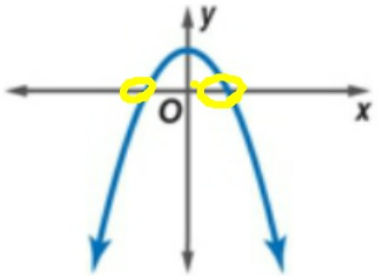
LESSON 9–2 Solving Quadratic Equations by Graphing

Before we jump into this, let's talk about these "solutions."

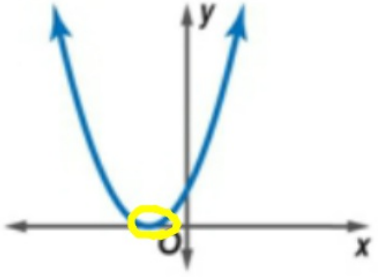
What is the name of the "x" value in these cases?

y = 0, then you have x-int.

KeyConcept Solutions of Quadratic Equations



two unique real solutions



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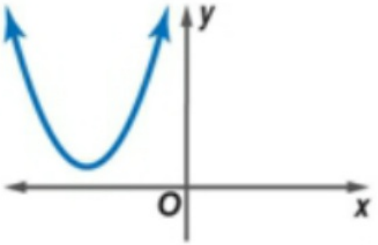


no real solutions

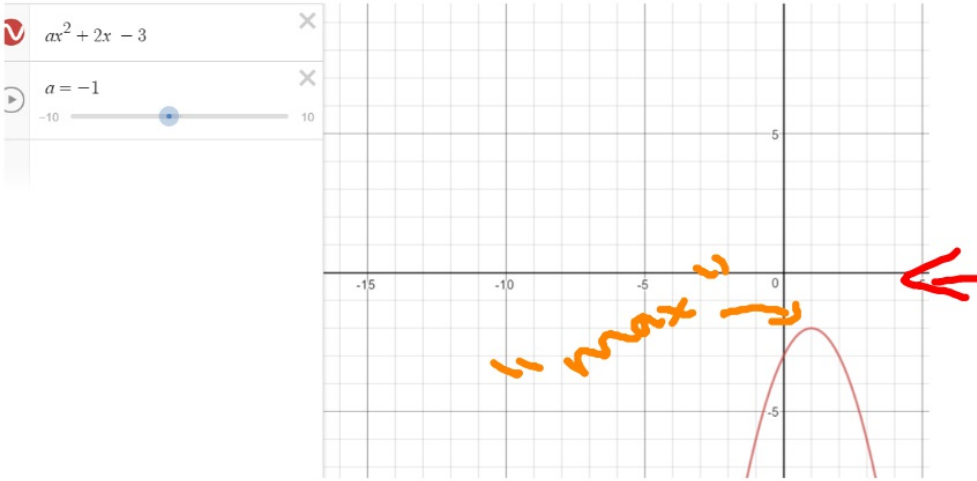
$$y = ax^2 + bx + c$$

$$0 = 2x^2 + 5x + 3$$

What do you notice about the "y" value in the red equation?

