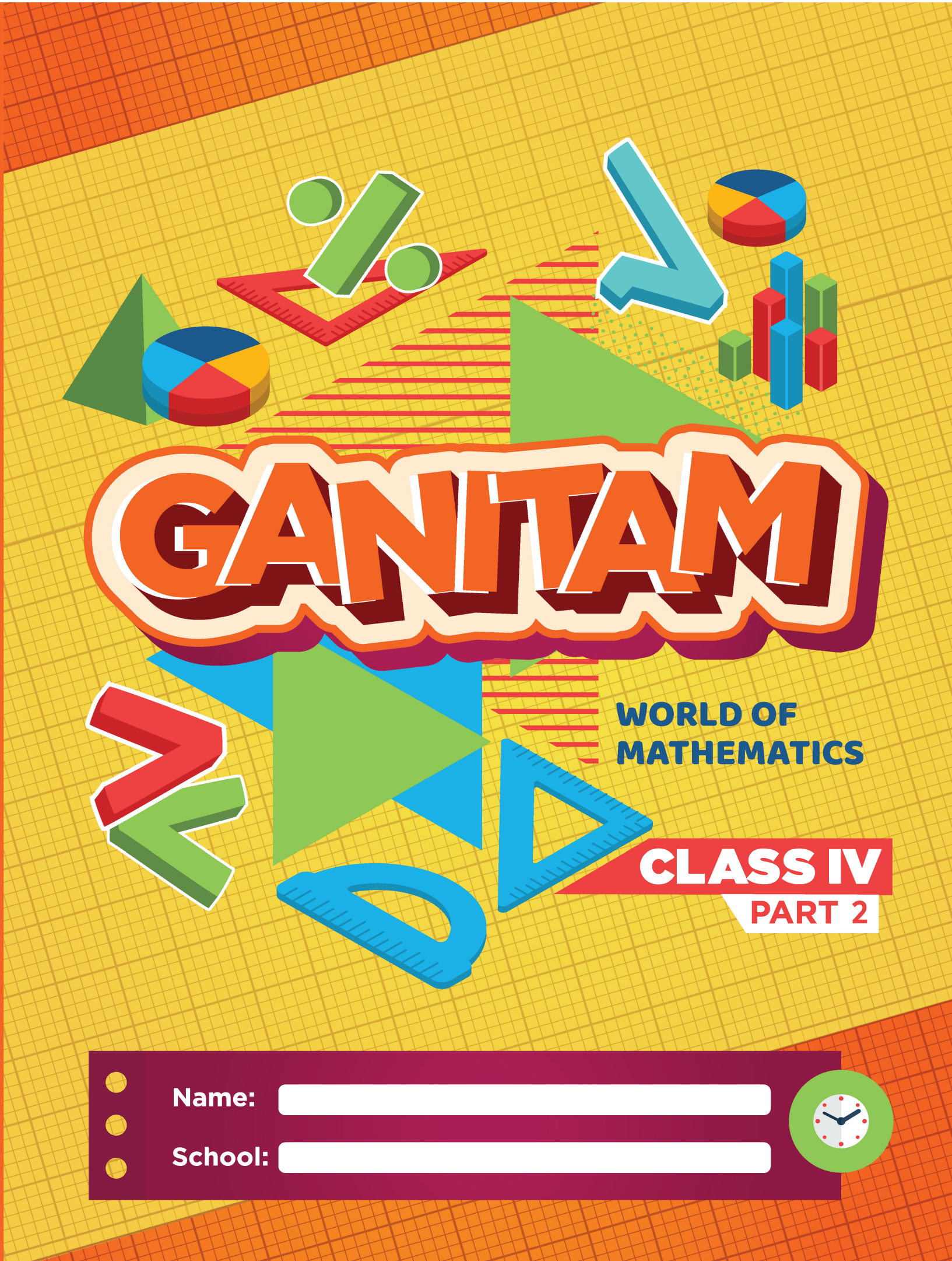
GANITAM
WORLD OF MATHEMATICS
CLASS IV
PART 2
Name:
School:

Ganitam

The World of Mathematics

Part II

Ganitam

The World of Mathematics

Second Edition published in 2024

MRP ₹ 200/-

Preface

Ganitam – The World of Mathematics

Mathematics builds hope. It helps us believe that every problem has a solution.

Education imparted in classrooms should be linked to life outside school. Hence the knowledge and skills acquired in school should help children understand the world around them better, and thereby contribute towards its betterment. This series of books on Mathematics titled "Ganitam-The World of Mathematics", has been prepared with that thought on our minds. The book has been designed in such a way that it enhances inquisitiveness in children by encouraging them to ask questions and seek answers rather than just learn what is listed in the books.

The content has been carefully curated, so that it reflects the rich cultural diversity of our motherland Bharat, enabling the child to intuitively understand the unifying values that bond the citizens of this great country together. Thus, the book will help a child gain various skills required for the 21st century and be a universal citizen with a passion for following Indian values.

The core content of the book originates from the Vedas which provide the key concepts of Mathematics. For example, the sutra एकाधिकेन पूर्वेण(Ekaadhikena Purvena) indicates an interesting mathematical application. Great ancient Indian scholars like Acharya Aryabhatta, Brahmagupta, Bhaskaracharya, Pingala, Mahavira, and more contemporary ones like Srinivasa Ramanujan along with their counterparts from other parts of the world, have further developed this body of knowledge. Numerous teachers from the DAV Group of Schools, with their decades of rich experience, have compiled the existing knowledge in a child-friendly form.

 Considering the social orientation of the organization, we have consciously ensured that the cost of the textbook is affordable without

compromising on the quality of paper/print. Also, the e-copy of the entire book will always be downloadable for free from our website – davchennai.org/publications.

This is the first version of the book and could contain not only omissions, but also areas of improvement. We request the reader to excuse us for the omissions, but please do bring to our notice any feedback for correction and improvement in subsequent versions. We will remain grateful to you for your support and feedback.

Lastly, before signing off, we would like to express our profound gratitude to Almighty for guidance and encouragement in this endeavour. As the great mathematician, Srinivasa Ramanujan, rightly said - **"An equation for me has no meaning unless it expresses a thought of God."**

Chennai | June 2024

Secretary
Tamil Nadu Arya Samaj Edu. Society

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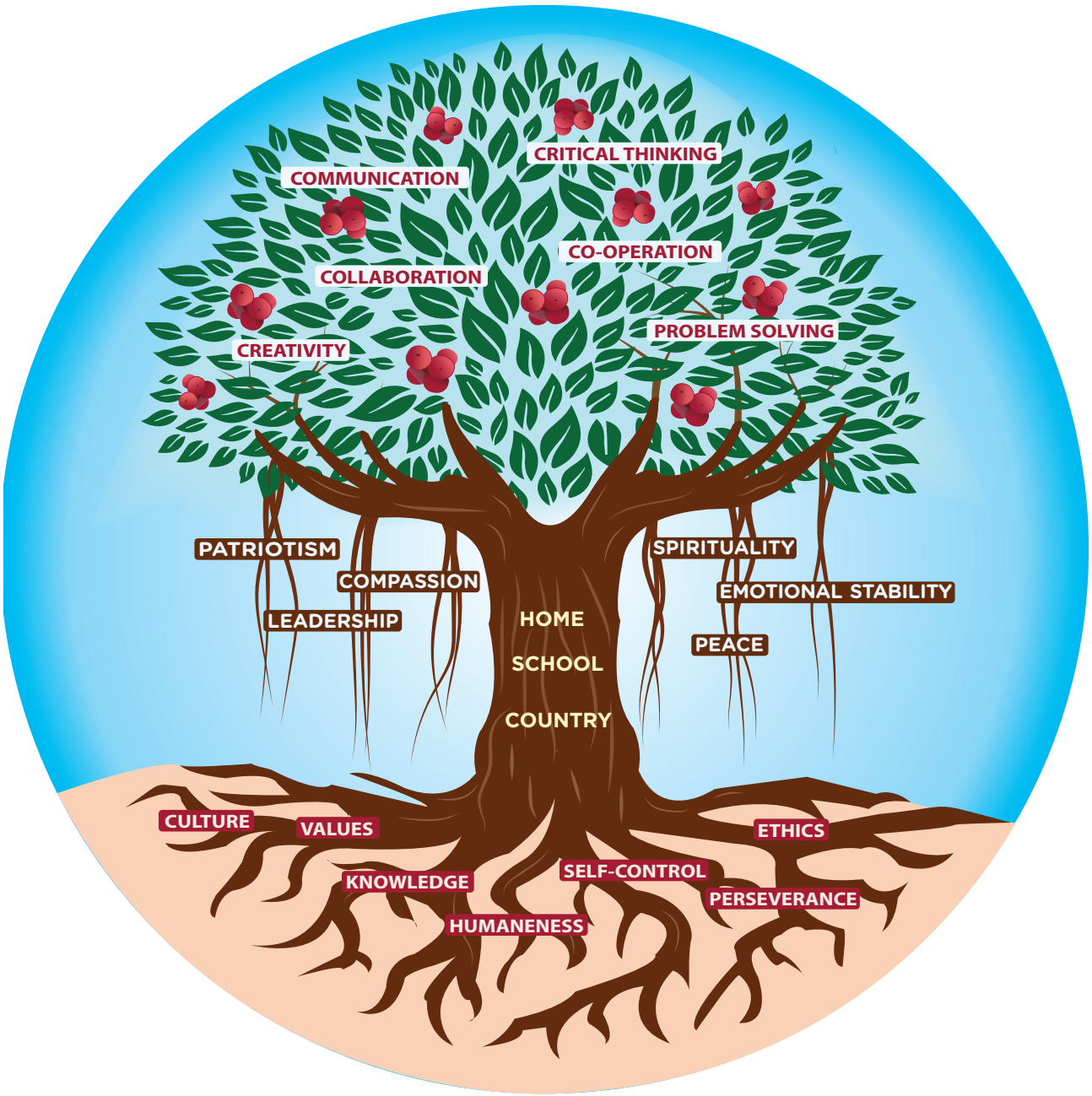
The Learning Tree



Contents

7 MULTIPLES AND FACTORS

Expected Learning Outcomes

At the end of this lesson, children will be able to:

Find the multiples of a number.

Identify common multiples of a given set of numbers

List the properties of multiples.

Check the divisibility of a number by 2,3,5,6,9 and 10

List the prime and composite numbers between 1 and 20.

Find the factors of a number.

List the properties of factors.

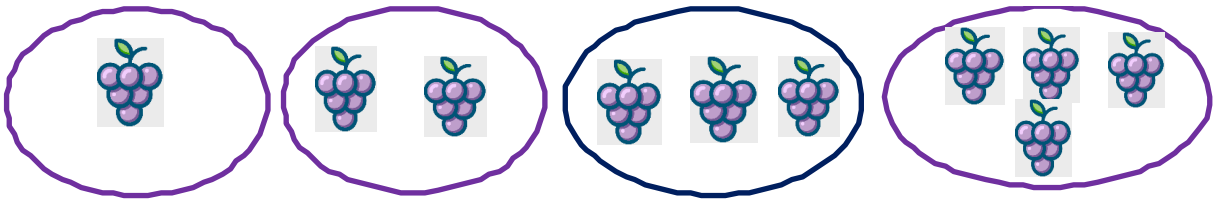
Identify the common factors for a given set of numbers

Draw the factor tree of a number.

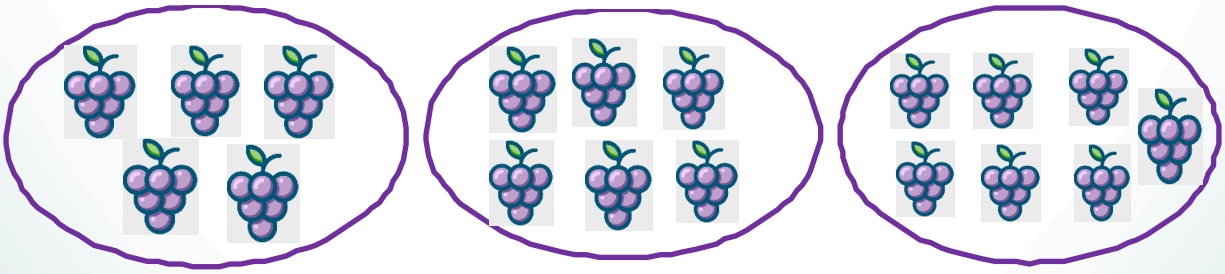
Multiples In Real Life

Karna loves grapes. His father brought him a box of grapes. He wanted to eat the bunches with 6 grapes on them. He picked them out and places them on different plates in the following order.

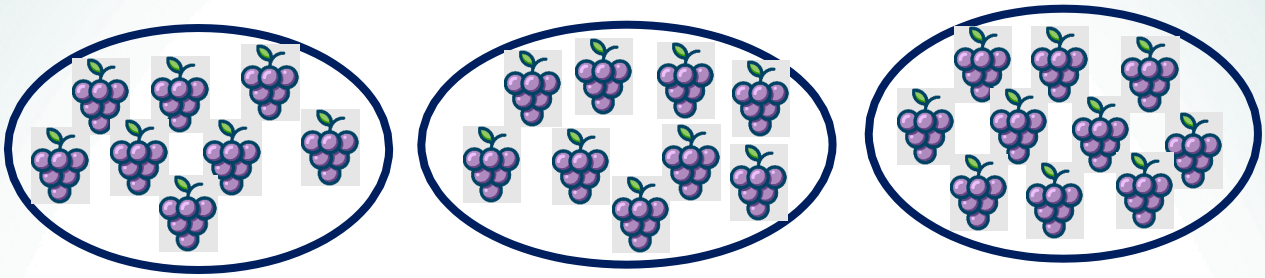
Complete the following.



1 x 6 = _____ 2 x 6 =_____ 3 x 6 = _____ 4 x 6 = _____



5 x 6 = 6 x 6 = 7 x 6 =



8 x 6 =_____ 9 x 6 = _____ 10 x 6 = _____

The number of grapes in his plate were 6,12,18,24,30,36,42,48,54,60.

Understanding Multiples

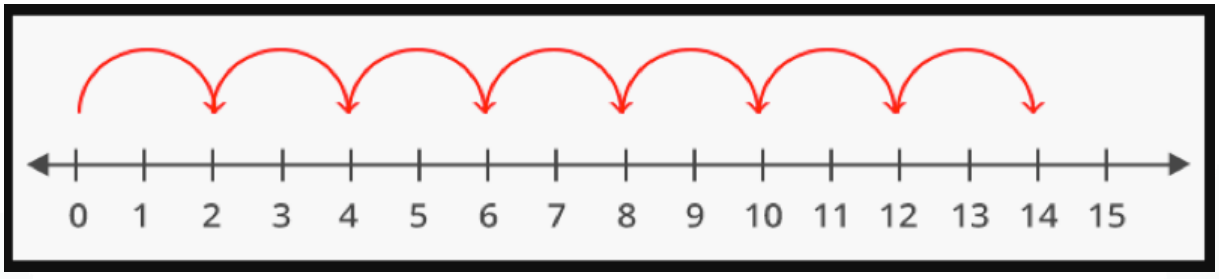
A multiple is got by multiplying the number by another number

Anagh has a grid with numbers 1 to 50. He coloured every third number yellow, starting from 1.

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

He shaded 3,6,9,12,15,18,21,24,27 ……..They are multiples of_____.

Try to get multiples of 2 by skip counting on the number line as shown



The multiples of 2 : _____

Start counting from 1 colour every seventh number red.

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

Now list the first five shaded numbers. ☐ ☐ ☐ ☐ ☐

They are multiples of 7.

Properties of Multiples

1. Every number is a multiple of itself.
   For example, 3 x 1 = 3 (3 is a multiple of 3).
2. Every number is a multiple of 1.
   For example, 1 x 2 = 2 , 1 x 8 = 8 , 1 x 9 = 9
3. The multiples of a number are either greater than or equal to the number.
   For example, 24 is a multiple of 1,2,3,4,6,8,12 and 24. It is greater than 1,2,3,4,6,8 and 12. It is equal to 24.
4. A number has infinite multiples. Hence, we cannot identify the largest multiple of a number.
   For example, we can keep multiplying any number by another number to get multiples.

EXERCISE 7.1

1. Fill in the blanks.

a) 12 is a multiple of 3. It is also a multiple of 1, 12, _____, _____ and_____.

b) 15 is a multiple of _____,_____, _____, and _____.

c) The smallest multiple of 21 is_____.

d) When we divide the multiple of a number by the number, the remainder will always be _____

2. Find the first 5 multiples of:

a. 7 b. 9 c. 10 d. 12 e. 15 f. 25

3. Check if the first number is a multiple of the second number.

a. 56, 7 b. 64, 8 c. 73, 9 d. 10, 10 e. 25, 1 f. 65, 5

4. Write the multiples of:
   a. 6 that are greater than 40 and lesser than 60.
   b. 15 that are smaller than 50.
   c. 20 that are between 75 and 125.
   d. 100 that are between 0 and 150.

Common Multiples

In the grid, Angad has coloured every fourth number red and Pavan has used yellow for every third number.

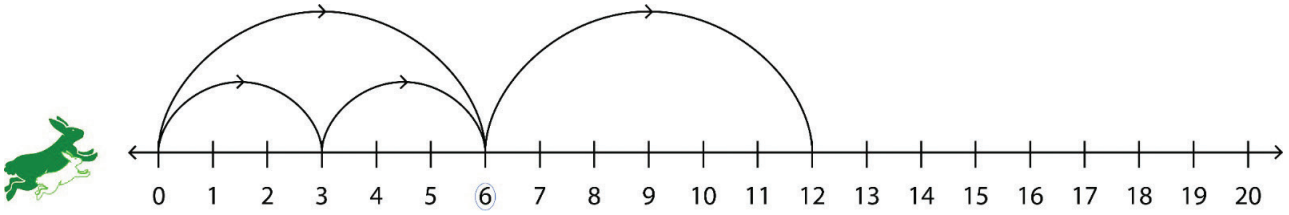
1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50

We see that the numbers 12,24,36 and 48 were coloured by both Angad and Pavan. These are common multiples of 3 and 4.

We can also use a number line to find common multiples.

Example :

Mama rabbit hops 6 steps from zero at a time while baby rabbit hops 3 steps from zero at the same time. Which steps will they both hop on to?



Multiples of 3 are 3,6,9,12,15,18,21,24, ……

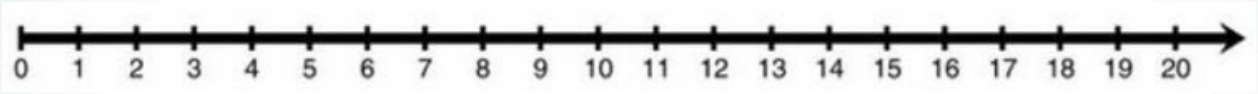
Multiples of 6 are 6,12,18,24,30,36, …….

The common multiples of 3 and 6 are 6,12,18,24, …….

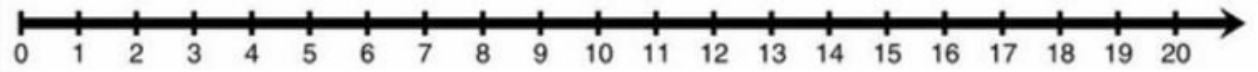
EXERCISE 7.2

1. Ring the numbers that are multiples of both 1 and 2.
   1, 2, 4, 5, 8, 10, 15, 16, 18, 20
2. Ring the numbers that are multiples of both 3 and 6.
   1, 2, 3, 4, 5, 9, 12, 15, 18, 20

3. Use the number line to find the common multiples of:
   a. 2 and 5



   b. 3 and 4



4. List the first 10 multiples of each pair and find their common multiples.

   a. 3 and 5 b. 4 and 5 c. 5 and 10

   d. 6 and 8 e. 2 and 4 f. 4 and 3

Fun Activity

Use a checked paper as shown in the figure. Number two rows. Write your name and your friend's name continuously as shown. Shade the boxes that have the last letter of each name. The boxes that are shaded for both the names show the common multiples of the number of letters in each name.

Look at the example with the names Ram and Daksh.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
R	A	M	R	A	M	R	A	M	R	A	M	R	A	M	R	A	M
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
D	A	K	S	H	D	A	K	S	H	D	A	K	S	H	D	A	K

Experiential Learning

Kashyap goes for swimming every 4 days and Laksh every 6 days. They both went for swimming on 31st January 2015. Which are the common dates that they would have gone for swimming in February?

FEBRUARY 2015						
SUN	MON	TUE	WED	THU	FRI	SAT
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

Test of Divisibility

A dividend is divisible by the divisor, if the remainder is zero.

For example, 15 is divisible by 5 as 5 divides 15 without leaving a remainder. Also, 15 is not divisible by 4 because the remainder is not zero.

A **divisibility test** is a rule which gives a quick way to find out whether a number is divisible by another.

Divisibility by 2

A number is divisible by two if the digit in its ones place is 0,2,4,6 or 8, or all even numbers are divisible by 2.

Example : 252, 574, 6790, 3386 and 768 are all divisible by 2.

Divisibility by 10

A number is divisible by ten if the digit in it's ones place is "0".

Example : 10, 6790, 270 and 750 are all divisible by 10.

Divisibility by 5

A number is divisible by five if the digit in it's ones place is "0" or "5".

Example : 25, 570, 7385, 800 and 325 are all divisible by 5.

Divisibility by 3

A number is divisible by three if the sum of it's digits is divisible by 3.

Example : Is 345 divisible by 3?

Sum of the digits = 3 + 4 + 5 = 12

12 is divisible by 3 because 12÷3 leaves a remainder 0.

Therefore, 345 is also divisible by 3.

Divisibility by 9

A number is divisible by nine if the sum of it's digits is divisible by 9.

Example : Is 648 divisible by 9?

Sum of the digits = 6 + 4 + 8 = 18

18 is divisible by 9 as the remainder is 0.

Therefore, 648 is also divisible by 9.

Divisibility by 6

A number is divisible by six if it is divisible by both 2 and 3.

Example : 2070 is divisible by 2 as it is an even number. The sum of the digits 2+0+7+0 = 9 (divisible by 3), so 2027 is divisible by 3.

Since it is divisible by 2 and 3, it is divisible by 6.

25833 is divisible by 3, but not by 2. So 25833 is not divisible by 6.

6,723 is not divisible by 6 because it is not divisible by 2, though it is divisible by 3.

EXERCISE 7.3

1. Put ✓ if divisible and × if not divisible.

DIVISIBLE BY						
Number	**2**	**3**	**5**	**6**	**9**	**10**
90						
100						
75						
45						
81						
63						
180						
135						
2118						

2. Ones place of each of the numbers is left blank. Fill it up with a suitable digit to make the statement true.

a. 345 _____ is divisible by 2.

b. 649 _____ is divisible by 5.

c. 785 _____ is divisible by 10.

Higher Order Thinking Skills

1. Find the smallest number that should be subtracted from 3453 to make it divisible by 2, 5 and 10.
2. Find the smallest number that can be added to 6,148 to make it divisible by both 3 and 10.
3. Find the number between 27 and 31 that is divisible by 2 and 5.

Prime Numbers

Numbers which have exactly two factors, 1 and the number itself are called **prime numbers.**

For example, 2, 3, 5, 7, 11, 13, ... are all prime numbers.

9 is not a prime number because it has more than two factors.

Composite Numbers

Numbers which have three or more factors are called **composite numbers.**

For example, 4, 6, 8, 10, 12, ……. are all composite numbers.

- 1 is neither a prime number nor a composite number.
- 2 is the smallest prime number and 4 is the smallest composite number.
- 2 is the only even prime number.

EXERCISE 7.4

1. Identify each of the following as prime or composite number.

   a. 18 b. 2 c. 11 d. 15 e. 10 f. 5

2. List all the prime numbers between 1 and 20.

3. Fill in the blanks to make a list of composite numbers up to 20.

   4, _____, 8, 9,_____ , 12, 14, _____,_____ ,_____ , _____

Factors

We know that when two or more numbers are multiplied, we get their product. The numbers being multiplied, are the **factors** of the **product.**

For example, 7 x 5 = 35.

Here, 7 and 5 are the factors of 35.

We know that the division statement 20 ÷ 5 = 4, gives rise to the multiplication fact 5 x 4 = 20. The numbers 5 and 4 are the factors of 20.

The factor of a number divides the number without leaving a remainder.

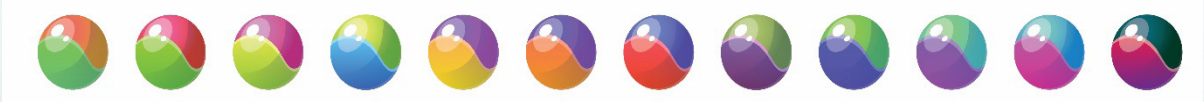
5 is a factor of 20, as 20 ÷ 5 leaves a remainder is zero.

Similarly, 4 is a factor of 20, as 20 ÷ 4 gives a remainder zero.

4 is not a factor of 22, because 4 divides 22 giving a remainder 2.

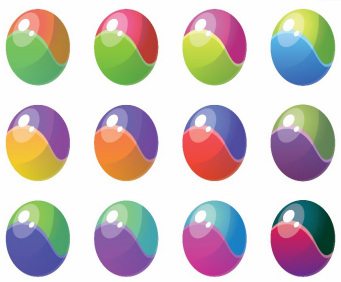
Aditi arranged 12 marbles in a single row. Akshar arranged his 12 marbles in 2 rows of 6 marbles each and Ahalya arranged her 12 marbles in 3 rows of 4 marbles each.

Aditi's arrangement - 1 x 12 = 12



Akshar's arrangement 2 x 6=12

Ahalya's arrangement 3 x 4 = 12



Thus, 1, 2, 3, 4, 6 and 12 are the factors of 12.

Try These!

Write 'Yes' or 'No'

Is 8 a factor of 32 ? _____

Is 1 a factor of 5 ? _____

Is 2 a factor of 11 ? _____

Is 6 a factor of 6 ? _____

Properties of Factors

- You can divide all numbers by 1 without leaving a remainder.

  1 is a factor of every number.

- Every number can be divided by itself without leaving a remainder.

  Every number is a factor of itself.

- 1, 2, 3, 4, 6, 8, 12 and 24 are factors of 24.

  1, 2, 3, 4, 6, 8 and 12 are smaller than 24. 24 is equal to 24.

  Factor of a number is either smaller than or equal to the number

  The smallest factor of a number is 1.

  The biggest factor of a number is the number itself.

- 24 has 8 factors. 14 has 4 factors.

  A number has limited number of factors.

EXERCISE 7.5

I. Answer the following

a. Based on the multiplication fact 8 × 9 = 72, list the factors of 72 and the multiple of 8 and 9.

b. Which number has only 1 factor ?

c. Which is the smallest factor and the greatest factor of 425 ?

d. Is 2 a factor of an odd number ?

Finding Factors by Multiplication and Division

a. By multiplication

To find the factors of a number by multiplication, you should know your multiplication tables.

Let us find the factors of 18 using multiplication.

1 x 18 = 18, 1 and 18 are factors of 18.

2 x 9 = 18, 2 and 9 are factors of 18.

3 x 6 = 18, 3 and 6 are factors of 18.

4 x ? = 18 There is no number with which 4 and 5 can be multiplied

5 x ? = 18 to get 18. So, 4 and 5 are not factors of 18.

There is no need to go any further as 6 is already a factor.
Thus, 1, 2, 3, 6, 9 and 18 are the factors of 18.

b. By division

Let us find the factors of 24 using division. 24 ÷ 1 = 24, 1 and 24 are factors of 24.

24 ÷ 2 = 12, 2 and 12 are factors of 24.

24 ÷ 3 = 8, 3 and 8 are factors of 24.

24 ÷ 4 = 6, 4 and 6 are factors of 24.

] as the remainder is 0

24 ÷ 5 = 4, R = 4, 5 is not a factor of 24.

There is no need to divide further as 6 is already a factor. Thus, 1, 2, 3, 4, 6, 8, 12 and 24 are the factors of 24.

