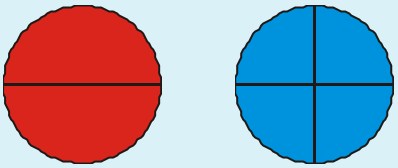
# 2

# Joining Parts

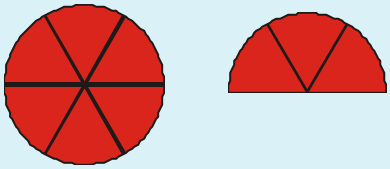
## Let's halve it!

Cut out two circles of equal size from a paper. Divide one of them into two equal parts and the other into four equal parts.



One part of the first circle is as big as two parts of the second circle, isn't it? That is, 2 parts out of 4 equal parts of a whole make $\frac{1}{2}$.

Now, cut out another circle of the same size and divide it into six equal parts using set square. How many of these make half the circle?



So 3 parts out of 6 equal parts of a whole also make $\frac{1}{2}$.

What if the circle is divided into eight equal parts?

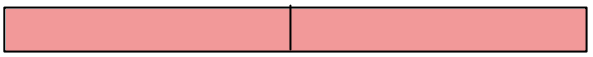
## A row over a cake!

One of the two cakes of the same size, is cut into four equal parts and the other into eight equal parts. Anu took a piece of the first cake and Abi took two pieces of the other. They started arguing over who got more. Can you settle it?

## Half means...

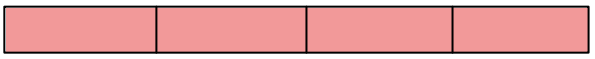
What is half a meter?

Cut out a few paper strips each 1 meter long. Fold one of them in half and draw a line along the fold.



Now the strip is divided into two equal parts. What is the length of each part?

Take another strip, fold it in half and then, fold each part again in half.



How many parts are there now?

How many of them make $\frac{1}{2}$ meter?

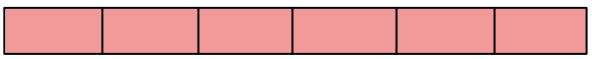
Here, we took 2 parts from 4 equal parts.

How do we write it as a fraction?

What do we see now?

$$\frac{2}{4} \text{ meter } = \frac{1}{2} \text{ meter}$$

Now, take another strip, fold it in half and then fold each part into 3 equal parts.



How many of these parts make $\frac{1}{2}$ meter?

This gives another way of writing $\frac{1}{2}$ meter. What is it?

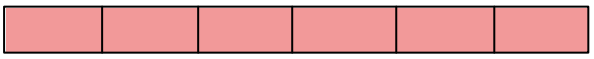
Similarly, folding paper strips in various ways, can you find some more forms of $\frac{1}{2}$ meter? (see the section *A dotted line* in the lession, *Part Math* of the Class 5 textbook)

## What is one-third?

How do we mark $\frac{1}{3}$ meter on a paper strip of length 1 meter?

What is the total length of two such parts?

Take another strip, fold it in three and then, fold each part in two.



How many of these 6 parts make $\frac{1}{3}$ meter?

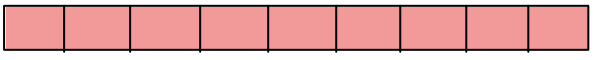
And $\frac{2}{3}$ meter?

That is,

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

$\frac{4}{6}$ meter $= \frac{2}{3}$ meter

What if each $\frac{1}{3}$ meter is divided into 3 equal parts?

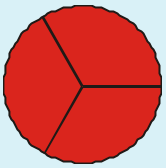


From this, what are the different ways of writing $\frac{1}{3}$ meter and $\frac{2}{3}$ meter?

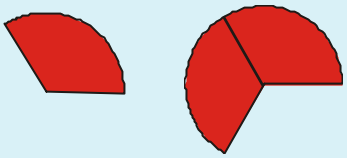
Again, folding the strip in various ways, can you find other forms of these lengths?

## Mismatches

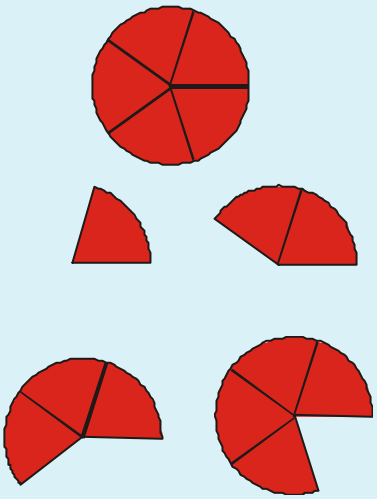
Cut out a circle and divide it into three equal parts.



