LESSON Practice C 8-6 Radical Expressions and Rational Exponents Simplify each expression. Assume all variables are positive. **2.** $\sqrt[4]{x^{16}y^8}$ $3.\sqrt[3]{\frac{x^7}{27x^3}}$ $1.\sqrt[4]{(2x)^8} \cdot \sqrt[3]{(2x)^6}$ Write each expression in radical form, and simplify. 6. $(16x^3)^{\frac{3}{2}}$ **4.** $216^{\frac{2}{3}}$ 5. $1000^{-\frac{2}{3}}$ Write each expression by using rational exponents. $7.\sqrt[5]{(3x)^4}$ 8. $(\sqrt[5]{-6})^3$ 9. $\sqrt[4]{30x^3}$ Simplify each expression. **12.** $\left(\frac{x^8}{v^4}\right)^{\frac{3}{4}}$ **10.** $25^{\frac{1}{4}} \cdot 25^{-\frac{7}{4}}$ **11.** $(-64)^{\frac{1}{3}}$ **13.** $\left(\frac{x^3}{125}\right)^{\frac{1}{3}}$ **14.** $(-8x^{18})^{\frac{2}{3}}(\sqrt[3]{y^6})$ **15.** $(a^4b^8)^{-\frac{1}{4}}$ **18.** $\left(\frac{m^8}{n^{12}}\right)^{-\frac{1}{4}}$ 16. $(\sqrt[3]{-8x^9})^2$ **17.** $(3x)^{\frac{2}{3}}(3x)^{\frac{7}{3}}$

Solve.

19. Each key on a piano produces a frequency that is $2^{\frac{1}{12}}$ times higher than the frequency of the key immediately to its left. Moving *n* keys to the right of any key increases the frequency of the starting note by a factor $2^{\frac{n}{12}}$. The key corresponding to Concert A has a frequency of 440 Hz. What is the frequency of note D, which is 5 keys to the right of Concert A?

Practice A 8-6 Radical Expressions and Rational Exponents			Practice B 8-6 Radical Expressions and Rational Exponents		
Answer each question.			Simplify each expression.	Assume all variables are posit	ive.
1. List all of the square roots of	of 36.	6 and -6	$1.\sqrt[3]{125x^9}$	$2.\sqrt[4]{\frac{x^8}{81}}$	$3.\sqrt[3]{\frac{64x^3}{8}}$
2. What is the inverse of the second	quare of a number?	The square root		v 81 x ²	V 8
 Express n^{1/2} without a fraction 	nal exponent.	\sqrt{n}	$5x^{3}$	3	2x
4. Express $n^{\frac{7}{4}}$ without a fraction	nal exponent.	$\sqrt[4]{n^7}$	Write each expression in r	adical form, and simplify.	
 Write the following root: the and the index is 12. 	radicand is 10	12/10	4. 64 ⁵	5. 27 ² /3	6. $(-8)^{\frac{4}{3}}$
Find all real roots.			32	9	16
6. 4th roots of 1	7. cube roots of 27	8. square roots of 81	Write each expression by	using rational exponents.	
		·	7. $\sqrt[5]{51^4}$	8. $(\sqrt{169})^3$	9. $\sqrt[7]{36^{14}}$
±1	3	±9	51 ^{⁴/₅}	169 ^{3/2}	36 ²
Write each expression in radio 9. 6 ¹ / ₂	cal form, and simplify. 10. $8^{\frac{2}{3}}$	11. 5 ⁴ / ₃	Simplify each expression.		
_	$\sqrt[3]{8^2} = 4$	$\sqrt[3]{5^4}$	10. $4^{\frac{3}{2}} \cdot 4^{\frac{5}{2}}$	11 $27^{\frac{4}{3}}$	12. $(125^{\frac{2}{3}})^{\frac{1}{2}}$
√6	$\sqrt{8^2} = 4$	V5*	10. 4- • 4-	11. $\frac{27^{\frac{3}{3}}}{27^{\frac{2}{3}}}$	12. (125°)
Write each expression by usir			256	9	5
12. $\sqrt{7^2}$	13. ∜5 ³	14. ∛10 ⁵	13. $(27 \cdot 64)^{\frac{2}{3}}$	14. $(\frac{1}{243})^{\frac{1}{5}}$	15. $64^{-\frac{1}{3}}$
7 ¹ or 7	5 ³ / ₄	10 ⁵ /3	13. (27 · 64) ³	14. $(\frac{1}{243})^3$	13. 04
Simplify each expression. Ass	sume all variables are posit	ive.	144	<u>1</u> 3	$\frac{1}{4}$
15. $\sqrt[3]{8x^3}$	16. $\sqrt{\frac{36}{16}}$	17. $2^2 \cdot 2^3$			4
	3		16. $(-27x^6)^{\frac{1}{3}}$	17. $\frac{(25x)^{\frac{3}{2}}}{5 \cdot x^{\frac{1}{2}}}$	18. $(4\chi)^{-\frac{1}{2}} \cdot (9\chi)^{\frac{1}{2}}$
2 <i>x</i>	2	2 ⁵ or 32			3
18. $\frac{(3x)^4}{(3x)^2}$	19. $(5^2)^2$	20. $\left(\frac{8x^3}{27}\right)^{\frac{1}{3}}$	$-3x^{2}$	25 <i>x</i>	2
9x ²	5 ⁴ or 625	$\frac{2x}{2}$	Solve.		
