

~~7~~
~~14~~

2.7
1.14 ?
prime...

Warm up!

Remember, x-intercepts are the solutions!

Examples 1-3 Solve each equation by graphing.

10. $x^2 + 7x + 14 = 0$ ✗

13. $x^2 - 5x + 12 = 0$ ✗

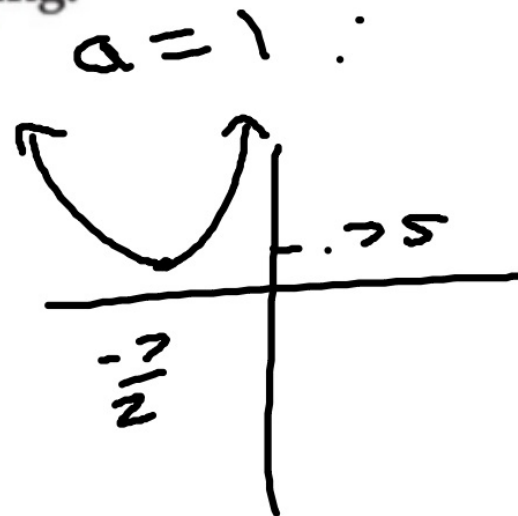
step 1: $x = \frac{-b}{2a}$

⑩ $= \frac{-(7)}{2(1)} = \frac{-7}{2}$

$\left(\frac{-7}{2}\right)^2 + 7\left(\frac{-7}{2}\right) + 14$

$= \frac{49}{4} - \frac{49}{2} + 14$

$12.25 - 24.5 + 14 = .75$



 **New Vocabulary**

Let's explore quadratics with Desmos...

- transformation

← general term

- translation

"move"

- dilation

"stretch"

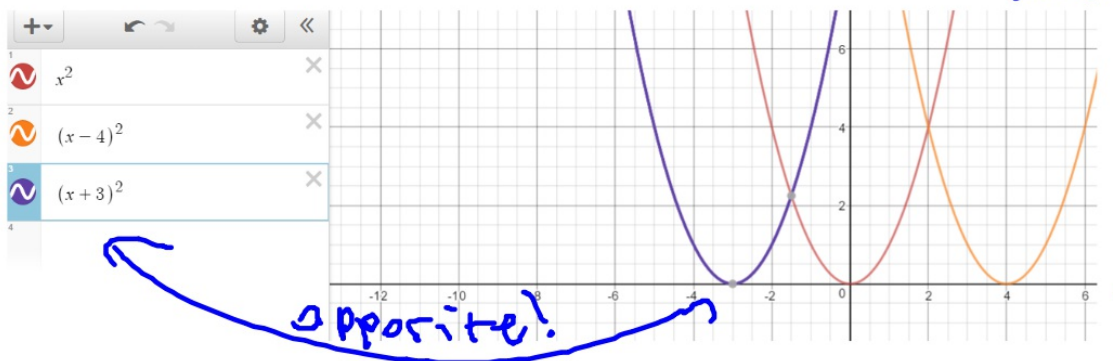
- reflection

"mirror..."

← specific ways
to transform...

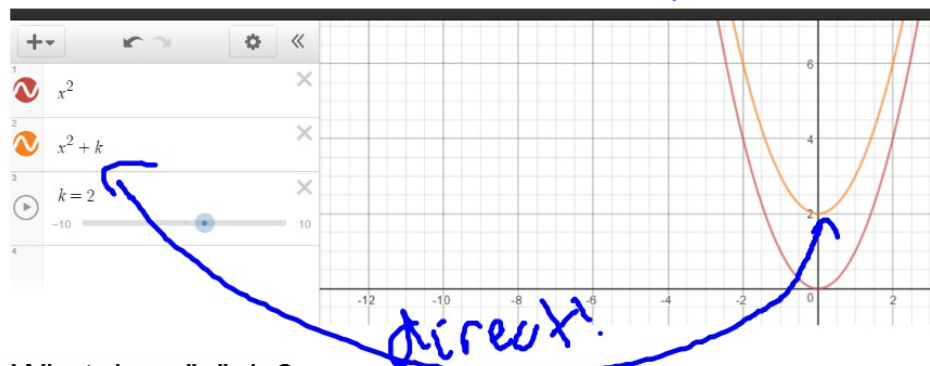
What does "h" do?

