2-5 Additional Practice

Completing the Square

Use square roots to solve quadratic equations and find the solutions to the following equations.

1. $x^2 + 12x + 36 = 25$

2. $x^2 - 10x + 25 = 144$

3. $x^2 + 6x + 9 = \frac{49}{4}$

4. $x^2 - 22x + 121 = 225$

Rewrite the equations in the form $(x - p)^2 = q$

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

6. $x^2 - 6x + 13 = 0$

Solve each quadratic equation by completing the square.

7. $x^2 + 10x - 1 = 0$

8. $x^2 + 2x - 7 = 0$

9. $-x^2 + 6x + 10 = 0$

10. $x^2 + 5x = 3x + 11$

Write each equation in vertex form.

11. $y = x^2 - 6x + 4$

12. $y = x^2 + 14x + 50$

13. $y = 3x^2 + 8x + 2$

14. $y = -2x^2 + 6x - 2$

15. The quadratic equation $d = -t^2 + 4t + 33$ models the depth of water, d, in feet in a flood channel t hours after a rainstorm.

    a. Solve the equation $-t^2 + 4t + 33 = 0$.

    b. Approximate the positive solution found in part (a) to two decimal places.

    c. Interpret the answer to part (b) in terms of the problem.

16. While in orbit, a space scientist measures the pressure inside a container as it is being heated and then cooled. She records the information and discovers the pressure, p, in pounds per square inch, is related to the time, t, in minutes after the experiment began according to the equation $p = -0.2t^2 + 1.6t$. Complete the square in the expression $-0.2t^2 + 1.6t$.

2-5 Additional Practice

Completing the Square

Solve each equation by first finding the principle square root of each side.

1. $x^2 + 12x + 36 = 25$

$x = -11, x = -1$

2. $x^2 - 10x + 25 = 144$

$x = 17, x = -7$

3. $x^2 + 6x + 9 = \frac{49}{4}$

$x = \frac{1}{2}, x = -\frac{13}{2}$

4. $x^2 - 22x + 121 = 225$

$x = -4, x = 26$

Rewrite each equation in the form $(x - p)^2 = q$

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

$(x + 2)^2 = 1$

6. $x^2 - 6x + 13 = 0$

$(x - 3)^2 = -4$

Solve each quadratic equation by completing the square.

7. $x^2 + 10x - 1 = 0$

$x = -5 \pm \sqrt{26}$

8. $x^2 + 2x - 7 = 0$

$x = -1 \pm 2\sqrt{2}$

9. $-x^2 + 6x + 10 = 0$

$x = 3 \pm \sqrt{19}$

10. $x^2 + 5x = 3x + 11$

$x = -1 \pm 2\sqrt{3}$

Write each equation in vertex form.

11. $y = x^2 - 6x + 4$

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

12. $y = x^2 + 14x + 50$

$y = (x + 7)^2 + 1$

13. $y = 3x^2 + 8x + 2$

$y = 3\left(x + \frac{4}{3}\right)^2 - \frac{10}{3}$

14. $y = -2x^2 + 6x - 2$

$y = -2\left(x - \frac{3}{2}\right)^2 + \frac{5}{2}$

15. The quadratic equation $d = -t^2 + 4t + 33$ models the depth of water, d, in feet in a flood channel t hours after a rainstorm.

a. Solve the equation $-t^2 + 4t + 33 = 0$. $t = 2 \pm \sqrt{37}$

b. Approximate the positive solution found in part (a) to two decimal places. **8.08**

c. Interpret the answer to part (b) in terms of the problem.
The depth of the water is 0 feet 8.08 hours after the rainstorm.

16. While in orbit, a space scientist measures the pressure inside a container as it is being heated and then cooled. She records the information and discovers the pressure, p, in pounds per square inch, is related to the time, t, in minutes after the experiment began according to the equation $p = -0.2t^2 + 1.6t$. After how many seconds is the pressure in the container the greatest? **After 4 seconds**