1. How to check if 12 is a factor of 64 ?

64 ÷ 12 = 5 Remainder= 4; 12 is not a factor of 64, as the remainder is not 0

2. Is 15 a factor of 105?

105 ÷ 15 = 7, Remainder=0; therefore 15 is a factor of 105

EXERCISE 7.6

1. Circle the

a) Factors of 56

2	7	6	5	10	3	8

b) Factors of 18

3	2	7	9	4	18	6

2. Find the factors by multiplication.

a) 14 b) 15 c) 16 d) 48 e) 23 f) 35 g) 36 h) 55

3. Find the factors by division.

a) 18 b) 14 c) 25 d) 39 e) 93 f) 63 g) 56 h) 28

4. Check if the second number is a factor of the first. Write 'Y' for yes and 'N' for no.

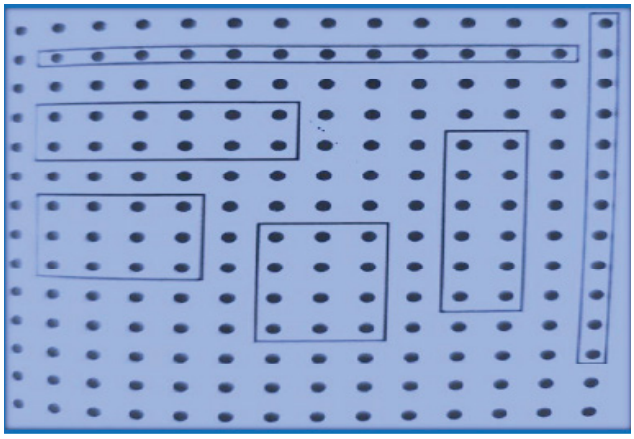
a) 20, 5 _____ b) 33, 11 _____ c) 144, 12 _____ d) 154, 5 _____

e) 50, 7 _____ f) 121, 11 _____ g) 45, 0 _____ h) 81, 1 _____

i) 99, 99 _____ j) 22, 13 _____ k) 64, 8 _____ l) 54, 3 _____

Fun with Maths

You can ask one of your friends to join you to find the factors of a number, say 12 using the sheet given below. Join the dots to get a rectangle/square for the following multiplication facts.



$1 \times 12 = 12$ or $12 \times 1 = 12$

$2 \times 6 = 12$ or $6 \times 1\ 2 = 12$

$4 \times 3 = 12$ or $3 \times 4 = 12$

Thus the factors of 12 are 1,2,3,4,12.

You can perform this activity for different numbers and identify their factors.

EXERCISE 7.7

1. Which of the following are not factors of 36?

   4 8 10 12 6 2 18 16

2. List all even factors of 48.

3. List all odd factors of 63.

4. Is 55 even or odd? What are the factors of 55? The factors of 55 are _____ (Odd or Even)

Common Factors

Let us find the common factors of 30 and 20.

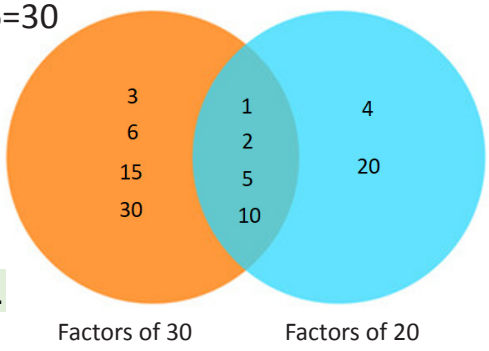
We know that 1x 30 = 30, 2 x 15= 30, 3 x10=30, 5 x 6=30

The factors of 30 are 1,2,3,5,6,10,15 and 30.

We know that 1x20 = 20, 2 x 10 = 20, 4 x 5 =20

The factors of 20 are 1,2,4,5,10 and 20.

The common factors of 30 and 20 ar 1, 2, 5 and 10.

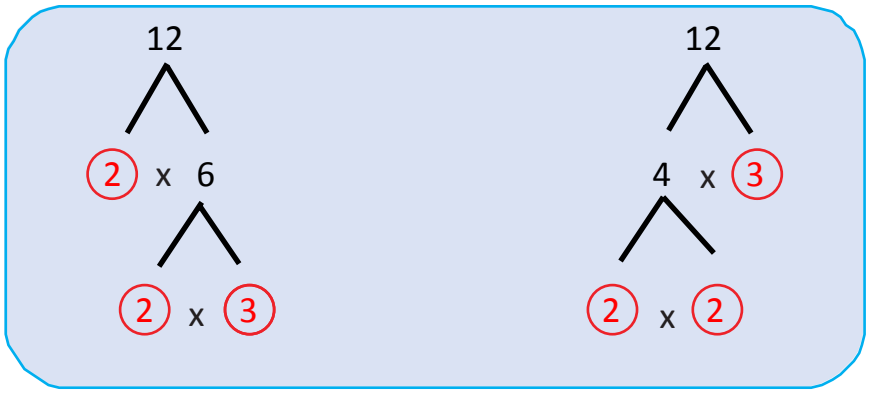


Factor trees

A number can have many factors. The factors can be multiplied in different ways to get the number.

Example

We can make factor trees as shown for 12.



Both factor trees end with 12 = 2 x 2 x 3.

A **factor tree** shows the different ways by which a number can be made by multiplying its factors.

Note: We do not show 1 x number itself on the factor tree.

EXERCISE 7.8

I. Find the factors of the numbers. Then list the common factors.

a) 4, 8 b) 6, 8 c) 4, 5 d) 14, 21 e) 24, 16 f) 12, 16

II. Make factor trees for the following.

a) 8 b) 20 c) 15 d) 21 e) 54 f) 96

III. Find

a. The greatest factor of 15.

b. The smallest factor of 12.

c. The smallest multiple of 9 is

d. Two factors of 13

e. The first three multiples of 7

f. The smallest multiple of 25.

g. The smallest common multiple of 3 and 5.

IV. Answer the following

a. Can 2 be a factor of an odd number ?

b. Pick out the pairs in which the first number is a factor of the second.

a. 3 and 34 b. 6 and 66 c. 12 and 120 d. 11 and 111 e. 7 and 84

c. Pick out the pairs in which the first number is a multiple of the second.

a. 18 and 4 b. 24 and 6 c. 72 and 8 d. 105 and 15 e. 117 and 7

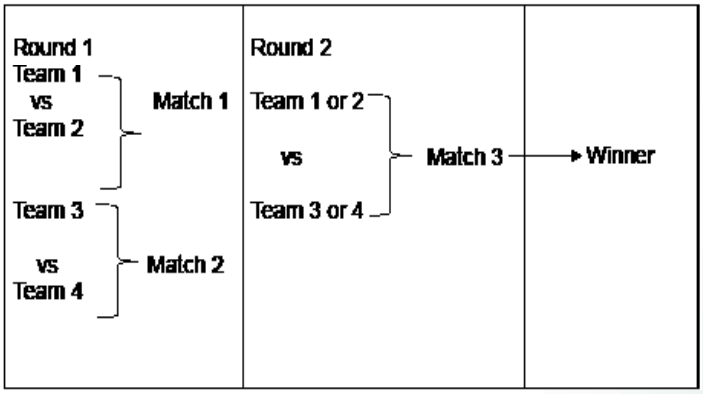
Logical Reasoning

1) Three friends shared a cupboard that had 17 shirts. Each person had at least one shirt.

If each person had only odd number of shirts, which of the following could be the maximum number of shirts possessed by one person?

a) 11 b) 13 c) 15 d) 17

2) Shown below is the fixture of 4 teams that took part in a throwball tournament. 3 matches were played to determine the winner.



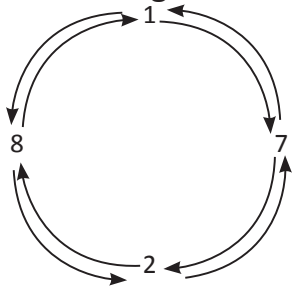
If there are 8 teams taking part in the tournament and no draws made, how many matches must be played to determine the winner if the same kind of schedule is followed?

a) 4 b) 6 c) 7 d) 8

Note: There were no matches drawn in both the schedules.

WORKSHEET

1. Find the sum of the odd factors of 15 .
2. Check whether 178 is a multiple of 6 using the rules of divisibility .
3. Find the greatest 3-digit common multiple of 2 and 3
4. List all the factors of 6
   a) Find the sum of all the factors
   b) Find the product of all the factors
   c) Discuss the relation between the sum , product and the number 6
5. Can a number have odd number of factors ? Justify with an example.
6. How many 1-digit prime numbers are there ?
7. Find the product of all 1 – digit composite numbers
8. Let's have fun with numbers
   Every number is unique in its own way. For example 1728
   Take 2 -digits at a time, clockwise and anticlockwise as shown and find their sum.



   Clockwise : 17+72+28+81 = 198
   Anticlockwise : 18+82+27+71 = 198
   Try doing it with your two wheeler / four wheeler number.
   Record your observations.
9. Draw 3 different factor trees for 90
10. Write any 2 numbers which are neither divisible by 2 nor by 9.

8 FRACTIONS

Expected Learning Outcomes

At the end of this lesson, children will be able to:

Identify and represent the fraction from a given collection.

Find the value of the fraction.

Find the equivalent fractions of a given fraction.

Simplify a fraction to its lowest term.

Distinguish between like and unlike fractions.

Compare, add and subtract like fractions

Identify the type of fraction

Convert the improper fraction into mixed number and vice-versa.

Apply the concept of fractions in real life situation.

Recapitulation

Fractions around us

1. Vruksha loves nature. She takes care of her beautiful garden everyday by watering the plants and trees. She has 8 mango trees, 12 guava trees and 3 neem trees in her garden.

Total number of trees in the garden = _____

What fraction of trees are mango trees? _____

What fraction of trees are guava trees? _____

What fraction of trees are neem trees? _____

2. Harish loves watermelon. His appa (father in tamil) bought one big watermelon. His amma (mother in Tamil) cut the watermelon into 10 equal pieces.

He ate 4 pieces, his father ate 3 pieces, and his mother ate 2 pieces.

What fraction of watermelon did a) Harish eat? _____

b) his father eat? _____

c) his mother eat? _____

What fraction of it was left behind? _____

3. A book of moral values contains 43 pages. Anju read 21 pages of it and her sister Manju read 27 pages of the same book.

Fraction of pages read by Anju = _____

Fraction of pages read by Manju = _____

Who has read the larger part of the book? _____

4. A bus contains 24 seats. $\frac{1}{4}$ of the seats are not occupied. Find the fraction of seats occupied.

Number of seats not occupied $= \frac{1}{4}$ of $\square$

$= \frac{1}{4} \times \square$

$= \square \div \square$

$= \square$ seats

Number of seats occupied $= 24 - \square = \square$

Fraction of seats occupied = $\square$

5. Mata (mother in Punjabi) bought a dozen bananas. She used half of them to prepare a milk shake. (1 dozen = 12 bananas)

Number of bananas used for milkshake = $\frac{1}{2}$ of a dozen bananas.

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

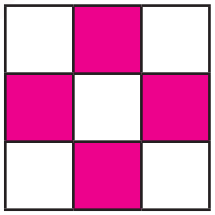
$= \square \div \square$

$= \square$

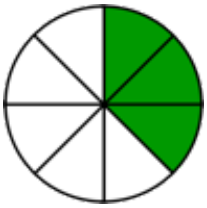
Mata used $\square$ bananas to make a milk shake.

EXERCISE 8.1

I Write the fraction of the coloured part.

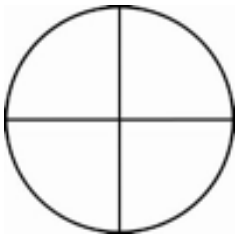
a.  = _____

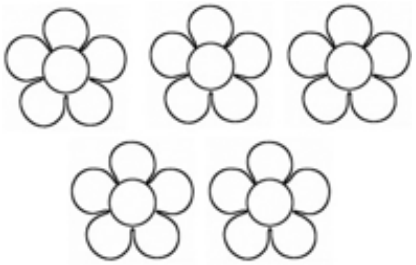
b.  = _____

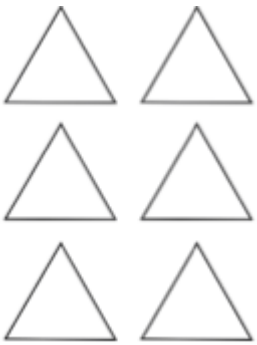
c.  = _____

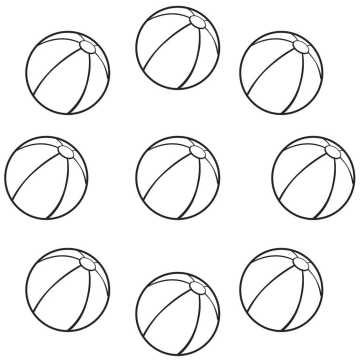
d.  = _____

II. Colour to represent the fraction.

a. $\frac{2}{4}$ 

b. $\frac{3}{5}$ 

c. $\frac{4}{6}$ 

d. $\frac{5}{9}$ 

III. Write the fraction for the following.

a. Numerator = 5 Denominator = 7

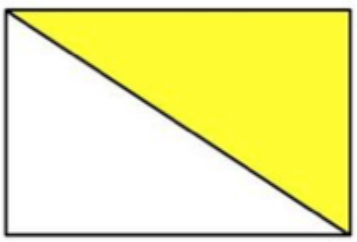
b. Denominator = 9 Numerator = 4

c. Numerator = 6 Denominator = 13

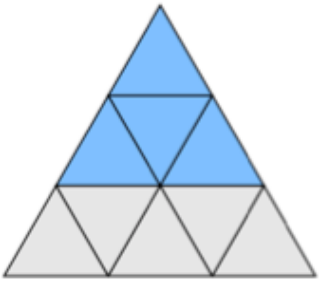
d. Numerator = 27 Denominator = 31

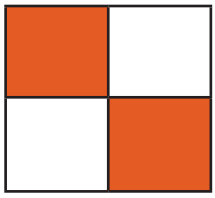
IV. Half Concept

1. Put a ✓ in the box if the coloured portion represents $\frac{1}{2}$.

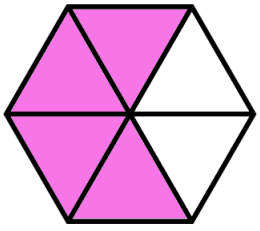
a.  ☐

b.  ☐

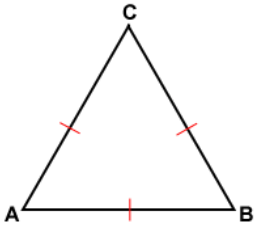
c.  ☐

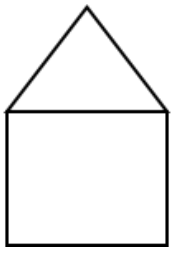
d.  ☐

e.  ☐

f.  ☐

2. Colour half the portion of the given figures.

a. 

b. 

3. In a class of 40, half were selected for a talent examination. How many students were selected for the examination?

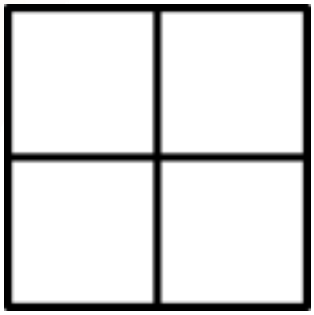
4. A cap seller had 58 blue caps. He sold half of them in the morning. How many blue caps did he sell in the morning?

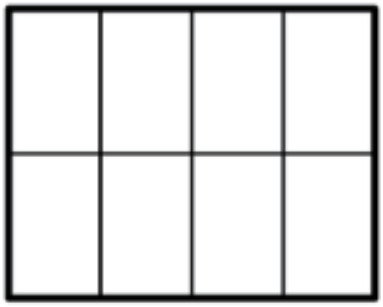
5. A park has 122 lights. Only $\frac{1}{2}$ of them are lit every evening. How many lights are lit every evening?

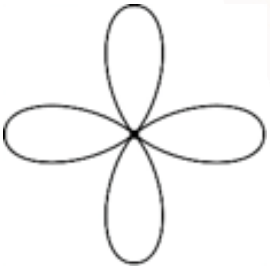
6. How many millilitres make $\frac{1}{2}$ a litre?

V. A Quarter

a. Colour $\frac{1}{4}$ of each.







Example

a. One-fourth of 996 books in a book bank are puzzle books. How many are puzzle books?

One fourth of 996 books = $\frac{1}{4} \times 996$

= $996 \div 4$

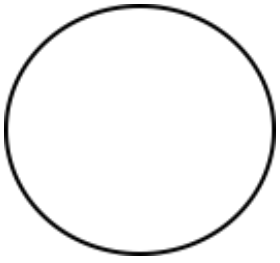
= 249 books

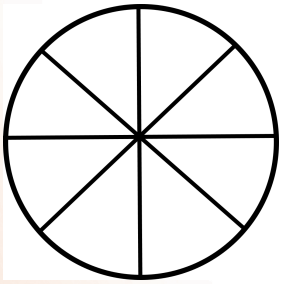
$$
\begin{array}{r}
249 \\
4\overline{)996} \\
-\,8\downarrow \\
\hline
19 \\
-\,16\downarrow \\
\hline
36 \\
-\,36 \\
\hline
0
\end{array}
$$

Vi. Beyond Half and Quarter

Division of a whole to obtain equal parts

Let us divide the given circle into 8 equal parts.





Each part is $\frac{1}{8}^{th}$ of the circle

Let us find out the value of a part of the whole

Example

a) $\frac{1}{11}$ of 132

$= \frac{1}{11} \times 132$

$= 132 \div 11 = 12$

Let's compare two fractions

When the fractions have the same denominator the one with the greater numerator is the greater fraction.

Examples

a) $\frac{7}{9} < \frac{8}{9}$ b) $\frac{10}{10} = 1$ c) $\frac{13}{20} > \frac{9}{20}$

EXERCISE 8.2

1. Find

a. $\frac{1}{5}$ of 40 = _____

b. $\frac{1}{8}$ of 64 = _____

c. $\frac{1}{12}$ of 24 = _____

d. $\frac{1}{7}$ of 91 = _____

e. $\frac{1}{6}$ of 3 kg = _____

f. $\frac{1}{10}$ of 5 dozens = _____

2. Fill in the circle with >, < or =, to make the statements true.

a. $\frac{7}{18}$ ◯ $\frac{6}{18}$

b. $\frac{10}{15}$ ◯ $\frac{10}{15}$

c. $\frac{1}{7}$ ◯ $\frac{12}{12}$

d. $\frac{3}{8}$ ◯ $\frac{5}{8}$

e. $\frac{11}{11}$ ◯ 1

f. $\frac{2}{13}$ ◯ $\frac{2}{13}$

3. In a class test the marks obtained by five students are as follows.

Ram $\frac{9}{20}$ Arjun $\frac{20}{20}$ Krish $\frac{16}{20}$ Bharat $\frac{11}{20}$ Nakul $\frac{13}{20}$

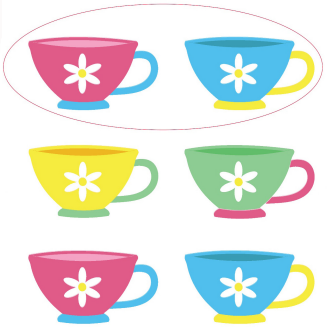
Whose performance was the best?
Whose performance was the least?
Arrange their scores in ascending order.

Fraction of a collection

Here is a collection of six cups.

To find

a) One third of the collection

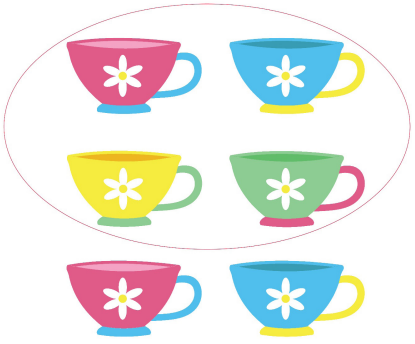


$\frac{1}{3}$ x 6

6 ÷ 3 = 2

$\frac{1}{3}$ of this collection is 2

b) Two third of the collection



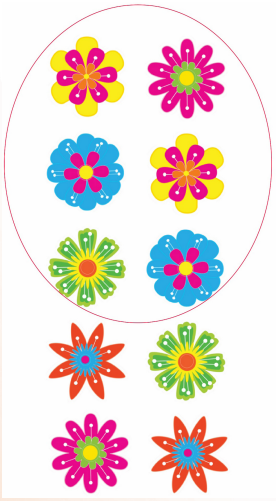
$\frac{2}{3}$ x 6

Step 1: 6 ÷ 3 = 2

Step 2: 2 x 2 = 4

$\frac{2}{3}$ of this collection = 2 x 2 = 4

c) Three fifths of the collection



$\frac{3}{5}$ x 10

Step 1: 10 ÷ 5 = 2

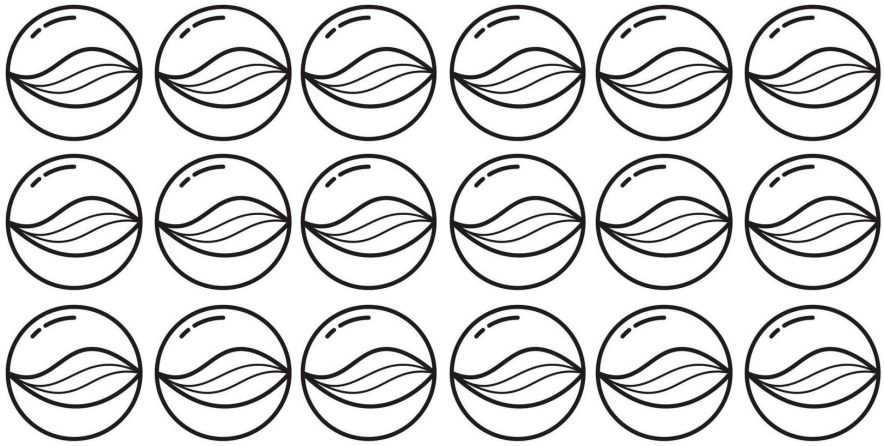
Step 2: 3 x 2 = 6

$\frac{3}{5}$ of 10 = 6

$\frac{3}{5}$ of this collection is 6

Fun Activity

Colour $\frac{3}{6}$ of the collection of marbles green, $\frac{2}{6}$ of the collection of marbles yellow. How many marbles are not coloured?



Example 1

Raghav jogged $\frac{3}{4}$ of an hour in a day. How many minutes did he jog?

$\frac{3}{4}$ of 60 minutes = $\frac{3}{4}$ x 60

Step 1: Divide 60 by 4 $\quad 60 \div 4 = 15$

Step 2: Multiply 3 and 15 $\quad 3 \times 15 = 45$

$\frac{3}{4}$ of 60 minutes = 45 minutes

So, Raghav jogged for 45 minutes.

Example 2

Roshan and Ruchi visited the beach with their parents. They collected 64 shells during the visit.

Roshan collected $\frac{3}{8}$ of the shells and Ruchi collected $\frac{5}{8}$ of it.

Number of shells collected by Roshan = $\frac{3}{8}$ of 64 $\quad = \frac{3}{8}$ x 64

Step 1: $64 \div 8 = 8$

Step 2: $3 \times 8 = 24$

Roshan collected 24 shells.

Number of shells Ruchi collected = $\frac{5}{8}$ of 64 = $\frac{5}{8}$ x 64

Step 1: $\frac{5}{\cancel{8}}$ x $\overset{8}{\cancel{64}}$ (64 ÷ 8 = 8)

Step 2: 5 x 8 = 40

Ruchi collected 40 shells.

Example 3

How many centimetres make $\frac{4}{5}$ of a metre?

$\frac{4}{5}$ of 1 metre = $\frac{4}{5}$ of 100 centimetres [1 m = 100 cm]

= $\frac{4}{5}$ x 100

Step 1: $\frac{4}{\cancel{5}}$ x $\overset{20}{\cancel{100}}$ (100 ÷ 5 = 20)

Step 2: 20 x 4 = 80

$\frac{4}{5}$ of 1 metre is 80 cm

Egyptians used fractions as early as 1800 BC. However, they represented all fractions as unit fractions, which made fractional representation difficult. The ancient Romans used a system of fractions where the denominator was always a multiple of 12. (12, 24, 36,48...).

By 311 BC, Babylonians tried to make fractional representation simpler but in vain. The Brahmi script with 9 symbols and a zero, devised by Indians even before the emergence of some of the ways of counting, spread to the Arabs because of trade contacts. The representation of fractions that our fore fathers used was similar to what we use now, with a numerator and a denominator. However, the vinculum (the line separating the two) was missing. This was added by the Arabs and thus emerged the form of fractions that we use now.

EXERCISE 8.3

I Find the value of

a) $\frac{2}{5}$ of 60

b) $\frac{4}{7}$ of 21

c) $\frac{2}{11}$ of 33

d) $\frac{3}{13}$ of 26

e) $\frac{8}{15}$ of 30

f) $\frac{4}{9}$ of 27

II Find the value

a) $\frac{2}{3}$ of a dozen

b) $\frac{1}{3}$ of an hour in minutes

c) $\frac{4}{7}$ of a week in days

d) $\frac{7}{10}$ of a metre in centimetres

e) $\frac{2}{5}$ of a kilogram in grams

f) $\frac{3}{4}$ of a litre in millilitres

III. Applications in real life

a) In a garden $\frac{3}{9}$ of 45 flowers are roses. How many roses are there in the garden?

b) In a class of 40, $\frac{2}{5}$ are boys and the rest are girls. How many students are boys? How many are girls?

c) Mala took $\frac{3}{4}$ of an hour to reach her friend's house for a birthday party and $\frac{3}{6}$ of an hour to return home. For what did she take a longer time? By how many minutes?

Equivalent Fractions

Example 1

Sagar and Prithvi ordered a methi parata each for dinner

Sagar :

I cut my parata into 4 equal pieces and ate 2 pieces.

Prithvi :

I cut my parata into 2 equal pieces and ate a piece.

Sagar has 2 pieces out of 4 pieces.

Prithivi has 1 piece out of 2 pieces.

Sagar

$\frac{2}{4}$

Prithivi

$\frac{1}{2}$

2 quarters is the same as 1 half.

When different fractions have the same value, they are equivalent fractions.

Example 2

24 students were given training for basketball. 12 of them were selected for a basketball tournament.

$\frac{12}{24}$ of the students were selected

$\frac{1}{2}$ of the students were selected

Can we find some more equivalent fractions for $\frac{1}{2}$?

$\frac{12}{24}$ is same as $\frac{1}{2}$

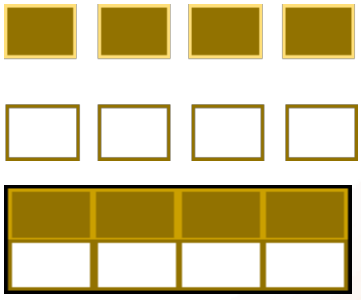
$\frac{1}{2}$ and $\frac{12}{24}$ are equivalent fractions.

Example 3

Magesh took 4 pieces out of 8 pieces of chocolate. Suresh took $\frac{1}{2}$ of the chocolate bar. Have they taken the same quantity?. Let's check.

$\frac{4}{8} \div \frac{4}{4} = \frac{1}{2}$ (∵ 4,8 are divisible by 4)

So $\frac{4}{8}$ and $\frac{1}{2}$ are equivalent fractions.



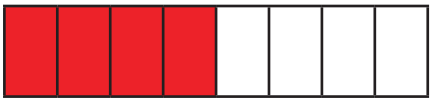
Magesh

Suresh

Pictorial representation of equivalent fractions

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

2.  $= \frac{2}{4}$

3.  $= \frac{4}{8}$

Observe the coloured portion of the figures given above. They represent the same fraction of the figure though their numerical representation is different. Such fractions are known equivalent fractions.

