

8.2 Notetaking with Vocabulary

I can graph quadratics using transformations or characteristics.

I can find the zeros of a quadratic function.

Write the meaning of each vocabulary term.

zero of a function - an x -value for which $f(x) = 0$

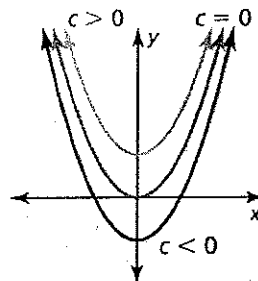
zero of a function $f(x) = 0$ \iff x -intercept of a graph \iff the solution/root of the equation $ax^2 + bx + c = 0$

Core Concepts

vertical shift

Graphing $f(x) = ax^2 + c$ using transformations.

- When $c > 0$, the graph of $f(x) = ax^2 + c$ is a shift up of the graph of $f(x) = ax^2$.
- When $c < 0$, the graph of $f(x) = ax^2 + c$ is a shift down of the graph of $f(x) = ax^2$.



Vertex $(0, c)$

also y-int.!

The vertex of the graph of $f(x) = ax^2 + c$ is $(0, c)$ and the axis of symmetry is $x = 0$

Notes:

Reflection over x -axis?
if $a < 0$.

Vertical stretch? $|a| > 1$

Vertical compression? $0 < |a| < 1$

8.2 Notetaking with Vocabulary (continued)

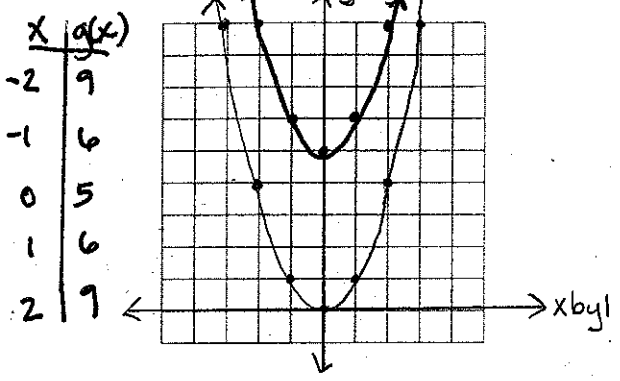
$f(x) = x^2$

Practice

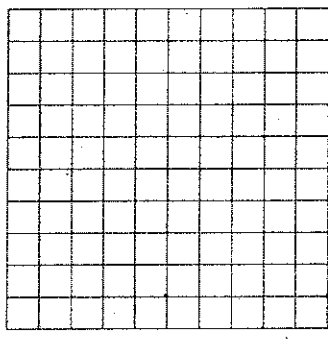
In Exercises 1-4, graph the function using transformations. Compare the graph to the graph of $f(x) = x^2$.

x	f(x)
-2	4
-1	1
0	0
1	1
2	4

1. $g(x) = x^2 + 5$



2. $m(x) = x^2 - 3$

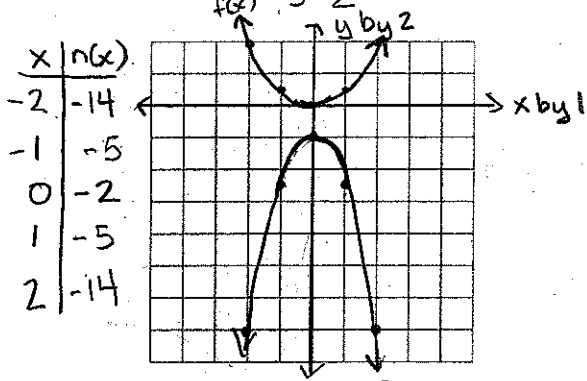


x	m(x)
-2	1
-1	-2
0	-3
1	-2
2	1

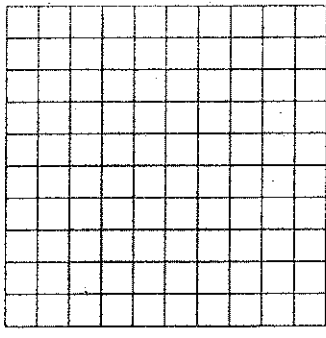
3. $n(x) = -3x^2 - 2$

reflection
v. stretch
shift down

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



4. $q(x) = \frac{1}{2}x^2 - 4$



$n(-2) = -3(-2)^2 - 2$
 $n(-2) = -3 \cdot 4 - 2$
 $n(-2) = -12 - 2$
 $= -14$

$n(x)$ is a reflection over the x-axis, vertical stretch and a shift down 2 of $f(x)$.

