# ANSWER PRESENTATION TOOL

Algebra 2 - Student Edit | 3 | 6 - Practice | 2-44 | ALL EVEN ODD | Show Sol

**2.** A; The $x$-intercepts are $x = 1$ and $x = 3$. The test point (2, 5) satisfies the inequality.

**4.** D; The $x$-intercepts are $x = -1$ and $x = -3$. The test point $(-2, 5)$ satisfies the inequality.

**6. Step 1** Graph $y = 4x^2$. Because the inequality symbol is $\geq$, make the parabola solid.

**Step 2** Test a point inside the parabola, such as (0, 1).

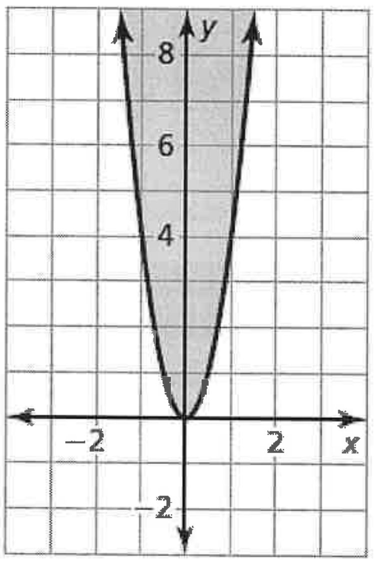
$y \geq 4x^2$

$1 \overset{?}{\geq} 4(0)^2$

$1 \geq 0$

So, (0, 1) is a solution of the inequality.

**Step 3** Shade the region inside the parabola.



**8. Step 1** Graph $y = x^2 + 5$. Because the inequality symbol is <, make the parabola dashed.

**Step 2** Test a point outside the parabola, such as (0, 1).

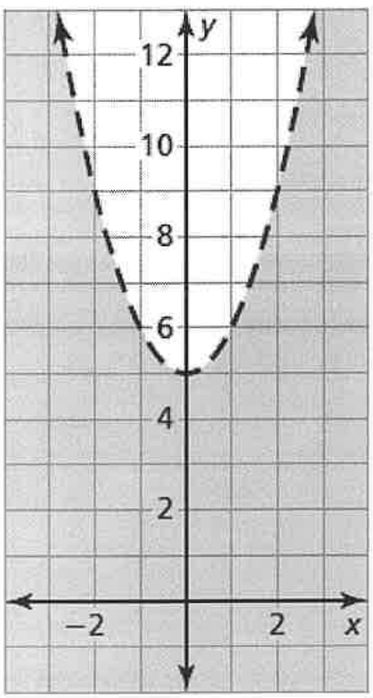
$y < x^2 + 5$

$1 \overset{?}{<} (0)^2 + 5$

$1 < 5$

So, (0, 1) is a solution of the inequality.

**Step 3** Shade the region outside the parabola.



**10. Step 1** Graph $y = -2x^2 + 9x - 4$. Because the inequality symbol is $\geq$, make the parabola solid.

**Step 2** Test a point outside the parabola, such as (0, 0).

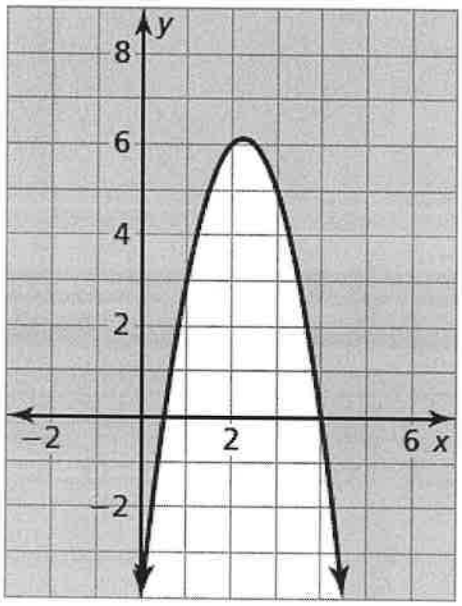
$$y \geq -2x^2 + 9x - 4$$

$$0 \stackrel{?}{\geq} -2(0)^2 + 9(0) - 4$$

$$0 \geq -4$$

So, (0, 0) is a solution of the inequality.