		3		orbit the nucleus with a certain $\frac{1}{7^2}$	
- Ex	22. $2 \cdot \left(\frac{1}{8}\right)^{\frac{1}{3}}$	23. $(\sqrt{25x^2})^3$	protons in the nucleus a	omas velocity, equal to $\frac{Z^3}{137}$ c, wh and c is the speed of light. In term	ns of <i>c</i> , what is the
$\frac{2}{x}$	1	125 <i>x</i> ³	characteristic Fermi-Tho	omas velocity of the electrons in I	Uranium, for which $Z = 92?$
				About 0.15 <i>c</i>	
Copyright © by Holt, Rinehart and Winston. All rights reserved.	43	Holt Algebra 2	Copyright © by Holt, Rinehart and Winston. All rights reserved.	44	Holt Algebra 2
Simplify each expression. Ass $1.\sqrt[4]{(2x)^8} \cdot \sqrt[4]{(2x)^6}$	sume all variables are posit 2. $\sqrt[4]{\frac{x^{16}y^8}{81}}$		Use Properties of <i>n</i> th Rom Product Property: $\sqrt[n]{ab} =$	ots to simplify radical expression $\sqrt[n]{a} \cdot \sqrt[n]{b}$	IS.
16 24	$\frac{x^4y^2}{2}$	$\frac{3.\sqrt[3]{\frac{x^7}{27x^3}}}{\frac{x\sqrt[3]{x}}{2}}$	Simplify: $\sqrt[4]{81x^8}$.		
16x ⁴	$\frac{x^4y^2}{3}$	$\underbrace{\begin{array}{c}3\sqrt[4]{\frac{x'}{27x^3}}\\-\\-\\-\\-\\-\\-\\-\\-\\-\\-\\-\\-\\-\\-\\-\\-\\-\\-\\$	Simplify: $\sqrt[4]{81x^8}$. $\sqrt[4]{3^4 \cdot x^4 \cdot x^4}$	Factor into perfect fourth roo	ts.
$\frac{16x^4}{\text{Write each expression in radio}}$	$\frac{x^4y^2}{3}$	$\underline{\qquad \qquad \frac{x\sqrt[3]{x}}{3}}$	Simplify: $\sqrt[4]{81x^8}$.		ts.
Write each expression in radio 4. 216 ² 3	$\frac{x^4y^2}{3}$ cal form, and simplify. 5. $1000^{-\frac{2}{3}}$	$- \frac{\frac{X\sqrt[3]{X}}{3}}{6. (16x^3)^{\frac{3}{2}}}$	Simplify: $\sqrt[4]{81x^8}$. $\sqrt[4]{3^4 \cdot x^4 \cdot x^4}$ $\sqrt[4]{3^4 \sqrt[4]{x^4} \sqrt[4]{x^4}}$ $3 \cdot x \cdot x$ $3x^2$	Use the Product Property. Think: $\sqrt[n]{a^n} =$	<i>ts.</i> <i>a</i> , so $\sqrt[4]{3^4} = 3$ and $\sqrt[4]{x^4} = x$.
Write each expression in radio	$\frac{x^4y^2}{3}$ cal form, and simplify. 5. 1000^{-2}	$\underline{\qquad \qquad \frac{x\sqrt[3]{x}}{3}}$	Simplify: $\sqrt[4]{81x^8}$. $\sqrt[4]{3^4 \cdot x^4 \cdot x^4}$ $\sqrt[4]{3^4 \sqrt[4]{x^4} \sqrt[4]{x^4}}$ $3 \cdot x \cdot x$ $3x^2$	Use the Product Property. Think: $\sqrt[n]{a^n} = \frac{\sqrt[n]{a}}{\sqrt[n]{a}}$	<i>a</i> , so $\sqrt[4]{3^4} = 3$ and $\sqrt[4]{x^4} = x$.