Hence $\frac{1}{2}, \frac{2}{4}, \frac{4}{8}$ are equivalent fractions.

Now, let us find an equivalent fraction of $\frac{3}{7}$.

Multiply the numerator and denominator by 9

$$\frac{3}{7} \times \frac{9}{9} = \frac{27}{63}$$

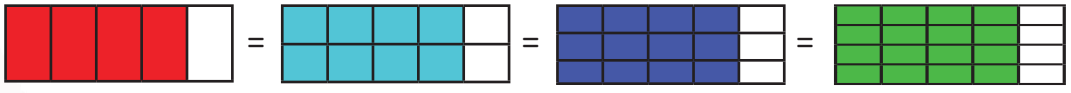
Multiply the numerator and denominator by 7

$$\frac{3}{7} \times \frac{7}{7} = \frac{21}{49}$$

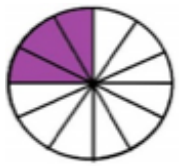
Let us know.
To get an equivalent fraction, multiply or divide the numerator and the denominator of the fraction by the same number (other than zero).

EXERCISE 8.4

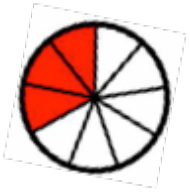
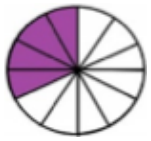
1. Fill in the blanks to represent the equivalent fractions.

a) 

$$\frac{4}{5} = \frac{8}{\square} = \frac{12}{\square} = \frac{16}{\square}$$

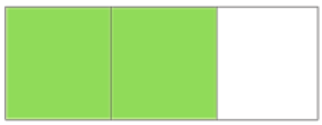
b)  =  =  = 

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

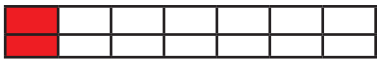
c)  =  =  = 

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

2. Write the equivalent fractions.

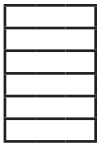
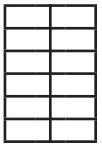
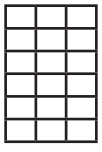
a.  = 

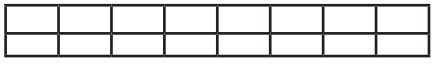
$\square$ $\square$

b.  = 

$\square$ $\square$

3. Colour the parts to show the equivalent fractions.

a. $\frac{2}{6}$  = $\frac{4}{12}$  = $\frac{6}{18}$ 

b.  = 

$\frac{5}{8}$ $\frac{10}{16}$

4. Fill in the missing numerator to make the fractions equivalent

a) $\frac{1}{3} = \frac{\square}{21}$ b) $\frac{5}{6} = \frac{\square}{30}$ c) $\frac{4}{9} = \frac{\square}{81}$ d) $\frac{4}{11} = \frac{\square}{33}$ e) $\frac{7}{15} = \frac{\square}{90}$

5. Select the equivalent fractions of $\frac{2}{3}$

a) $\frac{6}{12}$ b) $\frac{15}{20}$ c) $\frac{8}{12}$ d) $\frac{10}{15}$ e) $\frac{20}{30}$

6. Circle the equivalent fractions of $\frac{3}{4}$.

a) $\frac{9}{12}$ b) $\frac{18}{24}$ c) $\frac{12}{20}$ d) $\frac{21}{28}$ e) $\frac{33}{44}$

7. Find the first four equivalent fractions of:

a) $\frac{2}{5}$ b) $\frac{5}{7}$ c) $\frac{3}{4}$ d) $\frac{7}{8}$ e) $\frac{6}{11}$

8. Fill in the boxes to get the equivalent fraction.

a) $\frac{3}{4} \times \frac{\square}{\square} = \frac{21}{28}$ b) $\frac{1}{14} \times \frac{\square}{\square} = \frac{3}{42}$

c) $\frac{6}{11} \times \frac{\square}{\square} = \frac{12}{22}$ d) $\frac{4}{7} \times \frac{\square}{\square} = \frac{40}{70}$

e) $\frac{7}{12} \times \frac{\square}{\square} = \frac{35}{60}$ f) $\frac{9}{15} \times \frac{\square}{\square} = \frac{18}{30}$

9. Write "Yes" if the fractions are equivalent and "No" if they are not.

a) $\frac{3}{4}$ and $\frac{6}{8}$ ☐ b) $\frac{9}{10}$ and $\frac{9}{11}$ ☐ c) $\frac{5}{6}$ and $\frac{10}{18}$ ☐

d) $\frac{4}{5}$ and $\frac{24}{30}$ ☐ e) $\frac{1}{12}$ and $\frac{6}{72}$ ☐ f) $\frac{7}{10}$ and $\frac{14}{20}$ ☐

10. Select the equivalent fractions of $\frac{2}{3}$ and $\frac{5}{6}$ from the given fractions and write them in the appropriate box.

$\frac{4}{6}$, $\frac{50}{60}$, $\frac{18}{27}$, $\frac{12}{18}$, $\frac{35}{42}$, $\frac{20}{30}$, $\frac{15}{18}$, $\frac{30}{36}$

$\frac{2}{3} =$ ☐

$\frac{5}{6} =$ ☐

Reducing a fraction to it's simplest form

A fraction is in the lowest terms if both the numerator and denominator are divisible by one only. (i.e) if 1 is the only common factor of the numerator and the denominator.

Example 1: Reduce $\frac{3}{5}$ to its lowest term.

The common factor of 3 and 5 is 1 only. Hence $\frac{3}{5}$ is in its simplest form.

Example 2: Reduce $\frac{9}{18}$ to its lowest form

Step 1:

Let us find the factors for the numerator and denominator.

Factors of 9 are 1, 3, 9.

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

Common factors = 3,9

Highest Common Factor (HCF) = 9

Since they have a common factor other than 1, the fraction can be simplified.

Step 2:

Divide the numerator and denominator by 9, the Highest Common Factor (HCF)

$$\frac{9 \div 9}{18 \div 9} = \frac{1}{2}$$

Simplest form of $\frac{9}{18}$ is $\frac{1}{2}$

It can also be done in 3 steps

Step 1:

Let us find the factors for the numerator and denominator.

Factors of 9 are 1, 3, 9.

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

Common factors = 3,9

Step 2:

Divide the numerator and denominator by 3.

$$\frac{9 \div 3}{18 \div 3} = \frac{3}{6}$$

Step 3:

Let us find the factors for the numerator and denominator.

Factors of 3 are 1, 3.

Factors of 6 are 1, 2, 3, 6.

The common factor of the numbers is 3 (so $\frac{3}{6}$ is not in its lowest term) .

Divide the numerator and denominator by 3.

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

Simplest form of $\frac{9}{18}$ is $\frac{1}{2}$.

Higher Order Thinking Skills

Vashita has written 5 fraction which are in simplest form. Can you write 5 fractions in its lowest form which are not in Group 1?

Group 1	$\frac{3}{7}$	$\frac{2}{5}$	$\frac{9}{11}$	$\frac{8}{13}$	$\frac{16}{23}$
Group 2					

EXERCISE 8.5

1. Write Yes if the second fraction is the simplest form of the first

a) $\frac{10}{12}, \frac{5}{6}$ ☐ b) $\frac{1}{4}, \frac{1}{2}$ ☐ c) $\frac{9}{12}, \frac{3}{4}$ ☐

d) $\frac{100}{500}, \frac{1}{5}$ ☐ e) $\frac{8}{24}, \frac{1}{4}$ ☐

2. Shade the fractions that are in the lowest terms.

$\frac{5}{6}$	$\frac{4}{4}$	$\frac{2}{8}$	$\frac{9}{10}$	$\frac{5}{8}$	$\frac{3}{7}$
$\frac{3}{8}$	$\frac{2}{20}$	$\frac{6}{9}$	$\frac{5}{10}$	$\frac{1}{6}$	$\frac{4}{6}$
$\frac{1}{2}$	$\frac{3}{3}$	$\frac{6}{12}$	$\frac{6}{8}$	$\frac{4}{5}$	$\frac{7}{7}$
$\frac{2}{3}$	$\frac{5}{25}$	$\frac{2}{10}$	$\frac{4}{12}$	$\frac{1}{3}$	$\frac{9}{12}$
$\frac{11}{12}$	$\frac{5}{15}$	$\frac{3}{12}$	$\frac{2}{4}$	$\frac{1}{4}$	$\frac{4}{8}$
$\frac{5}{9}$	$\frac{3}{4}$	$\frac{2}{6}$	$\frac{2}{14}$	$\frac{2}{5}$	$\frac{3}{11}$

3. Fill in the boxes to make the statements true.

a) $\frac{4}{8} \div \frac{\square}{\square} = \frac{1}{2}$ b) $\frac{11}{88} \div \frac{\square}{\square} = \frac{1}{8}$ c) $\frac{6}{9} \div \frac{\square}{\square} = \frac{2}{3}$

d) $\frac{8}{40} \div \frac{\square}{\square} = \frac{1}{5}$ e) $\frac{5}{15} \div \frac{\square}{\square} = \frac{1}{3}$ f) $\frac{14}{63} \div \frac{\square}{\square} = \frac{2}{9}$

g) $\frac{7}{28} \div \frac{\square}{\square} = \frac{1}{4}$ h) $\frac{8}{56} \div \frac{\square}{\square} = \frac{1}{7}$ i) $\frac{10}{25} \div \frac{\square}{\square} = \frac{2}{5}$

j) $\frac{26}{108} \div \frac{\square}{\square} = \frac{2}{9}$ k) $\frac{49}{56} \div \frac{\square}{\square} = \frac{7}{8}$ l) $\frac{100}{160} \div \frac{\square}{\square} = \frac{5}{8}$

4. Encircle the fractions which can be reduced to $\frac{2}{5}$

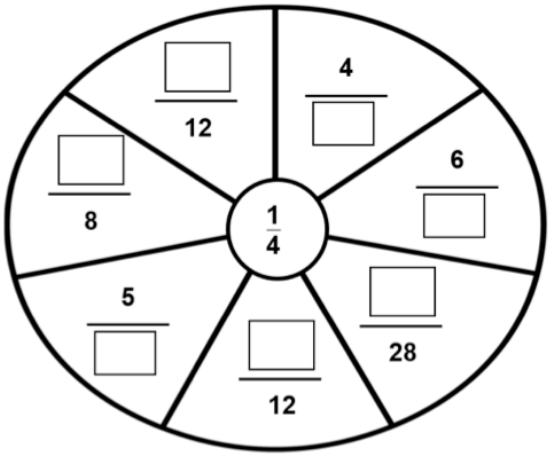
$\frac{10}{15}$, $\frac{8}{20}$, $\frac{6}{15}$, $\frac{10}{25}$, $\frac{6}{20}$, $\frac{16}{20}$

5. Find two equivalent fractions for each of the fraction by division

a) $\frac{9}{18}$ b) $\frac{4}{16}$ c) $\frac{12}{18}$ d) $\frac{20}{30}$ e) $\frac{15}{60}$

Fun activity - 1

Fill in the missing numbers in the wheels to make fractions equivalent to the fraction in the centre.



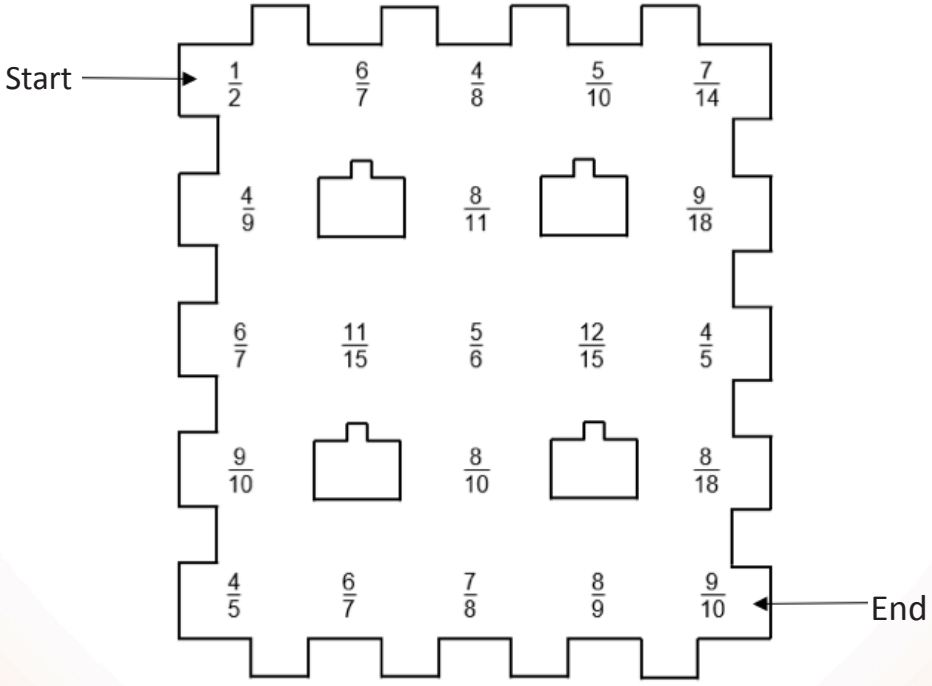
Number fun

$\frac{2}{4} = \frac{3}{6} = \frac{79}{158}$ are equivalent fractions.

All the digits from 1 to 9 have being used once.

Fun activity 2

Akil must go along the fractions which are already in the simplest form. Can you help him?

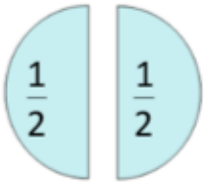
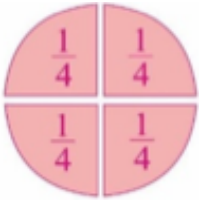


Art Integrated Activity

Take an origami paper. Draw a circle on it. Divide the circle equally into 8 equal parts. Create your own pattern / design of peacock feather using the 8 pieces and complete the peacock by sticking it's feathers.

Whole as a Fraction

Krishna acharya cut out circles of the same size. He gave it to five students for colouring it. They did it as follows.

Dharma	Bhima	Arjuna	Nagula	Sahadeva
				
1 whole	1 whole	1 whole	1 whole	1 whole
$\frac{1}{1}$	$\frac{2}{2}$	$\frac{4}{4}$	$\frac{8}{8}$	$\frac{16}{16}$

Dharma coloured the whole circle.

Bhima divided the circle into 2 equal parts and coloured both.

Arjuna divided the circle into 4 equal parts and coloured all of them.

Nagula divided the circle into 8 equal parts and coloured all the 8 parts.

Sahadeva divided the circle into 16 equal parts and coloured the 16 parts.

All the five coloured one full circle.

$\frac{1}{1}$ $\frac{2}{2}$ $\frac{4}{4}$ $\frac{8}{8}$ $\frac{16}{16}$

What is one whole in a fraction?

In a fraction , if the numerator and the denominator are equal then the fraction is equal to one whole.

Like and Unlike Fractions

There are 5 buses in a bus terminus. Each bus has 40 seats.

Fraction of seats occupied in each bus.

Bus 1	Bus 2	Bus 3	Bus 4	Bus 5
$\frac{27}{40}$	$\frac{16}{40}$	$\frac{13}{40}$	$\frac{31}{40}$	$\frac{40}{40}$

The denominators of all these fractions are 40.

Fractions with same denominator are called like fractions.

Fractions whose denominators are different are unlike fractions.

Which bus is fully occupied?

Which bus is least occupied?

Let us know

- To compare like fractions, compare their numerators.
- The fraction with greater numerator is the greater fraction.

Comparison of Like Fractions

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

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

Arranging like fractions in ascending order

In a flower boutique, there are 15 roses. $\frac{4}{15}$ of them are orange, $\frac{5}{15}$ are red $\frac{2}{15}$ are yellow, $\frac{3}{15}$ are pink, $\frac{1}{15}$ are white. Arrange them in ascending order of their availability?

Solution : Let us compare the numerators 1<2<3<4<5

Therefore $\frac{1}{15} < \frac{2}{15} < \frac{3}{15} < \frac{4}{15} < \frac{5}{15}$

Arranging like fractions in descending order

In a set of 24 colour papers that Dev had, $\frac{4}{24}$ were green, $\frac{7}{24}$ were red, $\frac{6}{24}$ were yellow, $\frac{5}{24}$ were blue and $\frac{2}{24}$ were orange.

Solution : On comparing the numerators 7>6>5>4>2

Therefore $\frac{7}{24} > \frac{6}{24} > \frac{5}{24} > \frac{4}{24} > \frac{7}{24}$

EXERCISE 8.6

1. Write "Y" for like fractions and "N" for unlike fractions

a) $\frac{3}{5}, \frac{2}{5}$ b) $\frac{7}{9}, \frac{7}{15}$ c) $\frac{10}{12}, \frac{12}{15}$ d) $\frac{9}{20}, \frac{19}{20}$ e) $\frac{15}{30}, \frac{8}{15}$

2. Compare the fractions and use the correct sign (<, > or =)

a) $\frac{9}{10} \square \frac{5}{10}$ b) $\frac{10}{10} \square \frac{7}{15}$ c) $\frac{17}{25} \square \frac{7}{25}$ d) $\frac{4}{11} \square \frac{8}{11}$

e) $\frac{1}{6} \square \frac{5}{6}$ f) $\frac{9}{9} \square \frac{1}{9}$ g) $\frac{5}{7} \square \frac{3}{7}$ h) $\frac{1}{3} \square \frac{2}{3}$

3. Arrange in ascending order

a) $\frac{9}{15}, \frac{4}{15}, \frac{11}{15}, \frac{8}{15}$ b) $\frac{5}{11}, \frac{1}{11}, \frac{10}{11}, \frac{7}{11}$ c) $\frac{2}{7}, \frac{5}{7}, \frac{6}{7}, \frac{4}{7}$

4. Arrange in descending order

a) $\frac{3}{4}, \frac{1}{4}, \frac{2}{4}, \frac{4}{4}$ b) $\frac{10}{12}, \frac{5}{12}, \frac{11}{12}, \frac{7}{12}$ c) $\frac{5}{8}, \frac{2}{8}, \frac{7}{8}, \frac{3}{8}$

Addition of like fractions

Example 1:

Add $\frac{1}{7}$ and $\frac{4}{7}$

$\frac{1}{7} + \frac{4}{7} = \frac{1+4}{7} = \frac{5}{7}$

Example 2:

Add $\frac{5}{10}$ and $\frac{4}{10}$

$\frac{5}{10} + \frac{4}{10} = \frac{5+4}{10} = \frac{9}{10}$

Example 3:

Lashit's mom cut a mango into 6 pieces. Lashith ate $\frac{3}{6}$ of the mango. His sister ate $\frac{2}{6}$ of the mango. How much mango did they eat together?

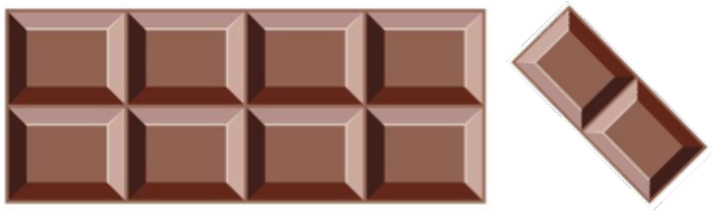
Lashith and his sister ate $\frac{3}{6} + \frac{2}{6}$ of the mango.

So, $\frac{3}{6} + \frac{2}{6} = \frac{3+2}{6} = \frac{5}{6}$

Let us know

- To add two like fractions, add the numerators.
- The denominator remains the same.

Subtraction of like fractions



Sridhar had a chocolate bar. He ate 2 pieces from it.

What fraction of chocolate pieces are left?

$$\frac{10}{10} - \frac{2}{10} = \frac{10-2}{10} = \frac{8}{10}$$

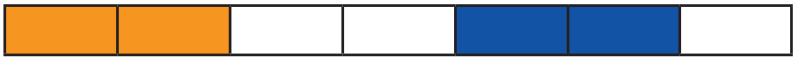
Let us know

- To subtract two like fractions, subtract the numerators.
- The denominator remains the same

EXERCISE 8.7

1. Add using figures

a)  $= \frac{1}{6} + \frac{2}{6} = \frac{\quad}{\quad}$

b)  $= \frac{\quad}{\quad} + \frac{\quad}{\quad} = \frac{\quad}{\quad}$

c)  $= \frac{\quad}{\quad} + \frac{\quad}{\quad} = \frac{\quad}{\quad}$

2. Add the following like fraction

a) $\frac{3}{6} + \frac{2}{6}$ b) $\frac{8}{13} + \frac{3}{13}$ c) $\frac{1}{5} + \frac{3}{5}$

d) $\frac{4}{23} + \frac{7}{23}$ e) $\frac{6}{11} + \frac{3}{11}$ f) $\frac{3}{10} + \frac{7}{10}$

3. Add and reduce the sum to its lowest term

a) $\frac{4}{10} + \frac{2}{10}$ b) $\frac{7}{18} + \frac{5}{18}$ c) $\frac{12}{20} + \frac{3}{20}$

d) $\frac{9}{40} + \frac{19}{40}$ e) $\frac{14}{35} + \frac{7}{35}$ f) $\frac{8}{22} + \frac{3}{22}$

4. Subtract, give the difference in its lowest term

a) $\frac{9}{9} - \frac{2}{9}$ b) $\frac{17}{19} - \frac{13}{19}$ c) $\frac{6}{10} - \frac{5}{10}$

d) $\frac{8}{18} - \frac{3}{18}$ e) $\frac{12}{26} - \frac{7}{26}$ f) $\frac{15}{21} - \frac{10}{21}$

g) $\frac{9}{10} - \frac{1}{10}$ h) $\frac{13}{15} - \frac{3}{15}$ i) $\frac{16}{20} - \frac{4}{20}$

j) $\frac{3}{8} - \frac{1}{8}$ k) $\frac{15}{18} - \frac{9}{18}$ l) $\frac{17}{21} - \frac{3}{21}$

6. Subtract $\frac{12}{25}$ from $\frac{21}{25}$ 7. Subtract $\frac{31}{50}$ from $\frac{50}{50}$.

8. Subtract $\frac{6}{8}$ from 1.

9. Add and reduce the sum to its lowest term. $\frac{1}{8} + \frac{2}{8} + \frac{3}{8}$

10. Which is greater?

a) $\frac{7}{9} + \frac{1}{9}$ (or) $\frac{9}{9} - \frac{5}{9}$ b) $\frac{6}{11} - \frac{2}{11}$ (or) $\frac{1}{11} + \frac{2}{11}$

c) $1 + \frac{2}{3}$ (or) $1 - \frac{2}{3}$ d) $2 - \frac{5}{7}$ (or) $3 - \frac{5}{7}$

Applications in real life

a) Manoj read $\frac{3}{10}$ of a story book on Monday and $\frac{5}{10}$ of the story book on Tuesday. What fraction of the story book did he read on both days altogether?

b) Ramesh painted $\frac{1}{4}$ of a picture in the morning and $\frac{2}{4}$ of it in the evening.

1) What fraction of the picture did he paint during the day?

2) What fraction of it is yet to be painted?

c) Pooja had $\frac{6}{6}$ pieces of chocolates. She ate $\frac{2}{6}$ pieces of them. What portion of the chocolate is left?

d) Rani walked $\frac{4}{5}$ of a kilometre. How much distance has she to cover to complete 1 km?

e) Mama bought $\frac{3}{4}$ kg of carrots. She used $\frac{1}{4}$ kg for cooking. What weight of carrots was not used for cooking?

f) One day 7 students were absent, in a class of 40.

What fraction of students i) were present?

ii) were absent for the class on that day?

SUBJECT INTEGRATION

Land and water

About $\frac{1}{3}$ of Earth's surface is land and the rest is water.

What fraction of Earth is water?

The area occupied by _____ is more than that occupied by _____on earth. (Fill in with land/water appropriately)

Suggest two ways to conserve water.

Types of Fractions

Proper Fractions

Proper fractions are always less than one whole.

In a proper fraction, numerator is always smaller than the denominator.

Improper Fractions

Improper fractions are greater than or equal to one whole.

$\frac{7}{7}$ = 1 whole. It is also an improper fraction.

In an improper fraction, the numerator is equal to or greater than the denominator.

Unit Fractions

Proper fractions with numerator 1 are called unit fractions.

$\frac{1}{7}, \frac{1}{9}, \frac{1}{12}, \frac{1}{8}$ are unit fractions.

EXERCISE 8.8

1) Write any 3.

a) Proper fractions with denominator 9.

b) Improper fractions with denominator 4.

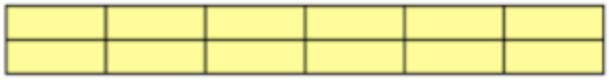
c) Unit fractions with denominator 11.

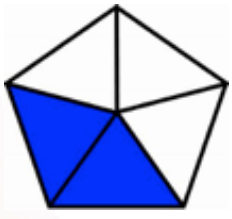
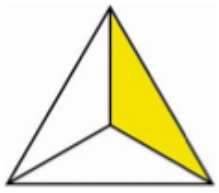
2. Select the odd one out.

a. $\frac{1}{5}, \frac{1}{7}, \frac{1}{9}, \frac{7}{7}, \frac{1}{50}$ b. $\frac{8}{15}, \frac{9}{12}, \frac{6}{5}, \frac{4}{13}, \frac{3}{11}$

c. $\frac{15}{7}, \frac{4}{3}, \frac{28}{8}, \frac{1}{6}, \frac{19}{9}$

3. Represent each of the coloured portion as a fraction. Also write **'Yes'** if it represents a whole and **'No'** if it does not.

a)  b) 

c)  d) 

4. Encircle the given fractions which represent a whole.

$\frac{6}{6}$ $\frac{9}{9}$ $\frac{12}{12}$ $\frac{21}{21}$ $\frac{1}{50}$ $\frac{50}{50}$ $\frac{18}{17}$ $\frac{4}{14}$

5. Ashwin practiced bowling for $\frac{3}{4}$ of an hour every day. Pandya practiced for $\frac{7}{4}$ of an hour every day.

(i) Who practiced longer in a day? _____

(ii) Who among the two practiced for more than an hour every day?

Mixed number

Conversion of improper fraction to a mixed number

Consider the fraction $\frac{7}{4}$

$\frac{7}{4}$ is an improper fraction. So it can be written as a whole number and a fraction. (Mixed fraction)

$\frac{7}{4}$ is same as $\frac{4}{4} + \frac{3}{4} = 1 + \frac{3}{4}$

$\frac{7}{4} = 7 \div 4 = 1\ \frac{3}{4}$

$$4 \overline{)\ 7\ } \quad 1$$
$$-\ 4$$
$$3$$

Quotient $\frac{\text{Remainder}}{\text{Divisor}}$

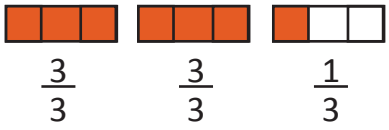
4 - divisor

1 - quotient

3 - remainder

Conversion of a mixed number into an improper fraction

Example 1: $2\ \frac{1}{3}$

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

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

$2 \rightarrow$ Wholes $\qquad \frac{1}{3} \rightarrow$ Proper fraction

$\frac{3}{3} + \frac{3}{3} + \frac{1}{3} = \frac{7}{3}$

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

$= \frac{6 + 1}{3} = \frac{7}{3}$

Example 2 :

Anandha had two biscuit packets with 5 biscuits in each. She ate the biscuits in one packet and two biscuits from another. Write the biscuits that Anandha ate as a fraction.

One packet had 5 biscuits, she ate one whole. (i.e) $\frac{5}{5} = 1$. From the second packet of 5, she ate 2. So she ate $\frac{2}{5}$ of it.

