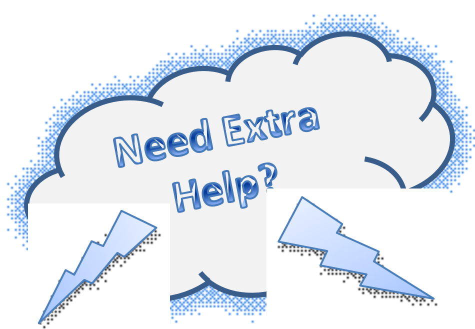
Unit 4: Polynomials (Basics)

Lesson	Assignment	
Unit 4 Introduction *Learning Targets:* ▪ I can use the power properties to simplify monomials.	Unit 4 Introduction Worksheet	
4.1 Roots of Real Numbers *Learning Targets:* ▪ I can simplify radicals. ▪ I can use a calculator to approximate radicals.	Worksheet 4.1	
4.2 Radical Expressions *Learning Targets:* ▪ I can simplify radical expressions. ▪ I can add, subtract, multiply, and divide radical expressio	Worksheet 4.2	
4.3 Rational Exponents *Learning Targets:* ▪ I can write expressions with rational exponents in radical form, and vice versa. ▪ I can simplify expressions in exponential or radical form.	Worksheet 4.3	
4.4 Radical Equations and Inequalities *Learning Targets:* ▪ I can solve equations containing radicals.	Worksheet 4.4	
4.5 Complex Numbers *Learning Targets:* ▪ I can add and subtract complex numbers. ▪ I can multiply and divide complex numbers.	Worksheet 4.5	
Unit 4 Review	Review Worksheet **Study for the test!**	



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Algebra 2A **Unit 4 Notes**

Unit 4 Introduction

Product of Monomials

- **I can identify the base and the exponent.**
- **I can simplify product of monomials.**

What is it?

Examples:

Power

Important characteristics:

Nonexample:

Product of Monomials

- **I can simplify product of powers.**

Examples:

What is it?

Product of Powers

Important characteristics:

Nonexample:

Example 1: Simplify the following

a. $(4^5)(4^2)$ b. $(6x^2)(x^4)$ c. $(3x^4y)(-4x^2)$

Your Turn 1: Simplify the following

1. $(2^3)(2^4)$ 2. $(5v^4)(3v)$ 3. $(-4ab^6)(7a^2b^3)$

Product of Powers

- I can simplify product of powers.

What is it?

Examples:

Important characteristics:

Power of Powers

Nonexample:

Example 2: Simplify the following

a. $(x^5)^2$ b. $(y^7)^3$ c. $(3xy)^2$

Your Turn 2: Simplify the following

1. $(m^6)^2$ 2. $(2b^2)^4$ 3. $(4abc)^2$

Example 3: Simplify the following

d. $(10ab^4)^3\,(3b^2)^2$

Your Turn 3: Simplify the following

4. $(2xy^2)^3\,(-4x^5)^2$

Quotient of Monomials

- **I can simplify quotients of monomials.**

What is it?

Important characteristics:

Quotient of Monomials

Examples:

Nonexample:

Example 4: Simplify the following

a. $\dfrac{16x^3y^4}{4x^5y}$

b. $\dfrac{(3a^7b^2)^2}{12a^4b^8}$

Your Turn!!

$\dfrac{(3xy^5)^2}{(2x^3y^7)^3}$

What it is:	**What it looks like:**

Characteristics:	It does NOT look like:

What it is:	What it looks like:
Characteristics:	**It does NOT look like:**

Zero Exponents

NEGATIVE EXPONENT RULE:

$$a^{-n} = \frac{1}{a^n}$$

Example 1: Simplify the following

1. x^{-3}

2. $5a^{-2}b^0$

3. $-4a^{-7}b^{-3}$

Your Turn 1: Simplify the following

a. $3w^{-3}$

b. $4x^{-7}$

c. $3x^0y^{-4}$

Example 2: Simplify the following

4. $\dfrac{6a^0}{3a^{-2}}$

5. $\dfrac{4a^{-5}b^7}{6a^{-2}b^{-3}}$

Your Turn 2:

d.

$\dfrac{5^{-2}}{y^{-9}}$

$\dfrac{3x^0y^{-2}}{15x^{-4}y}$

$\left(\dfrac{12ab^3}{4a^{-4}b^{-4}}\right)^0$

4.1 - Lesson Roots of Real Numbers

Learning Targets	• I can simplify radicals. • I can use a calculator to approximate radicals.

