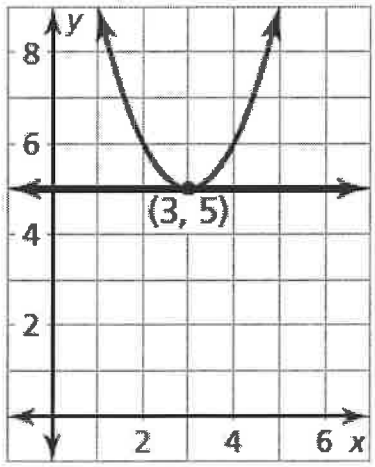
2. The solution is $(-4, 1)$.

4. The solutions are $(1, 4)$ and $(9, 4)$.

6.



The solution is $(3, 5)$.

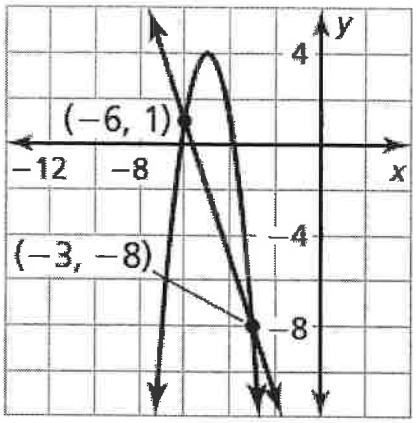
Check:

$x = 3$:

$y = (x - 3)^2 + 5 = (3 - 3)^2 + 5 = 5$

$y = 5$

8.



The solutions are $(-6, 1)$ and $(-3, -8)$.

Check:

$x = -6$:

$y = -3x^2 - 30x - 71 = -3(-6)^2 - 30(-6) - 71 = 1$

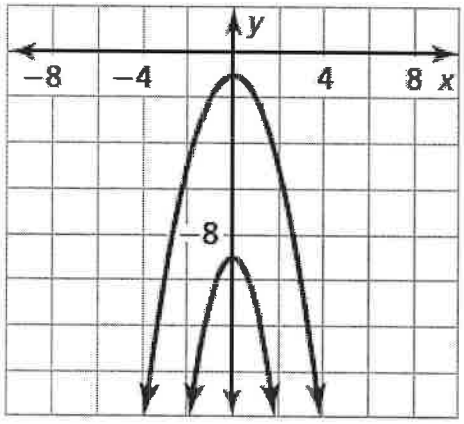
$y = -3x - 17 = -3(-6) - 17 = 1$

$x = -3$:

$y = -3x^2 - 30x - 71 = -3(-3)^2 - 30(-3) - 71 = -8$

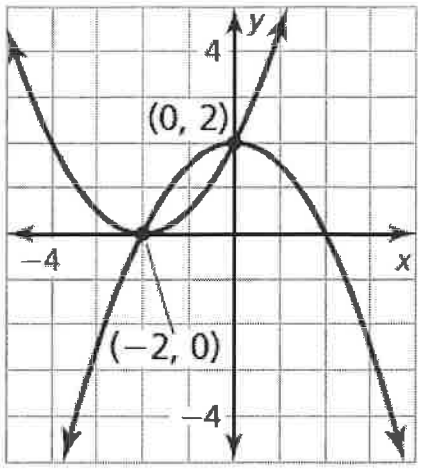
$y = -3x - 17 = -3(-3) - 17 = -8$

10.



The graphs do not intersect, so there is no real solution.

12.



The solutions are $(-2, 0)$ and $(0, 2)$.

Check:

$x = -2$:

$$y = \frac{1}{2}(x + 2)^2 = \frac{1}{2}(-2 + 2)^2 = 0$$

$$y = -\frac{1}{2}x^2 + 2 = -\frac{1}{2}(-2)^2 + 2 = 0$$

$x = 0$:

$$y = \frac{1}{2}(x + 2)^2 = \frac{1}{2}(0 + 2)^2 = 2$$

$$y = -\frac{1}{2}x^2 + 2 = -\frac{1}{2}(0)^2 + 2 = 2$$

14. Substitute $7 - x$ for y in Equation 1 and solve for x.

$$x^2 + (7 - x)^2 = 49$$
$$x^2 + 49 - 14x + x^2 = 49$$
$$2x^2 - 14x + 49 = 49$$
$$2x^2 - 14x = 0$$
$$2x(x - 7) = 0$$
$$2x = 0 \quad \text{or} \quad x - 7 = 0$$
$$x = 0 \quad \text{or} \quad x = 7$$

To solve for y, substitute $x = 0$ and $x = 7$ into the equation $y = 7 - x$.

$$y = 7 - x = 7 - 0 = 7$$
$$y = 7 - x = 7 - 7 = 0$$

The solutions are (0, 7) and (7, 0).

16. Substitute $-2x - 5$ for y in Equation 2 and solve for x.

$$-3x^2 + 4x - (-2x - 5) = 8$$
$$-3x^2 + 6x + 5 = 8$$
$$-3x^2 + 6x - 3 = 0$$
$$x^2 - 2x + 1 = 0$$
$$(x - 1)^2 = 0$$
$$x = 1$$

To solve for y, substitute $x = 1$ into the equation $y = -2x - 5$.

$$y = -2x - 5 = -2(1) - 5 = -7$$

The solution is $(1, -7)$.