Put these pieces together, one by one. Do we ever get a semi circle?



Now take another circle and cut into five equal parts. Again join the pieces one by one.

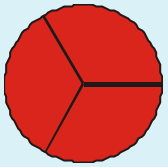


Do we get a semicircle?

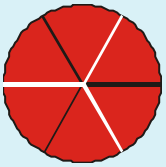
Anything special about the *number* of parts, so that you can make a semicircle by joining some of these?

## Dividing again

Cut a circular piece of paper into three equal parts.



Each part is $\frac{1}{3}$ of the circle. Suppose each of these parts is divided into two equal parts?



Now, how many equal parts are there in all?

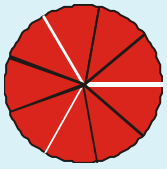
How many of them make up $\frac{1}{3}$ of the circle?

And $\frac{2}{3}$ of the circle?

Now again divide a circle into three equal parts and this time, divide each of these parts into three instead of two.

How many of these make $\frac{1}{3}$?

And $\frac{2}{3}$?



Now try these questions.

- What part of a meter is got by dividing 1 meter into 15 equal parts? To get this, into how many equal parts should we divide every $\frac{1}{3}$ meter?
- What form of $\frac{1}{3}$ meter and of $\frac{2}{3}$ meter do we get from the above problem?
- 1 meter is divided into 10 equal parts. Can we put together some of these to get $\frac{1}{2}$ meter? How about $\frac{1}{3}$ meter?

## A fraction means

What is $\frac{3}{4}$?

If we divide something into 4 equal parts and take 3 of these parts, we get $\frac{3}{4}$.

Here the bottom number 4 is called the *denominator* and 3, the top number is called the *numerator*.

The denominator is the number of equal parts into which we divide something. The numerator is the number of these parts we take.

## One number, several forms

We have seen various forms of fractions like $\frac{1}{2}$, $\frac{1}{3}$ and $\frac{2}{3}$.

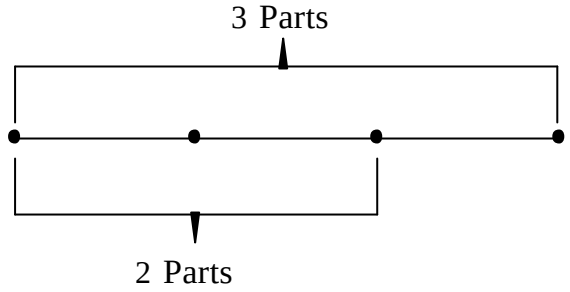
$\frac{1}{2} = \frac{2}{4} = \frac{3}{6} =$ .....

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

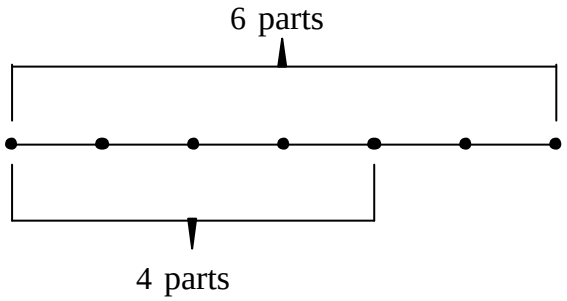
$\frac{2}{3} = \frac{4}{6} = \frac{6}{9} =$ .....

How did we get these?

Consider $\frac{2}{3}$, for example. $\frac{2}{3}$ is 2 parts out of 3 equal parts.




What if each of these 3 parts is again divided into 2 equal parts?

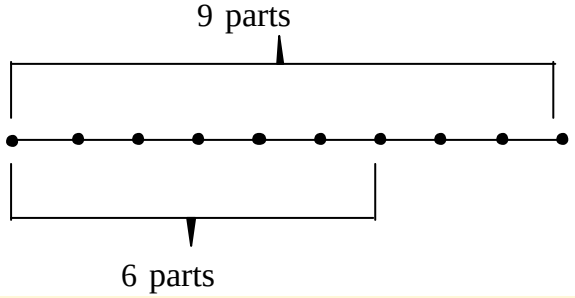



There are $2 \times 3 = 6$ parts in all.
The 2 parts taken earlier now become $2 \times 2 = 4$ parts.

So, to get $\frac{2}{3}$, we need 4 parts out of these 6 equal parts.
That is,

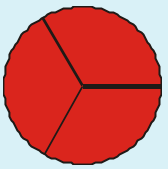
$$\frac{2}{3} = \frac{4}{6}$$

Now, suppose each of the 3 parts taken earlier is divided into 3 equal parts.