**Step 3** Shade the region outside the parabola.



**12. Step 1** Graph $y = \left(x - \frac{1}{2}\right)^2 + \frac{5}{2}$. Because the inequality symbol is ≤, make the parabola solid.

**Step 2** Test a point outside the parabola, such as (0, 0).

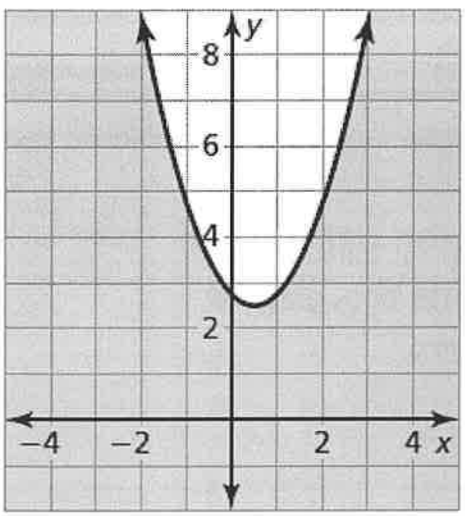
$$y \leq \left(x - \frac{1}{2}\right)^2 + \frac{5}{2}$$

$$0 \stackrel{?}{\leq} \left(0 - \frac{1}{2}\right)^2 + \frac{5}{2}$$

$$0 \leq \frac{11}{4}$$

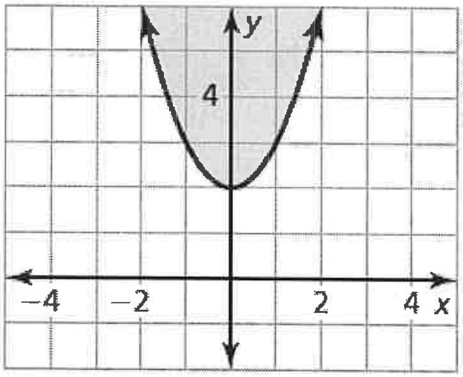
So, (0, 0) is a solution of the inequality.

**Step 3** Shade the region outside the parabola.




**14.** Let $P = (x_1, y_1)$, then the inequality is $y_1 > f(x_1)$.

**16.** The region inside the parabola should be shaded, not outside the parabola.



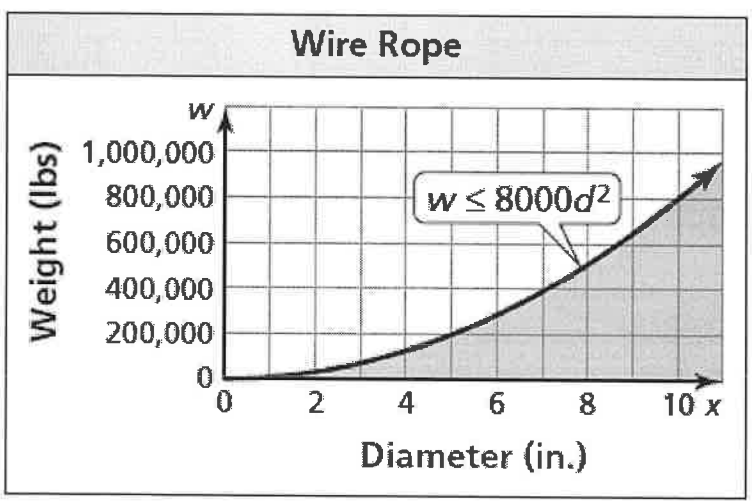

**18.** Graph $W = 8000d^2$ for nonnegative values of $d$. Because the inequality symbol is ≤, make the parabola solid, Test a point outside the parabola, such as (1, 7000).