18. Substitute $-3x - 3$ for y in Equation 1 and solve for x.

$$2x - 3 = (-3x - 3) + 5x^2$$
$$2x - 3 = -3x - 3 + 5x^2$$
$$0 = 5x^2 - 5x$$
$$0 = 5x(x - 1)$$
$$5x = 0 \quad \text{or} \quad x - 1 = 0$$
$$x = 0 \quad \text{or} \quad x = 1$$

To solve for y, substitute $x = 0$ and $x = 1$ into the equation $y = -3x - 3$.

$$y = -3x - 3 = -3(0) - 3 = -3$$
$$y = -3x - 3 = -3(1) - 3 = -6$$

The solutions are $(0, -3)$ and $(1, -6)$.

20. Begin by solving for y in Equation 1.

$$y = 4x^2 - 16x + 22$$

Next, substitute $4x^2 - 16x + 22$ for y in Equation 2 and solve for x.

$$4x^2 - 24x + 26 + 4x^2 - 16x + 22 = 0$$
$$8x^2 - 40x + 48 = 0$$
$$x^2 - 5x + 6 = 0$$
$$(x - 3)(x - 2) = 0$$
$$x - 3 = 0 \quad \text{or} \quad x - 2 = 0$$
$$x = 3 \quad \text{or} \quad x = 2$$

To solve for y, substitute $x = 3$ and $x = 2$ into the equation $y = 4x^2 - 16x + 22$.

$$y = 4x^2 - 16x + 22 = 4(3)^2 - 16(3) + 22 = 10$$
$$y = 4x^2 - 16x + 22 = 4(2)^2 - 16(2) + 22 = 6$$

The solutions are $(3, 10)$ and $(2, 6)$.

22. Begin by solving for y in Equation 2.

$$y = -1 + x$$

Next, substitute $-1 + x$ for y in Equation 1 and solve for x.

$$x^2 + (-1 + x)^2 = 5$$

$$x^2 + 1 - 2x + x^2 = 5$$

$$2x^2 - 2x - 4 = 0$$

$$x^2 - x - 2 = 0$$

$$(x - 2)(x + 1) = 0$$

$$x - 2 = 0 \quad \text{or} \quad x + 1 = 0$$

$$x = 2 \quad \text{or} \quad x = -1$$

To solve for y, substitute $x = 2$ and $x = -1$ into the equation $y = -1 + x$.

$$y = -1 + x = -1 + 2 = 1$$

$$y = -1 + x = -1 + (-1) = -2$$

The solutions are $(2, 1)$ and $(-1, -2)$.

24. Add the equations to eliminate the y-term and obtain a quadratic equation in x.

$$-3x^2 + 2x - 5 = y$$

$$\underline{\qquad -x + 2 = -y}$$

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

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

$$x = \frac{-1 \pm \sqrt{-35}}{-6}$$

Because the discriminant is negative, the equation $-3x^2 + x - 3 = 0$ has no real solution. So, the original system has no real solution.

26. Subtract the equations to eliminate the y-term and obtain a quadratic equation in x.

$$\begin{aligned} y &= -x^2 - 6x - 10 \\ -(y &= 3x^2 + 18x + 22) \\ \hline 0 &= -4x^2 - 24x - 32 \end{aligned}$$

$$0 = -4(x + 2)(x + 4)$$

$$0 = (x + 2) \text{ or } 0 = (x + 4)$$

$$x = -2 \quad \text{or} \quad x = -4$$

To solve for y, substitute $x = -2$ and $x = -4$ into the equation $y = -x^2 - 6x - 10$.

$$y = -x^2 - 6x - 10 = -(-2)^2 - 6(-2) - 10 = -2$$

$$y = -x^2 - 6x - 10 = -(-4)^2 - 6(-4) - 10 = -2$$

The solutions are $(-2, -2)$ and $(-4, -2)$.

28. Add the equations to eliminate the y-term and obtain a quadratic equation in x.

$$y = x^2 + 4x + 7$$
$$-y = 4x + 7$$
$$0 = x^2 + 8x + 14$$

$$x = \frac{-8 \pm \sqrt{8^2 - 4(1)(14)}}{2(1)}$$

$$x = \frac{-8 \pm \sqrt{8}}{2}$$

$$x = \frac{-8 \pm 2\sqrt{2}}{2}$$

$$x = -4 \pm \sqrt{2}$$

To solve for y, substitute $x = -4 - \sqrt{2}$ and $x = -4 + \sqrt{2}$ into the equation $y = -4x - 7$.

$$y = -4x - 7 = -4(-4 - \sqrt{2}) - 7 = 9 + 4\sqrt{2}$$

$$y = -4x - 7 = -4(-4 + \sqrt{2}) - 7 = 9 - 4\sqrt{2}$$

The solutions are $(-4 - \sqrt{2}, 9 + 4\sqrt{2})$ and $(-4 + \sqrt{2}, 9 - 4\sqrt{2})$.

