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MATHEMATICS

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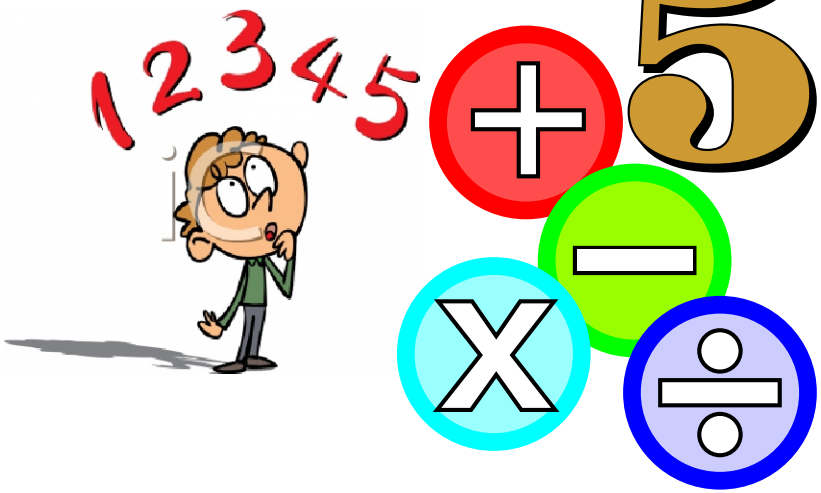

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CHAPTER NO.1

NUMER SYSTEM

In Class-IV, we learnt how to write and read numbers upto one Crore. In this Chapter you will study the numbers upto Arab, Millions and Billions.

1. Reading and writing of natural numbers upto One Arab.

One Arab = 1,00,00,00,000 = Hundred Crore

The place value of one Arab is shown below.

Example **2, 75, 38, 82, 172**

Arabs		Crores		Lacs		Thousand Ones				
Ten Arabs	Arabs	Ten Crores	Crores	Ten Lacs	Lacs	Ten Thousands	Thousands	Hundreds	Tens	Ones
1	0	0	0	0	0	0	0	0	0	0
	2	7	5	3	8	8	2	1	7	2

It is read as: Two Arab, Seventy Five Crore, Thirty Eight Lac, Eighty Two Thousands, One Hundred and Seventy Two.

Example-2

(ii) 3, 33, 34, 33, 833

(Ii) 6, 89, 42, 13, 750

Arabs		Crores		Lacs		Thousand Ones				
Ten Arabs	Arabs	Ten Crores	Crores	Ten Lacs	Lacs	Ten Thousands	Thousands	Hundreds	Tens	Ones
	3	3	3	3	4	3	3	8	3	3
	6	8	9	4	2	1	3	7	5	0

2. Reading and writing numbers in billions.

Billions	Millions			Thousands			Ones		
Billions 1000 Million	H.M	T.M	M	H.Th	T.Th	Th	H	T	U
1	0	0	0	0	0	0	0	0	0
9	5	6	2	0	0	5	3	2	1

9, 56, 20, 05, 321 in Crores, Billions and Arabs.

❖ In Crores Read as:
Nine Hundred Fifty Six Crore, Twenty Lac, Five Thousand, Three Hundred, Twenty One.

❖ In Billions Read as:
Nine Arab, Fifty Six Crore, Twenty Lac, Five Thousand, Three Hundred Twenty One.

ACTIVITY CLASS ROOM

Q.1 Write the following numbers in crores, billions and Arabs.
(i) 1287593846 (ii) 4158376783
(iii) 3750428976 (iv) 5076384297
and also use these numbers in Tables.

NOTE: Teacher should guide this Activity to students.

1.1 Number and Numerals:

It is convenient to have special name for those symbols that represent numbers. It is tiresome to repeat the words "Symbol" for a number. We therefore use the word "numeral" to designate any symbol for a number.

$8, \frac{1}{4}, 3 \times 46, 3+5, 6\frac{1}{7}, 95\%, \frac{2}{3}, -\frac{6}{7}$ are the examples of numerals, the Numeral % represents $\frac{1}{100} = .01$, so that $5\% = \frac{5}{100} = .05$

Remember the name of a number is a numeral and the numeral is composed of symbol

A number can be represented by many numerals. For example:
$6 = 7-1, 4+5 = 9 \div 2 = 4.5, \quad 16 \quad 4 = 4$

The equality signs mean that these symbols all represent the same numbers even though the numerals are different.

1.2 ROMAN NUMERALS:

History of mathematics tells us about different symbols which have been in use, at different times and by different nations.

Modern numerals which are in use at present time were developed by the joint efforts of Arabian and Hindu mathematicians Arabic numerals 0①②③④⑤⑥⑦⑧⑨ are still used today in Turkey, Egypt, Arabic and near by countries. The system of numerals used now-a-days are the Indo-Arab Numerations. These are mostly called the English Numerals. Arithmetic is full of symbols which you have already learnt to read and use. The basic symbols given below are called digits.

IN ENGLISH (Words)	:	ARABIC NUMERALS
Zero	:	0
One	:	1
Two	:	2
Three	:	3
Four	:	4
Five	:	5
Six	:	6
Seven	:	7
Eight	:	8
Nine	:	9

About 2000 years ago Roman mathematicians introduced a numeral system in which letters are used as symbols for numbers. Today, we can see these numerals in some clocks faces and in different books the seven basic Roman numerals are given below:

Number	English Numeral	Roman Numeral
One	1	I
Five	5	V
Ten	10	X
Fifty	50	L
Hundred	100	C
Five Hundred	500	D
Thousand	1000	M

Originally the Roman numeral for five was a sketch of a hand later this was simplified to a "V" The roman system was based on "10" since all their symbols for large numbers denotes multiples of

10, that is L = 5 x 10, C = 10 x 10, D = 5 x 10 x 10, etc.

By addition and subtraction we can write any number in Roman numerals.

PROPERTY - 1

If the smaller numerals is to the right of the larger numeral, we obtain the value of the pair by addition

Examples

1	VII	represents	5 + 1 + 1 = 7
2	XII	represents	10 + 1 + 1 = 12
3	XV	represents	10 + 5 = 15
4	LI	represents	50 + 1 = 51
5	LV	represents	50 + 5 = 55
6	LXIX	represents	50 + 10 + 9 = 69
7	CXII	represents	100 + 10 + 1 + 1 = 112
8	DCL	represents	500 + 100 + 50 = 650
9	DCXVII	represents	500 + 100 + 10 + 5 + 1 + 1 = 617
10	MDCLX	represents	1000 + 500 + 100 + 50 + 10 = 1660

PROPERTY - 2

If the smaller numeral is to the Left of the larger numeral, we obtain the value of the pair by subtraction.

Examples

1.	IV	=	1	–	5	=	4
2.	IX	=	1	–	10	=	9
3.	XL	=	10	–	50	=	40
4.	XC	=	10	–	100	=	90
5.	LC	=	50	–	100	=	50
6.	XD	=	10	–	500	=	490
7.	CD	=	100	–	500	=	400
8.	LD	=	50	–	500	=	450
9.	CM	=	100	–	1000	=	900
10	DM	=	500	–	1000	=	500

Roman Numerals can also be written Using Capital letters of English alphabets such as I, II, III, IV, V, VI, VII, VIII, IX, X etc. Following table will help you to write some numbers in English and Roman numerals.

Number	English Numeral	Roman Numeral
One	1	I
Two	2	II
Three	3	III
Four	4	IV
Five	5	V
Six	6	VI
Seven	7	VII
Eight	8	VIII

Nine	9	IX
Ten	10	X
Eleven	11	XI
Twelve	12	XII
Thirteen	13	XIII
Fourteen	14	XIV
Fifteen	15	XV
Sixteen	16	XVI
Seventeen	17	XVII
Eighteen	18	XVIII
Nineteen	19	XIX
Twenty	20	XX
Twenty Four	24	XXIV
Twenty Six	26	XXVI
Twenty Nine	29	XXIX
Thirty	30	XXX
Forty	40	XL
Sixty	60	LX
Seventy	70	LXX
Eighty	80	LXXX
Ninety	90	XC
One Hundred Twenty	120	CXX
One Hundred Sixty	160	CLX
One Hundred Fifty	150	CL
Nine Hundred Forty	940	MDCLX
One Thousand Six Hundred Sixty	1660	MCML VIII OR
One Thousand Nine Hundred fifty Eight	1958	CMML VIII
Four Thousand Two Hundred Thirty Five	4235	MMMMCCXXXV

1.3 OPERATION IN ROMAN NUMERALS

Addition and Subtraction of Roman numerals are relatively easy, but Multiplication and Division are much more difficult than wit modern numerals, Usually, some device, such as, a counting board was needed to multiply numbers.

Addition: Consider the following examples:

Add VII an VI.

Solution: VII + VI

VII	(7)
VI	(6)
XIII	(13)

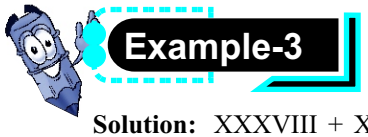
(Because V + V = X)

Add VIII an IV.

Solution: VIII + IV

VIII	(8)
+IV	(4)
XII	(12)

(V + V = X, IX = 9 and III = 3)
(Remove I from both sides of X)
or XII



Add XXXVIII and XXIV

Solution: XXXVIII + XXIV

XXX VIII	(38)
+ XXIV	(24)
LXII	(62)

or L X II

EXPLANATION:

X + X + X + X + X = L, Both are equal to 50
V + V = X and remove I from both sides of X

Add DCCCL XVIII and CCXVII
DCCCLXVIII + CCXVII

D C C C L X V I I I	(868)
+ C C X V I I	(217)
M L X X X V	(1085)

EXPLANATION:

a.	1 + 1 + 1 + 1 + 1	=	V	=	5
b.	V + V	=	X	=	10
c.	X + X	=	XX	=	20
d.	L	=	L	=	50
e.	C + C + C + C + C	=	D	=	500
f.	D + D	=	M	=	1000
					1085

Hence DCCCLXVIII + CCXVII = MDLXXXV = 1085

SUBTRACTION:

Subtract VI from VIII.

Solution: VIII - VI

V I I I	(8)
- V I	(6)
I I	(2)

(Because V - V = 0 AND I - I = 0)

Example-2

Subtract XVI from XXV

Solution:

X X V - X V I

X X V (25)

-X V I (16)

I X (9)

Explanation:

a. Carry O from V, it remains IV (V - I = IV)

b. Subtract I from I, it becomes 0.

c. Now carry from X, it remains I X (X I = I X)

d. Add I and IV, it becomes V.

e. Subtract V from V, it becomes 0.

f. Subtract X from X = 0 The answer is IX = 9.

Example-3

Subtract C C X V I I from D C C C C L X V I I.

Solution:

D C C C L X V I I I - C C X V I I

D C C C L X V I I I (868)

- C C X V I I (217)

D C L I (651)

Explanation: **(C - C = 0, X - X = 0, V - V = 0, I - I = 0)**

Because D = 500, C = 100, L = 50, I = I (One)

Hence D C C C L X V I I I - C C X V I I = D C L I = 651

Exercise 1.1

Q.1: Write down the following numbers in Roman Numerals:

1. 11 Ans: XI

2. 19 Ans: XIX

3. 59 Ans: LIX

4. 64 Ans: LXIV

5. 114 Ans: CXIV

6. 249 Ans: CCIXL

7. 1020 Ans: MXX

8. 2659 Ans: MMDCLIX

9. 98 Ans: XCVIII

10. 5555 Ans: MMMMMDLV

Q.2: Write down the following numbers in English Numerals:

1. X X I Ans: 21

2. C I X Ans: 109

3. X X X V Ans: 35

4. X X I X Ans: 29

5. C X V I I Ans: 117

6. M D X V I Ans: 1516

7. D C L X X Ans: 670

8. M C C X V 1215

9. D X X V Ans: 525

10. M D C L X

Ans: 1660

Q.3: Add the following numbers:

1. V I I I + V I I

V I I I
+ V I I
X V

OR

8
+7
15

2. X V I + I V

X V I
+ I V
X X

OR

16
+4
20

3. C L X I + C X L

```
  C L X I
+ C C X L
---------
  C C C L I
```

OR

```
  2 1 1
+ 1 4 0
---------
  3 5 1
```

4. D X X + M M D

```
  D X X
+ M M D
---------
M M M X X
```

OR

```
  0 5 2 0
+ 2 5 0 0
---------
  3 0 2 0
```

5. X C + X

```
  X C
+   X
-----
  C
```

OR

```
  9 0
+ 1 0
-----
  1 0 0
```

Q.4: Find the difference of the following numbers.

1. V I I I - I V

```
  V I I I
-   I V
-------
  I V
```

OR

```
  8
- 4
---
  4
```

2. X I I I - V I I

```
  X I I I
-   V I I
---------
  V I I
```

OR

```
  1 3
- 6
---
  7
```

3. Subtract L X I I from C L X X V

```
  C L X X V
-   L X I I
-----------
  C X I I I
```

OR

```
  1 7 5
- 6 2
-----
  1 2 3
```

4. Subtract D X I X from D C X I X

```
  D C X I X
-   D X I X
-----------
        C
```

OR

```
  6 1 9
- 5 1 9
-----
  1 0 0
```


5. Subtract M M from M M D

```
  M M D
-   M M
-------
      D
```

OR

```
  2 5 0 0
- 2 0 0 0
---------
    5 0 0
```

6. Subtract M D C L X from M M D C X V

```
  M M D C X V
-   M D C L X
-------------
      L V C M
```

OR

```
  2 6 1 5
- 1 6 6 0
---------
    9 5 5
```

Q.5: Change the following into Arabic numerals:

Q.1: Holy Prophet Muhammad (P.B.U.H) was born at Makkah in D L X X I A.D.

Ans: Holy Prophet Hazrat Muhammad (P.B.U.H) was born at Makkah in 571 A.D.

Q.2: Our Great Leader Qaid-e-Azam Muhammad Ali Jinnah was born in M D C C C L X X V I A.D.

Ans: Our Great Leader Qaid-e-Azam Muhammad Ali Jinnah was born in 1876 A.D.

Q.3: Pakistan Came into being in M C M X L V I I A.D.

Ans: Pakistan Came into being in 1947 A.D.

Q.4: First war between Pakistan and India happened in M C M L X V A.D.

Ans:First war between Pakistan and India happened in 1965 A.D.

CHAPTER NO.2

FACTORS, HIGHEST COMMON FACTOR AND LEAST MULTIPLE

2.1 FACTORS

We can express numbers such as 12, 16, 18 etc, as a product of a number of factors.

$12 = 1 \times 2 \times 3 \times 2 \longrightarrow 2 \times 3 \times 2$

$16 = 1 \times 2 \times 2 \times 2 \times 2 \longrightarrow 2 \times 2 \times 2 \times 2$

$18 = 1 \times 2 \times 3 \times 3 \longrightarrow 2 \times 3 \times 3$

SINCE 1 IS A FACTOR OF EVERY NUMBER, WE MAY OMIT 1

However, number such as 2, 3, 5 etc, cannot be expressed as a product of number of factors. Such numbers are called prime numbers.

The above number have been factorized by memory of tables which we have learnt in earlier classes. However a chart of tables is given below to recall your memory.

TABLES

2 x 1 = 2	3 x 1 = 3	4 x 1 = 4	5 x 1 = 5	6 x 1 = 6
2 x 2 = 4	3 x 2 = 6	4 x 2 = 8	5 x 2 = 10	6 x 2 = 12
2 x 3 = 6	3 x 3 = 9	4 x 3 = 12	5 x 3 = 15	6 x 3 = 18
2 x 4 = 8	3 x 4 = 12	4 x 4 = 16	5 x 4 = 20	6 x 4 = 24
2 x 5 = 10	3 x 5 = 15	4 x 5 = 20	5 x 5 = 25	6 x 5 = 30
2 x 6 = 12	3 x 6 = 18	4 x 6 = 24	5 x 6 = 30	6 x 6 = 36
2 x 7 = 14	3 x 7 = 21	4 x 7 = 28	5 x 7 = 35	6 x 7 = 42
2 x 8 = 16	3 x 8 = 24	4 x 8 = 32	5 x 8 = 40	6 x 8 = 48
2 x 9 = 18	3 x 9 = 27	4 x 9 = 36	5 x 9 = 45	6 x 9 = 54
2 x 10 = 20	3 x 10 = 30	4 x 10 = 40	5 x 10 = 50	6 x 10 = 60

7 x 1 = 7	8 x 1 = 8	9 x 1 = 9	10 x 1 = 10	11 x 1 = 11
7 x 2 = 14	8 x 2 = 16	9 x 2 = 18	10 x 2 = 20	11 x 2 = 22
7 x 3 = 21	8 x 3 = 24	9 x 3 = 27	10 x 3 = 30	11 x 3 = 33
7 x 4 = 28	8 x 4 = 32	9 x 4 = 36	10 x 4 = 40	11 x 4 = 44
7 x 5 = 35	8 x 5 = 40	9 x 5 = 45	10 x 5 = 50	11 x 5 = 55
7 x 6 = 42	8 x 6 = 48	9 x 6 = 54	10 x 6 = 60	11 x 6 = 66
7 x 7 = 49	8 x 7 = 56	9 x 7 = 63	10 x 7 = 70	11 x 7 = 77
7 x 8 = 56	8 x 8 = 64	9 x 8 = 72	10 x 8 = 80	11 x 8 = 88
7 x 9 = 63	8 x 9 = 72	9 x 9 = 81	10 x 9 = 90	11 x 9 = 99
7 x 10 = 70	8 x 10 = 80	9 x 10 = 90	10 x 10 = 100	11 x10 = 110

12 x 1 = 12	13 x 1 = 13	14 x 1 = 14	15 x 1 = 15	16 x 1 = 16
12 x 2 = 24	13 x 2 = 26	14 x 2 = 28	15 x 2 = 30	16 x 2 = 32
12 x 3 = 36	13 x 3 = 39	14 x 3 = 42	15 x 3 = 45	16 x 3 = 48
12 x 4 = 48	13 x 4 = 52	14 x 4 = 56	15 x 4 = 60	16 x 4 = 64
12 x 5 = 60	13 x 5 = 65	14 x 5 = 70	15 x 5 = 75	16 x 5 = 80
12 x 6 = 72	13 x 6 = 78	14 x 6 = 84	15 x 6 = 90	16 x 6 = 96
12 x 7 = 84	13 x 7 = 91	14 x 7 = 98	15 x 7 = 105	16 x 7 = 112
12 x 8 = 96	13 x 8 = 104	14 x 8 = 112	15 x 8 = 120	16 x 8 = 128
12 x 9 = 108	13 x 9 = 117	14 x 9 = 126	15 x 9 = 135	16 x 9 = 144
12 x 10 = 120	13 x 10 = 130	14 x 10 = 140	15 x 10 = 150	16 x 10 = 160

17 x 1 = 17	18 x 1 = 18	19 x 1 = 19	20 x 1 = 20	21 x 1 = 21
17 x 2 = 34	18 x 2 = 36	19 x 2 = 38	20 x 2 = 40	21 x 2 = 42
17 x 3 = 51	18 x 3 = 54	19 x 3 = 57	20 x 3 = 60	21 x 3 = 63
17 x 4 = 68	18 x 4 = 72	19 x 4 = 76	20 x 4 = 80	21 x 4 = 84
17 x 5 = 85	18 x 5 = 90	19 x 5 = 95	20 x 5 = 100	21 x 5 = 105
17 x 6 = 102	18 x 6 = 108	19 x 6 = 114	20 x 6 = 120	21 x 6 = 126
17 x 7 = 119	18 x 7 = 126	19 x 7 = 133	20 x 7 = 140	21 x 7 = 147
17 x 8 = 136	18 x 8 = 144	19 x 8 = 152	20 x 8 = 160	21 x 8 = 168
17 x 9 = 153	18 x 9 = 162	19 x 9 = 171	20 x 9 = 180	21 x 9 = 189
17 x 10 = 170	18 x 10 = 180	19 x 10 = 190	20 x 10 = 200	21 x 10 = 210

First Method

84 = 7 x 12

= 7 x 3 x 4

= 7 x 3 x 2 x 2

Second Method

2	84
2	42
3	21
	7

If number is large and we are sure of the factors, it is easier to use method 2. Start with the smallest Prime Divisor.

Exercise 2.1

Q.1: Express each of the following as a product of prime factors.

1. 24

Sol:

2	24
2	12
2	6
3	3
	1

Ans: The prime factors of 24 = 2x2x2x3

2. 36

Sol:

2	36
2	18
3	9
3	3
	1

Ans: The prime of 36 = 2x2x3x3

3. 38

Sol:

3	39
13	13
	1

Ans: The prime factors of 39 = 3x13

4. 40

Sol:

2	40
2	20
2	10
5	5
	1

Ans: The prime of 40 = 2x2x2x5

5. 42

Sol:

2	42
3	21
7	7
	1

Ans: The prime factors of 42= 2x3x7

6. 90

Sol:

2	90
3	45
3	15
5	5
	1

Ans: The prime of 90 = 2x3x3x5

7. 44

Sol:

2	44
2	22
11	11
	1

Ans: The prime factors of 44= 2x2x11

8. 45

Sol:

3	45
3	15
5	5
	1

Ans: The prime of 45 = 3x3x5

9. 48

Sol:

2	48
2	24
2	12
2	6
3	3
	1

Ans: The prime factors of 48= 2x2x2x2x3

10 .108

Sol:

2	108
2	5 4
3	2 7
3	9
3	3
	1

Ans: The prime of 36 = 2x2x3x3

2.2 Rules of Divisibility

Should be remembered

1. By 2:
A number is divisible by 2 if its unit place contains 0 or any even number.

2. By 3:
A number is divisible by 3 if its sum of the digits is divisible by 3.

3. By 4:
A number is divisible by 4 if its last two digits (i.e Tens and Units) are divisible by 4.

4. By 5:
A number is divisible by 5, if 0 or 5 occupy its unit place.

5. By 6:
If a number is divisible both by 2 and 3, it is divisible by 6.

6. By 8:
If the last 3 digits (i.e Hundreds, tens and units of a number are divisible by 8), then the number is divisible by 8.

7. By 9:
If the sum of the digits of a number is divisible by 9 then the number is divisible by 9.

8. By 10:
A number is divisible by 10 if 0 occupies its unit place.

9. By 11:
If the sum of the even and odd digits of a number are same or if the difference of those two sums is divisible by 11, then the number is divisible by 11.

Exercise 2.2

Q.1: Which of the following are divisible by 2 and 10?
(a) 5243 (b) 8980 (c) 356372 (d) 324017 (e) 3570
Ans: (b) and (e) are divisible by 2 and 10

Q.2: Which of the following are divisible by 3 and 4?
(a) 8396 (b) 9804 (c) 3213 (d) 3528 (e) 4662
Ans: (b) and (d) are divisible by 3 and 4, while (a), (c) and (e) are not divisible by 2 and 4.

Q.3: Which of the following are divisible by 6?
(a) 4632 (b) 5970 (c) 3211 (d) 3072 (e) 1236
Ans: (a), (b), (d) and (e) are divisible by 6, while (c) is not divisible by 6.

Q.4: Which of the following are divisible by 8 ?
(a) 59320 (b) 684631(c) 69320 (d) 74108 (e) 532126
Ans: (a), (c) and (d) are divisible by 8, while (b) and (e) are not divisible by 8.

Q.5: Which of the following are divisible by 9 ?
(a) 3690 (b) 12345 (c) 67896 (d) 3780 (e) 373201
Ans: (a), (c) and (d) are divisible by 9, while (b) and (e) are not divisible by 9.

Q.6: Which of the following are divisible by 11?
(a) 469326 (b) 371048 (c) 362043 (d) 274483 (e) 455555
Ans: (a), (c) and (d) are divisible by 11, while (b) and (e) are not divisible by 11.

2.3 DIVISORS OF A NUMBER

Let us find all divisors or factors of 30. We know that 1 divides 30, similarly 2, 3, 5, 6, 15 and 30 also divide 30, 5 divides 5, 10, 15 and 30 divides 30.

Hence the list of all the divisors of 30 is.
{1, 2, 3, 4, 5, 6, 10, 15, 30}

Let us find the list of all the divisors of 13.
it is {1, 13}

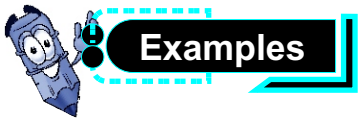
Find the list of divisors of 1.
it is { 1 }

From the above workings you may have learnt the following points.

1. Since 1 is a divisor of every number, therefore the list of divisors of any number is never nil.

2. There is only one divisor of number 1 which is 1 itself.

3. There are some numbers, having only two distinct divisors one is 1 and second is itself. Such numbers are known as PRIME NUMBERS.



2, 5, 7, 17, 19, 23, 31, ... etc.

4. There are some numbers, having more than two distinct divisors. Such numbers are called composite numbers.

2, 4, 6, 8, 9, 12, 15, 21, 25, 33, 42,..... etc

Exercise 2.3

Q.1: Find the divisors of:

(a) 2

Ans: 1,2 are the divisors of 2.

R.W

2	2
	1

(b) 3

Ans: 1,3 are the divisors of 3.

R.W

3	3
	1

(c) 10

Ans: 1,2,5 and 10 are the divisors of 10.

R.W

2	10
5	5
	1

(d) 12

Sol: $2\overline{)12}\,6$ $\quad 3\overline{)12}\,4$ $\quad 6\overline{)12}\,2$

$\underline{12}$ $\quad \underline{12}$ $\quad \underline{12}$

x x $\quad$ x x $\quad$ x x

Ans: 1,2,3,4,6 and 12 are the divisors of 12.

(e) 17

Ans: 1 and 17 are the divisors of 17.

R.W

17	17
	1

(f) 25

Ans: 1,5 and 25 are the divisors of 25.

R.W

5	25
5	5
	1

(g) 36

Sol:

$$2\overline{)36}\,(18 \qquad 3\overline{)36}\,(12 \qquad 4\overline{)36}\,(9$$

$$\begin{array}{r} -2 \\ \hline 16 \\ -16 \\ \hline 00 \end{array} \qquad \begin{array}{r} -36 \\ \hline 00 \end{array} \qquad \begin{array}{r} -36 \\ \hline 00 \end{array}$$

Hence:
Ans: The divisors of 36 are 1,2,3,4,6,9,12,18 and 36.

(h) 14

Ans: The divisors of 14 are 1,2,7 and 14.

R.W

2	14
7	7
	1

(i) 15

Ans: The divisors of 15 are 1,3,5 and 15.

R.W

3	15
5	5
	1

(j) 30

Sol:

$$2\overline{)30}\,(15 \qquad 3\overline{)30}\,(10 \qquad 5\overline{)30}\,(6 \qquad 6\overline{)30}\,(5 \qquad 10\overline{)30}\,(3$$

$$\begin{array}{r} -30 \\ \hline 00 \end{array} \qquad \begin{array}{r} -30 \\ \hline 00 \end{array} \qquad \begin{array}{r} -30 \\ \hline 00 \end{array} \qquad \begin{array}{r} -30 \\ \hline 00 \end{array} \qquad \begin{array}{r} -30 \\ \hline 00 \end{array}$$

Hence:
Ans: The divisors of 30 are 1,2,3,5,6,10,15 and 30.

Q.2: Write all the prime numbers lying between 30 to 50.

Ans: 31, 37, 41, 43, 47.

Q.3: Write all composite numbers which are greater than 40 and less than 57.

Ans: 42, 44, 45, 48, 49, 50, 51, 52, 54, 55, 56.

Q.4: Write all prime number which are greater than 10 and less than 20.

Ans: 11, 13, 17, 19.

Q.5: Classify the following numbers into prime and composite number. { 29, 37, 57, 67, 69, 75, 79, 81, 83 }

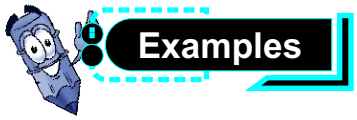
Ans:

Prime Numbers	Composite Numbers
29	57
37	69
67	75
79	81
83	

2.4 COMMON DIVISORS

Find the common divisors of 12, 18, 24

The list of divisors of 12 = { 1, 2, 3, 4, 6, 12 }
The list of divisors of 18 = { 1, 2, 3, 6, 9, 18 }
The list of divisors of 24 = { 1, 2, 3, 4, 6, 8, 12, 24 }
The list of common divisors is { 1, 2, 3, 6 }



Find the common divisors of 15 and 25

List of divisors of 15 = { 1, 3, 5, 15}
List of divisors of 25 = { 1, 5, 25 }
List of common divisors of 15 and 25 = { 1, 5 }

Exercise 2.4

Q.1: Find the common divisors of:

1. 8 and 4

Sol:

2	8
2	4
2	2
	1

2	4
2	2
	1

The divisors of 8 = 1x2x2x2
The divisors of 4 = 1x2x2

Ans: The common divisors of 8 and 4 = 1x2x2

2. 9 and 12

Sol:

3	9
3	3
	1

2	12
2	6
3	3
	1

The divisors of 9 = 3x3
The divisors of 12 = 2x2x3

Ans: The common divisors of 9 and 12 = 1x3

3. 12 and 15

Sol:

2	12
2	6
3	3
	1

3	15
5	5
	1

The divisors of 12 = 2x2x3
The divisors of 15 = 3x5

Ans: The common divisors of 12 and 15 is 3.

4. 12 and 20

Sol:

2	12
2	6
3	3
	1

2	20
2	10
5	5
	1

The divisors of 12 = 2x2x3
The divisors of 20 = 2x2x5

Ans: The common divisors of 2x2 = 4

5. 15 and 18

Sol:

3	15
5	5
	1

2	18
3	9
3	3
	1

The divisors of 15 = 3x5
The divisors of 180 = 2x3x3

Ans: The common divisors of 15 and 18 is 3.

6. 16 and 20

Sol:

2	16
2	8
2	4
2	2
	1

2	20
2	10
5	5
	1

The divisors of 16 = 2x2x2x2
The divisors of 20 = 2x2x5

Ans: The common divisors of 16 and 20 is = 2x2 = 4.

7. 48 and 64

Sol:

2	48
2	24
2	12
2	6
3	3
	1

2	64
2	32
2	16
2	8
2	4
2	2
	1

The divisors of 48 = 2x2x2x2x3
The divisors of 64 = 2x2x2x2x2x2

Ans: The common divisors of 48 and 64 is = 2x2x2x2 = 16.

8. 18 and 24

Sol:

2	18
3	9
3	3
	1

2	24
2	12
2	6
3	3
	1

The divisors of 18 = 2x3x3
The divisors of 24 = 2x2x2x3

Ans: The common divisors of 18 and 24 is = 2x3 = 6.

9. 18 and 27

Sol:

2	18
3	9
3	3
	1

3	27
3	9
3	3
	1

The divisors of 18 = 2x3x3
The divisors of 27 = 3x3x3

Ans: The common divisors of 18 and 27 is = 3x3 = 9.

10. 24 and 36

Sol:

2	24
2	12
2	6
3	3
	1

2	36
2	18
3	9
3	3
	1

The divisors of 24 = 2x2x2x3
The divisors of 36 = 2x2x3x3

Ans: The common divisors of 24 and 36 is = 2x2x3 = 12.

2.5 Greatest common Divisor (G.C.D)

In the previous exercise we have learnt to find the list of common divisors of two numbers. The greatest common divisor of the two number is called G.C.D.

Example-1 Find the G.C.D of 18 and 24

Solution: Divisions of 18 are
{ 1, 2, 3, 6, 9, 18 }
Divisions of 24 are
{ 1, 2, 3, 4, 6, 8, 12, 24 }
The common divisors of 18 and 24 = { 1, 2, 3, 6 }
So G.C.D = { 6 }

Second Method 18 & 24

18) 24 (1
18
6) 18 (3
18
x x

So G.C.D = {6} Ans.

Example-2 Find the GCD of 24 and 48

Solution: Divisors of 24 are
{1, 2, 3, 6, 9, 8, 12, 24 }
Divisors of 48 are
{1, 2, 3, 4, 6, 8, 12, 16, 24, 48}
The common divisors of 24 and 48 are :
{ 1, 2, 3, 4, 6, 8, 12, 24 }
So G.C.D = { 24 }

Second Method 24 & 48

24) 48 (2
48
x

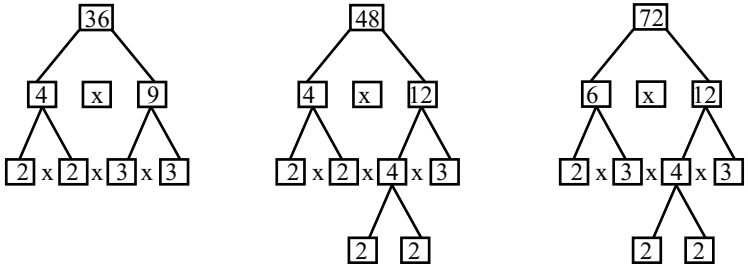
So G.C.D = {24} Ans.

Exercise 2.5

Q.1. Complete the following table:

Pairs of Numbers	Product of Prime Factors	All the Divisors		Common Divisors	G.C.D G.C.D
20	2 x 2 x 5	1 2 4 5 10 20		2, 5, 10	10
30	2 x 3 x 5	1 2 3 5 6 10 15 30		2, 5, 10	10
12	2 x 2 x 3	1 x 2 x 2	4	2 , 4	4
16	2 x 2 x 2 x 2	1 x 2 x 2	4	2 , 4	4
15	3 x 5	1 x 5	5	1 , 5	5
20	2 x 2 x 5	1 x 5	5	1 , 5	5
16	2 x 2 x 2 x 2	2 x 2 x 2	8	2 , 2 , 2 , 8	8
24	2 x 2 x 2 x 3	2 x 2 x 2	8	2 , 2 , 2 , 8	8
12	2 x 2 x 3	2 x 2	4	2 , 2 , 4	4
16	2 x 2 x 2 x 2	2 x 2	4	2 , 2 , 4	4
14	2 x 7	1 x 7	7	7	7
21	3 x 7	1 x 7	7	7	7

Q.2. Copy and complete each of the following factor trees.



Q.3: Find the G.C.D of each of the following sets of numbers.

1. 30 and 40

Sol:

2	30
3	15
5	5
	1

2	40
2	20
2	10
5	5
	1

Factors of 30 = 2x3x5
Factors of 40 = 2x2x2x5
Common divisors of 30 and 40 = 2x5 = 10
Ans: The G.C.D of 30 and 40 is 10.

2. 21 and 35

Sol:

3	21
7	7
	1

5	35
7	7
	1

Factors of 21 = 3x7
Factors of 35 = 5x7
Common Factors of 21 and 35 = 7
Ans: The G.C.D of 21 and 35 = 7

3. 32 and 40

Sol:

2	32
2	16
2	8
2	4
2	2
	1

2	40
2	20
2	10
5	5
	1

Factors of 32 = 2x2x2x2x2
Factors of 40 = 2x2x2x5
Common Factors of 32 and 40 = 2x2x2= 8
Ans: The G.C.D of 32 and 40 is 8.

4. 14 and 28

Sol:

2	14
7	7
	1

2	28
2	14
7	7
	1

Factors of 14 = 2x7
Factors of 28 = 2x2x7
Common Factors of 14 and 28 = 2x7= 14
Ans: The G.C.D of 14 and 28 =14

5. 25 and 30

Sol:

5	25
5	5
	1

2	30
3	15
5	5
	1

Factors of 25 = 5x5
Factors of 30 = 2x2x5
Common Factors of 25 and 30 = 5
Ans: The G.C.D of 25 and 30 =5

6. 27 and 36

Sol:

3	27
3	9
3	3
	1

2	36
2	18
3	9
3	3
	1

Factors of 27 = 3x3x3
Factors of 36 = 2x2x3x3
Common Factors of 27 and 36 = 3x3 = 9
Ans: The G.C.D of 27 and 36 = 9

7. 27 and 45

Sol:

3	27
3	9
3	3
	1

3	45
3	15
5	5
	1

Factors of 27 = 3x3x3
Factors of 45 = 3x3x5
Common Factors of 27 and 45 = 3x3 = 9
Ans: The G.C.D of 27 and 45 = 9

8. 15 and 35

Sol:

3	15
5	5
	1

5	35
7	7
	1

Factors of 15 = 3x5
Factors of 35 = 5x7
Common Factors of 15 and 35 = 5
Ans: The G.C.D of 15 and 35 = 5

9. 42 and 48

Sol:

2	42
3	21
7	7
	1

2	48
2	24
2	12
2	6
3	3
	1

Factors of 42 = 2x3x7
Factors of 48 = 2x2x2x2x3
Common Factors of 42 and 48 = 2x3 = 6
Ans: The G.C.D of 42 and 48 = 6

10. 45 and 60

Sol:

3	45
3	15
5	5
	1

2	60
2	30
3	15
5	5
	1

Factors of 45 = 3x3x5
Factors of 60 = 2x2x3x5
Common Factors of 45 and 60 = 3x5 = 15
Ans: The G.C.D of 45 and 60 = 15

Q.4: Find the G.C.D in each of the following sets of numbers.

1. 14, 21 and 28

Sol:

2	14
7	7
	1

3	21
7	7
	1

2	28
2	14
7	7
	1

Factors of 14 = 2x7
Factors of 21 = 3x7
Factors of 28 = 2x2x7
Common Factors of 14,21 and 28 = 7
Ans: The G.C.D of 14,21 and 28 = 7

2. 24, 30 and 36

Sol:

2	24
2	12
2	6
3	3
	1

2	30
3	15
5	5
	1

2	36
2	18
3	9
3	3
	1

Factors of 24 = 2x2x2x3
Factors of 30 = 2x3x5
Factors of 36 = 2x2x3x3
Common Factors of 24,30 and 36 = 2x3=6
Ans: The G.C.D of 24,30 and 36 = 6

3. 20, 28 and 36

Sol:

2	20
2	10
5	5
	1

2	28
2	14
7	7
	1

2	36
2	18
3	9
3	3
	1

Factors of 20 = 2x2x5
Factors of 30 = 2x2x7
Factors of 36 = 2x2x3x3
Common Factors of 20,28 and 36 = 2x2=4
Ans: The G.C.D of 20,30 and 36 = 4

4. 18, 21 and 27

Sol:

2	18
3	9
3	3
	1

3	21
7	7
	1

3	27
3	9
3	3
	1

Factors of 18 = 2x3x3
Factors of 21 = 3x7
Factors of 27 = 3x3x3
Common Factors of 18,21 and 27 = 3
Ans: The G.C.D of 18,21 and 27 = 3

5. 20, 30 and 50

Sol:

2	20
2	10
5	5
	1

2	30
3	15
5	5
	1

2	50
5	25
5	5
	1

Factors of 20 = 2x2x5
Factors of 30 = 2x3x5
Factors of 50 = 2x5x5
Common Factors of 20,30 and 50 = 2x5=10
Ans: The G.C.D of 20,30 and 50 = 10

6. 24, 36 and 42

Sol:

2	24
2	12
2	6
3	3
	1

2	36
2	18
3	9
3	3
	1

2	42
3	21
7	7
	1

Factors of 24 = 2x2x2x3
Factors of 36 = 2x2x3x3
Factors of 42 = 2x3x7
Common Factors of 24,36 and 42 = 2x3=6
Ans: The G.C.D of 24,36 and 42 = 6

2.6 Highest Common Factor (HCF)

The greatest Common Factor of two numbers is the product of all the common factors.

Example-1 Find the Highest Common factor of 36 and 48

Step-II. Resolve these numbers into their prime factor.

36 = 1 x 2 x 2 x 3 x 3

48 = 1 x 2 x 2 x 2 x 2 x 3

Step-II Find common prime factors.

The common factors are 1 x 2 x 2 x 3

Step-III Find the product of the common prime factors.

1 x 2 x 2 x 3 = 12

Therefore H.C.F of 36 and 48 is 12

NOTE-1: G.C.D of the above two numbers is also 12.

This shows that G.C.D of two numbers is same as their H.C.F

In the previous article we have found the greatest common factor of 36 and 48 by factors. The same can be found by Division method in the following two ways.

Method-1

2	36 , 48
2	18 , 24
3	9 , 12
	3 , 4

H.C.F = 2 x 2 x 3 = 12

Method - 2

36) 48 (1
36

12) 36 (3
36
x

H.C.F = 12

The divisor which gives no remainder is known as G.C.D.

Hence the G.C.D is 12

Both the methods are equally popular and students are allowed to follow the method they like.

Factor method recommended to find the G.C.D when

(i) The number are small.
(ii) They are easily factorized .
(iii) G.C.D of more than two numbers is required.

Division method is recommended when,

(i) The numbers are large.
(ii) They are not easily factorisable.

Sometimes it becomes quite tedious to resolve a number (particularly a large number) into factors by inspector. Then it can be factorized by long division method keeping in mind the rules of divisibility. The method is illustrated as under.

Find the H.C.F or G.C.D of 90, 150 and 165. Let us find the factors of these numbers by long Division method.

2	90
3	45
3	15
5	5
	1

2	150
3	75
5	25
5	5
	1

3	165
5	55
11	11
	1

Now 90 = 2 x 3 x 3 x 5
150 = 2 x 3 x 5 x 5
165 = 3 x 5 x 11

Common factors are 3 x 5
G.C.F = 15

Example-2 Find the HCF or GCD of 28, 42, 56

Solution:

2	28
2	14
7	7
	1

2	42
3	21
7	7
	1

2	56
2	28
2	14
7	7
	1

Thus 28 = 2 x 2 x 7
42 = 2 x 3 x 7
56 = 2 x 2 x 2 x 7

Common factor are 2 x 7 G.C.D = 14

Exercise 2.6

Q.1. Find H.C.F of the following by any method.

