Objective: Choose a method to solve a quadratic equation.

Concept

Methods for Solving a Quadratic Equation

Square Root Property: Best method for quadratic equations **of the form** $\boldsymbol{a(x-h)^2+k=0}$ **and** $\boldsymbol{ax^2+c=0}$.

Complete the Square: Best method for quadratic equations of the form $x^2+bx+c=0$ that **cannot be factored and where** $\boldsymbol{b}$ **is an even number**.

Factoring: Best method for quadratic equations of the form $ax^2+bx+c=0$ **that can be factored easily**.
Also, best method for quadratic equations of the **form** $\boldsymbol{ax^2+bx=0}$ **where** $\boldsymbol{x}$ **is a common factor**.
Also a good method for quadratic equations **with a difference of two squares structure**.

Quadratic Formula: Best method for quadratic equations of the form $ax^2+bx+c=0$ that **cannot be factored or cannot be factored easily**.

Objective: Choose a method to solve a quadratic equation.

Concept

Which method was used to solve the equation?

Factoring

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

$$(x-5)(x-2) = 0$$

$$x-5=0 \quad x-2=0$$

$$\boxed{x=5, \ \ x=2}$$

Objective: Choose a method to solve a quadratic equation.

Concept

Which method was used to solve the equation?

Complete the Square

$$x^2 - 4x = -9$$

$$x^2 - 4x + 4 = -9 + 4$$

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

$$\sqrt{(x-2)^2} = \pm\sqrt{-5}$$

$$x - 2 = \pm\sqrt{5}i$$

$$\boxed{x = 2 + \sqrt{5}i,\ \ x = 2 - \sqrt{5}i}$$

Objective: Choose a method to solve a quadratic equation.

Concept

Which method was used to solve the equation?

Quadratic Formula

$$2x^2 - x - 3 = 0$$

$$x = \frac{1 \pm \sqrt{(-1)^2 - 4(2)(-3)}}{2(2)}$$

$$x = \frac{1 \pm \sqrt{25}}{4}$$

$$x = \frac{1+5}{4} = \frac{6}{4}, \quad x = \frac{1-5}{4} = \frac{-4}{4}$$

$$\boxed{x = \frac{3}{2}, \quad x = -1}$$

Objective: Choose a method to solve a quadratic equation.

Concept

Which method was used to solve the equation?

Square Root Property

$$3x^2 - 8 = 0$$

$$3x^2 = 8$$

$$x^2 = \frac{8}{3}$$

$$\sqrt{x^2} = \pm\sqrt{\frac{8}{3}}$$

$$x = \pm\frac{\sqrt{8}}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \pm\frac{\sqrt{24}}{\sqrt{9}} = \pm\frac{2\sqrt{6}}{3}$$

$$\boxed{x = -\frac{2\sqrt{6}}{3},\ \ x = \frac{2\sqrt{6}}{3}}$$

Objective: Choose a method to solve a quadratic equation.

Solve by Factoring or the Square Root Property

$$25x^2 - 4 = 0$$

Factoring

$$25x^2 - 4 = 0$$

$$(5x-2)(5x+2) = 0$$

$$5x - 2 = 0 \quad 5x + 2 = 0$$

$$\boxed{x = \frac{2}{5} \qquad x = -\frac{2}{5}}$$

Square Root Property

$$25x^2 - 4 = 0$$

$$25x^2 = 4$$

$$x^2 = \frac{4}{25}$$

$$\sqrt{x^2} = \pm\sqrt{\frac{4}{25}} = \pm\frac{\sqrt{4}}{\sqrt{25}}$$

$$\boxed{x = -\frac{2}{5}, \ \frac{2}{5}}$$

Which method did you choose and why did you choose that method?

Objective: Choose a method to solve a quadratic equation.

Solve by Factoring or Completing the Square

$$x^2 - 12x - 45 = 0$$

Factoring

$$x^2 - 12x - 45 = 0$$

$$(x-15)(x+3) = 0$$

$$x - 15 = 0 \quad x + 3 = 0$$

$$\boxed{x = 15 \qquad x = -3}$$

Complete the Square

$$x^2 - 12x - 45 = 0$$

$$x^2 - 12x + 36 = 45 + 36$$

$$(x-6)^2 = 81$$

$$\sqrt{(x-6)^2} = \pm\sqrt{81}$$

$$x - 6 = -9, \quad 9$$

$$\underline{+6 \quad +6, +6}$$

$$\boxed{x = -3, \quad 15}$$

Which method did you choose and why did you choose that method?

