

Chapter 10 Review

10.1 Graph $y = ax^2 + c$

pp. 628–634

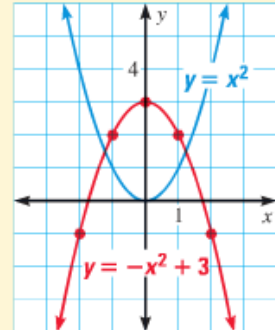
EXAMPLE

Graph $y = -x^2 + 3$. Compare the graph with the graph of $y = x^2$.

Make a table of values for $y = -x^2 + 3$. Then plot the points from the table and draw a smooth curve through the points.

x	-2	-1	0	1	2
y	-1	2	3	2	-1

Both graphs have the same axis of symmetry, $x = 0$. However, the graph of $y = -x^2 + 3$ has a different vertex than the graph of $y = x^2$, and it opens down. This is because the graph of $y = -x^2 + 3$ is a vertical translation (of 3 units up) and a reflection in the x -axis of the graph of $y = x^2$.



PROBLEMS

Problem 4
pp. 628–630
5–7

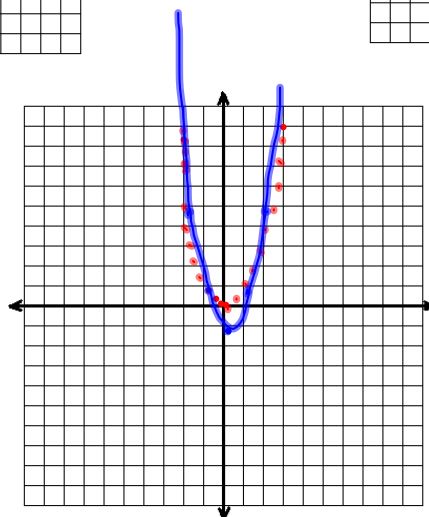
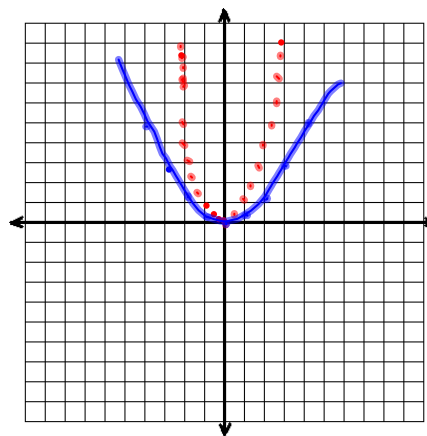
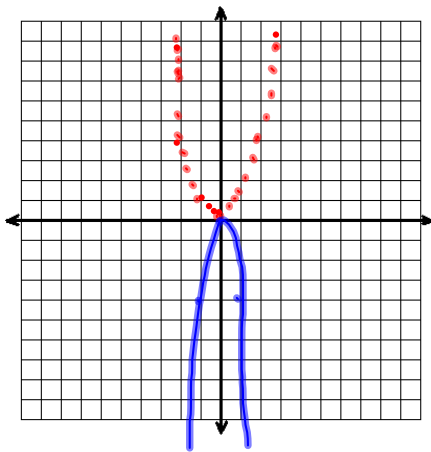
EXERCISES

Graph the function. Compare the graph with the graph of $y = x^2$.

5. $y = -4x^2$

6. $y = \frac{1}{3}x^2$

7. $y = 2x^2 - 1$



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

pp. 635-640

EXAMPLE

Graph $y = -x^2 + 2x + 1$.

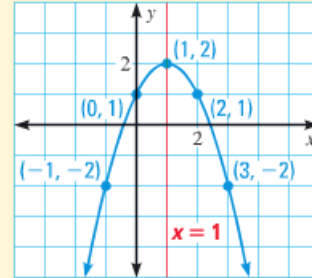
STEP 1 Determine whether the parabola opens up or down. Because $a < 0$, the parabola opens down.

STEP 2 Find and draw the axis of symmetry:

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

STEP 3 Find and plot the vertex. The x-coordinate of the vertex is $-\frac{b}{2a}$, or 1. The y-coordinate of the vertex is $y = -(1)^2 + 2(1) + 1 = 2$.

STEP 4 Plot four more points. Evaluating the function for $x = 0$ and $x = -1$ gives the points $(0, 1)$ and $(-1, -2)$. Plot these points and their reflections in the axis of symmetry.