1. 15 and 20

Sol:

3	15
5	5
	1

2	20
2	10
5	5
	1

Factors of 15 = 3x5
Factors of 20 = 2x2x5
Common Factors of 15 and 20 = 5
Ans: The HCF of 15 and 20 = 5

2. 16 and 20

Sol:

2	16
2	8
2	4
2	2
	1

2	20
2	10
5	5
	1

Factors of 16 = 2x2x2x2
Factors of 20 = 2x2x5
Common Factors of 16 and 20 = 2x2=4
Ans: The HCF of 16 and 20 = 4

3. 35 and 50

Sol:

5	35
7	7
	1

2	50
5	25
5	5
	1

Factors of 35 = 5x7
Factors of 20 = 2x5x5
Common factors of 35 and 50 = 5
Ans: The HCF of 35 and 50 = 5

4. 39 and 91

Sol:

3	39
13	13
	1

7	91
13	13
	1

Factors of 39 = 3x13
Factors of 91 = 7x13
Common Factors of 39 and 91 = 13
Ans: The HCF of 39 and 91 = 13

5. 60 and 90

Sol:

2	60
2	30
3	15
5	3
	1

2	90
3	45
3	15
5	5
	1

Factors of 60 = 2x2x3x5
Factors of 90 = 2x3x3x5
Common Factors of 60 and 90 = 2x3x5=30
Ans: The HCF of 60 and 90 = 30

6. 63 and 81

Sol:

3	63
3	21
7	7
	1

3	81
3	27
3	9
3	3
	1

Factors of 63 = 3x3x7
Factors of 81 = 3x3x3x3
Common Factors of 63 and 81 = 3x3x=9
Ans: The HCF of 63 and 81 = 9

7. 102 and 153

Sol:

2	102
3	5 1
17	1 7
	1

3	153
3	5 1
17	1 7
	1

Factors of 102 = 2x3x17
Factors of 153 = 3x3x17
Common Factors of 102 and 153 = 3x17 = 51
Ans: The HCF of 102 and 153 = 51

8. 244 and 256

Sol:

2	244
2	122
61	6 1
	1

2	128
2	6 4
2	3 2
2	1 6
2	8
2	4
2	2
	1

Factors of 244 = 2x2x61
Factors of 128 = 2x2x2x2x2x2x2
Common Factors of 244 and 128 = 2x2 = 4
Ans: The HCF of 244 and 128 = 4

9. 86 and 387

Sol:

2	86
43	43
	1

3	387
3	129
43	4 3
	1

Factors of 86 = 2x43
Factors of 387 = 3x3x43
Common Factors of 86 and 387 = 43
Ans: The HCF of 86 and 387 = 43

10. 70 and 420

Sol:

2	70
5	35
7	7
	1

2	420
2	210
3	105
5	3 5
7	7
	1

Factors of 70 = 2x5x7
Factors of 420 = 2x2x3x5x7
Common Factors of 70 and 420 = 2x5x= 10
Ans: The HCF of 70 and 420 = 10

11. 51 and 85

Sol:

3	51
17	17
	1

5	85
17	17
	1

Factors of 51 = 3x17
Factors of 85 = 5x17
Common Factors of 51 and 85 = 17
Ans: The HCF of 51 and 85 = 17

12. 14, 28, 35

Sol:

2	14
7	7
	1

2	28
2	14
7	7
	1

5	35
7	7
	1

Factors of 14 = 2x7
Factors of 28 = 2x2x7
Factors of 35 = 5x7
Common Factors of 14,28 and 35 = 7
Ans: The HCF of 14,35 and 35 = 7

2.7 Word Problems as H.C.F.

Example-1

Find the greatest number by which 80, 112, 144 are exactly divisible.

Solution: Here we have to find the greatest common divisor of 80, 112, 144.

Let us find it by factors:
80 = 2 x 2 x 2 x 2 x 5
112 = 2 x 2 x 2 x 2 x 7
114 = 2 x 2 x 2 x 2 x 3 x 3

2	80
2	40
2	20
2	10
5	5
	1

2	112
2	56
2	28
2	14
7	7
	1

2	144
2	72
2	36
2	18
3	9
3	3
	1

The common factors are 2 x 2 x 2 x 2 = 16
G.C.D is 16 This is the required number.

Example-2

Find the greatest number by which when 80, 130 and 155 are divided the remainder in each case is 5.

Solution: Subtract the common remainder from each number then find G.C.D of the numbers so obtained.

80 - 5 = 75
130 - 5 = 125
155 - 5 = 150

Now find the G.C.D of 75, 125, 150
75 = 3 x 5 x 5
125 = 5 x 5 x 5
150 = 2 x 3 x 5 x 5

3	75
5	25
5	5
	1

5	125
5	25
5	5
	1

2	150
3	75
5	25
5	5
	1

The common factors are 5 x 5
Hence the required number is 25.

Example-3

Find the greatest number by which 80, 100 and 120 are divided resting in to the remainders of 4, 5, 6 respectively.

Solution: Subtract the corresponding remainder from the numbers and then find G.C.D of the numbers so obtained.

80	100	120
- 4	- 5	- 6
76	95	114

Now find the G.C.D of 75, 125, 150

76 = 2 x 2 x 19
95 = 5 x 19
144 = 2 x 3 x 19
Hence the G.C.D 19

2	76
2	38
19	19
	1

5	95
19	19
	1

2	114
3	57
19	19
	1

Example-4

Three drums contain 120, 192, 312 litres of kerosene Oil respectively then find the Capacity of the largest jug with which they can be measured exactly.

Solution: To measure the drums exactly we need a jug of such size which can divide the numbers 120, 192, 312 leaving no remainders.

So the problem is to find a common divisor of 120, 192, 312.

2	120	192	312
2	60	96	156
2	30	48	78
3	15	24	39
	5	8	13

G.C.D = 2 x 2 x 2 x 3 = 24
Hence the measure of the required jug is 24 litres.

Exercise 2.7

Q.1. Find te greatest number by which 42, 49 and 63 are exactly divisible.

Sol:

7	42,	49,	63
	6,	7,	9

Ans: The greatest number is 7, by which 42, 49 and 63 are exactly divisible.

Q.2. Find the greatest number by which 90, 180 and 360 are exactly divisible.

Sol:

2	90,	180,	360
3	45,	90,	180
3	15,	30,	60
5	5,	10,	20
	1	2	4

Ans: The greatest number is 90, by which 90, 180 and 360 are exactly divisible.

Q.3. Find the greatest number with which 70, 112, 224 are exactly divisible.

Sol:

2	70,	112,	224
7	35,	56,	112
	5,	8,	16

Ans: The greatest number is14, by which 70, 112 and 224are exactly divisible.

Q.4. Find the greatest number with which if we divide 85, 109, 145 separately, the remainder in each case is 1.

Sol: First we subtract 1 from 85, 109 and 145
Then,
85-1=84, 109-1=108, 145-1 = 144

2	84,	108,	144
2	42,	54,	72
3	21,	27,	36
	7,	9,	12

2x2x3 = 12
Ans: The greatest number is12, with which if we divide 85, 109, 145 respectively the remainder in each case is 1.

Q.5. Find the largest number of boys among which when 243, 291 or 387 oranges are distributed you have 3 oranges left in each case.

Sol: First we subtract 3 from 243, 291 and 387.
Then,
243-3, 291-3, 383
=240 , 288, 384

Sol:

2	240,	288,	384
2	120,	144,	192
2	60,	72,	96
2	30,	36,	48
3	15,	18,	24
	5,	6,	8

2x2x2x2x3 = 48

Ans: The largest number of boys among which when 234, 391 or 387 oranges are distributed, you have 3 oranges left in each case.

2.8 Multiples and Least Common Multiple

In the beginning of Chapter. We have seen a table of multiples of 2 to 20 with the help of the chart or by using our memory we can give the answers of many problems and we can also find the common multiples least common multiples of given numbers.

Example-1

Find the common multiples of 8 and 12.

Solution: The list of multiples of 8 are
{8, 16, 24, 32, 40, 48, 56, 64, 72, 80 .....}
The list of multiples of 12 are
{12, 24, 36, 48, 60, 72, 84, 96, 108, 120 }
Therefore the list of common multiples of 8 and 12 is {24, 48, 72...}

Example-2

Find the least common multiple of 12 and 15

Solution: The multiples of 12 are
12, 24, 36, 48, 60, 72, 84, 96, 108, 120, ...
The multiples of 15 are
15, 30, 45, 60, 75, 90, 105, 120, ...
The common multiples are 60, 120, ...
The least common multiple is 60

Example-3

Find the least common multiple of 3, 4 and 6

Solution: The multiples 3 are
3, 6, 9, 12, 15, 18, 21, 27, 30, 33, 36 .....
The multiples of 4 are
4, 8, 12, 16, 20, 24, 28, 32, 36, 40, 44, 48, ...
The multiples of 6 are
6, 12, 18, 24, 30, 36, 42, 48, 54 .....
The common multiples are
12, 24, 36, 48 .....
Therefor the least common multiple is 12.

Exercise 2.8

Q.1. Write down the first four multiples of 4.

Sol:

= 4x1, 4x2, 4x3, 4x4
= 4 , 8 , 12 , 16

Q.2. Find the list of all the multiples of 15 which are greater than 30 and less than 70.

Sol:

Ans: 35, 40, 45, 50, 55, 60, 65.

Q.3. Find all multiples of 11 which are less than 80.

Sol:

= 11x1, 11x2, 11x3, 11x4, 11x5, 11x6, 11x7

= 11 , 22 , 33 , 44 , 55 , 66 , 77

Q.4. Find first common multiples of 2 and 3.

Sol:

Multiples of 2:

2 x 1 = 2
2 x 2 = 4
2 x 3 = 6
2 x 4 = 8
2 x 5 = 10
2 x 6 = 12
2 x 7 = 14
2 x 8 = 16
2 x 9 = 18
2 x 10 = 20
2 x 11 = 22
2 x 12 = 24
2 x 13 = 26
2 x 14 = 28
2 x 15 = 30

Multiples of 3:

3 x 1 = 3
3 x 2 = 6
3 x 3 = 9
3 x 4 = 12
3 x 5 = 15
3 x 6 = 18
3 x 7 = 21
3 x 8 = 24
3 x 9 = 27
3 x 10 = 30

Ans: The common multiples of 2 and 3 are 6, 12, 18, 24, 30.

Q.5. Find the common multiples of 6 and 8 lying between 60 and 80.

Sol:

Multiples of 6:

6 x 1 = 6
6 x 2 = 12
6 x 3 = 18
6 x 4 = 24
6 x 5 = 30
6 x 6 = 36
6 x 7 = 42
6 x 8 = 48
6 x 9 = 54
6 x 10 = 60
6 x 11 = 66
6 x 12 = 72

Multiples of 8:

8 x 1 = 8
8 x 2 = 16
8 x 3 = 24
8 x 4 = 32
8 x 5 = 40
8 x 6 = 48
8 x 7 = 56
8 x 8 = 64
8 x 9 = 72
8 x 10 = 80

Ans: The common multiples of 6 and 8 are 24, 48, and 72.

Q.6. Find the least common multiple of 3, 6 and 9.

Sol: **Multiples of 3:**

= 3x1, 3x2, 3x3, 3x4, 3x5, 3x6, 3x7, 3x8, 3x9, 3x10

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

Sol: **Multiples of 6:**

= 6x1, 6x2, 6x3, 6x4, 6x5, 6x6, 6x7, 6x8, 6x9, 6x10

= 6 , 12 , 18 , 24 , 30 , 36 , 42 , 48 , 54 , 60

Sol: **Multiples of 9:**

= 9x1, 9x2, 9x3, 9x4, 9x5, 9x6, 9x7, 9x8, 9x9, 9x10

= 9 , 18 , 27 , 36 , 45 , 54 , 63 , 72 , 81 , 90

Ans: The least multiple of 3, 6, and 9 is 18.

Q. 7. Find the least common multiple of 5, 10 and 15

Sol: **Multiples of 5:**

= 5x1, 5x2, 5x3, 5x4, 5x5, 5x6, 5x7, 5x8, 5x9, 5x10

= 5 , 10 , 15 , 20 , 25 , 30 , 35 , 40 , 45 , 50

Sol: **Multiples of 10:**

= 10x1, 10x2, 10x3, 10x4, 10x5, 10x6, 10x7, 10x8, 10x9, 10x10

= 10 , 20 , 30 , 40 , 50 , 60 , 70 , 80 , 90 , 100

Sol: **Multiples of 15:**

= 15x1, 15x2, 15x3, 15x4, 15x5, 15x6, 15x7, 15x8, 15x9, 15x10

= 15 , 30 , 45 , 60 , 75 , 90 , 105 , 120 , 135 , 150

Ans: The least common multiple of 5, 10 and 15 is 30.

Q. 8. Find the L.C.M of 12, 16 and 24.

Sol:

2	12,	16,	24
2	6,	8,	12
2	3,	4,	6
2	3,	2,	3
3	3,	1,	3
	1,	1,	1

2x2x2x2x3 = 48

Ans: The L.C.M of 12, 16, and 24 is 48.

Q. 9. Find the L.C.M of 12, 15 and 18.

Sol:

2	12,	15,	18
2	6,	15,	9
3	3,	15,	9
3	1,	5,	3
5	1,	5,	1
	1,	1,	1

2x2x3x3x5 = 180

Ans: The L.C.M of 12, 15, and 18 is 180

Q. 10.Find the L.C.M of 18, 36 and 54.

Sol:

2	18,	36,	54
2	9,	18,	27
3	9,	9,	27
3	3,	3,	9
3	1,	1,	3
	1,	1,	1

2x2x3x3x3 = 108

Ans: The L.C.M of 18, 36, and 54 is 108

2.9 Methods to find (L.C.M)

There are three methods which are very common to find the L.C.M. of given numbers.

Find the least common multiple of 4, 6 and 8

Method-1

There multiples of 4, 8, 12, 16, 20 (24) 28 .....
There multiples 6 are 6, 12, 18, (24) 30, 36, 42 .....
There multiples of 8 are 16, (24) 32, 40, 48, 56 .....
The encricled number 24 is L.C.M of 4, 6 and 8.

Method-2

$4 = 2 \times 2 = 2^2$
$6 = 2 \times 3 = 2^1 \times 3$
$8 = 2 \times 2 \times 2 = 2^3$
L.C.M $= 2^3 \times 3 = 24$

Explanation:

The product of all the highest multiples of all the prime factors of 4, 6, and 8 is their L.C.M. Thus the highest multiple of factor 2 is 2^3 and that of 3 is 3 so the L.C.M is the product of 2^3 and 3 or $2^3 \times 3$.
This is slightly a difficult method and may be avoided .....

Methods-3

2	4	6	8
2	2	3	4
2	1	3	2
3	1	3	1
	1	1	1

L.C.M is $2 \times 2 \times 2 \times 3 = 24$

Explanation:

Start with the smallest prime number which divides any of these numbers, continue dividing until all the numbers are fully divided.

Exercise 2.9

Q.1: Find L.C.M of the following by factor method.

(1) 3 and 4

Sol:

3	3
	1

2	4
2	2
	1

Factors of 3 = 1x3
Factors of 4 = 1x2x2
Common Factors = 1
Separate factors = 3x2x2
All factors = 1x3x4 = 12
Ans: The LCM of 3 and 4 = 12

(2) 8and10

Sol:

2	8
2	4
2	2
	1

2	10
5	5
	1

Factors of 8 = 2x2x2
Factors of 10 = 2x5
Common Factors = 2
Separate factors = 2x2x5
All factors = 2x2x2x5 = 40
Ans: The LCM of 8 and 10 = 40

(3) 2and6

Sol:

2	2
1	1
	1

2	6
3	3
	1

Factors of 2 = 1x2
Factors of 6 = 1x2x3
Common Factors = 1x2
Separate factors = 3
All factors = 1x2x3 = 6
Ans: The LCM of 2 and 6 = 6

(4) 10 and12

Sol:

2	10
5	5
	1

2	12
2	6
3	3
	1

Factors of 10 = 2x5
Factors of 12 = 2x2x3
Common Factors = 2
Separate factors = 2x3x5
All factors = 2x2x3x5 = 60
Ans: The LCM of 10 and 12 = 60

(5) 6, 8 and 12

Sol:

2	6
3	3
	1

2	8
2	4
2	2
	1

2	12
2	6
3	3
	1

Factors of 6 = 2x3
Factors of 8 = 2x2x2
Factors of 12 = 2x2x3
Common Factors = 2x2x3
Separate factors = 2
All factors = 2x2x2x3 = 24
Ans: The LCM of 6 , 8 and 12 = 24

Q.2: Find L.C.M of the following by division method.

(1) 11, 22, 33

Sol:

2	11,	22,	33
3	11,	11,	33
11	11,	11,	11
	1,	1,	1

2x3x11 = 66

Ans: The LCM of 11, 22 and 33 = 66

(2) 9, 22, 30

Sol:

2	9,	22,	30
3	9,	11,	15
3	3,	11,	5
5	1,	11,	5
11	1,	11,	1
	1,	1,	1

2x3x3x5x11 = 990

Ans: The LCM of 9,22 and 30 = 990

(3) 27, 18, 16

Sol:

2	27,	18,	16
2	27,	9,	8
2	27,	9,	4
2	27,	9,	2
3	27,	9,	1
3	9,	3,	1
3	3,	1,	1
	1,	1,	1

2x2x2x2x3x3x3 = 432

Ans: The LCM of 27, 18 and 16 = 432

(4) 15, 25, 35

Sol:

3	15,	25,	35
5	5,	25,	35
5	1,	5,	7
7	1,	1,	7
	1,	1,	1

3x5x5x7 = 525

Ans: The LCM of 15, 25 and 35 = 525

(5) 13, 18, 52

Sol:

2	13,	18,	52
2	13,	9,	26
3	13,	9,	13
3	13,	3,	13
13	13,	1,	13
	1,	1,	1

2x2x3x3x13 = 468

Ans: The LCM of 13, 18 and 52 = 468

CHAPTER NO.3

COMMON FRACTIONS

3.1 REVISION

1. Fraction:

We know that Fraction is a part of an object or a part of a set. Every fraction is written with the help of Numerator and Denominator.

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

$\frac{3}{7}$ is a fraction in which 3 is numerator and 7 is denominator.

2. Proper Fraction:

A fraction in which the numerator is smaller than the denominator is called |Proper Fraction $\frac{1}{2}$ $\frac{3}{4}$, $\frac{5}{7}$ $\frac{7}{9}$ ..... are the examples of a proper fraction.

3. Improper Fraction:

A fraction in which the numerator is greater than the denominator is called Improper Fraction $\frac{3}{2}$, $\frac{6}{5}$, $\frac{8}{7}$, $\frac{9}{8}$, ... are the examples of Improper Fraction an Improper fraction can be changed into mixed fraction on dividing the numerator by the denominator of the fraction.

Examples Change $\frac{27}{4}$ into mixed fraction.

Solution: Divide 27 by 4

$$4 \overline{)\,27\,} \; 6 \leftarrow \text{Integral Part}$$
$$\underline{24}$$
$$3 \leftarrow \text{Remainder}$$

Hence $\frac{27}{4} = 6\frac{3}{4}$ (Mixed fraction)

4. Mixed Fraction:

A fraction which is the sum of a whole or integral number and a fraction is called "Mixed Fraction" $2\frac{3}{4}, 3\frac{3}{4}, 5\frac{3}{7}, 7\frac{5}{7}$, are the examples of mixed fraction. Each mixed fraction has two parts. One is the whole or Integral number and the other is a fraction.

A mixed fraction can be changed into an improper fraction. Example of such fraction is $2\frac{5}{6} = \frac{17}{6}$ because $6 \times 2 + 5 = \frac{17}{6}$

5. Equivalent Fraction:

When we divide or multiply the numerator and the denominator of a fraction by the same number, we get an equivalent fraction.

Fro example $\frac{20}{25} \frac{\div}{\div} \frac{5}{5} = \frac{4}{5}$ and $\frac{7}{9} \frac{\times}{\times} \frac{4}{4} = \frac{28}{36}$

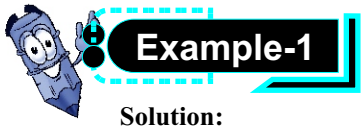
If the cross product of two fraction are equal, they are equivalent faction.

6. Greater Fraction:

If two fractions have the same numerators, then the fraction having lowest denominator will be "Greater Fraction" symbol ">" (greater than) is placed between fractions. Examples of such fraction are $\frac{3}{5} > \frac{3}{7}$ and $\frac{9}{11} > \frac{9}{13}$.

3.2 Addition of Common Fractions

If the denominator of two or more fractions are the same then they can be added or subtracted easily.



Example-1

Find the sum of $\frac{4}{9} + \frac{5}{9}$

Solution:

$$\frac{4}{9} + \frac{5}{9} = \frac{4+5}{9} = \frac{9}{9} = 1$$

Explanation: Both fractions have the same denominators, so they are like fraction L.C.M of the denominators of like fractions remains the same as the denominators. Only addition of the numerators gives the sum of the fractions.

Example-2

Find the sum of $\frac{2}{15} + \frac{4}{15} + \frac{7}{15} + \frac{8}{15}$

Solution:

$$\frac{2}{15} + \frac{4}{15} + \frac{7}{15} + \frac{8}{15}$$

$$= \frac{2 + 4 + 7 + 8}{15}$$

Explanation: Take L.C.M. of the denominators which is 15 and add the numerators of each fraction to get the sum of all the fractions.

Example-3

Find the sum of $\frac{5}{6} + \frac{17}{5}$

Solution: $\frac{5}{6} + \frac{17}{5} = \frac{5 \times 5 + 6 \times 17}{30} = \frac{25 + 102}{30} = \frac{127}{30} = \frac{47}{30}$

(1) Equivalent Fraction:

Since the denominators of the given fractions are not the same, so we make use of equivalent fractions.

The equivalent fractions of $\frac{5}{6}$ are $\frac{10}{12}, \frac{15}{18}, \frac{20}{24}, \frac{25}{30}, \frac{30}{36}$,..... .....

The equivalent fractions of $\frac{7}{15}$ are $\frac{14}{30}, \frac{21}{45}, \frac{28}{60}$, ...

We pick $\frac{25}{30}$ to replace $\frac{5}{6}$ and $\frac{14}{30}$ to replace $\frac{7}{15}$

Because $\frac{25}{30}$ and $\frac{14}{30}$ have the same denominators.

Thus $\frac{5}{6} + \frac{7}{15} = \frac{25}{30} + \frac{14}{30}$

$$= \frac{25 + 14}{30} = \frac{39}{30} = 1\frac{9}{30}$$ Ans.

(2) By taking L.C.M

Find the number which is divisible by both 6 and 15. For this find L.C.M of 6 and 15.

2	6 , 15
3	3 , 15
5	1 , 5
	1 , 1

L.C.M = 2 x 3 x 5 = 30

Now change both the denominators equal to their L.C.M i.e 30.

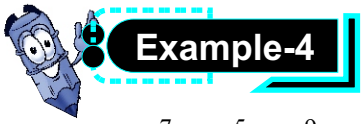
Thus $\frac{5}{6} \times \frac{5}{5} = \frac{25}{30}$ and $\frac{7}{15} \times \frac{2}{2} = \frac{14}{30}$

Therefore $\frac{5}{6} + \frac{7}{15} = \frac{25}{30} + \frac{14}{30}$

$= \frac{25 + 14}{30} = \frac{39}{30} = \frac{13}{10} = 1\frac{1}{10}$

Simplify, it is solved as mentioned below:

$\frac{5}{6} + \frac{7}{15} = \frac{25 + 14}{30} = \frac{39}{30} = \frac{13}{10} = 1\frac{3}{10}$



Example-4

Find the sum of $\frac{7}{8} + \frac{5}{12} + \frac{9}{16} + \frac{9}{4}$

Solution: $\frac{7}{8} + \frac{5}{12} + \frac{9}{16} + \frac{9}{4}$ Find the L.C.M of 8, 12, 16 and 9.

2	8 , 12 , 16 , 9
2	4 , 6 , 8 , 9
2	2 , 3 , 4 , 9
2	1 , 3 , 2 , 9
3	1 , 3 , 1 , 9
3	1 , 1 , 1 , 3
	1 , 1 , 1 , 1

L.C.M = 2 x 2 x 2 x 2 x 3 x 3 = 144

Explanation:

(i) Write 144 under only one line.

(ii) Divide 144 by the first denominator 8, to get 18.

(iii) Multiply the first numerator 7 by 18, to get 126.

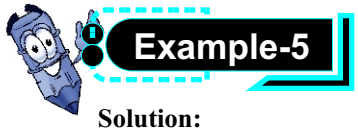
(iv) Put (+) sign after the first fraction, and repeat the processes of division and multiplication at the last fraction then simplify as mentioned below:

$\frac{7}{8} + \frac{5}{12} + \frac{9}{16} + \frac{9}{4}$

$= \frac{7 \times 18 + 5 \times 12 + 9 \times 9 + 4 \times 16}{144}$

$= \frac{126 + 60 + 81 + 64}{144} = \frac{331}{144}$

Now divide 331 by 144 to get $2\ \frac{43}{144}$



Example-5

Simplify $3\frac{5}{6} + 2\frac{4}{9} + 7\frac{5}{12}$

Solution: $3\frac{5}{6} + 2\frac{4}{9} + 7\frac{5}{12}$

Change mixed fractions into improper fractions.

$= \frac{23}{6} + \frac{22}{9} + \frac{89}{12}$

$= \frac{23 \times 6 + 22 \times 4 + 89 \times 3}{36}$

$= \frac{138 + 88 + 267}{36} = \frac{493}{36} = 13\frac{25}{36}$

(Change $\frac{493}{36}$ into mixed fraction)

Alternate Method:

Add the whole numbers first and then simplify the fractions

$3\frac{5}{6} + 3\frac{4}{9} + 7\frac{5}{12}$

$= 3 + 2 + 7 + \frac{5}{6} + \frac{4}{9} + \frac{5}{12}$

(Take L.C.M of 6, 9 and 12)

$= 12 + \frac{5 \times 6\ \ 6\ \ 4 \times 4\ \ 6\ \ 5 \times 4}{36}$

$= 12 + \frac{30 + 16 + 15}{36} = 12 + \frac{61}{36}$

(Divide 61 by 36 to get mixed fraction $1\ \frac{25}{36}$)

$= 12 + 1\frac{25}{36}$ (Add the whole numbers to get $13\ \frac{25}{36}$)

Exercise 3.1

Q.1: Write correct number in the blank space:

1. $\frac{1}{5}+\frac{3}{5}=\frac{\boxed{4}}{5}$ 2. $\frac{2}{7}+\frac{3}{7}=\frac{5}{\boxed{7}}$ 3. $\frac{6}{19}+\frac{17}{19}=\frac{23}{\boxed{19}}$

4. $\frac{15}{11}+\frac{16}{11}=\frac{31}{\boxed{11}}$ 5. $\frac{3}{5}+\frac{6}{5}+\frac{7}{5}=\frac{\boxed{16}}{5}$ 6. $\frac{2}{7}+\frac{8}{7}+\frac{1}{7}=\frac{\boxed{11}}{7}$

7. $\frac{1}{6}+\frac{1}{6}=\frac{2}{\boxed{6}}$ 8. $\frac{12}{23}+\frac{15}{23}=\frac{27}{\boxed{23}}$

Q.2: Find the sum of the following fractions by making the denominators equal:

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

Sol: **First method:**

$= \frac{2 \times 4}{3 \times 4}+\frac{3 \times 3}{4 \times 3}$

$= \frac{8}{12}+\frac{9}{12}$

The LCM is 12

$= \frac{8 \times 9}{12}$

$= \frac{17}{12}$

$= 1\ \frac{5}{12}$ Ans:

Second method:

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

LCM = 2x2x3
LCM = 12

R.W

$12\overline{)\ 17\ (1}$
$\quad\ 12$
$\quad\overline{\ \ 5}$

R.W

2	3 , 4
2	3 , 2
3	3 , 1
	1 , 1

$= \frac{(2 \times 4)+(3 \times 3)}{12}$

$= \frac{8+9}{12}$

$= \frac{7}{12}$

$1\ \frac{5}{12}$ Ans:

2. $\frac{\mathbf{2}}{\mathbf{5}}+\frac{\mathbf{3}}{\mathbf{7}}$

Sol: **First method:**

$= \frac{2 \times 7}{5 \times 7}+\frac{3 \times 5}{7 \times 5}$

$= \frac{14}{35}+\frac{15}{35}$

$= \frac{14 \times 15}{35}$

$= \frac{29}{35}$ Ans:

Second method:

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

LCM = 5x7
LCM = 35

$= \frac{(2 \times 7)+(5 \times 3)}{35}$

$= \frac{14+15}{35}$

$= \frac{29}{35}$ Ans:

R.W

5	5 , 7
7	1 , 7
	1 , 1

3. $\mathbf{1\frac{3}{4}+2\frac{3}{7}}$

Sol: **First method:**

$= 1\frac{3}{4} + 2\frac{3}{7}$

$= \frac{7}{4} + \frac{17}{7}$

$= \frac{7 \times 7}{4 \times 7} + \frac{17 \times 4}{7 \times 4}$

$= \frac{49}{28} + \frac{68}{28}$

$= \frac{49 \times 68}{28}$

$= \frac{137}{28}$

$= 4\frac{25}{28}$ Ans:

R.W

28) 137 (4
112
25

Second method:

$= 1\frac{3}{4} + 2\frac{3}{7}$

$= \frac{7}{4} + \frac{17}{7}$

R.W

2	4 , 7
2	2 , 7
7	1 , 7
	1 1

LCM = 2X2x7
LCM = 28

$= \frac{(7 \times 7) + (17 \times 4)}{28}$

$= \frac{49 + 68}{28}$

$= \frac{137}{28}$

$= 4\frac{25}{28}$ Ans:

4. $\mathbf{2\frac{9}{10}+1\frac{7}{15}}$

Sol: **First method:**

$= 1\frac{9}{10} + 1\frac{7}{15}$

$= \frac{29}{10} + \frac{22}{15}$

$= \frac{29 \times 15}{10 \times 15} + \frac{22 \times 10}{15 \times 10}$

$= \frac{{}^{87}\cancel{435}}{\cancel{150}_{30}} + \frac{\cancel{220}^{44}}{\cancel{150}_{30}}$

$= \frac{87}{30} + \frac{44}{30}$

$= \frac{87 \times 44}{30}$

$= \frac{131}{30}$

$= 4\frac{11}{30}$ Ans:

R.W

29
x15
145
29x
435

R.W

$^{1}87$
44
131

R.W

30) 131 (4
120
11

Second method:

$= 1\frac{9}{10} + 2\frac{7}{15}$

$= \frac{29}{10} + \frac{22}{15}$

R.W

2	10 , 15
3	5 , 15
5	5 , 5
	1 1

LCM = 2x3x5
LCM = 30

$= \frac{(29 \times 3) + (22 \times 2)}{30}$

$= \frac{87 + 44}{30}$

$= \frac{131}{30}$

$= 4\frac{11}{30}$ Ans:

5. $\frac{4}{9} + \frac{7}{12} + \frac{5}{6}$

Sol: **First method:**

$$\frac{4}{9} + \frac{7}{12} + \frac{5}{6}$$

$$= \frac{4 \times 4}{9 \times 4} + \frac{7 \times 3}{12 \times 3} + \frac{5 \times 6}{6 \times 6}$$

$$= \frac{16}{36} + \frac{21}{36} + \frac{30}{36}$$

$$= \frac{16 + 21 + 30}{36}$$

$$= \frac{67}{36}$$

$$= 1\ \frac{31}{36}$$ Ans:

R.W

$$36\overline{)\ 67\ (1}$$
$$\underline{36}$$
$$31$$

Second method:

$$\frac{4}{9} + \frac{7}{12} + \frac{5}{6}$$

R.W

2	9 , 12 , 6
2	9 , 6 , 3
3	9 , 3 , 3
3	3 , 1 , 1
	1 1 1

LCM = 2x2x3x3
LCM = 36

$$= \frac{4}{9} + \frac{7}{12} + \frac{5}{6}$$

$$= \frac{(4 \times 4) + (7 \times 3) + (5 \times 6)}{36}$$

$$= \frac{16 + 21 + 30}{36}$$

$$= \frac{67}{36}$$

$$= 1\ \frac{31}{36}$$ Ans:

6. $\frac{3}{4} + \frac{5}{8} + \frac{7}{6}$

Sol: **First method:**

$$\frac{3}{4} + \frac{5}{8} + \frac{7}{6}$$

$$= \frac{3 \times 6}{4 \times 6} + \frac{5 \times 3}{8 \times 3} + \frac{7 \times 4}{6 \times 4}$$

$$= \frac{18}{24} + \frac{15}{24} + \frac{28}{24}$$

$$= \frac{18 + 15 + 28}{24}$$

$$= \frac{61}{24}$$

$$= 2\ \frac{13}{24}$$ Ans:

R.W

$$\begin{array}{r} {\scriptstyle 2} \\ 18 \\ 15 \\ \hline 28 \\ \hline 61 \end{array}$$

R.W

$$24\overline{)\ 61\ (2}$$
$$\underline{48}$$
$$13$$

Second method:

$$\frac{3}{4} + \frac{5}{8} + \frac{7}{6}$$

R.W

2	4 , 8 , 6
2	2 , 4 , 3
2	1 , 2 , 3
3	1 , 1 , 3
	1 1 1

LCM = 2x2x2x3
LCM = 24

$$= \frac{(3 \times 6) + (5 \times 3) + (7 \times 4)}{24}$$

$$= \frac{18 + 15 + 28}{24}$$

$$= \frac{61}{24}$$

$$= 2\ \frac{13}{24}$$ Ans:

R.W

$$24\overline{)\ 61\ (2}$$
$$\underline{48}$$
$$13$$

3.3 Subtraction of Common Fractions:

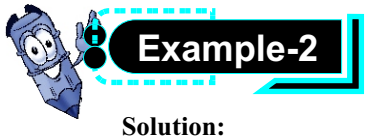
Find the difference of $\frac{7}{11} - \frac{4}{11}$

Solution: $\frac{7}{11} - \frac{4}{11}$

Explanation: Both fractions have the same denominators. We know L.C.M of the denominators of like fractions remains the same as the denominators. Only subtraction of the numerators gives the difference of the fractions.

$$\frac{7-4}{11} = \frac{3}{11} = \frac{1}{11}$$

Thus



Find the difference of $\frac{28}{15} - \frac{14}{15} - \frac{4}{15}$

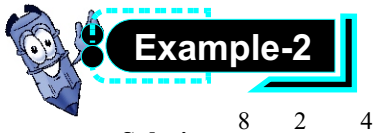
Solution:

$$\frac{28}{15} - \frac{14}{15} - \frac{4}{15}$$

$= \frac{28 - 14 - 4}{15}$ (Add - 14 and - 4 which give - 18)

$= \frac{28 - 18}{15}$ (Subtract 18 from 28 which gives 10)

$= \frac{\cancel{10}}{\cancel{15}} = \frac{2}{3}$ (Reduce $\frac{10}{15}$ to its simplest form $\frac{2}{3}$)



Solve: $\frac{8}{5} - \frac{2}{3} - \frac{4}{15}$

Solution: $\frac{8}{5} - \frac{2}{3} - \frac{4}{15}$

(1) Equivalent Fraction's Method:

Since the denominators of the given fractions re not the same, so we make use of equivalent fractions.

The equivalent fractions of $\frac{8}{5}$ are : $\frac{16}{10}, \frac{24}{15}, \frac{32}{20}, \ldots\ldots\ldots$

The equivalent fractions of $\frac{2}{3}$ are: $\frac{4}{6}, \frac{6}{9}, \frac{8}{12}, \frac{10}{15}, \frac{12}{18}$ $\ldots\ldots\ldots$

The equivalent fractions of $\frac{4}{15}$ are: $\frac{8}{30}, \frac{12}{45}$ $\ldots\ldots\ldots\ldots$

We pick $\frac{24}{15}$, $\frac{10}{15}$ and $\frac{4}{15}$ from the above equivalent fractions, because all fractions have some denominators.

Now replace $\frac{8}{5}$ to $\frac{24}{15}$ and $\frac{8}{3}$ to $\frac{10}{15}$

Thus $\frac{8}{5} - \frac{2}{3} - \frac{4}{15} = \frac{24}{15} - \frac{10}{15} - \frac{4}{15}$

$= \frac{24 - 10 - 4}{15} = \frac{24 - 14}{15} = \frac{\cancel{10}}{\cancel{15}} = \frac{2}{3}$

(2) By Taking L.C.M

To find the least number which is divisible by 3, 5 and 15, we take the L.C.M of 3, 5 and 15.

3	3 , 5 , 15
5	1 , 5 , 5
	1 , 1 , 1

L.C.M = 3 X 5 = 15

Now change the denominators equal to their L.C.M which is 15

Thus $\frac{8}{5} \times \frac{3}{3} = \frac{24}{15}$ and $\frac{2}{3} \times \frac{5}{5} = \frac{10}{15}$

Therefore $\frac{8}{5} - \frac{3}{2} - \frac{4}{15} = \frac{24}{15} - \frac{10}{15} - \frac{4}{15}$

$= \frac{24 - 10 - 4}{15} = \frac{24 - 14}{15} = \frac{10}{15} = \frac{2}{3}$

Example2

Find the value of $4\frac{3}{8} - 1\frac{5}{12} - 2\frac{1}{6}$

Solution: $4\frac{3}{8} - 1\frac{5}{12} - 2\frac{1}{6}$

Change mixed fractions into improper fractions.

$= \frac{35}{8} - \frac{17}{12} - \frac{13}{6}$

$= \frac{315 - 102 - 156}{72}$

$= \frac{57}{72}$ Ans

Exercise 3.2

Q.1: Find the difference of the following:

1. $\frac{\mathbf{8}}{\mathbf{7}} - \frac{\mathbf{5}}{\mathbf{7}}$

Sol: $\frac{8}{7} - \frac{5}{7}$

$= \frac{8 - 5}{7}$

$= \frac{3}{7}$ **Ans:**

2. $\frac{\mathbf{15}}{\mathbf{12}} - \frac{\mathbf{11}}{\mathbf{12}}$

Sol: $\frac{15}{12} - \frac{11}{12}$

$= \frac{15 - 11}{12}$

$= \frac{{}^{1}\cancel{4}}{\cancel{12}_{3}}$

$= \frac{1}{3}$ **Ans:**

3. $\frac{\mathbf{26}}{\mathbf{21}} - \frac{\mathbf{13}}{\mathbf{21}} - \frac{\mathbf{10}}{\mathbf{21}}$

Sol: $\frac{26}{21} - \frac{13}{21} - \frac{10}{21}$

$= \frac{26 - 13 - 10}{21}$

$= \frac{26 - 23}{21}$

$= \frac{{}^{1}\cancel{3}}{\cancel{21}_{7}}$

$= \frac{1}{7}$ **Ans:**

5. $\frac{\mathbf{34}}{\mathbf{25}} - \frac{\mathbf{13}}{\mathbf{25}} - \frac{\mathbf{10}}{\mathbf{25}}$

Sol: $\frac{34}{25} - \frac{13}{25} - \frac{10}{25}$

$= \frac{34 - 13 - 10}{25}$

$= \frac{34 - 23}{25}$

$= \frac{11}{25}$ **Ans:**

4. $\frac{\mathbf{9}}{\mathbf{4}} - \frac{\mathbf{5}}{\mathbf{4}}$

Sol: $\frac{9}{4} - \frac{5}{4}$

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

$= \frac{{}^{1}\cancel{4}}{\cancel{4}^{1}}$

$= 1$ **Ans:**

Q.2: Simplify the given fractions by making denominators equal:

1. $\frac{\mathbf{5}}{\mathbf{3}} - \frac{\mathbf{3}}{\mathbf{4}}$

Sol: $\frac{5}{3} - \frac{3}{4}$

$= \frac{5 \times 4}{3 \times 4} - \frac{3 \times 3}{4 \times 3}$

$= \frac{20}{12} - \frac{9}{12}$

$= \frac{20 - 9}{12}$

$= \frac{11}{12}$ **Ans:**

2. $\frac{\mathbf{7}}{\mathbf{5}} - \frac{\mathbf{6}}{\mathbf{7}}$

Sol: $\frac{7}{5} - \frac{6}{7}$

$= \frac{7 \times 7}{5 \times 7} - \frac{6 \times 5}{7 \times 5}$

$= \frac{49}{35} - \frac{30}{35}$

$= \frac{49 - 30}{35}$

$= \frac{19}{35}$ **Ans:**

3. $5\frac{1}{7} - 2\frac{3}{14}$

Sol: $5\frac{1}{7} - 2\frac{3}{14}$

$\frac{36}{7} - \frac{31}{14}$

$= \frac{36 \times 14}{7 \times 14} - \frac{31 \times 7}{14 \times 7}$

$= \frac{504}{98} - \frac{217}{98}$

$= \frac{504 - 217}{98}$

$= \frac{^{41}\cancel{287}}{\cancel{98}_{14}}$

$= \frac{41}{14}$ **Ans:**

4. $2\frac{7}{10} - 1\frac{4}{15}$

Sol: $2\frac{7}{10} - 1\frac{4}{15}$

$\frac{27}{10} - \frac{19}{15}$

$= \frac{27 \times 3}{10 \times 3} - \frac{19 \times 2}{15 \times 2}$

$= \frac{51}{30} - \frac{38}{30}$

$= \frac{51 - 28}{30}$

$= \frac{23}{30}$ **Ans:**

5. $\frac{15}{9} - \frac{7}{12} - \frac{6}{6}$

Sol: $\frac{15}{9} - \frac{7}{12} - \frac{6}{6}$

$= \frac{15 \times 4}{9 \times 4} - \frac{7 \times 3}{12 \times 3} - \frac{6 \times 6}{6 \times 6}$

$= \frac{60}{36} - \frac{21}{36} - \frac{36}{36}$

$= \frac{60 - 21 - 36}{36}$

$= \frac{60 - 57}{36}$

$= \frac{^{1}\cancel{3}}{\cancel{36}_{12}}$

$= \frac{1}{12}$ **Ans:**

Q.3: Simplify the following fractions by taking L.C.M.