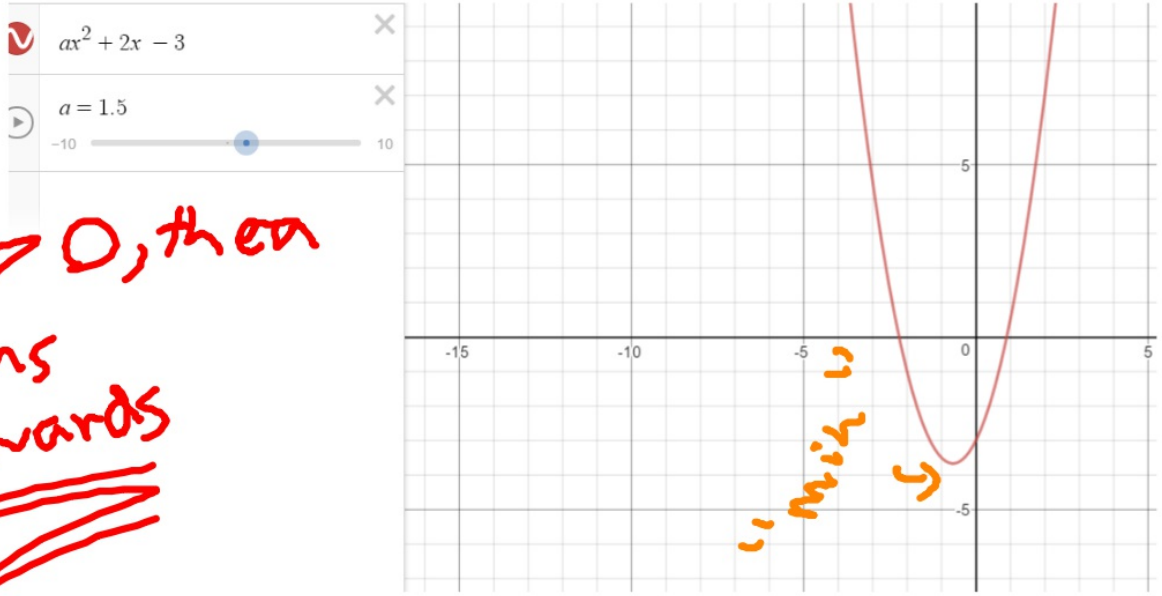
$y = ax^2 + bx + c$

when does the parabola open up or down?



"max"

If $a < 0$, it opens downwards



"min"

If $a > 0$, then it opens upwards

Examples 1–3 Solve each equation by graphing. **1–4. See Ch. 9 Answer Appendix for graphs.**

1. $x^2 + 3x - 10 = 0$ **2, –5**
2. $2x^2 - 8x = 0$ **0, 4** Can we factor...?
3. $x^2 + 4x = -4$ **–2**
4. $x^2 + 12 = -8x$ **–6, –2**

$5 \times -2 = -10$, $5 + -2 = 3$ $(x+5)(x-2)=0$

Here are the NEW instructions; find the vertex, find the x-intercepts (if any), and graph.

Step 1: Find the axis of symmetry.

$x+5=0$ $\quad x-2=0$

$-5 \quad -5 \quad +2 \quad +2$

$x=-5 \quad x=2$

$\frac{-3}{2}$

x	y

① $y = x^2 + 3x - 10$

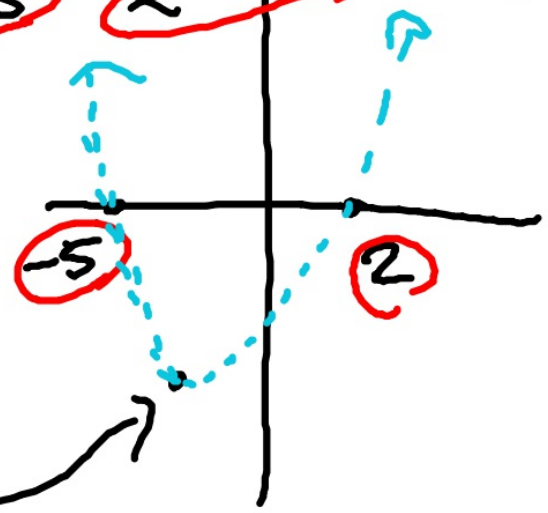
$a = 1$, $b = 3$ (signs)