$$W \le 8000d^2$$

$$7000 \overset{?}{\le} 8000(1)^2$$

$$7000 \le 8000$$

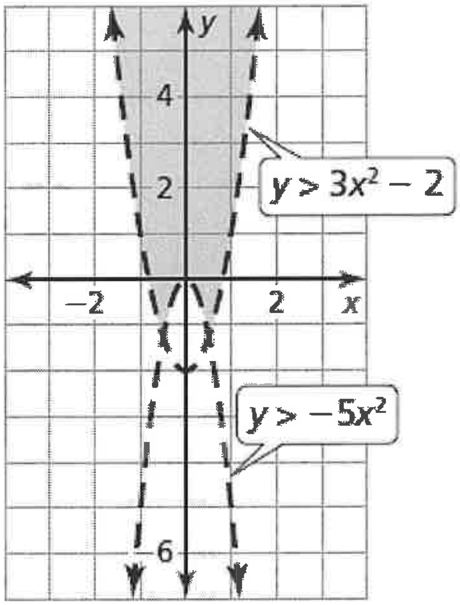
Because (1, 7000) is a solution, shade the region outside the parabola. The shaded region represents weights that can be supported by wire ropes with various diameters.



**20. Step 1** Graph $y > -5x^2$.

**Step 2** Graph $y > 3x^2 - 2$.

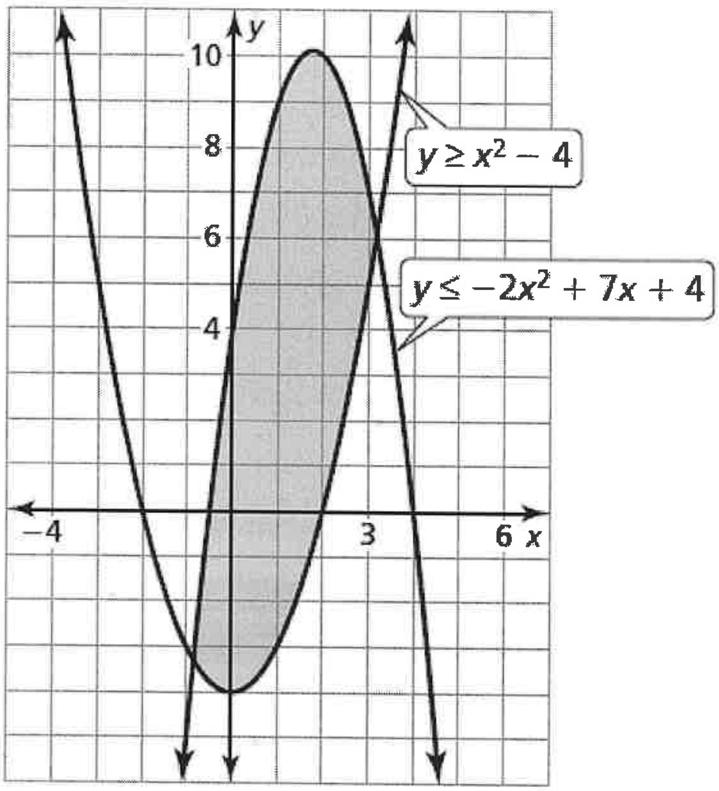
**Step 3** Identify the region where the two graphs overlap. This region is the graph of the system.