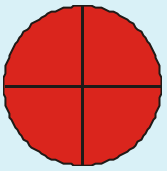

## Common division

Suppose a circle is divided into 3 equal parts.



We can put some of these together to form the fractions $\frac{1}{3}$ and $\frac{2}{3}$.

What if we divide the circle into 4 equal parts?

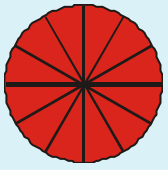


we can make $\frac{1}{4}, \frac{1}{2}, \frac{3}{4}$.

Can we make all these fractions using the parts of a single division?

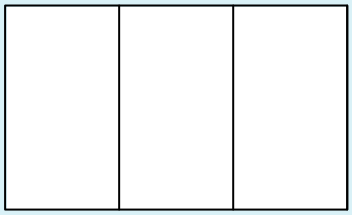
How about 12 equal parts?

See if we get all the above fractions by putting together some of these pieces.

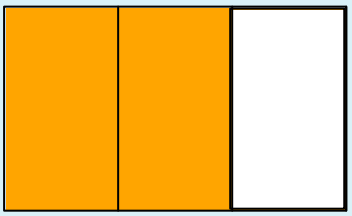


## Forms differ

Cut out a rectangle and divide it into three equal parts using two lines, as in the figure below.



Colour two parts.



We have coloured $\frac{2}{3}$ of the rectangle.

Now draw a line horizontally through the middle of the rectangle as in the next figure.

Now the rectangle has been divided into 6 equal parts. Four of them are coloured. That is, $\frac{4}{6}$ of the rectangle is coloured.

Thus $\frac{2}{3} = \frac{4}{6}$, right?

Total number of parts $= 3 \times 3 = 9$

Number of parts taken $= 3 \times 2 = 6$

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

Suppose we divide each part into 4 equal parts?

Total number of parts = ..... × 3 = .....

Number of parts taken = ..... × 2 = .....

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

Thus we can divide every $\frac{1}{3}$ part again and again. In all such divisions, what can you say about the total number of parts?

What sort of a number is it?

What about the number of parts taken?

So in all the various forms of $\frac{2}{3}$, what sort of a number is the denominator?

And the numerator?

What about the numerator and denominator of the various forms of $\frac{1}{3}$ ? of $\frac{1}{2}$ ?

Now, can't you answer the following questions?

- Write $\frac{1}{3}$ as a fraction with denominator 21.
- Can you write $\frac{1}{3}$ as a fraction with denominator 10? With denominator 100?
- Write $\frac{1}{4}$ as a fraction with denominator 100.
- Write each pair of fractions given below as fractions with the same denominator.

  (Example: $\frac{1}{2} = \frac{3}{6}, \frac{1}{3} = \frac{2}{6}$)

  - $\frac{1}{3}, \frac{1}{4}$
  - $\frac{1}{4}, \frac{1}{6}$
  - $\frac{1}{3}, \frac{1}{6}$

## Simple form

We have seen that a single fraction can be written in different forms, by multiplying the numerator and denominator by the same number.

For example,

$$\frac{3}{4} = \frac{6}{8} = \frac{9}{12} = \frac{12}{16} = \ldots\ldots$$

Now look at the fraction, $\frac{10}{12}$. The numerator and denominator are both even numbers, right?

So, we can write

$$\frac{10}{12} = \frac{5\times 2}{6\times 2} = \frac{5}{6}$$

What about $\frac{2}{12}$?

Let's now simplify $\frac{6}{12}$ like this:

$$\frac{6}{12} = \frac{3\times 2}{6\times 2} = \frac{3}{6}$$

3 and 6 are multiples of 3. Then so,

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

That is,

$$\frac{6}{12} = \frac{1}{2}$$

6, 12 are both multiples of 6. If we had noted this at first we could have written

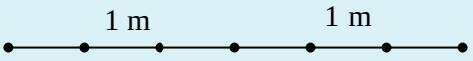
$$\frac{6}{12} = \frac{1\times 6}{2\times 6} = \frac{1}{2}$$

in a single step.

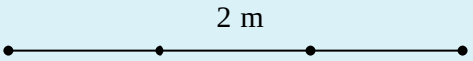
### Another look at it

If 2 meters are divided into 3 equal parts, what would be the length of each part?

First let us divide each meter into 3 equal parts.




Now we have 2 meters divided into 6 equal parts. Suppose we take these parts two at a time.




We now have 2 meters divided into 3 equal parts, right?

