Objectives: In this fractions unit, we will

- subtract and add fractions with unlike denominators (pp. 101-102)
- multiply fractions(pp.109-110)
- Divide fractions (pp. 113-114)

Review: Which is greater, 1/3 or ¼? 5/3 or 7/3? 1 ½ or 6/4? -1 ¾ or -1 ½? 7/9 or 5/6?

Reduce the following: 14/28, 34/46, 1 4/6, 82/4

Subtract: 2 1/3 – 4/3, 1 2/7 – 6/7

MAT*095 Fraction Summary Sheet

What is a fraction? A fraction is a number that can represent part of a whole.

$$\frac{\textit{numerator: represents how many of the parts you have}}{\textit{denominator: represents how many parts is takes to make a whole}}$$

Mixed number: the sum of a natural number and a fraction. For example, 3 ½

Converting a Mixed Number to an Improper Fraction: Multiply the natural number times the denominator and add the numerator to this product. Place this number of the denominator of the original mixed number.

Example: $2\frac{3}{4} = \frac{2\cdot4+3}{4}$

Converting an Improper Fraction to a Mixed Number: Divide the denominator into the numerator. Write the missed number using the following form: $\textit{quotient}\ \frac{\textit{remainder}}{\textit{original denominator}}$

Example: $\frac{17}{5} = 3\frac{2}{5}$

Reducing Fractions to Lowest Terms: Divide the numerator and denominator by the greatest common factor, the product of all factors common to both.

Example: $\frac{6}{45} = \frac{2\cdot3}{3\cdot3\cdot5} = \frac{2}{15}$

Multiplying Fractions: Multiply numerators with numerators and denominators with denominators and reduce to lowest terms if possible.

Example: $\frac{2}{15}\cdot\frac{6}{7} = \frac{2\cdot6}{15\cdot7} = \frac{2\cdot2\cdot3}{3\cdot5\cdot7} = \frac{4}{35}$

$$2\frac{1}{4}\cdot3\frac{2}{5} = \frac{9}{4}\cdot\frac{17}{5} = \frac{153}{20} = 7\frac{13}{20}$$

Dividing Fractions: Change to multiply by the reciprocal, then multiply.

Example: $\frac{2}{15}\div\frac{6}{7} = \frac{2}{15}\cdot\frac{7}{6} = \frac{2\cdot7}{15\cdot6} = \frac{2\cdot7}{3\cdot5\cdot2\cdot3} = \frac{7}{45}$

Add/Subtract Fractions with a Common Denominator: Add/Subtract the numerators and keep the common denominator. Reduce to lowest terms if possible.

Example: $\frac{2}{7}+\frac{3}{7} = \frac{2+3}{7} = \frac{5}{7}$

$$3\frac{2}{5}-2\frac{1}{5} = \frac{17}{5}-\frac{11}{5} = \frac{6}{5} = 1\frac{1}{5}$$

Add/Subtract Fractions with Different Denominators: Find the Least Common Denominator (LCD) and rewrite the fractions as equivalent fractions with the LCD. Then, add/subtract as described above.

Example: $\frac{2}{3}-\frac{1}{4} = \frac{2\cdot4}{3\cdot4}-\frac{1\cdot3}{4\cdot3} = \frac{8}{12}-\frac{3}{12} = \frac{8-3}{12} = \frac{5}{12}$

Page 101: working with unlike denominators

1. To add and subtract fractions with unlike denominators.
2. The mixture of ¾ parts pure gold, 4/25 parts silver and 9/100 parts copper gives us yellow gold. These fractions are all part of a whole, so their sum is 1.
3. The whole circle represents 1. Shade parts of the circle to show the amount of pure gold in yellow gold. (shade in 3 out of 4 parts in the circle)
4. ¼ part of the circle is not shaded. The unshaded part is the sum of 4/25 + 9/100 or the amount of silver and copper in yellow gold.
5. The Least Common Denominator (LCD) of ¾, 4/25, and 9/100 is 100.
6. To show that the above parts equal 1, you need to find the Least Common Multiples (LCM) of 4, 25, and 100.
7. The LCM, 100, is also the LCD of these fractions.

