BRIDGE COURSE MATERIALS FOR V CLASS TEACHERS OF KARNATAKA STATE

SUBJECT : MATHEMATICS

COORDINATOR

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REGIONAL INSTITUTE OF EDUCATION, MYSORE-6

(NATIONAL COUNCIL OF EDUCATIONAL RESEARCH AND TRAINING)

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PREFACE

In Karnataka, all the lower primary schools were upgraded very recently, and now, the responsibility of teaching class V rests on the shoulders of lower primary school teachers. In view of the above fact, the Regional Institute of Education has accepted to develop a bridge course in teaching of Mathematics, Science and English for class V.

The following are the Coordinators.

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Coordinator for Mathematics

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These three separate course materials are developed by the respective groups over a series of workshops conducted at RIE, Mysore. The list of the participants in the Mathematics group is enclosed in the end. The names of the members of Science and English groups will be enclosed in the respective materials.

The Coordinators are thankful to all the participants and the others who have directly or indirectly helped in developing these course materials. They hope that these materials will be used the teachers.

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CHAPTER I

NUMBERS

1.1 Place Value of Numbers

1.2 Expansion of Numbers

1.3 Estimation of Numbers

1.4 Bigger and Smaller Numbers

1.5 Arranging the Numbers

1.6 Kannada and Roman Numbers

Review Exercise 1

1.1 Place Value of Numbers

Read and Write the Numbers

When we read any number, we use the symbol, (comma) to make reading more easy. For example, the number 412315 is written as 4,12,315 and read as "Four Lakhs, Twelve Thousand and Three Hundred and Fifteen".

The number 62735 can be written as 62,735 and read as "Sixty Two Thousand, Seven Hundred and Thirty Five".

1. Now, insert the sign , (comma sign) in the appropriate place and read the following numbers :
   a) 9006
   b) 30602
   c) 243454
   d) 694929
   e) 523201
   f) 293940

2. Find the place value of numbers encircled.
   Ex: 31325
   Ans: 2 is in Tens place.

	T.Th	Th	H	T	U
	3	1	3	2	5

   (i) 34,671 (ii) 68,642 (iii) 6.47,139
   (iv) 9,81,045 (v) 29,657 (vi) 1,23,025

3. Write the following numbers in words.
   Example: 1,20,590 : One Lakh Twenty Thousand Five Hundred and Ninety.
   (i) 32,456 (ii) 90,101 (iii) 45,101

4. Write the following numbers using numerals :

(i) Forty five thousand six hundred and nine (Ans: 45,609)

(ii) One lakh twenty five thousand three hundred and one.

(iii) Three lakhs fifty five thousand, two hundred and ten.

(iv) Twenty five thousand, five hundred, fifty five.

5. In the following example, in each case we write the next number by increasing the number by 100. For example, 50, 150, 250, 350,..... Now fill up the blank spaces in the following examples by increasing by 1000 each time.

i)

3,555	4,555	----------	----------
11,505	12,505	----------	----------
25,100	26,100	----------	----------
36,111	37,111	----------	----------

ii) Fill in the blanks :

90,000	95,000	----------	----------
75,000	80,000	----------	----------
1,15,000	1,20,000	----------	----------
2,35,200	2,40,200	----------	----------

6. Write the place value of each digit in the following. Ex. 25,311

T.Th	Th	H	Ten	Unit
2	5	3	1	1

i) 906501
ii) 855611
iii) 3245611

7. i) Add 38443132 to 815321 and write answer by using place value table (used in above example).

ii) Add 512321 and 635231. Write answer in place value table.

iii) Add 49547631 and 432429, then write answer by using comma (,) in suitable places.

iv) Add 5429631 to 324528 then write answer by using comma in suitable places.

Review Exercise 2

Number Place : Each numeral has a place in any number. For example, 438. In this number, the digit '4' is in the hundredth place and '3' is the tenth place and '8' is in units place.

Place Value of a Number : In number systems, the value of the digit increases ten times as it moves from right to left by one place. For example, 32. In this number, the digit 2 is in unit place. Hence the face value of the digit '2' is 2. Place value of 3 in the number 32 is thirty. If the number 32 is multiplied by 10, then the digit '2' changes from the units place to tenths place. Then its face value is 20. The following table shows the changing value of the digit 2.

Number	Product	Place Value of the digit '2'
32	32	2 (unit)
32 × 10	320	20 (Tens)
320 × 10	3200	200 (Hundred)
3200 × 10	32000	2000 (Thousand)
32000 × 10	320000	20000 (Ten thousand)
320000 × 10	3200000	200000 (Lakhs)
3200000 × 10	32000000	2000000 (Ten Lakhs)

1.2 Expanded Form : In general, we use base 10 system to write the expanded form of a given number. For example, we write 234 in the expanded form as follows:

$$234 = 2 \times 10^2 + 3 \times 10^1 + 4$$

$$= 2 \times 100 + 3 \times 10 + 4$$

1. Write the following numbers in the expanded form :

6534 (Ans: $6 \times 1000 + 5 \times 100 + 3 \times 10 + 4 \times 1$)

74405 =

758 =

2. Simplify the following expanded forms :

a) $3 \times 10{,}000 + 6 \times 100 + 4 \times 10 + 8 \times 1$ (Ans : 30,648)

b) $4 \times 100000 + 7 \times 10000 + 0 \times 1000 + 2 \times 100 + 8 \times 1$

3. Write the following numbers in words.

a) 36,230 (Ans : Thirty Six Thousand Two Hundred and Thirty)

b) 5,48,560

4. Write the following numbers in numerals and also write them in expanded form.

a) Sixty Seven Thousand Four Hundred Fifty Six (Ans: 67,456)

$(= 6 \times 10000 + 7 \times 1000 + 4 \times 100 + 5 \times 10 + 6)$

b) Four lakhs seven thousand five hundred thirty only.

5. In the following numbers, write the place value of the numerals encircled.

a) 42,20, 900 (Ans : 2,00,000)

b) 30,663 (Ans: 600)

c) 4,23167 (Ans: 3000)

6. In the following numbers some numerals are underlined. Write their place value in words.

a) 6<u>1</u>432 b) 31<u>4</u>56 c) 41<u>2</u>378 d) <u>7</u>689102

7. Write the place value of each numeral for the number 4,38,532.

8. Match the following :

	A	B
1.	One thousand	Five hundred
2.	6 is in ten thousandth place	1000
3.	The place of the digit '5' in the number 44532	62345
4.	4000 + 800 + 20 + 7	3000 + 400 + 60 + 1
5.	3461	4827

Review Exercise 3

1.3 Estimation of Numbers

When 342 is estimated to its tenth place, its value becomes 340 because '2' is in unit place and it is less than '5'.

A. Fill up the blanks:

1. When 265 is estimated to its hundredth place, its value becomes…….(300) (because 6 is in tenth place is more than 50).
2. When 5, 881 is estimated to its thousandths place, the value becomes ……..(6000)
   ('8' is in 100^{th} place and its value is more than 500).
3. When 17,820 is estimated to its $10,000^{th}$ place its value becomes…….(20,000).
4. When 5,38,546 is estimated to its lakh place the value becomes…….(5,00,000).
5. Estimate the following numbers into their 100^{th} place.
   i) 5,122 ii) 8,401 iii) 6,254
   iv) 6,486 v) 9,072 .
6. Estimate the following numbers into their 1000^{th} place value.
   i) 63,024 ii) 84,346 iii) 54,6888 iv) 30,769
7. Estimate the following numbers into their $10,000^{th}$ place value.
   i) 84,686 ii) 16,580 iii) 2,02,540 iv) 3,60,300
8. Estimate the Distance :
   The distance between Bindu and Rekha's houses is 4 km 380 metres. Estimate the same distance in thousand meters.
   Solution : 1 km = 1,000 mts.
   4 kms = 4,000 mts
   ∴ 4 km 380 mts = 4,380 mts
   and 380 is less than 500. Therefore, 4,380 mts is approximately equal to 4,000 mts.

∴ The distance between Bindu's house and Rekha's house is 4,000 mts (approximately).

9. The capacity of a drum is 185 litres. Find the capacity of seven drums of the same size and estimate it to hundredth place.

10. The height of a coconut tree is 1,800 cms. What is the estimated height in meters ?

11. If Latha brought 1¾ kg of sugar. Estimate the weight of sugar in grams. (1 kg = 1000 gms).

12. Express the estimated population of your taluk in thousands.

Review Exercise 4

1.4 Bigger and Smaller Numbers : Using the three digits 1,2 and 3, we can write six different numbers of three digits (without repeating any digit) by different rearrangements). For example,

Starting with		Write the numbers
1	⟶	1 2 3; 1 3 2
2	⟶	2 1 3; 2 3 1
3	⟶	3 1 2; 3 2 1

Compare the above numbers and write them in ascending order (increasing order) as follows :

123 → 132 → 213 → 231 → 312 → 321

i.e. the lowest number is 123 i.e. starting with smallest digit and ending with biggest digit 3. In between the middle numbers come in the respective order.

2. 5, 6, 4 are the different numbers. Write all the three digit numbers.

Starting with 4	⟶	456, 465
Starting with 5	⟶	546, 564
Starting with 6	⟶	645, 654

The biggest number is 654 and the smallest is 456.

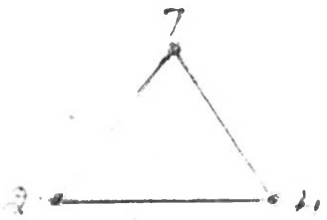
3. Use 8, 9, 7 – Arrange them in different ways and write all the possible numbers.

4. 1,3,5,7 – arrange them in different ways and write all the possible numbers starting with seven. For example, one of them is 7135. Write the other numbers.

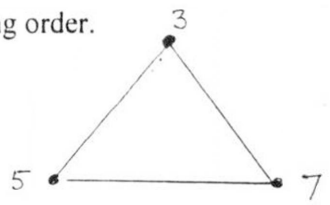
5. 2,325 is a number having 4 digits and '2' is repeated.
   2325, 2352, 2235, 2253, 2532, 2523
   3225, 3252, 3522, 5232, 5322, 5223
   Here 2235 is the smallest and 5322 is the biggest number.

6. Write the smallest and biggest numbers (without repeating any numeral) using all the four numerals 1,2,3 and 4.

7. Use the numbers in the corners of the figure and write all the possible numbers of three digits, without repeating any digit. Also, write the biggest and smallest number among them.

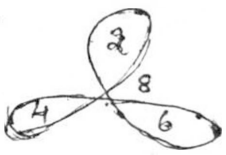


8. Construct all the possible 3 digit numbers using the numbers in figure and write them in the increasing order.



9. Using the numbers in the figure, construct all 3 digit numbers and mention the biggest and the smallest numbers.

10. Using the four numbers of the figure, write all the possible number of 4 digits without repeating any number.



11. Using all the numbers on tip of each leaf, write the smallest number in the centre and write the biggest number starting with each number in the respective leaf.

Answer : Smallest 23456

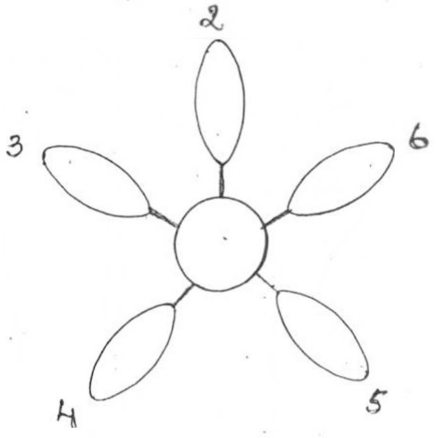
36542

26543

65432

46532

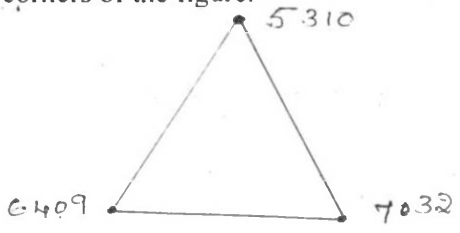
56432



Review Exercise 5

1.5 Arranging the Numbers (in ascending/increasing, descending/decreasing order)

Look at the numbers written on the corners of the figure.



The smallest number is 5310.

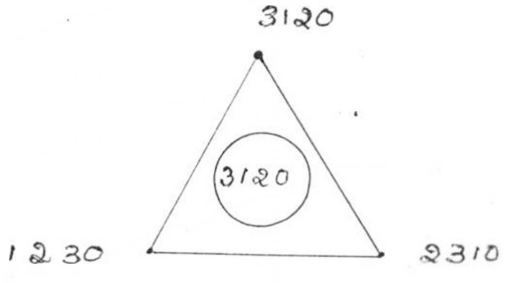
The next higher number is 6409.

The largest number is 7032.

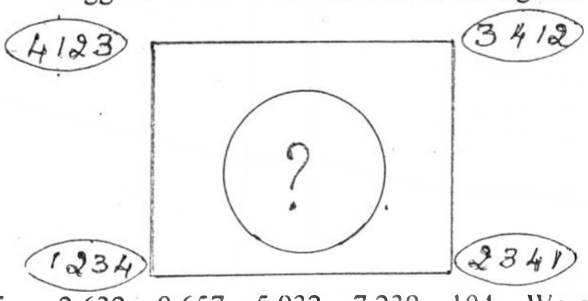
We can write them in the increasing order as : 5310, 6409, 7032

Also, we can write them in the decreasing order as : 7032, 6409, 5310

1. Write the biggest number in the middle of the figure :



2. Write the biggest number in the middle of the figure.



3. 1,575, 2,632, 9,657, 5,932, 7,239, 104. We arrange these numbers in ascending order, we write these numbers from smallest to biggest numbers.

104, 1,575, 2,632, 5,932, 7,239, 9,657 is ascending order.

9,657, 7,239, 5,932, 2,632, 1,575, 104 is descending order.

Arrange the following numbers into ascending order.

i)	2,450	6,000	8,500	9,900	10,000
ii)	11,500	15,000	12,000	10,500	13,000
iii)	222	2,220	22,220	220	
iv)	2.12	21.2	212.0	02120	

4. Find biggest and smallest number among the following numbers.

i)	27,209	99,203	89,000	2,92,333	32,933	
ii)	4,6178	36,099	6,305	36,605	74,305	
iii)	24,638	36,248	35,712	73,512	77,377	
iv)	12,345	9,851	65,000	38,004	18,400	
v)	2,500	2,430	6,500	8,005	2,430	3,530

5. Number of books in different libraries are given below. Arrange the numbers in ascending order.

Sl. No.	Libraries	No. of Books
1.	A	15,225
2.	B	92,325
3.	C	85,612
4.	D	63,123
5.	E	1,20,123
6.	F	75,135

6. By using the following numbers, write biggest and smallest numbers (eg. If the given number is 58,981, then the biggest is 98851 and the smallest is 15,889)

i) 89,216
ii) 65,301
iii) 32,10,546
iv) 9,18,273
v) 7,16,253
vi) 6,31,457

1.6 The Numerals

Revision Exercise 6

1,2,3,4,5,6,7,8,9,0 are called the Hindu Arabic Numerals. The following are the Kannada numerals.

1 = ೧ 6 = ೬
2 = ೨ 7 = ೭
3 = ೩ 8 = ೮
4 = ೪ 9 = ೯
5 = ೫ 10 = ೧೦

The number 340 can be written using Kannada numerals as : ೩೪೦

Exercise :

1. Change the following Hindi-Arabic numbers into Kannada numerical form.
   i) 12; ii) 177 iii) 268 iv) 510

2. Change the following Kannada numbers into Hindu Arabic numerical form.

   ೧೭ , ೮೨ , ೬೧ , ೧೦೭

3. Change the following statement into Kannada numerical form.
   i) fourteen ii) seventy one
   iii) three hundred fifty two

Roman Numbers

To change Hindu-Arabic numbers into Roman numerical form we use the following seven letters.

I	V	X	L	C	D	M
1	5	10	50	100	500	1000

We write the numbers from 1 to 10 in roman system as follows :

1	2	3	4	5	6	7	8	9	10
I	II	III	IV	V	VI	VII	VIII	IX	X

Look at the above numbers (digits).

a) Right side digits are bigger than the left side digits. For example, in number IV, the bigger digit V is to the right and the smaller digit I is to the left. The value of the number can also be understood by subtracting the smaller digit from the bigger one i.e IV = 5 – 1 = 4 ; IX = 10 – 1 = 9

b) If right side digits are smaller than the left side digits. The value of the number can be understood by adding the smaller digit to the bigger digit.

For example : 1. VI = 6 = 5 + 1; 2. XI = 11 = 10 + 1

Now we write 167 in Roman digit

$167 = 100 + 50 + 10 + 5 + 2 \Rightarrow 167 = CLXVII$

c) When a digit or numeral is repeated its value will be a multiple of that numeral (digit).

For example, $XXX = 10 \times 3 = 30$

$CC = 100 \times 2 = 200$ and so on.

d) While repeating the numerals the symbols IXCM ARE used repeatedly three times only.

For example : 44 is written as XLIV.

e) In any number the digits V, L, D are used only once.

Example : 15 = XV

65 = LXV etc.

f) When a smaller digit is found in between the two big digits, first we subtract middle digit from the right digit. Then add left digit.

For example e: XIV = 14. Here X and V are big digits and I is the middle digit.

V – I = 4

X = 10

XIV = 10 + 4 = 14

g) A bar over a numeral gives a value 1000 times the value of that numeral. For example,

$\overline{IV} = 4 \times 1000 = 4000$

$\overline{X} = 10 \times 1000 = 10000$ and so on.

h) The numeral '0' is not used in Roman digits.

a) The four fundamental operations – Addition, Subtraction, Multiplication and Divisions are not usually done in Roman number system.

Revision Exercise 7

a) Express each of the following using Roman numeral system.

a) One hundred and seventy

b) Five thousand one hundred and forty six

c) Eleven thousand and sixty nine only.

a) Express each of the following using Roman numerals.

a) 19; b) 233; c) 3468 d) 44,650

a) Express each of the following in Hindu-Arabic numeral.

a) XCIV b) CDX c) MDCIX

*****

CHAPTER II

OPERATIONS ON NUMBERS

2.1 Addition, Subtraction

Add 375 and 131.

	Hundreds	Tens	Units
	3	7	5
	1	3	1
Answer	**5**	**0**	**6**

The teachers can ask the students to write the numbers in their appropriate places (units, tens, hundreds, etc) and then do the addition as done above. Similar procedure can be adopted in subtraction also.

Subtract 131 from 375.

	Hundreds	Tens	Units
	3	7	5
	1	3	1
Answer	**2**	**4**	**4**

Revision Exercise 1

1. Add the following :

   23,250

   40,450

2. Simplify the following :

   a) 4,436 + 4,634 + 5,560 =

   b) 3,215 + 6,320 + 43,125 =

   c) 1,235 + 3,135 + 4,120 + 2,130 =

   d) 1,572 + 2,03,015 + 1,325 + 1,23,103 =

3. If a school has purchased notebooks for Rs.200/- and textbooks for Rs.5000/-, papers for Rs.500 and pens for Rs.200, find the total amount .

