\,d^2$

$= \dfrac{c^2d\times c^2d\times c^2d}{cd^2\times cd^2\times cd^2} = \dfrac{\cancel{c}\times\cancel{c}\times\cancel{d}\times c\times c\times\cancel{d}\times c\times\cancel{c}\times\cancel{d}}{\cancel{c}\times\cancel{d}\times d\times\cancel{c}\times d\times d\times\cancel{c}\times\cancel{d}\times\cancel{d}}$

Answer: $\dfrac{c^3}{d^3}$

Factoring and Rational Expressions

1) Factor: $t^2 - 81$
Solution:
This is a difference of 2 squares type.
Answer: (t + 9) (t - 9)
2) Factor $x^2 - 8x + 12$
Solution: This is a trinomial, get 2 numbers whose product is (+12) and the sum is {-8).
They are -6 -2.
The answer is(x - 6) (x - 2).
3) $2x^2 - 7x - 15$
Solution: This is the type where $a \neq 1$
It is a trinomial $ax^2 + bx + c$.
Multiply (2) (-15) = -30.
Now get 2 numbers whose product is -30 and the sum is -7,
The numbers are -10 and +3.
Since you have $2x^2$ use the following factors.
(2x -10) (2x +3)
Get the common factor of each factor
2(x - 5) (2x + 3)
Finally, throw the common factors away. The answer is
(x - 5) (2x + 3)
Very innovative, you do not have to check it.

4) Factor $4x^2 - 12x + 5$
Solution: It is a trinomial $a \neq 1$
(4) (+5) = +20
Get two numbers whose product is (+20) and the sum is (-12)
The numbers are -10 and -2
Since we have $4x^2$, use the following factors.
(4x - 10) (4x -2)
Take common factors
2(2x -5) 2(2x -1)
Now for your final answer discard the common factors.
(2x -5) (2x -1)

Factoring and Rational Expressions (continued)

5) Reduce $\frac{x^2+5x+6}{x+3}$

Solution: You can never cancel terms out if there is addition or subtraction sign between them. You can cancel out only when they are in multiplication form.

$x^2 + 5x + 6$ could be changed to multiplication by factoring.

$\frac{\cancel{(x+3)}(x+2)}{\cancel{(x+3)}}$

Answer: (x+2)

6) Divide $\frac{9x^2y}{3x} \times \frac{5xy}{2x}$

Since there are no signs between the terms, we do not have to factor. So treat the problem just like dividing normal fractions, change to multiplication, and flip the 2nd term.

$\frac{9x^2y}{3x} \times \frac{2x}{5xy}$

Answer: $\frac{{}^{3}\cancel{9} \times x \times \cancel{x} \times \cancel{y}}{{}_{1}\cancel{3}\cancel{x}} \times \frac{2\cancel{x}}{5\cancel{xy}} = \frac{6x}{5}$

7) Multiply $\frac{x^2-16}{5x-15} \times \frac{5(x-3)}{x^2-7x+12}$

Solution:

Factor: $\frac{(x+4)(x-4)}{5(x-3)} \times \frac{5(x-3)}{(x-3)(x-4)}$

Now cross out the identical items. $\frac{(x+4)\cancel{(x-4)}}{5(x-3)} \times \frac{5\cancel{(x-3)}}{\cancel{(x-3)(x-4)}}$

Answer: $= \frac{x+4}{x-3}$

Factoring and Radical Expression (continued)

8) Add: $\frac{5}{3x}+\frac{1}{x}$

You cannot add fractions unless they have the same denominator. The L.C.D. is 3x. Make a division line. $\frac{}{3x}$

Now divide the L.C.D 3x by the 1st denominator, which is 3x, you get 1, the answer multiply it by 5, so we get 5: $\frac{5+}{3x}$. Now divide the L.C.D. 3x by the 2nd denominator x, you get 3, multiply it by the numerator 1, you get 3, multiply it by the numerator 1, you get 3. $\frac{5+3}{3x}$. The answer is $\frac{8}{3x}$.

