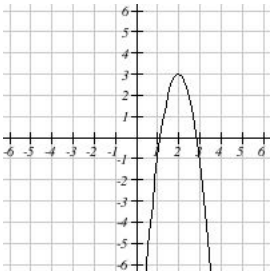
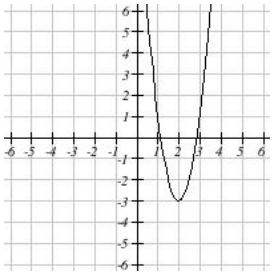
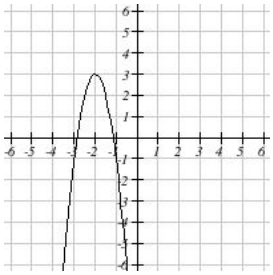
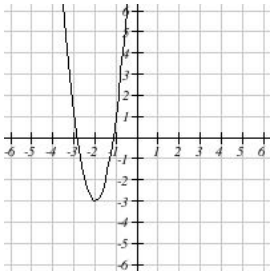
Introduction to Quadratic Functions and their Graphs

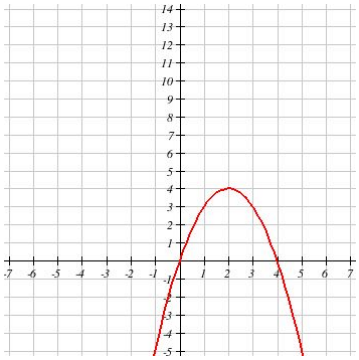
1. Consider the quadratic function $f(x) = 9x^2 - 49$.
   a. Its vertex is _____.
   b. The x -intercepts are _____.
   c. The y -intercept is _____.
2. Consider the Quadratic function $f(x) = x^2 - 4x - 12$.
   a. Its vertex is _____.
   b. The x -intercepts are _____.
   c. The y -intercept is _____.
3. Consider the Quadratic function $f(x) = 3x^2 - 18x - 21$
   a. Its vertex is _____.
   b. The x -intercepts are _____.
   c. The y -intercept is _____.
4. Consider the quadratic function $f(x) = x^2 - 3x - 10$.
   a. Its vertex is _____.
   b. The x -intercepts are _____.
   c. The y -intercept is _____.
   d. The line of symmetry has the equation _____
5. Consider the quadratic function $f(x) = -3x^2 - 9x + 54$.
   a. Its vertex is _____.
   b. The x -intercepts are _____.
   c. The y -intercept is _____.
   d. The line of symmetry has the equation _____
6. Consider the Quadratic function $f(x) = x^2 - 3x - 40$.
   a. Its vertex is _____.
   b. The x -intercepts are _____.
   c. The y -intercept is _____.
   d. The line of symmetry has the equation _____
7. Consider the parabola given by the equation $f(x) = x^2 + 14x - 7$
   a. The value of $f(-3)$ is
   b. The vertex is
   c. The y -intercept is the point
   d. Find the two values of x that make $f(x) = 0$.
8. Consider the parabola given by the equation $f(x) = -x^2 + 6x + 14$
   a. The value of $f(-2)$ is
   b. The vertex is
   c. The y -intercept is the point
   d. Find the two values of x that make $f(x) = 0$.
9. The quadratic equation $y = -1(x + 9)(x - 3)$ is in *factored form*.
   What are the *x*-intercepts for the graph of this equation?

10. Match the function with its graph.

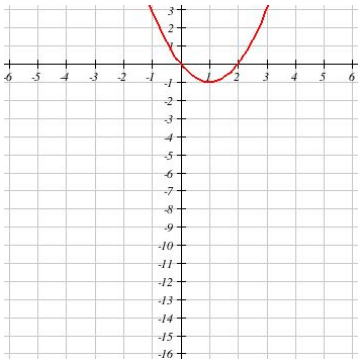
$y = 4(x+2)^2 - 3$

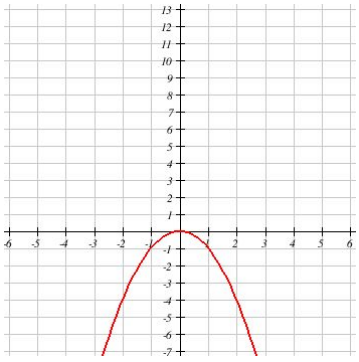
11. The graph of $y = -x^2 + 4x$ is shown below. Use the graph to solve the equation $-x^2 + 4x = 0$.



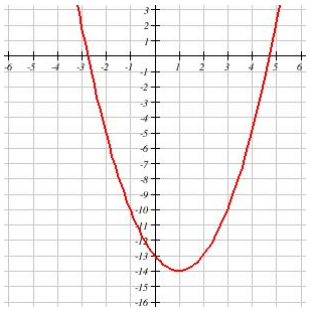
12. The graph of $y = x^2 - 2x$ is shown below. Use the graph to solve the equation $x^2 - 2x = 0$.



13. The graph of $y = -x^2$ is shown below. Use the graph to solve the equation $-x^2 = 0$.



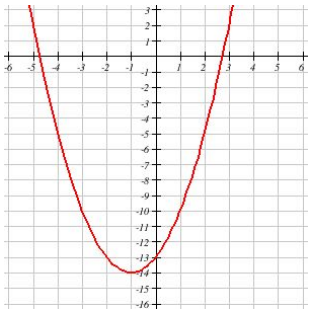
14. The graph of $f(x) = x^2 - 2x - 13$ is shown below. Use the graph to solve the equation $f(x) = -15$.



15. A person standing close to the edge on top of a 96-foot building throws a ball vertically upward. The quadratic function $h(t) = -16t^2 + 116t + 96$ models the ball's height above the ground, $h(t)$, in feet, t seconds after it was thrown.
    a. What is the maximum height of the ball?

    b. How many seconds does it take until the ball hits the ground?

16. The graph of $W(x) = x^2 + 2x - 13$ is shown below. Use the graph to solve the equation $W(x) = -14$.



17. NASA launches a rocket at $t = 0$ seconds. Its height, in meters above sea-level, as a function of time is given by $h(t) = -4.9t^2 + 283t + 213$.
    a. Assuming that the rocket will splash down into the ocean, at what time does splashdown occur?

    b. How high above sea-level does the rocket get at its peak?

++++++++++++++++

Key - Part 1

1. (0,-49) ~ (2.3333333333333,0),(-2.3333333333333,0) ~ (0,-49)
2. (2,-16) ~ (-2,0),(6,0) ~ (0,-12)
3. $(3,-48)$ or $(3,-48)$ ~ $(-1,0),(7,0)$ or $(-1,0),(7,0)$
4. (-2,0),(5,0) ~ (0,-10) ~ $(1.5,-12.25)$ ~ $x=1.5$
5. (-6,0),(3,0) ~ (0,54) ~ $(-1.5,60.75)$ ~ $x=-1.5$
6. $(1.5,-42.25)$ ~ $(-5,0),(8,0)$ ~ $(0,-40)$
7. $\frac{-14+4\sqrt{14}}{2}, \frac{-14+4\sqrt{14}}{2} = 0.48331477354788, -14.483314773548$
8. $\frac{-6+2\sqrt{23}}{2}, \frac{-6+2\sqrt{23}}{2} = -1.7958315233127, 7.7958315233127$
9. (-9,0) ~ (3,0)
10. graphs
11. $0, 4$
12. $0, 2$
13. 0
14. DNE
15. 306.25 feet ~ 8 seconds
16. -1
17. 58.498 seconds ~ 4299.173 meters