4. If there are 520 boys and 719 girls in a school, find the number of students in that school.

5. If Sheela's monthly pay is Rs.5,000/- and she spends Rs.3,000/- for provisions and Rs.1,000/- for rent. Find the remaining amount in her pocket.

6. Rajamma purchases 1000 eggs from Saleem and 500 eggs from Rangamma. Out of these total eggs, 100 eggs are rotten. Find the total number of eggs which are in good condition.

7. For Annual Sports, Rajesh purchases stationery materials for Rs.1,252/- sweets for Rs.455/- and cold drinks for Rs.125/-. Find the remaining amount if the total amount given from the school is Rs.3,000/-.

8. In a plantation, there are 12,000 trees out of which, 1500 are mangoes, 1355 are teak, 1000 are coconut, 250 are jack fruits. Find the total number of other trees in that plantation.

2.2 Multiplication and Division

Note: The teachers are requested to introduce the concept of multiplication as repeated addition and revise all the prerequisites needed in the previous classes before going to the multiplication of large numbers. The Multiplication Tables should be known (by heart) to the students to make this operation easy.

1. If there are 18 boxes, each box containing 15 soap cakes, find the total number of soap cakes available.

Answer: Total number of soap cakes = 18×15

18×15

90

18

Ans: 270

2. A truck can carry 3420 books. Find the number of books that can be carried in 35 such trucks.

Ans: 1 truck = 3420 books

35 trucks = 3420 × 35

17100

10260

119700 books

35 trucks can carry 119700 books

3. The cost of a silk sari I sRs.2500/-. What is the total cost of 132 sarees?

Solution :

The cost of 1 saree = 2500

The cost of 132 sarees = 2500 × 132

5000 - multiplication by 2 - Unit place value

7500 - multiplication by 3 – Tenth place value

2500 - multiplication by 1 - 100th place value

330000 Total

The total cost of 132 sarees is Rs.3,30,000/-

4. Find the product of :

i) 2,421 × 261

multiplication by 1
multiplication by 6
multiplication by 2

Add

ii) 1,942 × 312

iii) 4,132 × 365

iv) 52,641 × 139

5. In a hostel, there are 250 students. The room rent for each student per month is Rs.120. Calculate the total collection of room rent from all the students.

6. The cost of a cow is Rs.10,200/-. If a diary has to purchase 25 such cows, how much money is required ?

7. A tonic bottle contains 150 ml of medicine. How many litres of medicine can be filled in 30 bottles of the same size? (1 litre = 1000 ml).

8. Average weight of a person is 70 kgs. Find the total weight of 65 persons of the same weight ?

Division

1. There is a container having 120 kgs of rice, which has to be distributed to 15 persons equally. How many kgs of rice that each person gets ?

Solution: The total amount of rice is : 120 kg

The number of persons : 15

The rice, each person gets : $\frac{120}{15}$ kgs

= 8 kgs

2. 2500 kg of Ragi is to be filled in smaller bags. Each bag can hold only 50 kgs of Ragi. Find the number of bags required?

$$\text{Number of bags required} = \frac{\textit{Total amount of Ragi (in kgs)}}{\textit{The number of kgs that each bag holds}}$$

$$= \frac{2500}{50}$$

= 50 bags.

3. 5250 oranges are brought from a fruit stall and filled in 25 bags equally. Find the number of fruits contained in each bag.

Total number of oranges brought =

Number of bags =

Fruits contained in each bag =

i.e.
```
25 ) 5250 ( 210        Quotient = 210
     50                Remainder = 0
    ---
     25
     25
    ---
      0
    ---
```

Answer: The number of fruits contained in each bag = 210

4. There are 3268 roses with a flower merchant. He filled them in 12 bags equally. How many roses are there in each bag and find the remaining flowers.

```
12 ) 3268 ( 272        Quotient = 272
     24                Remainder = 4
     ---
      86
      84
     ---
       28
       24
     ---
        4
```

The number of roses in each bag = 272.

Remaining roses = 4

5. Work out the following division problems and write the correct quotient and remainder in the respective boxes.

	Quotient	Remainder
3,695 ÷ 15	246	05
2,008 ÷ 14	143	06
2,008 ÷ 12		
2,080 ÷ 11		

6. A contractor has Rs.18,000/- with him. He wishes to distribute it equally to 65 workers. How much money each worker will get ? How much money will be left with the contractor?

7. 16 carpenters work together and earn Rs.19,200/- in a week. If they distribute this money equally among themselves, how much money each person gets ?

8. There are 368 students in a school who wish to come to the school by vans. How many vans are needed if each van can carry 16 students?

2.3 Least Common Multiple (LCM)

If we want to find the LCM of 3 and 5, the teacher asks the students to write as follows :

All the multiples of 3 are : 3, 6, 9, 12, **15**, 18, 21, 24, 27, 30,.....

All the multiples of 5 are : 5, 10, **15**, 20, 25, 30,.....

Find all the common multiples (common numbers in both the groups). For example, here in this case,

The common multiples are : 15, 30, 45,....

Among the common multiples, the least is 15. Hence the LCM of 3 and 5 is 15.

Example 2 : Find the LCM of 2 and 3.

Multiples of 2 are : 2, 4, 6, 8, 10, 12,.....

Multiples of 3 are : 3, 6, 9, 12, 15,.....

$\therefore$ LCM of 2 and 3 is 6.

Example 3 : Find the LCM of 6 and 12

$6 = 2 \times 3$

$12 = 2 \times 3 \times 2$

LCM $= 2 \times 3 \times 2$

$= 12$

Revision Exercises 10

1. Find the LCM of (i) 20, 25 ii) 10, 15 iii) 6, 10
   iv) 16, 36 v) 42, 56

2. Find LCM of the following : 6, 4, 9

   Ex : LCM of 6, 4, 9

   LCM $= 2 \times 3 \times 2 \times 3$

   LCM = 36

2	6, 4, 9
3	3, 2, 9
	1, 2, 3

   Find the LCM :

   i) 3,5, 6 ii) 11, 33, 55

   iii) 18, 36, 54 iv) 11, 15, 20, 25

3. Fill in the blanks with suitable multiples :

(Ex : 3, ---, 9, 12, ---- Ans: 3, 6, 9, 12, 15)

i) 5, 10, ---, 20

ii) 36, 54, ----

iii) 24, 52, ----

4. If length and breadth of tiles are as follows, find the number of tiles needed to make a square in each case and draw squares.

Ex : 3 cms, 4 cms

$3 \times 4 = 12$ tiles needed to make square.

i) 5 cm 6 cm ii) 12 cm, 10 cm

iii) 7 cm, 8 cm iv) 6 cm, 7 cm

Revision Exercise 11

2.4 Highest Common Factor (HCF)

Write all the factors of 12 and 16

Factors of 12 are : 1, 2, 3, 4, 6, 12

Factors of 16 are : 1, 2, 4, 8, 16

In the above groups, we see that 1, 2 and 4 are the common factors and 4 is the of highest value. This is called the highest common factor or HCF.

$\therefore$ The HCF of 12 and 16 is 4. We can also find HCF as follows :

12 and 16 are written as product of primes.

$12 = 2 \times 2 \times 3$

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

$12 = \boxed{2 \times 2} \times 3$

$15 = \boxed{2 \times 2} \times 2 \times 2$ In these 2 and 2 are the two common factors of two numbers. Therefore, 4 is the HCF of 12 and 16.

Note: When we find HCF of two or more large numbers, the factor method is difficult. In such cases, we apply division method.

For example, find HCF of 90 and 135.

Step 1 : Write two numbers in columns.

Step 2 : Divide the bigger number (105) by the smaller one (90).

Step 3 : Now again divide (90) by the remainder (45).

1	135	90	2
	90	90	
	45	....	

This process continues till the remainder becomes zero. Here 45 is HCF of 135 and 90.

Problems :

1. Find HCF of following numbers by factorization method.
   i) 18, 12; ii) 40, 60 iii) 26, 28, 30
2. Find the HCF of the following by division method.
   i) 180, 288 ii) 300, 275
3. Find the HCF of 90 and 81, 65 and 11, 1008 and 840 by both the above methods and verify your answer.

2.5 Average

Savitha scores 75, 80, 70, 85, 90 in mathematics in five tests.

Average of the marks scored by Savitha = $\frac{\textit{Total marks scored in all the tests}}{\textit{Number of Tests}}$

$$= \frac{75 + 80 + 70 + 85 + 90}{5}$$

$$= \frac{400}{5}$$

$$= 80$$

Exercise 12

1. Calculate the average of the following :

   Ex : i) 40, 30, 32, 60, 18

$$\text{Average} = \frac{40 + 30 + 32 + 60 + 18}{5}$$

$$= \frac{180}{5} = 36$$

   i) 13, 9, 10, 12, 18

   ii) 19, 81, 72, 36, 45, 54

   iii) 110, 201, 201, 303, 400

   iv) 500, 602, 708, 910, 110

   v) 12.1, 120.1, 13.5, 112.3

   vi) 100, 205, 308, 100, 117

2. In a class the marks of 5 students in mathematics are 85, 92, 58, 39, 80. Find the average marks.

   Note : Average $= \frac{sum\ of\ scores}{No.\ of\ students}$

3. The day temperatures of 7 days at Mysore is given below.

Sunday	:	$32^{o}C$
Monday	:	$33^{o}C$
Tuesday	:	$30^{o}C$
Wednesday	:	$31^{o}C$
Thursday	:	$31.5^{o}C$
Friday	:	$29.5^{o}C$
Saturday	:	$31^{o}C$

   Find the average temperature.

4. Rekha scored the following marks in the first term examination. Find the average marks.

   Kannada : 76, English : 74, Hindi : 80, Mathematics : 78, Gen. Science : 77, Social Studies : 75

5. Suresh spends 21 hours in library in a week. Find the average time he spends daily.

6. Find an average of the following scores.
61, 58, 64, 57, 54, 62, 63, 56, 59

7. There are 20 students in a hostel. They eat 140 roties per day. Find the average number of rotis consumed by each student per day.

8. Rani walks 8 kms in 4 hours. What is her average speed?

9. Shashi gets a profit of Rs.55, Rs.46, Rs.120 and Rs.37 in flower business in four days. Find the average profit he gets in a day.

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CHAPTER III

COMMERCIAL ARITHMETIC AND MEASUREMENTS

3.1 Profit and Loss

Preview : In the preceding classes, the children are taught numbers of different sorts, their representation and operations with numbers. These have particular use in life situations. In commercial arithmetic, the application of the mathematics learnt already is made for solving problems which every one comes across.

Introduction: In daily life, we carry out transactions involving money and articles. Money is the medium of exchange. Articles needed are got from persons and agencies in exchange of money – which we term as Selling and Buying. The person who wants rice (say) gets it from another person who has rice by giving money to the latter. Then the first person has *bought* rice from the second person while the second has *sold* rice to the first. These persons are called *buyer and seller* respectively.

When a number of things are bought, the buyers are given the details of the business by the seller in a particular form – the bill. The bill is also an important record for the seller.

Measurements and calculations are not always exact. When it is not exact, we have to round it off to the nearest (to the possible extent) value to the exact. Here the concepts - estimation and approximation are employed.

The unit unfolds these aspects to motivate the learner bringing the different aspects of teaching the point.

3.1 Profit/Loss/Preparation of Bill

Profit and Loss

a) I buy two dozens of orange paying Rs.24/- and sell it for Rs.30/.

Here the money paid to buy the oranges is the cost price.

Thus the cost price = Rs.24/-

And the money got by selling the oranges is the selling price so that the selling price = Rs.30/-.

The selling price is *greater than* cost price and the difference (Selling Price) - (Cost Price) is the profit. Then for the profit

= 30 – 24 = 6 Rs.

b) I buy a dozen eggs for Rs.18/- and sell it for Rs.12/-.

The cost price = Rs.18

The selling price = Rs.12

And the selling price is *less than* cost price and the difference

(Cost Price) – (Selling Price) is the loss.

Therefore Loss = 18 – 12 = Rs.6.

Definitions/Terminology/Notations and Formulas

1. The amount paid by the seller on the article is called the Cost Price (C.P.).
2. The amount paid by the buyer to get the article is called the Selling Price (S.P.).

If the selling price is *greater than* the cost price, then

(S.P. – C.P.) = Profit (1)

If the selling price is *less than* the cost price, then

(C.P. – S.P.) = Loss (2)

Note:

1. Using (1), given any two of S.P., C.P., Profit, the remaining one can be found in case S.P, is greater than C.P.
2. Using (2), given any two of S.P., C.P., Loss, the remaining one can be found, in case S.P. is less than C.P.
3. If the Cost Price = Selling Price, the there is no profit or loss.

3.2 Bill Preparation

When a buyer purchases articles from a shop, the seller prepares a bill (usually the cash bill). The bill gives the details regarding the items, quality, quantity of the items, the amount paid for each item and the total (or net) amount paid by the buyer.

Form of the Bill

Name and Address of the Shop

Cash Bill **Date :**

Sl. No.	Item	Quantity	Rate	Amt	
	Total Amt in words:				

Seller/Seal

Why is bill necessary ?

1. It helps correct calculations and avoiding over/under payment.
2. It (Bill) is a useful record to systematise the expenditure.
3. It is necessary (by law) for the seller to keep above doubt his transactions and useful in calculating the sales tax, etc. to be paid.

Phone No.565321 **SHARADA BOOK SHOP**
(2^{ND} Cross, 10^{th} Main, Mysore)

Cash Bill Date :

14.10.2002

Sl. No.	Item	Quantity	Rate	Amt
1.	White Paper	20	0.50	10.00
2.	Pencil	4	2.50	10.00
3.	Note Book (200 pages)	5	12.00	60.00
4.	Note Book (100 pages)	5	8.00	40.00
5.	Rubber	2	1.00	2.00
6.	Dot pen	4	6.00	24.00
7.	Refills	2	2.50	5.00
8.	Scale	1	10.00	10.00
	Total Amt in words:			**161.00**

Received Rupees One hundred and sixty one only.

Note: Goods once sold will not be exchanged or taken back.

(Signature and Cash Seal)

Teaching Strategies/Learning Activities

In order to ensure better understanding and lasting learning of the concepts, learning activities – physical and problem solving are planned.

a) Physical Activities :

1. A (mock) Selling and Buying Play

Materials Required

i) Paper/cardboard pieces in rectangular shapes and circular shapes of different sizes with denominations marked. These are dummy currencies and coins.

ii) Articles with labels and price tags – as toys, books, chocolates, pencils, etc.

Teacher divides the students into two classes. 'A Seller' and 'Set of Buyers'.

A selected boy/girl is a 'seller' and selected few children are buyers.

Each buyer purchases articles of his choice by paying the price for the articles. Each item has the price tag on it and the seller has the cost price list for his items.

After each 'sale', the teacher asks the students –

1. What is the C.P.?
2. What is the S.P. ?
3. Is the S.P. more (or less) than the C.P.?
4. Is it profit or loss?
5. What is the profit/loss ?

2. The teacher asks the students to tabulate the observations made in the previous activities in the following format.

Sl. No.	Article	C.P.	S.P.	Profit or Loss	Why?	Amt of Profit/Loss

b) Problem Solving (Model Solved Problems)

1. Ningaiah bought 40 kgs of potatoes for Rs.320/- from a grower and sold at the rate of Rs.200/- for 20 kgs. Did he get profit or loss and how much ?

Solution: C.P. for 40 kg potato = Rs.320

$\therefore$ C.P. per kg = 320/40 = Rs.8.00

S.P. for 20 KG =Rs.200/-

$\therefore$ S.P. per kg = 200/20 = Rs.10

Since S.P. per kg is greater than C.P. per kg, he made a profit

= S.P. – C.P. = 10 – 8 = Rs.2.00

$\therefore$ Profit for 40 kgs = 40 × 2 = Rs.80.00

2. Peer Sab bought a cow for Rs.3,600/- and made a profit of Rs.500/- by selling it. What is the selling price? If he had sold it for Rs.3,200/- what would be his profit or loss?

Solution : C.P. = Rs.3,600/-

Profit = Rs.500/-

Using S.P – C.P. = profit

S.P. – 3,600 = 500

$\therefore$ S.P. = Rs.3,600 + 500

or S.P. = Rs.4,100/-

If S.P. = Rs.3200/- then S.P. is less than C.P. (Rs.3,600/-)

$\therefore$ It would be a loss and using C.P. – S.P. = loss =

3600 – 3200 = Rs.400.

3. Babu bought 200 coconuts for Rs.1200/-. He sold 120 coconuts for Rs.960 and the rest for Rs.400/-. Was it a profit or loss on the whole and how much was the profit/loss per coconut?

Solution: C.P. for 200 coconuts = Rs.1200

S.P. for 120 coconuts = Rs.960

S.P. for 80 (remaining) coconuts = Rs.400

$\therefore$ S.P. for 200 coconuts = 960 + 400 = Rs.1360/-

S.P. for 200 coconuts is greater than C.P.

Hence it is a profit and profit = S.P. – C.P. = 1360 – 1200

$\therefore$ Net Profit = Rs.160/-

$\therefore$ Profit per coconut = 160/200 =Rs.0.80 (or 80 paise)

4. Akhtar bought 60 dozen eggs from a poultry farm and on selling it he had a loss of Rs.360/-. How much loss would have been there had he purchased and sold 100 dozens?

Solution : Loss for 60 dozens =Rs.360/-

$\therefore$ Loss per dozen = Rs.60/-

$\therefore$ Loss for 100 dozen eggs = 60×10

= Rs.600/-

5. Venkaiah made a profit of Rs.200/- per sheep by selling 15 sheep for Rs.15000/-. What was the cost price per sheep? Had he sold at Rs.750/-per sheep, how much net profit or loss would have been there ?

Solution: S.P. for 15 sheep = Rs.15,000

$\therefore$ S.P. per sheep = 15,000/15 = Rs.1000/-

Profit per sheep = Rs.200/-

S.P. - C.P. = Profit

$\therefore$ 1000 – C.P. = 200

$\therefore$ C.P. per sheep = 1000 – 200 = Rs.800

If S.P. per sheep = Rs.750, since S.P. is less than C.P. (750 is less than 800) it is loss and loss per sheep = 800 – 750 = Rs.50/-.

$\therefore$ Net loss (in this case) = 15×50 = Rs.750/-.

6. Ritu purchased the following items from a grocery shop :

2 kgs of sugar @ Rs.12.50 per kg
5 kgs of rice @ Rs.17.00
2 kgs of dal @ Rs.25.00
1 packet cooking oil @ Rs.50.00 (per packet)
and 3 packets of atta @ Rs.16.00 (per packet)

Prepare a bill.

