Name: KEY Hour: ____________ Date: ____________

NOTES: Section 12.2 – Operations with Radical Expressions

Goals: #1 - I can add, subtract, multiply, and divide radical expressions.

Homework: Section 12.2 Worksheet

Warm Up:

1. Evaluate the function for the given value of x.
   a. $\sqrt{x-6}$; 31

   $\sqrt{31-6}$

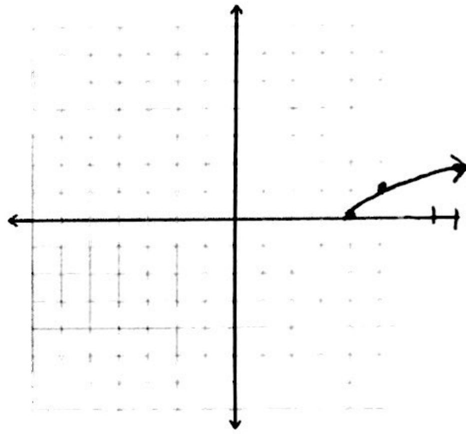
   $\sqrt{25}$

   $\boxed{5}$

2. Graph the function. State the domain and range.

   a. $y = \sqrt{x-4}$

x	y
4	0
5	1
8	2
13	3
20	4



Domain: $x \geq 4$

Range: $y \geq 0$

$x-4 \geq 0$

$x \geq 4$

3. Find the domain of the function.

   b. $y = 2\sqrt{x-2} + 2$

   $x-2 \geq 0$

   $\boxed{x \geq 2}$

Review:

When we simplify radical expressions, we look for perfect square numbers. (4, 9, 16, 25, 36, 49, 64, 81, 100)

Example: $\sqrt{32}$

$\sqrt{16} \cdot \sqrt{2}$

$\boxed{4\sqrt{2}}$

You practice: Simplify the radical expression.

1. $\sqrt{40}$

   $\sqrt{4} \cdot \sqrt{10}$

   $\boxed{2\sqrt{10}}$

2. $\sqrt{128}$

   $\sqrt{64} \cdot \sqrt{2}$

   $\boxed{8\sqrt{2}}$

3. $\sqrt{300}$

   $\sqrt{100} \cdot \sqrt{3}$

   $\boxed{10\sqrt{3}}$

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Notes:

To multiply radical expressions, we use the product property.

- Radical Product Property $\sqrt{a} \cdot \sqrt{b} = \sqrt{a \cdot b}$

Example #1: Simplify the radical expression.

1. $\sqrt{2} \cdot \sqrt{8}$

$\sqrt{8 \cdot 2}$

$\sqrt{16}$

$\boxed{4}$

2. $\sqrt{2}(5 - \sqrt{3})$

$5\sqrt{2} - \sqrt{3 \cdot 2}$

$\boxed{5\sqrt{2} - \sqrt{6}}$

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

$4 - 2\sqrt{3} + 2\sqrt{3} - \sqrt{3 \cdot 3}$

$4 - \sqrt{9}$

$4 - 3$

$\boxed{1}$

You practice: Simplify the radical expression.

1. $\sqrt{5}(\sqrt{2} + 1)$

$\boxed{\sqrt{10} + \sqrt{5}}$

2. $(6 - \sqrt{2})(6 + \sqrt{2})$

$36 + 6\sqrt{2} - 6\sqrt{2} - \sqrt{2 \cdot 2}$

$36 - \sqrt{4}$

$36 - 2$

$\boxed{34}$

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

$\sqrt{3 \cdot 12}$

$\sqrt{36}$

$\boxed{6}$

Notes:

To divide radical expressions, we use the qutioent property.

- Radical Quiotient Property $\sqrt{\frac{a}{b}} = \frac{\sqrt{a}}{\sqrt{b}}$

Remember, we CANNOT have radicals in our denominator.

We rationalize the denomiator:

Example: $\frac{3}{\sqrt{5}} \cdot \frac{\sqrt{5}}{\sqrt{5}}$

$\frac{3\sqrt{5}}{25}$ $\boxed{\frac{3\sqrt{5}}{5}}$

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Example #2: Simplify the radical expression.

1. $\frac{1}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}}$

$\frac{\sqrt{3}}{\sqrt{9}}$

$\boxed{\frac{\sqrt{3}}{3}}$

2. $\sqrt{\frac{10}{3}}$

$\frac{\sqrt{10}}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}}$

$\frac{\sqrt{30}}{\sqrt{9}}$ $\boxed{\frac{\sqrt{30}}{3}}$

You practice: Simplify the radical expression.

1. $\sqrt{\frac{3}{7}}$

$\frac{\sqrt{3}}{\sqrt{7}} \cdot \frac{\sqrt{7}}{\sqrt{7}}$

$\frac{\sqrt{21}}{\sqrt{49}}$ $\boxed{\frac{\sqrt{21}}{7}}$

2. $\frac{2}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}}$

$\frac{2\sqrt{2}}{\sqrt{4}}$

$\frac{\cancel{2}\sqrt{2}}{\cancel{2}}$ $\boxed{\sqrt{2}}$

Notes:

To add or subtract radical expressions, we combine "like" terms.

Example #3: Simplify the radical expression.

1. $1\sqrt{2} + 3\sqrt{2}$

$\boxed{4\sqrt{2}}$

2. $2\sqrt{2} + \sqrt{5} - 6\sqrt{2}$

$\boxed{-4\sqrt{2} + \sqrt{5}}$

3. $4\sqrt{3} - \sqrt{27}$

$\sqrt{9} \cdot \sqrt{3}$

$4\sqrt{3} - 3\sqrt{3}$

$\boxed{\sqrt{3}}$

You practice: Simplify the radical expression.

1. $3\sqrt{5} - 2\sqrt{5}$

$\boxed{\sqrt{5}}$

2. $\sqrt{18} + \sqrt{2}$

$\sqrt{9} \cdot \sqrt{2}$

$3\sqrt{2} + \sqrt{2}$

$\boxed{4\sqrt{2}}$

3. $\sqrt{7} + \sqrt{2} + 3\sqrt{7}$

$\boxed{4\sqrt{7} + \sqrt{2}}$