

NAME: \_\_\_\_\_

Math 8

Unit 3: WORKSHEETS  
DIVISION OF FRACTIONS

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**KEEP  
CALM  
AND  
DO THE  
MATH**

St. Brendan School  
Mr. Martínez

# DIVISION OF FRACTIONS

## METHOD 1: CROSS-MULTIPLICATION

*Multiply the numerator and denominator that each line of the "X" connects*

$$\begin{array}{l}
 1 \times 5 = 5 \\
 2 \times 3 = 6
 \end{array}
 \quad
 \begin{array}{c}
 \boxed{5} \\
 \frac{1}{2} \\
 \frac{3}{5} \\
 \boxed{6}
 \end{array}$$

**Be careful! To DIVIDE, you actually multiply!**

$$\frac{2}{3} : \frac{7}{5} = \frac{10}{21}$$

$$\frac{2}{3} : \frac{4}{5} = \frac{10}{12}$$

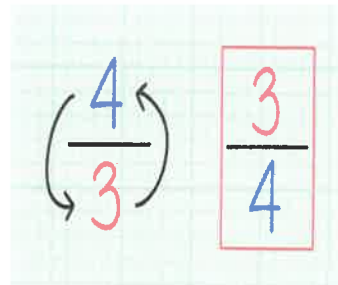
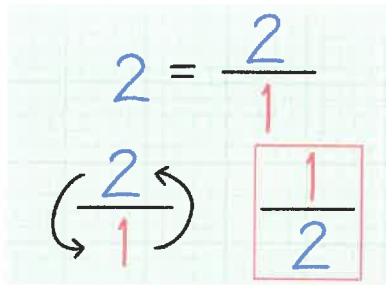
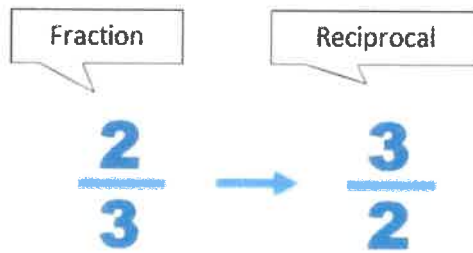
*DIVIDE USING CROSS-MULTIPLICATION*

- 1 )  $\frac{1}{4} \div \frac{15}{20} =$
- 2 )  $\frac{3}{7} \div \frac{1}{4} =$
- 3 )  $\frac{17}{20} \div \frac{7}{14} =$
- 4 )  $\frac{5}{8} \div \frac{9}{15} =$
- 5 )  $\frac{2}{8} \div \frac{1}{5} =$
- 6 )  $\frac{3}{16} \div \frac{4}{5} =$
- 7 )  $\frac{1}{2} \div \frac{1}{15} =$
- 8 )  $\frac{4}{5} \div \frac{2}{9} =$
- 9 )  $\frac{1}{2} \div \frac{3}{4} =$
- 10 )  $\frac{3}{14} \div \frac{1}{2} =$
- 11 )  $\frac{3}{9} \div \frac{16}{20} =$
- 12 )  $\frac{12}{20} \div \frac{3}{5} =$
- 13 )  $\frac{9}{16} \div \frac{16}{18} =$
- 14 )  $\frac{3}{9} \div \frac{3}{4} =$
- 15 )  $\frac{1}{6} \div \frac{6}{14} =$

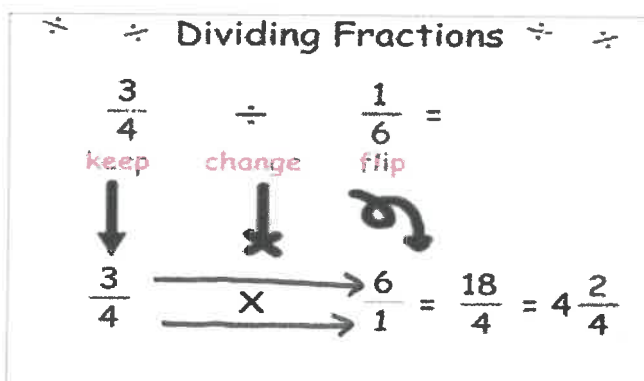
# DIVISION OF FRACTIONS

## METHOD 2: MULTIPLYING BY THE RECIPROCAL

The **RECIPROCAL** of a fraction:



