Review Exercise Set 1

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

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

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

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

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

$$n^2 + 12n + 36 = 0$$

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

$$2x^2 - 5x = 7$$

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

$$2r^2 - 6r = 20$$

Review Exercise Set 1 Answer Key

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

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

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

$x^2 - 4x = 21$

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

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

$x^2 - 4x + 4 = 21 + 4$
$x^2 - 4x + 4 = 25$

Factor the perfect square trinomial

$(x - 2)^2 = 25$

Use the square root property

$$\begin{aligned} x - 2 &= \pm\sqrt{25} \\ x - 2 &= \pm 5 \\ x &= 2 \pm 5 \end{aligned}$$

$$\begin{aligned} &x = 2 + 5 \quad or \quad x = 2 - 5 \\ &x = 7 \qquad\qquad\;\; x = -3 \end{aligned}$$

7 and -3 are the solutions for the equation

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

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

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

$a^2 + 2a = 5$

Exercise 2 (Continued):

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

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

$$a^2+2a+1=5+1$$
$$a^2+2a+1=6$$

Factor the perfect square trinomial

$$(a+1)^2=6$$

Use the square root property

$$a+1=\pm\sqrt{6}$$
$$a=-1\pm\sqrt{6}$$

$$a=-1+\sqrt{6} \quad or \quad a=-1-\sqrt{6}$$

$-1+\sqrt{6}$ and $-1-\sqrt{6}$ are the solutions for the equation

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

$$n^2+12n+36=0$$

$$\frac{1}{2}(12)=6; \quad (6)^2=36$$

The polynomial already has the necessary constant in order to factor it as a perfect square trinomial

$$(n+6)^2=0$$
$$n+6=\pm\sqrt{0}$$
$$n+6=0$$
$$n=-6$$

-6 is the solution for the equation

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

$$2x^2 - 5x = 7$$

Factor 2 from the left side of the equation so that the leading coefficient inside the parenthesis is 1

$$2\left(x^2 - \frac{5}{2}x\right) = 7$$

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

$$\frac{1}{2}\left(\frac{5}{2}\right) = \frac{5}{4}; \quad \left(\frac{5}{4}\right)^2 = \frac{25}{16}$$

Since 2 is being multiplied to each term in the parenthesis on the left side, we must multiply the fraction $\frac{25}{16}$ by 2 when we add it to the right side

$$2\left(x^2 - \frac{5}{2}x + \frac{25}{16}\right) = 7 + 2\left(\frac{25}{16}\right)$$
$$2\left(x^2 - \frac{5}{2}x + \frac{25}{16}\right) = \frac{56}{8} + \frac{25}{8}$$
$$2\left(x^2 - \frac{5}{2}x + \frac{25}{16}\right) = \frac{81}{8}$$

Factor the perfect square trinomial in the parenthesis

$$2\left(x - \frac{5}{4}\right)^2 = \frac{81}{8}$$

Solve for x

$$\frac{1}{2} \times 2\left(x - \frac{5}{4}\right)^2 = \frac{1}{2} \times \frac{81}{8}$$
$$\left(x - \frac{5}{4}\right)^2 = \frac{81}{16}$$
$$x - \frac{5}{4} = \pm\sqrt{\frac{81}{16}}$$
$$x - \frac{5}{4} = \pm\frac{9}{4}$$
$$x = \frac{5}{4} \pm \frac{9}{4}$$

Exercise 4 (Continued):

$$
\begin{aligned}
x &= \frac{5}{4} + \frac{9}{4} \quad or \quad & x &= \frac{5}{4} - \frac{9}{4} \\
x &= \frac{14}{4} & x &= -\frac{4}{4} \\
x &= \frac{7}{2} & x &= -1
\end{aligned}
$$

-1 and $\frac{7}{2}$ are the solutions for the equation

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

$$2r^2 - 6r = 20$$

$$2\left(r^2 - 3r\right) = 20$$

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

$$2\left(r^2 - 3r + \frac{9}{4}\right) = 20 + 2\left(\frac{9}{4}\right)$$

$$2\left(r^2 - 3r + \frac{9}{4}\right) = \frac{40}{2} + \frac{9}{2}$$

$$2\left(r - \frac{3}{2}\right)^2 = \frac{49}{2}$$

$$\frac{1}{2} \times 2\left(r - \frac{3}{2}\right)^2 = \frac{1}{2} \times \frac{49}{2}$$

$$\left(r - \frac{3}{2}\right)^2 = \frac{49}{4}$$

$$r - \frac{3}{2} = \pm\sqrt{\frac{49}{4}}$$

$$r = \frac{3}{2} \pm \frac{7}{2}$$

Exercise 5 (Continued):

$$\begin{aligned} r &= \frac{3}{2}+\frac{7}{2} \quad or \quad & r &= \frac{3}{2}-\frac{7}{2} \\ r &= \frac{10}{2} & r &= -\frac{4}{2} \\ r &= 5 & r &= -2 \end{aligned}$$

-2 and 5 are the solutions for the equation