Do Now

- Write the definition (or give an example) of the following terms:

1. Dividend
2. Divisor
3. Denominator
4. Numerator
5. Unit Fraction
6. Proper Fraction
7. Improper Fraction
8. Mixed Number
9. Equivalent Fraction
10. Least Common Multiple (LCM)
11. Least Common Denominator (LCD)
12. Greatest Common Factor (GCF)

Objectives: In this fractions unit, we will

- explore numbers between one and zero (p 73-4)-unit and proper fractions
- Explore numbers greater than or equal to 1(p.77-8)-improper fraction and mixed number
- Explore why fractions with different digits can have the same value(p.81-2)-equivalent fractions & GCF
- Compare and round fractions (p.85-6) – LCM or LCD
- Explore adding fractions with like (same) denominators (p. 93-4)
- Explore how to subtract fractions and check answers (p. 97-8)

Page 73: Proper fractions

1. To explore numbers between zero and one

2&3. The expressions that represent dividing the distance between 0 and 1 into 2 equal parts is 1÷2 or ½ where 1 is the dividend/divisor. The word name for this number is one-half

4. ½ is called a fraction and represents one number divided by another number

5. In a fraction, a)the numerator, is the top number. It is the number we are dividing into.

   b) The denominator, is the bottom number. It is the number we are dividing by. Example: ½ => numerator/denominator

6. Ex: The bar represents one unit.

1

Each of the bottom bar represents 1/3
or one out of 3 or one over three.
In fractions, 1/3 => part/whole
The word name for each part is one-third

1/3 +1/3+1/3

Page 74:Proper fractions(con't)

7. A unit fraction has a numerator of 1 and a denominator that is a whole number greater than 1. Examples: 1/8, ¼, 1/3, ½
8. ←--|----|----|----|----|----|----|----|----|----→ Note: smaller denominator with the same numerator is the bigger value

   0 1/8 ¼ ½ 1
9. ←--|----|----|----|----|----|----|----|----|----→

   0 ¼ ½=2/4 3/4 4/4=1
10. If the numerator and denominator of a fraction are equal, the fraction is equal to 1. Example: $2/2 = 4/4 = 1$
11. A proper fraction is a fraction whose numerator is less than (<) its denominator. Ex: ¾, ¼, 4/5, 2/3.
12. Fractions, 2/2, 4/4, 8/8 are NOT proper fractions because the numerator < (is less than) the denominator in a proper fraction
13. Fractions that have the same value are equivalent.

Page 77: Improper fractions

1. To explore fractions greater than or equal to 1.
2. An improper fraction is a fraction whose numerator is greater than or equal to its denominator. Examples: 9/8, 7/4, 5/3, 3/2.
3. On a number line, the greater number always lies to the right of the smaller number.

←|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----→

4. 0 ¼ ½=2/4 3/4 4/4=1 5/4 6/4=3/2 7/4 8/4=2

where 5/4 , 6/4 , 7/4 , 8/4 are improper fractions

5. The fraction 8/4 means 8÷4, so 8/4 = 2
6. The fraction 6/4 means 6÷4, which equals 1 with a remainder of 2.
7. The fraction 6/4 = 1+ 2/4
8. 6/4 is an improper fraction

   1 is a whole number

   2/4 is a proper fraction

Page 78, imProper Fractions-continued

9. A mixed number is a number greater than 1 that has a whole number part and a fractional part.
10. The expression not equivalent to 6/4 is

    b)1 ¾

11. To express an improper fraction as a mixed number:

Example: 6/4 = 1 2/4

a) Divide the numerator by the denominator, Ex: 6÷ 4
b) Use the quotient for the whole number part of the mixed number, Ex: quotient is 1
c) Use the remainder, expressed as a proper fraction, as the fractional part of the mixed number, Ex: Remainder is 2, express it as 2/4.