Write each expression in radio 4. 216 ³ <u>36</u> Write each expression by usir	$ \frac{x^4y^2}{3} $ cal form, and simplify. 5. 1000^{-3} $ \frac{1}{100} $ or grational exponents.	$\frac{\frac{x\sqrt[3]{x}}{3}}{6. (16x^3)^{\frac{3}{2}}}$	Simplify: $\sqrt[4]{81x^8}$. $\sqrt[4]{3^4 \cdot x^4 \cdot x^4}$	Use the Product Property. Think: $\sqrt[n]{a^n} = \sqrt[n]{b^n}$ Always t when ar	a, so $\sqrt[4]{3^4} = 3$ and $\sqrt[4]{x^4} = x$. rationalize the denominator expression contains a radical
Write each expression in radio 4. 216 ³ <u>36</u>	$ \frac{x^4y^2}{3} $ scal form, and simplify. 5. 1000^{-3} $ \frac{1}{100} $		Simplify: $\sqrt[4]{81x^8}$. $\sqrt[4]{3^4 \cdot x^4 \cdot x^4}$ $\sqrt[4]{3^4 \sqrt[4]{x^4}}$ $3 \cdot x \cdot x$ $3x^2$ Quotient Property: $\sqrt[4]{\frac{B}{2}}$ Simplify: $\sqrt[4]{\frac{X^2}{2}}$.	Use the Product Property. Think: $\sqrt[n]{a^n} = \frac{\sqrt[n]{a}}{\sqrt[n]{b}}$ Always I when an in the definition	a, so $\sqrt[4]{3^4} = 3$ and $\sqrt[4]{x^4} = x$. rationalize the denominator
Write each expression in radio 4. 216 ³ <u>36</u> Write each expression by usir	$ \frac{x^4y^2}{3} $ cal form, and simplify. 5. 1000^{-3} $ \frac{1}{100} $ or grational exponents.	$\frac{\frac{x\sqrt[3]{x}}{3}}{6. (16x^3)^{\frac{3}{2}}}$	Simplify: $\sqrt[4]{81x^8}$. $\sqrt[4]{3^4 \cdot x^4 \cdot x^4}$ $\sqrt[4]{3^4 \sqrt[4]{x^4}}$ $3 \cdot x \cdot x$ $3x^2$ Quotient Property: $\sqrt[4]{\frac{B}{2}}$ Simplify: $\sqrt[4]{\frac{X^2}{2}}$.	Use the Product Property. Think: $\sqrt[n]{a^n} = \frac{\sqrt[n]{a}}{\sqrt[n]{b}}$ Always I Always I in the de lise the Quotient Property. Simp	a, so $\sqrt[4]{3^4} = 3$ and $\sqrt[4]{x^4} = x$. rationalize the denominator expression contains a radical enominator.
Write each expression in radie 4. $216^{\frac{2}{5}}$ Write each expression by usin 7. $\sqrt[3]{(3x)^4}$ (3x) $\frac{4}{5}$	$\frac{x^4y^2}{3}$ cal form, and simplify. 5. $1000^{-\frac{6}{3}}$ $\frac{1}{100}$ arg rational exponents. 8. $(\sqrt[6]{-6})^3$ 3		Simplify: $\sqrt[4]{81x^8}$. $\sqrt[4]{3^4 \cdot x^4 \cdot x^4}$ $\sqrt[4]{3^4 \sqrt{x^4} \sqrt[4]{x^4}}$ $3 \cdot x \cdot x$ $3x^2$ Quotient Property: $\sqrt[4]{B} =$ Simplify: $\sqrt[4]{x^9}$. $\sqrt[4]{x^9}$ $\sqrt[4]{x^9}$ $\sqrt[4]{x^9}$ $\sqrt[4]{x^9}$ $\sqrt[4]{x^9}$ $\sqrt[4]{x^9}$ $\sqrt[4]{x^9}$	Use the Product Property. Think: $\sqrt[n]{a^n} = \frac{\sqrt[n]{a}}{\sqrt[n]{b}}$ Always I Always I in the de lise the Quotient Property. Simp	a, so $\sqrt[4]{3^4} = 3$ and $\sqrt[6]{x^4} = x$. rationalize the denominator expression contains a radical enominator.
Write each expression in radie 36 Write each expression by usin $7.\sqrt[3]{(3x)^4}$	$\frac{x^4y^2}{3}$ cal form, and simplify. 5. $1000^{-\frac{6}{3}}$ $\frac{1}{100}$ arg rational exponents. 8. $(\sqrt[6]{-6})^3$ 3		Simplify: $\sqrt[4]{81x^8}$. $\sqrt[4]{3^4 \cdot x^4 \cdot x^4}$ $\sqrt[4]{3^4 \sqrt{x^4} \sqrt[4]{x^4}}$ $3 \cdot x \cdot x$ $3x^2$ Quotient Property: $\sqrt[4]{B} =$ Simplify: $\sqrt[4]{x^9}$. $\sqrt[4]{x^9}$ $\sqrt[4]{x^9}$ $\sqrt[4]{x^9}$ $\sqrt[4]{x^9}$ $\sqrt[4]{x^9}$ $\sqrt[4]{x^9}$ $\sqrt[4]{x^9}$	Use the Product Property. Think: $\sqrt[n]{a^n} = \frac{\sqrt[n]{a}}{\sqrt[n]{b}}$ Always I Always I in the de lise the Quotient Property. Simp	a, so $\sqrt[4]{3^4} = 3$ and $\sqrt[4]{x^4} = x$. rationalize the denominator expression contains a radical enominator.
Write each expression in radie 4. $216^{\frac{2}{3}}$ Write each expression by usin 7. $\sqrt[3]{(3x)^4}$ (3x) $\frac{4}{5}$ Simplify each expression. 10. $25^{\frac{1}{4}} \cdot 25^{-\frac{7}{4}}$	$\frac{x^4y^2}{3}$ cal form, and simplify. 5. 1000^{-3} $\frac{1}{100}$ and rational exponents. 8. $(\sqrt[6]{-6})^3$ $(-6)^{\frac{3}{5}}$		Simplify: $\sqrt[4]{81x^8}$. $\sqrt[4]{3^4 \cdot x^4 \cdot x^4}$ $\sqrt[4]{3^4 \sqrt{x^4} \sqrt[4]{x^4}}$ $3 \cdot x \cdot x$ $3 \cdot x \cdot x$ Quotient Property: $\sqrt[6]{a} = 1$ Simplify: $\sqrt[6]{x^9}$. $\sqrt[4]{x^9}$ $\sqrt[4]{x^9}$. $\sqrt[4]{x^9}$. $\sqrt[$	Use the Product Property. Think: $\sqrt[n]{a^n} = \frac{\sqrt[n]{a}}{\sqrt[n]{b}}$ Always I in the de Use the Quotient Property. Simp $\sqrt[n]{x^3}$	a, so $\sqrt[4]{3^4} = 3$ and $\sqrt[4]{x^4} = x$. rationalize the denominator expression contains a radical enominator.
