Your Name

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Notes

Factoring Trinomials

a = 1

Quadratic Equations

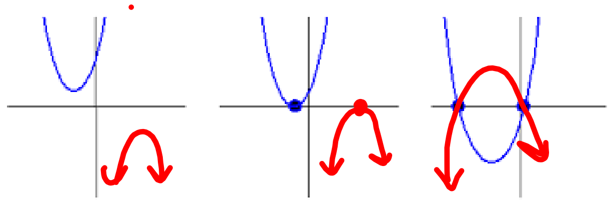
Standard Form: $ax^2 + bx + c = 0$ where $a \neq 0$

Solutions/Roots/Zeros of an equation:

the x intercepts of the function, where y is 0

where it crosses x axis

SO... **factoring finds the x values that produce 0 for y** (Include in your x-y table of points)



Type of Factor solution	**No Solutions** Not Factorable Imaginary solutions	**One Solution** Factors are the same Real Number solution	**Two Solutions** Factors are different Real Number solutions
Graph Description	When the function doesn't cross the x-axis at all	When the function touches the x-axis once (technically it touches twice, it goes to and back within the same point)	When the function touches the x-axis twice $(x_1,0)$ and $(x_2,0)$ $x = x_1$ and $x = x_2$

Remember Distributing with Polynomials

Every term in the first polynomial factor gets multiplied "distributed" to every term in the second polynomial factor

$(x+2)(x+3)$

$x^2+3x+2x+6$

x^2+5x+6

$(x+5)(x^2-3x+2)$

$x^3-3x^2+2x+5x^2+-15x+10$

$x^3+2x^2-13x+10$

x^3 + 2x^2 - 13x + 10

Factoring a Trinomial

$x^2+bx+c \longrightarrow (x+m)(x+n)$

Notice: Three terms and the coefficient of x^2 is 1.

$m \cdot n = c$
$m + n = b$

Step 1: Find two numbers that multiply to the last number c, and add to the middle term b.

Step 2: put one number with the (x + _) factor and the other number with the other (x + _)

ex. $x^2 + 4x + 3$

$a=1 \quad b=4 \quad c=3$

$\cdot 3$, 1, 3, $+4$

$\boxed{(x+1)(x+3)}$

$(x+3)(x+1)$

Factor Pairs for 3		Sum of Factors
1	3	4
-1	-3	-4

ex. $m^2 - 12m - 32$

$a=1 \quad b=-12 \quad c=-32$

$\cdot -32$, $+ -12$

not factorable
Prime Polynomial

Factor Pairs for -32		Sum of Factors
-1	32	31
1	-32	-31
-2	16	14
2	-16	-14
-4	8	4
4	-8	-4

Factoring a Trinomial

$x^2 + bx + c \longrightarrow (x + m)(x + n)$

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$\cdot 3$

$+4$

$\boxed{(x+1)(x+3)}$

$3 \quad 1x \quad x^2 \quad 3x \quad 3$

Factor Pairs for 3		Sum of Factors
1	3	4
-1	-3	-4

ex. $m^2 - 12m - 32$

$a=1 \quad b=-12 \quad c=32$

Unfactorable Trinomial

$\cdot -32$

$-1 \quad 32$

$+ -12$

Factor Pairs for -32		Sum of Factors
-1	32	31
1	-32	-31
2	-16	-14
-2	16	14
-4	8	4
4	-8	-4

none add to -12

$x^2 = 4$

$x = \sqrt{4}$

$= \sqrt{\underline{2} \cdot \underline{2}}$

$x = 2$ or $x = -2$

$x^4 = 16$

$x = \sqrt[4]{\underline{2} \cdot \underline{2} \cdot \underline{2} \cdot \underline{2}}$

$x = 2$ or $x = -2$

$x^2 = -4$

$x = \sqrt{\underline{?} \cdot \underline{?}}$

not possible

$x = \pm\sqrt{-4}$

$x = \pm\sqrt{4} \cdot \sqrt{-1}$

$x = \pm 2i$

$x^3 = -8$

$x = \sqrt[3]{\underline{-2} \cdot \underline{-2} \cdot \underline{-2}}$

$x = -2$

$x^3 = 8$

$x = \sqrt[3]{\underline{2} \cdot \underline{2} \cdot \underline{2}}$

$x = 2$

Factor each trinomial

$r^2 - 3r + 2$

2
-1 -2
-3

$\boxed{(r-1)(r-2)}$

$x^2 + 6x + 5$

$\boxed{(x+1)(x+5)}$

5
1 5
6

$x^2 - x - 6$

$\boxed{(x-3)(x+2)}$

-6
-3 2
-1

$x^2 - 5x - 6$

$\boxed{(x-6)(x+1)}$

-6
-6 +1
-5

Quadratic Form Polynomials:

middle term degree is half the leading term's

to find the m and n, Pretend it is x^2 and factor,

but the middle term determines the degree in the factors

half of 4

$x^4 + 7x^2 + 6$

$\boxed{(x^2+1)(x^2+6)}$

6
1 6
7

half of 6

$x^6 - 7x^3 + 6$

$\boxed{(x^3-1)(x^3-6)}$

6
-1 -6
-7

half of

$x^8 - 5x^4 + 6$

$\boxed{(x^4-3)(x^4-2)}$

6
-3 -2
-5

$c^2 - 15c + 56$

56
- -
-15

$\cdot$ 12	+ -8	
1, 12	13, 11	✗
-2, -6	-8, 4	✓

$a^8 - 18a^4 = -72$

$a^8 - 18a^4 + 72 = 0$

~~Pretend~~

$\cancel{a^2 - 18a^1 + 72}$

$(a^4 - 6)(a^4 - 12)$

$-6a^4$

$-12a^4$

$\cdot 72$

$-6 \quad -12$

$+ -18$

72

8 9

4 2 · 3 3

$a^4 - 6 = 0$

$a^4 = 6$

$a = \pm\sqrt[4]{6}$

$a^4 - 12 = 0$

$a^4 = 12$

$a = \pm\sqrt[4]{12}$

Discussion Time:

What did you notice as you went through these?

Remember: It is the simple things in life....

The Zero Product Property

Anything times 0 equals 0

$a(0)=0$ $(0)b=0$

if $ab=0$ then **either b was 0 or a was 0**

There it is! Use your new skills to solve the equation.

$x^2 - 4x - 21=0$

$(x-7)(x+3)=0$

-21

$-7 \quad 3$

-4

$x-7=0 \quad x+3=0$

$\boxed{x=7 \quad x=-3}$

$x^4 - 22x^2 = -121$

$+121 \quad +121$

$x^2 - 22x + 121 = 0$

$(x-11)(x-11)=0$

$x-11=0 \quad x-11=0$

$\boxed{x=11 \text{ twice}}$

$a^6 - 18a^3 + 80 = 0$

$(a^3 - 10)(a^3 - 8) = 0$

$a^3 - 10 = 0 \quad a^3 - 8 = 0$

$a^3 = 10 \quad a^3 = 8$

$\boxed{a = \sqrt[3]{10} \text{ \& } a = 2 \text{ and 4 imaginary solutions}}$

$x^8 - 2x^4 = 35$

$x^8 - 2x^4 - 35 = 0$

$(x^4 - 7)(x^4 + 5) = 0$

$x^4 - 7 = 0 \quad x^4 + 5 = 0$

$x^4 = 7 \quad x^4 = -5$

$\boxed{x = \pm\sqrt[4]{7} \text{ \& 6 imaginary solutions}}$

$j^7 - 9j^4 - 10j = 0$

$j(j^6 - 9j^3 - 10) = 0$

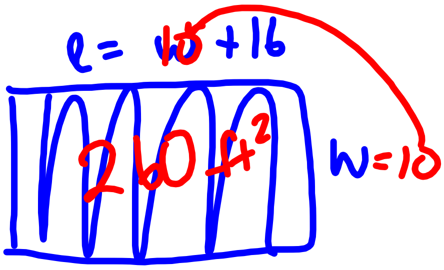
$j(j^3 - 10)(j^3 + 1) = 0$

$j = 0 \quad j^3 - 10 = 0 \quad j^3 + 1 = 0$

$j^3 = 10 \quad j^3 = -1$

$\boxed{j = 0,\ j = \sqrt[3]{10} \text{ \& } j = -1 \text{ and 4 imaginary solutions}}$

32.



10 ft × 26 ft

$A = lw$

$A = (w + 16)w$

$A = w^2 + 16w$

$260 = w^2 + 16w$

$-260 \qquad -260$

$0 = w^2 + 16w - 260$

$0 = (w + 26)(w - 10)$

$w + 26 = 0 \quad w - 10 = 0$

$\cancel{w = -26} \quad \boxed{w = 10 \text{ ft}}$