9) Subtract: $\frac{5}{9x}-\frac{3}{18x^2}$

Solution: The L.C.D. is $18x^2$. Do the same things like the previous problem.

Answer: $\frac{10x-3}{18x^2}$

10) Simplify: $\frac{\frac{1}{3}+\frac{5}{6}}{\frac{5}{6}-\frac{1}{3}}$

Solution: This is a complex fraction, Get the L.C.D. of all the denominators. It is 6. Now, multiply each fraction by 6.

Then, $\frac{1}{3}$ become 2, $\frac{5}{6}$ becomes 5 and $\frac{1}{3}$ becomes 2.

The result is $\frac{2+5}{5-2}=\frac{7}{3}$

11) Solve: $\frac{1}{x}+3=\frac{4}{3}$

Solution: This is a rational equation. Get the L.C.D. first, it is 3x. Now multiply every term by 3x on both sides of the equation, you get 3+9x=4x. This is a simple equation.

$$\begin{array}{l} 3+9x=4x \\ \underline{\;-9x\;\;-9x} \\ \;\;3=-5x \end{array}$$

. Divide both sides by 5

Answer: $x=\frac{-3}{5}$

Operations On Radicals

Simplifying Radical

1) $\sqrt{25} = \pm 5$ because (+5) (+5) =25
   (-5) (-5) =25

2) $\sqrt{18} = \sqrt{2 \times 9} = 3\sqrt{2}$

3) $\sqrt{1{,}000} = \sqrt{100 \times 10} = 10\sqrt{10}$

Radicals (continued)

Adding or Subtracting Radicals

You can add or subtract radicals if they belong to the same family.

Examples: Add: $7\sqrt{5}+3\sqrt{3}+5\sqrt{5}+2\sqrt{3}$

The problem is similar to $7x+3y+5x+2y$

$=12x+5y$

This answer is $12\sqrt{5}+5\sqrt{3}$

Subtract $\sqrt{18}-5\sqrt{3}$

$=\sqrt{9\times 2}-5\sqrt{2}$

$=3\sqrt{2}-5\sqrt{2}$

$=-2\sqrt{2}$

Multiplication of Radicals

$(\sqrt{2})^{2}=\sqrt{2}\times\sqrt{2}=\sqrt{4}=2$

Division of Radicals

$\frac{7}{\sqrt{5}}$ You cannot have $\sqrt{\ }$ in the denominator.

$\frac{7}{\sqrt{5}}\bullet\frac{\sqrt{5}}{\sqrt{5}} = \frac{7\sqrt{5}}{5}$

Note: It is wise to memorize $\frac{1}{\sqrt{3}}=\frac{\sqrt{3}}{3}$

Radical Equations

1) Solve $\sqrt{x-2}=9$

Solution:

Square both sides

$x-2=81$

Add 2 to both sides.

$x=83$

Matrices

Adding Matrices: You can add matrices only if they have the same dimensions

Example: $\begin{bmatrix} 1 & 2 \\ 3 & -5 \end{bmatrix} + \begin{bmatrix} 3 & 4 \\ 5 & 2 \end{bmatrix} = \begin{bmatrix} 4 & 6 \\ 8 & -3 \end{bmatrix}$

Subtracting Matrices: You can subtract matrices only if they have the same dimensions.

Example: $\begin{bmatrix} 5 & 3 \\ 4 & 1 \end{bmatrix} - \begin{bmatrix} 1 & 2 \\ 3 & 1 \end{bmatrix} = \begin{bmatrix} 4 & 1 \\ 1 & 0 \end{bmatrix}$

Multiplying Matrices: You can multiply matrices only if then number of rows of the first matrix equals the number of columns of the second matrix.

Example: $\begin{bmatrix} 2 & 3 \\ 1 & 5 \end{bmatrix} \times \begin{bmatrix} 1 \\ 2 \end{bmatrix}$

Note: It is easier to use the Texas Instruments 83 (TI83) calculator to multiply matrices.

