Name: **KEY**

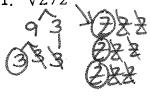**Topic:** 7.2 Properties of Rational Exponents- Day 3

Summary:

All of the rules we've used this week also apply when there are variables.

Examples:

1. $\sqrt[3]{27z^9}$

$\boxed{3z^3}$

2. $(16g^4h^2)^{1/2} = \sqrt{16g^4h^2}$

$\boxed{4g^2h}$

*Divide inside exponent by index to pull out — put remainders under radical.

3. $\sqrt[5]{\dfrac{x^5}{y^{10}}}$ $\boxed{\dfrac{x}{y^2}}$

4. $\sqrt[4]{12d^4e^9f^{14}} =$

$\boxed{de^2f^3\sqrt[4]{12ef^2}}$

5. $8\sqrt{x} - 3\sqrt{x}$

$\boxed{5\sqrt{x}}$

6. $2\sqrt[4]{6x^5} + x\sqrt[4]{6x}$

$2x\sqrt[4]{6x} + x\sqrt[4]{6x}$

$\boxed{3x\sqrt[4]{6x}}$

7. $\sqrt[3]{8r^3s^5t^{10}}$

$2rst\sqrt[3]{s^2t}$

8. $(625j^8k^4)^{1/4}$

$\sqrt[4]{625j^8K^4}$

$5jK$

Let's examine the similarity between radicals and fractional exponents. In your calculator, find the value of the following...

$\sqrt{4} = \pm 2$	$(4)^{1/2} = \pm 2$
$\sqrt[3]{27} = 3$	$(27)^{1/3} = 3$
$\sqrt[4]{16} = \pm 2$	$(16)^{1/4} = \pm 2$
$\sqrt[5]{1,024} = 4$	$(1,024)^{1/5} = 4$

What is the pattern that you recognize?

$\sqrt[y]{x} = \underline{x^{\frac{1}{y}}}$

Examples:
Write each expression in radical form.

9. $7^{\frac{1}{2}}$

$\sqrt{7}$

10. $4^{\frac{4}{3}}$

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

11. $2^{\frac{5}{3}}$

$$\left(\sqrt[5]{2}\right)^3$$

12. $7^{\frac{4}{3}}$

$$\left(\sqrt[4]{7}\right)^3$$

13. $(5x)^{-\frac{5}{4}}$

$$\frac{1}{(5x)^{5/4}} = \frac{1}{\sqrt[4]{(5x)^5}}$$

$$\boxed{\frac{1}{5x\sqrt[4]{5x}}}$$

14. $(5x)^{-\frac{1}{2}}$

$$\frac{1}{(5x)^{1/2}} = \frac{1}{\sqrt{(5x)}}$$

$$\frac{1}{\sqrt{(5x)}} \cdot \frac{\sqrt{(5x)}}{\sqrt{(5x)}} = \boxed{\frac{\sqrt{(5x)}}{5x}}$$

*can't leave radical in denominator.

Write each expression in exponential form. Then Simplify.

15. $\left(\sqrt{10}\right)^3$

$$10^{\frac{3}{2}}$$

16. $\sqrt[6]{2}$

$$2^{\frac{1}{6}}$$

17. $\left(\sqrt[4]{2}\right)^5$

$$2^{\frac{5}{4}}$$

18. $\left(\sqrt[4]{5}\right)^5$

$$5^{\frac{5}{4}}$$

19. $\left(\sqrt[4]{m}\right)^3$

$$m^{\frac{3}{4}}$$

20. $\left(\sqrt[3]{6x}\right)^4$

$$(6x)^{\frac{3}{4}}$$