THIRAN

(Targeted Help for Improving Remediation & Academic Nurturing)

Teacher's Handbook

Classes : 6, 7 & 8

MATHEMATICS

2025-2026

DEPARTMENT OF SCHOOL EDUCATION
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THE CONSTITUTION OF INDIA

PREAMBLE

WE, THE PEOPLE OF INDIA, having solemnly resolved to constitute India into a **SOVEREIGN SOCIALIST SECULAR DEMOCRATIC REPUBLIC** and to secure to all its citizens:

JUSTICE, social, economic and political;

LIBERTY of thought, expression, belief, faith and worship;

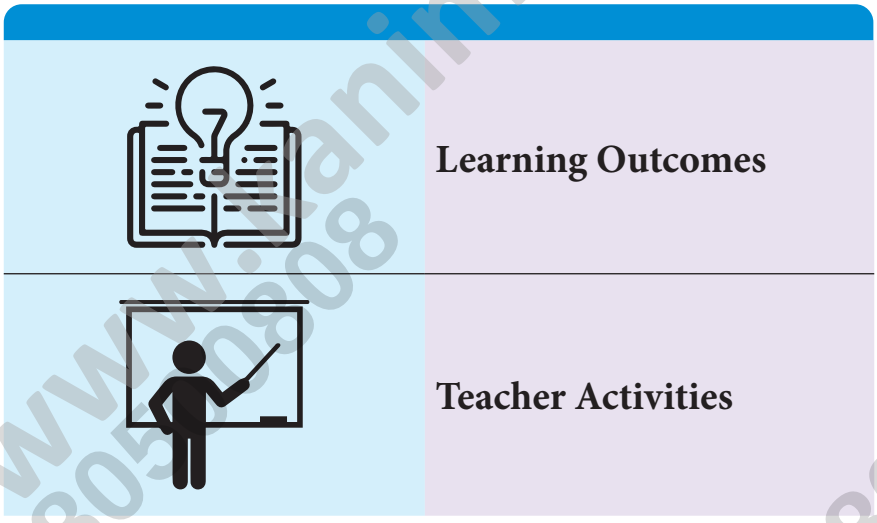
EQUALITY of status and of opportunity;

and to promote among them all

FRATERNITY assuring the diginity of the individual and the unity and integrity of the Nation;

IN OUR CONSTITUENT ASSEMBLY this twenty-sixth day of November, 1949, do **HEREBY ADOPT, ENACT AND GIVE TO OURSELVES THIS CONSTITUTION.**

Content



Note to the Teacher: Make the students colour the stars after completing each module and write the date of completion of the module in their workbook.

Fundamental Concepts

Classes : 6, 7 & 8

MATHEMATICS

Content

THIRAN – Plan of Action – Fundamental Language Skills

S.No.	Title	Days	Content	Learning Outcomes
1	One, two digit numbers - Place value	1 - 2	Introduction of single-digit and two-digit numbers, Place value	Counts objects using numbers 1 to 9 (M 102) Reads and writes numerals for numbers up to 99 (M 201)
2	Comparison of two digit numbers	3 - 6	bigger number - smaller number, Predecessor - Successor, ascending - descending order Odd numbers - even numbers	Uses place value in writing and comparing two digit numbers. (M 202)
3	Addition and subtraction of one, two digit numbers	7 - 12	Addition and subtraction of single-digit and two-digit numbers	Constructs addition facts up to 9 by using concrete objects. (M 104) Subtracts numbers using 1 to 9. (M 105) Solves simple daily life problems/ situations based on addition of two digit numbers (M 204) Solves daily life situations based on subtraction of two digit numbers (M 205)
4	Addition and subtraction of three digit numbers	13 - 17	Introduction of three-digit numbers, their addition and subtraction	Reads and writes numbers up to 999 using place value (M 301) Solves simple daily life problems using addition and subtraction of three digit numbers with and without regrouping, sums not exceeding 999 (M 303)
5	Multiplication	18 - 19	Multiplication of single-digit and two-digit numbers	Constructs and uses the multiplication facts (tables) of 2, 3, 4, 5 and 10 in daily life situations (M 304)

S.No.	Title	Days	Content	Learning Outcomes
6	Square numbers	20	Finding square numbers	Identifies the pattern in triangular number and square number (M 515)
7	Least Common Multiples (LCM)	21	Multiples, finding LCM	Applies HCF or LCM in a particular situation (M 603)
8	Division and Highest Common Factor (HCF)	22 - 23	Division, factors, finding, HCF	Explains the meaning of division facts by equal grouping/ sharing and finds it by repeated subtraction. (M 306)
9	Prime and Composite number	24	Composite and Prime numbers	Recognises and appreciates (through patterns) the broad classification of numbers as even, odd, prime, co-prime, etc. (M 602)
10	Divisibility	25	Divisibility by 2, 3, 4, 5, 6, 9 and 11	Proves divisibility rules of 2, 3,4, 5, 6, 9 and 11 (M 803)
11	Number system	26	Natural numbers, whole numbers and integers	Recognises and appreciates (through patterns) the broad classification of numbers as even, odd, prime, co-prime, etc. (M 602)
12	Operations on integers	27	Four basic operations on integers	Solves problem involving addition and subtraction of integers. (M 604)
13	Fractions	28	Fractions, types of fractions	Identifies half, one-fourth, three-fourths of a whole in a given picture by paper folding and also in a collection of objects. (M 404)
14	Addition and subtraction of fractions	29	Addition and subtraction of fractions	Solves problems on daily life situations involving addition and subtraction of fractions / decimals (M 606)
15	Decimal numbers	30	Recognizing decimal numbers	Converts fractions into decimals and vice versa (M 508)

1 One, two digit numbers - Place value

Days : 1, 2

Learning Outcomes

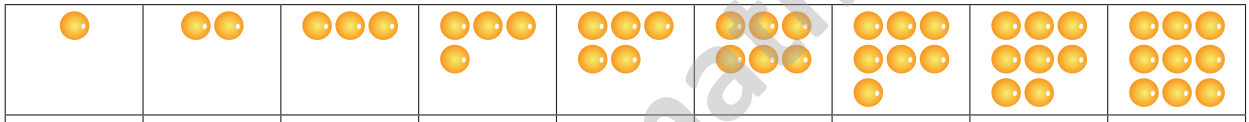
- Counting objects using the numbers from 1 to 9.
- Reads and writes numeral for numbers up to 99.
- To know the place value of two digit number.

Teacher Activities

Activity 1: (Introduction of one digit numbers)

Introducing single digit numbers using beads, sticks and seeds.

Associating the number of objects with numerals 1 to 9 and introducing them. Showing one bead and telling one, showing two beads and telling 2 and so on. Introducing the numbers 1 to 9 and its numerals by showing appropriate number of objects.



1	2	3	4	5	6	7	8	9

Activity 2: (Introduction of two digit numbers)

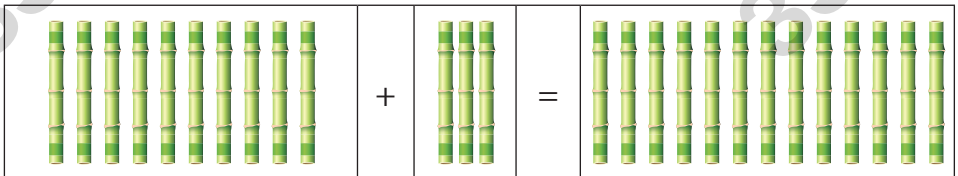
Teacher adds a bead with nine beads and introduces the number ten with ten beads. Its numeral form is '10'.

9	+	1	=	10

By adding the beads one by one with ten beads, he introduces the numbers 11, 12…99.

Activity 3: (Place Value)

Teacher keeps bundled with 10 sticks and some loose sticks on the table. Teacher takes a bundle of ten sticks and 3 loose sticks on his left hand and thirteen loose sticks on his right hand. He/She counts both separately and shows that the same 13 sticks are there in both of his hands. With this he/she explains that 13 ones can be grouped as one ten and 3 ones.



10	+	3	=	13

He/She explains in 13, 3 represents 3 ones and 1 represents one ten. The same is repeated with different numbers and place value is explained. He/She also explains that there are ten ones in a ten.

2 Comparison of two digit numbers

Days : 3 - 6

Learning Outcomes

- Comparison of two digit numbers.
- Knows the predecessor and successor of a number.
- To arrange the numbers in ascending and descending order.
- To know the odd and even numbers.

Activity 1: (Bigger number - Smaller number)

Compare : 23 and 35

Step 1: Number of tens in 23 is 2

Number of tens in 35 is 3

Step 2: Now 3 tens are greater than 2 tens.

Therefore 35 is bigger than 23 and 23 is less than 35.

Compare : 42 and 47

Step 1: The number of tens in 42 is 4

The number of tens in 47 is 4.

Now both the numbers have 4 tens. Now let us compare the ones.

Step 2: The number of ones in 42 is 2.

The number of ones in 47 in 7.

Step 3: Now 7 ones is bigger than 2 ones. Therefore 47 is bigger than 42 and 42 is smaller than 47.

Hence to compare two numbers first compare tens. If tens are equal then compare ones.

Activity 2: (Predecessor - Successor)

The teacher writes the number 27 on the blackboard and says that the predecessor of 27 is 26 if you subtract 1 from that number, and the successor of 27 is 28 if you add 1 to that number.

In this way, the teacher teaches the predecessor and successor of different numbers. Hence when one is removed from the given number, we get the predecessor of that number and one is added to a given number, we get the successor of that number.

Activity 3: (Ascending Order - Descending Order)

Teacher explains the method of arranging the numbers in ascending order as below. Teacher writes the following numbers 67, 45, 56, 38, 93 on the blackboard. The smallest number among the five is 38. Then the smallest number among the remaining four is 45. The smallest number among the remaining is 56. The smaller number of the remaining two is 67. The biggest number is 93. Now ascending order of the numbers is 38, 45, 56, 67, 93. The descending order is 93, 67, 56, 45, 38. Hence when we writes the numbers from smaller to greater, it is known as ascending order and when we write the numbers from greater to smaller, it is known as descending order. Similarly the procedure is followed for different numbers.

Activity 4: (Odd number - Even number)

Teacher represents 21 and 14 in terms dots on the blackboard. Then he/she circles two, two dots corresponding to both the numbers. He/She is left with one dot for 21 and no dots for 14. He/She concludes that 21 is the odd number and 14 is the even number. Similarly he/she explains with different numbers. Also, the teacher explains odd numbers are ending with 1, 3, 5, 7, 9 and even numbers are ending with 0, 2, 4, 6, 8.

3 Addition and subtraction of one, two digit numbers

Days : 7 - 12

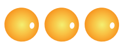
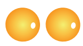
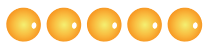
Learning Outcomes

- To know the addition of one digit numbers.
- To know the addition of two digit numbers.
- To know the subtraction of one digit numbers.
- To know the subtraction of two digit numbers.

Teacher Activities

Activity 1: (Addition of one digit numbers)

Teacher takes 3 sticks in one hand and 2 sticks on the other hand. He/She adds the sticks in his both hands and tells the total as 5.

	+		=	
3		2		5

In this way, teacher explains adding the numbers is called addition and it is represented by the symbol (+). Similarly he teaches the addition using different numbers.

Activity 2: (Addition of two digit numbers)

Teacher writes 24 + 15 on the blackboard. First he represents the numbers in the place value grid. Then he adds the numbers in ones place and then ten place. The answer is 39. Similarly he explains addition of numbers with carry over.

	T	O
	2	4
+	1	5
	3	9

Activity 3: (Subtraction of one digit numbers)

Teacher takes 6 beads and removes 2 beads from it and tells the number of remaining beads is 4.

Removal of objects is known as Subtraction and it is denoted by the symbol (–). In the same way, teacher teaches Subtraction using different single numbers.

Activity 4: (Subtraction of two digit numbers)

Teacher writes 48-13 on the blackboard. First he/she represents the numbers in the place value grid. Then he subtract them and gives the answer as 35. Similarly he explains subtraction of numbers with borrowing.

	T	O
	4	8
–	1	3
	3	5

4 Addition and subtraction of three digit numbers

Days : 13 - 17

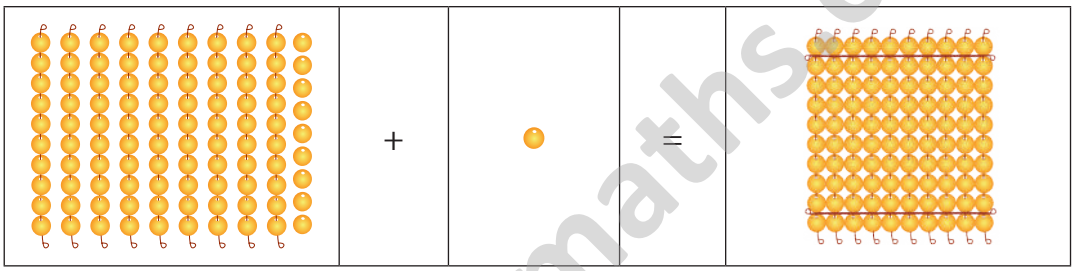
Learning Outcomes

- Reads and writes numeral for numbers up to 999.
- To know the addition of three digit numbers.
- To know the subtraction of three digit numbers.

Teacher Activities

Activity 1: (Introduction - Three digit numbers)

Teacher adds a bead to a collection of 99 beads and introduces the number hundred with hundred beads and its numeral form is 100.



By adding the beads one by one with hundred balls, he/she introduces the numbers 101, 102, 103…. 999 with its numerals.

Activity 2: (Addition of three digit numbers)

Teacher writes 315 + 224 on the blackboard. First he/she represents the numbers in the place value grid. Then he adds the numbers in ones place and then tens and hundreds place as below. The answer is 539.

	H	T	O
	3	1	5
(+)	2	2	4
	5	3	9

Similarly he explains addition of numbers with carry over.

Activity 3: (Subtraction of three digit numbers)

Teacher writes 485 - 132 on the blackboard. First he/she represents the numbers in the place value grid. Then he subtracts them and gives the answer as 353.

	H	T	O
	4	8	5
(–)	1	3	2
	3	5	3

Similarly he explains subtraction of numbers with borrowing.

5 Multiplication

Days : 18 - 19

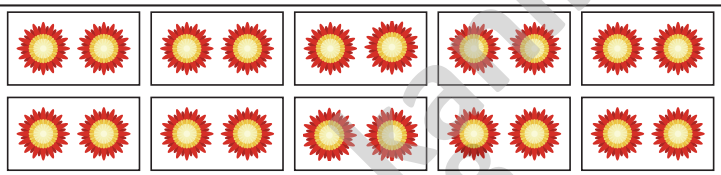
Learning Outcomes

- To know the concept of multiplication.

Teacher Activities

Activity 1:

Teacher takes 10 cards with two flowers in each card and keeps one card on the table and says that there are two flowers, two cards on the table and says that there are four flowers and continuing the same for 10 cards. He/She consolidates on the blackboard as below.

Cards	Table	No. of Flowers
	1×2	2
	2×2	4
⋮	⋮	⋮
	10×2	20

Now the multiplication 2 table is introduced as above. Similarly the other multiplication tables are introduced

Activity 2:

Teacher explains multiplication problems using place holders as below

1. $\square \times 4 = 20$
2. $2 \times \square = 12$
3. $5 \times 6 = \square$

Similarly he/she explains many problems involving multiplication of two digit numbers. For example

$$\begin{array}{r} 35 \times \\ 12 \\ \hline 70 \\ 35 \\ \hline 420 \\ \hline \end{array}$$

6 Square numbers

Day : 20

Learning Outcomes

- To know the square numbers

Teacher Activities

Activity:

Teacher forms squares with seeds as below

1×1=1 2×2=4 3×3=9 4×4=16 5×5=25

He/she counts the number of seeds in each square and writes on the board. A number which forms a square is known as a perfect square numbers.

Hence when we multiply a number with itself we get a perfect square number.

Number	Square number	Number	Square number
1	1	11	121
2	4	12	144
3	9	13	169
4	16	14	196
5	25	15	225
6	36	16	256
7	49	17	289
8	64	18	324
9	81	19	361
10	100	20	400

7 Least Common Multiple (LCM)

Day : 21

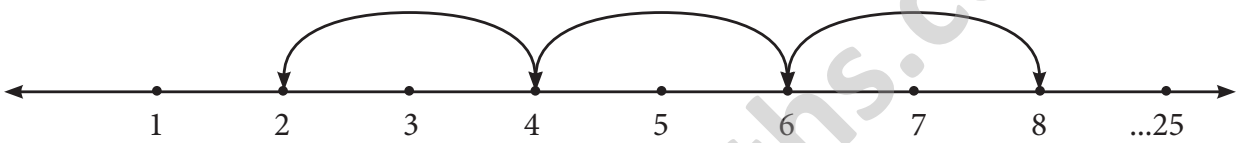
Learning Outcomes

- To know the Least Common Multiple (LCM) through multiples.

Teacher Activities

Activity 1:

Teacher draws a number line on the board as below.



Teacher explains skip counting of 2's with number line He/She lists out the numbers as 2, 4, 6, 8, ... and tells these are known as multiples of 2. In this way Teacher teaches multiples of different numbers.

Activity 2:

Teacher takes a sheet of monthly calendar and circle the multiples of 3 in green and multiples of 4 in red colour He/She writes them on board as

Multiples of 3 = 3, 6, 9, 12, 15, 18, 21, 24, 27, 30

Multiples of 4 = 4, 8, 12, 16, 20, 24, 28.

Common Multiples of 3, 4 = 12, 24.

Least Common Multiple (LCM) = 12

Now the least common number 12 is known as Least Common Multiple (LCM) of 3 and 4.

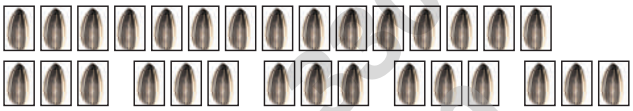
8 Division and Highest Common Factor (HCF)

Days : 22 - 23

Learning Outcomes

- To know the concept of division.
- To know the HCF through factors.

Teacher Activities



Activity 1: (Division)

Teacher takes fifteen seeds and place them in threes on the table. The number of groups are five. This is nothing but division of 15 by 3by equal grouping.