Solution :

Total biscuits Anantha ate $= \dfrac{5}{5} + \dfrac{2}{5}$

$= \dfrac{7}{5}$ or $1 + \dfrac{2}{5}$

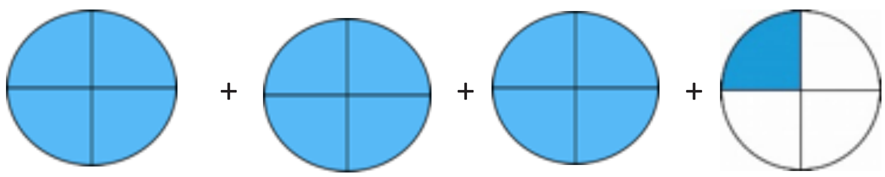
$= 1\dfrac{2}{5}$

$$\begin{array}{r|l} & 1 \\ \hline 5 & 7 \\ - & 5 \\ \hline & 2 \end{array}$$

Mixed number = Quotient $\dfrac{\text{Remainder}}{\text{Divisor}}$

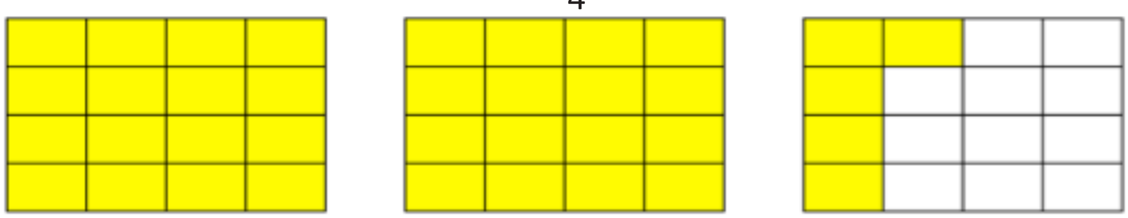
EXERCISE 8.9

1.Write the improper fraction and mixed number for the coloured part of each of the following.

a. 

Improper fraction $\dfrac{4}{4} + \dfrac{4}{4} + \dfrac{4}{4} + \dfrac{1}{4} = \square$

Mixed number $1 + 1 + 1 + \dfrac{1}{4} = \square$

b. 

Improper fraction: $\dfrac{16}{16} + \dfrac{16}{16} + \dfrac{5}{16} = \square$

Mixed number: $1 + 1 + \dfrac{5}{16} = \square$

2 Draw and colour to represent the following improper fractions.

a. $\dfrac{3}{2}$ b. $\dfrac{5}{3}$ c. $\dfrac{6}{5}$

3. Draw and shade to represent the following mixed number.

a. $1\frac{1}{4}$ b. $3\frac{2}{3}$ c. $2\frac{1}{5}$

4. Match the improper fraction with its correct mixed number.

a. $\frac{17}{4}$ $4\frac{2}{9}$

b. $\frac{17}{12}$ $4\frac{1}{4}$

c. $\frac{18}{5}$ $5\frac{1}{10}$

d. $\frac{38}{9}$ $1\frac{5}{12}$

e. $\frac{51}{10}$ $3\frac{3}{5}$

5. Convert the improper fractions into mixed numbers.

a . $\frac{7}{2}$ b. $\frac{13}{4}$ c. $\frac{15}{8}$ d. $\frac{44}{11}$ e. $\frac{25}{8}$

6. Convert the mixed numbers into improper fractions.

a. $4\frac{2}{3}$ b. $8\frac{3}{4}$ c. $5\frac{1}{5}$ d. $7\frac{3}{5}$ e. $2\frac{11}{12}$

7. Fill in with missing numerators.

a. $3\frac{4}{5} = \frac{\square}{5}$ b. $4\frac{9}{10} = \frac{\square}{10}$

c. $4\frac{3}{7} = \frac{\square}{7}$ d. $3\frac{7}{11} = \frac{\square}{11}$

8. Write Yes or No.

a. $3\frac{1}{3} = \frac{10}{3}$

b. $\frac{29}{7} = 2\frac{9}{7}$

c. $\frac{17}{3} = 5\frac{2}{3}$

d. $7\frac{2}{5} = \frac{37}{5}$

e. $\frac{101}{4} = 1\frac{5}{20}$

9. Tick the correct answer.

a. $\frac{12}{3} = \frac{4}{1}$ or $\frac{0}{12}$

b. $\frac{9}{5} = 4\frac{1}{5}$ or $1\frac{4}{5}$

c. $\frac{13}{2} = 6\frac{1}{2}$ or $6\frac{1}{13}$

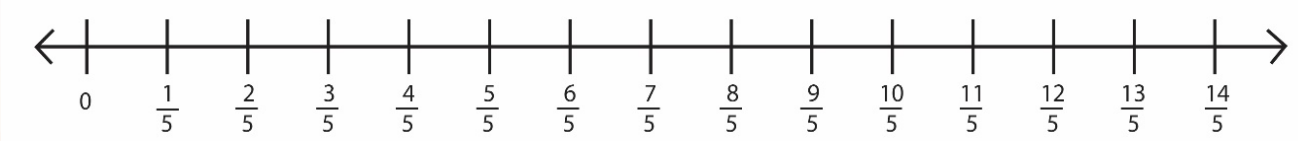
d. $\frac{31}{7} = 4\frac{1}{7}$ or $4\frac{3}{7}$

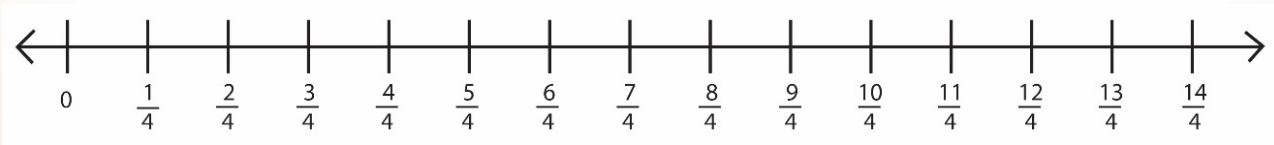
e. $\frac{49}{5} = 9\frac{4}{5}$ or $5\frac{4}{9}$

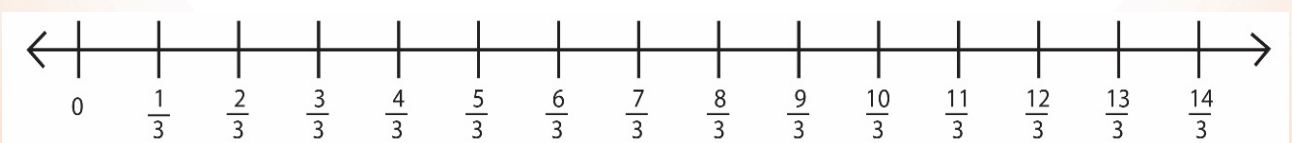
10. Sheelu bought $2\frac{3}{4}$ m of cloth to stitch curtains. How many centimeters of cloth did she buy?

11. Locate the following on the number line

a) $1\frac{1}{5}$ b) 3 c) $2\frac{2}{3}$







Worksheet

1. Write an equivalent fraction of the following.

a.  _____ b.  _____

2. Identify the improper fraction: $\frac{6}{7}$, $\frac{11}{7}$

3. Find $\frac{4}{7}$ of 49.

4. Convert $\frac{41}{3}$ into an mixed fraction.

5. Arrange in ascending order. $\frac{8}{20}$, $\frac{17}{20}$, $\frac{12}{20}$, $\frac{3}{20}$

6) Add $\frac{1}{2}$ and $\frac{7}{12}$

7) Subtract $\frac{7}{8}$ and $\frac{3}{8}$

8. Convert the improper fraction into a mixed number: $\frac{39}{6}$

9. Sonu read 20 pages of a book containing 100 pages. Arun read $\frac{2}{5}$ of the same book. Who has read lesser pages?

10. 200 chairs are arranged in a hall for a meeting. $\frac{3}{5}$ of the total chairs are occupied. How many chairs are empty?

11. How many $\frac{1}{8}$ make one whole?

Logical Reasoning

1. Fraction $\frac{A}{B}$ = 1 when

a) A>B b. A<B c. A=B d. None of these

2. If $\frac{3}{4} = \frac{18}{d}$, $\frac{5}{8} = \frac{25}{e}$, $\frac{9}{11} = \frac{f}{66}$, $\frac{7}{8} = \frac{g}{64}$, find d,e,f and g.

3. On a tree there were a few birds. Of them $\frac{1}{2}$ were crows, $\frac{1}{4}$ of them were mynas and the remaining 9 were parrots. How many birds were there on the tree?

a. 26 b. 56 c. 36 d. 45

4. Of the 8 students in an art class six eighths are in 6th grade. How many sixth graders are in the art class?

a. 1 b. 8 c. 6 d. 5

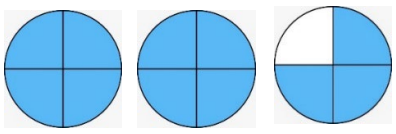
5. Sonu puts 20 flowers in a vase. If two tenths are white, how many white flowers are in the vase?

a) 4 b. 8 c. 2 d. 12

6. What fraction has to be added to $1\frac{3}{4}$ to get 2?

a) 14 b. $\frac{2}{4}$ c. $\frac{3}{4}$ d. $\frac{1}{3}$

7. Write the fraction of the shaded part?



a) 2 b. $1\frac{1}{2}$ c. $2\frac{3}{4}$ d. $1\frac{3}{4}$

8. What fraction of students are boys if the class strength is 40 and the number of girls is 20?

a) $\frac{4}{7}$ b. $\frac{4}{8}$ c. $\frac{4}{16}$ d. $\frac{13}{28}$

9. If $p = \frac{1}{12}$ $q = \frac{5}{12}$ $r = \frac{11}{12}$ $s = \frac{7}{12}$, then the descending order of above fractions is

a) p, q, r, s b. s, r, q, p c. r, s, q, p d. r, p, s, q

10) If the shaded area is $\frac{1}{3}$, the value of the whole would be.

a) $\frac{2}{3}$ b. $1\frac{1}{3}$ c. $\frac{3}{3}$ d. $2\frac{2}{3}$

SUBJECT INTEGRATION

Evolution of the cricket bat

The cricket bat that we use today, is entirely different from what it was when playing of the game started around 1620.

It is interesting to know that the first bat was in the shape of a hockey stick. The shape helped as bowling was underarm then.

The modern -day bat that is much lighter and rectangular came into vogue when bowling became overarm and the speed of delivery of the ball increased.

The sap of willow tree is even today the preferred material for making bats.

Kashmiri willow bats are the biggest competitors for the English willows as the number of nations picking up Kashmiri willows have increased now by leaps and bounds.

Remember, though we all love the game of cricket, watch it with fervour and savour every ball played, it entered our land because of the British who enslaved and brought hardship and penury on us. Let us remember, enjoy and cheer our indigenous games.

Changes in cricket bats

Bat size	Approximate age (in years)	Height of the batsman (cm)	Bat length (in inches)	Bat width (in inches)
1	4 – 5	upto 132	25	3
2	6 – 7	132 - 137	27	3
3	8	137 - 142	28	3
4	9 – 11	142 - 147	29	3

9 TIME

Expected Learning Outcomes

At the end of this lesson, children will be able to:

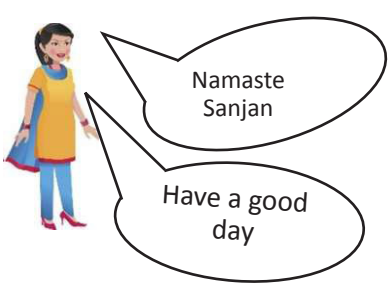
Read and write the time to the exact minute. Write the time in three ways.

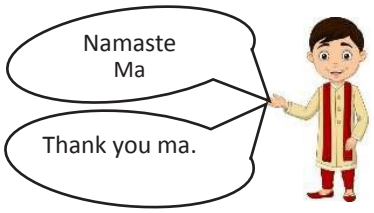
Use a.m. and p.m., appropriately

Convert 12-hour clock time into 24-hour clock time and vice-versa.

Calculate the duration and finishing time.

Applying the skills to solve real life problems.





Sanjan started his morning activities. Can you look at the clock and note the time of his activities

Waking up ☐

Brushing teeth ☐

Yoga and exercises ☐

Bathing ☐

Praying

Breakfast

Getting ready to school

Going to school

Sanjan is a punctual boy. His school starts at 8 O'clock in the morning. Everyday he reaches his school before 8:00 am. Do you like to be punctual? _____

Think and answer:

1. At what time does you school start?
2. Are you punctual to school everyday?
3. How much time do you spend at your breakfast table?

EXERCISE 9.1

I. **Indicate ✓ or ✗ against the time in the box.**

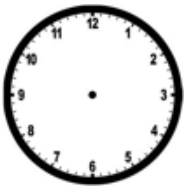
1. Half past 4 is 4:30 ☐
2. Half past 7 is 6:30 ☐
3. Half past 1 is 1:45 ☐
4. Quarter past 11 is 11:30 ☐
5. Quarter past 1 is 12:45 ☐
6. Quarter past 9 is 9:15 ☐
7. Half past 10 is 10:30 ☐
8. Half past 3 is 3:05 ☐

II. Match the following

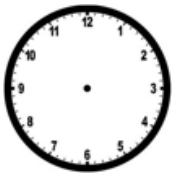
1	5 hours before 5:30	11:00
2	1 hour after 9:25	10:25
3	1 hour after 8:30	12:30
4	60 minutes before 12	7:50
5	10 minutes before 7	11:45
6	50 minutes after 7	6:50
7	15 minutes after 11:20	9:30
8	15 minutes before 12	11:35

III. Draw the hands of the clock to indicate the given time

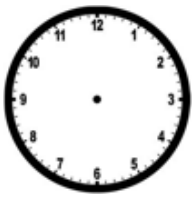
a. 20 minutes past 4



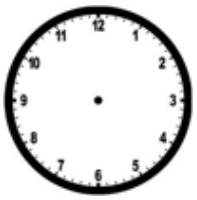
b. 10 minutes past 9



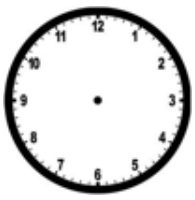
c. Quarter past 8



d. Half past 7



e. 25 minutes past 11



IV. Write the time in two ways.

1. 

_____

_____

2. 

_____

_____

3 

_____

_____

4. 

_____

_____

V. Estimate the time taken by you for the following.

1. Eating breakfast on a
   (i) holiday _____ (ii) working day _____
2. Climbing the staircase to reach the first floor.
   (i) walking _____ (ii) in a lift _____
3. Reading
   (i) a story book (50 pages) _____ (ii) a lesson (10 pages) _____
4. Drawing
   (i) A simple scenery _____ (ii) A science diagram _____
5. Filling a 1L water bottle
   (i) from a tap _____ (ii) using a 40 mL glass _____

VI. Answer the following.

1. Name the months of a year that start with the letter J?
2. During which month do we celebrate Teachers Day?
3. How many days are there in a leap year?
4. How many hours are there in a week?
5. Ram says that his date of birth is 29/2/2017. Can he be right? Why / Why not?
6. In a particular year, if 1st of August is a Sunday, what day will it be on 28th August?

Reading the Exact Time

The minute hand takes 5 minutes to move from one number to the next number on the clock face. If the minute hand is at 1 in the clock face, we read it as 5 minutes.

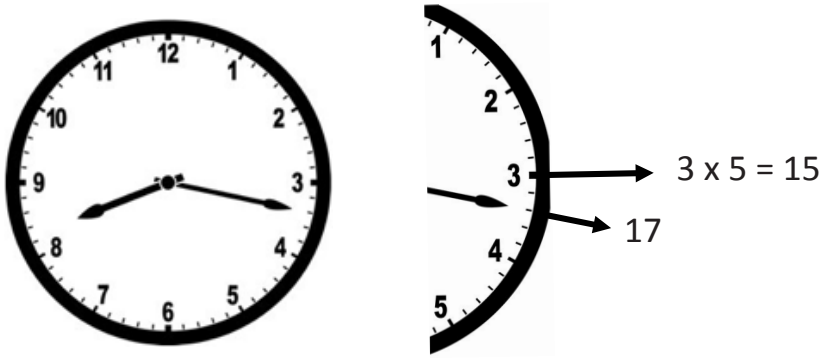
$$1 \times 5 = 5.$$

If the minute hand says 10 in the clock face, we read it as 50 minutes.

$$10 \times 5 = 50$$

The interval between 2 numbers is further divided into 5 equal parts. Each part is 1 minute.

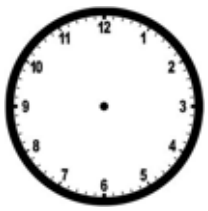
What time it is if the hour hand is between 8 and 9, minute hand is between 3 and 4 ?

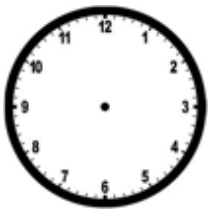


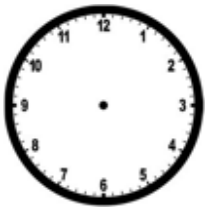
The time is 8:17

EXERCISE 9.2

1.**Draw hands on the clock to show the time.**


10:07


4:31


5:57


9:19

2. Where would the minute hand be, if the clock represents

Example:16 minutes – The minute hand lies between 3 and 4 of the clock face.

a. 38 minutes – The minute hand lies between and of the clock face.

c. 59 minutes – The minute hand lies between and of the clock face.

3. **Find the answer.**

a. How many minutes are there in a day?

b. Which hand moves faster - minute hand or hour hand?

c. A student started riding his bicycle at 7:15 am and reached his school at 7:50 a.m. How many minutes did he take to reach the school?

4. At 12:37 pm, two clocks show the following times.

CLOCK 1

12:46

CLOCK 2

12:32

a. Which clock is faster? By how many minutes? _____

b. Which clock is slower? By how many minutes? _____

5. If the long hand is between 10 and 11 and shorthand is between 4 and 5, what could be the different times that it indicates (correct to a minute)

Expressing the Time in three ways

Vikram and his family were on a holiday trip. They were waiting at a railway station. The announcement at the station said that a particular train would depart at 8:20 hours.

Vikram said, "Hey! The train will start at 8 hours 20 minutes."

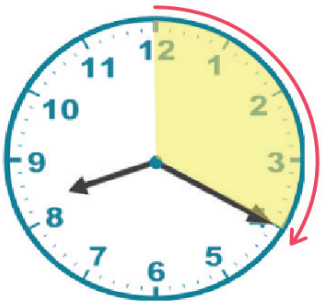
His father said, "It is at 20 minutes past 8."

His mother said, "It is at 40 minutes to 9

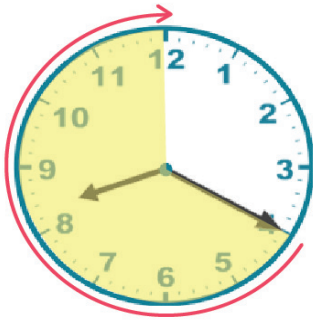
His little sister was sure that all of them were wrong, because each quoted a different time.

Her father helped her understand that all of them meant the same time.

8 hours 20 minutes



20 minutes past 8



40 minutes to 9

Example:

Expressing the given time in three different ways.

a) 7:25
   (i) 7 hours 25 minutes.
   (ii) 25 minutes past 7.
   (iii) 35 minutes to 8.

b) 10:55
   (i) 10 hours 55 minutes.
   (ii) 55 minutes past 10.
   (iii) 5 minutes to 11

c) 4:38
   (i) 4 hours 38 minutes.
   (ii) 38 minutes past 4.
   (iii) 22 minutes to 5.

d) 12:59
   (i) 12 hours 59 minutes.
   (ii) 59 minutes past 12.
   (iii) 1 minute to 1

EXERCISE 9.3

1) Write the time for each of the following.

a) 10 minutes past 4. b) 2 minutes past 3. c) 29 minutes past 10.

d) 48 minutes past 11. e) 5 minutes to 5. f) 12 minutes to 12.

g) 33 minutes past 7. h) 15 minutes to 8. i) 18 minutes to 1.

j) 49 minutes to 6.

2) Write the time in three different ways.

a) 6:05 b) 3:45 c) 7:18 d) 9:02 e) 4:14

Do you know?

Normally we use:

- Minutes past hour – if the minute hand shows less than 30 minutes.
- Minutes to hour – if the minute hand shows greater than 30 minutes.

Use of a.m. and p.m.

a.m. – ante meridiem

p.m. – post meridiem

In 12 hour clock, a.m. and p.m. are used as indications centered around noon

a.m. - Denotes time before noon or midday.

p.m. - Denotes time afternoon or after midday.

We do not write 12:00 a.m. or 12:00 p.m.. Instead, we write 12:00 noon and 12:00 midnight respectively.

Night 12 O'Clock → 12 midnight

Day 12 O'Clock → 12 noon

12	1	2	3	4	5	6	7	8	9	10	11	12
Midnight	a.m.	a.m.	a.m.	a.m.	a.m.	a.m.	a.m.	a.m.	a.m.	a.m.	a.m.	Noon
12	1	2	3	4	5	6	7	8	9	10	11	12
Noon	p.m.	p.m.	p.m.	p.m.	p.m.	p.m.	p.m.	p.m.	p.m.	p.m.	p.m.	Midnight

Applications of a.m. and p.m.

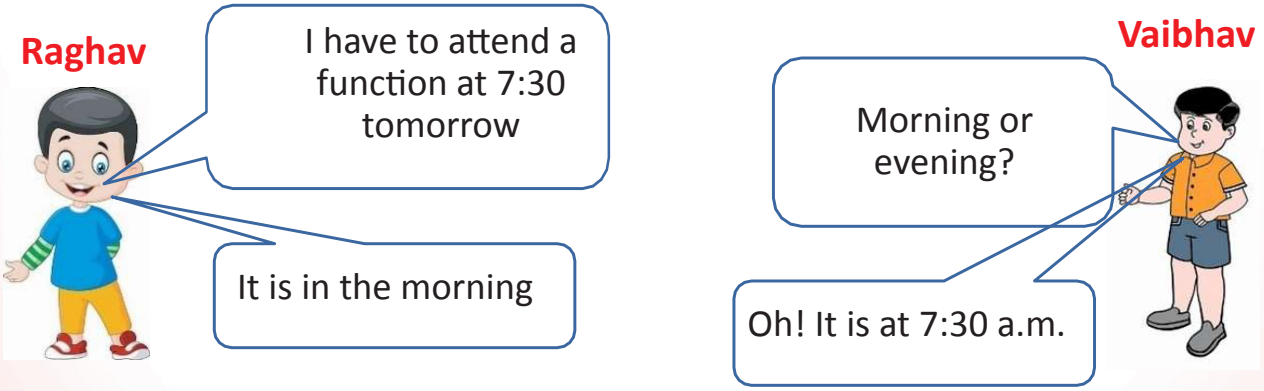
Fill in the blanks with a.m. or p.m.

a) Muthu, a vegetable vendor opens his vegetable shop at 6:15 _____(morning).

b) He closes his shop at 12:30 _____(afternoon). He again opens it at 2:30 _____ (evening) and closes at 9:30 _____(night).

Importance of a.m. and p.m.

Using a.m. / p.m. helps us to know whether the event happened before or after midday.



- Mahesh has to take a bus at 9:30 in the night So, it is 9:30 p.m.
- 5 hours before 12:00 noon is a.m. or p.m.? It is 7:00 a.m., (It is before midday)

EXERCISE 9.4

1. **Fill in the blanks with a.m. or p.m.**

a) The sun rises at 5:49 ___
b) We have dinner at 7:30 ___
c) Children play in a park from 5:30 ___, in the evening
d) The stars twinkle from 6:30 ___
e) Sonali had her breakfast at 8:15 ___
f) Anand goes to bed, after his everyday work at 10:00 ___

2. Write the time using a.m. or p.m.

a) 3 hours before midday.
b) 2 hours before midnight.
c) 1 hour after noon.
d) 5 minutes before noon.
e) 12 minutes after midnight.
f) 10 minutes to noon.
g) 35 minutes past noon.
h) 15 minutes before midnight.

3. Write the time indicating a.m./p.m.

a) 4 hours after 9:15 p.m.
b) 2 hours before 12:30 p.m.
c) 15 minutes after 6:30 p.m.
d) 30 minutes after 11:30 a.m.
e) 6 minutes after 11:50 p.m.
f) One hour before 3:15 a.m.
g) 3 hours after 10:45 a.m.
h) Half an hour after 7:05 p.m.

Fun Activity

Sunday Emoji Chart

Write the time spent on the activities listed on a Sunday.

Eat _____

Sleep _____

Study _____

Play _____

Help (House activity) _____

Pet care _____

Outing _____

Watching TV/ Playing video games _____

24 Hour Clock

In our everyday work, we use 12-hour clock to know the time. We read a.m. or p.m. according to whether the event happened before midday or after midday.

Transport services, defence forces and organisations that function round the clock use the 24 hour clock time.
The day starts at 12 midnight. It is written as 00:00 hours

12:00 midnight → 00:00

Hours minutes

1:45 a.m. is written as 01:45 hours

Hours minutes

Representation of time from 12:00 midnight to 12:00 noon

12-hour clock time	24-hour clock time
12:00 midnight	00:00 hours
1:00 a.m.	01:00 hours
2:00 a.m.	02:00 hours
3:00 a.m.	03:00 hours
4:00 a.m.	04:00 hours
5:00 a.m.	05:00 hours
6:00 a.m.	06:00 hours

12-hour clock time	24-hour clock time
7:00 a.m.	07:00 hours
8:00 a.m.	08:00 hours
9:00 a.m.	09:00 hours
10:00 a.m.	10:00 hours
11:00 a.m.	11:00 hours
12:00 noon	12:00 hours

Representation of time from 12:00 noon to 12:00 midnight

12-hour clock time	24-hour clock time
12:00 noon	12:00 hours
1:00 p.m.	13:00 hours
2:00 p.m.	14:00 hours
3:00 p.m.	15:00 hours
4:00 p.m.	16:00 hours
5:00 p.m.	17:00 hours
6:00 p.m.	18:00 hours

12-hour clock time	24-hour clock time
7:00 p.m.	19:00 hours
8:00 p.m.	20:00 hours
9:00 p.m.	21:00 hours
10:00 p.m.	22:00 hours
11:00 p.m.	23:00 hours
12:00 midnight	00:00 hours

Write the time using 24-hour clock time.

Example 1

8:25 a.m. → 08:25 hours

a.m. represents before midday. So, 08:00 hours is the same 8:00 a.m. Minutes to be carried over as it is.

Hence 8:25 a.m. is written as 08:25 hours in 24-hour clock time.

Example 2

9:30 p.m. → 21:30 hours

p.m. represents after midday. So, 9:00 p.m. becomes 12 + 9 = 21 hours. Minutes to be carried over as it is.

Hence 9:30 p.m. is written as 21:30 hours in 24 hours clock time.

Example –3

12:40 p.m . → 12:40 hours

For 12 hours alone, check if it is before midday or after midday.

Special case of 12-hour time.

12:40 a.m. (i) It is starting of the day.
(ii) It is before midday.

So, 12:40 a.m. is written as 00:40 hours in 24-hour clock time.

12:40 p.m. (i) Already 12 hours are over in the day.
(ii) It is after midday.

So, 12:40 p.m. is written as 12:40 hours in 24-hour clock time.

Write the time using 12-hour clock.

Example 4

17:40 hours
(i) The hour given is more than 12, so it is after midday (p.m.)
(ii) Subtract 12 hours from 17 hours to get 12-hour clock time

17 – 12 = 5

17:40 hours is written as **5:40 p.m.** in 12-hour clock time.

Example 5

11:05 hours
(i) The hour given is less than 12, so it is before midday (a.m.)
(ii) 11:05 hours is written as 11:05 a.m. in 12-hour clock time.

Example 6

12:05 hours is written as 12:05 p.m.

Example7

00:55 hours is written as 12:55 a.m.

