

## Vertex Formula (#45)

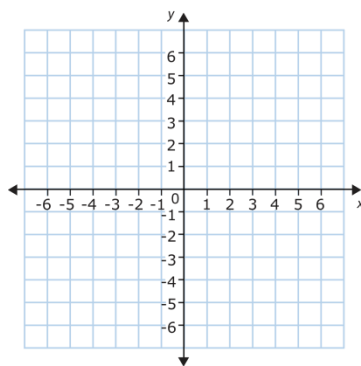
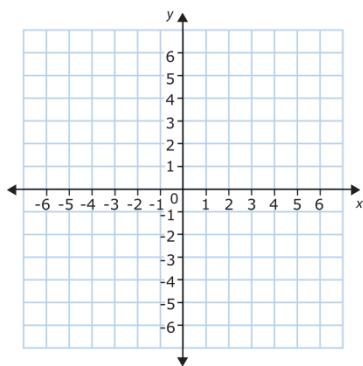
Graph each parabola using its vertex and roots (if any). Find the vertex and roots with the formulas below.

$$\text{Vertex} = \left( \frac{-b}{2a}, f\left(\frac{-b}{2a}\right) \right)$$

$$\text{Roots} = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

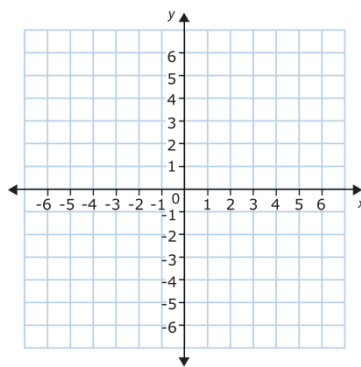
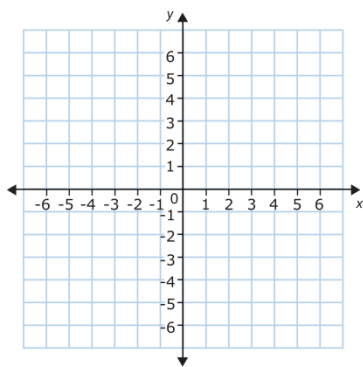
1.  $f(x) = x^2 - 4x$

2.  $f(x) = x^2 + 4x - 5$

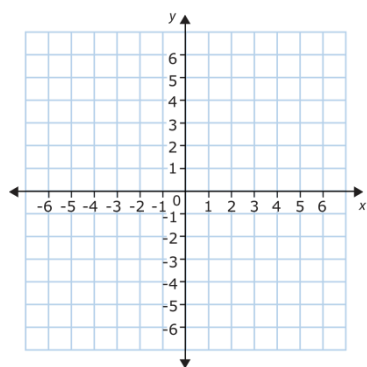


3.  $f(x) = -3x^2 + 7x - 2$

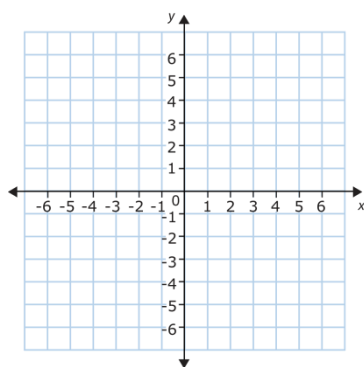
4.  $f(x) = 2x^2 + 8x + 8$



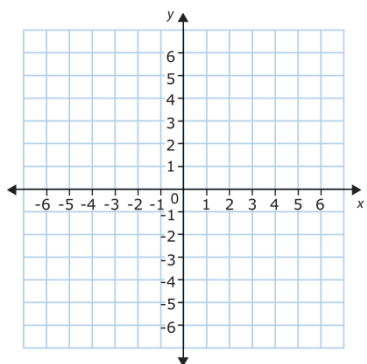
5.  $f(x) = -x^2 + x + 1$



6.  $f(x) = x^2 + 1$



7.  $f(x) = 3x^2 - 5$



8.  $f(x) = -4x^2 + 8x - 3$

