Starter

*These problems are on pg.15 on your new lesson, which you need to pick up from the desk next to Mrs. Hansens'.

Topic: Long division with Polynomials

Use long division to determine if the given linear term is a factor of the polynomial (polynomial; factor).

1. $x^3 + 6x^2 + 8x;\ x + 2$

2. $b^2 - 9b - 10;\ b + 1$

3. $x^2 + 9x + 14;\ x + 7$

4. $2x^2 - 5x - 1;\ x - 3$

5. LD $x^3 + 10x^2 + 13x + 36;\ x + 9$

6. SYN. $m^3 + m^2 - 36m + 42;\ m + 7$

$$
\begin{array}{r}
x^2 + x + 4 \\
x + 9 \overline{\smash{)}\ x^3 + 10x^2 + 13x + 36} \\
-(x^3 + 9x^2) \quad\ \downarrow\quad \downarrow \\
\hline
x^2 + 13x + 36 \\
-(x^2 + 9x)\ \downarrow \\
\hline
4x + 36 \\
-(4x + 36) \\
\hline
0
\end{array}
$$

$(x+9)(x^2 + x + 4)$

x+9 is a factor!

⑥
$$
\begin{array}{r|rrrr}
-7 & 1 & 1 & -36 & 42 \\
   &   & -7 & 42 & -42 \\
\hline
   & 1 & -6 & 6 & \boxed{0}
\end{array}
$$

m+7 is a factor!

$(x+7)(m^2 - 6m + 6)$

Feb 08-09:43 AM

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4.3 What Does it Mean to Be Rational?
A Solidify Understanding Task

Part I: Comparing rational numbers and rational fractions.
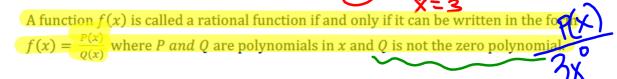
1. In your own words, define *rational number.*
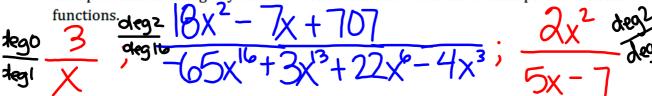
   Any number that we can write as a fraction.

   Circle the numbers below that are rational and refine your definition, if needed.

   3 -5 $\frac{2}{3}$ $\frac{20}{3}$ 14 2.7 $\sqrt{5}$ 2^3 3^{-3} $\log_2 8$

   $3^{-3} = \frac{1}{3^3}$ $2^x = 8$ $x = 3$

2. The definition of a *rational function* is as follows:

   A function $f(x)$ is called a rational function if and only if it can be written in the form $f(x) = \frac{P(x)}{Q(x)}$ where P and Q are polynomials in x and Q is not the zero polynomial.

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

   Interpret this meaning in your own words and then write three examples of rational functions.

   $\frac{\text{deg 0}}{\text{deg 1}}\ \frac{3}{x}$; $\frac{\text{deg 2}}{\text{deg 16}}\ \frac{18x^2 - 7x + 707}{-65x^{16} + 3x^{13} + 22x^6 - 4x^3}$; $\frac{2x^2}{5x - 7}\ \frac{\text{deg 2}}{\text{deg 1}}$

3. How are rational numbers and rational functions similar? Different?

   Rat. functions have variables.
   both are math & have #s.

Part II: Arithmetic of Rational Expressions: making connections between rational numbers and rational expressions. Solve problems in the first column and then use the same process to simplify the rational expressions in the second column.

Arithmetic of rational numbers	Arithmetic of rational expressions
4a. $\frac{2}{3} \cdot \frac{7}{7} + \frac{4}{7} \cdot \frac{3}{3} = \frac{14}{21} + \frac{12}{21} =$ $\frac{14+12}{21} = \frac{26}{21}$	4b. $\frac{(x-1)}{(x-1)} \cdot \frac{3}{(x+1)} + \frac{4}{(x-1)} \cdot \frac{(x+1)}{(x+1)} =$ $\frac{3(x-1) + 4(x+1)}{(x-1)(x+1)} = \frac{3x-3+4x+4}{(x-1)(x+1)} =$ $= \boxed{\frac{7x+1}{(x-1)(x+1)}}$ or $\frac{7x+1}{x^2-1}$
5a. $\frac{3}{8} + \frac{5}{6}$	5b. $\frac{(x-1)}{(x-1)} \cdot \frac{2x}{(x+3)} + \frac{4x}{(x-1)(x+3)} =$ $\frac{2x(x-1)+4x}{(x-1)(x+3)} =$ $\frac{2x^2-2x+4x}{(x-1)(x+3)} = \frac{2x^2+2x}{(x-1)(x+3)} =$ $\boxed{\frac{2x(x+1)}{(x-1)(x+3)}}$ OR
7a. $\frac{3}{8} \times \frac{5}{6}$	7b. $\frac{(x+1)(x-2)}{(x+2)} \times \frac{(x+5)}{(x-2)(x+2)} = \frac{(x+1)(x+5)}{(x+2)(x+2)}$ or $\boxed{\frac{(x+1)(x+5)}{(x+2)^2}}$ or $\frac{x^2+6x+5}{x^2+4x+4}$
8a. $\frac{3}{8} \div \frac{5}{6}$	8b. $\frac{(x+1)(x-2)}{(x+2)} \div \frac{(x+5)}{(x-2)(x+2)}$ $\frac{(x+1)(x-2)}{(x+2)} \cdot \frac{(x-2)(x+2)}{(x+5)} =$ $\boxed{\frac{(x+1)(x-2)^2}{(x+5)}}$
6a. $\frac{7}{8} - \frac{1}{6}$	6b. $\frac{2x}{(x+3)} - \frac{4}{(x-1)}$

9. To summarize, explain how you would perform the following arithmetic operations on rational expressions:

Adding:

Subtracting:

Multiplying:

Dividing:

Homework/Classwork

Finish the "Ready, Set, Go" pages that you have been given, #1-24, and anything else you have **not** finished from the 4.3 worksheets. Whatever is not finished in class is homework!

HW #9-24