STEP 5 Draw a parabola through the plotted points.

EXERCISES

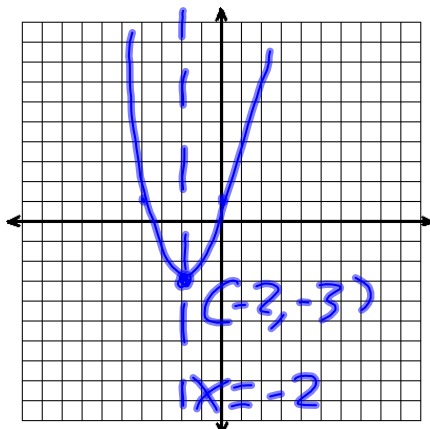
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Graph the function. Label the vertex and axis of symmetry.

8. $y = x^2 + 4x + 1$

9. $y = 2x^2 - 4x - 3$

10. $y = -2x^2 + 8x + 5$



$a = 1$
 $b = 4$
 $c = 1$

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

$$x = -2$$

$$y = (-2)^2 + 4(-2) + 1$$

$$4 - 8 + 1$$

$$y = -3$$

$a = -2$
 $b = 8$
 $c = 5$

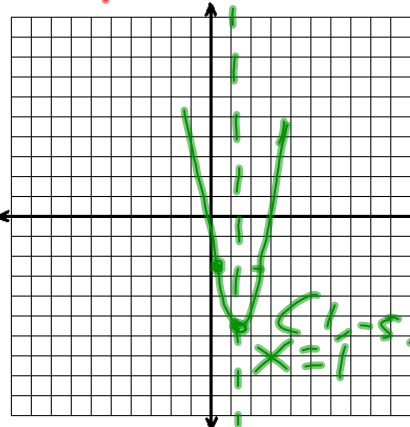
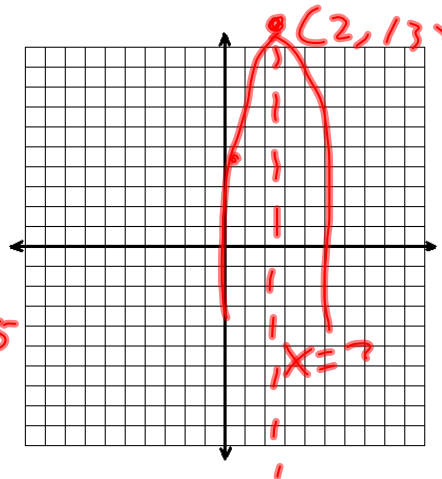
$$-\frac{8}{2(-2)} = 2$$

$$x = 2$$

$$-2(2)^2 + 8(2) + 5$$

$$-8 + 16 + 5$$

$$y = 13$$



$a = 2$
 $b = -4$
 $c = -3$

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

$$x = 1$$

$$2(1)^2 - 4(1) - 3$$

$$2 - 4 - 3 = -5$$

$$y = -5$$

10.3 Solve Quadratic Equations by Graphing

pp. 643-649

EXAMPLE

Solve $x^2 - 7x = -12$ by graphing.

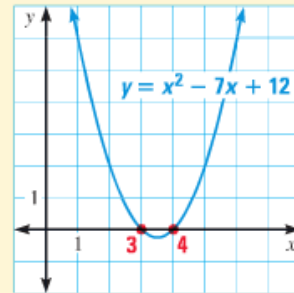
STEP 1 Write the equation in standard form.

$x^2 - 7x = -12$ Write original equation.

$x^2 - 7x + 12 = 0$ Add 12 to each side.

STEP 2 Graph the related function $y = x^2 - 7x + 12$.
The x-intercepts of the graph are 3 and 4.

► The solutions of the equation $x^2 - 7x + 12 = 0$ are 3 and 4.



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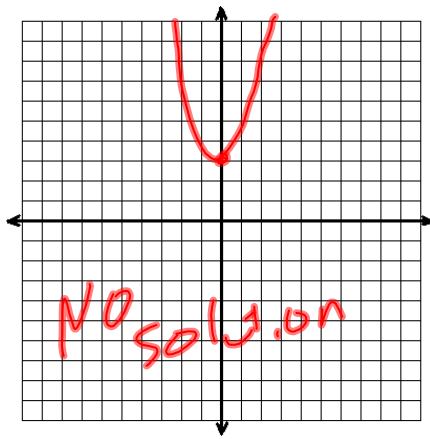
EXERCISES

Solve the equation by graphing.