Page 81, Equivalent Fractions

1. To explore why fractions with different digits can have the same value
2. In an orchestra, there are 48 musicians in the following sections:

Percussion 4 drums, gongs, handbell,chime	Brass 12 (trumpet, tuba, Trombon,Fhorn	Woodwind 8 (saxophone, clarinet)	String 24 (guitar, violin, viola, cello)

The fractions representing each section is as follows:

a. Strings: 24/48, b. Brass: 12/48, c. woodwind: 8/48, d. percussion: 4/48

3. The fraction $48/48 = 1$ represents the total orchestra
4. In a circle with 48 equal parts, each part represents 1 musician.
5. Because $48/24 = 2$, then 24 parts out of 48 represents ½ of the circle. The fractions ½ and 24/48 are equivalent fractions.
6. Brass: $12/48 = 1/4$, or $48 \div 12 = 4$. $\underline{12(\div 12) = 1}$ 12 is the GCF
   $48(\div 12) = 4$

   woodwind: $8/48 = 1/6$, or $48 \div 8 = 6$. $\underline{8\ (\div 8) = 1}$ 8 is the GCF
   $48(\div 8) = 6$

   percussion: $4/48 = 1/12$, or $48 \div 4 = 12$. $\underline{4(\div 4) = 1}$ 4 is the GCF
   $48(\div 4) = 12$

Page 82, Equivalent fractions (con't)

7. If the numerator and denominator of a fraction have a common factor other than 1, then the fraction can be reduced.
8. The greatest common factor (GCF) of 24 and 48 is 24.
9. How to use GCF in fractions reduction to get equivalent fractions:

Example: $\frac{24}{48} = \frac{24 \div 24}{48 \div 24} = \frac{1}{2}$. Since $24/24 = 1$

10. When we divide 24/48 by 1 (or 24/24), we get ½. To check: multiply the fraction ½ by 24/24, we get 24/48.
11. GCF of: 12/48 is 12; 8/48 is 8; 4/48 is 4
12. Write 1 as an improper fraction and multiply each of the fractions:

$\frac{1}{1} \times \frac{12}{12} = \frac{12}{48}$ $\quad$ $\frac{1}{6} \times \frac{8}{8} = \frac{8}{48}$ $\quad$ $\frac{1}{12} \times \frac{4}{4} = \frac{4}{48}$

13. A fraction is in lowest terms (reduced or simplified) if the numerator and denominator have NO common factor other than 1.
14. The fraction 4/9 (b) is not equivalent to 2/3.

Page 85, Ordering Fractions

1. To compare and round fractions
2. The whole number part of the fractions 144 ¾ and 144 ⅝ is 144. Each fractional part is less than 1, so these numbers lie between the whole numbers 144 and 145. ←---|--------|--------|------→

   144 145
3. The numerator of the fraction that is equivalent to ¾ and has a denominator of 8 is 6, since ¾ = 6/8

Ordering:

4. If the denominator of 2 fractions are alike (same), the fraction with the greater numerator is the greater fraction.Ex:1/3<2/3
5. By multiplying ¾ by 2/2 = 1, we get the equivalent fraction 6/8.
6. A multiple is the product of a given whole number and another whole number. Ex: 12 is a multiple of 3, since 3 x 4 = 12 (product)
7. One way to decide which of 2 fractions is greater is to write them with like denominators.

   Ex: ⅓, ¼ = 4/12, 3/12. Since 4/12 > 3/12, then ⅓ > ¼.
8. To find a common denominator of 2 fractions that have unlike denominators, multiply the 2 denominators. Ex: 3, 4 → 12 (LCM)

Page 86, Ordering fractions (con't)

9. To compare 4/5 and 5/6, try this:

a) Multiply the denominators 5 & 6 to get a common denominator of 30.

b) Use an improper fraction equal to 1 to find an equivalent fraction with a denominator of 30 for each fraction. Ex: since we cannot tell which has a bigger value, 4/5 or 5/6, multiply the denominators to find a least common multiple.

$\frac{4}{5} \times \frac{6}{6} = \frac{24}{30}$ $\quad\quad$ $\frac{5}{6} \times \frac{5}{5} = \frac{25}{30}$

c) Since 24/30 < 25/30, then 4/5 < 5/6

10. The Least common Denominator (LCD) is the Least Common Multiple of the denominators of the fractions.

11. From problem 9, the numbers 30, 60, 90 are common denominators of 5 and 6, but 30 is the Least Common Denominator (LCD) of 5 and 6.