Sl. No.	Purchases	Quantity	Rate	Amount
1.	Sugar	2	12.50	25.00
2.	Rice	5	17.00	85.00
3.	Dal	2	25.00	50.00
4.	E.Oil	1	50.00	50.00
5.	Atta	3	16.00	48.00
	Total			258.00

Exercises

1. Prepare a bill for the following purchases.

   Onion (4 kgs) at Rs.6.00
   Potato (5 kgs) at Rs.8.00
   Tomato (2 kgs) at Rs.12.00
   Oranges (1 kg) at Rs.24.00
   Apple (1/2 kg) at Rs.44.00
   Banana (2 dozens) at.Rs.20.00

2. Prepare a bill for the following items taken in a restaurant by a few friends.

	Rate
Idli (10)	2.00
Set Dosa(4)	10.00
Masala Dosa(2)	14.00
Poori Sagu (3 plate)	12.00
Jamoon (6)	4.00
Coffee (5)	3.00
Tea (4)	3.00
Badam Milk (1)	6.00
Cool drinks (2)	9.00

Exercises

1. A cloth merchant sold 50 mts cloth at Rs.35/- per metre. If the cost price for 100m of the same cloth is Rs.3200/-, how much net profit or loss does he make?
2. Range Gowda bought a piece of land for Rs.21,000/- and sold it getting a profit of Rs.3,500/-. What was the selling price of the land?
3. Appanna bought 25 kgs of beans paying Rs.175/- to the grower. If he wants a profit of Rs.1.50 per kg, what should be the selling price (i) per kg, (ii) for 25 kgs.
4. Nanjunda Swamy had a loss of Rs.120/- selling twenty hens for Rs.1,380/-. What was the net cost price and the cost price per hen.
5. In the previous problem, what must be the selling price per hen in order to make a profit of Rs.5.00 per hen.

6. Fill in the blanks.

	in Rupees		Profit	Loss	No Profit –No loss
	S.P.	C.P.			
i)	12.00	15.00			
ii)	250.00	220.00			
iii)	1500.00		150.00		
iv)	2500.00			220.00	
v)		12000.00	1500.00		
vi)	10000.00	10000.00		3600.00	

3.3 Measurement

Measurements of different kinds are done for different purposes.

Given two objects, the child compares them to find out the bigger and the smaller one. As the child grows, it asks the questions "How many?", "How much?" about the things around. Now we see some examples where the measurements are very much essential.

Example :

a) A surveyor takes measurement of length and distance to calculate the area of a field.

b) An engineer calculates volume and surface areas of different objects.

c) A doctor uses his appliances to measure the heart beat, pulse rate, blood pressure, body temperature, etc.

The above examples show the importance of measurements and calculations in daily life.

3.4 Length

Concepts

a) Comparison of objects by size – long, small, high, low, tall, short, wide, narrow, etc.

b) Knowing and understanding relation between various units of length (like meter, inch, mile, km, etc).

c) Convert one unit of length to another.

d) Measuring length in standard units of length cm, metre, km.

e) Solving daily life problems relating to standard units of length.

Children usually enjoy this activity. Ask the students to measure the table by using his span, fingers and hands and feet. The measurement done in this way by different persons differ from one another. Hence, there is need for standard units.

Standard Units of Length :

100 centimeters (cm) = 1 meter

1000 meters = 1 kilometer

Standard Units of Weight :

1000 grams = 1 kilogram

Standard Units of Measurement :

1000 milliliter (ml) = 1 litre

1. The teacher can measure the length of room in meters in the presence of students and ask them to measure the length of table, door, window, etc. by using meter scale.
2. Measure the quantity of water (or any liquid) using standard measuring cans in terms of litres.
3. Weigh stones (or any object) in terms of kilogram and grams.

The above activities will have to be repeated till they develop the skill of measurements.

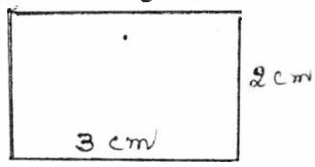
Problems

1. The length of a rectangular garden is 10 metres and the breadth is 4 metres. What is the length of barbed wire needed to encircle it 4 times ?
2. Observe the letters given below and measure the total length of the segments in the letters in mm. Convert them into centimeters.

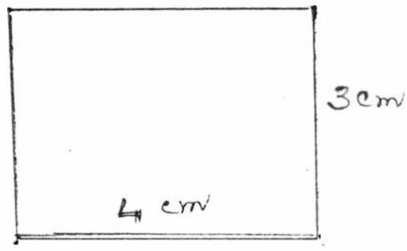
F E L H I

3. Observe the following figures.

a) What is the length and breadth of the figure?



b) What is the length of ribbon required to paste to the boundary of the rectangle?



3.5 Perimeter and Area

Concept

1. Perimeter of a plane figure is the length of the boundary of the plane figure.
2. Perimeter of a rectangle = 2 (length + breadth)
3. Perimeter of a Square = 4 (length of a side)
4. Unit of perimeter is the unit of length.
5. Area of a rectangle = The product of length and breadth (length × breadth)
6. Area of a square =length × length = $(\text{length})^2$
7. Unit of Area = Sq. Unit or $(\text{Unit})^2$

Activities

1. Teacher can ask the students to measure the length and breadth of the Board, window, etc. nearest to a centimeter.
2. Teacher asks a few students to measure the length, breadth and then perimeter of the above objects.
3. Ask the children to calculate the perimeter using the formula.
   Perimeter = 2 length + 2 breadth
4. The teacher asks to record the measurement taken by the students and calculate perimeter and area as follows :

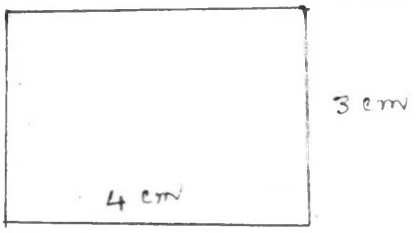
Sl. No.	Object	Length	Breadth	Perimeter	Area
1.	A textbook				
2.	The top of a desk				
3.	A window				
4.	A top of the teacher's table				
5.	The floor of the classroom				

5. Now children may find the lengths of sides and perimeter of different objects using formula. Perimeter = 2 length + 2 breadth.

6. Asks the children to measure the length and breadth of a square kerchief. Students observe the length and breadth of a kerchief are equal. The kerchief is a square. Students understand perimeter of the square = 4 (length of a sides)

Problems:

In a rectangle the length is 4 meters and breadth is 3 meters. Find the perimeter and the area of rectangle.



Perimeter of the rectangle = 2 (length + breadth)

= 2 (4 + 3)

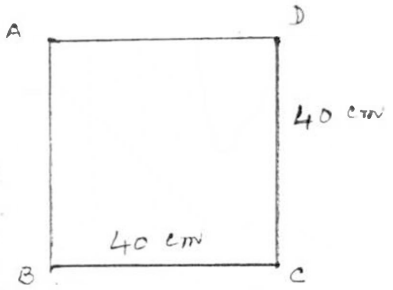
2 × 7 = 14 meters

Area of a rectangle = length × breadth

= 4× 3 = 12 sq. meters.

Problem 2

Find the perimeter and area of the figure.



1. What is its shape?
2. What is the length of the sides?
3. What about the sides of the figure?

Given figure is a square. All the four sides are equal, each of length 40cms.

Perimeter of a square = 40 + 40 + 40 + 40 = 40 × 4 = 160 cm.

Remember: Perimeter of a square = 4 × length of a side.

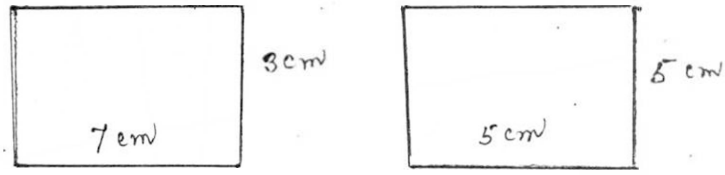
Area of a square = length^2 or side^2

= 40^2 = 1600 sq. cm

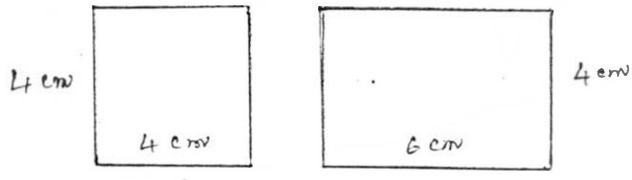
Remember : Area of a square = (A side)^2

Solve these problems.

1. Find the perimeter of the figures given below.



2. Find the area of the figures given below :



3. A book has length of 20 cms and width 15 cms. Find its perimeter and area.

4. A square tile is of side 30 cms. Find its perimeter and area by using formula.

3.6 Mass (Weight)

Concept

1. Though mass and weight of an object are different (with their unit of measurement). Here we use the word "weight" for mass.
2. Comparison of weight of two objects.
3. Measurement of weight using Non Standard / Standard units.
4. Calculation of weight.

Activity

1. Give different objects to the children and ask them to hold them. Which object is heavy? Which object is light?
2. Take any two small containers with different sizes and fill them with sand and lift them separately. Try to find out which is heavier?

3. Collect the stones. Arrange them according to their size, lift each one of them and compare their weights.
4. Ask the student to approach provision stores and collect the information from the shop, regarding the measurement of weight (mass).
   Ex. Grams, mg, kg
5. Children should be asked to find out the following:
   a) How many grams equal to 1 kg.?
   b) How many decagram equal to 1 kg?
   c) How many hectogram equal to 1 kg?
   d) How many milligrams equal to 1 gram?
   e) How many centigram equal to 1 gram?
   f) How many decigram equal to 1 gram?

   The unit of weight is gram, milligram and kg.

Problems:

1. Convert 1048 mg into grams :

   Solution : 1000 mg = 1 gram

   1048 mg = (1048 ÷1000) grams

   Ans: 1048 mgs = 1 gram and 48 mg
2. Convert 4 kg into grams.

   Solution : 1 kg = 1000 grams

   4 kgs = (4 × 1000) grams

   = 4000 grams
3. Convert 2006 grams into kg.
4. Find the total weight (add the weight of sugar, tea powder and groundnut).

Item	Kgs	Grams
Sugar	02	250
Tea Powder	01	050
Groundnut	05	200

   What is the approximate weight in kgs?
5. The weight of the toor dal bought from a shop is 2500 grams. Express in kg.

3.7 Volume and Capacity

Volume of a solid is the amount of space the solid occupies.

Concepts:

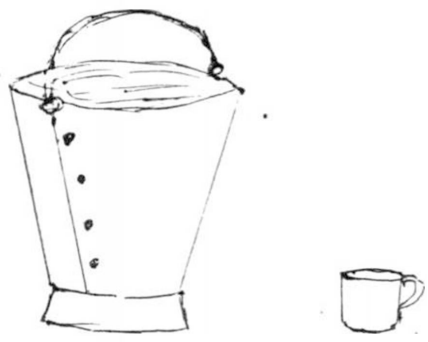
1. Comparison of sizes of 3 dimensional objects.
2. Measurement of volume of the cubical objects.
3. Non-standard units of volume.
4. Calculating volumes as product of length, breadth and height.
5. Standard units of volume is cm^3.
6. The unit of the volume is 1 cc or 1 cub. Cm.

Activities

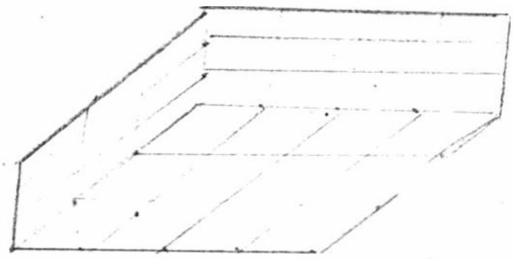
1. Comparing the sizes of the two objects. Which is bigger or smaller. Teacher can give some examples.
   a) Hill is smaller than the mountain.
   b) Cricket ball is smaller than football.
   c) Wooden box is greater than chalk box.
2. Teacher can ask the students to measure the length, breadth and height of the box (instrument box).
3. Teachers can display pictures/objects of a solid/vessel/boxes, etc. and ask them questions related to comparison of their sizes.
   a) The amount of milk in a bottle.
   b) The amount of grains in a bag.
   c) The capacity of a can full of oil.

An activity (volume in non-standard units)

1. A bucket holds 50 mugs of water or 50 units. The size of the mug is not specific.



2. Bricks are arranged in cuboid form. We say the volume of this cuboid is 36 bricks. Volumes of bricks is not specific.



Measure the length, breadth and height of the cuboid in cms. Volume is calculated by the formula length × breadth × height.

If the length = 9 cms, breadth = 5 cms and height = 4 cms, then

Volume = length × breadth × height

$= 9 \times 5 \times 4 \text{ cm}^3$

$= 180 \text{ cm}^3$

Exercise :

1. One litre of oil is put into packets of 200 ml capacity. How many packets are made?

Solution: 1 packet has 200 ml.

1 litre = 1000 ml

$\therefore$ No. of packets = 1000/200 = 5

2. A cuboid has dimension 20 cm × 40 cm × 8 cm. It is made up of cubes of 1 cub.cm. volume. If the cubes are dissembled and a cube is formed, what is the length of the cube so formed?

Solution: Volume of cuboid = 20 × 40 × 80

= 64000 cub. Cm

= 40 cm × 40 cm × 40 cm

The volume of the cube = length × length × length

= 40 × 40 × 40

Hence the length of the cube = 40 cms.

3. The volume of a cuboid shaped tin is 1000 cub. Cm. Find the volume of sugar contained in

i) half the ten ii) quarter the ten iii) three-fourth of the ten

4. The amount of oil filling quarter of a can is 250 ml. What is the capacity of the can?
5. A cuboid is of length 6 cms, width 3 cms and height 2 cms. Find its volume.
6. A match box has a length 3 cms, width 2 cms and height 1 cm. Find its volume.
7. Find the volume of a cube of sides 4 cms.

3.8 Time

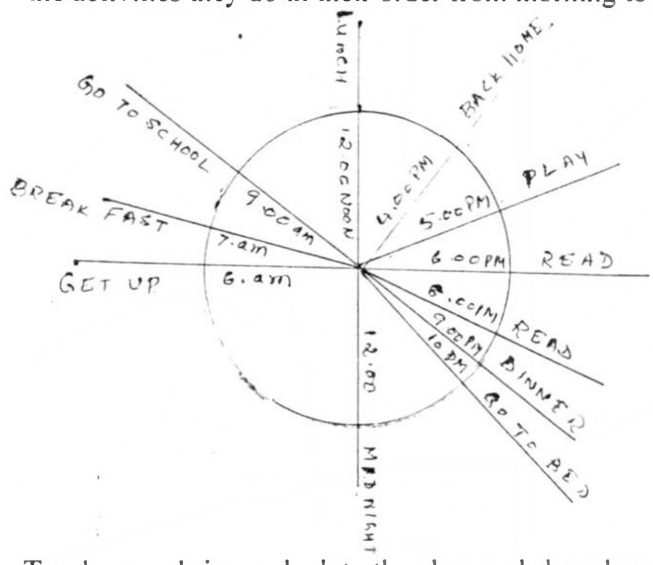
Concepts:

1. Day, week, month, year
2. Reading the clock– 12 hours and 24 hours.
3. Phrases - am/pm
4. Relation between a) seconds/minutes/hours/day; b) day/week/month/year
5. Reading the calendar

Activities :

1. Teacher can ask the students to recall the durations of day and night.
2. Teacher can explain how our ancient people estimated time 'before noon' and 'afternoon' by observing the shadows of a person.
3. The teacher can recall all the activities of a child in a day and make a chart of it as follows :

   Draw a circular chart to indicate the various activities. Ask children to tell the activities they do in their order from morning to night.



4. Teacher can bring a clock to the class and show how to read the time.

5. Teacher can display a clock and describe its various parts. Ask the children to prepare a clock model showing the following.
   a) 12'O Clock
   b) 2' O Clock
   c) 6 "O Clock
   d) 10' O Clock

6. Ask the children to understand the following :
   a) What is the time taken by the minutes hand to go one round?
   b) How much time is taken by the hour hand to go one round?
   c) When will the two hands coincide?
   d) What will be the position of the minute hand when the hour hand shows 6 'O clock.
   e) How many times the clock shows the same time in a day?

7. Ask the children to bring one sheet of an old calendar sheet. Ask them to find the answers to the following questions.
   a) What is the date today? Year, Month and Date.
   b) What is the name of this month?
   c) How many days are there in that month?
   d) How many Sundays are there in the month? Other days?

8. Write the times as per 24 hour clock time.

Example: 3.00 p.m.		15 hr
a)	5.00 pm	
b)	1.30 pm	
c)	12 hour noon	
d)	12 hour midnight	

8. Fill in the blanks with suitable answer:
   1. Number of minutes in a day----------
   2. Number of hours in a week ----------
   3. The time taken to travel from Mysore to Bangalore is 180 minutes. Convert it into hours----------
   4. A day has ---------- hours.

9. Ask the children to find the month in which the following days fall.

a) Your birthday
b) Republic Day
c) Children's Day
d) Teacher's Day
e) Independence Day

Exercises

1. Now it is quarter to 3 O Clock. After how many hours and minutes, it will be half past 7 O clock.

Solution: It is quarter to 3 O clock now. Therefore, now the time is 2.45.

Afterwards, the time is half past 7 O clock.

$\therefore$ the time then is 7.30.

The duration between them = 7.30 – 2.45 = 4 hours 45 minutes.

2. Ramappa worked in the field from 6 am to 5 pm. What is the total time he worked if he used 2 hours for lunch and rest?

Date: The time he worked = 6 am to 5 pm

The time used for lunch and rest = 2 hours

To find : Total time he worked.

6 am to 12 noon = 6 hours

And 12 noon to 5 pm = 5 hours

Total = 6 + 5 = 11 hours

Time used for lunch and rest = 2 hours

$\therefore$ The time he worked in the field = 11 – 2 = 9 hours.

$\therefore$ Ramappa worked for 9 hours in the field.

2. Give the answers to the following questions as per both 12 hour clock and 24 hour clock.

a) At what time do you go to school ?
b) At what time do you get up in the morning?
c) At what time do you go to bed?
d) At what time does your father leave for his work?
e) At what time does your mother get up?

