



XS4B56



Today is Saniya's birthday. In the classroom, she cuts the cake along with her friends. There are total 8 persons in the classroom including her teacher and friends. Saniya wants to distribute the cake equally among all. Help Saniya divide the cake into 8 equal parts.



Now tell us -

How much part of the cake will each child get? $\frac{1}{8}$ (one upon eight)

Here $\frac{1}{8}$ $\rightarrow$ numerator
 $\frac{1}{8}$ $\rightarrow$ denominator

We write the fractions in the form of $\frac{\text{Numerator}}{\text{Denominator}}$ and read as Numerator upon Denominator.

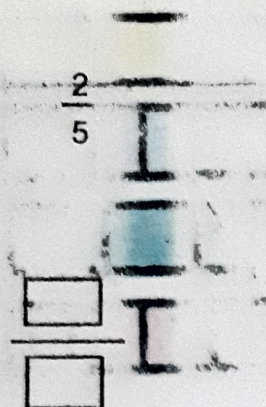


Now look at the figures and write the fraction of their coloured parts and white parts-

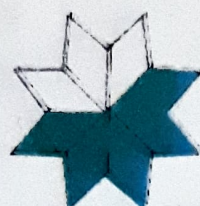
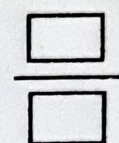
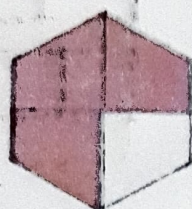
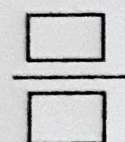
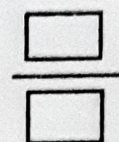
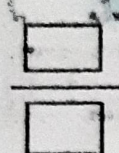
Fraction of coloured parts

Figure

Fraction of white parts

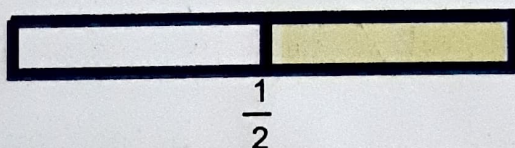


$$\frac{3}{5}$$

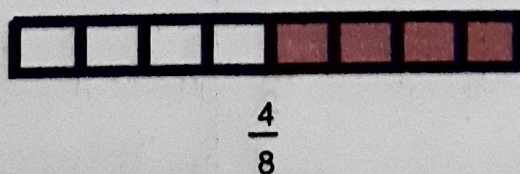
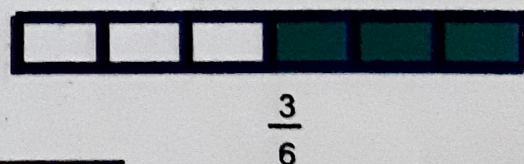
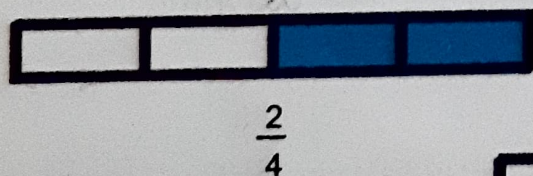


Equivalent Fraction

Let's take four paper strips of equal size. See the first strip, by colouring its $\frac{1}{2}$ fraction -



Similarly, see the second, third, and fourth strip, by colouring $\frac{2}{4}$, $\frac{3}{6}$ and $\frac{4}{8}$ fractions respectively-



Now put these strips one below the other without leaving any gap and see the coloured parts. Are the coloured parts of all the four strips equal to each other?



We can say that $\frac{1}{2}, \frac{2}{4}, \frac{3}{6}, \frac{4}{8}$ are the equivalent fractions.

In this way we can say that the fractions which show the equal parts are known as equivalent fractions.



Do it yourself - Draw the fraction $\frac{1}{3}, \frac{2}{6}, \frac{3}{9}, \frac{4}{12}$ on strips of the same size

and check whether they are equivalent or not?

Think - Is there any relation among these equivalent fractions?

Look and Understand - In $\frac{1}{2}, \frac{2}{4}, \frac{3}{6}, \frac{4}{8}$ numerator is increasing like 1, 2, 3, 4.. denominator is increasing like 2, 4, 6, 8..

Thus on multiplying and dividing the numerator and denominator by 2, 3, 4, respectively we get equivalent fractions in sequence.

Similarly, look $\frac{1}{3}, \frac{2}{6}, \frac{3}{9}, \frac{4}{12}$ in the same way.