**22. Step 1** Graph $y \geq x^2 - 4$.

**Step 2** Graph $y \leq -2x^2 + 7x + 4$.

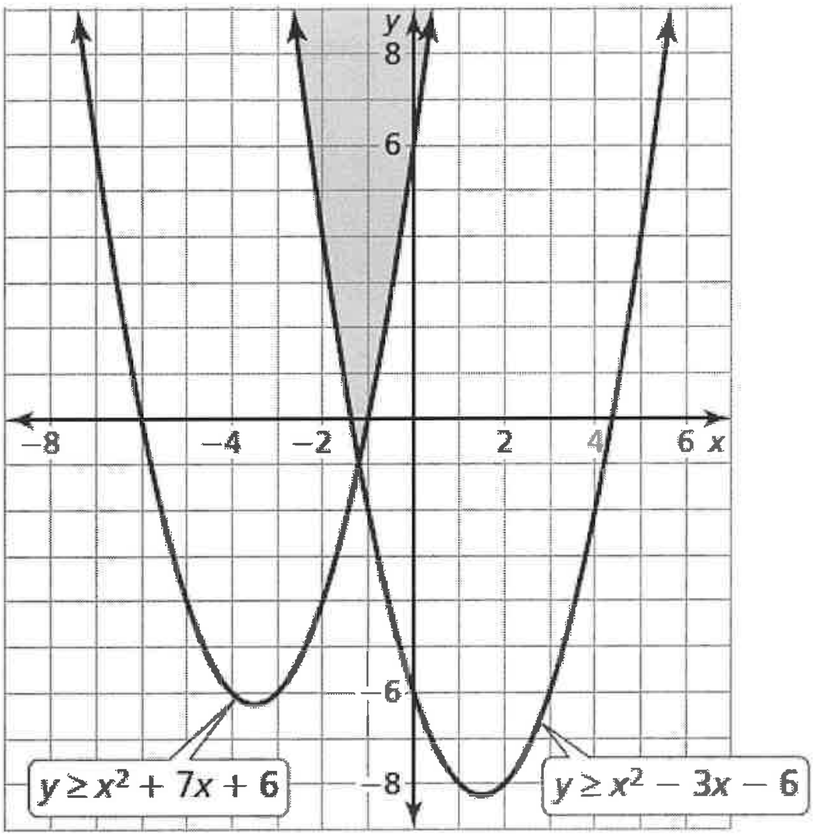
**Step 3** Identify the region where the two graphs overlap. This region is the graph of the system.



**24. Step 1** Graph $y \geq x^2 - 3x - 6$.

**Step 2** Graph $y \geq x^2 + 7x + 6$.

**Step 3** Identify the region where the two graphs overlap. This region is the graph of the system.



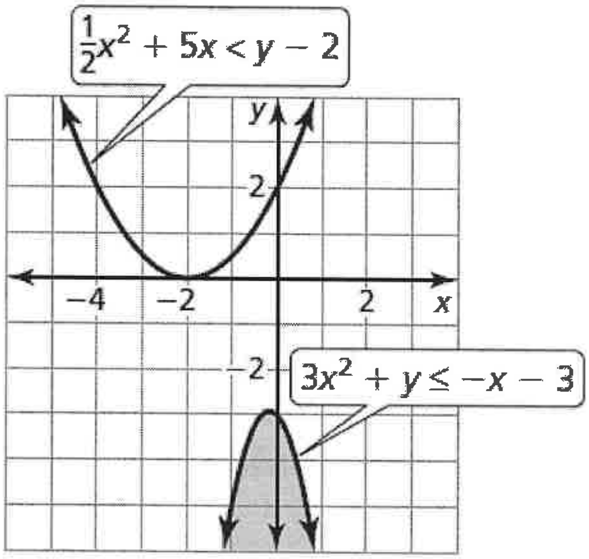
**26.** $3x^2 + y \leq -x - 3$ $\qquad\qquad$ $\frac{1}{2}x^2 + 2x \geq y - 2$

$y \leq -3x^2 - x - 3$ $\qquad\qquad$ $\frac{1}{2}x^2 + 2x + 2 \geq y$

**Step 1** Graph $y \leq -3x^2 - x - 3$

**Step 2** Graph $y \leq \frac{1}{2}x^2 + 2x + 2$

**Step 3** Identify the region where the two graphs overlap. This region is the graph of the system.



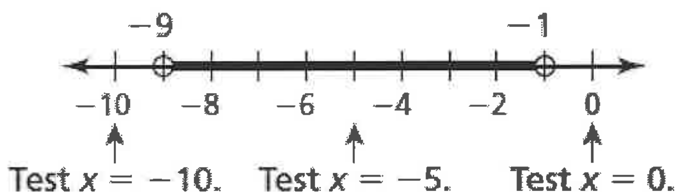
**28.** First, write and solve the equation obtained by replacing $<$ with $=$.

