Warm-up:

Divide the polynomials using long division.

1) $\dfrac{x^3 - 4x^2 + 9}{x - 3}$

$x - 3 \overline{)\, x^3 - 4x^2 + 0x + 9}$ $\quad x^2 - x - 3$

$-x^3 + 3x^2$

$-x^2 + 0x$

$+x^2 - 3x$

$-3x + 9$

$\cdot\ 3x - 9$

R 0

$\frac{x^3}{x} = x^2(x - 3) = x^3 - 3x^2$

$\frac{-x^2}{x} = -x(x - 3) = -x^2 + 3x$

$\frac{-3x}{x} = -3(x - 3) = -3x + 9$

2) $(3x^4 - x^2 + 8x + 5) \div (x^2 - 3)$

$x^2 - 3 \overline{)\, 3x^4 + 0x^3 - x^2 + 8x + 5}$ $\quad 3x^2 + 0x + 8$

$-3x^4 + 0x^2$

$0x^3 + 8x^2 + 8x + 5$

$0x^3 + 0x - 0x$

$8x^2 + 8x + 5$

$-8x^2 + 0x - 24$

R $8x + 29$

$Q = 3x^2 + 8$ R $8x + 29$

$\frac{3x^4}{x^2} = 3x^2(x^2 - 3) = 3x^4 - 9x^2$

$\frac{0x^3}{x^2} = 0x(x^2 - 3) = 0x^3 - 0x$

$\frac{8x^2}{x^2} = 8(x^2 - 3) = 8x - 24$

$\frac{8x}{x^2}$

Exponent Rules.

#1 multiplication.

$x^n \cdot x^m = x^{n+m}$

ex: $x^2 \cdot x^3 = x^{2+3} = x^5$

$2x^2 \cdot x^2 = 2x^{2+2} = 2x^4$

#2 Division

$\frac{x^n}{x^m} = x^{n-m}$

ex: $\frac{x^5}{x^3} = x^{5-3} = x^2$

$\frac{4x^5}{2x^3} \quad \frac{4}{2} \cdot x^{5-3} = 2x^3$

#3 Negative

$x^{-n} = \frac{1}{x^n}$

ex: $x^{-2} = \frac{1}{x^2}$

$2^{-2} = \frac{1}{2^2} = \frac{1}{4}$

#4 Power to a power

$(x^n)^m = x^{n \cdot m}$

ex: $(x^2)^3 = x^{2 \cdot 3} = x^6$

$(x^n y)^m = x^{n \cdot m} y^{1 \cdot m}$

ex: $(3x^2y)^2 = 3^{1 \cdot 2} x^{2 \cdot 2} y^{1 \cdot 2}$

$= 3^2 x^4 y^2$

$= 9x^4y^2$

1) $\dfrac{x^3 - 4x^2 + 9}{x - 3}$

2) $(3x^4 - x^3 + 8x^2 + 5x + 3)(x^2 - x + 3)^{-1}$

ACT of the Day

2. The monthly fees for single rooms at 5 colleges are $370, $310, $380, $340, and $310, respectively. What is the mean of these monthly fees?

F. $310
G. $340
H. $342
J. $350
K. $380

mean is same as the average.

$$\frac{370+310+380+340+310}{5}$$

$= 342$

Unit 1 ~ Polynomials

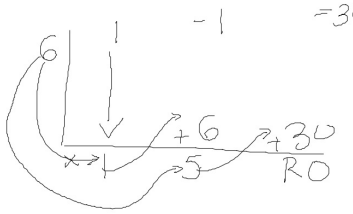
Objectives: A.APR.2 & 6

Day 6:
Dividing Polynomials (Synthetic Division)

When can you use synthetic division?

Example 1: Divide using synthetic division.

$$(x^2 - x - 30) \div (x - 6)$$



Q: $1x+5$

$x^2 - x - 30 = (x-6)(x+5)$

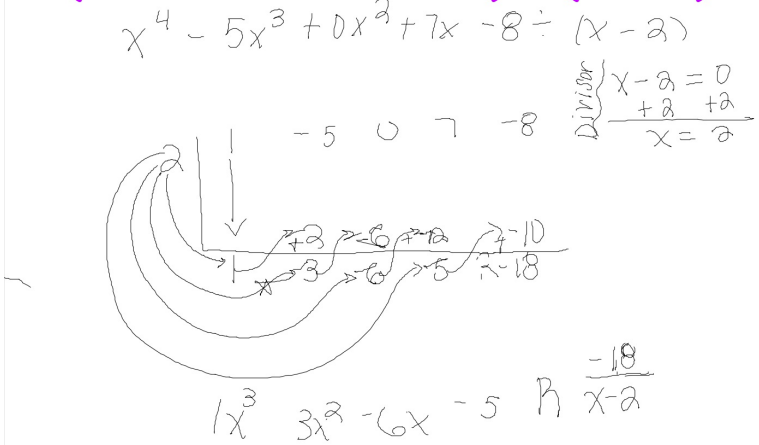
Divisor: $x - 6 = 0$
$+6 \quad +6$
$x = 6$

Steps

1. Set the divisor equal to zero and solve for x.
2. Drew an upside down division sign place the divisor on the outside. Place the leading coefficients inside of the division symbol.
3. Always bring the 1st number down •multiply the divisor by the quotient and place it under the 2nd inside the divisor and add.
4. multiply my divisor by the 2nd quotient, place it under the 3rd term and add

Example 2: Divide using synthetic division.

$(-5x^3 + x^4 + 7x - 8) \div (x - 2)$



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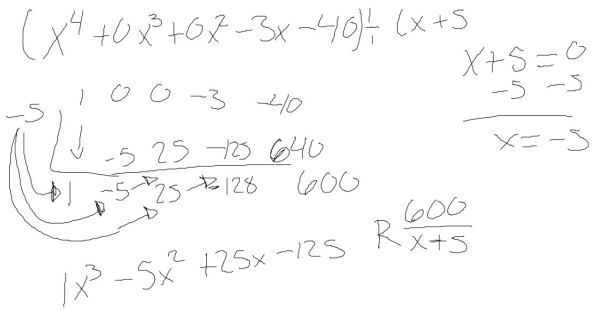
Your Turn: Divide using synthetic division.

$(x^4 - 3x - 40) \div (x + 5)$



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Example 4:

Is x + 1 a factor of $3x^4 - 4x^3 + 12x^2 + 5$?

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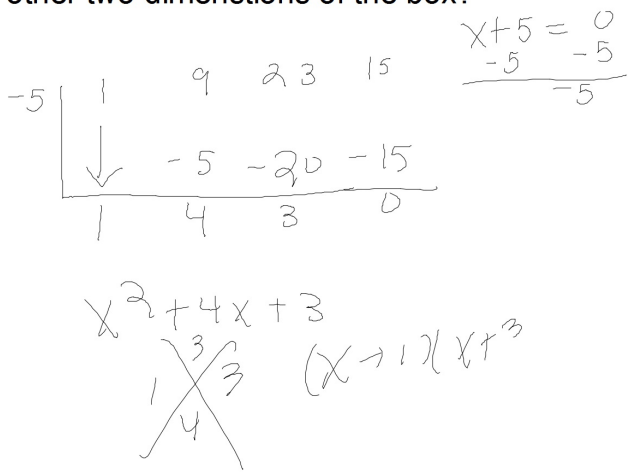
Example 5:

The polynomial $x^3 + 9x^2 + 23x + 15$ expresses the volume, in cubic inches, of a box, and the length is (x + 5) inches. What are the other two dimenstions of the box?



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