1. Keep the first fraction as it is.
2. Change from division to multiplication
3. Change the second fraction to its **RECIPROCAL** (flip the fraction)
4. Multiply as you multiply fractions (Numerators with numerators, denominators with denominators)



## FIND THE RECIPROCAL OF THE FOLLOWING NUMBERS

1.  $\frac{4}{9}$

2. 5

3.  $\frac{2}{5}$

4.  $\frac{1}{7}$

5. 11

6.  $1\frac{2}{3}$

7.  $\frac{4}{11}$

8.  $\frac{1}{4}$

9.  $\frac{1}{20}$

10.  $\frac{8}{9}$

11.  $5\frac{4}{9}$

12.  $6\frac{1}{4}$

13. 14

14.  $\frac{7}{8}$

15. 18

16.  $2\frac{7}{16}$

17.  $7\frac{1}{6}$

18. 7

19.  $\frac{12}{13}$

20.  $8\frac{2}{3}$

21.  $\frac{2}{15}$

22.  $\frac{4}{21}$

23. 36

24.  $5\frac{3}{4}$

25.  $16\frac{7}{9}$

26.  $9\frac{2}{3}$

27. 4

28.  $4\frac{1}{3}$

29. 12

30.  $\frac{7}{15}$

*DIVIDE USING THE RECIPROCAL*

1.  $\frac{11}{5} \div \frac{20}{3}$

5.  $\frac{1}{3} \div \frac{3}{2}$

9.  $\frac{1}{5} \div \frac{3}{2}$

2.  $\frac{1}{8} \div \frac{11}{7}$

6.  $\frac{2}{5} \div \frac{7}{9}$

10.  $\frac{11}{10} \div \frac{5}{3}$

3.  $\frac{1}{5} \div \frac{9}{8}$

7.  $\frac{1}{8} \div \frac{7}{5}$

11.  $\frac{7}{5} \div \frac{20}{3}$

4.  $\frac{4}{7} \div \frac{5}{4}$

8.  $\frac{1}{5} \div \frac{14}{9}$

12.  $\frac{3}{5} \div \frac{7}{3}$

# DIVISION OF FRACTIONS

## METHOD 3: THE "SANDWICH" METHOD

$$x \left( \frac{3}{4} \right) \times \left( \frac{7}{8} \right) = \frac{3 \times 8}{4 \times 7}$$

1. Write the fractions as numerator and denominator of another fraction. That is, put the first fraction on top, draw a line, and put the other fraction on the bottom.
2. Multiply the outer digits: this is the numerator.
3. Multiply the inner digits: this is the denominator.

$$x \left( \frac{a}{b} \right) \times \left( \frac{c}{d} \right) = \frac{a \times d}{b \times c}$$