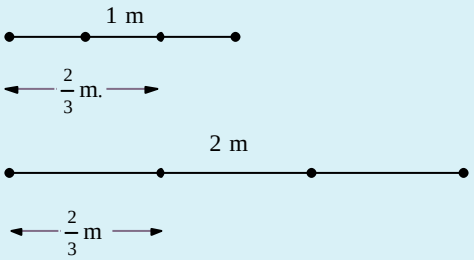
Each of these parts is got by joining 2 of the 3 equal parts into which 1 meter is divided; which means $\frac{2}{3}$ of 1 meter, or $\frac{2}{3}$ meter.

So what do we see here?

$\frac{2}{3}$ meter can be got in two different ways.

Divide 1 meter into 3 equal parts and take 2 parts.

Divide 2 meters into 3 equal parts and take 1 part.



## They are fractions too!

What does $\frac{4}{3}$ meters mean?

We can't take 4 parts out of 3 equal parts of 1 meter.

But something else can be done. We can divide several strings of length 1 meter into 3 equal parts. Then we can lay end to end 4 such pieces. Let's call this length $\frac{4}{3}$ meters.

What is this length really?

The length of 3 such pieces together is 1 meter. The remaining string is of length $\frac{1}{3}$ meter.

That is,

$\frac{4}{3}$ meters = 1 meter + $\frac{1}{3}$ meter = $1\frac{1}{3}$ meters.

We can also consider $\frac{4}{3}$ meters as the length got by dividing 4 meters into 3 equal parts. 3 meters itself, divided into 3 equal parts give 1 meter. If we divide the remaining 1 meter also into 3 equal parts, we get $\frac{1}{3}$ meter. So, whichever way we look at it, $\frac{4}{3}$ meters is $1\frac{1}{3}$ meters.

Now let's try to simplify $\frac{24}{36}$.

$$\frac{24}{36} = \frac{4\times 6}{6\times 6} = \frac{4}{6}$$

We can simplify again, can't we?

$$\frac{4}{6} = \frac{2\times 2}{2\times 3} = \frac{2}{3}$$

What do we get now?

$$\frac{24}{36} = \frac{2}{3}$$

Can you simplify this again? Why not?

What do we see here?

> If the numerator and denominator of a fraction have a common factor, we can divide both by this common factor, and get another form of this fraction.

If all common factors are removed, we get a form in which the numerator and denominator are the smallest. It is called the fraction in its *lowest terms*.

For example, $\frac{24}{36}$ in its lowest terms is $\frac{2}{3}$, as we have seen just now.

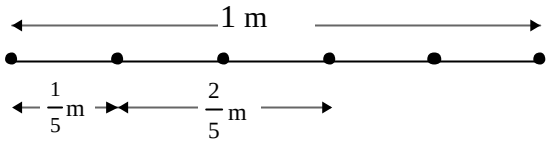
Can you now mentally reduce the fractions below to their lowest terms?

- $\frac{10}{30}$
- $\frac{20}{40}$
- $\frac{15}{20}$
- $\frac{12}{16}$
- $\frac{16}{24}$
- $\frac{18}{45}$

## Let's add up

Suma got a piece of ribbon $\frac{1}{5}$ meter long and Rema got a piece $\frac{2}{5}$ meter long. To find the total length of the ribbons, we need only place them end to end.

Look at this picture.

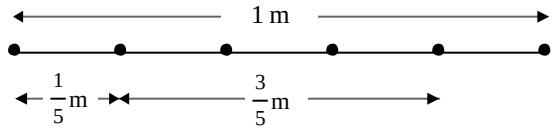



Didn't you get the total length?

We can write it like this:

$$\frac{1}{5} + \frac{2}{5} = \frac{3}{5}$$

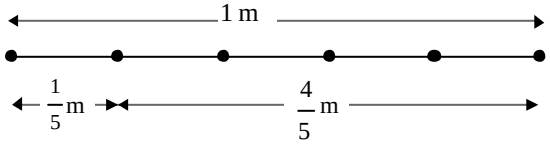
What is $\frac{1}{5}$ meter long string and a $\frac{3}{5}$ meter long string are placed end to end?




What do we get now?

$$\frac{1}{5} + \frac{3}{5} = \text{.....}$$

If it is $\frac{1}{5}$ meter and $\frac{4}{5}$ meter?




Now we get 1 full meter. That is,

$$\frac{1}{5} + \frac{4}{5} = 1$$

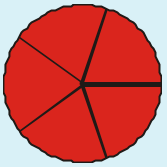
If we divide something into 5 equal parts and then take all the 5 parts, we get the whole thing. So we can write 1 as $\frac{5}{5}$ also.

