The first page of exam 4 was pretty bad overall. ☹️

So be careful on the final exam!

Ex. 1 \( \frac{3}{4} + \frac{1}{5} = \frac{3 \cdot 5}{4 \cdot 5} + \frac{1 \cdot 4}{5 \cdot 4} = \frac{15}{20} + \frac{4}{20} = \frac{19}{20} \)

We can always find a common denominator by multiplying the two denominators together. ☹️

Ex. 2 \( \frac{3}{4} + \frac{a}{b} = \frac{3 \cdot b}{4 \cdot b} + \frac{a \cdot 4}{b \cdot 4} = \frac{3b}{4b} + \frac{4a}{4b} = \frac{3b + 4a}{4b} \)

From Exam 4

\( \frac{a}{b} - \frac{b}{a} + \frac{4}{c} \)  Decide which two you want to add/subtract first.

\[
= \left( \frac{a}{b} - \frac{b}{a} \right) + \frac{4}{c} \\
= \left( \frac{a \cdot a}{b \cdot a} - \frac{b \cdot b}{a \cdot b} \right) + \frac{4}{c} \\
= \left( \frac{a^2 - b^2}{ab} \right) + \frac{4}{c} \\
= \frac{a^2 - b^2}{ab} + \frac{4}{c} \\
= \frac{(a^2 - b^2) \cdot c}{ab \cdot c} + \frac{4 \cdot ab}{c \cdot ab} \\
= \frac{ca^2 - cb^2}{abc} + \frac{4ab}{abc} \\
= \frac{ca^2 - cb^2 + 4ab}{abc} 
\]
Ex. 31\[ \frac{1}{a} + \frac{1}{b} + \frac{1}{c} \]

Step 1: decide which two to work with first.

\[ \frac{1}{a} + \left( \frac{1}{b} + \frac{1}{c} \right) \]
\[ = \frac{1}{a} + \frac{\left( \frac{1}{b} \cdot c + \frac{1}{c} \cdot b \right)}{bc} \]
\[ = \frac{1}{a} + \left( \frac{c}{bc} + \frac{b}{bc} \right) \]
\[ = \frac{1}{a} + \frac{c + b}{bc} \]
\[ = \frac{1}{a} \cdot \frac{bc}{abc} + \frac{(c + b) \cdot a}{bc \cdot a} \]
\[ = \frac{bc}{abc} + \frac{(c + b) \cdot a}{abc} \]
\[ = \frac{bc + (c + b) \cdot a}{abc} \]

Alternative Approach: Adding the three all at once

\[ \frac{1}{a} + \frac{1}{b} + \frac{1}{c} \]
\[ = \frac{bc}{abc} + \frac{ac}{abc} + \frac{ab}{abc} \]
\[ = \frac{bc + ac + ab}{abc} \]
Exam 4: 7b.) If $\frac{13}{11}$ of a number $N$ exceeds $N$ by 10, what is $N$?

\[
\text{distance} = 10 \\
\leftarrow 5 \quad 5 \quad \rightarrow \\
N = \frac{11}{11} \times N \quad \frac{12}{11} \times N \quad \frac{13}{11} \times N \\
\Rightarrow \frac{11}{11} \times N = 5.
\]

\[
N = \frac{5}{11} = \frac{5 \times 11}{11} = 55
\]

7a.) $2 \times M$, exceeds $M$ by 5

\[
\leftarrow 5 \\
\quad M \quad \rightarrow \\
2M = M + M
\]

Definitions on Exam 4:

2a.) $\frac{a}{b} \times \frac{m}{n}$ definition:

\[
\begin{array}{c}
\frac{a}{b} \\
\hline
\frac{m}{n}
\end{array}
\]

b.) $\frac{a}{b} : \frac{m}{n}$ definition: the fraction $F$ such that $F \times \frac{m}{n} = \frac{a}{b}$

3i) \(0 \neq 1\), why?

\[
\leftarrow 0 \quad 1 \rightarrow \\
\text{On the # line, } 0 \text{ comes before } 1.
\]
Exam 4: #5) \( \frac{2}{7} \), which is closer \( \frac{1}{3} \) or \( \frac{5}{21} \)

Common denominator: \( 21 \).

\[ \frac{2}{7} = \frac{2 \times 3}{7 \times 3} = \frac{6}{21} \]
\[ \frac{1}{3} = \frac{1 \times 7}{3 \times 7} = \frac{7}{21} \]
\[ \frac{5}{21} = \frac{5}{21} \]

They are both the same distance away from \( \frac{2}{7} \).

#6

\[ \frac{19}{12} \]

- We need to add \( \frac{6}{12} \) to \( F - C - C \) 5 times to get to \( F + E + C + E \).
- Convert both given fractions to the same sequence.
- Steps from \( F - C - C \) to \( F + E + C + E \):
  \[ \frac{39}{12} - \frac{19}{12} = \frac{20}{12} \]. So, 20 steps on the \( \frac{1}{12} \) sequence.

- \( 20 \div 5 = 4 \)
- Thus \( E = \frac{4}{12} \)

Therefore, \( F + C = \frac{(F - C - C) + (C + C + C)}{2} \)

\[ = \frac{19}{12} + \left( \frac{4}{12} + \frac{4}{12} + \frac{4}{12} \right) \]
\[ = \frac{19 + 4 + 4 + 4}{12} = \frac{31}{12} \]
Part I: Whole #s

Exam 1:
- $+,-,\times$
  $\Rightarrow$ including other bases
- standard algorithms

Exam 2:
- long division
  $\Rightarrow$ including other bases
- multiplication/division algorithms
- explanation of division w/ remainder using money

Exam 3:
- number line
- unit
- definition of fraction
- equivalent fractions
- problems using the number line
- fraction addition/subtraction
- decimals

Exam 4:
- long division w/ decimals
- decimal approximations & error estimates
  $\Rightarrow$ will not be on test
- more number line problems
- fraction arithmetic w/ some letters instead of specific numbers

$\uparrow \uparrow \uparrow$
Definitely will be on the test!

Final is scheduled at 11:00 am on Thursday!