*DIVIDE USING THE SANDWICH METHOD*

1.  $\frac{6}{5} \div \frac{17}{3}$

5.  $\frac{13}{9} \div \frac{5}{2}$

9.  $\frac{7}{4} \div \frac{18}{5}$

2.  $\frac{1}{3} \div \frac{1}{2}$

6.  $\frac{13}{9} \div \frac{9}{4}$

10.  $\frac{3}{7} \div \frac{10}{3}$

3.  $\frac{10}{9} \div \frac{7}{2}$

7.  $\frac{4}{9} \div \frac{11}{5}$

11.  $\frac{1}{3} \div \frac{3}{2}$

4.  $\frac{5}{4} \div \frac{13}{9}$

8.  $\frac{1}{3} \div \frac{13}{2}$

12.  $\frac{6}{5} \div \frac{13}{6}$



# DIVISION OF MIXED NUMBERS

## CONVERTING MIXED NUMBERS TO FRACTIONS

$$6\frac{2}{3} = \frac{6 \times 3 + 2}{3} = \frac{18 + 2}{3} = \frac{20}{3}$$

$$1\frac{1}{3} = \frac{1 \times 3 + 1}{3} = \frac{3 + 1}{3} = \frac{4}{3}$$

## DIVIDING MIXED NUMBERS

1. Convert any mixed numbers to improper fractions.
2. Divide fractions using method of your choice.

On the following example, the “*reciprocal*” method is used:

$$\begin{aligned}
 9 \div 2\frac{7}{10} &= \frac{9}{1} \div \frac{27}{10} && \text{First, rewrite all mixed numbers as} \\
 &&& \text{improper fractions.} \\
 &= \frac{\cancel{9}^1}{1} \times \frac{10}{\cancel{27}_3} && \text{Then, invert and multiply.} \\
 &= \frac{10}{3}, \text{ or } 3\frac{1}{3}
 \end{aligned}$$

1.  $7\frac{1}{2} \div 1\frac{3}{5}$

5.  $3\frac{3}{4} \div 2\frac{6}{7}$

9.  $3\frac{1}{5} \div 1\frac{1}{5}$

2.  $2\frac{2}{3} \div 2\frac{1}{4}$

6.  $2\frac{1}{2} \div 2\frac{1}{2}$

10.  $4\frac{1}{2} \div 2\frac{2}{7}$

3.  $1\frac{1}{2} \div 5\frac{2}{3}$

7.  $3\frac{1}{3} \div 1\frac{3}{4}$

11.  $9\frac{1}{2} \div 2\frac{3}{8}$

4.  $2\frac{5}{6} \div 4\frac{1}{2}$

8.  $1\frac{1}{7} \div 2\frac{2}{9}$

12.  $1\frac{8}{9} \div 2\frac{2}{3}$

1)  $3\frac{7}{8} \div 5\frac{5}{8}$

2)  $10\frac{4}{9} \div 2\frac{4}{7}$

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

4)  $1\frac{1}{4} \div 8$

5)  $4\frac{3}{5} \div 1\frac{1}{4}$

6)  $3\frac{1}{2} \div 4\frac{4}{5}$

7)  $\frac{3}{5} \div 2\frac{3}{7}$

8)  $3\frac{1}{3} \div 1\frac{3}{8}$

9)  $5\frac{5}{6} \div 3\frac{8}{9}$

10)  $4\frac{1}{3} \div 3\frac{9}{10}$

11)  $\frac{1}{6} \div 1\frac{1}{4}$

12)  $4\frac{3}{5} \div 4\frac{1}{3}$

13)  $4\frac{1}{3} \div 3\frac{5}{7}$

14)  $2\frac{1}{3} \div 1\frac{1}{6}$

15)  $3\frac{3}{4} \div 4\frac{1}{2}$

16)  $4\frac{2}{3} \div 2\frac{1}{8}$

17)  $4\frac{7}{8} \div 1\frac{7}{8}$

18)  $5\frac{1}{4} \div 4\frac{1}{3}$

19)  $1\frac{1}{6} \div 7\frac{1}{4}$

20)  $\frac{1}{2} \div 4\frac{4}{5}$

## DIVISION OF FRACTIONS AND WHOLE NUMBERS

$$\frac{9}{17} \div 3$$

$$\begin{aligned}\frac{9}{17} \div 3 &= \frac{9}{17} \div \frac{3}{1} = \frac{9}{17} \times \frac{1}{3} = \frac{9 \times 1}{17 \times 3} \\ &= \frac{9}{51} = \frac{9 \div 3}{51 \div 3} = \frac{3}{17}\end{aligned}$$

