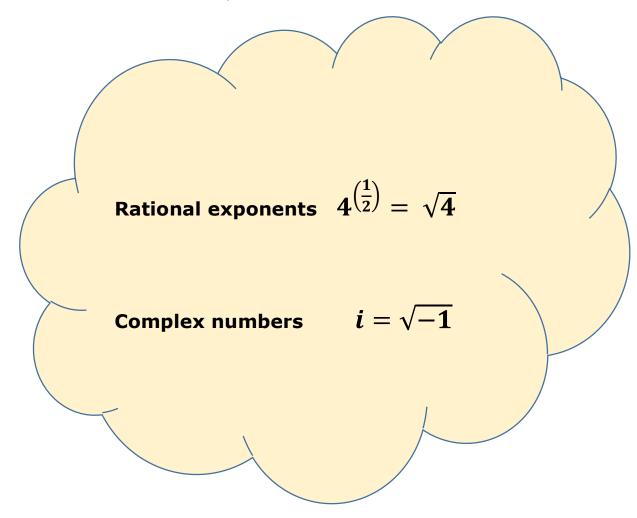
## Unit 7: Powers, Roots, and Numbers

(Chapter 7, page 290)

Radical new ideas in this chapter:



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
Deire sing Lagrage was the	
Principal square root	
Radical	
Radical sign $$	
Radical expression Radicand	
$\sqrt{a^2} = \underline{\hspace{1cm}}$	Theorem 7-2
Cube root <sup>3</sup> √	
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	Theorem
For any numbers a and b,	7-4
Tot any numbers a and b,	
$\sqrt[k]{a} \cdot \sqrt[k]{b} = \sqrt[k]{ab}$	
Examples $\sqrt{20}$ = $\sqrt{3}\sqrt{6}$ =	

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

Rational numbers as exponents	
$\sqrt[k]{a^m} =$	Theorem 7-6
$a^{rac{1}{k}}=$ Example:	Definition page 311
$a^{\frac{m}{k}} =$	Definition page 311
Example:	
$a^{-\left(\frac{m}{k}\right)}=$ 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 $x = \sqrt{x+7} + 5$	

Complex Numbers	
Notation $i = \sqrt{-1}$ $i^2 = \underline{\hspace{1cm}}$	Page 321
Powers of i : i <sup>2</sup> ,i <sup>3</sup> ,i <sup>4</sup> ,i <sup>5</sup> ,	
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: $\frac{26}{2-3i}$ =	