Lesson 01: Fraction Review

Lesson Objectives:

- Student will be able to
- Reduce fractions
- Multiply fractions
- Divide fractions
- Add fractions
- Subtract fractions
- Change mixed numbers into improper fractions and improper fractions into mixed numbers.
- Add, subtract, multiply and divide mixed numbers

Let's start by reviewing fractions.

First, fractions are written as a part/whole. When you get a fraction like 2/5, what we're really saying is that if you divided the whole into 5 parts, you would have 2 of them. The top number is called the numerator, and the bottom number is called the denominator. The numerator tells you how many parts you have, and the denominator tells you into how many parts the whole was split.

Reducing Fractions

We will start by reviewing how to reduce fractions. The reduction of fractions happens when both the numerator and the denominator have a factor in common. For example, the fraction $^3/_{15}$ will reduce because both 3 and 15 have a factor of 3. To reduce we divide both the numerator and denominator by that factor. So, we have

$$^3/_{15} \div {}^3/_3 = {}^1/_5$$

Here are some fractions for you to try and reduce.

- $^{20}/_{60}$
- $^6/_8$
- $^{30}/_{45}$

ANSWERS:

- $^{20}/_{60} \div {}^{20}/_{20} = {}^1/_3$

- $^6/_8 \div {}^2/_2 = {}^3/_4$

- $^{30}/_{45} \div {}^{15}/_{15} = {}^2/_3$

Click on this link to see a video about reducing fractions.

Multiplying Fractions

Now let's review how to multiply fractions. Multiplying fractions is the easiest operation to do with fractions. Here are the steps.

1. **Multiply the numerators**
2. **multiply the denominators**
3. **reduce**

Example 1:

$$\frac{2}{3} \cdot \frac{1}{4}$$

$$\frac{(2)(1)}{(3)(4)}$$

$$\frac{2}{12}$$

$$\frac{1}{6}$$

Example 2:

$$\frac{5}{8} \cdot \frac{3}{4}$$

$$\frac{15}{32}$$

Click on this link to watch a video about multiplying fractions.

Dividing Fractions

Dividing fractions is almost as easy. We need to use the reciprocal to divide fractions. The reciprocal is a fraction "flipped:" For example, the reciprocal of 2/3 is 3/2. You take the numerator and put it in the denominator and take the denominator and put it in the numerator. Here are the steps for dividing fractions.

1. **Change the *second* fraction to its reciprocal and change the division to multiplication.**
2. **Multiply the numerators**
3. **multiply the denominators**
4. **reduce.**

Example 1:

$$\frac{3}{10} \div \frac{4}{5}$$

Step 1: **reciprocal of the second fraction and change division to multiplication**

$$\frac{3}{10} \cdot \frac{5}{4}$$

Steps 2 and 3: **multiply numerators and multiply denominators**

$$\frac{(3)(5)}{(10)(4)}$$

$$\frac{15}{40}$$

Step 4: **reduce**

$$\frac{3}{8}$$

Example 2:

$$\frac{3}{4} \div \frac{5}{8}$$

$$\frac{3}{4} \cdot \frac{8}{5}$$

$-\dfrac{24}{20}$

$\dfrac{-6}{5}$

Watch [this](#) video to see some more examples.

Adding and Subtracting Fractions

Next, we need to review how to add and subtract fractions. In order to add and subtract fractions we need to make sure we are adding and subtracting equal size parts, so we need to make sure that we have fractions with the same denominator. Here are the steps for adding and subtracting fractions.

1. **Get a common denominator (sometimes this is already done for you)**
2. **Add/subtract the numerators.**
3. **Keep the denominator**
4. **Reduce (if necessary)**

Example 1:

$^4/_5 - {}^2/_3$

Step 1: **Get a common denominator:** Since one fraction has a denominator of 5 and the other has a denominator of 3, we need to find the smallest number that they both go into. The multiples of 5 are 5, 10, 15, 20, 25 ….. The multiples of 3 are 3, 6, 9, 12, 15, 18,..... Since they both have 15 as a multiple, this is going to be our common denominator. We multiply each fraction so that we have 15 on the bottom of both fractions. Be careful because we must multiply both the numerator and the denominator of the fraction by the same number so we don't change the value of the fraction. This is the opposite of reducing.

We know that 5 * 3 = 15, so we multiply the numerator and the denominator of the first fraction by $^3/_3$

$^4/_5 * {}^3/_3 = {}^{12}/_{15}$

We also know that 3 * 5 = 15, so we multiply the numerator and the denominator of the second fraction by 5

$^2/_3 * {}^5/_5 = {}^{10}/_{15}$

So, now our problem becomes

$^{12}/_{15}$ - $^{10}/_{15}$

Step 2: **Add/subtract the numerators.**

12 − 10 = 2

Step 3: **Keep the denominator**

$^{2}/_{15}$

Step 4: **Reduce**

Since 2 and 15 don't have any common factors, this does not reduce, so our answer is $^{2}/_{15}$

Example 2:

$^{1}/_{2}$ + $^{2}/_{8}$

Step 1: Common denominator = 8

$^{1}/_{2}$ * $^{4}/_{4}$ = $^{4}/_{8}$

$^{2}/_{8}$ * $^{1}/_{1}$ = $^{2}/_{8}$

Step 2:

4 + 2= 6

Step 3:

$^{6}/_{8}$

Step 4:

$^{3}/_{4}$

_

Example 3:

$^{1}/_{4}$ + $^{1}/_{6}$

$(^{1}/_{4}$ * $^{3}/_{3})$ + $(^{1}/_{6}$ * $^{2}/_{2})$

$^{3}/_{12}$ + $^{2}/_{12}$

$^5/_{12}$

Watch video for another example.