1. $\frac{7}{6} - \frac{7}{15}$

Sol: $\frac{7}{6} - \frac{7}{15}$

R.W

2	6 , 15
3	3 , 15
5	1 , 5
	1 , 1

LCM = 2x3x5

LCM = 60

$= \frac{(7 \times 10) + (7 \times 4)}{60}$

$= \frac{70 - 28}{60}$

$= \frac{^{7}\cancel{42}}{\cancel{60}_{10}}$

$= \frac{7}{10}$ Ans:

2. $\frac{8}{5} - \frac{6}{7}$

Sol: $\frac{8}{5} - \frac{6}{7}$

R.W

5	5 , 7
7	1 , 7
	1 , 1

LCM = 5x7

LCM = 35

$= \frac{(8 \times 7) + (6 \times 5)}{35}$

$= \frac{56 - 30}{35}$

$= \frac{26}{35}$ Ans:

3. $\frac{17}{12} - \frac{11}{18}$

Sol: $\frac{17}{12} - \frac{11}{18}$

R.W

2	12 , 18
2	6 , 9
3	3 , 9
3	1 , 3
	1 , 1

LCM = 2x2x3x3

LCM = 36

$= \frac{(17 \times 3) + (11 \times 2)}{36}$

$= \frac{51 - 22}{36}$

$= \frac{29}{36}$ Ans:

4. $\frac{27}{15} - \frac{17}{10}$

Sol: $\frac{27}{15} - \frac{17}{10}$

R.W

2	15 , 10
3	15 , 5
5	5 , 5
	1 , 1

LCM = 2x3x5

LCM = 30

$= \frac{(27 \times 2) + (17 \times 3)}{30}$

$= \frac{54 - 51}{30}$

$= \frac{{}^{1}\cancel{3}}{\cancel{30}_{10}}$

$= \frac{1}{10}$ Ans:

5. $\frac{7}{3} - \frac{8}{9} - \frac{5}{6}$

Sol: $\frac{7}{3} - \frac{8}{9} - \frac{5}{6}$

LCM = 2x3x3

LCM = 18

$= \frac{(5 \times 6) - (8 \times 2) - (5 \times 3)}{18}$

$= \frac{30 - 16 - 15}{18}$

$= \frac{30 - 31}{18}$

$= \frac{1}{18}$ Ans:

R.W

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

3.4 Multiplication of Common Fractions and Reducing to lowest terms:

We know that multiplication is a simple process of adding the same number again and again. Consider the example:

Multiply $\frac{3}{4}$ **by** $\frac{6}{7}$

Solution: $\frac{3}{4} \times \frac{6}{7}$ (Multiply 3 by 6 and 4 by 7)

$= \frac{18}{28}$ (is the simplest form of $\frac{18}{28}$)

Multiply $\frac{14}{9}$ **by** $\frac{11}{8}$

Solution: $\frac{14}{9} \times \frac{11}{8}$ (Multiply 14 by 11 and 9 by 8)

$= \frac{154}{72} = \frac{77}{36}$ (Change $\frac{154}{72}$ in its simplest form $\frac{77}{36}$)

$= 2\frac{5}{36}$ (Change $\frac{77}{36}$ into to mixed fraction)

Example-3

Simplify $3\frac{7}{16} \times 2\frac{2}{11}$

Solution:

$3\frac{7}{16} \times 2\frac{2}{11}$ (Change into improper fraction)

$= \frac{\overset{5}{\cancel{55}}}{\cancel{16}_{5}} \times \frac{\overset{3}{\cancel{24}}}{\cancel{11}_{1}}$ (Divide 55 by 11, 24 and 16 by 8)

$= \frac{15}{2} = 7\frac{1}{2}$ (Change $\frac{15}{2}$ into mixed fraction $7\frac{1}{2}$)

Example-4

$8 \times \frac{3}{4}$

Solution:

$= \frac{\overset{6}{\cancel{24}}}{\cancel{4}_{1}} = 6$

OR $= \overset{2}{\cancel{8}} \times \frac{3}{\cancel{4}}$

$= 6$

Exercise 3.3

Q.1: Simplify the following:

(1) $\frac{5}{6} \times 12$

Sol:

$= \frac{5}{\cancel{6}_{1}} \times \frac{\cancel{12}}{1\,\cancel{1}}$

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

$= \frac{10}{1}$

$= 10$ Ans:

(2) $14 \times \frac{5}{6}$

Sol:

$= \frac{\overset{7}{\cancel{14}}}{1} \times \frac{5}{\cancel{6}_{3}}$

$= \frac{7}{1} \times \frac{5}{3}$

$= \frac{35}{3}$ Ans:

(3) $\frac{13}{18} \times 8$

Sol:

$= \frac{13}{\cancel{18}_{9}} \times \frac{\overset{4}{\cancel{8}}}{1}$

$= \frac{13}{9} \times \frac{4}{1}$

$= \frac{68}{9}$

$= 7\frac{5}{9}$ Ans:

(4) $10 \times \frac{12}{5}$

Sol:

$= \frac{\overset{2}{\cancel{10}}}{1} \times \frac{12}{\cancel{5}_{1}}$

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

$= \frac{24}{1}$

$= 24$ Ans:

R.W

$9\overline{)68}\,(7$

$\underline{63}$

5

(5) $\frac{1}{12} \times 12$

Sol:

$= \frac{1}{\cancel{12}_{1}} \times \frac{\cancel{12}^{1}}{1}$

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

$= 1$ Ans:

(6) $\frac{12}{13} \times \frac{39}{16}$

Sol:

$= \frac{\overset{3}{\cancel{12}}}{\cancel{13}_{1}} \times \frac{\overset{3}{\cancel{39}}}{\cancel{16}_{4}}$

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

$= \frac{9}{4}$ Ans:

(7) $\frac{24}{17} \times \frac{34}{15}$

Sol:

$= \frac{\overset{8}{\cancel{24}}}{\cancel{17}_{1}} \times \frac{\cancel{34}^{1}}{\cancel{15}_{5}}$

$= \frac{8}{1} \times \frac{2}{5}$

$= \frac{16}{5}$

$= 3\frac{1}{5}$ Ans:

R.W

$5\overline{)16}\,(3$

$\underline{15}$

1

(8) $\frac{26}{18} \times \frac{27}{39}$

Sol:

$= \frac{\overset{2}{\cancel{26}}}{\cancel{18}_{2}} \times \frac{\overset{3}{\cancel{27}}}{\cancel{39}_{3}}$

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

$= \frac{6}{6}$ Ans:

$= 1$ Ans:

(9) $\frac{44}{21} \times \frac{24}{11}$

Sol: $= \frac{\cancel{44}^{4}}{\cancel{21}_{7}} \times \frac{\cancel{24}^{8}}{\cancel{11}_{1}}$

$= \frac{4}{7} \times \frac{8}{1}$

$= \frac{32}{7}$ Ans:

(10) $\frac{65}{12} \times \frac{18}{13}$

Sol: $= \frac{\cancel{65}^{5}}{\cancel{12}_{2}} \times \frac{\cancel{18}^{3}}{\cancel{13}_{1}}$

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

$= \frac{15}{2}$

$= 7\frac{1}{2}$ Ans:

(11) $2\frac{1}{4} \times 2\frac{2}{3}$

Sol: $= 2\frac{1}{4} \times 2\frac{2}{3}$

$= \frac{\cancel{9}^{3}}{\cancel{4}_{1}} \times \frac{\cancel{8}^{2}}{\cancel{3}_{1}}$

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

$= \frac{6}{1}$

$= 6$ Ans:

(12) $5\frac{1}{7} \times 1\frac{5}{9}$

Sol: $= 5\frac{1}{7} \times 1\frac{5}{9}$

$= \frac{\cancel{36}^{4}}{\cancel{7}_{1}} \times \frac{\cancel{14}^{2}}{\cancel{9}_{1}}$

$= \frac{4}{1} \times \frac{2}{1}$

$= \frac{8}{1}$

$= 8$ Ans:

(13) $3\frac{1}{5} \times 1\frac{7}{8}$

Sol: $= 3\frac{1}{5} \times 1\frac{7}{8}$

$= \frac{\cancel{16}^{2}}{\cancel{5}_{1}} \times \frac{\cancel{15}^{3}}{\cancel{8}_{1}}$

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

$= \frac{6}{1}$

$= 6$ Ans:

3.5 Division of Common Fractions:

Consider the following example:

Example-1 **Divide 16 by 4**

Solution: **16 ÷ 4**

Change division " ÷ " sign to multiplication "x" sign and write the whole number after " ÷ " sign which is 4 in the form of fraction and simplify it.

$16 \times \frac{1}{4} = \frac{16 \times 1}{4} = \frac{\cancel{16}^{4}}{\cancel{4}_{1}} = 4$ (Simplest form of $\frac{16}{4}$ is 4)

In the above example we see that to divide 16 by 4 is equivalent to multiply 16 by $\frac{1}{4}$, which is the multiplicative Inverse of 4.

Example-2 **Divide 24 by 8.**

Solution: 24 ÷ **8**

$24 \times \frac{1}{8} = \frac{24 \times 1}{8} = \frac{\cancel{24}^{3}}{\cancel{8}_{1}} = 3$ (Simplest form of $\frac{24}{8}$ is 3)

We see that dividing 24 by 8 is the same as multiplying by the Reciprocal of 8 Reciprocal or Multiplicative Inverse of 8 is $\frac{1}{8}$

This implies that $24 \div 8 = 24 \times \frac{1}{8} = 3$

Example-3 Simplify $\frac{8}{9} \div 2$

Solution: $\frac{8}{9} \div 2$

$= \frac{8}{9} \times \frac{1}{2}$ (Change ÷ into x and substitute Multiplicative Inverse of 2, which is $\frac{1}{2}$)

$= \frac{8 \times 1}{9 \times 2} = \frac{\cancel{8}^{4} \times 1}{9 \times \cancel{2}_{1}} = \frac{4}{9}$

Example-4

Simplify $\frac{5}{11} \div \frac{15}{44}$

Solution: $\frac{5}{11} \div \frac{15}{44}$

$= \frac{5}{11} \times \frac{15}{44}$ (Multiplicative Inverse of $\frac{15}{44}$ is $\frac{44}{15}$)

$= \frac{\overset{1}{\cancel{5}} \times \overset{4}{\cancel{44}}}{\underset{1}{\cancel{11}} \times \underset{3}{\cancel{15}}} = \frac{4}{3} = 1\frac{1}{3}$ (Change $\frac{4}{3}$ into mixed fraction)

Exercise 3.4

Q.1: Simplify the following:

1. $\frac{8}{7} \div 3$

Sol: $\frac{8}{7} \div 3$

$= \frac{8}{7} \div \frac{3}{1}$

$= \frac{8}{7} \times \frac{1}{3}$

$= \frac{8}{21}$ **Ans:**

2. $\frac{4}{5} \div \frac{2}{15}$

Sol: $\frac{4}{5} \div \frac{2}{15}$

$= \frac{\overset{2}{\cancel{4}}}{\underset{1}{\cancel{5}}} \times \frac{\overset{3}{\cancel{15}}}{\underset{1}{\cancel{2}}}$

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

$= \frac{6}{1}$

$= 6$ **Ans:**

3. $\frac{12}{13} \div \frac{16}{39}$

Sol: $\frac{12}{13} \div \frac{16}{39}$

$= \frac{\overset{3}{\cancel{12}}}{\underset{1}{\cancel{13}}} \times \frac{\overset{3}{\cancel{39}}}{\underset{4}{\cancel{16}}}$

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

$= \frac{9}{4}$

$= 2\frac{1}{4}$ **Ans:**

R.W

4) 9 (2

8

1

4. $5\frac{3}{8} \div 4\frac{3}{10}$

Sol: $5\frac{3}{8} \div 4\frac{3}{10}$

$= \frac{\overset{2}{\cancel{43}}}{\underset{1}{\cancel{8}}} \times \frac{\overset{3}{\cancel{43}}}{\underset{1}{\cancel{10}}}$

$= \frac{1}{4} \times \frac{5}{1}$

$= \frac{5}{4}$

$= 1\frac{1}{4}$ **Ans:**

R.W

4) 5 (1

4

1

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

Sol: $\frac{15}{7} \div \frac{3}{1}$

$= \frac{\overset{5}{\cancel{15}}}{7} \times \frac{1}{\underset{1}{\cancel{3}}}$

$= \frac{5}{7} \times \frac{1}{1}$

$= \frac{5}{7}$ **Ans:**

6. $\frac{2}{7} \div \frac{3}{14}$

Sol: $\frac{2}{7} \div \frac{3}{14}$

$= \frac{2}{\underset{1}{\cancel{7}}} \times \frac{\overset{2}{\cancel{14}}}{3}$

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

$= \frac{4}{3}$

$= 1\frac{1}{3}$ **Ans:**

7. $2\frac{1}{3} \div \frac{14}{39}$

Sol: $2\frac{1}{3} \div \frac{14}{39}$

$= \frac{7}{3} \div \frac{14}{39}$

$= \frac{\overset{1}{\cancel{7}}}{\underset{1}{\cancel{3}}} \times \frac{\overset{3}{\cancel{39}}}{\underset{2}{\cancel{14}}}$

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

$= \frac{3}{2}$

$= 1\frac{1}{2}$ **Ans:**

8. $7\frac{1}{8} \div 1\frac{3}{16}$

Sol: $7\frac{1}{8} \div 1\frac{3}{16}$

$= \frac{57}{8} \div \frac{19}{16}$

$= \frac{\overset{3}{\cancel{57}}}{\underset{1}{\cancel{8}}} \times \frac{\overset{2}{\cancel{16}}}{\underset{1}{\cancel{19}}}$

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

$= \frac{6}{1}$

$= 6$ **Ans:**

9. $6\frac{3}{4} \div 9$

Sol: $6\frac{3}{4} \div 9$

$= \frac{27}{4} \div \frac{9}{1}$

$= \frac{\overset{3}{\cancel{27}}}{4} \times \frac{1}{\underset{1}{\cancel{9}}}$

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

$= \frac{3}{4}$ **Ans:**

10. $\frac{2}{3} \div \frac{14}{15}$

Sol: $\frac{2}{3} \div \frac{14}{15}$

$= \frac{\overset{1}{\cancel{2}}}{\underset{1}{\cancel{3}}} \times \frac{\overset{5}{\cancel{15}}}{\underset{7}{\cancel{14}}}$

$= \frac{1}{1} \times \frac{5}{7}$

$= \frac{5}{7}$ **Ans:**

3.6 Problem Based on Common Fraction

(a) Multiplication:

Example-1

Cost of a pen is Rs. $\frac{2}{3}$ Find the cost of 9 such pens.

Solution: Cost of a pen is Rs. $\frac{2}{3}$

Cost of 9 pens $= \frac{2}{3} \times 9 = \frac{2 \times \cancel{9}^{3}}{\cancel{3}_{1}} = 2 \times 3 = 6$

Hence the cost of 9 pens will be Rs. 6.

Example-2

Saba bought $4\frac{1}{6}$ kg of sweets. She gave one fifth of the sweets to her friend. What fraction of sweets did her friend get?

Solution:

Total sweets $= 4\frac{1}{6}$

Here friend got one fifth of it. This means $\frac{1}{5}$ of $4\frac{1}{6}$

$= \frac{1}{5} \times 4\frac{1}{6}$ (Change $4\frac{1}{6}$ into improper fraction, $= \frac{25}{6}$)

$= \frac{1}{5} \times \frac{25}{6} = \frac{1 \times \cancel{25}^{5}}{\cancel{5}_{1} \times 6} = \frac{5}{6}$ (She got $\frac{5}{6}$ kg of sweets)

(b) DIVISION:

Example-1

My mother made 9 frocks of the same from a piece of cloth measuring $16\frac{1}{5}$ meters. How much cloth is used in each frock?

Solution: Total measurement of the cloth is $16\frac{1}{5}$ meters.

Total frocks are 9.

Cloth is used in each frock $= 16\frac{1}{5} \div 9$

$= 16\frac{1}{5} \times \frac{1}{9}$ (Multiplicative Inverse of $9 = \frac{1}{9}$)

$= \frac{81}{5} \times \frac{1}{9}$ (Change $16\frac{1}{9}$ into improper fraction)

$= \frac{\cancel{81}^{9} \times 1}{5 \times \cancel{9}_{1}} = \frac{9}{5} = 1\frac{4}{5}$ meters of cloth is used in each frock.

Example-2

Iqbal had Rs.25 $\frac{1}{2}$. He bought some books of the same price. If the cost of a book is Rs.$4\frac{1}{4}$, find the total number of books he bought?

Solution: Total amount that he had Rs.$25\frac{1}{2}$

Cost of a book that he bought is Rs.$4\frac{1}{4}$

Total books she bought $= 25\frac{1}{2} \div 4\frac{1}{4}$

$= \frac{51}{2} \div \frac{17}{4}$ (Improper fractions of $25\frac{1}{2}$ and $4\frac{1}{4}$)

$= \frac{51}{2} \times \frac{4}{17}$ (Reciprocal of $\frac{17}{4}$ is $\frac{4}{17}$)

$= \frac{51}{2} \times \frac{4}{17} = 3 \times 2 = 6$

Hence she bought 6 books in Rs.$25\frac{1}{2}$

Exercise 3.5

Q.1. A shopkeeper had 12 dozen eggs. He sold two third of the eggs in a day. Find the total number of eggs he sold.

Sol: A shopkeeper had = 12 dozen eggs.
He sold $\frac{2}{3}$ of the eggs in a day
Total number of egg =?

Sol: $\frac{2}{\cancel{3}_{1}} \times \cancel{12}^{4}$

8 eggs

If he sold 8 eggs out of 12

Then,

$= 12 \times 8$

$= 96$

R.W

13
x8
96

Ans: He sold 96 eggs out of 12 dozen.

Q.2. What will be the total amount of 12 copies, if the cost of a copy is Rs.11 $\frac{1}{4}$?

Sol: $11\frac{1}{4} \times 12$

$\frac{45}{\cancel{4}_1} \times \cancel{12}^{3}$

$= 45 \times 3$

$= 135$

Ans: The cost of 12 copies is Rs. 135

Q.3. A drum can hold 5 $\frac{1}{7}$ litres of milk. How many such drums are required to hold 2 $\frac{6}{7}$ litres of milk?

Sol: $5\frac{1}{7} - 2\frac{6}{7}$

$= \frac{36}{7} + \frac{20}{7}$

$= \frac{36+20}{7}$

$= \frac{56}{7} = 8$ Ans:

Q.4. If $\frac{5}{8}$ meters of string is cut into 10 equal pieces, what is the length of each piece?

Sol: $\frac{5}{8} \times 10$

$= \frac{25}{4}$ Ans:

Q.5. A shopkeeper sold 11 sets of games for Rs.90 $\frac{3}{4}$ what was the cost of each set?

Data:

Shopkeeper sold 11 set of game $= 90\frac{3}{4}$

$= \frac{363}{4} - 11$

$= \frac{363 - 4(11)}{4}$

$= \frac{363}{4}$

$= \frac{363 - 44}{4}$

$= \frac{319}{4}$

$= 79.75$ Ans:

Q.6. One plank is $\frac{4}{7}$ meters long. What will be the total length of 21 such planks?

Sol: $\frac{4}{7} \times 21$

$\frac{4}{\cancel{7}_1} \times \cancel{21}^{3}$

$= 4 \times 3$

$= 12$ Ans:

3.7 Multiplication and Division of Fractions

In some problems of common fractions both the signs of division and multiplication are present. To simplify such problems we perform the operation of division first and then of multiplication.

Consider the following examples:

Example-1 Simplify $\frac{7}{16} \times \frac{8}{15} \div \frac{25}{14}$

Solution:

$\frac{7}{16} \times \frac{8}{15} \div \frac{25}{14}$

$\frac{7}{\cancel{16}_{8}} \times \frac{\cancel{8}}{15} \times \frac{\cancel{14}^{7}}{25}$ (Multiplicative inverse of $\frac{14}{25}$)

$\frac{7 \times 1 \times 7}{1 \times 15 \times 25} = \frac{49}{375}$ (Performing multiplication)

Example-2

Simplify $2\frac{2}{5} \div 3\frac{3}{11} \times 1\frac{2}{33}$

Solution: $2\frac{2}{5} \div 3\frac{3}{11} \times 1\frac{2}{33}$ (Change into improper fractions)

$= \frac{12}{5} \div \frac{36}{11} \times \frac{35}{33}$

$= \frac{12}{5} \times \frac{11}{36} \times \frac{35}{33}$ (Reciprocal of $\frac{36}{11} = \frac{11}{36}$)

$= \frac{\overset{1}{\cancel{12}}}{\underset{1}{\cancel{5}}} \times \frac{\overset{1}{\cancel{11}}}{\underset{3}{\cancel{36}}} \times \frac{\overset{7}{\cancel{35}}}{\underset{3}{\cancel{33}}}$ (Performing multiplication)

$= \frac{1 \times 1 \times 7}{1 \times 3 \times 3} = \frac{7}{9}$

Example-3

Simplify $5\frac{3}{5} \div 3\frac{8}{9} \times 6\frac{1}{4} \div 4\frac{8}{9}$

Solution: $5\frac{3}{5} \div 3\frac{8}{9} \times 6\frac{1}{4} \div 4\frac{8}{9}$

$= \frac{28}{5} \div \frac{35}{9} \times \frac{25}{4} \div \frac{44}{9}$ (Improper fractions)

$= \frac{28}{5} \times \frac{9}{35} \times \frac{25}{4} \times \frac{9}{44}$ (Reciprocals of $\frac{35}{9}$ and $\frac{44}{9}$)

$= \frac{\overset{4}{\cancel{28}}}{\underset{1}{\cancel{5}}} \times \frac{\overset{1}{\cancel{9}}}{\underset{}{\cancel{35}}} \times \frac{\overset{5}{\cancel{25}}}{\underset{1}{\cancel{4}}} \times \frac{\cancel{44}}{\underset{1}{\cancel{9}}}$ (Performing Multiplication)

$= \frac{4}{\underset{1}{\cancel{5}}} \times \frac{1}{\underset{1}{\cancel{5}}} \times \frac{\overset{5}{\cancel{25}}}{\underset{1}{\cancel{1}}} \times \frac{11}{1}$

$= \frac{4}{1} \times \frac{1}{\underset{1}{\cancel{5}}} \times \frac{\overset{1}{\cancel{5}}}{1} \times \frac{11}{1}$

$= 44$ Ans:

Exercise 3.6

Q.1: Simplify the following:

(1) $\frac{5}{8} \times \frac{32}{15} \div \frac{16}{9}$

Sol: $\frac{5}{8} \times \frac{32}{15} \div \frac{16}{9}$

$= \frac{\overset{1}{\cancel{5}}}{8} \times \frac{\overset{2}{\cancel{32}}}{\underset{3}{\cancel{15}}} \times \frac{9}{\underset{1}{\cancel{16}}}$

$= \frac{1}{\underset{4}{\cancel{8}}} \times \frac{\overset{1}{\cancel{2}}}{\underset{1}{\cancel{3}}} \times \frac{\overset{3}{\cancel{9}}}{1}$

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

(2) $5\frac{7}{10} \times 3\frac{1}{3} \div 3\frac{3}{6}$

Sol: $5\frac{7}{10} \times 3\frac{1}{3} \div 3\frac{3}{6}$

$= \frac{57}{10} \times \frac{10}{3} \div \frac{21}{6}$

$= \frac{\overset{19}{\cancel{57}}}{\underset{1}{\cancel{10}}} \times \frac{\overset{1}{\cancel{10}}}{\underset{1}{\cancel{3}}} \times \frac{6}{21}$

$= \frac{19}{1} \times \frac{1}{1} \times \frac{\overset{2}{\cancel{6}}}{\underset{7}{\cancel{21}}}$

$= \frac{19}{1} \times \frac{2}{7}$

$= \frac{38}{7}$

$= 5\frac{3}{7}$ Ans:

R.W

$7\overline{)38}\,5$

35

3

(3) $\mathbf{\frac{5}{6} \div \frac{8}{12} \times \frac{24}{4}}$

Sol: $\frac{5}{6} \div \frac{8}{12} \times \frac{24}{4}$

$= \frac{5}{\cancel{6}_1} \times \frac{\cancel{12}^{2}}{8} \times \frac{24}{4}$

$= \frac{5}{1} \times \frac{\cancel{2}^{1}}{\cancel{8}_1} \times \frac{\cancel{24}^{3}}{\cancel{4}_2}$

$= \frac{15}{2}$

$= 7\frac{1}{2}$ Ans:

R.W

2) 15 (7
14
1

(4) $\mathbf{7\frac{1}{3} \times 2\frac{1}{3} \div 4\frac{2}{3}}$

Sol: $7\frac{1}{3} \times 2\frac{1}{3} \div 4\frac{2}{3}$

$= \frac{22}{3} \times \frac{7}{3} \div \frac{14}{3}$

$= \frac{22}{3} \times \frac{\cancel{7}^{1}}{3} \times \frac{3}{\cancel{14}_2}$

$= \frac{22}{3} \times \frac{1}{\cancel{3}} \times \frac{\cancel{3}}{2}$

$= \frac{\cancel{22}^{11}}{\cancel{6}_3}$

$= \frac{11}{3}$

$= 3\frac{2}{3}$ Ans:

(5) $\mathbf{\frac{3}{7} \times \frac{12}{5} \div \frac{24}{35}}$

Sol: $\frac{3}{7} \times \frac{12}{5} \div \frac{24}{35}$

$= \frac{3}{7} \times \frac{\cancel{12}^{1}}{\cancel{5}_1} \div \frac{\cancel{35}^{7}}{\cancel{24}_2}$

$= \frac{3}{\cancel{7}_1} \times \frac{\cancel{7}_1}{2}$

$= \frac{3}{2}$

$= 1\frac{1}{2}$ Ans:

R.W

2) 3 (1
2
1

(6) $\mathbf{3\frac{1}{8} \div 2\frac{7}{9} \times 6\frac{2}{5}}$

Sol: $3\frac{1}{8} \div 2\frac{7}{9} \times 6\frac{2}{5}$

$= \frac{25}{8} \times \frac{25}{9} \div \frac{32}{5}$

$= \frac{\cancel{25}^{1}}{8} \times \frac{9}{\cancel{25}_1} \times \frac{32}{5}$

$= \frac{1}{\cancel{8}_1} \times \frac{9}{1} \times \frac{\cancel{32}^{4}}{5}$

$= \frac{9}{1} \times \frac{4}{5}$

$= \frac{36}{5}$

$= 7\frac{1}{5}$ Ans:

R.W

5) 36 (7
35
1

(7) $\mathbf{\frac{8}{9} \div \frac{4}{21} \times \frac{3}{28}}$

Sol: $\frac{8}{9} \div \frac{4}{21} \times \frac{3}{28}$

$= \frac{\cancel{8}^{2}}{\cancel{9}_3} \times \frac{\cancel{21}^{7}}{\cancel{4}_1} \times \frac{3}{28}$

$= \frac{2}{3} \times \frac{\cancel{7}^{1}}{1} \times \frac{3}{\cancel{28}}$

$= \frac{\cancel{2}^{1}}{\cancel{3}_1} \times \frac{\cancel{3}}{\cancel{4}_2}$

$= \frac{1}{2}$ Ans:

(8) $4\frac{2}{9} \times 2\frac{7}{19} \div 3\frac{1}{5}$

Sol: $4\frac{2}{9} \times 2\frac{7}{19} \div 3\frac{1}{5}$

$= \frac{38}{9} \times \frac{45}{19} \div \frac{16}{5}$

$= \frac{\cancel{38}^{2}}{9_{3}} \times \frac{\cancel{45}^{15}}{\cancel{19}_{1}} \times \frac{5}{\cancel{16}_{8}}$

$= \frac{\cancel{2}^{1}}{\cancel{3}_{1}} \times \frac{\cancel{45}^{5}}{1} \times \frac{5}{\cancel{16}_{8}}$

$= \frac{5}{1} \times \frac{5}{8}$

$= \frac{25}{8}$

$= 3\frac{1}{8}$ Ans:

R.W

$8\overline{)25}\,3$

$\frac{24}{1}$

(9) $\frac{5}{8} \times \frac{8}{15} \div \frac{16}{9} \times \frac{2}{3}$

Sol: $\frac{5}{8} \times \frac{8}{15} \div \frac{16}{9} \times \frac{2}{3}$

$= \frac{\cancel{5}^{1}}{\cancel{8}_{1}} \times \frac{\cancel{8}^{1}}{\cancel{15}_{3}} \times \frac{\cancel{9}^{3}}{\cancel{16}_{8}} \times \frac{\cancel{2}^{1}}{\cancel{3}_{1}}$

$= \frac{1}{1} \times \frac{1}{3} \times \frac{3}{8} \times \frac{1}{1}$

$= \frac{1}{\cancel{3}_{1}} \times \frac{\cancel{3}_{1}}{8}$

$= \frac{1}{8}$ Ans:

(10) $2\frac{1}{5} \times 3\frac{3}{7} \div 2\frac{2}{11}$

Sol: $2\frac{1}{5} \times 3\frac{3}{7} \div 2\frac{2}{11}$

$= \frac{11}{5} \times \frac{24}{7} \div \frac{24}{11}$

$= \frac{11}{5} \times \frac{\cancel{24}^{1}}{7} \times \frac{11}{\cancel{24}_{1}}$

$= \frac{11}{5} \times \frac{11}{7}$

$= \frac{121}{35}$ Ans:

CHAPTER NO.4

USE OF BRACKETS

4.1 USE OF BRACKETS

We have learnt about the four basic operations (÷ , x, +, -) separately in the previous chapter. Sometimes all these basic operations are present in some mathemethical expression. But it is difficult to us to simplify these operations correctly, because on simplifying of such expressions we shall se that we get different values of the same expression according as we understood the same expression in one way or the other. To avoid this confusion, we use Brackets.

Shape of Brackets:

There different types of brackets commonly use in mathematics:

1. _____ **Bar Bracket**
2. ( ) **Small brackets or Parenthesis**
3. { } **Curly brackets or Braces**
4. [ ] **Large brackets or Square brackets**

How to remove brackets:

While simplifying such mathematical expressions in which brackets are involved, following steps are to be adopted.

1st - Step The part of the expression within Parenthesis is simplified

2nd - Step The part of the expression within Braces is simplified.

3rd - Step The part of the expression within Square brackets is simplified.

Example-1 **Simplify** $5\frac{3}{5}+\left[\frac{2}{5}\ \left\{\left(\frac{7}{2}\ \ \frac{1}{3}\right)\ \frac{3}{13}\right\}\right]$

Solution:

$$5\frac{3}{5}+\left[\frac{2}{5}\div\left\{\left(\frac{7}{2}-\frac{1}{3}\right)\times\frac{3}{13}\right\}\right]$$

$$=5\frac{16}{3}+\left[\frac{2}{5}\div\left\{\left(\frac{7\text{ x }3-1\text{ x }2}{6}\right)\times\frac{3}{13}\right\}\right] \quad \textbf{(1st Step)}$$

$$=\frac{16}{3}+\left[\frac{2}{5}\div\left\{\left(\frac{21-2}{6}\right)\times\frac{3}{13}\right\}\right]$$

$$=\frac{16}{3}+\left[\frac{2}{5}\div\left\{\left(\frac{19}{6}\times\frac{3}{13}\right)\right\}\right] \quad \textbf{(2nd Step)}$$

$$=\frac{16}{3}+\left[\frac{2}{5}\div\frac{19}{26}\right] \quad \textbf{(3rd Step)}$$

$$=\frac{16}{3}+\left[\frac{2}{5}\times\frac{26}{19}\right]$$

$$=\frac{16}{3}+\frac{52}{95}$$

$$=\frac{16\text{ x }95+52\text{ x }3}{285}$$

$$=\frac{1520+156}{285}$$

$$=\frac{1676}{285} \quad \text{(Change } \frac{1676}{285} \text{ into mixed fraction)}$$

$$=5\frac{1676}{285}$$

Example-2 **Simplify** $3\frac{1}{2}-\left(\frac{1}{4}+\frac{3}{2}\right)$

Solution:

$$3\frac{1}{2}-\left(\frac{1}{4}+\frac{3}{2}\right)$$

$$=\frac{7}{2}-\left(\frac{1}{4}+\frac{3}{2}\right)$$

$$=\frac{7}{2}-\left(\frac{1+6}{4}\right)$$

$$=\frac{7}{2}-\frac{7}{4}$$

$$=\frac{14-7}{4}$$

$$=\frac{7}{4}$$

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

Example-3 **Simplify** $4\frac{1}{8}-\left\{1\frac{1}{4}+\left(\frac{1}{2}+\frac{7}{8}\right)\right\}$

Solution:

$$4\frac{1}{8}-\left\{1\frac{1}{4}+\left(\frac{1}{2}+\frac{7}{8}\right)\right\}$$

$$=\frac{33}{8}-\left\{\frac{5}{4}+\left(\frac{1}{2}+\frac{7}{8}\right)\right\}$$

$$=\frac{33}{8}-\left\{\frac{5}{4}+\left(\frac{4}{8}+\frac{7}{8}\right)\right\}$$

$$=\frac{33}{8}-\left\{\frac{5}{4}+\left(\frac{4+7}{8}\right)\right\}$$

$$=\frac{33}{8}-\left\{\frac{5}{4}+\frac{11}{8}\right\}$$

$$=\frac{33}{8}-\left\{\frac{10+11}{8}\right\}$$

$$=\frac{33}{8}-\frac{21}{8}$$

$$=\frac{33-21}{8}$$

$$=\frac{12}{8}$$

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

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

Example-4 **Simplify** $4\frac{3}{5}-\left[1\frac{3}{8}\div\left\{\frac{5}{7}\times\left(\frac{1}{3}+\frac{1}{4}\right)\right\}\right]$

Solution:

$$4\frac{3}{5}-\left[1\frac{3}{8}\div\left\{\frac{5}{7}\times\left(\frac{1}{3}+\frac{1}{4}\right)\right\}\right]$$

$$=\frac{23}{5}-\left[\frac{11}{8}\div\left\{\frac{5}{7}\times\left(\frac{1}{3}+\frac{1}{4}\right)\right\}\right]$$

$$=\frac{23}{5}-\left[\frac{11}{8}\div\left\{\frac{5}{7}\times\left(\frac{4}{12}+\frac{3}{12}\right)\right\}\right]$$

$$=\frac{23}{5}-\left[\frac{11}{8}\div\left\{\frac{5}{7}\times\left(\frac{4+3}{12}\right)\right\}\right]$$

$$=\frac{23}{5}-\left[\frac{11}{8}\div\left\{\frac{5}{7}\times\frac{7}{12}\right\}\right]$$

$$=\frac{23}{5}-\left[\frac{11}{8}\div\frac{5}{12}\right]$$

$$=\frac{23}{5}-\left[\frac{11}{\cancel{8}_{2}}\times\frac{\overset{3}{\cancel{12}}}{5}\right]$$

$$=\frac{23}{5}-\frac{33}{10}$$

$$=\frac{46}{10}-\frac{33}{10}$$

$$= \frac{46 - 33}{10}$$

$$= \frac{13}{10}$$

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

Example-5

Simplify

$8.5 + \left[12.546 - \left\{8.01 + \left(2.001 - 0.008\right)\right\}\right]$

Solution:

$$8.5 + \left[12.546 - \left\{8.01 + \left(2.001 - 0.008\right)\right\}\right]$$

$$= 8.5 + \left[12.546 - \left\{8.01 + 1.993\right\}\right]$$

$$= 8.5 + \left[12.546 - 10.003\right]$$

$$= 8.5 + 2.543$$

$$= 11.043$$

Example-6

Simplify

$2.3 \times \left[5.1306 - \left\{8.3884 \div \left(1.6 + 2.7 \times 0.4\right)\right\}\right]$

Solution:

$$2.3 \times \left[5.1306 - \left\{8.3884 \div \left(1.6 + 2.7 \times 0.4\right)\right\}\right]$$

$$= 2.3 \times \left[5.1306 - \left\{8.3884 \div \left(1.6 + 1.08\right)\right\}\right]$$

$$= 2.3 \times \left[5.1306 - \left\{8.3884 \div 2.68\right\}\right]$$

$$= 2.3 \times \left[5.1306 - 3.13\right]$$

$$= 2.3 \times 2.0006$$

$$= 4.60138$$

$$= 4.6014$$

Exercise 4.1

Q.1: Simplify:

(1) $2 + 2 - 6 \div 3$

Sol: $2 + 2 - 6 \div 3$

$= 4 - 2$

$= 2$ Ans:

(2) $3 - (7 + 5 - 3) + 4 \times 8 \div 2$

Sol: $3 - (7 + 5 - 3) + 4 \times 8 \div 2$

$= 3 - (12 - 3) + 4 \times 8 \div 2$

$= 3 - 9 + 4 \times 8 \div 2$

$= 3 - 9 + 4 \times 4$

$= 3 - 9 + 16$

$= 19 - 9$

$= 10$ Ans:

(3) $2\frac{2}{3} - \left(\frac{7}{9} \div \frac{14}{15}\right)$

R.W

2	3 , 6
3	3 , 3
	1 , 1

Sol: $2\frac{2}{3} - \left(\frac{7}{9} \div \frac{14}{15}\right)$

$= \frac{8}{3} - \left(\frac{\cancel{7}^{1}}{\cancel{9}_{3}} \times \frac{\cancel{15}^{5}}{\cancel{14}_{2}}\right)$

$= \frac{8}{3} - \frac{5}{6}$

LCM = 2 x 3

LCM = 6

$= \frac{(8 \times 2) - (5 \times 1)}{6}$

$= \frac{16 - 5}{6}$

$= \frac{11}{6}$

$= 1\frac{5}{6}$ Ans:

R.W

$6\overline{)11}\,(1$

$\frac{6}{5}$

(4) $\left(4\frac{1}{9}\times\frac{45}{74}\right)-\left(\frac{7}{8}\div1\frac{15}{16}\right)$

Sol: $\left(4\frac{1}{9}\times\frac{45}{74}\right)-\left(\frac{7}{8}\div1\frac{15}{16}\right)$

$= \left(\frac{37}{9}\times\frac{45}{74}\right)-\left(\frac{7}{8}\div\frac{31}{16}\right)$

$= \left(\frac{5}{2}\right)-\left(\frac{7}{\cancel{8}_1}\times\frac{\cancel{16}^{2}}{31}\right)$

$= \frac{5}{2}-\left(\frac{7}{1}\times\frac{2}{31}\right)$

$= \frac{5}{2}-\frac{14}{31}$

LCM = 2 x 31
LCM = 62

$= \frac{(5x31)-(14x2)}{6}$

$= \frac{155-28}{62}$

$= \frac{127}{62}$

$= 2\frac{3}{62}$ Ans:

R.W

2	2 , 31
3	1 , 31
	1 , 1

R.W

62) 127 (2
124
3

(5) $\left\{7\frac{1}{8}\times\left(\frac{4}{19}\div\frac{5}{9}\right)\right\}-2\frac{1}{5}$

Sol: $\left\{7\frac{1}{8}\times\left(\frac{4}{19}\div\frac{5}{9}\right)\right\}-2\frac{1}{5}$

$= \left\{\frac{57}{8}\times\left(\frac{4}{19}\times\frac{9}{5}\right)\right\}-\frac{11}{5}$

$= \left\{\frac{57}{8}\times\frac{36}{85}\right\}-\frac{11}{5}$

$= \left\{\frac{\cancel{57}^{3}}{\cancel{8}_2}\times\frac{\cancel{36}^{9}}{\cancel{85}_5}\right\}-\frac{11}{5}$

$= \left\{\frac{3}{2}\times\frac{9}{5}\right\}-\frac{11}{5}$

$= \frac{27}{10}-\frac{11}{5}$

R.W

2	10 , 5
5	5 , 5
	1 , 1

LCM = 2 x 5
LCM = 10

$= \frac{(27x1)-(11x2)}{10}$

$= \frac{27-22}{10}$

$= \frac{5}{10}$

$= \frac{1}{2}$ Ans:

(6) $2+\left\{\frac{1}{2}+\frac{1}{6}\div\left(\frac{1}{6}\div\frac{1}{3}\right)\right\}$

Sol: $2+\left\{\frac{1}{2}+\frac{1}{6}\div\left(\frac{1}{6}\div\frac{1}{3}\right)\right\}$

$= 2+\left\{\frac{1}{2}+\frac{1}{6}\div\left(\frac{1}{\cancel{6}_2}\times\frac{\cancel{3}^{1}}{1}\right)\right\}$

$= 2+\left\{\frac{1}{2}+\frac{1}{\cancel{6}_3}\times\frac{\cancel{2}^{1}}{1}\right\}$

$= 2+\left\{\frac{1}{2}+\frac{1}{3}\right\}$

LCM = 2 x 3
LCM = 6

$= 2+\left\{\frac{(1x3)+(1x2)}{6}\right\}$

$= 2+\left\{\frac{3+2}{6}\right\}$

$= \frac{2}{1}+\frac{5}{6}$

$= \frac{(2x6)+(5x1)}{6}$

$= \frac{12+5}{6}$

$= \frac{17}{6}$

$= 2\frac{5}{6}$ Ans:

R.W

2	2 , 3
3	1 , 3
	1 , 1

R.W

6) 17 (2
12
5

(7) $\mathbf{15\frac{1}{3} - \left[\frac{2}{3} \div \left\{\left(\frac{5}{2} - \frac{1}{3}\right) \times \frac{3}{13}\right\}\right]}$

Sol: $15\frac{1}{3} - \left[\frac{2}{3} \div \left\{\left(\frac{5}{2} - \frac{1}{3}\right) \times \frac{3}{13}\right\}\right]$

$= \frac{46}{3} - \left[\frac{2}{3} \div \left\{\left(\frac{5x3-1x2}{6}\right) \times \frac{3}{13}\right\}\right]$

$= \frac{46}{3} - \left[\frac{2}{3} \div \left\{\left(\frac{15-2}{6}\right) \times \frac{3}{13}\right\}\right]$

$= \frac{46}{3} - \left[\frac{2}{3} \div \left\{\frac{\cancel{3}^{1}}{\cancel{6}_{2}} \times \frac{\cancel{3}^{1}}{\cancel{13}_{1}}\right\}\right]$

$= \frac{46}{3} - \left[\frac{2}{3} \div \frac{1}{2}\right\}\right]$

$= \frac{46}{3} - \left[\frac{2}{3} \times \frac{2}{1}\right\}\right]$

$= \frac{46}{3} - \frac{4}{3}$

$= \frac{46-4}{3}$

$= \frac{\cancel{42}^{14}}{\cancel{3}_{1}}$

$= 14$ Ans:

(8) $\mathbf{1\frac{2}{3} \times 2\frac{4}{5} - \left\{\left(2\frac{5}{8} \div \frac{15}{16}\right) \times 1\frac{1}{7}\right\}}$

Sol: $1\frac{2}{3} \times 2\frac{4}{5} - \left\{\left(2\frac{5}{8} \div \frac{15}{16}\right) \times 1\frac{1}{7}\right\}$

$= \frac{5}{3} \times \frac{14}{5} - \left\{\left(\frac{23}{8} \div \frac{15}{16}\right) \times \frac{8}{7}\right\}$

$= \frac{5}{3} \times \frac{14}{5} - \left\{\left(\frac{23}{\cancel{8}_{1}} \times \frac{\cancel{16}^{2}}{15}\right) \times \frac{8}{7}\right\}$

$= \frac{5}{3} \times \frac{14}{5} - \left\{\left(\frac{23}{1} \times \frac{2}{15}\right) \times \frac{8}{7}\right\}$

$= \frac{\cancel{5}}{3} \times \frac{14}{\cancel{5}} - \frac{46}{15} \times \frac{8}{7}$

$= \frac{14}{3} - \frac{368}{105}$

LCM = 3 x 5 x7
LCM = 105

R.W
46
x8
368

$= \frac{(14x35) + (368x1)}{105}$

$= \frac{490 + 368}{105}$

$= \frac{122}{105}$

$= 1\frac{17}{105}$ Ans:

R.W

105) 122 (1
-105
17

R.W

3	3 ,105
5	1 , 35
7	1 , 7
	1 , 1

R.W
35
x14
140
35x
490

R.W
490
-368
122

(9) $\mathbf{\left\{\left(2.2 \times 2.2\right) - \left(1.8 \times 1.8\right)\right\} \div \left\{2.2 - 1.8\right\}}$

Sol: $\left\{\left(2.2 \times 2.2\right) - \left(1.8 \times 1.8\right)\right\} \div \left\{2.2 - 1.8\right\}$

$= \left\{4.84 - 3.24\right\} \div 0.4$

$= 1.6 \div 0.4$

$= 4$ Ans:

(10) $\mathbf{1.4 \times \left[0.9 - \left\{1.802 \div \left(1.8 + 1.6 \times 0.2\right)\right\}\right]}$

Sol: $1.4 \times \left[0.9 - \left\{1.802 \div \left(1.8 + 0 \times 0.2\right)\right\}\right]$

$= 1.4 \times \left[0.9 - \left\{1.802 \div 2.12\right\}\right]$

$= 1.4 \times \left[0.9 - 0.85\right]$

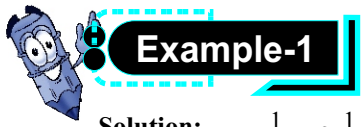
$= 1.4 \times 0.05$

$= 0.07$ Ans:

4.2 Associative Property of Addition in Fractions

We have learnt in the previous class that:
When more than two whole numbers are added, the way in which the number are grouped or combined, does not affect the sum.