Objective: Choose a method to solve a quadratic equation.

Solve by Completing the Square or the Quadratic Formula

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

Complete the Square

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

$$x^2 + 8x + 16 = 2 + 16$$

$$(x+4)^2 = 18$$

$$\sqrt{(x+4)^2} = \pm\sqrt{18} = \pm\sqrt{9}\cdot\sqrt{2}$$

$$x + 4 = \pm 3\sqrt{2}$$

$$-4 \quad -4$$

$$\boxed{x = -4 - 3\sqrt{2},\ -4 + 3\sqrt{2}}$$

Quadratic Formula

$$x = \frac{-1(8) \pm \sqrt{(8)^2 - [4(1)(-2)]}}{2(1)}$$

$$x = \frac{-8 \pm \sqrt{64 - [-8]}}{2}$$

$$x = \frac{-8 \pm \sqrt{72}}{2}$$

$$x = \frac{-8}{2} \pm \frac{6\sqrt{2}}{2}$$

$$\boxed{x = -4 - 3\sqrt{2},\ -4 + 3\sqrt{2}}$$

Which method did you choose and why did you choose that method?

Objective: Choose a method to solve a quadratic equation.

Solve by the Quadratic Formula or the Square Root Property

$$3x^2 + 17 = 0$$

Quadratic Formula

$$x = \frac{-1(0) \pm \sqrt{(0)^2 - [4(3)(17)]}}{2(3)}$$

$$x = \frac{0 \pm \sqrt{0 - 204}}{6}$$

$$x = \frac{\pm\sqrt{-204}}{6} = \frac{\pm\sqrt{4}\cdot\sqrt{51}\cdot\sqrt{-1}}{6}$$

$$x = \pm\frac{2\sqrt{51}}{6}i$$

$$\boxed{x = -\frac{\sqrt{51}}{3}i, \frac{\sqrt{51}}{3}i}$$

Square Root Property

$$3x^2 = -17$$

$$x^2 = \frac{-17}{3}$$

$$\sqrt{x^2} = \pm\sqrt{\frac{-17}{3}} =$$

$$x = \pm\frac{\sqrt{17}i}{\sqrt{3}}\cdot\frac{\sqrt{3}}{\sqrt{3}} = \pm\frac{\sqrt{51}}{\sqrt{9}}i = \pm\frac{\sqrt{51}}{3}i$$

$$\boxed{x = -\frac{\sqrt{51}}{3}i, \quad \frac{\sqrt{51}}{3}i}$$

Which method did you choose and why did you choose that method?

Objective: Choose a method to solve a quadratic equation.

Solve by Factoring or the Quadratic Formula

$$6x^2+19x-36=0$$

Factoring

$$6x^2+19x-36=0$$

$$(2x+9)(3x-4)=0$$

$$2x+9=0 \quad 3x-4=0$$

$$\boxed{x=-\frac{9}{2} \qquad x=\frac{4}{3}}$$

Quadratic Formula

$$x=\frac{-1(19)\pm\sqrt{(19)^2-[4(6)(-36)]}}{2(6)}$$

$$x=\frac{-19\pm\sqrt{361-[-864]}}{12}$$

$$x=\frac{-19\pm\sqrt{1225}}{12}$$

$$x=\frac{-19}{12}\pm\frac{35}{12}$$

$$x=\frac{-19}{12}-\frac{35}{12}=-\frac{54}{12}, \quad x=\frac{-19}{12}+\frac{35}{12}=\frac{16}{12}$$

$$\boxed{x=-\frac{9}{2},\frac{4}{3}}$$

Which method did you choose and why did you choose that method?

Objective: Choose a method to solve a quadratic equation.

Closure

What method would you use to solve the equation shown? Explain your reasoning.

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

I would use factoring because the GCF is x. The equation would factor into $x(x-4)=0$ and then using the Zero Product Property I would find the solutions: $x=0$ and $x=4$.