3. Udyan Express moves towards Bangalore leaving Raichur at 10 p.m. Write this according to railway time table.

Unit Test

Max Marks: 25

I. Fill in the blanks.

1. One Km is……..Meters.
2. 7650 grams is …….kg.
3. Area of a rectangle is……..
4. Perimeter of a square is ……..
5. Unit of volume is……
6. Convert 21.00 hours as per 12 hours clock. 6 × 1

II. Among the 3 given answers, select the appropriate answer and fill up in the space provided.

657 meters = …….. 6.75kms, 0.675 kms, 67.5 kms

650 milliliters = …….. 65.0 litres, 0.650 litres, 6.50 litres

125 grams = …….. 1.25 kg, 12.5 kg, 0.125 kg

0730 hours = …….. 7.30 am, 7.30 pm, 0.73 am

42 days = …….. 3 weeks, 5 weeks, 6 weeks

August month has …….. 28 days, 30 days, 31 days

6 × 1

III. Solve the problems :

1. The length of a rectangular garden is 15 meters and the breadth is 10 meters. What is the area of a rectangular garden?
2. The side of the square chess board is 50 cms. Find its area in square centimeters.
3. Find the volume of a cube of side 6 cms.
4. A bus starts from Bidar at 4.30 p.m. and reaches Bangalore at 9.30 am the next day. Calculate the time taken by the bus.
5. With the help of the formula, find the area of the figure.

5 × 2

6. A match box has a length 3 cms, width 2 cms, and height 1 cm. Find its volume. (3)

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CHAPTER IV

FRACTIONS

4.1 Concept of Fraction

In earlier classes, the children are taught numbers and numerals, their representation using place value and operations on the numbers. These basic ideas are important not only in Mathematics but also in daily life situations because of their usefulness.

Introduction : Numbers beyond zero and natural numbers are got with the help of natural numbers and the four fundamental operations. For example, while the sum or product of two natural numbers is a natural number, their difference or division gives numbers of altogether different sort - negative integers and rational numbers. The latter numbers are represented in two different forms - the fractional form and the decimal form. These are studied in the unit. They have applications in daily life problems. Percentage is a special form of expressing a number and is used in many problems arising in various contexts.

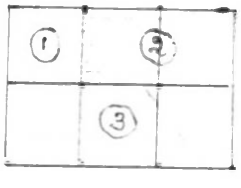
Concepts : A common fraction is a part or several equal parts of unity.

Example 1 : Take a length AB. Divide AB into three equal parts.

Then AC = CD = DB.

Take AB as a unit (i.e. 1). AC = CD = DB = one of the three equal parts and denoted by $\frac{1}{3}$. Likewise AD = two of three equal parts and denoted by $\frac{2}{3}$. These numbers, $\frac{1}{3}$ and $\frac{2}{3}$ are common fractions and their value is less than 1.

2. ABCD is a rectangle and is divided into six smaller rectangles of equal area as shown in the figure.



The rectangle (1) = one of the six equal parts.

$$= \frac{1}{6} = \text{one-sixth}$$

The rectangle (2) = two of six equal parts

$$= \frac{2}{6} \text{ two-sixth}$$

The rectangle (3) = three of six equal parts

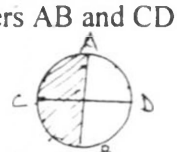
$$= \frac{3}{6} \text{ three sixth.}$$

Notation: A fraction three of five equal parts is denoted by $\frac{3}{5}$ (to be read as three by five) i.e. three fifth. In $\frac{3}{5}$, 3 is called the *numerator* and 5 is called the *denominator* of the fraction.

Equivalent fractions - Lowest form of a fraction

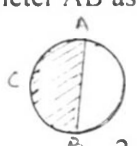
1. Divide a circle into four equal parts by diameters AB and CD as shown.

   The part ACB (shaded = Two fourth = $\frac{2}{4}$



2. Divide the circle into two equal parts by a diameter AB as shown.

   The part ACB (shaded) = half = $\frac{1}{2}$



It is evident that both shaded parts in the figures are equal. i.e. $\frac{2}{4} = \frac{1}{2}$.

i) The two fractions $\frac{2}{4}$ and $\frac{1}{2}$ are called equivalent fractions.

ii) The fraction $\frac{1}{2}$ is in the lowest form, because the numerator and the denominator have no common factor except 1. However, $\frac{2}{4}$ is not in the lowest form since the numerator and the denominator have a common factor other than 1.

To find whether the two given fractions are equivalent or not.

Given two fractions, multiply both the fractions by the l.c.m. of the denominators of the fractions. If the numbers so got are equal, then the fractions are equivalent.

Examples :

1. Are $\frac{4}{6}$ and $\frac{6}{9}$ equivalent ? L.C.M. of 6 and 9 is 18.

   $\frac{4}{6} \times 18 = 12$

   $\frac{6}{9} \times 18 = 12$

   and $12 = 12$

   $\therefore$ $\frac{4}{6}$ and $\frac{6}{9}$ are equivalent fractions.

2. Are $\frac{2}{3}$ and $\frac{3}{4}$ equivalent ?

   L.C.M. of 3 and 4 = 12

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

   $\frac{3}{4} \times 12 = 9$ and $8 \neq 9$

   $\therefore$ The fractions $\frac{2}{3}$ and $\frac{3}{4}$ are *not* equivalent.

Reducing a fraction to its lowest form.

Given a fraction $\frac{16}{24}$ (say).

Divide the numerator and denominator of the fraction by their H.C.F.

Then the fraction got is in the lowest form. H.C.F. of 16 and 24 is equal to 8.

$\frac{16}{24} = \frac{16 \div 8}{24 \div 8} = \frac{2}{3}$. This fraction is in the lowest form (because the H.C.F. of 2 and 3 is 1).

Parts of a Fraction : The fraction has two parts. For example, $\frac{1}{2} = \frac{numerator}{deno\,min\,ator}$

Numerator : The number above the line is called numerator. It indicates the number of parts that is taken for counting (or consideration).

Denominator: The number below the line is called Denominator. It indicates the total number of parts (in a complete object).

(The line in between numerator and denominator separates them).

Types of fractions :

There are two types in fractions.

1. Proper fractions
2. Improper fractions

Proper fractions: In any fraction, if the numerator is less than the denominator. Such fractions are called proper fractions. Example, $\frac{1}{2}, \frac{3}{4}, \frac{2}{5}, \frac{7}{10}$, ... etc.

Improper fractions: In any fraction, if the numerator is greater than or equal to denominator, such fractions are called improper fractions.

Example: $\frac{2}{1}, \frac{4}{3}, \frac{5}{6}, \frac{6}{3}$, ... etc.

Note:

1. Mixed fraction is nothing but another form of a improper fraction.

   a) $\frac{5}{2} = 2\frac{1}{2}$ b) $\frac{9}{4} = 2\frac{1}{4}$

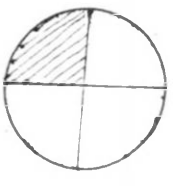
2. The value of a proper fraction is always less than 1. And the value of an improper fraction is always greater than or equal to 1.

Unit-Test

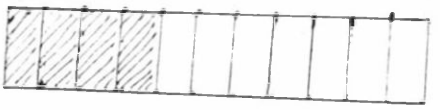
I. Observe the figures given below and answer the questions in the form of fractions.

i) a) coloured part =

b) blank part (non-coloured part) =

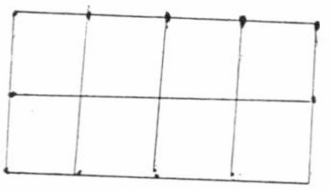


ii) a) coloured part = $\frac{..}{11}$



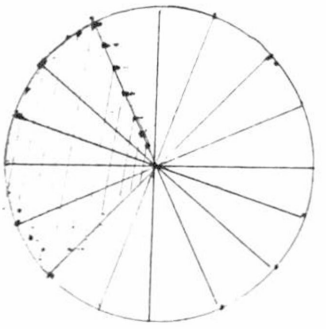
b) non-coloured part = $\frac{7}{..}$

iii) Colour $\frac{5}{8}$ part of this figure.



II. Fill up the blank with suitable number.

In the figure, coloured part is $\frac{\quad}{16}$



III. Read the following fractions.

$\frac{2}{5}$, $\frac{7}{10}$, $\frac{5}{9}$, $\frac{3}{4}$, $\frac{7}{2}$

IV. Identify which is the numerator and which is the denominator in the following fractions.

a) $\frac{2}{3}$ b) $\frac{5}{6}$ c) $\frac{9}{7}$ d) $\frac{11}{10}$

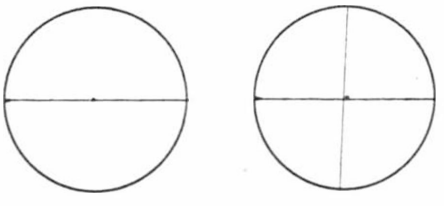
V. From the following fractions, separate proper fractions and improper fractions.

a) $\frac{3}{4}$, $\frac{2}{7}$, $\frac{8}{5}$, $\frac{11}{10}$, $\frac{13}{17}$, $\frac{5}{3}$

4.2 Equivalent Fractions

Observe the following examples:

Example 1 : Look at the two equal circles given below.



The first circle is divided into two equal parts and one part is coloured.. The coloured part indicates the fraction $\frac{1}{2}$.

In this circle, the coloured part and non coloured part are two equal parts. Therefore, coloured part is one of the two equal parts. Therefore, it can be read as $\frac{1}{2}$ or one by two.

The second circle is divided into four equal parts and two parts among them are coloured. Hence, coloured parts of the figure is $\frac{2}{4}$ or two by four . By observing the above two figures, $\frac{1}{2}$ and $\frac{2}{4}$. The part that is coloured in the first figure is equal to the coloured parts in the second figure.

Here the fractions $\frac{1}{2}$ and $\frac{2}{4}$ are equivalent fractions. (If fractions are equal to one another, we call them equivalent fractions.

Note: The teacher must show this by folding circular shaped paper into four parts.

Example : $\frac{2}{5} = \frac{2}{5} \times \frac{2}{2} = \frac{4}{10}$. Hence $\frac{2}{5}$ and $\frac{4}{10}$ are equivalent fractions.

Note:

1. To write equivalent fraction to a given fraction, multiply both numerator and denominator by the same number. (The value of a fraction does not change if both the numerator and denominator of the fraction is multiplied by the same number).
2. To reduce the given fractions to the simplest or lowest form, divide both numerator and denominator by the same number.

Example: $\frac{35}{42} = \frac{5}{6}$. In this fraction both numerator and denominator are divided by 7.

Unit-Test

1. Write two equivalent fractions to each of the following fractions.

$\frac{3}{4}, \frac{2}{5}, \frac{7}{10}, \frac{7}{21}, \frac{11}{25}$

2. Match the following equivalent fractions.

A	B
$\frac{1}{2}$	$\frac{12}{28}$
$\frac{3}{7}$	$\frac{9}{15}$
$\frac{3}{5}$	$\frac{1}{3}$
$\frac{5}{15}$	$\frac{4}{8}$

3. Fill up the blanks with suitable number.

a) $\frac{2}{5} = \frac{\square}{20}$ b) $\frac{3}{7} = \frac{9}{\square}$ c) $\frac{3}{4} = \frac{\square}{20} = \frac{24}{\square}$

4. Identify the equivalent fractions from the following fractions.

a) $\frac{1}{3}$; $\frac{4}{12}$ b) $\frac{5}{7}$; $\frac{11}{14}$ c) $\frac{16}{32}$; $\frac{2}{4}$ d) $\frac{27}{81}$; $\frac{3}{7}$

4.3 Comparison of fractions :

1. Compare the two fractions when their denominators are equal :

Example :

Observe the above figures. The shaded part of rectangles A and B are $\frac{1}{4}$ and $\frac{3}{4}$ respectively. Among the two, $\frac{3}{4}$ is bigger fraction than $\frac{1}{4}$. Hence, $\frac{3}{4} > \frac{1}{4}$ or $\frac{1}{4} < \frac{3}{4}$ ($\frac{1}{4}$ is smaller than $\frac{3}{4}$).

Note:

1. If denominators of two or more fractions are equal, then the fraction which has greatest numerator is the greatest one.. In the above example, $\frac{3}{4}$ is the greatest because it has greatest numerator.

2. If numerators of two or more fractions are equal, then the fraction which has greatest denominator is the smallest.

Example : Consider $\frac{5}{7}$ and $\frac{5}{2}$.

Here numerators are equal and the fraction $\frac{5}{2}$ is greatest because it has lowest denominator.

Hence, $\frac{5}{2} > \frac{5}{7}$ or $\frac{5}{7} < \frac{5}{2}$

3. If numerators and denominators are not equal in two or more fractions, then we must convert them to fractions having the same numerator or the same denominator. Then identify which is bigger and which is smaller.

Example : $\frac{2}{3}$, $\frac{4}{5}$ are two fractions. We have to equalize the denominators of these fractions. For $\frac{2}{3}$ multiply both numerator and denominator by 5.

$$\frac{2}{3} = \frac{2}{3} \times \frac{5}{5} = \frac{10}{15}$$

For $\frac{4}{5}$, multiply both numerator and denominator by 3.

$$\frac{4}{5} = \frac{4 \times 3}{5 \times 3} = \frac{12}{15}$$

Then $\frac{2}{3} = \frac{10}{15}$ and $\frac{4}{5} = \frac{12}{15}$ $7\frac{2}{3} = \frac{10}{15}$ and $\frac{4}{5} = \frac{12}{15}$.

Here the denominators are equal and $\frac{12}{15}$ is greater than $\frac{10}{15}$ because it has greater numerator.

$\frac{12}{15} > \frac{10}{15}$.

Hence $\frac{4}{5} > \frac{2}{3}$ or $\frac{2}{3} < \frac{4}{5}$

Unit-test

1. Find the greatest and the smallest of the following fractions.

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

2. Write the following fractions in ascending (increasing) order.

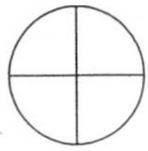
a) $\frac{2}{7}, \frac{5}{7}, \frac{3}{7}, \frac{4}{7}$ b) $\frac{17}{5}, \frac{17}{13}, \frac{17}{10}, 1\frac{17}{25}$

c) $\frac{2}{6}, \frac{4}{8}, \frac{3}{12}, \frac{1}{4}$

4.4 Addition of Fractions

Observe the following examples.

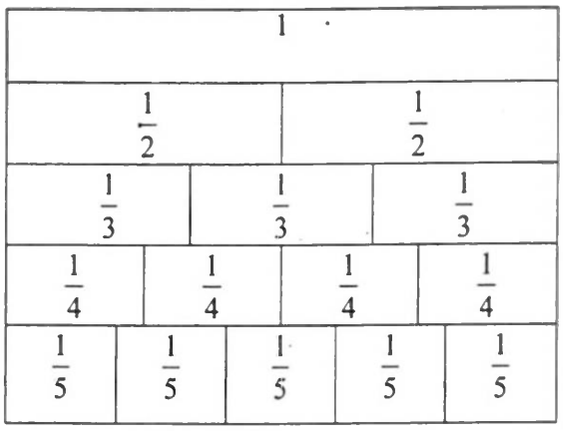
a) This is a complete circle. Each part is equal to $\frac{1}{4}$.



b) When you add two such parts, we get $\frac{2}{4}$.

c) When we add three such parts we get $\frac{3}{4}$.

d) In any one complete object, 1. How many $\frac{1}{2}$ are there ? 2. How many $\frac{1}{3}$ are there ? 3. How many $\frac{1}{4}$ are there ? 4. How many $\frac{1}{5}$ are there ?



Two halfs are there.

Three $\frac{1}{3}$s are there.

Therefore,

1. $\frac{1}{2} + \frac{1}{2} = 1$
2. $\frac{1}{3} + \frac{1}{3} + \frac{1}{3} = 1$
3. $\frac{1}{4} + \frac{1}{4} + \frac{1}{4} + \frac{1}{4} = 1$
4. $\frac{1}{5} + \frac{1}{5} + \frac{1}{5} + \frac{1}{5} + \frac{1}{5} = 1$

When we are going to study the addition, subtraction, multiplication and division of fractions, we have to give examples from real life situations. A few examples are given below.

1. Rama has Rs. $\frac{3}{4}$. His mother gave him Rs. $\frac{1}{2}$. What is the total amount with him now?
2. Radha has a ribbon of $2\frac{1}{2}$ mts long. From this, she cut off $1\frac{1}{2}$ mts and gives to her friend Usha. Now find the length of the ribbon left with her?
3. A pencil costs Rs. $1\frac{1}{2}$. Find the value of 10 such pencils ?
4. Kamala has Rs.10. She distributes the money to 20 children. How much money each child will get?

Addition of Fractions

1. When the denominators of any two or more fractions are same.

Ex. 1. $\frac{3}{7} + \frac{2}{7} = \frac{3+2}{7} = \frac{5}{7}$

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

Note: In any two or more fractions, when the denominator are same the numerator can be added directly and the denominator can be written as it is.

2. When the denominators are different

Example: Add $\frac{3}{4}$ and $\frac{1}{2}$.

Observe the method followed in converting into fractions of equal denominators.

Multiply the denominator and the Numerator of $\frac{3}{4}$ by 2 : $\frac{3}{4} = \frac{3\times2}{4\times2} = \frac{6}{8}$.

Multiply the denominator and the numerator of $\frac{1}{2}$ by 4 : $\frac{1}{2} = \frac{1\times4}{2\times4} = \frac{4}{8}$

Now add : $\frac{3}{4} + \frac{1}{2}$

$= \frac{6}{8} + \frac{4}{8}$

$= \frac{6+4}{8} = \frac{10}{8}$

$= \frac{5}{4} = 1\frac{1}{4}$ (simplify wherever necessary)

Addition of fractions is also possible by finding LCM of the denominators. (To make the denominators common, we find a number which is divisible by both the denominators.

This number is the LCM of the two denominators.

Example : Add $\frac{5}{12}$ and $\frac{2}{9}$.

The LCM of 12 and 9 is 36.

Multiply the Numerator and the denominator of $\frac{5}{12}$ by 3 : $\frac{5}{12} = \frac{5\times3}{12\times3} = \frac{15}{36}$.

Multiply $\frac{2}{9}$ by 4 : $\frac{2}{9} = \frac{2 \times 4}{9 \times 4} = \frac{8}{36}$

Now add : $\frac{5}{12} + \frac{2}{9} = \frac{15}{36} + \frac{8}{36}$

$= \frac{15+8}{36} = \frac{23}{36}$

Exercises:

I. Add the following.

1. $\frac{1}{3} + \frac{2}{3}$
2. $\frac{2}{3} + \frac{5}{6}$
3. $\frac{2}{3} + \frac{4}{5}$
4. $6\frac{1}{2} + 5\frac{1}{4}$

II. Fill up the blanks.

1. Rs. $\frac{2}{10}$ + Rs. $\frac{4}{10}$ =
2. $\frac{4}{5}$ lit + $\frac{1}{5}$ lit =
3. $\frac{3}{4}$ mt = $\frac{1}{2}$ mt =
4. $3\frac{1}{2}$ mt + 2 mt =
5. $6\frac{1}{4}$ mt + $2\frac{1}{4}$ mt =

4.5 Subtraction of Fractions

Subtraction of fractions when denominators are same.

