Graphing Quadratic Equations

1. What is the turning point, or vertex, of the parabola whose equation is $y = 3x^2 + 6x - 1$?

2. What is the equation of the axis of symmetry of the parabola represented by $y = -x^2 + 6x - 4$?

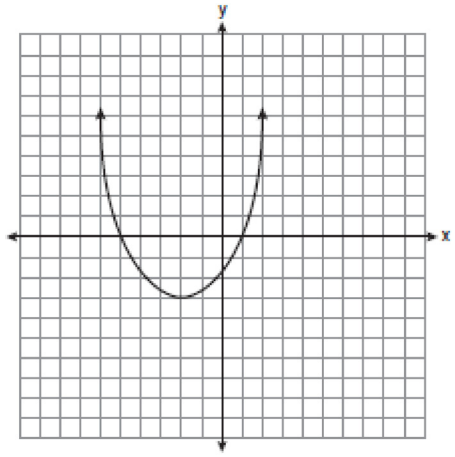
3. What is the minimum point of the graph of the equation $y = 2x^2 + 8x + 9$?
   (1) (2, 33) (2) (2, 17) (3) (–2, –15) (4) (–2, 1)

4. A model rocket is launched from ground level. Its height, *h* meters above the ground, is a function of time *t* seconds after launch and is given by the equation $h = -4.9t^2 + 68.6t$. What would be the maximum height, to the nearest meter, attained by the model?

5. The height of a swimmer's dive off a 10-foot platform into a diving pool is modeled by the equation $y = 2x^2 - 12x + 10$, where *x* represents the number of seconds since the swimmer left the diving board and *y* represents the number of feet above or below the water's surface. What is the farthest depth below the water's surface that the swimmer will reach?

6. An equation of a parabola that has $x = -2$ as its axis of symmetry is
   (1) $y = x^2 - 4x + 1$ (2) $y = x^2 - 2x + 3$
   (3) $y = 2x^2 + 8x - 3$ (4) $y = 2x^2 + 4x - 7$

7. What are the vertex and the axis of symmetry of the parabola shown in the diagram below?



8. Consider the graph of the equation $y = ax^2 + bx + c$, when $a \neq 0$. If *a* is multiplied by 3, what is true of the graph of the resulting parabola?
   (1) The vertex is 3 units above the vertex of the original parabola.
   (2) The new parabola is 3 units to the right of the original parabola.
   (3) The new parabola is wider than the original parabola.
   (4) The new parabola is narrower than the original parabola.

9. Melissa graphed the equation $y = x^2$ and Dave graphed the equation $y = -3x^2$ on the same coordinate grid. What is the relationship between the graphs that Melissa and Dave drew?
   (1) Dave's graph is wider and opens in the opposite direction from Melissa's graph.
   (2) Dave's graph is narrower and opens in the opposite direction from Melissa's graph.
   (3) Dave's graph is wider and is three units below Melissa's graph.
   (4) Dave's graph is narrower and is three units to the left of Melissa's graph.