Simplifying Radicals

Square Root	For any real numbers a and b, if $a^2 = b$, then a is a square root of b.
nth Root	For any real numbers a and b, and any positive integer n, if $a^n = b$, then a is an nth root of b.

$$a^2 = b$$

$$\text{then} \quad a = \sqrt{b}$$

$$\text{or} \quad a = b^{\frac{1}{2}}$$

Even Roots:

Odd Roots:

Example 1: Simplify.

a. $\sqrt{49z^8}$

b. $\sqrt[3]{-343}$

c. $-\sqrt{625y^2z^4}$

Your Turn 1: Simplify.

a. $\sqrt{144p^6}$

b. $-\sqrt[3]{m^6n^9}$

c. $\sqrt[4]{(2x)^8}$

Example 2: Simplify.

a. $-\sqrt[3]{(2a-1)^6}$

b. $\sqrt{36x^2 - 12x + 1}$

Your Turn 2: Simplify.

a. $\sqrt{(3x-1)^2}$

b. $\sqrt[3]{-8}$

c. $\sqrt{(-3c)^4}$

Example 3: Use a calculator to approximate each value to three decimal places.

a. $\sqrt{1050}$

b. $\sqrt[3]{0.054}$

c. $-\sqrt[4]{500}$

Your Turn 2: Use a calculator to approximate each value to three decimal places.

a. $\sqrt{12{,}500}$

b. $\sqrt[3]{-15}$

c. $\sqrt[6]{856}$

In your own words, what is the **Big Idea** of the lesson.

Big Idea: ____

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Name ______________________

Algebra 2A **Unit 4 Notes**

4.2 - Radical Expressions

Learning Targets	• I can simplify radical expressions. • I can add, subtract, multiply, and divide radical expressions.

Simplify Radical Expressions

Product Property of Radicals	For any real numbers a and b, and any integer $n > 1$: 1. if n is even and a and b are both nonnegative, then $\sqrt[n]{ab} = \sqrt[n]{a} \cdot \sqrt[n]{b}$. 2. if n is odd, then $\sqrt[n]{ab} = \sqrt[n]{a} \cdot \sqrt[n]{b}$.

Example 1: Simplify.

a. $\sqrt[3]{-16a^5b^7}$

b. $\sqrt[4]{32a^9b^{20}}$

Your Turn 1: Simplify.

a. $\sqrt{75x^4y^7}$

b. $5\sqrt{54}$

c. $\sqrt[3]{16}$

Example 2: Simplify.

a. $\sqrt{\dfrac{8x^3}{45y^5}}$

b. $\sqrt[3]{\dfrac{p^5q^3}{40}}$

Your Turn 2: Simplify.

a. $\sqrt{\dfrac{a^6b^3}{98}}$

b. $\sqrt[3]{-\dfrac{1}{8}d^2f^5}$

Example 3: Simplify. (Adding radicals.) $2\sqrt{50} + 4\sqrt{500} - 6\sqrt{125}$	**Your Turn 3:** Simplify. $\sqrt{20} + \sqrt{125} - \sqrt{45}$
Example 4: Simplify. (Multiplying radicals.) a. $(4\sqrt{12})(3\sqrt{20})$ b. $(2\sqrt{3} - 4\sqrt{2})(\sqrt{3} + 2\sqrt{2})$	**Your Turn 4:** Simplify. a. $2\sqrt{3}(\sqrt{15} + \sqrt{60})$ b. $(\sqrt{3} + 4\sqrt{7})^2$

Example 5: Simplify. (Dividing radicals.) **Remember conjugates!!!**

a. $\dfrac{2 - \sqrt{5}}{3 + \sqrt{5}}$

b. $\dfrac{4 + \sqrt{2}}{2 - \sqrt{2}}$

Your Turn 5: Simplify.

a. $\dfrac{3}{7-\sqrt{2}}$

b. $\dfrac{3+\sqrt{2}}{2-\sqrt{2}}$

In your own words, what is the **Big Idea** of the lesson.

Big Idea: ____

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Name ______________________

Algebra 2A **Unit 4 Notes**

4.3 - Rational Exponents

Learning Targets	• I can write expressions with rational exponents in radical form, and vice versa. • I can simplify expressions in exponential or radical form.

Rational Exponents and Radicals

Definition of $b^{\frac{1}{n}}$	For any real number b and any positive integer n, $b^{\frac{1}{n}} = \sqrt[n]{b}$, except when $b < 0$ and n is even.
Definition of $b^{\frac{m}{n}}$	For any nonzero real number b, and any integers m and n, with $n > 1$, $b^{\frac{m}{n}} = \sqrt[n]{b^m} = \left(\sqrt[n]{b}\right)^m$, except when $b < 0$ and n is even.

