Math 11 Unit 5: Radicals (Chp 5 in workbook)
Unit 5.1: Simplifying radicals

A. Vocabulary

$$8\sqrt[3]{27}$$

i) Like radicals:

ii) mixed radicals:

iii) entire radicals:

iv) simplify radicals:

B. How to change an entire radical to a mixed radical?

Ex: $\sqrt{12} =$

Ex: $-3\sqrt{12} =$

Ex: $\sqrt[3]{54} =$

C. How to convert mixed radicals to entire radicals?

Ex: $3\sqrt{12} =$

Ex: $-3\sqrt{12} =$

Ex: $4\sqrt[3]{2} =$

-WB pg 158 #1-7: 4 from each
-extra practice handout: pg 7 sec 1.4 #1-15, 25-30
pg 8: #31-33, 45, 47

Math 11: unit 5.1b - more practice with radicals and rational exponents

A. Remember:

i) (2) (2) = and (-2)(-2) = so $\sqrt{4}$ =

….so how can we tell which one we want?

….generally $\sqrt{4}$ = and $-\sqrt{4}$ =

-what about (2)(2)(2)(2) = and (-2)(-2)(-2)(-2)=

…we see $\sqrt[4]{16}$ = and $-\sqrt[4]{16}$ =

…notice that as long as we have an even number for the exponent, we can NEVER simplify to a negative answer:

ie: $x^4 = -16$

ii) what about: (-2)(-2)(-2) = so $\sqrt[3]{-8}$ =

…so, notice that as long as we have an odd number for the exponent, we CAN simplify to a negative answer.

try: solve for 'x'

1) $x^2 = 16$

2) $x^2 = -16$

3) $x^5 = -32$

4) $x^3 = -3$

B. Rational exponents:

-from grade 10, for any positive integer 'n' and 'a':

$$a^{\frac{1}{n}} = \sqrt[n]{a} \;\; ; \quad a^{\frac{m}{n}} = \left(a^{\frac{1}{n}}\right)^m = \sqrt[n]{a^m} \quad or \quad (\sqrt[n]{a})^n$$

$$a^{-n} = \frac{1}{a^n} \; ; \qquad so \qquad a^{\frac{-m}{n}} = \frac{1}{a^{\frac{m}{n}}} = \frac{1}{\sqrt[n]{a^n}}$$

$$\sqrt[n]{\frac{a}{b}} = \frac{\sqrt[n]{a}}{\sqrt[n]{b}}$$

Try: write in radical form:

ex: $5^{\frac{1}{3}} =$

$ex$: $5^{\frac{7}{9}} =$

ex: $5^{-3} =$

$ex: \ 5^{-\frac{7}{9}} =$

ex: $\sqrt[3]{\frac{8}{27}} =$

....note: 'a' must be a positive integer! ....cannot do

$(-a)^{\frac{m}{n}}$ *becuase the exponent laws and BEDMAS don't work consistently*

$try: (-8)^{\left(\frac{4}{3}\right)\left(\frac{3}{4}\right)}$ *and you will get 2 different answers*

C. How to do square roots with positive powers of x?

-the square roots of negative numbers is 'undefined' when discussing real numbers. You CAN do square roots of negative numbers as imaginary numbers (as part of a class of numbers called 'complex numbers'…not rational or irrational numbers that we normally use)

-see: https://www.youtube.com/watch?v=65wYmy8Pf-Y and https://www.youtube.com/watch?v=oxF5VQSA4Hw

-interesting, inter-related videos: https://www.youtube.com/watch?v=gHUHZXjpwOE, https://www.youtube.com/watch?v=0OHiSZUvn0I https://www.youtube.com/watch?v=19c4c3SwtS8

ie: $\sqrt{-9} =$

Ex: $\sqrt{x^6} =$

ex: $\sqrt{x^7} =$

Ex: $\sqrt{16x^8}$

ex: $\sqrt{x^2 - 6x + 9}$

-do pg 151 #2-7: pick 5 from each, 10, 12, 16

Math 11 Unit 5.2: Operations with Radicals (Add/Subtract)