Example : 1. $\frac{2}{5} - \frac{1}{5} = \frac{2-1}{5} = \frac{1}{5}$

2. $\frac{7}{10} - \frac{2}{10} = \frac{7-2}{10} = \frac{5}{10} = \frac{1}{2}$

Note: In any fractions, when the denominators are same, find the difference between the numerators directly and the denominator can be written as it is.

Subtraction of fractions when the denominators are different.

Example : Subtract $\frac{1}{3}$ from $\frac{3}{4}$ i.e. $\frac{3}{4} - \frac{1}{3}$.

a) Observe the method followed in converting into fractions of equal denominators.

Multiply by 3 : $\frac{3}{4} = \frac{3 \times 3}{4 \times 3} = \frac{9}{12}$

Multiply by 4 : $\frac{1}{3} = \frac{1 \times 4}{3 \times 4} = \frac{4}{12}$

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

$$= \frac{9}{12} - \frac{4}{12}$$

$$= \frac{9-4}{12} = \frac{5}{12}$$

(Simplify wherever possible).

b) Subtraction of fraction is also possible by finding LCM of the denominators. To make the denominators common, we find a number which is divisible by both the denominators. This number is the LCM of the two denominators. For example :

Simplify : $\frac{5}{12} - \frac{2}{9}$

36 is the LCM of 12 and 9.

$$= \frac{5}{12} - \frac{2}{9}$$

$$= \frac{15}{36} - \frac{8}{36}$$

$$= \frac{15-8}{36} = \frac{7}{36}$$

c) Subtraction of mixed fraction where denominators are different.

Example: Geetha has Rs.$10\frac{1}{2}$. In that she spent Rs.$5\frac{3}{4}$. Find the amount left with her?

Step 1 : Geetha has Rs. $10\frac{1}{2}$

Geetha spent = $5\frac{3}{4}$

Remaining amount = $10\frac{1}{2} - 5\frac{3}{4}$.

Step 2: Convert mixed fractions to improper form.

$$\frac{21}{2} - \frac{23}{4}$$

Step 3 : To make the denominators common, we find a number which is divisible by both the denominators. This number is the LCM of the two denominators. For the above problem,

L.C.M. of 2 and 4 is 4.

$$\frac{21}{2} = \frac{21}{2} \times \frac{2}{2} = \frac{42}{4}$$

$$\frac{23}{4} = \frac{23}{4}$$

Step 4 :

$$10\frac{1}{2} - 5\frac{3}{4}$$

$$= \frac{21}{2} - \frac{23}{4}$$

$$= \frac{42}{4} - \frac{23}{4}$$

$$= \frac{42 - 23}{4}$$

$$= \frac{19}{4}$$

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

The amount left with Geetha = Rs.$4\frac{3}{4}$.

Exercise

a) $\frac{3}{4} - \frac{1}{4} = ?$

b) $\frac{5}{7} - \frac{3}{7} = ?$

c) $\frac{6}{10} - \frac{2}{3} = ?$

d) $6\frac{3}{4} - 2\frac{1}{3} = ?$

e) $\frac{5}{6} + \frac{1}{12} - \frac{3}{4} = ?$

II. From a piece of cloth measuring $2\frac{1}{2}$ mts. Kamala cut $1\frac{2}{5}$ mts for stitching her skirt. Now what is the length of remaining piece of cloth ?

4.6 Multiplication of Fractions

1. Multiplication of a fraction by a whole number (by an integer).

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

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

Step 2 : $\frac{3 \times 3}{2 \times 1} = \frac{3}{2}$

Note: When we multiply a fraction by a whole number, first change whole number into fraction form. Then multiply directly.

2. Multiplication of a fraction by another fraction.

Example : Step 1 : $\frac{3}{4} \times \frac{8}{15}$

Step 2 : $\frac{3 \times 8}{4 \times 15} = \frac{24}{60} = \frac{2}{5}$

Note: Multiply directly both the numerator and denominator as above. Simplify wherever possible.

Multiplication of mixed fractions

Example : $5\frac{1}{4} \times 2\frac{2}{3}$

Step 1 : Convert both of them into improper fractions

$$5\frac{1}{4} \times 2\frac{2}{3} = \frac{21}{4} \times \frac{8}{3}$$

Step 2 : $\frac{21 \times 8}{4 \times 3} = \frac{168}{12}$ Multiply directly both the numerator and denominator.

Step 3 : $\frac{168}{12} = 14$ Simplify wherever possible.

Example 2 : If one meter of cloth costs Rs.$50\frac{1}{2}$, what is the cost of 4 meters ?

The cost of 4 meters $= 50\frac{1}{2} \times 4$

$$= \frac{101}{2} \times 4$$

$$= \frac{101 \times 4}{2} = 101 \times 2 = \text{Rs.}202.$$

$\therefore$ The cost of 4 meters cloth is Rs.202/-.

Exercises

1. $\frac{4}{5} \times 8 = ?$
2. $10 \times \frac{7}{10} = ?$
3. $\frac{2}{4} \times \frac{3}{4} = ?$
4. $\frac{4}{5} \times \frac{7}{10} = ?$
5. $\frac{2}{4} \times \frac{4}{5} \times \frac{10}{8} = ?$
6. If one mile is equal to $\frac{8}{5}$ kilometers, then (a) 5 miles are equal to how many kilometers ? (b) 8 miles are equal to how many kilometers ?
7. To prepare a cup of coffee $\frac{2}{5}$ cup of milk is required. How many cups of milk are required to prepare 25 cups of coffee ?

4.7 Division of Fractions

1. Division of a fraction by a whole number.

Example : $\frac{1}{4} \div 8$

Step 1 : $\frac{1}{4} \div \frac{8}{1}$ (Convert whole number into fraction)

Step 2 : $\frac{1}{4} \times \frac{1}{8}$ (while dividing, we have to multiply the fraction by the reciprocal of (whole number) the right side fraction).

Step 3 : $\frac{1 \times 1}{4 \times 8} = \frac{1}{32}$

Ans: $\frac{1}{4} \div 8 = \frac{1}{32}$.

Division of fraction by another fraction

Example : $\frac{3}{10} \div \frac{3}{5}$

Step 1 : $\frac{3}{10} \div \frac{3}{5}$

Step 2 : $\frac{3}{10} \times \frac{5}{3}$ (The dividend is to be multiplied by the reciprocal of the divisor).

Step 3 : $\frac{3 \times 5}{10 \times 3} = \frac{15}{30} = \frac{1}{2}$ (directly multiply both numerator and denominator and simplify wherever possible).

Division of a whole number by a fraction.

Example 1 : $8 \div \frac{4}{5}$

Step 1 : $\frac{8}{1} \div \frac{4}{5}$ (correct whole number into a fraction).

Step 2 : $\frac{8}{1} \times \frac{5}{4}$ (multiplying the dividend by the reciprocal of the divisor)

Step 3 : $\frac{8 \times 5}{1 \times 4} = \frac{40}{4} = 10$ (multiply both numerator and denominator directly and simplify wherever possible).

IV. Dividing a mixed fraction by another mixed fraction.

Example : $5\frac{1}{5} \div 2\frac{8}{9}$

Step 1 : $\frac{26}{5} \div \frac{26}{9}$ (convert both fractions into their improper form).

Step 2 : $\frac{26}{5} \times \frac{9}{26}$ (The dividend is to be multiplied by the reciprocal of the divisor of the second fraction)

Step 3 : $\frac{26 \times 9}{5 \times 26} = \frac{9}{5}$ (simplify wherever necessary and multiply directly both numerator and denominator).

Step 4 : $\frac{9}{5} = 1\frac{4}{5}$ (convert improper fraction into mixed fraction)

Ans: $\left(5\frac{1}{5} \div 2\frac{8}{9}\right) = 1\frac{4}{5}$.

Exercise

I. Work out the following.

1. $\frac{2}{3} \div 8$ 2. $4 \div \frac{1}{3}$ 3. $\frac{11}{20} \div \frac{22}{10}$

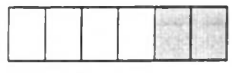
4. $8\frac{2}{5} \div 3\frac{1}{7}$

II. There is a stock of 12 kg of rice in a house. The daily requirement of rice in the house is $\frac{3}{4}$ kg. How many days the stock of rice will lost ?

Unit Test

Answer the following questions.

1.



a) Coloured part in the figure is equal to ---------(fraction).

b) Non-coloured part in the figure is equal to ----------(fraction).

2. Identify which is bigger and which is smaller among the fractions $\frac{3}{4}$ and $\frac{1}{2}$ by drawing the figures.

3. What are the types of fractions? Name them. Give one example each.

4. Write the improper form of fraction $4\frac{2}{5}$.

5. Write five equivalent fractions to $\frac{3}{5}$.

6. Write in the simplest form of $\frac{35}{42}$.

7. Identify which is smaller and which is greater from the following fractions.

$\frac{3}{5}$ and $\frac{2}{7}$.

8. A man walked $4\frac{1}{2}$ km and ran $5\frac{1}{4}$ km. Find the total distance travelled by him.

9. A can contains $10\frac{1}{2}$ lts of milk. From this, $4\frac{1}{2}$ lts of milk is used. Find the remaining quantity of milk in the can.

10. In a class, there are 50 students. Among them $\frac{2}{5}$ are girls. Find the number of girls in the class?

11. To stitch one shirt $1\frac{1}{4}$ mts of cloth is needed. How many shirts can be stitched with 10 mts of cloth?

4.8 Decimals

The fraction having denominators as powers of ten are called decimal fractions (e.g. $\frac{1}{10}$, $\frac{21}{100}$, $\frac{103}{100}$, $\frac{111}{1000}$ etc). The word decimal might have been derived from the latin word 'Decem' (meaning 10) or the Sanskrit word 'Dashama' (meaning 10).

The decimal system is adopted for the purpose of making calculation easy.

In this system,

1 km = 10 decameter = 1000 meters

1 liter = 10 decilitres

1 decilitres = 10 centilitres

1 rupee = 100 paise (10^2 paise)

Example for decimal numbers

0.4, 0.32, 8.8, 0.88, 1.2, 1.6

Here the meaning of 0.4 is $\frac{4}{10}$. Similarly, $0.32 = \frac{32}{100}$.

The other decimal numbers can also be expressed in the form of fractions.

Addition :

Ex. 1 0.0201 + 0.8120 + 0.270

Sum = 0.0201 + 0.8120 + 0.270

i.e.
$$\begin{array}{r} 0.0201 \\ 0.8120 \\ \underline{0.270} \\ 1.1021 \end{array}$$

(We should write the decimal numbers according to decimal places one below another as shown).

Ex. 2 Add the following fraction by converting them into decimals.

$$2 + \frac{2}{10} + \frac{2}{100} + \frac{2}{1000} = ?$$

$\frac{2}{10} = 0.2$ $\frac{2}{100} = 0.02$ $\frac{2}{1000} = 0.002$

Sum = 2 + 0.2 + 0.02 + 0.002

= 2.222

Ex.3. Add the following by converting them into decimals.

Kgm	gms
8	500
2	200

8 Kgm 500 gm = 8.500 K.gms.

2 Kgm 200 gm = 2.200 K.gms

Sum = 8.500 + 2.200 = 10.700 K.gms

Ex.4. Add the following:

i)	Rs.	Paise	ii) Litre	Millilitre
	2 .	70	7	700
	3 .	50	7	200

Ex. 5. A person has deposited the following amount in a bank upto five months as follows:

Rs.9000.24

Rs.5020.30

Rs.3210.50

Rs.8020.70

Rs.6020.50

Find the total amount he has deposited.

Ex. 6. A school teacher purchases ribbons to her school children as follows : Red 201.50 mts, blue 100.6 mts, green 150.7 mts, black 170.2 mts. Find the total length of ribbon she purchased.

Ex.7. Rama, Sheela, Seeta purchases wheat 10.2 kg, 50.2 kg and 25.3 kg respectively. Find the total quantity of wheat they purchased.

Ex.8. If there are three tanks in a hostel containing 100.2 lit, 200.25 lit, 500.1 lit of water, find the total quantity of water filled in all the tanks together.

Subtraction

Ex.1. Subtract 33.79 from 35.97.

```
 35.97
-33.79
  2.18
```

Ex.2. Subtract the following by converting into decimals.

i)	Rs.	Paise	ii) Metres	Cms
	5	300	8	900
-	3	400	- 8	200

iii)	Lit.	Millilitre	iv)	Kgm	Gms
	19	30		20	200
-	30	40	-	15	100

Ex.3. In a cloth shop out of 20 mts. cloth salesman cuts 2.5 mts, 1.5 mts, 3.5 mts, 4.2 mts cloth. Find the remaining cloth in that roll.

Total length of cloth he cuts from roll = 2.5
1.5
3.5
4.2
11.7 mts

Remaining cloth = 20.0 - 11.7 = 8.3 mts

Ex.4. Gopal has 25 metres of wire with him out of which, Raju takes 11.5 mts and then Ravi takes 2.5 mts. Find the remaining length of the wire with Gopal.

Ex.5. A teacher collects money from I to V class students as follows Rs.250.20, Rs.3555.50, Rs.425.50, Rs.530.80and Rs.624.80. Then she paid Rs.635.50 for sweets. Calculate the remaining amount she has.

Ex.6. If Rani gets Rs.7000/- as monthly pay her expenditure is as follows :

Rent : Rs.1500.00

Ration : Rs.1850.20
Electricity : Rs. 300.50
Fuel : Rs. 300.75

Find savings of Rani at the end of the month.

Multiplication

I. Multiply the following

1. $1.25 \times 10 =$

(Multiply 125 and 10 i.e. 1250 then put point after two digits from right side because there are two decimal places).

$125 \times 10 = 1250$

$1.25 \times 10 = 12.50$

2. $2.56 \times 3 =$

$(256 \times 3 = 768)$

$2.56 \times 3 = 7.68$

3. $+0.352 \times -10$

$(352 \times 10 = 3520)$

$(\therefore\ 0.352 \times -10) = -3.520$

4. -2.56×-2

$(256 \times 2 = 512$

$\therefore\ 2.56 \times -2 = +5.12$

II. Multiply the following :

1. 6.35×10
2. 7.13×-2
3. 3.25×-1
4. 1.25×-5
5. 5.32×6
6. 3.125×-7
7. -1235×15
8. -1567×-2
9. 5.25×525

III.

1. The cost of cloth per metre is Rs.25 and Sheela purchases 2.5 metres cloth. Calculate total amount she has to pay.
2. Ramu travels 12.5 km/hour by scooter. Find the total distance he travels in 6 hours.
3. If the cost of a mango is Rs.4.50 calculate the cost of 12 mangoes.
4. Ravi spends 7.5 hours for reading in a day. Calculate the total number of hours he spends for reading in a week.

Division of Decimals

Ex.I. Divide $6.6 \div 10$

(Remove the decimal of numerator by multiplying it by 10 to both numerator and denominator)

$$\frac{6.6}{10} \times \frac{10}{10} = \frac{66}{100} = 0.66$$

(Verification $0.66 \times 10 = 6.6$)

Ex.II. Divide the following decimals.

1. $6.3 \div 7$
2. $4.9 \div 7$
3. $7.6 \div 10$
4. $8.5 \div 5$
5. $6.4 \div 8$
6. $2.5 \div -5$
7. $169 \div 100$
8. $-7.5 \div 15$
9. $1.5 \div -3$

III.

1. If the ribbon of length 12.5 meters is cut it into 5 pieces, find the length of each piece.
2. If the stick of length 100.25 metres is cut it into 5 equal parts, find the length of each part.
3. A school Headmaster purchases a table cloth roll of 112.5 metres and then he cuts it into 5 equal parts. Find the length of each part.
4. Three people together purchase a sugarcane stick of 6.30 ft and cut into 3 equal parts. Find the length of each part.

4.9 Conversion of Decimals into Fractions

We know that decimals are the other forms of fractions. We can convert decimals into fractions and fractions into decimals.

Observe : The following examples :

$\frac{1}{2} = 0.5$

$\frac{1}{4} = 0.25$

$\frac{3}{5} = 0.6$

$\frac{15}{6} = 2.5$

2) 10 (.5
10

4) 10 (.25
8
20
20

5) 30 (.6
30

6) 15 (2.5
12
30
30

In the above examples, fractions are converted into decimals by the long division method.

Now, we see that the decimals are converted into fractions.

$0.8 = \frac{8}{10}$ i.e. $\frac{0.8}{1} \times \frac{10}{10} = \frac{8}{10}$

$2.5 = \frac{25}{10}$ i.e. $\frac{2.5}{1} \times \frac{10}{10} = \frac{25}{10}$

$0.25 = \frac{25}{100}$ i.e. $\frac{0.25}{1} \times \frac{100}{100} = \frac{25}{100}$

In order to convert the decimals into fractions, we have to multiply both the numerator and the denominator by 10, 100, 1000, 10,000 etc. if the number of digits in the decimals are 1,2,3....respectively.

As we have seen in the previous example, we find

0.8 was multiplied by $\frac{10}{10}$.

2.5 was multiplied by $\frac{10}{10}$ and

0.25 was multiplied by $\frac{100}{100}$

Exercise

1. Convert the following fractions into decimals :

$$\frac{25}{100}, \frac{3}{10}, \frac{8}{15}, \frac{92}{100}, \frac{91}{10}, \frac{32}{5}$$

2. Convert the following fractions into decimals.

$$\frac{75}{100}, \frac{560}{100}, \frac{450}{200}, \frac{250}{1000}, \frac{350}{1000}, \frac{63}{700}$$

3. Convert the following decimals into fractions.

   2.8, 9.8, 0.09, 21.7, 2.65, 0.92

4. Convert the following decimals into fractions.

   0.9, 0.90, 0.09, 0.009, 9.9, 90.9

Place Value of Decimals

Already we have learnt the place value of a number. For example, 3,49,257 is placed in the place value table below. Here we see that the place value increases with the multiples 10 from right to left.

1,00,000	10,000	1,000	100	10	1
Lakh	Ten Thousand	Thousand	Hundred	Ten	Unit
3	4	9	2	5	7

But in the decimal numbers, the place value decreases with the multiples of ten from left to right after the decimal point. That can be shown in the table below.

Thousandth	Hundredth	Tenth	Unit	Decimal	$\frac{1}{Ten}$	$\frac{1}{Hundred}$	$\frac{1}{Thousand}$
1000	100	10	1	Decimal point	$\frac{1}{10}$	$\frac{1}{100}$	$\frac{1}{1000}$

Observe the following examples:

Fraction Form

1. 2.51

Unit		Decimal	$\frac{1}{10}$	$\frac{1}{100}$
2	.	5	1	

$$2 + \frac{5}{10} + \frac{1}{100} = 2.51.$$

2. 15.62

Ten	Unit	Decimal	$\frac{1}{10}$	$\frac{1}{100}$
1	5	.	6	2

$10 + 5 + \frac{6}{10} + \frac{2}{100} = 15.62$

Exercises

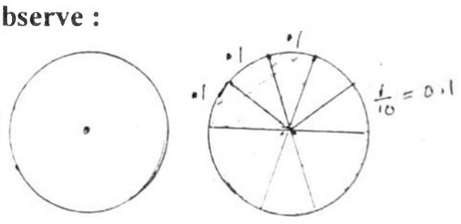
Write the place value of the following decimal numbers in place value table.

