Fraction Top Tips

Ordering fractions

Example 1

2 , 3 , 1

15 5   3

1) Find a common denominator – what is the lowest number they all divide exactly into? 15, 5 and 3 all divide exactly into 15

2) Multiply each fraction so that 15 is the denominator (bottom number)

Remember: Whatever you do to the top, you have to do to the bottom

2/15 will stay the same

$$\frac{3}{5} \xrightarrow{\times 3} = \frac{9}{15}$$

$$\frac{1}{3} \xrightarrow{\times 5} = \frac{5}{15}$$

You now have 2/15, 9/15, 5/15

3) Ordering in ascending order means going up, so smallest to biggest. Look at the numerators (top numbers) and put them in size order smallest first.

2 , 5 , 9   or with the original fractions   2 , 1 , 3

15 15   15   15   3   5

4) Putting in descending order means going down, so biggest to smallest. Look at the numerators and put them in size order with the largest number first.

9 , 5 , 2   or with the original fractions   3 , 1 , 2

15 15   15   5   3   15

Example 2

$\dfrac{5}{6}$, $\dfrac{2}{9}$, $\dfrac{1}{3}$

1) Find a common denominator – what is the lowest number they all divide exactly into?
6, 9 and 3 all divide exactly into 18

2) Multiply each fraction so that 18 is the denominator (bottom number)

Remember: Whatever you do to the top, you have to do to the bottom!

X 3		X 2		X 6
$\dfrac{5}{6}$ $= \dfrac{15}{18}$		$\dfrac{2}{9}$ $= \dfrac{4}{18}$		$\dfrac{1}{3}$ $= \dfrac{6}{18}$
X 3		X 2		X 6

You now have 15/18, 4/18, 6/18

3) Ordering in ascending order means going up, so put the numerators in size order smallest first.

$\dfrac{4}{18}$, $\dfrac{6}{18}$, $\dfrac{15}{18}$ or with the original fractions $\dfrac{2}{9}$, $\dfrac{1}{3}$, $\dfrac{5}{6}$

4) Putting in descending order means going down, so look at the numerators and put them in size order with the largest number first.

$\dfrac{15}{18}$, $\dfrac{6}{18}$, $\dfrac{4}{18}$ or with the original fractions $\dfrac{5}{6}$, $\dfrac{1}{3}$, $\dfrac{2}{9}$

Example 3

Sometimes it is easier and quicker to convert each fraction into a decimal and then order them based on their decimal equivalence.

For example if you had to order $\frac{3}{4}$, 2/10 and $\frac{1}{2}$ as decimals this would be 0.75, 0.2 and 0.5

Ascending order: 0.2, 0.5, 0.75   or   2/10, $\frac{1}{2}$, $\frac{3}{4}$

Descending order: 0.75, 0.5, 0.2   or $\frac{3}{4}$, $\frac{1}{2}$, 2/10

Fraction Top Tips

Converting improper fractions to mixed numbers

An improper fraction is a top heavy fraction where the numerator is bigger than the denominator

Example 1

$\frac{14}{3}$ is an improper fraction which means 14 ÷ 3

1) To convert to a mixed number solve the number sentence 14 ÷ 3 = 4 r2

2) Put the remainder over the denominator (what you are dividing by) to get 4 2/3

3) 4 2/3 is a mixed number as it contains a whole number and a fraction

Example 2

Example: Convert $\frac{11}{4}$ to a mixed fraction.

Divide:

➡ 11 ÷ 4 = 2 with a remainder of 3

Write down the 2 and then write down the remainder (3) above the denominator (4).

