Factoring Review - (this is not in your book)

Mrs. Ghoss

Factors are pieces that when multiplied together give you a number.

$$\left.\begin{matrix} 1 \times 12 \\ 2 \times 6 \\ 3 \times 4 \end{matrix}\right\} = 12$$

So, the factors of 12 are 1, 2, 3, 4, 6, + 12

The multiples of 12 are...
12, 24, 36, 48, 60, 72, 84, ...
Remember that multiples are like the multiplication tables!

Examples of the factors of 20:

$$\left.\begin{matrix} 1 \cdot 20 \\ 2 \cdot 10 \\ 4 \cdot 5 \end{matrix}\right\} = 20 \qquad 1, 2, 4, 5, 10, 20$$

Multiples of 20 = 20, 40, 60, 80, 100, 120, ...

Factors of 18

1 · [redacted]
2 · [redacted]
3 · [redacted]
= 18 [redacted], [redacted], [redacted], [redacted], [redacted], [redacted]

Multiples of 18 = [redacted], [redacted], [redacted], [redacted], [redacted], ...

Prime Numbers

A prime number is a number with exactly two factors: 1 and itself

Example:
$11 = 1 \cdot 11$

Interesting facts:

- the only even prime number is 2
- if the sum of the digits is a multiple of 3, that number can be divided by 3

  → Example: $123 = 1+2+3 = 6$
  6 is a multiple of 3

  $$\begin{array}{r} 41 \\ 3\overline{)123} \end{array}$$

  factors of 123 are 1, 3, 41, 12
- no prime number greater than 5 can end in 5... (it could be divided by 5)

  → Example: 65 is not prime

  $$\begin{array}{r} 13 \\ 5\overline{)65} \end{array}$$

  factors of 65 ↓
  1, 5, 13, 65
- zero and 1 are <u>not</u> prime

  → zero has an infinite number of factors
  $0 \cdot 1 = 0, \ 0 \cdot 2 = 0, \ 0 \cdot 3 = 0, \ 0 \cdot 4 = 0, \ldots$

  → 1 has only 1 factor!
  $\underline{1} \cdot \underline{1} = 1$ ☹ – that's not 2 different numbers

Prime Numbers Under 100

single digits	2, 3, 5, 7
"teens"	11, 13, 17, 19
twenties	23, 29
thirties	31, 37
forties	41, 43, 47
fifties	53, 59
sixties	61, 67
seventies	71, 73, 79
eighties	83, 89
ninties	91, 97

Prime Factorization

Mrs. Aross

Now that we understand primes numbers, let's use them!

Breaking down 8 ☺

$8 = 2 \cdot \underbrace{*}_{2 \cdot 2}$ $8 = 2 \cdot 2 \cdot 2$

$10 = 2 \cdot 5$	$12 = 2 \cdot 2 \cdot 3$
$15 = 3 \cdot 5$	$16 = 2 \cdot 2 \cdot 2 \cdot 2$
$18 = 2 \cdot 3 \cdot 3$	$20 = 2 \cdot 2 \cdot 5$
22 = ___ · ___	25 = ___ · ___
30 = ___ · 3 · ___	35 = ___ · ___

How to factor large numbers:

For every zero, you need a $2 \cdot 5$

$100 = 2 \cdot 2 \cdot 5 \cdot 5$

200 is $2 \cdot 100$

$200 = 2 \cdot 2 \cdot 2 \cdot 5 \cdot 5$

$1000 = 2 \cdot 2 \cdot 2 \cdot 5 \cdot 5 \cdot 5$

$500 = 2 \cdot 2 \cdot 5 \cdot 5 \cdot 5$

$800 = 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 5 \cdot 5$

your turn:

600 = ___ · ___ · ___ · ___ · ___ · ___

40 = ___ · ___ · ___ · ___

You have learned this so you can reduce your fractions effectively!

