7 Mathematics

Theory and exercises on equal fractions

2 March 2026

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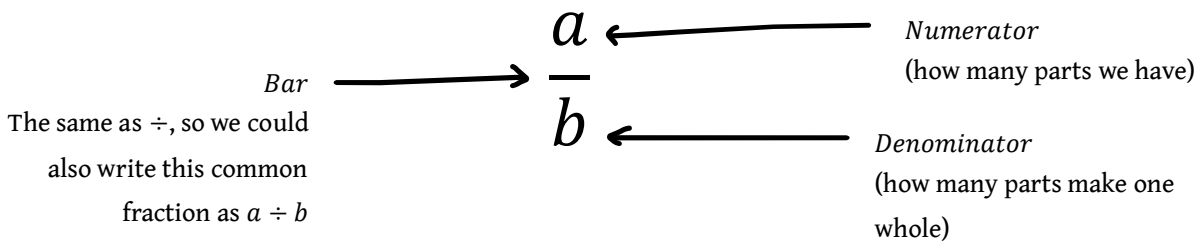
1 – When are two fractions 'equal?'

Recall the structure of a common fraction:



Let us say that we have 2 common fractions, $Fraction\ A$ and $Fraction\ B$:

$Fraction\ A$: $\frac{2}{4}$ $Fraction\ B$: $\frac{1}{2}$

We can only say that $Fraction\ A$ is *equal* to $Fraction\ B$ if:

They have the same 'value'

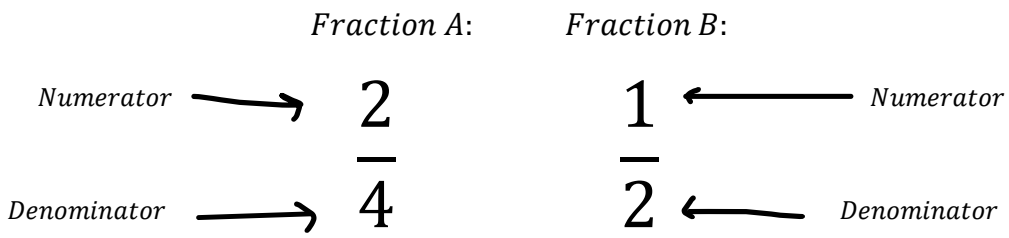
But what do we mean by the *'value'* of a fraction, and how do we find the *values* of $Fraction\ A$ and $Fraction\ B$?

We shall discuss this next:

The *value* of a fraction is

the result that we get when we divide the fraction's numerator by its denominator.

For instance, let us find the *values* of *Fraction A* and *Fraction B*:



1. The *value* of *Fraction A* is its numerator (2) divided by its denominator (4), so
   $2 \div 4$ which $= 0.5$
   So, the *value* of *Fraction A* is 0.5

2. The *value* of *Fraction B* is its numerator (1) divided by its denominator (2), so
   $1 \div 2$ which $= 0.5$
   So, the *value* of *Fraction B* is 0.5

So, it seems that the *value* of *Fraction A* is 0.5, and the *value* of *Fraction B* is also 0.5.

But remember, we say that two fractions are *equal* to each other if they have the same *value*.

Therefore, *Fraction A* = *Fraction B* = 0.5

$$\frac{2}{4} = \frac{1}{2} = 0.5$$

Questions for you, are the following fractions equal or unequal? And can you explain why?

a. $\frac{3}{6} = 3 \div 6 = 0.50$ and $\frac{5}{10} = 5 \div 10 = 0.50$

b. $\frac{2}{8} = 2 \div 8 = 0.25$ and $\frac{7}{10} = 7 \div 10 = 0.70$

c. $\frac{4}{5} = 4 \div 5 = 0.80$ and $\frac{8}{10} = 8 \div 10 = 0.80$

d. $\frac{20}{50} = 20 \div 50 = 0.40$ and $\frac{42}{60} = 42 \div 60 = 0.70$

e. $\frac{7}{9} = 7 \div 9 = 0.777 \ldots$ and $\frac{5}{10} = 5 \div 10 = 0.714285 \ldots$

2 – Finding equal fractions without a calculator

Let us change the numerators and denominators of $Fraction\ A$ and $Fraction\ B$:

$Fraction\ A$: $\frac{5}{6}$ $Fraction\ B$: $\frac{2}{7}$

Now, let us say that we want to determine whether $Fraction\ A$ and $Fraction\ B$ are still equal.

