Finding the Vertex of Quadratic Equations

The vertex (x, y) of equations in the form $y = ax^2 + bx + c$ can be found by letting $x = -\frac{b}{2a}$, and *y* will be whatever you get when you plug *x* into the equation above.

- Example: $y = 3x^2 + 12x - 5$ For the vertex, $x = -\frac{b}{2a} = -\frac{12}{2(3)} = -\frac{12}{6} = -2$.

  Plug in x = –2 into the equation:

  $y = 3(-2)^2 + 12(-2) - 5 \quad = \quad 3(4) - 24 - 5 \quad = \quad 12 - 29 \quad = \quad -17$

  So, the vertex is (–2, –17).

Find the vertex of the parabolas given by the equations below.

1. $y = 3x^2 - 24x - 7$
2. $y = x^2 + 6x + 3$
3. $y = -2x^2 - 8x + 10$
4. $y = 2x^2 - 16x + 1$
5. $y = 3x^2 - 24x - 15$
6. $y = -x^2 + 5x + 1$
7. $y = -4x^2 + 8x - 1$
8. $y = 6x^2 + 12x + 6$
9. $y = 2x^2 - 2x + 5$