ALGEBRA 4

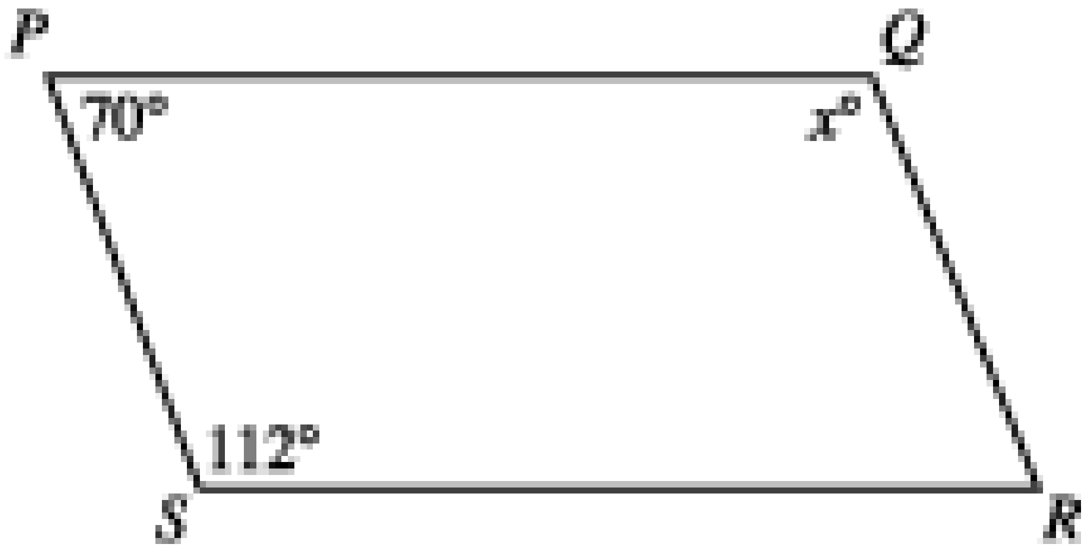
Day 48

Bell Work

In quadrilateral *PQRS* below,
sides *PS* and *QR* are parallel for what value of x ?

Individual Question

A. 182
B. 132
C. 112
D. 110
E. 70



5.4 Dividing Polynomials

Objectives:

- To Divide Polynomials Using Synthetic Division.
- To know that Long Division exists.

To Divide Polynomials:

- Write polynomial in standard form
- Put 0's in for missing parts

You have to remember 0's as place holders!!!!

Long Division

- Allows you to divide any polynomial by another polynomial
- The process is long, thus the name, and we have better options
- If you want to see it… I can show you another time! ☺

<u>Synthetic Division</u>: simplifies long-division by dividing by a linear expression $x - a$

<u>Steps to using Polynomial Synthetic Division:</u>

- Write the equation in standard form
- (put 0's in for exponents not represented)
- Multiply leading coefficient by the value of the variable
- Sum the next coefficient with the answer from Step 2
- Multiply the answer from Step 3 by the value of the variable
- Sum the next coefficient with the answer from Step 4
- Continue until each coefficient has been used

Example:

$f(x) = 2x^4 - 8x^2 + 5x - 7$ divided by $x - 3$

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$$2x^4 + 0x^3 - 8x^2 + 5x - 7$$

$$\begin{array}{c|ccccc}
 & 2 & 0 & -8 & 5 & -7 \\
3 & \downarrow & 6 & 18 & 30 & 105 \\
\hline
 & 2 & 6 & 10 & 35 & 98
\end{array}$$

$2x^4 - 8x^2 + 5x - 7 =$ **$(2x^3 + 6x^2 + 10x + 35)(x-3)$ + R: 98**

Remainder Theorem;

If a polynomial $f(x)$ is divided by $x - k$, then the remainder is $r = f(k)$

Based on the last problem…

By the Remainder Theorem, $f(3)$ is the remainder when you divide $f(x)$ by $x - 3$

$f(3) = 98$

Is $(x+5)$ a factor of $x^3 + 7x^2 - 38x - 240$? If yes, what are the other factors? If no, what is the remainder?

Is $(x+5)$ a factor of $x^3 + 7x^2 - 38x - 240$? If yes, what are the other factors? If no, what is the remainder?

- Since you get a remainder of 0 when doing synthetic division, then $(x+5)$ is a factor
- The other factors are $(x+8)$ and $(x-6)$
- Therefore, $x^3 + 7x^2 - 38x - 240 = (x+5)(x+8)(x-6)$

Thinking Ahead… Solve

$x^3 – 2x^2 - x – 6 = 0$

For Next Time

Page 308 #1-7, 11-25 (odd), 29, 33-37 (odd), 41

(Extra Practice #44-62)

5.5 Theorems About Roots of Polynomial Equations

Objectives: To Solve Equations using the Rational Root Theorems

To use the Conjugate Root Theorem

We are going to skip this because of time with the snow days…

- The idea… is that we could solve these without a calculator by looking at the constant and the lead coefficients factors…

- We okay using our calculator to graph and find the zeros???

Conjugate Root Theorem:

The irrational roots of P(x) come in conjugate pairs. That is if $a+\sqrt{b}$ is a solution then $a-\sqrt{b}$ also has to be a solution.

The complex zeros of a polynomial function with real coefficients always occur in complex conjugate pairs also. That is if $a+bi$ is a solution then $a-bi$ also has to be a solution.

Example:
What are the other roots?

Given

1.) 4, 4, 2 + i

2.) 0, 7, -6i

3.) $5, 7+\sqrt{2}$

<u>Example:</u>
What are the other roots?

Given

1.) 4, 4, 2 + i

2.) 0, 7, -6i

3.) $5, 7 + \sqrt{2}$

$\boldsymbol{2 - i}$

$\boldsymbol{6i}$

$\boldsymbol{7 - \sqrt{2}}$

For Next Time

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(optional assignment)