Remember that every whole number IS a fraction with a denominator of 1. To divide, convert every whole number into a fraction, and then divide using the method of your choice.

$$1\frac{2}{7} \div 5$$

$$\begin{aligned}1\frac{2}{7} \div 5 &= \frac{9}{7} \div \frac{5}{1} = \frac{9}{7} \times \frac{1}{5} \\ &= \frac{9 \times 1}{7 \times 5} = \frac{9}{35}\end{aligned}$$

1 )  $4 \div \frac{2}{3} =$

2 )  $\frac{3}{4} \div 14 =$

3 )  $19 \div \frac{1}{7} =$

4 )  $\frac{5}{7} \div 19 =$

5 )  $19 \div \frac{1}{3} =$

6 )  $\frac{2}{3} \div 13 =$

7 )  $\frac{2}{3} \div 17 =$

8 )  $\frac{3}{4} \div 7 =$

9 )  $\frac{1}{2} \div 14 =$

10 )  $\frac{2}{6} \div 11 =$

11 )  $17 \div \frac{5}{10} =$

12 )  $\frac{3}{6} \div 15 =$

13 )  $\frac{1}{4} \div 14 =$

14 )  $\frac{3}{4} \div 8 =$

15 )  $12 \div \frac{2}{6} =$

1.  $\frac{1}{3} \div \frac{19}{8}$

5.  $20 \div \frac{4}{5}$

9.  $\frac{5}{8} \div \frac{15}{7}$

2.  $\frac{13}{5} \div \frac{2}{7}$

6.  $\frac{3}{5} \div \frac{7}{5}$

10.  $4 \div \frac{1}{2}$

3.  $4 \div \frac{7}{3}$

7.  $\frac{1}{3} \div \frac{10}{7}$

11.  $7 \div \frac{4}{5}$

4.  $\frac{7}{9} \div \frac{7}{3}$

8.  $\frac{10}{3} \div \frac{13}{9}$

12.  $1 \div \frac{8}{5}$

# DIVISION OF 3 OR MORE FRACTIONS

When dividing three or more fractions:

## IF USING CROSS-MULTIPLICATION or THE SANDWICH METHOD

- Divide from left to right.
- Divide the first 2 fractions using any of the two methods mentioned above.
- Once you get a result, divide it by the NEXT fraction.
- Repeat this process until the last fraction is divided.

## YOU CAN USE THE RECIPROCAL

- When using the reciprocal, keep the first fraction the same.
- Change all division signs to multiplication signs.
- Multiply the first fraction by the RECIPROCAL of each of the other fractions.
- REMEMBER: To multiply fractions, multiply numerators by numerators, and denominators with denominators.
- Look at the following example:

$$\frac{12}{7} \div \frac{3}{2} \div \frac{10}{9}$$
$$\frac{12}{7} \times \frac{2}{3} \times \frac{9}{10}$$

