Government of Tamilnadu

STANDARD FIVE

TERM II

VOLUME 2

MATHEMATICS 

 SCIENCE

SOCIAL SCIENCE 

NOT FOR SALE

Untouchability is inhuman and a crime

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CONTENTS

MATHEMATICS (1 – 46)

SCIENCE (47 – 85)

SOCIAL SCIENCE (86 – 124)

MATHEMATICS

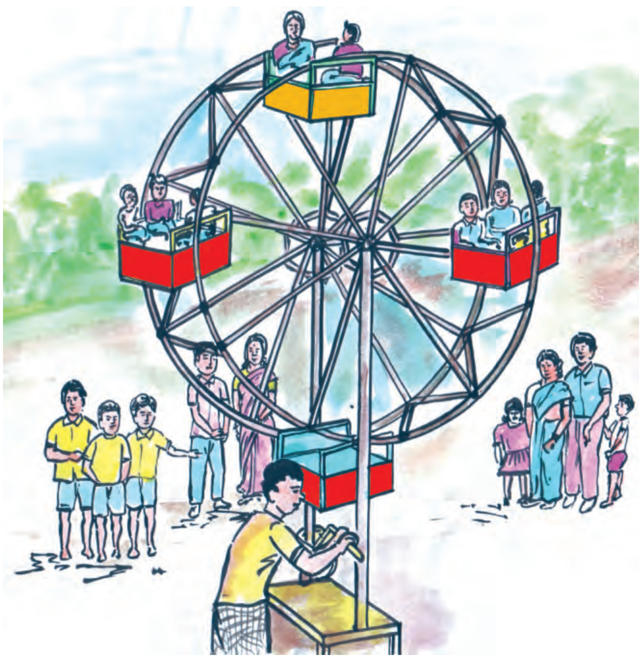
STANDARD FIVE

TERM II

1 Symmetry

Half a Turn

In a small town, Raja earned his living by running a mini 'Giant wheel' during the festive seasons near the temple. Many people visited the temple with their children and the children loved to ride on the giant wheel. He earned a lot of money but there was one problem. He was not able to keep count of the exact number of times the wheel had rotated. The children kept calling out saying that there was one more round to be completed. He had difficulty in counting because all the cabins looked alike. All the four cabins were painted bright red. He was worried that he was losing money. His young daughter suggested a solution for the problem.



Can you guess it? She gave a very simple solution. she suggested that one cabin be painted yellow. Do you think the problem is solved?

Try and solve the following problems.

- In a numberless wristwatch, there is no indication of the numerals. How will you tie it around your left wrist?

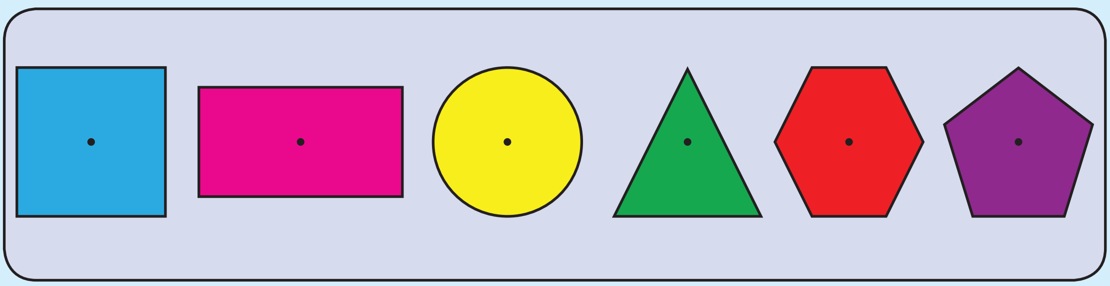
- A school boy held the digital watch upside down and noted 15 seconds as 51 seconds. What should he do to correct his mistake?

- In a hostel, rooms are numbered as NO 11, NO 12, . . . NO 17
No one dared to enter room NO 17 why?

- In a library, comic books are pasted with 5 digit numbers starting from 35000 to 35030. No one touched the particular book titled “You are a winner”. It was found that a particular number was pasted, upside down over the word “winner”. Can you guess the reason and the number.

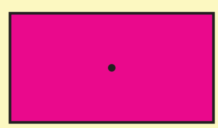
Activity

Guess which of the shapes below would look the same after half a turn ?

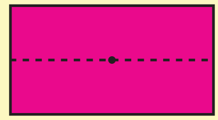


Do you find it difficult to say? If yes, then there is a way to check your guess. Here’s how you can do it. Take any of the shapes.

Trace its outline on a sheet of paper. Cut the shape and take it out. Here a rectangular shape is taken.



Then draw a horizontal line passing through its centre.



Fold it once horizontally, so that the fold falls on the centre. One half fits exactly over the other half. We say that rectangular shapes look the same after half a turn.

Repeat the same procedure for other shapes given above and check whether the guessed answers are correct.

Practice Time

(1) Find out which of the following letters look the same after half a turn.

N A T D O

(2) Which of these English words read the same on half a turn?

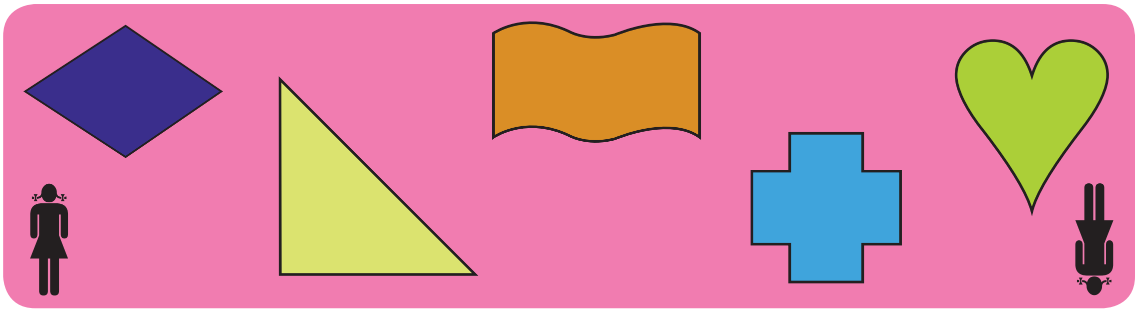
SIS, MOON, NOW, NOON

(3) Give half a turn to the numbers given below. Find which of them still look the ~~same~~.

6 3 5 I 7 0

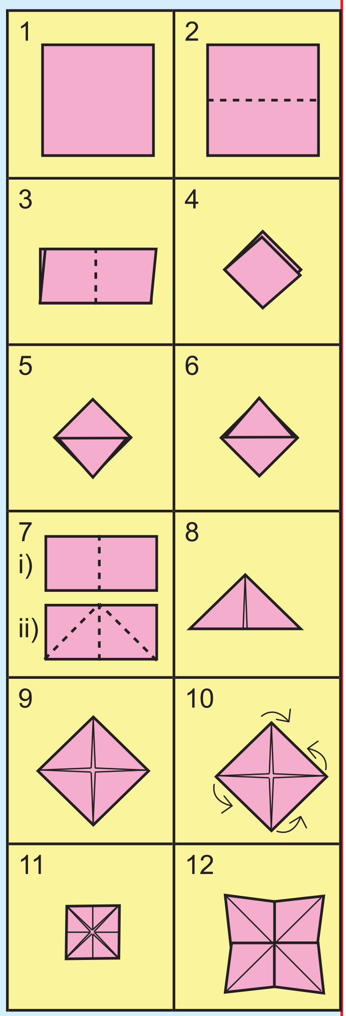
(4) Write all 5 digit numbers which look the same on half a turn.

(5) Which among the following pictures will look the same on half of a turn? Put a tick mark (✓)



Activity

Have you seen four cups made of paper. Let us make four cups



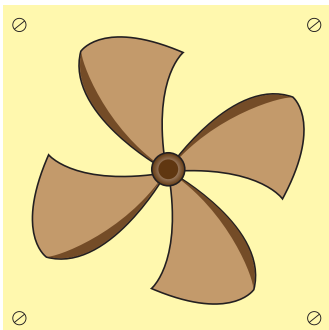
1. Take a square sheet of paper
2. Fold it in half
3. Fold it again in half
4. Turn the folded paper such that the folded two sides are at the bottom.
5. From the four flaps take one flap and fold it.
6. Turn the folded shape and take another flap and fold it.
7. Turn it inside out. One side is like 7 (i) and the other side is like 7 (ii).
8. Then fold other two flaps backwards to get the figure 8.
9. Open it out.
10. Reverse it and fold the four corners towards the centre. Repeat the steps 2 and 3.
11. Open it out.
12. The four cups are ready.

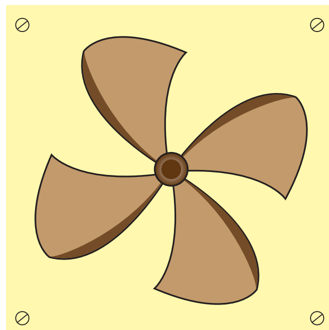
Rotate it and observe

- Do the four cups look the same on $\frac{1}{4}$ of a turn?
- Does it look the same on half a turn? Discuss.

One-fourth turn

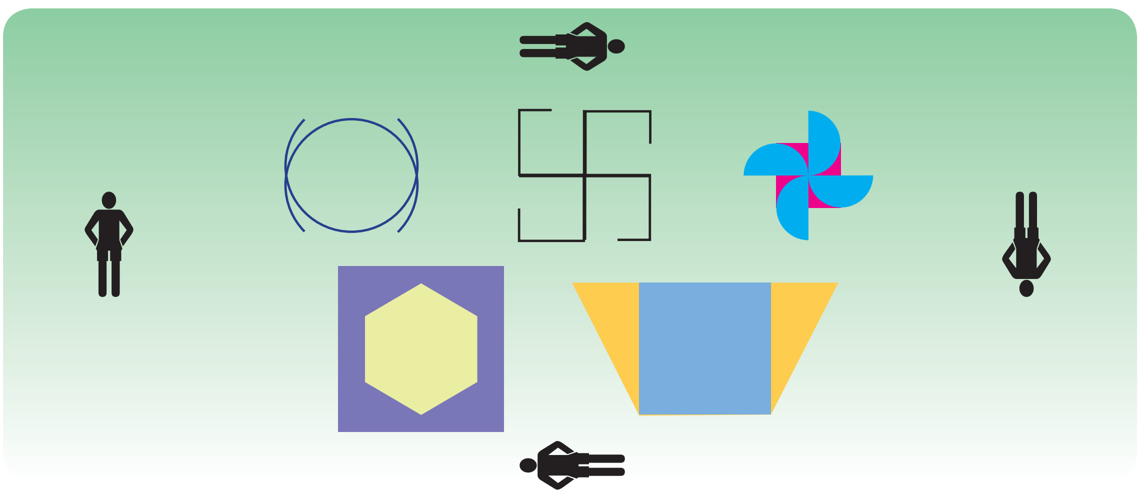
The blades of an exhaust fan look the same on $\frac{1}{4}$ of a turn.


Before turning it


After $\frac{1}{4}$ of a turn.

