Happy Thursday, September 29th!

Division Packet on your desk please!

Do Now:

$(x^4-6x^3-32x^2+150x+175)\div(x+5)$

-5 | 1 -6 -32 150 175

↓ -5 55 -115 -175

1 -11 23 35 | 0 ← Remainder

$x^3-11x^2+23x+35$

Sep 28-9:50 PM

The only time you cannot use synthetic division...

$(x^3+2x-7)\div(x^2+6)$

Sep 29-10:31 AM

The crazy thing is...

We are still factoring!

GCF

Long abc

Short abc

Sum of cubes

Diff of cubes

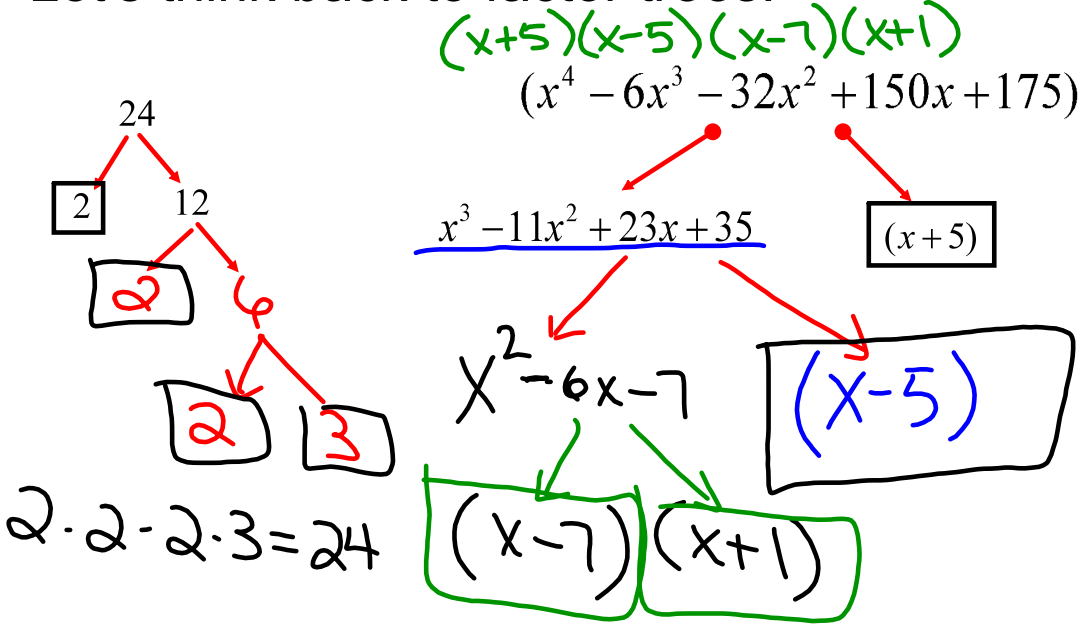
Diff of squares

Long Division

Synthetic Division

Sep 29-7:33 AM

Let's think back to factor trees:



Sep 28-9:51 PM

How do you know which number to "try" in synthetic division?

Conjecture not proven

RATIONAL ROOT THEOREM

fraction

Zeros
Solutions

Sep 29-11:13 AM

Factoring an nth degree polynomial is tough!

$$P(x) = a_n x^n + a_{n-1} x^{n-1} + \ldots + a_1 x + a_0$$

But the factors of a_n and a_0 can help us factor P(x) and ultimately solve the equation!

Rational Root Theorem

~~P(x)~~ Poly must be in standard form with integer coefficients!

$f(x) = x^4 + 3x - 2$

highest degree

$-2 + 3x + x^4$

Sep 26-11:54 AM

Ex 1. Finding all possible rational roots

$2x^3 - x^2 + 2x + 5 = 0$

leading coefficient: 2 — 1, 2, -1, -2

constant: 5 — Factors: 5, 1, -5, -1

Only possible rational roots are : 1, -1, 5, -5, $\frac{1}{2}$, $-\frac{1}{2}$, $\frac{5}{2}$, $-\frac{5}{2}$

factors of constant: $\pm 1, \pm 5$

factors of lead coefficient: $\pm 1, \pm 2$

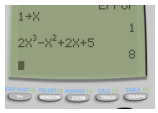
$\pm 1, \pm 5, \pm \frac{1}{2}, \pm \frac{5}{2}$

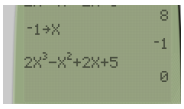
-1

Find the rational root (does it make the polynomial equal zero?)!

Graphing Calculator - Easy!

By hand - takes more time





repeat for each possible rational root.

Sep 26-12:02 PM

$$\frac{\pm 3, \pm 5, \pm 15, \pm 1}{\pm 4, \pm 2, \pm 1}$$

$\pm \frac{3}{4}, \pm \frac{3}{2}, \pm 3, \pm \frac{5}{4}, \pm \frac{5}{2}, \pm 5$

$\pm \frac{15}{4}, \pm \frac{15}{2}, \pm 15$ $\pm \frac{1}{4}, \pm \frac{1}{2}, \pm 1$

Sep 29-10:58 AM

What are the rational roots?

$$P(x) = 3x^3 + 7x^2 + 6x - 8$$

Only possible rational roots are :

factors of constant

factors of lead coefficient

Sep 26-3:37 PM

Always make sure the polynomial is in standard form!!

$$4x^5 + 3x^7 - 2x + 5 = 0$$

$3x^7 + 4x^5 + 5$

Sep 29-7:40 AM

Using the Rational Root Theorem

What are the rational roots of

$$P(x) = 15x^3 - 32x^2 + 3x + 2$$

$$\frac{\text{factors of constant}}{\text{factors of lead coefficient}}$$

Sep 26-3:39 PM

Exit Slip:

What are the possible rational roots of:

$$5x^2 + 6x^4 - 2x + 1 = 0$$

Homework: On the back of notes

Sep 26-3:40 PM