In other words, we want to know whether $Fraction\ A$ and $Fraction\ B$ have the same $value$. And recall, that we find the $value$ of a fraction using $numerator \div denominator$.

But,

$$it\ may\ be\ difficult\ to\ calculate$$

$$5 \div 6\ and\ 2 \div 7.$$

In this case, we can use a different method to determine whether $Fraction\ A$ and $Fraction\ B$ are equal.

This method is called

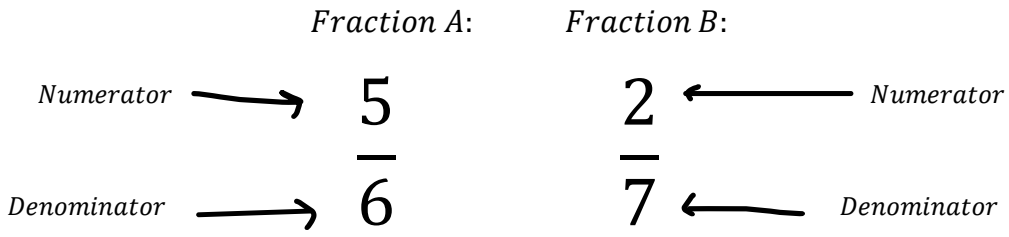
$$converting\ two\ fractions\ to\ their\ lowest\ common\ denominator.$$

But how do we *convert two fractions,*

like Fraction A and Fraction B,

to their lowest common denominator,

to see if they are equal?



1. Write down the *denominators* of *Fraction A* and *Fraction B*:

	Fraction A $\frac{5}{6}$	*Fraction B* $\frac{2}{7}$
Denominator	6	7

Questions for you. Can you perform this first step for the following pairs of fractions?

a. $\frac{5}{6}$ and $\frac{3}{4}$ b. $\frac{2}{5}$ and $\frac{3}{8}$

2. Find the *lowest possible number* that you could divide by *both* of the *denominators* that you wrote down - without a remainder.
For example, since the denominators of *Fraction A* and *Fraction B* are:

	Fraction A $\frac{5}{6}$	*Fraction B* $\frac{2}{7}$
Denominator	6	7

We need to find the *lowest possible number* that can be divided by 6 and can also be divided by 7 without a remainder.

Here is an easy way to do this:

a. Write down the *smaller* of the two denominators:

We have:

	$Fraction\ A\quad \frac{5}{6}$	$Fraction\ B\quad \frac{2}{7}$
$Denominator$	6	7

And because $6 < 7$, we will write:

6		

b. Multiply that smaller denominator by 2, and check if you can divide your answer by the bigger denominator without getting a remainder.

$6 \times 2 = 12$	$12 \div 7 = 1\ remainder\ 5$	×

If you get a remainder, like we did above, multiply the *denominator* by 3 instead, and repeat the steps:

$6 \times 2 = 12$	$12 \div 7 = 1\ remainder\ 5$	×
$6 \times 3 = 18$	$18 \div 7 = 2\ remainder\ 4$	×

Please see next page.

If you still get a remainder, multiply the smaller denominator by 4, 5, 6, 7 .... Continue to try until the result is a number with no remainder:

	$Fraction\ A\quad \frac{5}{6}$	$Fraction\ B\quad \frac{2}{7}$
$Denominator$	6	7

$6 \times 2 = 12$	$12 \div 7 = 1\ remainder\ 5$	×
$6 \times 3 = 18$	$18 \div 7 = 2\ remainder\ 4$	×
$6 \times 4 = 24$	$24 \div 7 = 3\ remainder\ 1$	×
$6 \times 5 = 30$	$30 \div 7 = 4\ remainder\ 2$	×
$6 \times 6 = 36$	$36 \div 7 = 5\ remainder\ 1$	×
$6 \times 7 = 42$	$42 \div 7 = 6$	YES

This means that the *lowest possible number* that can be divided by both 6 and 7 is 42. 42 is called *the lowest common denominator*, which we can reach by multiplying 6 by 7.

