

Foundations of Algebra Unit 1 - Rational and Irrational Numbers Practice
 Name: _____ Date: _____

Day 5 - Simplifying Radical Expressions

Simplify:

1. $\sqrt{18}$	2. $\sqrt{48}$	3. $\sqrt{64}$
4. $\sqrt{125}$	5. $\sqrt{81}$	6. $\sqrt{54}$
7. $\sqrt{63}$	8. $\sqrt{27}$	9. $\sqrt{21}$
10. $\sqrt{40}$	11. $-\sqrt{26}$	12. $\sqrt{150}$
13. $\sqrt{90}$	14. $\sqrt{168}$	15. $\sqrt{36}$

Aug 2-3:31 PM

Thursday, August 9, 2018

Use prime factorization to simplify the following radicals

Simplify:

1. $\sqrt{18}$	2. $\sqrt{125}$	3. $\sqrt{72}$	4. $\sqrt{180}$
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Jul 31-4:26 PM

Foundations of Algebra Unit 1 - Rational and Irrational Numbers Notes
 Name: _____ Date: _____

Day 6 - Simplifying Radical Expressions with Variables

When simplifying radical expressions, you simplify the variables using the same method as you did previously (Remember $\sqrt{x^2} = x$; square and square roots undo each other).
 If I see x^2 , that just means _____
 If I see x^4 , that just means _____
 The _____ of the variable tells us how many times to multiply the variable by _____.

Simplify the following radical expressions.

1. $\sqrt{x^4}$	2. $\sqrt{x^2}$	3. $\sqrt{y^4x^2}$
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Understanding Exponents

For some, listing out the variables may be beneficial. Others may see a pattern for when we have variables as our radicand and choose to follow that pattern as their method.

When we have variables as the radicand, we want to pay attention to their exponents.
 When we have an **even exponent**, we are going to take _____ out and there will be nothing left under the radical.
 When we have an **odd exponent**, we are going to leave _____ under the radical and take _____ of the rest out.

Observe Example 1 above, $\sqrt{x^4}$. What was the exponent of the variable? _____ How many 'x's did we take out? _____. Was there anything left under the radical? _____

Observe Example 2 above, $\sqrt{x^2}$. What was the exponent of the variable? _____ How many 'x's did we take out? _____. Was there anything left under the radical? _____

Practice: Simplify the following radical expressions.

1. $\sqrt{x^{10}}$	2. $\sqrt{y^{12}}$	3. $\sqrt{a^8}$	4. $\sqrt{x^{11}y^2}$
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Aug 2-3:34 PM

Foundations of Algebra Unit 1 - Rational and Irrational Numbers Notes
 Name: _____ Date: _____

Putting it All Together

When simplifying radical expressions, you simplify **BOTH** the coefficients and variables using the same method as you did previously (Remember $\sqrt{x^2} = x$; square and square roots undo each other). Remember, anything that is left over stays under the radical!

a. $\sqrt{9x^4}$	b. $\sqrt{4x^4}$	c. $\sqrt{32x^2}$
d. $\sqrt{45y^2}$	e. $\sqrt{108x^2y^2}$	f. $3\sqrt{12x^2}$
g. $3\sqrt{18a^2}$	h. $-2\sqrt{81b^4}$	i. $5\sqrt{20x^2y^2}$

Aug 2-3:34 PM

Foundations of Algebra Unit 1 - Rational and Irrational Numbers Practice
 Name: _____ Date: _____

Day 6 - Simplifying Radical Expressions with Variables

RADICALS ARE IN SIMPLEST FORM WHEN...

- NO perfect square factors other than 1 are under the radical.
- NO fractions are under the radical.
- NO radicals are in the denominator.

Simplify:

1. $\sqrt{x^4}$	2. $\sqrt{49x^2}$	3. $\sqrt{36y^2}$
4. $\sqrt{16x^2}$	5. $\sqrt{a^2b^4}$	6. $\sqrt{18x^2y^2}$
7. $\sqrt{90x^2y}$	8. $\sqrt{24x^2y^3}$	9. $-2\sqrt{15x^2y^2}$

Aug 2-3:32 PM

Foundations of Algebra Unit 1 - Rational and Irrational Numbers Practice

10. $\sqrt{196x^2y^2}$	11. $\sqrt{450c^2}$	12. $3\sqrt{48y^2}$
13. $\sqrt{48a^2b^2c^2}$	14. $\sqrt{27x^2}$	15. $\sqrt{12y^2}$
16. $\sqrt{81y^2z^2}$	17. $\sqrt{54x^2}$	18. $\sqrt{128x^2y^2}$
19. $\sqrt{54x^2}$	20. $\sqrt{98a^2b^2c^2}$	21. $\sqrt{48x^2y^2z^2}$

Aug 2-3:33 PM

Friday, August 10, 2018

Simplify the following radicals

1. $\sqrt{a^2b^4}$
2. $\sqrt{49a^8x^{12}}$
3. $\sqrt{32m^7n^{11}}$
4. $\sqrt{20x^{10}y^5}$

Jul 31-4:26 PM

Foundations of Algebra Unit 1 – Rational and Irrational Numbers Notes

Day 7 – Radical Operations

Yesterday, we learned how to simplify radicals. Today, we are going to learn some operations we can perform with radicals: the first operation we will explore is multiplication.

