Déjà Vu, It's Algebra 2!

Lesson 16

Polynomials: Finding Complex & Irrational Roots

Irrational Conjugate Theorem:
In a polynomial $P(x)$ with rational coefficients, if $a+\sqrt{b}$ is a root, then so is $a-\sqrt{b}$, provided that a is rational and $\sqrt{b}$ is irrational.

Example:
Find the exact value of all roots of $f(x)=2x^3-9x^2+2$ if $x=\frac{1}{2}$ and $x=2+\sqrt{6}$ are roots. What is its factorization?

Another closely related theorem is the . . .

Complex Conjugate Theorem:
In a polynomial $P(x)$ with real coefficients, if $a + bi$ is a root, then so is $a - bi$, where a, b are real numbers and i is the imaginary unit.

Example:
Write a polynomial $h(x)$ of lowest degree whose roots are $x = -i + 2$, $x = -\sqrt{3}$, and $x = 4$.

Rational Root theorem:

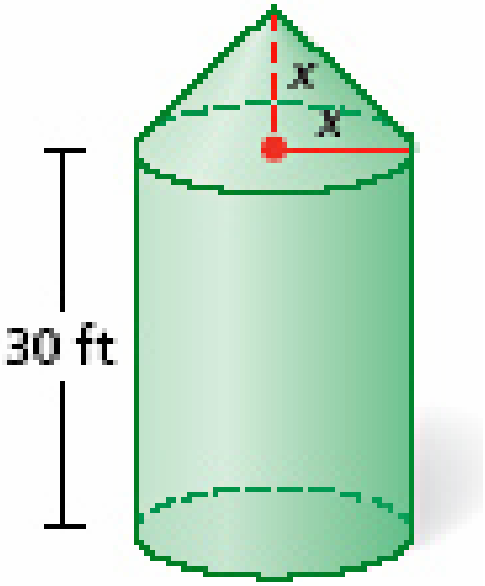
If a polynomial has rational roots, then they will be of the form $\frac{p}{q}$, where p is a factor of the CONSTANT, and q is a factor of the LEADING COEFFICIENT.

Example:

List the possible rational roots, then find all complex roots of $m(x) = 2x^4 + 3x^3 + 4x^2 + 9x - 6$

Déjà RE-Vu

A grain silo is shaped like a cylinder with a cone-shaped top. The cylinder is 30 feet tall. The silo can hold 1152π cubic feet of grain at full capacity. Find the radius, *x*, of the silo.



References:

All images TI-83+ calculator

http://go.hrw.com/gopages/ma/alg2_07.html
http://cres1.lancs.ac.uk/~esasb1/recipes/pics/grain.gif
http://www.comunications.it/img/rational.gif