(See the lesson, *Part Math* of class 5)

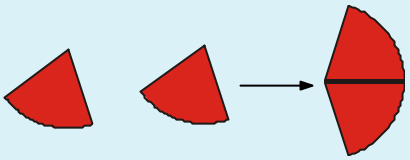
### Circular additions

Don't you remember how we put pieces of circles together, to find some sums?

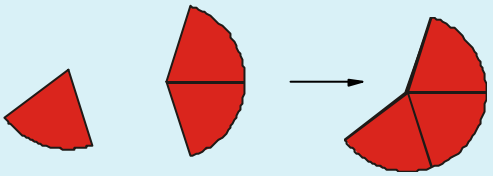
Cut out a circle and divide it into 5 equal parts.



What all sums can we form by pulling together some of these pieces?



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



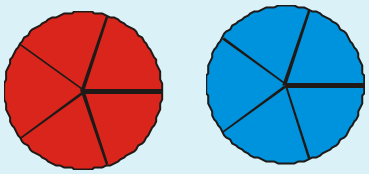
$$\frac{1}{5} + \frac{2}{5} = \frac{3}{5}$$

What other sums can we form like this?

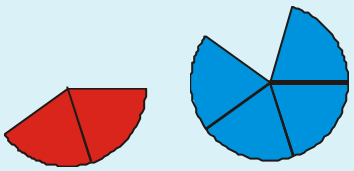
What are different ways of getting 1 as the own?

## One and a bit more

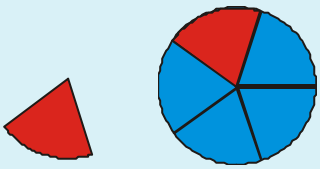
Cut out two circles of equal size and divide each into five equal parts.



Choose two parts from the first and four from the second.



Shift one piece and we get this:



That is,

$$\frac{2}{5} + \frac{4}{5} = \frac{1}{5} + 1$$

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

Which all sums greater than 1 can you make this?

That is,

$$\frac{1}{5} + \frac{4}{5} = \frac{5}{5} = 1$$

Suppose we add up $\frac{2}{5}$ meter and $\frac{4}{5}$ meter? $\frac{1}{5}$ meter itself added to $\frac{4}{5}$ meter gives the whole 1 meter. What more do we have to add?

So it is $1 + \frac{1}{5}$ meters. This is usually written $1\frac{1}{5}$ meter. That is,

$$\frac{2}{5} + \frac{4}{5} = 1\frac{1}{5}$$

We can get $1\frac{1}{5}$ meter is by putting together to 6 pieces of length $\frac{1}{5}$ meter. So, we can write it as $\frac{6}{5}$ meters also.

That is, $\frac{6}{5} = 1\frac{1}{5}$

Thus, $\frac{2}{5} + \frac{4}{5} = \frac{6}{5} = 1\frac{1}{5}$

Now try these problems.

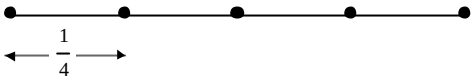
- Ravi completed $\frac{2}{9}$ of a job the first day and $\frac{4}{9}$ of it on the second. How much of the job did he do in these two days together? How much remains to be done?
- Rema and Suma have pots of the same size. $\frac{4}{7}$ of Rema's pot and $\frac{5}{7}$ of Suma's pot are filled with water. Suma pours water from her pot to Rema's pot till it is full. How much water remains in Suma's pot now?

## Adding up another way

$\frac{1}{2}$ kilometer of the road from Niaz's home to his school is tarred and $\frac{1}{4}$ kilometer is untarred. What is the distance from Niaz's home to his school?

Here, the distance is $\frac{1}{4} + \frac{1}{2}$ kilometer.

Draw a line, as in the figure, to show 1 kilometer.

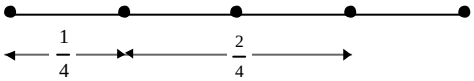



Mark $\frac{1}{4}$ from one end.

Now we have to mark $\frac{1}{2}$ *from* this point. How do we do it?

If we take 2 out of 4 equal parts, we get $\frac{1}{2}$, right?

That is, $\frac{1}{2} = \frac{2}{4}$



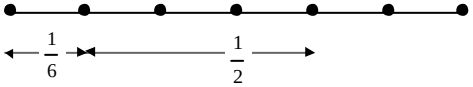

Now we have 3 parts in all.