11. $4x^2 + x + 3 = 0$

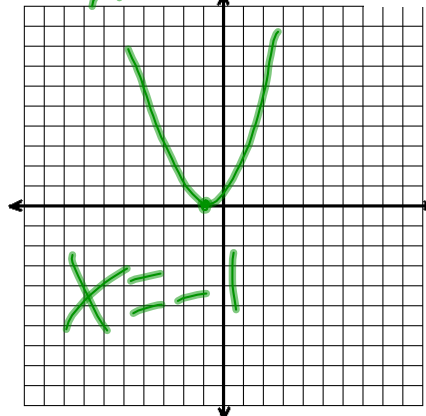
12. $x^2 + 2x = -1$

13. $-x^2 + 8 = 7x$

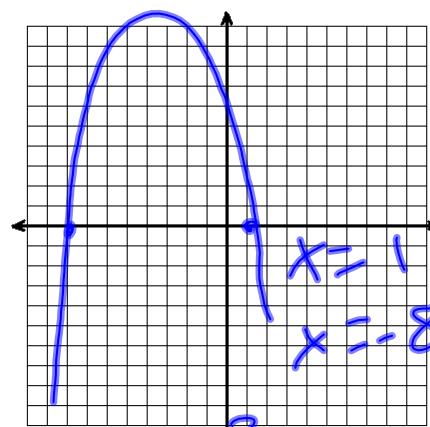


$4x^2 + x + 3 = 0$

$x^2 + 2x = -1$



$x = -1$



$-x^2 + 8 = 7x$

10.4 Use Square Roots to Solve Quadratic Equations

pp. 652–658

EXAMPLE

Solve $5(x - 6)^2 = 30$. Round the solutions to the nearest hundredth.

$$5(x - 6)^2 = 30$$

Write original equation.

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

Divide each side by 5.

$$x - 6 = \pm\sqrt{6}$$

Take square roots of each side.

$$x = 6 \pm\sqrt{6}$$

Add 6 to each side.

► The roots of the equation are $6 + \sqrt{6} \approx 8.45$ and $6 - \sqrt{6} \approx 3.55$.

Solve the equation. Round your solutions to the nearest hundredth, if necessary.

14. $6x^2 - 54 = 0$

$$\begin{aligned} 6x^2 &= 54 \\ \sqrt{x^2} &= \sqrt{9} \\ x &= \pm 3 \end{aligned}$$

15. $3x^2 + 7 = 4$

$$\begin{aligned} 3x^2 &= -3 \\ x^2 &= -1 \\ \sqrt{x^2} &= \sqrt{-1} \\ \text{No Solution} \end{aligned}$$

16. $g^2 + 11 = 24$

$$\begin{aligned} g^2 &= 13 \\ \sqrt{g^2} &= \pm\sqrt{13} \\ g &\approx \pm 3.6 \end{aligned}$$

17. $7n^2 + 5 = 9$

$$\begin{aligned} 7n^2 &= 4 \\ n^2 &= \frac{4}{7} \\ \sqrt{n^2} &= \sqrt{\frac{4}{7}} \\ n &= \pm 0.756 \end{aligned}$$

18. $2(a + 7)^2 = 34$

$$\begin{aligned} (a+7)^2 &= 17 \\ \sqrt{(a+7)^2} &= \pm\sqrt{17} \\ a+7 &= \pm 4.12 \\ a &= 4.12 - 7 \quad a = -4.12 - 7 \\ &= -2.88 \quad -11.12 \end{aligned}$$

19. $3(w - 4)^2 = 5$

$$\begin{aligned} (w-4)^2 &= \frac{5}{3} \\ \sqrt{(w-4)^2} &= \pm\sqrt{\frac{5}{3}} \\ w-4 &= \pm 1.29 \\ w &= 1.29 + 4 \quad w = 1.29 - 4 \\ &= 5.29 \quad -2.71 \end{aligned}$$

10.6 Solve Quadratic Equations by the Quadratic Formula pp. 671

EXAMPLE

Solve $4x^2 + 3x = 1$.

$$4x^2 + 3x = 1$$

Write original equation.

$$4x^2 + 3x - 1 = 0$$

Write in standard form.