Write each expression in radie 4. $216^{\frac{2}{3}}$ 36 Write each expression by usin 7. $\sqrt[6]{(3x)^4}$ (3x) $\frac{4}{5}$ Simplify each expression.	$\frac{x^4y^2}{3}$ cal form, and simplify. 5. 1000^{-3} $\frac{1}{100}$ and rational exponents. 8. $(\sqrt[6]{-6})^3$ $(-6)^{\frac{3}{5}}$		Simplify: $\sqrt[4]{81x^8}$. $\sqrt[4]{3^4 \cdot x^4 \cdot x^4}$ $\sqrt[4]{3^4 \cdot x^4 \cdot x^4}$ $\sqrt[4]{3^4 \cdot x^4 \cdot x^4}$ $3 \cdot x \cdot x$ $3 \cdot x \cdot x$ $3 \cdot x \cdot x$ Quotient Property: $\sqrt[6]{a} = 1$ Simplify: $\sqrt[6]{x^9}$ $\sqrt[4]{x^9}$	Use the Product Property. Think: $\sqrt[n]{a^n} = \frac{\sqrt[n]{a}}{\sqrt[n]{b}}$ Always the value of the	a, so $\sqrt[4]{3^4} = 3$ and $\sqrt[4]{x^4} = x$. rationalize the denominator expression contains a radical enominator.
Write each expression in radie 4. $216^{\frac{2}{3}}$ Write each expression by usin 7. $\sqrt[4]{(3x)^4}$ (3x) $\frac{4}{5}$ Simplify each expression. 10. $25^{\frac{1}{4}} \cdot 25^{-\frac{2}{4}}$ $\frac{1}{125}$	$\frac{x^4y^2}{3}$ cal form, and simplify. 5. 1000^{-3} $\frac{1}{100}$ and rational exponents. 8. $(\sqrt[6]{-6})^3$ $(-6)^{\frac{3}{5}}$	$ \begin{array}{c} & \underline{x \sqrt[3]{x}} \\ 3 \\ \hline \\ 6. & (16x^3)^{\frac{3}{2}} \\ \hline \\ 9. \sqrt[4]{30x^3} \\ 9. \sqrt[4]{30x^3} \\ \hline \\ 12. & \left(\frac{x^8}{y^4}\right)^{\frac{3}{4}} \\ \hline \\ \frac{x^6}{y^3} \\ \hline \end{array} $	$\begin{array}{c} \text{Simplify:} \sqrt[4]{81x^8}, \\ & \sqrt[4]{3^4 \cdot x^4 \cdot x^4} \\ & \sqrt[4]{3^3 \cdot x^4 \cdot x^4} \\ & 3 \cdot x \cdot x \\ & 3x^2 \end{array} \\ \begin{array}{c} \text{Quotient Property:} \sqrt[4]{\frac{3}{2}} \\ & \sqrt[4]{\frac{2}{2}}, \\ & \sqrt[4]{\frac$	Use the Product Property. Think: $\sqrt[n]{a^n} = \sqrt[n]{b^n}$ Always I when are in the de Use the Quotient Property. Simp $\sqrt[n]{x^n}$ ationalize the denominator.	a, so $\sqrt[4]{3^4} = 3$ and $\sqrt[4]{x^4} = x$. rationalize the denominator expression contains a radical enominator.
