

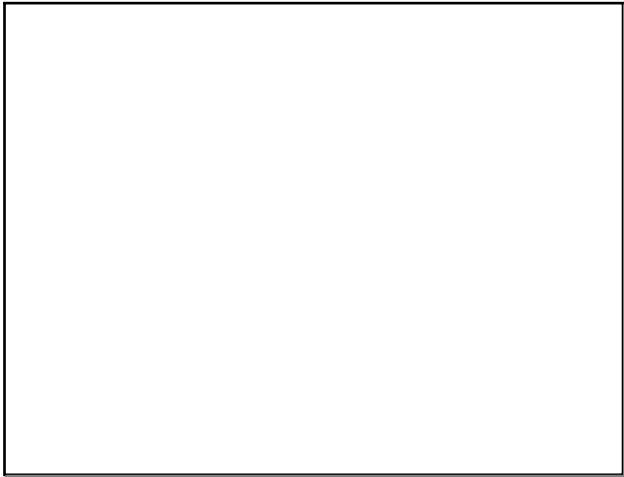
Lesson 2.10- Objective: SWBAT divide polynomials by synthetic division

Kickoff
Take out your homework and answer the following:
1) Divide $f(x) = 3x^2 - 4x + 7$ by $x - 1$ using long division.
2) Solve and graph $3x^2 - 6x - 9 > 0$. State your answer in interval notation.

① $x - 1 \overline{) 3x^2 - 4x + 7}$
 $\underline{-(3x^2 - 3x)}$
 $-\cancel{3x} + 7$
 $\underline{-(+3x - 3)}$
 6

② $3x^2 - 6x - 9 > 0$
 $3(x^2 - 2x - 3) > 0$
 $3(x - 3)(x + 1) > 0$
 $x - 3 = 0 \quad x + 1 = 0$
 $x = 3 \quad x = -1$

③ $3(-2)^2 - 6(-2) - 9 = 15 > 0$
 $3(0)^2 - 6(0) - 9 = -9 < 0$
 $3(1)^2 - 6(1) - 9 = -9 < 0$
 $3(4)^2 - 6(4) - 9 = 15 > 0$



Try this: Using long division find the quotient.
 $(2x^2 + 10x + 12) \div (x + 3)$

$x + 3 \overline{) 2x^2 + 10x + 12}$
 $\underline{-(2x^2 + 6x)}$
 $4x + 12$
 $\underline{-(4x + 12)}$
 0

$2x + 4$
 they are factors!

Dividing Polynomials Using Synthetic Division ***only works in the form $(x + k)$

Example: Use synthetic division for the following
 $(2x^3 - 7x^2 - 8x + 16) \div (x - 4)$

First, write down the coefficients in descending order, and k of the divisor in the form $(x - k)$.

$k = 4 \quad 2 \quad -7 \quad -8 \quad 16$

Bring down the first coefficient. \downarrow $\begin{array}{r|rrrr} 4 & 2 & -7 & -8 & 16 \\ & 8 & 4 & -16 & \\ \hline & 2 & 1 & -4 & 0 \end{array}$ These are the coefficients of the quotient (and the remainder)

Multiply this by k . Add the column. Repeat the process.

$2x^2 + x - 4$

Examples:

1) $(x^4 - 10x^2 - 2x + 4) \div (x + 3)$

$-3 \overline{) 1 \ 0 \ -10 \ -2 \ 4}$
 $\underline{-(3x^3 + 9x^2)}$
 $3x^3 - 9x^2 - 2x + 4$
 $\underline{-(3x^3 + 9x^2)}$
 $-11x^2 - 2x + 4$
 $\underline{-(-11x^2 - 33x)}$
 $31x + 4$
 $\underline{-(31x + 93)}$
 -89

2) $(2x^3 + 7x^2 - 4x^2 - 27x - 18) \div (x - 2)$

$2 \overline{) 2 \ 7 \ -4 \ -27 \ -18}$
 $\underline{-(2x^2 + 14x)}$
 $2x^2 + 11x - 18$
 $\underline{-(2x^2 - 4x)}$
 $15x - 18$
 $\underline{-(15x - 30)}$
 12

$2x^2 + 11x + 18$

Complete the following:

3) $(x^2 + 7x + 12) \div (x + 3)$

4) $(x^3 - 4x^2 + 9) \div (x - 3)$

5) $(7x^4 - 10x^3 + 3x^2 + 3x - 3) \div (x - 1)$

6) $(x^3 - 2x^2 - 4) \div (x - 2)$

7) $(2x^3 - x^2 - 6x - 1) \div (x + 1)$

8) $(6x^5 + 21x^4 - 14x^3 - 8x^2 + x - 6) \div (x + 4)$

9) $(2x^3 - 5x - 7) \div (x - 2)$

10) $(4x^3 - 15x + 17) \div (x + 8)$