

Unit 3 Day 1 Notes – Rational Exponents

Date: _____

❖ Rational or fractional exponents can be rewritten in radical form:

Converting from rational exponent to radical form:

$$x^{a/b} = \sqrt[b]{x^a}$$

The **numerator** of the exponent becomes the **exponent** of the radicand.The **denominator** of the exponent becomes the **index of the radicand**.

➤ EXAMPLES:

1. $9^{1/2} = \sqrt[2]{9} = \sqrt{9} = 3$	2. $64^{1/3} = \sqrt[3]{64} = 4$
3. $x^{2/3} = \sqrt[3]{x^2}$	4. $16^{-1/2} = \frac{1}{16^{1/2}} = \frac{1}{\sqrt{16}} = \frac{1}{4}$ *** Negative exponents become fractions
5. $4x^{1/7} = 4\sqrt[7]{x}$	6. $(3x)^{3/4} = \sqrt[4]{(3x)^3}$

➤ You Try: Write each expression in **simplest** radical form:

1. $2^{1/2} = \sqrt{2}$	2. $3^{1/2} = \sqrt{3}$	3. $9^{-1/2} = \frac{1}{3}$	4. $25^{1/2} = 5$	5. $7^{1/3} = \sqrt[3]{7}$
6. $x^{4/7} = \sqrt[7]{x^4}$	7. $15^{-1/4} = \frac{1}{\sqrt[4]{15}}$	8. $x^{1/2} = \sqrt{x}$	9. $y^{-1/2} = \frac{1}{\sqrt{y}}$	10. $4x^{2/3} = 4\sqrt[3]{x^2}$
11. $3x^{-1/2} = \frac{3}{\sqrt{x}}$	12. $(7a)^{1/2} = \sqrt{7a}$	13. $(6x)^{-1/2} = \frac{1}{\sqrt{6x}}$	14. $27^{5/3} = 243$	15. $(5x)^{1/6} = \sqrt[6]{5x}$

$$3\left(\frac{1}{\sqrt{x}}\right)$$

❖ Radicals can be rewritten in rational exponent form:

Converting from radical to rational exponent form:

$$\sqrt[b]{x^a} = x^{a/b}$$

The **exponent** of the radicand becomes the **numerator** of the fraction.

The **index** of the radicand becomes the **denominator** of the fraction.

➤ **EXAMPLES:**

1. $\sqrt[3]{5} = \underline{5^{1/3}}$	2. $\sqrt[3]{7^2} = \underline{7^{2/3}}$
3. $\sqrt[4]{x} = \underline{x^{1/4}}$	4. $\frac{1}{\sqrt[3]{x^2}} = \frac{1}{x^{2/3}} = \underline{x^{-2/3}}$ $\frac{1}{a^n} = a^{-n}$
5. $5\sqrt[3]{x} = \underline{5x^{1/3}}$	6. $\sqrt[5]{(3x^2)^4} = \underline{(3x^2)^{4/5}}$

➤ **You Try:** Write each expression in **exponential** form:

16. $\sqrt{7}$ $7^{1/2}$	17. $\sqrt{6}$ $6^{1/2}$	18. $\sqrt[4]{8}$ $8^{1/4}$	19. $\sqrt[5]{18}$ $18^{1/5}$	20. $\sqrt[3]{x^2}$ $x^{2/3}$
21. $\sqrt[3]{(2x^2)}$ $(2x^2)^{1/3}$	22. $\frac{1}{\sqrt[3]{5}}$ $5^{-1/3}$	23. $2\sqrt[4]{15}$ $2(15)^{1/4}$	24. $\sqrt{(3x)^7}$ $(3x)^{7/2}$	25. $(\sqrt[3]{3v})^2$ $(3v)^{2/3}$

Unit 3 Day 1 CW

Rewrite the expression using rational exponent notation.

1. $\sqrt[3]{7}$

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

3. $(\sqrt[5]{14})^4$

4. $(\sqrt[7]{-21})^3$

5. $(\sqrt[8]{11})^7$

6. $(\sqrt[9]{-2})^4$

Rewrite the expression using radical notation.

7. $17^{1/3}$

8. $44^{1/6}$

9. $33^{2/3}$

10. $9^{5/3}$

11. $(-28)^{7/5}$

12. $39^{4/7}$

Evaluate the expression without using a calculator.

13. $(\sqrt[3]{8})^2$

14. $(\sqrt[4]{16})^3$

15. $(\sqrt[4]{81})^4$

16. $36^{3/2}$

17. $4^{5/2}$

18. $27^{2/3}$

19. $125^{4/3}$

20. $(-8)^{1/3}$

21. $(-32)^{3/5}$

Unit 3 Day 1 HW

➤ Rewrite each expression in **radical form** and then simplify completely:

1. $100^{1/2}$	2. $125^{1/3}$	3. $(17x)^{1/2}$	4. $64^{1/3}$	5. $16^{1/4}$
6. $16^{3/4}$	7. $(8^{1/2})^2$	8. $(8^{1/3})^3$	9. $(16x^4)^{1/4}$	10. $125^{-1/3}$

➤ Rewrite each expression in **exponential form** and then simplify completely:

11. $\sqrt{81}$	12. $\sqrt[3]{125}$	13. $\sqrt[4]{20x^3}$	14. $\sqrt[3]{-64}$	15. $\sqrt[3]{8}$
16. $(\sqrt[3]{8x})^3$	17. $(\sqrt{98})^2$	18. $(\sqrt[3]{98})^3$	19. $(\sqrt[4]{98})^4$	20. $(\frac{1}{\sqrt{x}})^{-4}$

➤ Evaluate each of the following expressions. Give exact answers.

21. $27^{2/3}$	22. $1^{3.5}$	23. $(\frac{1}{32})^{1/5}$	24. $(-27)^{-2/3}$	25. $4^{2.5}$
26. $(\frac{1}{16})^{3/4}$	27. $216^{1/3}$	28. $16^{-1/4}$	29. $25^{3/2}$	30. $(x^6)^{1/2}$