Review Exercise Set 22

Exercise 1: Solve by using the completing the square method.

$$x^2 - 2x - 63 = 0$$

Exercise 2: Solve by using the completing the square method.

$$y(y + 6) = -8$$

Exercise 3: Solve by using the completing the square method.

$$n^2 + 5n - 2 = 0$$

Exercise 4: Solve by using the completing the square method.

$$2b^2 - 6b = 10$$

Exercise 5: Solve by using the completing the square method.

$$2r^2 - 8r = -64$$

Review Exercise Set 22 Answer Key

Exercise 1: Solve by using the completing the square method.

$$x^2 - 2x - 63 = 0$$

Rewrite the equation with the constant on the right side of the equation

$$x^2 - 2x = 63$$

Take half of the coefficient for x, square it, and add it to both sides of the equation

$$\frac{1}{2}(-2) = -1; \quad (-1)^2 = 1$$

$$\begin{aligned} x^2 - 2x + 1 &= 63 + 1 \\ x^2 - 2x + 1 &= 64 \end{aligned}$$

Factor the perfect square trinomial

$$(x-1)^2 = 64$$

Use the square root property

$$\begin{aligned} x - 1 &= \pm\sqrt{64} \\ x - 1 &= \pm 8 \\ x &= 1 \pm 8 \end{aligned}$$

$$\begin{aligned} &x = 1 + 8 \quad or \quad &&x = 1 - 8 \\ &x = 9 &&x = -7 \end{aligned}$$

Check:

$$\begin{aligned} x^2 - 2x - 63 &= 0 \\ (9)^2 - 2(9) - 63 &= 0 \\ 81 - 18 - 63 &= 0 \\ 81 - 81 &= 0 \\ 0 &= 0 \end{aligned} \qquad \begin{aligned} x^2 - 2x - 63 &= 0 \\ (-7)^2 - 2(-7) - 63 &= 0 \\ 49 + 14 - 63 &= 0 \\ 63 - 63 &= 0 \\ 0 &= 0 \end{aligned}$$

9 and -7 are the solutions for the equation

Exercise 2: Solve by using the completing the square method.

$$y(y+6)=-8$$
$$y^2+6y=-8$$

$$\frac{1}{2}(6)=3; \quad (3)^2=9$$

$$y^2+6y+9=-8+9$$
$$(y+3)^2=1$$
$$y+3=\pm\sqrt{1}$$
$$y+3=\pm 1$$
$$y=-3\pm 1$$

$$y=-3+1 \quad or \quad y=-3-1$$
$$y=-2 \qquad\qquad y=-4$$

Check

$$y(y+6)=-8 \qquad\qquad y(y+6)=-8$$
$$(-2)(-2+6)=-8 \qquad\qquad (-4)(-4+6)=-8$$
$$(-2)(4)=-8 \qquad\qquad (-4)(2)=-8$$
$$-8=-8 \qquad\qquad -8=-8$$

-2 and -4 are the solutions for the equation

Exercise 3: Solve by using the completing the square method.

$$n^2+5n-2=0$$
$$n^2+5n=2$$

$$\frac{1}{2}(5)=\frac{5}{2}; \quad \left(\frac{5}{2}\right)^2=\frac{25}{4}$$

$$n^2+5n+\frac{25}{4}=2+\frac{25}{4}$$
$$\left(n+\frac{5}{2}\right)^2=\frac{8}{4}+\frac{25}{4}$$

Exercise 3 (Continued):

$$\left(n+\frac{5}{2}\right)^2=\frac{33}{4}$$

$$n+\frac{5}{2}=\pm\sqrt{\frac{33}{4}}$$

$$n=-\frac{5}{2}\pm\frac{\sqrt{33}}{2}$$

$$n=-\frac{5}{2}+\frac{\sqrt{33}}{2} \quad or \quad n=-\frac{5}{2}-\frac{\sqrt{33}}{2}$$

$$n=\frac{-5+\sqrt{33}}{2} \qquad\qquad n=\frac{-5-\sqrt{33}}{2}$$

Check:

$$n^2+5n-2=0$$

$$\left(\frac{-5+\sqrt{33}}{2}\right)^2+5\left(\frac{-5+\sqrt{33}}{2}\right)-2=0$$

$$\frac{25-10\sqrt{33}+33}{4}+\frac{-25+5\sqrt{33}}{2}-2=0$$

$$\frac{58-10\sqrt{33}}{4}+\frac{-50+10\sqrt{33}}{4}-\frac{8}{4}=0$$

$$\frac{58-10\sqrt{33}}{4}+\frac{-58+10\sqrt{33}}{4}=0$$

$$0=0$$

$$n^2+5n-2=0$$

$$\left(\frac{-5-\sqrt{33}}{2}\right)^2+5\left(\frac{-5-\sqrt{33}}{2}\right)-2=0$$

$$\frac{25+10\sqrt{33}+33}{4}+\frac{-25-5\sqrt{33}}{2}-2=0$$

$$\frac{58+10\sqrt{33}}{4}+\frac{-50-10\sqrt{33}}{4}-\frac{8}{4}=0$$

$$\frac{58+10\sqrt{33}}{4}+\frac{-58-10\sqrt{33}}{4}=0$$

$$0=0$$

Exercise 3 (Continued):

$\frac{-5+\sqrt{33}}{2}$ and $\frac{-5-\sqrt{33}}{2}$ are the solutions

Exercise 4: Solve by using the completing the square method.

$$2b^2 - 6b = 10$$

Multiply the equation by one-half to make the leading coefficient equal to one

$$\frac{1}{2}\left(2b^2 - 6b\right) = \frac{1}{2}(10)$$
$$b^2 - 3b = 5$$

Take half of the coefficient for b, square it, and add it to both sides of the equation

$$\frac{1}{2}(-3) = -\frac{3}{2}; \quad \left(-\frac{3}{2}\right)^2 = \frac{9}{4}$$

$$b^2 - 3b + \frac{9}{4} = 5 + \frac{9}{4}$$
$$b^2 - 3b + \frac{9}{4} = \frac{20}{4} + \frac{9}{4}$$
$$b^2 - 3b + \frac{9}{4} = \frac{29}{4}$$

Factor the perfect square trinomial

$$\left(b - \frac{3}{2}\right)^2 = \frac{29}{4}$$

Use the square root property and solve for b

$$b - \frac{3}{2} = \pm\sqrt{\frac{29}{4}}$$
$$b = \frac{3}{2} \pm \frac{\sqrt{29}}{2}$$

Exercise 4 (Continued):

$$b = \frac{3}{2} + \frac{\sqrt{29}}{2} \quad or \quad b = \frac{3}{2} - \frac{\sqrt{29}}{2}$$
$$b = \frac{3+\sqrt{29}}{2} \qquad b = \frac{3-\sqrt{29}}{2}$$

Exercise 5: Solve by using the completing the square method.

$$2r^2 - 8r = -64$$
$$\frac{1}{2}\left(2r^2 - 8r\right) = \frac{1}{2}\left(-64\right)$$ 2r² - 8r = -64
$$r^2 - 4r = -32$$

$$\frac{1}{2}\left(-4\right) = -2; \quad \left(-2\right)^2 = 4$$

$$r^2 - 4r + 4 = -32 + 4$$
$$r^2 - 4r + 4 = -28$$
$$\left(r-2\right)^2 = -28$$
$$r - 2 = \pm\sqrt{-28}$$

It is not possible to take the square root of a negative number and get a real number, so this equation has no real solutions.