In addition to the above he explains divisions on the blackboard as below

$$\begin{array}{r} 5 \\ 3\overline{)15} \\ 15 \\ \hline 0 \end{array}$$

Here,
15 is the dividend;
3 is the divisor;
5 is the quotient;
0 is the remainder

Activity 2: (HCF)

Teacher explains the method of finding HCF of 16, 24 by factorisation method as below.

The multiplication facts of 16 are	=1×16, 2×8, 4×4
The factors of 16 are	=1, 2, 4, 8, 16
The multiplication facts of 24 are	=1×24, 2×12, 3×8, 4×6
The factors of 24 are	=1, 2, 3, 4, 6, 8, 12, 24
The common factors of 16 and 24 are	=1, 2, 4, 8
The highest common factor is	=8
HCF of (16, 24)	= 8

Activity 3:

Teacher explains the method of finding HCF of 7, 8 by factorisation method as below

The multiplication fact of 7 are	= 1×7
The factors of 7 are	= 1,7
The multiplication fact of 8 are	= 1×8, 2×4
The factors of 8 are	= 1, 2, 4, 8
The common factors of 7 and 8is	= 1
Hence HCF of (7,8)	= 1

9 Prime and Composite number

Day : 24

Learning Outcomes

- To know the prime and composite numbers

Teacher Activities

Activity: (Division)

Teacher writes numbers like 15, 18, 1,2,5, 9, 14, on the blackboard and write their multiplication facts and factors as follows.

15 ⟶ 1×15, 3×5;

Factors of 15 ⟶ 1, 3, 5, 15

18 ⟶ 1× 18, 2×9, 3×6;

Factor of 18 ⟶ 12,3,6,9,18

1 ⟶ 1×1;

Factors of 1 ⟶ 1

2 ⟶ 1×2;

Factors of 2 ⟶ 1, 2

5 ⟶ 1×5;

Factors of 5 ⟶ 1, 5

9 ⟶ 1×9, 3×3;

Factors of 9 ⟶ 1, 3, 9

14 ⟶ 1×14, 2×7;

Factors of 14 ⟶ 1, 2, 7, 14

The teacher classifies the numbers based on its Factors as below

The number having only two Factors (1 and the same number)	The numbers having more than two Factors
2 ⟶ 1, 2 5 ⟶ 1, 5	9 ⟶ 1, 3, 9 14 ⟶ 1, 2, 7, 14 15 ⟶ 1, 3, 5, 15 18 ⟶ 1, 2, 3, 6, 9, 18

Teacher introduces that the first category namely the numbers having only two factors (1 and the same number) are called prime numbers and the second category namely the numbers having more than two factors are called composite numbers.

The prime numbers are = 2, 5

The composite numbers are = 9, 14, 15, 18

The number 2 is the only even prime number

The number 1 is being the unit number it is neither prime nor composite number

10 Divisibility

Day : 25

Learning Outcomes

- To know the divisibility rules.

Teacher Activities

Activity 1:

Teacher writes the following numbers on the blackboard and divide them by 2

(i)18 (ii) 32

(iii) 21 (iv) 44

(v) 50 (vi) 66

(vii) 73 (viii) 69

The numbers divisible by 2 are 18, 32, 44, 50, 66

Observe and list out the ones place of the above numbers as 8, 2, 4, 0 and 6

That is 0, 2, 4, 6, 8

Hence teacher concludes that all the numbers having any of the above numbers in ones place is divisible by 2

Activity 2:

Teacher writes the following numbers on the blackboard and adds their digits as below

36 = 3+6 = 9

41 = 4+1 = 5

51 = 5+1 = 6

53 = 5+3 = 8

72 = 7+2 = 9

84 = 8+4 = 12 = 1+2=3

By observing the addition of the digits of the above numbers, list the numbers 36, 51, 72, 84 which is divisible by 3. Thus, if the sum of the digits of the number is divisible by 3, then the number is divisible by 3. Similarly the teacher explains the divisibility of the numbers 4,5,6,8,9,10 and 11.

11 Number system

Day : 26

Learning Outcomes

- To know the properties of natural numbers, whole numbers and integers.

Teacher Activities

Activity 1:

The numbers that are used to count the objects are called counting numbers or Natural numbers. It is denoted by N N= { 1, 2, 3, ……..}

The smallest natural number is 1

All natural numbers except 1 have a predecessor

All natural numbers have a successor

Activity 2:

When 0 is added to the natural numbers, we get the set of whole number. It is denoted by the letter W.

W = {0, 1, 2, 3 .....}

The smallest whole number is 0

All whole numbers except 0 have a predecessor

All whole numbers have a successor

Sum of two whole numbers is a whole number for example

(i) 25+30=55 (ii) 13+0=13

Difference between two whole numbers need not be a whole number For example,

(i) 42-15=37 (ii) 32-43=?

The product of two whole numbers is a whole number for example,

(i) 13×2=26 (ii) 27×0=0

The division of two whole numbers need not be a whole number. For example,

(i) $\frac{24}{3}=8$ (ii) $\frac{14}{3}=?$

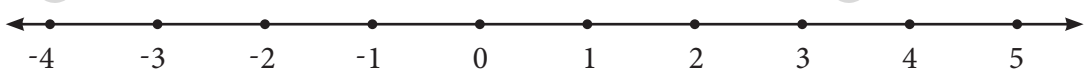
Activity 3:

Teacher gives two problems 5-3 and 3-5 and asks what is the value of 3-5? With this, teacher introduces the need for an extension of numbers.

The extension of number system is called Integer which includes negative numbers and positive numbers and it is donated by Z.

Z= {…. -3, -2, -1, 0, 1, 2, 3, ….}

The number line for integers is



From the number line, we observe that

The numbers to the right of '0' are called positive integers and to the left of '0' are called negative integers.

0 is less than every positive integer but greater than every negative integer.

For eg: 0<4 and 0>-4

12 Operations on integers

Day : 27

Learning Outcomes

- To know the four basic operations on Integers.

Teacher Activities

Activity 1:

Teacher extends the addition table for negative integers as below.

5+2=7

4+2=6

3+2=5

2+2= 4

1+2=3

0+2=2

-1+2=1

-2+2=0

-3+2=-1

-4+2=-2

-5+2=-3

He/She makes the students read the table and practises for other numbers also. From the table he explains addition of Integers as below.

4 + 2 = 6; (-2) +2 = 0 ; (-4) + 2 = -2

Therefore when we add a positive integer and a negative integer, we find the difference of two integers with the symbol of greater integer.

Teacher explains the addition table for negative integers as below.

2 + (-1) = 1

1 + (-1) = 0

0 + (-1) = -1

(-1) + (-1) = -2

(-2) + (-1) = -3

He/she explains adding two negative integers as similar to regular addition with negative sign as below

(-1) + (-1) = -2

(-2) + (-1) = -3

Activity 2:

Teacher explains subtraction of integers with tables as below

3 - 2 = 1	3-(-2)=5
2 - 2 = 0	2-(-2)=4
1 - 2 = -1	1-(-2)=3
0 - 2 = -2	0-(-2)=2
-1 -2 = -3	-1-(-2)=1
-2 -2 = -4	-2-(-2)=0
-3 -2 = -5	-3-(-2)=-1

He/She explains problems from the tables as below

1-2=-1; 2-(-2) = 4;

-3-2=-5; -2-(-2)=0

Activity 3:

Teacher extends the multiplication table as below and explains multiplication of integers.

3×2=6	3×(-2)=-6
2×2=4	2×(-2)=-4
1×2=2	1×(-2)=-2
0×2=0	0×(-2)=0
-1×2=-2	-1×(-2)=2
-2×2=-4	-2×(-2)=4
-3×2=-6	-3×(-2)=6

He/She explains the following problems from the table.

$3 \times 2 = 6$; $3\times(-2)=-6$

$(-3) \times 2 = -6$; $(-3)\times(-2)=6$

Activity 4:

Teacher explains division of integers with the help of multiplication tables as below.

$3 \times 2 = 6$ $\quad \frac{6}{2} = 3$ and $\frac{6}{3} = 2$

$(-3) \times 2 = -6$ $\quad \frac{(-6)}{2} = -3$ and $\frac{(-6)}{(-3)} = 2$

From the above, we observe that when we multiply or divide integers with same sign (either '+' or '–') we get positive integer and multiply or divide integers with different signs (one '+' and one '–'), we get negative integer.

13 Fractions

Day : 28

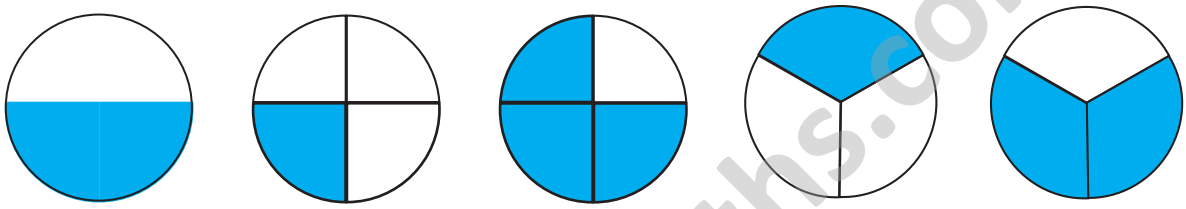
Learning Outcomes

To know the fractions.

Teacher Activities

Activity 1:

Teacher introduces simple fractions through pictures.



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

Teacher explains from the above picture that a fraction is how many parts are a part of whole.

$$\text{Fraction} = \frac{\text{Numerator}}{\text{Denominator}}$$

In this Denominator is the total number of equal parts that make up a whole and Numerator is the number of equal parts taken from a whole.

For example, in $\frac{3}{4}$, 3 is Numerator and 4 is Denominator

Activity 2:

Teacher writes some fractions on the board as below.

$$\frac{1}{2}, \frac{3}{4}, \frac{4}{3}, \frac{3}{2}, \frac{4}{5}, \frac{5}{2}$$

He/she compares numerator and denominator and groups the fractions as below.

$$\frac{1}{2}, \frac{3}{4}, \frac{4}{5} \qquad \frac{4}{3}, \frac{3}{2}, \frac{5}{2}$$

From the above example, in a fraction, if the numerator is smaller than the denominator, then it is called as a proper fraction and if the numerator is greater than the denominator, then it is called as an improper fraction.

Mixed fraction is defined as a fraction which contains a whole number and a proper fraction.

Example : $1\frac{1}{4}$

14 Addition and subtraction of fractions

Day : 29

Learning Outcomes

To know the addition and subtraction of fractions.

Teacher Activities

Activity 1:

Teacher explains addition and subtraction of fractions with same denominator as below

(i) $\frac{3}{5}+\frac{1}{5}=\frac{3+1}{5}=\frac{4}{5}$ (ii) $\frac{3}{5}-\frac{1}{5}=\frac{3-1}{5}=\frac{2}{5}$

Therefore when fractions have same denominator, it is enough to add or subtract the numerator.

Activity 2:

Teacher explains addition and subtraction of fractions with different denominators as below.

(i) $\frac{2}{3}+\frac{3}{4}$ (ii) $\frac{4}{5}-\frac{3}{4}$

The multiples of 3 are : 3, 6, 9, 12, 15, 18, 21, 24 ....
The multiples of 4 are : 4, 8, 12, 16, 20, 24, 28, ...
The common multiple are : 12, 24, ...
The Least Common Multiple is : 12
The LCM of (3, 4) = 12

Let us write the equivalent fraction of $\frac{2}{3}$ and $\frac{3}{4}$ as below

$\frac{2}{3}=\frac{2\times4}{3\times4}=\frac{8}{12}$; $\frac{3}{4}=\frac{3\times3}{4\times3}=\frac{9}{12}$

Therefore $\frac{2}{3}+\frac{3}{4}=\frac{8}{12}+\frac{9}{12}=\frac{17}{12}$

(ii) $\frac{4}{5}-\frac{3}{4}$

The multiples of 5 are : 5, 10, 15, 20, 25, 30, 35, 40, 45, 50.
The multiples of 4 are : 4, 8, 12, 16, 20, 24, 28, 32, 36, 40.
The common multiples are : 20, 40,
The Least Common Multiple is : 20.
The LCM of (4,5) = 20

Let us write the equivalent fractions of $\frac{4}{5}$ and $\frac{3}{4}$ as below

$\frac{4}{5}=\frac{4\times4}{5\times4}=\frac{16}{20}$; $\frac{3}{4}=\frac{3\times5}{4\times5}=\frac{15}{20}$

Therefore $\frac{4}{5}-\frac{3}{4}=\frac{16}{20}-\frac{15}{20}=\frac{1}{20}$

15 Decimal numbers

Day : 30

Learning Outcomes

- To know the decimal numbers

Teacher Activities

Activity:

Teacher introduces decimal numbers as below. He/She takes a rectangle, divides it into ten equal parts and shades one part of it as below

The fraction of the shaded portion = $\frac{1}{10}$. This can be represented as 0.1 which is called decimal form of a fraction. Therefore, the fractions with denominator 10, 100, 1000, ……. can be represented in decimal form. For example,

(i) $\frac{3}{10} = 0.3$

(ii) $\frac{45}{100} = 0.45$

(iii) $\frac{7865}{1000} = 7.865$

(iv) $\frac{2}{5} = \frac{2\times2}{5\times2} = \frac{4}{10} = 0.4$

Grade Level Concept

6

MATHEMATICS

Content

THIRAN – Plan of Action – Grade Level Concept – 6th Standard

S.No.	Title	Days	Content	Learning Outcomes
1	Geometric Properties	1	Identifying lines of symmetry	Identifies 2D shapes from the immediate environment that have rotation and reflection symmetry like alphabet and shapes (M 510)
2	Perimeter, area and angles	2	Finding the perimeter and area of squares and rectangles, identifying types of angles	Finds out the perimeter and area of rectangular objects in the surroundings like floor of the class room, surfaces of a chalk box etc. (M 620) Classifying angles according to their measure (M 612)
3	Numbers, Number names and Place value	3	Recognizing numbers above 10,000	Reads and writes numbers bigger than 1000 being used in her/his surroundings (M 501)
4	Numbers - Addition	4	Addition of four-digit numbers	Creates and solves simple real life situations/ problems including money, length, mass and capacity by using the four operations (M 403)
5	Numbers - Subtraction	5	Subtraction of four-digit numbers	
6	Numbers - Multiplication	6	Multiplication using Napier's method	
7	Numbers - Division	7	Dividing a three-digit number by a single-digit number	
8	Numbers - Factors	8	Finding factors using the T CHART method	
9	Measurements – Conversion of Higher unit into Lower unit (length)	9	Conversion of length measures	Relates different commonly used larger and smaller units of length, weight and volume and converts larger units to smaller units and vice versa(M 512)
10	Measurements – Addition and Subtraction (length)	10	Addition and subtraction of length measures	Solves problem involving daily life situations related to length, distance, weight, volume and time involving four basic arithmetic operations (M 415)

S.No.	Title	Days	Content	Learning Outcomes
11	Measurements – Conversion of Higher unit into Lower unit (weight)	11	Conversion of weight measures	Relates different commonly used larger and smaller units of length, weight and volume and converts larger units to smaller units and vice versa(M 512)
12	Measurements – Addition and Subtraction (weight)	12	Addition and subtraction of weight measures	Solves problem involving daily life situations related to length, distance, weight, volume and time involving four basic arithmetic operations (M 415)
13	Measurements – Conversion of Higher unit into Lower unit (capacity)	13	Conversion of capacity measures	Relates different commonly used larger and smaller units of length, weight and volume and converts larger units to smaller units and vice versa(M 512)
14	Measurements – Addition and Subtraction (capacity)	14	Addition and subtraction of capacity measures	Solves problem involving daily life situations related to length, distance, weight, volume and time involving four basic arithmetic operations (M 415)
15	Time	15	Recognizing hours and minutes on a clock	Reads clock time in hour and minutes and expresses the time in a.m. and p.m. (M 416) Relates to 24 hr clock with respect to 12 hr clock (M 417)
16	Algebra	16	Recognizing and comparing the value of algebraic expressions	Adds/subtracts algebraic expressions (M 708)
17	Fractions	17	Identifying quarter, half, three-quarter and whole part using numbers	Identifies half, one-fourth, three-fourths of a whole in a given picture by paper folding and also in a collection of objects. (M 404)
18	Pattern	18	Pattern of triangular numbers and square numbers	Identifies the pattern in triangular number and square number (M 515)
19	Money	19	Addition problems based on money	Applies the four fundamental arithmetic operations in solving problems involving money, length, mass, capacity and time intervals (M 514)
20	Information processing	20	Knowing the details through pictures	Collects data related to various daily life situations, represents it in tabular form and as bar graphs and interprets it. (M 516)

1 Geometric Properties

Days : 1

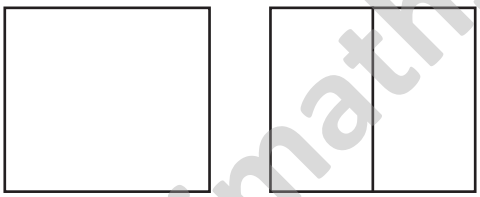
Learning Outcomes

- Identifies 2D shapes from the immediate environment that have rotation and reflection symmetry.

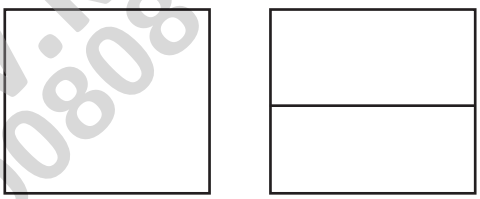
Teacher Activity

Activity: Identifying symmetrical lines.

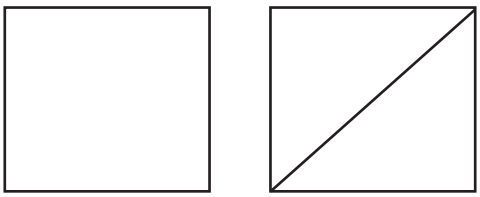
Step – 1: Taking a square shaped sheet, the teacher folds it vertically into two equal parts as shown in the diagram below. Draws a straight line on the folded area that divides it into two equal parts. It is called as line of symmetry.