3.8, 3.08, 308.5, 13.058, 9.006

4.10 Comparison of Decimals

Observe :

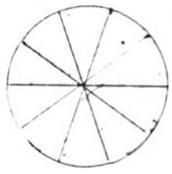
a)



$1 + 0.1 + 0.1 + 0.1$

$= 1.3$

b)



0.8

In fig.(a) there is a whole circle having ten parts in addition to 3 separate parts i.e. its value is 1.3. In fig.(b) the whole circle is divided into ten parts and 8 parts are taken. Its value is 0.8. Here we can say that $1.3 > 0.8$.

While comparing the decimals the following steps are to be considered.

I. **Compare the whole numbers.**

9.1, 10.1, 19.1, 12.1, 20.1

Here, 9, 10, 19, 12, 20 are the whole numbers and 20 is the biggest

i.e. $20 > 19 > 12 > 10 > 9$

$\therefore$ $20.1 > 19.1 > 12.1 > 10.1 > 9.1$

II. **Compare the first decimal number**

If the whole numbers are equal, then compare the first decimal place number.

Ex. 10.2, 10.32, 10.62, 10.90, 10.08

Here in the first decimal places, there are 2, 4, 6, 9 and 0. Among them 9 is the biggest.

i.e. $9 > 6 > 3 > 2 > 0$

$\therefore$ $10.90 > 10.62 > 10.32 > 10.2 > 10.08$

III. **Compare the 2nd Decimal number**

If the whole number and first decimal numbers are equal, then compare the second decimal place number.

Ex. 10.29, 10.23, 10.28, 10.20, 10.27, 10.21

Here, in the second decimal place, there are 9, 3, 8, 0, 7 and 1. Among them 9 is the biggest.

i.e. $9 > 8 > 7 > 3 > 1 > 0$

$\therefore$ $10.29 > 10.28 > 10.27 > 10.23 > 10.21 < 10.20$

Similarly, continue the same procedure. For 3rd, 4th decimal places to compare the different decimal numbers. Then we find the form like

$$....> 1000 > 100 > 10 > 1 > \frac{1}{10} > \frac{1}{100} > \frac{1}{1000} .....$$

Exercises

1. **Compare the following decimal numbers and write in ascending order.**
   a) 7.1, 17.9, 7.19, 17.0
   b) 9.1, 8.2, 2.8, 2.89, 9.18, 8.27

2. **Compare the following decimal numbers and write in descending order.**
   a) 23.5, 21.7, 28.4, 21.072, 23.53, 21.721
   b) 3.425, 8.936, 4.395, 8.930, 5.826, 3.427

3. **Encircle the biggest number in the following groups of decimal numbers.**
   a) 2.8, 3.8, 3.82
   b) 2.6, 2.09, 2.16
   c) 1.7, 7.1, 7.01
   d) 6.04, 4.60, 0.46

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CHAPTER V

PERCENTAGE

Preview

The knowledge of fractions, decimal representation of numbers operations on them and the unitary method are prerequisites knowledge for the unit. This pre-knowledge is already given to the children in the previous classes. The concepts and processes learnt in the previous classes are very essential to learn and use the contents of this unit. The knowledge learnt in the unit have very important applications in daily life.

Introduction

Percent (from Latin word "per centum", " by the hundred") means a hundredth part. The symbol for percentage , % is a distortion of the notation c_{to} moral which is a contraction for the word "Cento" . thus 1% stands for $\frac{1}{100}$(fraction) and 0.01 (decimal). Percentage is a convenient phrase (from the calculation point) employed in many daily-life problems. Percentage representation of a number is yet another form of a real number, the other form being the fractional form and decimal form. In commercial problems and problems of banking, the use of percentage is made in plenty of contexts.

Money earns money over a period of time. When large amount of money accumulates in banks and financial institutions, that money does not remain idle. It is used for productive purposes so that the money invested generates more money. The money so earned in partly or fully distributed to the investors (those who keep money in banks) in the form of interests.
This is the basic idea – that 'Money grows'.

The unit elaborates the concepts – percentage and simple interest and attempts to bring correct understanding of the concepts besides the ability to solve problems in this context.

5.1 Percentage

I :

Concepts: a) one hundredth part is called one percent (of a unit)

b) it is denoted by 1%

c) 1% is equal to $\frac{1}{100}$ and 0.01.

$$\frac{1}{100} = 0.01 = 1\%$$

Learning Activities

III Physical Activities (Learning by doing)

1. Teacher shows a meter scale, Draws the attention to
   (a) the metre scale is divided into 100 equal parts and each part is a hundredth part of the length of the scale.
   (b) 'One hundredth part' is called a percent and it is denoted by 1% (read as one percent)

   In reference to this observation, asks the children to fill the table

No. of hundredth part	**2**	**10**	**50**	**80**	**95**	**100**
Percent	2%	10%				
Number represented	$2\times0.01=0.02$ or $2\times\frac{1}{100}=\frac{2}{100}$	$10\times0.01=0.1$ or $10\times\frac{1}{10}=\frac{10}{100}$				

2. Teacher

(a) shows a rectangular (or square) board divided into 100 equal rectangles (or squares)

(b) Shades different sets of smaller rectangles (or squares)

(c) Asks the students to construct the number of small rectangles shaded in each sit and express the number on percent of the whole rectangle

3. In the previous activity , the teacher asks the students to write each of the sets of shaded parts in the fractional form and the decimal form

For example

Shaded part	Percent form	Fraction form	Decimal form
	12%	$\frac{12}{100} = \frac{3}{25}$	0.12

4. Teacher draws the students' attention to observe :

a) (Percent form) $\times \frac{1}{100}$ = (Fractional form)

b) Fractional form = 100 $\times$ (percent form)

Eg: 1. To convert 6% to fraction form

Multiply by $\frac{1}{100}$

$\therefore$ The $= \frac{6}{100} = \frac{3}{50}$ (in the lower form)

2. To convert $\frac{3}{20}$ Into % form

Multiply by 100

$\therefore$ the % $= \frac{3}{20} \times 100 = 15\%$

3. Teacher recalls the method of expressing

a) a fraction in the decimal form

b) a decimal in the fraction form

c) expressing a number in

i) % form

ii) fraction from

iii) decimal form

2. **Problem Solving – (Model solved problems)**

1. In a hall 100 persons have assembled. 40 among them are children, others are adults. Find the percentage of children and adults in the hall.

Solution

Total no. of persons =100

No of children = 40

∴ No of adults =100 - 40 = 60

∴ % of children = 40%

and % of adults = 60%

2. A person travels a distance of 100 Kms, traveling by car a distance of 35 Km, by train a distance of 50 Km and the rest by scooter. Express the percentages of total journey in each mode of travel.

Solution

Total distance = 100 Km

By Car = 35 Km

By Train = 50 Km

By Scooter = 15 Km

Hence % of travel (a) by car = 35%

(b) by Train =50%

(c) by Scooter=15%

3. Ganapathi who brought 5 chappathis to eat during lunch break of the School could at only 3 chappathis and gave the remaining to his friend. What % of chappathis did (i) he eat? (ii) his friend eat?

Solution : Total No of chappathis =5

No. of chappathis Ganapathi ate = 3

No. of chappathis his friend ate = 2

$\therefore$ The part of chappathis Ganapathi ate = $\frac{2}{3}$

$\therefore$ The part of chappathis his friend ate = $\frac{2}{5}$

$\therefore$ the % of chappathis

(a) Ganapathi ate $= \frac{3}{5} \times 100 = 60\%$

(b) His friend ate $= \frac{2}{5} \times 100 = 40\%$

4. Sunder and Shankar solved problems and 12 problems correctly in an exercise having 20 problems. What percentage of the problem in exercise did they solve correctly respectively?

Solution No of problems solved correctly

(c) by Sunder = 8

(d) by Shankar=12

$\therefore$ Total No. of problems = 8+12 = 20

$\therefore$ The fraction of total No. of problems correctly solved

(a) by Sunder $= \frac{8}{20} = 40\%$

(b) by Shankar $= \frac{12}{20} = 60\%$.

5. Two sisters Suneetha and Vinutha did respectively 25% and 45% of the total house hold work while the rest of the work was done by her mother. What

fraction of the works was done by the sisters and the % of work done by their mother.

Solution: Let 100units be the amount of household work

Then the fraction of work done by

a) Suneetha $= \frac{25}{100} = \frac{5}{20} = \frac{1}{4}$

b)Vinutha $= \frac{45}{100} = \frac{9}{20}$

c) The fraction of work done by their mother

$$= \frac{100-25-45}{100} = \frac{30}{100} \ldots = \frac{3}{10} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots$$

The % of work done by their mother $= \frac{3}{10} \times 100$

$= 30\%$

6. A person gets 60% of his total Annual income from salary, 25% from rent of his house and the rest from interest on his bank deposits. If the total income is 2 lakhs rupees. Find the income in rupees from each source.

Solution: Annual income from

(a) Salary $= 60\% = \frac{60}{100}$ (of Total income)

(b) Rent $= 25\% = \frac{25}{100}$ (of Total income)

(c) Interest $= 15\% = \frac{15}{100}$ (of Total income)

$\therefore$ Income in Rs. From

(a) Salary $\frac{60}{100} \times 2$ lakh $= \frac{60}{100} \times (2{,}00{,}000)$

$= $ Rs.1,20,000

(b) Rent $= \frac{25}{100} \times 2{,}00{,}000 =$ Rs.50,000

(c) Interest $= \frac{15}{100} \times 2{,}00{,}000 =$ Rs.30,000

7. A cloth merchant announces a discount of 5% on the marked price of any cloth in his shop. Anuritha purchases two Sarees, four Towels and five children garments. If her bill come to Rs. 2400/= how much should she pay after the discount?

Solution: Total Cost price =2400.00

$$\text{Total discount @ } 5\% = \frac{2400 \times 5}{100} = 120$$

$\therefore$ The amount to be paid $= 2400 - 120 =$ Rs.2280.00

Exercises:

1. In a locality 65% Speak Kannada only, 15% Urdu only and the rest Tamil only. Find the number of persons in each case, if there are 500 residents in the locality.
2. A girl spends 6 hours in School, 12 hours at home work and the rest of the day in sleep. Express these in percentage.
3. A wall is constructed by 3 persons A,B,C and earn Rs. 2000.00. If they have started the work in the proportion of 2:3:5, what % of money does each get and how much?
4. In a village 35% of persons are farmers. 40% persons are merchants and the remaining 240 persons are Government servants. How many are in the village?
5. A box contains some balls. 25% of them are white, 15% of them are red, 20% are black and the rest are green. If the white and red put together are 6. Find the No. of balls of each colour in the box.

Simple Interest

Concepts

(a) When an amount is kept in a bank (or given as loan) the amount earns money over the period for which the money is kept.

(b) The amount kept is called the Principal amount. The amount earned is called the Interest. The amount got back at the end of the Period of time is called the Amount.

(c) Amount = Principal + Interest

(d) Interest paid for a Principal of Rs 100 for one year (usually) is called the rate of Interest. It is expressed as percentage per annum. For example, the rate of interest is 8% per annum means 100 rupees over one year gets an interest Rs. 8

(e) Net (Total interest) = $\frac{(\text{Principal}) \times (\text{Rate of Interest}) \times (\text{No. of Years})}{100}$

(f) Amount= $\left[\text{Principal} + \frac{(\text{principal}) \times (\text{Rate of Interest}) \times (\text{No. of Years})}{100}\right]$.....

(g) Simple Interest is the interest calculated on the initial Principal amount only. In this case, the Principal does not change every year.

Learning Activities

Physical Activities

(a) Teacher asks students to visit (or takes student to) Bank, post office and other money lending/depositing institutions so that the students can get information regarding the interest rate and how the total amount is calculated.

(b) Give information regarding money transactions and financial institutions which accept deposits and lend loans.

(c) Explains how interest is calculated.

(d) Asks students to list various situations when money is deposited (or lent) to earn interest.

(e) Conduct a make-believe episode of money lending.

-A student, A is a money lender.

He lends money to another student B.

Teacher mentions the rate of interest and period and asks both A and B in turn to calculate the interest and Amount

(f) Teacher asks the students to fill in

Money deposited	Period of Deposit(Year)	Rate of Interest %	Total Interest	Amount
1) Rs. 2000	3	8	-	-
2) Rs. 5000	2	6	-	-
3) Rs. 4000	4	-	960	-
4) Rs. !0000	-	9	-	14500
	3	8	-	8920

Problem Solving (Model Problems Solved)

1. Rangappa bought Rs 5000 from Bheemaiah on simple Interest 8% p.a After 5 years he returns the amount due with interest. How much interest has he to pay and what is the amount to be paid?

Solution : Rate of interest = 8% p.a

i.e Rs 8/- = per Rs.100 per year

$\therefore$ in one year, interest = $\frac{8}{100} \times 5000 = Rs.400$

$\therefore$ in 5 years, Interest = 400 × 5= Rs.2000/-

$\therefore$ Amount to be paid back = Principal + Interest

Formula : **(a) Interest** = $\frac{Principal \times No.of\ years \times Rate}{100} = 2000$

(b) Amount = Principal + Interest = 5000 + 2000 = Rs.7000

2. Dheeraj Mall is a money lender who charges Simple Interest @ 12% p.a Somanna took Rs. 8000 loan and returned Rs. 12,800. What was the Period of loan?

Solution : Amount = Rs.12,800

(-) Principal = Rs.8,000

$\therefore$ Interest = Rs.4,800

But Interest $= \frac{principal \times Period\ of\ loan \times Rate}{100}$

$\therefore \quad 4{,}800 = \frac{8000 \times Period\ of\ loan \times Rate}{100}$

$\therefore \quad 4{,}800 = \frac{8000 \times Period\ of\ loan \times 12}{100}$

$\therefore$ Period of loan $= \frac{4800 \times 100}{8000 \times 12} = 5$ years

3. Channegowda took a loan of Rs. 10,000 from a Cooperative Bank on Simple Interest and paid an interest of Rs 4500 in 6 years. What the rate of interest charged by the Bank?

Solution : Interest $= \frac{\text{Pr}incipal \times No.of\ years \times Rate}{100}$

$4500 = \frac{10{,}000 \times 6 \times Rate}{100}$

$\therefore$ Rate $= \frac{4500}{10000} \times \frac{100}{6} = 7.5$

$\therefore$ Rate of interest charged by the bank = 7.5% p.a

4. Ramakka took a loan from 'Grameena Sahakara Sangha' to setup a poultry farm, which charges 7% Simple Interest . After 6 years she returned the loan and an interest of Rs.8400. What was the loan she had taken?

Solution : Interest $= \frac{\text{Pr}incipal \times No.of\ years \times Rate}{100}$

$8400 = \frac{\text{Pr}inciple \times 6 \times 7}{100}$

Principal $= \frac{8400 \times 100}{42} =$ Rs.20,000

The loan she had taken was Rs.20,000

5. Mayavathi took a loan of from 'Employees' provident Fund' a sum of money to build a house. The rate of interest (Simple) is 4.5% p.a. and the period of loan is 20 years. If she paid back Rs.3,80,000 (Rupees Three lakh eighty thousand) what was the loan she had taken.

Solution: $\text{Amount} = \text{Principal}\left[1+\frac{\textit{No.of years} \times \textit{Rate}}{100}\right]$

$$3{,}80{,}000 = \text{Principal}\left[1+\frac{20\times 4.5}{100}\right]$$

$$\therefore \quad 3{,}80{,}000 = \text{Principal} \times \frac{19}{10}$$

$$\therefore \quad 19 \times \text{Principal} = 3{,}80{,}000 \times 10$$

$$\therefore \quad \text{Principal} \quad \frac{38\times 1{,}00{,}000}{19} = \text{Rs. } 2{,}00{,}000$$

(Rs.2 lakhs)

$\therefore$ The loan taken by Mayavathi = Rs 2 lakhs

Exercises:

1. Rachappa took Rs 25,000 from Rural Land development Bank which charges 5.5% p.a. interest. If he repays the loan in 4 years, how much interest has he to pay to the bank?
2. Rupa took a loan of Rs 1 lakh to buy a car from L.I.C which charges interest 8% p.a.(simple). If she can repay the amount at the end of 10 years , what is the amount to be paid to the L.I.C.
3. Amanulla takes a loan of Rs 80,000 from a commercial Bank which charges simple interest 11% p.a. How many years did he take to repay the amount if the interest paid by him is Rs 52,800?
4. What is the rate of simple interest charged by a Cooperative bank to a person who pays an interest of Rs 3900 on a loan of Rs 10,000 in 6 years?

5. Dinakar charges an interest of 8% p.a.(simple). Govinda took a loan from Dinakar and at the end of 5 years paid an amount of Rs 350. How much was the loan and how much , the interest?

5.3 Sets – Representation of sets

Preview: Numbers and number operations are learnt earlier. These numbers are important types of collections called sets.

Introduction : In daily life we talk of different sorts of collections of objects. If an object either belongs to a collection or does not belong to it, then the collection is called a set. A set therefore, is a collection of well defined objects. In mathematics and elsewhere we come across different types of sets. Further sets with operations on their elements display patterns called mathematical structures. This unit initiates to the basic idea – sets and their representation.

Concept :

1. Set is a collection of well-defined objects.
2. Objects forming a set are called elements (or members) of the set.
3. Symbolic representation of a set
   - Roster form
   - Set builder form
4. Diagrammatic representation of a set
   - Venn Diagram

Learning Activities:

1. Teacher asks the children to recall different sorts of collections which are sets
2. Teacher cites examples of sets
   - encourages the children to give further examples of sets
   - set of birds
   - set of numbers
   - set of objects in the class room
   - set of books they have in their bags

3. Teacher explains ways of representing sets so on.

- In Roster form, elements are listed.
- In set builder form, elements' property are mentioned
- In Venn diagram, elements are shown as points marked inside a circle.

Problems Solving:

1. Give ***any three*** examples of sets.

Solution : (a) Set of all the students of class V.

(b) Set of all teachers in the school.

(c) Set of all persons (members) of a family.

(Any examples may be given)

2. Write the following sets in Roster form.

(a) The set of first three letters of English alphabets.

(b) The set of all positive integers less than 10.

(c) The set of rivers flowing in Mysore District.

