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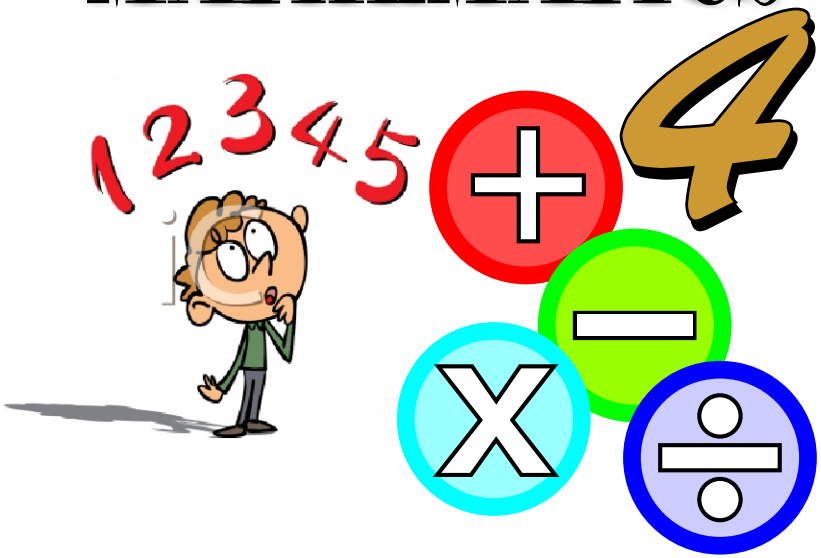

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CHAPTER NO.1

NUMBER SYSTEM

You have studied how to write upto 9 lacs in Class-III. In this Chapter you will study the numbers upto ten lacs and crores.

We know that 1 lac is written in figures as:

Lacs	Ten Thousands	Thousands	Hundreds	Tens	Units
1	0	0	0	0	0

There are 100 thousands in one lac or 100,000 = 1 Lac. The number one lac consists of six digits. We can write other numbers in similar way Let us see the following Examples:

Example-1

Two lac, eighty four thousand, six hundred and fifty four.

Lacs	Ten Thousands	Thousands	Hundreds	Tens	Units
2	8	4	6	5	4

Example-2

Three lac, eighteen thousand, four hundred and seventy five.

Lacs	Ten Thousands	Thousands	Hundreds	Tens	Units
3	1	8	4	7	5

Example-3

Nine lac, Ninety Nine thousand, Nine hundred and Ninety Nine.

Lacs	Ten Thousands	Thousands	Hundreds	Tens	Units
9	9	9	9	9	9

999999 is the greatest six digit number.

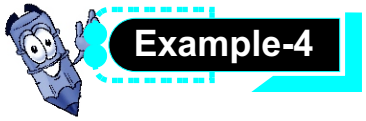
The next number to 999999 is ten lacs.

It is written as:

Ten Lacs	Lacs	Ten Thousands	Thousands	Hundreds	Tens	Units
1	0	0	0	0	0	0

The number ten lac consists of seven digits. 1,000,000 is the smallest seven digit number. It is also called one million. One million is written as 1,000,000.

In the same way number four million is written as 4,000,000 seven million is written as 7,000,000.



Example-4

Twenty five lacs thirty two thousand five hundred and fifteen can be written as:

Ten Lacs	Lacs	Ten Thousands	Thousands	Hundreds	Tens	Units
2	5	3	2	5	1	5

In terms of millions, the above number is written as 2,532,515.

Example-5

Ninety nine lacs, ninety nine thousand, nine hundred ninety nine is written as:

Ten Lacs	Lacs	Ten Thousands	Thousands	Hundreds	Tens	Units
9	9	9	9	9	9	9

In terms of million above number, is written as 9,999,999, is the greatest seven digit number.

The next number to 9,999,9999 is one crore which can be written as:

Crore	Ten Lacs	Lacs	Ten Thousands	Thousands	Hundreds	Tens	Units
1	0	0	0	0	0	0	0

In terms of millions, the number one crore is written as:10,000,000.

There are 100 lacs in 1 crore.

1 crore is also called ten million.

NOTE

10,000,000 = 10 million.

100 lacs = 1 crore

Example-6

Write 2,68,13,495 in words

Solution:

The given number is : Two crore, sixty eight lacs, thirteen thousand, four hundred and ninety five.

Example-7

Write the number eight crore, fifteen lacs, five thousand two hundred thirty five in figures and read in terms of millions.

Solution: The given number is written in figure as under:

Crore	Ten Lacs	Lacs	Ten Thousands	Thousands	Hundreds	Tens	Units
8	1	5	0	5	2	3	5

In terms of million the above number is written as 81,505,235. It is read as?

Eighty one million five hundred five thousand two hundred and thirty five.

Example-8

Write eight crore fifty lacs sixty one thousand nine hundred and twenty one in figures. Also read and write in terms of millions.

Solution:

Crore	Ten Lacs	Lacs	Ten Thousands	Thousands	Hundreds	Tens	Units
8	5	0	6	1	9	2	1

In terms of millions the above number is written as: 85,061,921.

It is read as eighty five million, sixty one thousand nine hundred twenty one.

2. Place Values:

We know that every number can be formed with the help of ten twenty one.

0, 1, 2, 3, 4, 5, 6, 7, 8, 9.

Every digit of the number has got same specific values according to its place it is called the place value of the digit.

The chart showing the place values is called the place value chart.

	Lacs	Thousands		Ones		
	100000 Lacs	10000 Ten Thou	1000 Thou	100 Hund	10 Tens	1 Ones
325678	3	2	5	6	7	8
493560	4	9	3	5	6	0
769105	7	2	9	1	0	5
93006		9	3	0	0	6
621358	6	2	1	3	5	8

We write the above numerals in the expands form as follows:

325678 = (300000 + 20000 + 5000 + 600 + 70 + 8

(Three Lacs, Twenty five thousand six hundred seventy eight)

493560 = (400000 + 90000 + 3000 + 500 + 60

(Four Lacs, Ninety three thousand five hundred sixty)

769105 = (700000 + 60000 + 9000 + 100 + 0 + 5

(Seven Lacs, Sixty Nine thousand One hundred five)

934006 = (900000 + 30000 + 4000 + 0 + 0 + 6

(Nine Lacs, Thirty four thousand six)

621358 = (600000 + 20000 + 1000 + 300 + 50 + 8

(Six Lacs, Twenty one thousand Three hundred Fifty eight)

Do you see that the place value of 6 is different in each of the above numerals?

Exercise 1.1

Q.1. Write the following numbers in figures:

(i) Eighteen lacs, ninety thousand, six hundred fifty one.

Ans: 1890651.

(ii) Forty lacs, four hundred and forty two.

Ans: 4000442.

(iii) Three crore, twenty seven lacs, ninety five thousand and six.

Ans: 32795006.

Q.4: Two crore, fifty lacs, ten thousand and one hundred.

(Iv) 25010100.

(v) Thirteen crore, and three hundred.

Ans: 13000300.

(vi) Eighty one crore seventy lacs and seventy seven.

Ans: 81700077.

(vii) Ninety crore, nine lacs, nine thousand and nine.

Ans: 909090009.

(viii) Forty eight lacs, and three.

Ans: 4800003.

(ix) Seventy lacs, two hundred and forty.

Ans: 7000240.

(X) Forty eight lacs.

Ans: 4800000.

Q.2. Write the following numbers in words.

(1) 10,00,000

Ans: Ten lacs or (1 million)

(2) 70,77,707

Ans: Seventy Lac, Seventy Seven Thousand seven Hundred and Seven.

(3) 27,38,567

Ans: Twenty seven lacs thrity eight thousand, five hundred and sixty seven.

(4) 57,63,678

Ans: Fifty seven lac, sixty three thousand six hundred and seventy eight

(5) 38,42,523

Ans: Thrity eight lac forty two thousand five hundred and twenty three.

(6) 1,00,00,000

Ans: One Crore.

Q.3. Write the place value of circle digit in the following numbers:

(1) 7 3 (4) 8

Ans: Tens

(2) 2 1 (7) 6 4

Ans: Hundreds

(3) 3 (5) 9 6 2 4

Ans: Ten thousand

(4) (5) 7 9 6 2 3 4 1

Ans: Crore (Ten Million)

(5) 3 1 6 2 4 (8)

Ans: Ones

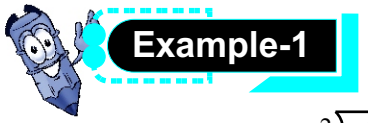
3. Even and odd numbers:

You have learnt how to read and write the numbers both in figures as well as in words upto ten millions/crores. If you look back on these numbers you will surely notice that they can be very classified into two categories.

(a) 16357 **(b) 26486**

Odd = The first category (a) is not divisible by 2 and it is **"ODD".**
Even = The second category (b) is divisible by 2 and it is called **"EVEN"**

In order to know whether number is **ODD** or **EVEN** divide it by **"2"** it leaves a **REMINDER** is **ODD** and if it leaves no **REMINDER** ____it is **EVEN**.



295 is a number Divide it by 2.

```
2 ) 295 ( 147
  - 2
    09
  - 08
    15
  - 14
     1
```

"1" is **REMAINDER** so number 295 is odd.

Similarly take the number 276 and divide it by 2.

```
2 ) 276 ( 138
  - 2
    07
  -  6
    16
  - 16
     0
```

The REMAINDER is "0" so 276 is even.

Example-3 **Take the number 350 and divide it by 2.**

$$
\begin{array}{r|l}
2 & 350 \\
- & 2 \\
\hline
 & 15 \\
- & 14 \\
\hline
 & 10 \\
- & 10 \\
\hline
 & 0
\end{array}
\quad 175
$$

The is **REMAINDER** is **"0"** so 350 is Even.

Exercise 1.2

Q.1: Write down the odd numbers between 10 to 20.
Ans: 11, 13, 15, 17, 19

Q.2: Write down the even numbers between 30 to 50.
Ans: 32, 34, 36, 38, 40, 42, 44, 46, 48

Q.3: Write down the ten odd numbers after 60.
Ans: 61, 63, 65, 67, 69, 71, 73, 75, 77, 79

Q.4: Write down 10 even numbers before 100.
Ans: 80, 82, 84, 86, 88, 90, 92, 94, 96, 98

Q.5: Is 1000 an odd number?
Ans: No.

Q.6: Is 55 an even number?
Ans: No.

Q.7: Which is the first even number before 100.
Ans: 98

Q.8: Which is the first odd number after 100.
Ans: 101

Q.9: Write down first five odd numbers.
Ans: 1, 3, 5, 7, 9

Q.10: Write down first five even numbers.
Ans: 2, 4, 6, 8, 10

Q.11. Separate the odd and even numbers from the following:

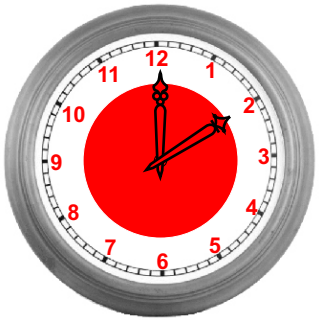
(1) 169 (2) 254 (3) 456 (4) 189
(5) 293 (6) 784 (7) 964 (8) 524
(9) 837 (10) 249

Even	Odd
254	169
456	189
784	193
964	837

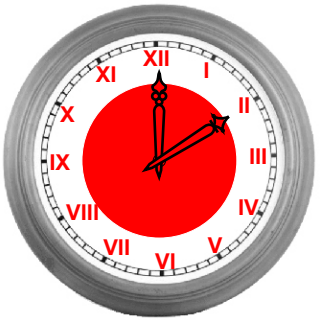
1.2 ROMAN NUMERALS

We are familiar with numerals formed by 0, 1, 2, 3, 4, 5, 6, 7, 8 and 9. Numerals formed by these digits are known as the **"Arabic Numerals"** There are also some other numerals called the Roman numerals.

