Notes - Rational Exponents

1. A rational number ________________________________
2. A rational exponent is therefore a ________________ exponent.
3. A rational exponent is another way of writing a _______________ (also known as a root). The _______________ of the fraction indicates the root.
   
   ex 1: \( \sqrt{x} = \) ____________  
   ex 2: \( \frac{1}{\sqrt{x}} = \) ____________
   
   ex 3: \( \frac{1}{x^2} = \) ____________  
   ex 4: \( x^{\frac{1}{7}} = \) ____________

4. If the numerator of a rational exponent is not one, then the radical is also being raised to a power. This can be written two different ways.
   
   ex 5: \( \frac{2}{3} x^\frac{2}{3} = \) ____________ = ____________  
   ex 6: \( m^{\frac{5}{2}} = \) ____________ = ____________

Write the following in exponential form. If possible simplify the exponent.

   ex 7: \( \sqrt[3]{x^2} = \) ____________  
   ex 8: \( \sqrt[3]{x^6} = \) ____________
   
   ex 9: \( (\sqrt{x})^9 = \) ____________  
   ex 10: \( (\sqrt[4]{y})^{10} = \) ____________

Write the following as a radical.

   ex 11: \( x^{\frac{2}{7}} = \) ____________  
   ex 12: \( y^{\frac{1}{6}} = \) ____________
When the base is a number instead of a variable, a rational exponent can be used to simplify to a number answer.

ex 13: \(8^{\frac{4}{3}} = \) \( \) 
ex 14: \(4^{\frac{3}{2}} = \) \( \)

ex: 15: \(9^{\frac{1}{2}} = \) \( \) 
ex 16: \(25^{\frac{3}{2}} = \) \( \)

ex 17: \(-8^{\frac{4}{3}} = \) \( \) 
ex 18: \((-8)^{\frac{4}{3}} = \) \( \)

ex 19: \(-27^{\frac{4}{3}} = \) \( \)

When two exponents appear on the same base (power to a power), first multiply the exponents together and then simplify if possible.

ex 20: \(\left(\frac{2}{x^{\frac{3}{2}}}\right)^{-6} = \) \( \) 
ex 21: \(\left(\frac{4}{x^{\frac{2}{3}}}\right)^{10} = \) \( \)

ex 22: \(\left(\frac{1}{3^{\frac{2}{3}}}\right)^{6} = \) \( \) 
ex 23: \(\left(\frac{4}{-3}^{\frac{2}{3}}\right)^{9} = \) \( \)