Solution : Denoting sets by A,B,C etc.,

Answers: (a) A = { a,b,c}

(b) B = {1,2,3,4,5,6,7,8,9}

(c) C = {Kaveri, Kapila}

3. Write the following sets in set builder form

(a) {2,4,6,8} (b) { Chamundi hill}

(c) { Rama, Lakhsmana,Bharatha, Shatrugna}

Answers: (a) { All even integers less than 10}

(b) { Hill in Mysore City}

(c) { All sons of Dasharatha of Ramayana}

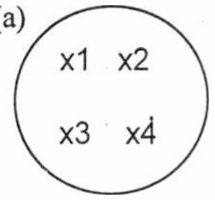
4. Write the Venn diagram for the sets –

(a) A = { 1,2,3,4} (b) B = { p,q,r }

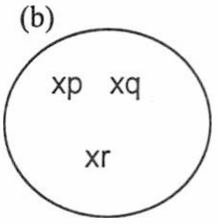
(c) C = { Bangalore, Mysore, Hubli, Belgaum}

Solutions:

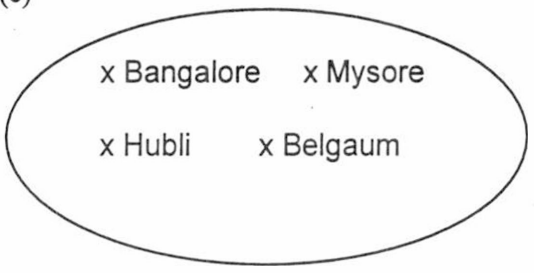
(a)



(b)



(c)



Note: While writing sets in Roster form, each element of the set appears once and only once (No repetition).

Eg: The set of all letters of the word

(a) WORD is {W,O,R,D}

(b) LETTER is {L,E,T,R}

Exercise:

(1) What is a set?

(2) Give two examples of sets

(3) Write two number sets in Roster form

(4) Write two sets in set Builder form

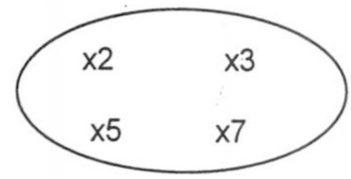
(5) Write two sets and their venn diagrams

(6) Write the sets given by the following venn diagrams in

(a) Roster form (b) Set builder form

(i)

(ii)



5.4 Literal Numbers and Algebraic Expression

Introduction: Numbers and operations as +,-,x , ÷ on numbers are learnt earlier. A generalization of these are literal numbers and algebraic expressions.

If the strength of a class is 30, on a day all the 30 may not be present in the class. The attendance on a day in the class is any when between 0 and 30. in such situation we use literal numbers (as the name suggests – letters playing the role of numbers). Accordingly, we may denote the attendance in the class by n (or any letter). Then n can be any of the numbers 0 to 30. when expressions are formed using numbers, literal numbers and operational figures, we get algebraic expressions.

Concept :

1. A letter (or letters) used to denote the number of objects in a given situation are called a literal number.
2. Algebraic expressions are formed by literal number using the operations, +. -, x , ÷.

Example

1. Age of the father is x years.

   ∴Age of the father 10 years ago = (x-10) years.

   ∴and age of the father 5 years later = (x+5) years.
2. Husband is 4 years older than his wife. If the age of the wife is n years, then the husband's age is (n + 4) years.

   If the age of the husband is y years, then the age of the wife is (y-4) years.

3. The length of a rectangle slate is 4 cms greater than its width. If the width is n cms, then length is (n + 4) cms.

Perimeter = 2(length + width)

$= 2[(n + 4) + n] = 2(2n + 4)$

$\therefore$ | Perimeter $= 4n + 8$ |

4. If $t^{o}c$ is the temperature and after sometime the temperature comes down by $10^{o}c$, then the new temperature is $(t-10)^{o}c$.
5. Sum of two numbers is 10. If one number is x then the other number is (10-x) [because $x + (10 - x) = 10$].
6. If n is the length of a cube, then its volume is $n \times n \times n = x^3$.
7. If the cost of apple per Kg is Rs 40, then $\times$ Kgs of apple costs $40 \times$ Rs.
8. If the ratio between the length and breadth of a rectangle is 3:2 , and the length of the rectangle is l, then breadth $= \left[2\frac{l}{3} \text{ because } \frac{length}{breadth}\right] = \frac{3}{2}$.

3 breadth = 2 length $\therefore$ Breadth $= \frac{3}{2}$ Length

or breadth $= \frac{3l}{2}$

Learning Activities:

(1) Teacher gives the children a number of instances when literal numbers are used.

(2) Provides opportunity to the children to use letters of their choice informing expressions involving literal numbers.

(3) Gives a variety of situations when literal numbers and algebraic expressions are used.

Exercise:

Using literal numbers, form the expression for what is asked in each problem –

1. Population of a country 10 years ago, if the present population is p.
2. Sum of two numbers is 20 and one of the numbers is n.

3. Perimeter of a square is p and the side length is _____ and the area is _____.

4. On a bench in a classroom n children can sit and there are 10 benches. The number of children in the class, if each bench is full.

5. Bus fare from Mysore to Mandya is Rs 16. and there are n passengers boarding the bus at Mysore and bound to Mandya. Their total fair is ____.

6. car travels at a constant speed of 50 Km/h. for t hr. the distance covered by the car is _____.

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CHAPTER VI

GEOMETRY

6.1 Angles

Preview

In the previous class, we have learnt the construction of line segments and the angles using a scale and a protractor .

Name the following figures after measuring the angles.

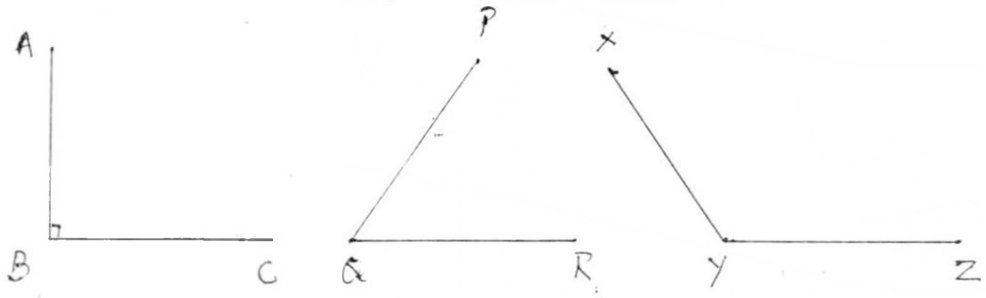
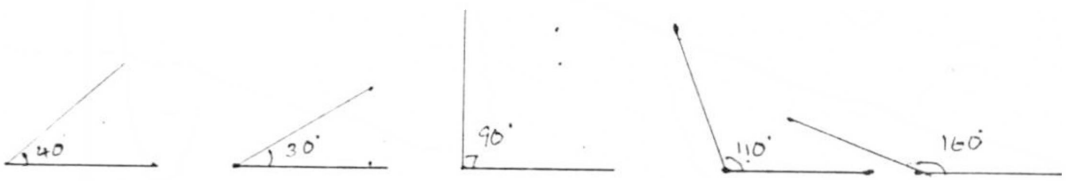


Fig (i) Fig (ii) Fig (iii)

Identify the different types of angles in the following figures.



Make a list of objects at home where right angles are seen (walls, tins, boxes)

Using a protractor draw the following angles.

1) 30^0 2) 60^0 3) 90^0 4) 115^0 5) 160^0

Concepts

Construction of a right angle, an acute angle, an obtuse angle and a straight angle using a scale and a protractor.

Strategy

Children are asked to draw various angles using a scale and to identify the angles which are less than 90^0 and more than 90^0 after measuring them.

Any angle which is less than 90^0 is called an acute angle and an angle which is more than 90^0 but less than 180^0 is called an obtuse angle. If the angle is 90^0, it is called a right angle. An angle at a point on a straight line is called as a straight angle whose measure is 180^0

Activity

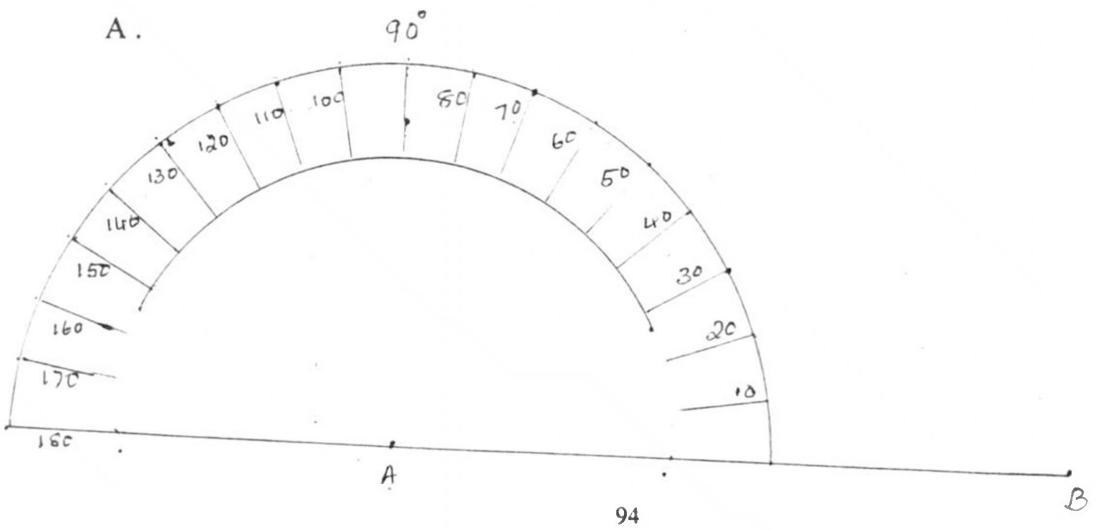
1. In the instrument box, the angles seen in the set square indicate _____angle and _____ angle.
2. Take a sheet of paper and fold it to form an acute angle, a right angle and an obtuse angle.
3. Paper cuttings indicating various angles are given to students and asked to identify the different types of angles.

Right Angle

Draw a line segment equal to the given length.

A B

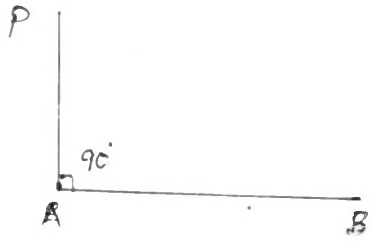
Place the protractor on the line in such a way that the center coincides with the point A.



Locate the point 'P' which indicates 90^0 on the protractor.

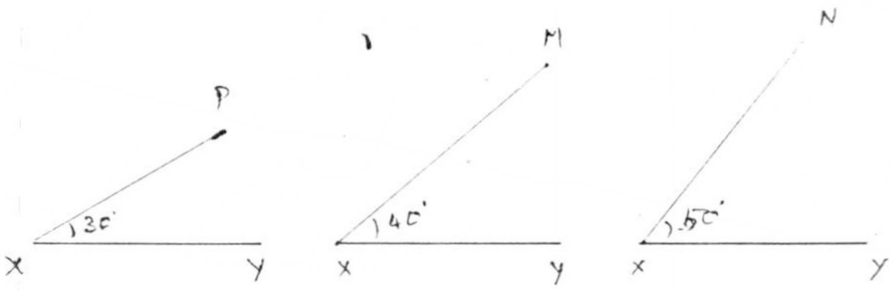
Join PA . Angle PAB is 90^0 and is called a right angle.

The angle is written as $\angle PAB = 90^0$.



Acute Angle

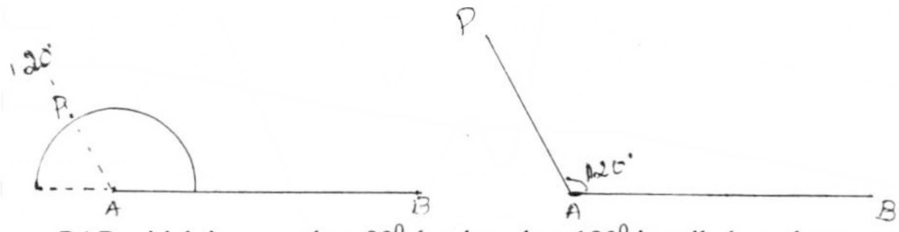
Draw a line XY of given length. At X construct an angle 30^0 or 40^0 or 50^0 using a scale and a protractor.



The angles in the above figures are all less than 90^0 and they are called as acute angles. Any angle which is less than 90^0 is called an acute angle.

Obtuse Angle

Draw a line AB of a given length. At A, the center of the protractor is placed. Locate a point 'P' on the protractor which indicates more than 90^0 to the left side of the line.



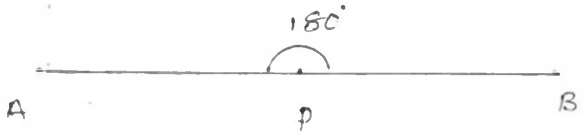
PAB which is more than 90^0 but less than 180^0 is called an obtuse angle.

Here PAB $=120^0$.

Straight Angle

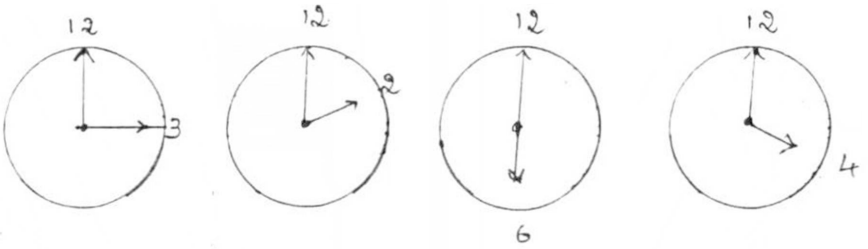
Draw a line AB of given length. Locate a point 'P' on AB. Measure the angle at P using a protractor. It is seen that the APB or BPA is 180^0.

Any angle which is 180^0 is called straight angle.



Activities

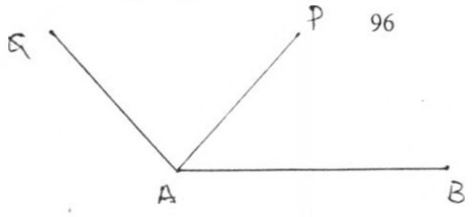
1. See the following pictures of a wall clock showing different time. Name the angles formed between the hours and the minute hand at the center of the clock.



2. By using any two sticks construct acute angles, obtuse angles and straight angles.

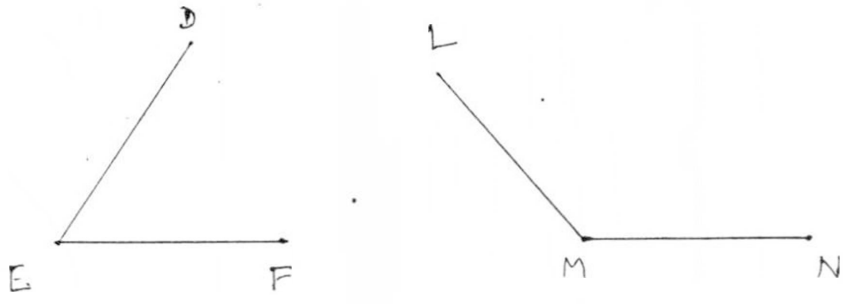
3. On any line segment construct an acute angle, an obtuse angle and a straight angle using a protractor.

4. In the following diagram, measure the acute angle and an obtuse angle.



Exercise :

1. Construct an angle XOY = 70^0
2. Construct an angle AOB = 130^0
3. Measure the angles in the following diagrams.



$\angle$ DEF = _____ $\angle$ LMN = _____

4. Fill in the blanks.
   i) Right angle is equal to _____ degree.
   ii) The angle 40^0 is an _____ angle.
   iii) The angle 150^0 is an_____ angle.
   iv) The angle 180^0 is called as _____ angle.
   v) An acute angle is less than _____degrees.
   vi) An obtuse angle is more than _____ degree but less than _____ degree.

Follow Up Activities

1. Using a sheet of paper construct an acute, an obtuse and a right angle by folding it.
2. Observe the angles formed between the two edges of various articles at home.

Eg: a tin, a box an almirah, windows, doors, tables, etc.,

6.2 Plane Figures – Rectangle

Preview

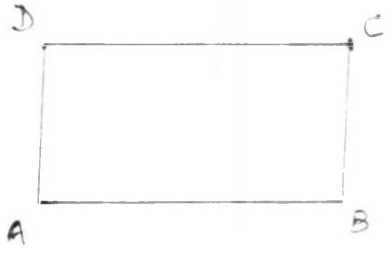
1. The surfaces of many objects are rectangular or circular in nature.

   Eg: Plates, doors, books, tins, bottles, wheels etc.,

2. In the following figures name the shapes of the surfaces.

Figure of a table	Figure of an opened book	Figure of wall	Figure of plates	Figure of a cube

3. Measure the sides and angles of the following figure.



Concepts

Construction of a rectangle using scale and a protractor.

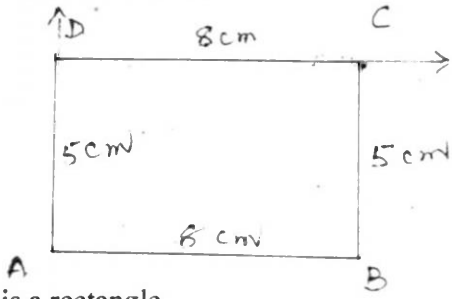
Strategy

Draw a line AB of given legth (8Cm). At A construct a right angle using a protractor.

Locate the point D on the new line of given breadth (5 cm) using scale.

At D construct a right angle on the line AD.

Locate the point C on the second line drawn at a distance equal to the length AB (8 cm) by using a scale. Join BC.

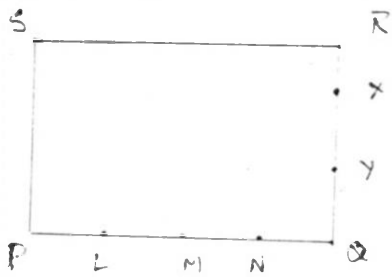


ABCD is a rectangle

Each angle in a rectangle is equal to 90^0 and the opposite sides are equal and equi-distant.

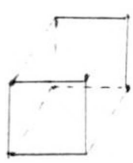
Activity

1. Draw a rectangle with sides 7 cm and 4 cm.
2. In the following rectangle measure the distance between the opposite sides at various points (opposite sides are equidistant).



Square

Observe a cube and find out shapes of each surface and measure the lengths of each edge.



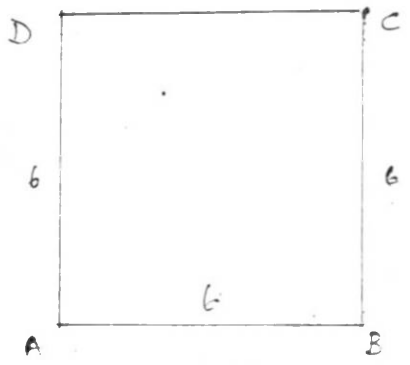
Name the objects which are having square surfaces (a kerchief, carom board, Dice, chess board).

Concept

Construction of a square using scale and a protractor.

Strategy

Draw a line AB of given length (6 cm) At A and B construct right angles using a protractor. Locate C and D on these lines such that AB = BC = AD join CD.



