

Operations with Fractions and Decimals Add/Sub/Mult/Div

Multiplication rules

1. Put all MIXED NUMBERS in IMPROPER FORM.
2. Reduce all fractions before multiplying
3. Multiply the numerator times the numerator and the denominator times the denominator.

Example:

$$\frac{1}{2} \cdot \frac{4}{8} = \frac{1 \cdot 2 \cdot 2}{2 \cdot 2 \cdot 2 \cdot 2} = \frac{1}{4}$$

Examples:

$$1\frac{1}{2} \cdot 2\frac{1}{3} = \frac{3}{2} \cdot \frac{7}{3} = \frac{7}{2} = 3\frac{1}{2}$$

To Multiply decimals numbers:

$0.4(2.8) = 1.12$	Multiply the numbers, then count the number of decimal places.
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Division rules

1. CHANGE division sign to a multiplication sign.
2. Write the RECIPROCAL of the divisor (2nd number).
3. Follow the multiplication rules.

Example:

$$\frac{1}{2} \div \frac{1}{6} = \frac{1}{2} \cdot \frac{6}{1} = \frac{2 \cdot 3}{2} = \frac{3}{1} = 3$$

Example:

$$2\frac{1}{2} \div 2\frac{1}{3} = \frac{5}{2} \div \frac{7}{3} = \frac{5}{2} \cdot \frac{3}{7} = \frac{15}{14}$$

To **DIVIDE** decimal numbers:

<ol style="list-style-type: none">1. Move the decimal point in the divisor so that it becomes a whole number.2. Move the decimal point in the dividend the same number of places to the right3. Divide as if working with whole numbers. Write the decimal point in the answer directly above the decimal point in the dividend.	$\begin{array}{r} 0.06 \overline{) 1.8072} \\ \underline{30.12} \\ 6 \overline{) 180.72} \end{array}$
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Addition and subtraction rules

1. Must have a common denominator
2. Add or subtract numerators only
3. Denominator remains the same
4. Reduce to lowest terms
5. When adding or subtracting mixed numbers
 - a. Add or subtract whole numbers
 - b. With addition and subtraction extra step (carrying or borrowing) may be needed
 - c. Answers must always be in lowest terms

Example: $\frac{1}{4} + \frac{2}{3} = \frac{1}{4} \left(\frac{3}{3} \right) + \frac{2}{3} \left(\frac{4}{4} \right) = \frac{3}{12} + \frac{8}{12} = \frac{3+8}{12} = \frac{11}{12}$

Step 1: Find the LCD of 4 & 3

$$\begin{array}{r} 4: 2 \cdot 2 \\ 3: \quad 3 \\ \hline \text{LCD} : 2 \cdot 2 \cdot 3 = 12 \end{array}$$

I need to change my denominator to 12. So I need to multiply the first fraction by $\left(\frac{3}{3}\right)$ & the second fraction by $\left(\frac{4}{4}\right)$.

Examples:

Billy Joe and Bobby Sue both own sports cars. Both Billy Joe and Bobby Sue were bringing their cars in for an oil change. The mechanic filled each of their engines with premium oil. In Billy Joe's Corvette, the mechanic put $5\frac{2}{3}$ quarts of oil. In Bobby Sue's Mazda Miata, the mechanic put $4\frac{1}{2}$ quarts of oil. What is the total amount of oil that was put into their cars?

$$\begin{array}{r} 5\frac{2}{3} \\ + 4\frac{1}{2} \\ \hline 9\frac{7}{6} = 9 + 1\frac{1}{6} = 10\frac{1}{6} \quad (\text{carried } 1) \end{array}$$

Suzie Q. had braces then a retainer for a total of 5 years. She wore a retainer for $2\frac{1}{8}$ years after her braces were removed. How long did her friends call her metal mouth?

$$\begin{array}{r}
 5 = 4\frac{8}{8} \\
 - 2\frac{1}{8} = - 2\frac{1}{8} \\
 \hline
 2\frac{7}{8} = \text{(borrowed } 1 = \frac{8}{8}\text{)}
 \end{array}$$

Examples:

Add the following numbers: 2.046, 0.658 and 1.39.

Line up the decimals, fill in any needed zero, and add the columns.	$ \begin{array}{r} 2.046 \\ 0.658 \\ +1.390 \\ \hline 4.094 \end{array} $
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Subtract the following numbers: $10.8 - 3.52$

Line up the decimals, fill in any needed zeros and subtract the columns.	$ \begin{array}{r} 10.80 \\ -3.52 \\ \hline 7.28 \end{array} $
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