moves left + + right



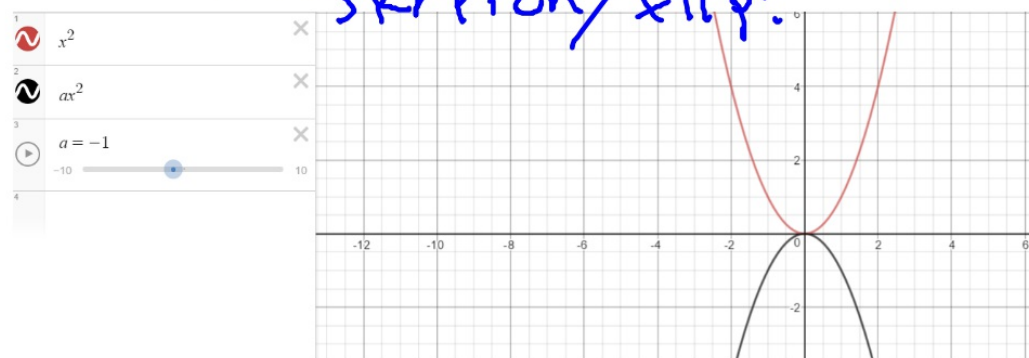
What does "k" do?

moves up or down



What does "a" do?

stretch/flip!

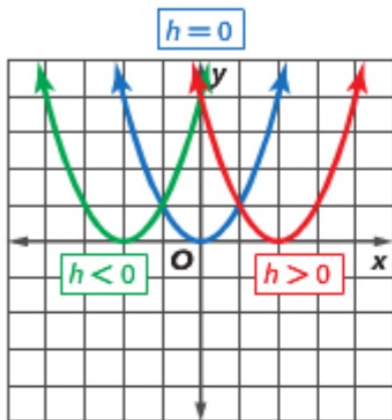


ConceptSummary Transformations of Quadratic Functions

Warm up! Write this down! $f(x) = a(x - h)^2 + k$

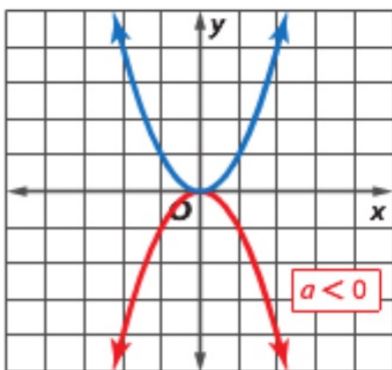
h , Horizontal Translation

h units to the right if h is positive
 $|h|$ units to the left if h is negative



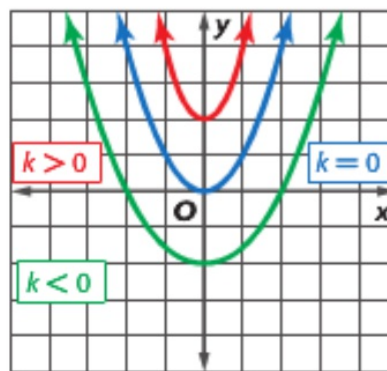
a , Reflection

If $a > 0$, the graph opens up.
If $a < 0$, the graph opens down.



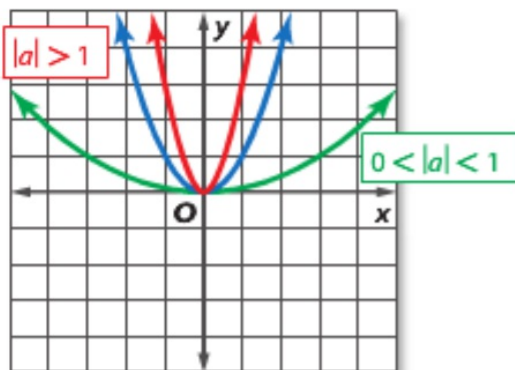
k , Vertical Translation

k units up if k is positive
 $|k|$ units down if k is negative



a , Dilation

If $|a| > 1$, the graph is stretched vertically.
If $0 < |a| < 1$, the graph is compressed vertically.



Q.568

Check Your Understanding

 = Step-by-Step Solutions begin on page R13.

Examples 1–5, 7

Describe how the graph of each function is related to the graph of $f(x) = x^2$. **1–6. See margin.**

1. $g(x) = x^2 - 11$

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

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

4. $g(x) = x^2 + 6$

5. $g(x) = -4(x + 3)^2$

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

Example 6

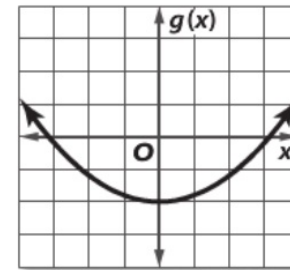
7. **MULTIPLE CHOICE** Which is an equation for the function shown in the graph? **C**

A $g(x) = \frac{1}{5}x^2 + 2$

C $g(x) = \frac{1}{5}x^2 - 2$

B $g(x) = -5x^2 - 2$

D $g(x) = -\frac{1}{5}x^2 - 2$



Additional Answers

1. translated down 11 units
2. translated right 2 units and compressed vertically
3. reflected across the x -axis, translated up 8 units
4. translated up 6 units
5. reflected across the x -axis, translated left 3 units and stretched vertically
6. reflected across the x -axis, translated down 2 units