Look at Figure 3.1:



CLOCK-A



CLOCK-B

The number used in clock A are Arabic numerals and the numerals used in Clock B are the Roman numerals.

The Romans used seven English alphabets to write numerals.

The alphabets I, V, X, L, C, D and M. These are also called basic symbols of the roman numerals.

The value of these symbols are as follows:

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

All the Roman Numerals upto 50, are formed by the symbols **I, V, X** and **L**, under certain rules which we will learn in the next class.

NUMERALS	
Arabic	**Roman**
1	I
2	II
3	III
4	IV
5	V
6	VI
7	VII
8	VIII
9	IX
10	X
11	XI
12	XII
13	XIII

NUMERALS	
Arabic	**Roman**
14	XIV
15	XV
16	XVI
17	XVII
18	XVIII
19	XIX
20	XX
21	XXI
22	XXII
23	XXIII
24	XXIV
25	XXV
26	XXVI

NUMERALS	
Arabic	**Roman**
27	XXVII
28	XXVIII
29	XXIX
30	XXX
31	XXXI
32	XXXII
33	XXXIII
34	XXXIV
35	XXXV
36	XXXVI
37	XXXVII
38	XXXVIII
39	XXXIX

NUMERALS	
Arabic	**Roman**
40	XL
41	XLI
42	XLII
43	XLIII
44	XLIV
45	XLV
46	XLVI
47	XLVII
48	XLVIII
49	XLIX
50	L

Roman numerals are formed by adding or subtracting the basic symbols.

1 = 1	7 = 5 + 1 + 1 = VII
2 = 1 + 1 = II	8 = 5 + 1 + 1 + 1 = VIII
3 = 1 + 1 + 1 = III	9 = 10 - 1 = IX
4 = 5 - 1 = IV	10 = X
5 = V	11 = X + 1 = XI
6 = 5 + 1 = VI	12 = X + 1 + 1 = XII

Here we find that usually numerals are formed by using the addition principle.

But 4 and 9 are formed by subtraction principle. In Roman Notation there is no symbol for zero.

Example-1

Write the Roman numerals for each.
(A) 14 (b) 19 (c) 20 (d) 40 (e) 49

Solution:

(a) 14 = 10 + 4
= 10 + (5 - 1)
= XIV

(b) 19 = 10 + (10 - 1)
= XIX

(c) 20 = 10 + 10
= XX

(d) 40 = 50 - 10
= XL

(e) 49 = (50 - 10) + (10 - 1)
= XLIX.

Example-2

Write the Arabic numerals for each.
(a) XXII (b) XXX (c) XXXVI
(d) XXXIX (e) XIX

Solution:

(a) **XXII** = **10 + 10 + 1 + 1**
= 22

(b) **XXX** = **10 + 10 + 10**
= 30

(c) **XXXVI** = **10 + 10 + 10 + 5 + 1**
= 36

(d) **XXXIXI** = **10 + 10 + 10 + (10 - 1)**
= 10 + 10 + 10 + 9
= 39

(b) **XIX** = **10 + (10 - 1)**
= 10 + 9
= 19

Exercise 1.3

Q.1: Tick (✓) the right and cross out (✘) the wrong:

(1) 14 = XIIII ✘
(2) 21 =XXI ✓
(3) 28 = IIXXX ✘
(4) 37 = XXXVI ✘
(5) 41 = XXXXI ✓
(6) 50 = L ✓
(7) 91 = XCI ✓
(8) 105 = CV ✓
(9) 400 = DC ✓
(10) 1000 = MX ✘

Q.2: Write as an Arabic numerals:

(1) XVII
Ans: 17
(2) XLIII
Ans: 43
(3) XXXIX
Ans: 39
(4) XVIII
Ans: 18
(5) XXIV
Ans: 24

(6) XXVI

Ans: 26

(7) XLVII

Ans: 47

(8) XXV

Ans: 25

(9) XC

Ans: 90

(10) LX

Ans: 60

Q.3: Write as Roman Numerals:

(1) 15

Ans: XV

(2) 23

Ans: XXIII

(3) 48

Ans: XLVIII

(4) 80

Ans: LXXX

(5) 75

Ans: LXXV

(6) 115

Ans: CXV

(7) 99

Ans: XCIX

(8) 59

Ans: LIX

(9) 10

Ans: X

(10) 230

Ans: CCXXX

CHAPTER NO.2

FACTORS AND MULTIPLES

2.1 Concept of Divisibility and Factors of Natural Numbers:

We have already studied about the division in previous class, Here we shall learn about the concept of division, divisors, factors and multiples.

Consider the following examples:

Example-1 **Divide 56 by 8**

Here 56 ÷ 8 = 7 with remainder 0.
(Because 7 x 8 = 56)
56 ÷ 7 = 8 with remainder 0.
(Because 8 x 7 = 56)

OR

$$8\overline{)56}\,(7$$
$$-\,56$$
$$00$$

We can also write that 7 x 8 = 8 x 7 = 56

We note that as 56 is exactly divisible by 7 and 8. So we say that 7 and 8 are the divisors of 56. In other words 7 and 8 are the factors of 56. Because 7x 8 = 8 x7 = 56.

Remember: A quantity which is exactly divisible by a number then that number is called the divisor or factor of that quantity.

Example-2 **Consider the number 12.**

Number 1, 2, 3, 4, 6 and 12 divide the number 12 exactly with "o" as remainder.

Therefore these numbers are the factors or divisors of 12.

Example-3 **Consider the number 10.**

Numbers 1, 2, 5 and 10 divide 10 exactly. Hence they are the factors of 10.

ACTIVITY-1: Find the divisors or factors of the numbers 2, 4, 5, 7, 9, 12, 18, 24, 32 and 48.

Number	Divisors of Factors
2	1, 2
4	1, 2, 4
5	1, 5
7	1, 7
9	1, 3, 9
12	1, 2, 3, 4, 6, 12
18	1, 2, 3, 6, 9, 12
24	1, 2, 3, 4, 6, 8, 12, 24
32	1, 2, 4, 8, 16, 32
48	1, 2, 3, 4, 6, 8, 12, 16, 24, 48

ACTIVITY-2: With the help of your class fellows answer the following questions.

(i) Is 1 divisor of every number?
(ii) Is every number is divisor of itself?
(iii) How many divisors do 1 have?
(iv) At least how many divisors except 1 do a number have?
(v) What is the largest divisor of any number.

2.2 Divisibility Tests:

(i) Numbers Divisible by 2.

The number with 0, 2, 4, 6 or 8 at its units place is divisible by 2.
(These numbers are also called even numbers)

Example **10, 14, 58, 76 and 92 are divisible by 2.**

(ii) Numbers Divisible by 3.

The number is divisible by 3 if the sum of all its digits is divisible by 3.
(These numbers are also called even numbers)

ACTIVITY Which of the following numbers are divisible by 3?
(I) 138 (ii) 1635 (iii) 251

Solution:

Number	Sum of digits	Remarks
138	1 + 3 + 8 = 12	12 is divisible by 3, so 138 is also divisible by 3.
1635	1 + 6 3 + 5 = 15	15 is divisible by 3, so 1635 is also divisible by 3.
251	2 + 5 + 1 = 8	8 is divisible by 3, so 251is also not divisible by 3.

Remember: A number is divisible by 6 if it is divisible by both 2 and 3.

Example **Is the number 120 divisible by 6?**

120 is divisible by 2 as there is 0 at units place.
120 is divisible by 3 as sum of its digits is divisible by 3.
Hence 120 is divisible by 6.

(iii) NUMBERS DIVISIBLE BY 5.

A number having 0 or 5 at its units place is divisible by 5.
For example, 10, 40, 55, and 95 are divisible by 5 but 11, 12, 23, 24, 6 are not divisible by 5.

Remember: A number is divisible by 10 if the digit at its units place is zero or if it is divisible by both 2 and 5.

ACTIVITY Look at the table and answer the following questions:

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	12	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

(i) How many numbers are divisible by 3 ?
Ans: 3,6,9,12,15,18,etc.
(ii) How many numbers are divisible by 5?
Ans: 5,10,15,20,25,30,35,etc.
(iii) How many numbers are divisible by both 3 and 5?
Ans: 1,5,30,45,60,75.
(iv) How many numbers are divisible by both 6 and 9?
Ans: 18,36,54 etc.
(v) How many numbers are divisible by both 9 and 10?
Ans: 90.
(vi) How many numbers are divisible by both 6 and 10?
Ans: 30,60,90.
(vii) How many numbers are divisible by 6, 9 and 10?
Ans:90.

Exercise 2.1

Q.1. Which of the following are not divisors of 24?

1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 12, 14, 24.

Ans: Divisor of 24 = 2, 3, 4, 6, 8, 12, 24
The numbers which are not divisor of 24 are 17, 19, 29, 31m 47.

Q.2. **Answer the following:**

(i) Is 7 a divisor of 56 ?

Ans: Yes is 7 a divisor of 56.

(ii) 9 a divisor of 91?

Ans: No, 9 is not a divisor of 99.

(iii) Is 5 a divisor of 45 ?

Ans: Yes, 5 is a divisor of 45

(iv) Is 13 a divisor of 18?

Ans: No, 13 is not a divisor of 98.

Q.3. Fill in the blanks:

(i) A number with 0, 2, 4, 6 or 8 at the **Unit** place is divisible by 2.

(ii) If the sum of all the digits of a number is divisible by 3 then it is divisible by **3**.

(iii) If a number is divisible by 2 and 3 both then it is divisible by **5**.

(iv) 120 is divisible by 2 and 5 both because **6** is at the **Unit** place.

4.Which of the following numbers are divisible by 6?

(i) 55 (ii) 120 (iii) 140 (iv) 318 (v) 540

Ans: The numbers which are divisible by 6 are:

(ii) 120 (iv) 318 (v) 540

5. Put a (✓) in the box below the number if it is divisible by the number given in the first column.

Divisible by \ Number	256	612	8320	12348	430013
2		✓	✓	✓	✘
3			✘	✓	
5			✓	✘	
6			✓		✘
10			✓	✘	

2.3 Prime and Composite Numbers

(i) Prime Numbers:

A number is said to be a prime number if its only factors or divisors are 1 and the number itself. For example. 19 has two divisors only that is, 1 and 19 itself. Thus 19 is a prime number.

In the same way 2, 3, 5, 7, 11, 13, 17, 19, 23, 29, are all prime numbers.

(ii) Composite Numbers:

A number is called a composite number if it has a factor or divisor different from 1 and the number itself.

For example: the number 14 is a composite number because 14 has 2 and 7 as factors different from 1 and itself.

Similarly divisors of 36 are 1, 2, 3, 4, 6, 9, 12, 18 and 36, so 36 is composite number.

Example **Is 13 a prime number?**

Solution: The divisors of 13 are 1 and 13 only.

Therefore 13 is a prime number.

ACTIVITY

Separate all prime and composite numbers between 30 and 40.