$$x^2 + 10x + 9 = 0$$

$$(x + 9)(x + 1) = 0$$

$$x = -9 \quad \text{or} \quad x = -1$$

The numbers $-9$ and $-1$ are critical values of the original inequality. Plot $-9$ and $-1$ on a number line, using open dots because the values do not satisfy the inequality. The critical $x$-values partition the number line into three intervals. Test an $x$-value in each interval to determine whether it satisfies the inequality.




$$(-10)^2 + 10(-10) + 9 \not< 0$$

$$(-5)^2 + 10(-5) + 9 < 0 \checkmark$$

$$0^2 + 10(0) + 9 \not< 0$$

So, the solution is $-9 < x < -1$.

**30.** First, write and solve the equation obtained by replacing > with =.

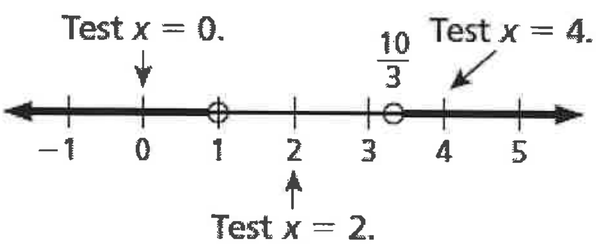
$$3x^2 - 13x = -10$$

$$3x^2 - 13x + 10 = 0$$

$$(3x - 10)(x - 1) = 0$$

$$x = \frac{10}{3} \quad \text{or} \quad x = 1$$

The numbers $\frac{10}{3}$ and 1 are critical values of the original inequality. Plot $\frac{10}{3}$ and 1 on a number line, using open dots because the values do not satisfy the inequality. The critical $x$-values partition the number line into three intervals. Test an $x$-value in each interval to determine whether it satisfies the inequality.




$3(0)^2 - 13(0) > -10$ ✓

$3(2)^2 - 13(2) \not> -10$

$3(4)^2 - 13(4) > -10$ ✓

So, the solution is $x < 1$ or $x > \frac{10}{3}$.

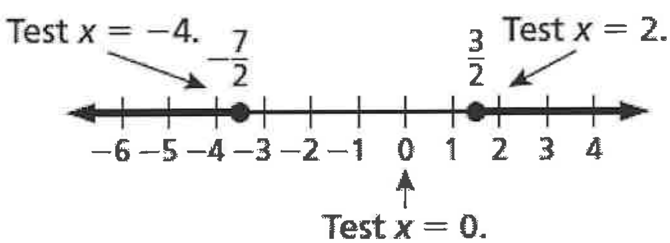
**32.** First, write and solve the equation obtained by replacing $\geq$ with $=$.

$$4x^2 + 8x - 21 = 0$$

$$(2x + 7)(2x - 3) = 0$$

$$x = -\frac{7}{2} \quad \text{or} \quad x = \frac{3}{2}$$

The numbers $-\frac{7}{2}$ and $\frac{3}{2}$ are critical values of the original inequality. Plot $-\frac{7}{2}$ and $\frac{3}{2}$ on a number line, using closed dots because the values do satisfy the inequality. The critical $x$-values partition the number line into three intervals. Test an $x$-value in each interval to determine whether it satisfies the inequality.




$$4(-4)^2 + 8(-4) - 21 \geq 0 \checkmark$$

$$4(0)^2 + 8(0) - 2 \not\geq 0$$

$$4(2)^2 + 8(2) - 21 \geq 0 \checkmark$$

So, the solution is $x \leq -\frac{7}{2}$ or $x \geq \frac{3}{2}$.