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Write each expression in radie 4. $216^{\frac{2}{3}}$ Write each expression by usin 7. $\sqrt[3]{(3x)^4}$ (3x) $\frac{\frac{4}{5}}{}$ Simplify each expression. 10. $25^{\frac{1}{4}} \cdot 25^{-\frac{7}{4}}$ 13. $(\frac{x^3}{(125)})^{\frac{1}{3}}$ $\frac{x}{5}$	$\frac{x^{4}y^{2}}{3}$ cal form, and simplify. 5. $1000^{-\frac{2}{3}}$ $\frac{1}{100}$ ng rational exponents. 8. $(\sqrt[5]{-6})^{3}$ $(-6)^{\frac{3}{5}}$ 11. $(-64)^{\frac{1}{3}}$ 14. $(-8x^{16})^{\frac{2}{3}}(\sqrt[3]{y^{6}})$ $4x^{12}y^{2}$	$ \begin{array}{c} \underline{x \sqrt[3]{x}}{3} \\ \underline{x \sqrt[3]{x}}{3} \\ \underline{x \sqrt[3]{x}}{3} \\ \underline{x \sqrt[3]{3}}{3} \\ \underline{y \sqrt[3]{3}}{3} \\ \underline{y \sqrt[3]{3}}{3} \\ \underline{x \sqrt[3]{4} \cdot x^{\frac{3}{4}}}{3} \\ \underline{x \sqrt[3]{4} \cdot x^{\frac{3}{4}}}{12. \left(\frac{x^{8}}{y^{4}}\right)^{\frac{3}{4}}} \\ \underline{x \sqrt[3]{4} \cdot x^{\frac{3}{4}}}{12. \left(\frac{x^{8}}{$	$\begin{array}{c} \text{Simplify:} \sqrt[4]{81x^8}, \\ & \sqrt[4]{3^4 \cdot x^4 \cdot x^4} \\ & \sqrt[4]{3^4 \sqrt{x^4} \sqrt{x^4}} \\ & 3 \cdot x \cdot x \\ & 3 \cdot x \\ & 3 \cdot x \cdot x \\ & 3 \cdot x \\ & 3$	Use the Product Property. Think: $\sqrt[n]{a^n} = \frac{\sqrt[n]{a}}{\sqrt[n]{b}}$ Always the value of the	a, so $\sqrt[4]{3^4} = 3$ and $\sqrt[6]{x^4} = x$. rationalize the denominator the expression contains a radical prominator. Diffy the numerator. Think: $= \sqrt[6]{x^3} \sqrt[6]{x^3} \sqrt[3]{x^3} = x \cdot x \cdot x.$ 3. $\sqrt[6]{125x^6}$
Write each expression in radie 4. $216^{\frac{2}{3}}$ Write each expression by usin 7. $\sqrt[3]{(3x)^4}$ (3x) $\frac{4}{5}$ Simplify each expression. 10. $25^{\frac{1}{4}} \cdot 25^{-\frac{2}{4}}$ $\frac{1}{125}$ 13. $(\frac{x^3}{125})^{\frac{1}{3}}$ x	$ \frac{x^4y^2}{3} $ cal form, and simplify. 5. 1000^{-3} $\frac{1}{100}$ ng rational exponents. 8. $(\sqrt[6]{-6})^3$ $(-6)^{\frac{3}{5}}$ 11. $(-64)^{\frac{1}{3}}$ -4	$ \begin{array}{c} \underline{x \sqrt[3]{x}}{3} \\ \underline{x \sqrt[3]{x}}{3} \\ \underline{x \sqrt[3]{x}}{3} \\ \underline{x \sqrt[3]{3}}{3} \\ \underline{y \sqrt[3]{3}}{3} \\ \underline{y \sqrt[3]{3}}{3} \\ \underline{x \sqrt[3]{3}}{3} \\ \underline{x \sqrt[3]{4}}{x \sqrt[3]{4}} \\ \underline{x \sqrt[3]{4}}{x \sqrt[3]{4}} \\ \underline{x \sqrt[3]{4}}{y \sqrt[3]{4}} \\ \underline{x \sqrt[3]{4}} \\ \underline{x \sqrt[3]{4}}{y \sqrt[3]{4}} \\ \underline{x \sqrt[3]{4}} \\ \underline{x \sqrt[3]{4}} \\ \underline{x \sqrt[3]{4}} \\ x \sqrt[$	$\begin{array}{c} \text{Simplify:} \sqrt[4]{81x^8}, \\ & \sqrt[4]{3^4 \cdot x^4 \cdot x^4} \\ & \sqrt[4]{3^4 \sqrt{x^4} \sqrt{x^4}} \\ & 3 \cdot x \cdot x \\ & 3 \cdot x \\ & 3 \cdot x \cdot x \\ & 3 \cdot x \\ & 3$	Use the Product Property. Think: $\sqrt[n]{a^n} = \frac{\sqrt[n]{a}}{\sqrt[n]{b}}$ Always I Always I when and in the de ise the Quotient Property. Simplify.	a, so $\sqrt[6]{3^4} = 3$ and $\sqrt[6]{x^4} = x$. rationalize the denominator expression contains a radical anominator. bify the numerator. Think: $= \sqrt[6]{x^3} \sqrt[6]{x^3} \sqrt[6]{x^3} = x \cdot x \cdot x.$