Procedure:
Press 2nd, X^{-1}Key
Go to EDIT, press ENTER
Press 2, ENTER, 2, ENTER
Enter the elements in Matrix A
Press 2nd, X^{-1} Key
Go to EDIT
Go down to [B], Press ENTER ,press 2 enter 1 enter
Enter the elements in Matrix [B]
Turn the calculator off (Press 2nd and the ON key to turn it off), then turn it on.
Press 2nd, X^{-1}, ENTER
Press the multiplication sign
Press 2nd , X^{-1}, go down to [B], press enter twice.
The answer is $\begin{bmatrix} 8 \\ 11 \end{bmatrix}$

Equal Matrices: 2 matrices are equal if each element in the first matrix equals the element in the second matrix that is in the same location.

Example: $\begin{bmatrix} 3 & 1 \\ 5 & x \end{bmatrix} = \begin{bmatrix} 3 & 1 \\ 5 & 8 \end{bmatrix}$

Answer: x=8

Sets

A set is a list of elements, objects or things, example the set of even number, set of students in class and so on.

Union of 2 sets: A= {1, 2, 3, 4}

B= {3, 4, 5, 6}

$A \cup B$ or A union B is the list of all numbers in A and B

$A \cup B$= {1, 2, 3, 4, 5, 6}

Intersection of 2 Sets: A= {1, 2, 3, 4}

B= {3, 4, 5, 6}

$A \cap B$ or A intersection B are the numbers that are common between A and B.

$A \cap B$= {3, 4}

Subsets: A is a subset of B if every element in A is found in B

Logarithms

Log $\frac{a}{b}$ It is read as Log a base b

Which Means how many times you have to multiply b by itself in order to get a.

Example: $\text{Log}_2 8=3$

Because $2\times2\times2=8$

Example: Log 1000 (since the base is not given, it is 10)

$\text{Log}_{10}1000=3$

Because $10\times10\times10=1000$

Natural Log: The symbol is Ln and the base is an irrational number e, which is close to 2.7.

Example: Ln e ˆ5=5

Evaluating logarithms using TI83:

Example: $\text{Log}_2 64$

1) Press log (64)/log (2) ENTER (you should get 6)

2) Log 100

Press Log (100)

ENTER (you should get 2)

3) Ln eˆ3

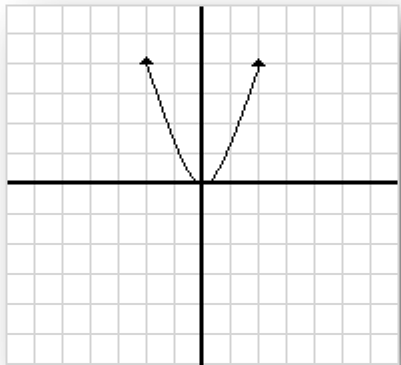
Press Ln, 2[nd] Ln 3

Close the parentheses

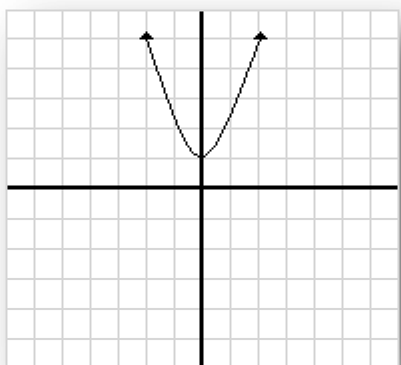
ENTER, (you should get 3)

Shifting of Parabolas

The graph $y=x^2$ is a parabola that looks like:

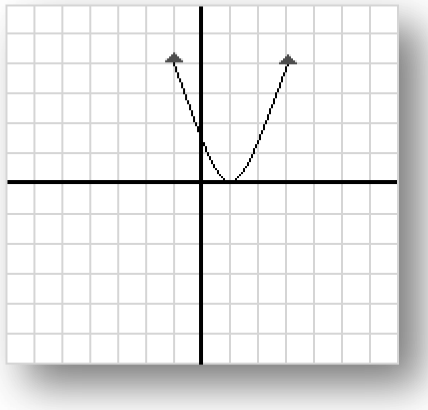


The graph $y=x^2+1$ is the same graph as $y=x^2$, except it is shifted 1 unit upward.