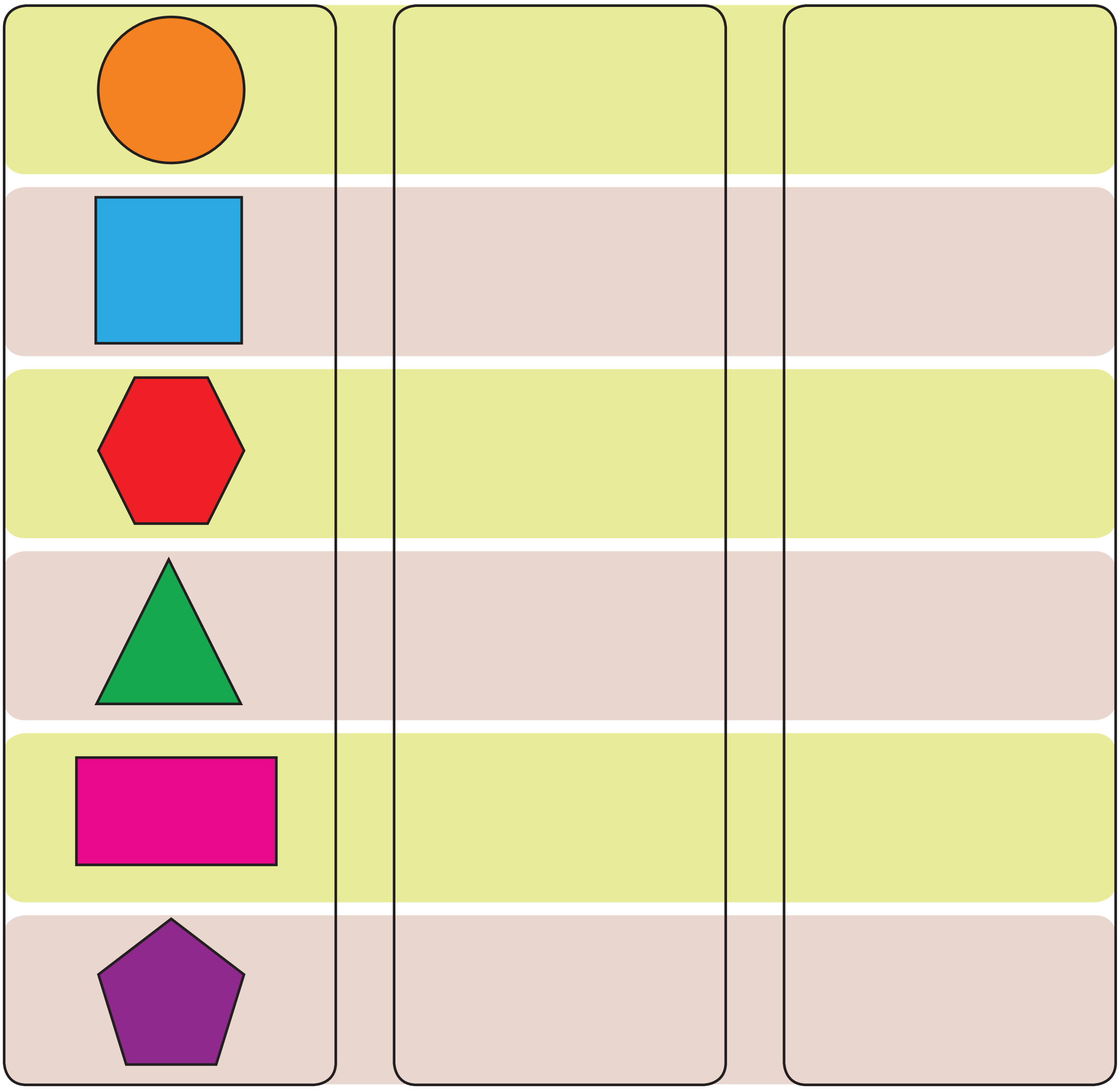
Practice Time

(1) Among the following shapes, find out which one would look the same after $\frac{1}{4}$ of a turn. Put a mark (✓)



(2) Draw what the following shapes would look like on $\frac{1}{4}$ of a turn and half of a turn.

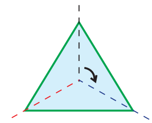
On $\frac{1}{4}$ of a turn   On half of a turn



(3) Draw three shapes which will look the same after half of a turn.

(4) Draw three shapes which will look the same after $\frac{1}{4}$ of a turn.

One-third turn

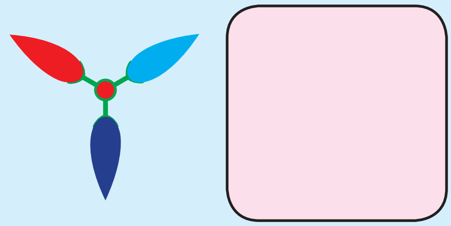


Which one will look the same on $\frac{1}{3}$ of a turn? Put a tick mark (✓) for the correct one.

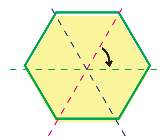
(a)

(b)

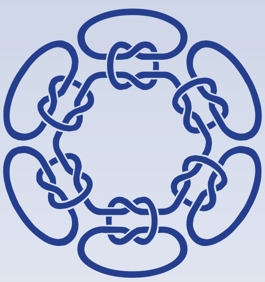
Draw the shape after $\frac{1}{3}$ of a turn

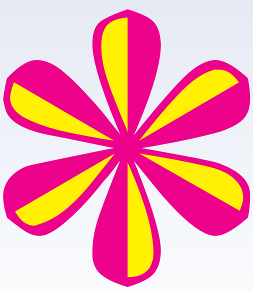


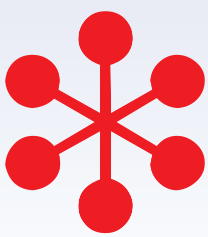
One-sixth turn



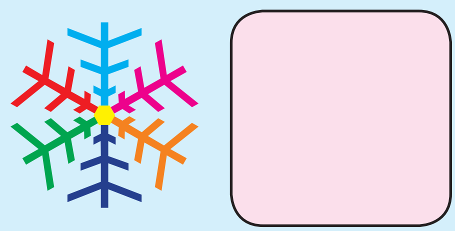
Can you observe that these shapes look the same on $\frac{1}{6}$ of a turn





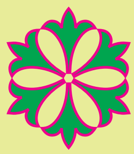
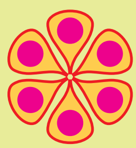
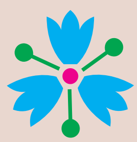
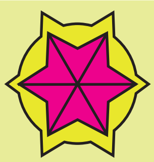


Draw the shape after $\frac{1}{6}$ of a turn



Practice Time

(1) Look at the following shapes. Draw how they will look on $\frac{1}{3}$ of a turn and $\frac{1}{6}$ of a turn.

	$\frac{1}{3}$ of a turn	$\frac{1}{6}$ of a turn
		
		
		
		
		

(2) Draw three shapes which will look the same after $\frac{1}{3}$ of a turn.

(3) Draw three shapes which will look the same after $\frac{1}{6}$ of a turn.

Group Activity

Collect and draw *kolams* in your notebook which will look the same after half a turn, $\frac{1}{4}$ of a turn, $\frac{1}{3}$ of a turn and $\frac{1}{6}$ of a turn.

Symmetry

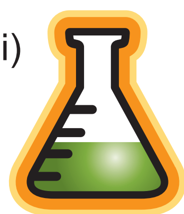
The front view pictures of a tiger, an architectural marvel, a rocket, a butterfly, a bird and a flower are some of the examples exhibiting symmetry.

The bodies of most of the animals are symmetrical. Their left and right sides are mirror images of each other.

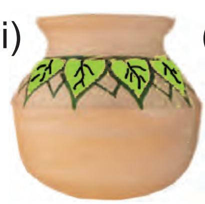
Practice Time

(1) List any four symmetrical objects that you see on your way to school and draw them.

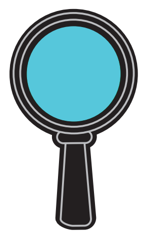
(2) Identify the shapes given below. Check whether they are symmetrical or not. Draw the line of symmetry if they are symmetrical.

(i) 

(ii) 

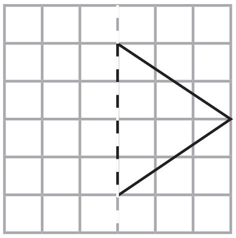
(iii) 

(iv) 

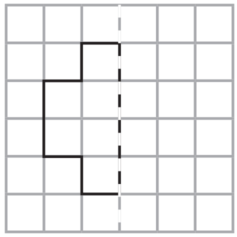
(v) 

Complete them such that the dotted line is the line of symmetry.

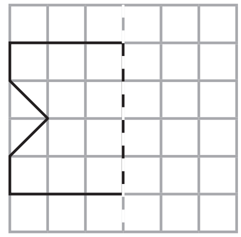
(i)



(ii)



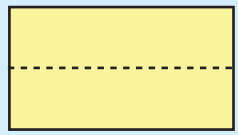
(iii)



Activity (3)

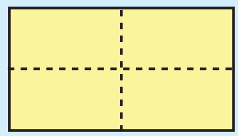
Figures with two lines of symmetry

Take a rectangular sheet. Fold it length wise, so that one half fits exactly over the other half.



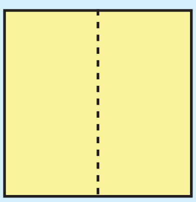
1st fold

Then fold it breadthwise in the same way. These two lines are the lines of symmetry.



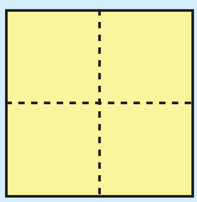
2nd fold

Figures with multiple (more than two) lines of symmetry



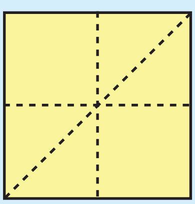
1st fold

Take a square sheet. Fold it into half vertically.



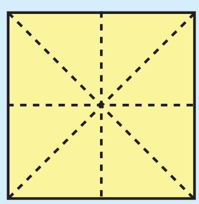
2nd fold

Fold it again into half horizontally.



3rd fold

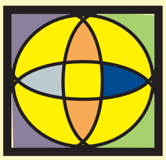
Holding the closed ends as the base fold the two joined flaps along the base.



Open out the fold. There are four lines of symmetry.

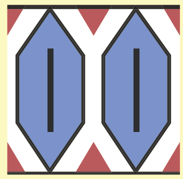
(1) Find the number of lines of symmetry for each of the following shapes.

(i)

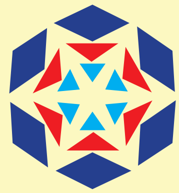


(ii)

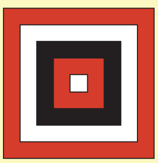
(iii)



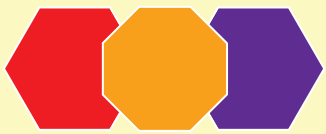
(iv)



(v)

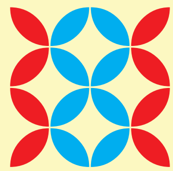


(vi)



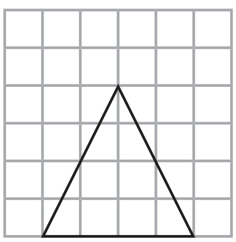
(vii)

(viii)

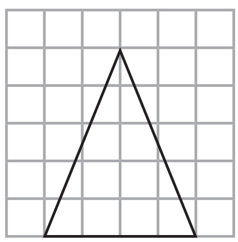


(2) Trace each figure and draw the lines of symmetry ,if any.