$x = \frac{-b}{2a} = \frac{-(3)}{2(1)} = \frac{-3}{2}$

$y = (\frac{-3}{2})^2 + 3(\frac{-3}{2}) - 10$

$\frac{9}{4} \quad \frac{9}{2} \quad -10$

$2.25 - 4.5 - 10 = -12.25$



3. $x^2 + 4x = -4$ **−2**

$x^2 + 4x + 4 = 0$

$ax^2 + bx + c = y$

$a = 1$

$x = \frac{-b}{2a} = \frac{-(4)}{2(1)} = \frac{-4}{2} = -2$

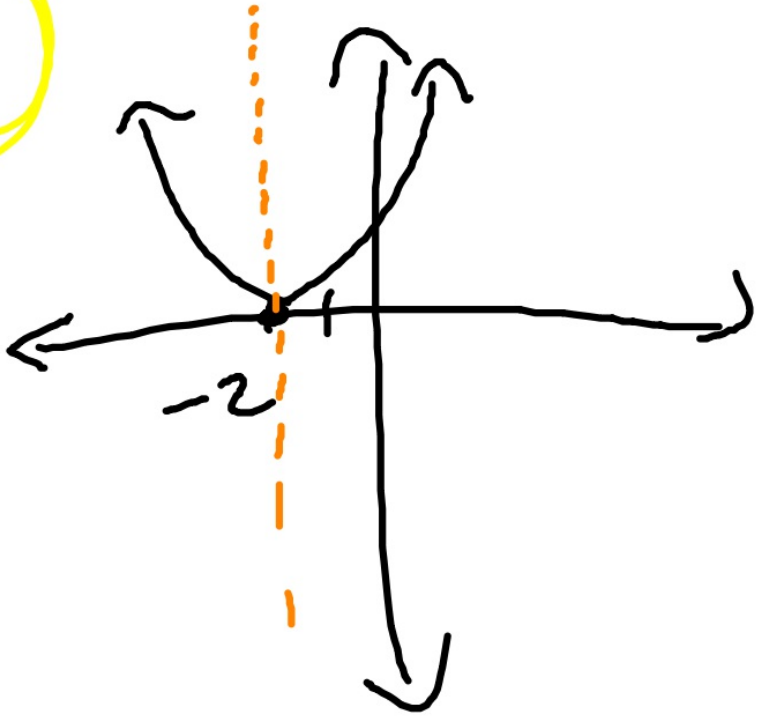
$x = -2$

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

$4 - 8 + 4 = 0$

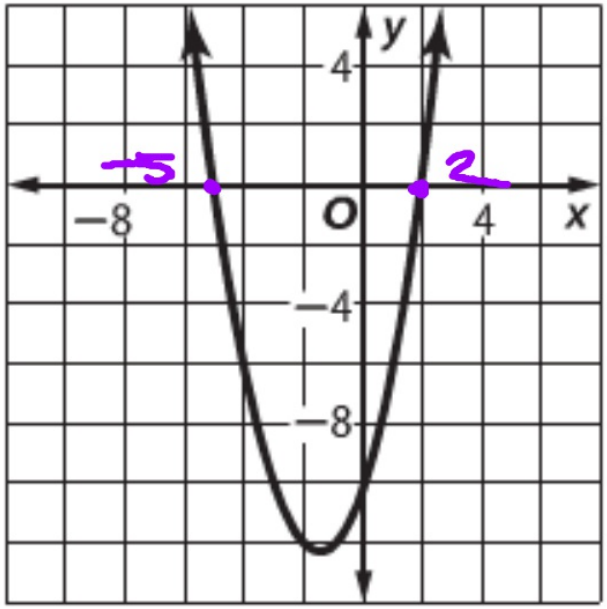
$(-2, 0)$

vivxet

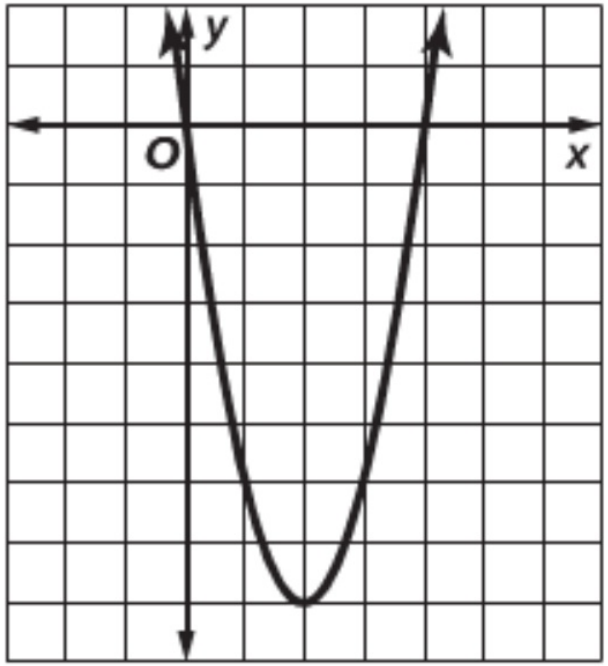


Lesson 9-2

1.



2.



