

Arithmetic Help Book 1 – The Tricky Fraction Stuff!

Multiplying a whole number by a fraction

The example: $12 \times \frac{3}{4}$

REMEMBER multiplying (X) also means OF. So basically the question is asking 'What are $\frac{3}{4}$ of 12. And to do that, we 'Divide the whole number by the bottom (denominator) and times by the top (numerator)'

So $12 \div 4 = 3 \times 3 = 9$. $\frac{3}{4}$ of/x 12 is 9.

Multiplying a whole number by a mixed number fraction

The example: $12 \times 2\frac{3}{4}$

1. Multiply the whole numbers first: $12 \times 2 = 24$.
2. Then, like above, find $\frac{3}{4}$ of/x 12. $12 \div 4 = 3 \times 3 = 9$. $\frac{3}{4}$ of/x 12 is 9.
3. Finally add the two whole numbers together. $24 + 9 = 33$.

So, $12 \times 2\frac{3}{4} = 33$.

Multiplying fractions

The example: $\frac{2}{5} \times \frac{3}{4}$

EASY!! Multiply the top two numbers. Multiply the bottom two numbers:

$$2 \times 3 = 6$$

$$5 \times 4 = 20$$

Meaning your answer is $\frac{6}{20}$. Then check to see if you can simplify the fraction by dividing BOTH the top number and the bottom number by the same (highest possible common) factor. 6 and 20 can both be divided by 2 so the simplified answer is $\frac{3}{10}$.

Dividing a fraction by a whole number

The example: $\frac{1}{4} \div 5$

1. Turn the whole number into an improper fraction $\frac{5}{1}$
2. Then turn this fraction upside down $\frac{1}{5}$

3. Then turn the divide sign into a multiply:

$$\frac{1}{4} \times \frac{1}{5}$$

4. Finally, multiply the two top numbers and then multiply the two bottom numbers.

$$1 \times 1 = 1$$

$$4 \times 5 = 20$$

Therefore your final answer is $\frac{1}{20}$. It can't be simplified any further as the top number (numerator) is 1.

Adding Fractions with the same denominators

The example:

$$\frac{3}{5} + \frac{1}{5}$$

This is very easy because the denominators are the same (common).

Therefore, you simply add the two numerators and LEAVE THE DENOMINATOR THE SAME.

$$3 + 1 = 4$$

So the answer is $\frac{4}{5}$. Always check to see if it can be simplified. In this case, it can't.

Adding Fractions with different denominators

The example:

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

This is harder because the denominators are different. So you have to make the **denominators common**. This means finding a multiple of both denominators.

Strategy 1: Use your times tables knowledge!

Strategy 2: Start with the larger of the 2 denominators and count up in that amount until you reach a number both denominators go in to. 4....8....12 Bingo!

Strategy 3: Multiply the two denominators together. $3 \times 4 = 12$

Now you have to make the original fractions equivalent to fractions with 12 as a denominator.

$\frac{1}{3} = \frac{4}{12}$ because in order to change the denominator from 3 to 12 you multiplied by 4 so you have to do the same to the numerator in order to keep it equivalent.

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So, like the section above, add the numerators together and KEEP THE DENOMINATOR THE SAME:

$\frac{4}{12} + \frac{3}{12} = \frac{7}{12}$ as 7 is a prime number then this fraction can't be simplified so this is the final answer.

Adding Fractions and the final answer is improper.

The example: $\frac{2}{3} + \frac{3}{4}$

Now with a common denominator $\frac{8}{12} + \frac{9}{12}$

The answer this time is $\frac{17}{12}$. This is improper which means your fraction is bigger than 1 whole. Answers shouldn't be left improper so you simply calculate how many wholes you've got by seeing how many times the bottom number goes into the top. If there is a remainder, this becomes a fraction with the whole number, using the same denominator.

So 12 goes into 17 once, with 5 left over meaning the answer is: $1 \frac{5}{12}$ which can't be simplified any further as 5 is prime.

Subtracting Fractions with the same denominators

The example: $\frac{3}{5} - \frac{1}{5}$

This is very easy because the denominators are the same (common).

Therefore, you simply subtract the two numerators and LEAVE THE DENOMINATOR THE SAME.

$$3 - 1 = 2$$

So the answer is $\frac{2}{5}$. Always check to see if it can be simplified. In this case, it can't.

Subtracting Fractions with different denominators

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So, like the section above, subtract the numerators and KEEP THE DENOMINATOR THE SAME:

$\frac{4}{12} - \frac{3}{12} = \frac{1}{12}$ this can't be simplified so this is the final answer.

FOR ADDITION AND SUBTRACTION, IF YOU HAVE MIXED NUMBER FRACTIONS, ALWAYS DEAL WITH THE WHOLE NUMBER FIRST, THEN DO THE FRACTION PART.

Addition

E.G. $2\frac{2}{3} + 1\frac{1}{6}$ would become $2\frac{4}{6} + 1\frac{1}{6} = 3\frac{5}{6}$ if your answer contains an improper fraction, do as you did above and add the whole number(s) onto the existing whole number e.g. $3\frac{7}{6} = 4\frac{1}{6}$

Subtraction

E.G. $2\frac{2}{3} - 1\frac{1}{6}$ would become $2\frac{4}{6} - 1\frac{1}{6} = 1\frac{3}{6}$ or simplified, $1\frac{1}{2}$

If the fraction in the first mixed number fraction isn't big enough to subtract the second fraction, turn one of the whole numbers into a fraction with the same numerator and denominator and then add it to the fraction

e.g. $3\frac{1}{3} - 1\frac{2}{3} = 2\frac{3}{3} + \frac{1}{3} - 1\frac{2}{3}$ so now subtract the whole numbers $2 - 1 = 1$.

Then the fractions $\frac{3}{3} + \frac{1}{3} = \frac{4}{3} - \frac{2}{3} = \frac{2}{3}$ The final answer is $1\frac{2}{3}$

Subtracting Mixed Number Fractions with different denominators

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So, like the section above, add the numerators together and KEEP THE DENOMINATOR THE SAME:

$\frac{4}{12} - \frac{3}{12} = \frac{1}{12}$ This can't be simplified so this is the final answer.