Write each expression in radie 4. $216^{\frac{2}{3}}$ Write each expression by usin 7. $\sqrt[3]{(3x)^4}$ (3x) $\frac{\frac{4}{5}}{}$ Simplify each expression. 10. $25^{\frac{1}{4}} \cdot 25^{-\frac{7}{4}}$ 13. $(\frac{x^3}{(125)})^{\frac{1}{3}}$ $\frac{x}{5}$	$\frac{x^{4}y^{2}}{3}$ cal form, and simplify. 5. $1000^{-\frac{2}{3}}$ $\frac{1}{100}$ ng rational exponents. 8. $(\sqrt[5]{-6})^{3}$ $(-6)^{\frac{3}{5}}$ 11. $(-64)^{\frac{1}{3}}$ 14. $(-8x^{16})^{\frac{2}{3}}(\sqrt[3]{y^{6}})$ $4x^{12}y^{2}$	$ \begin{array}{c} \underline{x \sqrt[3]{x}}{3} \\ \underline{x \sqrt[3]{x}}{3} \\ \underline{x \sqrt[3]{x}}{3} \\ \underline{x \sqrt[3]{3}}{3} \\ \underline{y \sqrt[3]{3}}{3} \\ \underline{y \sqrt[3]{3}}{3} \\ \underline{x \sqrt[3]{4} \cdot x^{\frac{3}{4}}}{3} \\ \underline{x \sqrt[3]{4} \cdot x^{\frac{3}{4}}}{12. \left(\frac{x^{8}}{y^{4}}\right)^{\frac{3}{4}}} \\ \underline{x \sqrt[3]{4} \cdot x^{\frac{3}{4}}}{12. \left(\frac{x^{8}}{$	$\begin{array}{c} \text{Simplify:} \sqrt[4]{81x^8}, \\ & \sqrt[4]{3^4 \cdot x^4 \cdot x^4} \\ & \sqrt[4]{3^4 \cdot x^4 \cdot x^4} \\ & \sqrt[4]{3^4 \cdot x^4 \cdot x^4} \\ & 3 \cdot x \cdot x \\ & 3x^2 \end{array} \\ \begin{array}{c} \text{Cuotient Property:} \sqrt[4]{\frac{B}{2}} \\ & \frac{\sqrt[4]{2}}{2}, \\ & \sqrt[4]{2}, $	Use the Product Property. Think: $\sqrt[n]{a^n} = \frac{\sqrt[n]{a}}{\sqrt[n]{b}}$ Always I Always I when and in the de ise the Quotient Property. Simplify.	a, so $\sqrt[4]{3^4} = 3$ and $\sqrt[6]{x^4} = x$. rationalize the denominator the expression contains a radical prominator. Diffy the numerator. Think: $= \sqrt[6]{x^3} \sqrt[6]{x^3} \sqrt[6]{x^5} = x \cdot x \cdot x$. 3. $\sqrt[6]{125x^6}$ $= \sqrt[6]{125} \cdot \sqrt[6]{x^6}$
Write each expression in radie 4. $216^{\frac{2}{3}}$ Write each expression by usin 7. $\sqrt[3]{(3x)^4}$ (3x) $\frac{4}{5}$ Simplify each expression. 10. $25^{\frac{1}{4}} \cdot 25^{-\frac{7}{4}}$ $\frac{1}{125}$ 13. $(\frac{x^3}{(125)})^{\frac{1}{3}}$ $\frac{x}{5}$ 16. $(\sqrt[3]{-8x^9})^2$	$\frac{x^{4}y^{2}}{3}$ cal form, and simplify. 5. $1000^{-\frac{2}{3}}$ $\frac{1}{100}$ ng rational exponents. 8. $(\sqrt[5]{-6})^{3}$ $(-6)^{\frac{3}{5}}$ 11. $(-64)^{\frac{1}{3}}$ 14. $(-8x^{16})^{\frac{2}{3}}(\sqrt[3]{y^{6}})$ $\frac{4x^{12}y^{2}}{(\sqrt[3]{y^{5}})}$ 17. $(3x)^{\frac{2}{3}}(3x)^{\frac{7}{3}}$	$ \begin{array}{c} \underline{x \sqrt[3]{x}}{3} \\ \underline{x \sqrt[3]{x}}{3} \\ \underline{x \sqrt[3]{x}}{3} \\ \underline{x \sqrt[3]{3}}{3} \\ \underline{y \sqrt[3]{3}}{3} \\ \underline{y \sqrt[3]{3}}{3} \\ \underline{x \sqrt[3]{3}}{3} \\ \underline{x \sqrt[3]{4}}{x \sqrt[3]{4}} \\ \underline{x \sqrt[3]{4}}{x \sqrt[3]{4}} \\ \underline{x \sqrt[3]{4}}{y \sqrt[3]{4}} \\ \underline{x \sqrt[3]{4}} \\ \underline{x \sqrt[3]{4}}{y \sqrt[3]{4}} \\ \underline{x \sqrt[3]{4}} \\ \underline{x \sqrt[3]{4}} \\ \underline{x \sqrt[3]{4}} \\ x \sqrt[$	$\begin{array}{c} \text{Simplify:} \sqrt[4]{81x^8}, \\ & \sqrt[4]{3^4 \cdot x^4 \cdot x^4} \\ & \sqrt[4]{3^4 \sqrt{x^4} \sqrt{x^4}} \\ & 3 \cdot x \cdot x \\ & 3 \cdot x \cdot x \\ & 3 \cdot x \cdot x \\ \text{Ouotient Property:} \sqrt[4]{b} = \\ \text{Simplify:} \sqrt[4]{x^9}, \\ & \sqrt[4]{x^9}, \\ & \sqrt[4]{x^2}, \\ & \sqrt[4]{x^4}, \\ & \sqrt[4]{x$	Use the Product Property. Think: $\sqrt[n]{a^n} = \sqrt[n]{b^n}$ Always I Always I in the de ise the Quotient Property. Simplify. 