Step – 2: Teacher folds it horizontally into two equal parts as shown in the diagram below. Draws a straight line on the folded area that divides it into two equal parts. It is called as line of symmetry.



Step – 3: Teacher folds it diagonally into two equal parts as shown in the diagram below. Draws a straight line on the folded area that divides it into two equal parts. It is called as line of symmetry.



Thus the teacher draws symmetrical lines for different shapes.

2 Perimeter, area and angles

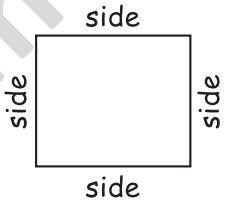
Day : 2

Learning Outcomes

- Explores the area and perimeter of simple geometrical shapes (triangle, rectangle, square) in terms of given shape as a unit.
- Classifies and draws the angles and knows supplementary and complementary angles.

Teacher Activity

Activity -1: Finding the perimeter and area of a square and a rectangular shapes.



Step – 1: Introducing the perimeter and area of a square as shown in the diagram below. In the square, all the four sides are equal.

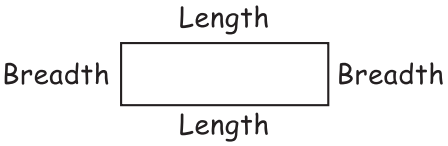
Step – 2: Perimeter of the square = SIDE+SIDE+SIDE+SIDE = 4 × SIDE units

Area of a square = SIDE × SIDE square units

Example: If a side of a square is 5cm, then find its perimeter and area. Side of square = 5cm

Perimeter of a square = 4 × SIDE = 4 × 5 = 20 cm

Area of a square = SIDE × SIDE = 5 × 5 = 25 cm^2



Step – 3: Introducing the perimeter and area of a rectangle as shown in the diagram below. In a rectangle, we have 2 lengths and 2 breadths.

Step – 4: Perimeter of the rectangle = (length+breadth)+(length+breadth)

= 2 × (length+breadth) units

Example: If the length of a rectangle is 6m and width is 4m,then find its perimeter and area.

Perimeter of the rectangle = (length+breadth)+(length+breadth) units

= 2 × (length+breadth) = 2 × (6+4) = 2 × (10) = 20m.

Area of a rectangle = length × breadth square units = 6 × 4 = 24m^2.

Activity -2: Knowing the types of angles.

Step – 1: Explaining the types of angles.

(i) Acute angle, (ii) Obtuse angle, (iii) Right angle, (iv) Straight angle, (v) Zero angle

Step – 2: First you have to tell the students the right angle. Protractor is to be explained to the students by showing it how to mark an angle 90° by using the protractor. Also exercise are to be given to draw a right angle.

Step – 3: Students know types of angles by using protractor. They are to be explained if an angle is less than 90°, then it is acute (ex. 30°, 50°, 65°)

Step – 4: If an angle is more than 90°, then it is described as an obtuse angle (ex. 120°, 150°, 165°)

Step – 5: If an angle is 180°, then it is described as a straight angle.

Step – 6: If the sum of two angles is 90° then two angles of a linear pair are always complementary. (eg; 60° is a complement of 30°)

Step – 7: If the sum of two angles is 180°, then two angles of a linear pair are always supplementary. (eg; 150° is a supplement of 30°)

3 Numbers, Number names and Place value

Day : 3

Learning Outcomes

- Reads and writes numbers bigger than 10000.

Teacher Activity

Activity 1: Knowing numbers more than 10000.

Step – 1: Creating numbers using the number cards on the plugin by moving up and down and training to read the created new numbers.

Step – 2: Tabulate the given numbers according to the place value.

T. Th	Th	H	T	O
3	5	4	2	5

Step – 3: Practise writing the given numbers in expanded form.

$$30000 + 5000 + 400 + 20 + 5 = 35425$$

Activity 2 :

Step – 1: Write a large number on the board (e.g.47,368)

Step – 2 : Ask students

- How many digits does this number have ? (5)
- What is the place value of '4'? (Ten thousands)

Step – 3 : Read the number aloud

- forty seven thousand three hundred sixty eight

4 Numbers - Addition

Day : 4

Learning Outcomes

- Applies the four fundamental arithmetic operations in solving problems involving money, length, mass, capacity and time intervals.

Teacher Activity

Activity : Addition of 4 digit numbers(Without Regrouping)

Step – 1: Add: 3420 + 4136 + 322

Step – 2: Arrange the Numbers according to place value

	Th	H	T	O
	3	4	2	0
	4	1	3	6
(+)		3	2	2

Step – 3: Teacher adds the Ones, Tens, Hundreds and Thousands using lines or fingers. First add Ones (0 + 6 + 2 = 8), Tens (2 + 3 + 2 = 7), Hundreds (4+1+3=8), Thousands (4+3=7) and finds the sum.

	Th	H	T	O
	3	4	2	0
	4	1	3	6
(+)		3	2	2
	7	8	7	8

3420+4136+322= 7878.

Similarly, Teacher solves various addition problems.

5 Numbers - Subtraction

Day : 5

Learning Outcomes

- Applies the four fundamental arithmetic operations in solving problems involving money, length, mass, capacity and time intervals.

Teacher Activity

Activity 1: Subtraction of four digit numbers (Without regrouping)

Step – 1: Subtract: 5458 - 2035

Step – 2: Arrange the numbers according to the place value.

	Th	H	T	O
	5	4	5	8
(-)	2	0	3	5

Step – 3: Teacher subtracts the Ones, Tens, Hundreds and Thousands using lines or Fingers. First subtract Ones (8-5=3), Tens (5-3=2), Hundreds (4-0=4), Thousands (5-2=3) and finds the subtraction.

	Th	H	T	O
	5	4	5	8
(-)	2	0	3	5
	3	4	2	3

5458-2035 = 3423. Teacher solves various subtraction problems.

Activity 2: Subtract 3000 - 1695

Step: Subtract Ones (10-5=5), Tens (9-9=0), Hundreds (9-6=3), and Thousands (2-1=3 respectively as shown below.

	Th	H	T	O
	(2)	(9)	(9)	(10)
	~~3~~	~~0~~	~~0~~	~~0~~
(-)	1	6	9	5
	1	3	0	5

In the same way, Teacher explains more subtraction problems (with regrouping).

6 Numbers - Multiplication

Day : 6

Learning Outcomes

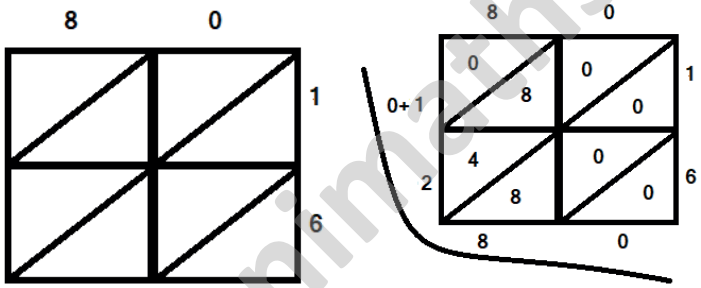
- Applies the four fundamental arithmetic operations in solving problems involving money, length, mass, capacity and time intervals.

Teacher Activity

Activity: Multiplication of numbers (Napier Method)

Step – 1: Multiplication of a two digit number by a two digit Number

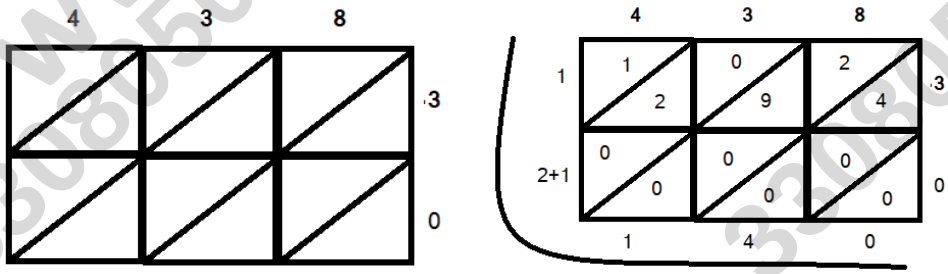
Here the multiplicand is 80 and multiplier is 16 and by multiplying



we get $80 \times 16 = 1280$

Step – 2: Multiplication of a three digit number by a two digit number

438×30. Here the multiplicand is 438 and multiplier is 30 and by multiplying



we get, $438 \times 30 = 13140$

7 Numbers - Division

Day : 7

Learning Outcomes

- Applies the four fundamental arithmetic operations in solving problems involving money, length, mass, capacity and time intervals.

Teacher Activity

Activity: Division of three digit numbers by one digit number

Step – 1: Divide :437 ÷ 2

Here dividend is 437 and divisor is 2. Take 4 Hundreds from 437

2) 437 (2

4 ⟶ 4 divides 2 times by 2

0 ⟶ remainder

So, divide by 2 and write quotient 2 and subtract (4-4=0), bring down the next number 3 to get 03

Step – 2:

2) 437 (21

4

03 ⟶ (03 divides 1 time by 2)

02

1

So, divide 3 and write quotient part as 1 (21) and subtract (03-02=1), bring down the next number 7 to get 17

Step – 3:

2) 437 (218

4

03

02

17 ⟶ (2 divides 17 by 8 times only)

16

1

Step – 4: So divide 17 by 2 and write the quotient as 8 (218) and subtract (17-16) and write the remainder 1.

8 Numbers - Factors

Day : 8

Learning Outcomes

- Applies the four fundamental arithmetic operations in solving problems involving money, length, mass, capacity and time intervals.

Teacher Activity

Activity: Explaining the method of viewing factors using the T CHART method.

Example : Find the factors of 24.

As 1 is a factor of each number, hence 1 is a factor of 24.

24	
1	24

As the number 24 is ending by 4, it is divisible by 2. Hence 2 is a factor.

We can find whether the number will be divisible by 3, 4, 5, 7, 9, 10

Explaining the factors of 24 are 1,2,3,4,6,8,12,24.

24	
1	24
2	12
3	8
4	6

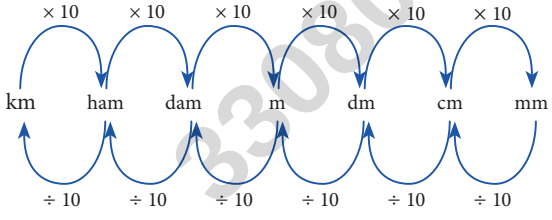
9 Measurements – Conversion of Higher unit into lower unit (Length)

Learning Outcomes

- Conversion of meter into centimeter and vice versa

Teacher Activity

Activity: Converting kilometer into meter and meters into centimeters



Step – 1: Converting kilometer in to meter

1 km = 1000 m 7 km = 7000 m 3 km 50 km = 3050 m

Step – 2: Converting meter in to centimeter

1 m = 100 cm 7 m = 700 cm 12 m 15 cm = 1215 cm

10 Measurements - Addition and Subtraction (Length)

Day : 10

Learning Outcomes

- Solves problem involving daily life situations related to length, distance, weight, volume and time involving four basic arithmetic operations.

Teacher Activity

Activity: Addition operation (Measurement of Length)

Step – 1: Add : 28 km 30 m + 10 km 42 m

First add the meter (30 + 42 = 72), whose sum is less than 100.

Next add the kilometer (28 + 10 = 38)

	km	m
	28	30
(+)	10	42
	38	**72**

Step – 2: If the length of one side of a compound wall of a school is 42 m 59 cm and the length of the other side of the wall is 38 m 67 cm, then find the total length of the compound wall.

First add cm (59 + 67 = 126). Whose sum is greater than 100 (100 + 6).

Convert 100 cm = 1 m and add 1 metre.

Then add the meters (42 + 38 + 1 = 81).

The total length of the compound wall = 81m 26cm

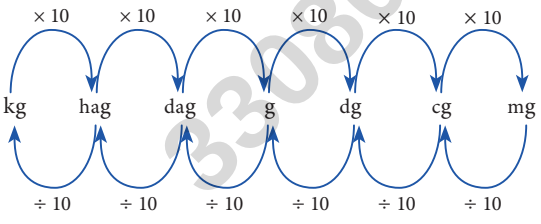
	m	cm
	42	59
(+)	38	67
	81	**26**

11 Measurements - Conversion of higher unit into lower unit (Weight)

Learning Outcomes

- Conversion of kilogram into gram and gram into milligram.

Teacher Activity



Activity: Conversion of kilograms into gram and gram into milligram (Measurement of weight)

Step – 1: Conversion of kilogram into gram (weighing)

1kg = 1000g 8kg = 8000g 4kg 50g = 4050g

Step – 2: Conversion of gram into milligram (weighing)

1g = 1000mg 5g = 5000mg 17g 15mg = 1715mg

12 Measurements - Addition and Subtraction (Weight)

Day : 12

Learning Outcomes

- Solves problem involving daily life situations related to length, distance, weight, volume and time involving four basic arithmetic operations.

Teacher Activity

Activity : Addition (Measurement of weight)

Step – 1: Find the sum of 18kg 600g + 41kg 320g

First find the sum of the grams (600 + 320 = 920) whose sum is less than 1000g.

Next find the sum of the kilogram (18 + 41 = 59).

	kg	g
	18	600
(+)	41	320
	59	920

Step – 2: If the weight of one bag of rice is 43kg 590mg and the weight of another bag of rice is 28kg 790g, then find the total weight of the two bags of rice.

First we need sum of grams (790 + 590 = 1380) whose sum is greater than 1000g. Convert 1380g into gram (1000 + 380). Here Convert 1000g = 1kg and sum with the kilograms (43 + 28 + 1 = 72).

	kg	g
	43	790
(+)	28	590
	72	380

The total weight of the two bags of rice = 72 kg 380 g

13 Measurements - Conversion of higher unit into lower unit (Capacity)

Day : 13

Learning Outcomes

- Conversion of litres into millilitres and vice versa.

Teacher Activity

Activity: Conversion of litres into millilitres (capacity)

Step – 1: Convert 18 litres into millilitres

1 litre contains 1000 *ml*.

I.e. 1 litre is equal to 1000 *ml*.

Step – 2: $1\ l = 1 \times 1000\ ml$

$= 1000\ ml$

$2\ l = 2 \times 1000\ ml$

$= 2000\ ml$

$3\ l = 3 \times 1000\ ml$

$= 3000\ ml$

$18\ l = 18 \times 1000\ ml$

$= 18000\ ml$

14 Measurements - Addition and subtraction (Capacity)

Day : 14

Learning Outcomes

- Solves problem involving daily life situations related to length, distance, weight, volume and time involving four basic arithmetic operations.

Teacher Activity

Activity 1: Addition Operation (Capacity)

Step – 1: Add: 12 *l* 300 *ml* + 21 *l* 540 *ml*

First add millilitres 300 and 540 (300 + 540 = 840) whose sum is less than 1000*ml*. Next add 12 and 21 litres (12 + 21 = 33). Then we get 33 litres.

The answer we get 33 litres 840 *ml*.

	l	*ml*
	12	300
(+)	21	540
	33	840

Step – 2: If the capacity of a jar is 42 *l* 250 *ml* and the capacity of another jar is 28 *l* 850 *ml*, then find the total capacity of the two jars.

First add millilitres 250 and 850 (250 + 850 = 1100), whose *ml* more than 1000. Convert 1100 *ml* into as litre.(1000 + 100 = 1 *ml* + 100 *ml*). Next add 1 litre with 42 litre (42 + 28 + 1 = 71). We get 71 litres

The total capacity of jars = 71 litres 100 *ml*.

	l	*ml*
	42	250
(+)	28	850
	71	100

Activity 2: Subtraction (Capacity)

Step – 1: Find : 18 *l* 900 *ml* - 12 *l* 400 *ml*

First you have to subtract millilitres 900 and 400 (900-400 = 500).we get 500 *ml*. Then subtract litres 18 and 12(18-12 = 6).we get 6 litres.

	l	*ml*
	18	900
(–)	12	400
	6	500

Step – 2: In a water tank with a capacity of 34 *l* 150 *ml*, 17 *l* 250 *ml* water is filled. Find how much of water is needed to fill the rest.

First you need to subtract millilitres (150-250 =?). It is not possible to subtract so take 1 litre from 34 *l* (34 – 1 = 33) and convert 1 *l* = 1000 *ml* and add with 150*ml* where we get 1150 *ml*. Then subtract 250*ml* from 1150*ml*, we get 900*ml* (1150-250 = 900). Next subtract 17 *l* from 33, we get 16 *l* (33-17 = 16).

The amount of remaining water to be filled = 16 *l* 900 *ml*.

	l	ml
	34	150
(–)	17	250
	16	900

15 Time

Day : 15

Learning Outcomes

- Reads clock time in hour and minutes and expresses the time in a.m. and p.m.

Teacher Activity

Activity: Recognizing hours and minutes in the clock

Step – 1: Teacher demonstrates minute hand and hour hand with a model clock by rotating it.

Step – 2: 5,10,15, ... 60 were written around the clock on a cardboard.

Teacher demonstrates:

- If the long hand (minute hand) moves from 12 to 1, then it is 5 minutes.
- If the long hand (minute hand) moves from 12 to 2, then it is 10 minutes… and
- If the long hand (minute hand) moves from 12 and returns to 12, then it is 60 minutes.

Students know that 60 minutes = 1 hour.

Step – 3: Teacher demonstrates:

- If the small hand (hour hand) moves from 12 to 1, then it is 1 hour.
- If the small hand (hour hand) moves from 12 to 2, then it is 2 hours… and
- If the small hand (hour hand) moves from 12 and returns to 12, then it is 12 hours.

Teacher explains 12 hours = half a day (1/2 day)

Step – 4: Teacher demonstrates with the model clock as:

- From mid -night 12 to noon 12 is 12 hours. It is called as forenoon.
- From noon 12 to mid-night 12 is 12 hours. It is called as afternoon.

Step – 5: Teacher discusses and explains about noon and afternoon:

- Students arriving time to school, lunch hour and students returning time to home.

16 Algebra

Day : 16

Learning Outcomes

- Understanding algebraic expressions and its values.
- Able to write on the value of expressions in parity.
- Knowing to Comparison of algebraic expressions.