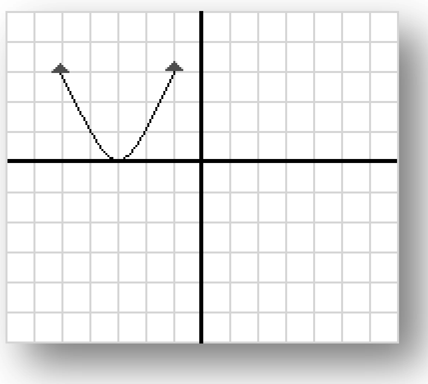


Shifting of Parabolas (continued)

The graph $y=(x-1)^2$ is the same graph as $y=x^2$, except it is translated 1 unit to the right.

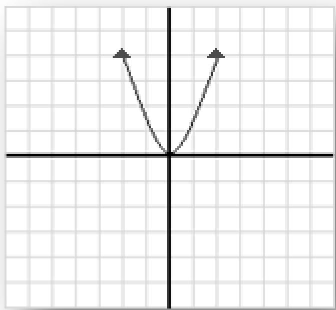


The graph $y=(x+3)^2$ is the same graph as $y=x^2$, except it is translated 3 units to the left.



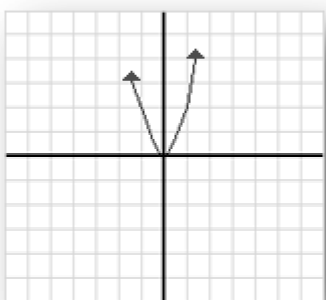
Effect of "a" on parabolas

$y = x^2$ - Graph looks like



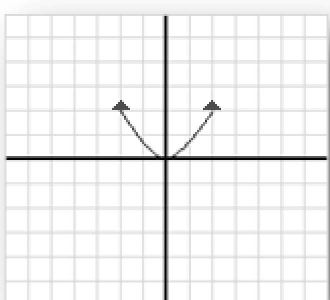
a = 1

$y = 2x^2$ - Graph looks like:



a = 2

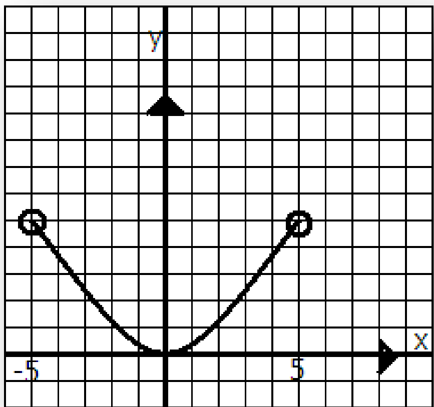
$y = 0.5x^2$ - Graph looks like



As "a" gets smaller, the graph opens wider

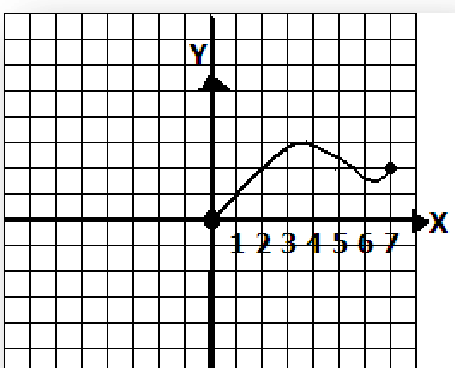
Finding the Domain

Finding the domain:
Example:



Find the domain of the top graph:
Solution:
Domain is in the value of x from the lowest to the highest. The smallest value of x is almost -5 and the largest is almost +5
Domain is -5<x<5

Example:



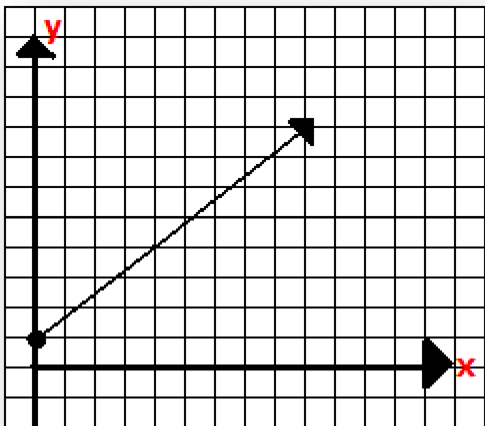
Find the domain
Solution: x goes from 0 to 7 inclusive.

$0 \le x \le 7$

Finding the Range

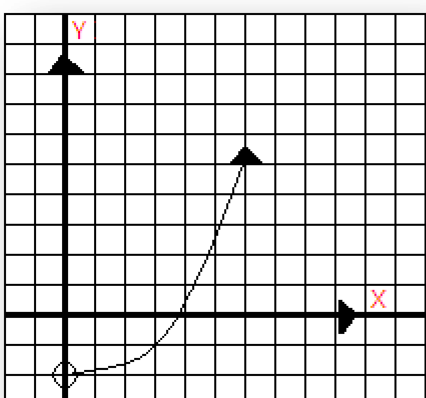
Example:

Find the y range of the graph below:



Solution: Finding the range means finding the range from the smallest value of y to the longest value of y.
The range of this graph is from y=1 to infinity or $y \geq 1$

Example: Find the range



y range from almost -2 to infinity or y>-2

Finding The Range (continued)

1) What is the range of the function?
   $f(x) = -\left|x^2 - 3\right|$
   When the domain is $-3, -2, -1$?
   A. $-9, -1, -4$
   B. $-6, -7, -1$
   C. $-6, -1, -2$
   D. $9, 7, 4$
   E. $12, 7, 4$
   Solution: The domain is the value of x. Therefore when x=-3
   f(x)= $-\left|(-3)^2 - 3\right| = -\left|9 - 3\right| = -6$
   When x=-2
   f(x)= $-\left|(-2)^2 - 3\right| = -\left|4 - 3\right| = -1$
   When x=1
   f(x)= $-\left|(-1)^2 - 3\right| = -\left|1 - 3\right| = -\left|-2\right| = -2$
   Therefore the answer is "C"

X and Y Intercepts

X-intercept: set $y=0$
Y-intercept: set $x=0$

Example: What are the coordinates of the y-intercept of the line represented by the equation?

$4x+2y=10$

Solution:
Set $X=0$
$4(0)+2y=10$
$2y=10$
$y=5$
$(0,5)$

Example: What are the coordinates of the x-intercept of:
$3(X-5)+Y=7$

Solution: For X-intercept, set $y=0$:

$3(x-5)+Y=7$
$3(x-5)+0=7$
$3x-15=7$
$3x=22$
$x=22/3$
$(22/3,0)$

Probability of 2 Events:

Dependent

Definition: Probability of 2 events=P (1^{st} event)$\times$P (2^{nd} event)

Example: A jar contains 5 blue marbles, 3 red and 7 yellow. One marble is drawn and was not replaced. Another marble was drawn afterwards. What is the probability that both marbles are red?

Solution: P (1^{st} red marble) = $\frac{3}{15} = \frac{1}{5}$

Since the marble was not replaced,

P (2^{nd} red marble) = $\frac{2}{14} = \frac{1}{7}$

P (2 red marbles) = $\frac{1}{5} \times \frac{1}{7} = \frac{1}{35}$

Independent Events

Probability of 2 Events

Definition: Probability of 2 events=Probability of 1st event $\times$ Probability of 2nd event.

Example: Lily had a game with 2 groups of playing tiles. The first group of 24 tiles had all the letters of the alphabets except X and Z. Each tile had 1 letter on it. The second group of ten tiles had the numbers 0 through 9, with 1 number on each tile. If Lily drew 1 letter tile and 1 number tile at random, what is the probability that she would draw a letter in her name and an odd number?