For example: $(5 + 4) + 6 = 5 + (4 + 6)$. This is called the Associative Property of Addition. The same property of whole number is true in case of common fractions as well. Consider the following example.



Example-1 **Add** $\frac{3}{4}$, $2\frac{1}{2}$ **and** $3\frac{1}{5}$

Solution: $\frac{1}{5} + 2\frac{1}{2} + 3\frac{1}{5}$

We can add the given equation in two ways. First we add $\frac{3}{4}$ and $2\frac{1}{2}$ together and then add $3\frac{1}{5}$ to its sum. The other way is to add $2\frac{1}{2}$ and $3\frac{1}{5}$ together and then add $\frac{3}{4}$ to the sum. Observe the ways off addition.

Case - 1: $\frac{1}{5} + 2\frac{1}{2} + 3\frac{1}{5}$ (Change into improper fractions)

$= \left(\frac{3}{4} + \frac{1}{5}\right) + \frac{16}{5}$ (Take L.C.M of 4 and 2 only)

$= \left(\frac{3 \times 1 + 5 \times 2}{4}\right) + \frac{16}{5}$

$= \left(\frac{3 + 10}{4}\right) + \frac{16}{5}$ (Now take L.C.M of 4 and 5)

$= \left(\frac{13 \times 5 + 16 \times 4}{20}\right) = \frac{65 + 64}{20} = \frac{129}{20}$ or $6\frac{9}{20}$

Case - 2: $\frac{3}{4} + \left(2\frac{3}{4} + 3\frac{1}{5}\right)$ (Change into improper fractions)

$= \frac{3}{4} + \left(\frac{5}{2} + \frac{16}{5}\right)$ (Take L.C.M of 4 and 2 only)

$= \frac{3}{4} + \left(\frac{5 \times 5 + 16 \times 2}{10}\right)$

$= \frac{3}{4} + \left(\frac{25 + 32}{10}\right)$

$= \frac{3}{4} + \frac{57}{10}$ (Now take L.C.M of 4 and 10)

$= \frac{3 \times 5 + 57 \times 2}{20} = \frac{15 + 114}{20} = \frac{129}{20}$ or $6\frac{9}{20}$

R.W

3	4 , 10
5	2 , 5
7	1 , 5
	1 , 1

Thus we can see that the result of addition in both cases is same. This verifies that: Associative Property of Addition may be applied in common fractions.

Exercise 4.2

Q.1: Fill in the blank space:

(1) $\frac{1}{2} + \left(\frac{4}{5} + \frac{3}{4}\right) = \left(\frac{1}{2} + \frac{4}{5}\right) + \frac{3}{4}$

(2) $\left(\frac{6}{7} + \frac{5}{6}\right) + \frac{3}{8} = \frac{6}{7} + \left(\frac{5}{6} + \frac{3}{4}\right)$

(3) $2\frac{1}{3} + \left(\frac{3}{4} + 3\frac{1}{6}\right) = \left(2\frac{1}{3} + \frac{3}{4}\right) + 3\frac{1}{6}$

(4) $\left(5\frac{6}{7} + 3\frac{2}{5}\right) + \frac{1}{2} = 5\frac{6}{7} + \left(3\frac{2}{5} + \frac{1}{2}\right)$

(5) $\frac{1}{7} + \left(6\frac{2}{3} + 3\frac{5}{3}\right) = \left(\frac{1}{7} + 6\frac{2}{3}\right) + 3\frac{5}{6}$

Q.2: Verify that:

(1) $\left(\frac{9}{8}+\frac{7}{12}\right)+\frac{5}{16} = \frac{9}{8}+\left(\frac{7}{12}+\frac{5}{16}\right)$

Sol: LHS = RHS

Take LHS:

$= \left(\frac{9}{8}+\frac{7}{12}\right)+\frac{5}{16}$

$=$ LCM = 2x2x2x3
LCM = 24

$= \left(\frac{9 \times 3)+(7 \times 2)}{24}\right)$

$= \left(\frac{27+14}{24}\right)+\frac{5}{16}$

$= \frac{41}{24}+\frac{5}{16}$

$=$ LCM = 2x2x2x2x3
LCM = 48

$= \left(\frac{(41 \times 2)+(5 \times 3)}{48}\right)$

$= \left(\frac{82+15}{48}\right)$

$= \frac{97}{48}$

$= 2\frac{1}{48}$ **Ans:**

R.W

2	8 , 12
2	4 , 6
2	2 , 3
3	1 , 3
	1 , 1

Take RHS:

$= \frac{9}{8}+\left(\frac{7}{12}+\frac{5}{16}\right)$

LCM = 2x2x2x2x3
LCM = 48

$= \frac{9}{8}+\left(\frac{(7 \times 4)+(5 \times 3)}{48}\right)$

$= \frac{9}{8}+\left(\frac{28+15}{48}\right)$

$= \frac{9}{8}+\frac{43}{48}$

R.W

2	16 , 24
2	8 , 12
2	4 , 6
2	2 , 3
3	1 , 3
	1 , 1

R.W

2	12 , 16
2	6 , 8
2	3 , 4
2	3 , 2
3	3 , 1
	1 , 1

$=$ LCM = 2x2x2x2x3
LCM = 48

$= \left(\frac{(9 \times 6)+(43 \times 1)}{48}\right)$

$= \left(\frac{54+43}{48}\right)$

$= \frac{97}{48}$

$= 2\frac{1}{48}$ **Ans:**

R.W

48) 97 (2
96
1

R.W

2	8 , 48
2	4 , 24
2	2 , 12
2	1 , 6
3	1 , 3
	1 , 1

(2) $\frac{1}{6}+\left(\frac{2}{3}+\frac{7}{12}\right) = \left(\frac{1}{6}+\frac{2}{3}\right)+\frac{7}{12}$

Sol: LHS = RHS

$= \frac{1}{6}+\left(\frac{2}{3}+\frac{7}{12}\right) = \left(\frac{1}{6}+\frac{2}{3}\right)+\frac{7}{12}$

Take LHS:

$= \frac{1}{6}+\left(\frac{2}{3}+\frac{7}{12}\right)$

$=$ LCM = 2x2x3
LCM = 12

$= \frac{1}{6}+\left(\frac{2x4+7x1}{12}\right) = \frac{1}{6}+\frac{8+7}{12}$

$= \frac{1}{6}+\frac{15}{12}$

$=$ LCM = 2x2x3
LCM = 12

$= \left(\frac{(1 \times 2)+(15 \times 1)}{12}\right)$

$= \frac{2+15}{12}$

$= \frac{17}{12}$

$= 1\frac{5}{12}$ **Ans:**

R.W

2	3 , 12
2	3 , 6
3	3 , 3
	1 , 1

R.W

2	6 , 12
2	3 , 6
3	3 , 3
	1 , 1

Take RHS:

$\left(\frac{1}{6} + \frac{2}{3}\right)$

R.W

2	6 , 3
3	3 , 3
	1 , 1

$=$ LCM = 2x3
LCM = 6

$= \left(\frac{1x1 + 2x2}{6}\right) + \frac{7}{12}$

$= \frac{1x4}{6} + \frac{7}{12}$

$= \frac{5}{6} + \frac{7}{12}$

$=$ LCM = 2x2x3
LCM = 12

$= \left(\frac{(5 \times 2) + (7 \times 1)}{12}\right)$

$= \frac{10 + 7}{12}$

$= \frac{17}{12}$

$= 1\frac{5}{12}$ **Ans:**

(3) $\left(4\frac{3}{4} + 2\frac{1}{6}\right) + 1\frac{3}{8} = 4\frac{3}{4} + \left(2\frac{1}{6} + 1\frac{3}{8}\right)$

R.W

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

Sol: LHS = RHS

$= \left(4\frac{3}{4} + 2\frac{1}{6}\right) + 1\frac{3}{8} = 4\frac{3}{4} + \left(2\frac{1}{6} + 1\frac{3}{8}\right)$

$= \left(\frac{19}{4} + \frac{13}{6}\right) + \frac{11}{8} = \frac{19}{4} + \left(\frac{13}{6} + \frac{11}{8}\right)$

Take LHS:

R.W

2	12 , 8
2	6 , 4
2	3 , 2
3	3 , 1
	1 , 1

$= \left(\frac{19}{4} + \frac{13}{6}\right) + \frac{11}{8}$

$=$ LCM = 2x2x3
LCM = 12

$= \frac{19 \times 3 + 13 \times 2}{12} + \frac{11}{8}$

$= \frac{83}{12} + \frac{11}{8}$

$=$ LCM = 2x2x2x3
LCM = 24

$= \frac{83 \times 2 + 11 \times 3}{24}$

$= \frac{166 + 33}{24}$

$= \frac{199}{24}$

$= 8\frac{7}{24}$ **Ans:**

R.W

$24\overline{)199}\,(8$
$\underline{192}$
7

R.W

2	6 , 8
2	3 , 4
2	3 , 2
3	3 , 1
	1 , 1

Take RHS:

$\frac{19}{4} + \left(\frac{13}{6} + \frac{11}{8}\right)$

$=$ LCM = 2x2x2x3
LCM = 24

$= \frac{19}{4} + \left(\frac{13x4 + 11x3}{24}\right)$

$= \frac{19}{4} + \frac{52 + 33}{24}$

$= \frac{19}{4} + \frac{85}{24}$

$=$ LCM = 2x2x2x3
LCM = 24

$= \frac{19 \times 6 + 85 \times 1}{24} = \frac{114 + 85}{24}$

$= \frac{199}{24}$

$= 8\frac{7}{24}$ **Ans:**

R.W

2	4 , 24
2	2 , 12
2	1 , 6
3	1 , 3
	1 , 1

R.W

$24\overline{)199}\,(8$
$\underline{-192}$
7

Hence proved LHS = RHS

(4) $3\frac{1}{3} + \left(5\frac{1}{2} + 1\frac{5}{6}\right) = \left(3\frac{1}{3} + 5\frac{1}{2}\right) + 1\frac{5}{6}$

LHS = RHS

$= 3\frac{1}{3} + \left(5\frac{1}{2} + 1\frac{5}{6}\right) = \left(3\frac{1}{3} + 5\frac{1}{2}\right) + 1\frac{5}{6}$

$= \frac{10}{3} + \left(\frac{11}{2} + \frac{11}{6}\right) = \left(\frac{10}{3} + \frac{11}{2}\right) + \frac{11}{6}$

Take LHS:

$= \frac{10}{3} + \left(\frac{11}{2} + \frac{11}{6}\right)$

LCM = 2 x 3
LCM = 6

$= \frac{10}{3} + \left(\frac{11x3 + 11x1}{6}\right)$

$= \frac{10}{3} + \left(\frac{33 + 11}{6}\right)$

$= \frac{10}{3} + \frac{44}{6}$

LCM = 2 x 3
LCM = 6

$= \frac{10x2 + 44x1}{6}$

$= \frac{20 + 44}{6}$

$= \frac{64}{6}$

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

R.W

2	2 , 6
3	1 , 3
	1 , 1

R.W

2	3 , 6
3	3 , 3
	1 , 1

Take RHS:

$= \left(\frac{10}{3} + \frac{11}{2}\right) + \frac{11}{6}$

LCM = 2 x 3
LCM = 6

$= \left(\frac{10x2 + 11x3}{6}\right) + \frac{11}{6}$

R.W

2	3 , 2
3	3 , 1
	1 , 1

$= \frac{10x2 + 11x3}{6} + \frac{11}{6}$

$= \frac{20 + 33}{6} + \frac{11}{6}$

$= \frac{53}{6} + \frac{11}{6}$

$= \frac{53 + 11}{6}$

$= \frac{64}{6}$

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

Hence proved LHS = RHS

4.3 Associative property of Multiplication in fractions

When more than two whole numbers are multiplied, the way in which the number are grouped or combined, does not affect the product.

For example: (4 x 6) x 7 = 6 x (4 x 7). This is called the **Associative Property of Addition.** The same property of whole number is true in case of common fractions as well. Consider the following example.

Example-1

Simplify: $2\frac{2}{5}$, $3\frac{1}{8}$ and $3\frac{1}{5}$

Solution: $2\frac{2}{5} \times 3\frac{1}{8} \times 3\frac{1}{5}$

We can find the product of the given equation in two ways. First we multiply $2\frac{2}{5}$, and $3\frac{1}{8}$ together then multiply $3\frac{1}{5}$ to its product. The other way is to multiply $3\frac{1}{8}$ and $3\frac{1}{5}$ together and then multiply $2\frac{2}{5}$ the product. Observe the ways of multiplication.

Case - 1 $\left(2\frac{2}{5} \times 3\frac{1}{8}\right) \times 3\frac{1}{5}$ (Change into improper fractions)

$= \left(\frac{\overset{3}{\cancel{12}}}{\cancel{5}_{1}} \times \frac{\overset{5}{\cancel{25}}}{\cancel{8}_{2}}\right) \times \frac{16}{5}$

$= \frac{\overset{3}{\cancel{12}}}{\cancel{5}_{1}} \times \frac{\overset{8}{\cancel{16}}}{\cancel{5}_{1}} \times 3 \times 8 = 24$

Case - 2 $2\frac{2}{5} \times \left(3\frac{1}{8} \times 3\frac{1}{5}\right)$ (Change into improper fractions)

$= \frac{12}{5} \times \left(\frac{\overset{5}{\cancel{25}}}{\cancel{8}_{1}} \times \frac{\overset{2}{\cancel{16}}}{\cancel{5}_{1}}\right)$

$= \frac{12}{\cancel{5}_{1}} \times \overset{2}{\cancel{10}} = 12 \times 2 = 24$

Thus we can see that the result of multiplication in both the cases is the same. This verifies that: Associative Property of Multiplication may be applied in common fractions.

Exercise 4.3

Q.1.Fill in the blank space:

(1) $\frac{3}{2} \times \left(\frac{2}{5} \times \frac{1}{4}\right) = \left(\frac{3}{2} \times \frac{2}{5}\right) \times \frac{1}{4}$

(2) $\left(\frac{7}{9} \times \frac{2}{3}\right) \times \frac{9}{14} = \frac{7}{9} \times \left(\text{—} \times \frac{9}{14}\right)$

(3) $2\frac{1}{4} \times \left(\frac{11}{4} \times 3\frac{9}{14}\right) = \left(2\frac{1}{4} \times \frac{11}{4}\right) \times 3\frac{1}{7}$

(4) $\left(3\frac{4}{7} \times 2\frac{4}{5}\right) \times \frac{1}{2} = 3\frac{4}{7} \times \left(2\frac{4}{5} \times \frac{1}{2}\right)$

(5) $\frac{1}{7} \times \left(6\frac{2}{3} \times 3\frac{7}{6}\right) = \left(\frac{1}{7} \times 6\frac{2}{3}\right) \times 3\frac{7}{6}$

Q.2: Verify that:

(1) $\left(\frac{9}{14} \times \frac{21}{12}\right) \times \frac{6}{7} = \frac{9}{14} \times \left(\frac{21}{12} \times \frac{6}{7}\right)$

Sol: **LHS = RHS:**

$= \left(\frac{9}{14} \times \frac{21}{12}\right) \times \frac{6}{7} = \frac{9}{14} \times \left(\frac{21}{12} \times \frac{6}{7}\right)$

Take LHS:

$= \left(\frac{\overset{3}{\cancel{9}}}{\cancel{14}_{2}} \times \frac{\overset{3}{\cancel{21}}}{\cancel{12}_{4}}\right) \times \frac{6}{7}$

$= \frac{9}{\cancel{8}_{4}} \times \frac{\overset{3}{\cancel{6}}}{7}$

$= \frac{27}{28}$ Ans:

Take LHS:

$= \frac{9}{14} \times \left(\frac{\overset{3}{\cancel{21}}}{\cancel{12}_{2}} \times \frac{\overset{1}{\cancel{6}}}{\cancel{7}_{1}}\right)$

$= \frac{9}{14} \times \frac{3}{2}$

$= \frac{27}{28}$

Hence Proved LHS = RHS

(2) $\frac{1}{6} \times \left(\frac{2}{3} \times \frac{9}{8}\right) = \left(\frac{1}{6} \times \frac{2}{3}\right) \times \frac{9}{8}$

Sol: **LHS = RHS:**

$= \frac{1}{6} \times \left(\frac{2}{3} \times \frac{9}{8}\right) = \left(\frac{1}{6} \times \frac{2}{3}\right) \times \frac{9}{8}$

Take LHS:

$= \frac{1}{6} \times \left(\frac{\overset{1}{\cancel{2}}}{\cancel{3}_{1}} \times \frac{\overset{3}{\cancel{9}}}{\cancel{8}_{4}}\right)$

$= \frac{1}{\cancel{6}} \times \frac{\cancel{3}}{4}$

$= \frac{1}{8}$ **Ans:**

Take LHS:

$= \left(\frac{1}{\cancel{6}_{3}} \times \frac{\overset{1}{\cancel{2}}}{3}\right) \times \frac{9}{8}$

$= \frac{1}{\cancel{9}_{1}} \times \frac{\overset{1}{\cancel{9}}}{8}$

$= \frac{1}{8}$ Ans:

Hence proved LHS = RHS

(3) $\left(4\frac{5}{7} \times 2\frac{2}{7}\right) \times 3\frac{1}{5} = 4\frac{5}{7}\left(2\frac{2}{7} \times 3\frac{1}{5}\right)$

Sol: **LHS = RHS**

$\left(4\frac{5}{7} \times 2\frac{2}{7}\right) \times 3\frac{1}{5} = 4\frac{5}{7}\left(2\frac{2}{7} \times 3\frac{1}{5}\right)$

Take LHS:

$= \left(4\frac{5}{7} \times 2\frac{2}{7}\right) \times 3\frac{1}{5}$

$= \left(\frac{33}{7} \times \frac{16}{7}\right) \times \frac{16}{5}$

$= \frac{528}{49} \times \frac{16}{5}$

$= \frac{8448}{245}$

Take LHS:

$= 4\frac{5}{7} \times \left(2\frac{2}{7} \times 3\frac{1}{5}\right)$

$= \frac{33}{7} \times \left(\frac{16}{7} \times \frac{16}{5}\right)$

$= \frac{33}{7} \times \frac{256}{35}$

$= \frac{8448}{245}$

(4) $3\frac{1}{3} \times \left(5\frac{1}{4} \times 1\frac{5}{11}\right) = \left(3\frac{1}{3} \times 5\frac{1}{4}\right) \times 1\frac{5}{11}$

Sol: **LHS = RHS**

$3\frac{1}{3} \times \left(5\frac{1}{4} \times 1\frac{5}{11}\right) = \left(3\frac{1}{3} \times 5\frac{1}{4}\right) \times 1\frac{5}{11}$

Take LHS:

$= 3\frac{1}{3} \times \left(5\frac{1}{4} \times 1\frac{5}{11}\right)$

$= \frac{10}{3} \times \left(\frac{21}{\cancel{4}_{1}} \times \frac{\overset{4}{\cancel{16}}}{11}\right)$

$= \frac{10}{\cancel{3}_{1}} \times \frac{\cancel{84}^{28}}{11}$

$= \frac{10}{1} \times \frac{28}{11}$

$= \frac{280}{11}$

$= 25\frac{5}{11}$

R.W

$11\overline{)280}\,(25$

-22

60

-55

05

Take LHS:

$= \left(3\frac{1}{3} \times 5\frac{1}{4}\right) \times 1\frac{5}{11}$

$= \left(\frac{\overset{5}{\cancel{10}}}{\cancel{3}_{1}} \times \frac{\overset{7}{\cancel{21}}}{\cancel{4}_{2}}\right) \times \frac{16}{11}$

$= \frac{35}{\cancel{2}_{1}} \times \frac{\cancel{16}^{8}}{11}$

$= \frac{280}{11}$

$= 25\frac{280}{11}$ Ans:

Hence proved LHS = RHS

CHAPTER NO.5

DECIMAL FRACTIONS

5.1 DECIMAL

Fractional Numbers are represented by many different kinds of numerals, but important one for convenience and speed of calculation is the decimal representation. We use a dot **(.)** for decimal. It comes from the word **'Decimus'** which means tenth in **Latin**. Different form of decimals are still in use. In England the decimal point is used in the midway position of the numbers such as 82.346. In U.S. it is placed with bottom of the numbers such as 82.346 and in France comma **(,)** is used in place of decimal point such as 82.346. But today we commonly place a decimal point in the bottom when write a decimal fraction as 0.021.

5.2 DECIMAL FRACTIONS

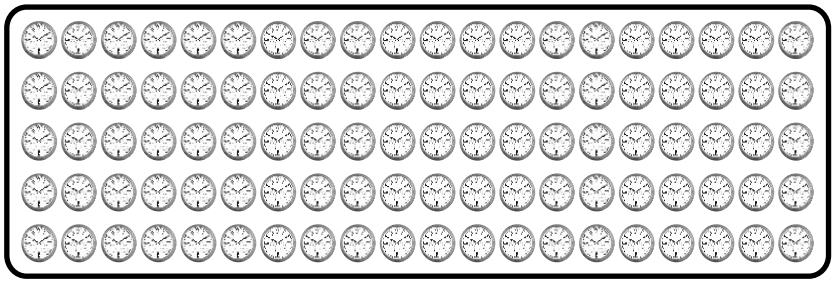
Look at the following figure. There are ten moons of the same shape and size in which one is shaded black.

The shaded moon is one-tenth $\frac{1}{10}$ of the whole moons. It is written as **.1** or **0.1**. It is read as **Decimal one.** The remaining moons of the above figure which are unshaded are nine tenth $\frac{9}{10}$ of the whole moons. It is written as **.9** or **0.9** and read as Decimal nine.

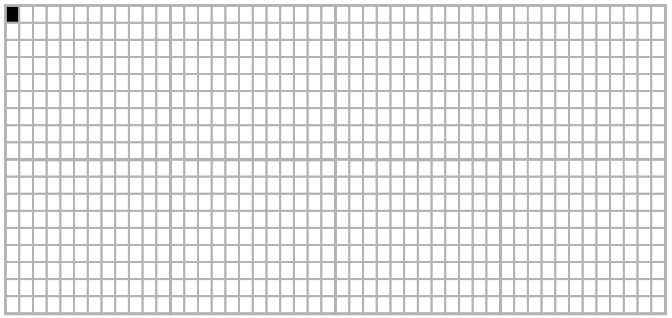
Similarly we write **four tenth** $\frac{4}{10}$ as **(.4)** and **eight tenth** $\frac{8}{10}$ as **(.8)** in decimal form. Now observe the following figure. There are hundred clocks in the given figure. Look at the first clock. It shows 9 O' clock while the remaining 99 clocks show 3.0 O' clock.

We can say **one-hundreth** $\frac{1}{100}$ part of the whole clocks shows 9' O' Clock. In decimal fraction $\frac{99}{100}$ is written as **(.01).** We read it as **Decimal zero one.** On the other

other hand $\frac{99}{100}$ parts of the whole clocks which show the time 3' O' Clock in decimal notation is written as **.99** and read as **Decimal nine.** Similarly $\frac{39}{100}$ in decimal form will be written as **.39** and read as **Decimal three nine.**



Let us now observe the following figure in which 1000 squares of equal sizes are shown. We see one square is shaded while 999 squares are unshaded. It means **one-thousandths** $\frac{1}{1000}$ part of the whole square is shaded while $\frac{999}{1000}$ part of the squares are unshaded. In the form of decimal notation. $\frac{1}{1000}$ is written as **.001** and read as **Decimal zero zero one.** $\frac{999}{1000}$ is written as **.999** and read as **Decimal nine nine nine.** Similarly if 48 squares of the figure are coloured then it represents $\frac{48}{1000}$. of the whole and in the form of decimal $\frac{48}{1000}$ is written as **.048** and it is read as **Decimal zero four eight**.



Similarly $\frac{261}{1000}$ in decimal form is **.261**, read as **Decimal two six one** or **Point two six one** and $\frac{807}{1000}$ in decimal form is **.807**, as **Decimal eight zero seven or Point eight zero seven.**

We have observed from the above examples that how is a fraction defined in terms of decimal fraction. The term **'Decimal Fraction'** is used to mean a special group of common fractions, whose denominators are one of the following: $\frac{1}{10} = .1$, $\frac{1}{100} = .01$, $\frac{1}{1000} = .001$, $\frac{21}{10} = 2.1$, $\frac{49}{100} = .49$, $\frac{347}{1000} = .347$

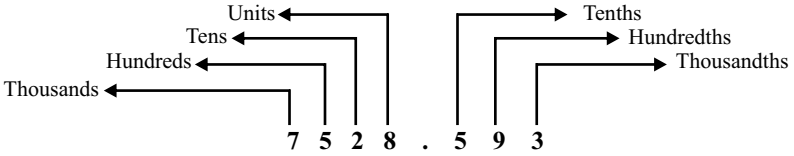
Simply we can say that **decimal fraction** is that fraction whose denominator is either 10, 100, 1000 or 10000 etc. We sometimes shorten the term decimal fraction to simply **decimal.**

5.3 PLACE VALUE STRUCTURE

Decimal fractions are written simply as an extension of the Indo-Arabic base - 10 system of notation. Each succeeding place to the left of the units place increases by a factor of 10, and each succeeding place to the right of the units place decreases by a factor of $\frac{1}{10}$. Thus, the place value in a decimal numerical is as follows:

Thousands	Hundreds	Tens	Units	Tenths	Hundredths	Thousandths
1000	100	10	1	$\frac{1}{10} = .1$	$\frac{1}{100} = .01$	$\frac{1}{1000} = .001$

Example: The number 7528.593 is shown in the chart below:



Place value of digits before the decimal point	Place value of digits after the decimal point
The number 7 stands for 7000 it is in thousand's place	The number 5 is in the tenth's place means $\frac{1}{10}$ or 0.5.
The number 5 stands for 500 because it is in hundred's place	The number 9 is in the hundredth's place means $\frac{9}{100}$ or 0.09.
The number 2 is the ten's place, so it stands for 20	The number 3 is in the thousandth's place which means $\frac{3}{1000}$ or 0.003 .
The number 8 stands for 8 only because it is in the unit's place.	----------

The number 8556.473 means

$8 \times 1000 + 3 \times 100 + 5 \times 10 + 6 \times 1 + 4\left(\frac{1}{10}\right) + 7\left(\frac{1}{100}\right) + 3\left(\frac{1}{1000}\right)$

or $8000 + 300 + 50 + 6 + \frac{4}{10} + \frac{7}{100} + \frac{3}{1000}$

Simplifying this, we have $8356\frac{473}{1000}$ or $\frac{8356473}{1000}$

Thus we see that the decimal 8356.473 is in fact the fraction,

$\frac{8356473}{1000}$. Similarly $247.1 = \frac{2471}{10}$ and $18.29 = \frac{1829}{100}$

We can say that there are 8 thousands, 3 hundreds, 5 tens, 6 units, 4 tenths, 7 hundredths and 4 thousandths in 8356.472.

Remember that the **"centre"** of the decimal numeral is the unit place, not the decimal point. The point simply tells, which is the unit place.

5.4 To convert Decimal Fraction into common Fractions:

Observe the following examples:

Convert 5 into common fraction.

Solution: The number 5 is after decimal point which means 5 is at the tenth's place in decimal fraction.

Therefore $.5 = \frac{5}{10} = \frac{1}{2}$ (Simplified form of $\frac{5}{10}$)

Hence $\frac{1}{2}$ .5

Example-2 **Convert .49 into common fraction.**

Solution: The number 4 is after decimal point which means 4 is at the tenth's place and 9 is at the hundredth's place.

$$.49 = .4 + .09$$

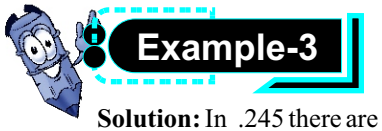
$$= \frac{1}{10} \quad \frac{9}{100} \qquad \text{(Take L.C.M of 10 and 10)}$$

$$= \frac{4 \times 10 + 9 \times 1}{100} = \frac{40 \times 9}{100} = \frac{49}{100}$$

$$= \frac{49}{100} \quad .49 =$$

Or simply write 1 at the denominator place and put as many zeros as the decimal number has digits after the decimal point.

Thus $= \frac{49}{100}$ .49 =



Example-3 **Convert .245 into common fraction.**

Solution: In .245 there are 2 tenths, 4 hundredths and 5 thousandths.

$$245\frac{2}{10} = \frac{4}{100} + \frac{5}{1000} + \qquad \text{(Tale L.C.M of 10, 100, 1000)}$$

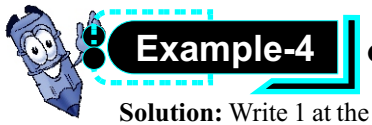
$$= \frac{2 \times 100 + 4 \times 10 + 5 \times 1}{1000}$$

$$= \frac{200+40+5}{1000} = \frac{\overset{49}{\cancel{245}}}{\underset{200}{\cancel{1000}}} = \frac{49}{200} \text{ (Simplified form)}$$

In other we can say that: .245 has 245 thousandths.

$$\frac{245}{1000} = \frac{49}{200}$$

Which means

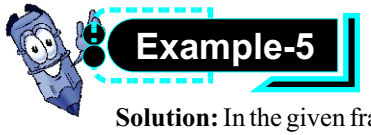


Example-4 **Convert 0.0848 into common fraction.**

Solution: Write 1 at the denominator place and put as many zeros as the decimal number has digits after the decimal point.

Numerator of 0.0848 will be 848.

$$0.08848 = \frac{\overset{53}{\cancel{106}}}{\underset{625}{\cancel{1250}}}\frac{\cancel{848}}{\cancel{10000}} = \frac{53}{625} \qquad \text{(Simplified form)}$$



Example-5 **Convert 4.586 into common fraction.**

Solution: In the given fraction 4 is at the unit place. It is written as a whole number and the digits after the decimal point are written in the form of fraction. Put there zeros after 1 at the denominator place to remove the decimal point of the numerator.

.

$$4.586 = 4\frac{\overset{293}{\cancel{586}}}{\underset{500}{\cancel{1000}}} = 4\frac{293}{500} \text{ (Simplify the fractional part only)}$$

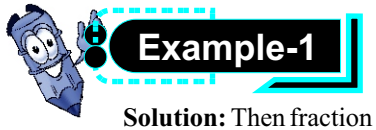
Example-6 **Convert 29.0544 into common fraction.**

Solution: Write 29 as a whole number and put four zeros after 1 at the denominator place to remove the decimal point. Numerator of the decimal fraction after decimal point will be 544. Therefore;

$$29\frac{\overset{34}{\cancel{136}}}{\underset{625}{\cancel{2500}}}\frac{\cancel{544}}{\cancel{10000}} = 29\frac{34}{625} \text{ (Simplify the fractional part only)}$$

5.5 To convert Common Fraction into Decimal Fraction

(A) When the denominators are the multiple of 10 i.e 10, 100, 1000.



Example-1 **Convert $\frac{7}{10}$ into decimal fraction.**

Solution: Then fraction $\frac{7}{10}$ shows that there are 7 tenths i.e 7

Therefore $\frac{7}{10}$ = .7

Example-2 **Convert $\frac{45}{100}$ into decimal fraction.**

Solution: $\frac{45}{100}$ shows 45 hundredths, which means .45.

Hence $\frac{45}{100}$ = .45

Example-3 **Convert $\frac{765}{1000}$ into decimal fraction.**

Solution: In $\frac{765}{1000}$ there are three zones in the denominator.

Therefore, the numerator will be 765 thousandths.

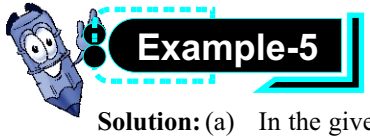
Hence $\frac{765}{1000}$ = .765

Example-4 **Convert $\frac{38}{10}$ into decimal fraction.**

Solution: (a) One zero in the denominator show that 3 is at the unit. place an 8 is at the tenths place. Thus $\frac{38}{10}$ = 3.8.

(B) Change 3.8 into mixed fraction which will be 3 i.e 3 + $\frac{8}{10}$, and $\frac{8}{10}$ mean 8 tenths which is equal to .8.

Therefore $\frac{38}{10}$ = 3.8



Example-5 **Convert $\frac{4678}{100}$ into decimal fraction.**

Solution: (a) In the given fraction it is clear that 7 is at the tenths place because there are two zeros in the denominator. Therefore we put the decimal point between units and tenths place.

Thus $\frac{4678}{100}$ = 46.78.

(b) Mixed fraction of $\frac{4678}{100}$ = $46\frac{78}{100}$

$46 + \frac{78}{100}$, and $\frac{78}{100}$ means 78 hundredths i.e. 78

Therefore $\frac{4678}{100}$ = 46 + .76 = 46.78

Example-6 **Convert $\frac{523468}{1000}$ into decimal fraction.**

Solution: (a) Three zeros of the denominator show that 3 is at the units place and 4 is at the tenths place in the fraction. Therefore, place the decimal point between 3 and 4.

Thus in decimal fraction $\frac{523468}{1000}$ = 523.468

(b) Change $\frac{523468}{1000}$ into mixed fraction i.e 523 $\frac{468}{1000}$

$523 + \frac{468}{1000}$, and $\frac{468}{1000}$ means 468 thousandths i.e .468. Therefore $\frac{523468}{1000}$ = 523 + .468 = 523.468

(b) When the denominators are not the multiple of 10. i.e 2, 4, 5, 20, 25, 50 and 200.

When the denominators are not the multiple of 10, then change their denominators into fraction having denominators 10, 100 or 1000 etc.

Example-1

Convert $\frac{1}{2}$ into common fraction.

Solution: Change the denominator of the given fraction into the multiple of 10. For this multiply & divide the fraction by 5.

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

So

$$= \frac{5}{10} = .5 \text{ or } 0.5$$

Example-2

Convert $\frac{1}{2}$, $\frac{17}{5}$, $\frac{59}{20}$, $\frac{4}{25}$, $\frac{143}{50}$ and $\frac{27}{200}$ into common fraction.

Solution:

1. $\frac{3}{4} = \frac{3 \times 25}{4 \times 25} = \frac{75}{100} = .75 \text{ or } 0.75$

2. $\frac{17}{5} = \frac{17 \times 2}{5 \times 2} = \frac{34}{10} = 3.4$

3. $\frac{59}{20} = \frac{59 \times 5}{20 \times 5} = \frac{295}{100} = 2.95$

4. $\frac{4}{25} = \frac{4 \times 4}{25 \times 4} = \frac{16}{100} = .16 \text{ or } 0.16$

5. $\frac{143}{50} = \frac{143 \times 2}{50 \times 2} = \frac{286}{100} = 2.86$

6. $\frac{27}{200} = \frac{27 \times 5}{200 \times 5} = \frac{135}{1000} = .135 \text{ or } 0.135$

Exercise 5.1

Q.1: Convert the following fractions into common fractions:

1. 20.1

Sol: 20.1

$= \frac{201}{10}$ **Ans:**

2. 104.9

Sol: 104.9

$= \frac{1049}{10}$

$= 104\frac{9}{10}$ **Ans:**

R.W

$$10\overline{)1049}\,(104$$
$$-100$$
$$49$$
$$40$$
$$9$$

3. 10.08

Sol: 10.08

$= \frac{\overset{504}{\cancel{1008}}}{\underset{50}{\cancel{100}}}$

$= \frac{\overset{252}{\cancel{504}}}{\underset{25}{\cancel{50}}}$

$= \frac{252}{25}$

$= 10\frac{2}{25}$ **Ans:**

R.W

$$25\overline{)252}\,(10$$
$$-250$$
$$2$$

4. 0.026

Sol: 0.026

$= \frac{\cancel{26}}{\cancel{1000}}$

$= \frac{13}{500}$ **Ans:**

5. 6.007

Sol: 6.007

$= \frac{6007}{1000}$

$= 6\ \frac{7}{1000}$ **Ans:**

R.W

1000) 6007 (6
-6000
7

6. 27.20

Sol: 27.20

$= \frac{\cancel{2720}^{1360}}{\cancel{100}_{50}}$

$= \frac{\cancel{1360}^{680}}{\cancel{50}_{25}}$

$= \frac{\cancel{680}^{136}}{\cancel{25}_{5}}$

$= \frac{136}{5}$

$= 27\frac{1}{5}$ **Ans:**

R.W

5) 136 (27
-10
36
35
1

7. 0.003

Sol: 0.003

$= \frac{3}{1000}$ **Ans:**

8. 5.105

Sol: 5.105

$= \frac{\cancel{5105}^{1021}}{\cancel{1000}_{200}}$

$= \frac{1021}{200}$

$= 5\ \frac{21}{200}$ **Ans:**

R.W

200) 1021 (5
-1000
21

9. 35.240

Sol: 35.240

$= \frac{\cancel{35240}^{1760}}{\cancel{1000}_{500}}$

$= \frac{\cancel{1760}^{880}}{\cancel{500}_{250}}$

$= \frac{\cancel{880}^{440}}{\cancel{250}_{125}}$

$= \frac{\cancel{440}^{88}}{\cancel{125}_{25}}$

$= \frac{88}{25}$

$= 2\ \frac{38}{25}$ **Ans:**

R.W

25) 88 (2
-50
38

10. 0.39

Sol: 0.39

$= \frac{39}{100}$ **Ans:**

Q.2: Convert the following fraction into decimal fraction:

1. $\frac{1}{10}$

Sol: $\frac{1}{10}$

$= 0.1$ **Ans:**

R.W

$10 \overline{)\ 10\ (0.1}$

-10

00

2. $\frac{988}{1000}$

Sol: $\frac{988}{1000}$

$= 0.988$ **Ans:**

R.W

$1000 \overline{)\ 9880\ (0.988}$

-9000

8800

-8000

8000

-8000

0000

3. $\frac{99}{1000}$

Sol: $\frac{99}{1000}$

$= 0.099$ **Ans:**

R.W

$1000 \overline{)\ 9900\ (0.099}$

9000

9000

-9000

0000

4. $\frac{4}{200}$

Sol: $\frac{4}{200}$

$= 0.02$ **Ans:**

R.W

$200 \overline{)\ 400\ (0.02}$

-400

000

5. $\frac{5}{500}$

Sol: $\frac{5}{500}$

$= 0.01$ **Ans:**

R.W

$500 \overline{)\ 500\ (0.01}$

-500

000

6. $\frac{52}{100}$

Sol: $\frac{52}{500}$

$= 0.52$ **Ans:**

R.W

$500 \overline{)\ 520\ (0.52}$

-500

200

-200

000

Q.3: Convert the following fraction into decimal fraction:

1. $\frac{23}{10}$

Sol: $\frac{23}{10}$

$= 2.3$ **Ans:**

R.W

$10 \overline{)\ 23\ (2.3}$

-20

30

-30

00

2. $\frac{1247}{100}$

Sol: $\frac{1247}{100}$

$= 12.47$ **Ans:**

R.W

100) 1247 (12.47
-100
247
-200
470
-400
700
-700
000

3. $\frac{35}{10}$

Sol: $\frac{35}{10}$

$= 3.5$ **Ans:**

R.W

10) 35 (3.5
-30
50
-50
00

4. $\frac{405}{10}$

Sol: $\frac{405}{10}$

$= 40.5$ **Ans:**

R.W

10) 405 (40.5
-400
50
-50
00

5. $\frac{1}{5}$

Sol: $\frac{1}{5}$

$= 0.2$ **Ans:**

R.W

5) 10 (0.2
-10
00

5.6 Addition and Subtraction of Decimal Fractions

In adding or subtracting the decimal fractions, we write the numbers with the place value, that is tens under tens, units under units, tenths under tenths, hundredths under hundredths etc. In this way decimal point of the fraction will also be under the decimal point automatically.

Example-1

Find the sum of 25.245 and 1.392

Solution: Le us write the given numbers according to the place value of each number and do simple addition just like the addition of whole numbers.

```
  25.245
+  1.392
  26.637
```

Example-2

Add 167.084, 53.203 and 00.752.

Solution: Decimal point of each fraction should be under decimal point.

```
  167.084
   53.203
+  00.752
  221.039
```

Example-3

Subtract 45.375 from 63.214

Solution:

$$\begin{array}{r} 63.214 \\ -\ 45.375 \\ \hline 17.839 \end{array}$$

Example-4 **Simplify 45.603 -107.236+ 365.479 - 87.35**

Solution: Add the values with '+' sign and the values with ' ' sign separately. Then subtract the smaller sum from the grater sum and put the sign of greater one. In the given example the numbers 45.603 and 365.479 are with positive sign while the remaining ones are with negative sign.

(a)

$$\begin{array}{r} +045.603 \\ +365.479 \\ \hline +411.082 \end{array}$$

(Write 0 before 4 to make decimal place equal.)

(b)

$$\begin{array}{r} -107.236 \\ -087.350 \\ \hline -\ 19.886 \end{array}$$

(Write 0 before 8 and after 5 to make decimal place equal.)

Now subtract 194.886 from 411.082

$$\begin{array}{r} +411.082 \\ -194.886 \\ \hline +216.196 \end{array}$$

Hence the answer is + 216.196 because 411.082 is with +ve sign but 19.886 is with the -ve sign.