EXERCISE 9.5

1. Tick the correct equivalent from the ones given in brackets

a) 3:30 p.m. is (15:30 p.m. / 15:30 hours / 03:30 hours)
b) 6:15 a.m. is (18:15 hours / 18:15 p.m. / 06:15 hours)
c) 12:10 a.m. is (00:10 hours / 12:10 hours / 00:10 p.m.)
d) 10:25 p.m. is (10:25 hours / 22:25 hours / 10:25 a.m.)
e) 12:32 p.m. is (24:32 hours / 12:32 hours / 00:32 hours)

2. Write the given time in 24-hour clock.

a)	4:30 p.m.	b)	12:39 a.m.	c)	7:12 a.m.
d)	7:17 p.m.	e)	9:29 p.m.	f)	6:42 p.m.
g)	12:45 a.m.	h)	9:06 a.m.	i)	8:16 p.m.

3. Write the given time in 12-hour clock format.

a)	16:40 hours	b)	00:05 hours	c)	18:30 hours
d)	12:44 hours	e)	12:06 hours	f)	23:55 hours
g)	04:16 hours	h)	10:33 hours	i)	12:35 hours

FACT CORNER

Some radishes are ready to eat 3 weeks from seeding.

Green beans and cucumber are ready to eat 6 to 7 weeks after planting.

Do you know?

Husainabad clock tower in Lucknow constructed in 1881, at a cost of ₹ 1.75 lakhs, is one of the oldest and tallest towers in India.

Time Interval (Duration)

Time taken by any activity (from start to the end of an activity) is called the duration or time interval, of the activity.

Example 1

Arpita started colouring a picture at 5:40 p.m. and completed it at 6:20 p.m. How long did she take to complete the activity?

Time Interval	Time Taken
5:40 p.m. to 6:00 p.m.	20 minutes
6:00 p.m. to 6:20 p.m.	20 minutes

Total time taken = 20 minutes + 20 minutes
= 40 minutes

Arpita took 40 minutes to complete her colouring.

Example 2

A Yoga class started at 6:15 a.m. and ended at 7:25 a.m. What was the duration of the class?

Time Interval	Time Taken
6:15 a.m. to 7:15 a.m.	1 hour
7:15 a.m. to 7:25 a.m.	10 minutes

Total time taken = 1 hour + 10 minutes
= 1 hour 10 minutes

The yoga class lasted for 1 hour and 10 minutes.

EXERCISE 9.6

1. Find the duration (in minutes) of time between the given times.

a) 9:25 a.m. and 9:50 a.m.
b) 7:10 a.m. and 7:30 a.m.
c) 8:05 p.m. and 8:25 p.m.
d) 4:40 p.m. and 4:48 p.m.
e) 6:29 p.m. and 6:46 p.m.
f) 3:22 p.m. and 3:34 p.m.

2. Find the duration of time (in hours) between the given times.

a) 4:35 a.m. and 7:35 a.m.
b) 10:25 a.m. and 11:25 a.m.
c) 9:10 a.m. and 12:10 p.m.
d) 11:35 p.m. and 6:35 a.m.
e) 8:30 a.m. and 8:30 p.m.
f) 18:55 hours and 22:55 hours

3. Find the time interval

a) From 6:30 p.m. to 7:40 p.m.
b) From 8:15 a.m. to 9:30 a.m.
c) From 12:15 hours to 14:20 hours
d) From 1:35 hours to 03:00 hours
e) From 2:30 p.m. to 5:00 p.m

Finishing Time

Starting time + Duration = Finishing time

Example 1

A music concert lasted for 3 hours. If it started at 6:30 p.m., when did it end?

Finishing time = starting time + duration
= 6:30 p.m. + 3 hours
= 9:30 p.m.

The programme got over at 9:30 p.m.

Example 2

Dhruva left for Bengaluru at 05:00 hours. The duration of the journey was 5 hours. When did he reach Bengaluru?

Finishing time = starting time + duration

= 5:00 a.m. + 5 hours

= 10:00 a.m.

Dhruva reached Bangalore by 10:00 a.m.

EXERCISE 9.7

1. Find the finishing time

Starting time	Duration	Finishing Time
9:35 a.m.	4 hours	
6:55 p.m.	10 hours	
11:30 p.m.	8 hours	
12 noon	6 hours	
18:15 hours	9 hours	

2. Solve

a) A train leaves Prayagraj at 8:35 a.m. and takes 4 hours to reach Kanpur. At what time would it reach Kanpur.

b) Students left for an excursion at 7.15 a.m. They returned to school after 6 hours. At what time did they return?

c) In an office the duration of lunch break is an hour from 12.40 p.m. When does the break end?

d) The duration of a flight from Mumbai to Delhi is 2 hours. If it leaves Mumbai at 22.05 hours, at what time would it reach Delhi?

Applying the skills to solve real life problems

1) Ritu waited for a bus from 19:45 hours to 20:00 hours. How long did she wait for the bus?

2) Usha reached 2 hours and 5 minutes later than Saroja. If Saroja reached the meeting at 11:00 a.m., at what time did Usha reach the meeting venue?

3) Raj starts studying at 10:15 a.m. and continues till 12:15 p.m. How many hours does he study?

4) A cricket match started at 9:00 a.m. Each team batted for 3 hours. There was lunch break for 1 hour. When did the match get over?

5) A school starts at 8:00 a.m. Students are in school for 7 hours. At what time does the school get over everyday?

6) Hari was advised by his doctor to take a medicine once in 6 hours. If he had taken it at 2:20 p.m., when should he take his next dose?

Worksheet

I. Match the following

1)	I go to play at 4:00	leap year	( )
2)	Time between noon and 5:00 p.m.	non-leap year	( )
3)	11:59 in the morning	7 hours	( )
4)	Year 2020	5 hours	( )
5)	Year 2021	a.m.	( )
6)	Time between 5:00 p.m. and midnight	p.m.	( )

II. Tick the correct answer

1) How many minutes does the minute hand take to move from 2 to 5?

a. 3 minutes b. 20 minutes c. 15 minutes d. 25 minutes

2) What time will it be 2 hours after 11:45 a.m.?

a. 12:45 a.m. b. 1:45 a.m. c. 12:45 p.m. d. 1:45 p.m.

3) Add 4 hours 30 minutes and 2 hours 30 minutes.

a. 6 hours b. 7 hours c. 8 hours d. 5 hours

4) How many complete rounds does the hour hand make on the clock face in a day?

a. 12 rounds b. 10 rounds c. 2 rounds d. 6 rounds

5) In a clock, the hour hand is between 10 and 11 and the minute hand is at 11. The time is

a. 10:15 b. 11:15 c. 10:55 d. 11:10

III. Fill in the blanks.

a) 60 _____= 1 hour b) 1 minute = 60_____

c) 12 months = 1 _____ d) 7_____= 1 week

e) 1 day = _____hours f) 52 weeks = _____year

g) Half an hour = _____minutes h) Quarter to 7 = 6 hours _____minutes

Logical Reasoning

1) The time seen on the clock is 15 minutes behind the correct time. What would be the correct time after half-an hour

a) 5:30 b) 6:30 b) 6:00 d) 5:00

2) If the day before yesterday was Thursday, then what day will be the day after tomorrow?

a) Sunday b) Wednesday c) Friday d) Monday

3) Meena and her mother made a quilt. It had 56 squares. If there are 8 rows of squares, how many squares are in each row?

a) 6 b) 7 c) 8 d) 9

4) i) Start at 23 ii) Count by 10 two times iii) Add 1 What number are you at?

a) 33 b) 44 c) 55 d) 45

5) If ◆ X 4 = ★

★ = 100 more than 10th multiple of 34

What is ◆ + ★ ?

a) 110 b) 440 c) 550 d) 990

6) Aunt Laxmi's clock is shown here.

She has to pick up her niece after 45 minutes. At what time should she pick her up?

a) 11:85 a.m. b) 12:35 a.m. c) 12:25 a.m. d) 12:00 p.m.

7) Gaurav visits his uncle's house every year in September.

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
		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			

This year he did not visit on weekends. The date/s that he visited are prime number/s. The sum of the digits on the day he visited is 5. On which day did he visit?

a) Monday b) Wednesday c) Thursday d) Tuesday

8) Kavin, Kannan, Kapil are friends. If the following statements are all true, which of them is the youngest?

Kavin is the oldest.

Kapil is not the youngest.

Kannan is not the oldest.

a) Kavin b) Kapil c) Kannan d) Both Kannan and Kapil

10 MEASUREMENTS

Expected Learning Outcomes

At the end of this lesson, children will be able to:

Know a few the units of length, mass and capacity.

Convert higher units to lower units and vice versa.

Understand addition, subtraction, multiplication and division of units in length, mass and capacity.

Apply the skill to solve real life problems related to length, weight and capacity

Recapitulate

I) Tick the correct answer.

a) Height of a tree (6 mL / 6 m / 6g)

b) Length of a purse (18 cm /18 g / 18 L)

c) Distance between Chennai and Hyderabad (650 g / 650 km / 650 L)

d) Weight of a cell phone (200 g / 200 m / 200L)

e) Weight of a Laptop (3 cm / 3 kg / 3 g)

f) Capacity of a bowl (150 g /150 mL / 150 L)

g) Petrol in a car tank (10 mL / 10 kg /10 L)

II. Fill in the blanks.

a) 1 m = _____cm

b) 3 m = _____cm

c) 4 kg = _____g

d) 9 km = _____m

e) 5 L = _____mL

f) 2000 m = _____km

g) 8000mL = _____L

h) 600 cm = _____m

i) 3000 g = _____kg

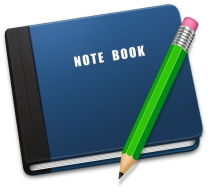
III) Match:

a)	Distance travelled by an auto in 1 hour	5 kg
b)	Height of a door	5 ml
c)	length of a crayon box	20 km
d)	Weight of a baby	2 m
e)	Weight of a leaf	20 L
f)	Capacity of a syringe	20 cm
g)	Capacity of a bucket	5 g

Concepts section
Measurement of length.

Acharya: Students, have you seen a cloth merchant using a rod to measure cloth?

Manasa: Yes acharya. It is a metre rod.



Acharya: You are correct. We measure the length and breadth of a room, height of a building or trees in metres. Would you prefer to use the same instrument and unit to measure the length of your pencil/ notebook?

Aswin: No, Acharya. The length of a pencil is much lesser than any of these measurements. So, we can use a scale to measure the length of it. It can be measured in cm

Acharya: Good. We measure the length of smaller objects like pencil note book etc. in centimetres. But insects like ants are still smaller. We express the length of very small objects in **millimetres.**

Roshini: Is the smallest unit of measuring length millimetre?

Acharya: We have still smaller units. You would have learnt in science about micro-organisms that cannot be seen with our naked eyes. However, for the present, we are going to look at millimetre as the smallest unit.

Vijay: I noticed while traveling by bus, the distance is marked in kilometres on the milestones placed on the highways.

Acharya: We express long distances in **Kilometres.** Students, you have learnt about centimetre, metre and kilometre in class 3. This year we shall learn about the other units of length and the relationship between the units.

Units of length

Ananya: Acharya, where do we use these units?

Acharya: Observe the given examples where we measure length in real life.

a) Height of a temple tower is 75 m.

b) Distance between the wickets in a cricket pitch is 20m 12 cm.

c) Length of a table varies depending on its use.

d) Arjun walks a distance of 1 km 500 m in 10 minutes.

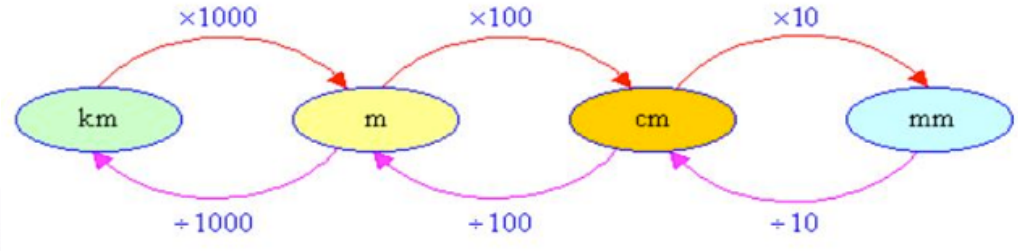
e) Height of the waterfall is 63 m.

Students: Thank you acharya. Is it possible to convert from one unit to another?

Acharya: Yes, we can. The units are based on metric system. When we convert a higher unit to a lower unit, one step below, we multiply by 10, when we convert to a unit two steps below, we multiply by 100 and so on.

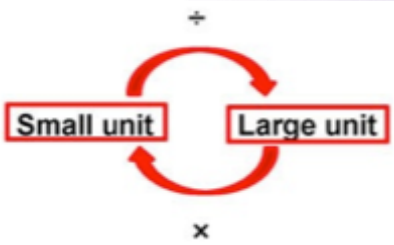
We divide by 10, when we convert a unit to the next higher unit.

To convert from higher units to lower units, **Multiply**



Remember

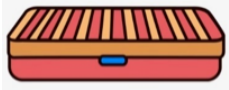
1 cm = 10 mm
1 m = 100 cm
1 km = 1000 m



EXERCISE 10.1

I) Measure the length of the given objects using a scale.

a) _____ cm _____mm

b)  _____ cm _____ mm

c)  _____cm _____mm

d)  _____cm _____ mm

II) Activity: Measure the length of the following and express in cm and mm.

a) Length of your eraser _____

b) Length of your maths reader _____

c) Breadth of your desk _____

d) Height of your water bottle _____

e) Length of your forearm _____

Conversion from metre to centimetre

Example: Length of a hall is 7 m.

We know, 1 m = 100 cm

7 m = 7 x100 =700 cm

Conversion from centimetre to metre.

Example: Height of a hibiscus plant is 300 cm

We know, 100 cm = 1 m.

300 cm = 300 ÷ 100 = 3 m

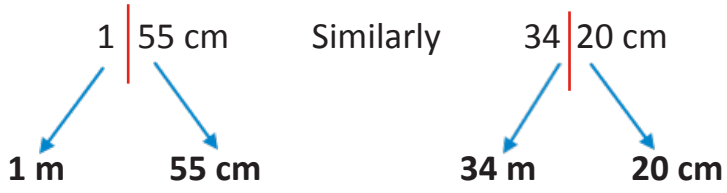
Conversion from centimetre to m and cm.

Example: Pooja's height is 155 cm.

155 cm ÷ 100 = 1m 55 cm (100cm = 1m)

We use the short method for division by 10,100 and 1000.

[To divide by 100, count from the extreme right of the dividend. Draw a line after two digits.]



To convert from metre to centimetre, multiply by 100
To convert from centimetre to metre, divide by 100.

EXERCISE 10.2

I) Convert to centimetres.

a) 4 m b) 20 m c) 52m d) 9 m 57 cm e) 6 m 24 cm

II) Convert to metres.

a) 900 cm b) 400 cm c) 700 cm d) 4300 cm e) 5000 cm

III) Express the given length in m and cm

a) My height is 145 cm.

= _____ m _____ cm

b) Height of my classroom is 523 cm.

= _____ m _____ cm

c) Length of a blackboard is 315 cm.

= _____ m _____ cm

d) Length of a saree is 530 cm.

= _____ m _____ cm

e) Height of a pole is 1210 cm.

= _____ m _____ cm

Facts Corner

The Sahyadri Birdwing has been declared the state butterfly of Karnataka. It is the second largest butterfly in India, which has a wing span of 14 cm to 19 cm. The Himalayan butterfly 'Golden Bird Wing' is the largest butterfly in India with a wing span of 194 mm.

Sahyadri Birdwing

194 mm = _____ cm _____ mm

Conversion from kilometre to metre

Example: Distance travelled by a car in 1 hour is 60 km which is equal to 60,000m.

We know, 1 km = 1000 m.

60 km = 60 x 1000 = 60,000 m

Conversion from metre to kilometre.

Example 1: Amit's house is 4000 metres away from his school.

1000 m = 1 km. So, 4000 m = 4000 ÷ 1000 = 4 km

Example 2: Conoor is situated at a height of 1850 m from sea level.

1850 m = 1850 ÷ 1000 = 1 km 850 m.

1 | 850 m → **1 km** **850 m**

Similarly 14 | 670 m → **14 km** **670 m** = 14 km 670 m

To convert from kilometre to metre, multiply by 1000.
To convert from metre to kilometre, divide by 1000.

EXERCISE 10.3

I) Convert into metres

a) 6 km b) 13 km c) 7 km 7 m d) 10 km 10 m

II) Convert into kilometres

a) 2000 m b) 5000 m c) 14000 m d) 30,000 m

III) Convert into given units

a) 4 km 4 m = _____m

b) 9 km 27 m = _____ m

c) 15 km 2 m = _____ m

d) 8005 m = _____ km _____ m.

e) 12460 m = _____ km _____ m

f) 33908 m = _____ km _____ m.

EXERCISE 10.4

I) Fill in the blanks

a) 200 cm = ____m
b) 6 m 21 cm = _____ cm
c) 314 cm = _____ m _____ cm
d) 2 m 9 cm = _____ cm
e) 1954 cm = ___m ____ cm
f) 15 m 60 cm = _____ cm
g) 2860 m = ____ km _____ m
h) 3 km 3 m = _____ m
i) 14300 m = ____ km _____ m
j) 8 km 74 m = _____ m
k) 5000 m = _____ km

Facts Corner

Height of Mount Everest is 8,849 metres.

The diameter of the earth at the equator is 12,742 kilometres

The height of the statue of Sardar Vallabhbhai Patel in Gujarat is 182 metres.

The height of Burj Khalifa in Dubai is 830 metres.

Arctic tern travels 90,000 km every year during the migratory season.



Fraction of a kilometre

Half of a kilometre: Rohan ran 1 km. But his sister Sreya ran only half the distance covered by Rohan. How much did she run?

1 km = 1000 metres. Half a km = $\frac{1}{2}$ x 1000 m = 1000 ÷ 2= 500 metres.

Sreya ran $\frac{1}{2}$ **km = 500 m**.

Quarter of a kilometre

$\frac{1}{4}$ of a km = $\frac{1}{4}$ x 1000 m = 1000 ÷ 4 = 250m $\frac{1}{4}$ **km = 250 m**

REMEMBER

Half = $\frac{1}{2}$, Quarter = $\frac{1}{4}$,

Three quarter = $\frac{3}{4}$

Three quarter of a kilometre.

$\frac{3}{4}$ of a km= $\frac{3}{4}$ x 1000 m=(1000 ÷ 4)x3 =250 x3=750 m $\frac{3}{4}$ **km =750 m**

Similarly, we can calculate half, quarter and three quarters of a metre.

$\frac{1}{2}$ of a m = $\frac{1}{2}$ x100 cm = 100 ÷ 2 = 50 cm [1 metre =100 cm]

$\frac{1}{4}$ of a m = $\frac{1}{4}$ x100 cm = 100 ÷ 4 = 25 cm

$\frac{3}{4}$ of a m = $\frac{3}{4}$ x 100 cm = (100 ÷ 4) x 3 = 25 x 3 =75 cm

Let us summarise the above conversions.

$\frac{1}{2}$ **m = 50 cm**	$\frac{1}{2}$ **km = 500m**
$\frac{1}{4}$ **m = 25 cm**	$\frac{1}{4}$ **km = 250 m**
$\frac{3}{4}$ **m =75 cm**	$\frac{3}{4}$ **km = 750 m**

Experiential Learning:

Take a ribbon of length 1 metre. Fold it exactly into two equal parts and measure the length of each part using a scale.

Make it into four equal parts and measure the length of each part using a scale. Note down the measurments in your notebook and discuss with your teacher.

1 km =1000 m

1 m =100 cm

Example 1: Convert $4\frac{1}{4}$ km into metre.

$4\frac{1}{4}$ km = 4000 m + 250 m = 4250 m

Example 2: Convert $2\frac{1}{2}$ m into centimetre

$2\frac{1}{2}$ m = 200 cm + 50 cm = 250 cm

Example 3 : Express 5 km 750 m as a fraction.

750 m = $\frac{3}{4}$ km. so, 5 km 750 m = 5 $\frac{3}{4}$ km

EXERCISE 10.5

I) Express as a fraction

a) 1 km 250 m = _____ km

b) 6 m 50 cm = _____ m

c) 14 km 500 m = _____km

d) 9 m 75 cm = _____ m

e) 2 km 750 m = _____ km

f) 10 m 25 cm = _____ m

II) Convert into given units

a) $4\frac{1}{2}$ m = _____ cm

b) $2\frac{1}{2}$ km = _____ m

c) $9\frac{3}{4}$ m = _____ cm

d) $7\frac{1}{4}$ km = _____ m

e) $12\frac{1}{4}$ m = _____ cm

f) $11\frac{3}{4}$ km = _____ m

Measurements of mass or weight

Acharya:

The quantity of matter in a substance is called its mass.

We measure the weight of lighter objects like pencil, eraser, chalk in grams and heavier objects like a table, computer, rice bag, vegetables etc. in **kilograms**

Ankit:

Yes acharya. Weight of the soap I use is 75 grams 

Pooja: Acharya, how do we measure weight?

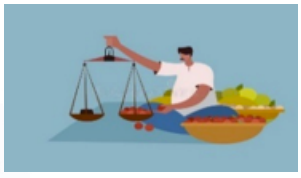
Acharya: We use different types of weighing machines to measure the weight of objects.

Common balance

Digital or electronic machine

Weighing machine

Spring balance

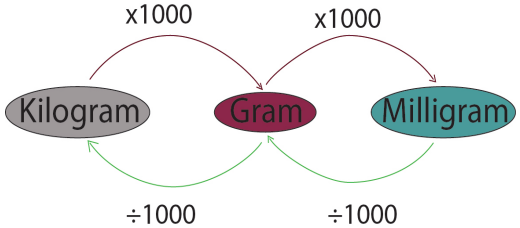


Units of weight

1 gram = 1000 milligrams

1 kilogram = 1000 grams

The standard unit of weight is gram.



Meera is carrying 2 kg of mangoes. Her brother is carrying 2000 g of mangoes. Whose bag is heavier?

Answer:_____

EXERCISE 10.6

I) Anitha went to a market and bought the following.

Guess those that could be in grams and those in Kg.

 _____	 _____	 _____	 _____
 _____	 _____	 _____	 _____

II) Make a list of things you buy at home.

In grams: _____ , _____ , _____

In kilograms: _____ , _____ , _____

Half, quarter and three quarter of a Kilogram

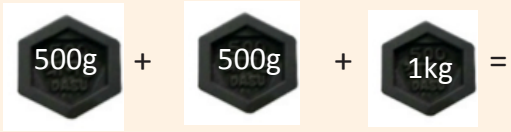
$\frac{1}{2}$ of 1kg = 1000 ÷ 2 = 500 g. $\frac{1}{4}$ of 1 kg =1000 ÷ 4 = 250 g.

$\frac{3}{4}$ of 1 kg = 1000 ÷ 4 = 250. 250 x 3 = 750 g

$\frac{1}{2}$ kg = 500 g $\frac{1}{4}$ kg = 250 g $\frac{3}{4}$ kg = 750 g

Remember

500 g + 500 g = 1000 g = 1 kg



Therefore, two 500 g makes a kg.

250 g + 250 g +250 g + 250 g = 1000 g = 1 kg

Therefore, four 250 g makes a kg.

750 g + 750 g = 1500 g = $1\frac{1}{2}$ kg

Conversion from kilogram to gram

Example 1: Weight of a baby is 3 kg.

We know, 1 kg = 1000 g

3 kg = 3x1000 =3000 g

Similarly, 15 kg = 15 x1000 = 15000 g

Example 2 : Anu bought $2\frac{1}{2}$ kg of mangoes.

2 kg = 2000 g and $\frac{1}{2}$ kg = 500 g

$2\frac{1}{2}$ kg = 2500 g

Conversion from gram to kilogram

To convert from kilogram to gram, multiply by 1000.

To convert from gram to kilogram, divide by 1000.

EXERCISE 10.7

Measurements of weights in real life

I) A. Convert into given units

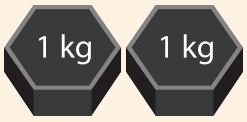
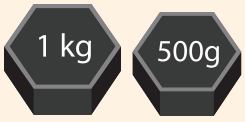
a) Weight of a traditional stone grinder is 17 kg = _____ g

b) Weight of a gas cylinder is 14 kg 200 g = _____g

c) Weight of a trolley bag is $3\frac{1}{2}$ kg = _____ g

d) Weight of a puppy is 4 kg = _____ g

B. Complete the table

Weights	in grams	In kilograms
	_____ g	_____k g
	_____ g	_____k g
	_____ g	_____k g
	_____ g	_____k g

II) Convert into grams.

a) 7 kg b) 80 kg c) 16 kg d) $1\frac{1}{4}$ kg e) $3\frac{1}{2}$ kg f) $9\frac{3}{4}$ kg

III) Convert into kilograms and grams.

a) 6000 g b) 30,000 g c) 11000 g d) 1280 g e) 2050g f) 4005 g

IV) Express as a fraction.

a) 4500 g = _____ kg

b) 6750 g = _____ kg

c) 10250 g= _____ kg

V) Fill in the blanks.

a) 3 kg = _____ g

b) 90 kg =_____g

c) 4,000 g = _____ kg

d) 2820 g =___ kg ____g

e) 7007 g= ____ kg ____ g

f) 2 kg 170 g = _____ g + _____ g = _____ g

g) 8 kg 8 g = _____ g + _____ g =_____ g

h) $6\frac{3}{4}$ kg = _____ g i) $14\frac{1}{2}$ kg = _____ g

Which would be difficult for you to carry? I kg of stone or 1kg of peacock feather?

Activity: Choose the weights from the ones given to make the pans equal.

Higher Order Thinking Skills

What are the different ways of making the pans equal?

1 kg = ____ g + ____ g + ____ g + ____ g

1 kg = ____ g + ____ g + ____ g

500 g = ____ g + ____ g + ____ g + ____ g+ ____ g

500 g = _____ g + _____ g + _____ g + _____ g

2 kg = _____ g + _____ g + _____ g + _____ g

2 kg = ____ g + _____ g + _____ g + _____ g + _____ g

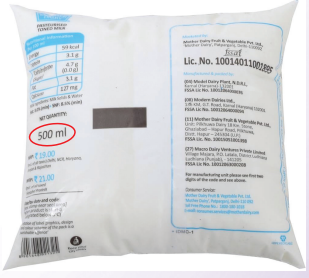
750 g = _____ g + _____ g + _____ g

Measurements of Capacity or Volume

The quantity of liquid a container can hold is called the capacity of that container. The quantity of milk or juice in a bottle is the volume of the liquid.

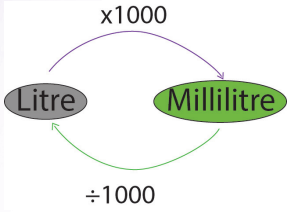
The water bottle can hold 750 mL of water.
So, the capacity of the bottle is 750 mL.

Mahitha: Yes acharya, I have seen 500 mL printed in milk packets. So, the quantity of milk in it is 500 mL.



Acharya: Good. We measure larger quantities of liquid such as water in a bucket, oil can, petrol, diesel etc, in litres and smaller quantities such as coffee, tea, medicine in millilitres. Today, we shall learn about other standard units of capacity in detail

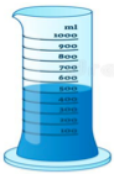
Units of capacity:

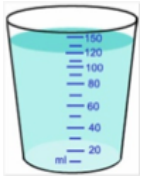


The standard unit of capacity is litre.

Anjana: How do we measure smaller volumes of liquids acharya?

Acharya: We use a graduated cylinder, spoons or measuring cups to measure smaller volumes of liquids





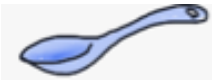
EXERCISE 10.8

Measurement of capacity in real life

I) Fill in the blanks with the units that would be appropriate for the given quantity

a) Capacity of a 

_____ (litres / millilitres)

b) Capacity of a  _____ (litres / millilitres)

c) Capacity of a  _____ (litres / millilitres)

d) Capacity of a  _____ (litres / millilitres)

e) Capacity of a 

_____ (litres / millilitres)

II Match the container with the volume





1 L **250 ml** **5 L** **25 L** **100 ml**

Thinking Skills

You have two buckets of capacity 3 litres and 5 litres. How can you measure 1 litre of water using these two buckets?

