Your Name

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Notes

Factoring Trinomials

a ≠1

$h = vt - 16t^2$

$v = 48$ ft/s

ground $h = 0$

$0 = 48t - 16t^2$

$0 = -16t^2 + 48t$

$0 = -16(t^2 - 3t)$

$0 = -16t(t - 3)$

$-16t = 0$ $\quad t - 3 = 0$

$t = 0$ $\quad t =$ 3 second

Factoring a Trinomial

AC Method

$ax^2 + bx + c$

Notice: Three terms and the coefficient of x^2 is not 1.

Step 1: Factor out GCF first.

Step 2: Find two numbers that multiply to what *a* and *c* multiply to (the product is *ac*) and add to the middle term *b*

Step 3. Rewrite the trinomial where the middle term has been split using the two numbers you found

Step 4. Continue to factor by grouping.

ex. $2x^2 - 3x - 2$ ($a=2$, $b=-3$, $c=-2$; $a \cdot c = -4$)

$2x^2 - 4x + 1x - 2$

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

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

Factor Pairs for -4		Sum of Factors
-1	4	3
1	-4	-3
2	-2	0

ex. $8x^2 - 4x - 24$

$4(2x^2 - x - 6)$ ($a=2$, $b=-1$, $c=-6$; $a \cdot c = -12$)

$4(2x^2 + 3x - 4x - 6)$

$4[x(2x+3) - 2(2x+3)]$

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

Factor Pairs for		Sum of Factors
-1	12	11
1	-12	-11
-2	6	4
2	-6	-4
-3	4	1
3	-4	-1

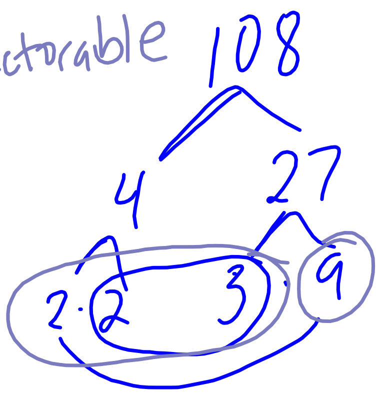
Prime Polynomial

ex. $6x^2 - 7x + 18$ ($a=6$, $c=18$; $a \cdot c = 108$)