Teacher Activity

Activity:

Step – 1: Teach the students about function of seeing the same number of answers using the four basic operations of Mathematics.

1) Solution of a number 10:

$5+5=10$

$15-5=10$

$5\times2=10$

$20\div2=10$

2) Solution of a number 8:

$6+2=8$

$10-2=8$

$4\times2=8$

$16\div2=8$

Students are taught how a number can be expressed by using four fundamental operations.

Step – 2: Larger and smaller in algebraic expressions

Teacher teaches how to use symbols in the algebraic expressions.

1. $4+6 \square 17-10$

2. $5+3 \square 8-3$

Skills are developed among students in using symbols (**<, >, =**) in the box.

17 Fractions

Learning Outcomes

Day : 17

- Represents the fractions as half, one fourth and three-fourths by using numbers/numerals.
- Shows the equivalence of a fraction with other fractions

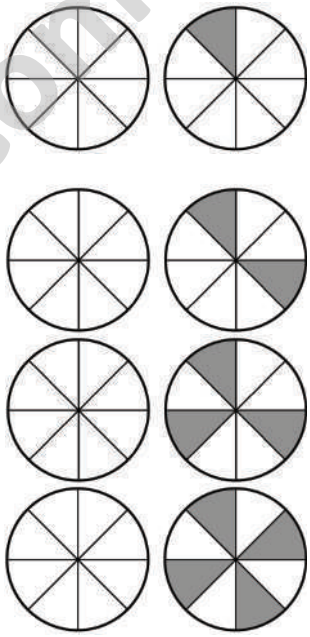
Teacher Activity

Activity 1: Introduction of Numerator, denominator

Step – 1: Divide a circle into 8 equal parts, a part is coloured and shown by the teacher to the students. We say it as one-eighth and written as

Denominator: In the diagram the circle is divided into 8 equal parts.

Numerator: In the diagram a part is coloured. That is in $\frac{1}{8}$, here the numerator is 1 and the denominator is 8.



Step – 2: Divide the circle into 8 equal parts and if two parts of them are coloured, we say it as $\frac{2}{8}$ which is read as two parts of eight. Here the numerator is 2 and the denominator is 8.

Step – 3: Divide the circle into 8 equal parts and if three parts of them are coloured, we say it as $\frac{3}{8}$ which is read as three parts of eight. Here the numerator is 3 and the denominator is 8.

Step – 4: Divide the circle into 8 equal parts and if four parts of them are coloured, we say it as $\frac{4}{8}$ which is read as four parts of eight. Here the numerator is 4 and the denominator is 8. Also it is simplified as $\frac{1}{2}$.

Also repeat the process to find the other fractions with their numerator and denominator by colouring.

Activity 2: Recognizing equivalent fractions

Step – 1: Take a rectangular piece of coloured paper. Fold the sheet into two equal parts and colour one part. Fraction of the coloured area = $\frac{1}{2}$.

Step – 2: Fold the same sheet again to get four equal parts and colour 2 parts. Now, the fraction of the coloured area = $\frac{2}{4}$.

Step – 3: Fold the same sheet again to get eight equal parts and colour 4 parts. Now, the fraction of the coloured area = $\frac{4}{8}$.

By doing the same thing continuously, we can know the formation of equivalent fractions like $\frac{1}{2}$, $\frac{2}{4}$, $\frac{4}{8}$, ...

Activity 3: Identifies types of fractions

Step – 1: Teacher distributes 10 apples equally to 2 students.

Step – 2: Each students receives 5 apples and its fraction is $\frac{5}{10} = \frac{1}{2}$, here the numerator is less than the denominator. It is said to be as a proper fraction. Teacher describes that "In a fraction, if the numerator is less than the denominator, then the fraction is known as Proper fraction".

Step – 3: Teacher distributes 10 apples equally to 4 students.

Step – 4: Each students receives $2\frac{1}{2}$ apples and its fraction is $2 + \frac{1}{2} = \frac{5}{2}$, here the numerator 5 is greater than the denominator 2. Hence, the teacher describes that "In a fraction, if the numerator is greater than the denominator, then the fraction is known as Improper fraction".

18 Pattern

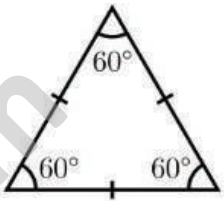
Day : 18

Learning Outcomes

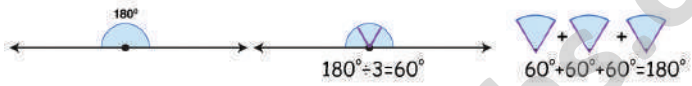
- Find the structural pattern of triangular numbers and square numbers and create patterns with the number of angles and its types.

Teacher Activity

Activity 1: Patterns of triangles

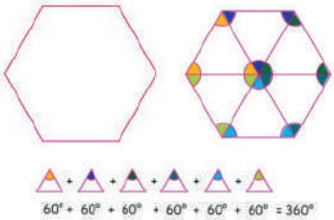


Step – 1: Observe the angles at the vertices of a triangle.
It is an equilateral triangle. Here 3 angles at the 3 vertices are equal. All the angles are 60° and the sum of the angles are 180° were explained.



Step – 2: Create the hexagon formed by using equilateral triangle and findinig the angles in it.

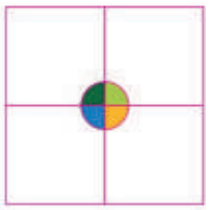
In the hexagon placing the equilateral triangle as shown above. The angle formed in a regular hexagon is 360°



Step – 3: Find the angles by using square. An angle in a circle will be 360°. Finding angles in a square by using a circle.

In the diagram we learn that the angle of a circle is 360°.

Now the angle formed in a square = 360° ÷ 4 = 90°.



= 360° ÷ 4 = 90°

Activity 2: Creating square numbers

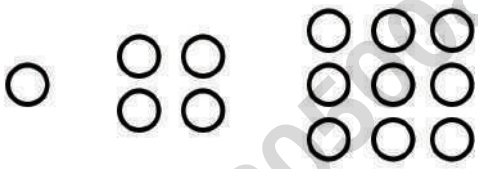
Step – 1: Take 100 seeds / beeds.

Step – 2: First keep one seed once.

Keep two seeds twice; Keep three seeds thrice.

Keep four seeds four times; Keep five seeds five times.

Like the above we can create so many.



Step – 3: From the above pattern we can explain that, "If a number is multiplied by the number itself will be a square number".

Step – 4: Explain the following numbers are square numbers. 1, 4, 9, 25,36,49,64, ……..

Activity 3: Saying triangular numbers

Step – 1: Ask students to say natural numbers

1,2,3,4,5,6,7,8,910,11,12,….

Step – 2: Summing the consecutive numbers from natural numbers we get Triangular numbers

Step – 3: 1 – 1, 1+2=3, 1+2+3=6 …..

1,3,6,10,15,21, are the triangular numbers.

19 Money

Day : 19

Learning Outcomes

- Applies the four fundamental arithmetic operations in solving problems involving money, length, mass, capacity and time intervals.

Teacher Activity

Activity 1: Addition (Money)

Step – 1: Students are divided into 4 groups according to the strength of the classroom.

Group 1: Asks to purchase sufficient pencils, erasers and scribbling notes.

Group 2: Asks to purchase sufficient newspapers, cardboards and coloured pens.

Group 3: Asks to purchase sufficient brooms, buckets, cups, and sanitizers.

Group 4: Asks to purchase sufficient milk packets ($\frac{1}{4}$ l and $\frac{1}{2}$ l).

Example:

1. If the cost of a pen is Rs 5, then the cost of 10 pens is ___.

2. If the cost of a milk is Rs 40 per litre, then the cost of $\frac{1}{2}$ litre is ___.

The above examples will experience the students in buying and selling using rupees. Teacher explains the above examples using black board.

Activity 2: Addition (Money)

Find addition for 8987.75 + 9565.50 + 7693.50

First add the paise , 0.75 + 0.50 + 0.50 = 175 paise. convert 175 paise into rupees as 1 rupee and 75 paise using '1 rupee = 100 paise'. Next they are asked to add rupees 8987, 9565 and 7693 (8987 + 8565 + 7693 + 1 = 26246) we get, 26246

Rs	P
8987	75
9565	50
7693	50
26246	75

20 Information Processing

Day : 20

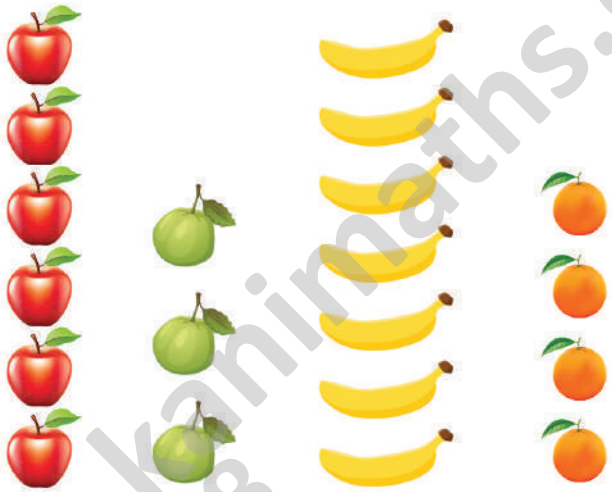
Learning Outcomes

- Collects data related to various daily life situations, represents it in tabular form and as bar graphs and interprets it.

Teacher Activity

Activity: Knowing the details through pictures.

Step – 1: Teacher prepares detailed pictures of fruits used in a family in 4 days and clarifies the answers to the following questions.



Step – 2:

1. Number of fruits used by the family on the fourth day _____.
2. What is the day that the most fruits were used? And What is the name of the fruit ?
3. How many apples were used?
4. What is the number of fruits used on the second day?

Get to know the details through questions like the above.

Grade Level Concept

7

MATHEMATICS

Content

THIRAN – Plan of Action – Grade Level Concept – 7th Standard

S.No.	Title	Days	Content	Learning Outcomes
1	Numbers - I	1	Understanding and representing large numbers	Reads and writes numbers bigger than 1000 being used in her/his surroundings (M 501)
2	Numbers - II	2	Calculating the approximate value of large numbers	Solves problem involving addition and subtraction of integers. (M 604)
3	Algebra	3	Solving word problem using unitary method	Adds/subtracts algebraic expressions (M 708)
4	Ratio and Proportion	4	Comparing ratios in various situations	Compares quantities using ratios in different situations. (M 608)
5	Geometry - I	5	Explaining shapes with open and closed sides	Describes geometrical ideas like line, line segment, open and closed figures, angle, triangle, quadrilateral, circle, etc., with the help of examples in surroundings (M 610)
6	Geometry - II	6	Knowing types of angles, supplementary angle, complementary angle	Explains congruency of triangles on the basis of the information given about them like (SSS, SAS, ASA, RHS) (M 715)
7	Statistics	7	Representing information with tally marks and pictograph	Arranges given/collected information in the form of table, pictograph and bar graph and interprets them. (M 621)
8	Information Processing - I	8	Solving Sudoku puzzles	Collects data related to various daily life situations, represents it in tabular form and as bar graphs and interprets it. (M 516)
9	Numbers - III	9	Learning about composite, prime numbers	Recognises and appreciates (through patterns) the broad classification of numbers as even, odd, prime, co-prime, etc. (M 602)
10	Numbers - IV	10	Relationship between LCM and HCF	Applies HCF or LCM in a particular situation (M 603)

S.No.	Title	Days	Content	Learning Outcomes
11	Measurements - I	11	Conversion of length measures	Relates different commonly used larger and smaller units of length, weight and volume and converts larger units to smaller units and vice versa(M 512)
12	Measurements - II	12	Reading time, 12-hour system, 24-hour system	Reads clock time in hour and minutes and expresses the time in a.m. and p.m. (M 416) Relates to 24 hr clock with respect to 12 hr clock (M 417)
13	Bill, Profit and Loss	13	Calculating profit, loss and discount	Applies the concept of percent in profit and loss situation in finding discount, VAT and compound interest. (M 809)
14	Geometry - III	14	Knowing types of triangles and their properties	Classifies triangles into different groups/ types on the basis of their angles and sides. (M 616)
15	Information Processing - II	15	Representing numerical expressions and algebraic expressions on a icon map	Collects data related to various daily life situations, represents it in tabular form and as bar graphs and interprets it. (M 516)
16	Fractions	16	Cross multiplication, addition of unlike fractions	Uses algorithms to multiply and divide fractions/decimals. (M 704)
17	Integers	17	Comparing integers	Solves problem involving addition and subtraction of integers. (M 604)
18	Perimeter and Area	18	Perimeter of square and rectangle and finding area	Finds out the perimeter and area of rectangular objects in the surroundings like floor of the class room, surfaces of a chalk box etc. (M 620)
19	Symmetry	19	Identifying two-dimensional shapes with symmetry	identifying symmetrical 2-Dimensional (2-D) shapes which are symmetrical along one or more lines (M 614)
20	Information Processing - III	20	Learning about the iterative process and pattern and the fibonacci sequence	Collects data related to various daily life situations, represents it in tabular form and as bar graphs and interprets it. (M 516)

1 Numbers - I

Day : 1

Learning Outcomes

- To understand large numbers and the terms used to represent them.

Teacher Activity

Look at the calendar and write today's date, for example, 19.04.2025 as 19042025. We are going to write the number in Indian number system. To write in Indian number system, the first three digits from right side of the number should be punctuated by a comma.

For example: Writing the number by putting comma in the number 19042025 as 19042,025. Then, put commas for every two digits to the left. Writing the number by putting comma in the number 19042025 as 1,90,42,025.

We can write the number 1,90,42,025 in place value method as follows

Crores	Ten Lakhs	Lakhs	Ten Thousands	Thousands	Hundreds	Tens	Ones
1	9	0	4	2	0	2	5

Hence, the number 1,90,42,025 is read as One Crore Ninety Lakhs Forty Two Thousands and Twenty five.

To write in International Number System, a comma should be punctuated by three digits, from right to left of the number. For example, writing the number by putting commas in the number 19042025 as 19,042,025.

We can write the number 19,042,025 in place value method as follows

Ten Millions	Millions	Hundred Thousands	Ten Thousands	Thousands	Hundreds	Tens	Ones
1	9	0	4	2	0	2	5

That is, the number 19,042,025 is read as Nineteen Million Forty Two Thousand and Twenty five.

Similarly, let us read some other numbers: 48205231, 56132074.

2 Numbers - II

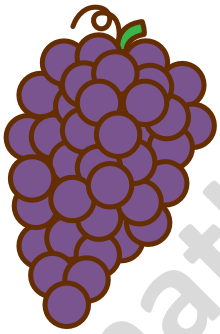
Day : 2

Learning Outcomes

- To employ estimation of large numbers.
- To understand and use the properties of Whole numbers.

Teacher Activity –1

Can you count the number of fruits seen in the picture below accurately?



Can't say the exact number, Isn't it !

So, we say, there may be 50 fruits here. We call it as Approximation.

The approximate numbers are very close to the actual number. It can be a little more or less. This value is called the Estimated value.

Let us know about rounding off the numbers to the nearest tens place here.

To round off a number to ten, we have to notice the digit in the tenth place.

For example, if we want to round off the number 76 to its nearest tens place, we need to look at the number 7 in the tenth place.

If the number to the right of the tenth place value is equal or greater than 5, then "1" must be added. If it is less than 5 there is no need to change the number in the tenth place.

So, the number to the right of 7 is 6. Since the number 6 is greater than 5, we have to add 1 to 7. 7 + 1 = 8.

Convert the numbers on the right side as zero.

So, rounding off the number 76 to the nearest ten is 80.

Teacher Activity –2

We already know that a set of natural numbers is N = {1, 2, 3...}.

Adding '0' to the set N gives us the set of whole numbers. It is represented as W = {0, 1, 2, 3,...}. For any two Whole numbers , addition of those whole numbers and interchanging of those whole numbers does not affect their addition. It is called as commutative of addition.

For example, when we add the two numbers 43 + 57, we get 100. When we interchange the numbers, say 57 + 43, Then also we get 100.

Addition of integers for Whole numbers also satisfies the commutative property.

3 Algebra

Day : 3

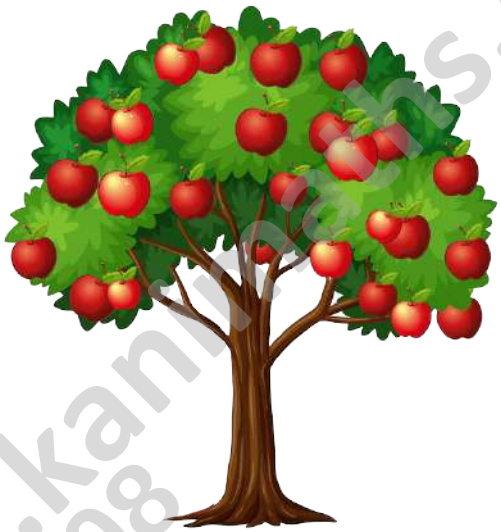
Learning Outcomes

- Uses variable with different operations to generalize a given situation.
- Uses unitary method in solving various word problems.

Teacher Activity

Algebra gives a way for writing the facts in short and simplest way.

We call an unknown number as a variable. They are written by using alphabets '*a*' to '*z*'.



Teacher: Can you tell me how many leaves are there in the tree (picture)?

Students: Don't know

Teacher: We can't say exactly. Each of us will say different number (approximately). As it varies from person to person, we call it as a variable. It can be denoted as '*x*'. (Note: we can use alphabets '*a*' to '*z*' for denoting variables).

(i) Dear Students we can write 5 plus 3 as 5 + 3 by using symbol.

(ii) If we add a number 3 with a variable '*y*' and it is written as *y* + 3

Here, "Add 3 with a number" is a verbal statement and '*y* + 3'is an algebraic statement.

(iii) Consider there are '*m*' apples in a basket. If you take 2 apples from the basket, then it may be written as '*m*-2'. Here "2 apples taken from basket" is a verbal statement and "*m*-2" is an Algebraic statement.

Similarly, if the cost of one apple is ₹*x* then the cost of three apples is ₹3*x*.

4 Ratio and Proportion

Day : 4

Learning Outcomes

- Compares quantities using ratios in different situations.