Conversion from litres to millilitres

Example 1: Sachin bought 4 litres of milk which is equal to 4000 mL

We know, 1 L = 1000 mL

4 L = 4 x 1000 = 4000 mL

Example 2 : Water in a drum is 9 L 200 mL

9 L 200 mL= 9 x1000 + 200 = 9,000 + 200 = 9,200 mL

Example 3 : Banu bought $1\frac{1}{2}$ litres of milk.

$1\frac{1}{2}$ **L =** 1000 mL + 500 mL = 1500 mL.

Conversion from millilitres to litres

Example 1 : Mona drinks 3000 mL of water every day.

1000 mL = 1L. 3000 mL= 3000 ÷ 1000 = 3 L

Example 2: Aryan filled the petrol tank of his bike with 5300 mL of petrol.

5300 mL = 5300 ÷ 1000 = 5 L 300 mL

5 | 300 mL

5 L 300 mL

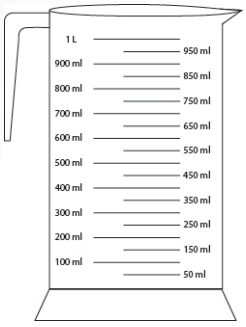
To convert litre to millilitres, multiply by 1000.
To convert millilitres to litre, divide by 1000.

Half, Quarter and Three Quarters of a litre.

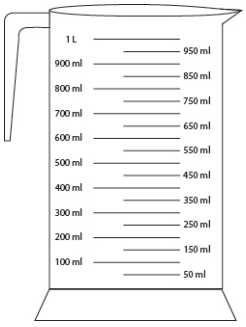
We know 1 litre = 1000 mL

So, $\frac{1}{2}$ L = 500 mL $\frac{1}{4}$ L = 250 mL $\frac{3}{4}$ L = 750 mL

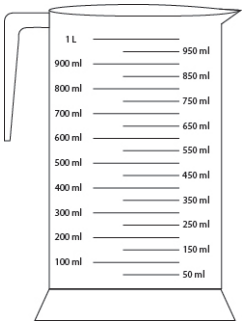
Activity: Colour the mug to represent the given volume.



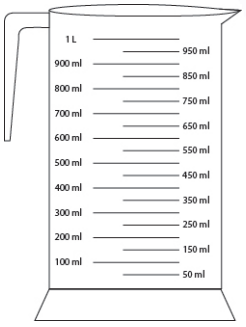
$\frac{1}{2}$ L



$\frac{1}{4}$ L



$\frac{3}{4}$ L



1 L

EXERCISE 10.9

I) Convert into millilitres

a) 6 L b) 20 L c) 8 L 150 mL d) 6 L 6 mL e) $5\frac{1}{4}$ L

II) Convert into Litres

a) 7000 mL b) 10,000 mL c) 1L 250 mL d) 9 L 500 mL e) 3L 750 mL

III) Convert into litres and millilitres

a) 1420 mL b)1350 mL c) 4015 mL d) 8002 mL e) 13610 mL

IV) Fill in the blanks

a) 8 L = _____ mL

b) 250 mL = _____ L

c) 32 L = _____ mL

d) 1750 mL = _____ L

e) 3000 mL = _____ L

f) 3500 mL= _____ L

g) 2712 mL = _____ L _____ mL

h) $6\frac{1}{2}$ L = _____ mL

i) 14670 mL = _____ L _____ mL

j) $8\frac{3}{4}$ L = _____ mL

k) 9001 mL= _____ L _____ mL

l) $10\frac{1}{4}$ L = _____ mL

Higher Order Thinking Skills

Tara has two litres of badam milk. She decides to pour it equally into glasses of 250 mL each. How many glasses would she need to do that?

Answer_____

Addition and subtraction in measurements

Example 1: Rohan purchased 1m 25 cm cloth to stitch a shirt and 2 m 75 cm of cloth for pant. Find the total length of cloth bought by Rohan.

			m	cm
Length of cloth required to stitch a shirt	=		1	45
Length of cloth required to stitch a pant	=	+	2	75
Total length of cloth required	=		4 m	20 cm

Example 2 : Dheeraj filled 8 L of petrol in his car. After driving for 4 hours, was left with 5 L 372 mL of petrol.

How much of the fuel has been consumed?

			L	mL
Quantity of petrol filled	=		8	0 0 0
Quantity of petrol left	=	–	5	3 7 2
Quantity of petrol used	=		2 L	6 2 8 mL

NOTE: All arithmetic operations have to be performed over with the same units. If the units are not the same, convert appropriatly and perform the operation.

Example 3:

1) Add 5 m 29cm and 8 m 95 cm.

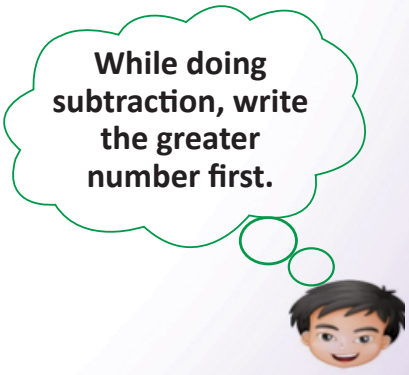
m	cm
5	2 9
+ 8	9 5
1 4	2 4

Ans. 14 m 24 cm

2) Subtract3 L 974 mL from 6 L 200 mL

L	mL
~~6~~ 5	~~2 0 0~~ 11 9 10
– 3	9 7 4
2	2 2 6

Ans. 2 L 226 mL



EXERCISE 10.10

Answer the following.

I) Add:

a) 2 8 9 g + 8 4 5 g

b) 6 7 5 0 g + 1 8 6 0 g

c) 1 4 5 7 mL + 6 3 5 mL

d) 8 6 5 m + 2 4 5 m

II) Subtract:

a) 4 0 6 − 1 7 8

b) 7 0 0 0 g − 3 2 8 9 g

c) 6 3 2 0 mL − 8 7 4 mL

d) 9 0 0 4 m − 7 3 0 8 m

III) Add:

a)	m	cm
	7	50
+	9	50

b)	kg	g
	3	985
+	7	348

c)	L	mL
	4	780
+	3	59

d)	km	m
	2	674
+	9	8

e) 38 m + 5 m 87 cm f) 13 L 370 mL + 4 L 980 mL

g) 46 kg 817g + 9 kg 6 g

IV) Subtract:

a)	m	cm
	18	00
−	14	85

b)	kg	g
	5	100
−	3	70

c)	L	mL
	6	250
−	2	9

d)	km	m
	13	000
−	8	269

e) Subtract 2 kg 740 g from 8 kg. f) Subtract 685 m from 3 km

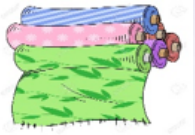
g) 37 m – 8 m 49 cm

Higher Order Thinking Skills

Lavanya noticed a leaking tap in her school and plugged it. If 50 mL of water leaks in 1 minute, how much water would get wasted in I hour? [Express in litres]

V) Solve:

1) Anitha visited her Mausi's house in Kumbakonam. She travelled 49 km 150 m by bus and 850 m by walk to reach the house.
   Find the total distance travelled by her? [Mausi-mother's sister]



2) A shopkeeper cuts a cloth of length 64 m 30 cm from a bundle of 90 metres. Find the length of the remaining cloth.

3) Janani bought 5 kg of rice for a week. If she is left with 1 kg 450 g, How much of it was used?

4 Sangeeth bought 4 kg 350 g of apples and 3 kg 685 g of mangoes and 750 g of bananas to prepare fruit salad.
   Find the total weight of fruits bought by him.

5) A bucket can hold 8 L 250 mL of water while a drum can hold 12L of water. Find the difference in their capacities.

VALUE BASED QUESTION

Vijay travels a distance of 3 km 780 m every day by car to reach the school. His friend Arun who stays 2 km 750 m away from Vijay's house, goes to school by another car. The distance between Arun's house and school is 1 km. They decide to carpool, but debate, who has to be picked up by whom. Help them decide to arrive at a solution.

a) Distance that they have to travel to reach school if Vijay picks up Arun.

b) Distance that they have to travel to if Arun picks up Vijay.

c) Do you carpool? Would that help in reducing carbon footprint. Discuss.

Multiplication and division in measurements

Example 1: Weight of a bag of rice is 3 kg 500 g. Find the weight of 6 such bags.

Solution:

Weight of 1 bag = 3 kg 500 g

Weight of 6 bags = 3 kg 500 g x 6

$$\begin{array}{r} 3\text{kg } 500\text{ g} \\ \times\ 6 \\ \hline 21\text{ kg } 000\text{ g} \end{array} \quad \text{or} \quad \begin{array}{r} 3500\text{g} \\ \times\ 6 \\ \hline 21000\text{ g} \end{array} = 21\text{ kg}$$

Example 2: The length of a ribbon is 9 m 12 cm. It is cut into 8 equal pieces. What is the length of each piece?

Length of a ribbon = 9 m 12 cm
= 900 cm + 12 cm = 912 cm (convert into lower units for division)
Number of pieces = 8
Length of each piece = 912 ÷ 8 = 114 cm

EXERCISE 10.11

I) Multiply and express the product in higher units

a) 4150 g x 5	b) 3008 mL x 9	c) 1942 m x 6	d) 614 km x 7
e) 208 kg x 4	f) 4 km 319 m x 3	g) 7 m 35 cm x 5	h) 2 kg 450 g x 7
i) 5 L 730 mL x 9	j) 45 cm x 5	k) 250 mL x 4	l) 7 kg 160 g x 8

II) Divide:

a) 6840 g ÷ 2	b) 987 m ÷ 7	c) 2005 L ÷ 5	d)153cm ÷ 9
e) 4m20cm ÷ 4	f)9kg 150 g ÷ 6	g) 5L 4 mL ÷ 3	h) 5 km 790m ÷ 8

III) Answer the following.

a) The length of yarn needed to make 1 garland is 2 m 35 cm. Find the length of yarn needed to make 4 such garlands.

b) A bag of sugar weighs 8 kg 250g. The shopkeeper wants to divide this into 5 equal packets. What will be the weight of each packet?

c) A jug contains 5280 mL of lemon juice. It is equally poured into 3 glasses. What is the quantity of juice in each glass?

d) Madhumitha bought 1 kg 260 g of peanuts and 1 kg 940 g of jaggery to make peanut candies. If the weight of each candy has to be 50 g, how many candies can she prepare?

Aswath visited his Nana's house to celebrate Pongal. (Nana-Father in Telugu)

He had 10 litres of petrol in his car. After travelling a distance of 3 km 920 m, he filled 8 L 575 mL of petrol in a petrol punk.

Then he drove a distance of 4 km 360 m to arrive at the destination.

i) What was the distance travelled by Aswath?

Worksheet

1. Tick the correct answer

i) Which is the best unit to measure the length of a pencil?

a) km b) m c) cm d) mm

ii) Two tumblers of equal capacities, sum up to 1L. What is the capacity of each tumbler?

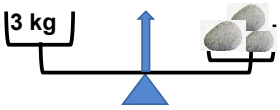
a) 250 mL b) 750 mL c) 400 mL d) 500 mL

iii) How many 250 g will make 2 kg?

a) 4 b) 8 c) 12 d) 16

iv) Kavya has a rope of length 95 cm. She cuts it into 5 equal pieces. What is the length of each piece?

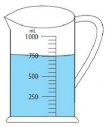
a) 100 cm b) 475 cm c) 19 cm d) 90 cm

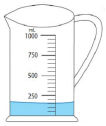
v) 

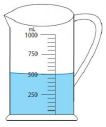
If all the stones weigh the same, What is the weight of each stone

a) 1 g b) 500 g c) 750 g d) 1000 g

2. Match :

a) 150 mL 

b) 500 mL 

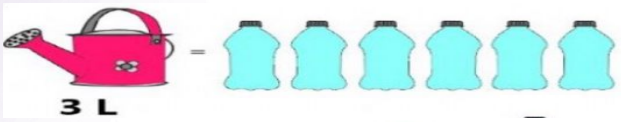
c) 750 mL 

3. Guess

a) 

= 

Capacity of each  = _____ mL

b) 

Capacity of each  = _____ mL

c) 

300mL

Capacity of each  = _____ mL

d) 

750 mL

Capacity of each  = _____ mL

4. Convert

a) 3 m 29 cm to cm

b) 6 km to m

c) 8 kg 20 g to g

d) 9 km 175 m to m

e) 3 L 498 mL to mL

f) 2 m 2 cm to cm

g) 1750 g to kg

h) 625 cm to m and cm

i) $7\frac{1}{4}$ L to mL

j) 60 km to m

k) 6 kg 5 g to g

l) $3\frac{1}{2}$ m to cm

m) 12006 mL to L and mL

n) 6045 cm to m and cm

5. Do as directed.

a) 34m + 8 m 15 cm

b) 7 kg – 4 kg 694 g

c) 27 L + 9 L 43 mL

d) 7 m 95 cm x 8

e) 6 kg 785 g x 4

f) 4 L 150 mL x 6

g) 7 m 25 cm ÷ 5

h) 8 km 764 m ÷ 2

i) 3 L 609 mL ÷ 9

j) 8 km 130 m – 5 km 9 m

k) $2\frac{1}{2}$ km + $6\frac{1}{4}$ km (Convert into metre and add)

l) Subtract 4 km 820 m from 19 km 40 m

m) Subtract 35 cm from 1 metre.

n) One packet of biscuit weighs 175 g. What is the weight of 7 such packets?

6. Solve:

a The capacity of three buckets is 5 L, 8 L 415 mL, 7 L 860 mL respectively. Find the total quantity of water that can be filled in the buckets.

b) Megna had 950 mL of kheer. She shared 175 mL with one friend and 360 mL with another. Find the quantity of kheer left with her.

c) The weight of a conch is 1kg 504 g. What is the weight of 8 such conches?

d) Manasvi needs 5 L 350 mL of milk to make 40 rasgullas. She has only 2 L 740 mL of milk with her. How much more milk does she need to make the 40 rasagullas.

e) The length of a running track is 2 km 702 m. If Mohan runs 6 times on the track, find the distance covered by him.

f) Aruna had 9 L of water. She wanted to divide this equally in 5 buckets. Find the volume of water that would be in each bucket?

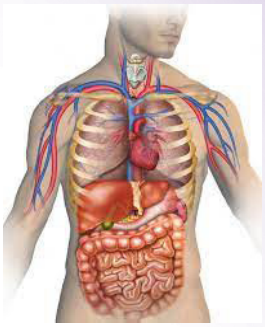
g) Sarika bought vegetables and fruits weighing 6 kg 350 g. If the weight of fruits was 2 kg 790 g, what is the weight of vegetables?

h) Nithya needs 3 L 650 mL of water to water her plants in her garden every day. Find the quantity of water used by her in a week. (Express in millilitres)

[Do you water the plants in your house?]

Higher Order Thinking Skills

1) The cost of $\frac{1}{2}$ kg of salt is ₹ 15. What is the cost of 1 kg of salt?
2) The price of 100 g of ghee is ₹ 42. What is the price of 2 kg of ghee?
3) The price of 1 L of oil is ₹ 264. What is the price of 250 mL of oil?
4) Monish has a jar full of mango juice. He gave 345mL each to 7 of his friends. He had 180 mL left with him. Find the capacity of the jar? [Express it in litres and millilitres.]
5) Tharika bought $\frac{1}{4}$ L of honey. If she takes 5 mL of honey every day, for how many days would the honey be sufficient?

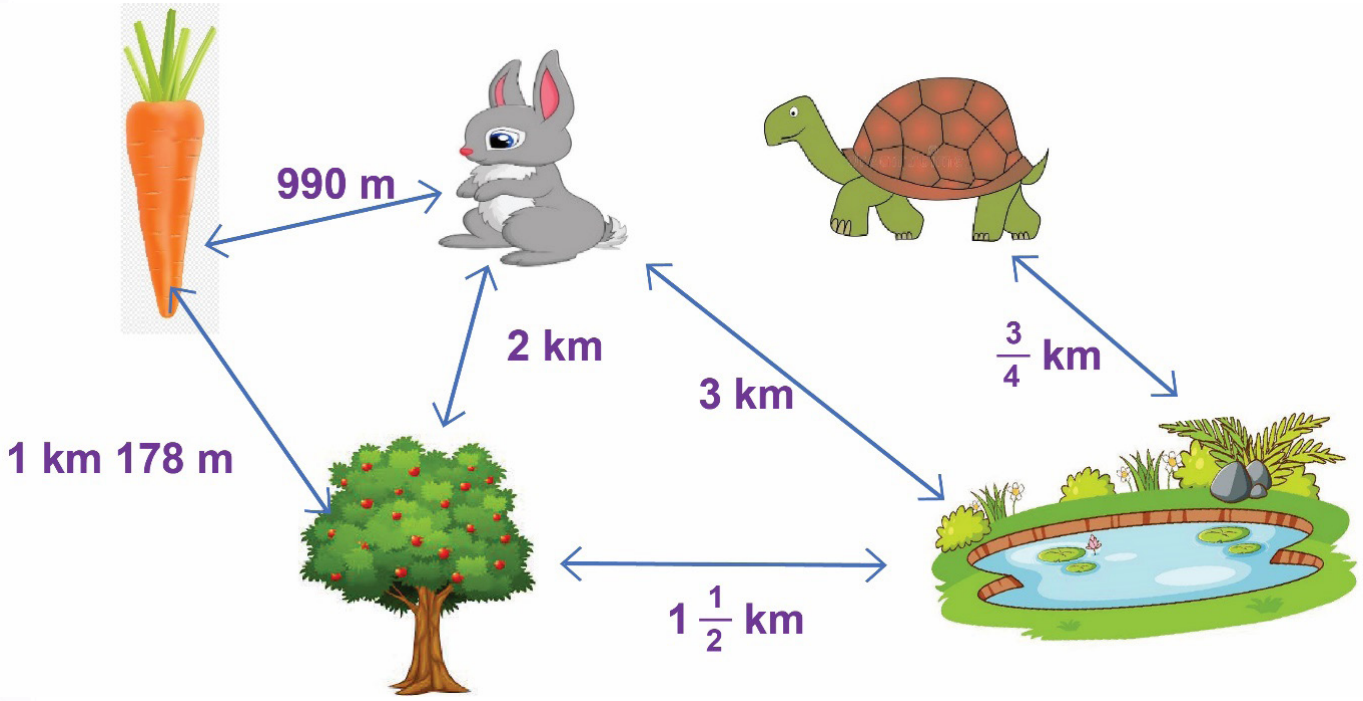


Some interesting measurements

1) The adult human brain weighs about 1400g = ___kg ____g
2) The weight of an adult human liver is about $1\frac{1}{2}$ kg = ____ g
3) An average adult has $5\frac{1}{2}$ litres of blood in his body =____ mL
4) The length of the small intestine in an adult human is 6m 50 cm = ____cm
5) The average length of the longest bone Femur (thigh bone) in human body is 48 cm. It is equal to = _____mm

Higher Order Thinking Skill

1) Observe the picture and answer the following.



a) The shortest distance that the rabbit has to hop to reach the tree is _____ m

b) The distance between the tortoise and the pond: _____ m

c) The rabbit ran to the tree, ate the nuts that were strewn on the ground, went to the pond drank water and rushed to meet his friend, the tortoise.
The distance travelled by the rabbit to reach his friend is _____ m.

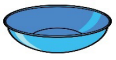
2. A Puzzle to Puzzle you

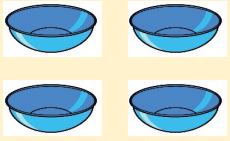
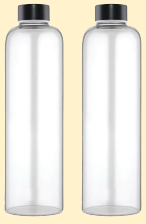
Usha has 21 glasses, out of which 7 are full, 7are half full with juice and 7 are empty.

The juice has to be distributed among three people.

How will you distribute the glasses and juice so that each person gets equal number of glasses and the same quantity of juice?

3. Lab activity

The capacity of a  is 250 mL.

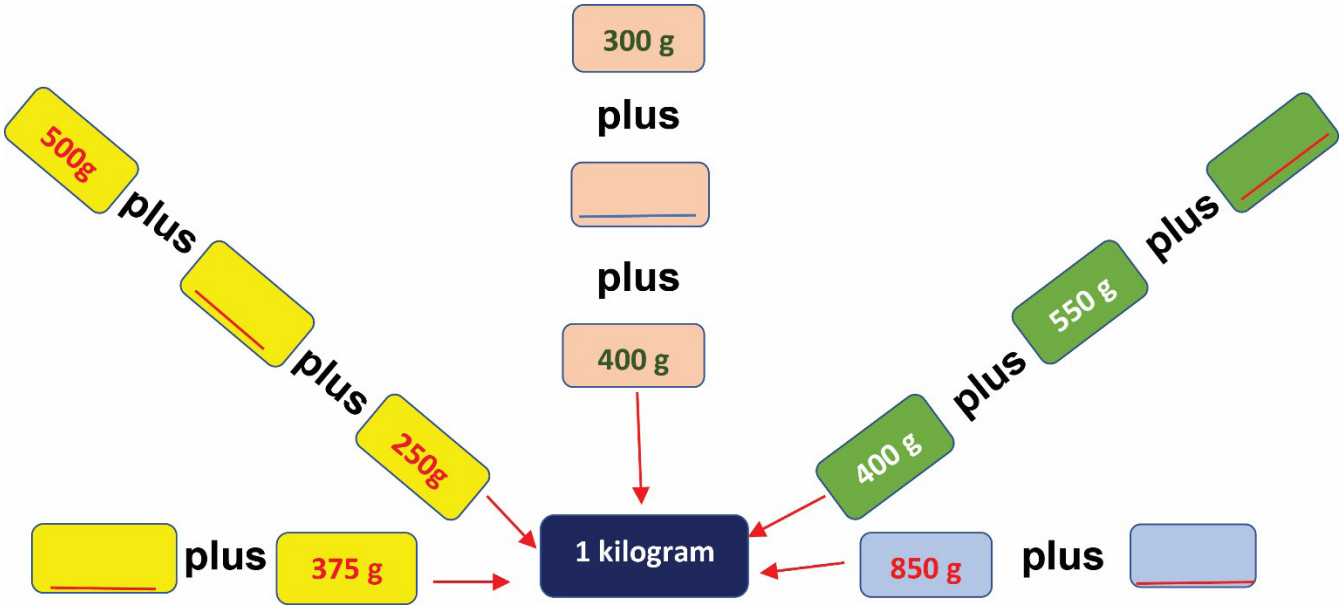
 **Bottle** =	
 **Jug** =	
 **Bucket** =	
 **Water can** =	

4.Experiential learning

Using a rope/ruler of length of 1m, measure the following. Express them in m and cm.

Length of the	Length in m and cm
a) Black board	
b) Classroom	
c) Window	
d) A4 Size paper	

5. Fill in the boxes



Value based question

On Seema's birthday, her Nani (grandma in Telugu) kneads 3 kg 625 g of dough. She used 1kg 790 g of it to roll chapathis. Seema helped her Nani to prepare poories with the remaining dough, for donation to a nearby old age home.

a) What weight of dough was used to make poories?

b) Seema spent the evening of her birthday, happily at the old age home. How would you like to spend the evening on your birthday?

6. Identify the unit for the following from the grid.

a) The standard unit of capacity _____

b) Weight of a gold ring _____ 

c) Length of an ant _____ 

d) Capacity of a syringe _____ 

e) Weight of a jackfruit _____ 

f) Height of a giraffe _____

g) Distance between Chennai and Mahabalipuram _____

h) Length of a toothbrush -_____ 

B	G	R	A	M	E	L	T	E	R
K	I	L	O	M	E	T	R	E	M
S	I	U	N	L	I	T	R	E	E
C	E	N	T	I	M	E	T	R	E
M	E	T	R	E	P	E	R	I	L
M	I	L	L	I	M	E	T	R	E
K	I	L	O	G	R	A	M	E	R
M	I	L	L	I	L	I	T	R	E

Logical Reasoning

1. Tower A is not shorter than Tower B. Tower A is taller than Tower C. Which Tower is the shortest?

a) A b) B c) C d) Both B and C

2. Length of two rods are 9 feet and 6 feet. What is the smallest length that can be measured using either of the rods?

a) 15 b) 3 c) 54 d) 18

3. Prasanth walked 25 km north from his house, then turned left, and walked 25 km. He then turned south and walked 40 km. He again turned right and walked 25 km. How far is he from his house?

a) 15 km b) 50 km c) 65 km d) 0 km

11 PERIMETER

Expected Learning Outcomes

At the end of this lesson, children will be able to:

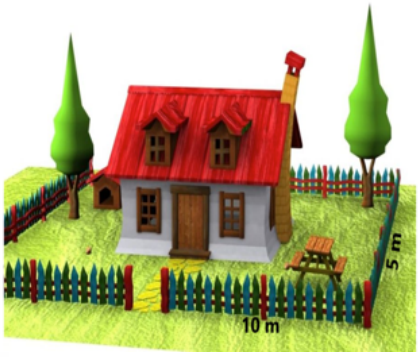
Find the perimeter of the polygons.

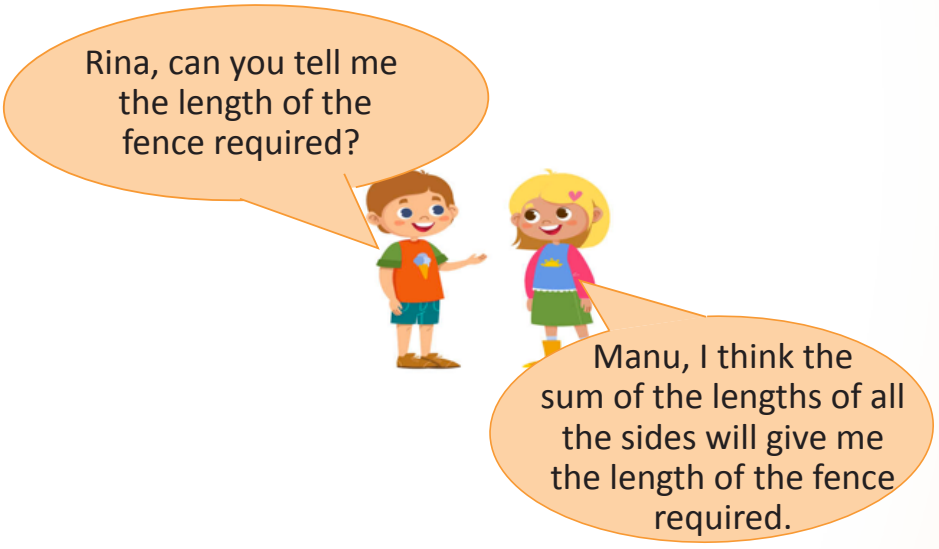
Understand that perimeter of a polygon is the sum of the length of its sides.

Define perimeter and state its unit.

Perimeter in Real Life

Manu's parents have built a beautiful house with a lovely garden. To protect the garden, his father wants to put a fence around it.





Concept Section

Perimeter

The perimeter of a closed figure is the distance around it. The unit of perimeter is the unit of length.

Can you guess what answer Rina gave?

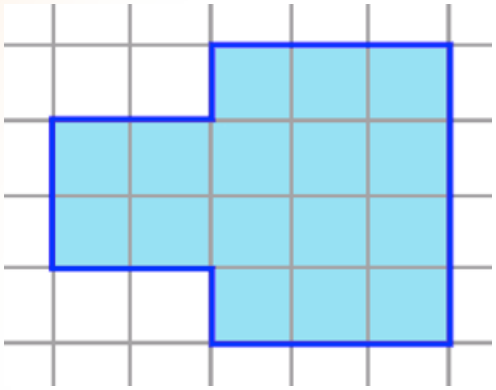
The sum of all the 4 sides of the field = 10 m + 5 m + 10 m + 5 m

= 30 m

The word perimeter is derived from the Greek words 'peri' and 'metron', where 'peri' means 'around' and 'metron' means 'measure'.