SOLUTION: Numbers between 30 and 40 are 31, 32, 33, 34, 35, 36, 37, 38 and 39. Now we write these numbers and their divisors in the chart given below:

Number	Divisors	Remarks
31	1, 31	Prime
32	1, 2, 4, 8, 16, 32	Composite number
33	1, 3, 11, 33	Composite number
34	1, 2, 17, 34	Composite number
35	1, 5, 7, 35	Composite number
36	1, 2, 3, 4, 6, 9, 12, 18, 36	Composite number
37	1, 37	Prime number
38	1, 2, 19, 38	Composite number
39	1, 3, 13, 39	Composite number

From the above table it is clear that the number 31 and 37 are the only prime numbers and 32, 33, 34, 35, 36, 38, 39 are composite numbers.

Exercise 2.2

Q:1. Which of the following are prime Numbers.

12, 17, 22, 32, 35, 33, 19, 6, 25, 29, 31, 47

Ans: 17, 19, 29, 31 and 47 are the prime numbers.

Q:2. Write all Prime numbers between 41 and 60.

Ans: 43, 47, 53, 59.

Q:3. Write all the Composite numbers which are less than 20.

Ans: 2, 3, 5, 7, 11, 13, 17, 19, are prime numbers.

Q:4. Find the greatest prime number which is less than:

(i) 15

Ans: 13

(ii) 29

Ans: 23

(iii) 67

Ans: 61

(iv) 79

Ans: 73

(v) 85

Ans: 83

(vi) 100

Ans: 93

Q:5. Encircle the composite number:

Ans: 12✓, 13, 14✓, 15, 16✓, 17, 18✓, 19

Q:6. Write Prime and Composite numbers in different columns between 30 and 60.

Prime Number	Composite Number	
31	32	49
37	33	56
41	34	57
43	35	52
47	36	54
53	38	55
59	39	56
	40	57
	42	58
	44	
	46	
	48	
	50	

7. Fill in the blanks:

(i) Every prime number except ____1____ is odd.

(ii) The number ___2___ is a divisor of every number.

(iii) Since 9 has 3 divisors, so 9 is a _Composite_ number.

(iv) Each prime number has exactly __Two__ divisor.

(v) Since 7 has 2 divisors so 7 is a __Prime__ number.

2.4 FACTORIZATION

We know that:

(i) $18 = 18 \times 1$ (ii) $18 = 9 \times 2$

(iii) $18 = 6 \times 3$ (iv) $18 = 2 \times 3 \times 3$

When we express a number as a product of its factors, we call it factorization of that numbers. Thus the products shown above are all factorization of 18.

2.5 Prim Factors

For example, $4 \times 7 = 28$, here 7 is a prime number. So 7 is the prime factor of 28.

The prime factors of any number can be found by division method. In this method we divide the given number by its prime divisor. If quotient is again a composite number, divide it again by its prime factor. Repeat this process till we get 1 as quotient.

This is explained by the following example.

Example-1 **Find the prime factors of 42.**

Solution:

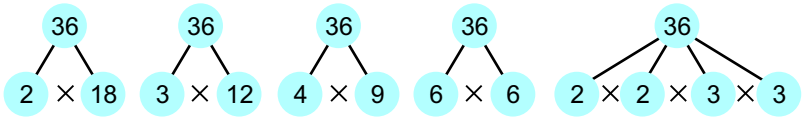
2	42
3	21
7	7
	1

Hence 2, 3 and 7 are the prime factors of 42.

2.6 Prime Factorization

A factorization in which every factor is a prime factor is called prime factorization.

Example **Look at the factorizations of 36.**



The factorizations of 36 are:

$36 = 3 \times 12$, $36 = \times 4 \quad 9$, $36 \times = 6 \quad 6$,

$36 = 2 \times 18$, $36 = \times 2 \times 2 \times 3 \quad 3$,

Which of the above factorizations has all prime factors? $2 \times 2 \times 3 \times 3$

Thus, $2 \times 2 \times 3 \times 3$ is a prime factorization of 36.

Given below are factorizations of 12, 30 and 42.

$12 = 2 \times 6$	$30 = 3 \times 10$	$42 = 6 \times 7$
$12 = 3 \times 4$	$30 = 2 \times 3 \times 5$	$42 = 14 \times 3$
$12 = 2 \times 2 \times 3$	$30 = 6 \times 5$	$42 = 2 \times 3 \times 7$

Thus, following are the prime factorization of 12, 30 and 42.

$42 = 2 \times 2 \times 3$

$30 = 2 \times 3 \times 5$

$42 = 2 \times 3 \times 7$

Exercise 2.3

Q.1. Find all the possible factors of the following numbers:

(i) 10

Ans: 1, 2, 5 and 10 are factors of 10.

(ii) 32

Ans: 1, 2, 4, 8,9,12, 16, 32 are factors of 32.

(iii) 56

Ans: 1, 2, 4, 7, 8, 14, 28, 56, are factors of 56.

(iv) 72

Ans: 1, 2, ,3, 4, 6,8,9, 12, 18, 24, 36, 72 are factors of 72.

Q.2. Find the prime factorization of these numbers:

(i) 21

Sol:

3	21
7	7
	1

Ans: 3x7

(ii) 120

Sol:

2	120
2	60
2	30
3	15
5	5
	1

Ans: 2x2x2x3x5

(iii) 200

Sol:

2	200
2	100
2	50
5	25
5	5
	1

Ans: 2x2x2x5x5

(iv) 232

Sol:

2	232
2	116
2	56
2	28
2	14
7	7
	1

Ans: 2x2x2x2x2x7

(v) 520

Sol:

2	520
2	260
2	130
5	65
13	13
	1

Ans: 2x2x2x5x13

(vi) 352

Sol:

2	352
2	176
2	88
2	44
2	22
11	11
	1

Ans: 2x2x2x2x2x11

Q.3. State the answer is Yes or No.

(i) The prime factorization of 66 is $2 \times 3 \times 11$. ✓

(ii) The prime factorization of 50 is $2 \times 5 \times 5$. ✓

(iii) The prime factorization of 54 is $3 \times 3 \times 6$. ×

(iv) The prime factorization of 28 is $2 \times 2 \times 7$. ✓

2.7 Common Factors

Consider the following example:

Consider the numbers 36 and 48.

Factors of 36 are: 1 , 2 , 3 , 4 , 6 , 9 , 12 , 18 , 36

Factors of 48 are: 1 , 2 , 3 , 4 , 6 , 8 , 12 , 16 , 24 , 48

Among the factors of 36 and 48, the factors 1, 2, 3, 4, 6 and 12 are common in both. These are called the common factors.

Find the common factors of 30 and 42.

Factors of 30 are: 1 , 2 , 3 , 5 , 6 , 10 , 15 , 30

Factors of 42 are: 1 , 2 , 3 , , 6 , 7 , 14 , 21 , 42

Therefore, the common factors are 1, 2, 3, 6.

Example-2

Find the common factors of 9 and 18.

Factors of 9 are: 1 , 3 , 9

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

Hence the common factors are 1 , 3 and 9.

Exercise 2.4

Q.1. Encircle the common factors for each pair of the number.

(i) 8 and 12

The factors of 8 are: ①,②,④, 8

The factors of 12 are: ①,②, 3 ,④, 6 , 12

(ii) 16 and 24

The factors of 16 are: ①,②,④,⑧, 16

The factors of 24 are: ①,②, 3 ,④, 6 ,⑧, 12 , 24

(Iii) 5 and 8

The factors of 5 are: ①, 5

The factors of 8 are: ①, 2 , 4 , 8

Q.2. List the factors for each number. Encircle the common factors for each group of three numbers:

(i) 6 (1 , ②,③,⑥)

12 (1,②,③, 4,⑥,12)

18 (1,②,③,⑥,9, 18)

(ii) 10 (1, 2,⑤ , 10)

15 (1, 3 , ⑤ ,15)

25 (1, ⑤, 25)

(iii) 9 (①, 3,9)

20 (①,2 , 5,10 ,20)

28 (①, 2 , 4 ,7 ,14 ,28)

(iv) 16 (1 ,②,④, 8 ,10)

24 (1,②, 3 , ④, 6, 8,12 ,24)

36 (1 ,②, 3,④, 6, 9,18 ,36)

2.8 Highest Common Factors (HCF) or Greatest Common Divisor (GCD)

Let us consider the factors of 18 and 24.

Factors of 18 are : 1 , 2 , 26 , 9 , 18.

Factors of 24 are: 1 , 2 , 3 , 4 , 6 , 8 , 12 , 24.

So the common factors of 18 and 24 are 1 , 2 , 3 , 6.

Among these four factors the largest common factor is 6. This factor is called highest common factor of 18 and 24.

Highest Common Factors is written as H.C.F. It is also called as Greatest Common Divisor G.C.D.

2.9 Different Methods of Finding H.C.F

There are three different methods of finding H.C.F.

(i) By common factors (ii) By Prime factorization

(iii) By division method

Let us discuss them separately.

(i) Find H.C.F by Common Factors

Example-1

Find the H.C.F of 16 and 36.

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

Factors of 36 are: 1 , 2 , 3 , 4 , 6 , 9 , 12 , 18 , 36.

The common factors of 16 and 36 are 1, 2, 4.

So, the highest common factor (H.C.F) of 16 and 36 is 4.

Example-2

Find the H.C.F of 14 , 28 and 35 by using common factors.

Solution: Factors of 14 are: 1 , 2 , 7 , 14

Factors of 28 are: 1 , 2 , 4 , 7 , 14 , 28

Factors of 35 are: 1 , 5 , , 7 , 35

Common Divisors or factors are : 1, 7.
Hence, H.C.F. is 7.

(ii) Finding H.C.F by Prime Factorization.

Find the H.C.F of 16 and 36.

Solution: First of all find the prime factorizations of 16 and 36.

2	16
2	8
2	4
2	2
	1

2	36
2	18
3	9
3	3
	1

The prime factorizations of 16 and 36 are:

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

$36 = 2 \times 2 \times 3 \times 3$

H.C.F of 16 and 36 is the product of common prime factors.

That is, $2 \times 2 = 4$

Hence, 4 is the H.C.F of 16 and 36

Remember: We can find the H.C.F. of 3 or more numbers by finding the product of common factors in their prime factorization.

Find the H.C.F of 66, 110 and 154 by the prime factorization.

Solution: First of all find the prime factorization of 66, 110 and 154.

2	66
3	33
11	11
	1

2	110
5	55
11	11
	1

2	154
7	77
11	11
	1

$66 = 2 \times 3 \times 11$ $110 = 2 \times 5 \times 11$ $154 = 2 \times 7 \times 11$

Therefore
$66 = 2 \times 3 \times 11$
$110 = 2 \times 5 \times 11$
$154 = 2 \times 7 \times 11$
HCF $= 2 \times 11 = 22$

(iii) Finding H.C.F by Division Method:

In this method, we divide the bigger number by the smaller number. If remainder is other than 0, we again divide the divisor by remainder. Continue the process till the remainder is zero. The last divisor is H.C.F.

Find theH.C.F. of 16 and 36.

Solution:

$$\begin{array}{r|l} & 2 \\ 16 & 36 \\ & -32 \\ \hline & 4 \;\big|\; 16 \\ & \quad -16 \\ \hline & \quad\;\; 0 \end{array}$$

The last divisor is 4 and therefore, H.C.F. = 4

To find the H.C.F. of 3 or more numbers, we first find the H.C.F. of the largest two numbers. Then find the H.C.F. fo the third number and the H.C.F. fo first two numbers. The last divisor will be the required H.C.F.

Find the H.C.F. of 63, 105 and 231.