	x	-1
x	x ²	-1x
1	1x	-1

8.2 Notetaking with Vocabulary (continued)

In Exercises 5–8, find the zeros of the function. $f(x) = 0$ $y = 0$

5. $y = -x^2 + 1$
 $0 = -x^2 + 1$
 $0 = -1(x^2 - 1)$
 $0 = -1(x+1)(x-1)$

$x^2 - 1$
 $a = 1$ $b = 0$ $c = -1$
 $\frac{1}{1} \cdot \frac{-1}{-1} = -1$
 $\frac{1}{1} + \frac{-1}{-1} = 0$
 $x+1=0$ $x-1=0$
 $x = -1$ $x = 1$

6. $y = -4x^2 + 16$
 $0 = -4x^2 + 16$
 $0 = -4(x^2 - 4)$

7. $n(x) = -x^2 + 64$

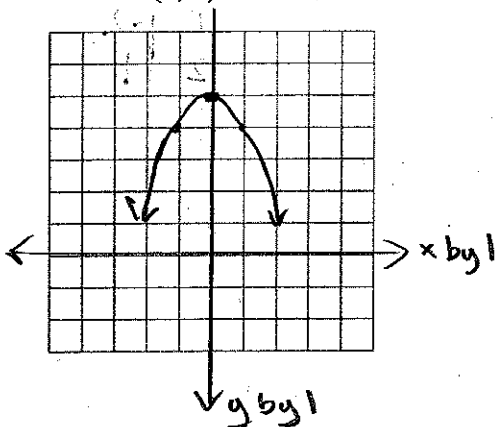
8. $p(x) = -9x^2 + 9$
 $0 = -9x^2 + 9$
 $0 = -1(9x^2 - 1)$
 $0 = -1(3x+1)(3x-1)$

$9x^2 - 1$
 $a = 9$ $b = 0$ $c = -1$
 $\frac{-3}{-3} \cdot \frac{3}{3} = -9$
 $\frac{-3}{-3} + \frac{3}{3} = 0$

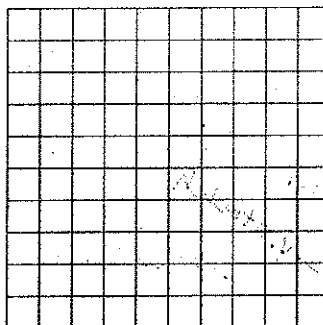
	3x	-1
3x	9x ²	-3x
1	3x	-1

In Exercises 9 and 10, sketch a parabola with the given characteristics.

9. The parabola opens down, and the vertex is (0, 5).



10. The lowest point on the parabola is (0, 4).



$3x+1=0$
 $3x = -1$
 $x = -\frac{1}{3}$

$3x-1=0$
 $3x = 1$
 $x = \frac{1}{3}$

11. The function $f(t) = -16t^2 + s_0$ represents the approximate height (in feet) of a falling object t seconds after it is dropped from an initial height s_0 (in feet). A tennis ball falls from a height of 400 feet.

a. After how many seconds does the tennis ball hit the ground?

want t ? $0 = -16t^2 + 400$
 $0 = -16(t^2 - 25)$
 $0 = -16(t-5)(t+5)$

height? 0
output
 $t-5=0$ $t+5=0$
 $t=5$ $t=-5$

The tennis ball lands after 5 seconds.

b. Suppose the initial height is decreased by 384 feet. After how many seconds does the ball hit the ground?