Page 102:Unlike Denominators(con't)

WHITE GOLD	Pure Gold	Copper	Nickel	zinc
1/1 =	(¾)+	(4/25)+	(4/100) +	?

8a. $\frac{3}{4} \times \frac{25}{25} = \frac{75}{100}$ b. $\frac{4}{25} \times \frac{4}{4} = \frac{16}{25}$

9. White gold consists of ¾ pure gold and ¼ of other mixture which includes copper, nickel and zinc. Since ¾ of white gold is pure gold, the sum of copper, nickel, and zinc in pure gold = ¼.
10. (see box) Use ¼ - 4/25 – 4/100 to find the fraction of zinc in white gold. Before subtracting the expression, find the Least Common Denominators (LCD) of ¼, 4/25, and 4/100.
11. Use the LCD to rename ¼ and 4/25.

a. ¼ = 25/100 b. 4/25 = 16/100

12. The fraction of zinc in white gold in lowest term:

$$\frac{25 - 16 - 4}{100} = \frac{5}{100} = \frac{1}{20}$$

13a. 9/15 b. 5/15

14. To find the difference of 159 3/5 – 15 1/3:

a. Find the difference between the whole number 2
b. Rewrite 3/5 and 1/3 using LCD: 9/15-5/15
c. What is 159 9/15 – 15 5/15? 144 4/15
d. omit

Page 109: Products of fractions

1. To multiply fractions
2. Area of a rectangle is the product of length times width.

3a. The area of each small square is ¼

3b. The length and width of each small square is ½ x ½ which is equal to ¼.

4. The product of 2 fractions is equal to the product of the numerators over the product of the denominators.
5. To find the value of ½ x ¼, write the fraction 1x1 over 2x4 which simplifies to 1/8. Ex: $\frac{1}{} \times \frac{1}{} = \frac{1}{}$

$$2 \times 4 = 8$$

6. When multiply a number by a fraction less (<) than 1, the product will be less than the numbers multiplied.

Page 110, product (con't)

7. To multiply a whole number and a fraction, first write the whole number as an improper fraction whose denominator is 1. Ex: 5x(1/2) = (5/1) x ½.

8&9. L is the length. If L = 2 ¾ feet, you can multiply ½ and 2 ¾ to find the area.

10. Before finding the product, first change the mixed number 2 ¾ to an improper fraction. So 2 ¾ = 11/4.

11. The product of ½ x 11/4 = 11/8.

12. The mixed number of 11/8 = 1 3/8.

13. As an example, the value of 2/3 x 2 ¾ = 2/3 x 11/4 = 22/12 = 1 10/12 = 1 5/6 is less than < 2 ¾ because 2/3 is less than 1.

14a. Write 2/3 x 2 ¾ as the product of a fraction and an improper fraction: 2/3 x 11/4

b. The product is 22/12 c. In lowest term: 11/6

d. As a mixed number: 1 5/6

Page 113, Quotients & Remainders

1. To divide by fractions (Skip Questions 2-8)
2. If the dividend stays the same, as the divisor decreases, the quotient increases.
3. The equation $6 \div 3 = 2$ tells us that there are 2 threes in 6.
4. Since there are 2 halves in 1, there are 12 halves in 6. So 6 divided by ½ is 12.
5. Since there are 3 thirds in 1, there are 18 thirds in 6. So, 6 divided by 1/3 is 18.
6. What is the quotient of 6 and 1/5? 30
7. In the division problems, notice that the divisors decrease from ½ to 1/3 to 1/5, the quotients increase.