**Thus,** $\frac{1}{4} + \frac{1}{2} = \frac{3}{4}$

Let's write down the method once again

$$\frac{1}{4} + \frac{1}{2} = \frac{1}{4} + \frac{2}{4} = \frac{1+2}{4} = \frac{3}{4}$$

Can we find $\frac{1}{6} + \frac{1}{2}$ like this?



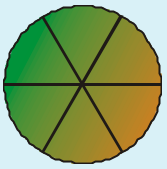

$$\frac{1}{6} + \frac{1}{2} = \frac{1}{6} + \frac{3}{6} = \frac{4}{6}$$

Can't we simplify this?

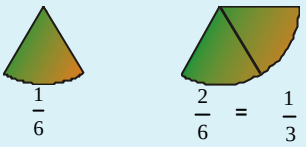
$$\frac{4}{6} = \frac{2\times2}{3\times2} = \frac{2}{3}$$

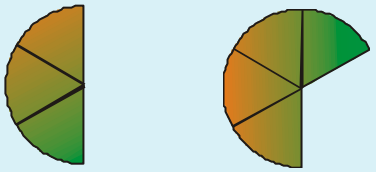
### Six parts sums

Cut out a circle and divide it into 6 equal parts. (You know how to do this, using a set square or protractor, don't you?)



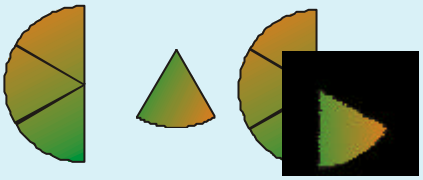
What are the fractions you can make with these?




What all sums do we get from these?

For example,



## Addition trick

How do we find $\frac{1}{3}+\frac{1}{5}$?

We find forms of $\frac{1}{3}$ and $\frac{1}{5}$ which have the same denominator.

In all the various forms of $\frac{1}{3}$, the denominator is a multiple of 3.

What about $\frac{1}{5}$?

Thus, the denominator we need is a multiple of 3 and 5.

$3 \times 5$ is a multiple of 3 and 5.

$$\frac{1}{3} = \frac{1\times5}{3\times5} = \frac{5}{15}$$

$$\frac{1}{5} = \frac{1\times3}{5\times3} = \frac{3}{15}$$

So, $\frac{1}{3}+\frac{1}{5}=\frac{5}{15}+\frac{3}{15}=\frac{8}{15}$

Here the numerator of the sum is 8 = 3 + 5 and the denominator is 15.

Any two fractions with numerator 1 can be added like this.

For example, let's find $\frac{1}{4}+\frac{1}{6}$

$$\frac{1}{4} = \frac{6}{24}$$

$$\frac{1}{6} = \frac{4}{24}$$

$$\frac{1}{4}+\frac{1}{6} = \frac{10}{24} = \frac{5}{12}$$

So,

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

Now how about $\frac{1}{2}+\frac{1}{3}$?

How do we do this?

Do you remember writing $\frac{1}{3}$ and $\frac{1}{2}$ as fractions with the same denominator?

$$\frac{1}{3} = \frac{1\times2}{3\times2} = \frac{2}{6}$$

$$\frac{1}{2} = \frac{1\times3}{2\times3} = \frac{3}{6}$$

So,

$$\frac{1}{3}+\frac{1}{2} = \frac{2}{6}+\frac{3}{6} = \frac{2+3}{6} = \frac{5}{6}$$

Let's try one more example.

We want to find $\frac{2}{3}+\frac{1}{4}$

First we change these to fractions with the same denominator.

In all the different forms of $\frac{2}{3}$, what sort of a number is the denominator?

What about $\frac{1}{4}$?

So, what sort of a number should be the common denominator?

$$\frac{2}{3} = \frac{2\times4}{3\times4} = \frac{8}{12}$$

$$\frac{1}{4} = \frac{1\times3}{4\times3} = \frac{3}{12}$$

Now we can add, can't we?

$$\frac{2}{3} + \frac{1}{4} = \frac{8}{12} + \frac{3}{12} = \frac{8+3}{12} = \frac{11}{12}$$

- A new road is being constructed in Vellimala panchayat. During the first week, $\frac{1}{4}$ of the work was done and during the second week $\frac{3}{5}$. What part of the work was finished by the end of second week? The whole work was finished by the end of third week. What part was done during the third week?
- A child sleeps for $\frac{1}{3}$ of the day and spends $\frac{1}{4}$ of the day at school. What part of the day do these together make?
- Abdu and Raghavan take up a contract to till a piece of farm land. Abdu tills $\frac{2}{7}$ of the land a day and Raghavan tills $\frac{1}{5}$ of the land a day. What part of the land do they together till in a day?