Example 1:

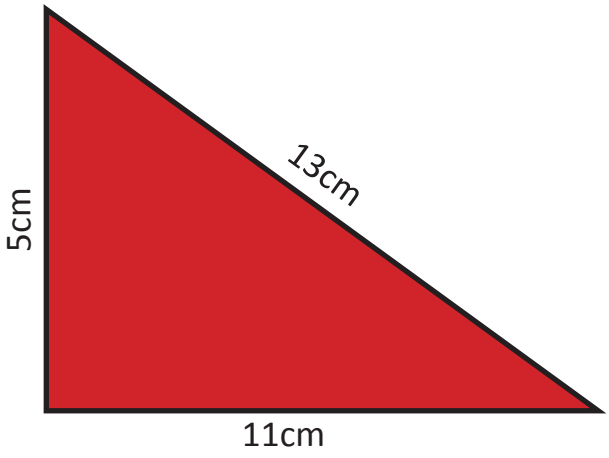
Find the perimeter of the figure. Each square is of side 1 cm.



Length of the blue outline = 3 cm + 1 cm + 2 cm + 2 cm + 2 cm + 1 cm + 3 cm + 4 cm.
Perimeter of the figure = 18 cm.

Example 2:

Find the perimeter of this triangle



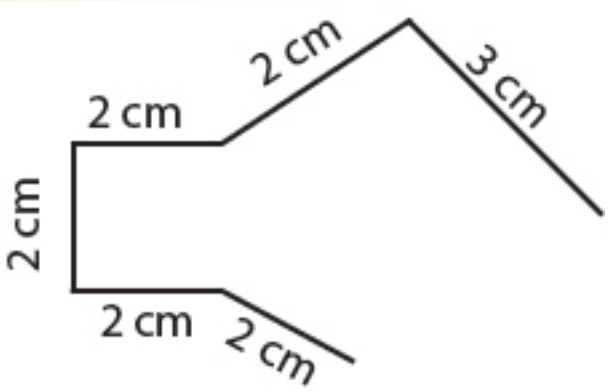
Perimeter = 11 cm + 5 cm + 13 cm
= 29 cm

Example 3:

Find the perimeter of the square stamp of side 2 cm.

Perimeter of the stamp = 2 cm + 2 cm + 2 cm + 2 cm
= 8 cm

Higher Order Thanking Skills

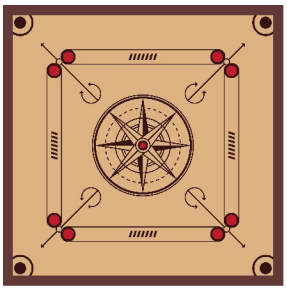


Is it possible to find the perimeter of the given figure? Why?

EXERCISE 11.1

1. Find the perimeter

a.



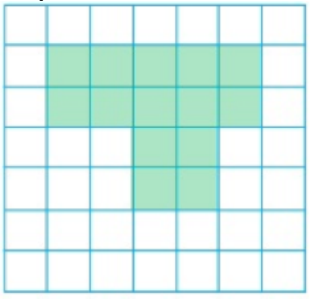
b.

c.

d.

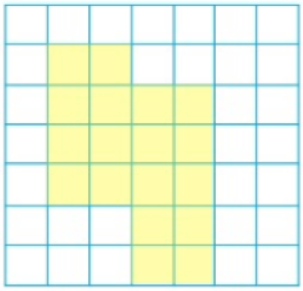
2. Find the perimeter of shaded part in each. Each small square is of side 1 cm

a.

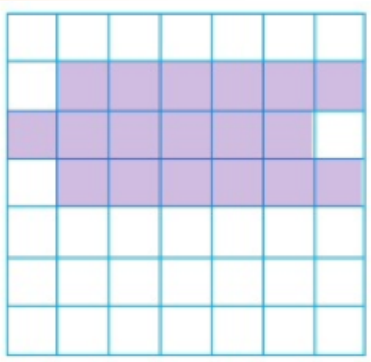


Perimeter : _____

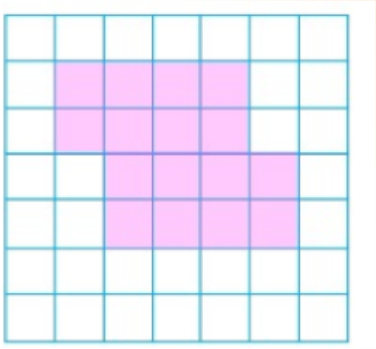
b.



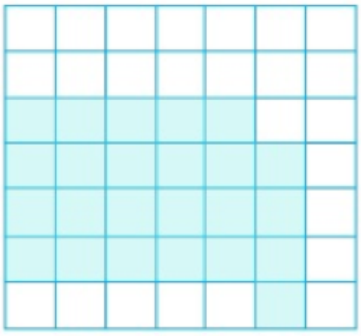
Perimeter : _____

c. 

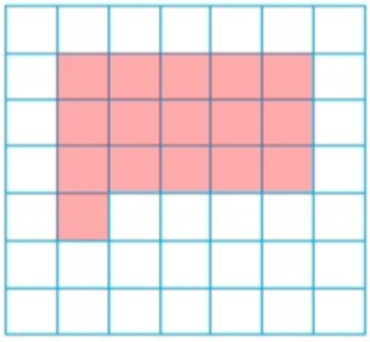
Perimeter : _____

d. 

Perimeter : _____

e 

Perimeter : _____

f. 

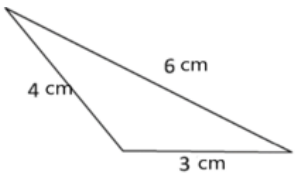
Perimeter : _____

EXERCISE 11.2

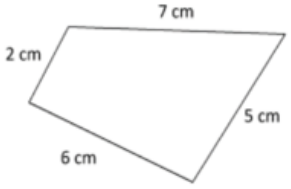
1. Find the perimeter of the figures given:

1) 

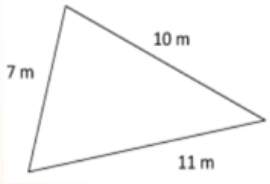
Perimeter : _____ cm

2) 

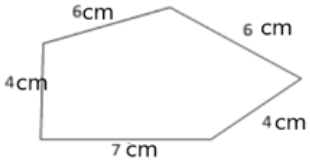
Perimeter : _____ cm

3) 

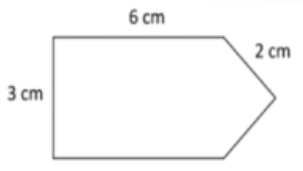
Perimeter : _____ cm

4) 

Perimeter : _____ cm

5) 

Perimeter : _____ cm

6) 

Perimeter : _____ cm

2. Find the perimeter of the triangles with the given sides:

a. 4 cm, 3 cm and 5 cm.

b. 3 cm, 5 cm and 7 cm.

c. 2 cm, 6 cm and 5 cm.

d. 8 cm, 3 cm and 4 cm.

3. Find the perimeter of each square of side.

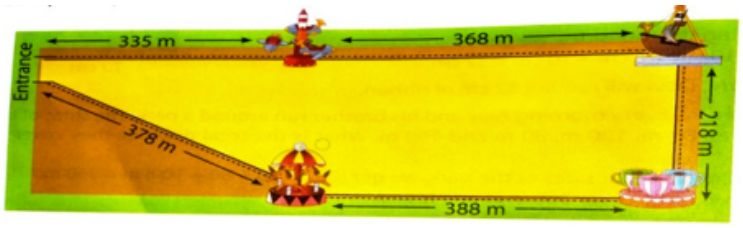
a.4 cm b. 10 cm c. 9 cm d. 17 cm

4. Find the perimeter of each rectangle.

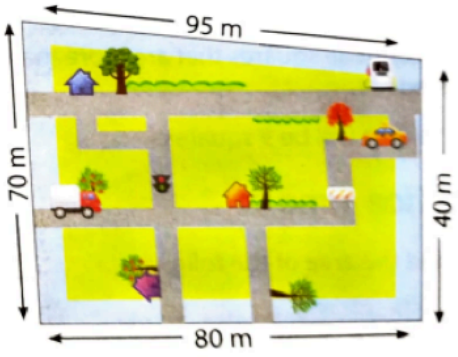
a. 4 cm and 2 cm b. 6 cm and 4 cm

c. 19 cm and 7 cm d. 12 cm and 14 cm

5. Find the length of the wire required to fence the children's park.



6. Priya runs around a square plot whose sides are 110 m each. Preetha runs around another park with dimensions as shown in the figure. Who covers more distance and by how much?



EXERCISE 11.3

Applications in real life:

1. The length of a post card is 10 cm and its breadth 7 cm. Find the perimeter of the post card.

2. The length of a field is 120 m and its width 80 m. Sanjay ran thrice along the boundary. Find the distance that Sanjay ran.

3. Mr. Arjun wants to fence his plot. The plot is in the shape of a square with sides measuring 21 m. What length of wire should he purchase for the fence?

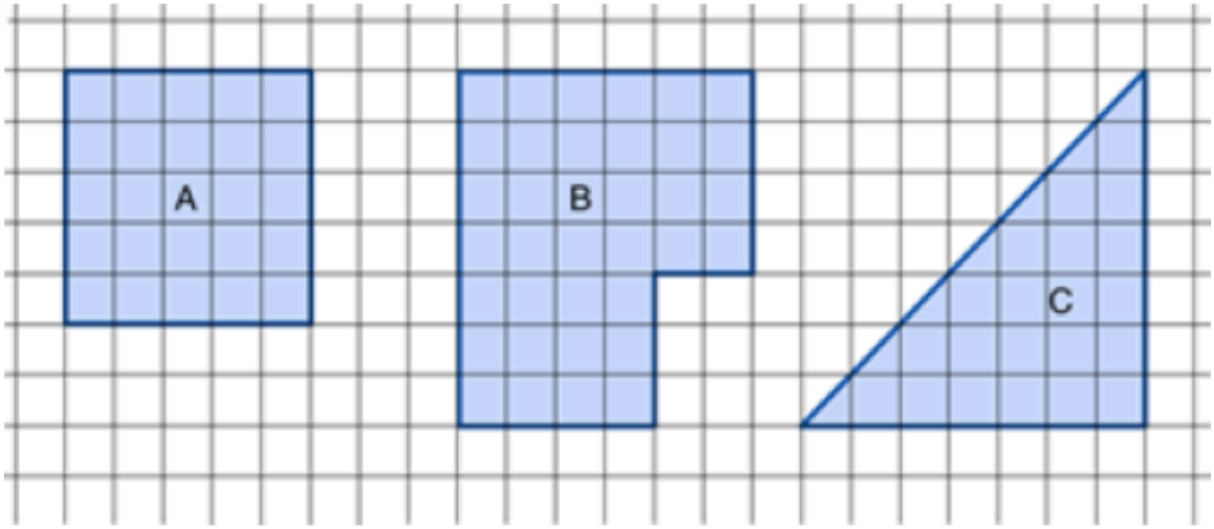
4. Find the perimeter of a foot ball court of length 150 m and breadth 90 m.

5. Tina stitched a lace border on a triangular scarf whose sides are 60 cm, 40 cm and 50 cm. What length of lace did she use?

6. Harish wants to fence his square garden of side 20 m. The cost of the wire is ₹ 640 per metre. How much money does he need?

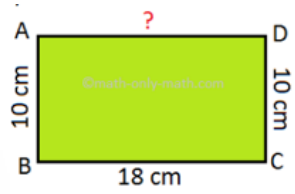
Skill Drill

1. Find the perimeter of the part shaded. Each square is of side 1 cm



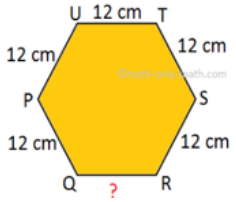
2. Fill in the missing measurement:

a.



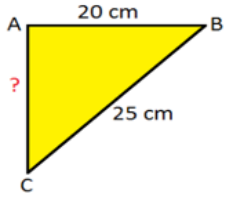
Perimeter = 56 cm,
AD = _____

b.



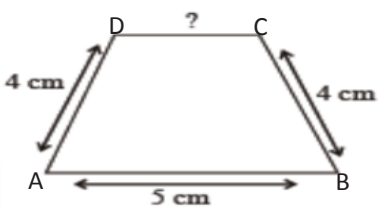
Perimeter = 72 cm,
QR = _____

c.



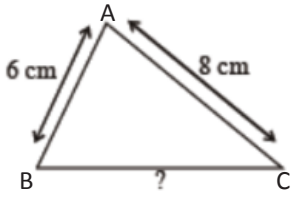
Perimeter = 63 cm,
AC = _____

d.



Perimeter = 16 cm,
CD = _____

e.



Perimeter = 21 cm,
BC = _____

3. Complete the table:

Side of the square	Perimeter
12 cm	
	80 cm
25 m	
	200 cm

4. Complete the table:

Length	Breadth	Perimeter
6 cm	4 cm	
	13 cm	40 cm
12 m		144 m
55 m	25 m	

Higher Order Thinking Skills

I. Choose the correct answer

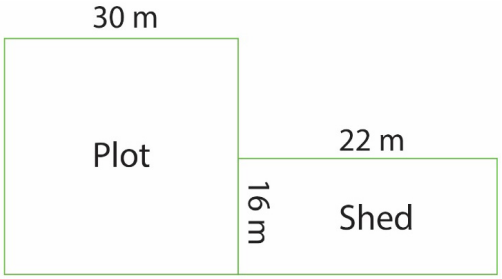
1. The perimeter of a square ABCD is :
   a) Sum of its sides b) 4 x side c) AB+BC+CD+AD d) all of these
2. The perimeter of a square of side 1 cm is:
   a) 1 cm b) 4 cm c) 2 cm d) 8 cm
3. If you double the sides of a square, its perimeter will:
   a) remain the same b) double c) increase 4 times d) increase 8 times.
4. If the length of a rectangle is increased by 2 cm, then its perimeter increases by:
   a) 2 cm b) 8 cm c) 4 cm d) 6 cm
5. If the perimeter of a square is 12 cm, then its side is:
   a) 6 cm b) 3 cm c) 24 cm d) 48 cm

II. Answer the following:

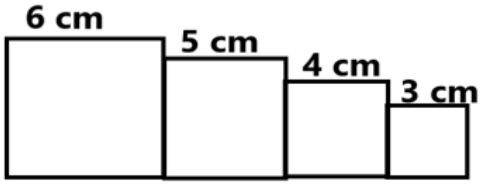
1. Rekha painted a beautiful picture with dimensions as shown. Her teacher gave her 50 cm ribbon to decorate it along its sides. What length of the ribbon will she use, if she uses it once around the picture? How much ribbon will be left after decorating the painting?

2. The sides of a park are 100 m, 150 m, 200 m and 150 m. If Rakesh runs around it 5 times, what distance does he cover? How many times must he run if he wants to cover 1800 m.?
3. Find the length of a rectangle whose perimeter is 200 cm and breadth 40 cm.

4. Ramu has a square plot of side 30 m and a rectangular shed of length 22 m and breadth 16 m adjoining it. He wants to fence the plot and the shed together. What length of barbed wire would he need to do that?



5. Find the perimeter of the given figure if each shape is a square.



Activity 1

Using a string or a thread to find the perimeter of the leaves.

Activity 2

Materials required:

A 10 rupee note, a Ganitam book, a pencil box and a ruler.

Method:

1. Measure the length and breadth of each object using a ruler.
2. Find its perimeter.
3. Write down your observations in the table given, using appropriate units.

Object	Length	Breadth	Perimeter
10 rupee note			
Pencil box			
Mathematics book			

Time to think

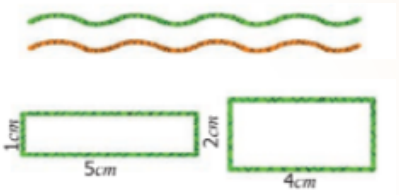
Arun received two pieces of twine, of length 12 cm each.

He was asked to make a rectangle/s and square/s, using one for each. Help Arun cut the sides of the square/s and rectangle/s from them.

Square/s = Length of a side = _____ cm

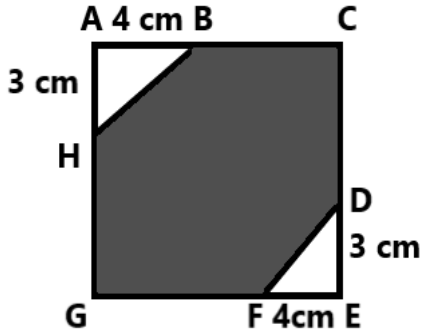
Rectangle/s = l =___cm b =___cm

l =___cm b =___cm



Logical Thinking

1. ACEG is a square. BC is thrice of AB. If BH = DF = 5 cm, then find the perimeter of BCDFGH.

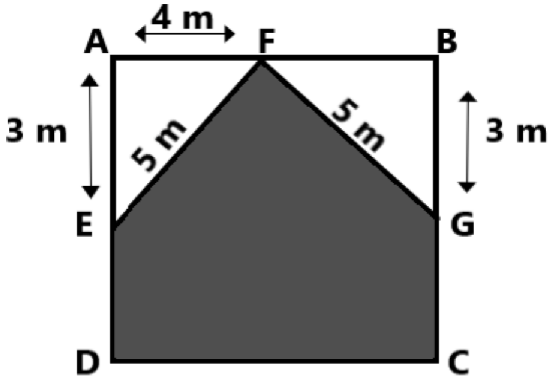


a) 60 cm b) 52 cm c) 48 cm d) 45 cm

2. Mohan walks around a square park whose side is 50 m. One day he walked around the park 6 times. How much distance did he walk on that day?

a) 1450 m b) 1500 m c) 300 m d) 1200 m

3. ABCD is a square of perimeter 32 m. Two triangular corners have been cut away as shown in the figure. What is the perimeter of the shaded figure?



a) 39 m b) 28 m c) 35 m d) 53 m

12 GEOMETRY- PART 2

Expected Learning Outcomes

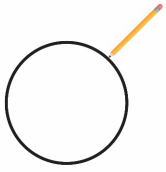
At the end of this lesson, children will be able to:
Find the centre, radius, diameter, chord and circumference of a circle.
Draw a circle of given radius using a compass.
Use patterns to make simple codes and decode simple messages.

Circle

Take one of each a) bangle b) coin c) water bottle cap or anything that is round.



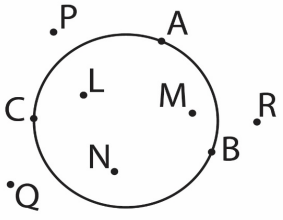

Place each of them on your notebook and trace their outlines. What do you observe?
All their outlines are circles.



A circle is a closed figure. It has no sides and no corners.

Points that are interior, exterior and on the circle

Look at the circle.



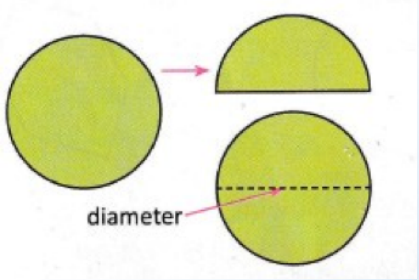
Points A, B and C are on the circle.

Points L, M and N are inside the circle.

Points P, Q and R are outside the circle.

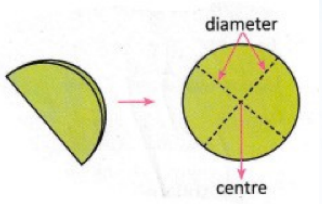
Diameter, centre and radius

Cut out a circle that you have drawn. Fold it and crease it so that the two parts fit exactly over each other. Now you have got a **semicircle.**



Open the paper now. The impression that you see across the circle on the fold is the **diameter** of the circle.

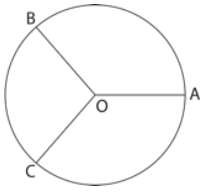
The line segment joining any two points on the circle and passing through the centre is called the **diameter** of the circle.



Now fold the circle again along a different line so that it forms two halves. The new crease is also a diameter. You can see that the diameters meet at a point. The point at which the diameters meet is called the **centre** of the circle.

A diameter divides a circle into two equal parts. Each part of the circle is a semicircle. You can draw as many diameters as you want in a circle. All diameters of a circle passes through its centre and are of equal length.

The word 'Circle' is derived from a Greek word that means 'hoop' or 'ring'.



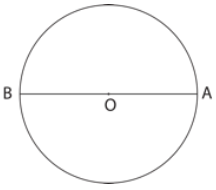
A line segment joining the centre of the circle to any point on the circle is called the radius of the circle. OA, OB, OC are a few radii (plural of radius) of the circle. Infinite numbers of radii can be drawn for a given circle. However all the radii are of equal length for a given circle.

The diameter connects two points on a circle through the centre.

Thus diameter = 2 x radius.

OA and OB are the radii while BA is the diameter.

BA = OB + BA (or) BA = 2x OB (or) 2 x OA

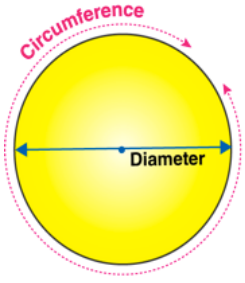


Circumference

How can you measure the length of a circle?

Let us try to do it using a string:

- Place the string at any point on a circle.
- Wrap the string around the circle until it meets the starting point. Cut the string at that point.
- Open out the string and measure its length on a scale.
- The length of the string is the length of the circle.

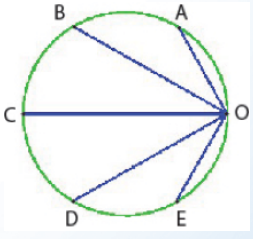


The length of the circle is called its **circumference**

Chord

A line segment joining any two points on the circumference of the circle is called the chord of the circle. In the given figure OA, OB, OC, OD and OE are a few chords of the circle. A circle can have infinite number of chords. They can have different lengths too.

Diameter is the longest chord of the circle.



Think – What is the difference between a chord and a diameter ?

EXERCISE 12.1

Fill in the blanks

a) A circle is a _____ (closed/open) figure.

b) A circle _____ (does/does not) have sides.

c) If the radius of a circle is 4 cm, it's diameter is _____cm, and the distance from the centre of the circle to a point on the circle is ____cm.

d) If the diameter of a circle is 12 cm, its radius is _____cm, and the distance from the centre of the circle to a point on the circle is_____cm.

e) In a circle of diameter 16 cm, the distance between the centre of the circle and a point on the circle is_____cm.

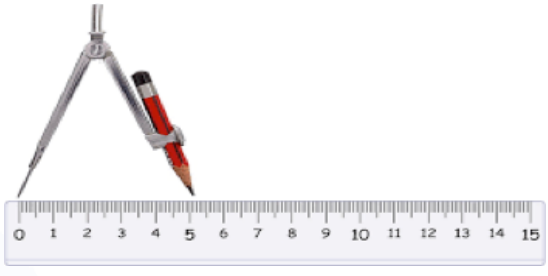
Drawing a Circle

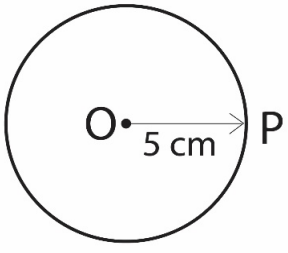
A circle can be drawn using a compass.

Let us draw a circle of radius 5 cm.

- Fix a sharp pencil in your compass.
- Stretch the arms of the compass, and place it on a scale so that the metal tip is at the 0 cm mark and the pencil point is at 5 cm mark.
- Place the metal tip of the compass on the page, hold it in place, trace a curve by moving the pencil arm around.
- You will obtain a circle

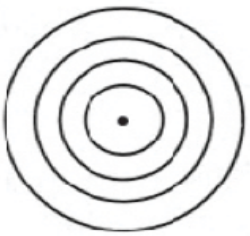
The point on the paper at which the metal tip was fixed is the centre of the circle.
The distance between that point and any point on the circle is the radius of the circle.



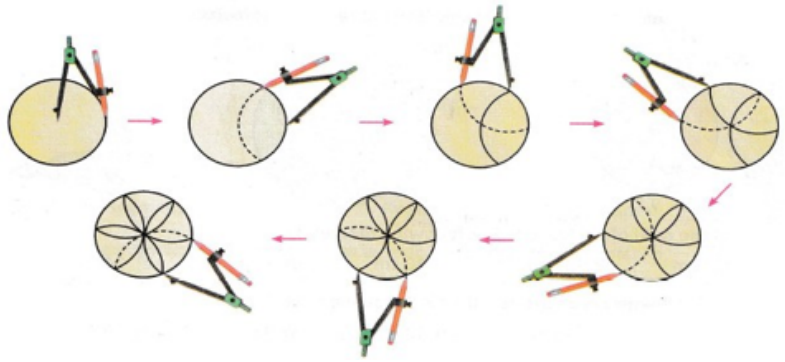


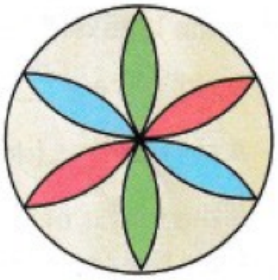
Concentric Circles

Two or more circles which have the same centre and different radii are called concentric circles

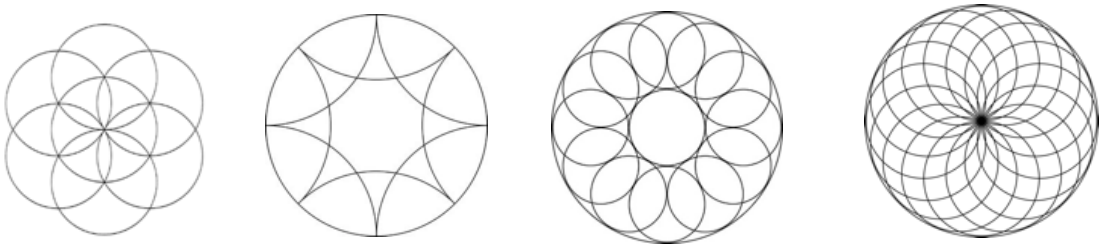


Designs using circles





Use your imagination to colour the designs.



EXERCISE 12.2

1. Draw a circle of radius 4 cm. Mark the

a. Centre b. Radius c. Diameter

2. Draw a circle and mark the following:

a. Centre b. Radius c. Diameter d. Chord

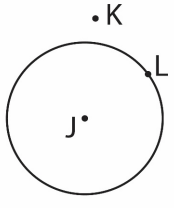


Fig-1

3. Find out where points J, K and L lie in Fig-1

4. Find the radii of circles with the following diameters.

a. 12 cm b. 22 cm c. 30 cm d. 2 cm e. 14 cm

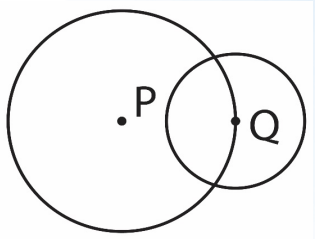
5. Find the diameters of circles with the following radii

a. 10 cm b. 2 cm c. 12 cm d. 7 cm e, 20 cm

Experiential Learning

a. Mark a point in the middle of the page of your notebook and name it P. With P as the centre, draw a circle of radius 5 cm.

b. Mark a point Q anywhere on the circle. With Q as centre draw a circle of radius 3 cm.
c. What are the diameters of the circles that you have drawn?



Fun Activity

Let's spin

Make a circle with shapes marked as shown in the figure. Fix a pencil at the centre to enable it to rotate freely around/over the circle.

Now you may start playing with your friends.

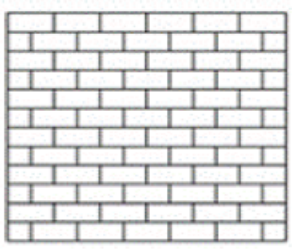
Each of you can spin the pencil once. Note the figure at which the pencil points when it stops spinning. Count the number of vertices that the shape has. Note it down as the point for the spinner. Continue with the others.

