Unit 7: Powers, Roots, and Numbers

(Chapter 7, page 290)

Radical new ideas in this chapter:

Rational exponents $\mathbf{4^{\left(\frac{1}{2}\right)} = \sqrt{4}}$

Complex numbers $\boldsymbol{i = \sqrt{-1}}$

Trivia: Complex numbers were brought to common use by Leonhard Euler in the 1750's.

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☐	Square root ---- Every positive real number has _____ real square roots. ---- Zero ____________________________________ ---- Negative _________________________________	Theorem 7-1
☐	Principal square root	
☐	Radical ---- Radical sign $\sqrt{\ }$ ---- Radical expression ---- Radicand	
☐	$\sqrt{a^2}$ =_______	Theorem 7-2
☐	Cube root $\sqrt[3]{\ }$ ---- Every real number has ______ cube root(s) ---- $\sqrt[3]{-27}$ = ________	
☐	K'th root ---- Even root ---- Odd root	
☐	Value of $\sqrt[k]{a^k}$ =	Theorem 7-3
☐	Multiplying and simplifying For any _____________ numbers a and b , $\sqrt[k]{a} \cdot \sqrt[k]{b} = \sqrt[k]{ab}$ ---- Examples -- $\sqrt{20}$ = -- $\sqrt{3}\sqrt{6}$ = -- __________________________	Theorem 7-4

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☐	Roots of quotients ------------------- ---- Examples	Theorem 7-5
☐	Adding and simplifying ---- Examples: -- $3\sqrt{8}-5\sqrt{2}=$ -- ____________________	
☐	Multiplying and simplifying ---- Examples: -- $\sqrt[3]{y}\left(\sqrt[3]{y^2}+\sqrt[3]{2}\right)=$ -- ____________________ -- ____________________	
☐	Rationalizing denominators -- $\sqrt{\frac{2}{3}}=$	
☐	Conjugate ---- Examples: -- $\frac{1}{\sqrt{2}+\sqrt{3}}=$ -- ____________________	

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	Rational numbers as exponents	
☐	$\sqrt[k]{a^m} =$	Theorem 7-6
☐	$a^{\frac{1}{k}} =$ ---- Example: ________________________	Definition page 311
☐	$a^{\frac{m}{k}} =$ ---- Example: ________________________	Definition page 311
☐	$a^{-\left(\frac{m}{k}\right)} =$ ---- Example: ________________________	Definition page 312
☐	Simplifying using rational exponents ---- Example: $\sqrt[4]{x^4y^{12}z^5} =$	
☐	Solving radical equations	Theorem 7-7
☐	Extraneous roots ---- Examples: -- Solve $x = \sqrt{x+7} + 5$	

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	Complex Numbers	
☐	Notation $\mathrm{i} = \sqrt{-1}$ $i^2 =$ ____	Page 321
☐	Powers of i : $\mathrm{i}^2, \mathrm{i}^3, \mathrm{i}^4, \mathrm{i}^5, \ldots$	
☐	Imaginary number	Definition page 321
☐	Complex number	Definition page 322
☐	----Examples: $\sqrt{-6} \cdot \sqrt{-3}$	
☐	Conjugate number	
☐	----Example: Complex number times it's conjugate $(2+3i)\cdot(2-3i) =$	Theorem 7-8
☐	Remove complex component from denominator ('Rationalize' denominator) ----Examples: -- $\frac{26}{2-3i} =$ -- ____	

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