

**Lesson 5: Operations with Fractions**

**OBJECTIVES: SWBA to**

Use the order of operations and knowledge of fractions (add, subtract, multiply and divide) to simplify numeric expressions.

**6. NS.1**

**INTRODUCTION**

In our meeting, we learned about using fraction models to divide fractions. Last year, around May-June, in the 5<sup>th</sup> grade we learned about addition, subtraction, and multiplication of fractions. Today, we are using everything we know about fractions (addition, subtraction, multiplication and division, expressing in lowest term, mixed numbers to improper fraction, multiplicative or reciprocal), and the order of operations to simplify numeric expressions.

**MINI-LESSON (I DO):**

Use the Order of Operations to simplify the expression below.

$$2 \div \frac{1}{4} + 3 \times \frac{1}{2}$$

Step	What	why
1	$2 \div \frac{1}{4} + 3 \times \frac{1}{2}$	Original expression
2	$2 \div \frac{1}{4} + 3 \times \frac{1}{2} =$ $8 + 3 \times \frac{1}{2}$	Moving left to write, the first sign we see is the division sign $\div$ . Therefore, we divide first. By remember, when dividing fraction, we keep the first fraction, change the $\div$ to $\times$ , and multiply by the multiplicative inverse or reciprocal of the second fraction. $2 \div \frac{1}{4} = 2 \times \frac{4}{1} = 2 \times 4 = 8$
3	$8 + 3 \times \frac{1}{2} =$ $8 + \frac{3}{2}$	Moving left to right we see the addition sign (+) and the multiplication sign (x). However, according to the order of operations we must multiply before we add. Therefore, $3 \times \frac{1}{2} = \frac{3}{1} \times \frac{1}{2} = \frac{3}{2}$
4	$8 + \frac{3}{2} =$ $\frac{8}{1} + \frac{3}{2} = \frac{8 \times 2}{1 \times 2} + \frac{3}{2} = \frac{16}{2} + \frac{3}{2} = \frac{19}{2}$ or $9\frac{1}{2}$	The last operation is addition. However, in order to add two fractions the fractions must be <b>like fraction</b> , meaning they must have the <u>same denominator</u> . So, before we add 8 and $\frac{3}{2}$ , I have to find the least common multiple or denominator between 1 and 2, which is two.
5	$2 \div \frac{1}{4} + 3 \times \frac{1}{2} = 9\frac{1}{2}$	Solution

**Guided Practice:**

Simplify the expression below:

$$2\frac{1}{4} \div \left(1\frac{3}{4} + 1\frac{1}{4}\right)$$

Step	What	why
1	$2\frac{1}{4} \div \left(1\frac{3}{4} + 1\frac{1}{4}\right)$	Original expression
2	$2\frac{1}{4} \div \left(1\frac{3}{4} + 1\frac{1}{4}\right) =$ $2\frac{1}{4} \div \left(2\frac{4}{4}\right) =$ $2\frac{1}{4} \div 3 = 2\frac{1}{4} \div \frac{3}{1}$	According to the order of operations, we have to simplify what is inside the parentheses first. Therefore we skip the division sign.
3	$2\frac{1}{4} \div \frac{3}{1} =$ $2\frac{1}{4} \times \frac{1}{3} =$ $2\frac{1}{4} \times \frac{1}{3} = \frac{9}{4} \times \frac{1}{3} = \frac{9}{12} = \frac{3}{4}$	<p>Division is the only operation left. We use <b>Keep, Change, and Reciprocal</b>—keep the first fraction, change <math>\div</math> to <math>\times</math>, take the multiplicative inverse or reciprocal of the second fraction. Next, change any mixed number to improper fraction.</p> <p>Express in simplest form or lowest term if necessary.</p>
4	$2\frac{1}{4} \div \left(1\frac{3}{4} + 1\frac{1}{4}\right) = \frac{3}{4}$	Solution

**Independent Practice (You Do):**

**Problem 1:**

Simplify the following expression. Express in simplest form in necessary.

$$\frac{1}{3} \times (9 - 2) - \frac{5}{6}$$

<i>Step</i>	<i>What</i>	<i>why</i>
1		
2		
3		
4		
5		

**Problem 2:**

Ranjeet is entering a competition to win some gold coins. She must answer the following skill-testing question.

What is the value of  $10 - 2 \times \frac{1}{2}$ ?

She is unsure if the correct answer is 4 or 9.

- a) How could Ranjeet determine a possible answer of 4?
- b) How could Ranjeet determine a possible answer of 9?
- c) What is the correct answer? Explain.

**Problem 3:**

Dave and Manuel were comparing their solutions to the following problem.

Three quarters of a number is 6. What is the number?

Dave evaluated  $\frac{3}{4} \times 6$  to get an answer of  $4\frac{1}{2}$ .

Manuel evaluated  $6 \div \frac{3}{4}$  to get an answer of 8.

Which answer is correct? Explain.

**Problem 4:**

Mia evaluated the expression  $\left(\frac{1}{2} + \frac{1}{4}\right) \times \frac{5}{3}$  to equal  $\frac{11}{12}$ .

- a) What mistake did she make?
- b) What is the correct value?

**Problem 5:**

Simplify the following expression. Express in simplest form in necessary.

$$2\frac{1}{4} - \frac{1}{2} \times \left(\frac{3}{4} - \frac{1}{8}\right)$$

## Final Summary

In a U-Shape:

1. Re-state the objective to assess if students learn it
2. Elicit from students what they have learned and what they want to learn more about.
3. Tie what they learn to the lesson, and upcoming lessons (Next Saturday, they will learn about proportion, a comparison of two ratios!)