**34.** First, write and solve the equation obtained by replacing $\leq$ with $=$.

$$-\frac{1}{2}x^2 + 4x = 1$$

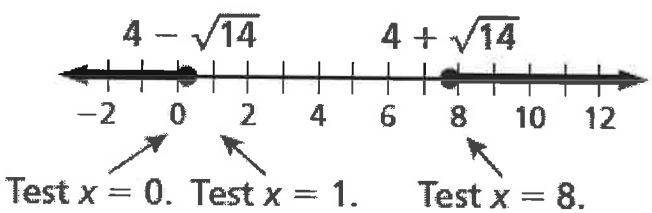
$$-\frac{1}{2}x^2 + 4x - 1 = 0$$

$$x^2 - 8x + 2 = 0$$

$$x = \frac{8 \pm \sqrt{56}}{2}$$

$$x = 4 \pm \sqrt{14}$$

The numbers $4 - \sqrt{14}$ and $4 + \sqrt{14}$ are critical values of the original inequality. Plot $4 - \sqrt{14}$ and $4 + \sqrt{14}$ on a number line, using closed dots because the values do satisfy the inequality. The critical $x$-values partition the number line into three intervals. Test an $x$-value in each interval to determine whether it satisfies the inequality.




$$-\frac{1}{2}(0)^2 + 4(0) \leq 1 \checkmark$$

$$-\frac{1}{2}(1)^2 + 4(1) \not\leq 1$$

$$-\frac{1}{2}(8)^2 + 4(8) \leq 1 \checkmark$$

So, the solution is $x \leq 4 - \sqrt{14}$ or $x \geq 4 + \sqrt{14}$.

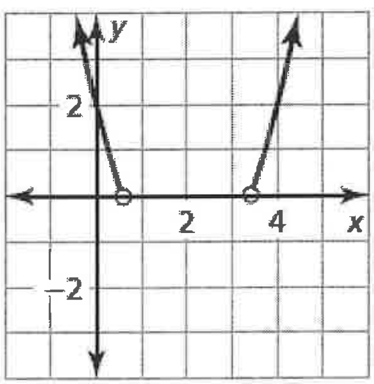
**36.** The solution consists of the $x$-values for which the graph of $y = x^2 - 4x + 2$ lies above the $x$-axis. Find the $x$-intercepts of the graph by letting $y = 0$ and use the Quadratic Formula to solve $0 = x^2 - 4x + 2$ for $x$.

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

$$x = \frac{4 \pm \sqrt{8}}{2}$$

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

The solutions are $x \approx 0.59$ and $x \approx 3.41$. Sketch a parabola that opens up and has 0.59 and 3.41 as $x$-intercepts. The graph lies above the $x$-axis to the left of $x = 0.59$ and to the right of $x = 3.41$. The solution of the inequality is approximately $x < 0.59$ or $x > 3.41$.



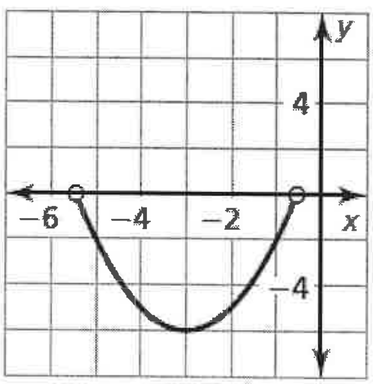
**38.** The solution consists of the $x$-values for which the graph of $y = x^2 + 6x + 3$ lies below the $x$-axis. Find the $x$-intercepts of the graph by letting $y = 0$ and use the Quadratic Formula to solve $0 = x^2 + 6x + 3$ for $x$.

$$x = \frac{-6 \pm \sqrt{6^2 - 4(1)(3)}}{2(1)}$$

$$x = \frac{-6 \pm \sqrt{24}}{2}$$

$$x = -3 \pm \sqrt{6}$$

The solutions are $x \approx -5.45$ and $x \approx -0.55$. Sketch a parabola that opens up and has $-5.45$ and $-0.55$ as $x$-intercepts. The graph lies below the $x$-axis to the right of $x = -5.45$ and to the left of $x = -0.55$. The solution of the inequality is approximately $-5.45 < x < -0.55$.

