

**GAYAZA HIGH SCHOOL**  
**S.4 MATH WORKSHEET TWO**  
**ORDER OF OPERATIONS WITH FRACTIONS**  
**(BODMAS)**

**PREREQUISITE KNOWLEDGE**

- LCM OR EQUIVALENT FRACTIONS
- ADDITION AND SUBTRACTION OF FRACTIONS
- MULTIPLICATION AND DIVISION OF FRACTIONS

**Order of Operations (BODMAS)**

1. Do all operations inside parentheses (brackets) and other grouping symbols.
2. Evaluate orders e.g. exponents, powers, etc. commonly known as “of”
3. Multiply and divide from left to right.
4. Add and subtract from left to right.

**Example 1**

$$\text{Solve: } \frac{1}{3} \times \left(\frac{2}{3}\right)^2 - \frac{1}{9}$$

There are no operations inside parentheses so evaluate the exponents first.

$$= \frac{1}{3} \times \left(\frac{2}{3} \times \frac{2}{3}\right) - \frac{1}{9}$$

$$= \frac{1}{3} \times \frac{4}{9} - \frac{1}{9}$$

Multiply next

$$= \frac{4}{27} - \frac{1}{9}$$

Always multiply before adding or subtracting.

$$\text{LCM} = 27$$

$$= \frac{4 - 3}{27}$$

Now subtract. Remember to get a common denominator when subtracting OR LCM of the denominators.

$$= \frac{1}{27}$$

**Example 2**

$$\text{Solve: } \frac{3}{5} - \frac{1}{2} \times \frac{1}{3}$$

Always multiply before adding or subtracting.

$$= \frac{3}{5} - \frac{1}{6}$$

LCM of 5 and 6 is 30

$$= \frac{3 \times 6 - 1 \times 5}{30}$$

$$= \frac{18 - 5}{30}$$

Subtracting fractions

$$= \frac{13}{30}$$

### Example 3

$$\text{Solve: } \frac{1}{3} \div \frac{7}{5} - \frac{1}{7}$$

Always divide before adding or subtracting.

$$= \frac{1}{3} \times \frac{5}{7} - \frac{1}{7}$$

When dividing, invert and multiply.

$$= \frac{5}{21} - \frac{1}{7}$$

LCM of 21 and 7 is 21

$$= \frac{5-3}{21}$$

Subtracting fractions

$$= \frac{2}{21}$$

### Example 4

$$\text{Solve: } \frac{3}{5} + \frac{2}{3} - \left(\frac{1}{5} + \frac{1}{3}\right)$$

Perform operations inside parentheses first.

$$= \frac{3}{5} + \frac{2}{3} - \left(\frac{3+5}{15}\right)$$

LCM of 5 and 3 is 15

$$= \frac{3}{5} + \frac{2}{3} - \frac{8}{15}$$

Now add and subtract from left to right.

$$= \frac{3 \times 3 + 2 \times 5 - 8 \times 1}{15}$$

LCM of 5, 3 and 15 is 15

$$= \frac{9 + 10 - 8}{15}$$

$$= \frac{19 - 8}{15}$$

$$= \frac{11}{15}$$

### Example 5

$$\text{Solve: } 9 \div \frac{1}{3} \times \frac{1}{3} \times \frac{1}{3} + \frac{1}{2} - 1$$

Multiply and divide from left to right.

$$= \frac{9}{1} \times \frac{3}{1} \times \frac{1}{3} \times \frac{1}{3} + \frac{1}{2} - 1$$

When dividing, invert (reciprocate) and multiply.

$$= \frac{27}{1} \times \frac{1}{3} \times \frac{1}{3} + \frac{1}{2} - 1$$

$$= \frac{27}{3} \times \frac{1}{3} + \frac{1}{2} - 1$$

$$= \frac{27}{9} + \frac{1}{2} - 1$$

Add and subtract from left to right.

$$= \frac{27}{9} + \frac{1}{2} - \frac{1}{1}$$

LCM of 9 and 2 is 18

$$= \frac{27 \times 2 + 1 \times 9}{18} - \frac{1}{1}$$

$$= \frac{54 + 9 - 18}{18}$$

$$= \frac{63 - 18}{18}$$

$$= \frac{45}{18}$$

$$= 2\frac{9}{18}$$

$$= 2\frac{1}{2}$$

Always simplify your fractions

#### Example 4

Solve:

$$= \frac{\frac{3}{5} + \frac{2}{3}}{\frac{1}{4} \times 9\frac{1}{9}}$$

You can first work out the numerator and the denominator separately and then combine them with the division operation.

OR

$$= \left(\frac{3}{5} + \frac{2}{3}\right) \div \left(\frac{1}{4} \times 9\frac{1}{9}\right)$$

Put numerator in brackets and divide with denominator also in brackets, then follow BODMAS

$$= \left(\frac{9 + 10}{15}\right) \div \left(\frac{1}{4} \times \frac{82}{9}\right)$$

Adding in the 1<sup>st</sup> brackets and in reducing 82 and 4 by 2 in the 2<sup>nd</sup> brackets

$$= \left(\frac{19}{15}\right) \div \left(\frac{1}{2} \times \frac{41}{9}\right)$$

$$= \frac{19}{15} \div \frac{41}{18}$$

$$= \frac{19}{15} \times \frac{18}{41}$$

Reducing 18 and 15 by 3

$$= \frac{19}{5} \times \frac{6}{41}$$

Multiply the fractions

$$= \frac{114}{205}$$

1. Evaluate the following fractions.

(a) $1\frac{1}{4} + 2\frac{1}{2} - 1\frac{3}{4}$	(b) $2\frac{1}{2} \times 3\frac{2}{3} \div 1\frac{5}{6}$
(c) $3\frac{1}{5}$ of $\left(2\frac{1}{2} + 7\frac{5}{8}\right)$	(d) $\frac{3\frac{1}{8} + 1\frac{2}{3}}{2\frac{1}{3} \times 5\frac{1}{12}}$

2. Simplify:  $\frac{1^{1/2} - (8^{1/3} \div 2^{1/2})}{1^{1/5} \text{ of } (1^{1/4} + 1^{2/3})}$  (UNEB 2008)

(6 marks)

3. Evaluate:  $\frac{1\frac{1}{5} + 4\frac{1}{2} \div 1\frac{1}{2}}{3\frac{3}{5} - 2\frac{2}{5} \times 1\frac{1}{4}}$

(6 marks)

4. Simplify:  $\frac{(3\frac{5}{6} \div 2\frac{2}{15}) \times \frac{3}{23}}{5\frac{1}{3} - 2\frac{7}{12}}$  (UNEB 2017)

(6 marks)

5. Evaluate  $\frac{2\frac{1}{2} + (\frac{3}{5} \times 1\frac{1}{4})}{1\frac{1}{8} - \frac{3}{4}}$  (UNEB 2016)

(6 marks)

END.