Rounding:

12. The number 11/7 lies between the whole number 1 and 2.

13. Round 11/7 to the nearest whole number: 2. The improper fraction 11/7 = 1 4/7. Since 1 4/7 > 1 ½, 11/7 is closer to 2 than to 1.

p. 93, addition with like denominators

1. To explore adding fractions with like (same) denominators

2 & 3. The fractions represent the actual rainfall from Jan-Dec:

(inches)	Jan-Mar	Apr-Jun	Jul-Sep	Oct-Dec
Actual Rainfall	2/10	1/10	2/10	7/10
Estimate rainfall	0	0	0	1

4. The estimated total rainfall is 1
5. The sum of 2 fractions with like denominators is the sum of the numerators .

6. Add 3/10 and 2/10 to find the amount of rain that fell from Jan to Sept. 3/10 + 2/10 = 5/10 of an inch.

7. The sum 5/10 and 7/10 is 12/10 or 1 2/10 (mixed number). In lowest terms, it is 1 1/5.
8. The estimated rainfall is reasonably close to the actual rainfall.

p.94, Addition (Con't)

9. Mixed number as the sum of whole number + fraction: a) 2 + 5/8 b) 1+1/8
10. To add mix numbers, add the whole number parts and the fractional parts.

11. Find the sum 2 5/8 and 1 1/8

a)The sum of the whole number is 3 (2+1).

b)The sum of the fraction is 6/8 (5/8 + 1/8).

c)The sum of the mixed numbers is 3 6/8.

d)The sum of mixed numbers, in lowest terms, is 3 ¾.

12. Remember: when adding fractions with like denominators, just add the numerators
13. After adding fractions always check to see if the fractions can be reduced to lowest terms. Ex: 3 6/8 = 3 ¾; 2/8 = ¼.

p. 97, Difference with like denominators

1. To explore how to subtract fractions
2. The pictures represent t-rex and a 10-year old boy footprint.

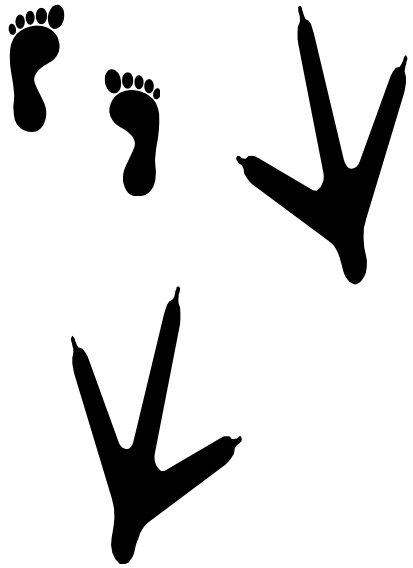
   T-rex print is 2 7/8 – 5/8 more than the boy's foot prints.

3. There are 18 eighths(1/8) between 2 7/8 and 5/8.
   The foot of the t-rex is 2 2/8 feet longer than that of the boy's
4. A repeat of 3
5. 2 7/8 = 2 + 7/8
6. The difference between fractions with like denominators is the difference of their numerators.
7. The steps to find 2 7/8 – 5/8:

a) Subtract the fractions: 7/8 – 5/8 = 2/8
b) Add the whole number and the fraction: 2 2/8
c) Reduce the fraction to lowest terms: ¼
d) The difference is equal to 2 ¼.

t-rex print: 2 7/8ft

boy's foot print: 5/8 ft



p.98, Difference with like denominators

8. To check 2 7/8 – 5/8: try 2 ¼ + 5/8 = 2 7/8
9. The height of t-rex is 17 2/3 ft. Height of an elephant is 11 1/3. Difference is 17 2/3 – 11 1/3
10. The estimated difference between the t-rex and elephant height is 7 ft or 18-11
11. The steps to find 17 2/3 – 11 1/3 :

a) The difference between the whole number is 6
b) The difference between the fractions is 1/3
c) The difference between the mixed number is 6 1/3.

12. To check if 17 2/3 – 11 1/3 = 6 1/3:
    try addition→ 6 1/3 + 11 1/3 = 17 2/3

Homework (Due 12/5)

Math III

Happy Thanksgiving!

1. Chapter 3 in Elementary math Olympiad practice booklet, pages 17 & 19, problems #6-10, #16-20
2. In the reader, Module 3: Fractions, Pages 73-100 all. Check powerpoint slides for answers to pp. 73-4, 77-8, 81-2, 85-6, 93-4, 97-8

Math IV

Happy Thanksgiving!

1. Chapter 3, Elementary Math Olympiad section, pages 16-19, problems #1-20 all.
2. In the reader, Module 3: Fractions, Pages 73-100 all. Check powerpoint slides for answers to pp. 73-4, 77-8, 81-2, 85-6, 93-4, 97-8
3. Worksheet after p.84 in the reader (Simplifying fractions, pages 4 and 5)
4. Worksheet after p. 96 in the reader (Adding and subtracting fractions with like denominators)

Do Now Answers

- Write the definition (or give an example) of the following terms:

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.