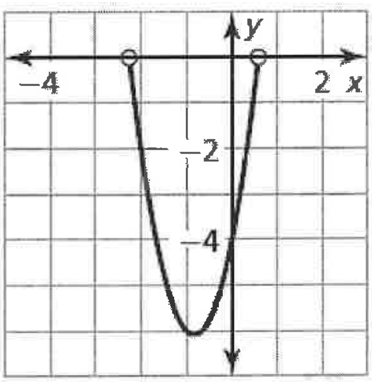


**40.** The solution consists of the $x$-values for which the graph of $y = 3x^2 + 5x - 4$ lies below the $x$-axis. Find the $x$-intercepts of the graph by letting $y = 0$ and use the Quadratic Formula to solve $0 = 3x^2 + 5x - 4$ for $x$.

$$x = \frac{-5 \pm \sqrt{5^2 - 4(3)(-4)}}{2(3)}$$

$$x = \frac{-5 \pm \sqrt{73}}{6}$$

The solutions are $x \approx -2.26$ and $x \approx 0.59$. Sketch a parabola that opens up and has $-2.26$ and $0.59$ as $x$-intercepts. The graph lies below the $x$-axis to the right of $x = -2.26$ and to the left of $x = 0.59$. The solution of the inequality is approximately $-2.2 < x < 0.59$.



**42.** The solution consists of the $x$-values for which the graph of $y = \frac{3}{4}x^2 + 4x - 3$ lies on or above the $x$-axis. Find the $x$-intercepts of the graph by letting $y = 0$ and use factoring to solve $0 = \frac{3}{4}x^2 + 4x - 3$ for $x$.

$$\frac{3}{4}x^2 + 4x - 3 = 0$$

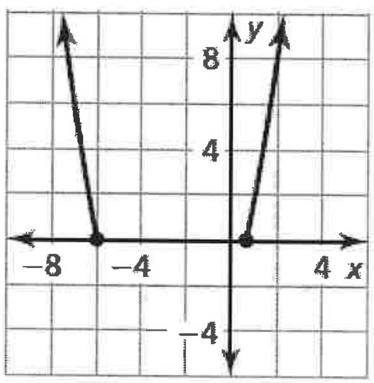
$$3x^2 + 16x - 12 = 0$$

$$(3x - 2)(x + 6) = 0$$

$$3x - 2 = 0 \quad \text{or} \quad x + 6 = 0$$

$$x = \frac{2}{3} \quad \text{or} \quad x = -6$$

The solutions are $x = -6$ and $x = \frac{2}{3}$. Sketch a parabola that opens up and has $-6$ and $\frac{2}{3}$ as $x$-intercepts. The graph lies above the $x$-axis to the left of $x = -6$ and to the right of $x = \frac{2}{3}$. The solution of the inequality is $x \leq -6$ or $x \geq \frac{2}{3}$.



**44.** Let $\ell$ represent the length (in feet) and $y$ represent the width (in feet).

| | |
|---|---|
| Perimeter = 150 | Area ≥ 1000 |
| $2\ell + 2w = 150$ | $\ell w \geq 1000$ |

Solve the perimeter equation for $x$ to obtain $w = -\ell + 75$. Substitute this into the area inequality to obtain a quadratic inequality in one variable.

$$\ell(-\ell + 75) \geq 1000$$

$$-\ell^2 + 75l \geq 1000$$

$$-\ell^2 + 75\ell - 1000 \geq 0$$

Use a graphing calculator to find the $\ell$-intercepts of $y = -\ell^2 + 75\ell - 1000$.

The $\ell$-intercepts are $\ell = 17.3$ or $\ell = 57.7$. The solution consists of the $\ell$-values for which the graph lies on or above the $\ell$-axis. The graph lies on or above the $\ell$-axis when $17.3 \leq \ell \leq 57.7$. So, the lengths of the playpen are between 17.3 and 57.7 feet.