1.  $\frac{2}{3} \div \left( \frac{5}{2} \div \frac{5}{8} \right)$

4.  $\frac{8}{7} \div \frac{4}{7} \div \frac{19}{6}$

7.  $\frac{19}{7} \div \frac{19}{7} \div \frac{11}{6}$

2.  $\frac{17}{10} \div \frac{1}{2} \div \frac{13}{2}$

5.  $\frac{4}{3} \div \left( \frac{11}{3} \div \frac{3}{4} \right)$

8.  $\frac{17}{9} \div \frac{8}{9} \div \frac{17}{8}$

3.  $\frac{7}{2} \div \frac{7}{5} \div \frac{13}{5}$

6.  $\frac{10}{3} \div \left( \frac{11}{2} \div \frac{8}{5} \right)$

9.  $\frac{9}{4} \div \frac{9}{7} \div \frac{9}{2}$



1.  $\frac{11}{4} \div \frac{13}{3} \div \frac{11}{7}$

4.  $\frac{15}{8} \div \left( \frac{17}{7} \div 2 \right)$

7.  $\frac{9}{4} \div \left( \frac{12}{5} \div \frac{10}{9} \right)$

2.  $\frac{5}{3} \div \frac{4}{7} \div \frac{13}{6}$

5.  $\frac{4}{5} \div \left( \frac{10}{3} \div \frac{7}{2} \right)$

8.  $\frac{5}{8} \div \frac{3}{10} \div 4$

3.  $\frac{6}{5} \div \frac{13}{6} \div 2$

6.  $\frac{2}{7} \div \frac{10}{3} \div \frac{1}{5}$

9.  $\frac{11}{4} \div \left( \frac{15}{2} \div \frac{7}{2} \right)$

1.  $9\frac{1}{2} \div 3\frac{1}{3} \div 1\frac{3}{5}$

4.  $2\frac{2}{9} \div \left(4\frac{1}{2} \div 4\frac{3}{4}\right)$

7.  $1\frac{1}{4} \div 1\frac{3}{10} \div 3\frac{3}{4}$

2.  $5\frac{1}{2} \div \left(5\frac{2}{3} \div 1\frac{1}{2}\right)$

5.  $1\frac{3}{7} \div \left(3\frac{2}{3} \div 1\frac{3}{8}\right)$

8.  $3\frac{3}{4} \div \left(7\frac{1}{2} \div 1\frac{2}{3}\right)$

3.  $3\frac{4}{5} \div 3\frac{1}{2} \div 3\frac{1}{5}$

6.  $1\frac{3}{5} \div \left(1\frac{3}{4} \div 1\frac{1}{4}\right)$

9.  $4\frac{1}{3} \div 1\frac{1}{10} \div 1\frac{1}{3}$

## Fraction Word Problems (Multiplication/Division)

When solving word problems, make sure to UNDERSTAND THE QUESTION. Look for bits of information that will help get to the answer. Keep in mind that some sentences may not have key words or key words might even be misleading. USE COMMON SENSE when thinking about how to solve word problems. The first thing you think of might be the best way to solve the problem.

Here are some KEY WORDS to look for in word problems:

Product, times: mean to multiply

Quotient, per, for each, average: mean to divide

Ex. 1: If 3 boxes of candy weigh  $6\frac{1}{2}$  pounds, find the weight per box.

"per" means to divide

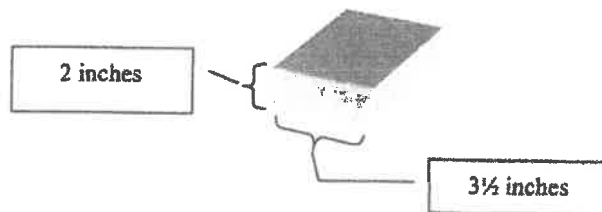
$$6\frac{1}{2} \div 3 = \frac{13}{2} \div \frac{3}{1} = \frac{13}{2} \times \frac{1}{3} = \frac{13}{6} = 2\frac{1}{6} \text{ pounds}$$



Ex. 2: If one "2 by 4" is actually  $3\frac{1}{2}$  inches wide, find the width of twelve "2 by 4"s.

$$3\frac{1}{2} \times 12 = \frac{7}{2} \times \frac{12}{1} = 42 \text{ inches}$$

twelve 2" by 4"s here means 12 times as wide as one 2" by 4"



### Fraction Word Problems (Multiplication/Division)

Solve the following fraction word problems. Cancel and simplify your answers.

