Your Name

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11/10/20

Factoring

Notes

GCF and by Grouping

Remember....

The distributive property

$4(x + 3)$

$4x + 12$

$4(x + 3)$

$4y^2(x + 3y)$

$4y^2 \cdot x + 4y^2 \cdot 3y$

$4y^2x + 12y^3$

Factoring

is just undoing

the distributive property!

Factoring a Polynomial

GCF

Two or three terms: Factor out GCF FIRST. Write the GCF on the outside of the parenthesis, and the left over factors that are added or subtracted inside the parenthesis. As if you undid the distributive property

ex. $12a^2 + 3a$

$3a \cdot 4a + 3a \cdot 1$

$3a(4a+1)$

ex. $6m + 4m^2n + 8m^3n^2$

$2m(3 + 2mn + 4m^2n^2)$

Remember Distributing with Polynomials

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

$(x+2)(x^2+3x+4)$

$x^2+3x+2x^2+6x+4x+8$

x^2+5x+6

Factoring by Grouping

Four terms: Factor out GCF first. Grouping is done by Factoring in twos.

1. Take out the GCF of two terms at a time,
2. you should be left with the exact same thing in both parenthesis (if not, it is not factorable by grouping)
3. Factor out the common binomial factor

ex. $32a^2 + 28a + 24a + 21$

$4a(8a+7)+3(8a+7)$

$(8a+7)(4a+3)$

$12a+8$

$3a\cdot 4+2\cdot 4$

$4(3a+2)$

ex. $6y^3 + 18y^2 - 4y - 12$

$2[3y^3+9y^2-2y-6]$

$2[3y^2(y+3)-2(y+3)]$

$2(y+3)(3y^2-2)$ ← factored acceptably

$2(y+3)(\sqrt{3}y-\sqrt{2})(\sqrt{3}y+\sqrt{2})$

factored completely

Factor each polynomial if possible

$3m + 36$

$3(m+12)$ GCF

$5x^2 - 35x$

$5x(x-7)$

$4p^2q^2 - 16pq^2 + 56pq^3$

$4pq^2(p-4+14q)$

$4a^3b + 28a^2b - 9a + 63$

$4a^2b(a+7) - 9(a-7)$

not the same

not factorable

$12x^2y + 36x^2 - 11y - 33$

$12x^2(y+3) - 11(y+3)$

$(y+3)(12x^2-11)$ ← acceptable for now

$(y+3)(\sqrt{12}x - \sqrt{11})(\sqrt{12}x + \sqrt{11})$

factored completely

It is the simple things in life....

The Zero Product Property

Anything times 0 equals 0

$a(0) = 0 \quad (0)b = 0$

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

This fun fact is how we are going to solve for a squared variable!

$x^2 + 2x + 1 = 0$

Solving a Polynomial Equation

Once we have found two or more things that are all multiplied and equal 0, one or all of those factors could equal 0. So we set each factor equal to 0 and solve for the variable.

ex. $(x+2)(x - 5) = 0$

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

$x=-2$ $x=5$

ex. $(4x - 8)(-5x + 7)=0$

ex. $x(x- 3)(x + 9) = 0$

$x=0$ $x-3=0$ $x+9=0$

ex. $6x(4x - 10)(x + 21)=0$

$6x=0$ $4x-10=0$ $x+21=0$

$x=0$ $x=\frac{10}{4}$ $x=-21$

Solve each equation. Check your solutions, there could be more than 1!

$3m + 36 = 0$

$5x^2 - 35x = 0$

$5x(x-7)=0$

$5x=0 \quad x-7=0$

$x=0 \quad x=7$

must = 0

$4p^2 = -16p$

$4p^2+16p=0$

$4p(p+4)=0$

$4p=0 \quad p+4=0$

$p=0 \quad p=-4$

$4a^3 + 28a^2 - 9a - 63 = 0$

$4a^2(a+7)-9(a+7)=0$

$(a+7)(4a^2-9)=0$

$a+7=0 \quad 4a^2-9=0$

$a=-7$

$4a^2=9$

need 3 answers

$\sqrt{a^2}=\sqrt{\frac{9}{4}}$

$a=\pm\frac{3}{2}$

$x^5 + 3x^4 + 3x^3 + 9x^2 - 4x - 12=0$

$x^4(x+3)+3x^2(x+3)-4(x+3)=0$

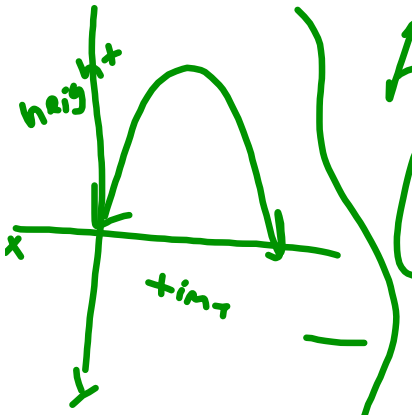
$(x+3)(x^2+3x^2-4)=0$

$(x+3)(x+4)(x-1)=0$

$x+3=0 \quad x+4=0 \quad x-1=0$

$x=-3 \quad x=-4 \quad x=1$

are there repeats? Are there imaginary? Look at the graph, or...learn calculus!



$60t - 16t^2 = 0$

$4t(15 - 4t) = 0$

$4t = 0 \quad 15 - 4t = 0$

$t = 0 \quad t = \frac{15}{4}$

0 seconds 3.75 sec.

$A = \frac{1}{2}b^2 - b$

$A = b\left(\frac{1}{2}b - 1\right)$

$16\left(\frac{1}{2}(16) - 1\right)$

$16(8 - 1)$

$16(7)$

$A = 112 \text{ ft}^2$