ABCD is a square.

$\angle DAB = ABC = BCD = ADC = 90^0$.

In a square, all sides are equal and each angle is 90^o.

Exercise

1. Draw a square of sides 5 cm in length.
2. In a rectangle each angle is equal to _____ degree.
3. In a rectangle opposite sides are _____ and _____.
4. In a square, each angle is equal to _____ degree.
5. In a square, all sides are _____.

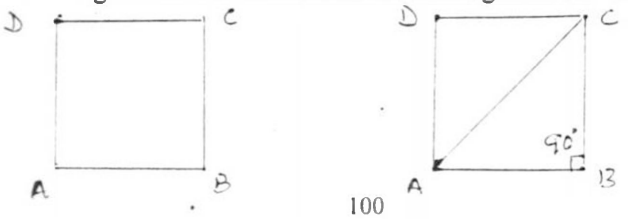
Follow Up Work

The children are asked to draw three rectangles and three squares choosing their own convenient measurements using a scale and a protractor.

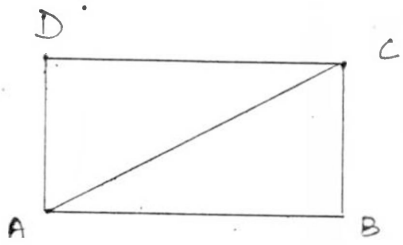
6.3 Triangle

Right Angled Triangle

Preview : A square piece of paper is folded in such a way that the opposite vertices coin side. Two triangles are formed where one of angles is 90^0 in each of them.



Similarly in a rectangle if we draw line joining the two opposite vertices and fold the paper along this line we get two triangles with a right angle in each of them.



Here ABC and ADC are the right angled triangles.

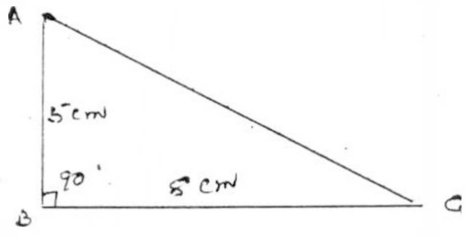
(Hint: observe the triangles formed in both the above cases)

Review Exercise

Construct a triangle ABC with BC = 8 cm ABC =90^0 and AB = 5cm. Using scale and the protractor.

(Hint: Draw the line BC =8 cm. At B construct right angle and locate A at distance of 5 cm from B. Join AC. ABC is the required triangle.

Any triangle having an angle of 90^o is called a right angled triangle.



Activity

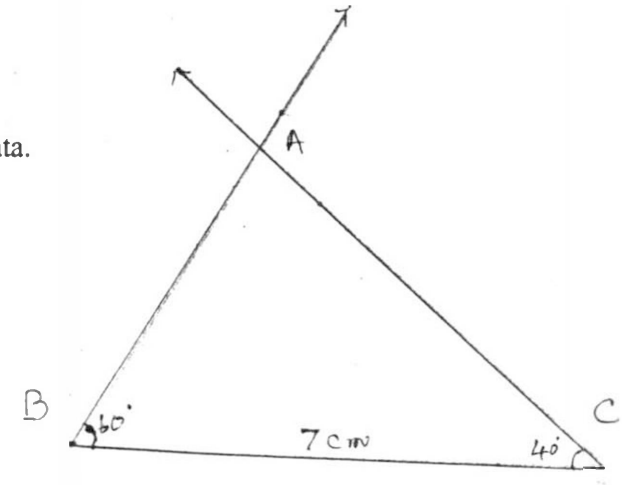
1. Construct five right angled triangles with suitable measures of your choice
2. Using coloured paper cut right angled triangles and measure the sides and angles in each of them.

Acute Angled Triangle

Activity

Construct a triangle ABC with the following data.

BC = 7 cm $ABC = 60^0$ $ACB = 40^0$



Draw a line BC = 7cm. At B construct an angle of 60^0 using a protractor. At C construct an angle 40^0. These two angular lines cut at A. Now ABC is the required triangle.

Measure the angle BAC.

The BAC $=80^0$.

In the triangle ABC each angle is less than a right angle. (Any angle less than 90^0 is called an acute angle).

A triangle whose angles are acute angles is called an acute angled triangle.

Exercise

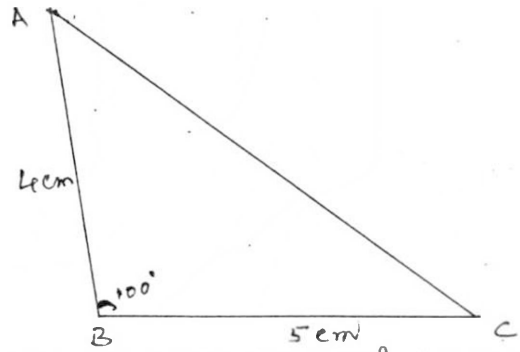
Construct acute angled triangles with the given data.

1.	QR = 6 cm	$PQR = 70^0$	$PRQ = 60^0$
2.	YZ = 5 cm	$XYZ = 65^0$	$YZX = 45^0$
3.	MN = 9 cm	$LMN = 80^0$	$MNL = 40^0$

Obtuse Angled Triangle

Activity

Construct a triangle ABC with the given data. BC = 5cm ABC = 100^0 AB =4cm.



Draw a line BC = 5cm. At B construct angle PBC = 100^0. Locate A on BP such that AB = 4cm. Join AC.

In the triangle, ABC = 100^0.

In any triangle if one of the angles is more than 90^0 then it is called an obtuse angled triangle.(an angle more than 90^0 and less than 180^0 is called an obtuse angle).

Exercise

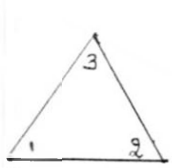
Construct obtuse angled triangles with the given data.

1. 7In triangle PQR, QR = 6cm, PRQ = 120^0, PR = 8 cm

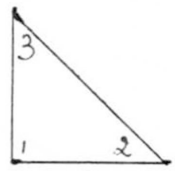
2. In triangle XYZ , YZ = 7cm, XYZ = 110^0 , XZY =30^0

Follow Up Work

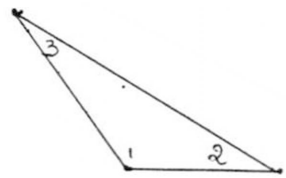
1) Measure the angles of the following triangles and fill in the table.



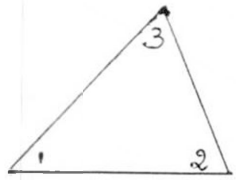
a



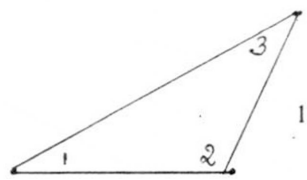
b



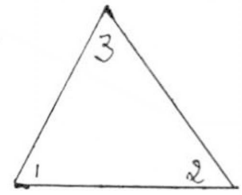
c



d



e



f

Triangle	Angles			Type of the Triangle
	1	2	3	
a	Acute	Acute	Acute	Acute
b				
c				
d				
e				
f				

2. Draw two acute angled triangles two obtuse angled triangles and two right angled triangles. Choosing your own measurements.

   (Hint: use the scale and protractors)

3. Using coloured paper cut rectangles, squares and triangles (2 each) and measure the sides and angles of each of them.

6.4 Circle

Preview

There are many circular objects in nature.

Eg. Ring, wheel, clocks, bottom of vessels such as tin, bottles, etc.,

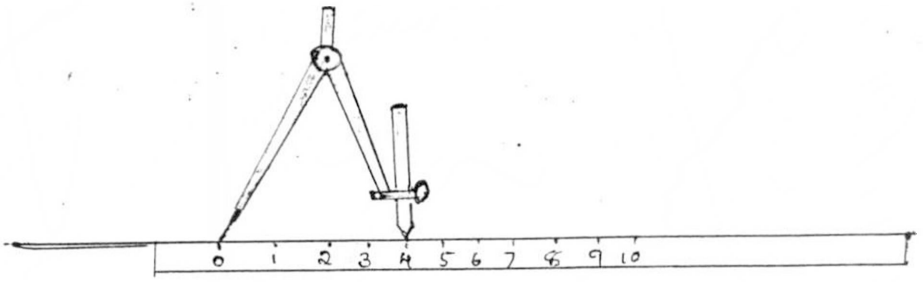
Concepts

Construction of circle.

Meaning of center and radius of a circle

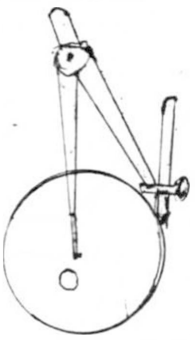
Strategy

1. Fix the pencil to the compass in such a way that the pencil point and the sharp point when brought together lie in the same plane.

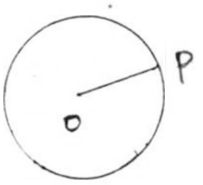


2. A radius of required length (4 cm) is selected with the help of a scale.

3. Fixing the sharp edge of the compass on a point (o) draw a circle by rotating the pencil edge. Now a circle is formed.



4. Take a point P on the curved line of the circle and join OP.



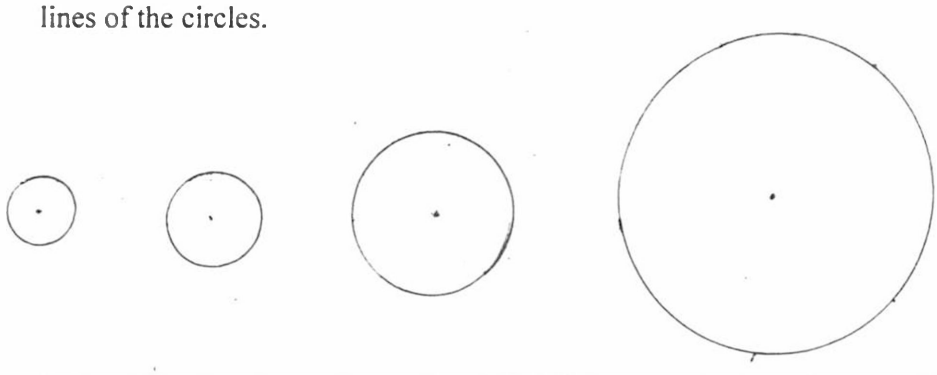
OP is called the radius of the circle and 'O' is the center of the circle.

Activity

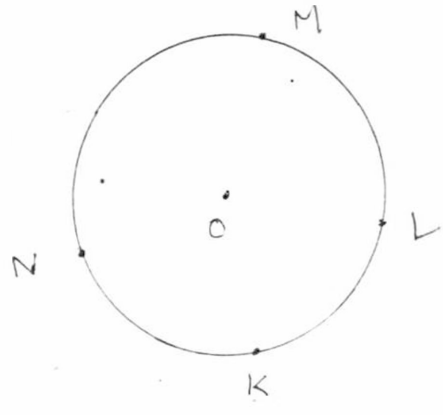
1. Construct different circles with the following radii.

   a) 3cm b) 5 cm c) 6 cm d) 4.5 cm

2. In the following circles measure the radii by selecting a point on the curved lines of the circles.



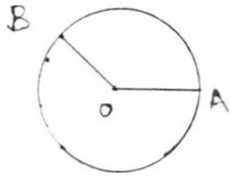
3. In the following figure four points K,L,M,N are marked on the curved line. Join them with the center 'O' measure KO, LO, MO, NO.



4. Fill in the blanks

a) The distance between the center and a point on the curved line of a circle is called _____

b) In the figure if OA= 5.5cm OB = _____



Follow Up Work

1. Draw six circles with different radii.

2. Draw different circles with different radii having the same centre, and observe them.
3. Fix a nail to the ground, tie one end of the thread to it. Take a convenient length of the thread and tie a stick to the selected point of the thread. By holding the stick make a circular motion. A circle is formed. With different lengths of the thread many circles are formed.

6.5 Symmetrical Figures

Introduction

The following pictures are shown to the children.

Butterfly	Cat	Spectacles
Floating duck	Flower	Picture of a palm

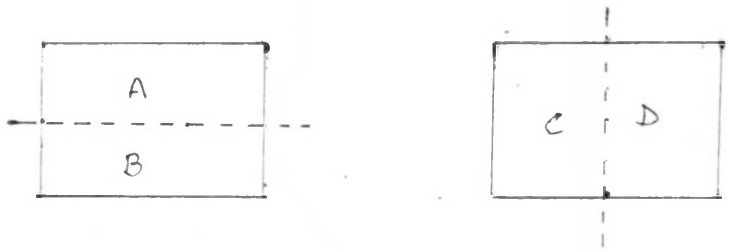
Classify the above pictures after identifying the symmetrical aspects.

Concept

In any drawing or picture or an object if the right side and the left side overlap when folded, or the top and bottom overlap we say that the drawing has symmetry.

Strategies

Construct a rectangle of convenient length and breadth using a scale and protractor.

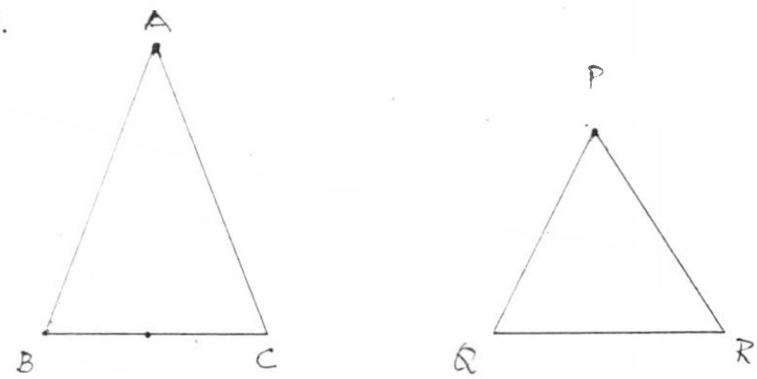


These figures have symmetry (Why?)

Exercise

1. Draw a circle with a convenient radius and write lines using a scale to form symmetrical diagrams.
2. Construct a square with a convenient length of the side. Draw lines to get symmetrical diagrams.

3.



AB = AC

PQ = QR = PR

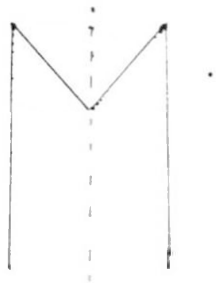
In the above triangles draw lines to get symmetrical figures.

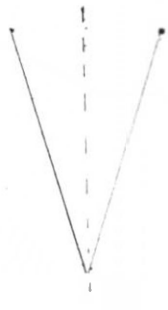
4. Water colours and papers can be used to prepare symmetrical diagrams.
(Hint: Put a few drops of colour on a paper and fold the paper. Press it to get the impression on the other side also. Open and see it!)

Follow Up Work

1. Identify the English alphabets which are symmetrical.

Eg.,





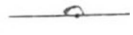
2. Identify the objects which are symmetrical in nature, and list them and draw their pictures.
(Eg., Flowers, Blackboard, Photo frame, boxes, Utensils, etc.,)

UNIT TEST

Marks : 30

I. Select the correct answers and write in the given brackets. 1×6 =6

1. An angle less than 90^0 is called ( )
a) Acute angle b)obtuse angle c) right angle d) straight angle

2. Straight angle among these diagrams is ( )
a)  b)  c)  d) 

3. Number of sides in this figure is () is
a) 4 b) 3 c) 2 d) 1

4. The triangle in which one angle is 90^0 is called ( )
a) Acute angle triangle b) Right angle triangle
c) Straight angle triangle d) obtuse angle triangle

5. The examples of an object which does not have symmetry is ( )
a) Compass b) Scale c) Divider d) Protractor

6. When a clock shows 4 'O' clock, the angle formed between the hour hand and the minute hand is ( )

a) acute angle b)obtuse angle c) straight angle d) right angle

II. Fill in the blanks: $1 \times 4 = 4$

1. In a rectangle, the opposite sides are _____ and _____.

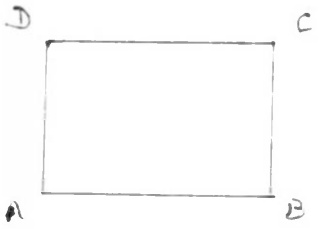
2. The distance between the center and a point on the curved line of a circle is called _____.

3. When two lines meet at a point _____ is formed.

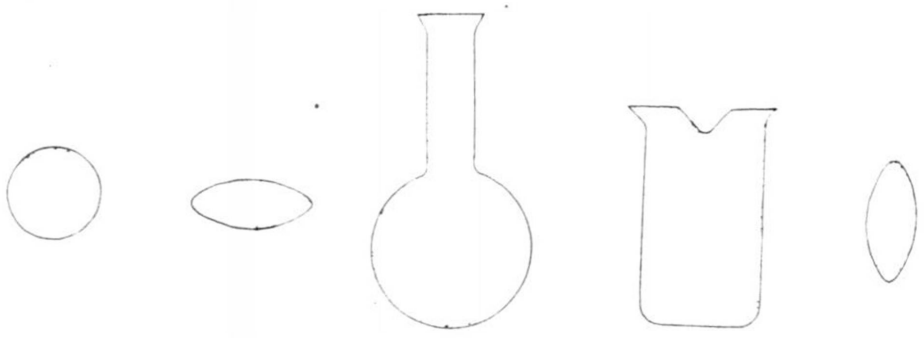
4. Instrument used to measure an angle is _____.

III. Answer the following : $2 \times 5 = 10$

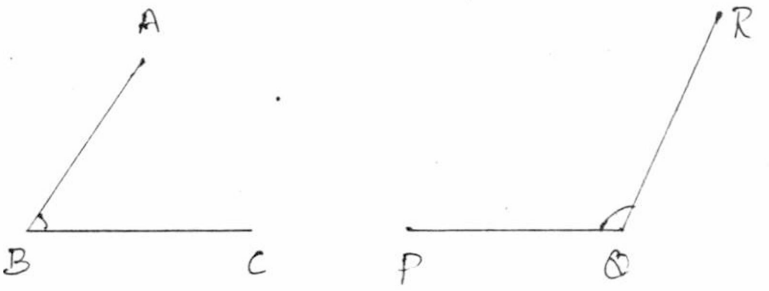
1. Construct an angle of 65^0 at A on the line AB using a scale and a protractor (AB = 5cm).
2. Construct a circle with radius 3 cm with 'O' as the center.
3. Name the equal sides and angles in this figure.



4. Draw lines to make each of the following figures symmetrical diagrams.



5. Name the following angles.



IV. Solve these problems. $3 \times 2 = 6$

1. Construct a square ABCD with side 5cm using scale and protractor
2. Construct a rectangle PQRS with sides 4.5 cm and 3.0 cm.

V. Construct a triangle PQR with PQ = 4.5 cm PQR = 110^0 RPQ = 30^0. Find PRQ and name the type of the triangle. $4 \times 1 = 4$

****