8a. $6 \div (½) = 12 \div 6 \times 2 = 12$

b. $6 \div (1/3) = 18 \div 6 \times 3 = 18$

c. $6 \div (1/5) = 30 \div 6 \times 5 = 30$

9. Dividing a number by a fraction is the same as multiplying the number and that fraction turned upside down. So $4 \div (1/6) = 24$ and $4 \times 6 = 24$

Page 114, quotient & remainders (con't)

10. If the product of 2 numbers is 1, the numbers are called reciprocals.

11. To divide a number by a fraction, multiply the number by the reciprocal of the fraction.

12a. In the expression: $6 \div (2/3)$, the reciprocal of $2/3 = 3/2$.

b. Write $6 \div (2/3)$ as the product of 6 and the reciprocal of $2/3 \rightarrow 6 \times (3/2)$

c. $6 \div (2/3) = 6 \times (3/2) = 18/2 = 9$

13. To estimate the quotient of $1\ 2/3 \div 8/9$:

a. Round $1\ 2/3$ to the nearest whole number: 2

b. Round $8/9$ to the nearest whole number: 1

c. The quotient of $1\ 2/3 \div 8/9$ is approximately 2.

14. To find the quotient of $1\ 2/3 \div 8/9$:

a. Write $1\ 2/3$ as an improper fraction in lowest terms: $5/3$

b. Write $5/3 \div 8/9$ as the product of 2 factors then find the product:
$5/3 \div 8/9 = 5/3 \times 9/8 = 45/24$

c&d. The product is $45/24$. In lowest term: $15/8$

e. In mixed number: $1\ 7/8$

Homework (Due 12/19)

Math III

1. In the reader, Module 3: Fractions, Pages 101-120 all. Check powerpoint slides for answers to pp. 101-102, 109-110, 113-114.

NOTE: Math Olympiad 2 is next week 12/12 during Math IV.

This week's homework is due in 2 weeks. Please finish pages 73-100 in the reader if you have not done so. I will post answers after 12/12

Math IV

1. In the reader, Module 3: Fractions, Pages 101-120 all. Check powerpoint slides for answers to pp. 101-102, 109-110, 113-114.

NOTE: Math Olympiad 2 is next week 12/12 during Math IV.

This week's homework is due in 2 weeks. Please finish pages 73-100 in the reader if you have not done so + the worksheets. I will post answers after 12/12.

definitions

1. Dividend-A number which is divided by another number. Example: 7 in 7/3
2. Divisor-The number by which a dividend is divided. Example: 3 in 7/3
3. Denominator-The expression written below the bar of a fraction. Ex: 3 in 7/3
4. Numerator-The expression written above the bar of a fraction. Ex: 7 in 7/3
5. Unit Fraction-has a numerator of 1 and a denominator that is a natural number greater than 1. Example: 1/8, 1/4
6. Proper Fraction-has a numerator that is less than its denominator. Ex:3/4, ½, 2/3
7. Improper Fraction-has a fraction whose numerator is greater than or equal to its denominator. Ex: 5/4, 11/7, 8/6
8. Mixed Number-A number that consists of a natural number and a fractional part.
9. Equivalent Fraction-Fractions that have the same value. Ex: 3/4 = 6/8
10. Least Common Multiple(LCM)-The smallest number that is divided by each of the given numbers.
11. Least Common Denominator(LCD)-same as Least Common Multiple
12. Greatest Common Factor(GCF)-The largest number that divides the given numbers exactly.

Do Now(from Chapter 3, Elementary Math Olympiad, Nov 21 Homework)

6. A number N divides each of 17 and 30 with the same remainder in each case. What is the largest value N can be? (Note: N divides 17 = 17/3)

17. A prime number is a whole number, greater than 1 that is divisible only by 1 and itself. Some example of prime numbers are 2, 3, 5, 7, 11 and 13. What is the largest prime number, P, such that 9 times P is less than 400?

18. In the 5-digit number A6A41, each of the As represents the same digit and A65A41 is divisible by 9. what digit does A represent?

1. (Math IV)There are many numbers that divide 109 with a remainder of 4. List all 2-digit numbers that have that property. (Example: 5 divides 109 =R4 → 109/5 = q R4)