Example 1: **Write $28^{\frac{1}{2}}$ in radical form.**

Example 2: **Write each radical using rational exponents.** $\sqrt[3]{3a^5b^2}$

Example 3: **Evaluate $\left(\frac{-8}{-125}\right)^{\frac{1}{3}}$**

Example 1: Write the expression in radical form. $(s^3)^{\frac{3}{5}}$	**Your Turn 1:** Write the expression in radical form. $300^{\frac{3}{2}}$

Example 2: Write each radical using rational exponents.

$\sqrt[4]{162p^5}$

Your Turn 2: Write each radical using rational exponents.

a. $\sqrt[4]{15^3}$

b. $\sqrt[3]{6xy^2}$

Example 3: Simplify.

a. $y^{\frac{2}{3}} \cdot y^{\frac{3}{8}}$

b. $\dfrac{a\sqrt[3]{b^4}}{\sqrt{ab^3}}$

c. $(-243)^{\frac{4}{5}}$

Your Turn 3: Simplify.

a. $\left(\dfrac{4}{9}\right)^{\frac{3}{2}}$

b. $\dfrac{x^{\frac{2}{3}}}{x^{\frac{1}{4}}}$

c. $27^{-\frac{1}{3}}$

In your own words, what is the **Big Idea** of the lesson.

Big Idea: ____

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Name ______________________

4.4 - Radical Equations

Learning Targets	• I can solve equations containing radicals.

Solve Radical Equations: The following steps are used in solving equations that have variables in the radicand. Some algebraic procedures may be needed before you use these steps.

Step 1: Isolate the radical on one side of the equation. (No #'s in front or separate.)

Step 2: To eliminate the radical, raise each side of the equation to a power equal to the index of the radical.

Step 3: Solve the resulting equation.

Step 4: Check your solution in the original equation to make sure that you have not obtained any extra roots.

Example 1: Solve. $2\sqrt{4x+8}-4=8$

Check:

Your Turn 1: Solve. $2\sqrt{3x+4}+1=15$

Check:

Example 2: Solve. $\sqrt{3x+1} = \sqrt{5x} - 1$

Check:

Your Turn 2: Solve. $\sqrt{9x-11} = x+1$

Check:

Your Turn 3: Solve and check each equation.

a. $\sqrt{5-x}-4=6$

b. $4\sqrt[3]{2x+11}-2=10$

c. $\sqrt{x^2+7x}=\sqrt{7x-9}$

In your own words, what is the **Big Idea** of the lesson.

Big Idea: ____

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Name ______________________

Algebra 2A

Unit 4 Notes

4.5 - Complex Numbers

Learning Targets	• I can add and subtract complex numbers. • I can multiply and divide complex numbers.

Add and Subtract Complex Numbers

Complex Number	A complex number is any number that can be written in the form $a + bi$, where a and b are real numbers and i is the imaginary unit ($i^2 = -1$). a is called the real part, and b is called the imaginary part.

Imaginery: $i =$

$i^2 =$

$i^3 =$

$i^4 =$

$i^5 =$

$i^{12} =$

$i^{25} =$

$i^{52} =$

Addition and Subtraction of Complex Numbers	Combine like terms. $(a + bi) + (c + di) = (a + c) + (b + d)i$ $(a + bi) - (c + di) = (a - c) + (b - d)i$

Example 1: Simplify. (add & subtract)

a. $(6 + i) + (4 - 5i)$

b. $(8 + 3i) - (6 - 2i)$

Your Turn 1: Simplify.

a. $(-4 + 2i) + (6 - 3i)$

b. i^{15}

c. $(5 + 2i) - (-6 - 3i)$

Example 2: Simplify. (multiply) $(2 - 5i) \cdot (-4 + 2i)$	**Your Turn 2:** Simplify. $(4 - 6i)(2 + 3i)$
Example 3: Simplify. (divide) $\frac{3 - i}{2 + 3i}$	**Your Turn 3:** Simplify. $\frac{3 + 4i}{4 - 5i}$
Example 4: Solve. $2x^2 + 24 = 0$	**Your Turn 4:** Solve. $5x^2 + 45 = 0$

Check for understanding.

Simplify.

1. $(5 - i) - (3 - 2i)$

2. $(5 - 3i)(-1 - i)$

3. $\dfrac{3 + 4i}{4 - 5i}$

4. i^{65}

Solve.

4. $x^2 + 18 = 0$

In your own words, what is the **Big Idea** of the lesson.

Big Idea: ____

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