Exercise 5.2

Q.1: Simplify the following decimal fractions:

(1) 0.765 + 13.54

Sol: 0.765 + 13.54

$$= \begin{array}{r} 13.54 \\ +\ 0.765 \\ \hline 14.305 \end{array}$$ **Ans:**

(2) 28.79 + 00.673

Sol: 28.79 + 00.673

$$= \begin{array}{r} 28.79 \\ +\ 00.673 \\ \hline 29.463 \end{array}$$ **Ans:**

(3) 857.67 + 128.534

Sol: 857.67 + 128.534

$$= \begin{array}{r} 857.67 \\ +146.534 \\ \hline 1004.204 \end{array}$$ **Ans:**

(4) 0018.0 + 20.5649

Sol: 0018.0 + 20.5649

$$= \begin{array}{r} 0018.0 \\ +\ 20.5649 \\ \hline 0038.5649 \end{array}$$ **Ans:**

(5) 250.00 + 1.7646

Sol: 250.00 + 1.7646

$$= \begin{array}{r} 250.00 \\ +\ 1.7646 \\ \hline 251.7646 \end{array}$$ **Ans:**

(6) 12.56 + 345.675 + 421.336

Sol: 12.56 + 345.675 + 421.336

$$= \begin{array}{r} 12.56 \\ +\ 345.675 \\ 421.336 \\ \hline 779.571 \end{array}$$ **Ans:**

Q.2: Simplify

(1) 0.765 - 12.546

Sol: 0.765 - 12.546

$$= \begin{array}{r} 12.546 \\ -\ 0.765 \\ \hline 11.781 \end{array}$$ **Ans:**

(2) 28.79 - 732.008

Sol: 28.79 - 732.008

$$= \begin{array}{r} 732.008 \\ -\ 28.79 \\ \hline 703.218 \end{array}$$ **Ans:**

(3) 875.67 - 60.97

Sol: 875.67 - 60.97

$$= \begin{array}{r} 875.67 \\ -\ 60.97 \\ \hline 814.70 \end{array}$$ **Ans:**

(4) 809.457 - 106.239

Sol: 809.457 - 106.239

$$= \begin{array}{r} 809.457 \\ -\ 109.239 \\ \hline 700.218 \end{array}$$ **Ans:**

(5) 250.00 - 145.040

Sol: 250.00 - 145.040

$$= \begin{array}{r} 250.00 \\ -\ 145.040 \\ \hline 104.960 \end{array}$$ **Ans:**

Q.3 Simplify

(1) 42.513 - 32.654 + 291.327 - 181.543

Sol: 42.513 - 32.654 + 291.327 - 181.543

= 42.513 + 291.327 - 32.654 - 181.543

= 333.84 - 214.197

= 119.643 **Ans:**

(2) 128.865 - 456.215 - 73.342 + 66.4235

Sol: 128.865 - 456.215 - 73.342 + 66.4235

= 128.865 + 66.4235 - 456.215 - 73.342

= 195.2885 - 529.557

= - 334.2685 **Ans:**

(3) 74.6341 + 234.675 + 85.1424 - 154.532

Sol: 74.6341 + 234.675 + 85.1424 - 154.532

= 309.3091 + 85.1424 - 154.532

= 394.4515 - 154.532

= - 239.9195 **Ans:**

(4) 743.841 - 645.342 + 21.1321 - 50.6721

Sol: 743.841 - 645.342 + 21.1321 - 50.6721

= 743.841 + 21.1321 - 645.342 - 50.6721

= 764.9731 - 690.0141

= 68.959 **Ans:**

(5) 441.723 + 32.3246 + 5870.09 + 410.3541

Sol: 441.723 + 32.3246 + 5870.09 + 410.3541

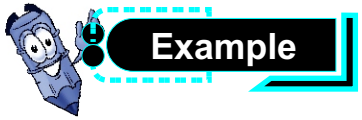
= 474.0476 + 5870.09 + 410.3541

= 6344.1376 + 410.3541

= 6754.4917 **Ans:**

5.7 Word problems based on Decimal Fractions:

(a) Addition:



The cost of a book is Rs.27.75, a pen is Rs.11.25 and a copy is Rs.6.35 What is their total cost.

Solution:

Cost of a book is	Rs.	27.75
Cost of a pen is	Rs.	11.25
Cost of a copy is +	Rs.	6.35
Total cost	Rs.	45.35

(b) Subtraction:

Example

The cost of a book is Rs.27.75, a pen is Rs.11.25 and a copy is Rs.6.35 What is their total cost.

Solution:

Total length of the plank is	14.28	Inches
Length of one piece is	9.39	Inches
Length of the other piece	4.889	Inches.

Exercise 5.3

Q.1: Anny had Rs.21.67. Her father and mother gave her Rs.9.85 and Rs.14.75. Find the total amount that she has now.

Sol:

Rs 21 . 67
Rs 9 . 85
Rs + 14 . 75
Total = Rs 46 . 27

Ans: Anny had the total amount Rs = 46.27.

Q.2:Total thickness of two books is 13.6cm. If one book is 6.7cm then find the thickness of the other book.

Sol:

13 . 6 cm
- 6 . 7 cm
6 . 9 cm

Ans: The thickness of the other book is 6.9 cm.

Q.3: Anwer has three books of thickness 15.2cm 16.4cm and 17.5cm respectively. If they are glued together then total thickness is 50cm. Fixed the thickness of glue.

Sol:

15 . 2 cm
16 . 4 cm
+ 17 . 5 cm
49 . 1 cm

New subtract 49 . 1 cm from 50

50.0
+ 49.1
0.9cm

Ans: The thickness of glue=0.9cm

Q.4: A milk man sold 45.370 litres in the morning 126.75 litres of milk in the evening. If he sold 20.50 litres of milk in the night then find the total litres of milk did he sell in a day.

Sol:

45 . 370 litres
126 . 75 litres
+ 20 . 50 litres
192 . 620

Ans: He sells 192.620 litres of milk in a day.

Q.5: Anwar had Rs. 24.50. He gave Rs.15.75 to a beggar. How much amount did he left with him?

Sol:

Rs = 24 . 50
Rs = -15 . 75
Rs = 8 . 75

Ans: Anwar had left Rs. 8.75

Q.6 The sum of two decimal fractions is 407.346. If one of them is 190.408. Find the other decimal fraction.

Sol:

407 . 346
- 190 . 408
216 . 938

Ans: The other decimal fraction is 216.938.

5.8 Multiplication of Decimal Fraction

(a) To multiply a decimal fraction by natural numbers

Solution: First find the product of the numbers in ordinary way ignoring the decimal point. Then place the decimal point in the product leaving as many digits on the right as they are in the decimal number.

```
  53.245
×    32
------
106490
159735×
-------
1703840
```

(Add 106490 and 159735)

Place decimal point after three digits from right, we get 1703.840.

Thus 53.245 x 32 = 1703.840.

(b) To multiply a decimal fraction by 10, 100, 1000 etc.

Consider the following example:

Example **Multiply 41.257 by 10, 100, 1000.**

Solution: We use ordinary method of multiplication.

a. 41.257

```
  X10
00000
41257x
------
412.570
```

b. 41.257

```
  X100
00000
00000x
41257xx
-------
4125.700
```

c. 41.257

```
  X1000
00000
00000x
00000xx
41257xxx
---------
41257.000
```


From the above example we conclude the following rules.

1. When a decimal fraction is multiplied by 10 the numbers are moved one place to the right from the decimal point or the decimal point is moved one place to the right. Therefore 31.257 becomes 31.570. Now the decimal point is after 2.

2. When a decimal fraction is multiplied by 100 the numerals are moved two places to the right from the decimal point or the decimal point is moved two places to the right. Therefore 31.257 becomes 3125.700. Now the decimal point is after 5.

3. When a decimal fraction is multiplied by 1000 the numeral are moved three place to the right from the decimal point or the decimal point is moved three place of the right. Therefore 31.257 becomes 31257.00. Now the decimal point is after 7.

Simply we can say when a decimal fraction is multiplied by 10, 100, 1000 put as many zeros after the last digit of the decimal fraction as the multiplier has and shift the decimal point towards right by as many places as the multiplier has zeros.

(c) To multiply a decimal fraction by a decimal fraction:

Consider the following example carefully:

1. $0.1 \times 0.1 = \frac{1}{10} \times \frac{1}{10} = \frac{1}{100} = 0.01$

2. $0.7 \times 0.7 = \frac{3}{10} \times \frac{3}{10} = \frac{9}{100} = 0.09$

3. $0.42 \times 0.2 = \frac{7}{10} \times \frac{9}{10} = \frac{63}{100} = 0.63$

4. $0.42 \times 0.2 = \frac{42}{100} \times \frac{2}{10} = \frac{84}{1000} = 0.084$

5. $0.124 \times 0.21 = \frac{124}{1000} \times \frac{21}{100} = \frac{2604}{100000} = 0.02604$

6. $0.891 \times 0.012 = \frac{891}{1000} \times \frac{12}{1000} = \frac{10692}{1000000} = 0.010692$

We concluded from the above multiplications, the following rules.

1. Multiply two decimal fractions ignoring their decimal points.
2. Count the total number of digits after decimal point in both the numbers. Place the decimal point in the product so obtained leaving as many places to the right of it as the sum of the digits on the right of decimal point in both the numbers. Shortage, if any being covered by putting extra zero/zeros before placing the decimal point. i.e 4, 5, 6.

Multiply 235.47 by 61.23

Solution:

```
  235.47
   61.23
  -------
   70641
  47094x
 23547xx
141282xxx
--------
144178281
```

(Multiply the fractions in ordinary manner)

In the given examples there are two digits in the first number and two digits in the second number after the decimal point. So we have to place decimal point in the product leaving four digits from the right.
Hence 235.47 x 61.23 = 14417.8281

Simplify 0.76 x 1.25 x 23.12.

Solution: First multiply 1.25 by 0.76 and then multiply the product of the two by 23.12 or the final product. Place the decimal point according to the above stated rules.

(i)

```
  1.25
  0.76
  ----
   750
  875x
 000xx
 ------
 0.9500
```

Place the decimal point in the last product leaving six digits from the right. Hence the product will be written as 21.964000.

Q.1: Multiply following decimal fractions by whole numbers:

1. 0.45 x 7

Sol: 0.45 x 7

= 0.45 x 7 = 3.15

Ans: 0.45 x 7 = 3.15.

2. 1.34 x 8

Sol: 1.34 x 8

= 1.34 x 8 = 10.72

Ans: 1.34 x 8 = 10.72.

3. 24.61 x 12

Sol: 24.61 x 12

```
 24 . 61
   x 12
 -------
   4922
+ 2461x
 -------
  295.32
```

Ans: 24.61 x 12 = 295.32.

4. 56.02 x 12

Sol: 56.02 x 12

```
 56 . 02
   x 12
 -------
  11284
+ 5602x
 -------
  672.24
```

Ans: 56.02 x 12 = 672.24.

5. 4.345 x 16

Sol: 4.345 x 16

$$\begin{array}{r} 4.345 \\ \times\ 16 \\ \hline 26070 \\ +\ 4345x \\ \hline 69.520 \end{array}$$

Ans: 4.345 x 16 = 69.520.

6. 123.5 x 26

Sol: 123.5 x 26

$$\begin{array}{r} 123.5 \\ \times\ 26 \\ \hline 07410 \\ +\ 2470x \\ \hline 3211.0 \end{array}$$

Ans: 123.5 x 26 = 3211.0.

Q.2: Simplify following decimal fractions:

1. 27.35 x 50.32

Sol: 27.35 x 50.32

$$\begin{array}{r} 27.35 \\ \times 50.32 \\ \hline 5470 \\ 8205x \\ 0000xx \\ 13675xxx \\ \hline 1376.2520 \end{array}$$

Ans: 27.35x50. 32 = 1376.2520.

2. 316.5 x 1.13

Sol: 316.5 x 1.13

$$\begin{array}{r} 316.5 \\ \times\ 113 \\ \hline 9495 \\ 3165x \\ +3165xx \\ \hline 357.645 \end{array}$$

Ans: 316.5 x 1.13 = 357445.

3. 65.23 x 12.6

Sol: 65.23 x 12.6

$$\begin{array}{r} 65.23 \\ \times\ 126 \\ \hline 39138 \\ 13046x \\ +\ 6523xx \\ \hline 821.898 \end{array}$$

Ans: 65.23 x 12.6 = 821.898.

4. 13.34 x 10.10

Sol: 13.34 x 10.10

$$\begin{array}{r} 13.34 \\ \times\ 10.10 \\ \hline 0000 \\ 1334x \\ 0000xx \\ +\ 1334xxx \\ \hline 134.7340 \end{array}$$

Ans: 13.34 x 10.10 = 134.7340.

5. 1.354 x 4.45

Sol: 1.354 x 4.45

$$\begin{array}{r} 1.354 \\ \times\ 4.45 \\ \hline 6770 \\ 5416x \\ +\ 5416xx \\ \hline 6.02530 \end{array}$$

Ans: 1.354 x 4.45 = 6.02530.

6. 736.1 x 3.12

Sol: 736.1 x 3.12

$$\begin{array}{r} 736.1 \\ \times\ 3.12 \\ \hline 14722 \\ 7361x \\ +\ 22083xx \\ \hline 2296.632 \end{array}$$

Ans: 736.1 x 3.12 = 2296.632.

7. 410.61 x 20.01

Sol: 410.61 x 20.01

$$\begin{array}{r} 40.61 \\ \times 20.01 \\ \hline 4061 \\ 0000x \\ 0000xx \\ +\ 8122xxx \\ \hline 812.6061 \end{array}$$

Ans: 410.61 x 20.01 = 812.6061.

8. 34.151 x 15.02

Sol: 34.151 x 15.02

$$\begin{array}{r} 34.151 \\ \times\ 15.02 \\ \hline 68302 \\ 0000x \\ 170755xx \\ +\ 34151xxx \\ \hline 512.94802 \end{array}$$

Ans: 34.151 x 15.02 = 512.94802.

9. 71.001 x 0.10

Sol: 71.001 x 0.10

$$\begin{array}{r} 71.001 \\ \times\ 0.10 \\ \hline 00000 \\ 71001x \\ 00000xx \\ \hline 07.10010 \end{array}$$

Ans: 71.001 x 0.10 = 07.10010.

10. 3.467 x 11.24

Sol: 3.467 x 11.24

$$\begin{array}{r} 3.467 \\ \times\ 11.24 \\ \hline 13868 \\ 6934x \\ 3467xx \\ \hline 3467xxx \\ \hline 38.96908 \end{array}$$

Ans: 3.467x11.24 = 38.96908.

Q.3: Simplify following decimal fractions:

1. 0.7 x 0 .7 x 0.7

Sol: 0.7 x 0.7 x 0.7

= 0.49 x 0.7

= 0.343 **Ans:**

R.W

```
  0.7
x 0.7
 49
00x
0.49
```

```
  0.49
x 0.7
 343
000x
0343
```

2. 0.02 x 1.2 x .14

Sol: 0.02 x 1.2 x .14

= 0.24 x 1.7

= 0.336 **Ans:**

R.W

```
  0.2
x 1.2
 04
02x
0.24
```

```
  0.24
x 1.4
 096
024x
0.336
```

3. 2.4 x 1.2 x 0.9

Sol: 2.4 x 1.2 x 0.9

= 2.88 x 0.9

= 2.592 **Ans:**

R.W

```
  2.4
x 1.2
 48
24x
2.88
```

```
  2.88
x 0.9
 2592
000x
2.592
```


4. 0.15 x 2.4 x 3.6

Sol: 0.15 x 2.4 x 3.6

= 0.360 x 3.6

= 1.2960 **Ans:**

R.W

```
  0.15
x 2.4
 060
030x
0.360
```

```
  0.360
x 3.6
 2160
1080x
1.2960
```

5. 11.2 x 3.6 x 0.45

Sol: 11.2 x 3.6 x 0.45

= 40.32 x 0.45

= 018.1440

Or 18.144 **Ans:**

R.W

```
  11.2
x 3.6
 672
336x
40.32
```

```
  40.32
x 0.45
 20160
16128x
00000xx
018.1440
```

6. 0.28 x 4.2 x 0.1

Sol: 0.28 x 4.2 x 0.1

= 1.176 x 0.1

= 0.1176 **Ans:**

R.W

```
  0.28
x 4.2
 056
112x
1.176
```

```
  1.176
x 0.1
 1176
0000x
0.1176
```

7. 1.01 x 1.0 x .0.1

R.W

Sol: 1.01 x 1.0 x .0.1

= 1.010 x 0.1

= 0.1010 **Ans:**

```
  1.01
x 1.0
 000
 101x
1.010

  1.010
x 0.1
 1010
 0000x
0.1010
```

8. 2.70 x 1.1 x 2.2

R.W

Sol: 2.70 x 1.1 x 2.2

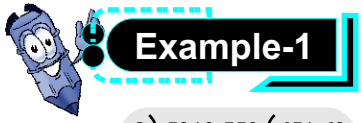
= 6.5340 **Ans:**

```
  2.70
x 1.1
 270
 270x
2.970

  2.970
x 2.2
 5940
 5940x
6.5340
```


5.9 Division Of Decimal Fraction

(a) To divide a decimal fraction by a natural number:
Examine the following example:



Divide 5213.52 by 8.

Solution:

```
8) 5213.552 (651.69
   48
   41
   40
   13
    8
   55
   48
   72
   72
    0
```

Explanation:
In this example **divided** has decimal point while **divisor** is a natural number. Divide 5213.52 by 8 in the ordinary was of long division and put the decimal point in the **quotient** when the division is arrived at decimal point in the divided
Hence 5213.552 ÷ 8 = 651.69

Divide 0.162 by 9.

Solution:

```
9) 0.162 (.018
   0
   16
   9
   72
   72
    0
```

Explanation:
In this example **divided** starts with decimal point, so put the decimal point at the quotient in the beginning. Since the dividend has one Tenth and I is less than 9, so put 0 after decimal.

Point in quotient and take one more number. Now we have 16 hundredth Complete the process of division in ordinary way.

If we want to short cut the division process we put 0 after the decimal point and complete the division in the ordinary way as follows.

$$9\overline{)0.162}(.018$$
$$\begin{array}{r} 9 \\ \hline 72 \\ 72 \\ \hline 0 \end{array}$$

Divide 5213.52 by 8.

Solution:

$$14\overline{)5213.52}(651.69$$
$$\begin{array}{r} -48 \\ \hline 41 \\ -40 \\ \hline 13 \\ -8 \\ \hline 55 \\ -48 \\ \hline 72 \\ -72 \\ \hline 00 \end{array}$$

↓ Remainder

Explanation:

Find the value of $\frac{12}{7}$ correct upto three places decimal.

Solution:

$$7\overline{)12.000}(1.714$$
$$\begin{array}{r} -7 \\ \hline 50 \\ -49 \\ \hline 10 \\ -7 \\ \hline 30 \\ -28 \\ \hline 2 \end{array}$$

↓ Remainder

Explanation:

(b) To divide a decimal fraction by a decimal fraction:

Observe the following example:

Divide 837.536 by 1.6.

Solution: In the given example dividend (837.536 by 1.6) and the divisor (1.6) both are in the form off decimal fractions. It is difficult to divide a decimal fraction by a decimal fraction directly so we change the divisor into a whole number before proceeding with the operation of division. For this we have to shift the decimal point in the divisor by one place to the right, so it becomes 16 and therefore the decimal point in the dividend is also to be shifted to the right by one place, so it becomes 8375.36. Now divide 8375.36. By 16 as usual.

$$16\overline{)8375.36}(523.46$$
$$\begin{array}{r} 80 \\ \hline 37 \\ 32 \\ \hline 55 \\ 48 \\ \hline 73 \\ 64 \\ \hline 96 \\ 96 \\ \hline 0 \end{array}$$

Hence 837.536 ÷ 1.6 = 523.46

Simplify 0.0496 ÷ 0.8

Solution: Shift the decimal point one place to the right in both, the divisor and the dividend. In this way the divisor and the dividend become 8 and 0.0496. Now divide 0.0496 by 0.8 in the ordinary way.

$$8\overline{)0.0496}(0.062$$
$$\begin{array}{r} 48 \\ \hline 16 \\ 16 \\ \hline 0 \end{array}$$

Hence 0.0496 ÷ 0.8 = 0.062

Exercise 5.5

Q.1: Find the value of the following, correct up to two places of decimal:

(1) $\frac{6}{5}$

Sol: —

$$5\overline{)6}\,(1.2$$
$$-5$$
$$10$$
$$-10$$
$$00$$

Ans: 1.2.

(2) $\frac{9}{10}$

Sol: $\frac{9}{10}$

$$10\overline{)90}\,(0.9$$
$$-90$$
$$00$$

Ans: 0.9

(3) $\frac{5}{14}$

Sol: $\frac{5}{14}$

$$14\overline{)50}\,(0.35$$
$$-42$$
$$80$$
$$-70$$
$$10$$

Ans: 0.35

(4) $\frac{7}{9}$

Sol: $\frac{7}{9}$

$$9\overline{)70}\,(0.77$$
$$-63$$
$$70$$
$$63$$
$$07$$

Ans: 0.77

(5) $\frac{7}{16}$

Sol: $\frac{7}{16}$

R.W

$$16\overline{)70}\,(0.43$$
$$64$$
$$60$$
$$-48$$
$$12$$

Ans: 0.43

(6) $\frac{9}{13}$

Sol: $\frac{9}{13}$

R.W

$$13\overline{)90}\,(0.69$$
$$-78$$
$$120$$
$$-117$$
$$3$$

Ans: 0.69

(7) $\frac{8}{25}$

Sol: $\frac{8}{25}$

R.W

$$25\overline{)80}\,(0.32$$
$$-75$$
$$50$$
$$-50$$
$$00$$

Ans: 0.32

(8) $\frac{4}{15}$

Sol: $\frac{4}{15}$

R.W

$$15\overline{)40}\,(0.26$$
$$-30$$
$$100$$
$$90$$
$$10$$

Ans: 0.26

Q.2: Find the value of the following, correct up to three places of decimal:

(1) $\frac{6}{5}$

Sol: $\frac{6}{5}$

R.W

$$5\overline{)\,6\,(1.2}$$
$$-5$$
$$10$$
$$-10$$
$$00$$

Ans: 1.2

(2) $\frac{7}{10}$

Sol: $\frac{7}{10}$

R.W

$$10\overline{)\,70\,(0.7}$$
$$-70$$
$$00$$

Ans: 0.7

(3) $\frac{9}{14}$

Sol: $\frac{9}{14}$

R.W

$$14\overline{)\,90\,(0.642}$$
$$48$$
$$60$$
$$56$$
$$40$$
$$-28$$
$$12$$

Ans: 0.642

(4) $\frac{3}{7}$

Sol: $\frac{3}{7}$

R.W

$$7\overline{)\,30\,(0.428}$$
$$-28$$
$$20$$
$$-14$$
$$60$$
$$-56$$
$$04$$

Ans: 0.428

(5) $\frac{7}{15}$

Sol: $\frac{7}{15}$

R.W

$$15\overline{)\,70\,(0.466}$$
$$-60$$
$$100$$
$$-90$$
$$100$$
$$-90$$
$$10$$

Ans: 0.466

(6) $\frac{6}{13}$

Sol: $\frac{6}{13}$

R.W

$$13\overline{)\,60\,(0.461}$$
$$-52$$
$$80$$
$$-78$$
$$20$$
$$-13$$
$$07$$

Ans: 0.461

(7) $\frac{9}{19}$

Sol: $\frac{9}{19}$

R.W

$$19\overline{)\,90\,(0.526}$$
$$-85$$
$$50$$
$$-38$$
$$120$$
$$-114$$
$$006$$

Ans: 0.466

Q.3: Evaluate correct upto three places after decimal:

1. 43.73 ÷ 8

Sol:
$$8 \overline{)43.73} \quad 5.466$$
$$-40$$
$$37$$
$$-32$$
$$53$$
$$-48$$
$$50$$
$$-48$$
$$02$$

Ans: 5.466

2. 0.53 ÷ 7

Sol:
$$7 \overline{)0.53} \quad 0.075$$
$$-49$$
$$40$$
$$-35$$
$$5$$
$$-4$$
$$1$$

Ans: 0.075

3. 32.25 ÷ 9

Sol:
$$9 \overline{)32.25} \quad 3.583$$
$$-27$$
$$52$$
$$-45$$
$$75$$
$$-72$$
$$30$$
$$-27$$
$$03$$

Ans: 3.583

4. 864.76 ÷ 10

Sol:
$$10 \overline{)864.76} \quad 86.476$$
$$-80$$
$$64$$
$$-60$$
$$47$$
$$-40$$
$$76$$
$$-70$$
$$60$$
$$-60$$
$$00$$

Ans: 86.476

5. 21.39 ÷ 5

Sol:
$$5 \overline{)21.39} \quad 4.278$$
$$-20$$
$$13$$
$$-10$$
$$39$$
$$-35$$
$$40$$
$$-40$$
$$00$$

Ans: 4.278

5.10 Word Problems based on Decimal Fractions:

(a) Multiplication:

Find the total weight of 5 cakes, if each cake weighing 12.750 kg.

Solution: Weight of 1 cake is 12.750kg. Weight of 5 cakes will be more than 1cake. Therefore we multiply 12.750 by 5

$$\begin{array}{r} 12.750 \\ \times\ 5 \\ \hline 63.750 \end{array}$$

Hence weight of 5 cakes will be 63.750 kg

Example-2

Cost of 1 kg flour is Rs.12.25. Find the cost of 12 kg of flour.

Solution: Cost of 1 kg of flour is Rs.12.25. Cost of 12 kg of flour will be more, so we multiply 12.25 by 12.

$$\begin{array}{r} 12.25 \\ \times \quad 12 \\ \hline 2450 \\ +1225\text{x} \\ \hline 147.00 \end{array}$$

Hence cost of 12 kg flour will be Rs.147.00

(b) Division:

Example-1

A plank is 26.4 metres long. 1 it is cut into 4 equal pieces, find the length off each piece.

Solution: Hence the length of each piece will be less than the total length, therefore we divide 26.4 by 4

$$\begin{array}{r|l} 4 & 26.4 \\ & -24 \\ \hline & 24 \\ & -24 \\ \hline & 0 \end{array} \quad 6.6$$

Check by multiplication
6.6 x 4 = 26.4

Hence each piece will be 6.6 meters long.

A milk man sold 127.5 litres of milk to 51 buyers. If he gave equal quantity of milk to each buyer then find the litres off milk that each buyer got.

Solution: To find how much each buyer got, we divide 127.5 litres of milk by 51 buyers.

$$\begin{array}{r|l} 51 & 127.55 \\ & -102 \\ \hline & 255 \\ & -255 \\ \hline & 0 \end{array} \quad 2.5$$

Check by multiplication
51 x 2.5 = 127.5

Therefore each buyer got 2.5 litres of milk.

Exercise 5.6

Q.1. Perimeter of a square is 57.2cm. Find the length of one side of the square.

Data:
Perimeter of square = 57.2cm.
Length of one side of square =?
We know that perimeter of square = 4L

$$57.2 = 4L$$

OR $L = \frac{57.2}{4}$

$$L = 14.3\text{cm}$$

Ans: The length of perimeter is 14.3cm

R.W

$$\begin{array}{r|l} 4 & 57.2 \\ & -4 \\ \hline & 17 \\ & -16 \\ \hline & 12 \\ & -12 \\ \hline & 00 \end{array} \quad 14.3$$

Q.2. Breadth of a rectangular room is 12.7 meters, if its length is 4 times that of its breadth then find the length of the room.

Data:
Breadth of a rectangular room = 12.7m
Length is 4 times that of breath.
Length of room.

Length = 4 (breadth)
Length = 4 (12.7)
Length = 50.8

Ans: The length of rectangular room is 50.8cm.

Q.3. Weight of an oil tin is 16.5 kg. What is the total weight of 15 such tins of oil?

Data:
Weight of a oil tin = 16.5gkg
Weight of 15 tins of oil = ?
If weight of a oil tin = 16.5g kg.

Then the weight of 15 tins of oil = 15 x 16.5 = 247.5

R.W

$$\begin{array}{r} 16.5 \\ \times\ 15 \\ \hline 825 \\ +165\times \\ \hline 247.5 \end{array}$$

Ans: The weight of 15 tins of oil = 247.5.

Q.4. The cost of a book is Rs.125.75 find the cost of 10 such books.

Data:

Cost of a book = Rs. 125.75.
Cost of 10 such book = ?

$$\begin{array}{r} 125.75 \\ \times\ 10 \\ \hline 00000 \\ 12575\times \\ \hline 1257.50 \end{array}$$

Ans: The weight of 15 tins of oil = 2475.

Q.5. I paid Rs.67.5 to a book seller for 9 books. What is the cost of one book?

Data:

Cost of a book = Rs. 67.5
Cost of 10 one book = ?

Sol:

$$9\overline{)\ 67.5\ }\ 7.5$$
$$\begin{array}{r} -63 \\ \hline 45 \\ -45 \\ \hline 00 \end{array}$$

Ans: The cost of one book is Rs. 7.5.

CHAPTER NO.6

UNITARY METHOD

6.1 Unitary Method

In the chapter we shall study the problems of sale and purchase or related to then which some across in our daily life. Some problems are those in which we know only the price of one article and are required to find the price of more articles. On the other hand some are those in which we know the price of more articles and are required to find the price of one article. To solve such problems, we introduce a method called **Unitary Method**.

Following rules will help you to solve such problems.

1. If the cost of one thing is given and required to find the cost of more things then **multiply** the numbers of things by the cost of one thing.
2. If the cost of more things is given and required to find the cost of one thing then divide the cost of the things by the numbers of things

Now observe the following examples carefully.

Price of a book is Rs.42. Find the price of 12 such books.

Solution: Because the cost of 12 books will be more than the cost of one book, so we multiply 42 by 12.

Cost of one book = 42 Rupees

Cost of 12 books = 42 x 12

= 504 Rupees.

Example-2

Cost of 18 meters of cloth is Rs.414. Find the cost of one meters of cloth.

Solution: Because the cost of one meters of cloth is less than the cost of 18 meters of cloth, so on dividing we can find the cost of one meter of cloth.

Cost of 18 meters of cloth = 414 Rupees

Cost of one meter of cloth = 414 ÷ 18

Hence the cost of one meter of cloth = 23 rupees.

```
18) 414 (23
   -36
    54
   -54
     0
```

Example-3

If 110 plants are equally planted in 10 rows, then find the total number of plants in each row.

Solution: Since plants in each row will be less, so we divide 110 by 10.

Total plants in 10 rows = 110

Total plants in each = 110 ÷ 10

= 11 plants

Rough Work

```
10) 110 (11
   -10
    10
   -10
     0
```

Hence 11 plants will be in each now.

Example-4

Tuition fee for a student is Rs.105. Find the tuition fee for 25 students.

Solution: Because fee for 25 students will be more, we multiply 105 by 25.

Fee for one student = 105 Rupees

Fee for 25 students = 105 x 25

= 2625 Rupees

Rough Work

```
  105
x 25
 525
+210x
2625
```

Hence fee for 25 students will be 2625 rupees.
Hence 11 plants will be in each now.

Exercise 6.1

Q.1: Cost of one dozen pencils is Rs.9.50. Find the cost of such 4 dozens of pencils.

Data:

1 dozen pencils = Rs. 9.50
4 dozen of pencils = ?

```
  9.50
x   4
 38.00
```

Ans: The cost of 4 dozens of pencils is Rs. 38.

Q.2: A shopkeeper sold 15kg of sugar for Rs.225. Find the selling price of 1 kg of sugar.

Data:

Selling price of 15kg of sugar = 225.
Selling price of 1 kg of sugar = ?

Sol:

```
15) 225 (15
   -15
    75
   -75
    00
```

Ans: The cost of 1kg of sugar = Rs. 15.

Q.3: There are 50 desks in a class. If three students are sitting on each desk, find the total number of students in the class.

Data:

Deske in a class = 50
Three students sit in each desk.
Students in the class= ?

$$\begin{array}{r} 50 \\ \times\ 3 \\ \hline 150 \end{array}$$

Ans: There are 150 students in the class.

Q.4: Perimeter of a square garden is 320 meters. What is the length of its one side?

Data:

Perimeter of a square garden = 320 meter.
Length of one side of garden = ?
We know that: $P = 4L$

$$320 = 4L$$
$$4L = 320$$
$$L = \frac{320}{4}$$
$$L = 80m$$

Ans: The length of one side of garden = 80.

Q.5: A car travels 55 km in one litre of petrol. How many kilometer will it travel in 22 litres of petrol?

Data:

A car travels 55km in 1 litre of petrol.
Distance covered by a car in 22 litres of petrol?

Sol:

$$\begin{array}{r} 55 \\ \times\ 22 \\ \hline 110 \\ +110\times \\ \hline 1210 \end{array}$$

Ans: A car travels 1210 kilometers in 22 litres of petrol.

Q.6: Weight of 120 cakes is 360kg. Find the weight of one cake.

Data:

Weight of 120 cakes = 360kg.
Weight of 1 cake = ?

Sol:

$$120\overline{)\ 360\ (3}$$
$$\underline{-360}$$
$$000$$

Ans: The wight of 1 = 3kg.

Q.7: If 3.5 meters of cloth is required for 1 shirt. Find the cloth for such 12 shirts in meters.

Data:

3.5 meters of clothes is required for 1 shirt.
Cloths for 12 shirts = ?

Sol:

$$\begin{array}{r} 3.5 \\ \times\ 12 \\ \hline 70 \\ +35\times \\ \hline 42.0 \end{array}$$

Ans: 42 meters of cloth is required for 12 shirts.

6.2 Further Problems on Unitary Method

Let us examine the following example:

Example-1

Faiza paid Rs.175 for 25 copies. How much has she to pay for such 35 copies?

Solution: First of all we have to find the price of one copy. Hence the price of one copy is less than the price of 25 copies, so we divide 175 by 25. The price of 35 copies can be calculated by the multiplication of 35 by the price of one copy.

Price of 25 copies = 175 Rupees

Price of 1 copy = 175 ÷ 25

= 7 Rupees

Price of 35 copies = 35 x 7 = 245

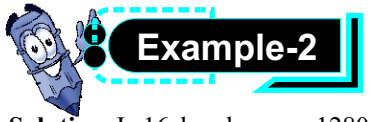
Rough Work

$25\overline{)175}\,(7$

175

0

Therefore total price of 35 copies will be 245 rupees.



Example-2

A man earns Rs.1280 in 16 days. Find the amount that he will earn in 12 days.

Solution: In 16 days he earns 1280 rupees.

In 1 day he will earn rupees, so divide 1280 by 16

= 1280 ÷ 16

= 80 Rupees

In 12 days he will earns Rs.= 80 x 12 = 960 rupees

Therefore he will earn 960 rupees in 122 days.

Example-3

Tayyaba purchased 12 meters off cloth for Rs.1860. How many meters of that cloth can be purchased for Rs.2635?

Solution: Rs.1860 is the cost of 12 meters of cloth.

Rs.1 will be the cost of less meters of cloth, so divide 12 by 1860 = 12 ÷1860

Rs.2635 will be the cost of more meters, so multiply 12 ÷1860 by 2635 = 12 ÷1860 x 2635

$$= \frac{\overset{1}{\cancel{2}}\ \cancel{12}}{\cancel{1860}\ \cancel{310}\ \cancel{155}\ \cancel{31}\ 1} \times \frac{17}{\cancel{527}\ \cancel{2635}} = 1 \times 17 = 17 \text{ m}$$

Hence 17 meters of cloth can be purchased for Rs.2635

Alternate Method:

Price of 12 meters of cloth = **1860 Rupees**

Price of one meter of cloth = **1860 ÷ 12**

= **155 rupees**

In Rs.2635 the meters of cloth = **2635 ÷155**

17 meters

Example-4

A Shopkeeper purchased 25 packets of sweet for Rs.2250. Find the cost of 37 such packets of sweet.

Solution:

Cost of 25 packets = 2250 Rupees

Cost of 1 packet = 2250 25

Cost of 37 packets = 2250 25 x 37

$$= \frac{\overset{90}{\cancel{450}}}{\cancel{2250}\ \cancel{25}\ \cancel{5}\ 1} \times 37$$

= 90 x 37 = 3330 Rupees

Exercise 6.2

Q.1. The price of 14 crates of cold drinks is Rs.672. Find the cost of 21 such crates.

Data:

Cost of 14 crates of cold drinks = Rs. 672

cost of 21 crates of cold drinks = ?

Solution:

If the cost 14 crates of cold drinks is Rs. 672.

Then,

The cost of 1 crate of cold drink = $\frac{672}{14}$

Sol:

$14\overline{)672}\,(48$

-56

112

-112

00

New multiply 48 by 21

Then 48x21

= 1008.

Ans: The cost of 21 crates of cold drink = Rs. 1008

Q.2. Saiqa purchased 17 meters of cloth for Rs.1224. How much had she to pay, if she had purchased only 8 meters of the same cloth?

Data:

Cost of 17 meters of clothes = Rs. 1224.
Cost of 8 meters of clothes = ?

Sol:

If the cost of 17 meters of clothes = Rs. 1224
Then,
The cost of 1 meter of cloth = 1224 ÷ 17

Sol:

$$\begin{array}{r|l} 17 & 1224 \\ -119 & \\ \hline 34 & \\ -34 & \\ \hline 00 & \end{array} \quad 72$$

The cost of 8 meters of clothes = 72x8

$$\begin{array}{r} 72 \\ \times\ 8 \\ \hline 576 \end{array}$$

Ans: The cost of 8 meters of clothes = Rs. 576.

Q.3. A milkman sold 245 litres of milk for Rs.4410. How much rupees will he get by selling 400 litres of the same milk?

Data:

The cost of 245 litres of milk = Rs. 4410
The cost of 400 litres of milk = ?

Sol:

If the cost of 245 litres of milk = Rs. 4410
Then,
The cost of 1 litre of milk = 4410 ÷ 245

Sol:

$$\begin{array}{r|l} 245 & 4410 \\ -245 & \\ \hline 1960 & \\ -1960 & \\ \hline 0000 & \end{array} \quad 18$$

The cost of 400 litres of milk = 400 x 18

$$\begin{array}{r} 400 \\ \times\ 18 \\ \hline 3200 \\ 400x \\ \hline 7200 \end{array}$$

Ans: The cost of 400 litres of milk = Rs. 7200.

Q.4. Rahila saves Rs.2850 in a month. Find her saving for one week. (1 month = 30 days, 1 week = 7 days).

Data:

Rahila saves Rs. 2850 in a month.
Rahila saving for one 1 week = ?

Sol:

If Rahila saves Rs. 2850 in a month.
Then,
Rahila saving for one day = 2850 ÷ 30

Sol:

$$\begin{array}{r|l} 30 & 2850 \\ -270 & \\ \hline 150 & \\ -150 & \\ \hline 000 & \end{array} \quad 95$$

If Rahila saves Rs. 95 in one day.
Then,
Rahila Saving for 1 week.

$$\begin{array}{r} 95 \\ \times\ 7 \\ \hline 665 \end{array}$$

Ans: Rahila saves Rs. 663 in one week.

Q.5. A washerman charges Rs.85 per hundred cloths. If he washed 270 clothes, find his income.

Data:

Charges of 100 clothes = Rs.85
charges of 270 clothes = ?

Sol:

If the charges of 100 clothes is Rs. 85.
Thes,
Then charges of 1 cloth = 85 ÷ 100

Sol:

```
100 ) 850 ( 0.85
     -800
      500
     -500
      000
```

The charges of 1 cloth = Rs. 0.85
If the charges of 1 cloth = Rs. 0.85
Then,
The charfges of 270 clothes = 0.85 x 270

```
   2 7 0
 x 0 . 8 5
 ---------
   1 3 5 0
 2 1 6 0 x
+ 0 0 0 x x
 ---------
 2 2 9 . 5 0
```

Ans: The charges of 270 clothes = Rs 229.5

Q.6. Samia purchased 5kg of fish for Rs.275. How much has she to pay for 16kg of fish of the same quality?

Data:

The cost of 5kg of fish = Rs.275
The cost of 16kg of fish = ?

Sol:

If the cost of 5kg of fish = Rs. 275
Then,
The cost of 1 kg of fish = 275 ÷ 5

Sol:

```
5 ) 275 ( 55
   -25
    25
   -25
    00
```

The cost of 1kg of fish = Rs. 55
If the cost of 1 kg of fish = Rs.55
Then,
The cost of 16kg of fish = 16 x 55

```
   5 5
 x 1 6
 -----
   3 3 0
 5 5 x
 -----
 8 8 0
```

Ans: The cost of 16kg of fish = Rs. 880.

Q.7. Monthly income of 26 persons is Rs.48230. If the income is the same, then find the income of 45 persons.

Data:

Monthly income of 26 personsRs. 48230
Monthly income of 45 persons = ?

Sol:

If the monthly income of 26 person = Rs. 48230
Then,
The income of 1 person = 48230 ÷ 26

Sol:

```
26 ) 48230 ( 1855
    -26
     222
    -208
      140
     -130
       130
      -130
       000
```

The income of 1 person = Rs. 1855
If the income of 1 person = Rs. 1855
Then,
The income of 45 persons = 1855 x 45

$$\begin{array}{r} 1855 \\ \times\ 45 \\ \hline 9275 \\ +7420\times \\ \hline 83475 \end{array}$$

Ans: The monthly income of 45 person is Rs. 83475.

Q.8. Aziz engaged 12 workers for Rs.1680. How many workers can be engaged for Rs.3920 if he gives the same amount to each.

Data:
Payment of 12 workers = Rs. 1680
number of workers for Rs. 3920 =?

Sol:

If the payment of 12 workers = Rs. 1680
Then,
The payment of 1 worker = 1680 ÷ 12

Sol:

$$\begin{array}{r|l} 12 & 1680 \\ -12 & \\ \hline & 480 \\ & -480 \\ \hline & 000 \end{array} \quad 140$$

The paymet of 1 worker = Rs. 140
If the payment of 1 worker = Rs. 140
Then,
The number of workers for Rs. 3920 = 3920 ÷ 140

$$\begin{array}{r|l} 140 & 3920 \\ -280 & \\ \hline & 1120 \\ & -1120 \\ \hline & 0000 \end{array} \quad 28$$

Ans: The number of workers for Rs.3920 are 28

CHAPTER NO.7

AVERAGE

7.1 INTRODUCTION

Suppose Sana read 140 pages of a story book in 4 hours. What was the average number of pages that she read one hour? The answr is that she read 35 pages in 1 hour, as 140 4=35 it does not mean that she read complete 35 pages in every hour. It may be possible that she read some of the pages faster at one time and slower at other time. Suppose read 40 pages in the first hour, 55 in the second hour, 20 in the third hour and 25 in the foruth hour respectively. To find the average number of pages that she read in 4 hours, we add the number of pages that she read in 4 hours and divide the sum by 4 i.e 4 hours..