A. How to do it?

-remember: $3x + 4x =$

$3x + 4y =$

-same with +/- radicals…you will need the same radicands:

Ex: $3\sqrt{2} + 4\sqrt{2} =$

Ex: $3\sqrt{2} + 4\sqrt{3} =$

-radicals should be in simplest form before you try to +/- them:

Ex: $\sqrt{12} + \sqrt{18} =$

Ex: $\sqrt{12} + \sqrt{48} =$

Note: $\sqrt{25+16} \neq \sqrt{25} + \sqrt{16}$

B. Try:

-do WB pg 165 #3abc, #5-7 (left), 8ab

or: handout pg 9 #1-28, 62a, 64a, 65, 66
-quiz next day: convert into mixed radical, convert into entire radical, +/- radicals

Math 11: Unit 5.3 - Operations with Radicals (X)

A. How to do it?

-remember: $3x \cdot 2y =$ so:

And: $3(x+2)=$

So: and

And:

B. What about multiplying binomials?

-remember: $(x+2)(3x+4)$ = FOIL or rectangle method!

So:

Ex: $(2\sqrt{7}+5\sqrt{5})(4\sqrt{3}+2\sqrt{6})$

Ex: $(3\sqrt{2}+\sqrt{1})(5\sqrt{6}-2\sqrt{7})$

-note: all the answers so far have at least 1 radical term. Is it possible to have non-radical answers?

-yes!....see part section ©: Conjugate Binomials!

C. What are conjugate binomials?

-numbers are the same, but one is '+' and the other is '-'
-note:

-we can use this to help us to multiply binomials:

Ex:

Ex:

-so by multiplying conjugate binomials, I get:

So:

So again:

-when multiplying conjugate binomials, I noticed that I _____have any _____ terms in my answers.

D. What about:

-in general:

-WB pg 175 #2-5: pick 5 from each
-handout: pg 7 section 1.4 # 34-45 (odd)
pg 8 part 2: #9-16
pg 9 #29-42 (odd)
-quiz next day on +/-/x radicals

Math 11 Unit 5.4: Operations with Radicals (Division)

A. How to do it?

-remember:

But what about:

-we CANNOT have square roots in the denominator, so how do we get rid of it? By a technique called 'rationalizing the denominator' (make the denominator into a rational number)!

So:

Ex: $\frac{2}{\sqrt{5}}$

Ex: $\frac{2}{3\sqrt{5}}$

Ex: $\frac{2}{\sqrt{x-5}}$

B. What about binomial denominators that contain radicals?

Ex: $\frac{1}{\sqrt{3}-\sqrt{2}}$

ex: $\frac{2}{\sqrt{6}-\sqrt{3}}$

Try: i) $\frac{4}{\sqrt{5}-\sqrt{2}}$

ii) $\frac{3}{\sqrt{5}+2}$

iii) $\frac{2+\sqrt{3}}{1-\sqrt{3}}$

-WB pg 179 #6-9: left, 11, 14, 15, 17
-handout pg 8 section 2 #17-22
pg 9 #43-52

-next day: quiz on x/divide with radicals

Math 11 Unit 5.5 Solving Radical Equations

A. Restrictions

-when solving radical equations, we need to consider restrictions, as we 'usually' cannot square root a negative number.

Ex: find the restrictions for:

i)

ii)

iii)

iv)

B. How to solve radical equations?

-we want to 'square' the equation to get rid of the square root sign. But by doing so, we sometimes get an *extraneous*, or bogus solution…so we need to check or solution.

Ex:

ex:

Ex: $\sqrt{2x+5} = 2\sqrt{2x} + 1$

-WB pg 185 #2-3: left, 4, 9
-assignment check/review, pretest, corrections, test