Warm Up

$6+1=7$

Justin has 44 pieces of candy to give 6 of his friends. If everyone is to get an equal share, how many candies will Justin have left for himself? Explain your reasoning.

each person has 7
2 left for Justin

$44 \div 6 = 7.\overline{3}$

$7 \times 6 = 42$?

each person has 6
2 left over

$44 \div 7 = 6.\overline{285714}$

Objective: SWBAT divide polynomials by using long & synthetic division

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

Agenda:

- warmup
- division notes
- practice
- exit ticket

-1 | 2 3 -1

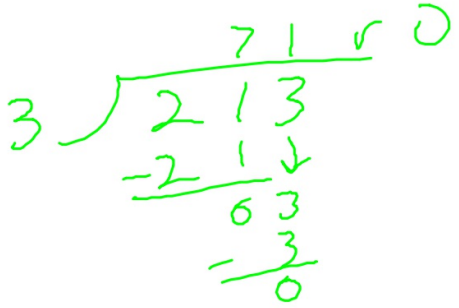
-2 -1

$2x + 1$ | -2

Division Review

Remainder Theorem: When dividing a polynomial by a binomial (x - a), the remainder is the value of the polynomial at x = a.

- (x - a) is a factor if and only if the remainder is zero.



Notes: Long division with polynomials

Divide the following: $(6x^2 + 4x - 17)$ by $(3x - 2)$

Divide: $4x^2 - 3x + 4$ by $x + 1$

$$
\begin{array}{r}
4x - 7 \text{ r } 11 \\
x+1 \overline{)\,4x^2 - 3x + 4} \\
-(4x^2 + 4x) \\
\hline
-7x + 4 \\
-(-7x - 7) \\
\hline
+11
\end{array}
$$

Notes: Synthetic Division

Steps:

1. Take the number from the divisor, flip the sign, and write it in the box
2. Write the coefficients from the first polynomial and bring the first one down
3. Multiply by the number in the box and write the result in the next column
4. Add straight down
5. Keep repeating steps 3 and 4
6. Write the answer with variables.

example:

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

2	1	5	−2	1	8
		2	14	24	50
	1	7	12	25	58

$x^3 + 7x^2 + 12x + 25 \text{ r } 58$

Polynomial Long Division

if a term is missing, write it in as a zero

ex) $x^3 - x + 12$ becomes

$x^3 + 0x^2 - x + 12$

Divide: $(7x^2 + 4x + 8) \div (x + 2)$

$$
\begin{array}{r}
7x - 10 \text{ R } 28 \\
x+2 \overline{)\,7x^2 + 4x + 8} \\
-(7x^2 + 14x) \\
\hline
-10x + 8 \\
-(-10x - 20) \\
\hline
28
\end{array}
$$

$7x(x+2)$

$7x^2 + 14x$

$-10(x+2)$

$-10x - 20$

The number of tickets sold during the Northside High School football season can be modeled by $t(x) = x^3 - 12x^2 + 48x + 74$, where x is the number of games played. Use the Remainder Theorem to find the number of tickets sold during the twelfth game of the season.

$x = 12$

(divide) by $x - 12$

$$12 \overline{)\ 1 \quad -12 \quad 48 \quad 74}$$
$$\underline{\qquad\quad 12 \quad\ 0 \quad 576}$$
$$1 \quad\ 0 \quad 48 \quad 650$$

650 tickets

$x^2 + 48$ r 650

Scavenger Hunt

There problems set up around the room. Work your first problem out, then look for the answer at another station. At each station, also write down the letter. When you've worked out all of the problems, use the letters to get the day's message.

If you finish that, practice in the Precalculus books:
pg. 115; pick from 1-37

Reflection

When is it better to use long division instead of synthetic?

When is it better to use synthetic division?