Lesson 19 Practice Problems

1. a. The quadratic equation $x^2 + 7x + 10 = 0$ is in the form of $ax^2 + bx + c = 0$. What are the values of a, b, and c?

   b. Some steps for solving the equation by completing the square have been started here. In the third line, what might be a good reason for multiplying each side of the equation by 4?

$x^2 + 7x + 10 = 0$	Original equation
$x^2 + 7x = -10$	Subtract 10 from each side
$4x^2 + 4(7x) = 4(-10)$	Multiply each side by 4
$(2x)^2 + 2(7)2x + \_\_\_\_^2 = \_\_\_\_^2 - 4(10)$	Rewrite $4x^2$ as $(2x)^2$ and $4(7x)$ as $2(7)2x$
$(2x + \_\_\_\_)^2 = \_\_\_\_^2 - 4(10)$	
$2x + \_\_\_\_ = \pm\sqrt{\_\_\_\_^2 - 4(10)}$	
$2x = \_\_\_\_ \pm \sqrt{\_\_\_\_^2 - 4(10)}$	
$x =$	

   c. Complete the unfinished steps, and explain what happens in each step in the second half of the solution.

   d. Substitute the values of a, b, and c into the quadratic formula, $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$, but do not evaluate any of the expressions. Explain how this expression is related to solving $x^2 + 7x + 10 = 0$ by completing the square.

2. Consider the equation $x^2 - 39 = 0$.

   a. Does the quadratic formula work to solve this equation? Explain or show how you know.

   b. Can you solve this equation using square roots? Explain or show how you know.

3. Clare is deriving the quadratic formula by solving $ax^2 + bx + c = 0$ by completing the square.

   She arrived at this equation.

   $$(2ax + b)^2 = b^2 - 4ac$$

   Briefly describe what she needs to do to finish solving for x and then show the steps.

4. Tyler is solving the quadratic equation $x^2 + 8x + 11 = 4$.

   Study his work and explain the mistake he made. Then, solve the equation correctly.

   $$\begin{aligned} x^2 + 8x + 11 &= 4 \\ x^2 + 8x + 16 &= 4 \\ (x + 4)^2 &= 4 \\ x = \text{-}8 \quad \text{or} \quad x &= 0 \end{aligned}$$

   (From Unit 7, Lesson 12.)

5. Solve the equation by using the quadratic formula. Then, check if your solutions are correct by rewriting the quadratic expression in factored form and using the zero product property.

   a. $2x^2 - 3x - 5 = 0$

   b. $x^2 - 4x = 21$

   c. $3 - x - 4x^2 = 0$

(From Unit 7, Lesson 16.)

6. A tennis ball is hit straight up in the air, and its height, in feet above the ground, is modeled by the equation $f(t) = 4 + 12t - 16t^2$, where t is measured in seconds since the ball was thrown.

   a. Find the solutions to $6 = 4 + 12t - 16t^2$ without graphing. Show your reasoning.

   b. What do the solutions say about the tennis ball?

(From Unit 7, Lesson 17.)

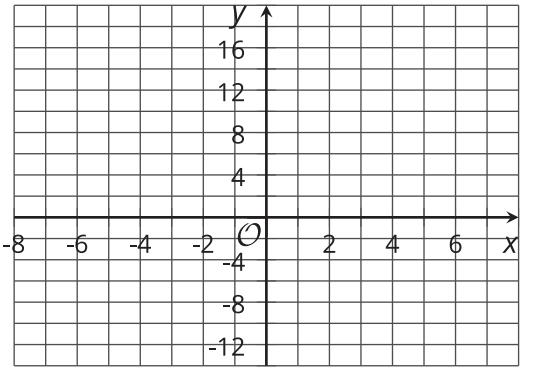
7. Consider the equation $y = 2x(6 - x)$.

   a. What are the x-intercepts of the graph of this equation? Explain how you know.

   b. What is the x-coordinate of the vertex of the graph of this equation? Explain how you know.

   c. What is the y-coordinate of the vertex? Show your reasoning.

   d. Sketch the graph of this equation.



(From Unit 6, Lesson 11.)