Algebra
Activity 5d - Completing the Square

1. Expand

   - $(x+1)(x+1)$
   - $(x+1)^2$ - How does an exponent relate to multiplication?
   - $(x-4)^2$
   - $(x-3)^2$
   - Thinking of these expressions as parabolas in general form, what pattern do you see between the coefficients b and c?

2. Factor

   - x^2+6x+9
   - $x^2-10x+25$
   - x^2+4x+4
   - Thinking of these expressions as parabolas in general form, what pattern do you see between the coefficients b and c?

3. Supply the missing constant so that $f(x)$ is a perfect square, then factor the expression.

   - $f(x) = x^2 - 8x +$
   - $f(x) = x^2 + 2x +$
   - $f(x) = x^2 - 12x +$
   - $f(x) = x^2 - 3x +$

4. Find the center and radius of the circle by completing the square. That is, add constants to both sides of the equation so that you can factor the equation into standard form $(x-h)^2 + (y-k)^2 = r^2$

$$x^2 + 10x + \qquad + y^2 - 6y + \qquad = 2$$

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5. Find the vertex of the following parabola by moving the constant to the left side, completing the square on the right side, adding the same constant to both sides, then writing in standard form $y = a(x - h)^2 + k$.

   - $y = x^2 + 6x + 3$

   - $y = x^2 - 10x + 22$

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

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

6. Find the vertex of the following parabola by moving the constant to the left side, completing the square on the right side, adding the same constant to both sides, then writing in standard form $y = a(x - h)^2 + k$.

$$y = x^2 + bx + c$$

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7. Find the vertex of the following parabola by moving the constant to the left side, dividing by the coefficient on x^2, completing the square on the right side, adding the same constant to both sides, finding a common denominator on the left side, simplifying, then writing in standard form $y = a(x - h)^2 + k$.

$$y = 2x^2 + 5x + 3$$

8. Find the vertex of the following parabola. You may use the procedure described in problem 7.

$$y = ax^2 + bx + c$$