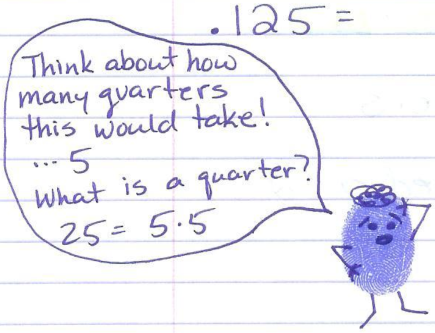
$.08 = \frac{8}{100} \qquad \frac{\cancel{2}\cdot\cancel{2}\cdot 2}{\cancel{2}\cdot\cancel{2}\cdot 5\cdot 5} \rightarrow \boxed{\frac{2}{25}}$

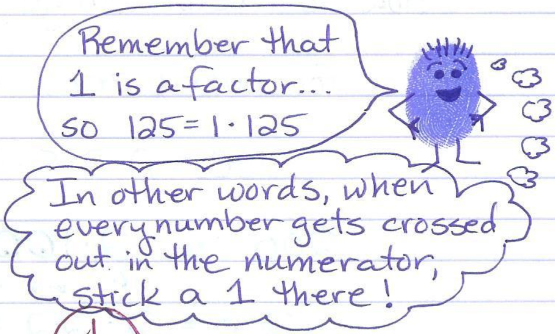
get rid of common factors

$.18 = \frac{18}{100} \qquad \frac{\cancel{2}\cdot 3\cdot 3}{\cancel{2}\cdot 2\cdot 5\cdot 5} \qquad \boxed{\frac{9}{50}}$

$-.06 = \frac{-6}{100} \qquad \frac{\cancel{2}\cdot 3}{\cancel{2}\cdot 2\cdot 5\cdot 5} \qquad \boxed{\frac{-3}{50}}$

$.125 = \qquad \frac{125}{1000} \qquad \frac{\cancel{5}\cdot\cancel{5}\cdot\cancel{5}}{2\cdot 2\cdot 2\cdot\cancel{5}\cdot\cancel{5}\cdot\cancel{5}} = \frac{1}{8}$





Your turn:

$.2 = \frac{2}{\underline{\quad}} \qquad \frac{\cancel{2}}{\cancel{2}\cdot 5} \qquad \boxed{\frac{1}{5}}$

$.36 = \frac{\underline{\quad}}{100} \qquad \frac{2\cdot 2\cdot 3\cdot 3}{\underline{\quad}\cdot\underline{\quad}\cdot\underline{\quad}\cdot\underline{\quad}} \qquad \boxed{\frac{\underline{\quad}}{\underline{\quad}}}$

$.85 = \frac{\underline{\quad}}{\underline{\quad}} \qquad \frac{\underline{\quad}\cdot\underline{\quad}}{\underline{\quad}\cdot\underline{\quad}\cdot\underline{\quad}\cdot\underline{\quad}} \qquad \boxed{\frac{\underline{\quad}}{\underline{\quad}}}$

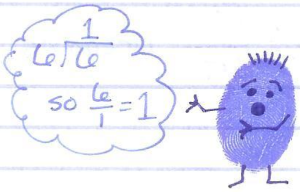
Dividing Rational Numbers

Lesson 3-4 (p.143) Mrs. Gross

Two numbers whose product is one are called ________ ________.

Examples: $\frac{1}{8} \cdot \frac{8}{1} = 1$

$\frac{2}{3} \cdot \frac{3}{2} = \frac{6}{6}$



$\frac{{}^{1}\cancel{2}}{{}_{1}\cancel{3}} \cdot \frac{\cancel{3}^{1}}{{}^{1}\cancel{2}} = \frac{1}{1} = 1$

What is the multiplicative inverse of:

$\frac{7}{16} \rightarrow \boxed{\frac{}{}}$

$2\frac{5}{6} \rightarrow \frac{17}{6} \rightarrow \boxed{\frac{}{}}$

Turn your mixed number into an improper fraction first!