Teacher Activity-1

Teacher explains that a ratio is the comparison of two quantities with same units. Teacher asks the students to say and record their height and weight on the black board. By comparing, the teacher introduces about ratio. Also in our daily life, comparison of marks and many more things are done.

Ratio is the comparison of two quantities by division. Its symbol is " : "

3: 4 represents a ratio. We call 3 as the first term and 4 is call second term.

3: 4 can be written as $\frac{3}{4}$

Teacher Activity-2

Teacher explains that the ratios equivalent to 2: 7 can be written as 4:14, 6:21.....

It is obtained as: $2: 7 = 2 \times 2: 7 \times 2 = 4:14$

$2: 7 = 2 \times 3: 7 \times 3 = 6: 21$

From the above example, Teacher concludes that, if the ratio of the front element and the rear element are multiplied or divided by the same number, then it will be its equivalent ratio.

Teacher Activity-3

Let us consider an equivalent ratio of 2 : 7 is 4 : 14. It can be written as follows 2 : 7 :: 4 : 14

Here, the extremes are 2 and 14 and the means are 7 and 4.

Product of extremes = $2 \times 14 = 28$

Product of means = $7 \times 4 = 28$

Then, the Product of the extremes is equal to the product of the means.

So, 2 : 7 = 4 : 14 . We can conclude that, In a proportion,

Product of extremes = Product of means.

5 Geometry - I

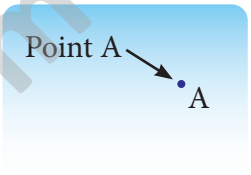
Day : 5

Learning Outcomes

- Describes geometrical ideas like line, line segment, open and closed figures, angle, triangle, quadrilateral, circle, etc., with the help of examples in surroundings.

Teacher Activity

The teacher shows sharp point of a pencil and recalls it as a point. Points are denoted by alphabets A, B, C,..



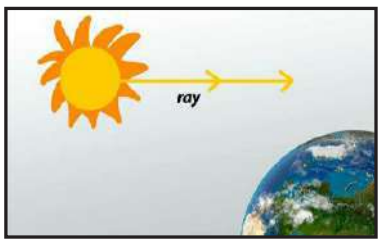
A line is infinite set of points and a line extends along both directions without an end. A line with two end points is called line segment.

Examples: scale, pencil, edges of table, etc.

We can measure the length of line segment.

A line segment extended to one direction infinitely is called a ray.

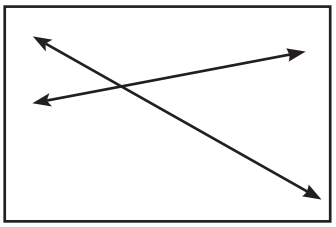
Example: Sun rays, torch flash light.



Two lines which will never meet and extend infinitely on both sides are called parallel lines.
Example: Railway track

Also the distance between parallel lines are equal.

If two lines are not parallel,they will meet at any point and they are called as intersecting lines.



6 Geometry - II

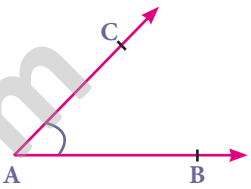
Day : 6

Learning Outcomes

- Classifying angles according to their measure.

Teacher Activity-1

Teacher explains by showing the above diagram that, when the two rays meet at a point, they form an angle at that point. We name the angels in the figure, ∠BAC or ∠CAB or ∠A. The teacher shows angles by using black board, wall, table, book and also asks some examples from students and teacher explains angles. By using protractor we measure angles in degree. Example: 40°, 85°, 160°.



Types of angles:

The teacher explains the types of angles with the angles made between hour hand and minute hand for certain time.

Special angles

3 o' clock

Right Angle (angle 90°)

10 o' clock

Acute angle (angle between 0° and 90°)

7.15o' clock

Obtuse angle (angle between 90° and 180°)

12.00 o' clock

Zero angle (0°).

6.00 o' clock

Straight angle (180°)

By taking the angle between door and wall, while opening and closing the door teacher determines the types of angle.

Teacher Activity-2

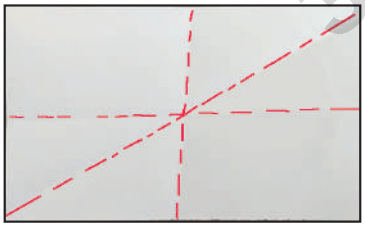
The teacher makes the students to know special pair of angles called complementary and supplementary angles. Two angles are complementary to each other if their sum is 90°. Two angles are supplementary to each other if they add up to 180°. Example:

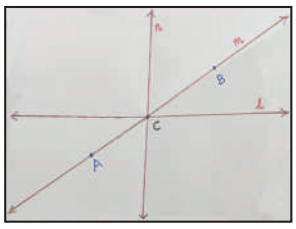
The complementary angle of 40° is, 90° – 40° = 50°

The supplementary angle of 110° is, 180° – 110° = 70°

Teacher Activity-3

Teacher explains by showing the below paper cutting that, when three or more lines pass through a point, they are said to be concurrent. The point is called point of concurrency.





In this figure, *l, m, n* are concurrent. 'C' is the point of concurrency.

The points A, B, C are collinear.

7 Statistics

Day : 7

Learning Outcomes

- Arranges given / collected information such as expenditure on different terms in a family in the last six months, in the form of table, pictograph and bar graph and interpret them.

Teacher Activity-1

Data:

Teacher explains that the numerical information or facts collected are known as data. Teacher asks a student to collect today's attendance details of our class in which we call that data as the primary data, because the student receives the information directly. The teachers ask another student to collect details of today's total attendance from the Headmaster on the same day. We call this as secondary data because the amount of information was already collected.

Teacher Activity-2

Teacher explains that the collected information/data can be arrived in numeral easily by using Tally marks:

The teacher tabulates and explains the favourite games of 30 students in a classroom by using Tally marks.

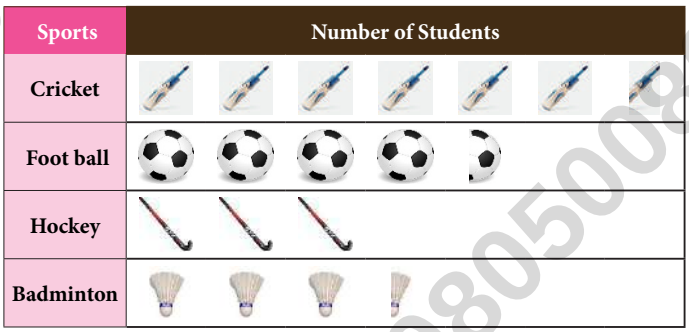
One	I
Two	II
Three	III
Four	IIII
Five	𝍸

Game	Tally Marks	Frequency
Cricket	𝍸 𝍸 I	11
Foot ball	𝍸 II	7
Hockey	IIII	4
Badminton	𝍸 III	8

Pictograph:

The data can be easily analysed and interpreted by using pictograph. Many number of information can also be denoted by using Pictograph:

Example: The following Pictograph shows the number of student playing different games in a school. (One full picture represents 10 students, One half picture represents 5 students)



1. Number of students playing cricket (6 full picture+1 half picture) = (6 × 10) +5 = 60 + 5 = 65.
2. Number of students playing football. (4 full Picture +1 half picture) = (4 × 10) + 5 = 40 + 5 = 45.
3. Number of students playing hockey. (3 full picture) = (3 × 10) = 30.
4. Number of students playing badminton. (3 full picture + 1 half picture) = (3 × 10) + 5 = 30 + 5 = 35.

Bar graph:

The teacher has to explain how to draw bar graph for the above information.

8 Information Processing - I

Day : 8

Learning Outcomes

- To solve puzzles like Sudoku.

Teacher Activity

Completing Sudoku will always make us happy. In some phases the numbers are not filled and in some phases the numbers are filled. There will be horizontal grids and vertical grids. Fill horizontal and vertical row between 1 to 9 numbers. But these numbers can't come more than once. In the 3 × 3 Sudoku we have to use the numbers from 1 to 3 properly.

3 × 3 Sudoku

1	2	3
2	3	1
3	**1**	**2**

Step 1: Explains that if the numbers in the first horizontal row are kept stable in 3 × 3 Sudoku, the second horizontal row can be filled in two ways, 2, 3, 1 or 3, 1, 2. First row is fixed as 1, 2, 3.

1	2	3

Step 2: Explains that if the first two horizontal rows are fixed in 3 × 3 Sudoku in the picture, the third row can be filled only in one way, as shown in the next picture.

1	2	3
2	3	1
3	**1**	**2**

1	2	3
2	3	1

Step 3: No number in the third row should come more than once. Therefore, Teacher explains that the things to remember that 3 × 3 can be filled only in one way in the third row in Sudoku.

Repeat the same process for 4 × 4 Sudoku.

9 Numbers - III

Day : 9

Learning Outcomes

- Classification of numbers as even, odd, prime, co-prime, composite etc.

Teacher Activity

We learnt about odd number and even number in the previous classes.

We are now going to find out composite numbers and prime numbers.

The teacher writes down all the numbers from 2 to 20 and their factors on the paper.

Teacher gives each student a number to fill the following table.

Numbers with more than two factors	Numbers with only two factors
4, 6, 8, 9, 10, 12, 14, 15, 16, 18, 20	2, 3, 5, 7, 11, 13, 17, 19

From this above table teacher explains the system of composite numbers and prime numbers and defines the following with examples.

Composite Numbers:

A Natural number having more than two factors is called a composite number.

Example: 4, 6, 8, 9, 10, 12,…

Prime Numbers:

A Natural number having only two factors (namely 1 and the number itself) is called prime number. Example: 2, 3, 5, 7, 11, 13,…

1 is neither a prime number nor a composite number.

10 Numbers - IV

Day : 10

Learning Outcomes

- To find the HCF or LCM of two or more numbers.

Teacher Activity-1

Finding the HCF of two numbers in common factors method:

Dear Students, let us take two numbers 12 and 24. Find multiplication of two numbers that gives the product of 12. We get $1 \times 12 = 12$, $2 \times 6 = 12$, $3 \times 4 = 12$.

The numbers 1, 2, 3, 4, 6,12 are called the factors of 12. Similarly for the number 24, $1 \times 24 = 24$, $2 \times 12 = 24$, $3 \times 8 = 24$, $4 \times 6 = 24$.

The numbers 1, 2, 3, 4, 6, 8, 12, 24 are the factors of 24. And 1, 2, 3, 4, 6, 12 are the common factors of 12 and 24. Here 12 is the highest common factor for 12 and 24.

Teacher Activity-2

Finding the LCM of two numbers in common multiples method:

Let us consider the number 6. If we multiply the number 6 by the numbers 1, 2, 3, 4, 5, 6, 7, 8, 9, 10,… respectively.

Then we get 6, 12, 18, 24, 30, 36, 42, 48, 54, 60,… respectively.

These are called multiples of 6.

Similarly, for the number 8, we get 8, 16, 24, 32, 40, 48, 56, 64, 72, 80,… respectively and these are called multiples of 8.

24, 48 are common multiples of 6 and 8. So 24 is the least common multiple of 6 and 8.

Teacher Activity-3

Relationship between the numbers and their HCF & LCM:

Students let us take two numbers 4 and 6 their HCF is 2, LCM is 12.

Now the product of two numbers, $4 \times 6 = 24$. Product of HCF and LCM is $2 \times 12 = 24$.

The product of two given numbers = The product of their HCF and LCM .

11 Measurements - I

Day : 11

Learning Outcomes

- To understand the position of decimal point in the conversion of smaller unit to larger unit and vice-versa.

Teacher Activity

Teacher explains about the universally accepted metric units in length are

10 Millimetre = 1 Centimetre

10 Centimetre = 1 Decimetre

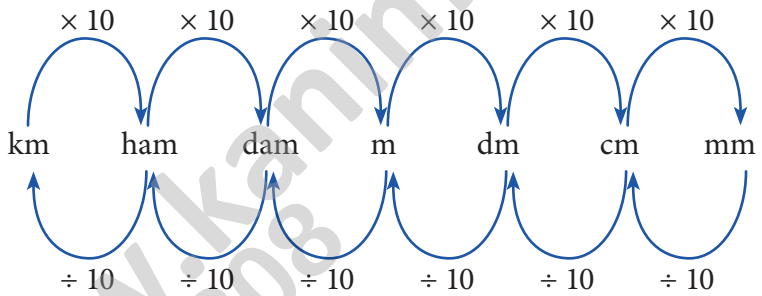
10 Decimetre = 1 Metre

10 Metre = 1 Decametre

10 Decametre = 1 Hectometre

10 Hectometre = 1 Kilometre

Conversions within the metric system:



When we move from higher unit to lower unit, multiply the given measure by the powers of 10's. When we move from Lower unit to higher unit, divide the given measure by the powers of 10's.

Example:

1) Convert 5*km* into metre.

We know that 1*km* = 1000 metre

5*km* = 5 × 1000 = 5000 meter.

Here, we convert higher unit (*km*) into lower unit. So, we multiply.

2) Convert 500*cm* into metre. We know that 100*cm* = 1 metre.

500*cm* = 500*cm* ÷100 = 5 metre.

Here, we convert lower unit (*cm*) to higher unit (*m*). So we divide.

12 Measurements - II

Day : 12

Learning Outcomes

- To read time in a clock and convert the 12 hour format to the 24 hour format and vice-versa.
- To find duration between two given time instances.

Teacher Activity-1

Teacher asks the students to tell the accurate time with a sample clock.

Reading the Time:

When the minute hand is on the right side of the clock we read the time as _____ minute past _____ hour.

20 minutes
Past 1 hour

1.20

10 Minutes
to 3.

2.50

When the minute hand is on the left side of the clock we read the time as _____ minute to _____ hour.

12-Hour Format:

The teacher explains to the students about antemeridien(a.m) and postmeridien (p.m). The time after 12:00 midnight and before 12:00 noon is antemeridien (a.m). The time after 12:00 noon and before 12:00 midnight is postmeridien (p.m). The teacher tells to the students that the time in the school before lunch is called as a.m., In the school after lunch time is called as p.m.

24-Hour Format:

To avoid morning or evening confusions we are using 24-hour format. In railway we are using in this format only. In this format we are using 4 digits. The first two digits show the hours and the last two digits show the minutes.

Example:

(i) 7 o' clock evening = 19:00 hours (ii) 5 o' clock morning = 05:00 hours

(iii) 6.30 in evening = 18:30 hours (iv) 12 midnight = 00:00 hours

Teacher Activity-2

Conversion of Time Format: Conversion into the 24 hour format and vice-versa.

12 hour format	24 hour format
05.25 a.m	05:25 hours
11.30 a.m.	11:30 hours
03.00 p.m.	15:00 hours
09.25 p.m.	21:25 hours
12 Noon	12:00 hours

24 hour format	12 hour format
04:15 hours	04.15 a.m.
07:40 hours	07.40 a.m.
22:05 hours	10.05 p.m.
23:30 hours	11.30 p.m.
00:00 hours	Midnight 12

13 Bill, Profit and Loss

Day : 13

Learning Outcomes

- To prepare a bill and verify the bill amount.
- To calculate profit and loss.
- To calculate Cost price, Selling price, Marked price and Discount.

Teacher Activity-1

Selvi purchased some stationery items for her learning: 3 one quire note book for ₹ 25/ note book, 2 pen for ₹ 35/pen, 1 pencil for ₹ 5, and 1 geometry box for ₹ 50. Prepare a bill for the above stationery items.

Cash Bill
Premium Stationery Mart, Salem Road, Namakkal.

Sl. No.	Items	Quantity	Rate (in ₹)	Amount (in ₹)
1.	Pen	2	35	70.00
2.	Note book (192 pages)	3	25	75.00
3.	Eraser	1	05	05.00
4.	Geometry Box	1	50	50.00
Total		**8**		**200.00**

The teacher explains about bill and preparation of bill from the above example.

Teacher Activity-2

Sukumar sold a Television at ₹ 27000. Its Cost Price is ₹ 25000. Then how to find Sukumar has a profit or loss in this sale? Here, Selling Price is greater than Cost Price. That is, Selling Price is ₹ 2000 more than the Cost Price. So, Sukumar gets profit. Hence, we can derive a formula,

Profit = Selling Price – Cost Price

Suppose Sukumar sold the Television at ₹ 24000, then the Selling Price is ₹ 1000 less than the Cost Price. That is, if Cost Price is greater than Selling Price, then it is called Loss. Hence, we can derive a formula,

Loss = Cost Price – Selling Price

Teacher Activity-3

I bought a car at ₹ 7,50,000. If I want a profit of ₹ 50,000, I fix the Selling Price as ₹ 8,00,000. This Selling Price is called as Marked Price. If I reduce ₹ 10,000 from the marked price, then it will be called as Discount. Then, we can derive a formula, Discount = Marked Price - Selling Price. So, we can conclude that the seller reduces certain amount from the marked price only and hence, he never meets loss.

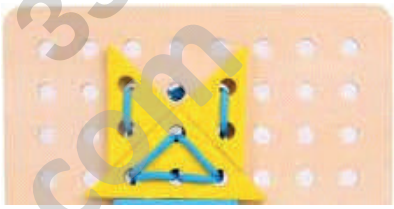
14 Geometry - III

Day : 14

Learning Outcomes

- Classifies triangles into different groups/types on the basis of their angles and sides. For example, scalene, isosceles or equilateral triangles on the basis of sides, etc.

Teacher Activity-1



After the teacher has explained the properties of the triangle to the students, the teacher shows equilateral triangle, isosceles triangle and scalene triangle by using rubber bands on geo-board and explains their properties.

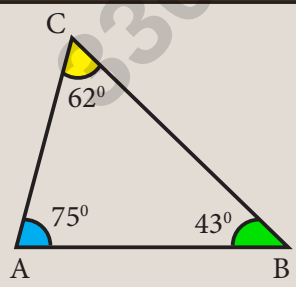
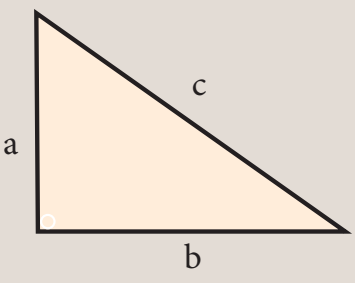
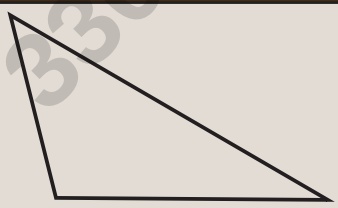
Types of triangle	Properties
Equilateral Triangle	All three sides are equal. All three angles are equal.
Isosceles Triangle	Two sides are equal. Two Angles are equal.
Scalene Triangle	All three sides are different. Three angles are different.