Find the sum of all the pages	Divide by the Number of addends	The Quotient is the Average of the numbers
40 55 20 + 25 140	$\begin{array}{r\|l} 4 & 140 \\ 12 & \\ \hline & 20 \\ & 20 \\ \hline & 0 \end{array}$ 35	35 Average number of page sana read was 35

It simply means that 140 pages read by her in the same time if she would read complete 35 pages in one hour.

Therefore average is the number of quantities of the same kind which represents the central measure of the given number

Thus average is a true representative of the given data of the same kind, although it may or may not have a member of the data. It is obtained by dividing the sum of the data by the number of data.

$$\text{Average} = \frac{\text{Sum of the data}}{\text{Total Number of data}}$$

7.2 CALCULATION OF AVERAGE

Consider the following examples:

Find the average of 21, 23, 40, 56 and 31.

There are five numbers or quantities of the given data.

Find the sum of the quantities and divide it by 5.

$$\text{Average} = \frac{\text{Sum of all the quantities}}{\text{Number of the quantities}}$$

Solution:

$$= \frac{21 + 32 + 40 + 56 + 31}{5}$$

$$= \frac{\overset{36}{\cancel{180}}}{\underset{1}{\cancel{5}}} = 36$$

Hence average of the given quantities is 36.

Find the average temperature of a week from the given data.

Friday	Saturday	Sunday	Monday	Tuesday	Wednesday	Thursday
26.5° C	28.4° C	27.5° C	27.5° C	27.5° C	27.2° C	26.0° C

Solution: We know there are seven days in a week, so to find the average temperature of the week, divide the sum of the temperature of 7 days by 7.

$$\text{Average temperature} = \frac{\text{Sum of temperature}}{\text{Days of a week}}$$

$$26.5 + 28.4 + 27.9 + 27.5 + 25.5 + 27.2 + 26.0$$

$$= 189\ °C$$

$$= \frac{\overset{27}{\cancel{189}}\ °C}{\underset{1}{\cancel{7}}} = 27\ °C$$

Hence average temperature of the week will be 27 °C

A milkman sold 86, 96, 68, 56, 788, 80.5 and 53.5 litres of milk in 7 days. Find the average sale of milk per day.

Solution: First we find the total litres of milk by adding the quantities of milk per day that he sold in 7 days and divide the sum of the litres by 7.

$$86 + 96 + 68 + 56 + 78 + 80.5 + 53.5 = 518 \text{ litres}$$

$$\text{Average sale per day} = \frac{\text{Total milk sold}}{\text{Number of days}}$$

$$= \frac{\overset{74}{\cancel{518}}}{\underset{1}{\cancel{7}}} = 74 \text{ litres}$$

A book seller sold 10 books of the same subject at different prices. 2 books for Rs.20, 3 books for Rs.15, 3 books for

Rs.25 and 2 books for Rs.35. Find the average prices that he got or each book.

Solution:

Price of 2 books at Rs.20 per book 20 x 2 = Rs. 40

Price of 3 books at Rs.15 per book 15 x 2 = Rs. 45

Price of 3 books at Rs.25 per book 25 x 3 = Rs. 75

Price of 2 books at Rs.35 per book 35 x 2 = Rs. 70

Total price of 10 Books = Rs.230

$$\text{Average sale per day} = \frac{\text{Sum of Prices}}{\text{Number of Books}}$$

$$= \frac{230}{10} = 23 \text{ Rupees}$$

Hence average price will be 23 rupees per book.

Exercise 7.1

Q.1.Find the average of the following quantities:

1. 12, 14, 16, 18, 25

Sol: $\text{Average} = \dfrac{\text{Sum of all quantities}}{\text{Number of quantities}}$

$\text{Average} = \dfrac{12 + 14 + 16 + 18 + 25}{5}$

$\text{Average} = \dfrac{{}^{17}\cancel{85}}{\cancel{5}_{1}}$

Average = 17 Ans:

R.W

5) 85 (17
-5
35
-35
00

2. 24, 25, 23, 28, 30, 32

Sol: $\text{Average} = \dfrac{\text{Sum of all quantities}}{\text{Number of quantities}}$

$\text{Average} = \dfrac{24 + 25 + 23 + 28 + 30 + 32}{6}$

$\text{Average} = \dfrac{{}^{27}\cancel{162}}{\cancel{6}_{1}}$

Average = 27 Ans:

R.W

6) 162 (27
-12
42
-42
00

3. 19.3, 20.7, 15.5, 14.5

Sol: $\text{Average} = \dfrac{\text{Sum of all quantities}}{\text{Number of quantities}}$

$\text{Average} = \dfrac{19.3 + 20.7 + 15.5 + 14.5}{4}$

$\text{Average} = \dfrac{{}^{17.5}\cancel{70}}{\cancel{4}_{1}}$

Average = 17.5 Ans:

R.W

4) 70 (17.5
-4
20
-20
00

4. 27, 43, 34, 45, 41, 36, 40

Sol: $\text{Average} = \dfrac{\text{Sum of all quantities}}{\text{Number of quantities}}$

$\text{Average} = \dfrac{27 + 43 + 34 + 45 + 41 + 36 + 40}{7}$

$\text{Average} = \dfrac{{}^{38}\cancel{266}}{\cancel{7}_{1}}$

Average = 38 Ans:

R.W

7) 266 (38
-21
56
-56
00

5. 85.4, 100.2, 95.4, 79.0

Sol: $\text{Average} = \dfrac{\text{Sum of all quantities}}{\text{Number of quantities}}$

$\text{Average} = \dfrac{85.4 + 100.2 + 95.4 + 79.0}{4}$

$\text{Average} = \dfrac{{}^{51}\cancel{360}}{\cancel{4}_{1}}$

Average = 51 Ans:

Q.2.Word Problem:

Q.1. Daily attendance of class (V) for a week was 56, 40, 51, 48, 55, 46 and 61. What was average daily attendance?

Sol: 56, 40, 51, 48, 55, 46 , 61

$\text{Average} = \dfrac{\text{Sum of all quantities}}{\text{Number of quantities}}$

$\text{Average} = \dfrac{56 + 40 + 51 + 48 + 55 + 46 + 61}{7}$

$\text{Average} = \dfrac{{}^{51}\cancel{357}}{\cancel{7}_{1}}$

Average = 51 Ans:

R.W

7) 357 (51
-35
7
-7
0

Q.2. A shopkeeper sold 210kg of sugar on Friday, 324kg on Sunday and 252kg on Monday. Find the average sales of sugar per day.

Sol: 210kg, 324kg, 252kg

$$\text{Average} = \frac{210 + 324 + 252}{3}$$

$$\text{Average} = \frac{786}{3}$$

Average = 262 Ans:

R.W

3) 786 (262
-6
18
-18
6
-6
0

Q.3. Find the average speed of a car per hour if it travels 50km in 1st hour, 60km in 2nd hour, 75km in 3rd hour 55km in 4th hour and 65km in 5th hour.

Sol:

$$\text{Average} = \frac{50 + 60 + 75 + 55 + 65}{5}$$

$$\text{Average} = \frac{305}{5}$$

Average = 61 Ans:

R.W

5) 305 (61
-30
5
-5
0

Q.4. From a bakery Hina purchased 1 cake at Rs. 16.3 cakes at Rs.24 per cake and 4 cakes at Rs.28 per cake. Find her average purchased price per cake.

Data: 1 cakes = Rs. 16
3 cakes = Rs. 24
4 cakes = Rs. 28

Sol:

$$\text{Average} = \frac{16 + 24 + 24 + 24 + 28 + 28 + 28 + 28}{8}$$

$$\text{Average} = \frac{200}{8}$$

Average = 25 Ans:

Ans: The average price of 8 cakes is Rs. 25.

Q.5. Mrs. Nargis saved Rs.290 in the month of April, Rs.340 in May, Rs.550 in June, Rs.600 in July and Rs.325 in August. Find her average saving of a month.

Sol: Rs. 290, Rs. 340, Rs. 550, Rs. 600, Rs. 325

$$\text{Average} = \frac{290 + 340 + 550 + 600 + 325}{5}$$

$$\text{Average} = \frac{2405}{5}$$

Average = 421 Ans:

R.W

5) 2105 (421
-20
105
-105
000

7.3 To find the sum when Average is given:

We know that average can be found by dividing the sum of the data by the number of the data or sum of all the quantities dividing by the number of all the quantities, but when the average of a data is given and want to find the sum or total quantities of the data, we multiply average by the number of data or quantities.

Therefore:

Sum of the quantities = Average x Number of quantities

Consider the following:

Example-1

Average attendance of a class for 6 days is 65. Find the total attendance.

Solution:

Average attendance	=	60
Number of days	=	6
Total attendance	=	60 x 6
	=	360

Hence total attendance of 6 days will be 360.

Example-2

The average height of 8 sticks is 5.9 feet. Find their total height.

Solution:

Average height	=	55.9 feet
Number of sticks	=	8
Total height	=	5.9 x 8
	=	47.2 feet

Hence total height of 8 sticks will be 47.2 feet.

Example-3

Average daily sales for first 15 days of a shopkeeper is Rs.315 and that of the next 15 days of the month is Rs.2885. Find his total income of the month.

Solution:

Average sale for first 15 days	=	315 rupees
Total sale for first 15 days	=	315 x 15
	=	4725 rupees
Average sale for the last 15 days	=	285 rupees
Total sale for last 15 days	=	285 x 15
	=	4275 rupees
Total sale for the month	=	4725 + 4275
	=	9000 rupees

Hence total income of the month will be 9000 rupees.

Example-4

The average weight of 10 bags of sugar is 40 kg. If the average weight of 9 bags off sugar is 38, then find the weight of the tenth bag.

Solution:

Average weight of 10 bags	=	40 kg
Total weight of 10 bags	=	40 x 10
	=	400 kg
Average weight of 9 bags	=	38 kg
Total weight of 9 bags	=	38 x 9
	=	342 kg
Weight of the tenth bag	=	400 - 342
	=	58 kg

Hence the weight of the tenth bag is 58 kg.

Exercise 7.2

Q.1. The average speed of a car is 62 km/hour. Find the total distance covered in 6 hours.

Sol: **Data:**

The average speed of a car = 62 km/h.
Distance covered in 6 hours = ?

First we calculate the distance.

$$\text{Speed} = \frac{\text{Distance}}{\text{Time}}$$

$$62 = \frac{\text{Distance}}{1}$$

Distance = 62 x 1 m
Distance = 62 m

R.W

$$\begin{array}{r} 62 \\ \times\ 6 \\ \hline 372 \end{array}$$

If the distance of a car is 62m.
Then,

= 62 x 6
= 372m

Ans: The car covered 372m distance in 6 hours.

Q.2. The average weight of 6 boys is 45 kg. Weight of five boys are 40, 42, 44, 52 and 49 kg. Find the weight of the sixth boy.

Sol: **Data:**

Average weight of 6 boys is 45kg.
Total weight of 6 boys = 45x6
Total weight of 6 boys = 270
Finding average of five boys:

$$= \frac{40 + 42 + 44 + 52 + 49}{5}$$

$$= \frac{227}{5}$$

$$= 45.4\text{kg}$$

The average weight of 5 boys is 45.4
Total weight of 5 boys = 45.4 x 5
The weight of 5 boys = 227.5

weight of 6 boys = 270-227.5
weight of 6 boys = 42.5kg

Ans: The weight of 6 boy is 42.5kg.

Q.3. The average marks of 8 subjects of a boy is 76. If the average marks of seven subjects is 72, then find the number in the remaining subject.

Sol: **Data:**

Average marks of 8 subjects of a boys is = 76
Total marks of 8 subjects = 76x8
Total marks of 8 subjects = 608

Average marks of 7 subjects = 72
Total marks of 7 subjects = 72x7
Total marks of 7 subjects = 504

Marks in remaining subjects = 608 - 504
Marks in remaining subjects = 104

Ans: The marks in remaining subjects = 104

Q.4. The average sale of a shopkeeper is Rs.200 for 30 days. If the average sale for the first 15 days is Rs.190 and for the last 14 days is Rs.180, then find the sale of the sixteenth day.

Average sale of a shopkeeper is Rs. 200 for 30 days
Total sale of a shopkeeper is Rs. 200 x 30
Total sale of a shopkeeper is Rs. 6000

Average sale for first 15 days is Rs. 190
Total sale for first 15 days is 15x190 = 2850
Average sale for 14 days is Rs. 180
Total sale for 14 days = 180 x14
Total sale for 14 days = 2520
Add the sale of 15 days and 14 days.

$$\begin{array}{r} 2850 \\ +2520 \\ \hline 5370 \end{array}$$

Sale of sixteenth day = 6000 - 5370
sale of sixteenth day = 630

Ans: The sale of sixteenth day is Rs. 630

Q.5. The heights of 4 boys are 6.2 feet, 5.10 feet, 5.9 feet and 5.6 feet. Find the average of height of 4 boys.

Sol:

$$\text{Average} = \frac{6.2 + 5.10 + 5.9 + 5.6}{4}$$

$$\text{Average} = \frac{22.8}{4}$$

Average = 5.7 Ans:

Ans: The average of height of 4 boys is 5.7 feet.

CHAPTER NO.8

ALGEBRA

8.1 Introduction:

Algebra is a part of Mathematic beside the Arithmetic which deals with number like 1, 3, 7, ... 1/3, 2/7, 2 3/5 Algebra deals with letters and number both. These letter have no definite values. They represent any number. Thus letters make the seance a little wider hence we can say Algebra is a subject of mathematics which gives more general aspects for the calculations.

Algebra was introduced by a Muslim scientist and mathematician named Muhammad-bin-Moosa Khwarizmi in the period 780-840 AD. His famous book. "Al-Jebra-wal-Muqbillah" contains a good material on this subject and basic rules and concepts.

8.1 How the Algebra Begins:

Example-1

A Teacher asked his students to write their age on the page and gave the pattern.

Age of student = x years

Nasar wrote (Age of Nasir = 15 years)

Here x means 15 (Ather wrote as)

Age of Ather = 16 years (Here x means 16)

Example-2

Khizar has 50 rupees.

If the spends Rs.10 the remaining amount is = 50 - 10 = Rs.40.

If the spends Rs.15 more next day the amount will be

Reduced to = 40 - 15 = 25

Reduced to = 40 - 15 = 25

Or Rs.50 - (10 + 15) = 25

If we write it in general $x - y$

x stands for 50 and y expresses the amount spends.

Example-3

If Ali can buy one dozen banana in Rs.20/-

He will pay for 3 dozen = Rs.20 x 3 = Rs.60/-

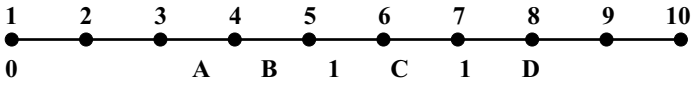
The same thing in algebra y x Rs.X/- = Rs.Xy

Here x = Rs.20 and y = 3 dozen

Xy = 20 x 3

= Rs.60

Example-4



A, B, C and D are four points located at x distance from O, for A x means 4 units.

for B x means 5 units.

C is at 7 units from O hence value of x for C is 7

Similarly for D, x = 8.

Example-5

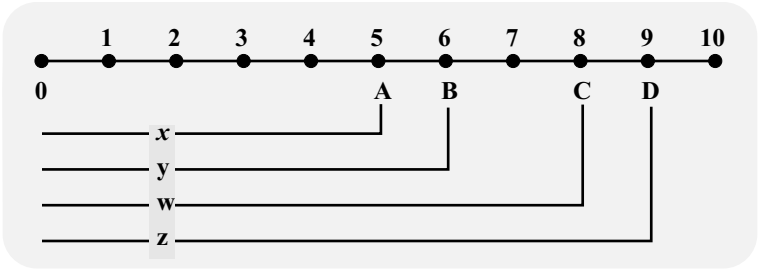
If it is said that A is at x distance from O, B is at y distance,

C is at w distance rom O

And D is at z distance from O.

Now x = 5, y = 6, w = 8 and z = 9.

We may conclude from figure and this given data.



Distance between A and B = y - x, => 6-5 => 1.

Distance between B and C = w - x, => 8-6, => 2.

Distance between A and C = w - x, => 8-5, => 3.

Distance between A and D = z - x, => 9-5, => 4.

Example-6

Write the following in symbolic form.

(I) Sum of 5 and y — $5 + y$

(ii) 3 is subtracted from x — $x - 3$

(iii) Sum of x and y — $x + y$

(iv) 3 is multiplied by x, y and z — $3 \times x \times y \times z = 3xyz$

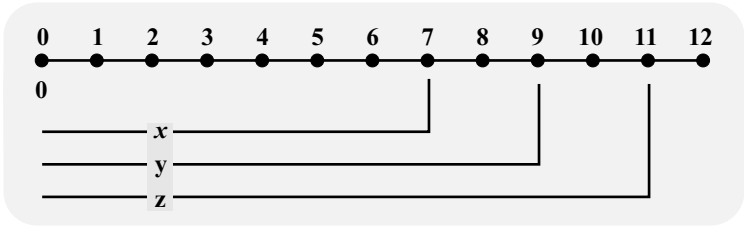
(v) 5 is divided by x — $5/x$

(vi) x is multiplied by y — $x \times y = xy$

(vii) x is divided by y — $x \div y = x/y$

Exercise 8.1

Q.1.See the figure and find the values of the notation x, y and z:

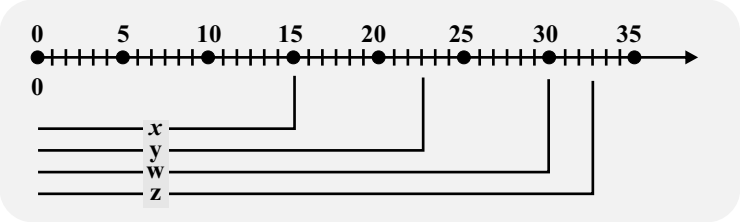


Ans: x=7, y=9, z =12.

Q.2. Write the following in symbolic form:

(i) 5 is subtracted from y.
Ans: y-5
(ii) 3 is added to x.
Ans: x+3
(iii) Sum of 7 and z.
Ans: 7+z
(iv) Sum of x and y.
Ans: $x + y$
(v) 3 is subtracted from y.
Ans: y-3
(vi) Product of 2, x and y.
Ans: 2xy
(vii) Division of y by 4.
Ans: y 4
(viii) Division of 5 by x.
Ans: $4 \div x$ *or* $5/x$
(ix) x is multiplied by 2y.
Ans: x x 2y
(x) Product of x, y and z is divided by 12.
Ans: $\frac{xyz}{12}$ or $xyz \div 12$

Q.3.See the figure and find the values of following:



(i) x +y (ii) y - x (iii) z - y (iv) z - x (v) z + x

(i) x +y

Sol: Let x = 15, y= 23
Then,
x + y
= 15 + 23
= 38 Ans:

(ii) y - x

Sol: Let y = 23, x = 15
Then,
y - x
= 23 - 15
= 8 Ans:

(iii) z - y

Sol: Let y = 23, z = 33
Then,
z - y
= 33 - 23
= 10 Ans:

(iv) z - x

Sol: Let x = 15, z = 33
Then,
z- x
= 33 - 15
= 18 Ans:

(v) z - x

Sol: Let x = 15, z = 33
Then,
z + x
= 33 - 15
= 48 Ans:

Q.4. Nadia had 15 rupees. She get x rupees more. Find the total number of rupees she had.

Data:

Nadia had 15 rupees.
She got x rupees.
Total rupees = ?

Sol: Let x = 15
then,

$$\begin{array}{r} 15 \\ -15 \\ \hline 30 \end{array}$$

Ans: Nadia had 30 total rupees.

Q.5. If Zaka's present age is x years what will be his age after 11 years?

Data:

Zaka's present age is x years.
His age after 11 years = ?

Sol: Let x = 15
then,

$$\begin{array}{r} 15 \\ -11 \\ \hline 30 \end{array}$$

Ans: Zaka will be 26 years old after 11 years.

Q.6. Zaka has 20 oranges, x of them are rotten. How many oranges are good?

Data:

Zaka had 20 oranges.
Rotten oranges = x
Good oranges that were left = ?

Sol:

Let x = 15
then,

$$\begin{array}{r} 20 \\ -15 \\ \hline 05 \end{array}$$

Ans: 5 oranges were left.

Q.7. If the cost of 12 pizzas is Rs. 3600 rupees what is the cost of one pizza?

Data:

Sol: Cost of 12 Pizzas = Rs 3600
Cost of one Pizza = ?

R.W

$$12\overline{)3600}\,(300$$
$$-3600$$
$$0000$$

Ans: The cost of one pizza is Rs. 300.

Q.8. If the cost of one ball is Rs. 250 then find the cost of 6 balls:

Data:

Sol: Cost of one ball = Rs. 250
Cost of 6 balls = ?

$$\begin{array}{r} {}^{3}250 \\ \times 6 \\ \hline 1800 \end{array}$$

Ans: The cost of 6 balls is Rs. 1800.

8.2 AREA

A square is a four sided figure whose all sides are equal if we A for area and S for sides.

Area of square = Side x Side

A = S x S

A rectangle is also a four sides figure but its opposite sides are equal. If we write L for its length and B for its breadth.

Area of rectangle = length x breadth.

A = L x B

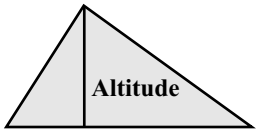
S A = S x S

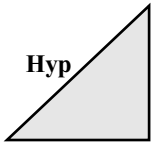
S

B A = L x B

L

A triangle is three sided figure.





If we write B for base and h for altitude .

Area of a triangle = ½ Base x altitude.

A = ½ Bh

Example-1

Find the area of a square if each side is (i) 5cm (ii) 2cm.

(i) A = S x S=> 5 x 5 => 15 cm^2

(ii) A = S x S=> 5 x 2 => 4 cm^2

Example-2

Find the area of a square if each side is (i) 5cm (ii) 2cm.

Base = B = 6cm

Altitude = h = 5cm

A = ½ B x h => ½ x 6 x 5 => 15cm^2.

Exercise 8.2

Q.1. Find the area of a square whose each side is 7 cm.

Sol: If L = 7cm of a square, then w = 7cm.

$$A = L \times w$$
$$A = 7 \times 7$$
$$A = 49cm^2$$

Ans: The area of square is $49cm^2$.

Q.2. Find the area of a rectangle which is 10cm long and 6cm wide.

Sol: L = 10cm , W = 6cm

$$A = L \times w$$
$$A = 10 \times 6$$
$$A = 60cm^2$$

Ans: The area of rectangle is $60cm^2$.

Q.3. What is the area of a triangle whose base is 10cm and the altitude is 5cm?

Sol: Base = 10cm , Altitude = 5cm

$$\text{Area of triangle} = \frac{1}{2} \text{ y Base x Altitude}$$
$$\text{Area of triangle} = \frac{1}{2} \times 10 \times 5$$
$$\text{Area of triangle} = \frac{1}{2} \times 50$$
$$\boxed{\text{Area of triangle} = 25cm^2}$$

Ans: The area of triangle = $25cm^2$

Q.4. Find the area of square if its each side is x cm.

Sol: If L = x cm then the W = x

$$A = L \times w$$
$$A = x \times x$$
$$A = x^2$$

Ans: The area of square = x^2.

Q.5. Find the area of rectangle whose bigger side is x and smaller side is y:

Sol: L = x, W = y

$$A = L \times w$$
$$A = x \times y$$
$$A = xycm^2$$

Ans: The area of a rectangle = $xy\ cm^2$.

Q.6. Find the area of triangle whose base is x and altitude is y.

Sol: Base = x , Altitude = y

$$\text{Area of triangle} = \frac{1}{2} \text{ y Base x Altitude}$$
$$\text{Area of triangle} = \frac{1}{2} \times x \times y$$
$$\text{Area of triangle} = \frac{xy}{2}$$

Q.7. x, y and z are the three sides of a right angle triangle x is the largest and y is the smallest. What is its area?

Sol: Length = x , Width = y and Height = z

$$\text{Area of triangle} = \frac{1}{2} \text{ x Base x Height}$$
$$\text{Area of triangle} = \frac{1}{2} \times y \times z$$
$$\text{Area of triangle} = \frac{1}{2} \times y \times z$$
$$\boxed{\text{Area of triangle} = \frac{yz}{2} \text{ cm}}$$

Q.8. If we join the opposed vertex (ends) of a rectangle whose length is 10cm and which is 8cm. Two triangles are formed. Find the area of each triangle.

Sol: Area of triangle = $\frac{1}{2}$ x Base x Height

Area of triangle = $\frac{1}{2}$ x 10 x 8

Area of triangle = $\frac{80}{2}$

Area of triangle = $40cm^2$

8.3 Algebraic Expression:

$2+x, x/2, y-2, y-3, x+y, 2xyz$ and $x+y+z$ all the algebraic expressions. x, $2x$, $x/2$, x^2, are called the single terms. x, y, z or any other notation (English letters) have different values in different specifications hence they are called variables where as number associated with these variable have constant values normally called constants.

TERMS

Any algebraic expression may have one, two, three or more terms.
$2x+y$ expression consists of two terms.
$x/2$ expression consists of only one term.
These terms are linked y sign of + or - .

Parts of a Term

Base, Exponent and coefficient.
We consider a term like $3x^2$ in which x is base.
3 is coefficient of x
2 is exponent or power of x.

Example-1

(i) Find the number of terms in the given expression.
(ii) Mark the coefficient and exponents of all terms.

$2x+3y^2+4$

Ans (i) There are three terms in the given expression.
(a) (ii) In the first term $2x \Rightarrow 2x$ (b) In the second term 3y2
x is the base y is the base
and I is power or exponent and 2 is the power or exponent

(c) In their term $4 \Rightarrow 4x^0$ base is not shown.
We assume if it is x or y, its power must be zero as any thing power is zero equal to 1, coefficient is 4.

Exercise 8.3

Q.1. Write the base, exponent and coefficient of the following:

(i) $4x^3$

Sol:
Base = x
Exponent = 3
Co-efficient = 4

(ii) $2/3x^2$

Sol:
Base = x
Exponent = 3
Co-efficient = 2/3

(iii) z^3

Sol:
Base = z
Exponent = 3
Co-efficient = 1

(iv) $3y^5$

Sol:
Base = y
Exponent = 5
Co-efficient = 3

(v) 5z

Sol:
Base = z
Exponent = 1
Co-efficient = 5

(vi) $-y^2$

Sol:
Base = y
Exponent = 2
Co-efficient = -1

(vii) $-4z^3$

Sol:
Base = z
Exponent = 3
Co-efficient = -4

(viii) $1/3z^{-1}$

Sol:
Base = z
Exponent = -1
Co-efficient = $\frac{1}{3}$

Q.2. Write the number of terms in the following expression:

(i) $2x + 3y + z$

Ans: 3 Terms

(ii) $x-y$

Ans: 2 Terms

(iii) $2y^2 - 5xz^3 + 7$

Ans: 3 Terms

Q.3. Differentiate arithmetic, algebraic expression:

(i) 3 + 4 > 5

Ans: Arithmetic

(ii) $2x+3$

Ans: Algebric

(iii) $7y - 2x > 20$

Ans: Algebric

(iv) 7z

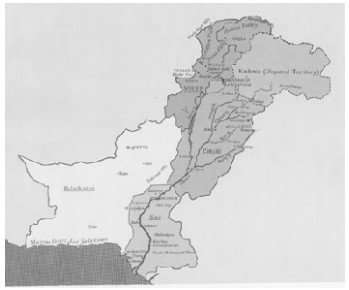
Ans: Algebric

CHAPTER NO.9

BASIC CONCEPTS OF GEOMETRY

9.1 POINT

It is a basic concept of geometry. The term point is used in geometry without definition. A pencil dot or a pin point on the paper is the idea of point in geometry.



Look at the adjoining map of Pakistan. In this map different cities of Pakistan are shown with the help of points. They are **P, Q, I, R L, M, H** and **K** which stand for Peshawar, Quetta, Islamabad, Rawalpindi, Lahore, Multan, Hyderabad and Karachi. The points may be named with the help of English alphabets such as **A, B, C, ..., x, y, z.** These letter are written in capital. For example a point 'y' indicated as 'y'.

9.2 LINE SEGMENT

Look at the following point 'A' and 'B'. Join them with a straight line.

A **B** **A** **B**

Thus we have the picture of a **line segment AB.** The line segment AB is a set of point consisting of (i) the points A and B and (ii) all the points between points **A** and **B**. We can take any number of points between points **A** and **B**. Look at the following figure.

Suppose the points **P, Q, R** and **S** lie on the line segment. **AB**. These points are called the members of the line segment **AB** or line segment **AB** passes through these points. Line Segment has two end points.

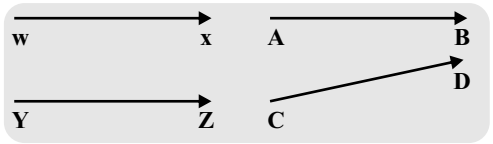
Point **A** and **B** are called the **end point** of the line segment **AB**. Symbolically a line segment **AB** is denoted by $\overline{AB}$. Length of a line segment **AB** is denoted by $m\overline{AB}$. If the length of **AB** is 4cm then it is written as $m\overline{AB} = 4cm$ where **'m'** stands for measurement.

9.3 RAY

Look at the following figures:

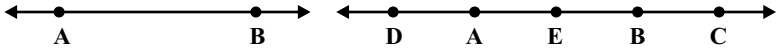
These are the rays $\overrightarrow{AB}$ and $\overrightarrow{BA}$ Symbolically they are represented by putting the arrows over them like $\overrightarrow{AB}$ and $\overrightarrow{BA}$ both the rays show different directions. $\overrightarrow{AB}$ has one end point **'A'** while $\overrightarrow{BA}$ has **B** as the end point **B** and the ray $\overrightarrow{BA}$ show that it has on end point in the direction of **A** because **"a ray just one end point"** Hence we can define that **"A** and all the point on one side of **'A'** on a line containing **'A'** Rays are of two types (i) **Parallel and** (ii) **Non-Parallel.**

If the rays have same distance between them they are called parallel rays and if two rays have different distance between them are:



9.4 LINE

We know a line segment has two end points. But when we say "Line" we means a straight line which can extend indefinitely in both the directions. Look at the following figure, **AB** which is a line.



The arrow heads show that a line has no end point and it may be extended in both the directions. It includes all the points beyond **'A'** and all the points beyond **'B'**. Symbolically line **AB** denoted by $\overleftrightarrow{AB}$.

Take any point **'C'** beyond point **'B'** then **AB** and $\overrightarrow{AC}$ represent the same line. Similarly take a point **'D'** before point A and also take another point **'E'** between point **'A'** and **'B'** in this way we bet $\overleftrightarrow{DA}$, $\overleftrightarrow{AE}$, $\overleftrightarrow{AB}$, $\overleftrightarrow{BC}$, etc. These are different names of the same line $\overleftrightarrow{DA}$, $\overleftrightarrow{AE}$, $\overleftrightarrow{AB}$, $\overleftrightarrow{BC}$ etc are different line segments.

Exercise 9.1

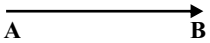
Q.1. What do you know about the following terms? Give one example of each.

(i) Point

It is a basic concept of geometry. The term point is used in geometry without definition. A pencil dot or a pin point on the paper is the example of point in geometry.

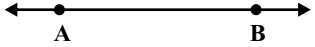
(ii) Ray

A ray has one end point .
For example:



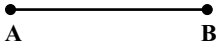
(iii) Line

A line has no end point .
For example:



(iv) Line Segment.

The line segment AB is a set of point consisting of (i) the points A and B and (ii) all the points between A and B.

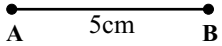


Q.2.Draw a line segment of the following measures.

(i) m$\overline{AB}$ = 5cm (ii) m$\overline{PQ}$ = 6.5cm (iii) m$\overline{LM}$ = 3.5cm

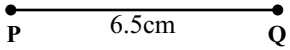
(i) m$\overline{AB}$ = 5cm

Sol:



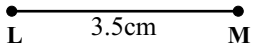
(ii) m$\overline{PQ}$ = 6.5cm

Sol:



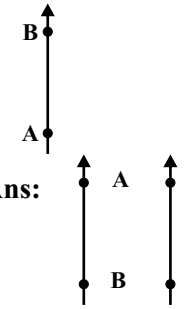
(iii) m$\overline{LM}$ = 3.5cm

Sol:

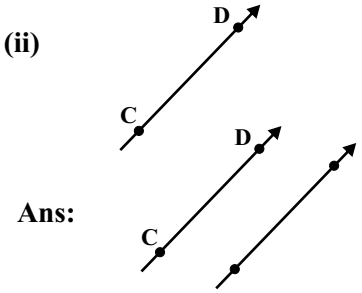


Q.3. Draw parallel in opposite direction of the following rays.

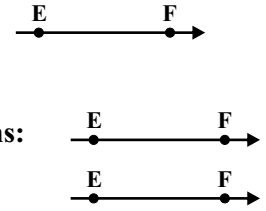
(i)



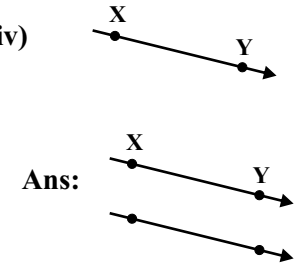
(ii)



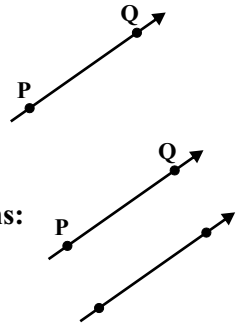
(iii)



(iv)

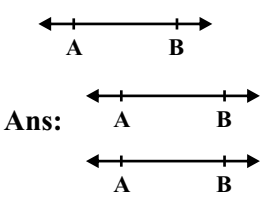


(v)

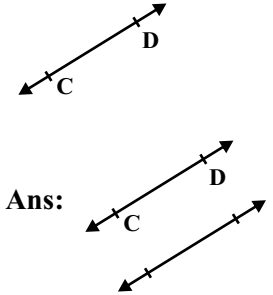


Q.4. Draw parallel line of the following lines.

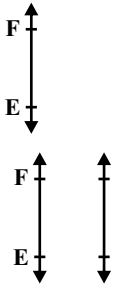
(i)



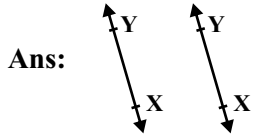
(ii)



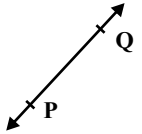
(iii)



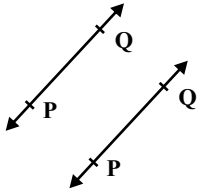
(iv)



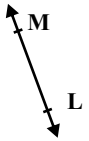
(v)



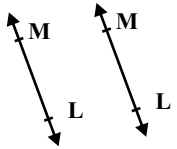
Ans:



(vi)

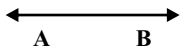


Ans:



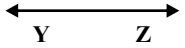
Q.5. Name the following figures.

(i)



Ans: Line

(ii)



Ans: Line

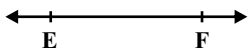
(iii)

Ans: Line seqment

(iv)

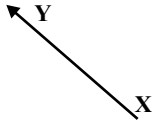
Ans: Line seqment

(v)



Ans: Line

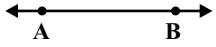
(vi)



Ans: Ray

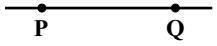
Q.6. Write the names of end points of the following figures:

(i)



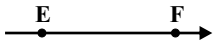
Ans: $\overleftrightarrow{AB}$, AB on end point

(ii)



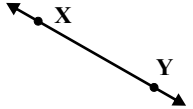
Ans: $\overline{PQ}$, P and Q are end point

(iii)



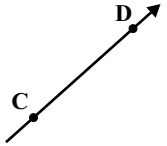
Ans: $\overrightarrow{EF}$, E is end point

(iv)



Ans: $\overleftrightarrow{XY}$, XY on end point

(v)



Ans: $\overrightarrow{CP}$, C is the end point

Q.7. Fill in the blanks:

(a) A line segment has **TWO** end point.

(b) Symbolically a line segment AB is written as **AB**.

(c) **POINT** is a basic concept in geometry.

(d) XY indicates the **LINE XY**.

(e) **RAY** has one end point.

9.5 ANGLE

Look at the adjoining figure and answer the following questions.

(a) How many rays are there in the figure?

(b) Write the names of the rays.

(c) Are the rays parallel to each other?

(d) Do the rays have common end point?

(e) Name the common end point of **BA** and **BC.**

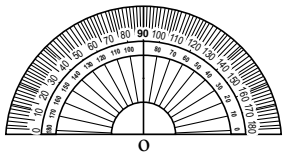
(f) That is the common end-point called?

(g) When two un-like rays have the same end-point, the figure which is so formed is called what?

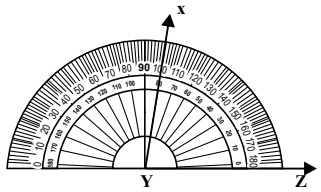
It means that two non-parallel rays which have a common end-point form an angle. Therefore **ABC** or **CBA** is the angle formed by the union of $\overrightarrow{BA}$ and $\overrightarrow{BC}$. Symbolically angle **ABC** is written as $\angle$ **ABC**. Sometimes the angle is named by its vertex. The angle **ABC** or **CBA** can be written as $\angle$**B** It is read as angle **B**. Sometimes we use small letters like **a, b, c, ...x, y, z** to represent angle. The rays **BA** and **BC** are called the arms of the angle and common end point which is **B** in the figure is called vertex of the angle.

9.6 MEASUREMENT OF AN ANGLE

The size of an angle is measured by a device called Protractor. You can see it in your geometry box.



Look at the adjoining figure of a protractor. The unit measure of an angle is **Degree.** The symbol of degree is **"o". A** protector has two semicircular scales, lower and upper. Each starts at **0°** and ends at **180°.** The straight line at the base from which the scales start and end is called **base line. 'O'** is the centre of the protractor. The lower scale start from right to left and upper scale starts from left to right.



In order to measure an angle XYZ with the help of a protractor place the centre of the Protractor **'0'** on vertex **'Y'** of the angle **XYZ** and adjust the protractor so the base line is lying exactly along the arm **YZ of Ð XYZ**.

Now look a the ray **XY**. The ray **XY** passes through the number 80 on the inner scale and the number 100 on the outer scale. Hence the measure of an angle **XYZ** IS 80°. Here we measure the angle **XYZ** from right to left because the base line is on the right side of the centre **'O'** of the protractor. If the base line is on the left side of the **'O'** of the protractor, then we measure the angle from left to right. While measuring the angle from right to left, the numbers of the lower scale are counted and from left to right, the numbers of the upper scale are counted.

9.7 To draw an angle of a given measure

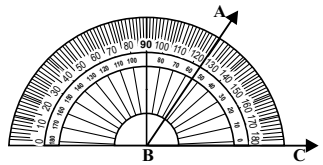
By using a protractor draw an angle of a given measure.

To draw an angle ABC of 55° measure.

Steps:

1. Draw a ray **BC.**

2. Place the centre of the protractor on the point **B** and adjust the base line of the protractor with **BC**.



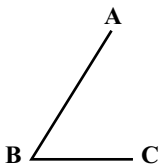
3. Put the mark at the point where the lower circular scale show 55°.
4. Write the name of the point as **'A'.**
5. Remove the protractor and draw the ray **BA**. The required angle is **ABC** which is 55°, that is $m\angle ABC = 55°$ or $m\angle B = 55°$.

Letter 'm' is used to show the measure of the angle.

Exercise 9.2

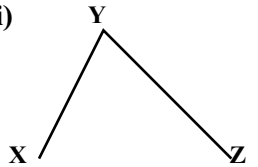
Q.1. Write the names of the vertices of the following figures.

(i)



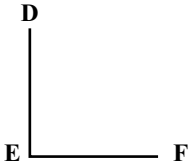
Ans: < ABC

(ii)



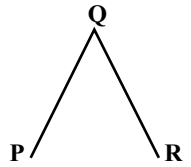
Ans: < XYZ

(iii)



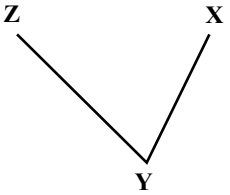
Ans: < DEF

(iv)



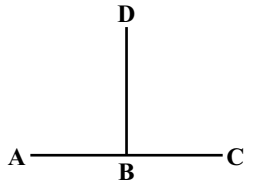
Ans: < PQR

(v)



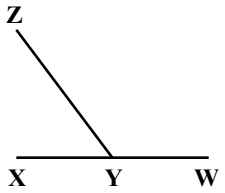
Ans: < XYZ

(vi)



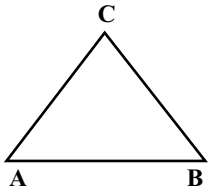
Ans: < ABD, <CBD

(vii)



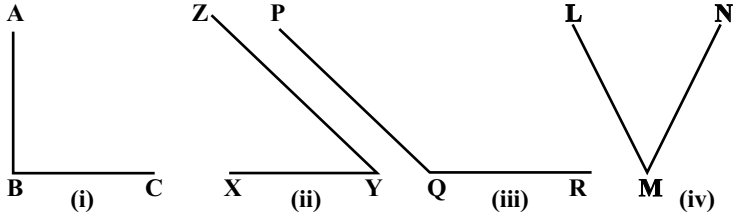
Ans: < XYZ, < WXZ

(viii)



Ans: < ABC, < ACB, < BAC

Q.2. Measure the following angels with the help of a protractor and write their measurements in the blank.



(i) ∠ABC = **90°** (ii) ∠XYZ = **45°**

(iii) ∠PQR = **120°** (iv) ∠LMN = **90°**

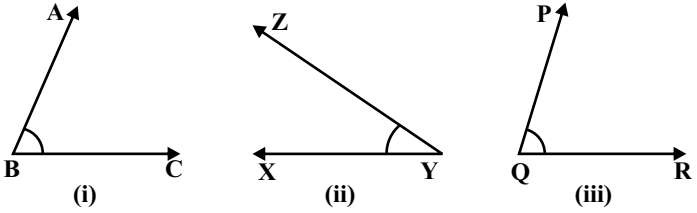
9.8 KINDS OF ANGLES

Angle are of different measure. Some angle are given special names according to their measures.

1. Acute Angle:

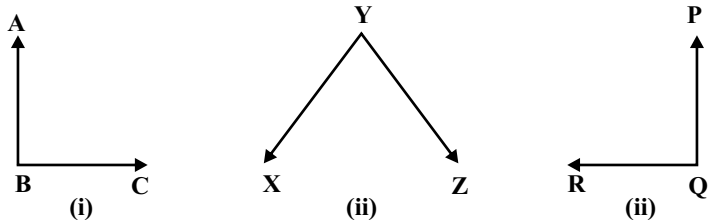
An angle whose measure is less than 90° is called an acute angle.

Following figures are of acute angle.