30. Subtract the equations to eliminate the y-term and obtain a quadratic equation in x.

$$-10x^2 + y = -80x + 155$$
$$\underline{-(5x^2 + y = 40x - 85)}$$
$$-15x^2 = -120x + 240$$
$$0 = 15x^2 - 120x + 240$$
$$0 = x^2 - 8x + 16$$
$$0 = (x - 4)^2$$
$$0 = x - 4$$
$$x = 4$$

To solve for y, substitute $x = 4$ into the equation $y = -5x^2 + 40x - 85$.

$$y = -5x^2 + 40x - 85 = -5(4)^2 + 40(4) - 85 = -5$$

The solution is $(4, -5)$.

32. The solutions are $(-1, 9)$ and $(7, 9)$ because the x-values have the same y-value.

34. Use the substitution method because one equation is solved for y.

Substitute $-4x^2 - 16x - 13$ for y in Equation 2 and solve for x.

$$\begin{aligned} -3x^2 + (-4x^2 - 16x - 13) + 12x &= 17 \\ -7x^2 - 4x - 13 &= 17 \\ -7x^2 - 4x - 30 &= 0 \end{aligned}$$

$$x = \frac{4 \pm \sqrt{-824}}{-14}$$

Because the discriminant is negative, the equation $-7x^2 - 4x - 30 = 0$ has no real solution. So, the original system has no real solution.

36. Use the elimination method because there is a y on the left-hand side of each equation.

Subtract the equations to eliminate the y-term and obtain a quadratic equation in x.

$$\begin{aligned} y &= 0.5x^2 - 10 \\ -(y &= -x^2 + 14) \\ \hline 0 &= 1.5x^2 - 24 \\ 24 &= 1.5x^2 \\ 16 &= x^2 \\ \pm 4 &= x \end{aligned}$$

To solve for y, substitute $x = -4$ and $x = 4$ into the equation $y = -x^2 + 14$.

$$y = -x^2 + 14 = -(-4)^2 + 14 = -2$$

$$y = -x^2 + 14 = -(4)^2 + 14 = -2$$

The solutions are $(-4, -2)$ and $(4, -2)$.

38. Use the substitution method because one equation is solved for y.

Substitute $-x + 14$ for y in Equation 1 and solve for x.

$$-x^2 + (-x + 14)^2 = 100$$
$$-x^2 + x^2 - 28x + 196 = 100$$
$$-28x + 196 = 100$$
$$-28x = -96$$
$$x = \frac{24}{7}$$

To solve for y, substitute $x = \frac{24}{7}$ into the equation $y = -x + 14$.

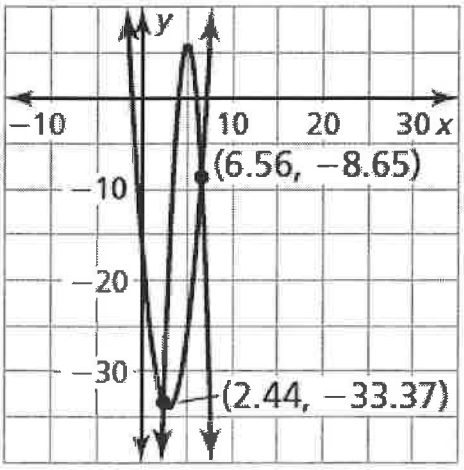
$$y = -x + 14 = -\left(\frac{24}{7}\right) + 14 = \frac{74}{7}$$

The solution is $\left(\frac{24}{7}, \frac{74}{7}\right)$.

40. Write a system of equations using each side of the original equation.

Equation	*System*
$2x^2 - 12x - 16 =$	$y = 2x^2 - 12x - 16$
$-6x^2 + 60x - 144$	$y = -6x^2 + 60x - 144$

Graph the equations in the same plane.

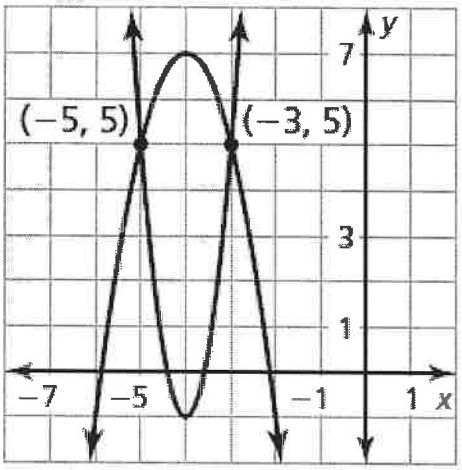


The solutions are $x \approx 2.44$ and $x \approx 6.56$.

42. Write a system of equations using each side of the original equation.

Equation	*System*
$-2x^2 - 16x - 25 = 6x^2 + 48x + 95$	$y = -2x^2 - 16x - 25$
	$y = 6x^2 + 48x + 95$

Graph the equations in the same plane.



The solutions are $x = -5$ and $x = -3$.