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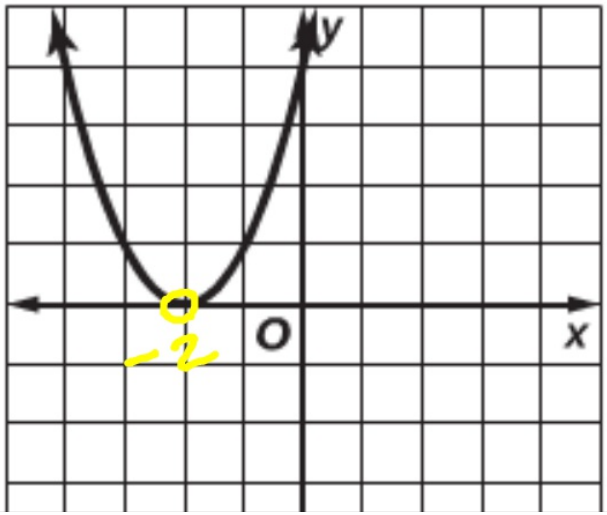

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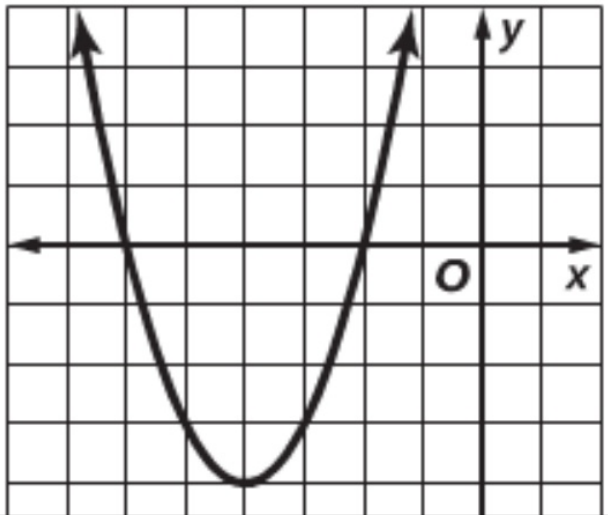


2. $2x^2 - 8x = 0$ **0, 4** Can we factor...?

$a=2 \quad b=-8 \quad$ GCF: $2x$

(2) $2x^2 - 8x = 0$

$2x(x-4) = 0$

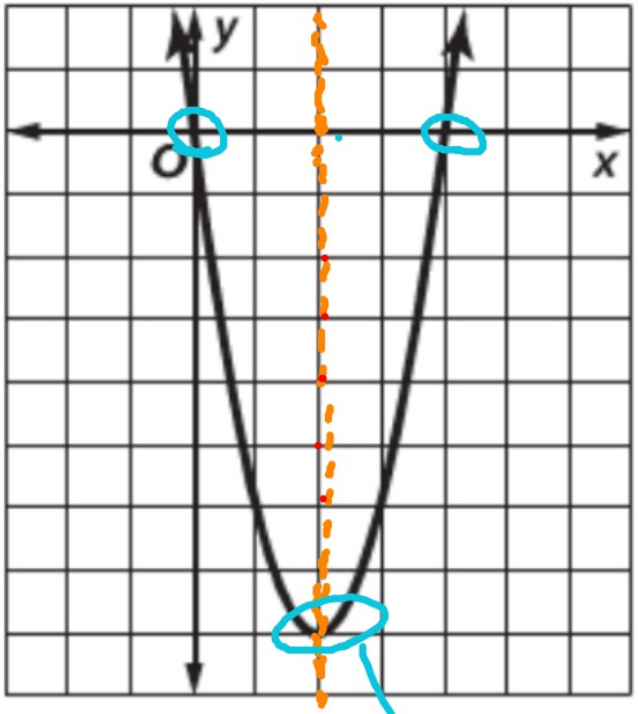
$\frac{2x}{2} = \frac{0}{2}$ $\qquad$ $x-4=0$ $\quad +4 \quad +4$

$x = 0$ $\qquad$ $x = 4$

$x = \frac{-b}{2a} = \frac{-(-8)}{2(2)} = \frac{8}{4} = 2$

$x = 2$

2.



