

# Station 1: Radical Operations

Simplify the following radical equations.

$$1. 21\sqrt{27x^5}$$

$\begin{matrix} 9 & \wedge & 3 & & \text{X} & \text{X} & \text{X} & \text{X} & \text{X} \\ \text{3} & & & & & & & & \end{matrix}$

$$(21)(3)x^2\sqrt{3x}$$

$$\boxed{63x^2\sqrt{3x}}$$

$$2. 3\sqrt{98a^3b^7}$$

$\begin{matrix} 98 \\ 49 & \wedge & 2 \\ \text{7} & & \end{matrix}$

$$3(7)ab^3\sqrt{2ab}$$

$$\boxed{21ab^3\sqrt{2ab}}$$

$$3. \sqrt{12} \cdot \sqrt{-75}$$

$$\sqrt{12} \cdot i\sqrt{75} = i\sqrt{900}$$

$$\boxed{30i}$$

$$4. (6 + 5i)(2 - i)$$

$$12 - 6i + 10i - 5i^2$$

$$12 + 4i + 5$$

$$\boxed{17 + 4i}$$

$$5. \text{Solve for } x \text{ and } y: (x + yi) - (2 - i) = 12 + 7i$$

$$\begin{array}{r} x + yi - 2 + i = 12 + 7i \\ + 2 - i \quad + 2 - i \\ \hline x + yi = 14 + 6i \end{array}$$

$$\boxed{\begin{array}{l} x = 14 \\ y = 6 \end{array}}$$

Rationalize each denominator and simplify each expression.

$$6. \frac{5}{(10-3i)} \cdot \frac{(10+3i)}{(10+3i)}$$

$$\frac{50 + 15i}{100 + 30i - 30i - 9i^2}$$

$$\frac{50 + 15i}{100 + 9} = \boxed{\frac{50 + 15i}{109}}$$

$$7. \frac{3}{(7+\sqrt{2})} \cdot \frac{(7-\sqrt{2})}{(7-\sqrt{2})}$$

$$\frac{21 - 3\sqrt{2}}{49 - 7\sqrt{2} + 7\sqrt{2} - \sqrt{4}} = \frac{21 - 3\sqrt{2}}{49 - 2}$$

$$\boxed{\frac{21 - 3\sqrt{2}}{47}}$$

# Station 2:

## Factoring

Factor each of the following. Check your work by FOLLing or BOXing your work.

1.  $12x^2 - 27$

$3(4x^2 - 9)$   
 $3(2x - 3)(2x + 3)$

$3(2x - 3)(2x + 3)$

2.  $2x^2 + 7x + 5$

~~$\begin{array}{ccc} & 10 & \\ 5 & & 2 \\ & 7 & \end{array}$~~

$(2x^2 + 5x)(x + 2x + 5)$   
 $x(2x + 5) + 1(2x + 5)$   
 $(x + 1)(2x + 5)$

$(x + 1)(2x + 5)$

3.  $8x^3 - 27$

SOAP

$(a | b) | (a^2 | ab | b^2)$   
 $(2x - 3) | (4x^2 + 6x + 9)$

$(2x - 3)(4x^2 + 6x + 9)$

4.  $x^2 - 10x + 9$

~~$\begin{array}{ccc} & 9 & \\ -9 & & -1 \\ & -10 & \end{array}$~~

$(x^2 - 9x)(-1x + 9)$   
 $x(x - 9) - 1(x - 9)$   
 $(x - 1)(x - 9)$

$(x - 1)(x - 9)$

5.  $\frac{25x^4z}{5x^2z} + \frac{15x^3z}{5x^2z} + \frac{5x^2z}{5x^2z}$

$5x^2z(5x^2 + 3x + 1)$

6.  $(2y - 8) + xy - 4x$

$2(y - 4) + x(y - 4)$

$(2 + x)(y - 4)$

$(2 + x)(y - 4)$

or

$(x + 2)(y - 4)$

# Station 3:

## Solving Quadratics

Solve each equation by using the Quadratic Formula.