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Quadratic formula

$$= \frac{-3 \pm \sqrt{3^2 - 4(4)(-1)}}{2(4)}$$

Substitute values in the quadratic formula:
 $a = 4$, $b = 3$, and $c = -1$.

$$= \frac{-3 \pm \sqrt{25}}{8}$$

Simplify.

$$= \frac{-3 \pm 5}{8}$$

Simplify the square root.

► The solutions of the equation are $\frac{-3+5}{8} = \frac{1}{4}$ and $\frac{-3-5}{8} = -1$.

CHECK You can check the solutions in the original equation.

If $x = \frac{1}{4}$:

$$4x^2 + 3x = 1$$

$$4\left(\frac{1}{4}\right)^2 + 3\left(\frac{1}{4}\right) \stackrel{?}{=} 1$$

$$1 = 1 \checkmark$$

If $x = -1$:

$$4x^2 + 3x = 1$$

$$4(-1)^2 + 3(-1) \stackrel{?}{=} 1$$

$$1 = 1 \checkmark$$

Use the quadratic formula to solve the equation. Round your solutions to the nearest hundredth, if necessary.

24. $x^2 - 2x - 15 = 0$

$$\frac{2 \pm \sqrt{(-2)^2 - 4(1)(-15)}}{2(1)}$$

$$\frac{2 \pm \sqrt{4 - (-60)}}{2}$$

$$\frac{2 \pm \sqrt{64}}{2}, \frac{2+8}{2}, \frac{2-8}{2}$$

$$= 5, -2$$

25. $2m^2 + 7m - 3 = 0$

$$\frac{-7 \pm \sqrt{7^2 - 4(2)(-3)}}{2(2)}$$

$$\frac{-7 \pm \sqrt{72}}{4}$$

$$\frac{-7+8.5}{4} \quad \frac{-7-8.5}{4}$$

$$= .375 \quad -15.5$$

$a = -1$ $b = 5$ $c = -3$

26. $-w^2 + 5w = 3$

27. $5n^2 - 7n = -1$

28. $t^2 - 4 = 6t + 8$

29. $2h - 1 = 10 - 9h^2$

10.7 Interpret the Discriminant

pp. 678-683

EXAMPLE

Equation $ax^2 + bx + c = 0$	Discriminant $b^2 - 4ac$	Number of solutions
a. $-16x^2 + 8x - 1 = 0$	$8^2 - 4(-16)(-1) = 0$	One solution
b. $4x^2 - 5x + 2 = 0$	$(-5)^2 - 4(4)(2) = -7$	No solution
c. $x^2 + 3x = 0$	$3^2 - 4(1)(0) = 9$	Two solutions

EXERCISES

Tell whether the equation has *two solutions*, *one solution*, or *no solution*.

31. $x^2 - 2x + 2 = 0$

$$\begin{aligned} &(-2)^2 - 4(1)(2) \\ &4 - 8 \\ &-8 < 0 \\ &\text{no solution} \end{aligned}$$

32. $4g^2 + 12g + 9 = 0$

$$\begin{aligned} &12^2 - 4(4)(9) \\ &0 = 0 \\ &\text{one solution} \end{aligned}$$

33. $5w^2 - 4w - 1 = 0$

$$\begin{aligned} &(-4)^2 - 4(5)(-1) \\ &36 > 0 \\ &\text{Two solutions} \end{aligned}$$

34. $\frac{1}{8}v^2 - 6 = 0$

$$\begin{aligned} &0^2 - 4\left(\frac{1}{8}\right)(-6) \\ &3 > 0 \\ &2 \text{ solutions} \end{aligned}$$

35. $n^2 - 3n = 4 - 2n^2$

$$\begin{aligned} &3n^2 - 3n - 4 \\ &(-3)^2 - 4(3)(-4) \\ &57 > 0 \\ &2 \text{ solutions} \end{aligned}$$

36. $2q^2 + 1 = 3q - 5$

$$\begin{aligned} &2q^2 - 3q + 6 = 0 \\ &(-3)^2 - 4(2)(6) \\ &-39 < 0 \\ &\text{no solution} \end{aligned}$$