The _____ of _____ states the square root of a product equals the product of the square roots of the factors.

$$\sqrt{ab} = \sqrt{a}\sqrt{b} \text{ where } a \geq 0 \text{ and } b \geq 0$$

When multiplying radicals, follow the following rules:

Multiplying Radicals – RULES

1. Multiply the _____ together.
2. Multiply the _____ together.
3. _____ the radical.

Directions: Multiply the following radicals. Make sure they are in simplest form.

a. $\sqrt{2}\sqrt{18}$ b. $\sqrt{5}\sqrt{10}$ c. $\sqrt{8}\sqrt{32}$

d. $4\sqrt{6}\sqrt{4\sqrt{6}}$ e. $-\sqrt{6}\sqrt{3\sqrt{8}}$ f. $6\sqrt{13}\sqrt{10}$

Aug 2-3:39 PM

Foundations of Algebra Unit 1 – Rational and Irrational Numbers Notes

Multiplying Radicals with Variables

Recall: Do you remember what the rule is when you multiply two variables with exponents together? Work through the following examples to come up with the rule for multiplying exponents.

1. $x^2 \cdot x^3 =$
2. $a^4 \cdot a^2 =$
3. $y^5 \cdot y^3 \cdot z^2 =$

Law of Exponents: When multiplying expressions with the same bases, _____ the exponents.

$$x^m \cdot x^n =$$

Directions: Multiply the following radicals. Make sure they are in simplest form.

a. $\sqrt{12}\sqrt{3}\sqrt{4}$ b. $\sqrt{3x}\sqrt{15x}$ c. $5\sqrt{2y}\sqrt{32y}$

d. Challenge: $-3\sqrt{8x^2z} + 2\sqrt{12z^2}$

Adding and Subtracting Radicals

To add and subtract radicals, you have to use the same concept of combining "like terms". In other words, your radicals must be the same before you can add or subtract.

Explore: Simplify the following expressions:

a. $4x + 6x$ b. $5x^2 - 2x^2$ c. $3x^3 + 3x - 4x^2$

Adding/Subtracting Radicals – RULES

1. _____ all radicals.
2. Then add/subtract the _____ radicals.

Aug 2-3:40 PM

Foundations of Algebra Unit 1 – Rational and Irrational Numbers Notes

Practice:

a. $2\sqrt{5}\sqrt{6\sqrt{5}}$ b. $3\sqrt{7}\sqrt{2\sqrt{7}}$ c. $4\sqrt{13}\sqrt{6\sqrt{13}}$

d. $6\sqrt{7}\sqrt{8\sqrt{10}\sqrt{3\sqrt{7}}}$ e. $11\sqrt{5}\sqrt{2\sqrt{10}}$ f. $3\sqrt{3}\sqrt{6\sqrt{27}}$

g. $3\sqrt{5}\sqrt{2\sqrt{500}}$ h. $3\sqrt{3}\sqrt{2\sqrt{12}}$ i. $12\sqrt{10}\sqrt{6\sqrt{2}}$

Putting it all Together

a. $\sqrt{12}\sqrt{49}\sqrt{4}$ b. $\sqrt{3}\sqrt{3}\sqrt{2\sqrt{3}}$ c. $\sqrt{5x}\sqrt{10}\sqrt{15}$

Aug 2-3:41 PM

Foundations of Algebra Unit 1 – Rational and Irrational Numbers Practice

Day 7 – Operations with Radicals

Multiply each expression.

1. $8\sqrt{3}\sqrt{5}\sqrt{2}$	2. $-4\sqrt{5}\sqrt{9\sqrt{6}}$	3. $3\sqrt{8}\sqrt{2}\sqrt{5}$
4. $-6\sqrt{32}\sqrt{-6\sqrt{2}}$	5. $\sqrt{2x}\sqrt{-6x}$	6. $\sqrt{80x}\sqrt{3x^2}$
7. $\sqrt{15x^2}\sqrt{10x^2}$	8. $\sqrt{8x^2}\sqrt{4x}$	9. $5\sqrt{xy}\sqrt{3xy^2}$
10. $\sqrt{2x}\sqrt{-6x}$	11. $\sqrt{10xy}\sqrt{2xy^2}$	12. $\sqrt{5}\sqrt{15}\sqrt{2}$
13. $\sqrt{2}\sqrt{8-5}$	14. $\sqrt{3}\sqrt{1+\sqrt{27}}$	15. $8\sqrt{3}\sqrt{2\sqrt{3}\sqrt{8}}$

Aug 2-3:41 PM

Foundations of Algebra Unit 1 – Rational and Irrational Numbers Practice

Simplify each expression.

1. $\sqrt{150}\sqrt{7\sqrt{24}}$	2. $-2\sqrt{90}\sqrt{5\sqrt{40}}$	3. $3\sqrt{98}\sqrt{-6\sqrt{18}}$
4. $\sqrt{20}\sqrt{-15\sqrt{7}}\sqrt{-5\sqrt{10}\sqrt{3\sqrt{7}}}$	5. $-9\sqrt{4}\sqrt{4\sqrt{7}}\sqrt{-4\sqrt{5}\sqrt{2\sqrt{7}}}$	
6. $x\sqrt{27}\sqrt{75x^2}\sqrt{2x\sqrt{12}}$	7. $x\sqrt{63}\sqrt{-x\sqrt{28}\sqrt{x\sqrt{700}}}$	
8. $5\sqrt{8xy}\sqrt{9\sqrt{200xy}\sqrt{32xy}}$	9. $-2\sqrt{54}\sqrt{7\sqrt{150}\sqrt{3\sqrt{144}}}$	
10. $-10\sqrt{9x}\sqrt{3\sqrt{36x}\sqrt{-50x}}$	11. $5\sqrt{180x}\sqrt{12\sqrt{75x}\sqrt{-4\sqrt{250x}}}$	

Aug 2-3:41 PM