

Topic: Quadratic Equations	Right-hand side
EQ: How can I do advanced complete the square?	
$y = 3x^2 - 12x - 24$	
1.) Factor out a, no matter what it is, by dividing all terms by it. Set y to 0.	$0 = 3(3x^2/3 - 12x/3 - 24/3)$ $0 = 3(x^2 - 4x - 8)$
2.) Complete the square for what's inside the parentheses using the identities inside the parentheses; simplify	$a = 1, b = -4, c = -8$ $0 = 3((x + b/2)^2 + c - (b/2)^2)$ $0 = 3((x + (-4)/2)^2 + (-8) - ((-4)/2)^2)$ $0 = 3((x - 2)^2 - 12)$
3.) Distribute the original "a" to the term on the right of the exponent	$0 = 3(x - 2)^2 - 12(3)$ $0 = 3(x - 2)^2 - 36$
4.) Define the vertex. The "x" that would make the parentheses equal 0 is x_v , and y, is what's on right of exponent	$x - 2 = 0$ $x = 2$ $y = 3(2)^2 - 36$ $y = -36$ (2, -36)
5.) Solve for x, find x_i	$0 = 3(x - 2)^2 - 36$ $36 = 3(x - 2)^2$ Divide by original "a" on both sides $12 = (x - 2)^2$ Sq. rt. both sides $\pm 3.46 = x - 2$ Add to both roots $x = +3.46 + 2 = 5.46$ (5.46, 0) $x = -3.46 + 2 = -1.46$ (-1.46, 0)
6.) Set x to 0, find y _i	$y = 3((0) - 2)^2 - 36$ $y = 3(-2)^2 - 36$ $y = 3(4) - 36$ $y = 12 - 36 = -24$ (0, -24)
Left-hand side:	
a.) $y = 5x^2 + 10x - 40$	
b.) $y = 2x^2 - 3x - 7$	
c.) $y = \frac{1}{2}x^2 - \frac{2}{3}x - \frac{4}{5}$	
<p><i>Handwritten notes for problem c:</i></p> <p>$0 = \frac{1}{2}(x^2 - \frac{4}{3}x - \frac{8}{5})$ <i>Advanced C.T.S.</i> $0 = \frac{1}{2}((x - \frac{2}{3})^2 + c - (\frac{2}{3})^2)$ $\frac{4}{3} \div 2 = \frac{2}{3}$ $\frac{1}{2}((x - \frac{2}{3})^2 - \frac{4}{9} - \frac{8}{5})$ $\frac{2}{3} \cdot \frac{2}{3} = \frac{4}{9}$ $\frac{1}{2}((x - \frac{2}{3})^2 - \frac{72}{45} - \frac{72}{45})$ $\frac{2}{3} \cdot \frac{2}{3} = \frac{4}{9}$ $\frac{1}{2}(x - \frac{2}{3})^2 - \frac{46}{45}$ $\frac{46}{45} = \frac{1}{2}(x - \frac{2}{3})^2$ $\frac{92}{90} = \frac{46}{45}$ $\frac{46}{45} = \frac{1}{2}(x - \frac{2}{3})^2$ $\sqrt{\frac{92}{90}} = \sqrt{\frac{1}{2}(x - \frac{2}{3})^2}$ $\pm 1.43 = x - 0.67$ $2.1 = x = 1.43 + 0.67$ $-0.76 = x = -1.43 + 0.67$ $\frac{2}{3} \cdot \frac{2}{3} = \frac{4}{9}$ $45 \cdot 9 = 405$ $y = \frac{1}{2}(x - \frac{2}{3})^2 - \frac{46}{45}$ $\frac{1}{2}(0 - \frac{2}{3})^2 - \frac{46}{45}$ $\frac{1}{2}(\frac{4}{9}) - \frac{46}{45}$ $\frac{10}{45} - \frac{46}{45}$ $-\frac{36}{45} = -\frac{4}{5}$ (0, -4/5)</p> <p><i>Do C.T.S. only</i> <u>Due to</u> x_i, y_i, v_i <i>verify if correct</i> use C.T.S. a.) $4x^2 - 12x - 8 = 9$ quick graph b.) $-6x^2 + 24x + 60$ c.) $\frac{2}{3}x^2 - 10x - \frac{1}{2}$</p>	