## How to subtract?

Which is longer? $\frac{3}{5}$ meter or $\frac{2}{5}$ metre?

Now, if from a string of length $\frac{3}{5}$ meter, we cut away $\frac{2}{5}$ meter, what would be left?

We can write it like this:

$$\frac{3}{5} - \frac{2}{5} = \frac{3-2}{5} = \frac{1}{5}$$

Likewise, we can find

$$\frac{7}{10} - \frac{3}{10} = \frac{7-3}{10} = \frac{4}{10} = \frac{2}{5}$$

### Another trick

How do we add $\frac{2}{3}$ and $\frac{4}{5}$?

If we write

$$\frac{2}{3} = \frac{2\times5}{3\times5} = \frac{10}{15}$$

$$\frac{4}{5} = \frac{4\times3}{5\times3} = \frac{12}{15}$$

We can easily find the sum

$$\frac{2}{3} + \frac{4}{5} = \frac{10}{15} + \frac{12}{15} = \frac{22}{15}$$

Now, we can find $\frac{22}{15} = 1\frac{7}{15}$

If $3 \times 5 = 15$ is made the common denominator, the numerator of the sum is $(2 \times 5) + (4 \times 3)$, isn't it?

Similarly, how do you find $\frac{3}{4} + \frac{2}{5}$?

$$\frac{3}{4} + \frac{2}{5} = \frac{(3\times5)+(2\times4)}{4\times5}$$

$$= \frac{15+8}{20}$$

$$= \frac{23}{20}$$

$$= 1\frac{3}{20}$$

.

## A subtraction trick

The rule used to add fractions can be used for subtraction as well.

For example,

$$\frac{3}{4} - \frac{2}{5} = \frac{(3\times5)-(2\times4)}{4\times5}$$

$$= \frac{15-8}{20}$$

$$= \frac{7}{20}$$

In order to find out the larger of two fractions also, such a cross multiplication can be used.

For example, suppose we want to find the larger of $\frac{4}{7}$ and $\frac{3}{5}$

If $7 \times 5 = 35$ is taken the common denominator, then the numerator of $\frac{4}{7}$ is $4 \times 5 = 20$ and that of $\frac{3}{5}$ is $3 \times 7 = 21$.

(That is, $\frac{4}{7} = \frac{20}{35}$, $\frac{3}{5} = \frac{21}{35}$).

Now, in order to find the larger fraction we need only on the numerators.

20 is less than 21.

So $\frac{3}{5}$ is greater.

Likewise, can you find the greater fraction from $\frac{2}{5}$ and $\frac{3}{8}$?

## Which is larger?

Which is larger, $\frac{2}{3}$ or $\frac{3}{4}$?

Suppose we put these into forms with the same denominator?

$$\frac{2}{3} = \frac{2\times4}{3\times4} = \frac{8}{12}$$

$$\frac{3}{4} = \frac{3\times3}{4\times3} = \frac{9}{12}$$

So, $\frac{2}{3}$ is made up of 8 parts out of 12 equal parts and $\frac{3}{4}$ is made up of 9 such parts. Naturally, $\frac{3}{4}$ is the larger of the two.

Using these forms with the same denominator, we can easily find.

$$\frac{3}{4} - \frac{2}{3} = \frac{9}{12} - \frac{8}{12} = \frac{1}{12}$$

## Cloth Math

Anup went to a cloth store with his father. Both of them want to buy material for shirts. Father needs $2\frac{1}{2}$ meters and Anup needs $1\frac{1}{2}$ meters. They bought the same cloth. How many meters of cloth did they buy altogether? How many meters more than Anup does father need?

They together need $2\frac{1}{5} + 1\frac{1}{2}$ meters.

How do we add these?

We have $2\frac{1}{5} = 2 + \frac{1}{5}$ and $1\frac{1}{2} = 1 + \frac{1}{2}$

So,

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

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

$$= 3 + \frac{1}{5} + \frac{1}{2}$$

$$= \text{.....}$$

How many meters does the father need more than the son?

For this, we find $2\frac{1}{5} - 1\frac{1}{2}$

We can't subtract $\frac{1}{5}$ form $\frac{1}{2}$.

What number added to $1\frac{1}{2}$ gives $2\frac{1}{5}$?

First we find, what added to $1\frac{1}{2}$ gives 2.

$$1\frac{1}{2} + \frac{1}{2} = 2$$

Now, what added to 2 gives $2\frac{1}{5}$?