Factor Pairs for		Sum of Factors
1	108	
-1	-108	
2	54	
3	36	
4	27	
6	18	
9	12	

Prime

Not factorable



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**

Factor or solve each trinomial

$3m^2 - 8m - 3$

$3m^2 - 9m + m - 3$

$3m(m-3) + 1(m-3)$

$(m-3)(3m+1)$

$16r^2 - 8r + 1$

$16r^2 - 4r - 4r + 1$

$4r(4r-1) - 1(4r-1)$

$(4r-1)(4r-1)$

$(4r-1)^2$

Perfect square trinomial

$8m^6 - 44m^3 + 48 = 0$

$4(2m^6 - 11m^3 + 12) = 0$

$4(2m^6 - 3m^3 - 8m^3 + 12) = 0$

$4(m^3(2m^3 - 3) - 4(2m^3 - 3)) = 0$

$4(2m^3 - 3)(m^3 - 4) = 0$

$4 \neq 0$ $2m^3 - 3 = 0$ $m^3 - 4 = 0$

$m^3 = \frac{3}{2}$ $m^3 = 4$

$m = \sqrt[3]{\frac{3}{2}}$ $m = \sqrt[3]{4}$

6 of 4 imaginary answers

$6x^8 + 5x^4 - 6 = 0$

$6x^8 + 9x^4 - 4x^4 - 6 = 0$

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

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

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

$x^4 = -\frac{3}{2}$ $x^4 = \frac{2}{3}$

$x = \pm\sqrt{-\frac{3}{2}}$ $x = \pm\sqrt[4]{\frac{2}{3}}$

6 imaginary

$3x^7 + 2x^4 = 8x$

$3x^7 + 2x^4 - 8x = 0$

$x(3x^6 + 2x^3 - 8) = 0$

$x(3x^6 + 6x^3 - 4x^3 - 8) = 0$

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

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

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

$x^3 = -2$ $x^3 = \frac{4}{3}$

$x = 0$ $x = \sqrt[3]{-2}$ $x = \sqrt[3]{\frac{4}{3}}$

and 4 imaginary solutions

$36x^8 - 10x^2 = -54x^6$

$36x^8 + 54x^6 - 10x^2 = 0$

$2x^2(18x^6 + 27x^3 - 5) = 0$

$2x^2(18x^6 - 3x^3 + 30x^3 - 5) = 0$

$2x^2[3x^3(6x^3 - 1) + 5(6x^3 - 1)] = 0$

$2x^2(6x^3 - 1)(3x^3 + 5) = 0$

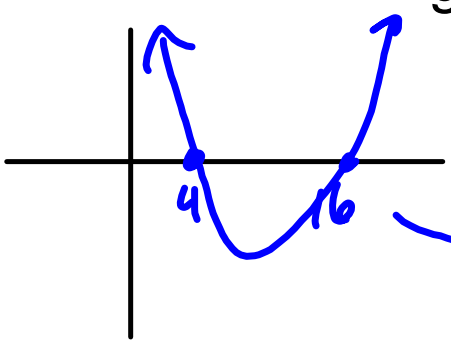
$2x^2 = 0$ $6x^3 - 1 = 0$ $3x^3 + 5 = 0$