1. A stack of boards is 21 inches high. Each board is  $1\frac{3}{4}$  inches thick. How many boards are there?
  
  
  
  
  
  
  
  
  
  
2. A satellite makes 4 revolutions of the earth in one day. How many revolutions would it make in  $6\frac{1}{2}$  days?
  
  
  
  
  
  
  
  
  
  
3. A bolt has  $16\frac{1}{2}$  turns per inch. How many turns would be in  $2\frac{1}{2}$  inches of threads?
  
  
  
  
  
  
  
  
  
  
4. If a bookshelf is  $28\frac{1}{8}$  inches long, how many  $1\frac{7}{8}$  inch thick books will it hold?
  
  
  
  
  
  
  
  
  
  
5. Deborah needs to make 16 costumes for the school play. Each costume requires  $2\frac{1}{4}$  yards of material. How many yards of material will she need?

Name \_\_\_\_\_

Date \_\_\_\_\_

**Products of Fractions and Mixed Numbers Word Problems -  
Independent Practice Worksheet**

Complete all the problems and answer as a whole number.

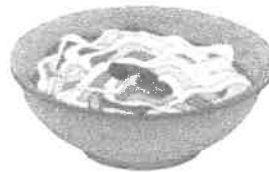
1. Collins made orange and guava candy. She made enough orange candy to fill 5 jars. If she made  $\frac{2}{3}$  as much guava candy as orange candy, how many jars will the guava candy fill?



2. There were 4 people in the room. Each has  $\frac{3}{5}$  of a bottle ink left. How many markers worth of ink were there in the room?



3. Carol and Maggie made pasta. Maggie made enough to fill 4 plates. If Carol made  $\frac{2}{3}$  as much pasta as Maggie, how many plates will the pasta fill?



4. Anthony and Ronald went fishing in the sea. Anthony caught 5 fish and Ronald caught  $\frac{3}{4}$  times as many as Anthony. How many fish did Ronald catch?



5. Mary organizes a birthday party for her daughter. There were 7 children who did not get cake, so she gave  $\frac{4}{5}$  of a piece of cake to each of them. How many total pieces did she distribute?



5. Sean used  $\frac{3}{4}$  cup of sugar to make a dozen brownies. How many sugar is in each brownie?
6. A gasoline pump delivers  $4\frac{2}{5}$  gallons of gas per minute. How many minutes will it take to fill a gas tank that holds  $16\frac{1}{2}$  gallons?
7. Six Flags Amusement Park has found that  $\frac{3}{5}$  of its customers ride the Colossus roller coaster. Of these,  $\frac{1}{4}$  ride it again. What fraction of the customers ride the roller coaster twice?
8. Bill earned \$45 at Happy Days Drive-In. He spent  $\frac{1}{3}$  of the money on gas for his car and  $\frac{1}{5}$  of it on flowers for his girlfriend. How much money does he have left for the big date?

Name \_\_\_\_\_ Period \_\_\_\_\_ Date \_\_\_\_\_

## Multiplying and Dividing with Fractions Word Problems

1. Mrs. Smith bought  $3\frac{1}{2}$  yards of yellow fabric. She used  $\frac{2}{3}$  of the fabric to make a chicken costume. How much fabric did she use?
2. Julie studied for  $3\frac{1}{3}$  hours during the 4 days before her last math test. If she studied for the same amount of time each day, how much time did she spend studying each day?
3. An aquarium holds  $6\frac{1}{4}$  gallons of water. The water level dropped to  $\frac{4}{5}$  of this amount. How much water should be added to full the aquarium?
4. A piece of plywood 24 inches wide is cut into strips  $2\frac{1}{2}$  inches wide. How many strips of this width can be cut?

Name \_\_\_\_\_

Date \_\_\_\_\_

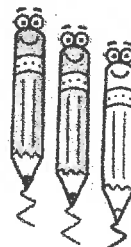
6. Anthony made 6 bouquets. If he used  $\frac{3}{4}$  of a bunch of flowers for each bouquet, how many flower bunches did he need?



7. George made white bread and wheat bread for the breakfast. He used  $\frac{5}{6}$  of the butter on white bread and the rest on the wheat bread. He used 7 sticks of butter in total. How many sticks of butter did he use on the white bread?