Answer:

$$2\frac{3}{4}$$

That example can be written like this:

$$\frac{11}{4} = 11 \div 4 = 2\ R\ 3$$
$$= 2\frac{3}{4}$$

Example 3

Example: Convert $\frac{10}{3}$ to a mixed fraction.

$$\frac{10}{3} = 10 \div 3 = 3\ R\ 1$$
$$= 3\frac{1}{3}$$

Answer:

$$3\frac{1}{3}$$

Converting mixed numbers to improper fractions

A mixed number is made up of a whole number and a fraction

Example 1

4 2/3 is a mixed number as 4 is the whole number and 2/3 is the fraction

1) To convert to an improper fraction multiply the whole number by the denominator so 4 x 3 = 12

2) Add on the numerator so 12 + 2 = 14

3) Put the answer over the denominator = 14/3

Example 2

Example: Convert $3\frac{2}{5}$ to an improper fraction.

Multiply the whole number part by the denominator:

➡ 3 x 5 = 15

Add that to the numerator:

➡ 15 + 2 = 17

Then write that result above the denominator:

$$\frac{17}{5}$$

We can do the numerator in one go:

Example 3

Example: Convert $2\frac{1}{9}$ to an improper fraction.

Calculating with Fractions - Top Tips

Adding fractions with the same denominator

$\underline{3}$ + $\underline{2}$

8   8

1) If the denominators are the same, then simply add the numerators together (3 + 2 = 5)

2) The denominator stays the same (8)

$\underline{3}$ + $\underline{2}$ = $\underline{5}$

8   8   8

Adding fractions with different denominators

Example 1

$\underline{1}$ + $\underline{5}$

4   12

1) Put over a common denominator, 4 and 12 both divide exactly into 12

2) Multiply ¼ so that 12 is the denominator (bottom number) whereas 5/12 will stay the same

Remember: Whatever you do to the top, you have to do to the bottom!

     X 3

$\underline{1}$ = $\underline{3}$

4   = 12

    X 3

3) Add the numerators together, but the denominator stays the same

$\underline{3}$ + $\underline{5}$ = $\underline{8}$

12   12   12

4) Simplify where possible - this answer can be simplified by dividing both numbers by 4 = $\underline{2}$

Example 2

$\underline{3}$ + $\underline{2}$

8   5

1) Put over a common denominator, 8 and 5 both divide exactly into 40 (multiply 8 and 5 together)

2) Multiply each fraction so the denominator (bottom number) is 40

Remember: Whatever you do to the top, you have to do to the bottom!

     X 5   X 8

$\underline{3}$ = $\underline{15}$ $\underline{2}$ = $\underline{16}$

8   = 40   5   = 40

    X 5   X 8

3) Add the numerators together, but the denominator stays the same

$\underline{15}$ + $\underline{16}$ = $\underline{31}$

40   40   40

4) Simplify where possible - this answer can't be simplified!

Adding mixed numbers and fractions

1 3/4 + 3/5

1) Convert the mixed number to an improper fraction first- multiply the whole number by the denominator, add the numerator and put back over the denominator

$1\frac{3}{4}$ = (1 x 4) + 3 = 7/4   so the calculation is now 7/4 + 3/5

2) Put over a common denominator, 4 and 5 both divide exactly into 20

2) Multiply each fraction so the denominator (bottom number) is 20

    X 5   X 4

$\underline{7}$ = $\underline{35}$ $\underline{3}$ = $\underline{12}$

4   = 20   5   = 20

    X 5   X 4

3) Add the numerators together, but the denominator stays the same

$\underline{35}$ + $\underline{12}$ = $\underline{47}$

20   20   20

4) Convert back to an improper fraction – 47 ÷ 20 = 2 r 7 = 2 7/20

Calculating with Fractions - Top Tips

Subtracting fractions with the same denominator

$\dfrac{4}{9} - \dfrac{2}{9}$

1) If the denominators are the same, then simply subtract the numerators (4 – 2 = 2)

2) The denominator stays the same (9)

$\dfrac{4}{9} - \dfrac{2}{9} = \dfrac{2}{9}$

Subtracting fractions with different denominators

Example 1

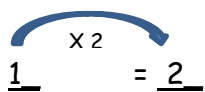$\dfrac{3}{4} - \dfrac{1}{2}$
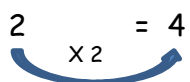
1) Put over a common denominator, 4 and 2 both divide exactly into 4

2) Multiply ½ so that 4 is the denominator (bottom number) whereas 3/4 will stay the same

Remember: Whatever you do to the top, you have to do to the bottom!