Solution: There are 2 events here (independent). One is the letters and the other is the numbers.

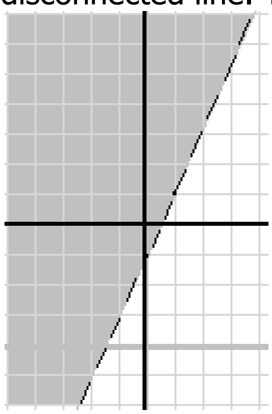
P (1 letter in her name, odd number) =
P (1 letter in her name) $\times$ P(odd number)
P (1 letter in her name) = $\frac{3}{24} = \frac{1}{8}$
(24=total letters without X and Z)
P (odd) = $\frac{5(odds)}{10(total\ numbers)} = \frac{1}{2}$
P (1 letter in her name, odd number) = $\frac{1}{8} \times \frac{1}{2} = \frac{1}{16}$.

Graphing Linear Inequalities with 2 variables

Example 1: Graph: y > 2x - 1
Solution: First graph y=2x-1. To do that, Pick any 2 numbers for x, and find the value of y.

x	**Y**
0	-1
1	1

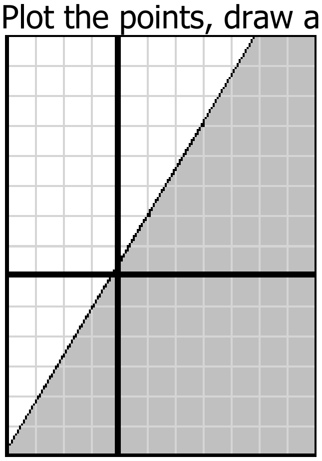
On a graph paper, plot the points (0,- 1) and (1,1). Connect the points with a disconnected line. The > means you should shade the area on top of the line



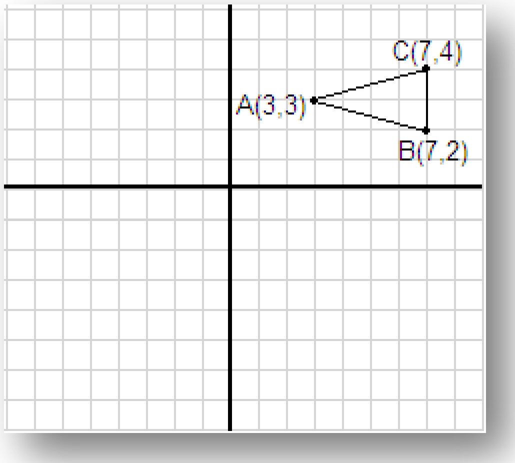
Example 2: Graph: 2y – 1 ≤ 3x
Solution: First solve for y: Add 1 for both sides, you get: $2y \le 3x+1$
Divide both sides by 2: $y \le (3x+1)/2$. Now graph the line.
To do that, pick any two values for x, and substitute to find y:

X	Y
1	2
3	5

Plot the points, draw a continuous line, and shade the area underneath the line.



Translation, Rotation, and Reflection



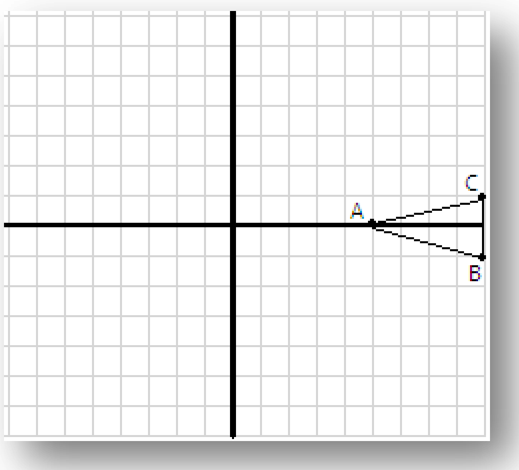
Translation: Translating ΔABC 2 units to the right and 3 units down means every vertex should have its new coordinates.