Solution:

$$\begin{array}{r|l} & 2 \\ 105 & 231 \\ & -210 \\ \hline & 21 \;\big|\; 105 \\ & \quad -105 \\ \hline & \quad\;\; 0 \end{array}$$

H.C.F. 105 and 231 = 21

Now we find the H.C.F. of 21 and 63.

$$\begin{array}{r|l} & 3 \\ 21 & 63 \\ & -\,63 \\ \hline & 0 \end{array}$$

Hence, H.C.F. of 63, 105 and 231 is 21.

2.10 Word Problems:

Example-1

Find the greatest number which exactly divides the number 80, 112 and 144.

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

Therefore, $80 = 2 \times 2 \times 2 \times 2 \times 5$

$112 = 2 \times 2 \times 2 \times 2 \times 7$

$144 = 2 \times 2 \times 2 \times 2 \times 3 \times 3$

The greatest number which divides the given number is the H.C.F. of these numbers.

H.C.F. $= 2 \times 2 \times 2 \times 2 = 16$

Example-2

Find the greatest number which when divide the given three numbers, 93, 154 and 170, leaves 3, 4 and 5 as remainders respectively.

Solution: First we subtract the remainders 3, 4 and 5 from 93, 154 and 170

respectively. We get $93 - 3 = 90$, $154 - 4 = 150$, $170 - 5 = 165$.

The new numbers are 90, 150 and 165. Then we find the H.C.F of these numbers.

$$\begin{array}{r|l} & 1 \\ 90 & 150 \\ & -\,90 \\ \hline 60 & 90 \\ & -\,60 \\ \hline 30 & 60 \\ & -\,60 \\ \hline & 0 \end{array} \qquad \begin{array}{r|l} & 5 \\ 30 & 165 \\ & -\,150 \\ \hline 15 & 30 \\ & -\,30 \\ \hline & 0 \end{array}$$

Check: $93 \div 15 = 6$ with remainder 3, $154 \div 15 = 10$ with remainder 4 and $170 \div 15 = 11$, with remainder 5.

Example-3

Three containers have 120, 192 and 312 litres capacity respectively. Find the capacity of the largest utensil by which these containers can be filled exactly.

Solution: The H.C.F. of 120, 192 and 312 is the capacity of the largest utensil by which the given containers can be filled.

$$\begin{array}{r|l} & 1 \\ 192 & 312 \\ & -\,192 \quad 1 \\ \hline 120 & 192 \\ & -\,120 \quad 1 \\ \hline 72 & 120 \\ & -\,72 \quad 1 \\ \hline 48 & 72 \\ & -\,48 \quad 2 \\ \hline 24 & 48 \\ & -\,48 \\ \hline & 0 \end{array} \qquad \begin{array}{r|l} & 5 \\ 24 & 120 \\ & -\,120 \\ \hline & 0 \end{array}$$

Thus the H.C.F. of 120, 192 and 312 is 24. The required capacity of the largest utensil is 24 litures.

Exercise 2.5

Q.1. Fill in the blanks:

(i) The common factor of 11 and 19 is 1.

(ii) G.C.D means Greatest Common division.

(iii) H.C.F mens Highest common facter.

(iv) H.C.F of two prime numbers is 1.

(v) H.C.F. of an even number and a prime number is 1.

(vi) H.C.F. of an even and an odd number is 1.

Q.2. Find the H.C.F. of the following by common divisors:

(i) 35 and 91

Sol:

5	35
7	7
	1

7	91
13	13
	1

Factors of 35 = 5 x 7
Factors of 91 = 7 x 13
Ans: The HCF of 35 and 91 is 7.

(ii) 39 and 65

Sol:

3	39
13	13
	1

5	65
13	13
	1

Factors of 39 = 3 x 13
Factors of 65 = 5 x 13
Ans: The HCF of 39 and 65 is 13.

(iii) 21, 28 and 36

Sol:

3	21
7	7
	1

2	28
2	14
7	7
	1

2	56
2	28
2	14
7	7
	1

Factors of 21 = 3 x 7
Factors of 28 = 2 x 2 x 7
Factors of 56 = 2 x 2 x 2 x 7
Ans: The HCF of 21,28 and 56 is 7.

(iv) 32, 40, 56 and 72.

Sol:

2	32
2	16
2	8
2	4
2	2
	1

2	40
2	20
2	10
5	5
	1

2	56
2	28
2	14
7	7
	1

2	72
2	36
2	18
3	9
3	3
	1

Factors of 32 = 2 x 2 x 2 x 2 x 2
Factors of 40 = 2 x 2 x 2 x 5
Factors of 56 = 2 x 2 x 2 x 7
Factors of 72 = 2 x 2 x 2 x 3 x 3
common factors of 32, 40, 56 and 72 is 8. (Since 2x2x2 = 8)
Ans: The HCF of 32, 40, 56 and 72 is 8.

Q.3. Find the H.C.F. of the following by the prime factorization.

(i) 88 and 165

Sol:

2	88
2	44
2	22
11	11
	1

3	165
5	5 5
11	1 1
	1

Factors of 88 = 2 x 2 x 2 x 11
Factors of 165 = 3 x 5 x 11
common factors of 88 and 165 is 11.
Ans: The HCF of 88 and 165 is 11.

(ii) 84 and 140

Sol:

2	84
2	42
3	21
7	7
	1

2	140
2	7 0
5	3 5
7	7
	1

Factors of 84 = 2 x 2 x 3 x 7
Factors of 140 = 2 x 2 x 5 x 7
common factors of 84 and 140 = 2x2x7 is 28.
common factors of 84 and 140 = 28.
Ans: The HCF of 84 and 140 is 28.

(iii) 70, 154 and 112

Sol:

2	70
5	35
7	7
	1

2	154
7	7 7
11	1 1
	1

2	112
2	5 6
2	2 8
2	1 4
7	7
	1

Factors of 70 = 2 x 5 x 7
Factors of 154 = 2 x 7 x 11
Factors of 112 = 2 x 2 x 2 x x 2 x 7
common factors of 70,154 , 112 = 2 x 7
common factors of 70,154 , 112 = 14
Ans: The HCF of 70, 154, 112 = 14

(iv) 126, 234, 198 and 90

Sol:

2	126
3	6 3
3	2 1
7	7
	1

2	234
3	117
3	3 9
13	1 3
	1

2	198
3	9 9
3	3 3
11	1 1
	1

2	90
3	45
3	15
5	5
	1

Factors of 126 = 2 x 3 x 3 x 7
Factors of 234 = 2 x 3 x 3 x 13
Factors of 198 = 2 x 3 x 3 x 11
Factors of 90 = 2 x 3 x 3 x 5
common factors of 126, 234, 198 and 90 = 2 x 3 x 3 = 18
Ans: The HCF of 126, 234, 198 and 90 is 18

Q.4. Find the H.C.F of the following by the division method.

(i) 648 and 882

Sol:

```
        1
  648 ) 882
      - 648    2
      -------
        234 ) 648
            - 468    1
            -------
              180 ) 234
                  - 180    3
                  -------
                    54 ) 180
                       - 162    3
                       -------
                         18 ) 54
                            - 54
                            ----
                              00
```

Ans: H.C.F of 648 and 882 is 18.

(ii) 513 and 805

Sol:

```
        1
  513 ) 805
      - 513    1
      -------
        292 ) 513
            - 292    1
            -------
              221 ) 292
                  - 221    3
                  -------
                    71 ) 221
                       - 213    8
                       -------
                         8 ) 71
                           - 64    1
                           -------
                             7 ) 8
                               - 7    7
                               -------
                                 1 ) 7
                                   - 7
                                   ---
                                     0
```

Ans: H.C.F of 513 and 805 is 1.

(iii) 256, 320 and 368

(i) 648 and 882

Sol:

```
          1
256 ) 368
    - 256     2
      112 ) 256
          - 224     3
            32 ) 112
               -  96     2
                  16 ) 32
                     -  32
                        00
```

```
          16
16 ) 256
     -  16
        96
      - 96
        00
```

```
          20
16 ) 320
     - 320
       000
```

Ans: H.C.F of 256, 320 and 368 is 16.

(iv) 132, 240, 324 and 348

Sol:

```
          2
90 ) 234
   - 180     1
     54 ) 90
        -  54     1
           36 ) 54
              -  36     2
                 18 ) 36
                    -  36
                       00
```

```
          7
18 ) 126
   - 126
     000
```

```
          5
18 ) 90
   -  90
      00
```

```
          11
18 ) 198
   -  18
      18
    - 18
      00
```

Ans: H.C.F of 126, 234, 198 and 90 is 18.

Q.5. Find greatest number, which exactly divides 72, 180 and 360.

Sol:

2	72
2	36
2	18
3	9
3	3
	1

2	180
2	9 0
3	4 5
3	1 5
3	5
	1

2	360
2	180
2	9 0
3	4 5
3	1 5
5	5
	1

Factors of 72 = 2 x 2 x 2 x 3 x 3
Factors of 180 = 2 x 2 x 3 x 3 x 5
Factors of 360 = 2 x 2 x 2 x 3 x 3 x 5
common factors of 72, 180, 360 = 2 x 2 x 3
common factors of 72, 180, 360 = 12
Ans: The HCF of 72, 180 and 360 it exactly divides the 72, 180 and 360.

Q.6. Find the greatest number by which if we divide 83, 133, 158, we get 3 as a remainder in each case.

= First subtract the 3 from 83, 133 and 153.
= 83 - 3, 133 - 3, 153 - 3
Now find HCF of 80, 130, 150.

2	80
2	40
2	20
2	10
5	5
	1

2	130
5	6 5
13	1 3
	1

2	150
3	7 5
5	2 5
5	5
	1

Factors of 80 = 2 x 2 x 2 x 2 x 5
Factors of 130 = 2 x 5 x 13
Factors of 150 = 2 x 3 x 5 x 5
common factors of 80, 130, 150 = 5
Ans: The greatest number is 5.

Q.7. Mubina has three bags. Each contains 243, 291 and 387 oranges respectively. When she distributes these oranges among the children equally, three oranges are left in each bag. Find the largest number of children.

Sol:

= 243 - 3 , 291 - 3 , 387-3

= 240, 288 384

Now find the HCF of 240, 288, 384

2	240
2	120
2	6 0
2	3 0
3	1 5
5	5
	1

2	288
2	144
2	7 2
2	3 6
2	1 8
3	9
3	3
	1

2	384
2	192
2	9 6
2	4 8
2	2 4
2	1 2
2	6
3	3
	1

Factors of 240 = 2 x 2 x 2 x 2 x 3 x 5

Factors of 288 = 2 x 2 x 2 x 2 x 2 x 3 x 3

Factors of 384 = 2 x 2 x 2 x 2 x 2 x 2 x 2 x 3

common factors of 240, 288, 384 = 2 x 2 x 2 x 2 x 3

common factors of 240, 288, 384 = 48

Ans: The HCF of 240, 288 and 384 = 48

2.11 Concept of Multiples

Consider the number 7 and 56. Now 56 ¸ 7 = 8 and 7 x 8 = 56. We say that 56 is a multiple of 7.

The multiples of 7 upto 56 are 7, 14, 21, 28, 35, 42, 49 and 56.

Similarly the multiples of 9 upto 45 are 9, 18, 27, 36 and 45.

The multiples of a number are numbers obtained by multiplying that number by 1, 2, 3, 4, ..., etc.

Example

Find all multiples of 4 which are less than 30.

4× 1 = 4, 4× 2 = 8 4 × 3 = 12 4× 4 = 16,

4× 5 = 20, 4× 6 = 24 4 × 7 = 28 4× 8 = 32,

As 32 is greater than 30, therefore, the required multiples of 4 less than 30 are 4, 8, 12, 16, 20, 24 and 28.