8. In school Carol completed  $\frac{2}{3}$  of a card during drawing period. She still has to make 5 cards. In how many periods will she need to complete all the cards?



9. Robinson made peanut butter cookies. He used  $\frac{4}{5}$  of a cup of peanut butter for each batch of cookies. If he has 8 cups of peanut butter, how many batches of cookies can he make?



10. Jennifer cooked vegetable soup for dinner.  $\frac{3}{5}$  of a cup of vegetables are used to make a cup of soup. How many cups of vegetables will she need to make 6 cups of soup?





**ORDER OF OPERATIONS – BEDMAS**

$$\left(\frac{3}{5} + \frac{3}{8}\right) \times \left(\frac{3}{4} - \frac{2}{3} \div \frac{8}{9}\right)$$

$$\frac{5}{6} \times \left(\frac{2}{5} \div \frac{3}{5} - \frac{1}{9} + \frac{2}{9}\right)$$

$$\left(\frac{5}{8} + \frac{1}{2} \div \frac{1}{3} - \frac{2}{5}\right) \times \frac{8}{9}$$

$$\left(\frac{4}{9} + \frac{1}{6} - \frac{2}{5} \times \frac{1}{9}\right) \div \frac{4}{5}$$

**ORDER OF OPERATIONS – BEDMAS**

$$\left(\left(\frac{3}{4} - \frac{3}{8}\right) \times \frac{7}{9}\right) \div \left(\frac{5}{6} + \frac{1}{3} + \frac{1}{2}\right)$$

$$\left(\left(\frac{2}{9} + \frac{4}{9}\right) \div \frac{1}{6}\right) \times \frac{7}{8} - \frac{1}{5} \times \frac{5}{6}$$

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

$$\left(\frac{2}{3} + \frac{2}{9}\right) \div \frac{5}{8} - \frac{5}{9} \times \left(\frac{5}{6} + \frac{1}{6}\right)$$

**ORDER OF OPERATIONS – BEDMAS**

$$\left(\frac{1}{2} \times \frac{1}{6}\right) \div \left(\frac{8}{9} + \frac{2}{9} - \frac{4}{9} - \frac{5}{9}\right)$$

$$\left(\left(\frac{7}{8} - \frac{1}{4}\right) \times \frac{8}{9}\right) \div \left(\frac{1}{9} + \frac{3}{8} + \frac{3}{4}\right)$$

$$\left(\frac{8}{9} + \frac{1}{2}\right) \times \frac{3}{5} - \frac{5}{9} \div \left(\frac{2}{3} + \frac{4}{9}\right)$$

$$\left(\frac{1}{6} \times \left(\frac{3}{4} + \frac{2}{3}\right)\right) \div \frac{5}{6} - \frac{2}{9} \div \frac{8}{9}$$

**ORDER OF OPERATIONS - BEDMAS**

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

$$6 \left( \frac{4}{3} \left(1 + \frac{1}{7}\right) \right) \div \frac{13}{10}$$

$$\left(1 - \frac{3}{4}\right) \times \frac{3}{7} \times 2$$

$$\frac{1}{2} \div \left(\frac{10}{7} \times 2\frac{5}{6}\right) \times 1\frac{3}{8}$$

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

$$\left(4\frac{9}{10} - 1\right)^3 \div 2\frac{1}{6}$$

$$\frac{1}{6} + \frac{1}{2} \times \left(2 - \frac{2}{3}\right) =$$

$$2 - \frac{1}{4} + \frac{1}{2} \times \frac{1}{4} =$$

$$4 \times \left(\frac{1}{2} + \frac{2}{8} \div \frac{1}{2}\right) =$$

$$\left(\frac{4}{2} - \frac{1}{2}\right) + 1) \times \frac{1}{2} =$$

$$\frac{1}{3} \times (7 - 1) =$$

$$\frac{4}{6} - \left(\frac{2}{3} - \frac{1}{6}\right) =$$