

Name: _____

Date: _____

Period: _____

Chapter 6 Review

6.1 Exponential Properties: Simplify.

USE THE JINGLE !!

1. $(a^5b^8)^3$ $a^{15}b^{24}$	2. $a^{-9} \cdot b^5 \cdot a^0 \cdot c^5 \cdot b^{-19}$ $a^{-9}b^{-14}c^5$ $\frac{c^5}{a^9b^{14}}$	3. $\frac{18r^5t^{-9}}{24r^3t^{-5}}$ $\frac{3r^2t^{-4}}{4}$ $\frac{3r^2}{4t^4}$
4. $\left(\frac{b^7}{b^3}\right)^{-1}$ $= \frac{b^{-7}}{b^{-3}}$ $= b^{-4}$ $= \frac{1}{b^4}$	5. $\frac{6a^{-4}(bc)^5}{3d^{-7}}$ $\frac{2a^{-4}b^5c^5}{d^{-7}} = \frac{2b^5c^5d^7}{a^4}$	6. $2m^{-4} \cdot -9n^{-6} \cdot 3n^0 \cdot m^{10}$ $(2 \cdot -9 \cdot 3)(m^{-4} \cdot m^{10})(n^{-6} \cdot n^0)$ $-54m^6n^{-6}$ $\frac{-54m^6}{n^6}$

6.2 Radical Form VS. Exponential Form of Rational Exponents

Write each expression in radical form.

7. $x^{\frac{4}{5}}$ $(\sqrt[5]{x})^4$	8. $x^{3.5} = x^{\frac{7}{2}}$ $(\sqrt{x})^7$
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Write each expression in exponential form.

9. $\sqrt[3]{x}$ $x^{\frac{1}{3}}$	10. $\sqrt{(7x)^5}$ $(7x)^{\frac{5}{2}}$ or $7^{\frac{5}{2}}x^{\frac{5}{2}}$
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Simplify.

11. $\sqrt[4]{81^3} = (\sqrt[4]{81})^3$ $(3)^3$ 27	12. $(b^{15})^{\frac{3}{5}} = (\sqrt[5]{b^{15}})^3$ $(b^3)^3$ b^9	13. $(\sqrt[3]{64})^2$ $(4)^2$ 16
14. $(25x^8)^{\frac{3}{2}}$ $(\sqrt{25x^8})^3$ $(5x^4)^3$ $125x^{12}$	15. $\sqrt[5]{32x^{10}}$ $2x^2$	16. $(27x^{18})^{-\frac{4}{3}}$ $(\sqrt[3]{27x^{18}})^{-4}$ $(3x^6)^{-4} = \frac{1}{(3x^6)^4}$ $= \frac{1}{2187x^{24}}$

6.3 & 6.4: Operations with Rational Exponents and Changing the Base

17. $x^{\frac{3}{8}} \cdot x^{\frac{4}{8}}$

$x^{\frac{7}{8}}$

18. $4a^{\frac{5}{3}} \cdot 2a^{\frac{7}{4}}$

Exponents: $\frac{5}{3} + \frac{7}{4} = \frac{20}{12} + \frac{21}{12} = \frac{41}{12}$

$8a^{\frac{41}{12}}$

19.

$(x^{-\frac{1}{2}} y^{-2})^{\frac{2}{3}}$

$x^{\frac{4}{6}} y^{\frac{4}{3}}$

$x^{\frac{2}{3}} y^{\frac{4}{3}}$

20. $\frac{3a^0 b^{\frac{2}{3}}}{a^2 b^{\frac{4}{3}}} \cdot \frac{2}{3} \cdot \frac{4}{3} = \frac{6}{3} = 2$

$3a^{-2} b^2$

$\frac{3b^2}{a^2}$

21. $\frac{3a^{\frac{1}{2}} b^{-\frac{1}{3}}}{2a^{-\frac{1}{3}} b^{\frac{2}{3}}}$

Exponent of a:

$\frac{1}{2} - (-\frac{1}{3}) = \frac{3}{6} + \frac{2}{6} = \frac{5}{6}$

$\frac{3}{6} + \frac{2}{6} = \frac{5}{6}$

exponent of b:

$-\frac{1}{3} - \frac{2}{3} = -\frac{3}{3} = -1$

$\frac{3a^{\frac{5}{6}}}{2b^{\frac{11}{6}}}$

22. $2^3 \cdot 8^4$

$2^3 \cdot (2^3)^4$

$2^3 \cdot 2^{12}$

2^{15}

23. $9^{-\frac{5}{3}} \cdot 81^{\frac{5}{2}}$

$9^{-\frac{5}{3}} \cdot (9^2)^{\frac{5}{2}}$

$9^{-\frac{5}{3}} \cdot 9^{\frac{10}{2}}$

exponent: $-\frac{5}{3} + \frac{10}{2} = -\frac{5}{3} + \frac{30}{6} = \frac{20}{6} = \frac{10}{3}$

$9^{\frac{10}{3}}$

24. $\frac{6^{\frac{2}{3}}}{36}$

$\frac{6^{\frac{2}{3}}}{6^2}$

exponent: $\frac{2}{3} - 2 = \frac{2}{3} - \frac{6}{3} = -\frac{4}{3}$

$6^{-\frac{4}{3}} = \frac{1}{6^{\frac{4}{3}}}$

25.