2. Right Angle:

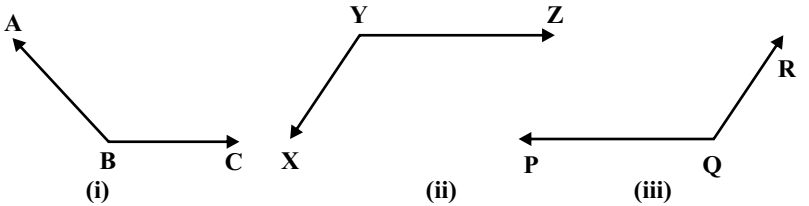
An angle whose measure is of 90° is called a right angle. Following figures are of right angle.



3. Obtuse Angle:

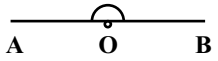
An angle whose measure is greater than 90° is called an obtuse angle.

Following figures are of obtuse angle.



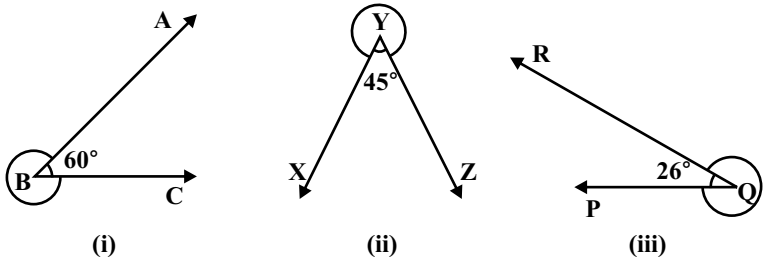
4. Straight Angle:

An angle whose measure is 180° is called a straight angle. Look at the figure of straight angle.



5. Reflex Angle:

An angle whose measure is greater than 180° but less than 360° is called a reflex angle. Look at the following figures off reflex angle.



To measure the reflex angle, measure the interior of the angle and subtract it from 360°. For example in fig (i) **ABC** = 60°. Now reflex angle will be 360° - 60° = 300° . Similarly in fig (ii) **XYZ = 45°** and reflex will be 360°=315° . Reflex angle is the exterior angle of the given angle.

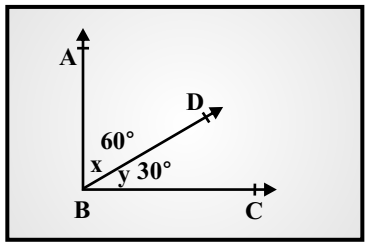
Some angles are given special names due to their positions which are as following.

9.9 RELATION BETWEEN ANGLES

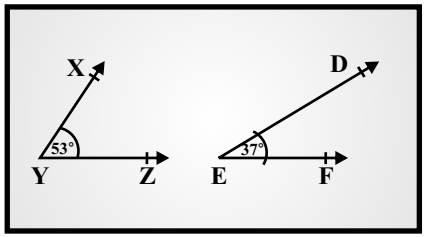
Complementary Angle:

If the sum measure of two angle is 90°, they are called Complementary Angle and each angle is said to be the complement of the other. Observe the following figures of complementary angles.

a. In the adjoining figure there are two adjacent angles, ∠ **ABD** or ∠ X = 60° and ∠ **DBC** or y = 30°. Both are complementary angles, because their sum measure is 90° or = m ∠ **ABC**.



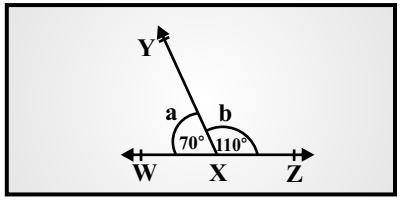
B. In the adjoining figure there are two angles, ∠ XYZ and ∠ DEF. Both angles are also complementary angles, because ∠XYZ = 53° and ∠ DEF = 53 °∠DEF = 37° and their sum measure is 90° i.e 53 + 37 = 90° .



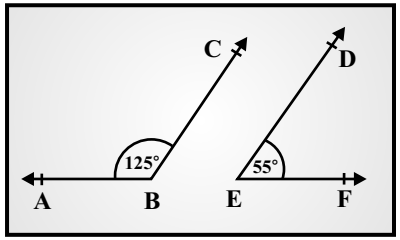
9.10 Supplementary Angles:

If the sum measure of two angles is 180, they are called supplementary angles and each angle is said to be the supplement of the other. Observe the following figures of supplementary angle.

a. In the adjoining figure there are two adjacent angles, ∠ **WXY** or ∠ a = 70° and ∠ **ZYX** or ∠ b = 110°. Both are supplementary angles, because their sum measure is 108° i.e 70° + 110° = 180° .

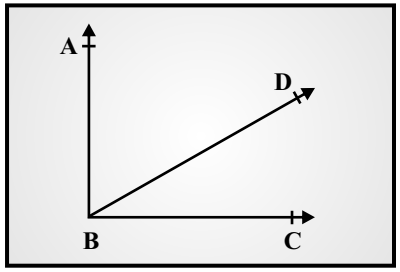


b. In the adjoining figure there are two adjacent angles, ∠**ABC** and ∠ DEF. Both the angles are also supplementary angles, because ∠ABC = 125° and DEF = 55° are their sum measure is 180° i.e 125° + 55° = 180° .



Adjacent Angle:

Observe the adjoining figure and answer the given questions.



(i) How many angle are there in the figure?

(ii) Write the names of the angle shown in the figure.

(iii) What is the common vertex of both the angles?

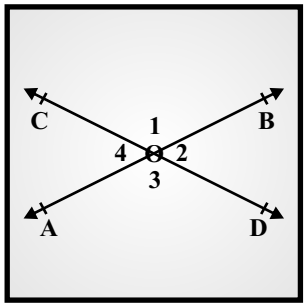
(iv) What is the common arm of both the angles? Hence two angles are said to be adjacent angles if;

They have a common vertex and a common arm.

In the above given figure ∠ **ABD** and ∠ **CBD** are adjacent angles because they have common vertex **'B'** and have a common arm $\overrightarrow{BD}$.

VERTICALANGLES:

Observe the adjoining figure and answer the given questions:



(i) How many lines are there in the figure?

(ii) Write the names of the lines shown in the figure.

(iii) At which point, lines **AB** and **DC** intersect each other?

(iv) How many angles are formed when $\overleftrightarrow{AB}$ and $\overleftrightarrow{CD}$ intersect each other?

(v) Write the names of the angles.

Measure all the angle with the help of a protractor.

(vi) Is there $\angle 1 = \angle 3$ in measurement?

(vii) Is there $\angle 2 = \angle 4$ in measurement?

(viii) How many pairs of angles are there in the figure?

Hence 1 two lines **AB** and **CD** intersect each other at point **O Ð BOC** and $\angle$**AOD** from a pair of vertical angles. Similarly$\angle$ **BOD** and $\angle$**AOC** from another pair of vertical angles. In other words we can say that.

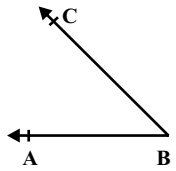
Two angles are called vertical angles if their arms form two pairs of opposite rays

In the figure above $\angle$**OA** and $\angle$**OB** is a pair of two opposite rays similarly **OC** and **OD** is another pair of opposite rays. $\angle$**1** and $\angle$**3** is a pair of vertical angles, $\angle$**2** and $\angle$**4** is another pair of vertical angles.

Exercise 9.3

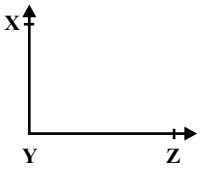
1. Measure the size of the following angles with the help of a protractor and name each angle according to its kind.

(i)



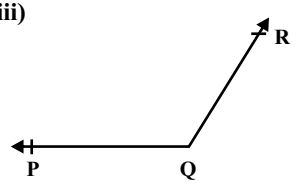
Measurement of angle =
Name of angle =

(ii)



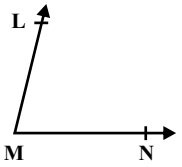
Measurement of angle =
Name of angle =

(iii)



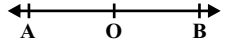
Measurement of angle =
Name of angle =

(iv)



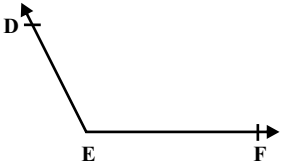
Measurement of angle =
Name of angle =

(v)



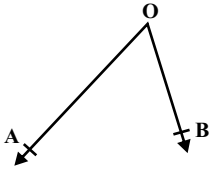
Measurement of angle =
Name of angle =

(vi)



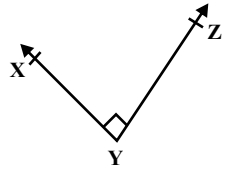
Measurement of angle =
Name of angle =

(vii)



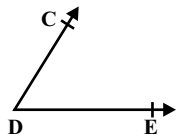
Measurement of angle =
Name of angle =

(viii)



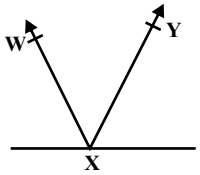
Measurement of angle =
Name of angle =

(ix)



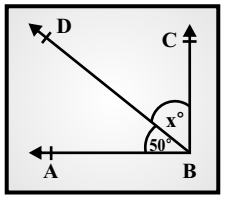
Measurement of angle = 50°
Name of angle = Acute

(x)



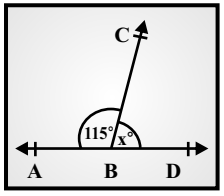
Measurement of angle = 301°
Name of angle = Refflex

Q. **2. Examine the following figure and answer the given questions:**



(i) How many angle are there?
Ans: Two.
(ii) Which point is the vertex?
Ans: B point is the vertex.
(iii) Name the arm which is common.
Ans: BD
(iv) What is the measure of ∠ **ABC**?
Ans: 90°
(v) If ∠ **ABD** = 50° then ∠ **CBD** = 40°
Ans: 40°
(vi) If x° + 50° = 90° then x° = 40°
Ans: 40°
(vii) ∠**ABD** and ∠ **CBD** are complementary angles. Why?
Ans: < ABC and < CBD are complementary angles because the sum of measurement of < ABC and < CBD is equal to 90°.

Q.**3. Look at the given figure and answer the following questions:**



(i) How many angles are there?
Ans: Two.
(ii) Which point is the vertex?
Ans: B point is the vertex.
(iii) Name the arm which is common?
Ans: BC.
(iv) What is the measure of ∠ **ABD**?
Ans: 180°

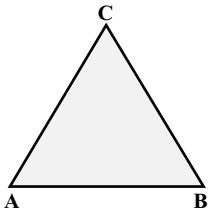
(v) If ∠ **ABC** = 115° then ∠ **CBD** = 65°
Ans: 65 °.
(vi) If x° + 115° = 180° then x° = 65°
Ans: 65 °.
(vii) ∠ **ABC** and ∠ **CBD** are supplementary angles. Why?
Ans: Because the sum of measurement of ABD and CBD = 180 °.
(viii) Do you agree that **ABD** is a straight line?
Ans: Yes, because it is a straight and can be extended to both side.
(ix) Are ∠ **ABC** and ∠**CBD** adjacent angles? If yes, then why?
Ans: Yes, because both the angles hove common arm Be.

CHAPTER NO.10

TRIANGLES

10.1 TRIANGLE

Observe the adjoining figure and answer the questions.



1. How many line segments are there? Name them.
2. How many angle are there? Name them.
3. Is it an open or closed figure? Therefore we can say that:

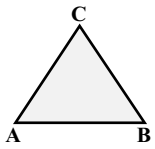
Triangle is a closed figure bounded by three line segments

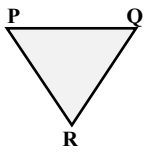
The line segments **AB, BC** and **CA** in the figure are called the sides of triangle **ABC.** Symbol of triangle is "Δ" Symbolically triangle **ABC** is written as Δ **ABC.** Point **A, B** and **C** are the vertices of Δ**ABC** and the angles formed at these vertices are called the angle of Δ **ABC .** There are six elements of a triangle i.e **3-sides** and **3-angles**.

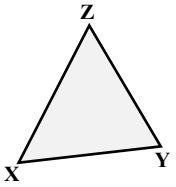
10.2 KINDS OF TRIANGLE

(a) Equilateral Triangle:

Measure the sides fo the following triangles and write your measurement of each side in the blank.







In triangle **ABC**, $\overline{AB}$ = 4 cm, $\overline{BC}$ = 4 cm, $\overline{CA}$ = 4 cm.

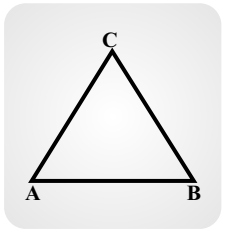
In triangle **PQR**, $\overline{PQ}$ = 4 cm, $\overline{RQ}$ = 4 cm, $\overline{PR}$ = 4 cm.

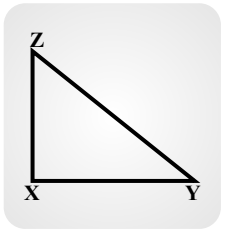
In triangle **XYZ**, $\overline{XY}$ = 4.5 cm, $\overline{YZ}$ = 4.5 cm, $\overline{ZX}$ = 4.5 cm.

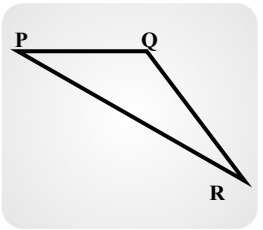
Triangle having all sides equal in length is called equilateral triangle

(b) Isosceles Triangle:

Measure the side of the following triangles and write your measurement of each side in the blank.







In triangle **ABC**, $\overline{AB}$ = 4.5 cm, $\overline{BC}$ = 4.5 cm, $\overline{CA}$ = 4.5 cm.

In triangle **XYZ**, $\overline{XY}$ = 5 cm, $\overline{XZ}$ = 5 cm, $\overline{YZ}$ = 5 cm.

In triangle **PQR**, $\overline{PR}$ = 7 cm, $\overline{RQ}$ = 4 cm, $\overline{PQ}$ = 4 cm.

(i) Name the side of Δ **ABC** which is equal in measurement.

(ii) Name the side of Δ **XYZ** which is equal in measurement.

(iii) Name the side of Δ **PQR** which is equal in measurement.

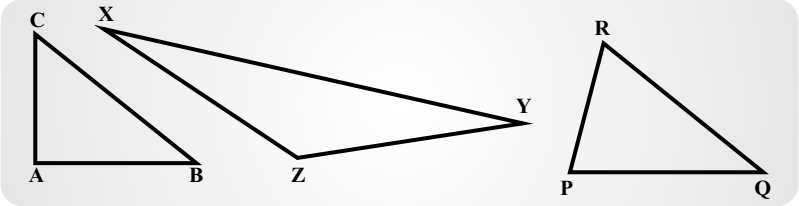
(iv) Do you agree that only two sides of each triangle are euqal?

Hence we can say that:

A triangle in which two sides are equal in length is called isosceles triangle.

(c) Scalene Triangle:

Measure the side of the following triangles and write your measurement of each side in the blank.



In triangle **ABC**, $\overline{AB}$ = 5 cm, $\overline{BC}$ = 5 cm, $\overline{AC}$ = 5 cm.

In triangle **XYZ**, $\overline{YX}$ = 8 cm, $\overline{YZ}$ = 5 cm, $\overline{XZ}$ = 6 cm.

In triangle **PQR**, $\overline{QR}$ = 6 cm, $\overline{PQ}$ = 5 cm, $\overline{RP}$ = 4 cm.

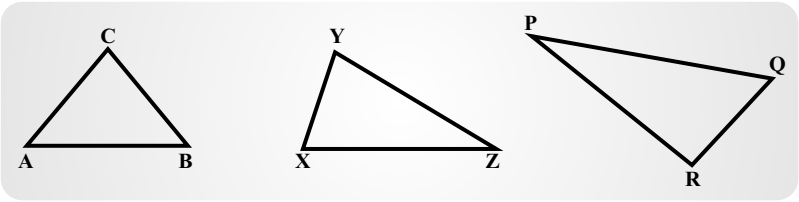
Do you agree three sides of each triangle are different in length?

Therefore we can say that:

A triangle having all the sides different in length is called scalene triangle.

(d) Acute Angled Triangle:

Measure the angles of each of the following triangles by using the protractor and write the measure of each angle in the blank.



In triangle **ABC**, ∠ **A** = 55 °, ∠ **B** = 50 °, ∠ **C** = 65 °

In triangle **XYZ**, ∠ **X** = 70 °, ∠ **Y** = 70 °, ∠ **Z** = 40 °

In triangle **PQR**, ∠ **P** = 45 °, ∠ **Q** = 45 °, ∠ **R** = 90 °

(I) Is each angle of ∠ **ABC** Is less than 90° ?

(ii) Is each angle of ∠ **XYZ** Is less than 90° ?

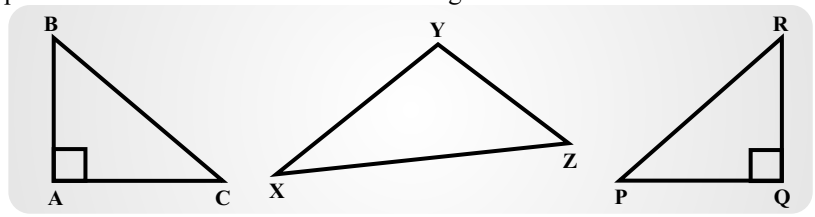
(iii) Is each angle of ∠ **PQR** Is less than 90° ?

(iv) That name do you give the angle which is less than 90° ?

Hence we can say that:

(e) Right Angled Triangle:

Measure the angles fo each of the following triangles by using the protractor and write the measure of each angle in the blank.



In triangle Δ **ABC**, ∠ **A** = 90 °, ∠ **B** = 45 °, ∠ **C** = 45 °

In triangle Δ **XYZ**, ∠ **X** = 45 °, ∠ **Y** = 90 °, ∠ **Z** = 45 °

In triangle Δ **PQR**, ∠ **P** = 45 °, ∠ **Q** = 90 °, ∠ **R** = 45 °

(i) Which angle is of 90° in Δ **ABC** ?

(ii) Which angle is of 90° in Δ **XYZ** ?

(iii) Which angle is of 90° in Δ **PQR** ?

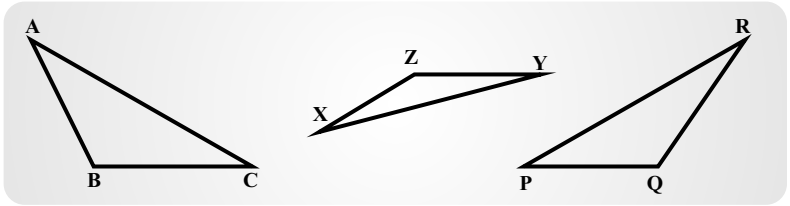
(iv) That name do you give the angle which is of 90° ?

Hence we can say that:

A triangle in which there is one angle equal to 90° is called a right angled triangle.

(f) Obtuse Angled Triangle:

Measure the angles of each of the following triangles by using the protractor and write the measure of each angle in the blank:



In triangle Δ **ABC**, ∠ **A** = 60 ° , ∠ **B** = 70 ° , ∠ **C** = 50 °

In triangle Δ **XYZ**, ∠ **X** = 80 ° , ∠ **Y** = 50 ° , ∠ **Z** = 50 °

In triangle Δ **PQR**, ∠ **P** = 70 ° , ∠ **Q** = 60 ° , ∠ **R** = 70 °

(i) Which angle is greater than 90° in Δ **ABC** ?

(ii) Which angle is greater than 90° in Δ **XYZ** ?

(iii) Which angle is greater than 90° in Δ **PQR**?

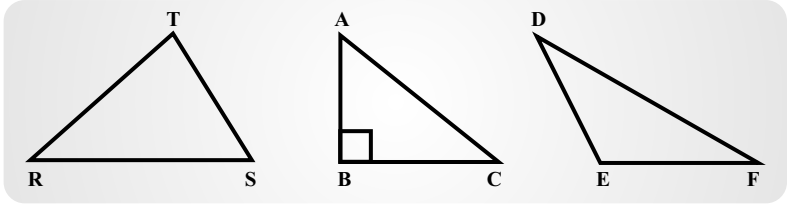
(iv) That name do you give the angle which is greater than 90° ?

Hence we can say that:

A triangle in which there is one angle greater than 90° is called obtuse angled triangle.

10.3 Sum Of The Angles Of A Triangle

Measure the each angle of the following triangles and write the sum of them in the blank:



(i) ∠ **R** +∠ S +∠ T = 180° (ii) **A** +∠ B +∠ C = 180 °

(iii) ∠ **D** +∠ E +∠ F = 180 °

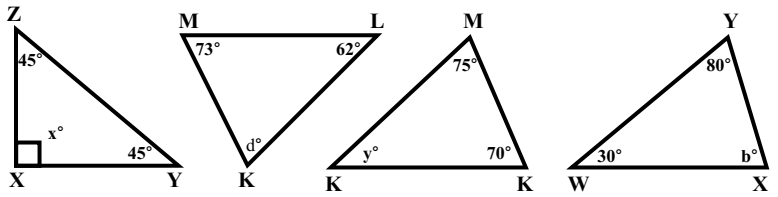
(iv) Do you agree that the sum of all the angles of a triangle is equal to 180° in each case ?

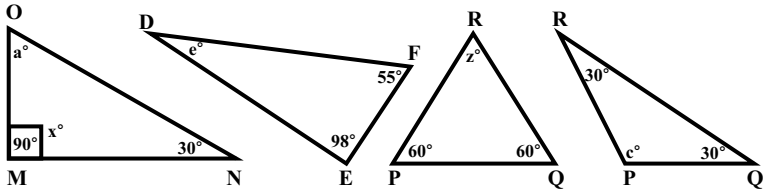
Hence we arrived at the conclusion that:

The sum of the measure of all the angles of a triangle is always equal to 180°

Exercise 10.1

1. Look at the following triangles. Find the size of unknown angles without measuring the angles.





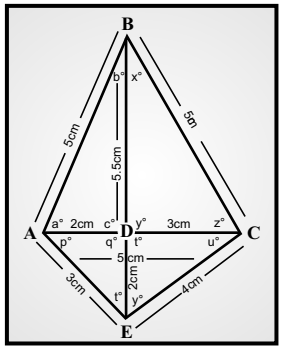
(i) In Δ **XYZ**, X = 90 ° (ii) In Δ **PQR**, Z = 60 °

(iii) In Δ **MNO**, **a** = 60 ° (iv) In Δ **WXY**, b = 65 °

(v) In Δ **QRS**, **c** = 120 ° (vi) In Δ **KLM**, d = 45 °

(vii) In Δ **DEF**, **e** = 60 °

2. Observe the adjoining figure carefully. There are eight triangle in the figure. Measure the sides and angles of each triangle, answer the given questions and fill in the blanks.



(i) How many right angled triangles are there?

Ans: Four

(ii) How many obtuse angled triangles are there?

Ans: Three

(iii) How many acute angled triangles are there?

Ans: One

(iv) Which of them are isosceles triangles?

Ans: Δ ADE

(v) Which of them are equilateral triangles?

Ans: Δ ABC

(vi) Which of them are scalene triangles?

Ans: Δ ABD, Δ CBD, Δ CED, Δ ABE, Δ CBE, Δ ACE

(vii) Name the sides which are equal in length of equilateral triangle.

Ans: AB, BC, and AC

(viii) Name the angles which are of 90° ?

Ans: BAD and BDC

(ix) In Δ ABC, AB = **5cm** cm, BC = **5** cm, AC = **5** cm.

(x) In Δ ACE, AE = **3** cm, EC = **4** cm, AC = **5** cm.

(xi) In Δ ABE, $\overline{AB}$ = **5** cm, $\overline{BE}$ = **10.5** cm, $\overline{AE}$ = **3** cm.

(xii) In Δ BCE, $\overline{BC}$ = **5cm** cm, $\overline{CE}$ = **4** cm, $\overline{BE}$ = **10.5** cm

(xiii) In Δ ABD, $\overline{AB}$ = **5** cm, $\overline{BD}$ = **3** cm, $\overline{DA}$ = **2** cm.

(xiv) In Δ BDC, $\overline{BD}$ = **5.5** cm, $\overline{CD}$ = **3** cm, $\overline{DB}$ = **5** cm.

(xv) Δ In CDE, $\overline{CD}$ = 3 cm, $\overline{DE}$ = 5 cm, $\overline{EC}$ = 4 cm.

(xvi) Δ In ADE, $\overline{AD}$ = 2 cm, $\overline{DE}$ = 5 cm, $\overline{AE}$ = 3 cm.

(xvii) x° + y° = 7.7 °

(xviii) a° + b° + c° = 7.7 °

(xix) y° + c° = 5 °

(xx) x° + z° = 8.5 °

10.4 Perimeter of a Triangle:

Perimeter means sum of all the sides of a closed figure bounded by line segments. To find the perimeter of a triangle we measure the length of its three sides and add them. **The sum of the measures of three sides is the perimeter of the triangle.**

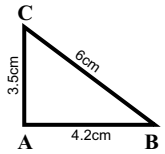
Examples-1

Find the perimeter of a triangle ABC when measure of its sides are given in the figure.

= mAB + mBC + mCA

= 42.cm + 6cm + 3.5cm

= 13.7cm



Examples-2

Find the perimeter of a triangle PQR is which $m\overline{PQ}$ = 6cm, $m\overline{QR}$ - 10cm and $m\overline{RP}$ = 8cm

Solution: Perimeter of Δ PQR = $m\overline{PQ}$ + $m\overline{QR}$ + $m\overline{RP}$

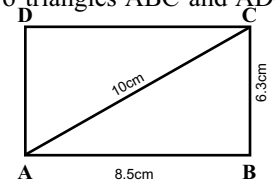
= 6cm + 10cm + 8cm

= 24cm

Examples-3

Find the perimeter of triangle shows in the figure.

Solution: In the given figure there are two triangles ABC and ADC which form a rectangle.



Perimeter of ΔABC = mAB + mBC + mCA

= 8.5 + 6.3 + 10

= 24.8cm

Perimeter of ΔADC = mAD + mDC + mCA

= 6.3 + 8.5 + 10

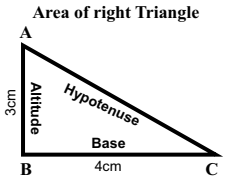
= 24.8cm

Because a rectangle has opposite sides equal in measures.

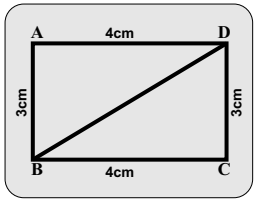
10.5 Area of a Triangle

We know that triangles are of three types according to their angles, right angled triangle, acute angled triangle and obtuse angled triangle.

1. Examine the given figure of Δ **ABC.** In figure $\angle$**B** is right angle, side **BC** is called the '**Base'.** The side opposite to $\angle$ **B** is AC. It is called the 'Hypotenuse', while side AB is the 'Altitude' because it is at right angle to the base. Altitude is also called the height of the triangle.



In Δ **ABC** measure of side **AB** = 3cm and measure of side **BC** = 4cm. If we place two such right triangles together with their hypotenuses along each other as shown in the adjoining figure, we see that both triangles together form a rectangle **ABCD** with its length = 4cm and breadth = 3cm. We can find the area of a rectangle by using the following formula.



Area of rectangle ABCD = Lenght x Breadth

= L x B

= 4cm x 3cm = 12 Sq.cm

Area of a triangle is measured in square centimeters. In other words area of two right angled triangles together = 12 Sq.cm. And of one right angled triangle = $\frac{12}{2}$ = 6 Sq. So we can say that area of a right angled triangle = $\frac{1}{2}$ of the area of rectangle formed by the base and the altitude of right angled triangle. In the form of formula we can write that:

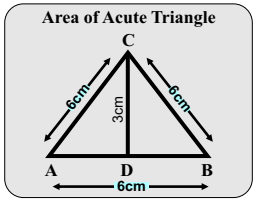
$$\textbf{Area of right angled triangle} = \frac{\textbf{Base x Altitude}}{\textbf{2}}$$

As altitude is called the height,

Therefore area of right angled triangle = $\frac{\text{Base x height}}{2}$

= $\frac{1}{2}$ (b x h)

2. Look at the adjoining figure of acute angled triangle. In this figure all the angles are acute, less than 90°.

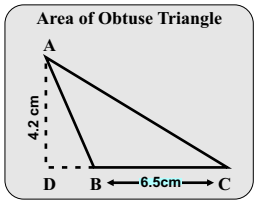


Draw a perpendicular $\overline{CD}$ on $\overline{AB}$. $\overline{CD}$ is the height of Δ **ABC.** Here AB is of 6cm. Measure the height of CD.

If it is 3cm then area of Δ **ABC** = $\frac{1}{2}$ (b x h)

= $\frac{1}{2}$ (6 x 3) = $\frac{1}{2}$ x 18 = $\frac{18}{2}$ = 9 Sq.cm

3. Examine the adjoining figure of obtuse angled triangle. In this figure $\angle B$ is an obtuse angle and the side $\overline{BC}$ is the base. Height of the triangle ABC is shown by a dotted line $\overline{AD}$ which is equal to 4.2cm. Now



Area of **ABC** $= \frac{1}{2}$ (base x height)

$= \frac{1}{2}$ (5.6 x 4.2)

$= \frac{1}{2}$ x 27.30

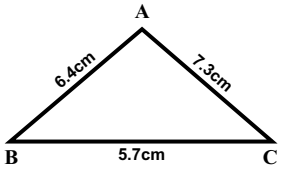
$= \frac{\overset{13.65}{\cancel{27.30}}}{\cancel{2}} = 13.65$ Sq.cm.

Hence the area of **ABC** = 13.65 Sq.cm or 13.65 cm^2

Exercise 10.2

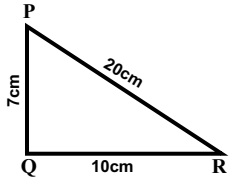
Q.1: Find the perimeter of the following triangles.

(i)



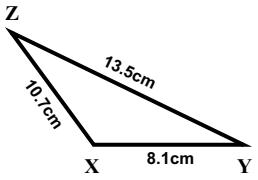
Sol: Perimeter of Δ BCA = mBC + m AC + mAB.
Perimeter of Δ BCA = 5.7 + 7.3 + 6.4
Perimeter of Δ BCA = 19.4cm.

(ii)



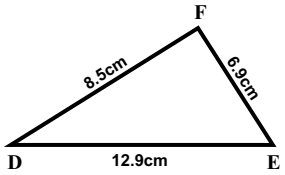
Sol: Perimeter of Δ PQR = mPQ + m QR + mRP.
Perimeter of Δ PQR = 7 + 10 + 20
Perimeter of Δ PQR = 37cm.

(iii)



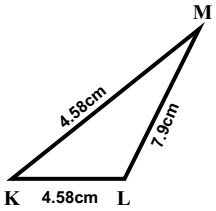
Sol: Perimeter of Δ XYZ = mXY + m YZ + mZX.
Perimeter of Δ XYZ = 8.1 + 13.5 + 10.7
Perimeter of Δ XYZ = 32.3cm.

(iv)



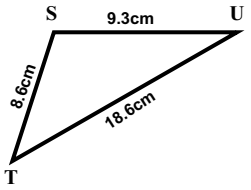
Sol: Perimeter of Δ DEF = mDE + m EF + mFD.
Perimeter of Δ DEF = 12.9 + 6.3 + 8.5
Perimeter of Δ DEF = 27.7cm.

(v)



Sol: Perimeter of Δ KLM = mKL + mLM + mMK.
Perimeter of Δ KLM = 4.58 + 7.9 + 4.58
Perimeter of Δ KLM = 17.06cm.

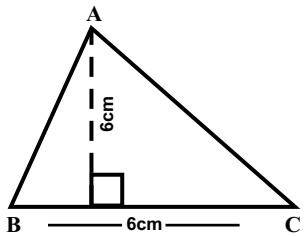
(Vi)



Sol: Perimeter of Δ TUS = mTU + mUS + mTS.
Perimeter of Δ TUS = 18.6 + 9.3 + 8.6
Perimeter of Δ TUS= 36.5cm.

Q.2: Find the area of the following triangles:

(i)



Sol: Base= 6cm, Height = 6cm

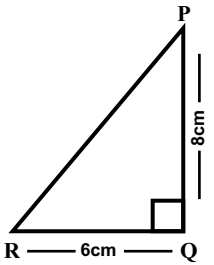
Area of triangle = $\frac{1}{2}$ x Base x Height

Area of triangle = $\frac{1}{2}$ x 6x6

Area of triangle = $\frac{1}{\cancel{2}_1}$ x $\cancel{36}^{36}$

Area of triangle = 18 cm^2

(ii)



Sol: Base= 6cm, Height =8cm

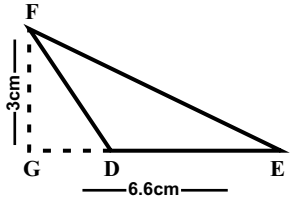
Area of triangle = $\frac{1}{2}$ x Base x Height

Area of triangle = $\frac{1}{2}$ x 6x8

Area of triangle = $\frac{1}{\cancel{2}_1}$ x $\cancel{48}^{24}$

Area of triangle = 24 cm^2

(iii)



Sol: Base= 6.6cm, Height = 3cm

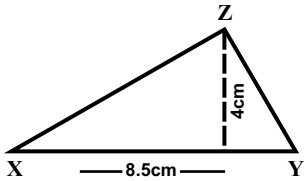
Area of triangle = $\frac{1}{2}$ x Base x Height

Area of triangle = $\frac{1}{2}$ x 6.6x3

Area of triangle = $\frac{1}{\cancel{2}_1}$ x $\cancel{18}^{9.4}$.8

Area of triangle = 9.4 cm^2

(iv)



Sol: Base= 8.5cm, Height = 4cm

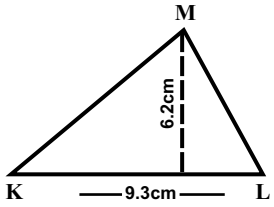
Area of triangle = $\frac{1}{2}$ x Base x Height

Area of triangle = $\frac{1}{2}$ x 8.5x4

Area of triangle = $\frac{34}{2}$

Area of triangle = 17cm^2

(v)



Sol: Base= 9.3cm, Height = 6.2cm

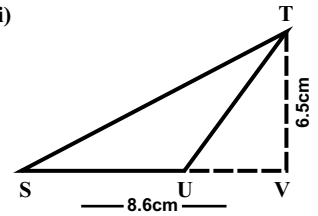
Area of triangle = $\frac{1}{2}$ x Base x Height

Area of triangle = $\frac{1}{2}$ x 9.3x6.2

Area of triangle = $\frac{57.66}{2}$

Area of triangle = 28.83 cm^2

(vi)



Sol: Base= 8.6cm, Height =6.5cm

Area of triangle = $\frac{1}{2}$ x Base x Height

Area of triangle = $\frac{1}{2}$ x 8.6x6.5

Area of triangle = $\frac{1}{\cancel{2}_1}$ x $\overset{27.95}{\cancel{55.9}}$

Area of triangle = 27.95 cm^2

Q.3: By using the given measures find the area of each of the following triangles.

(i) Base = 40mm, Height = 60mm

Sol: Area of triangle = $\frac{1}{2}$ x Base x Height

Area of triangle = $\frac{1}{2}$ x 40 x 60

Area of triangle = $\frac{2400}{2}$

Area of triangle = 1200 cm^2

(ii) Base = 3.5cm, Height = 7.2cm

Sol: Area of triangle = $\frac{1}{2}$ x Base x Height

Area of triangle = $\frac{1}{2}$ x3.5x 7.2

Area of triangle = $\frac{1}{2}$ x 25.2

Area of triangle = 12.6 cm^2

(iii) Base = 19.5cm, Height = 22.4cm

Sol: Area of triangle = $\frac{1}{2}$ x Base x Height

Area of triangle = $\frac{1}{2}$ x 19.5 x 22.4

Area of triangle = $\frac{436.8}{2}$

Area of triangle = 218.4 cm^2

(iv) Baes = 75mm, Height = 40mm

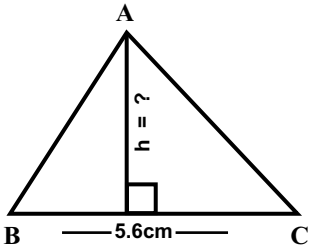
Sol: Area of triangle = $\frac{1}{2}$ x Base x Height

Area of triangle = $\frac{1}{2}$ x 75 x 40

Area of triangle = $\frac{3000}{2}$

Area of triangle = 1500 cm^2

Q.4: If the area of a triangle ABC is 11.76cm^2 and and the base is 5.6cm then find the height of the triangle ABC.



Sol: Area of triangle = $\frac{1}{2}$ x Base x Height

$11.76 = \frac{1}{2}$ x 5.6 x Height

2 (11.76) = 5.6 x Height

5.6 x Height = 23.52

Height = $\frac{23.52}{5.6}$

Height = 4.2cm

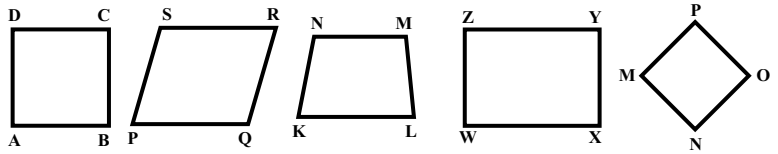
Ans: The height of the triangle = 4.2cm

CHAPTER NO.11

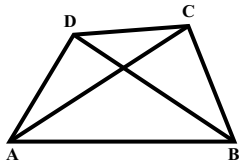
QUADRILATERALS

11.1 QUADRILATERAL

It is a plane figure bounded by four line segments or four straight lines. Following figures are the quadrilaterals.



Look at the adjoining figure of a quadrilateral **ABCD.** In this figure there are six line segments, $\overline{\mathbf{AB}}$, $\overline{\mathbf{BC}}$, $\overline{\mathbf{CD}}$ and $\overline{\mathbf{DA}}$. Are called the sides of quadrilateral **ABCD**. The point where two sides of it meet is called the vertex of the given figure. There are four vertices, A, B, C and D. Angles at the vertices are $\angle$**A,** $\angle$B, $\angle$**C** and $\angle$**D** and they are called the angles of quadrilateral **ABCD**. Symbolically quadrilateral **ABCD** is denoted by **ABCD**.



(i) Line segments which join opposite vertices are called the "diagonals" Here $\overline{\mathbf{AC}}$ and $\overline{\mathbf{BD}}$ are the diagonals of **ABCD.**

(ii) Sides $\overline{\mathbf{AB}}$ and $\overline{\mathbf{CD}}$ are opposite to each other. Similarly sides $\overline{\mathbf{BC}}$ and $\overline{\mathbf{DA}}$ are opposite to each other.

(iii) **A** is opposite to $\angle$**C** and $\angle$ **B** is opposite to $\angle$ **D**.

Som special types of quadrilaterals are described below:

(a) Parallelogram:

Look at the following figure of a quadrilateral ABCD. Measure all the sides and the angles of the figure. Now answer the following questions:

(i) Which side is opposite to $\overline{AB}$?

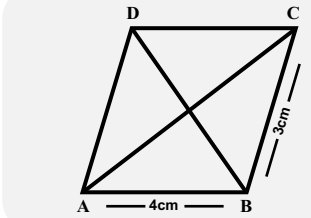
(ii) Which side is opposite to $\overline{BC}$?

(iii) Is side $\overline{AB}$ equal in measure to the side $\overline{DC}$?

(iv) Is the side $\overline{BC}$ equal in measure to the side $\overline{AD}$?

(v) Which angle is opposite to vertex **A**?

(vi) Which angle is opposite to vertex **B** ?



(vii) Do you agree that both the opposite pairs of an angles are equal in measure?

(viii) Are the opposite side of the given quadrilateral parallel to each other?

Hence we can say that:

A quadrilateral which has opposite sides parallel and equal in measure and opposite angles equal in measure is called a parallelogram.

Symbolically a parallelogram is denoted by **"||"**, in the above figure the sides $\overline{AB}$ || $\overline{CD}$ and $\overline{BC}$ || $\overline{AD}$.

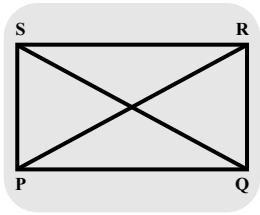
Opposite to $\angle$**A** is $\angle$ **C** and both are equal or congruent.

Similarly opposite $\angle$**B** is $\angle$ **D** and both are equal in measure.

$\overline{AC}$ and $\overline{BD}$ are the diagonals of **"||" ABCD.**

(b) Rectangle:

Look at the given figure of a quadrilateral **PQRS**. Measure all the sides and the angles of the figure. Now answer the following questions.



(i) Which side are opposite to each other?

(ii) Which angles are opposite to each other?

(iii) Are the opposite sides parallel to each other?

(iv) How many angles are there in the figure? Name them.

(v) Are all the angles of the figure right angles?

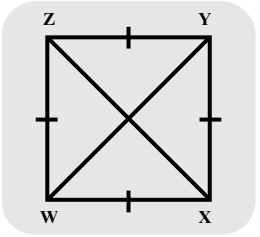
Hence we can say that:

A quadrilateral which has four right angles and equal opposite sides is called a rectangle

In the above figure the sides $\overline{PQ}$ || $\overline{RS}$ and $\overline{QR}$ || $\overline{PS}$. While m $\angle$P = m$\angle$Q = m$\angle$R = m$\angle$S = 90° . $\overline{PR}$ and $\overline{QS}$ are the diagonals of the rectangle **PQRS.**

(c) Square:

Look a the following figure of another quadrilateral **WXYZ.** Measure all the sides and the angles of the figure. Now answer the following questions.



(i) Which side are opposite to each other?

(ii) Which angles are opposite to each other?

(iii) Are the opposite sides parallel to each other?

(iv) Are all the angles of the figure right angles?

(v) Are all the sides of the figure equal in measure?

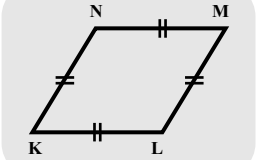
Hence we can say that:

A quadrilateral in which all its sides and angles are congruent i.e. equal in measure is called a square.

In the given figure the sides $\overline{WX}$ || $\overline{ZY}$ and $\overline{XY}$ || $\overline{WZ}$ and m$\overline{WX}$ = m$\overline{XY}$ = m$\overline{ZW}$ = m$\angle$W = m$\angle$X = m$\angle$Y = m$\angle$Z = 90° . $\overline{WY}$ and $\overline{XZ}$ are the diagonals of the square **WXYZ.**

(c) Rhombus:

Look at the following figure of another quadrilateral KLMN. Measure all the side and the angles of the figure. Now answer the following questions.