Teacher Activity-2

The teacher has to classify and explain the triangle based on the angles by using wooden triangles in the maths kit box.

The angles of the triangle can be measured with a protractor and the triangles can be classified according to the angles.

According to angles the types of triangle are as follows:

Acute angled triangle	Right angle triangle	Obtuse angles triangle
		

15 Information Processing - II

Day : 15

Learning Outcomes

- The numeric and algebraic expression on the icon map.
- Write the numeric and algebraic expression from the map.

Teacher Activity

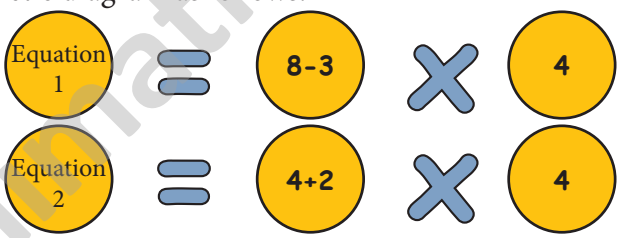
In the genetic mapping system, the computer answers us by simultaneously calculating billions of functions in a uniform manner. Here both the numeric and algebraic expression can be represented in the map by the following function:

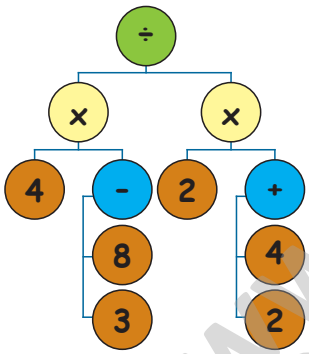
$[(8 - 3) \times 4] \div [(4 + 2) \times 2]$ Let us write a map in the form of a tree. Take the above file as Equation: 1 = $(8 - 3) \times 4$ and Equation: 2 = $(4 + 2) \times 2$ and write it as an icon as follows.

Then the equations can be written as a genetic diagram as follows:

Equation 1 = Factor 1 × Factor 2
= $(8 - 3) \times 4$

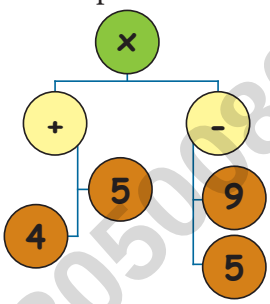
Equation 2 = Factor 1 × Factor 2
= $(4 + 2) \times 2$





Explain that combining the above two icon diagrams as follows will result in the conversion of the octave into a complete icon map.

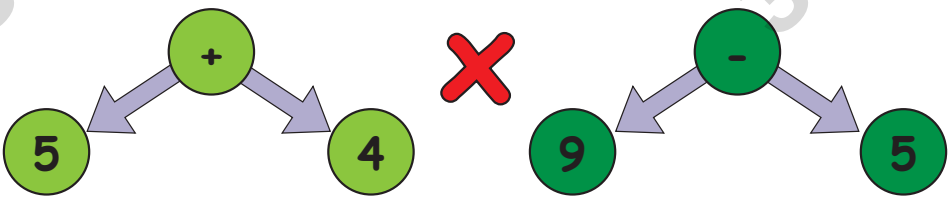
The conversion of the icon map into an octave and algebraic expression can be explained by the following functions.



The above icon diagram can be modified without changing the answer as follows:

The following number can be set by the above icon diagram is,

Numeric = $[5 + 4] \times [9 - 5]$



16 Fractions

Day : 16

Learning Outcomes

- Using fractions and decimals in different situations which involve money, length, temperature, etc.

Teacher Activity-1

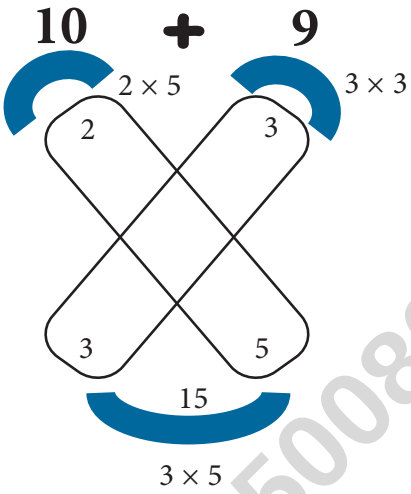
Comparison of two unlike fractions: Cross multiplication method:

If A won 5 out of 6 matches and B won 4 out of 5 matches in a game. Who won more matches? Here we take two different fractions $\frac{5}{6}$ and $\frac{4}{5}$ here we get $(5 \times 5 = 25)$ and $(6 \times 4 = 24)$ when multiplied using the cross multiplication method. Here, 25>24. Therefore, $\frac{5}{6}$ is greater than $\frac{4}{5}$ $\frac{5}{6} > \frac{4}{5}$. Hence A won the most matches.

Teacher Activity-2

Addition of two unlike fractions: Butterfly picture method:

Draws a butterfly picture as below to add two unlike fractions $\frac{2}{3}$ and $\frac{3}{5}$. So when we add two unlike fractions $\frac{2}{3}$ and $\frac{3}{5}$ we get the fraction $\frac{19}{15}$. The butterfly picture method can be used for the subtraction of two unlike fractions as well.



Teacher Activity-3

How many litres of milk does a milk man supply $\frac{3}{4}$ litres for 7 persons each?

To find the solution for this sum we have to multiply the whole number 7 by 3 (numerator) $(7 \times 3 = 21)$. Then divide 21 by 4 (Denominator).

$\frac{21}{4} = 5\frac{1}{4}$ litres of milk to be supplied for 7 persons.

Teacher Activity-4

To divide $\frac{2}{3} \div \frac{1}{6}$ *Here the reciprocal of* $\frac{1}{6}$ *is* $\frac{6}{1}$. Then multiply $\frac{2}{3}$ *and* $\frac{6}{1}$ we get $2 \times 6 = 12$ and $3 \times 1 = 3$. Therefore, $\frac{2}{3} \div \frac{1}{6} = \frac{12}{3} = 4$.

17 Integers

Day : 17

Learning Outcomes

- To compare and arrange integers in ascending and descending order.

Teacher Activity

Comparing Integers:

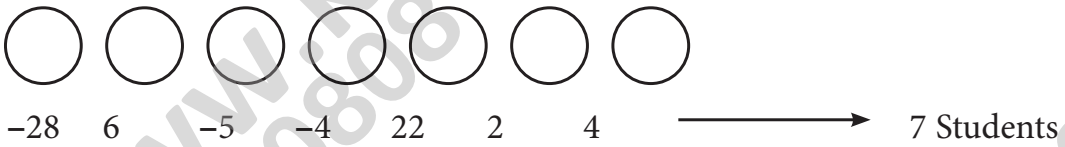
Teacher keeps 7 sheets in a box positive or negative integer is written on each sheet.

He/she selects 7 students and asks each one of them to pick a sheet randomly.

Then asks the students to stand right side those who have positive integers and stand left side those who have negative integers.

The teacher explains how to arrange integers in ascending and descending order.

Example:



Ascending Order = −28, −5, −4, 2, 4, 6, 22

Descending Order = 22, 6, 4, 2, −4, −5, −28

Now, when we compare 2 and −4,

we get $2 > -4$

18 Perimeter and Area

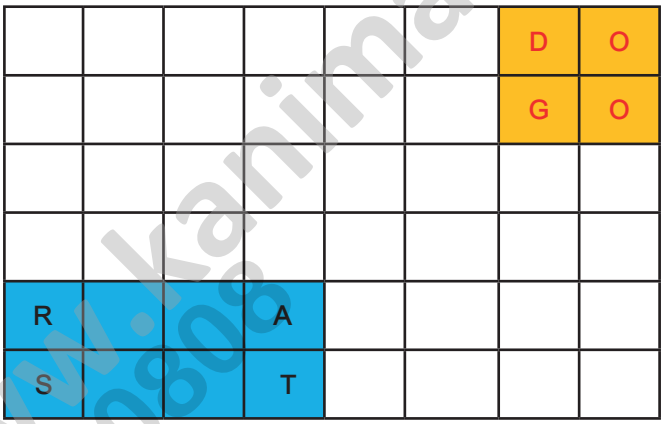
Day : 18

Learning Outcomes

- Finds out the perimeter and area of rectangular objects in the surroundings like floor of classroom, surfaces of a chalk box, etc.

Teacher Activity

Teacher asks the students to draw a square and a rectangle on a graph sheet and measure the length of the sides of the square and rectangle such that 1 cm = 1 unit. Then the teacher explains that the total number of units drawn by the students is the perimeter of the drawn figures. Thus, the teacher concludes that the "length of the boundaries of the closed figure is called Perimeter". Similarly students are explained that the number of square units presents in a closed square and rectangle is the area of the closed figure. Thus "area of the closed figure is the number of unit squares inside the closed figure".



The perimeter of the square GOOD	= 8 cm
The area of the square GOOD	= 4 Sq cm
The perimeter of the Rectangle STAR	= 12 cm
The area of the Rectangle STAR	= 8 Sq cm
Therefore, the perimeter of the square	= 4 × S units
Therefore, the area of the square	= S × S sq. units
Therefore, the perimeter of the Rectangle	= 2 [l + b] units
Therefore, the area of the Rectangle	= l × b Sq. units
Area of the STAR	= l × b = 4 × 2 = 8 Sq. cm

19 Symmetry

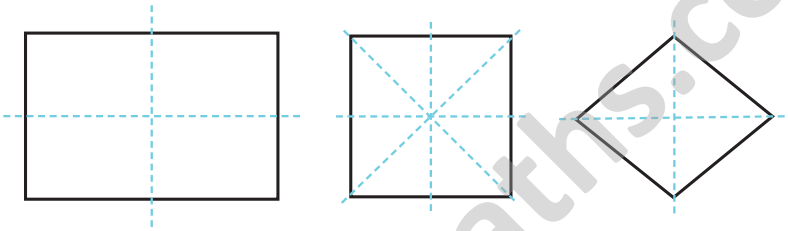
Day : 19

Learning Outcomes

- Identifying symmetrical 2Dimensional (2D) shapes which are symmetrical along one or more lines.

Teacher Activity - 1

The figures are symmetrical about the line.



The teacher explains the students about the reflectional symmetry by keeping the mirror along the line of symmetry in the above figures, the other half of the figure gets reflected by the mirror and it looks the same.

In the same way classroom is covered with flooring tiles without any change in the orientation.

Make the students to know when a pattern slides to a new position involves neither rotation nor reflection is translational symmetry.

Teacher Activity - 2

Draws Square, Rectangle, Circle on the black board.

Cut the same shapes with same measurements on the paper.

Place the figures on the blackboard as one shape is fixed and rotate the other about its centre.

If it looks the same after being rotated 360° about its centre, then the object is said to have rotational symmetry.

The number of times coincide the same shape in one complete rotation is called order of rotational symmetry.

20 Information Processing - III

Day : 20

Learning Outcomes

- To perceive iterative process and pattern
- To know Fibonacci sequence and Fibonacci number

Teacher Activity - 1

Teacher explains that an Iterative process is a procedure that is repeated many times which gives rise to a new form.

Teacher asks the students to observe the following sequences and to find the pattern involved.

The sequence is 1, 3, 5, 7,...

The pattern involved in this sequence is 1, 1 + 2 = 3, 3 + 2 = 5, 5 + 2 = 7, 7 + 2 = 9,...

The sequence is 2, 6, 12, 20, 30,... the pattern which generate

The pattern involved in this sequence is $1 \times 2 = 2$, $2 \times 3 = 6$, $3 \times 4 = 12$, $4 \times 5 = 20$, $5 \times 6 = 30$,...

Teacher Activity - 2

Fibonacci Numbers

Teacher asks the students to observe the following sequences and to find the pattern involved.

The sequence is 1, 1, 2, 3, 5, 8, 13, 21, 34,... We find and guess the next numbers.

1 + 1 = 2, 1 + 2 = 3, 2 + 3 = 5, 3 + 5 = 8, 5 + 8 = 13, 8 + 13 = 21, 13 + 21 = 34 we get these Numbers.

These are said to be Fibonacci Numbers

Grade Level Concept

8

MATHEMATICS

Content

THIRAN – Plan of Action – Grade Level Concept – 8th Standard

S.No.	Title	Days	Content	Learning Outcomes
1	Addition and Subtraction of Integers	1	Solve addition and subtraction of integers using a number line	Solves problem involving addition and subtraction of integers. (M 604)
2	Multiplication and Division of integers	2	Solve multiplication and division of integers using a number line	Multiplies/divides two integers (M 701)
3	Fractions and Decimals	3	Convert fractions to decimals	Solves problems related to conversion of percentage to fraction and decimal and viceversa (M 710)
4	Fundamental operations (+, –, x, ÷) on decimal numbers	4	Add and subtract decimals using a place value table	Solves problems on daily life situations involving addition and subtraction of fractions / decimals (M 606)
5	Percentage	5	Convert decimals to percentages and percentages to decimals	Solves problems related to conversion of percentage to fraction and decimal and viceversa (M 710)
6	Addition and subtraction of algebraic expressions and simple linear equations	6	Create and solve linear equations	Uses unitary method in solving various word problems. (M 609)
7	Exponents and Laws of Exponents	7	Understand and use exponent rules	Uses exponential form of numbers to simplify problems involving multiplication and division of large numbers. (M 706)
8	Degree of Algebraic Expression	8	Know about the order of algebraic expressions	
9	Algebraic identities	9	Solve problems using algebraic identities	Uses various algebraic identities in solving problems of daily life (M 808)
10	Inequation	10	Create and solve inequations	

S.No.	Title	Days	Content	Learning Outcomes
11	Angle sum property of triangles and congruence of triangles	11	Know about the congruence of triangles	Explains congruency of triangles on the basis of the information given about them like (SSS, SAS, ASA, RHS) (M 715)
12	Symmetry	12	Know symmetry through transformations	Classifies triangles into different groups/ types on the basis of their angles and sides. (M 616)
13	Pair of angles formed by Intersecting lines and Transversal	13	Adjacent angles, linear pair and vertically opposite angles	Verifies the properties of various pairs of angles formed when a transversal cuts two lines (M 713)
14	Perpendicular Bisector, Angle Bisector	14	Draw bisectors of given angles	
15	Tetromino	15	Create larger shapes using Tetrominoes	
16	Flow chart	16	Know the uses of a flow chart	Collects data related to various daily life situations, represents it in tabular form and as bar graphs and interprets it. (M 516)
17	Mean, Median and Mode	17	Know the mean, median and the mode	Finds various representative values for simple data from her/his daily life contexts like mean, median and mode (M 719)
18	Perimeter and Area of Special Quadrilaterals	18	Finding the perimeter and area of a parallelogram, rhombus, and trapezium	Estimates the area of shapes like trapezium and other polygons by using square grid/ graph sheet and verifies using formulas. (M 816)
19	Area of a Circular Path	19	Finding the area of circular path	
20	Direct and Inverse Proportion	20	Solving problems involving direct and inverse proportions	Solves problems based on direct and inverse proportions (M 810)

1 Addition and Subtraction of Integers

Day : 1

Learning Outcomes

- To understand addition and subtraction of integers.

Teacher Activity

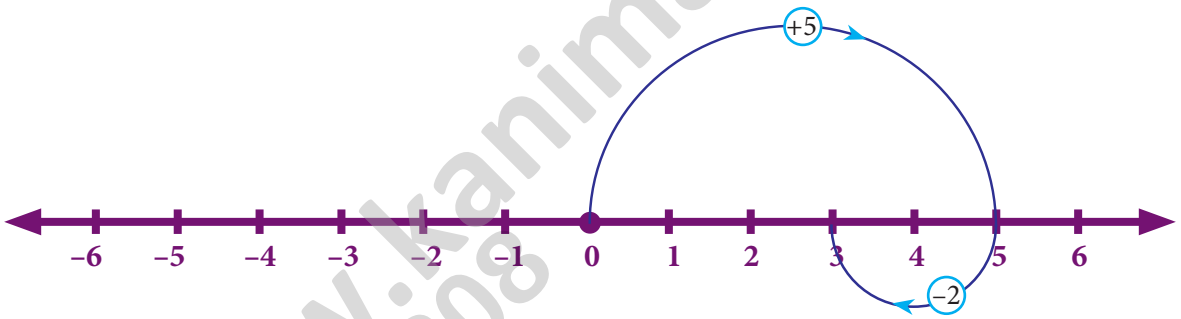
Activity 1:

Represent the integers 4, –5, 2, –3, –1 on the number line.

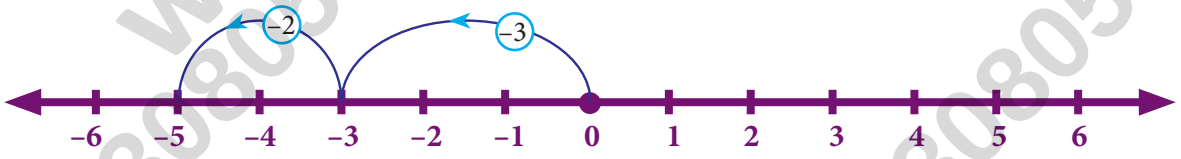
Activity 2:

Add: (i) 5 + (–2) and (ii) (–3) + (–2) = –5 using the number line.

(i) 5 + (–2) = 3



(ii) (–3) + (–2) = –5



2 Multiplication and Division of integers

Day : 2

Learning Outcomes

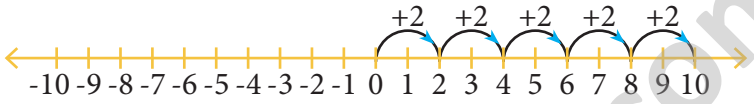
- To understand the concept of multiplication and division.

Teacher Activity

Activity 1:

Malathi saves ₹ 2 each day in her piggy bank for 5 days. Shall we represent it on the number line?