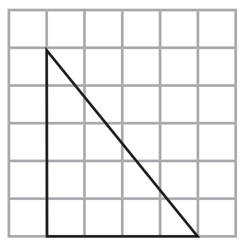
(i)



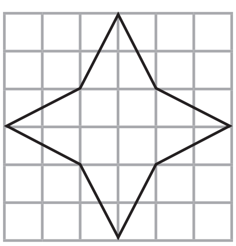
(ii)



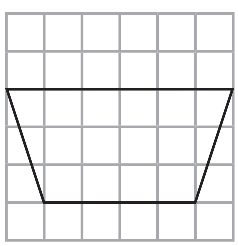
(iii)



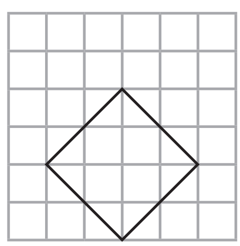
(iv)



(v)



(vi)

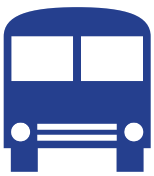


Reflection and symmetry

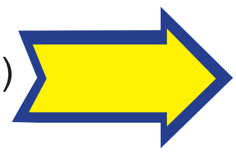
The mirror image of the face and the face itself are symmetrical about the plane of the mirror. Fold the paper in such a way that one face exactly falls on the other. Then the mirror line becomes the line of symmetry. Observe that the image is the reflection of the object at the mirror line.

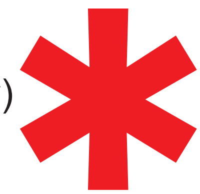
Practice Time

(1) Find the number of lines of symmetry in each of the following shapes. Check your answer by placing a mirror on the lines of symmetry.

(i) 

(ii) 

(iii) 

(iv) 

(v) 

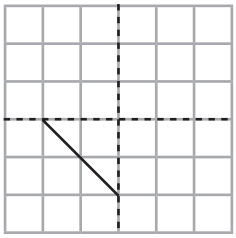
(vi) 

(vii) 

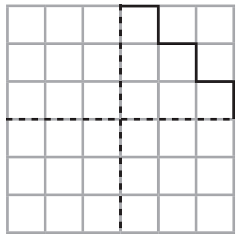
(viii) 

(2) Copy the following on a squared paper. Complete each one of them in such a way that the resultant figure has two dotted lines as two lines of symmetry.

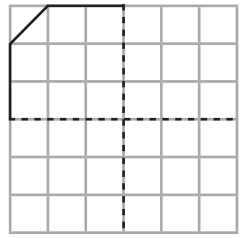
(i)



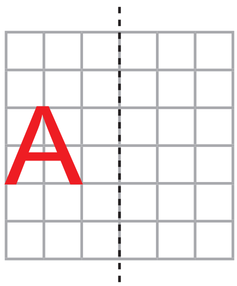
(ii)

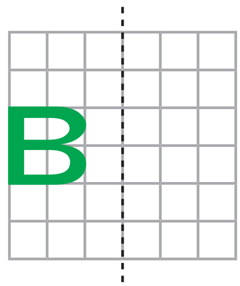


(iii)



3) Take a mirror image of the letter in the given line. Find which letters look the same after reflection and which do not.



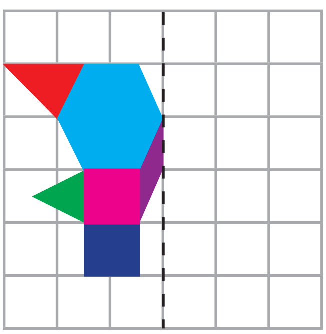


Try for other letters of the English alphabet.

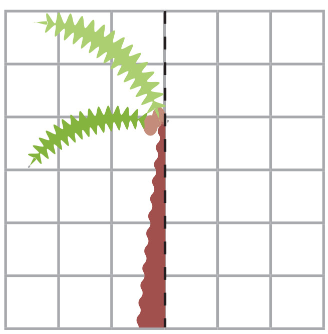
C, D, E, F, G, H, M, N, O, R, S

(4) Place the mirror along the line shown, get the other side and draw and colour it.

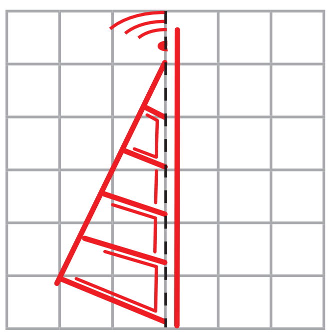
(i)



(ii)



(iii)



Project work

Collect and draw ten *kolams* in your notebook with one, two and three lines of symmetry.

2 Multiples & Factors

Multiples

Mary, Meena, Emily, Noorjahan and Taj are friends. It was raining then and hence they decided to play an indoor game.

Emily has a board in which numbers 1 to 50 were written as seen in the picture. She also has a set of cards numbered 1 to 10.

Emily explains the rules to her friends. To start the game, one person picks a card and notes down the number. For example, the person picks 4, she places a small stone on number 4 on the board. Then she adds 4 to the number on the board, and she gets 8, and places a stone on 8, then she again adds 4 and places a stone on 12 on the board and so on. The game continues, with others taking their turns.

Taj picked one card and she got number 3. Can you tell on which boxes she kept the stones?

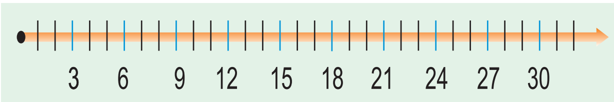
Look at the table given below.

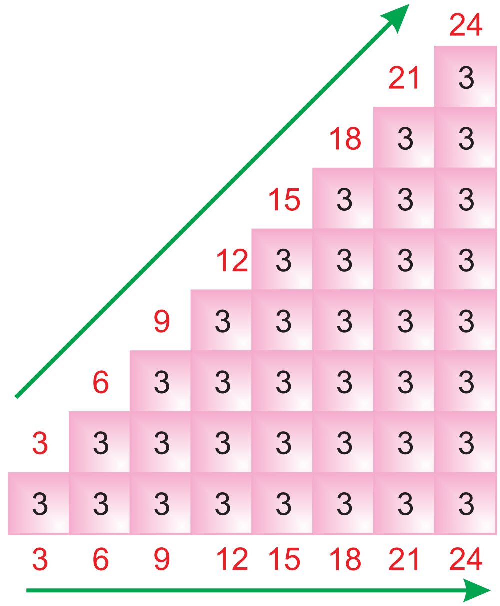
1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50

Number started with 3 and its consecutive summations are

3, 6, 9, 12, 15, 18, 21, 27, ...

Mark these numbers on the number line.

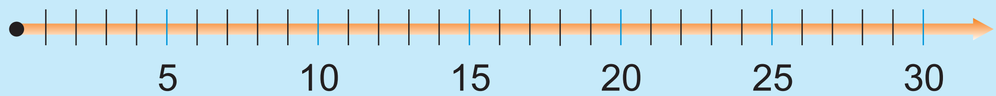




When a number is added repeatedly, the resulting numbers are called its multiples.

Mark the numbers, picked up by the other friends on the number line.

Noorjahan picked the number **5**

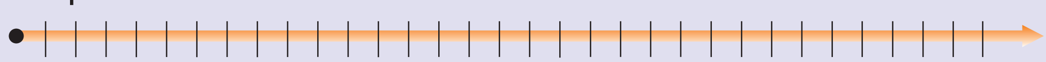


So, multiples of 5 are 5, 10, 15, 20, 25, 30,...

Emily picked the number **6**

So, multiples of 6 are ____________________

Meena picked the number **9**



So, multiples of 9 are ____________________

Mary picked the number **4**

So, multiples of 4 are ____________________

Know this

Each number is a first multiple of itself.

Practice Time

1.Fill in the blanks, with the multiples.

(i) 8, 16, ______, ______,______ 48 ______, ______.

(ii) 13, 26, ______, ______,______ 78______, ______.

(iii) 20, ______, ______, 80 ______, ______.

2.Write 5 multiples of each of the following numbers.

(i) 15 (ii) 25 (iii) 50

Project Work

The multiple of numbers from 1 to 10 are given in two ways that is from left to right and from top to bottom.

Follow the instructions and encircle the multiples.

1	2	3	4	5	6	7	8	9	10
2	4	6	8	10	12	14	16	18	20
3	6	9	12	15	18	21	24	27	30
4	8	12	16	20	24	28	32	36	40
5	10	15	20	25	30	35	40	45	50
6	12	18	24	30	36	42	48	54	60
7	14	21	28	35	42	49	56	63	70
8	16	24	32	40	48	56	64	72	80
9	18	27	36	45	54	63	72	81	90
10	20	30	40	50	60	70	80	90	100

Left to right:

From the 3rd multiple to the 8th multiple of 3

From the 3rd multiple to the 8th multiple of 6

From the 3rd multiple to the 8th multiple of 9

Top to bottom:

4th and 5th multiple of 3

7th and 8th multiple of 8

Shade the circles and enjoy.

What do you see? This year you are studying in ____ Standard.

To think

What is the connection between multiple of a number and its multiplication table?

Factors

Abdulla and Fathima got 4 cream biscuits each from their mom as snacks. Since Fathima is crazy about cream biscuits, Abdulla tempted her, and said "I will give you one more biscuit, if you answer my question".

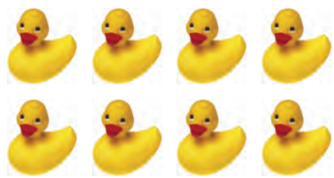
Fathima eagerly awaited the question. The question was to write 8 as a product of 2 numbers in all possible ways and use the toys to represent the different products.

Observe Fathima's answer:

$8 = 1 \times 8$

$8 = 8 \times 1$

$8 = 2 \times 4$



$8 = 4 \times 2$

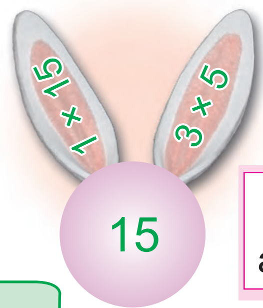
If a number can be written as a product of two or more numbers, those numbers are called factors.

Abdulla appreciated Fathima and gave her one more cream biscuit. He concluded saying that 8 can be expressed as the product of two different pairs of numbers.

$$8 = 1 \times 8$$
$$8 = 2 \times 4$$

Hence, the factors of 8 are 1, 2, 4 and 8.

i) Find the factors of 15.



Factors of 15 are 1, 3, 5, 15

ii) Find the factors of 9.

$9 = 1 \times 9$

$9 = 3 \times 3$

Factors of 9 are 1, 3, 9

Try these

(i) Find the factors of 10.

Factors of 10 are ____________

(ii) Find the factors of 6.

6 =

6 =

Factors of 6 are ____________

(i) Find the factors of 20.

Factors of 20 are 1, 2, 4, 5, 10, 20

(ii) Find the factors of 18.

$18 = 1 \times 18$

$18 = 2 \times 9$

$18 = 3 \times 6$

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

Try these

(ii) Find the factors of 24.

Factors of 24 are ____________

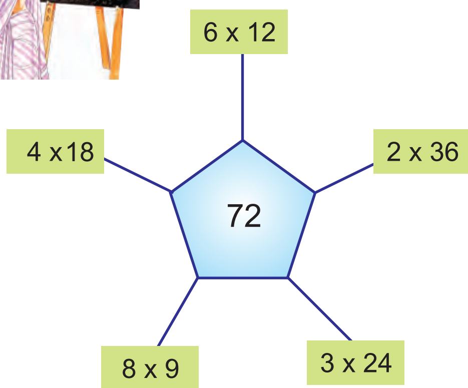
(ii) Find the factors of 36.

