## 9.2 Quadratic Inequalities in One Variable, pages 476–487

**6.** Choose a strategy to solve each inequality. Explain your strategy and why you chose it.

**a)** $x^2 - 2x - 63 > 0$

**b)** $2x^2 - 7x - 30 \geq 0$

**c)** $x^2 + 8x - 48 < 0$

**d)** $x^2 - 6x + 4 \geq 0$

**7.** Solve each inequality.

**a)** $x(6x + 5) \leq 4$

**b)** $4x^2 < 10x - 1$

**c)** $x^2 \leq 4(x + 8)$

**d)** $5x^2 \geq 4 - 12x$

**8.** A decorative fountain shoots water in a parabolic path over a pathway. To determine the location of the pathway, the designer must solve the inequality $-\frac{3}{4}x^2 + 3x \leq 2$, where $x$ is the horizontal distance from the water source, in metres.

**a)** Solve the inequality.

**b)** Interpret the solution to the inequality for the fountain designer.

**9.** A rectangular storage shed is to be built so that its length is twice its width. If the maximum area of the floor of the shed is 18 $m^2$, what are the possible dimensions of the shed?

**10.** David has learned that the light from the headlights reaches about 100 m ahead of the car he is driving. If $v$ represents David's speed, in kilometres per hour, then the inequality $0.007v^2 + 0.22v \leq 100$ gives the speeds at which David can stop his vehicle in 100 m or less.

**a)** What is the maximum speed at which David can travel and safely stop his vehicle in the 100-m distance?

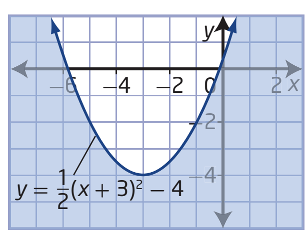
**b)** Modify the inequality so that it gives the speeds at which a vehicle can stop in 50 m or less.

**c)** Solve the inequality you wrote in part b). Explain why your answer is not half the value of your answer for part a).

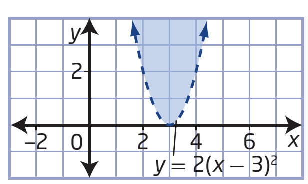
## 9.3 Quadratic Inequalities in Two Variables, pages 488–500

**11.** Write an inequality to describe each graph, given the function defining the boundary parabola.

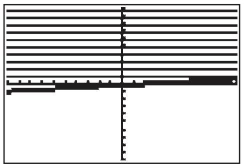
**a)**




**b)**

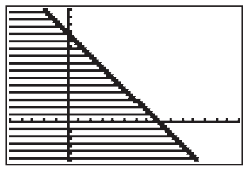


**e)** $y \geq \frac{1}{12}x$



**4. a)** $15x + 10y \leq 120$, where $x$ represents the number of movies and $y$ represents the number of meals.

**b)** $y \leq -1.5x + 12$



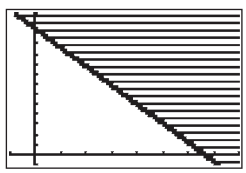
**c)** The region below the line in quadrant I ($x \geq 0$, $y \geq 0$) shows which combinations will work for her budget. The values of $x$ and $y$ must be whole numbers.

**5. a)** \$30 for a laptop and \$16 for a DVD player

**b)** $30x + 16y \geq 1000$, where $x$ represents the number of laptops sold and $y$ represents the number DVD player sold.

**c)** $y \geq -1.875x + 62.5$

The region above the line in quadrant I shows which combinations will give the desired commission. The values of $x$ and $y$ must be whole numbers.