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

How much did we add in all?

$$\frac{1}{2} + \frac{1}{5} = \text{.....}$$

That is, the father needs $\frac{7}{10}$ meter more than the son.

Can you find the answer in any other way?

## Large and Small

From two fractions with the same denominator, finding the larger and the smaller is easy. Comparing two fractions with the same numerator is also easy.

Which among $\frac{2}{3}$ and $\frac{2}{5}$ is the greater?

Think of something divided into 5 equal parts.

Now the same thing is divided into 3 equal parts.

The *pieces* of the second division are larger, right?

So $\frac{2}{3}$ is larger than $\frac{2}{5}$.

You can draw a picture to check this out.

## Large and Small

Which is greater, $\frac{3}{7}$ or $\frac{5}{8}$?

$$\frac{3}{7} = \frac{3\times8}{7\times8} = \frac{24}{56}$$

$$\frac{5}{8} = \frac{5\times7}{8\times7} = \frac{35}{56}$$

Now can't you find the larger one immediately?

The larger and smaller ones were found by looking at $3\times8$ and $5\times7$.

Likewise, can you mentally find the larger of $\frac{3}{4}$ and $\frac{5}{7}$?

## A different subtraction

There is another way of doing $2\frac{1}{5} - 1\frac{1}{2}$.

If we write

$$2\frac{1}{5} = 2 + \frac{1}{5} = \frac{10}{5} + \frac{1}{5} = \frac{11}{5}$$

and

$$1\frac{1}{2} = 1 + \frac{1}{2} = \frac{2}{2} + \frac{1}{2} = \frac{3}{2}$$

Then

$$2\frac{1}{5} - 1\frac{1}{2} = \frac{11}{5} - \frac{3}{2} = \frac{22}{10} - \frac{15}{10} = \frac{22-15}{10} = \frac{7}{10}$$

Now can't you do the following problems?

- Athira took some money from her *Sanchayika* deposit. She spent $\frac{2}{7}$ of this to buy books and $\frac{3}{7}$ to buy uniform. The remaining, she used to buy uniform for her brother.
  - How much of the total amount did she use to buy books and uniform for herself?
  - How much did she use to buy uniform for her brother?
- Beans, cucumber and Amaranth are grown in the school vegetable garden. Beans are grown in $\frac{2}{7}$ of the garden, cucumber in $\frac{3}{5}$ of the garden and amaranth in the remaining part.
  - How much of the garden is used for beans and cucumber?
  - How much is used to amaranth?

- Shameem rides $\frac{3}{10}$ of the distance to his school on his bicycle and travels $\frac{3}{5}$ by bus. He walks the rest of the distance.
  - How much of the total distance does he go by bicycle and bus?
  - How much does he walk?
- Raju decides to fence the compound around his home. The total length of the fence is 75 meters. On the first day, $12\frac{1}{2}$ meters of the fence was built and on the second, $11\frac{3}{4}$ meters.
  - What length of the fence was completed during these two days?
  - What is the remaining length to be built?
- A milk society got $75\frac{3}{4}$ liters of milk in the morning and $55\frac{1}{2}$ liters in the evening. The society sold $15\frac{1}{4}$ liters that day.
  - How many liters of milk did the society get that day?
  - Find the remaining quantity after the sales.
- Find the larger in each pair of these numbers. Subtract the smaller from the larger of these pairs.
  - $\frac{2}{3}, \frac{1}{2}$
  - $\frac{4}{5}, \frac{5}{6}$

## Yet another way

Look at the numbers below.

Which is the largest among $\frac{1}{2}, \frac{2}{3}, \frac{3}{4}, \frac{4}{5}, \frac{5}{6}, \frac{6}{7}$ ?

Suppose we subtract each from 1.

$$1-\frac{1}{2}=\frac{1}{2}$$

$$1-\frac{2}{3}=\frac{1}{3}$$

$$1-\frac{3}{4}=\frac{1}{4}$$

.....

.....

Now, can you find the largest and the smallest easily?

## World Population and India

About $\frac{1}{6}$ of the world population is in India and about $\frac{1}{6}$ is in China. What part of the world population do India and China together make?

- $\frac{2}{3}, \frac{3}{5}$
- $\frac{1}{3}, \frac{3}{10}$

- Murali bought a 20 meter long string. He cut out a piece $8\frac{3}{5}$ meters long and another $9\frac{4}{5}$ meters long. What is the length of the string that remains?
- Amarnath needs two iron wires each of length $5\frac{7}{10}$ meters to hang up rubber sheets to dry. How much wire does he need in all?