

Section 9 - 2 Quadratic Functions

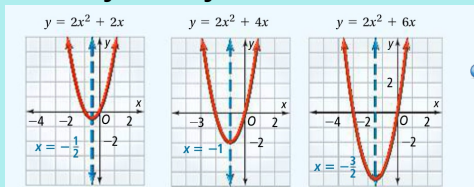
Students will be able to graph quadratic functions in the form $y = ax^2 + bx + c$.

SOLVE IT! Getting Ready!

You throw a ball straight up into the air and catch it at the same height you released it. The parabola at the right shows the height h of the ball in feet after t seconds. What is the total distance the ball travels? For how long does the ball travel up? Explain your reasoning.

Video

In the quadratic function $y = ax^2 + bx + c$, the value of b affects the position of the axis of symmetry.



Audio

The equation for the axis of symmetry is

$*x = \frac{-b}{2a}$ Check the third graph. $x = \frac{-b}{2a} = -\frac{6}{2(2)} = -\frac{6}{4}$

If $y = ax^2 + bx + c$, the axis of symmetry is at $x = \frac{-b}{2a}$. This is also the x-coordinate of the vertex.

Vertex (,)

To find the y-intercept of the function, remember to plug in 0 for x. $(0, c)$

Ex: Find the vertex and the y-intercept

1). $y = -2x^2 + 3x + 6$

vertex = $(.75, 7.125)$ $x = \frac{-b}{2a} = -\frac{3}{2(-2)} = \frac{-3}{-4} = .75$
 $y\text{-int} = (0, 6)$ $y = -2(.75)^2 + 3(.75) + 6 = 7.125$

2). $y = -6x^2 + 3$

vertex = $(0, 3)$ $x = \frac{-b}{2a} = \frac{-0}{2(-6)} = 0$
 $y\text{-int} = (0, 3)$
 pt $(1, -3)$

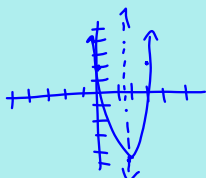
Find the vertex and the axis of symmetry, also give the y-int:

$$y = 3x^2 - 9x + 2$$

Vertex: $(1.5, 4.5)$
axis of sym: $X = 1.5$

y-int: $(0, 2)$

$$f(x) = 6x^2 + 4x - 5$$



What is the graph of the function

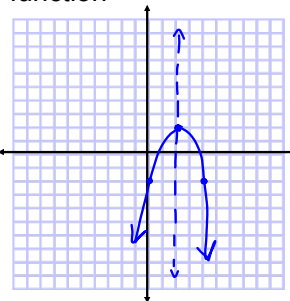
$$y = -x^2 + 4x - 2?$$

↓
opens
down

→ y-int: $(0, -2)$

$$X = \frac{-4}{2(-1)} = \frac{-4}{-2} = 2$$

Vertex $(2, 2)$



Go back and graph the previous functions using the information you found about the vertex, axis, and y-intercept.

Last section we said that if an object is falling you can use the equation $h = -16t^2 + c$. If the object projected into the air has a given initial velocity v , the formula $h = -16t^2 + vt + c$ gives the approximate height above ground.

Daniel kicks a soccer ball up into the air with an initial upward velocity of 64 ft per sec. The ball is 2 ft above the ground when it is kicked. How long will it take the ball to reach its max height? ^{2 sec} How high above the ground will it be? ^{66 ft} What is the range of the function?

$$h = -16t^2 + vt + c \quad h = -16t^2 + 64t + 2$$

$$x = -\frac{64}{2(-16)} = 2$$

Hwk: pg. 556 - 557
 #8, 14, 16 - 19 all,
 22 - 28 evens, 33,