Name	Date	Class	
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## **LESSON** Reading Strategy

8-6 Use a Concept Map

Vocabulary	Relationship
<i>n</i> is called the <b>index</b> of the expression	$\sqrt[n]{a^m} = a^{\frac{m}{n}}$
The number or expression	Example:
inside the radical sign <i>a</i> is called the <b>radicand</b> . $\sqrt[n]{a} =$	$-\frac{1}{\sqrt{35^6}} = 5^{\frac{6}{3}} = 5^2 = 25$
Product Property	Quotient Property
$\sqrt[n]{ab} = \sqrt[n]{a} \cdot \sqrt[n]{b}$	$\sqrt[n]{\frac{a}{b}} = \frac{\sqrt[n]{a}}{\sqrt[n]{b}}$
Example: $\sqrt[3]{216} = \sqrt[3]{27} \cdot \sqrt[3]{8} = 3 \cdot 2 = 6$	Example: $\sqrt{\frac{4}{9}} = \frac{\sqrt{4}}{\sqrt{9}} = \frac{2}{3}$

## Solve.

- **1.** Explain how to simplify  $8^{\frac{2}{3}}$ .
- **2.** Identify the radicand in the expression  $\sqrt[7]{7x-4}$ .
- **3.** Identify the property you would use to solve  $\sqrt{\frac{49}{x^4}}$ . Then solve.

Write each expressi	on as a radical and simplify.		
<b>4.</b> 9 <sup>1</sup> / <sub>2</sub>	<b>5.</b> 8 <sup>1/3</sup>	6. $(x^8)^{\frac{1}{4}}$	
7. 25 <sup><sup>3</sup>/<sub>2</sub></sup>	<b>8.</b> $(8x^6)^{\frac{1}{3}}$	9. $\left(\frac{4}{9}\right)^{\frac{3}{2}}$	

	h						
	Expressions an	d Rational Exp	ponents (cont	tinued)	8-6 Using Rational Exp	ponents	
					Rational exponents make it possible		
The <i>n</i> th root of a num		ed using a rational,	or fractional,		Consider the simple operation of multipl multiply the radical expression $\sqrt{2}$ .		
exponent: $\sqrt[n]{a} = a^{\frac{1}{n}}$ .	This	means to take the n	th root of a.		answer is no, or at least it is very diff		
Examples: $121^{\frac{1}{2}} = V$	121 = 11				may be done as follows: $\sqrt{2} \cdot \sqrt[3]{2} = 2^{\frac{1}{2}} \cdot 2^{\frac{1}{3}} = 2^{\frac{1}{2} + \frac{1}{3}}$	$a^{\frac{3}{2}+\frac{2}{2}}$ $a^{\frac{5}{2}}$ $a^{\frac{6}{2}}$	6/20
$216^{\frac{1}{3}} = \sqrt[3]{10}$							
$256^{\frac{1}{4}} = \sqrt[4]{1}$	256 = 4				When you look at the radicals, it may last expressions are equal. The oper		
Powers and roots can	be expressed using	rational exponents a	$a^{\frac{m}{n}} = (\sqrt[n]{a})^{m}.$		the result. Other fraction operations a exponents instead of radicals.	are possible when using	rational
		/	1		exponents instead of radicals. $\sqrt[3]{2} \cdot \sqrt[5]{3^2} = 2^{\frac{1}{3}} \cdot 3^{\frac{2}{5}} = 2^{\frac{5}{15}} \cdot 3^{\frac{5}{15}}$	$a_{15}^{6} = (a_{15}^{5} a_{15}^{6})^{\frac{1}{15}} = \frac{15}{2}$	0 <sup>6</sup> - <sup>15</sup> /00 000
Examples: $64^{\frac{2}{3}} = (\sqrt[3]{64})^2$	. 2		enominator is the ro				• • • • • • • • • • • • • • • • • • • •
01 (101)	$=4^2 = 16$ $\overline{-32}^4 = (-2)^4 = 16$		merator is the powe	er.	Once again, the radical operations a exponents greatly simplify the multip		rational
	using rational exponent $\sqrt{a^m} = a^{\frac{m}{n}}$				Simplify. Assume all variables have $1.\sqrt{18} \cdot \sqrt[4]{18}$	-	3√900 ⋅√√630