$\dfrac{1}{2} = \dfrac{2}{4}$

X 2 (top)   X 2 (bottom)

3) Subtract the numerators, but the denominator stays the same

$\dfrac{3}{4} - \dfrac{2}{4} = \dfrac{1}{4}$

4) Simplify where possible – this answer can't be simplified!

Example 2

2 - 3

3   7

1) Put over a common denominator, 3 and 7 both divide exactly into 21 (multiply 3 and 7 together)

2) Multiply each fraction so the denominator (bottom number) is 21

Remember: Whatever you do to the top, you have to do to the bottom!

X 7		X 3	
2 = 14		3 = 9	
3 = 21		7 = 21	
X 7		X 3	

3) Subtract the numerators, but the denominator stays the same

14 - 9 = 5

21   21   21

4) Simplify where possible

Subtracting mixed numbers and fractions

1 3/5 - 4/9

1) Convert the mixed number to an improper fraction first- multiply the whole number by the denominator, add the numerator and put back over the denominator

1 3/5 = (1 x 5) + 3 = 8/5   so the calculation is now 8/5 - 4/9

2) Put over a common denominator, 5 and 9 both divide exactly into 45

2) Multiply each fraction so the denominator (bottom number) is 20

X 9		X 5	
8 = 72		4 = 20	
5 = 45		9 = 45	
X 9		X 5	

3) Subtract the numerators, but remember the denominator stays the same

72 - 20 = 52

45   45   45

4) Convert back to an improper fraction – 52 ÷ 45 = 1 r 7 = 1 7/45

Calculating with Fractions - Top Tips

Multiplying fractions

Example 1

3 × 2

8   3

1) Multiply across – multiply the numerators together so 3 x 2 = 6

2) Multiply the denominators together so 8 x 3 = 24

3) Put together to get your answer

3 × 2 = 6

8 × 3   24

4) Simplify where possible – both numbers are divisible by 6, so you can simplify to ¼

Example 2

Example:

$$\frac{1}{2} \times \frac{2}{5}$$

Step 1. Multiply the top numbers:

$$\frac{1}{2} \times \frac{2}{5} = \frac{1 \times 2}{} = \frac{2}{}$$

Step 2. Multiply the bottom numbers:

$$\frac{1}{2} \times \frac{2}{5} = \frac{1 \times 2}{2 \times 5} = \frac{2}{10}$$

Step 3. Simplify the fraction :

$$\frac{2}{10} = \frac{1}{5}$$

With Pizza

Here you can see it with pizza ...

$$\frac{2}{5} \qquad \frac{1}{2} \times \frac{2}{5} \qquad \frac{2}{10} \qquad \frac{1}{5}$$

Do you see that half of two-fifths is two-tenths?
Do you also see that two-tenths is simpler as one-fifth?

Multiplying fractions by a whole number

Example 1

$\underline{4} \times 2$

9

1) The whole number of 2 can be written as a fraction as 2/1

2) $\underline{4} \times \underline{2}$

    9   1

3) Now multiply the numerators so 4 x 2 = 8

4) Multiply the denominators so 9 x 1 = 9

5) Put together to get your answer

$\underline{4} \times \underline{2} = \underline{8}$

9   1   9

6) Simplify where possible

Example 2

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

Make 5 into $\frac{5}{1}$:

$$\frac{2}{3} \times \frac{5}{1}$$

Now just go ahead as normal.