Factors of 36 are ____________

Note

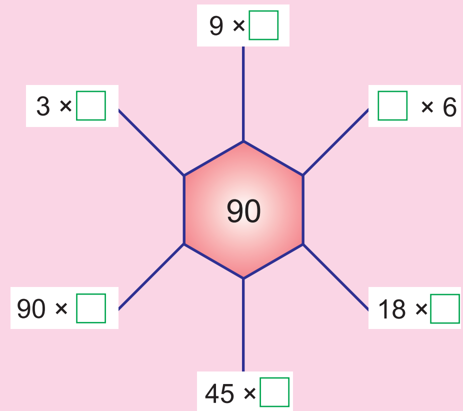
Observe the factors of 8, 15 and 20. For any number, 1 and the number itself are the factors. They are called trivial factors. Generally, we don't mention the trivial factors when we write these factors.

Find the factors of 72



Factors of 72 are
2, 3, 4, 6, 8, 9,12, 18, 24, 36

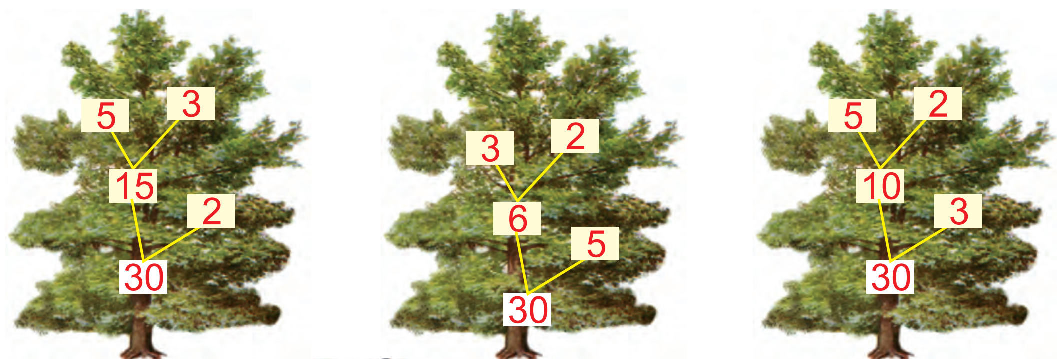
Fill in the boxes with suitable numbers and write the factors of 90



Factors of 90 are

FACTOR TREE

The factor tree for 30 are given in three different ways



Practice Time

1. Write the following numbers as multiplication of two numbers in all possible ways and write the factors: (i) 48 (ii) 50
2. Draw the factor tree for 60 in all possible ways.

The factors of a number can divide the number without remainder.

Activity 1

Two children can do the activity together.

Collect as many tamarind seeds as you can and divide them into groups of say 4 seeds each. Ask you friend to give the answer for say 5x4. Write down his answer.

From the group of seeds pick out 5 groups and count the number of seeds in them. Does it match with the answer given by your friend?

You can continue this activity with different number of seeds in a group.

Activity 2

Step 1 : Take 24 beads. Divide it into groups of 2 each. Note down whether any bead is left after making the groups.

Step 2 : Next make groups of 3 and see if any bead remains. Continue with 4, 5, ... and so on till you make a group of 24.

Step 3 : In each case note down the numbers in which no bead remains after grouping.

Step 4 : Find the factors of 24. Check whether the number you got in step 3 matches with the factors you have found.

This activity can be done using other numbers to find the factors.

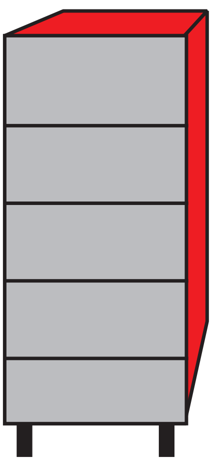
3 Fractions

Happy Birthday Celebration

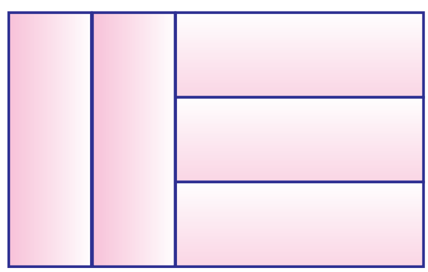
Gowtham wanted to celebrate his birthday in an orphanage with children. Hearing this, his parents, Seenu and Lakshmi felt very happy.

There were ten children in the orphanage. With the help of his father, he cut the cake into ten equal parts and distributed them. He gave_____ part of the cake to each child. There were 7 girls and 3 boys. Then _______ part of the cake was given to girls and _______ part of the cake was given to boys. Circle who has got the larger portion. Girls / boys.

During Holiday



Ranjitha helped her mother to arrange the clothes in the wardrobe. There were 5 shelves in it. In $\frac{3}{5}$th part of the shelves, the clothes were neatly arranged. In ________ part of the shelves, the clothes were not arranged.



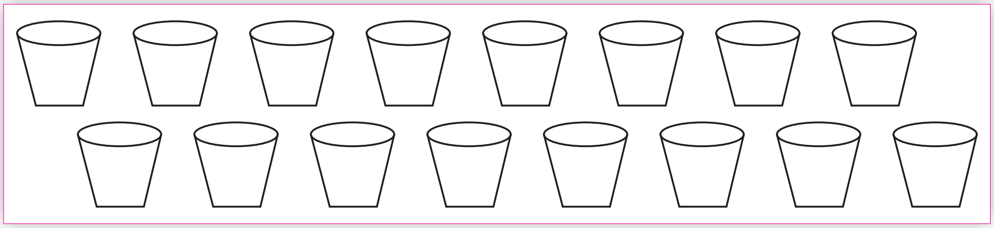
Have you seen wardrobes with five equal shelves in any other form. One way is given in the figure.

Activity

Create your own rectangular wardrobes in different ways with 5 equal shelves.

Activity

Colour $\frac{1}{4}$ of the flower pots in red. Colour half of them in blue. The remaining are to be coloured in green.



How many flower pots are red?

How many flower pots are blue?

How many flower pots are green?

Fraction is a number representing part of a whole. Whole may be a single object or a group of objects.

Kavitha shows a piece of chocolate having 5 equal parts.

It was decided that three-fifth of it belongs to Raman. This can be represented in a fraction as $\frac{3}{5}$.

A fraction is written as $\frac{\text{numerator}}{\text{denominator}}$

In the fraction $\frac{3}{5}$, 3 is the numerator and 5 is the denominator.

- What does 5 stand for?

It is the number of equal part into which the whole has been divided.

- What does 3 stand for?

It is the number of equal parts that has been selected from the whole.

Practice Time

(1) Pick out the denominator and numerator in each of the following fractions. Write them in the respective boxes.

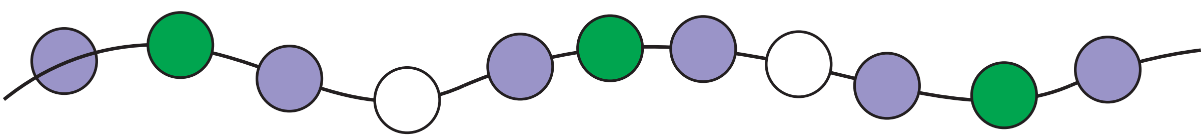
In $\frac{4}{6}$, Denominator is $\boxed{6}$ and Numerator is $\boxed{4}$

In $\frac{7}{12}$, Denominator is $\boxed{}$ and Numerator is $\boxed{}$

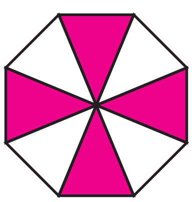
In $\frac{13}{20}$, Denominator is $\boxed{}$ and Numerator is $\boxed{}$

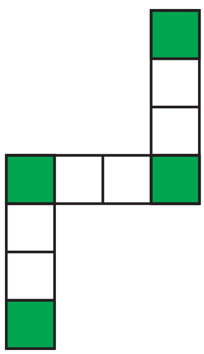
(2) In the given string of beads, number of white beads are _______ .

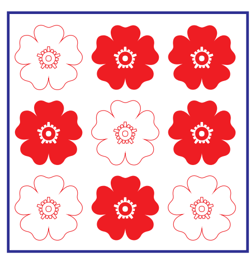
__________ beads are violet and __________ beads are green.

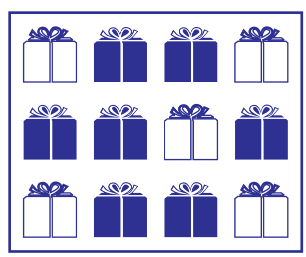


(3) Write the fraction representing the shaded portion.

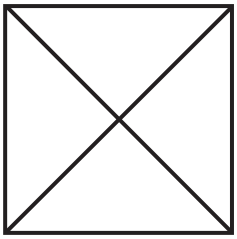




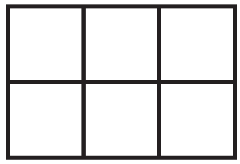




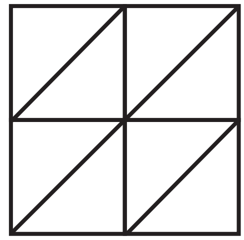
(4) Colour the part according to the given fraction:



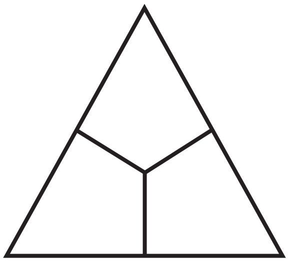
$\frac{3}{4}$



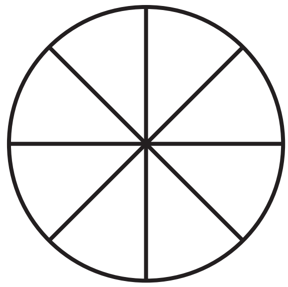
$\frac{5}{6}$



$\frac{2}{8}$

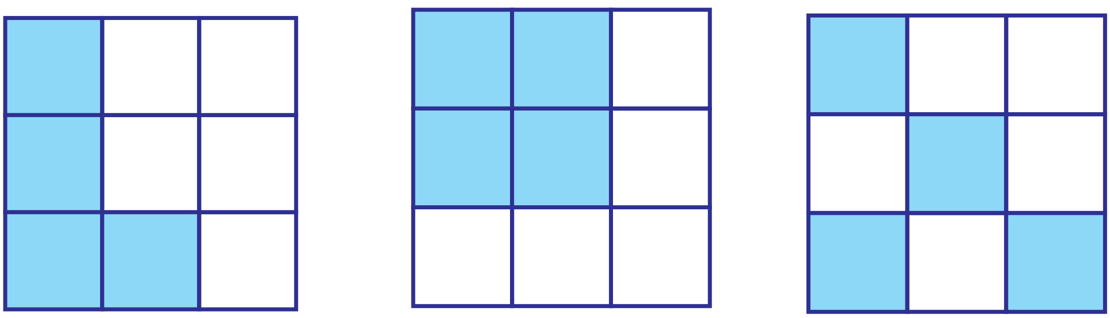


$\frac{2}{3}$



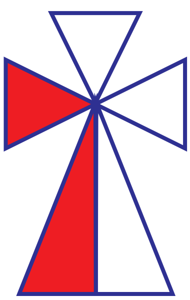
$\frac{3}{8}$

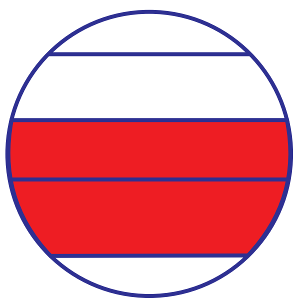
(5) In a 3 × 3 grid, the following figures show different ways of shading $\frac{4}{9}$. Make three more ways of shading $\frac{4}{9}$ in your notebook.