$(x+2, y-3)$

New A: $(3+2, 3-3) = (5,0)$

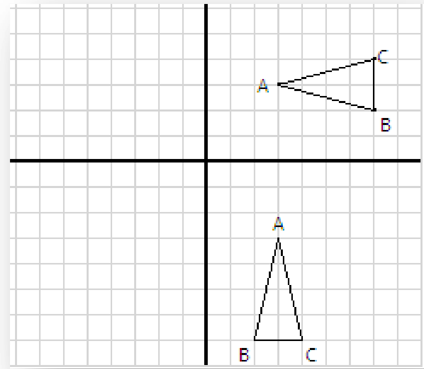
New B: $(7+2, 2-3) = (9,-1)$

New C: $(7+2, 4-3) = (9,1)$

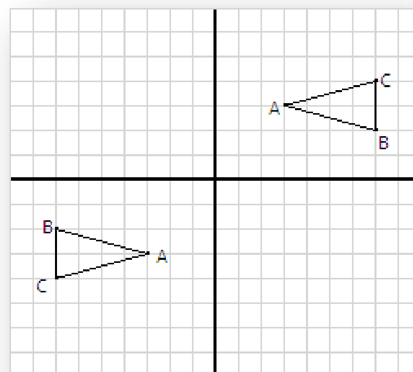


Rotation

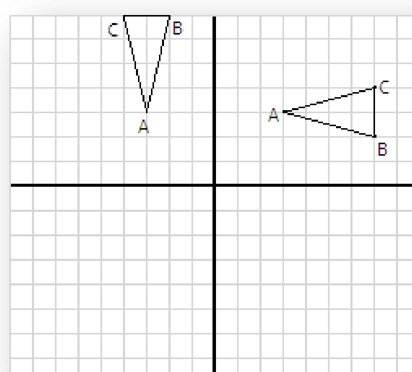
Most Popular rotations are 90°, 180°, and 270° and they are around the origin (clockwise)



90° Rotation:
New A: (3,-3)
New B: (2,-7)
New C: (4,-7)

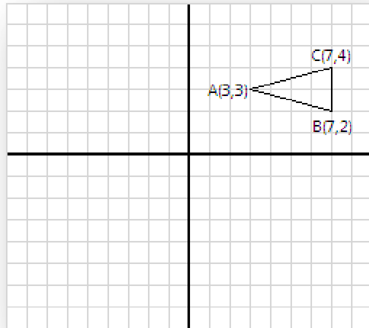


180° Rotation:
New A: (-3, -3)
New B: (-7, -2)
New C: (-7, -4)



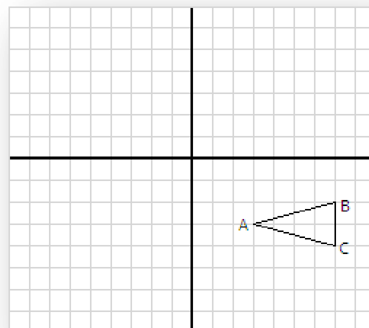
270° Rotation:
New A: (-3, 3)
New B: (-2, 7)
New C: (-4, 7)

Reflection



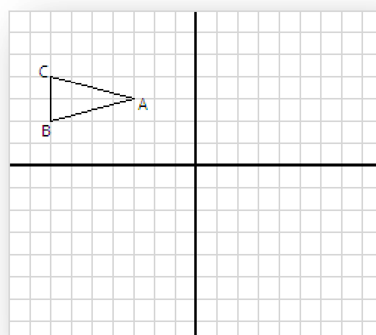
Reflecting triangle ABC across the X-axis means each vertex should have new coordinates as (x, -y)

New A: (3, -3)
New B: (7, -2)
New C: (7, -4)



Reflecting triangle ABC across the y-axis means each vertex should have new coordinates. (-x, y)

New A: (-3, 3)
New B: (-7, 2)
New C: (-7, 4)



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