$\left(\frac{\left(\frac{3}{4} \right)^{\frac{1}{3}}}{\left(\frac{5}{4} \right)^{\frac{1}{4}}} \right)^{\frac{2}{3}}$

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$$\left(\frac{(vu^{\frac{3}{4}})^{-\frac{1}{3}}}{u^{-5/4} v^{-1/4}} \right)^{\frac{2}{3}}$$

$$= \left(\frac{v^{-\frac{1}{3}} u^{-\frac{3}{12}}}{v^{-\frac{1}{4}} u^{-5/4}} \right)^{\frac{2}{3}}$$

$$\frac{v^{-\frac{2}{9}} u^{-\frac{6}{36}}}{v^{-2/12} u^{-10/12}}$$

exponent of v: $-\frac{2}{9} + \frac{2}{12}$

$$\frac{-8}{36} + \frac{6}{36} = \frac{-2}{36} = \boxed{\frac{-1}{18}}$$

exponent of u: $-\frac{6}{36} + \frac{10}{12}$

$$\frac{-6}{36} + \frac{30}{36} = \frac{24}{36} = \boxed{\frac{2}{3}}$$

$$v^{-\frac{1}{18}} u^{\frac{2}{3}} = \boxed{\frac{u^{\frac{2}{3}}}{v^{\frac{1}{18}}}}$$

6.5 – 6.8: Solving Radical and Rational Exponents Equations:

Solve. Check for extraneous solutions.

26.

$$\begin{array}{r} 3\sqrt{x} + 3 = 15 \\ -3 \quad -3 \\ \hline \end{array}$$

$$\frac{3\sqrt{x}}{3} = \frac{12}{3}$$

$$(\sqrt{x})^2 = (4)^2$$

$$\boxed{x = 16}$$

27.

$$\begin{array}{r} \sqrt[4]{4x-8} - 2 = 1 \\ +2 \quad +2 \end{array}$$

$$\left(\sqrt[4]{4x-8}\right)^4 = (3)^4$$

$$\begin{array}{r} 4x-8 = 81 \\ +8 \quad +8 \end{array}$$

$$\frac{4x}{4} = \frac{89}{4}$$

$$\boxed{x = 22.25}$$

28.

$$\frac{\sqrt{(2x-9)^5}}{4} = 8$$

$$\sqrt{(2x-9)^5} = 32$$

$$(2x-9)^{\frac{5}{2} \cdot \frac{2}{5}} = 32^{\frac{2}{5}}$$

$$2x-9 = (\sqrt[5]{32})^2$$

$$2x-9 = (2)^2$$

$$\begin{array}{r} 2x-9 = 4 \\ +9 \quad +9 \end{array}$$

$$\frac{2x}{2} = \frac{13}{2}$$

$$\boxed{x = 6.5}$$

29.

$$\frac{3(x+3)^{\frac{3}{4}}}{3} = \frac{81}{3}$$

$$(x+3)^{\frac{3}{4}} = 27^{\frac{4}{3}}$$

$$x+3 = (\sqrt[3]{27})^4$$

$$x+3 = (3)^4$$

$$\begin{array}{r} x+3 = 81 \\ -3 \quad -3 \end{array}$$

$$\boxed{x = 78}$$

even, thus has 2 answers

30.

$$2(x-4)^{\frac{2}{3}} = 72$$

(I have two solutions)

$$(x-4)^{\frac{2}{3} \cdot \frac{3}{2}} = 36^{\frac{3}{2}}$$

$$|x-4| = (\sqrt{36})^3$$

$$|x-4| = (6)^3$$

$$|x-4| = 216$$

$$\begin{array}{r} x-4 = 216 \\ +4 \quad +4 \\ \hline x = 220 \end{array}$$

$$\begin{array}{r} x-4 = -216 \\ +4 \quad +4 \\ \hline x = -212 \end{array}$$

31.

$$\frac{\sqrt{3x+13} - 5}{+5} = \frac{x}{+5}$$

$$(\sqrt{3x+13})^2 = (x+5)^2$$

$$3x+13 = (x+5)(x+5)$$

$$\begin{array}{r} 3x+13 = x^2+10x+25 \\ -3x-13 \quad \quad -3x-13 \\ \hline 0 = x^2+7x+12 \end{array}$$

$$0 = x^2+7x+12$$

$$0 = (x+4)(x+3)$$

$$\begin{array}{r} x+4 = 0 \\ \hline x = -4 \end{array}$$

$$\begin{array}{r} x+3 = 0 \\ \hline x = -3 \end{array}$$

32.

$$\sqrt{3x+2} - \sqrt{2x+7} = 0$$

$$+\sqrt{2x+7} \quad +\sqrt{2x+7}$$

$$(\sqrt{3x+2})^2 = (\sqrt{2x+7})^2$$

$$\begin{array}{r} 3x+2 = 2x+7 \\ -2x \quad \quad -2x \\ \hline x+2 = 7 \end{array}$$

$$\begin{array}{r} x+2 = 7 \\ -2 \quad -2 \\ \hline x = 5 \end{array}$$

$$\boxed{x = 5}$$

33.

$$(x-4)^{\frac{1}{2}} = (2x+7)^{\frac{1}{4}}$$

Multiply by LCM of denom.

$$(x-4)^2 = 2x+7$$

$$(x-4)(x-4) = 2x+7$$

$$\begin{array}{r} x^2-8x+16 = 2x+7 \\ -2x-7 \quad \quad -2x-7 \\ \hline x^2-10x+9 = 0 \end{array}$$

$$x^2-10x+9 = 0$$

$$(x-9)(x-1) = 0$$

$$x-9 = 0 \quad x-1 = 0$$

$$\boxed{x = 9}$$

$$x = 1$$

extraneous