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| **What is a radical?**  An expression that has a square root, cube root, etc. The symbol is  **Types of Radicals**  An **entire radical** is a radical with a coefficient of 1 (e.g.)  radical.PNGA **mixed radical** has a coefficient other than 1 (e.g.). It is 2 times . |

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| **A. SIMPLIFYING (Reducing) RADICALS**  To **simplify** means to find another expression with the same value.  It **does not mean** to find a decimal approximation. |

**Simplify**

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| **METHOD 1: LARGEST PERFECT SQUARE** | **METHOD 2: PRIME FACTORS** |
| **1.** Find the **largest** perfect square which will divide evenly into the number under your radical sign.  **Dividend**  **Divisor**  48 16 the largest perfect square  3 3 that divides evenly into 48 is **16**  1  **2.** Write the number appearing under your radical as the product (multiplication) of the perfect square and your answer from dividing.  **3.** Give each number in the product its own radical sign.  **4.** Reduce the "perfect" radical which you have now created.  **5.** You now have your answer. | **1.** **Factor** out the number into its prime factors.  48 2  24 2  12 2 4 8 = 2 x 2 x 2 x 2 x 3  6 2  3 3  1  **2.** Write all the prime factors under your radical  **3.** Give each twin numbers and single numbers in the product their own radical signs  **4.** Reduce the "perfect" radical which you have now created  **5.** You now have your answer |

i) Simplify the following “**entire”** radicals.

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| **a)** | **b)** |
| **c)** | **d)** |

ii) Express each of the following as “**entire”** radicals.

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| **a)** | **b)** |

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| **B. MULTIPLYING/ DIVIDING RADICALS**  When **multiplying** radicals, you must multiply the numbers **OUTSIDE (O)** the radicals **AND** then multiply the numbers **INSIDE (I)**the radicals.  **such as**  When **dividing** radicals, you must divide the numbers **OUTSIDE (O**) the radicals **AND** then divide the numbers**INSIDE (I)**the radicals.  **such as**  **Rationalizing The Denominator**  If a radical appears in the denominator of a fraction, it will need to be "removed" if you are trying to simplify the expression. To "remove" a radical from the denominator, multiply the top and bottom of the fraction by that same radical to create a rational number (a perfect square radical) in the denominator. This process is called ***rationalizing the denominator.***  **Simplify**  **Answer** |

**Multiply or divide**, then **simplify** the following radicals

**a)** **b)** **c)**

**d)**  **e)**

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| **D. ADDING RADICALS**  When adding or subtracting radicals, you must use the same concept as that of adding or subtracting "like" variables.  **In other words, the radicals must be the same before you add (or subtract) them.**  **Like Radicals**  **example non-example** |

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| **Ex1**: Add | Since the radicals are the same, simply add the numbers **in front** of the radicals (do **NOT** add the numbers under the radicals).  **Answer:** |
| **Ex2:** Add | Since the radicals are not the same, and both are in their simplest form, there is no way to combine these values.  The answer is the same as the problem.  **Answer:** |

Add the following radicals

**a) b)**

**MULTIPLYING BINOMIALS**

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| N | | 1. Simplify. Express your answer as a radical in simplest form. | | | | | | |
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|  |
|  | 1. Simplify. Express your answer as a radical in simplest form. | | | | | | | |
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**SIMPLIFYING RADICALS**

1. Simplify:

a)  b)  c)

d)  e)  f)

2. Simplify:

a)  b)  c)  d) 

3. Solve for *x*.

a)  b)  c)  d) 

4. Express both roots in decimal form, rounded to 3 decimal places.



a)  b)  c) 

5. Simplify:

a)  b) 

c)  d) 

e)  f) 

g)  h) 

i)  j) 

e) - 7 f) - 30 g)  h) 