Think- Can equivalent fraction be also obtained by dividing the numerator and denominator of fraction by the same number.

Look and Understand - $\frac{4}{8}, \frac{3}{6}$ and $\frac{2}{4}$

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

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

Verification of equivalent fractions

Are the fractions $\frac{2}{3}$ and $\frac{6}{9}$ equivalent?

To verify this we do cross multiplication

Example- $\frac{2}{3} \times \frac{6}{9}$

$$2 \times 9 = 18, \quad 6 \times 3 = 18$$

Since both the products are equal.

Therefore, $\frac{2}{3}$ and $\frac{6}{9}$ are equivalent fractions.

On multiplying or dividing the numerator and denominator of a fraction by the same number the value of fraction does not change.

Therefore fractions $\frac{4}{8}, \frac{3}{6}, \frac{2}{4}$ are equivalent fractions of $\frac{1}{2}$, which has been obtained on dividing the numerator and denominator by 4, 3, 2 respectively.

Now you also divide the numerators and denominators of fractions $\frac{4}{12}, \frac{3}{9}, \frac{2}{6}$ by 4, 3, 2 respectively to know which fraction they are equivalent to.



Do it yourself -

- Write three consecutive equivalent fractions of $\frac{5}{10}$.
- Are $\frac{1}{4}$ and $\frac{20}{40}$ equivalent fractions?
- Which of these fractions $\frac{2}{4}, \frac{8}{16}, \frac{9}{15}, \frac{20}{40}, \frac{5}{10}$ is not equivalent to fraction $\frac{1}{2}$?

Like and Unlike Fractions

In these fractions $\frac{5}{4}, \frac{3}{4}, \frac{2}{4}, \frac{1}{2}, \frac{1}{4}, \frac{2}{3}, \frac{3}{5}$ look at the fraction with the same denominators.

In the fractions $\frac{1}{4}, \frac{2}{4}, \frac{3}{4}, \frac{5}{4}$ the denominator of fractions are same. (All have denominator 4)

Hence, the fractions which have same denominators are called Like Fractions.

Whereas fractions $\frac{1}{2}, \frac{2}{3}, \frac{3}{5}$ have different denominators. Therefore, the fractions which have different denominators are called Unlike Fractions.



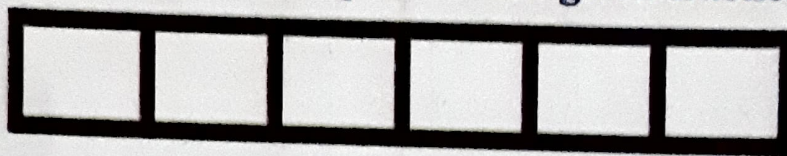
Do it yourself -

- Which of these fractions have same denominators $\frac{5}{7}, \frac{4}{7}, \frac{5}{3}, \frac{2}{7}, \frac{1}{5}$?.....
- Write any three fractions with different denominators.



Know this also -

Fill the colour in equivalent parts of the given fraction $\frac{1}{2}$ —



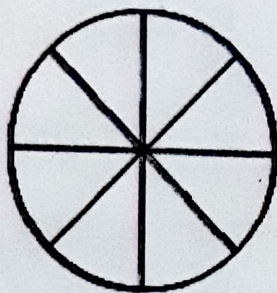
There are total six parts in the figure means denominator = 6

On making the denominator as 6 of the given fraction $\frac{1}{2} \Rightarrow \frac{1 \times 3}{2 \times 3} = \frac{3}{6}$ (To make the denominator as 6, numerator and denominator both have been multiplied by 3.)

It is clear that three out of six parts of the figure will be filled with colours.

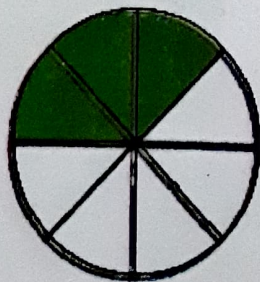


Similarly, colour the equivalent parts of the given fraction $\frac{6}{16}$



There are total 8 parts in the figure means denominator = 8

On making the denominator as 8 of the given fraction $\frac{6}{16} \Rightarrow \frac{6 \div 2}{16 \div 2} = \frac{3}{8}$



(To make the denominator 8, numerator and denominator both have been divided by 2.)

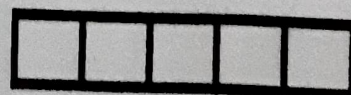


Do it yourself - Colour the equivalent parts of the given fractions -

$\frac{1}{3}$



$\frac{4}{10}$



Comparison of Fractions

Let's take four equal strips of paper.