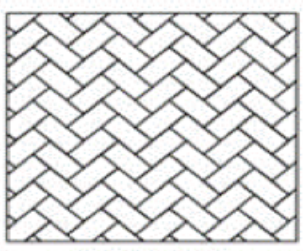
Decide among yourself the rule to identify the winner.

Patterns

Repetition of shapes rhythmically makes a pattern. Patterns make things look beautiful.

You can find patterns all around you. You can see patterns on the tiles, clothes, iron grills on the boundary wall etc.





Look at this pattern being made on cloth.

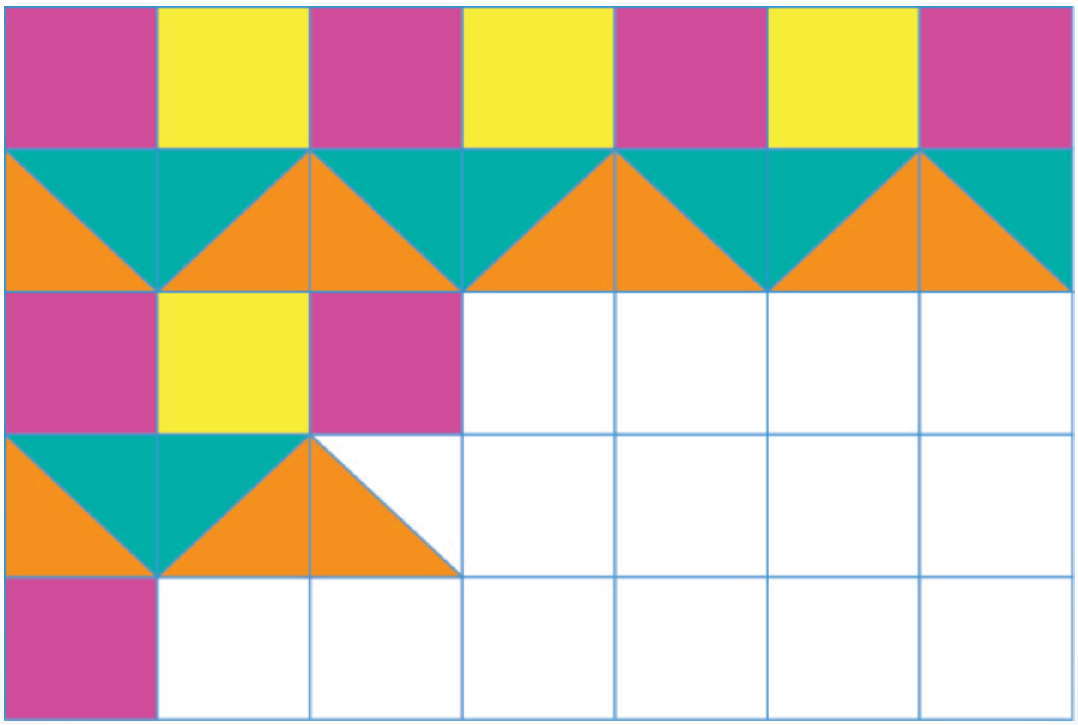
It is made using wooden blocks. These blocks are dipped in colour and cloth is stamped with them, in a particular order to create a design.

Try it out

Madhav has made a pattern of a steel gate for his new house. Can you try one for your house too?

Patterns help us to predict what comes next in a sequence.

Fill in the blank boxes to complete the pattern



Using patterns to make codes

Confidential information is coded in such a way that only the intended receiver can decode and understand it. A simple code is represented here.

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
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

Decode to understand the message.

13 5 5 20 1 20 20 5 14 16 13

Complete the code and use it to code the same message.

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W			
			w	v	u	t	s	r	q	p	o	n	m	l	k	j	i	h	g	f	e	d	c	b	a

EXERCISE 12.3

1. Use the following codes to encode the given messages.

A	B	C	D	E	F	G	H	I	J	K	L	M
26	25	24	23	22	21	20	19	18	17	16	15	14
N	O	P	Q	R	S	T	U	V	W	X	Y	Z
13	12	11	10	9	8	7	6	5	4	3	2	1

a. Keep your city clean.
b. Respect your elders.

2. Decode the following messages using the same code.

a. 18 15 12 5 22 14 2 24 12 6 13 7 9 2
b. 19 26 11 11 2 23 18 4 26 15 18

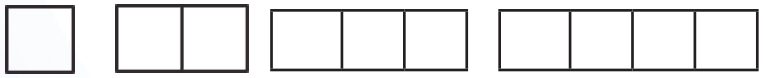
3. Each letter is worth some points. The points are added up to make the total of the word. Find the value of TENTS

TEE = 4 TEN = 6 NEST= 10 TENTS = _____

Number Patterns

Picture patterns can also be connected to number patterns.

Examples:

1. 

1 2 3 4

This is a growing or an increasing pattern.

The number pattern is 1,2,3,4

The rule here is to add 1 to get the next number in the pattern.

2. 

4 3 2 1

This is a decreasing pattern.

The number pattern is 4,3,2,1.

The rule here is to subtract 1 to get the next number.

3. 

2 6

This is an increasing pattern.

The number pattern is 2, 6, 18.

Here the rule is to multiply by 3 to get the next number.

EXERCISE 12.4

1. Write the next number in the pattern.

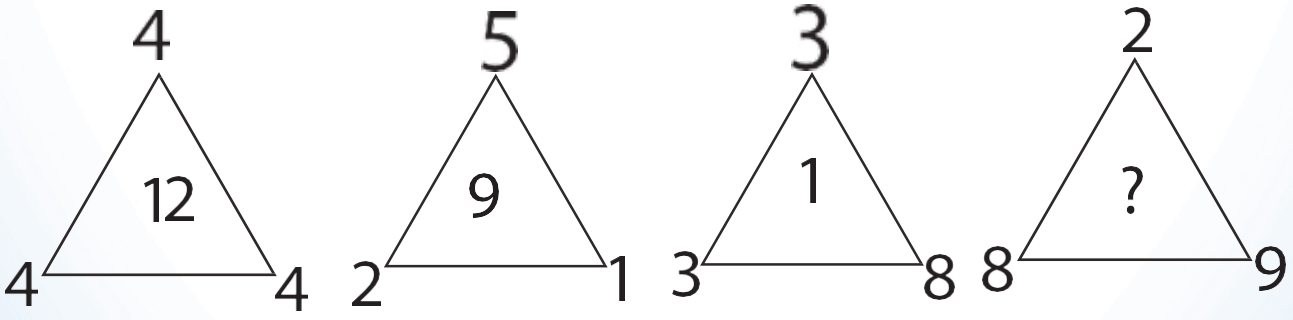
a. 12017, 12027, 12037, 12047, _____

b. 10, 20, 35, 55, 80, _____

c. 4018, 4015, 4012, 4009, 4006, _____

d. 8095, 8100, 8105, 8110, _____

2. Which number will come inside the last triangle?



Higher Order Thinking Skills

1. Study the pattern and write the products

a.
11 x 11	=	121
111 x 111	=	12321
1111 x 1111	=	1234321
11111 x 11111	=	_____
111111 x 111111	=	_____
1111111 x 1111111	=	_____

b.
3 x 5 = 15

6 x 5 = 15 + 15 = 30

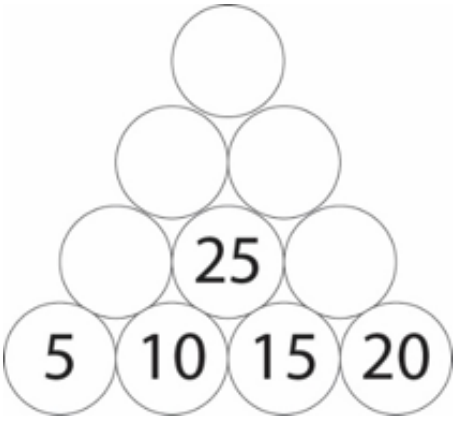
12 x 5 = 30 + 30 = 60

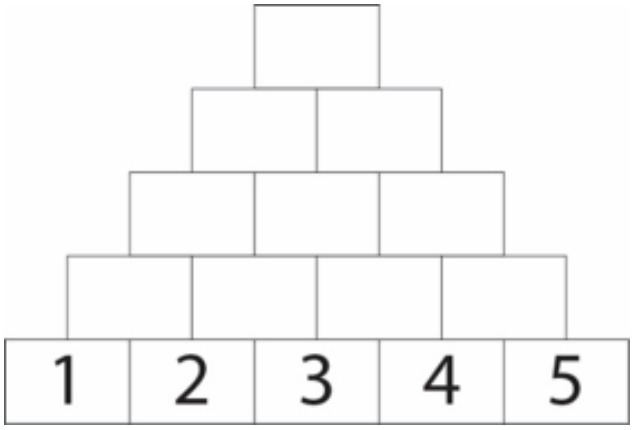
24 x 5 =_____ + _____ = _____

48 x 5 = _____ + _____ = _____

96 x 5 = _____ + _____ = _____

2. Add the two numbers below to get the number above them





Experiential Learning Activity:

A note to teacher

The class can be divided into equal groups. Each group will create 3 or 4 own secret codes. Write messages using each code share it with your teacher. Other groups have to decode the message and read it.

The code that cannot be decoded by the maximum number of groups is the best.

Try it out:

1. Draw two concentric circles of radii 4 cm and 5 cm with centre C. Find the diameters of both the circles. What is the difference between them?
2. What is the radius of a bangle whose diameter is 8 cm? Find the circumference of the bangle.

Logical Reasoning

1. Which of the following will complete the figure?

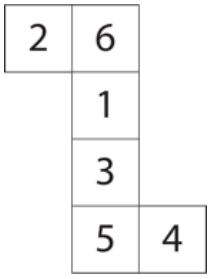
a. 

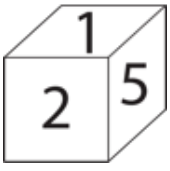
b. 

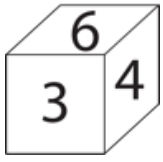
c. 

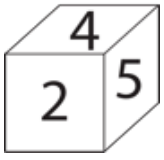
d. 

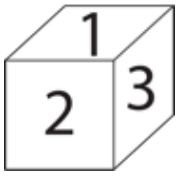
2. A sheet of paper is folded to form a cube. Select a figure from the options which is similar to the cube formed by folding the given sheet.



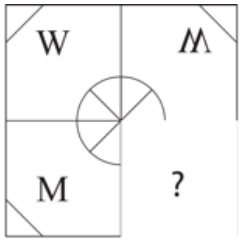
a. 

b. 

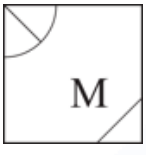
c. 

d. 

3. Which of the following options would complete the given figure pattern?



a. 

b. 

13 HANDLING DATA

Expected Learning Outcomes

At the end of this lesson, children will be able to:
Collect raw data and represent it using tally marks
Interpret the data represented in a bar graph
Draw a pictograph

A collection of information is called data. Data are collected, organized and analysed to make the information useful.

Raw data is information obtained in its original format.

Types of data:

Data is collected based on inquiries or analysis.

The data collected directly from the source is called the primary data.

Secondary data is data collected indirectly or from other sources.

Identify the type of data :

i) You ask your friend about his favourite subject.

ii) Your sister told you that 20 of her classmates were obese.

Tally marks:

Tally marks are a way to record or mark your counting. The general way of writing tally marks is a set of five lines. Four vertical lines are made for the first four counts, the fifth count is represented by a diagonal across the four lines. A tally chart gives a count of the data.

Tally marks are commonly used for counting scores, points, games won, number of people in a smaller circle etc.

Example: The school management decided to conduct extra coaching classes for the students after the school hours. They also decided to distribute fruits to students who enrol for after school activities. Each class was asked to give the preferred fruit of each participant. The class leader started writing the favourite fruits according to their roll number.

Apple,pineapple, apple, grapes, banana, apple, grapes, banana, pineapple, banana, banana, grapes, apple, apple, grapes, mango, apple, mango, grapes, banana, pineapple, banana, apple, mango, mango, banana, grapes, banana, mango, grapes.

Do you think it would be easy to count the number in each category, for all classes in the school?

The teacher suggested that a tally chart would help them find the exact number of fruits, of each kind.

The raw data can be represented in the tally chart as follows.

Fruit	Tally mark	Number of fruits
Grapes	𝍸 II	7
Mango	𝍸	5
Banana	𝍸 III	8
Pineapple	III	3
Apple	𝍸 II	7

EXERCISE 13.1

1. A survey was conducted on the number of students participating in various sports events. Fill in the table, to understand the data better.

Events	Tally mark	Number of students
Javelin	𝍸 III	
Shot Put		12
Discus Throw	𝍸 𝍸 III	
Hammer Throw		9

2. The shoe size of a class of 50 students are given below. Represent the data as a tally mark chart.

8, 7, 8, 7, 6, 7, 8, 8, 7, 6, 8, 7, 6, 6, 8, 7, 6, 5, 6, 7, 8, 7, 6, 5, 7, 7,
8, 6, 7, 7, 6, 8, 7, 6, 7, 8, 7, 6, 5, 6, 7, 8, 8, 7, 6, 5, 6, 7, 8, 8, 7.

Shoe size	Tally marks	No. of shoes
5		
6		
7		
8		

3. Students of a class were asked to choose one healthy habit which they practiced meticulously, using the codes given for each.

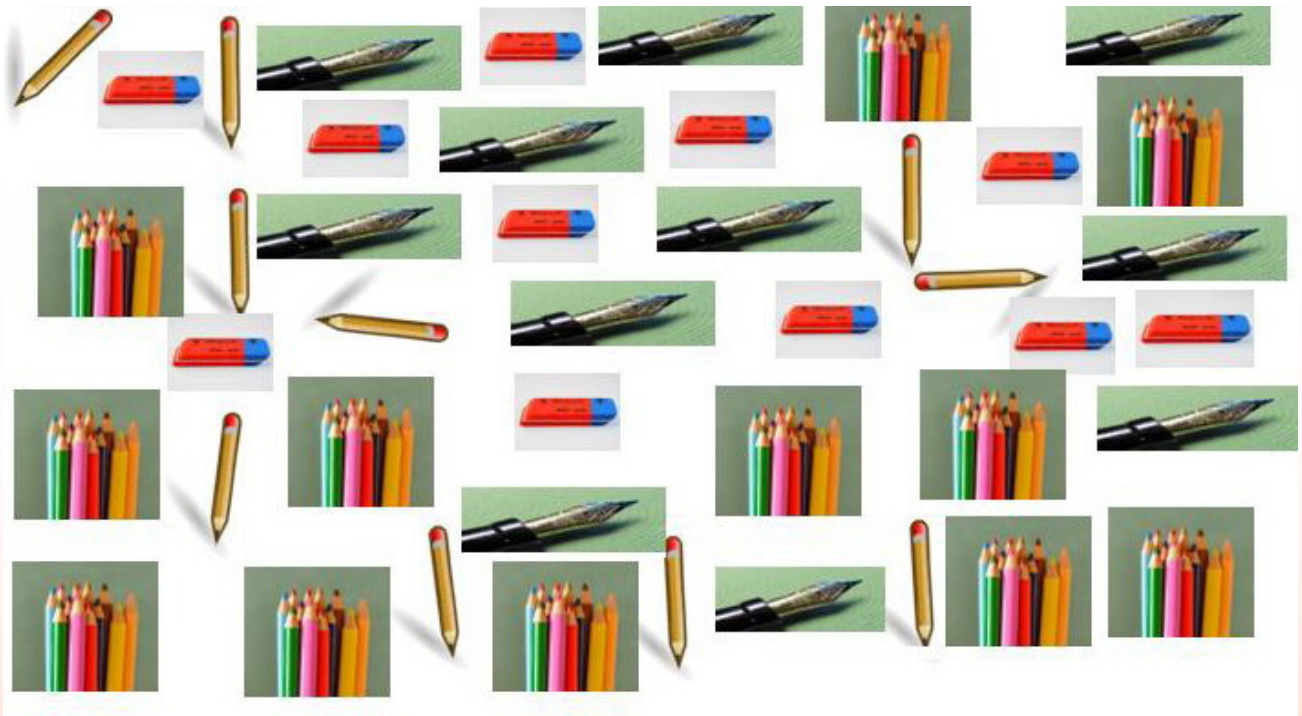
A- Physical activity. B-Healthy food habits, C-Hygienic practices , D- Adequate rest and sleep

Their inputs are listed. Represent the data as tally marks. Find the total number of students in the class.

A,D,B,C,D,D,C,A,B,C,C,A,B,D,A,C,C,C,A,B,C,B,A,D,D,D,B,A,C,A,C,B,A,C,A,B,C,D,A,B,

Healthy Habits	Tally marks	No. of students
Exercise		
Nutrition		
Hygiene		
Rest and sleep		

4. As a part of a Dhan Utsav Class IV students donated the following stationery items. Represent them in a tally mark chart.



Item	Tally Marks	Numbers
		
		
		

5. Pet is any animal kept by human beings for companionship. Following are some of the pet animals of our students. Prepare a tally mark chart to know more details about the pets. List i) The pet that most students had ii) The pet that least number of students had

Dog, Dog, Birds, Dog, Cat, Dog, Fish Cat, Dog, Rabbit,
Birds, Dog, Cat, Fish, Birds, Dog, Dog, Cat, Birds, Dog,
Cat, Fish, Dog, Dog, Cat, Birds, Rabbit, Cat, Cat, Cat,
Cat, Birds, Rabbit, Birds, Birds, Birds, Rabbit, Fish, Dog, Cat.

6. In a mathematics test, the following marks were obtained by 45 students of class IV. Arrange these marks in a tally mark chart, to know the marks scored by (a) maximum number of students (b) minimum number of students..

9, 7, 8, 10, 7, 9, 8, 7, 8, 10, 9, 7, 9, 10, 10, 7,
9, 8, 10, 9, 10, 9, 8, 7, 9, 7, 8, 9, 7, 10, 8, 7, 10, 9, 10, 10,
8, 7, 8, 9, 7, 9, 9, 8, 10

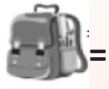
Pictograph

Representation of numerical data by using a picture/symbol is called a pictograph.

Example: To create awareness about helping the poor and needy we celebrate Dhan Utsav every year. School bags were distributed to the underprivileged children as a part of the programme.

The following are the details of bags that were distributed.

Colour	Number of bags
Pink	
Blue	
Green	
Brown	
Violet	

Key :  **= 10 bags**

Look at the pictograph and answer the following.

1. How many bags were distributed?
2. Maximum number of bags were of the colour_____
3. The color of the bags that was distributed the least_____

EXERCISE 13.2

1. The school organised a sale of craft items made by their students to raise fund for charity. Students of class IV made beautiful paper flowers.

Section	Number of Flowers
A	
B	
C	
D	
E	

Key :  **= 50 Flowers**

a. How many paper flowers were made by class IV students?

b. Which two sections made 200 paper flowers each?

c. What is the total number of paper flowers made?

2. The following vegetables were bought to prepare food for distribution. Represent the information using a pictograph.

Name of the vegetable	Quantity
Carrot	10Kg
Potato	8Kg
Tomato	6Kg
Onion	8Kg
Beans	4Kg

3. The following are the number of centums scored by class IV students of a school, in tests that were conducted on the topics listed. Represent the data as a pictograph. Choose a suitable key and justify the same.

Topics	No. of students
Numbers	40
Fractions	30
Geometry	50
Handling Data	60

Bar Graph

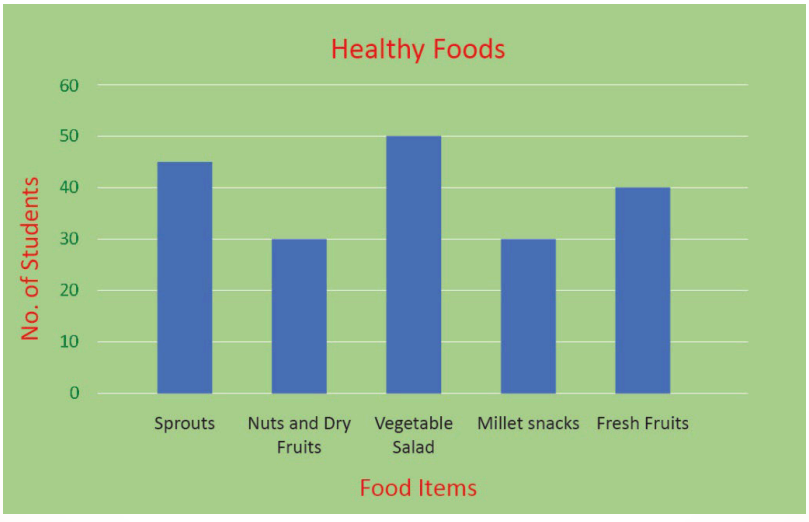
A bar graph is representation of data using vertical or horizontal rectangular bars. The width of the bar is uniform with equal spacing between them. The length of the bar is equal to the value it represents.

Example: To instill awareness about healthy food we celebrated health week in our school.

Data on the number of students, who brought different groups of healthy food for lunch on that day are given.

Food Items	No. of students
Sprouts	45
Nuts and Dry Fruits	30
Vegetable Salad	50
Millet Snacks	25
Fresh Fruits	40

The above information can be represented using a bar graph as shown.



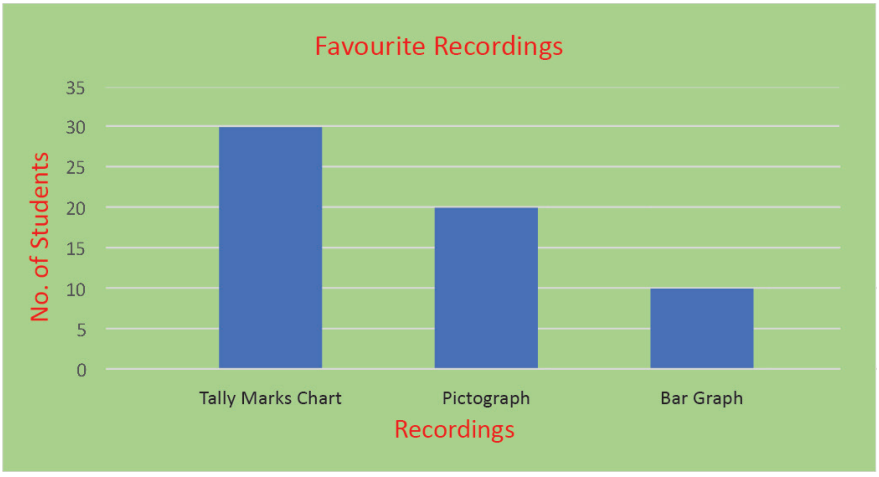
Observe the graph and answer the following questions

1. How many students participated in the celebration?
2. Which group of food was brought by most of the children?
3. How many students brought millet snacks?

EXERCISE 13.3

1. Look at the bar graph and answer the following questions.

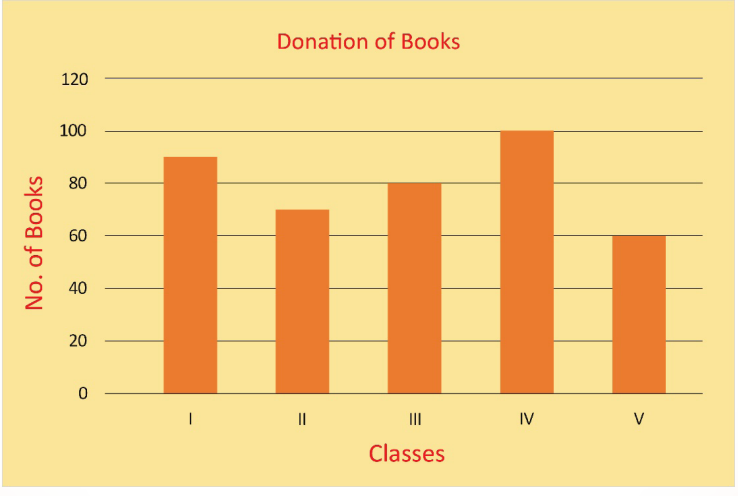
Data can be made easily understandable, by using tally marks, pictograph and bar graph. The below bar graph depicts the data on different ways preferred by students.



Answer the following Questions:

1. How many students were in the class?
2. How many students used tally marks chart?
3. How many more students used pictograph than bar graph?

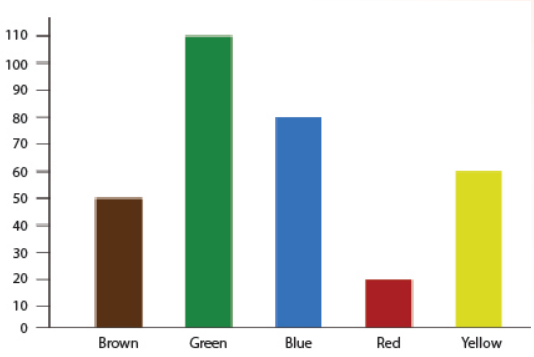
2. Our school children donate a book to our library on their birth days. Last year the number of books received as donation from our students is given in the bar graph. Look at the graph and answer the following questions.



1. How many students donated a book on their birthday?
2. How many more books were donated by class IV than class V?
3. How many students of class I donated books?

Higher Order Thinking Skills

1. Rakesh made the bar graph for different coloured marbles. By mistake he interchanged the bars for green and red. Consider the given bar graph and answer the following questions.



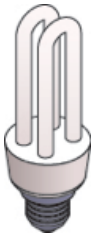
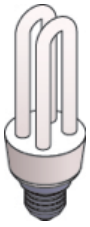
i. What is the actual difference between the number of red and yellow marbles?

a) 50 b) 180 c) 90 d) 40

ii. What is the sum of brown, green and blue marbles he actually has?

a) 240 b) 250 c) 150 d) 160

2. Each item in the given picture stands for a different value. The sum of each row and column is given

			₹125
			₹196
			₹240
₹267	₹54	₹240	

What is the value of  ?

a) ₹ 12 b) ₹ 84 c) ₹ 125 d) ₹ 45

Vedic Mathematics

BEEJANKA (DIGITAL ROOT)

Meaning: Beeja - seed Anka - digit

The sum of the digits of a number is called Beejanka

Eg. Beejanka of 526 = 5 + 2 + 6 = 13 → 1 + 3 = 4

The result of the four arithmetic operations can be checked using Beejanka.

Examples

736 + 245

7 3 6 → 7 + 3 + 6 = 16 → 1 + 6 = 7

+ 2 4 5 → 2 + 4 + 5 = 11 → 1 + 1 = +2

9 8 1 → 9 + 8 + 1 = 18 → 1 + 8 = 9

954 - 476

9 5 4 → 9 + 5 + 4 = 18 → 1 + 8 = 9

- 4 7 6 → 4 + 7 + 6 = 17 → 1 + 7 = -8

4 7 8 4 + 7 + 8 = 19 → 1 + 9 (10 → 1+0) = 1

13 x 14

1 3 → 1 + 3 = 4

x 1 4 → 1 + 4 = x 5

1 8 2 → 1 + 8 + 2 = 11, 1 + 1 = 2 } 20 2+0=2

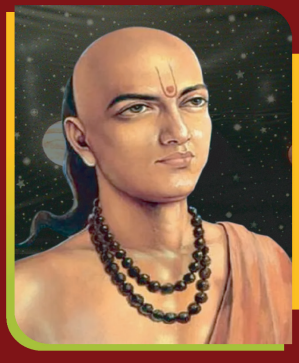
256 ÷ 7 quotient = 36, remainder = 4

DR of dividend = DR (q x dr + r)

DR (256) = DR (36 x 7 + 4)

2 + 5 + 6 → 13 → 1 + 3 → 4

9 x 7 + 4 (DR of 36 is 9) → 67 → 6 + 7 = 13 → 1 + 3 → 4



Zero

- Aryabhatta gave the world the concept of Zero (0)
- Means everything and nothing
- Binary numbers in computers would not have been possible without '0'

0
10
100
1000

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