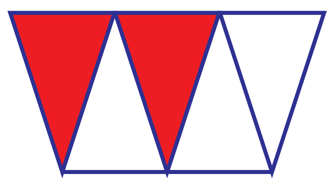


(6) Put the tick mark (✓) for the correct picture.

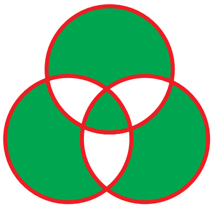
(i) $\frac{2}{5}$

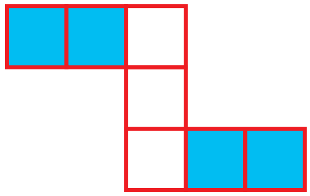


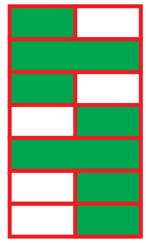




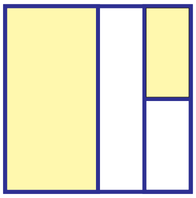
(ii) $\frac{4}{7}$

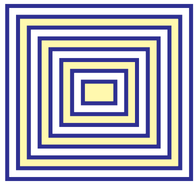


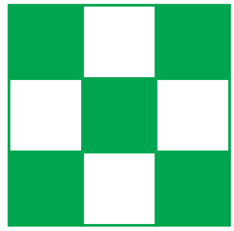




(iii) $\frac{5}{8}$







(7) Write the numbers from 1001 to 1021. Find the fraction of the even number from the list.

(8) What is the fraction of 5 hours in a day?

Activity

In our national flag,

- The uppermost part is saffron.
- The lowest part is coloured green.

Observe the picture and write.

What part of the flag is green?

________ part is saffron.

To think

Is the white colour a little less than $\frac{1}{3}$ of the flag? Why?

Project Work

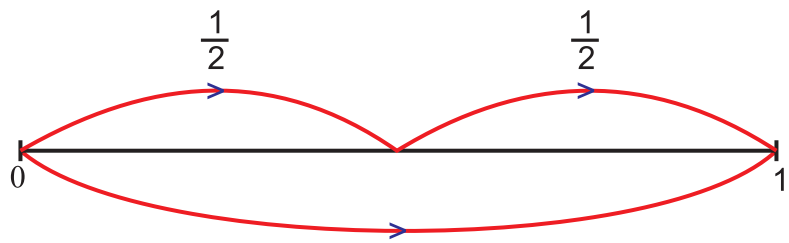
Collect the flags of 20 different countries. Stick them in your note book. Check whether they can be used to represent fraction. If so, write the fraction for each colour used in the flag.

TYPES OF FRACTIONS

Fraction less than 1

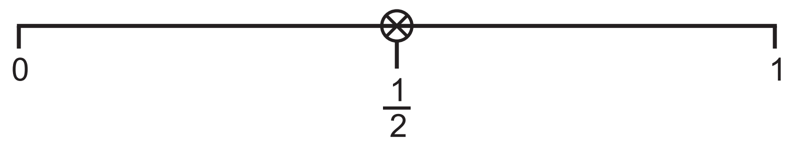
You have already learnt to show multiples of 2, 3, ... on a number line.

We can also show fractions on a number line .

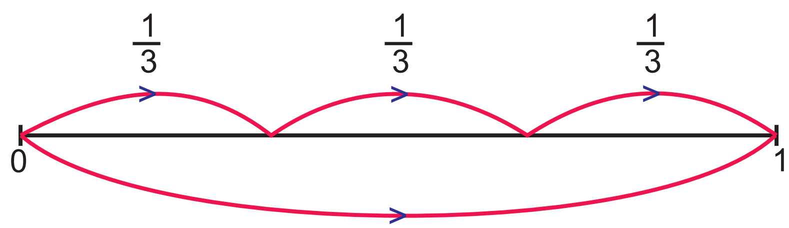


We divide the gap between 0 and 1 into two equal parts and show that each part is $\frac{1}{2}$.

Mark the point which divides the line into two equal halves as $\frac{1}{2}$.



Suppose we want to show $\frac{1}{3}$ on a number line into how many equal parts, should the length between 0 and 1 be divided?



We divide the length between 0 and 1 into 3 equal parts and show that each part is $\frac{1}{3}$.

Can you show $\frac{2}{3}$ on this number line? $\frac{2}{3}$ means 2 times of $\frac{1}{3}$ and $\frac{3}{3}$ means 3 times of $\frac{1}{3}$.

Observe that

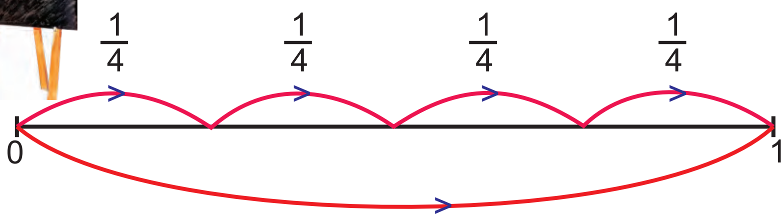
$\frac{0}{3} = 0$ and

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

Plot $\frac{0}{4}, \frac{1}{4}, \frac{2}{4}, \frac{3}{4}$ and $\frac{4}{4}$ on this number line.

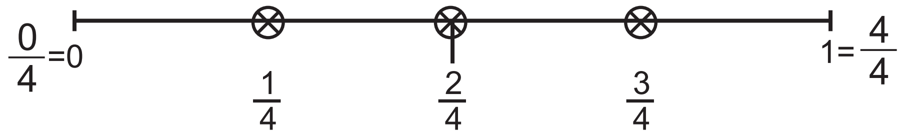
STEP 1

To plot these points divide the gap between 0 and 1 into 4 equal parts.



STEP 2

Mark the points $\frac{1}{4}$, $\frac{2}{4}$ and $\frac{3}{4}$ on the number line.



Kavitha recalls that the above fractions on the numberline represent parts of the whole. Raman adds that they are proper fractions. The denominator shows the number of parts into which the whole is divided and the numerator shows the number of parts that has been selected. Both of them concluded by saying that

All the fractions we have learnt so far are less than 1. These are called proper fractions. In a proper fraction the numerator is always less than the denominator.

Try these

(1) Give a proper fraction :

i) Whose numerator is 5 and the denominator is 6.

ii) Whose denominator is 10 and the numerator is 3.

iii) Make 5 proper fractions on your own.

(2) Locate the fractions $\frac{1}{2}, \frac{3}{5}$, $\frac{9}{10}, \frac{0}{9}$ and $\frac{5}{7}$ on separate number lines.

(3) Choose the correct answer and put (✓) mark against the correct column.

Fraction	equal to 0	less than 1	equal to 1
$\frac{1}{2}$		✓	
$\frac{4}{5}$			
$\frac{4}{4}$			
$\frac{5}{6}$			
$\frac{0}{7}$			
$\frac{200}{200}$			

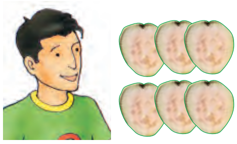
A way to Share

Sathya had three guavas and wanted to share them equally with her friend Madan. How can they divide the three guavas equally between them? Sathya and Madan tried to find a solution in their own way.

Sathya first shared one guava to each of them. Then she cut the third guava into two equal halves and shared between them equally. Thus each of them got one whole and one half guava. So, each one got $1 + \frac{1}{2}$ which is written as $1\frac{1}{2}$.

Fractions such as $1\frac{1}{2}$ are called mixed fractions. A mixed fraction is the combination of a whole and a fractional part.

Madan said, "I will divide like this". He cut each of the guavas into two equal halves and each of them got 3 half guavas.



In Madan's way, each share is equal to three halves which is written as $\frac{3}{2}$.

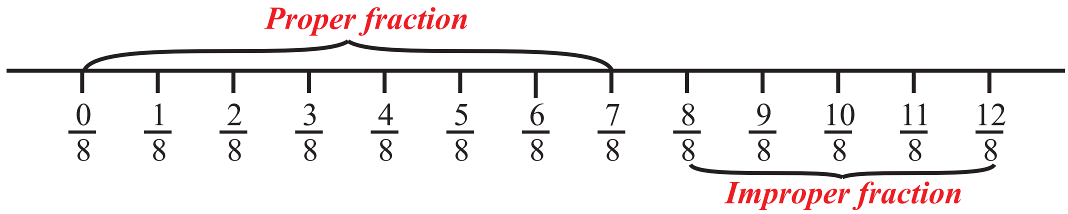
Madan observed that in the above fraction, the numerator is greater than the denominator. Such fractions are called improper fractions.

The fractions, in which the numerator is greater than or equal to denominator are called improper fractions.

Remember

In both the ways each of them got the same share. But the same share can be represented in two different ways.

Improper fractions are greater than or equal to 1. We can mark fraction such as $\frac{0}{8}, \frac{1}{8}, \ldots \frac{12}{8}$ on the number line.



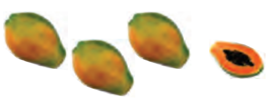
What about $\frac{0}{8}$ and $\frac{8}{8}$? We have already learnt that $\frac{0}{8}$ is 0 and $\frac{8}{8}$ is 1.

Try these

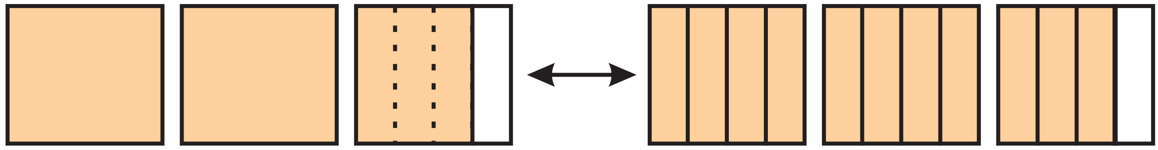
Draw the number line and locate the given points on it. List out the proper and improper fractions. (i) $\frac{2}{5}, \frac{3}{5}, \frac{8}{5}, \frac{4}{5}$ (ii) $\frac{1}{13}, \frac{15}{13}, \frac{8}{13}, \frac{17}{13}$

Mixed Fraction into Improper Fraction

Complete the table for two given mixed fractions $5\frac{1}{2}$ and $6\frac{1}{2}$.

Mixed Fractions	Improper Fractions	Mixed Fractions into Improper Fractions
$2\frac{1}{2}$ 		$\frac{(2 \times 2)+1}{2} = \frac{5}{2}$
$3\frac{1}{2}$ 		$\frac{(2 \times 3)+1}{2} = \frac{7}{2}$
$4\frac{1}{2}$ 		$\frac{(2 \times 4)+1}{2} = \frac{9}{2}$

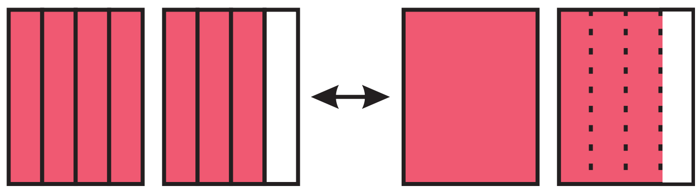
Conversion of mixed fraction $2\frac{3}{4}$ into improper fraction



$2\frac{3}{4}$ $\quad\quad$ $\frac{11}{4}$

The Improper fraction of $2\frac{3}{4}$ is $\frac{(4 \times 2) + 3}{4} = \frac{11}{4}$

Conversion of improper fraction $\frac{7}{4}$ into mixed fraction



$\frac{7}{4}$ $\quad\quad$ $1\frac{3}{4}$

$$\begin{array}{r|l} & 1 \\ \hline 4 & 7 \\ & 4 \\ \hline & 3 \end{array}$$

The mixed fraction of $\frac{7}{4}$ is $1\frac{3}{4}$.