See the first strip, by colouring

$\frac{1}{5}$ fraction. Similarly see the second, third

and fourth strips by colouring $\frac{2}{5}$, $\frac{3}{5}$, $\frac{4}{5}$

fractions respectively.

Now arrange these strips one below the

other without leaving any gap and see the coloured parts of all the strips. Now tell which fraction is smaller and which is greater?

Hence, we can say that $\frac{1}{5} < \frac{2}{5} < \frac{3}{5} < \frac{4}{5}$ (ascending order)

or $\frac{4}{5} > \frac{3}{5} > \frac{2}{5} > \frac{1}{5}$ (descending order)

In the same way you identify the smaller and greater fraction among the fractions $\frac{1}{7}$, $\frac{3}{7}$, $\frac{4}{7}$ and $\frac{6}{7}$ by colouring on the strips of equal size.

$\frac{1}{7}$, $\frac{6}{7}$, $\frac{3}{7}$, $\frac{4}{7}$ ascending order

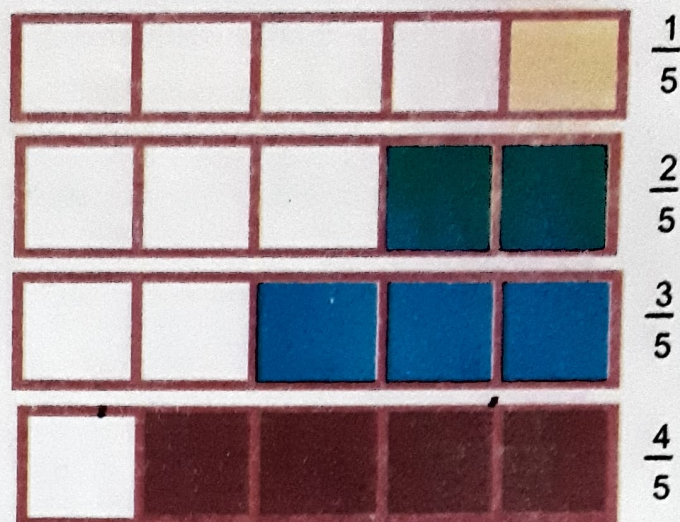
descending order

When the denominators are equal, the fraction with the greater numerator will be the greatest.



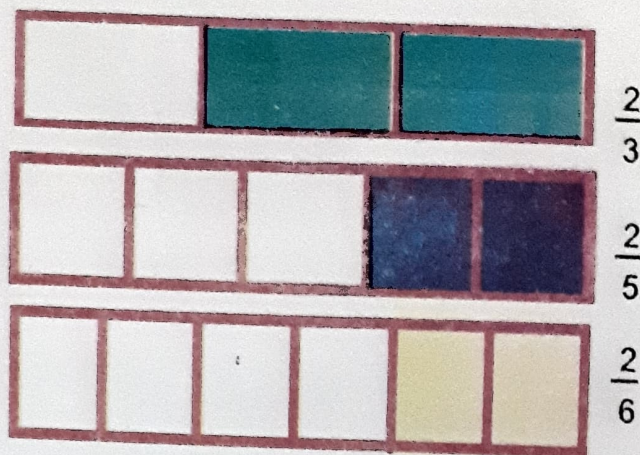
Think -

Can we identify the smaller and greater fractions if the numerators are equal?



Let's do and see -

Take four paper strips of equal size. See the first strip, by colouring its $\frac{2}{3}$ part. Similarly, see the second and the third strip, by colouring its $\frac{2}{5}$ and $\frac{2}{6}$ parts respectively.



Now arrange these strips one below the other without leaving any gap and see the coloured parts of all the strips. Now tell which fraction is greater and which is smaller.

Hence, we can say that $\frac{2}{3} > \frac{2}{5} > \frac{2}{6}$ (descending order)
or $\frac{2}{6} < \frac{2}{5} < \frac{2}{3}$ (ascending order)

Among fractions whose numerators are equal, the one with the greater denominator is smaller.

$$\frac{3}{5}, \frac{3}{6}, \frac{3}{7}, \frac{3}{8}$$

ascending order is.....

descending order is.....

Proper, Improper and Mixed Fractions

Proper Fraction

Fraction whose numerator is less than the denominator, is known as **proper** fraction.

For example- in the

fraction $\frac{2}{3}$, $2 < 3$



Do you know?