Remember: If we multiply a given number by different numbers the product will be its multiple. Multiples of a given number are exactly divisible by the given number.

Every number is least multiple of itself.

2.12 Common Multiples

Common multiples are the number which are common in multiples of two or more numbers.

Example-1

Find four common multiples of 3 and 6.

Solution: Multiples of 3 are: 3, 6, 12, 15, 18, 21, 24, 27, 30, 33, ...

Multiples of 6 are: 6, 12, 18, 24, 30, 36, 42, 48, 54, ...

Common multiples are: 6, 12, 18, 24.

Example-2

Find first three common multiples of 8 and 12.

Solution: Multiples of 8 are: 8, 16, 24, 32, 40, 48, 56, 64, 72,.....

Multiples of 12 are: 12, 24, 36, 48, 60, 72, 84, ...

First three common multiples are: 24, 48, 72.

Exercise 2.6

Q.1. Find first six multiples of the following:

(i) 9

Ans: 9, 18, 27, 36, 45, 54.

(ii) 10

Ans: 10, 20, 30, 40, 50, 60.

(iii) 6

Ans: 6, 12, 18, 24, 30, 36.

(iv) 8

Ans: 8, 16, 24, 32, 40, 48

(v) 11

Ans: 11, 22, 33, 44, 55, 66

(Vi) 7

Ans: 7, 14, 21, 28, 35, 42

Q.2. Fill in the blanks:

(i) $3 \times 8 = 24$, therefore 24 is the multiple of **3** and **8**.

(ii) $4 \times 9 = 36$, therefore 36 is the multiple of **4** and **9**.

(iii) $7 \times 7 = 49$, therefore 49 is the multiple of **7** and **7**.

(iv) $2 \times 15 = 30$, therefore 30 is the multiple of **2** and **1 5**.

(v) $2 \times 4 \times 5 = 40$, therefore 40 is the multiple of **8** and **4x5**.

(Vi) $2 \times 3 \times 4 = 24$, therefore 24 is the multiple of **2x3** and **4**.

Q.3. Encircle the multiples of 9 in the following:

10, 15, (18), 24, (27), 30, (36), 39, 43.

Q.4. Encircle the Common Multiples of the pairs of numbers given below:

(i) 3 (3, (6), 9, (12), 15, (18))

(ii) 6 ((6), (12), (18), 24)

2 (2, 4, 6, (8), 10, 12, 14, (16), 18)

8 ((8), (16), 24)

(iii) 4 ((4), (8), (12), 16, 20, (24))

24 (2, (4), 6, (8), 10, (12), 14, 16, 18, 20, 22, (24))

(iv) 9 (9, (18), 27, 36)

6 (6, 12, (18), 24, 30, 36)

(v) 9 (9, (18), 27, 36)

(vi) 12 (12, 24, (36))

4 (4, 8, 12, 16, 20, 24, 28, 32, (36))

9 (9, (18), 27, (36))

2.13 Least Common Multiple (L.C.M)

Let us consider the multiples of 2 and 3:

Multiples of 3 are: 3, 6, 9, 12, 15, 18, ...

Multiples of 2 are: 2, 4, 6, 8, 10, 12, 14, 16, 18, ...

Common Multiples are: 6, 12, 18, ...

The Least Common Multiple (L.C.M) of 2 and 3 is 6.

The Least Common Multiple (L.C.M) is the lowest multiple which is exactly divisible by the given numbers.

2.14 Different Methods of Finding L.C.M

There are three different methods of finding LCM.

(i) Using common multiples (ii) Using Prime Factorization.

(iii) Division method.

(I) Finding L.C.M. by using Common Multiples:

Find the L.C.M. of 4 and 5.

Solution: First find multiples of 4 and 5 and then encircle the common multiples.

Multiples of 4 = 4, 8, 12, 16, **20**, 24, 28, 32, 36, **40**, ...

Multiples of 5 = 5, 10, 15, **20**, 25, 30, 35, **40**, 45, 50, ...

Common multiples of 4 and 5 are: 20, 40, ...

Finally, we choose the smallest common multiple, which is 20.

Thus, the L.C.M. of 4 and 5 is 20.

Find the L.C.M. of 3, 4 and 6 by using common multiple.

Solution: Find the common multiples of 3, 4, and 6.

The multiples of 3 = 3, 6, 9, 12, 15, 18, 21, 24, 27, 30, 33, 36....

The multiples of 4 = 4, 8, 12, 16, 20, 24, 28, 32, 36, 40, 44, 48, ...

The multiples of 6 = 6, 12, 18, 24, 30, 36, 42, 48, ...

Common multiples of 3, 4 and 6 = 12, 24, 36, ...

So, the least Common Multiple (L.C.M) is 12.

Exercise 2.7

Q.1. Find the Least Common Multiple (L.C.M) of the following:

(i) Multiples of 6 are: 6, 12, 18, ...

Multiples of 2 are: 2, 4, 6, 8, 10, 12, 14, 16, 18, ...

L.C.M = **6**.

(ii) Multiples of 4 are: 4, 8, 12, 16, 20, ...

Multiples of 2 are: 2, 4, 6, 8, 10, 12, 14, 16, 18, 20 .....

L.C.M = **4**.

(iii) Multiples of 6 are: 6, 12, 18, 24, 30, 36, ...

Multiples of 9 are: 9, 18, 27, 36, ...

L.C.M = **18**.

(iv) Multiples of 9 are: 9, 18, 27, 36, ...

Multiples of 4 are: 4, 8, 12, 16, 20, 24, 28, 32, 36, ...

L.C.M = **36**.

(v) Multiples of 12 are: 12, 24, 36, 48, 60, 72.....

Multiples of 9 are: 9, 18, 27, 36, 45, 54, 63, 72.....

L.C.M = **36**.

Q.2. List the first eight multiples of each of the following numbers. Find the Least Common Multiple (L.C.M)

(i) Multiples of 9 = **9,18,27,36,45,54,63,72**

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

L.C.M = **9**

(ii) Multiples of 3 = **3,6,9,12,15,18,21,24**

Multiples of 4 = **4,8,12,16,20,24,28,32**

Multiples of 6 = **6,12,18,24,30,36,42,48**

L.C.M = **12**

(iii) Multiples of 5 = **5,10,15,20,25,30,35,40**

Multiples of 10 = **10,20,30,40,50,60,70,80**

L.C.M = **10**

(iv) Multiples of 3 = **3,6,9,12,15,18,21,24**

Multiples of 6 = **6,12,18,24,30,36,42**

Multiples of 8 = **8,16,24,32,40,48,56**

L.C.M = **24**

ii. Finding L.C.M. by Prime Factorization:

Find the L.C.M. of 48 and 54.

Solution: First of all we find Prime Factorization of 48 and 54.

2	48
2	24
2	12
2	6
3	3
	1

2	54
3	27
3	9
3	3
	1

The Prime Factorization of 48 and 54 are: $48 = 2 \times 2 \times 2 \times 2 \times 3$

$54 = 2 \times 3 \times 3 \times 3$

In Prime factorization of 48 and 54, the Prime Factor 2 occurs at the most four times and 3 occurs at the most three times.

We find the product of these Prime Factors with their number of occurring at the most (in any of the given factorizations). This product will be the required L.C.M.

So, L.C.M. = $\underbrace{2 \times 2 \times 2 \times 2}_{\text{At the most four times}}$ $\underbrace{3 \times 3 \times 3}_{\text{At the most three times}}$ = 432

Thus, the L.C.M. is 432.

Find by factors the L.C.M. of 12, 16 and 24.

Solution: Resolving into Prime Factors we get:

$12 = 2 \times 2 \times 3$

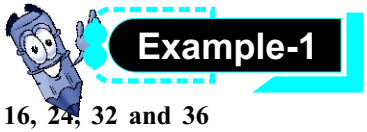
$16 = 2 \times 2 \times 2 \times 2$

$24 = 2 \times 2 \times 2 \times 3$

Looking at the factors, we find that 2 has occurred 4 times at the most and 3 has occurred once.

Hence, L.C.M $= 2 \times 2 \times 2 \times 2 \times 3 = 48$.

iii. Finding L.C.M. by Division:



Find the L.C.M. of 16, 24, 32 and 36

SOLUTION:

First we write given numbers in a row separated by commas and then we divide them by a prime factor which is common in at least two numbers. We continue this process until we get prime number.

2	16, 24, 32, 36
2	8, 12, 16, 18
2	4, 6, 8, 9
2	2, 3, 4, 9
2	1, 3, 2, 9
3	1, 1, 1, 9
3	1, 1, 1, 3
	1, 1, 1, 1

While finding the L.C.M the remaining factors may also be multiplied by the divisors.

Hence, the L.C.M. is

$\underbrace{2 \times 2 \times 2 \times 2 \times 3}_{\text{Prime divisors}} \times \underbrace{2 \times 3}_{\text{Remaining prime factor}} = 288$

Find the L.C.M of the following by the division method:
21, 35, 40 and 63

Solution: We find least common multiple of 21, 35, 40, 63.

3	21, 35, 40, 63
5	7, 35, 40, 21
7	7, 7, 8, 21
	1, 1, 8, 3

Hence, L.C.M $= 3 \times 5 \times 7 \times 8 \times 3 = 3320$.

Find the least number of oranges which can be equally distributed among 40, 50 or 60 children?

Solution: To find the least number of oranges, we have to find the L.C.M of 40, 50 and 60.

2	40, 50, 60
2	20, 25, 30
5	10, 25, 15
	2, 5, 3

Thus, the L.C.M is $2 \times 2 \times 5 \times 2 \times 5 \times 3 = 600$

So the required number of oranges is 600..

Exercise 2.8

Q.1. Find the L.C.M by prime factorization method:

(i) 6, 10, 16

Sol:

2 | 6
3 | 3
1

2 | 10
5 | 5
1

2 | 16
2 | 8
2 | 4
2 | 2
1

Factors of 6 = 2 x 3
Factors of 10 = 2 x 5
Factors of 16 = 2 x 2 x 2 x 2
common factors of = 2.
Different factors = 2 x 2 x 2 x 3 x 5.
All factors of = 2 x 2 x 2 x 2 x 3 x 5= 240.
Ans: L.C.M of 6, 10 and 16 = 240.

(ii) 4, 5, 7

Sol:

2 | 4
2 | 2
1

5 | 5
1

7 | 7
1

Factors of 4 = 2 x 2
Factors of 5 = 5
Factors of 7 = 7
common factors of = 1.
Different factors = 2 x 2 x 5 x 7 = 140.
Ans: L.C.M of 4, 5 and 7 = 140.

(iii) 7, 14, 21

Sol:

7 | 7
1

2 | 14
7 | 7
1

3 | 21
7 | 7
1

Factors of 7 = 7
Factors of 14 = 2 x 7
Factors of 21 = 3 x 7
common factors of = 7.
Different factors = 2 x 3 x 7 = 42.
Ans: L.C.M of 7, 14 and 21 = 42.