Mixed fraction can be expressed as improper fraction and improper fraction can be converted into mixed fraction.

We can express a mixed fraction as an Improper fraction

$$\textbf{Improper fraction} = \frac{\textbf{(Whole × Denominator) + Numerator}}{\textbf{Denominator}}$$

Try these

(1) Change these into improper fractions: a) $3\frac{3}{4}$ $\quad$ b) $2\frac{5}{7}$

(2) Change these into mixed fractions: a) $\frac{16}{3}$ $\quad$ b) $\frac{13}{5}$

MOTHER'S DAY

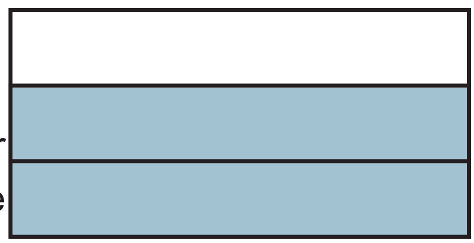
Mano and Meena each had a saving of ₹ 500. They wanted to greet their mother with a gift on the Mother's Day.

With half of his saving, Mano bought a saree worth ₹ 250. Meena bought a hand bag and bangles each for ₹ 125 each of which is one-fourth of her saving. Hence, she has spent two-fourth $\left(\frac{1}{4}+\frac{1}{4}\right)$ of her savings. Both the children spent, equal share of their savings to greet their mother. So, $\frac{1}{2}=\frac{2}{4}$.

Changing a fraction to higher terms.

Paper folding activity

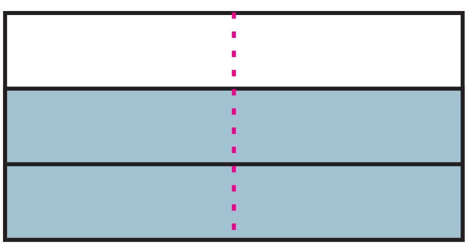
Take a rectangular sheet of paper measuring 6cm × 3 cm and represent the fraction $\frac{2}{3}$.



From the above picture

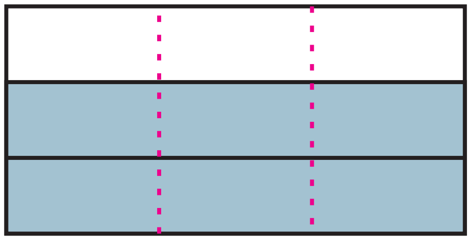
$$\boxed{\frac{2}{3} \times \frac{1}{1} = \frac{2}{3}}$$

Fold it exactly into two halves and unfold as shown.



$$\boxed{\frac{2}{3} \times \frac{2}{2} = \text{—}}$$

In another sheet of paper do the same activity as given above for representing $\frac{2}{3}$ and fold it into 3 equal parts and then unfold as done before.



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

We infer that $\frac{2}{3} = \frac{4}{\square} = \frac{\square}{\square}$

These are called equivalent fractions. They represent the same part of a whole.

To find an equivalent fraction, multiply both the numerator and the denominator of the given fraction by the same number.

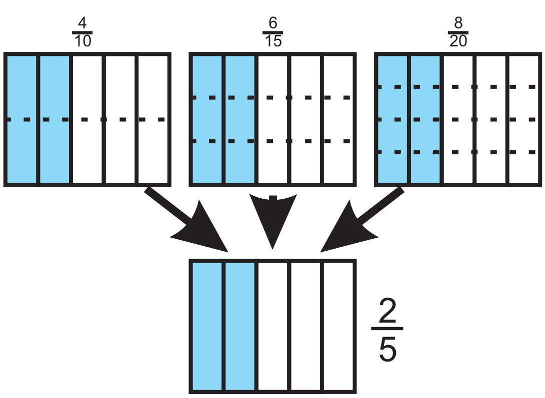
Try these

(1) Find the equivalent fractions of $\frac{3}{4}$ through paper folding until the numerator comes to 12.

(2) Find five equivalent fractions of $\frac{1}{5}$, $\frac{2}{7}$ and $\frac{4}{11}$.

Changing a fraction to lower terms.

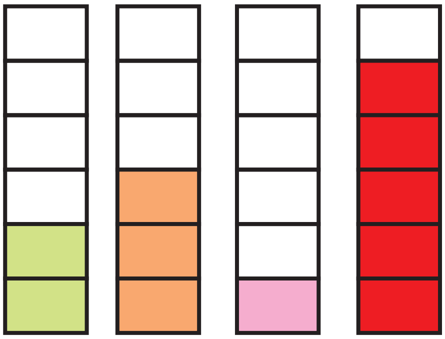
Look at the following representation of fractions.



To find an equivalent fraction, divide both the numerator and the denominator by the same number.

Like Fractions

Look at the shaded portion and write the fraction.



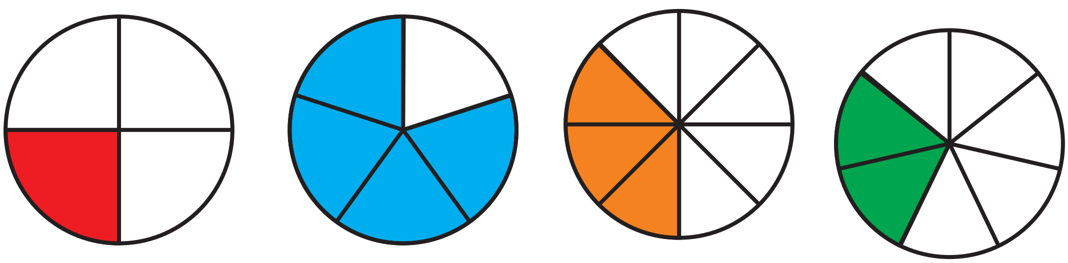
$\frac{2}{6}$ $\square$ $\square$ $\square$

What is common in all these fractions?

In these fractions the whole is divided into 6 equal parts. That is, the denominator of all fractions is equal to 6.

Fractions with same denominators are called like fractions.

Observe the following shaded portion, Find the fraction



$\boxed{\frac{1}{4}}$ $\square$ $\square$ $\square$

The whole of each is divided into different equal parts. That is, the denominators of all fractions are different.

Fractions with different denominators are called unlike fractions.

Try these

Group the given fractions into three groups of like fractions and one group of unlike fractions:

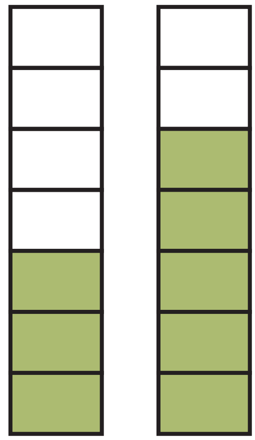
$\frac{1}{9}, \frac{7}{9}, \frac{5}{12}, \frac{7}{15}, \frac{7}{12}, \frac{8}{15}, \frac{5}{9}, \frac{8}{9}, \frac{4}{15}, \frac{1}{12}, \frac{1}{15}, \frac{8}{17}, \frac{9}{19}, \frac{7}{8}, \frac{2}{5}$

Comparing like Fractions

Let us compare two fractions $\frac{3}{7}$ and $\frac{5}{7}$.

In both the fractions, the whole is divided into 7 equal parts. The first and second fractions, 3 and 5 parts respectively are shaded from the divided whole. That is 3 times of $\frac{1}{7}$ is less than 5 times of $\frac{1}{7}$.

Hence $\frac{3}{7}$ is less than $\frac{5}{7}$.



$\frac{3}{7}$ $\frac{5}{7}$

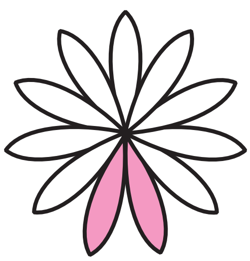
Try these

- Circle the greater fraction: (i) $\frac{4}{5}$, $\frac{3}{5}$ (ii) $\frac{11}{20}$, $\frac{13}{20}$ (iii) $\frac{17}{19}$, $\frac{15}{19}$

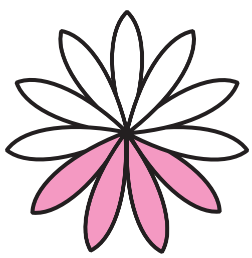
Small to Big

Arrange the following like fractions $\frac{2}{11}$, $\frac{4}{11}$, $\frac{7}{11}$ and $\frac{3}{11}$ in ascending order.

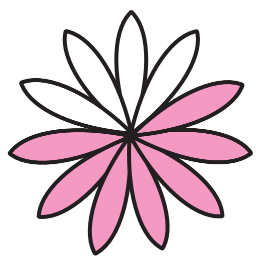
Pictorial representation of the given fractions:



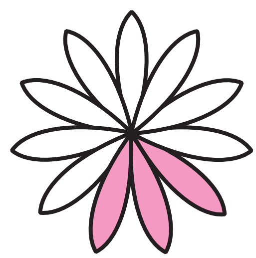
$\frac{2}{11}$



$\frac{4}{11}$

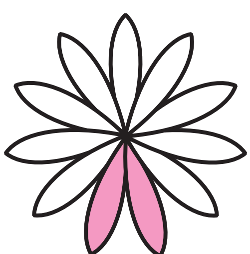


$\frac{7}{11}$

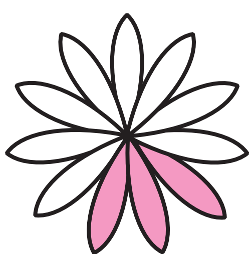


$\frac{3}{11}$

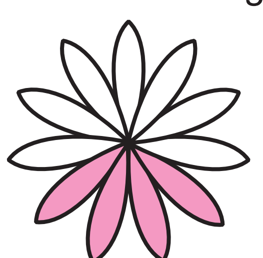
Let us rearrange them from the smallest to the greatest fractions.



$\frac{2}{11}$



$\frac{3}{11}$



$\frac{4}{11}$

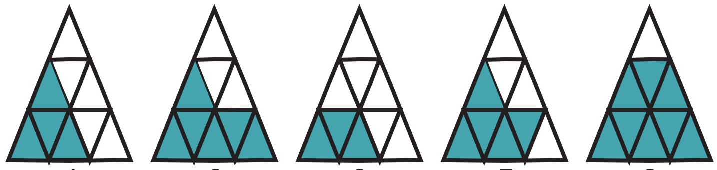
$\frac{7}{11}$

Ascending order of fractions are $\frac{2}{11}$, $\frac{3}{11}$, $\frac{4}{11}$, $\frac{7}{11}$

Big to Small

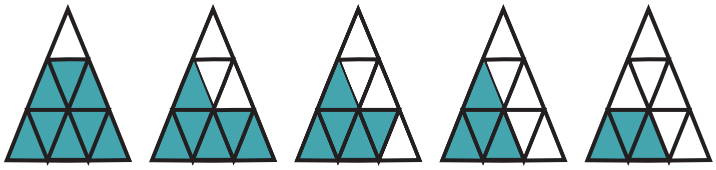
Arrange the following like fractions $\frac{4}{9}, \frac{6}{9}, \frac{3}{9}, \frac{5}{9}$ and $\frac{8}{9}$ in descending order.