**Examples
1–5, 7**

Describe how the graph of each function is related to the graph of $f(x) = x^2$. **8–17. See margin.**

8. $g(x) = -10 + x^2$

9. $h(x) = -7 - x^2$

10. $g(x) = 2(x - 3)^2 + 8$

11. $h(x) = 6 + \frac{2}{3}x^2$

12. $g(x) = -5 - \frac{4}{3}x^2$

13. $h(x) = 3 + \frac{5}{2}x^2$

14. $g(x) = 0.25x^2 - 1.1$

15. $h(x) = 1.35(x + 1)^2 + 2.6$

16. $g(x) = \frac{3}{4}x^2 + \frac{5}{6}$

17. $h(x) = 1.01x^2 - 6.5$

⑪ $h(x) = \frac{2}{3}x^2 + 6$

⑧ $g(x) = x^2 - 10$

⑨ $h(x) = -x^2 - 7$

8. translated down 10 units

9. reflected across the x -axis,
translated down 7 units

10. translated right 3 units and up 8
units and stretched vertically

11. compressed vertically, translated up
6 units

12. reflected across the x -axis, stretched
vertically, translated down 5 units

13. stretched vertically, translated up 3
units

14. compressed vertically, translated
down 1.1 unit

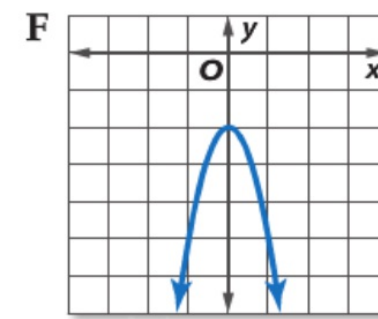
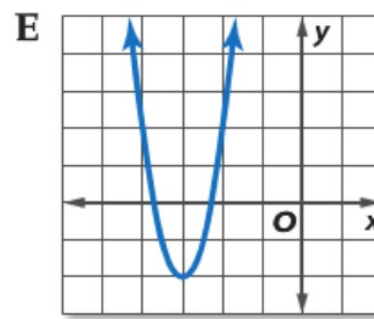
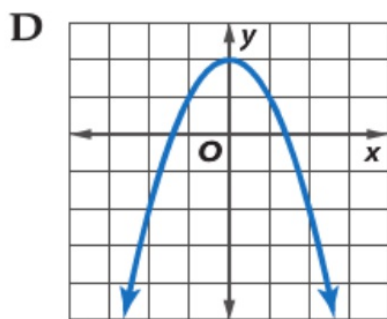
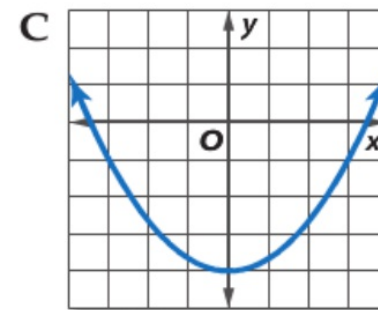
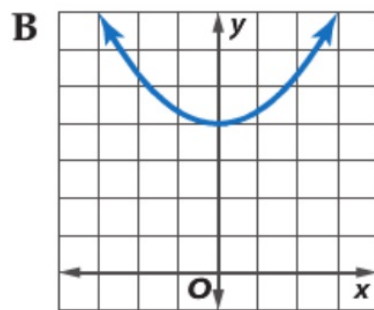
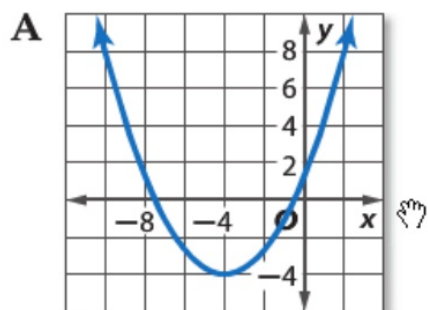
15. translated left 1 unit and up 2.6
units and stretched vertically

16. compressed vertically, translated
up $\frac{5}{6}$ unit

17. stretched vertically, translated down
6.5 units

Example 6

Match each equation to its graph.



18. $y = \frac{1}{3}x^2 - 4$ **C**

21. $y = -3x^2 - 2$ **F**

19. $y = \frac{1}{3}(x + 4)^2 - 4$ **A**

22. $y = -x^2 + 2$ **D**

20. $y = \frac{1}{3}x^2 + 4$ **B**

23. $y = (2x + 6)^2 + 2$ **E**