Mixed Numbers

Let's work on mixed numbers now. We will use the same steps to add, subtract, multiply, and divide mixed numbers, but first we need to change mixed numbers into improper fractions.

1. **Multiply the denominator by the whole number**
2. **Add the numerator to the product from step 1**
3. **Put the answer to step 2 on top of the denominator**

Example1: Change 1 $^5/_8$ to an improper fraction.

Step 1: **Multiply the denominator by the whole number**

(8)(1) = 8

Step 2: **Add the numerator to the product from step 1**

5 + 8 = 13

Step 3: **Put the answer to step 2 on top of the denominator**

$^{13}/_8$

Example 2: Change 3 ½ to an improper fraction

(2)(3) = 6

6+ 1 = 7

$^7/_2$

We also need to change improper fractions back to mixed numbers. The rule is that if the problem gives you mixed numbers, you give your answer as a mixed number. We are going to work backwards from what we just did. Here are the steps.

1. **Divide the numerator by the denominator.**
2. **Take the remainder and put it over the denominator**

Example 1: Change $^{16}/_5$ into a mixed number

Step 1: Divide the numerator by the denominator.

16 ÷ 5 = 3 R1

Step 2: Take the remainder and put it over the denominator

3 $\frac{1}{5}$

Example 2: Change $\frac{24}{5}$ into a mixed number

24 ÷ 5 = 4 R4

4 $\frac{4}{5}$

Watch this video on subtracting mixed numbers.

Practice

Click on the practice problems below to practice each of the concepts covered in this lesson. These are for practice only and not for a grade.

Practice Problem 1

Practice Problem 2

Practice Problem 3

Practice Problem 4

Practice Problem 5

Practice Problem 6

Click on the links below to do some more practice:

Simplifying Fractions

Adding and Subtracting Fractions

Multiplying Fractions

Dividing Fractions

Grading Rubric:

Grading for this lesson:

To get a 10: All answers are correct the first time, or within first revision.
To get a 9: You can have 1 incorrect answer after your original submission.
To get an 8: You can have 2 incorrect answers after your original submission.
To get a 7: You can have 3 incorrect answers after your original submission.
To get a 6: You can have 4 incorrect answers after your original submission.
To get a 5: Cheating - Plagiarism - purposeful or mistaken, which will lower your final grade for the course (so be very careful when posting your work!); lack of effort, disrespect, or attitude (we are here to communicate with you if you don't understand something);

Note: For this class it is necessary to post the questions over each answer. Failure to do so will result in asking for a revision.   **No grade will be given for incomplete work**.

Assignment:

1. Reduce $-\frac{6}{14}$

2. What is the reciprocal of $\frac{3}{11}$

3. Multiply $\left(\frac{2}{3}\right)\left(\frac{1}{4}\right)$

4. Multiply $\left(\frac{3}{8}\right)\left(\frac{7}{8}\right)$

5. Multiply $(^7/_8)(^6/_{21})$

6. Divide $^1/_3 \div {^4/_5}$

7. Divide $^2/_3 \div {^7/_8}$

8. Divide $^4/_5 \div {^8/_{25}}$

9. Add $^3/_5 + {^1/_5}$

10. Add $^3/_8 + {^5/_6}$

11. Subtract $^5/_8 - {^1/_3}$

12. Subtract $^2/_3 - {^1/_6}$

13. Add $2 \, ^6/_{16} + 3 \, ^3/_4$

14. Subtract $4 \, ^2/_3 - 2 \, ^4/_5$

15. Multiply $(4 \, ^4/_5)(3 \, ^5/_8)$

16. Divide $3 \, ^3/_8 \div 2 \, ^4/_7$

17. Louis bought 10 yd of material. He used $3 \, ^7/_8$ **to make a jacket. How much fabric is still left?**

18. Todd is putting new oak baseboard trim in his living room. He has one piece that is $12 \, ^1/_2$ **ft long and another that is** $8 \, ^2/_3$ **ft long. How much trim does he have total?**

19. To make peanut butter cookies, Jacob needs $^3/_4$ cups peanut butter. He wants to make 3 $^1/_2$ batches of the recipe for the school bake sale. How much peanut butter will he need?

20. Angela's pay check was $304.50 last week. She makes $8.40 an hour, how many hours did she work.