2. $\sqrt[n]{\frac{x^n}{6}}$ $\sqrt[n]{x^n}$	a, so $\sqrt[4]{3^4} = 3$ and $\sqrt[6]{x^4} = x$. rationalize the denominator the expression contains a radical anominator. Diffy the numerator. Think: $= \sqrt[6]{x^3} \sqrt[6]{x^3} \sqrt[6]{x^3} = x \cdot x \cdot x.$ 3. $\sqrt[6]{125x^6}$
Write each expression in radie 4. $216^{\frac{2}{3}}$ Write each expression by usin 7. $\sqrt[3]{(3x)^4}$ (3x) $\frac{4}{5}$ Simplify each expression. 10. $25^{\frac{1}{4}} \cdot 25^{-\frac{2}{4}}$ 13. $(\frac{x^3}{125})^{\frac{1}{3}}$ <u>4x^6</u> Solve. 19. Each key on a piano produce frequency of the key immedo key increases the frequency corresponding to Concert A	$\frac{x^{4}y^{2}}{3}$ cal form, and simplify. 5. $1000^{-\frac{2}{3}}$ $\frac{1}{100}$ hg rational exponents. 8. $(\sqrt[6]{-6})^{3}$ $(-6)^{\frac{3}{5}}$ 11. $(-64)^{\frac{1}{3}}$ 14. $(-8x^{16})^{\frac{2}{3}}(\sqrt[6]{y^{6}})$ $\frac{4x^{12}y^{2}}{17. (3x)^{\frac{2}{3}}(3x)^{\frac{2}{3}}}$ bes a frequency that is $2^{\frac{1}{12}}$ tri iately to its left. Moving <i>n</i> key or of the starting note by a fac has a frequency of 440 Hz. ¹ is 5 keys to the right of Conc	$\frac{x\sqrt[3]{x}}{3}$ 6. $(16x^3)^{\frac{3}{2}}$ $\frac{64x^4\sqrt{x}}{9}$ 9. $\sqrt[6]{30x^3}$ 12. $(\frac{x^9}{y^4})^{\frac{3}{4}}$ 15. $(a^4b^9)^{-\frac{1}{4}}$ 16. $(\frac{m^9}{p^{12}})^{-\frac{1}{4}}$ 17. $(\frac{x^9}{p^{12}})^{\frac{3}{4}}$ 18. $(\frac{m^9}{n^{12}})^{-\frac{1}{4}}$ 19. $\frac{1}{ab^2}$ 19. $(\frac{m^9}{n^{12}})^{-\frac{1}{4}}$ 19. $(\frac{m^9}{n^{12}})^{-\frac{1}{4}}$ 19. $(\frac{m^9}{n^{12}})^{-\frac{1}{4}}$ 19. $(\frac{m^9}{n^{12}})^{-\frac{1}{4}}$ 19. $(\frac{m^9}{n^{12}})^{-\frac{1}{4}}$ 10. $(\frac{m^9}{n^{12}})^{-\frac{1}{4}}$ 11. $(\frac{m^9}{n^{12}})^{-\frac{1}{4}}$ 11. $(\frac{m^9}{n^{12}})^{-\frac{1}{4}}$ 12. $(\frac{m^9}{n^{12}})^{-\frac{1}{4}}$ 13. $(\frac{m^9}{n^{12}})^{-\frac{1}{4}}$ 14. $(\frac{m^9}{n^{12}})^{-\frac{1}{4}}$ 15. $(\frac{m^9}{n^{12}})^{-\frac{1}{4}}$ 16. $(\frac{m^9}{n^{12}})^{-\frac{1}{4}}$ 17. $(\frac{m^9}{n^{12}})^{-\frac{1}{4}}$ 18. $(\frac{m^9}{n^{12}})^{-\frac{1}{4}}$ 19. $(\frac{m^9}{n^{14}})^{-\frac{1}{4}}$ 19. $(\frac{m^9}{n^{14}})^{-\frac{1}$	$\begin{split} & \text{Simplify: } \sqrt[4]{81x^8}.\\ & \sqrt[4]{3^4 \cdot x^4 \cdot x^4}\\ & \sqrt[4]{3^3 \sqrt{x^4} \sqrt[4]{x^4}}\\ & 3 \cdot x \cdot x\\ & 3x^2 \end{split} \\ & \text{Quotient Property: } \sqrt[4]{\frac{1}{9}} = .\\ & \text{Simplify: } \sqrt[4]{\frac{x^9}{2}}.\\ & \sqrt[4]{\frac{x^3}{\sqrt{2}}}.\\ & \frac{x^{3\sqrt{2}}}{\sqrt{2}}.\\ & \text{Simplify each expression.}\\ & 1.\sqrt[4]{x^8}.\sqrt[4]{x^4}.\\ & \sqrt[4]{\frac{x^4}{2x^{10}}}. \end{split}$	Use the Product Property. Think: $\sqrt[n]{a^n} = \sqrt[n]{b^n}$ Always I Always I in the de ise the Quotient Property. Simplify. 2. $\sqrt[n]{\frac{x^n}{6}}$ $\sqrt[n]{x^n}$	a, so $\sqrt[4]{3^4} = 3$ and $\sqrt[6]{x^4} = x$. rationalize the denominator the expression contains a radical prominator. Diffy the numerator. Think: $= \sqrt[6]{x^3} \sqrt[6]{x^3} \sqrt[6]{x^5} = x \cdot x \cdot x$. 3. $\sqrt[6]{125x^6}$ $= \sqrt[6]{125} \cdot \sqrt[6]{x^6}$