Questions for you. Can you find the *lowest common denominator* of the following pairs of fractions?

a. $\frac{5}{6}$ and $\frac{3}{4}$ b. $\frac{2}{5}$ and $\frac{3}{8}$

c. Once we have found our lowest common denominator, we need to *convert* or *change Fraction A* and *Fraction B* so that they both have this *lowest common denominator.*

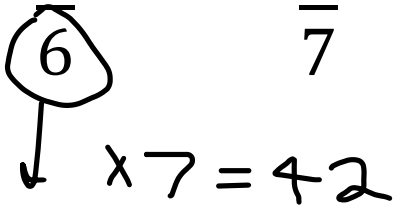
Fraction A: *Fraction B*:

$$\frac{5}{6} \qquad \frac{2}{7}$$

To do this, first remember how many times you had to multiply the *smaller denominator* to find your *lowest common denominator*,

Fraction A: *Fraction B*:

$$\frac{5}{6} \qquad \frac{2}{7}$$



Our smaller denominator was 6, and we had to multiply it 7 *times* to find our *lowest common denominator* of 42.

Now, we multiply the *numerator* and the *denominator* of the fraction with the *smaller denominator* the same number of times:

Fraction A: *Fraction B*:

$$\frac{5 \times 7}{6 \times 7} \qquad \frac{2}{7}$$

Fraction A: *Fraction B*:

$$\frac{35}{42} \qquad \frac{2}{7}$$

Now, all that we need to do is convert *Fraction B* to a *fraction* that also has our *lowest common denominator* of 42.

We need to ask,

what must I multiply 7 by to get 42?

Fraction A: *Fraction B*:

$$\frac{35}{42} \qquad \frac{2 \times 6}{7 \times 6}$$

Fraction A: *Fraction B*:

$$\frac{35}{42} \qquad \frac{12}{42}$$

d. Now that we have converted $Fraction\ A$ and $Fraction\ B$ to fractions with their $lowest\ common\ denominator$, we can easily tell whether or not they are equal!

$Fraction\ A$: $\frac{5}{6}$ $Fraction\ B$: $\frac{2}{7}$

$Fraction\ A$: $\frac{35}{42}$ $>$ $Fraction\ B$: $\frac{12}{42}$

$Fraction\ A$ and $Fraction\ B$ are $unequal$, and we don't need a calculator to tell!

If my friend and I were each given a full basket of 42 apples, and after a few days, I have 12 apples left, whilst my friend has 35 apples left, do my friend and I have $equal\ fractions$ of the full basket left?

We have now understood how to determine if two fractions are *equal* using the *converting to the lowest common denominator method*, which has the steps:

1. Write down the denominators of your two fractions

$$\frac{5}{6} \qquad \frac{2}{7}$$

2. Find the *lowest common denominator by*
    i. Writing down the smaller of the two denominators

$$6$$

    ii. Multiply it by 2, and check if you can divide your answer by the bigger denominator without a remainder.

$$6 \times 2 = 12\,, \quad 12 \div 7 = 1\ remainder\ 5$$

    iii. If you cannot, repeat the above step with 3,4,5,6,7,8 … until you get an answer without a remainder – which is your *lowest common denominator*.

$$6 \times 7 = 42\,, \quad 42 \div 7 = 6$$
$$LCD = 42$$

3. Use multiplication to convert your two fractions into new fractions with your *lowest common denominator*.

$$\frac{5 \times 7}{6 \times 7} \qquad \frac{2 \times 6}{7 \times 6}$$

$$\frac{35}{42} > \frac{12}{42}$$

Now it is your turn to try this method for yourself!

3 – Exercises

Please determine whether the following pairs of fractions are *equal* or *unequal* using the *lowest common denominator method*.

a. $\frac{5}{6}$ and $\frac{3}{4}$ b. $\frac{2}{5}$ and $\frac{3}{8}$ c. $\frac{3}{7}$ and $\frac{6}{14}$ d. $\frac{1}{3}$ and $\frac{4}{5}$ e. $\frac{1}{4}$ and $\frac{3}{12}$ f. $\frac{6}{7}$ and $\frac{6}{8}$