Fractions whose numerator is 1 are known as **unit fraction**

Like- $\frac{1}{3}, \frac{1}{5}, \frac{1}{7}, \frac{1}{12}$

Improper Fraction

Here $8 > 7$

or numerator $>$ denominator



Fraction whose numerator is greater than the denominator, is known as *improper* fraction.

Know this also -

$\frac{5}{5}$ here, numerator = denominator = 5



Do it yourself -

A fraction whose numerator and denominator are equal, is also known as Improper Fraction.

Choose and write the proper and improper fractions from $\frac{3}{3}$, $\frac{2}{4}$, $\frac{9}{8}$, $\frac{4}{9}$, $\frac{7}{5}$, $\frac{6}{6}$, $\frac{2}{5}$, $\frac{6}{3}$, $\frac{4}{5}$, $\frac{8}{5}$

Proper fractions -

Improper fractions -



Think

Think - Can an improper fraction be written in any other form ?

Look and understand the coloured parts -

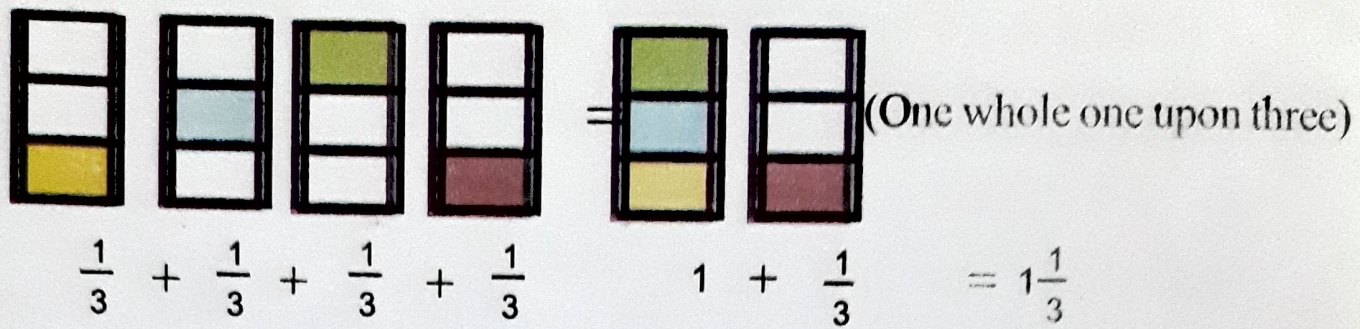


$$\frac{1}{2} + \frac{1}{2} + \frac{1}{2}$$

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

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



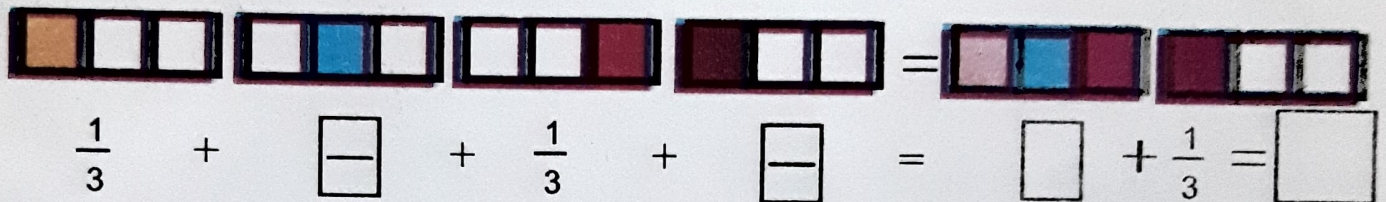


4 times $\frac{1}{3}$ or $\frac{4}{3}$



Do it yourself-

Understand and write in the form of fraction in the boxes-



In this way we can say that -

When an improper fraction is written as a combination of a whole number and a proper fraction, it is called a **mixed** fraction.

Converting an Improper Fraction into a Mixed Fraction

Let's change improper fraction $\frac{11}{3}$ into a mixed fraction-

Numerator is divided by denominator.

The quotient will represent the whole number,

the remainder will be the numerator and the divisor will represent the denominator.