Also it can be written as

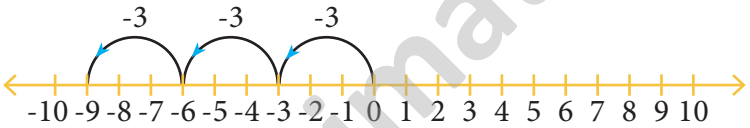


$(+2) + (+2) + (+2) + (+2) + (+2) = 10$

$(+2) \times 5 = 10.$

So, she saves ₹ 10.

If Malathi takes ₹ 3 each day from her piggy bank for 3 days. Shall we represent it on the number line?



It can be written as

$(-3) + (-3) + (-3) = -9$

$(-3) \times 3 = -9$

$(-3) \times (+3) = -9$

$(-3) \times (+2) = -6$

$(-3) \times (+1) = -3$

$(-3) \times (0) = 0$

$(-3) \times (-1) = +3$

$(-3) \times (-2) = +6$

From the pattern we note that,

i. product of two positive or two negative integers are positive.
ii. product of one positive and one negative integer is a negative integer.
iii. Product of either positive or negative integer with zero is a zero.

Activity 2:

Let us see the division concept of two positive integers with the product of two positive integers.

For example,

Multiplication	**Division**
$7 \times 5 = 35$	$35 \div 5 = 7, 35 \div 7 = 5$

So the division of two positive integers is again a positive integer.

For instance,

Multiplication	**Division**
i) $-8 \times 3 = -24$	$-24 \div 3 = -8, -24 \div -8 = 3$
ii) $(-4) \times (-5) = +20$	$20 \div -4 = -5, 20 \div -5 = -4$
iii) $(-4) \times (5) = -20$	$-20 \div -4 = 5, -20 \div 5 = -4$

From the above examples, we know that:

i. Division of two positive or two negative integers gives a positive integer.
ii. Division of a negative by a positive integers gives a negative integer.

Hence, division of two integers with same sign gives a positive integer and division of two integers with opposite signs gives a negative integer. An integer divided by 1 is an integer. An integer divided by zero is said to be not defined. Also, zero divided by any integer is zero.

3 Fractions and Decimals

Day : 3

Learning Outcomes

- Understand the notation and place value of decimal numbers.
- Learn the concepts of decimals and fractions and make use of it in daily life situations.

Teacher Activity

Activity 1:

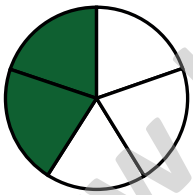
Observe the given table and express the given numbers as decimals and read them:

Thousands	Hundreds	Tens	Ones		One Tenths	One Hundredths	Decimal form
		2	3		7	5	
	7	0	6		5		
2	3	5	8		0	3	

Activity 2

(i) Look at the following pictures and write the answer in the decimal form:

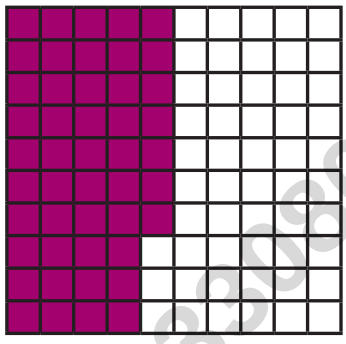
a) $\frac{2}{5}$



b) $2\frac{1}{2}$

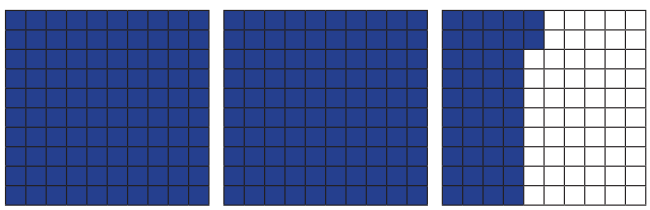
c) $\frac{7}{10}$

d) $\frac{47}{100}$

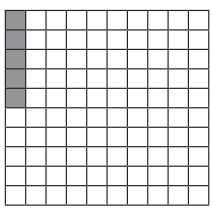


(ii) Observe the pictures and write the following decimals as fractions:

i) 2.42



ii) 0.05



4 Fundamental operations (+, −, ×,÷) on decimal numbers

Day : 4

Learning Outcomes

- Understand the four fundamental operations on decimal Numbers and make use of it in daily life situations.

Teacher Activity

(a) Add the given decimal numbers:

Decimal No.	Hundreds	Tens	Units	One tenths	One Hundreds	One thousands
68.37		6	8	3	7	
437.5	4	3	7	5	0	
Total						

(b) Subtract the given decimal numbers:

Decimal No.	Hundreds	Tens	Units	One tenths	One Hundreds	One thousands
25.43		2	5	4	3	
8.07			8	0	7	
Difference						

(c) Multiply :

(i) 4.72×3.6 **Direct Method**

4.72 -------> 2 Decimal Places
× 3.6 ---------->1Decimal Place

2832
1416

16.992 -----------> 3 Decimal Places

(d) Division of Decimal Numbers:

(i) I have $1\frac{1}{2}$ Kg of rice. If I wish to share it for 3 members equally then what quantity of rice each can have?

(ii) If I want to cut 3 equal pieces from a cloth of length 1.5*m*, then what will be the length of each piece?

What do you notice by your answers of the 2 questions?

(By asking these questions students will understand the similarities of division of rational numbers and decimal numbers. Also, they will be asked to recall - Dividing a thing means separating it into equal parts.)

5 Percentage

Day : 5

Learning Outcomes

- To convert a fraction into percentages and vice-versa.
- To convert a decimal number into percentage and vice-versa.
- To solve problems on percentages.

Teacher Activity

Activity:

Percentage means rounded to hundred. That is, percentage is a fraction in which the denominator is 100.

Conversion of fractions into percentage.

1. $\frac{3}{4} = \frac{3}{4} \times 100\%$
$= 3 \times 25\%$
$= 75\%$

2. $\frac{1}{5} = \frac{1}{5} \times 100\%$
$= 1 \times 20\%$
$= 20\%$

Conversion of percentage into fraction.

1. $48\% = \frac{48}{100}$
$= \frac{24}{50}$
$= \frac{12}{25}$

2. $25\% = \frac{25}{100}$
$= \frac{5}{20}$
$= \frac{1}{4}$

Conversion of decimals into percentage.

1. $0.62 = 0.62 \times 100\%$
$= \frac{62}{100} \times 100\%$
$= 62\%$

2. $1.25 = 1.25 \times 100\%$
$= \frac{125}{100} \times 100\%$
$= 125\%$

Conversion of percentage into decimals.

1. $18\% = \frac{18}{100}$
$= 0.18$

2. $42\% = \frac{42}{100}$
$= 0.42$

6 Addition and subtraction of algebraic expressions and simple linear equations

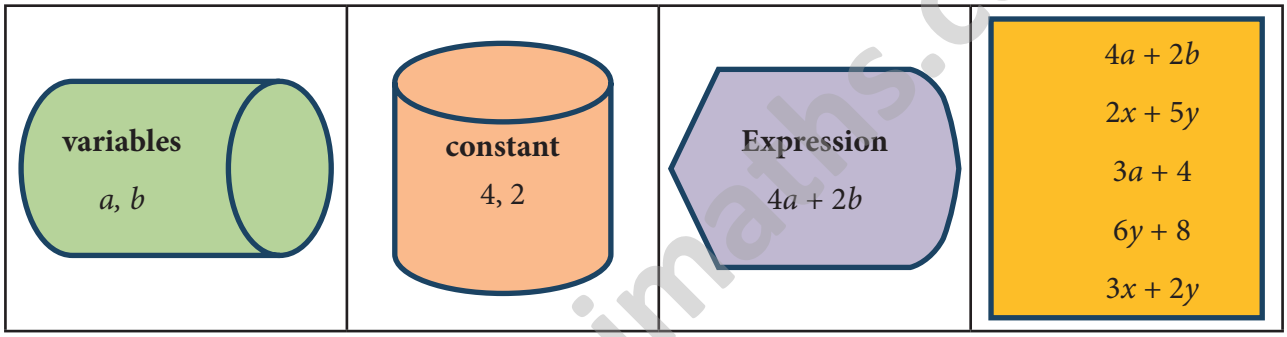
Day : 6

Learning Outcomes

- Ability to identify variables, constants, coefficients, elements, covariates, and similar elements in algebraic expressions.
- To know and use algebraic sum and subtraction.
- Ability to create simple expressions with two variables.
- To create simple linear equations and solve them.

Teacher Activity

Activity 1



From the above classroom context, the teacher explains that the variables will vary and have different values. Constants are fixed values, which is numerical.

He/she also illustrates the algebraic formula for combining variables by addition and subtraction with examples written on the blackboard.

Activity 2

In element $8ab$, 8 is the co-efficient of the remaining factor product ab. Similarly a is the coefficient of $8b$. $8a$ is the co-efficient of b. The chart illustrates how 8 stands for numerical co-efficient, and others are called simply co-efficients.

The terms having the same algebraic factors are called like terms. The terms with different algebraic factors are called unlike terms.

Like Terms

$5a, 2a, 6a, a, 8a, 12a, -4a$

Unlike Terms

$5a, 2b, -2$

Solve the Equation: $6a + 9a = 90$

Solution:

$$6a + 9a = 90$$
$$15a = 90$$
$$a = \frac{90}{15}$$
$$a = 6$$

7 Exponents and Laws of Exponents

Day : 7

Learning Outcomes

- Ability to express numbers in Exponential form.
- Ability to understand Laws of Exponents and use it.

Teacher Activity

Activity 1:

Teacher writes any number and factorising it. For example, let us find factors of 16

2	16
2	8
2	4
2	2
	1

$$16 = 2 \times 2 \times 2 \times 2$$

Instead of writing the factor 2 repeatedly 4 times, we can simply write it as 2^4. It can be read as 2 raised to the power of 4 or 2 to the power of 4 or simply 2 power 4.

Activity 2:

The Teacher introduces rules to multiply and divide exponential numbers with same base.

(i) Multiplication of Numbers in Exponential form:

$$a^m \times a^n = a^{m+n}$$

For Example : $4^3 \times 4^2 = 4^{3+2} = 4^5 = 4 \times 4 \times 4 \times 4 \times 4 = 1024.$

(ii) Division of Numbers in Exponential form:

$$\frac{a^m}{a^n} = a^{m-n}$$

For Example : $\frac{2^4}{2^2} = 2^{4-2} = 2^2 = 2 \times 2 = 4.$

(iii) Power of Exponential form:

$$(a^m)^n = a^{m \times n}$$

For Example : $(3^2)^3 = 3^{2\times3} = 3^6 = 3 \times 3 \times 3 \times 3 \times 3 \times 3 = 729$

Activity 3:

Multiplication and Division of Exponent numbers with different base and same power.

$a^m \times b^m = (a \times b)^m$

For Example : $3^2 \times 4^2 = (3 \times 4)^2 = 12^2 = 12 \times 12 = 144.$

$\frac{a^m}{b^m} = \left(\frac{a}{b}\right)^m$ **For Example :** $\frac{8^3}{4^3} = \left(\frac{8}{4}\right)^3 = (2)^3 = 2 \times 2 \times 2 = 8.$

8 Degree of Expression

Learning Outcomes

Day : 8

- Ability to understand Degrees of Expression.

Teacher Activity

Degree of Expression: The largest power of a variable in an expression is called its degree. If it has more than one variable, then one has to take the sum of the powers of variables in each term and take the maximum of all these sums. The degree of any term in an expression can only be a positive integer.

x^5 is a monomial expression, the highest power of the expression is its exponent, that is 5.

In the algebraic expression $2x^3 - x^2 - 8x + 3$, the term $2x^3$ has the highest power 3, hence its degree is 3.

In $-3p^4q^3$, the sum of powers of p and q is $7(4 + 3 = 7)$, hence its degree is 7.

9 Algebraic identities

Learning Outcomes

Day : 9

- To derive the Identities, $(a + b)^2 = a^2 + 2ab + b^2$, $(a - b)^2 = a^2 - 2ab + b^2$ $(a + b)(a - b) = a^2 - b^2$, $(x + a)(x + b) = x^2 + (a + b)\,x + ab$ through geometrical proof and solve the same.

Teacher Activity

Ask the students to say an expression. $3x + 6$ Change into the equation $3x + 6 = 0$

Ask to substitute the value of x as 1 in the given equation $x=1 \Rightarrow 3(1) = -6 \Rightarrow 3 \neq -6$

$x = 2 \Rightarrow 3(2) = -6 \Rightarrow 6 \neq -6$

$x = -2 \Rightarrow 3(-2) = -6 \Rightarrow -6 = -6$

It is not true for all values of the variables.

Now consider the algebraic expression $(a+b)^2 = a^2 + 2ab + b^2$

Substitute $a = 1$, $b = 2$

$(1+2)^2 = 1^2 + 2(1\times 2) + 2^2$

$3^2 = 1 + 2(2) + 4$

$9 = 1 + 4 + 4$

$9 = 9$

LHS = RHS

Substitute $a = 2$, $b = 3$

$(2+3)^2 = 2^2 + 2(2\times 3) + 3^2$

$5^2 = 4 + 2(6) + 3^2$

$25 = 4 + 12 + 9$

$25 = 25$

LHS = RHS

We shall find that for any value of 'a' and 'b' L.H.S = R.H.S. Such an equality, which is true for every value of the variable in it is called as an identity.

In general, algebraic equalities which hold true for all the values of the variables are called Identities. Similarly we can prove other identities.

10 Inequation

Day : 10

Learning Outcomes

- To know and construct linear inequations.
- To know the laws and solve the linear inequations.

Teacher Activity

Explanation 1: The minimum age for obtaining a driving license is 18. If Rajiv holds a driving license and his age is specified as x, then the above statement in mathematical form is:

$x \geq 18$ (say equal to 18 or greater than 18)

Explanation 2: If a bottle contains about 5 litres of water, then the statement can be written as $z \leq 5$ (z stands for the amount of water in the bottle).

Explanation 3: We know that the sum of two sides of a triangle are larger than the third. If the sides of the triangle are a, b, c, then $(a + b > c, b + c > a, c + a > b)$.

Inequation

An algebraic statement that shows two algebraic expressions being unequal is known as an algebraic inequation.

Construct inequations for the following statements:

1. Ramesh's salary is more than ₹25,000 per month; $x > 25{,}000$.
2. A lift can carry maximum of 5 persons; $y \leq 5$.
3. The exhibition will be there in town for at least 100 days; $x \geq 100$.
4. Consider a natural number less then; $x < 7$.

linear equation	linear Inequation
A simple linear equation has atmost one solution $3x - 3 = 12$ $3x - 3 + 3 = 12 + 3$ $3x = 15$ $\frac{3x}{3} = \frac{15}{3}$ $x = 5$	A linear inequation may have many solutions. $3x - 3 < 12$ $3x - 3 + 3 < 12 + 3$ $3x < 15$ $\frac{3x}{3} < \frac{15}{3}$ $x < 5$ $x = 1, 2, 3, 4$

Activity 1:

Solve: $2x + 4 < 18$, where x is a natural number.

$$2x + 4 - 4 < 18 - 4$$

$$2x < 14$$

$$\frac{2x}{2} < \frac{14}{2}$$

$$x < 7$$

Therefore, $x = 1, 2, 3, 4, 5, 6$.

11 Angle sum property of triangles and congruence of triangles

Day : 11

Learning Outcomes

- Apply angle sum property of triangles.
- Understand the concept of congruency of triangles.
- Know the criteria for congruence of triangles.

Teacher Activities

Activity 1:

Teacher draws a triangle in a flash card. Mark the three angles, cut out the angles separately and arrange the same in a straight line. Angles on a straight is 180°. From this we observe that, the sum of all angles in a triangle is 180°.

If three angles of a triangle are x, $(x + 2)$ and $(x + 4)$, then find the value of x.

Solution:

The sum of all three angles in a triangle is180.

$$\text{So, } x + (x + 2) + (x + 4) = 180$$
$$3x + 6 = 180,$$
$$3x = 180 - 6,$$
$$x = \frac{174}{3} = 58$$

Therefore, $x = 58°$

Activity 2:

Teacher teaches the concept of congruence of shapes using coins, triangles which are having different sides and angles to make a trace copy of one figure and place it over the other. If the shapes are completely matched with shape and size, then they are said to be congruent.

If the corresponding sides and angles of two triangles are equal, then the two triangles are said to be congruent.

Conditions for the Congruence of the triangles can be verified:

i) Side – Side – Side(SSS) ii) Side – Angle – Side(SAS) iii) Angle – Side – Angle(ASA)
iv) Right Angle – Hypotenuse – Side (RHS).

In a right angled triangle, angle opposite to right angle is called as **hypotenuse**.

12 Symmetry

Day : 12

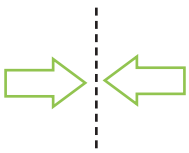
Learning Outcomes

- To recall the type of symmetry through diagrams.
- To learn symmetry through transformation (Translation, reflection and rotation).

Teacher Activities

Activity 1:

The teacher asks the students to view image of any shapes on the mirror, recall the own image in mirror daily at home. From this action, teacher explains and discuss the following:



- When an object is seen in a mirror, the image obtained on the other side of the mirror is called its **reflection**.
- The object and its reflection image show mirror symmetry. The mirror line here is the line of symmetry. Mirror symmetry is called **reflectional symmetry**.
- The reflected shape will be exactly the same as the original, the same distance from the mirror line and have the same size.
- The left and right sides of an object appear inverted in the mirror.

Activity 2:

Using chart paper, ask the children to draw two equilateral triangles and cut the triangles from the chart paper. Place them one over the other in a card-board. Rotates the top triangle around a fixed axis, how many times its appearance of size and shape match with other?

From this activity,

- An object is said to have a **rotational symmetry** if it looks the same after being rotated about its centre through an angle less than 360°. An object rotates around a fixed axis if its appearance of size and shape does not change.
- The minimum angle of rotational of a figure to get exactly the same figure as original is called the **angle of rotation**.
- The total number of times a figure coincides with itself in one complete rotation is called the **order of rotational symmetry**.