**6. a)** $\{x \mid x < -7 \text{ or } x > 9, x \in \mathrm{R}\}$

**b)** $\{x \mid x \leq -2.5 \text{ or } x \geq 6, x \in \mathrm{R}\}$

**c)** $\{x \mid -12 < x < 4, x \in \mathrm{R}\}$

**d)** $\{x \mid x \leq 3 - \sqrt{5} \text{ or } x \geq 3 + \sqrt{5}, x \in \mathrm{R}\}$

**7. a)** $\left\{x \mid -\frac{4}{3} \leq x \leq \frac{1}{2}, x \in \mathrm{R}\right\}$

**b)** $\left\{x \mid \frac{5 - \sqrt{21}}{4} < x < \frac{5 + \sqrt{21}}{4}, x \in \mathrm{R}\right\}$

**c)** $\{x \mid -4 \leq x \leq 8, x \in \mathrm{R}\}$

**d)** $\left\{x \mid x \leq \frac{-6 - 2\sqrt{14}}{5} \text{ or } x \geq \frac{-6 + 2\sqrt{14}}{5}, x \in \mathrm{R}\right\}$

**8. a)** $\left\{x \mid \frac{6 - 2\sqrt{3}}{3} \leq x \leq \frac{6 + 2\sqrt{3}}{3}, x \in \mathrm{R}\right\}$

**b)** The path has to be between those two points to allow people up to 2 m in height to walk under the water.

**9.** The length can be anything up to and including 6 m. The width is just half the length, so it is a maximum of 3 m.

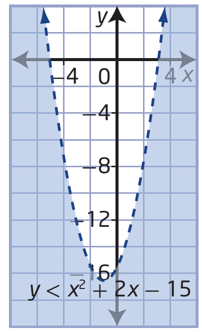
**10. a)** 104.84 km/h

**b)** $0.007v^2 + 0.22v \leq 50$

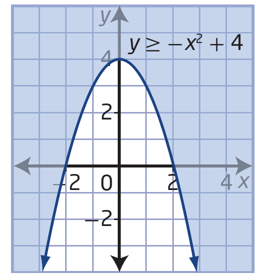
**c)** The solution to the inequality within the given context is $0 < v \leq 70.25$. The maximum stopping speed of 70.25 km/h is not half of the answer from part a) because the function is quadratic not linear.

**11. a)** $y \leq \frac{1}{2}(x + 3)^2 - 4$ **b)** $y > 2(x - 3)^2$

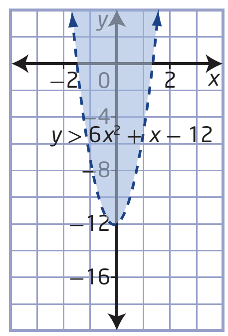
**12. a)**



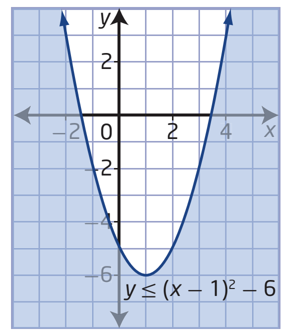

**b)**




**c)**



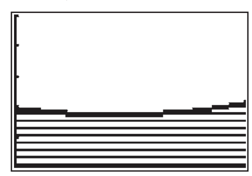

**d)**




**13. a)** $y < x^2 + 3$

**b)** $y \leq -(x + 4)^2 + 2$

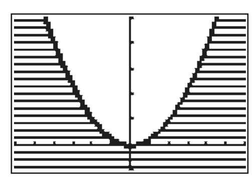
**14. a)** $y \leq 0.003t^2 - 0.052t + 1.986$, $0 \leq t \leq 20$, $y \geq 0$



**b)** $0.003t^2 - 0.052t - 0.014 \leq 0$; the years it was at most 2 t/ha were from 1975 to 1992.

**15. a)** $r \leq 0.1v^2$

You cannot have a negative value for the speed or the radius. Therefore, the domain is $\{v \mid v \geq 0, v \in \mathrm{R}\}$ and the range is $\{r \mid r \geq 0, r \in \mathrm{R}\}$.



**b)** Any speed above 12.65 m/s will complete the loop.

**16. a)** $20 \leq \frac{1}{20}x^2 - 4x + 90$

**b)** $\{x \mid 0 \leq x \leq 25.86 \text{ or } 54.14 \leq x \leq 90, x \in \mathrm{R}\}$; the solution shows where the cable is at least 20 m high.