Multiply tops and bottoms:

$$\frac{2}{3} \times \frac{5}{1} = \frac{2 \times 5}{3 \times 1} = \frac{10}{3}$$

The fraction is already as simple as it can be.

$$\text{Answer} = \frac{10}{3}$$

Or you can just think of the whole number as being a "top" number:

Example:

$$3 \times \frac{2}{9}$$

Multiply tops and bottoms:

$$\frac{3}{1} \times \frac{2}{9} = \frac{3 \times 2}{9} = \frac{6}{9}$$

Simplify:

$$\frac{6}{9} = \frac{2}{3}$$

Multiplying mixed numbers by a whole number

1 2/5 × 3

1) First of all convert the mixed number into an improper fraction – multiply the whole number by the denominator and add on the numerator

1 2/5 = (1 × 5) + 2 = 7 so it becomes 7/5

2) Now turn the 3 into a fraction so it becomes 7/5 × 3/1

3) Multiply the numerators across so 7 × 3 = 21

4) Multiply the denominators across so 5 × 1 = 5

5) Put together to get your answer

<u>7</u> × <u>3</u> = <u>21</u>

5 ×   1   5

6) Simplify where possible and then it can be converted back into a mixed number

21/5 means 21 ÷ 5 = 4 r 1 and then put the remainder over the denominator so it becomes 4 1/5

<u>Example 2</u>   What is $1\frac{3}{8}$ × 3 ?

Think of Pizzas.

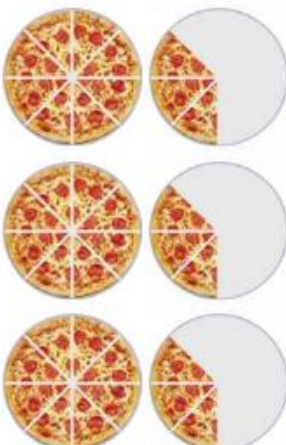$1\frac{3}{8}$ is 1 pizza and 3 eighths of another pizza.

First, convert the mixed fraction ($1\frac{3}{8}$) to an an improper fraction ($\frac{11}{8}$):

Cut the whole pizza into eighths and how many eighths do you have in total?

1 lot of 8, plus the 3 eighths = 8+3 = 11 eighths.

Now multiply that by 3:

$1\frac{3}{8} \times 3 = \frac{11}{8} \times \frac{3}{1} = \frac{33}{8}$

You have 33 eighths.

And, lastly, convert to a mixed fraction (only because the original fraction was in that form):

33 eighths is 4 whole pizzas (4×8=32) and 1 eighth left over.

And this is what it looks like in one line:

$$1\frac{3}{8} \times 3 = \frac{11}{8} \times \frac{3}{1} = \frac{33}{8} = 4\frac{1}{8}$$

Calculating with Fractions - Top Tips

Dividing a fraction by a whole number

Example 1

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

1) The numerator stays the same as 2

2) Multiply the denominator by the whole number, so 3 x 2 = 6

Numerator stays the same

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

x

Denominator multiplies by the whole number

4) Simplify where possible – 2/6 can be simplified to 1/3

Example 2

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

Step 1. Multiply the bottom number of the fraction by the whole number:

$$\frac{1}{2 \times 3}$$

Which equals:

$$\frac{1}{6}$$

Step 2. Fraction is already as simple as possible, so no need for step 2.

Answer:

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

Does it make sense?

Does $\frac{1}{2} \div 3$ really equal $\frac{1}{6}$?

Well look at the pizzas below ...

When half a pizza is divided into 3 equal parts, each person gets one sixth of a whole pizza.
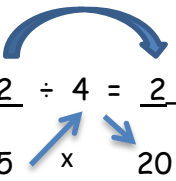
A Half: Divided by 3:

Answer:
$\frac{1}{6}$

<u>Example 3</u>

<u>2</u> ÷ 4

 5

1) The numerator stays the same as 2

2) The denominator multiplies with the whole number so 5 x 4 = 20

3) Put it together to get your answer

$\dfrac{2}{5}$ ÷ 4 = $\dfrac{2}{20}$ or it can be written as $\dfrac{2}{5 \times 4}$ = $\dfrac{2}{20}$

4) Simplify where possible – 2/20 can be simplified to 1/10

The children no longer need to know how to divide a fraction by a fraction as this used to be a Level 6 objective