Ans

$$\begin{array}{r} 3 \\ 3 \overline{)11} \\ \underline{-9} \\ 2 \end{array}$$

Therefore $\frac{11}{3} = 3\frac{2}{3}$



Converting a Mixed Fraction into an Improper Fraction

Let's change $3\frac{1}{4}$ into an improper fraction-

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

(here, 3 means $\frac{3}{1}$)

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

(make the denominators of $\frac{3}{1}$ and $\frac{1}{4}$ equal)

$$= \frac{12}{4} + \frac{1}{4}$$

$$= \frac{13}{4}$$

Let's do this way too-

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

$$= \frac{12 + 1}{4} \quad (\text{short method})$$

$$= \frac{13}{4}$$

The Simplest form of a Fraction

Let's do the factorization of numerator and denominator of fraction $\frac{6}{18}$

Factors of numerator 6 are - 1, 2, 3, 6

Factors of denominator 18 are - 1, 2, 3, 6, 9, 18

We have seen that the Highest Common Factor of numerator and denominator is 6. On dividing the numerator and denominator of the fraction by 6, the fraction changes into its simplest form.

$$\frac{6 \div 6}{18 \div 6} = \frac{1}{3}$$

When the H.C.F. of the numerator and the denominator of any fraction divides both the numerator and the denominator, the fraction changes into its simplest or lowest form.





Do it yourself -

- Convert the following improper fraction into mixed fraction-

(a) $\frac{17}{6}$

(b) $\frac{19}{3}$

(c) $\frac{21}{4}$

- Convert the following mixed fraction into improper fraction-

(a) $4\frac{1}{3}$

(b) $5\frac{1}{7}$

(c) $8\frac{1}{2}$

We have learnt

- To differentiate the smaller and greater fractions.
- To represent the given fraction through picture.
- To write a fraction in the simplest form.
- To identify the proper, improper and mixed fractions.

Exercise

- Arrange the given fractions in ascending and descending order -

(a) $\frac{1}{8}, \frac{2}{8}, \frac{4}{8}, \frac{3}{8}, \frac{7}{8}, \frac{6}{8}$

(b) $\frac{2}{7}, \frac{2}{6}, \frac{2}{5}, \frac{2}{3}, \frac{2}{9}, \frac{2}{11}$

- Write an equivalent fraction of $\frac{5}{6}$ whose numerator is 20



3. Fill in the blanks -

(a) $\frac{3}{5} = \frac{\boxed{}}{15}$

(b) $\frac{2}{7} = \frac{\boxed{}}{42}$

(c) $\frac{3}{4} = \frac{12}{\boxed{}}$

4. Identify proper, improper and mixed fractions and write them separately.

$\frac{3}{4}, \frac{2}{3}, \frac{5}{5}, \frac{4}{5}, \frac{11}{3}, \frac{13}{7}, 2\frac{5}{7}, 1\frac{6}{7}$

5. Fill in the blanks with the correct symbols ($>$, $=$, $<$)-

(a) $\frac{5}{6} \boxed{} \frac{11}{12}$ (b) $\frac{1}{2} \boxed{} \frac{1}{3}$ (c) $\frac{5}{12} \boxed{} \frac{1}{2}$ (d) $\frac{10}{3} \boxed{} \frac{4}{3}$

6. Tick ($\checkmark$) the correct statements and cross ($\times$) the incorrect statements -

(a) Numerator of a proper fraction is greater than the denominator. ☐

(b) Numerator of an improper fraction is greater than the denominator. ☐

(c) $\frac{5}{5}$ is an improper fraction. ☐

(d) $\frac{6}{8}$ is an improper fraction. ☐

(e) Mixed Fraction is always equal to or greater than 1. ☐

7. Write the answer -

(a) Any five fractions whose values are 1.

(b) Any three fractions which are equal to 2.

8. Which fraction is in the simplest form?

(a) $\frac{9}{11}$ (b) $\frac{2}{4}$ (c) $\frac{3}{6}$ (d) $\frac{6}{9}$



Make Magical Squares

A magical square is the square of number in which the sum of each row, each column and each diagonal remains equal. Today we will learn to make magical squares of 9 consecutive numbers.

Magical squares of numbers from 1 to 9

A	B	C	D	E	F	G	H	I
1	2	3	4	5	6	7	8	9

A	B	C
D	E	F
G	H	I

B	G	F
I	E	A
D	C	H

BEH and DEF makes two diagonals. The letter A that is the mid point of B and D will move diagonally to reach the mid point of H and F, and I that is the mid point of H and F will move to the mid point of B and D. In this way, C and G will change their places.

Thus, the magical squares formed with the numbers 1 to 9

1	2	3
4	5	6
7	8	9

2	7	6	15
9	5	1	15
4	3	8	15
15	15	15	

Similarly see the magical square of numbers from 4 to 12 -

4	5	6
7	8	9
10	11	12

5	10	9	24
12	8	4	24
7	6	11	24
24	24	24	