Pictorial representation of the given fractions:



$\frac{4}{9}$ $\frac{6}{9}$ $\frac{3}{9}$ $\frac{5}{9}$ $\frac{8}{9}$

Let us rearrange these from the greatest to the smallest fractions.



$\frac{8}{9}$ $\frac{6}{9}$ $\frac{5}{9}$ $\frac{4}{9}$ $\frac{3}{9}$

Descending order of fractions are $\frac{8}{9}, \frac{6}{9}, \frac{5}{9}, \frac{4}{9}, \frac{3}{9}$

Remember

We observe that

- To arrange like fractions in ascending order, we have to arrange the numerators of each of the fractions in ascending order.
- To arrange like fractions in descending order, we have to arrange the numerators of each of the fractions in descending order.

Practice Time

1. Write these in ascending and also in descending order

(i) $\frac{2}{8}, \frac{7}{8}, \frac{6}{8}, \frac{1}{8}$ (ii) $\frac{9}{7}, \frac{7}{7}, \frac{6}{7}, \frac{1}{7}$ (iii) $\frac{13}{12}, \frac{5}{12}, \frac{7}{12}, \frac{11}{12}, \frac{10}{12}$

2. Latha painted $\frac{3}{8}$ part of the wall in her room. Sudhakar helped her and he painted $\frac{5}{8}$ part of the wall. Find out who painted more?

3. Vani wanted to take her two daughters to a book exhibition. So, she asked both of them to say the time they needed to visit the book stall. Karthika said that it would take $\frac{1}{4}$ of two hours for her. Meghala said that it would take $\frac{3}{4}$ of an hour for her. Find who takes more time?

Activity

Take the fraction discs used for teaching fraction from the mathematics kit box. Take the disc which represents the fraction $\frac{1}{2}$ and place it separately. Then take the fractional discs which represent $\frac{2}{4}$ and place it above $\frac{1}{2}$. In the same way place the fractional discs representing $\frac{4}{8}$ and $\frac{5}{10}$ above $\frac{1}{2}$. What do you find out? Put the appropriate symbols (<, >, =) in the box below based on your observation.

$$\frac{1}{2} \ \boxed{} \ \frac{2}{4} \ \boxed{} \ \frac{4}{8} \ \boxed{} \ \frac{5}{10}$$

You can also make fractional parts using circular paper or chart paper prepared with the help of teacher.

Activity

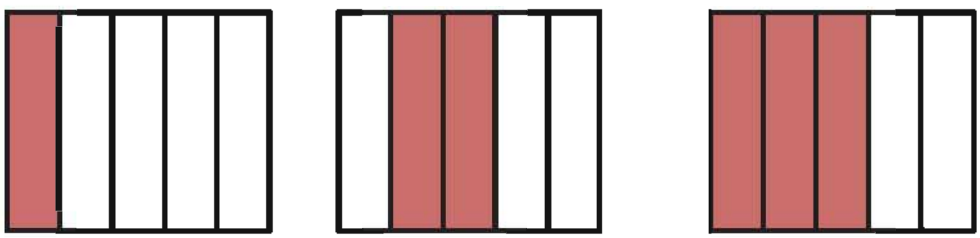
Saravanan and Sankari are siblings. Their mother shared two apples by cutting each apple into two equal halves. There were totally four parts. Out of these four parts she gave three parts to Saravanan. Then she gave one full apple and the remaining one part to Sankari. Represent each one's share as fraction. Then take fractional discs from the kit box representing each one's share. Compare both the fractions by placing one above other.

4 Addition, Subtraction and Multiplication of Fractions

Addition of like fractions

Geetha said that her mother uses $\frac{1}{3}$ of a litre of milk in the morning and $\frac{1}{3}$ of a litre of milk in the evening. Then the total quantity of milk she uses is $\frac{1}{3} + \frac{1}{3} = \frac{2}{3}$.

Find the sum: $\frac{1}{5} + \frac{2}{5}$



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

The sum of two or more like fractions can be obtained as follows.

Step 1 : Add the numerator $1 + 2 = 3$

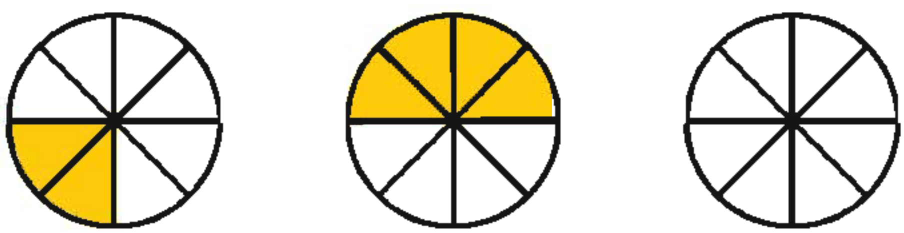
Step 2 : Retain the common denominator 5

Step 3 : $\frac{\text{Result of Step 1}}{\text{Result of Step 2}} = \frac{3}{5}$

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

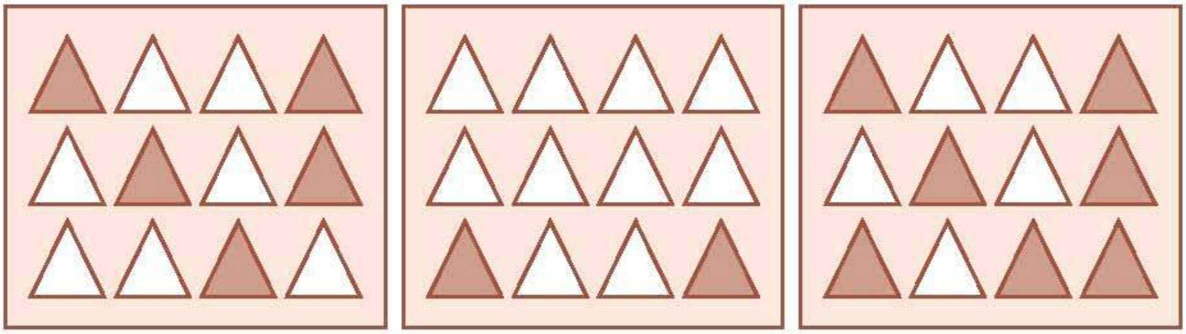
Try these

Write the fractions for the shaded part of the first two figures. Add them and shade the resultant part in the third figure.



$\square \quad + \quad \square \quad = \quad \square$

Find the sum of $\frac{5}{12}$ and $\frac{2}{12}$.

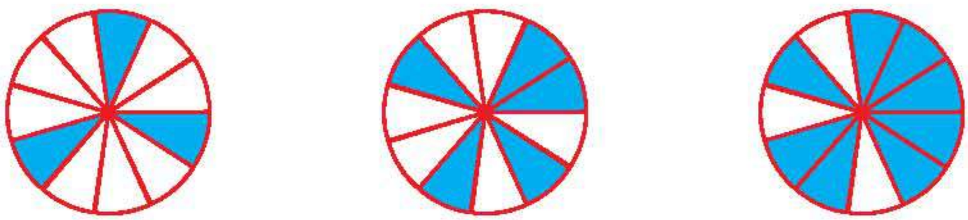


$$\frac{5}{12} + \frac{2}{12} = \frac{7}{12}$$

Try these

Find the sum of the following:

1.



$\square + \square = \square$

2.

$\square + \square = \square$

3. Add the like fractions (i) $\frac{3}{11} + \frac{7}{11}$ (ii) $\frac{4}{13} + \frac{8}{13}$

(iii) $\frac{4}{17} + \frac{9}{17}$ (iv) $\frac{7}{20} + \frac{2}{20}$

Finding the Balance

Shekar has $\frac{5}{6}$ part of the chocolate bar. He gave $\frac{2}{6}$ part of it to his younger sister. How much chocolate is left with him?

$$\underbrace{\frac{5}{6} \quad - \quad \frac{2}{6}}_{} \quad = \quad \frac{3}{6}$$

Thus the difference between two like fraction can be obtained as follows.

Step 1 : Subtract the smaller numerator from the bigger numerator $5 - 2 = 3$

Step 2 : Retain the common denominator 6

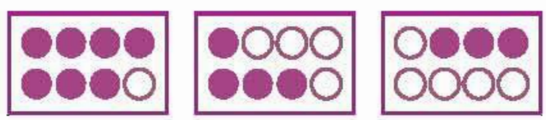
Step 3 : $\dfrac{\text{Result of Step 1}}{\text{Result of Step 2}} = \dfrac{3}{6}$ (or) $\dfrac{1}{2}$

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

Try these

1. 

$\square - \square = \square$

2. 

$\square - \square = \square$

3. Fill in the missing fraction

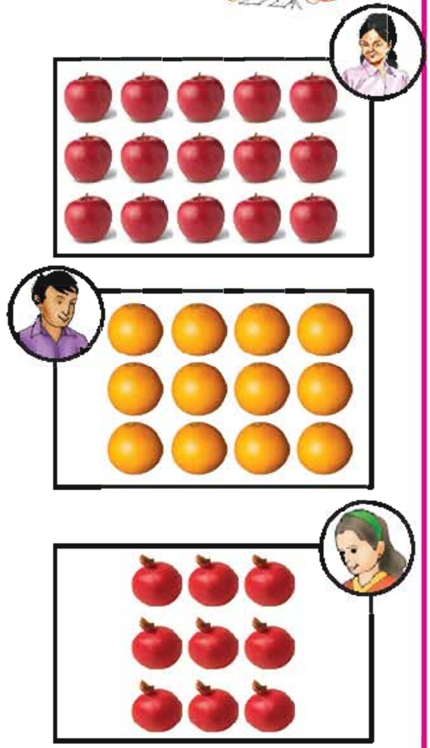
(i) $\frac{13}{18} - \frac{7}{18} =$ (ii) $\frac{8}{12} - \square = \frac{5}{12}$

(iii) $\square - \frac{3}{14} = \frac{9}{14}$ (iv) $\frac{7}{9} - \square = \frac{4}{9}$

4. Can you subtract $\frac{3}{10}$ from $\frac{8}{10}$

5. Find the difference between $\frac{5}{8}$ and $\frac{7}{8}$

Activity



Balu bought fruits for his friend's family. He bought 15 apples, 9 pomegranates and 12 oranges. His friend's daughter Mrithika received the fruit basket and she started sharing the fruits between her brother Gowtham and her cousin Madhu keeping her own share. She grouped the apples into 3 equal parts. Each one got ______ apples.

She grouped the pomegranates into 3 equal parts. Each one got ______ part of pomegranates. As Goutham did not like pomegranate, he gave his share to Mrithika.

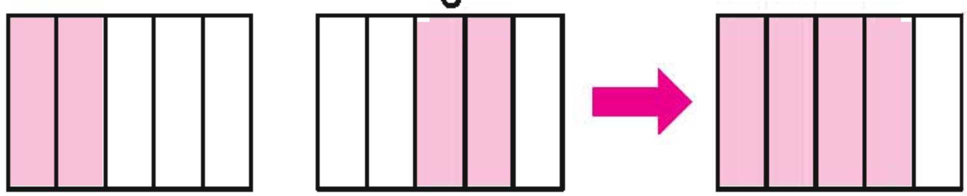
Now, Mrithika has $\frac{3}{9} + \boxed{} = \boxed{}$ part of pomegranates.