$x^2 = 0$ $x^3 = \frac{1}{6}$ $x^3 = -\frac{5}{3}$

$x = 0$ twice $x = 0.550$ $x = -1.186$

and 4 imaginary

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

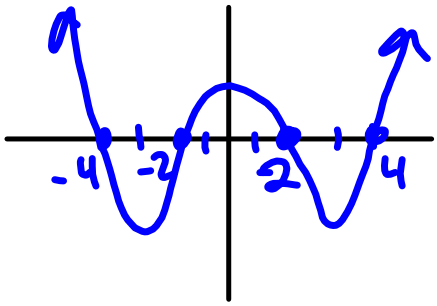


$p^2 - 20p + 64 = 0$

$(p-4)(p-16)=0$

$p-4=0 \quad p-16=0$

$p=4 \quad p=16$



$p^4 - 20p^2 + 64 = 0$

$(p^2-16)(p^2-4)=0$

$p^2-16=0 \quad p^2-4=0$

$p^2=16 \quad p^2=4$

$p=\pm 4 \quad p=\pm 2$

✓

Factor or solve each trinomial

$3m^2 - 8m - 3$

$16r^2 - 8r + 1$

$8m^6 - 44m^3 + 48 = 0$

$4(2m^6 - 11m^3 + 12) = 0$

a·c: 24, −3, −8, −11

$4(2m^6 - 3m^3 - 8m^3 + 12) = 0$

$4(m^3(2m^3 - 3) - 4(2m^3 - 3)) = 0$

$4(2m^3 - 3)(m^3 - 4) = 0$

$4 \neq 0$

$2m^3 - 3 = 0$

$m^3 = \frac{3}{2}$

$m = \sqrt[3]{\frac{3}{2}}$

$m^3 - 4 = 0$

$m^3 = 4$

$m = \sqrt[3]{4}$

4 imaginary answers

$6x^8 + 5x^4 - 6 = 0$

$3x^7 + 2x^4 = 8x$

$36x^8 - 10x^2 = -54x^6$

15. $8m^6 - 44m^3 + 48 = 0$

$4(2m^6 - 11m^3 + 12) = 0$

$4[2m^6 - 8m^3 - 3m^3 + 12) = 0$

$4[2m^3(m^3 - 4) - 3(m^3 - 4)] = 0$

$4 \cdot (m^3 - 4)(2m^3 - 3) = 0$

$4 \neq 0$

$m^3 - 4 = 0$ $\quad$ $2m^3 - 3 = 0$

$m^3 = 4$ $\quad$ $m^3 = 3/2$

$m = \sqrt[3]{4}$ $\quad$ $m = \sqrt[3]{3/2}$

$m = 1.587$ $\quad$ $m = 1.145$

4 imaginary

a · c

24

-8 -3

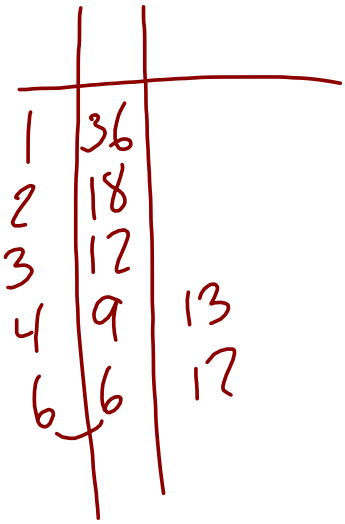
+

-11

(18) $18 + 11y^4 + 2y^8$

$2y^3 + 11y^4 + 18$

Prime polynomial



12. $48x^4 + 22x^2 = 15$

$48x^4 + 22x^2 - 15 = 0$

$48x^4 - 18x^2 + 40x^2 - 15 = 0$

$6x^2(8x^2 - 3) + 5(8x^2 - 3) = 0$

$(8x^2 - 3)(6x^2 + 5) = 0$

$8x^2 - 3 = 0$ $\quad 6x^2 + 5 = 0$

$\sqrt{x^2} = \sqrt{\frac{3}{8}}$ $\quad \sqrt{x^2} = \sqrt{\frac{-5}{6}}$

$x = \pm 0.612$ and two imaginary solutions

a·c

-720

-18 +40

+22

720

72 10

8 9 2 5

72	10	
16	45	
-18	40	22

9. $-4c^8 + 19c^4 = 21$

$\frac{-4c^8 + 19c^4 - 21 = 0}{-1 \qquad -1}$

$4c^8 - 19c^4 + 21 = 0$

$a \cdot c$

84

$-7 \quad -12$

-19

either or

$4c^8 - 7c^4 - 12c^4 + 21 = 0$

$4c^8 - 12c^4 - 7c^4 + 21 = 0$

$4c^4(c^4 - 3) - 7(c^4 - 3) = 0$

$(c^4 - 3)(4c^4 - 7) = 0$

$c^4 - 3 = 0$

$\sqrt[4]{c^4} = \sqrt[4]{3}$

$c = \pm 1.316$

$4c^4 - 7 = 0$

$\sqrt[4]{c^4} = \sqrt[4]{\frac{7}{4}}$

$c = \pm 1.150$

4 imaginary solutions

23. $10b^2 - 15b = 8b - 12$

$+12 \quad -8b \quad -8b \quad +12$

$10b^2 - 15b - 8b + 12 = 0$

$5b(2b-3) \quad -4(2b-3) = 0$

$(2b-3)(5b-4) = 0$

$2b-3=0 \qquad 5b-4=0$

$b = \frac{3}{2} \qquad b = \frac{4}{5}$

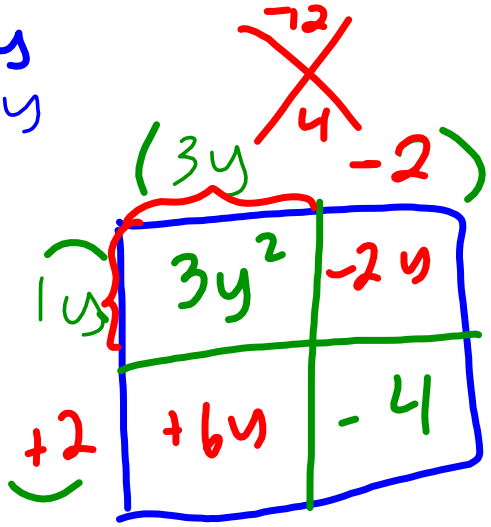
$9y^2 + 18y - 12 = 6y$

$-6y \qquad -6y$

$9y^2 + 12y - 12 = 0$

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

$3(3y-2)(1y+2) = 0$



34.

$10 - x = 15$

$(10-x)(12-x) = \frac{9}{8}(120)$

Orig Area

$120 - 10x - 12x + x^2 = 15$

$-15 \qquad -15$

$x^2 - 22x + 105 = 0$

$(x-15)(x-7) = 0$

105, -15, -7, -22

$x - 15 = 0 \qquad x - 7 = 0$

$x = 15$ or $x = 7$

$l = 10 - (7)$

$l = 3$ in

$w = 12 - (7)$

$w = 5$ in