1.  $3x^2 - 5x + 1 = 0.$

$a = 3$   
 $b = -5$   
 $c = 1$

$$x = \frac{5 \pm \sqrt{(-5)^2 - 4(3)(1)}}{2(3)} = \frac{5 \pm \sqrt{13}}{6}$$

$\left\{ \frac{5 \pm \sqrt{13}}{6} \right\}$

2.  $-7x^2 + 7x + 1 = \frac{-8}{+8}$

$$-7x^2 + 7x + 9 = 0$$

$$x = \frac{-7 \pm \sqrt{(7)^2 - 4(-7)(9)}}{2(-7)} = \frac{-7 \pm \sqrt{301}}{-14}$$

$a = -7$   $b = 7$   $c = 9$

$\left\{ \frac{-7 \pm \sqrt{301}}{-14} \right\}$

3.  $5x^2 + 70x + 245 = 0$

$a = 5$   
 $b = 70$   
 $c = 245$

$$x = \frac{-70 \pm \sqrt{(70)^2 - 4(5)(245)}}{2(5)} = \frac{-70 \pm \sqrt{0}}{10} = \frac{-70}{10} = -7$$

$\{-7\}$

Solve each equation by factoring.

4.  $x^2 - 20x + 100 = 0$

~~$\begin{matrix} 100 & & \\ -10 & & -10 \\ & -20 & \end{matrix}$~~

$(x-10)(x-10) = 0$   
 $x-10=0$        $x-10=0$   
 $x=10$            $x=10$

$\{10\}$

5.  $8x^2 + 7x - 1 = 0$

~~$\begin{matrix} -8 & & \\ 9 & & -1 \\ & 7 & \end{matrix}$~~

$(8x^2 + 8x)(-1x - 1) = 0$   
 $8x(x+1) - 1(x+1) = 0$   
 $8x-1=0$        $x+1=0$   
 $8x=1$            $x=-1$   
 $x=1/8$

$\{1/8, -1\}$

# Station 4:

## Absolute Value Equations

Solve each of the following. Check your work for extraneous solutions.

1.  $-8|3 - 8k| = 40$

$|-3 - 8k| = -5$

NO SOLUTION

$\{ \}$

2.  $\frac{10}{10}|7x + 3| = \frac{0}{10}$

$|7x + 3| = 0$

$\{-3/7\}$

$7x + 3 = 0$

$7x = -3$

$x = -3/7$

check:  $10|7(-3/7) + 3| = 0$

$10|-3 + 3| = 0$

$10|0| = 0$

$0 = 0 \checkmark$

3.  $-4|b - 2| - 9 = -37$

$-4|b - 2| = -28$

$|b - 2| = 7$

$b - 2 = 7$     $b - 2 = -7$

$b = 9$     $b = -5$

$\{-5, 9\}$

check:  $-4|9 - 2| - 9 = -37$

$-4|7| - 9 = -37$

$-28 - 9 = -37 \checkmark$

check:  $-4|-5 - 2| - 9 = -37$

$-4|-7| - 9 = -37$

$-28 - 9 = -37 \checkmark$

4.  $\frac{10}{-10} - 10|-8k + 4| = \frac{10}{-10}$

$-10|-8k + 4| = 0$

$|-8k + 4| = 0$

$-8k + 4 = 0$

$-8k = -4$

$k = 1/2$

$\{1/2\}$

check:

$10 - 10|-8(0.5) + 4| = 10$

$10 - 10|-4 + 4| = 10$

$10 - 10(0) = 10$

$10 = 10 \checkmark$

5.  $|9x - 4| = 86$

$9x - 4 = 86$

$9x = 90$

$x = 10$

$9x - 4 = -86$

$9x = -82$

$x = -82/9$

$\{10, -82/9\}$

check:  $|9(10) - 4| = 86$

$|90 - 4| = 86$

$|86| = 86 \checkmark$

check:  $|9(-82/9) - 4| = 86$

$|-82 - 4| = 86$

$|-86| = 86 \checkmark$

# Station 5:

## Absolute Value Inequalities

Solve each of the following. Graph your solutions of the number line provided and write your answers in both interval and set builder notation.