vertex

$2(2)^2 - 8(2) = y$

$8 - 16 = -8$

$y = -8$

Example 4 **Solve each equation by graphing. If integral roots cannot be found, estimate the roots to the nearest tenth.** **5–8. See Ch. 9 Answer Appendix for graphs.**

5. $-x^2 - 5x + 1 = 0$ **–5.2, 0.2**

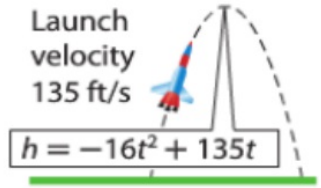
6. $-9 = x^2$ **no solutions**

7. $x^2 = 25$ **5, –5**

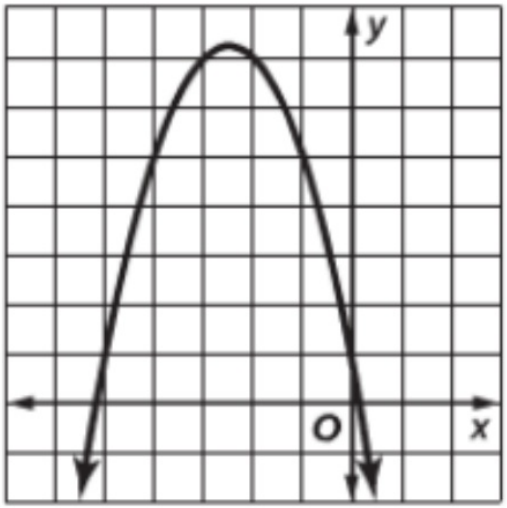
8. $x^2 - 8x = -9$ **6.6, 1.4**

Example 5

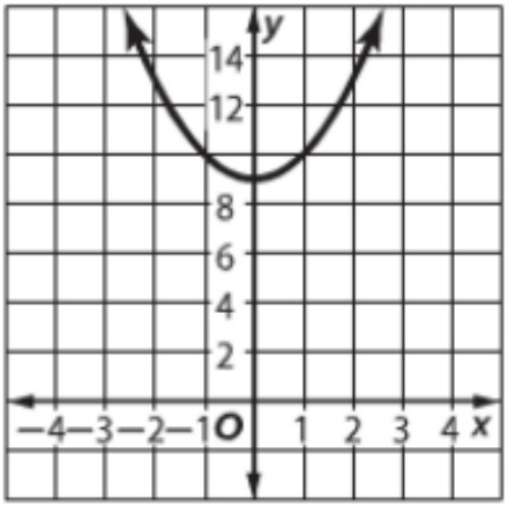
9. SCIENCE FAIR Ricky built a model rocket. Its flight can be modeled by the equation shown, where h is the height of the rocket in feet after t seconds. About how long was Ricky's rocket in the air? **about 8.4 seconds**



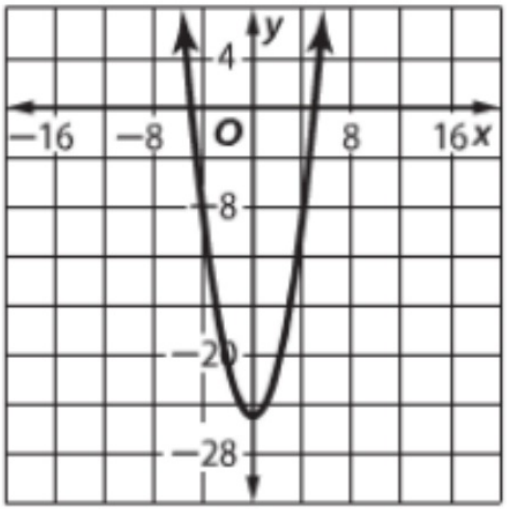
5.


y
O
x

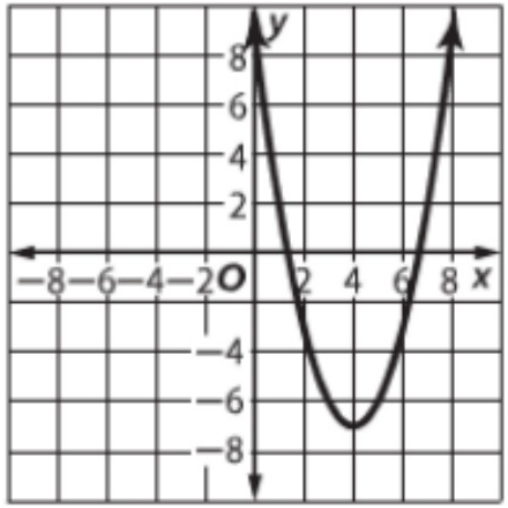
6.


