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CC ALGEBRA 2

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LESSON #4: COMPLETING THE SQUARE

DO NOW: Solve for x

1) $\sqrt{(x+4)^2} = \sqrt{36}$

$x+4 = \pm\sqrt{36}$

$x = -4 \pm \sqrt{36}$

$x = -4+6, -4-6$

2) $x^2 + 6x - 16 = 0$

a m

$(x+8)(x-2)$

-8 | 2

What is another way we can solve $x^2 + 6x - 16 = 0$?

$+16 \quad +16$

$x^2 + 6x + 9 = 16 + 9$

$\left(\frac{6}{2}\right)^2$

$\sqrt{(x+3)^2} = \sqrt{25}$

$x+3 = \pm\sqrt{25}$

$x = -3 \pm 5$

$x = 2, -8$

Steps:

In order to complete the square, the "a" value must be equal to 1!
1. Move the constant ("c" value) to the right side.
2. Make the left side a perfect square trinomial (Take half of the "b" value and square it) and add it to BOTH sides.
3. Factor the perfect square trinomial and simplify right side.
4. Take the square root of both sides and solve! (Remember positive and negative results!!!!)

Solve for the roots in simplest radical form:

1. $x^2 + 8x - 4 = 0$

$+4 \quad +4$

$x^2 + 8x + 16 = 4 + 16$

$\left(\frac{8}{2}\right)^2$

$\sqrt{(x+4)^2} = \sqrt{20}$

$x+4 = \pm\sqrt{20}$

$-4 \quad -4$

$x = -4 \pm \sqrt{20}$

$\boxed{x = -4 \pm 2\sqrt{5}}$

2. $x^2 + 20x = -40$

$x^2 + 20x + 100 = -40 + 100$

$\left(\frac{20}{2}\right)^2$

$\sqrt{(x+10)^2} = \sqrt{60}$

$x+10 = \pm\sqrt{60}$

$x = -10 \pm \sqrt{60}$

$\sqrt{4} \quad \sqrt{15}$

$\boxed{x = -10 \pm 2\sqrt{15}}$

Find the solution set by completing the square. Round to the nearest hundredth:

3. $\frac{3x^2 - 12x - 24}{3} = \frac{0}{3}$

$x^2 - 4x - 6 = 0$

$x^2 + \left(\frac{4}{2}\right)^2 x + 4 = 6 + 4$

$\sqrt{(x-2)^2} = \sqrt{10}$

$x - 2 = \pm\sqrt{10}$

$x = 2 \pm \sqrt{10}$

$x = 5.2, -1.2$

*4. $2x^3 + 16x^2 - 4x = 0$

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

$2x(x^2 + \left(\frac{8}{2}\right)^2 x + 16 = 2 + 16)$

$2x\sqrt{(x+4)^2} = \sqrt{18}$

$2x(x + 4 = \pm\sqrt{18})$

$\sqrt{9}\ \sqrt{2}$

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

$x = .2, -8.2$

*5. Solve for the roots by completing the square in simplest radical form: $x^2 - 7x = 1$

$x^2 + \left(\frac{-7}{2}\right)^2 x + \frac{49}{16} = 1 + \frac{49}{16}$

$\sqrt{\left(x - \frac{7}{4}\right)^2} = \sqrt{\frac{65}{16}}$

$x = \frac{7}{4} \pm \frac{\sqrt{65}}{\sqrt{16}}$

$x = \frac{7}{4} \pm \frac{\sqrt{65}}{4}$

$x = \frac{7 \pm \sqrt{65}}{4}$

6. Brandon solved the following quadratic equation by completing the square. **Describe and correct his errors:**

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

$x^2 + 2x = 1$

$x^2 + 2x + 1 = 1$ → He did not add one to both sides

$(x-1)^2 = 1$ ↳ should not be negative

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

$x = 1 \pm \sqrt{1}$

$x = \{0, 2\}$

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

$\sqrt{(x+1)^2} = \sqrt{2}$

$x + 1 = \pm\sqrt{2}$

$x = -1 \pm \sqrt{2}$