			$\sqrt{a}$ ) <sup>m</sup> = $\sqrt[n]{a^m}$ .		1. V 18 · V 18	<b>2.</b> $\sqrt{30}$ ·	√900 ·√630
Examples: $\sqrt{5} = 5$	$\frac{1}{2}$ $\sqrt[4]{6^3} = 0$				3\[4]72	30 <sup>30</sup> /3 <sup>17</sup>	$7 \cdot 7^{6} \cdot 10^{11} \approx 30^{30} 1.52 \times 10^{24}$
			ink: The root is $n =$ in power is $m = 3$ .	4.	3. $\sqrt{35xy} \cdot \sqrt[4]{35x^2 y^3}$	4. $\sqrt{3xy}$	$\cdot\sqrt[4]{75x^2y^3}\cdot\sqrt[3]{25x^2y}$
			le power is <i>m</i> – 3.		- ,, ,,	v - y	1 - ) 1 - )
					4/		$y\sqrt[4^2]{3^9\cdot 5^2 x^8 y^7} = 5xy$
Write each expressio		d simplify.	3		$xy\sqrt[4]{35^3 y} = xy\sqrt[4]{42},$		$\sqrt[4]{492,075x^8y^7}$
<b>7.</b> $27^{\frac{4}{3}} = (\sqrt[3]{27})^4$	<b>8.</b> 49 <sup>2</sup>		<b>9.</b> 16 <sup>3</sup>		$5.\sqrt{20} \div \sqrt[4]{20}$		$\sqrt[4]{8820}$ ÷ $\sqrt[5]{1296}$
04	(	(10)3 040	$(\sqrt[4]{16})$	3	4/77		$\frac{\sqrt[2^0]{5^5 \cdot 6^4}}{6} = \frac{\sqrt[2^0]{4,050,000}}{6}$ $\sqrt[3^3]{75x^2 y^2} \div \sqrt[6]{25x^3 y^4}$
81	()	$(\overline{49})^3 = 343$	(\/16)	8 = 8	$7.\sqrt{3xy} \div \sqrt[3]{3x^2y}$		6 6
Write each expressio	n by using rational e	exponents.			$7.\sqrt{3xy} \div \sqrt[3]{3x^2y}$		
<b>10.</b> $\sqrt[5]{4^2}$ Think: $m = 2$			<b>12.</b> $\sqrt[4]{6^5}$		$\frac{\sqrt[6]{3y}}{\sqrt[6]{x}} = \frac{\sqrt[6]{3x^5 y}}{x}$	- /	$\frac{\sqrt[6]{3}}{5\sqrt[6]{x^4} v^5} = \frac{\sqrt[6]{3x^2} y}{5xy}$
				_	$\frac{\sqrt{6}}{\sqrt{6}} = \frac{\sqrt{2}}{x}$		$5\sqrt[6]{x^4y^5}$ 5xy
4 <sup>2</sup> / <sub>5</sub>		19 <sup>1</sup> / <sub>2</sub>	64	<u>5</u> 4	9. <del>\(\frac{175}{\sqrt{3}\tag{175}}\)</del>		$3\sqrt{108})\sqrt[3]{9}$ $9\sqrt[4]{15}$
o					9. $\frac{1}{\sqrt{5}175}$	10.	9 ∜15
Simplify each expres	sion.				10		
<b>13.</b> $\left(\frac{24}{3x^3}\right)^{\frac{1}{3}}$	<b>14.</b> √49 · ∖	$\sqrt[3]{8x^6}$	15. $\sqrt{\frac{117}{13}}$		$175^{\frac{19}{30}} = 5\sqrt[30]{5^8 \cdot 7}$	19 <b>6</b> <sup>12</sup>	$5^9 \cdot 3^5 = 6\sqrt[12]{474,609,375}$
			1 10				
$\frac{2}{x}$		14 <i>x</i> <sup>2</sup>	3	}			
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All rights reserved.		47	п	Holt Algebra 2	All rights reserved.	48	Holt Algebra 2
Problen	n Solvina				Reading Strate	av	
LESSON Problem 8-6 Radical E Louise is building a g	Expressions an guitar-like instrumen	t. It has small meta	al bars,		Reading Strate           8-6         Use a Concept Maj           Vocabulary		Relationship
8-6 Radical E Louise is building a g called frets, positione of a specific scale on	Expressions an guitar-like instrumen ed across its neck so n each string. The dis	t. It has small meta that it can produc stance a fret should	al bars, ce notes d be		8-6 Use a Concept Ma Vocabulary n is called the index of the		•