y
14
12
8
6
4
2
−4 −3 −2 −1 O 1 2 3 4 x

7.


y
4
−16 −8 O 8 16 x
−8
−20
−28

8.


y
8
6
4
2
−8 −6 −4 −2 O 2 4 6 8 x
−4
−6
−8

Examples 1–3 Solve each equation by graphing. **10–21. See Ch. 9 Answer Appendix for graphs.**

10. $x^2 + 7x + 14 = 0$ ∅

11 $x^2 + 2x - 24 = 0$ **4, −6**

12. $x^2 - 16x + 64 = 0$ **8**

13. $x^2 - 5x + 12 = 0$ ∅

14. $x^2 + 14x = -49$ **−7**

15. $x^2 = 2x - 1$ **1**

16. $x^2 - 10x = -16$

17. $-2x^2 - 8x = 13$

18. $2x^2 - 16x = -30$

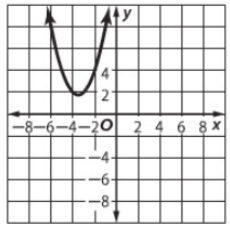
19. $2x^2 = -24x - 72$

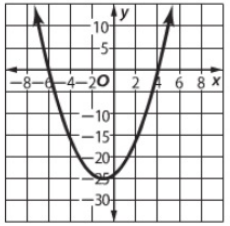
20. $-3x^2 + 2x = 15$

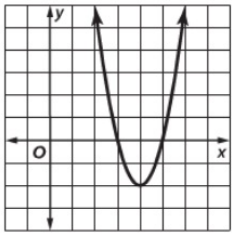
21. $x^2 = -2x + 80$

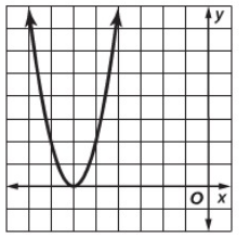
Step 1: Find the axis of symmetry

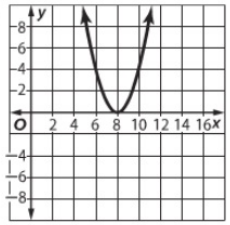
Think: does the parabola cross or touch the x-axis?

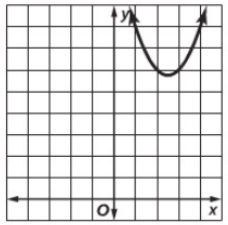
10. 

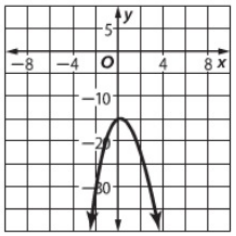
11. 

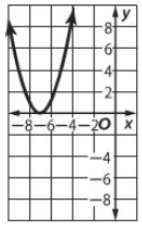
18. 

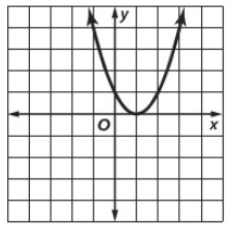
19. 

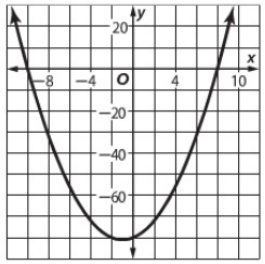
12. 

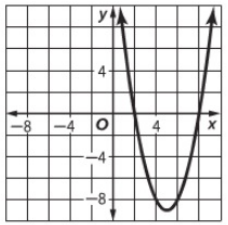
13. 

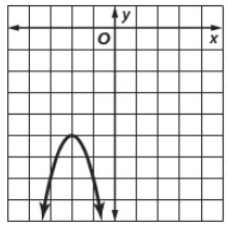
20. 

14. 

15. 

21. 

16. 

17. 

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