(iv) 24, 64

Sol:

2 | 24
2 | 12
2 | 6
3 | 3
1

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

Factors of 24 = 2 x 2 x 2 x 3
Factors of 64 = 2 x 2 x 2 x 2 x 2 x 2
Common factors of = 2 x 2 x 2
Different factors = 2 x 2 x 2 x 3
All factors = 2 x 2 x 2 x 2 x 2 x 2 x 3 = 192
Ans: L.C.M of 24 and 64 = 192

(v) 32, 36

Sol:

2 | 32
2 | 16
2 | 8
2 | 4
2 | 2
1

2 | 36
2 | 18
3 | 9
3 | 3
1

Factors of 32 = 2 x 2 x 2 x 2 x 2
Factors of 36 = 2 x 2 x 3 x 3
Common factors of = 2 x 2
Different factors = 2 x 2 x 2 x 3 x 3
All factors = 2 x 2 x 2 x 2 x 2 x 3 x 3 = 288
Ans: L.C.M of 32 and 36 = 288

(vi) 49, 56

Sol:

7	49
7	7
	1

2	56
2	28
2	14
7	7
	1

Factors of 49 = 7 x 7
Factors of 56 = 2 x 2 x 2 x 7
Common factors of = 7
Different factors = 2 x 2 x 2 x 7
All factors = 2 x 2 x 2 x 7 x 7 = 392
Ans: L.C.M of 49 and 56 = 392

Q.2. Find L.C.M. by division method:

(i) 9, 12, 30

Sol:

2	9,	12,	30
2	9,	6,	15
3	9,	3,	15
3	3,	1,	5
5	1,	1,	5
	1,	1,	1

L.C.M of 9, 12, 30 = 2 x 2 x 3 x3 x 5
= 180 Ans:

(ii) 16, 28, 32

Sol:

2	16,	28,	332
2	8,	14,	16
2	4,	7,	8
2	2,	7,	4
2	1,	7,	2
7	1,	7,	1
	1,	1,	1

L.C.M of 16, 28 and 32 = 2 x 2 x 2 x2 x 2 x 7
= 224 Ans:

(iii) 15, 25, 35

Sol:

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

L.C.M of 15, 25, 35 = 3 x 5 x 5 x 7
= 525 Ans:

(iv)13, 39, 52

Sol:

2	13,	39,	52
2	13,	39,	26
3	13,	39,	13
13	13,	13,	13
	1,	1,	1

L.C.M of 13, 39, 52 = 2 x 2 x 3 x 13
= 156 Ans:

(v)28, 35, 42

Sol:

2	28,	35,	42
2	14,	35,	21
3	7,	35,	21
5	7,	35,	7
7	7,	7,	7
	1,	1,	1

L.C.M of 28, 35 and 42 = 2 x 2 x 3 x5 x 7
= 420 Ans:

(vi)24, 40, 56

Sol:

2	24,	40,	56
2	12,	20,	28
2	6,	10,	14
3	3,	5,	7
5	1,	5,	7
7	1,	1,	7
	1,	1,	1

L.C.M of 24, 40 and 56 = 2 x 2 x 2 x3 x 5 x 7
=820 Ans:

Q.**3.** Which is the smallest number exactly divisible by 8, 12 and 20.

Sol:

2	8,	12,	20
2	4,	6,	10
2	2,	3,	5
3	1,	3,	5
5	1,	1,	5
	1,	1,	1

L.C.M of 8, 12 and 20 = 2 x 2 x 2 x 3 x 5 = 120
Ans: 120 is the number, which is exactly divisible by 8, 12 and 20

Q.**4.** Which is the smallest number exactly divisible by 5, 10 and 25.

Sol:

2	5,	10,	25
5	5,	5,	25
5	1,	1,	5
	1,	1,	1

L.C.M of 5, 10 and 25 = 2 x 5 x 5 = 50
Ans: 50 is the number, which is exactly divisible by 5, 10 and 25

Q.5. Find the least number which is divided by 26, 36 or 56 leaves zero as remainder.

Sol:

2	26, 36, 56
2	13, 18, 28
2	13, 9, 14
3	13, 9, 7
3	13, 3, 7
7	13, 1, 7
13	13, 1, 1
	1, 1, 1

L.C.M of 26, 36 and 56 = 2 x 2 x 2 x 3 x 3 x 7 x 13 = 6552
Ans: 6552is the number, which is exactly divisible by 26, 36and 56

Q.6. Find the least number which is exactly divisible by 35, 42 and 56.

Sol:

2	35, 42, 56
2	35, 21, 28
2	35, 21, 14
3	35, 21, 7
5	35, 7, 7
7	7, 7, 7
	1, 1, 1

L.C.M of 35, 42 and 56 = 2 x 2 x 2 x 3 x 5 x 7 = 840
Ans: 840 is the number, which is exactly divisible by 35, 42 and 56

CHAPTER NO.3

COMMON FRACTIONS

3.1 Proper Fractions

We have studied proper fractions, in the class III. We know that a fraction is a proper fraction, if its numerator is less than its denominator, following are the proper fractions.

$\frac{2}{3}$, $\frac{5}{7}$, $\frac{11}{12}$, $\frac{23}{28}$, $\frac{53}{87}$

We now learn about improper, mixed and equivalent fractions.

3.2 Improper Fractions

A fraction whose numerator is greater than or equal to its denominator is called an improper fraction for example:

$\frac{5}{3}$, $\frac{7}{5}$, $\frac{12}{10}$, $\frac{28}{11}$, $\frac{39}{21}$, $\frac{101}{101}$, ...

are improper fractions.

3.3 Mixed (Compound) Fractions

Consider the following figures:

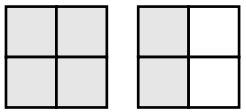


Fig. 1

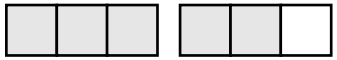


Fig. 2

Coloured portion of figure 1 represents six quarters, that is the fraction $\frac{6}{4}$, but it is clear from the figure that six quarters, consist of one whole and two quarters, $1+\frac{2}{4}$ which we write $1\ \frac{2}{4}$ and read "one whole and two over four"

Looking at the figure 2, we see that the coloured portion represents five one third which is the fraction $\frac{5}{3}$, it consists of one whole and two one third, $1 + \frac{2}{3}$ which we write $1\ \frac{2}{3}$ and read "One whole and two over three"

$1\ \frac{2}{4}$ and $1\ \frac{2}{3}$ are called Mixed (Compound) fractions, other

Examples are:

$3\ \frac{1}{4}$, $5\frac{2}{8}$, $35\frac{1}{6}$, $81\frac{2}{7}$

Thus we notice that a mixed fraction consists of two parts.

(i) Whole part.

(ii) A proper fraction.

3.4 Equivalent Fractions

The word equivalent means "the same" consider the following figures.

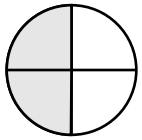


Fig. 1

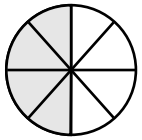


Fig. 2

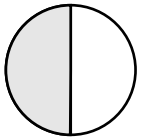


Fig. 2

Le us now see what represents the shaded part of each figure.
We notice that, shaded part in

fig. 1 $= \frac{2}{4}$ fig. 2 $= \frac{4}{8}$ fig. 3 $\frac{1}{2}$

Hence $\frac{2}{4}$, $\frac{4}{8}$ and $\frac{1}{2}$ are equivalent (same) fractions because each represents the same shaded portion, of the same figure.

Those fractions which represent the same portion of any thing, are called equivalent fractions.

3.5 Writing Fractions Equivalent to a given fraction:

Consider the following

Fig. 1

Fig. 2

Fig. 3

Now shaded portion of the

fig. 1 $= \frac{1}{2}$ fig. 2 $= \frac{2}{4}$ fig. 3 $= \frac{3}{6}$

But $\frac{1}{2}$, $\frac{2}{4}$ and $\frac{3}{6}$ represent half of the same figure, so they are equivalent.

$$\frac{1}{2} = \frac{2}{4} = \frac{3}{6}$$

$$\frac{1}{2} \overset{\times 2}{=} \frac{2}{4} \qquad \frac{1}{2} \overset{\times 3}{=} \frac{3}{6}$$

Hence If we multiply both the numerator and denominator of a fraction by a non zero number, we get a fraction equivalent to the given fraction.

Again

$$\frac{3}{6} \overset{\div 3}{=} \frac{1}{2} \qquad \frac{2}{4} \overset{\div 2}{=} \frac{1}{2}$$

Similarly if we divide both the numerator and the denominator of a given fraction by a non zero number, we get a fraction equivalent to the given fraction.

Example-1

Find three fractions equivalent to $\frac{3}{4}$

Solution:

$$\frac{3}{4} \overset{\times 2}{=} \frac{6}{8} \qquad \frac{3}{4} \overset{\times 3}{=} \frac{9}{12} \qquad \frac{3}{4} \overset{\times 5}{=} \frac{15}{20}$$

Hence $\frac{6}{8}$, $\frac{9}{12}$ and $\frac{15}{20}$ are equivalent fractions of $\frac{3}{4}$.

Example-2

Find three fractions equivalent to $\frac{48}{36}$

Solution:

$$\frac{48}{36} \overset{\div 2}{=} \frac{24}{18} \overset{\div 2}{=} \frac{12}{9} \overset{\div 3}{=} \frac{4}{3}$$

Hence $\frac{24}{18}$, $\frac{12}{9}$ and $\frac{4}{3}$ are equivalent fractions of $\frac{48}{36}$.

Exercise 3.1

Q.1. Separate the proper, improper and mixed or compound fraction from the following:

(i) $\frac{1}{2}$ (ii) $\frac{7}{12}$ (iii) $8\frac{1}{2}$ (iv) $\frac{12}{7}$ (v) $6\frac{5}{6}$

(vi) $\frac{18}{5}$ (vii) $\frac{3}{11}$ (viii) $\frac{5}{7}$ (ix) $6\frac{7}{9}$

Sol:

Proper Fraction	Improper Fraction	Mixed Fraction
$\frac{1}{2}$	$\frac{12}{7}$	$8\frac{1}{2}$
$\frac{7}{12}$	$\frac{18}{5}$	$6\frac{5}{6}$
$\frac{3}{11}$		$6\frac{7}{9}$
$\frac{5}{7}$		

Q.2. Find the next three fractions equivalent to each of the fractions.

(i) $\frac{1}{3}$

Sol: $\frac{1}{3}$

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

$\frac{1}{3} = \frac{2}{6} = \frac{3}{9} = \frac{4}{12}$ **Answer**

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

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

$\frac{5}{4} = \frac{5 \times 2}{4 \times 2} = \frac{5 \times 3}{4 \times 3} = \frac{5 \times 4}{4 \times 4}$

$\frac{5}{4} = \frac{10}{8} = \frac{15}{12} = \frac{20}{16}$ **Answer**

(iii) $\frac{7}{8}$

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

$\frac{7}{8} = \frac{7 \times 2}{8 \times 2} = \frac{7 \times 3}{8 \times 3} = \frac{7 \times 4}{8 \times 4}$

$\frac{7}{8} = \frac{14}{16} = \frac{21}{24} = \frac{28}{32}$ **Answer**

(iv) $\frac{8}{11}$

Sol: $\frac{8}{11}$

$\frac{8}{11} = \frac{8 \times 2}{11 \times 2} = \frac{8 \times 3}{11 \times 3} = \frac{8 \times 4}{11 \times 4}$

$\frac{8}{11} = \frac{16}{22} = \frac{24}{33} = \frac{32}{44}$ **Answer**

(v) $\frac{9}{13}$

Sol: $\frac{9}{13}$

$\frac{9}{13} = \frac{9 \times 2}{13 \times 2} = \frac{9 \times 3}{13 \times 3} = \frac{9 \times 4}{13 \times 4}$

$\frac{9}{13} = \frac{18}{26} = \frac{27}{39} = \frac{36}{52}$ **Answer**

Q.3. Write two more equivalent fractions for each of the following:

(i) $\frac{32}{80} = \frac{16}{40}$

Sol: $\frac{32 \div 2}{80 \div 2} = \frac{16}{40}$

$= \frac{16 \div 2}{40 \div 2} = \frac{8}{20}$

$= \frac{8 \div 2}{20 \div 2} = \frac{4}{10}$

$= \frac{4 \div 2}{10 \div 2} = \frac{2}{5}$

$= \frac{32}{80} = \frac{16}{40} = \frac{8}{20} = \frac{4}{10} = \frac{2}{5}$ **Answer**

(ii) $\frac{24}{40} = \frac{12}{20}$

Sol: $\frac{24 \div 2}{40 \div 2} = \frac{12}{20}$

$= \frac{12 \div 2}{20 \div 2} = \frac{6}{10}$

$= \frac{6 \div 2}{10 \div 2} = \frac{3}{5}$

$= \frac{24}{40} = \frac{12}{20} = \frac{6}{10} = \frac{3}{5}$ **Answer**

(iii) $\frac{108}{135} = \frac{36}{45}$

Sol: $\frac{108 \div 3}{135 \div 3} = \frac{36}{45}$

$= \frac{108 \div 3}{135 \div 3} = \frac{36}{45}$

$= \frac{36 \div 3}{45 \div 3} = \frac{12}{15}$

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

$= \frac{108}{135} = \frac{36}{45} = \frac{12}{15} = \frac{4}{5}$ **Answer**

(iv) $\frac{48}{96} = \frac{24}{48}$

Sol: $\frac{48 \div 2}{96 \div 2} = \frac{24}{48}$

$\frac{24 \div 2}{48 \div 2} = \frac{12}{24}$

$\frac{12 \div 2}{24 \div 2} = \frac{6}{12}$

$= \frac{48}{96} = \frac{24}{48} = \frac{12}{24} = \frac{6}{12}$ **Answer**

(v) $\frac{36}{60} = \frac{18}{30}$

Sol: $\frac{36 \div 2}{60 \div 2} = \frac{18}{30}$

$\frac{18 \div 2}{30 \div 2} = \frac{9}{15}$

$\frac{9 \div 3}{15 \div 3} = \frac{3}{5}$

$= \frac{36}{60} = \frac{18}{30} = \frac{9}{15} = \frac{3}{5}$ **Answer**

(vi) $\frac{625}{1250} = \frac{125}{250}$

Sol: $\frac{625 \div 5}{1250 \div 5} = \frac{125}{250}$

$\frac{125 \div 5}{250 \div 5} = \frac{25}{50}$

$\frac{25 \div 5}{50 \div 5} = \frac{5}{10}$

$= \frac{625}{1250} = \frac{125}{250} = \frac{25}{50} = \frac{5}{10}$ **Answer**

3.6 Reducing a Fraction to its Lowest Form

Consider the fraction $\frac{16}{24}$.

$\frac{16}{24} = \frac{16 \div 2}{24 \div 2} = \frac{8}{12}$

$\frac{8}{12} = \frac{8 \div 2}{12 \div 2} = \frac{4}{6}$

$\frac{4}{6} = \frac{4 \div 2}{6 \div 2} = \frac{2}{3}$

We note that:

$\frac{16}{24}$, $\frac{8}{12}$ $\frac{4}{6}$ and $\frac{2}{3}$ are all equivalent fractions.

Since there is no common divisor of the numerator and the denominator except 1 of the fraction $\frac{2}{3}$. This form is called the lowest form, thus $\frac{2}{3}$ is the lowest form of the fraction $\frac{16}{24}$.

A fraction is in the lowest form if there does not exit a common divisor of its numerator and denominator except 1.

Example-1 **Find the simpliest form of the fraction**

Solution:

$\frac{36}{60} = \frac{\overset{18}{\cancel{36}}}{\underset{30}{\cancel{60}}} = \frac{\overset{9}{\cancel{18}}}{\underset{15}{\cancel{30}}} = \frac{\overset{3}{\cancel{9}}}{\underset{5}{\cancel{15}}} = \frac{3}{5}$

Thus $\frac{3}{5}$ is the lowest form of $\frac{36}{60}$.

Another method : HCF of 36and 60 = 12.

Divide the numerator and denominator of the fraction by their HCF.

$\frac{36}{60} = \frac{36 \div 12}{60 \div 12} = \frac{3}{5}$

Exercise 3.2

Q.1: Find the simpliest for each of the following:

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

Sol: $\frac{2}{6}$

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

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

(2) $\frac{3}{15}$

Sol: $\frac{3}{15}$

$= \frac{3 \div 3}{15 \div 3} = \frac{1}{5}$

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

(3) $\frac{4}{20}$

Sol: $\frac{4}{20}$

$= \frac{4 \div 2}{20 \div 2} = \frac{2}{10}$

$= \frac{2 \div 2}{10 \div 2} = \frac{1}{5}$

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

(4) $\frac{18}{54}$

Sol: $\frac{18}{54}$

$= \frac{18 \div 3}{54 \div 3} = \frac{9}{27}$

$= \frac{9 \div 3}{27 \div 3} = \frac{3}{9}$

$= \frac{3 \div 3}{9 \div 3} = \frac{1}{3}$

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

(5) $\frac{25}{40}$

Sol: $\frac{25}{40}$

$= \frac{25 \div 5}{40 \div 5} = \frac{5}{8}$

$= \frac{5}{8}$ **Ans:**

(6) $\frac{25}{45}$

Sol: $\frac{25}{45}$

$= \frac{25 \div 5}{45 \div 5} = \frac{5}{9}$

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

(7) $\frac{40}{60}$

Sol: $\frac{40}{60}$

$= \frac{40 \div 2}{60 \div 2} = \frac{20}{30}$

$= \frac{20 \div 2}{30 \div 2} = \frac{10}{15}$

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

$= \frac{2}{3}$ **Ans:**

(8) $\frac{60}{48}$

Sol: $\frac{60}{80}$

$= \frac{60 \div 2}{80 \div 2} = \frac{30}{20}$

$= \frac{30 \div 2}{40 \div 2} = \frac{15}{20}$

$= \frac{15 \div 5}{20 \div 5} = \frac{3}{4}$

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

(9) $\frac{36}{64}$

Sol: $\frac{36}{64}$

$= \frac{36 \div 2}{64 \div 2} = \frac{18}{32}$

$= \frac{18 \div 2}{64 \div 2} = \frac{9}{32}$

$= \frac{9}{32}$ **Ans:**

3.7 Converting an Improper Fraction into A mixed Fraction

Consider the figure:

Shaded portion = 4 quarters + 3 quarters

= 7 quarters

= $\frac{7}{4}$

also shaded portion = 4 quarters + 3 quarters

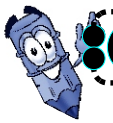
= $\frac{4}{4} + \frac{3}{4}$

= one whole + $\frac{3}{4}$

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

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

Short method: $\frac{7}{4}$ means $4\overline{)7}$ (quotient 1, remainder 3) means $1\frac{3}{4}$



Example-1 **Convert $\frac{13}{5}$ into a mixed fraction.**

Solution:

$\frac{13}{5}$ Means $5\overline{)13}$ (quotient 2, remainder 3) means $2\frac{13}{5}$

3.8 Converting a mixed Fraction to an Improper Fraction:

Consider the following figure:

Shaded portion $= 1\frac{1}{4}$

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

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

$= \frac{5}{4}$

$\therefore \quad 1\frac{1}{4} = \frac{5}{4}$

Short Method:

A mixed fraction, has a whole number and a proper fraction.

(1) Multiply the whole number with the denominator of the proper fraction.

(2) Add to the product, numerator of the fraction the sum is the numerator of the required improper fraction.

(3) Write the fraction keeping the denominator as denominator of the proper fraction.

Short method: $1\ \frac{1}{4}$ (1 × 4 + 1) gives us the numerator $4 \times 1 + 1 = 5$

Denominator remains the same

$\therefore \quad 1\frac{1}{4} = \frac{4 \times 1 + 1}{4} = \frac{5}{4}$

Example **Convert $3\frac{4}{7}$ into an improper fraction.**

Solution: $3\frac{4}{7} = \frac{7 \times 3 + 4}{7} = \frac{25}{7}$

Exercise 3.3

Q. 1: Convert each of the following into a mixed fraction.

(i) $\frac{3}{2}$

Sol:
$$2\overline{)\,3\,}\ 1,\quad -2,\quad 1$$

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

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

Sol:
$$3\overline{)\,5\,}\ 1,\quad -3,\quad 2$$

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

(iii) $\frac{9}{4}$

Sol:
$$4\overline{)\,9\,}\ 2,\quad -8,\quad 1$$

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

(iv) $\frac{13}{2}$

Sol:
$$2\overline{)\,13\,}\ 6,\quad -12,\quad 2$$

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

(v) $\frac{17}{5}$

Sol:
$$5\overline{)\,17\,}\ 3,\quad -15,\quad 2$$

Ans: $3\frac{2}{5}$

(vi) $\frac{21}{4}$

Sol:
$$4\overline{)\,21\,}\ 5,\quad -20,\quad 1$$

Ans: $5\frac{1}{4}$

(vii) $\frac{29}{4}$

Sol:
$$4\overline{)29}\ 7,\quad -28,\quad 01$$

Ans: $7\frac{1}{4}$

(viii) $\frac{31}{5}$

Sol:
$$5\overline{)31}\ 6,\quad -30,\quad 01$$

Ans: $6\frac{1}{5}$

(ix) $\frac{43}{7}$

Sol:
$$7\overline{)43}\ 6,\quad -42,\quad 01$$

Ans: $6\frac{1}{7}$

Q. 2: Convert each of the following into an improper fraction.

(i) $\mathbf{1\ \frac{1}{3}}$

Sol: $\frac{4}{3}$ Ans:

(ii) $\mathbf{2\ \frac{2}{3}}$

Sol: $\frac{8}{3}$ Ans:

(iii) $\mathbf{3\ \frac{1}{4}}$

Sol: $\frac{13}{4}$ Ans:

(iv) $\mathbf{5\ \frac{1}{5}}$

Sol: $\frac{26}{5}$ Ans:

(v) $\mathbf{6\ \frac{1}{4}}$

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

(vi) $\mathbf{6\ \frac{3}{4}}$

Sol: $\frac{27}{4}$ Ans:

(vii) $\mathbf{7\ \frac{1}{6}}$

Sol: $\frac{43}{6}$ Ans:

(viii) $\mathbf{7\ \frac{5}{6}}$

Sol: $\frac{47}{6}$ Ans:

(ix) $\mathbf{8\ \frac{1}{7}}$

Sol: $\frac{57}{7}$ Ans:

3.9 Comparison of Common Fractions, use of Symbols > and <.

We have learnt in class III, comparison of fractions with:
(I) Equal denominators
(Ii) Equal numerators
We revise these cases and learn, use of symbols > and <.

(I) We know if two fractions have the same denominator, the one with a greater numerator is greater than the other fraction.
Therefore $\frac{7}{4}$ is greater than $\frac{3}{4}$.
which we write: $\frac{7}{4} > \frac{3}{4}$; '>' is the symbol which is read as: "greater than".

Since $\frac{11}{12}$ is greater than $\frac{5}{12}$, we write $\frac{11}{12} > \frac{5}{12}$

(Ii) When two fractions have the same numerators, the one with grate denominator is smaller than the other.
$\frac{3}{7}$ is smaller than $\frac{3}{5}$, which we write $\frac{3}{7} < \frac{3}{5}$; '< ' is

the symbol which is read as "smaller than".

$\frac{5}{9}$ Is smaller than $\frac{5}{7}$ which we write $\frac{5}{9} < \frac{5}{7}$.