8-6 Radical E Louise is building a g called frets, positione of a specific scale on placed from the bridg	Expressions an guitar-like instrumen ed across its neck so n each string. The dis ge is related to a stri	t. It has small meta o that it can produc stance a fret should ng's root note leng	al bars, ce notes d be th by the		B-6 Use a Concept Ma Vocabulary n is called the index of the expression		$\sqrt[n]{a^m} = a^{\frac{m}{n}}$
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<b>8-6</b> Radical E Louise is building a g called frets, position of a specific scale on placed from the bridg function $d(n) = r/2^{-1}$ and <i>n</i> is the number Louise wants to know	Expressions an guitar-like instrumen ed across its neck so n each string. The dis ge is related to a stri $\frac{\pi}{2}$ , where <i>r</i> is the le of notes higher than	t. It has small meta o that it can produc stance a fret should ng's root note leng ength of the root no that string's root r	al bars, ce notes d be yth by the ote string note.		<b>8-6</b> Use a Concept Ma, Vocabulary <i>n</i> is called the <b>index</b> of the expression The number or expression	p	$\sqrt[n]{a^m} = a^{\frac{m}{n}}$
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<b>3-6 Radical E</b> Louise is building a g called frets, positions of a specific scale on placed from the bridg function $d(n) = r/2^{-1}$ and <i>n</i> is the number Louise wants to know on a 50-cm string. <b>1.</b> Find the distance to one octave (12 no a. Substitute value b. How far from th c. What fraction o of this fret from <b>2.</b> Complete the table	Expressions an guitar-like instrumen ed across its neck so heach string. The dis ge is related to a stri $\frac{\pi}{2}$ ), where <i>r</i> is the le of notes higher than the from the bridge for a f tes) higher than the or es for <i>r</i> and <i>n</i> in the gi he bridge should the fi of the string length is ti the bridge? e to find the distance l	t. It has small meta b that it can produc stance a fret should ng's root note leng ength of the root nr that string's root r that string's root r to that produces a l so to note. we function. the be placed? the distance irom the bridge, for f ale on this string.	al bars, be notes d be the by the bote string note. reent notes note exactly $\frac{d(12) = 50(2)}{25 \text{ cm}}$	12 12	<b>8-6</b> Use a Concept Ma, Vocabulary <i>n</i> is called the index of the expression The number or expression inside the radical sign <i>a</i> is called the radicand. <b>Product Property</b> $\sqrt[n]{ab} = \sqrt[n]{a} \cdot \sqrt[n]{b}$ Example: $\sqrt[n]{216} = \sqrt[n]{27} \cdot \sqrt[n]{8} = 3 \cdot 2 = 6$ <b>Solve.</b> 1. Explain how to simplify $8^{\frac{2}{5}}$ .	$\sqrt[p]{n} = a^{\frac{1}{n}}$	$\begin{array}{l} \sqrt[n]{a^m} = a^{\frac{m}{n}} \\ \text{Example:} \\ \sqrt[n]{5^6} = 5^{\frac{6}{3}} = 5^2 = 25 \\ \hline \textbf{Quotient Property} \\ \sqrt[n]{\frac{a}{b}} = \frac{\sqrt[n]{a}}{\sqrt[n]{b}} \\ \sqrt[n]{\frac{a}{b}} = \frac{\sqrt[n]{a}}{\sqrt[n]{b}} \\ \text{mple:} \sqrt[n]{\frac{a}{9}} = \frac{\sqrt[n]{a}}{\sqrt[n]{9}} = \frac{2}{3} \end{array}$