Write each expression in radie 4. $216^{\frac{2}{3}}$ Write each expression by usin 7. $\sqrt[3]{(3x)^4}$ (3x) $\frac{4}{5}$ Simplify each expression. 10. $25^{\frac{1}{4}} \cdot 25^{-\frac{2}{4}}$ 13. $(\frac{x^3}{125})^{\frac{1}{3}}$ <u>4x^6</u> Solve. 19. Each key on a piano produce frequency of the key immedo key increases the frequency corresponding to Concert A	$\frac{x^{4}y^{2}}{3}$ cal form, and simplify. 5. $1000^{-\frac{2}{3}}$ $\frac{1}{100}$ ng rational exponents. 8. $(\sqrt[6]{-6})^{3}$ $(-6)^{\frac{3}{5}}$ 11. $(-64)^{\frac{1}{3}}$ 14. $(-8x^{10})^{\frac{2}{5}}(\sqrt[6]{y^{6}})$ $\frac{4x^{12}y^{2}}{17. (3x)^{\frac{2}{3}}(3x)^{\frac{7}{3}}}$ exes a frequency that is $2^{\frac{1}{12}}$ tri iately to its left. Moving <i>n</i> key of the starting note by a fac has a frequency of 440 Hz.	$\frac{x\sqrt[3]{x}}{3}$ 6. $(16x^3)^{\frac{3}{2}}$ $\frac{64x^4\sqrt{x}}{9}$ 9. $\sqrt[6]{30x^3}$ 12. $(\frac{x^9}{y^4})^{\frac{3}{4}}$ 15. $(a^4b^9)^{-\frac{1}{4}}$ 16. $(\frac{m^9}{p^{12}})^{-\frac{1}{4}}$ 17. $(\frac{x^9}{p^{12}})^{\frac{3}{4}}$ 18. $(\frac{m^9}{n^{12}})^{-\frac{1}{4}}$ 19. $\frac{1}{ab^2}$ 19. $(\frac{m^9}{n^{12}})^{-\frac{1}{4}}$ 19. $(\frac{m^9}{n^{12}})^{-\frac{1}{4}}$ 19. $(\frac{m^9}{n^{12}})^{-\frac{1}{4}}$ 19. $(\frac{m^9}{n^{12}})^{-\frac{1}{4}}$ 19. $(\frac{m^9}{n^{12}})^{-\frac{1}{4}}$ 10. $(\frac{m^9}{n^{12}})^{-\frac{1}{4}}$ 11. $(\frac{m^9}{n^{12}})^{-\frac{1}{4}}$ 11. $(\frac{m^9}{n^{12}})^{-\frac{1}{4}}$ 12. $(\frac{m^9}{n^{12}})^{-\frac{1}{4}}$ 13. $(\frac{m^9}{n^{12}})^{-\frac{1}{4}}$ 14. $(\frac{m^9}{n^{12}})^{-\frac{1}{4}}$ 15. $(\frac{m^9}{n^{12}})^{-\frac{1}{4}}$ 16. $(\frac{m^9}{n^{12}})^{-\frac{1}{4}}$ 17. $(\frac{m^9}{n^{12}})^{-\frac{1}{4}}$ 18. $(\frac{m^9}{n^{12}})^{-\frac{1}{4}}$ 19. $(\frac{m^9}{n^{14}})^{-\frac{1}{4}}$ 19. $(\frac{m^9}{n^{14}})^{-\frac{1}$	Simplify: $\sqrt[4]{81x^8}$. $\sqrt[4]{3^4 \cdot x^4 \cdot x^4}$ $\sqrt[4]{3^4 \sqrt{x^4} \sqrt{x^4}}$ $3 \cdot x \cdot x$ Quotient Property: $\sqrt[4]{b} =$ Simplify: $\sqrt[4]{x^9}$. $\sqrt[4]{x^9}$. $\sqrt[4]{x^9}$. $\sqrt[4]{x^2}$. $\sqrt[4]{x^2}$. $\sqrt[4]{x^2}$. $\sqrt[4]{x^2}$. $\sqrt[4]{x^2}$. $\sqrt[4]{x^2}$. $\sqrt[4]{x^8}$. $\sqrt[4]{x^8}$. $\sqrt[4]{x^8}$. $\sqrt[4]{x^8}$. x^4 .	Use the Product Property. Think: $\sqrt[n]{a^n} = \sqrt[n]{b}$ Always the mark in the determinator. Ise the Quotient Property. Simplify. 2. $\sqrt[n]{\frac{x^n}{6}}$ $\sqrt[n]{x^n}$ $\frac{x^2\sqrt[n]{216}}{6}$	a, so $\sqrt[4]{3^4} = 3$ and $\sqrt[6]{x^4} = x$. rationalize the denominator the expression contains a radical enominator. Diffy the numerator. Think: $= \sqrt[6]{x^3} \sqrt[6]{x^3} \sqrt[3]{x^3} = x \cdot x \cdot x.$ 3. $\sqrt[6]{125x^6}$ $\sqrt[6]{125} \cdot \sqrt[6]{x^6}$ $= 5x^2$