13 Pair of angles formed by Intersecting lines and Transversal

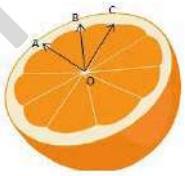
Day : 13

Learning Outcomes

- To understand about adjacent angles, linear pair and vertically opposite angles.
- To understand transversal.
- To identify the different types of angles formed by a pair of lines with a transversal.

Teacher Activities

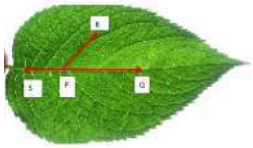
Activity 1: Adjacent Angles



The teacher cuts an orange and marks the angles in the orange.

In the figure, ∠AOC, ∠AOB and ∠BOC are the three angles marked. ∠AOB and ∠BOC are adjacent angles. There is only one common vertex. $\overrightarrow{OB}$ is the common arm. There are no Common interiors. So, two angles which have a common vertex and a common arm, whose interiors do not overlap are called adjacent angles.

Activity 2: Linear Pair

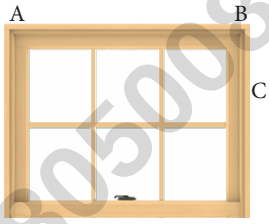


In the given figure, ∠QPR and ∠RPS are adjacent and these angles together will make ∠QPS which is a Supplementary angle. The adjacent angles that are supplementary lead us to a pair of angles that lie on a straight line. This pair of angles is called as linear pair of angles. So, the angle which lies in any point on the straight line is 180°. The sum of all the angles formed at a Point is 360°.

Activity 3: Vertically opposite angles

In this multiplication sign, the two lines are intersecting each other. When they intersect each other, 4 angles are formed. Two pairs of non-adjacent angles formed are called as vertically opposite angles. Also, the two opposite angles are equal.

Activity 4: Transversal



Teacher asks the pupils to look the windows in the class room. Observe the rods which are parallel and intersecting each other.

So, a transversal is a line that intersects two line at a distinct point.

In the window, where parallel rods A and B are transverse by C. Can you find a transversal in the window?

Corresponding Angles

All the pairs of angles have different vertices, lie on the same side of transversal (t), lie above, below the lines of l and m. Such pairs are called corresponding angles.

Alternate exterior angles

In the opposite sides of the transversal 't' the angles 1 and 5, 2 and 6 are called alternate exterior angles.

Angles formed by a transversal with parallel lines:

- Each pair of corresponding angles are equal.
- Each pair of alternative exterior angles are equal.
- Each pair of alternative interior angles are equal

14 Perpendicular Bisector, Angle Bisector

Day : 14

Learning Outcomes

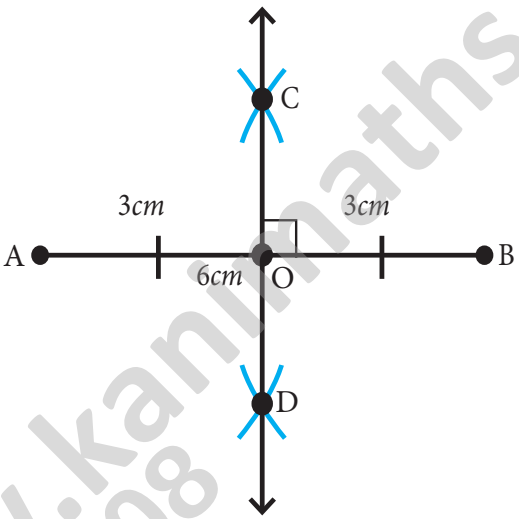
- To construct perpendicular bisector of a given line segment.
- To construct angle bisector of a given angle.

Teacher Activities

Activity 1:

Teacher explains about the construction of perpendicular bisector of a line segment by the following example:

Construct a perpendicular bisector of the line segment AB = 6*cm*.

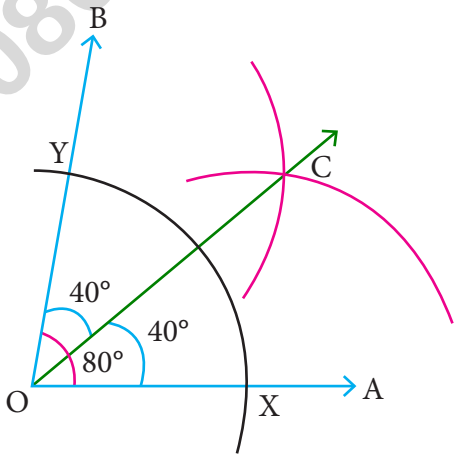


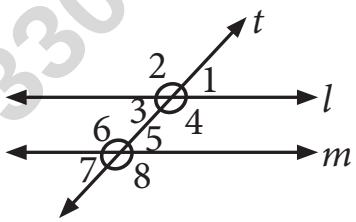
Activity 2:

Construction of angle bisector of an angle.

If a line or line segment divides an angle into two equal angles, then the line or line segment is called angle bisector of the given angle.

Construction of angle bisector of an angle 80°.





15 Tetromino

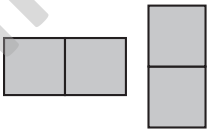
Day : 15

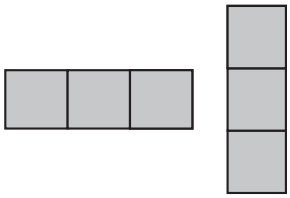
Learning Outcomes

- To understand the shapes of Tetrominoes
- To create larger shapes using Tetrominoes

Teacher Activities

i. Join two squares of side 1*cm* × 1*cm* horizontally or vertically. Such formation is called as Domino.

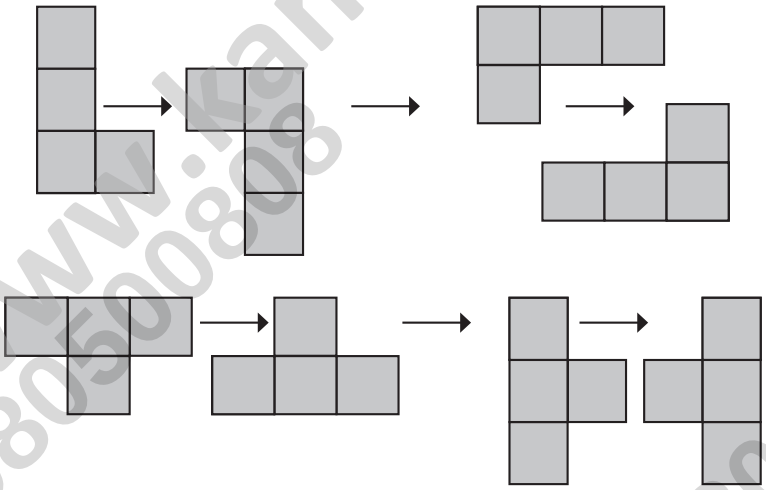




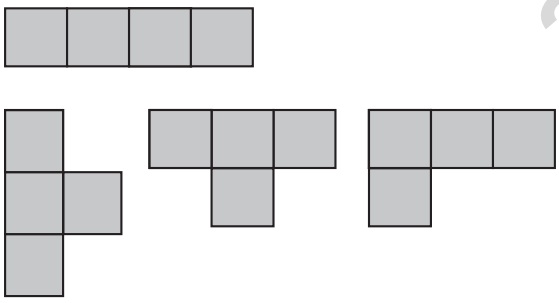
ii. When we join three squares of side 1cm × 1*cm* horizontally or vertically along their edges we will obtain a formation which is called as Trinomino.

iii. Similarly, when four squares of side 1cm × 1cm are joined horizontally or vertically along their sides the new formation so obtained is called as Tetromino.

iv. When we rotate these Tetrominoes, we get some other shapes as shown below:



v. Filling rectangular tiles using tetrominoes:



16 Flow chart

Day : 16

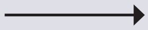
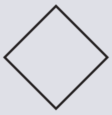
Learning Outcomes

- Able to create Flow Chart.
- To understand the use of Flow Chart.

Teacher Activities

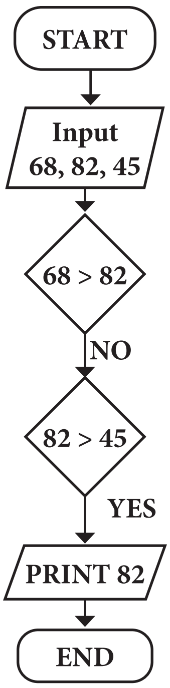
Activity 1:

Flow Chart: A Flow Chart is a pictorial representation and it gives an idea of instructions to perform a task or calculation.

Shape	Name	Meaning
	Flow line	Used to connect shapes and indicates the flow of instructions
	Terminal	Used to represent the Start and End of the task.
	Input/Output	Used to the instruction to be read, displayed are described inside.
	Processing	Used for calculating or indication of process of flow step.
	Decision	Used for any logic or comparison of an operation. The flow direction chosen depends on whether the answer to the question is 'yes' or 'no'.

Activity 2:

Finding a greatest number among three given numbers by Flow Chart:



17 Mean, Median and Mode

Day : 17

Learning Outcomes

- To understand, recognize and distinguish among the different types of averages such as the Arithmetic Mean, Median and Mode for discrete data.

Teacher Activities

Activity 1: Arithmetic Mean

Raja and Ram went to the garden to pluck mangoes. They both planned to divide the fruits evenly between them. Raja plucked 40 mangoes and Ram plucked 60 mangoes. If both have taken equally how many fruits will each get? 50 fruits. This is termed as Average or Arithmetic Mean or Mean.

$$\text{Therefore, Arithmetic Mean} = \frac{\textit{Sum of all observations}}{\textit{Number of observations}}$$

Activity2: Mode

Following table shows the yield of different types of fruits in a farmer's garden:

Fruits	Mango	Guava	Sapota	Pomegranate
Numbers	60	50	55	25

Here the yield of Mango tree is more than that of the other trees. The value of the data which occurs maximum number of times is called **Mode**.

For example, consider the data 26, 25, 26, 27, 21, 22, 26, 24, 30, 24, 20, 24, 28, 27, 23.

Here, 24 and 26 are repeated three times which is maximum and mode of this data is 24 and 26.

Hence the are given data has bimodal.

If the given data has two modes, then it is called bimodal.

For example, Consider the data 5, 8, 6, 5, 8, 3, 4, 8, 5, 6, 4, 6, 8, 5, 6.

Here 5, 6, 8 are repeated four times, Which is maximum and hence mode of this data 5, 6, 8. Hence the data has trimodal.

Note: If the given observations in a data occurs only once, then there is no mode for the given data.

Activity3: Median

The height of 11 students who are studying in class seven are given below in centimetres. 90, 95, 89, 72, 108, 87, 92, 105, 115, 97 and 80.

From the above data heights are arranged in a proper way. Which student's height will occupy the central position?

First arrange the given data in Ascending (or) Descending order.

Ascending order: 72, 80, 87, 81, 90, $\boxed{92}$, 95, 97, 105, 108, 115.

Here 92 is in the 6^{th} place which divides the data evenly on both sides.

This type of representation of middle most value of the given data is called the **median**.

18 Perimeter and Area of special Quadrilaterals

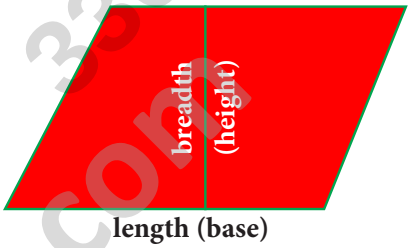
Day : 18

Learning Outcomes

- To find the perimeter and area of parallelogram, trapezium and rhombus.

Teacher Activities

Activity 1: Area of a parallelogram



Area of the parallelogram = Area of the rectangle

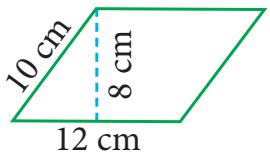
= length × breadth

= **base** × **height** *square units.*

Note: The length and the breadth of the rectangle becomes the base (b) and height (h) of the parallelogram.

Also, the sum of all four sides of a parallelogram is its perimeter.

Example: Find the area and the perimeter of the given parallelogram.



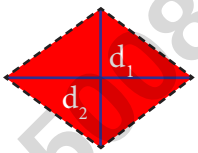
Area of the parallelogram = bh *sq.units*

= $12 \times 8 = 96$ *sq.m.*

Perimeter of the parallelogram = Sum of four sides

= $12 + 10 + 12 + 10 = 44$ *m*

Activity 2: Area of a rhombus



Area of a rhombus $= \frac{1}{2} \times$ length $\times$ breadth $= \frac{1}{2} \times d_1 \times d_2$ *sq.units.*

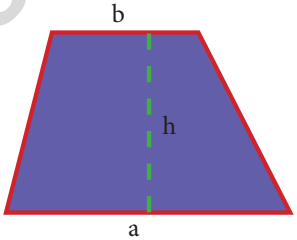
Example: If the diagonals of a rhombus are 6 feet and 5 feet, find its area.

Area of the rhombus $= \frac{1}{2} \times d_1 \times d_2$ *sq.units* $= \frac{1}{2} \times 6 \times 5 = 15$ *sq.feet.*

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

$= 15$ *sq.feet*

Activity 3 : Area of a trapezium



Area of a trapezium $= \frac{1}{2}$ $(a+b) \times h$ ***sq.units***

Example: If the parallel sides of a trapezium are $20m$, $15m$ and its height is $8m$, find its area.

Area of a trapezium $= \frac{1}{2} (a + b) \times h$ *sq.units* $= \frac{1}{2} \times (20 + 15) \times 8 = 140$ *sq.m.*

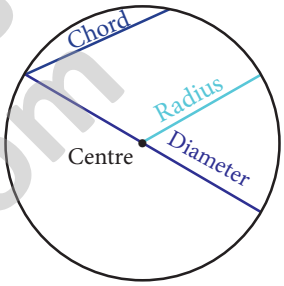
19 Area of a Circular Path

Day : 19

Learning Outcomes

- To find the circumference and area of a circle.
- To find the area of the circular path.

Teacher Activities



Activity 1: Parts of the circle

Introducing the parts of a circle such as centre, radius, chord, diameter, circumference and the relation between diameter and radius by paper folding method.

Activity 2: The value of π and the circumference of the circle

Teacher explains that $\frac{Circumference}{Diameter}$ is a constant (π) and the approximate value of π is $\frac{22}{7}$ or 3.14.

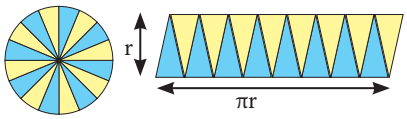
Also, the circumference of the circle $= diameter \times \pi = \pi d = 2\pi r \, units.$

Activity 3: The area of the circle

The area of the circle = The area of the parallelogram

= base × height = $\pi r \times r$

$= \pi r^2 \, sq.units.$

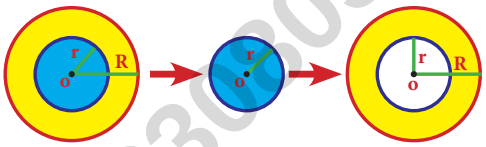


Note: The base of the parallelogram represents half the circumference of the circle **πr** and the height represents the radius of the circle.

Example: Find the area grazed by the cow which is tied with 7 meter rope.

$$\text{Area grazed by the cow} = Area\,of\,circle = \pi r^2 sq.units = \frac{22}{7} \times 7 \times 7 = 154\, sq.m$$

Activity 4: The area of the circular path



Circles drawn with different radius at a fixed point (called as centre) are called concentric circles. The circular path is the region between two concentric circles. **For example,** the side walks surrounding a circular swimming pool and a circular park. Now, let us see the area of the Circular path!

If you cut a small circle (inner circle) of radius **'r'** from the centre of a circle (outer circle) of radius **'R'**, the remaining area represents the area of the circular path.

The area of the circular path = Area of the outer circle – Area of the inner circle

$= (\pi R^2 - \pi r^2)$

$= \pi(R^2 - r^2) \, sq.units$

20 Direct and Inverse Proportion

Day : 20

Learning Outcomes

- To be able to understand and differentiate direct and inverse proportion.
- To solve application problems using direct and inverse proportion.

Teacher Activities

Activity 1:

Direct proportion

A function is organized to create awareness among students in planting trees. If each of 60 students plants one sapling, then how many saplings will be planted by them? Answer is 60 saplings. If each student plants two saplings, then the total saplings are 120. Here both quantities increase.

From this example, we learn that if both quantities are increases and decreases then they are said to be in direct proportion.

Activity 2:

Inverse proportion

Mukuthan's father gifted 60 chocolate for his birthday. He distributes two chocolates each to 30 friends. If he distributes 3 chocolates each to his friends, then 20 of his friends only will get chocolates.

Here one quantity increases and the other decreases and vice versa. Hence the two quantities are said to be inverse proportion.

Activity 3

If the cost of 5 notebooks is ₹ 100, then what will be the cost of 7 note books?

Number of notebooks (x)	5 (x_1)	7 (x_2)	Direct
Cost (y)	100 (y_1)	? (y_2)	Variation

Here the number of notebooks and the cost will also increase. Therefore the quantities are in direction variation $\left(\frac{x_1}{y_1} = \frac{x_2}{y_2}\right)$

$$\text{Hence, } \frac{x_1}{y_1} = \frac{x_2}{y_2}$$

$$\frac{5}{100} = \frac{7}{y_2}$$

$$5 \times y_2 = 100 \times 7$$

$$y_2 = \frac{100 \times 7}{5}$$

$$y_2 = 140$$

The cost of 7 notebooks is ₹ 140.

Note

Note

This book has been printed on 80 G.S.M.
Elegant Maplitho paper.
Printed by offset at

Teacher's Handbook

A call can change your life (24×7 toll free helplines for children below 18 years)

If you are forced into
Child Marriage or Child Labour,
If you are Emotionally,
Physically, Sexually
Harassed or Abused,

CHILD LINE 1098 NIGHT & DAY

If you feel unsafe dial CHILDLINE 1098 Night & Day
Caller details will be kept confidential

If you are feeling Threatened or
being Abused or Harassed -
Emotionally, Physically or Sexually,
If you are feeling unsafe,
If you need guidance for
Examinations or Higher Education
Dial 14417

14417 Education Information Centre

Caller details will be kept confidential

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