$1\frac{3}{8} \rightarrow \boxed{\frac{}{}} \rightarrow \boxed{\frac{}{}}$

$-\frac{5}{9} \rightarrow \boxed{\frac{}{}}$

The 5 or the 9 can be negative. Just don't forget your integer rules!

(pg. 144 at the very top is weird... go to example #2)

Instead of "dividing" fractions, multiply the first fraction by the inverse of the second fraction.

$\frac{1}{3} \div \frac{7}{15}$ becomes: $\frac{1}{{}_{1}\cancel{3}} \times \frac{\overset{5}{\cancel{15}}}{7} \Rightarrow$ cross reduce

$\frac{5}{7}$

$\frac{5}{8} \div \frac{-3}{4}$ becomes $\frac{5}{{}_{2}\cancel{8}} \times \frac{-\cancel{4}^{1}}{3} = \frac{-5}{6}$

$\frac{3}{4} \div 11$ becomes $\frac{3}{4} \times \frac{1}{11} = \frac{3}{\text{[redacted]}}$

(working with mixed numbers)

$6\frac{3}{8} \div -4\frac{1}{4}$ becomes... $\frac{51}{8} \div \frac{-17}{4}$

so... $\frac{51}{{}_{2}\cancel{8}} \times \frac{-\cancel{4}^{1}}{17} = \frac{-51}{34}$ now - use your calculator!

$\frac{-51}{34} = -1.5$ or $-1\frac{1}{2}$

Adding + Subtracting Fractions

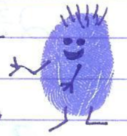
Mrs. Gross

Lesson 3-5 p.149

Fractions must have the same denominator before you can add or subtract them.

$\frac{4}{8} + \frac{1}{8} = \frac{5}{8}$

Note that the denominator does not change



$\frac{7}{12} - \frac{5}{12} = \frac{2}{12}$

Unless you can reduce your fraction

$\frac{2}{12} = \frac{1}{6}$

Now stick in mixed numbers and integers.

pg. 150 example #3

$\frac{3}{10} - \frac{9}{10}$ becomes $\frac{3}{10} + \frac{-9}{10} = \frac{-6}{10} = \frac{-3}{5}$

$\frac{5}{15} - \frac{10}{15}$ becomes $\frac{5}{15} + \frac{\quad}{15} = \frac{\quad}{15} = \frac{\quad}{\quad}$

$\frac{7}{8} - \frac{3}{8}$ becomes $\frac{7}{8} + \frac{\quad}{8} = \frac{\quad}{\quad} = \frac{\quad}{\quad}$

pg. 151 example #4   Look carefully at the blue rectangles

$3\frac{1}{4} - 1\frac{3}{4}$ "Re-name" the first fraction so you can work with the numerators!

$\underbrace{2+\frac{4}{4}+\frac{1}{4}}$

$2\frac{5}{4} - 1\frac{3}{4} = 1\frac{2}{4}$ then reduce $= 1\frac{1}{2}$

$9\frac{3}{8} - 5\frac{5}{8}$

$\underbrace{8+\frac{8}{8}+\frac{3}{8}}$

$8\frac{11}{8} - 5\frac{5}{8} = 3\frac{6}{8} = 3\frac{3}{4}$

pg. 152 example #6   (Now use algebraic fractions.)

$\frac{2a}{10} + \frac{4a}{10} = \frac{6a}{10}$ reduce! $\frac{3a}{5}$

$\frac{3x}{7} - \frac{5x}{7}$ becomes $\frac{3x}{7} + \frac{-5x}{7} = \frac{-2x}{7}$

$\frac{y}{8} + \frac{5y}{8} = \frac{6y}{8} = \frac{3y}{4}$

$\frac{x}{5} + \frac{4x}{5} = \frac{5x}{5} = \frac{1x}{1}$ which is really

1x...

which is x