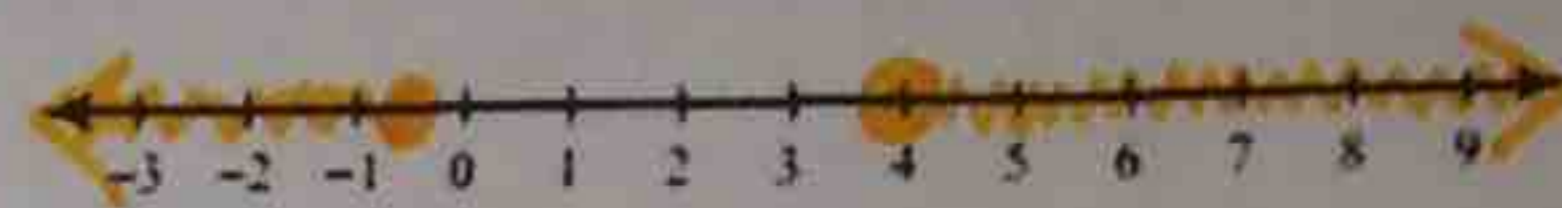
1.  $8 + |4x - 7| \geq 17$

$|4x - 7| \geq 9$

$4x - 7 \geq 9$        $4x - 7 \leq -9$

$4x \geq 16$        $4x \leq -2$

$x \geq 4$        $x \leq -1/2$



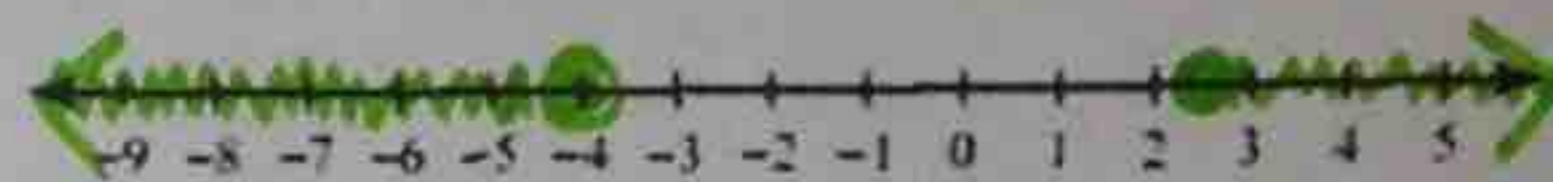
$(-\infty, -1/2] \cup [4, \infty)$

2.  $\frac{|2 + 3x|}{2} \geq 5$

$2 + 3x \geq 10$        $2 + 3x \leq -10$

$3x \geq 8$        $3x \leq -12$

$x \geq 8/3$        $x \leq -4$

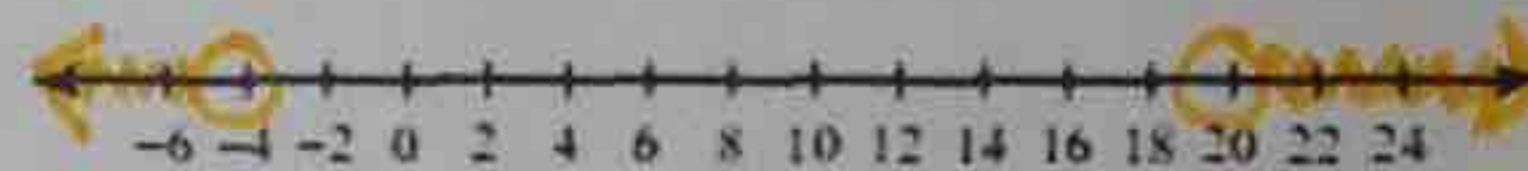


$(-\infty, -4] \cup [8/3, \infty)$

3.  $|b - 8| + 10 > 22$

$b - 8 > 12$        $b - 8 < -12$

$b > 20$        $b < -4$

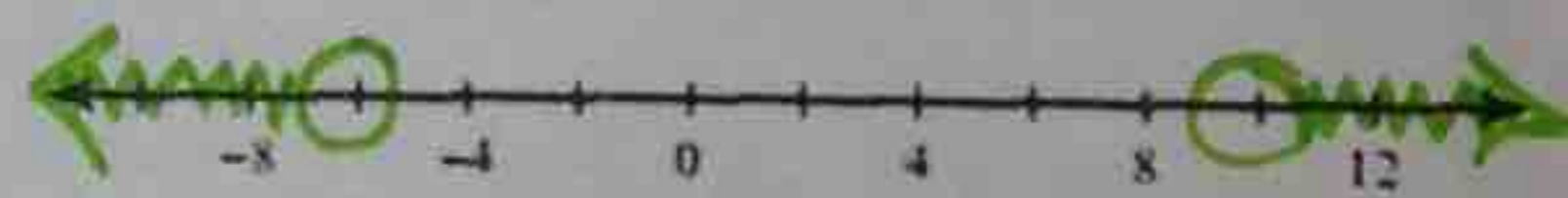


$(-\infty, -4) \cup (20, \infty)$

4.  $-3 + |n - 2| > 5$

$n - 2 > 8$        $n - 2 < -8$

$n > 10$        $n < -6$



$(-\infty, -6) \cup (10, \infty)$

5.  $-2|3x + 5| < 10$

$|3x + 5| > -5$

All real #s



$(-\infty, \infty)$