Warm up

What is the degree, leading coefficient & # of terms for each polynomial?

1. $3x^4 - 7x^6 + 2x^3 - 5$ D: 6, LC: −7, # terms: 4

2. $\frac{1}{2}x^3 - 7x^2 - 3x^2 + 9$ D: 3, LC: ½, # terms: 3

$\frac{1}{2}x^3 - 10x^2 + 9$

Factor completely:

3. $-3y^3 + 12y = -3y(y^2 - 4) = \boxed{-3y(y+2)(y-2)}$

4. $2a^2 + 5a - 3 = (2a-1)(a+3)$

$1 \cdot 2$ $\quad -1 \cdot 3$, $1 \cdot -3$ $\quad 6a - 1a = 5a$ ✓

5. $6x^3 - 20x^2 - 16x$

6. Solve #4 for the x-intercepts

5. $2x(3x^2 - 10x - 8)$

$3 \cdot 1$ $\quad -4 \cdot 2$, $-2 \cdot 4$ $\quad -1 \cdot 8$, $1 \cdot -8$

$\boxed{2x(3x \overset{+2}{\cancel{-4}})(x-4)}$

$-12x + 2x = -10x$ ✓

6. $(2a-1)(a+3) = 0$

$2a - 1 = 0$ $\quad a + 3 = 0$

$2a = 1$ $\quad \boxed{a = -3}$

$\boxed{a = 1/2}$

x-int!

$y = ax^2 + bx + c$

Standard Form

Axis of Symmetry

$x = \frac{-b}{2a}$

ex. $y = 3x^2 - 2x + 1$

$x = \frac{-(-2)}{2(3)} = \frac{2}{6} = \frac{1}{3}$

$x = 1/3$

Vertex

$\left(\frac{-b}{2a}, \text{plug in } x\right)$

y-intercept

$x = 0$

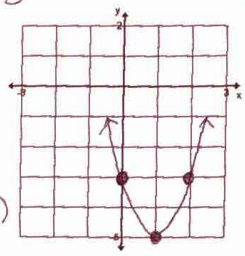
$(0, c)$

Miscellaneous HTG

1. find y-int.
   $(0, -3)$
2. find vertex
   $x = \frac{-b}{2a} = \frac{-(-4)}{2(2)} = 1$
   $y = 2(1)^2 - 4(1) - 3$
   $y = 2 - 4 - 3 = -5$ $(1, -5)$
3. reflect y-int.

Graph

$y = 2x^2 - 4x - 3$



$y = a(x-h)^2 + k$

Vertex Form

Axis of Symmetry

$x = h$

ex. $y = 2(x - 5)^2 + 1$

$x = 5$

Vertex

vertex: (h, k)

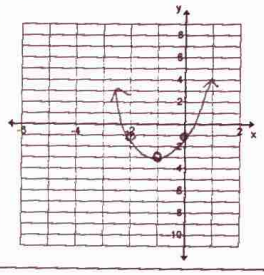
ex. $(5, 1)$

Miscellaneous HTG

1. find vertex
   $(-1, -3)$
2. pick any x-value & find y
   $x = 0$ $y = 2(0+1)^2 - 3$
   $y = 2(1) - 3$
   $y = 2 - 3 = -1$
   $(0, -1)$
3. reflect #2 pt

Graph

$y = 2(x+1)^2 - 3$



Factored Form

Axis of Symmetry

$x = \frac{r_1 + r_2}{2}$

Vertex

$\left(\frac{r_1 + r_2}{2}, \text{plug in } x\right)$

x-intercepts

$y = 0$ r_1 & r_2

ex. $y = 2(x-4)(x+2)$

x-int: $4, -2$

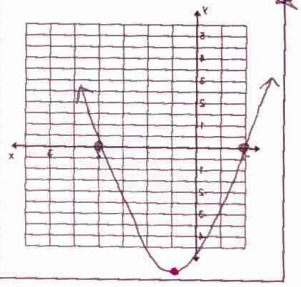
* setting each piece to 0

Miscellaneous

1. find x-int.
   x-int: -4 & 2
2. vertex
   $x = \frac{-4+2}{2} = \frac{-2}{2} = -1$
   $y = 2(-1+4)(-1-2)$
   $y = 2(3)(-3) = -18$
   $(-1, -18)$

Graph

$y = 2(x+4)(x-2)$



factor

FOIL

expand & FOIL

extra examples

VF → SF

$y = 2(x-1)^2 + 3$

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

↓ FOIL

$y = 2(x^2 - x - x + 1) + 3$

$y = 2(x^2 - 2x + 1) + 3$

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

$\boxed{y = 2x^2 - 4x + 5}$

FF → SF

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

↓ FOIL

$y = -2(x^2 + x - 5x - 5)$

$y = -2(x^2 - 4x - 5)$

$\boxed{y = -2x^2 + 8x + 10}$

SF → FF

$y = 2x^2 + 8x + 8$

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

$y = 2(x+2)(x+2)$