

### Example 1

Determine whether the given values of  $x$  are solutions of the equation. Justify your answer.

$$\frac{5}{2x} - \frac{4}{x} = 3$$

A)  $x = -1/2$

B)  $x = 4$

C)  $x = 0$

D)  $x = 1/4$

$$\text{LCD} = 2x$$

$$2x \left( \frac{5}{2x} \right) - 2x \left( \frac{4}{x} \right) = 3(2x)$$

$$5 - 2(4) = 6x$$

$$5 - 8 = 6x$$

$$\frac{-3}{6} = \frac{6x}{6}$$

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

### Example 2

Solve the equation. Show all the work.

$$14 \cdot \frac{x}{2} + \frac{6x}{7} = \frac{19}{14}$$

$$\text{LCD} = 14$$

$$7x + 2(6x) = 19$$

$$7x + 12x = 19$$

$$19x = 19$$

$$x = 1$$

## Section P. 4 Part 3

### Solving Equations Algebraically and Graphically

**Objective:** Given a radical and absolute Value equation, students will find its solutions algebraically, graphically and explain the process.

**Study Problems** pg 51 #69-70, 89-91 odd, 131-137 odd, 147-149.

### Section P-4 Solve Equations

- 1.) I will be able to solve quadratic equations by factoring and completing the square.
- 2.) I will be able to solve a radical equation by combining fractions.
- 3.) I will be able to solve absolute value equation by writing two equation.
- 4.) I will be able to solve radical equations by simplifying the power to one.

#### Example#1

Solve for the variable.

$$\sqrt{x+1} - 3x = 1$$

+3x      +3x

$$\rightarrow \left(\sqrt{x+1}\right)^2 = \left(3x+1\right)^2$$

(3x+1)(3x+1)

$$x+1 = 9x^2 + 6x + 1$$

Check

$$\sqrt{0+1} - 3(0) = 1$$
$$\sqrt{1} = 1$$
$$1 = 1 \checkmark$$

$$\sqrt{\frac{-5}{9} + 1} - 3\left(\frac{-5}{9}\right) = 1$$

$$\sqrt{\frac{4}{9}} + \frac{5}{3} = 1$$

$$\frac{2}{3} + \frac{5}{3} = 1$$

$\frac{7}{3} \neq 1$  extraneous soln

$$\frac{x+1}{-x-1} = \frac{9x^2 + 6x + 1}{-x-1}$$

$$0 = 9x^2 + 5x$$

$$0 = x(9x+5)$$

$$\boxed{x=0}, x = -\frac{5}{9}$$

### Example#2

Solve for the variable.

$$|x^2 - 3x| = -4x + 6$$

As is

$$\begin{aligned} x^2 - 3x &= -4x + 6 \\ +4x - 6 &+4x - 6 \\ \hline x^2 + x - 6 &= 0 \\ (x+3)(x-2) &= 0 \\ \boxed{x = -3}, x = 2 & \end{aligned}$$

Ext. Soln

opp

$$\begin{aligned} -(x^2 - 3x) &= -4x + 6 \\ -x^2 + 3x &= -4x + 6 \\ +x^2 - 3x &+x^2 - 3x \\ \hline 0 &= x^2 - 7x + 6 \\ 0 &= (x-6)(x-1) \\ \cancel{x = 6}, \boxed{x = 1} & \end{aligned}$$

Ext. Soln

### Example#3

Solve for the variable.

$$|\frac{1}{2}x - 6| + 2 = 5 \rightarrow |\frac{1}{2}x - 6| = 3$$

As is

$$\begin{aligned} \frac{1}{2}x - 6 &= 3 \\ +6 &+6 \\ \hline 2 \cdot \frac{1}{2}x &= 9 \cdot 2 \\ \boxed{x = 18} & \end{aligned}$$

check

$$\begin{aligned} \frac{1}{2}(18) - 6 &+ 2 = 5 \\ |3| + 2 &= 5 \\ 3 + 2 &= 5 \\ 5 &= 5 \checkmark \end{aligned}$$

opp

$$\begin{aligned} -(\frac{1}{2}x - 6) &= 3 \\ -\frac{1}{2}x + 6 &= 3 \\ -6 &-6 \\ \hline -2 \cdot \frac{1}{2}x &= -3 \cdot 2 \\ \boxed{x = 6} & \end{aligned}$$
$$\begin{aligned} \frac{1}{2}(6) - 6 &+ 2 = 5 \\ |-3| + 2 &= 5 \\ 3 + 2 &= 5 \\ 5 &= 5 \checkmark \end{aligned}$$

### Example#4

Solve for the variable.

$$\sqrt{x} - \sqrt{x-20} = 10$$

$$(-\sqrt{x-20})^2 = (10 - \sqrt{x})^2$$

$$x-20 = (10 - \sqrt{x})(10 - \sqrt{x})$$

$$\begin{array}{r} x-20 = 100 - 20\sqrt{x} + x \\ \cancel{-x} + 20 \quad \quad \quad +20 \quad \quad \quad \cancel{-x} \\ \hline \end{array}$$

$$0 = 120 - 20\sqrt{x}$$

$$\frac{-120}{-20} = \frac{-20\sqrt{x}}{-20}$$

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

~~36 = x~~ Extraneous soln

no soln.

check

$$\sqrt{36} - \sqrt{36-20} = 10$$

$$6 - \sqrt{16} = 10$$

$$6 - 4 = 10$$

$$-2 \neq 10$$

### Example#4

Solve for the variable.

$$(x-1)^{2/3} - 25 = 0$$

$$(x-1)^{2/3} = 25$$

$$(\sqrt[3]{(x-1)^2})^3 = (25)^3$$

$$\sqrt{(x-1)^2} = \pm \sqrt{15625}$$

$$x-1 = \pm 125$$

$$x = 1 \pm 125$$

$$x = 124 \quad x = 126$$