She grouped the oranges into 3 equal parts.

Each one got $\boxed{}$ part of oranges.

Multiplication of fraction

Look at the picture and find $\frac{2}{5} \times 2$.



$$\underbrace{\frac{2}{5} \qquad \frac{2}{5}}_{2 \text{ times of } \frac{2}{5}} = \frac{4}{5}$$

Step 1 : Multiply the numerator of the fractions $2 \times 2 = 4$

Step 2 : Retain the denominator 5

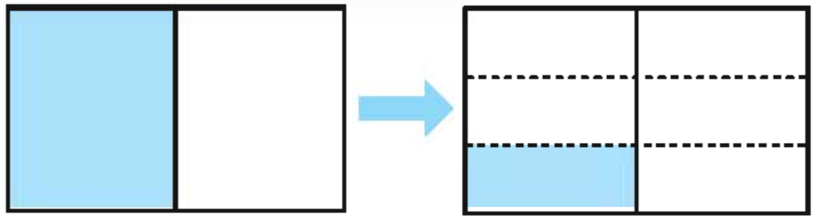
Step 3 : $\dfrac{\text{Result of Step 1}}{\text{Result of Step 2}} = \dfrac{4}{5}$

$$\frac{2}{5} \times 2 = \frac{2 \times 2}{5} = \frac{4}{5}$$

Multiply a fraction with another fraction

Find

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



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

From the figure $\frac{1}{3}$ of $\frac{1}{2}$ is found out.

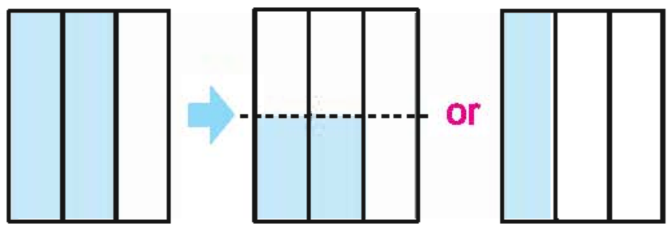
Step 1 : Multiply the numerator of both the fractions $1 \times 1 = 1$

Step 2 : Multiply the denominator of both the fractions $2 \times 3 = 6$

Step 3 : $\dfrac{\text{Result of Step 1}}{\text{Result of Step 2}} = \dfrac{1}{6}$

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

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



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

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

From the figure $\frac{1}{2}$ of $\frac{2}{3}$ is found out.

Try these

Find the answers for the following.

(i) $\frac{4}{7} \times 3 = \square$ (ii) $\frac{5}{9} \times 2 = \square$

(iii) $\frac{7}{15} \times 2 = \square$ (iv) $\frac{4}{11} \times 5 = \square$

(v) $\frac{3}{5} \times \frac{1}{4} = \square$ (vi) $\frac{3}{7} \times \frac{2}{5} = \square$

(vii) $\frac{7}{5} \times \frac{2}{3} = \square$ (viii) $\frac{4}{9} \times \frac{1}{5} = \square$

Practice Time

1. Round the greater fraction from the given pairs of fractions.

   (a) $\frac{3}{5}, \frac{4}{5}$ (b) $\frac{1}{7}, \frac{3}{7}$ (c) $\frac{3}{8}, \frac{6}{8}$ (d) $\frac{4}{9}, \frac{7}{9}$

2. Write the following fractions in ascending and descending order.

   (a) $\frac{3}{12}, \frac{6}{12}, \frac{10}{12}, \frac{5}{12}$ (b) $\frac{5}{8}, \frac{3}{8}, \frac{2}{8}, \frac{7}{8}$

3. Add

   (a) $\frac{3}{8} + \frac{2}{8} = \square$ (b) $\frac{2}{5} + \square = \frac{3}{5}$ (c) $\square + \frac{3}{6} = \frac{5}{6}$

4. Subtract

   (a) $\frac{4}{10} - \frac{1}{10} = \square$ (b) $\frac{7}{19} - \square = \frac{4}{19}$ (c) $\square - \frac{2}{17} = \frac{4}{17}$

5. Find the answers

   (i) Subtract $\frac{2}{5}$ from $\frac{3}{5}$ (ii) Subtract $\frac{1}{9}$ from $\frac{5}{9}$

   (iii) Subtract $\frac{8}{15}$ from $\frac{12}{15}$

6. The distance between Bhavani's house and her school is $\frac{1}{4}$ km. How long does she have to walk to go to school and come back?

7. Saran sleeps $\frac{1}{4}$ a day. How many hours does he sleep in 4 days?

8. In an egg case, 36 eggs can be placed. How many eggs can be placed in half of the egg case?

9. In a flower bouquet, there are 7 yellow roses and 13 red roses. Maran took 5 yellow roses and 8 red roses. Express the fraction of red and yellow roses taken by Maran ? Find out the fraction of red and yellow roses left in the bouquet?

10. Mani planted wheat in $\frac{3}{5}$ of his 15 acres of land. In how many acres of land did he plant?

11. The cost of 1 kg of Tomato is ₹ 18 and the cost of 1 kg of Onion is ₹ 16. Find the total cost of $2\frac{1}{2}$ kg of Tomatoes and $1\frac{1}{4}$ kg of Onions?

A challenge for you !

An old man had three sons. He owned 17 goats too. In his will, he has written: "After my lifetime $\frac{1}{2}$ part of the goats will go to Dass, $\frac{1}{3}$ will go to Muthu and $\frac{1}{9}$ will go to Mohan", making sure that all the 17 goats are alive.

The sons tried to divide the goats as per the will. $\frac{1}{2}, \frac{1}{3}, \frac{1}{9}$, of 17 goats? Not possible! They could not solve the problem. They approached a wise man. The wise man said, "take one of my goats and then share as per the will. After sharing, return my goat to me".

How many goats did Dass get?__________

Number of goats given to Muthu __________

Mohan got __________ goats.

Did the wise man get his goat back?

Decimals

Madan and Ravi were given a square sheet of paper with sides measuring 10cm each. They were asked to make 100 equal parts. Both of them started trying. Ravi started making small bits. Madan thought for a while and planned well. He started to cut the paper into 10 equal parts in lengthwise and breadthwise. He got 100 equal parts.

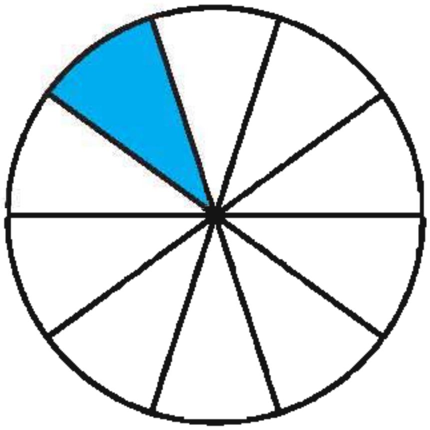
Among the 100 parts, what does each part represent? It is $\frac{1}{100}$

Can you imagine how small $\frac{1}{100}$ is?

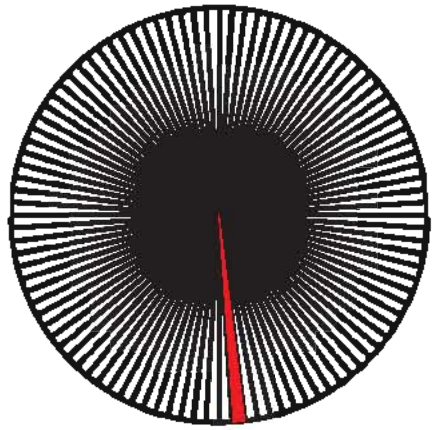
We see that

Fraction numbers whose denominators are 10 and 100 can be expressed as decimal numbers. Here '*Deci*' means ten.

Observe the following pictures.



$\frac{1}{10}$



$\frac{1}{100}$

The portion shaded in blue colour is $\frac{1}{10}$ and it is represented as 0.1

The portion shaded in red colour is $\frac{1}{100}$ and it is represented as 0.01

Change the following fractions into decimals.

(i) $\frac{2}{10} = 0.2$ (ii) $\frac{35}{100} = 0.35$ (iii) $\frac{6}{100} = 0.06$

Change the following decimals into fractions.

$0.9 = \frac{9}{10}$ (ii) $0.44 = \frac{44}{100}$ (iii) $0.03 = \frac{3}{100}$

Try these

1. Write decimal number for the following fractional numbers.

(i) $\frac{5}{10} = \square$ (ii) $\frac{8}{10} = \square$ (iii) $\frac{3}{10} = \square$

(iv) $\frac{36}{100} = \square$ (v) $\frac{48}{100} = \square$ (vi) $\frac{6}{100} = \square$

2. Write the fractional numbers for the following decimal numbers.

(i) $0.7 = \square$ (ii) $0.15 = \square$ (iii) $0.21 = \square$

Group Activity

Take a graph paper. Divide it into 100 equal parts. Shade the decimal portion. Use a separate sheet for each sum.

(i) 0.15 (ii) 0.37 (iii) 0.45 (iv) 0.40 (v) 0.07

Worksheet

Answer the following:

1. The fraction which is less than 1 is called ________
   I) Proper fraction II) Improper fraction
   iii) Mixed number iv) unlike fraction

2. The sum of $\frac{2}{11}$ and $\frac{1}{11}$ is ________
   i) $\frac{3}{11}$ ii) $\frac{6}{11}$ iii) $\frac{7}{11}$ iv) $\frac{9}{11}$

3. From the fractions given below the fraction which is not equivalent to the other three is ________
   i) $\frac{8}{10}$ ii) $\frac{4}{5}$ iii) $\frac{28}{35}$ iv) $\frac{5}{4}$

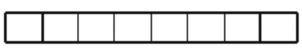
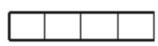
4. The difference between $\frac{8}{18}$ and $\frac{3}{18}$ is ________
   i) $\frac{5}{18}$ ii) $\frac{7}{18}$ iii) $\frac{1}{8}$ iv) $\frac{11}{18}$

5. $4\frac{8}{3}$ is equal to ________
   i) $\frac{8}{3}$ ii) $\frac{13}{3}$ iii) $\frac{10}{3}$ iv) $\frac{20}{3}$

6. The product of $\frac{2}{3}$ and 5 is ________
   i) $\frac{5}{3}$ ii) $\frac{7}{3}$ iii) $\frac{2}{8}$ iv) $\frac{10}{3}$

7. $\frac{1}{2}$ of 3 ________
   i) $\frac{3}{2}$ ii) $\frac{2}{3}$ iii) $\frac{1}{6}$ iv) $\frac{1}{5}$

8. If 1 litre of milk costs ₹ 20, the cost of $\frac{1}{2}$ litre is ________
   i) ₹ $20\frac{1}{2}$ ii) ₹ $10\frac{1}{2}$ iii) ₹ 10 iv) ₹ 15

9. If  represents 8,  represents
   i) $\frac{1}{2}$ of 8 ii) $\frac{1}{4}$ of 8 iii) $\frac{3}{4}$ of 8 iv) $\frac{1}{3}$ of 8

10. $\frac{2}{10}$ can be expressed as ________
    i) 0.2 ii) 0.5 iii) 0.1 iv) 0.02

'I can, I did'

Student's Activity Record

Subject :

S.No	Date	Lesson No.	Topic of the Lesson	Activities	Remarks