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<ul> <li>3-6 Radical E</li> <li>Called frets, positions of a specific scale on placed from the bridg function d(n) = r(2 - and n is the number to Louise wants to know on a 50-cm string.</li> <li>1. Find the distance i one octave (12 no a. Substitute value b. How far from the course (12 no a. Substitute value b. How far from the course (12 no a. Complete the table produce every other the Root Note Distance of Fret from Bridge (cm)</li> <li>Choose the letter for 3. Rafael made a cent The cube has a vor 336 cm<sup>3</sup>. What is is cube to the nearest (A) 7 B 12</li> </ul>	Expressions an guitar-like instrumen ed across its neck so each string. The dis- ge is related to a stri $\frac{1}{12}$ , hence r is the le of notes higher than where to place fred from the bridge for a f tees) higher than the ro es for r and n in the gi e bridge should the fr of the string length is th the bridge? e to find the distance is er note of an entire so 2 4 44.5 39.7 the best answer. raramic cube in art class oblume of the sidt ength of the	t. It has small meta b that it can produc stance a fret should ng's root note leng ength of the root not that string's root r is to produce differ ret that produces a to toot note. wen function te be placed? ne distance from the bridge, for f table on this string. 6 35.4 31 35.4 31	al bars,       be notes       d be       th by the       obte string       note.       rent notes       note exactly $d(12) = 50(2)$ $25 \text{ cm}$ $\frac{1}{2}$ frets that       8     10       1.5     28.1       has an exercise ball       tr 224 in. <sup>3</sup> . Find the	12 25 I with a e radius of	<b>3-6</b> Use a Concept May Vocabulary <i>n</i> is called the index of the expression The number or expression inside the radical sign <i>a</i> is called the radication <i>a</i> is called the radication <b>Product Property</b> $\sqrt[n]{ab} = \sqrt[n]{a} \cdot \sqrt[n]{b}$ Example: $\sqrt[n]{216} = \sqrt[n]{27} \cdot \sqrt[n]{8} = 3 \cdot 2 = 6$ <b>Solve.</b> 1. Explain how to simplify $8^{\frac{3}{2}}$ . Write <i>a</i> 2. Identify the radicand in the expression 3. Identify the property you would the Write each expression as a radication Write each expression as a radication <b>Write each expression</b> as a radication	$\sqrt[p]{a} = a^{\frac{1}{n}}$ Exa as a radical, $\sqrt[3]{8^2} = 1$ ession $\sqrt[3]{7x - 4}$ . 7x - 4 use to solve $\sqrt{\frac{49}{x^3}}$ . Then s Quotient Property;	$\sqrt[n]{a^m} = a^{\frac{m}{n}}$ Example: $\sqrt[3]{5^6} = 5^{\frac{6}{3}} = 5^2 = 25$ Quotient Property $\sqrt[a]{\frac{a}{b}} = \frac{\sqrt[a]{a}}{\sqrt[b]{b}}$ mple: $\sqrt{\frac{4}{9}} = \frac{\sqrt{4}}{\sqrt{9}} = \frac{2}{3}$ $\sqrt[3]{64} = 4$ solve.
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