(i) Are all the sides of the figure equal in measure?

(ii) Are all the angles of the figure right angles?

(iii) Do you agree that both the pairs of opposite angles are equal in measure.

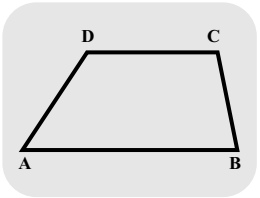
Thus we can say that:

A quadrilateral in which all the sides are equal in measure but no angle is a right angle is called a rhombus

In the above figure m $\overline{KL}$ = m$\overline{LM}$ = m$\overline{MN}$ = m$\overline{NK}$ and the sides $\overline{KL}$ || $\overline{MN}$ and $\overline{LM}$ || $\overline{KN}$. Opposite to ∠K is ∠M and opposite to ∠**L** is ∠**N**. Both pairs of opposite angles are equal.

(E) Trapezium:

Look at the following figure. It is also a quadrilateral. Measure all its sides and angles. Now answer the questions:



(i) Are all the angles equal in measure?

(ii) Are all the sides equal in measure?

(iii) Which side is opposite to $\overline{AB}$?

(iv) Which side is parallel to $\overline{DC}$?

(v) Is the side $\overline{BC}$ parallel to $\overline{AD}$?

So we can define that:

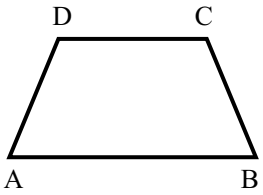
A quadrilateral in which only two sides are parallel is called a trapezium.

In the above figure the side $\overline{AB}$ || $\overline{AD}$

Exercise 11.1

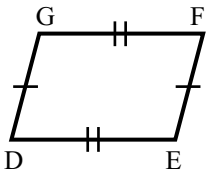
Q.1: Write down the names of the following quadrilateral.

(i)



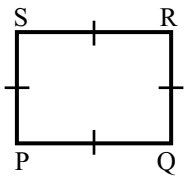
Ans: Trapezium.

(ii)



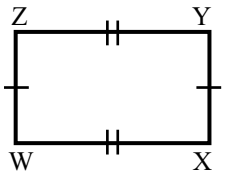
Ans: Parallelogram.

(iii)



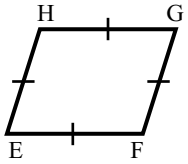
Ans: Square.

(iv)



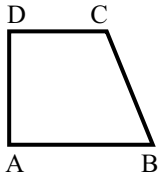
Ans: Rectangle.

(v)



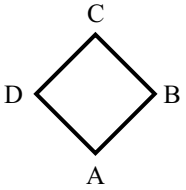
Ans: Rhombus.

(vi)



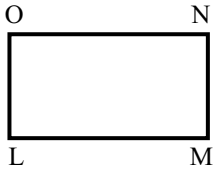
Ans: Trapezium.

(vii)



Ans: Kite.

(viii)



Ans: Rectangle.

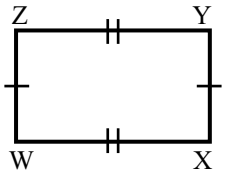
Q.2: Define the following terms with the help of figures.

(i) Square

Ans: <u>Square</u>

A quadrilateral in which all its sides and angles are congruent i-e equal in measurement is known as square.

<u>For example:</u>

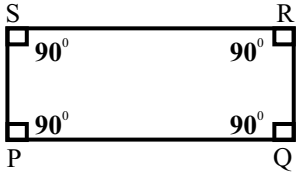


(ii) Rectangle

Ans: Rectangle

A quadrilateral which has four right angles and equal apposite sides is known as rectangle.

For example:

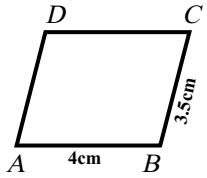


(iii) Parallelogram

Ans: Parallelogram

A quadrilateral which has apposite sides parallel and opposite angles are equal in measurement is known as a parallelogram.

For example:

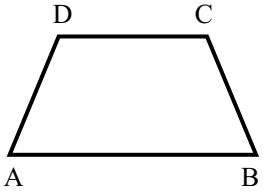


(iv) Trapezium

Ans: Trapezium

A quadrilateral in which only two sides are parallel is known as trapezium.

For example:



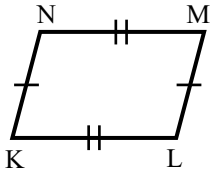
In the above figure the $\overline{AB}$ II $\overline{AD}$.

(v) Rhombus.

Ans: Rhombus

A quadrilateral in which all the sides are equal in measurement but no angle is a right angle is known as rhombus.

For example:

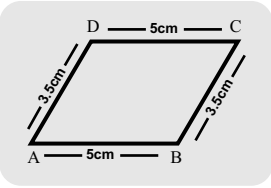


11.2 Perimeter of a Quadrilateral

Sum of the measure of all sides of a quadrilateral is called the perimeter of the quadrilateral.

(a) Perimeter of a parallelogram:

Look at the adjoining figure of a parallelogram **ABCD** whose length and breadth are given in the figure.



Perimeter of a $\|\|^m$ = 2 x (length + breadth)

$\overline{AB}$ is the length and $\overline{BC}$ is the breadth of $\|\|^m$

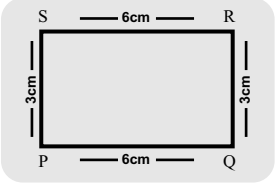
Now perimeter of the $\|\|^m$ **ABCD** = 2 x ($m\overline{AB}$ + $m\overline{BC}$)

= 2 x (5+3.5)

= 2 x 8.5 = 17.0 cm

(b) Perimeter of a rectangle:

Look at the adjoining figure of a rectangle **PQRS** whose length and breadth are given in the figure. Perimeter of a rectangle is the same as the perimeter of $\|\|^m$ i.e 2 x (length + breadth). $\overline{PQ}$ is the length and $\overline{QR}$ is the breadth of rectangle **PQRS.**



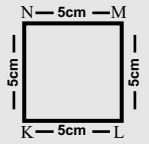
Thus perimeter of the rectangle **PQRS** = $2 \times (m\overline{PQ} + m\overline{QR})$

= 2 x (6+3)

= 2 x 9 = 18 cm

(c) Perimeter of a square:

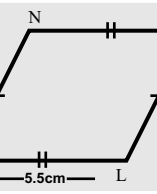
Look at the adjoining figure of a square **KLMN** whose each side is given in the figure.



Perimeter of a square = 4 x measure of a side. In the given square **KLMN** each side if 5cm. Therefore perimeter of the square **KLMN** = 4 x 5 = 20 cm.

(d) Perimeter of a rhombus:

Look at the adjoining figure of a rhombus **ABCD**. All of its sides are equal in measure. So we sue the same formula of the square perimeter to find the perimeter of the rhombus.

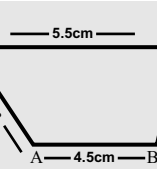


i.e 4 x measure of a side. In the figure of rhombus each side is of 5.5cm.

Hence perimeter of the rhombus **ABCD = 4 x 5.5 = 22.0cm.**

(e)Perimeter of a trapezium:

Examine the figure of a trapezium. Perimeter of a trapezium is the sum of measures of all its sides. In the figure measure of all the sides are given. Perimeter of a trapezium = Sum of all the four sides.



Therefore, perimeter of a:

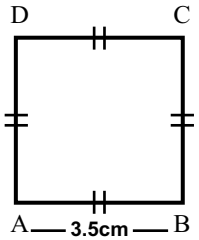
Trapezium **ABCD** = $m\overline{AB} + m\overline{BC} + m\overline{CD} + m\overline{DA}$.

= 4.5cm + 3.5cm + 5.5cm + 5cm = 18.5cm

Exercise 11.2

Q.1. Find the perimeter of the following figures:

(i)

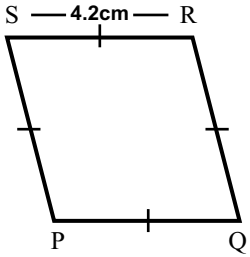


Sol: Perimeter = mAB + mBC + m CD + mDA

Perimeter = 3.5 + 3.5 + 3.5 + 3.5

Perimeter = 14cm

(ii)

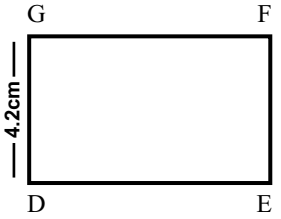


Sol: Perimeter = mPQ + mQR + mRS + mST

Perimeter = 4.2 + 4.2 + 4.2 + 4.2

Perimeter = 16.8cm

(iii)



Sol: **We know that:**

Perimeter of rectangle = 2 (Length + breadth)

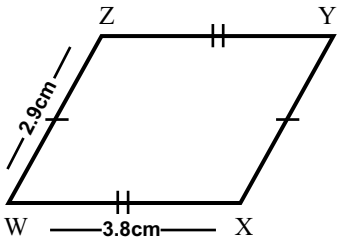
Perimeter = 2 (mGF + mDG)

Perimeter =2 (4.8 + 4.2)

Perimeter = 2 (9)

Perimeter = 18cm

(iv)



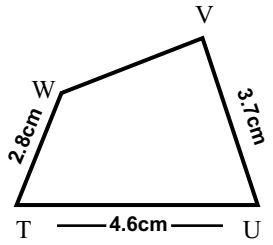
Sol: Perimeter = 2 (Length + breadth)

Perimeter = 2 (3.8 + 2.9)

Perimeter =2 (11.02)

Perimeter = 22.04cm

(v)

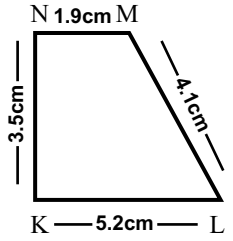


Sol: Area of trapezium = m$\overline{TU}$ + m$\overline{UV}$ + m$\overline{VW}$ + m$\overline{WT}$

Area of trapezium = 4.6 + 3.7 + 3.2 + 2.8

Area of trapezium = 14.3cm

(vi)

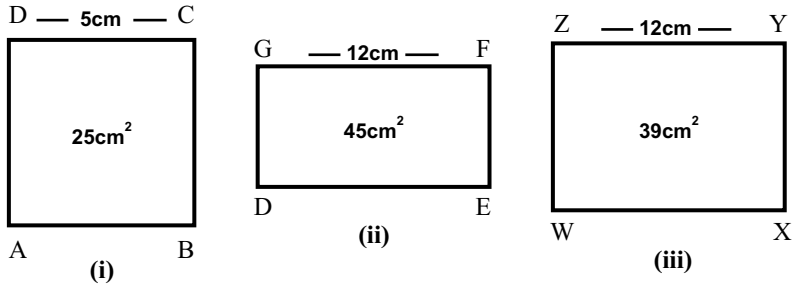


Sol: Area of trapezium = m$\overline{KL}$ + m$\overline{LM}$ + m$\overline{MN}$ + m$\overline{NK}$

Area of trapezium = 5.2 + 4.1 + 1.9 + 3.5

Area of trapezium = 14.7cm

Q.2. Find the length or breadth and perimeter of each of the following figures:



(i) Length = **5** cm., Perimeter = **20** cm.

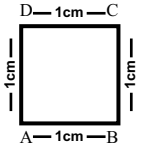
(ii) Breadth = **4cm** cm., Perimeter = **32** cm.

(Iii) Breadth = **3.75** cm., Perimeter = **31.50** cm.

11.3 Area of a Quadrilateral

It is the measurement of surface occupied by the region of a quadrilateral or the amount of surface covered by a quadrilateral.

Unit of Area:

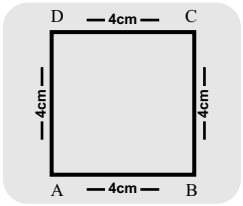


Look at the adjoining figure off a square. Is each side measures 1 cm. The area of the given square is s x s or 1 x 1 or 1 cm^2.

For small surface we use square centimeter (sq.cm or cm^2) as a unit, while for large surfaces square metre (sq.m or m^2) or square kilometer (sq.km or km^2) are used as a unit.

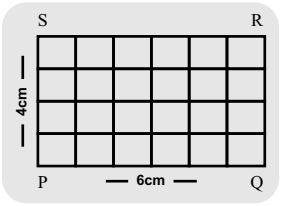
Now consider how to find the area of the given quadrilaterals.

(a) Area of a square:



Look at the adjoining figure of a square **ABCD**. Its each side is 4cm. What is the area of this square? We know area of a square **ABCD = side x side or s x s.** Area of square = side x side.

Therefore area of square **ABCD** = 4 x 4 = 16cm^2. There are four small squares in each column and each row fo the given square. Each side off a small square is of 1cm.



(b) Area of a rectangle:

Look at the adjoining figure of a rectangle **PQRS.** Side $\overline{\mathbf{PQ}}$ is its length and side $\overline{\mathbf{QR}}$ is its length is 6cm and breadth is 4cm. If we divide the given rectangle in small squares of 1cm.

Then we observe that 24 such small squares will completely cover the area of the rectangle. If 6 small squares are placed side by side, they cover the length $\overline{\mathbf{PQ}}$ of it. Similarly 4 small squares cover the breadth Hence total number of squares in the rectangle = 6 x 4 = 24. Thus we have the following formula to determine the area of a rectangle.

Area of a rectangle = L x Breadth

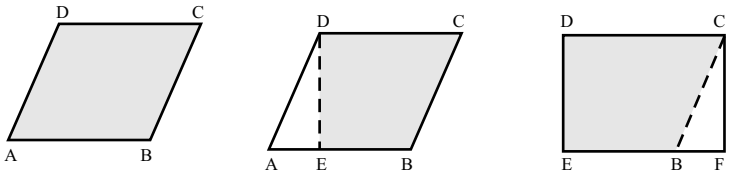
By applying the above formula we can find the area of **PQRS**.

Area of **PQRS** = Length x Breadth

= m$\overline{\mathbf{PQ}}$ x m

(c) Area of a parallelogram:

Examine the following figure of a parallelogram **ABCD.**



Draw a perpendicular '⊥' **DE** from point **D** to $\overline{\mathbf{AB}}$. In this way we get a right angles triangle **AED** as shown in figure (ii). Cut out the triangle **AED** and place it as shown in the figure (iii). Now we have a rectangle **CDEF.** We know that area of a rectangle = L x B. Therefore area of a parallelogram **ABCD** is the same as the area of the rectangle **CDEF.** Area of rectangle **CDEF = m$\overline{\mathbf{EF}}$ x m$\overline{\mathbf{FC}}$** But m$\overline{\mathbf{EF}}$ is equal to m$\overline{\mathbf{AB}}$ which is the base of the parallelogram and $\overline{\mathbf{DE}}$ is the height of the parallelogram.

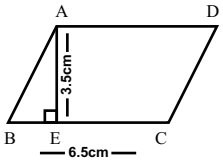
Therefore area off the parallelogram **ABCD** = m$\overline{\mathbf{AB}}$ x m$\overline{\mathbf{DE}}$ Thus we have the following formula to determine the area of the parallelogram.

Area of a parallelogram = base x height

Example

Find the area of a parallelogram ABCD whose measure of base and height are given in the figure.

Solution: In the given figure $\overline{AE}$ is the height and $\overline{BC}$ is the base of the $||^m$ **ABCD.**



Area of $||^m$ABCD = Base x Height

= m$\overline{AE}$ x m$\overline{BC}$

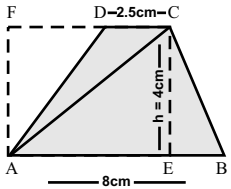
= 3.5 x 6.3

= 22.75cm^2

Hence area of parallelogram ABCD = 22.75cm^2.

(d) Area of a trapezium:

Look at the adjoining figure of a trapezium **ABCD.** It is made up of two triangles. D**ABC** and D**ADC**. In **ABC,** $\overline{AB}$ is the base and $\overline{CE}$ is the height and in D**ADC**, $\overline{CD}$ is the base and $\overline{AF}$ is the height which is the same as $\overline{CE}$. Now area of the given Trapezium **ABCD** can be calculated by applying the following formula.



Area of trapezium = area ABC + area of ADC

$= \frac{1}{2}$ (mAB x mCE) + $\frac{1}{2}$ (mDC x mAF)

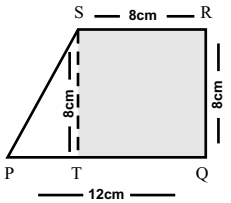
$= \frac{1}{2}$ (8 x 4) + $\frac{1}{2}$ (2.5 x 4)

$= (\frac{1}{\cancel{2}} \times \overset{4}{\cancel{8}} \times 4) + (\frac{1}{\cancel{2}} \times 2.5 \times \overset{2}{\cancel{4}})$

= 16 + 5.0 = 21cm^2.

Hence the area of trapezium ABCD = 21cm^2.

2. Look at the adjoining figure off a trapezium **PQRS.** It is made up of a square **QRST** and a right triangle **PTS**. Each side of the square **QRST = 8cm.**



Therefore area of the square **QRST** = side = 8 x 8 = 64cm^2.

Area of right triangle **PTS** $\frac{1}{2}$ = (base x Altitude)

$\frac{1}{2}$ = (4 x 8) [12 - 4 = 8]

$\frac{1}{\cancel{2}}$ = 4^2 x 8 = 16cm^2

Hence area of trapezium PQRS = Area of sq: QRST + Area of PST

= 64cm^2 + 16cm^2 = 80cm^2

We can find area of a trapezium by applying the following formula.

Area off a trapezium = $\frac{1}{2}$ [(sum of parallel sides) x height]

Parallel sides of trapezium **PQRS** are **PQ** and RS, & the height is ST.

Therefore area of trapezium **PQRS** = $\frac{1}{2}$ (mPQ + mRS) x mST

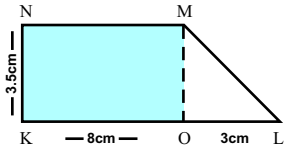
= $\frac{1}{2}$ (12+8) x 8

= $\frac{1}{2} \times \overset{10}{\cancel{20}} \times 8$

= 10 x 8 = 80cm^2

Hence area of trapezium PQRS = 80cm^2.

3. Look at the adjoining figure of a trapezium **KLMN.** Which is made up of a right triangle **MOL** and a rectangle **KOMN.**



Area of Trapezium **KLMN** = Area of $\triangle$ **MOL** + Area of rectangle.

$$= \frac{1}{2}\,(m\overline{OL} \times m\overline{MO}) + m\overline{KO} \times m\overline{MO})$$

$$= \frac{1}{2}\,(3 \times 3.5) + (6 \times 3.5)$$

$$= \frac{1}{\cancel{2}}\,\overset{5.25}{\cancel{10}}.5 + 21.0$$

$$= 5.25 + 21.0 = 26.25\text{cm}^2$$

OR Area of Trapezium **KOMN** $= \frac{1}{2}\,(m\overline{KL} \times m\overline{NM}) \times m\overline{MO}$

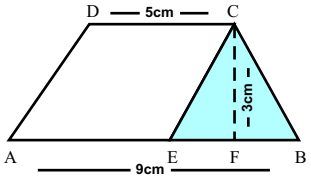
$$= \frac{1}{2}\,(6 + 9) \times 3.5$$

$$= \frac{1}{2} \times \overset{7.5}{\cancel{15}} \times 3.5$$

$$= 7.5 \times 3.5 = 26.25\text{cm}^2$$

Hence area of trapezium KLMN $= 26.25\text{cm}^2$

4. Look at the adjoining figure of a trapezium **ABCD.** It is made up of a $\triangle$ **BCE and a** $||^m$ AECD.



Area of Trapezium **ABCD** = Area of $\triangle$ **BCE** + Area of $||^m$ **AECD.**

$$= \frac{1}{2}\,(m\overline{BE} \times m\overline{CF} + m\overline{AE} \times m\overline{CF})$$

$$= \frac{1}{2}\,(4 \times 3) + (5 \times 3)$$

$$= \frac{1}{2} \times \overset{6}{\cancel{12}} + 15$$

$$= 6 + 15 = 21\text{cm}^2$$

OR Area of trapezium **ABCD**

$$= \frac{1}{2}\,(m\overline{AB} + m\overline{CD} \times m\overline{CF})$$

$$= \frac{1}{2}\,(9 + 5 \times 3)$$

$$= \frac{1}{\cancel{2}} \times \overset{7}{\cancel{14}} + 3$$

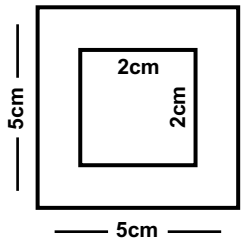
$$= 7 \times 3 = 21\text{cm}2$$

Hence area of trapezium **ABCD** $= 21\text{cm}^2$

Exercise 11.3

Q.1. Find the area of the shaded portion in each of the following figures:

(i)



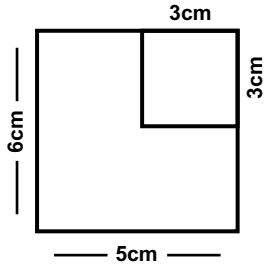
Sol:

Area = L x W	Area = L x W
Area = 5 x 5	Area = 2 x 2
Area = 25cm^2	Area = 4cm^2

Area of the shaded portion = 25 - 4

Area of the shaded portion = 21 cm^2

(ii)



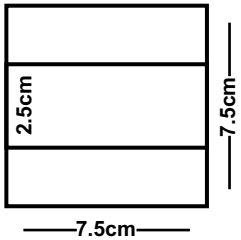
Sol:

Area = 6×5^2
Area = 30cm

Area = 3×3^2
Area = 9cm

Area of the shaded portion = 30 - 9
Area of the shaded portion = 21 cm^2

(iii)



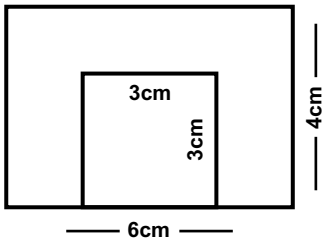
Sol:

Area = 7.5 x 7.5
Area = 5.6.25cm^2

Area = 7.5 x 2.5
Area = 18.75cm^2

Area of the shaded portion = 56.25-18.75
Area of the shaded portion = 37.50cm^2

(iv)



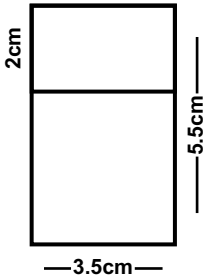
Sol:

Area = 6 x 4
Area = 24cm^2

Area = 3 x 3
Area = 9cm^2

Area of the shaded portion = 24-9
Area of the shaded portion = 15cm^2

(v)



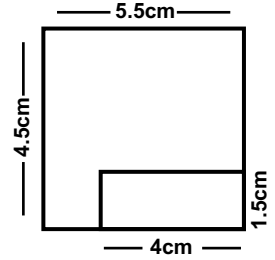
Sol:

Area = 2 x 2
Area = 4cm^2

Area = 3.5 x 3.5
Area = 12.25cm^2

Area of the shaded portion = 12.25-4
Area of the shaded portion = 8.25cm^2

(vi)



Sol:

Area = 4.5 x 5.5
Area = 24.75cm^2

Area = 4 x 1.5
Area = 18.75cm^2

Area of the shaded portion = 12.25-4
Area of the shaded portion = 8.25cm

Q.2: A rectangular play ground is 35m by 25m. If the area of the grassy portion is 400m2, then find the area of un-grassed portion.

Data:

Length = 35m
Width = 25m
Area of grassy portion = 400cm
Area of un-grassed portion =?

Sol:

Area = Length x width
Area = 35 x 25
Area = 875cm^2

Area of un-grassed portion = 875-400
Area of un-grassed portion = 475cm^2

Q.3: A wooden door is 7ft by 3.5ft. In the middle of the door an iron net 4ft by 3ft is fitted. Find the area of the wooden portion of the door.

Data:

Length of door = 7ft
Width of door = 3.5ft
Area of the door = length x width
Area of the door = 24.5cm^2

Finding area of iron net:

Length of iron net = 4ft
Width of iron net = 3ft
Area of iron net = Length x width
Area of iron net = 4 x 3
Area of iron net = 12cm^2

Finding area of wooden portion of the door.

Area of wooden portion = 24.5 - 12
Area of wooden portion = 12.5cm^2

Q.4: Length and breadth of a rectangular garden is 45m by 30m. If 45 plants are planted in its length and 35 plants in its breadth, then find the total number of plants in the garden.

Data:

Plants in length = 45
Plants in breadth = 35
Total plants = ?

Total plant = 45 x 35
Total plants = 1575 Ans:

Q.5: A photograph 20cm by 16cm is mounted on a cardboard 35cm by 25cm. Find the area of the cardboard not covered by the photograph.

Data:

Length of photograph = 20cm
Breadth of photograph = 16cm
Area of photograph = Length x Breadth

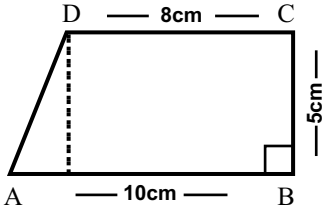
Area of cardboard = 35 x 25
Area of cardboard = $875cm^2$

Finding area of uncovered cardboard:

Area of uncovered cardboard = 875 - 320
Area of uncovered cardboard = $555cm^2$

Q.6: Find the area of the following trapeziums.

(a)



Sol: Area of trapezium ABCD

$$= \frac{1}{2} (m\overline{AB} + m\overline{CP} \times m\overline{BC})$$

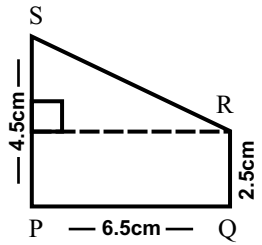
$$= \frac{1}{2} \times (10 + 8 \times 5)$$

$$= \frac{1}{2} \times (18 \times 5)$$

$$= \frac{90}{2}$$

Area of trapezium ABCD = $45cm^2$

(b)



Sol: Area of trapezium PQRS

$$= \frac{1}{2} (m\overline{PQ} + m\overline{QR} \times m\overline{SP})$$

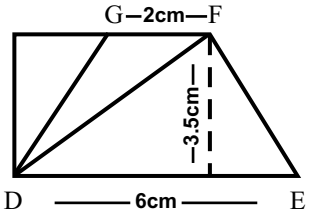
$$= \frac{1}{2} \times (6.5 + 2.5 \times 4.5)$$

$$= \frac{1}{2} \times (9 \times 4.5)$$

$$= \frac{1}{2} \times \cancel{(40.5)}$$

Area of trapezium PQRS = $20.25cm^2$

(c)



Sol: Area of trapezium DEFG

$$= \frac{1}{2} (m\overline{DC} + m\overline{GF} \times m\overline{DE})$$

$$= \frac{1}{2} \times (6 + 2 \times 3.5)$$

$$= \frac{1}{2} \times (8 \times 3.5)$$

$$= \frac{28}{2} = 14cm^2$$

Area of trapezium DEFG = $14cm^2$

CHAPTER NO.12

GRAPH

Some we want to answer the questions by showing data in picture and geometry. For this we graph. **Picto-graph, Bar graph LIne-graph and Circle-grap** are different type of graph. These graphs show the relationship between different variable quantities.

12.1 PICTO-GRAPH

In Picto-graph data is displayed by pictures. Look at the following Pictures of clocks which show different times. Her are some questions on the graph. road them carefully.

a. How many clocks show 1 pm ?
Six clocks

b. How many clocks show 3 pm?
Four clocks

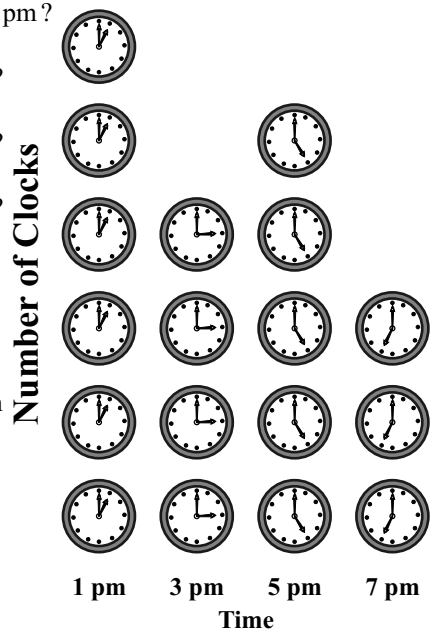
c. How many clocks show 5 pm?
Five clocks

d. How many clocks show 7 pm?
Three clocks

e. Which clocks are the most in number?
The clocks that show 1pl.

f. Which clocks are the least in number?
The clocks that show 7pl.

g. How many clocks are in all?
Eighteen



Exercise 12.1

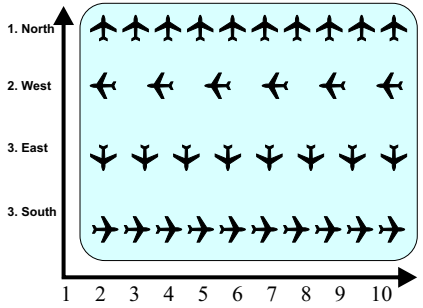
Q.1. The graph shows four different directions of the planes. The directions are **North, East, West** and **South** Study it carefully and answer the questions.

a. How many planes are flying towards North?
Ans: (a)

b. How many planes are flying towards South?
Ans: (b)

c. How many planes are flying towards East?
Ans: (c)

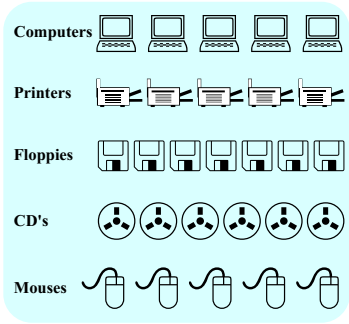
d. How many planes are flying towards West?
Ans: (d)



e. Which rows have the some number planes?
Ans: (e)

f. How many planes are there in each of the 7th and the 10th columns?
Ans: (f)

Q.2. A salesman of computer shop sold Computers, Printers, Floppies, Cds and Computer's Mouses in a week. Now answer the following questions.



a. How many computers did he sell if each computer represents 10-computers?
Ans: (a)

b. How many printers did he sell if each printer represents 20-printers?
Ans:(b)

c. How many floppies did he sell if each floppy represents 200-floppies?
Ans: (c)

d. Find the total cost of **8-CD's** if the cost of each **CD** is Rs.400?
Ans: (d)

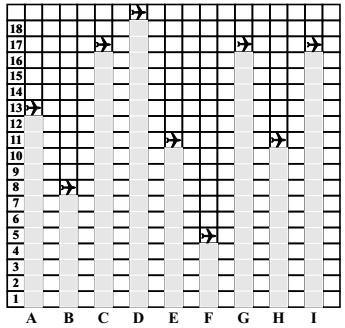
e. If a mouse represents 100-meters, then find the total mouses were sold.
Ans: (e)

F. How many **CD's** were sold if each CD represents **100-CDs**?
Ans: (f)

12.2 BAR - GRAPH

In Bar-graph data is displayed by bars horizontally. Or vertically, consider the following example.

Example



There are 9-planes which are flying at different height. If one small square represents 100-meters then by using Bar-graph answer the following questions.

a. Find the height of plane A.

1200m

b. Find the height of plane B.

600m

c. Find the height of plane C.

1500m

d. Find the height of planes D, E, F, G, H and I.

1800m, 900m, 400m, 1500m, 1000m, 1600m

e. Which plane if flying a t the highest level?

Plane-D

f. Which plane is flying at the lowest level?

Plane-F

g. Which planes are flying at the same height?

Plane C and G

h. How many meters high the plane D to plane C?

300m

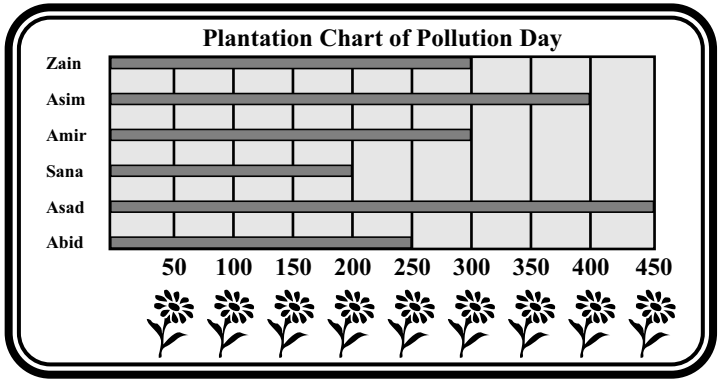
i. What is the difference between the height of plane F and plane G?

1100m

j. Which planes are flying at 100-meters difference?

Exercise 12.2

1. On the pollution day 6-boys planted different numbers of plants in their school which are shown in the Bar-graph below. Study the graph carefully and answer the questions.



A. Name the boys who planted the same number of plants.

Ans: Sana and Amir.

b. Which boy planted the highest number of plants?

Ans: Asas

c. How many plants did each boy plant?

Ans: Zain = 300, Asim = 400, Amir = 300, Sana 200, Asad 450 and Abid 250.

d. Which boy planted the lowest numbers of plants?

Ans: Sana.

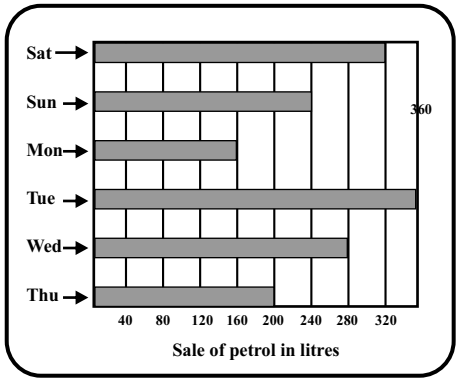
e. What is the difference between the plantation of Zain and Asad?

Ans: 150 planta.

f. Find the total plants which were planted at the pollution day.

And: 1900 plants.

3. The bar-graph below shows the sale of petrol or six days. Study i t c a r e f u l l y and answer the following:

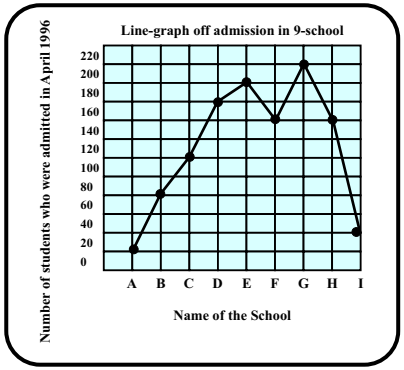


a. On which day was the sale of petrol highest?
Ans: Tuesday.
b. What was the sale of petrol on Monday?
Ans: 160 litres.
c. On which day was the sale of petrol lowest?
Ans: Monday
d. On which day was 320 litres of petrol sold?
Ans: Saturday.
e. How many more litres of petrol was sold on Sunday than Monday?
Ans: 80 litres.
f. Find the total sale of petrol in litres for the first three days.
Ans: 720 litres.
g. Find the total sale of petrol in litres for the last three days.
Ans: 840 litres.
h. On which day was 200 litres of petrol sold?
Ans: Thursday.
i. If the cost of 1-litre petrol is Rs.10, find the sale on Tuesday?
Ans: Rs. 3600

12.3 LINE-GRAPH

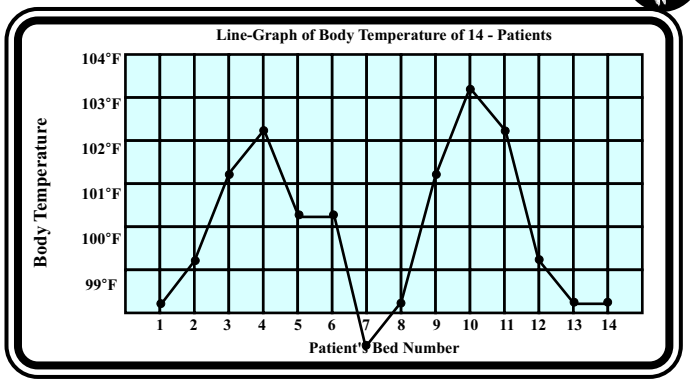
In **Line-graph** data is displayed by **points** on graph paper. The points are joined together by line segments to get line-graph.Consider the following example.

The **line-graph** shows the admission of (1180) students in 9-different school in the month of April 1996. Vertically each point shows the numbers of admission and horizontally the name of schools. Study in carefully and answer the questions below:



a. Name the school in which number of admissions are the same.
In schools F and H
b. In which school were the admission highest?
In school G
c. Find the total number of admissions in each school.
A-20, B-80, C-120, D-180, E-200, F-160, G-220, H-160, I-40
d. In which school were the admission lowest?
In school A
e. Find the difference of admissions between school **A** and school **B.**
The difference is 60
f. How many more students were admitted in school **F** than school **I**?
120 more students
g. How many students were admitted in schools **A, B, C** and **D**?
Total 400 students

Exercise 12.3



Q.1: The above points on graph shows the body temperature of 14-patients of a hospital. Study it carefully and answer the following questions.

A. Which patient has normal body temperature?
Ans: No7.

b. How many patients are there who have been suffering from fever?
Ans: 13 Patients.

c. How many patients are there whose body temperature is 99°F?
Ans: 4 Patients.

d. Which patient has the highest fever?
Ans: No.10.

e. How many patients are there who have the same fever? Write their bed number and body temperature.
Ans: {12 patients} {No. 1,8,13 ans 14}= 99°F, {No.2 and 12} = 100°F, {No.4 and 11} = 103°.

f. What is the body temperature of each patient of bed number 4, 5, 6, and 11?
Ans: 103°F, 101°F and 103°F.

g. Write the bed number of the patients whose ever is 101°F?
Ans: 5 and 6.

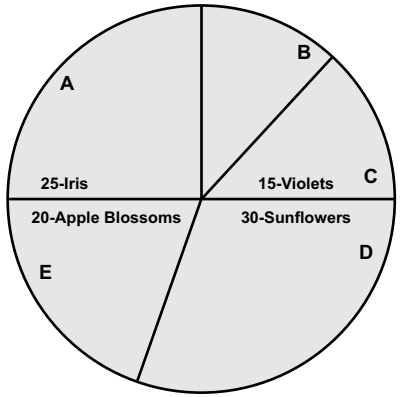
h. Find the difference of body temperature of bed number 9 if the normal body temperature is 98.6°F ?
Ans: 3.4°F.

I. Among first seven patients, whose body temperature is the highest?
Ans: -4

j. Among last seven patients, whose body temperature is the same?
Ans: No. 8, 13 and 14.

12.4 CIRCLE-GRAPH

Circle-graph is helpful or us when we want ot show parts of certain quantities and not the full. In circle-graph we make a circle and its different sectors to show the quantities.



Anne is a good girl. She loves flowers. There is a garden in her house. She planted 100 different flowering plants in a circle which are shown in the figure. Study the following questions and answers carefully.

a. How many sectors are there of the circle?
Five

b. Which sector of the circle is the biggest?
The Sector of sunflowers

c. Which sector of the circle is the smallest?
The sector of Lilies

d. How many flowers are there in sector **'A'** ?
Twenty five

e. Which flowers are there in sector **'D'** ?
Sunflowers

f. How many more flowers are there in sector **'D'** than sector **'B'** ?
Twenty

g. What is the fraction between the flowers of sector **C** and sector **D** ?
$\frac{1}{2}$

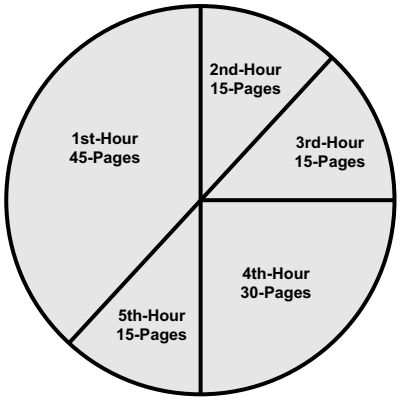
h. What is the fraction between the flowers of sector **B** and sector **D** ?
$\frac{1}{2}$

Exercise 12.4

1. Mehvish read some pages of a story book in 5-hours. She read different number of pages in each hour. She made a circle-graph to show her reading efficiency per hour. Study it carefully and answer the questions:

a. How many pages did she read in the 1st-hour?

Ans: 45 Pages.



b. Find the total numbers of pages she read in five hours.

Ans: 120

c. In which hour did she read the most pages?

Ans: 1st hour.

d. In which hours her reading efficiency remained the same?

Ans: 2nd, 2rd and 5th hour.

e. How many pages did she read in 2nd, 3rd and 5th hours?

Ans: 45 pages.

f. Find the ratio between the pages she read in 3rd and 4th hours?

Ans: 1:2.

g. Find the fraction between the pages he read in 5th and 4th hours?

Ans: 1/2

h. Find the ration between the pages she read in 2nd and 1st hours?

Ans: 1:3.

i. How many more pages did she read in the 1st hour than the 2nd hours?

Ans: 30 pages more.

j. In which hour she read the sum of pages of 2nd and 3rd hours?

Ans: 4th hour.

k. Can you tell from the graph the total number of pages that she read in the last three hours?

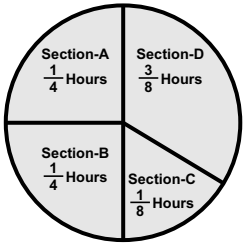
Ans: 60 pages.

l. In the sum of pages equal that she read in the first two hours and the last three hours.

Ans: Yes.

2. Mr. Anwar teaches English in four different sections of 5th-Class. He made a circle-graph of four periods to show the time fraction allocated to each section. Study it carefully and answer the questions:

a. Suppose he taught 8 hours totally, then find the time that he took to reach each section.



Ans: Sec A = 2 hours. Sec. B= 2 hours, Sec. C= 1 hour, Sec D = 3 hours.

b. In which section he took most of the time to teach?

Ans: 3 Hours.

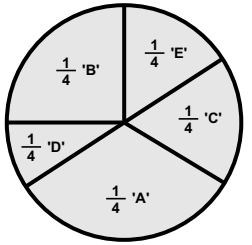
c. In which section he took the smallest fraction of his time?

Ans: Sec. C.

d. What do you think about the sum of the Graph should be? Add them and check your guess.

Ans:1.

3. Following circle-graph shows the annual result of 5th-class. Study it carefully and answer the questions:



a. Suppose if 24-student took the last then find the numbers of students passed in each grade.

Ans: 9 in A, 6 in B, 4in C, 2 in D, and 3 in E grade.

b. In which grade the numbers of students is the greatest?

Ans: A grade.

c. Which fraction shows the smallest number fo students?

Ans: $\frac{1}{12}$

d. What is the sum of the fractions?

Ans: 1.

e. Find the ration between the students who passed in **A** and **B** grades.

Ans: 3:2.

f. How many more students did pass in grad-A than the students of grad-D?

Ans: 7 more students.