Learning Center

Schoolcraft College

Jump Start

Session 5

Solving Equations – Linear Equations

Only one rule:_____

Some broad strategies:

1._____

2._____

3._____

Solve:

$\frac{3}{4}x - x = 9$

$\frac{x}{2} + \frac{2}{3} = 5$

$3x - 9 + 5x = 15$

$19b - 14 - 21b = -2$

$3(x - 4) + 2 = 5 - 2(7 - 2x)$

$1 + 2(x + 5) = -7(2 - x) + 1$

Solving Equations – Non-Linear Equations

Non-Linear Equations: don't just have x (or other variables), there is an exponent on x or it's rational (x in the denominator)

Zero Product Property:_____

Strategy:_____

Solve:

Higher Degree Equations

$x^2 - 5x + 6 = 0$

$3x^3 = 27x$

$(x - 1)(x + 2) = 28$

Rational Equations

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

$\frac{2t+3}{t-1} - \frac{2}{t+3} = \frac{5-6t}{t^2+2t-3}$

Radical Equations

$\sqrt{4x-3}-5=0$

$2x+\sqrt{x+1}=8$

What if you can't factor the expression?

The Quadratic Formula

Solve:

$x^2-x-7=0$

$2x^2=-6x-11$

Logarithms

Definition of a logarithm:

Ex:

$log_2(8) =$ $log_{10}(100) =$ $log_7\left(\frac{1}{7}\right) =$

Note: You can never take the log of _____

Rewriting Logarithms

Log Rules:

1._____

2._____

3._____

Rewrite the following expressions as one single logarithm

$\log_7 5 - 4\log_7 2 + \log_7 3$ $\log_2 x + 3\log_2 y - \log_2(z+1)$

Rewrite the following expressions as separate logarithms

$\log_3\left(xy^2\sqrt{z}\right)$ $\log\left(\frac{x^2}{yz^3}\right)$

Solving Logarithmic and Exponential Equations

This relies on the following rewrite of logarithm to exponential (or vice versa)

Solve:

$\log_2(x+1) = 3$

$\log_6(x+2) + \log_6(x-3) = 2$

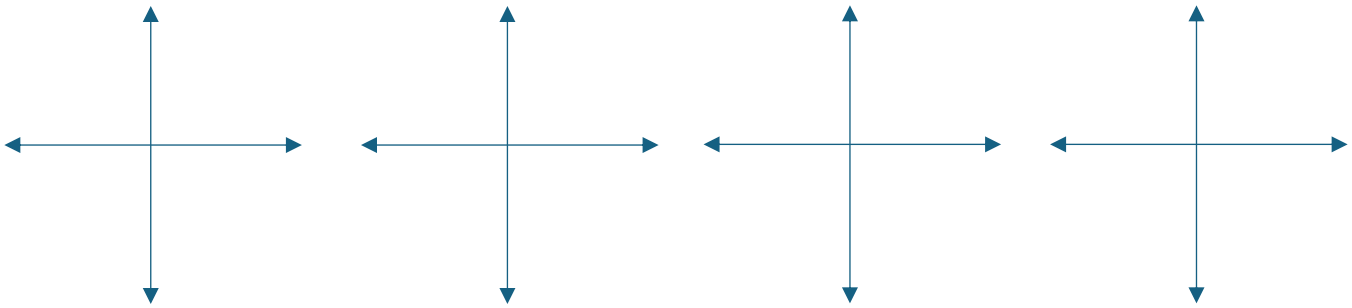
$5^x = 30$

$2 \cdot 3^{x-3} = 18$

Graphing by Transformation

One of the shortcuts that we use to graph some functions is called transformation. This involves taking a base graph and then shifting or flipping the original to get the final graph.

Some famous base graphs:



The transformations:

Shifts – a number being added or subtracted will cause the entire function to move a corresponding number of spaces in the appropriate direction

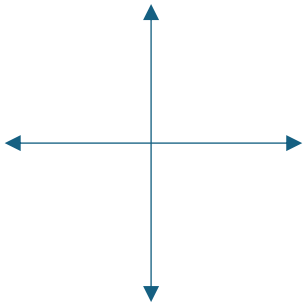
Flips – a negative sign in front of the function or variable will cause the entire graph to flip over the appropriate axis

Horizontal versus Vertical transformations: If the transformation is taking place outside of the function or parentheses, it will cause a vertical shift or flip. If the transformation is taking place inside of the function or parentheses, it will cause a horizontal shift or flip.

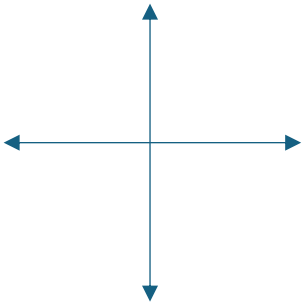
Special note: Transformations occurring inside the function will have the opposite effect of what the number implies. For example, $f(x) = \sqrt{x+2}$ will shift two spaces *left*, not right.

Ex: $f(x) = -(-x+1)^2 + 3$

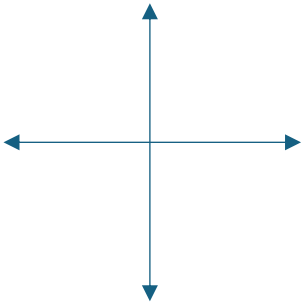
Ex: Sketch the graph of $f(x) = (x + 2)^2 + 3$



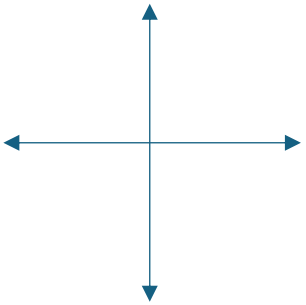
Ex: Sketch the graph of $f(x) = -\sqrt{x - 1}$



Ex: Sketch the graph of $f(x) = 3 - |x + 5|$



Ex: Sketch the graph of $f(x) = \sqrt{-x} + 5$



Ex: Sketch the graph of $f(x) = -\log_2(x - 4) - 3$