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LESSON 13: Rational Numbers as Exponents

- ☐ Definition and properties of integer exponents
- ☐ Rational exponents: $a^{1/n} = \sqrt[n]{a}$
- ☐ Positive rational exponents
- ☐ Negative rational exponents
- ☐ Laws of exponents for real number exponents
- ☐ To simplify radical expressions

1. List the Laws of Exponents

Exponent notation: b^n

Negative exponent: b^{-n}

One as an exponent: b^1

Product Rule: $b^n \cdot b^m$

Zero as an exponent: b^0

Quotient Rule: $\frac{b^n}{b^m}$

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The Power Rule: $\left(b^{n}\right)^{m}$

Factors and Negative Exponents: $(a \cdot b)^{-n}$

Raising a product to a power: $(a \cdot b)^{n}$

Reciprocals and Negative Exponents: $\frac{b^{-n}}{b^{-m}}$

Raising a quotient to a power: $\left(\frac{a}{b}\right)^{n}$

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Use the rules of exponents to solve each of the following problems

4. $x^{\frac{1}{2}} \cdot x^{\frac{1}{2}}$

5. $\left(x^{\frac{1}{5}} \right)^{5}$

Use what you know about radicals to solve each of the following problems

6. $\sqrt{x} \cdot \sqrt{x}$

7. $\left(\sqrt[5]{x} \right)^{5}$

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Identify the connection between radicals and exponential notation?

$$b = \sqrt[n]{a} \qquad b = a^{\frac{1}{n}}$$

Rewrite using radical notation:

8. $x^{\frac{1}{5}}$

9. $w^{\frac{2}{3}}$

Rewrite using exponent notation:

10. $\sqrt[5]{y}$

11. $\sqrt[7]{x^3}$

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Use your calculator to evaluate following mathematical expressions (with 6 digits after the decimal):

12. $\sqrt{8} \approx$

13. $\frac{2\sqrt{18}}{3} \approx$

14. $\sqrt[4]{64} \approx$

Revisit the radicals above. Simplify use the strategies we discussed last time.

15. $\sqrt{8}$

16. $\frac{2\sqrt{18}}{3}$

17. $\sqrt[4]{64}$

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Use rational exponents to simplify each of the following radical expressions .

24. $\sqrt[5]{\sqrt[2]{x}}$

25. $\sqrt[6]{(12x)^3}$