Square Root Property, Completing the Square, Quadratic Formula
The Square Root Property: We know that if $x^2 = a$, $x = \sqrt{a}$ or $x = -\sqrt{a}$.

1. Use the square root property to solve the following.

   $x^2 = 50$ $\qquad$ $16p^2 = 49$ $\qquad$ $3u^2 + 4 = 31$ $\qquad$ $5x^2 + 125 = 0$

   $(p-5)^2 = 9$ $\qquad$ $(3t-4)^2 = 4$ $\qquad$ $2(x-3)^2 - 6 = 0$ $\qquad$ $(u+5)^2 + 18 = 0$

   Notice the second row all had a binomial, like $(x + d)$ squared, which allowed us to use the square root property, since that was the only occurrence of the variable. If we have a quadratic equation that is not in this form, we can rewrite to be in this form, and this is called **completing the square**.

   In fact, we can use completing the square to derive the **Quadratic Formula**, which shows that if

   $ax^2 + bx + c = 0$, then $x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

2. Use completing the square, the Quadratic Formula, or factoring to solve the following.

   $p^2 + 4p + 6 = 0$ $\qquad$ $-3y - 10 = -y^2$ $\qquad$ $2x(x+6) = 14$

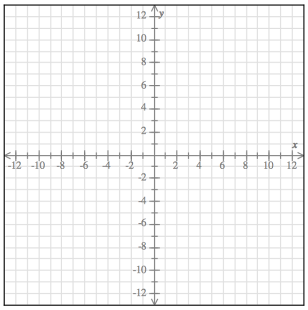
   $\frac{1}{5}h^2 + h + \frac{3}{5} = 0$ $\qquad$ $x^2 + 4x + 8 = 0$

3. Remember that x-intercepts happen when $y = 0$ or $f(x) = 0$, and y-intercepts occur when $x = 0$. Find the x and y-intercepts of the functions below. Write your answer in point form.

   $g(x) = 4y^2 + 8y - 5$ $\qquad$ $f(x) = 3x^2 + 2x - 2$

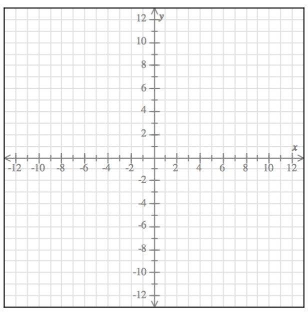
4. A baseball is thrown upward with an initial velocity of 32 $\frac{ft}{sec}$ from a cliff that is 48 feet off the ground. The baseball's height h (in feet) after t seconds is given by $h(t) = -16t^2 + 32t + 48$. Find the time at which the height of the ball is 64 feet.

5. Sketch a graph of $y = x^2$ by plotting points, using $x = -3, -2, -1, 0, 1, 2, 3$.

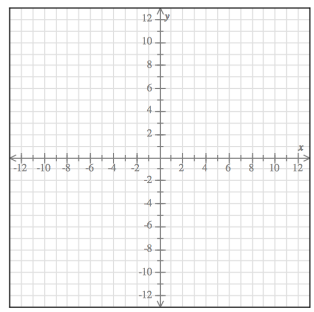


6. Sketch the following graphs by plotting points, and compare these to the graph of $y = x^2$.

$f(x) = x^2 + 3$



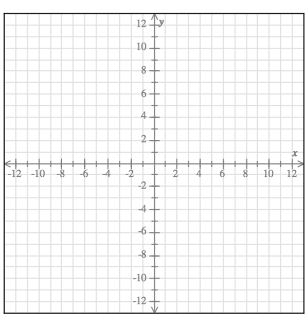
$g(x) = x^2 - 2$



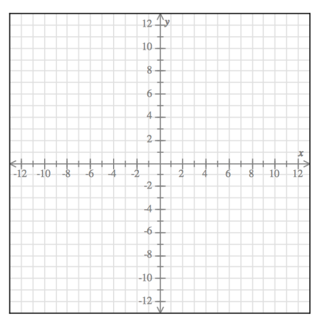
7. Generally, if $f(x) = x^2 + k$, describe how the graph shifts the $y = x^2$ if $k > 0$ and if $k < 0$.

8. Sketch a graph of the following functions, and compare these to the graph of $y = x^2$.

$h(x) = (x - 2)^2$



$k(x) = (x + 3)^2$



9. Generally, if $f(x) = (x - h)^2$, describe how the graph shifts the $y = x^2$ if $h > 0$ and if $h < 0$.