Exercise 3.4

Q.1.Find greater and smaller fraction in each of the following, and represent them using > or <.

(1) $\frac{5}{9}$, $\frac{4}{9}$ **Ans:** $\frac{5}{9} > \frac{4}{9}$

(2) $\frac{3}{11}$, $\frac{7}{11}$ **Ans:** $\frac{3}{11} < \frac{7}{11}$

(3) $\frac{3}{13}$, $\frac{3}{11}$ **Ans:** $\frac{3}{13} < \frac{3}{11}$

(4) $\frac{5}{14}$, $\frac{5}{16}$ **Ans:** $\frac{5}{14} > \frac{5}{16}$

(5) $\frac{5}{7}$, $\frac{6}{7}$ **Ans:** $\frac{5}{7} < \frac{6}{7}$

(6) $\frac{8}{12}$, $\frac{8}{15}$ **Ans:** $\frac{8}{12} > \frac{8}{15}$

(7) $\frac{3}{4}$, $\frac{6}{4}$ **Ans:** $\frac{3}{4} < \frac{6}{4}$

(8) $\frac{7}{12}$, $\frac{9}{12}$ **Ans:** $\frac{7}{12} < \frac{9}{12}$

(9) $\frac{8}{15}$, $\frac{8}{20}$ **Ans:** $\frac{8}{15} > \frac{8}{20}$

(10) $\frac{5}{6}$, $\frac{5}{10}$ **Ans:** $\frac{5}{6} > \frac{5}{10}$

(11) $\frac{7}{8}$, $\frac{9}{8}$ **Ans:** $\frac{7}{8} > \frac{9}{8}$

(12) $\frac{4}{15}$, $\frac{4}{17}$ **Ans:** $\frac{4}{15} > \frac{4}{17}$

(13) $\frac{11}{21}$, $\frac{10}{21}$ **Ans:** $\frac{11}{21} > \frac{10}{21}$

(14) $\frac{13}{34}$, $\frac{5}{34}$ **Ans:** $\frac{13}{34} > \frac{5}{34}$

3.10 Comparison of Common Fractions, By Finding Equivalent Fractions:

Example-1 **Compare** $\frac{3}{4}$ **and** $\frac{5}{6}$

Solution:

(I) We first find equivalent fractions of $\frac{3}{4}$ and $\frac{3}{4}$

$$\frac{3}{4} = \frac{6}{8} = \frac{9}{12} = \frac{12}{16} = \frac{15}{20}$$

$$\frac{5}{6} = \frac{10}{12} = \frac{15}{18} = \frac{20}{24}$$

(ii) We now pick fractions with the same denominators from these equivalent fractions.

$\frac{9}{12}$ and $\frac{10}{12}$

(iii) We know $\frac{9}{12}$ is smaller than $\frac{10}{12}$

But $\frac{3}{4} = \frac{9}{12}$ and $\frac{5}{6} = \frac{10}{12}$

Therefore $\frac{3}{4} < \frac{5}{6}$

Another method:

We can also shift $\frac{3}{4}$ and $\frac{5}{6}$ to fractions of common denominator, by the method:

Find L.C.M. of 4 and 6 which is 12. 12 is required common.

denominator of the fractions equivalent to $\frac{3}{4}$ and $\frac{5}{6}$

$$\frac{3}{4} = \frac{3\times3}{4\times3} = \frac{9}{12}$$

$$\frac{5}{6} = \frac{5\times2}{6\times2} = \frac{10}{12}$$

Therefore $\frac{9}{12} < \frac{10}{12}$

That is $\frac{9}{12} < \frac{10}{12}$

Exercise 3.5

Q.1. Insert the symbol > or < in each of the following:

(1) $\frac{4}{6} \square \frac{5}{9}$ **(2)** $\frac{3}{4} \square \frac{2}{5}$ **(3)** $\frac{2}{3} \square \frac{5}{4}$

(4) $\frac{3}{5} \square \frac{7}{3}$ **(5)** $\frac{4}{9} \square \frac{5}{6}$ **(6)** $\frac{1}{4} \square \frac{5}{6}$

(7) $\frac{3}{15} \square \frac{7}{12}$ **(8)** $\frac{13}{15} \square \frac{7}{9}$ **(9)** $\frac{4}{15} \square \frac{21}{25}$

(10) $\frac{49}{20} \square \frac{14}{15}$

3.11 Addition of Two or More Common Fractions:

We have learnt in class III.

(i) Fractions having the same denominator are called like fraction.

(ii) To add like fractions, we add their numerators, while denominator remains the same.

ADDING LIKE FRACTIONS :

Example-1 **Find the sum** **(i)** $\frac{3}{5} + \frac{1}{5}$

(ii) $\frac{4}{19} + \frac{5}{19} + \frac{11}{19}$

Solution:

(i) $\frac{3}{5} + \frac{1}{5} = \frac{3+1}{5}$

$= \frac{4}{5}$

(ii) $\frac{4}{19} + \frac{5}{19} + \frac{11}{19} = \frac{4+5+11}{19}$

$= \frac{20}{19} = 1\frac{1}{19}$

Exercise 3.6

Q.1. Find the sum

(1) $\frac{3}{8} + \frac{4}{8}$

Sol: $\frac{3}{8} + \frac{4}{8}$

$= \frac{3+7}{8}$

$= \frac{11}{8}$

$= 1\frac{3}{8}$ **Ans:**

R.W

$8\overline{)11}\ 1$

$-\ 8$

03

(2) $\frac{5}{12} + \frac{2}{12}$

Sol: $\frac{5}{12} + \frac{2}{12}$

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

$= \frac{7}{12}$ **Ans:**

(3) $\frac{7}{16} + \frac{6}{16}$

Sol: $\frac{7}{16} + \frac{6}{16}$

$= \frac{7+6}{16}$

$= \frac{13}{16}$ **Ans:**

(4) $\frac{4}{21} + \frac{5}{21} + \frac{8}{21}$

Sol: $\frac{4}{21} + \frac{5}{21} + \frac{8}{21}$

$= \frac{4+5+8}{21}$

$= \frac{17}{21}$ **Ans:**

(5) $\frac{4}{17} + \frac{3}{17} + \frac{6}{17}$

Sol: $\frac{4}{17} + \frac{3}{17} + \frac{6}{17}$

$= \frac{4+3+6}{17}$

$= \frac{13}{17}$ **Ans:**

(6) $\frac{11}{28} + \frac{11}{28} + \frac{3}{28}$

Sol: $\frac{11}{28} + \frac{11}{28} + \frac{3}{28}$

$= \frac{11+11+3}{28}$

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

(7) $\frac{10}{27} + \frac{5}{27} + \frac{7}{27}$

Sol: $\frac{10}{27} + \frac{5}{27} + \frac{7}{27}$

$= \frac{10+5+7}{27}$

$= \frac{22}{27}$ **Ans:**

(8) $\frac{4}{15} + \frac{7}{15} + \frac{8}{15}$

Sol: $\frac{4}{15} + \frac{7}{15} + \frac{8}{15}$

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

$= \frac{19}{15}$

$= 1\frac{4}{15}$ **Ans:**

R.W

$15\overline{)19}\ 1$

$-\ 15$

04

(9) $\frac{6}{13} + \frac{8}{13} + \frac{3}{13}$

Sol: $\frac{6}{13} + \frac{8}{13} + \frac{3}{13}$

$= \frac{6+8+3}{27}$

$= \frac{17}{13}$

$= 1\frac{4}{13}$ **Ans:**

R.W

$13\overline{)17}\ 1$

$-\ 13$

04

(10) $\frac{5}{12} + \frac{4}{12} + \frac{3}{12}$

Sol: $\frac{5}{12} + \frac{4}{12} + \frac{3}{12}$

$= \frac{5+4+3}{12}$

$= \frac{12}{12}$

$= 1$ **Ans:**

(11) $\frac{2}{19} + \frac{3}{19} + \frac{16}{19}$

Sol: $\frac{2}{19} + \frac{3}{19} + \frac{16}{19}$

$= \frac{2+3+16}{19}$

$= \frac{21}{19}$

$= 1\ \frac{2}{19}$ **Ans:**

R.W

$19\overline{)\ 21\ (\ 1}$

$-\ 19$

02

(12) $\frac{5}{29} + \frac{7}{29} + \frac{11}{29}$

Sol: $\frac{5}{29} + \frac{7}{29} + \frac{11}{29}$

$= \frac{5+7+11}{29}$

$= \frac{23}{29}$ **Ans:**

ADDING UNLIKE FRACTIONS:

To add fractions with different denominators (unlike fractions)

(i) We get their equivalent fractions with a common denominator,

(ii) We find L.C.M. of the denominators of the fractions, which is always the common denominator of the fractions, equivalent to the given fractions.

Examples-1

Add $\frac{1}{2}$ **and** $\frac{1}{5}$ **.**

Solution: Equivalent fractions of

$\frac{1}{2} = \frac{2}{4} = \frac{3}{6} = \frac{4}{8} = \frac{5}{10}$

Equivalent fractions of

$\frac{1}{5} = \frac{2}{10} = \frac{3}{15} = ...$

So $\frac{1}{2} + \frac{1}{5} = \frac{5}{10} + \frac{2}{10}$

$= \frac{7}{10}$

Examples-2

Find the sum $\frac{2}{3}$, $\frac{3}{4}$ and $\frac{1}{6}$

Solution: L.C.M. of the denominators 3, 4 and 6 is 12.

$\frac{1}{2} = \frac{2\times4}{3\times4} = \frac{8}{12}$

$\frac{3}{4} = \frac{3\times3}{4\times3} = \frac{9}{12}$

$\frac{1}{6} = \frac{1\times2}{6\times2} = \frac{2}{12}$

So $\frac{2}{3} + \frac{3}{4} + \frac{1}{6}$

$= \frac{8}{12} + \frac{9}{12} + \frac{2}{12} = \frac{19}{12}$

$= 1\frac{7}{12}$

Activity

Arrange the digits 1 to 6 (each once only) to make this fraction sum correct.

$\frac{\square}{\square} + \frac{\square}{\square} + \frac{\square}{\square} = 3\ \frac{8}{12}$

Solution:

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

Verify yourself please.

Exercise 3.7

Q.1: Show the addition of fraction.

(1) $\frac{1}{2} + \frac{1}{4}$

Sol: $\frac{1}{2} + \frac{1}{4}$

L.C.M = 2 x 2

L.C.M = 4

Sol: $\frac{(1x2) + (1x1)}{4}$

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

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

R.W

2	2 , 4
2	1 , 2
	1 , 1

(2) $\frac{3}{4} + \frac{9}{2}$

Sol: $\frac{3}{4} + \frac{9}{2}$

L.C.M = 2 x 2

L.C.M = 4

Sol: $\frac{(3x1) + (2x9)}{4}$

$= \frac{3+18}{4}$

$= \frac{21}{4}$

$= 5\ \frac{1}{4}$ **Ans:**

R.W

2	2 , 4
2	1 , 2
	1 , 1

R.W

$4\overline{)\ 21\ (\ 5}$

$-\ 20$

01

(3) $\frac{3}{2} + \frac{1}{8}$

Sol: $\frac{3}{2} + \frac{1}{8}$

L.C.M = 2 x 2 x 2

L.C.M = 8

Sol: $\frac{(3x4) + (1x1)}{8}$

$= \frac{12+1}{8}$

$= \frac{13}{8}$

$= 1\ \frac{5}{8}$ **Ans:**

R.W

2	2 , 8
2	2 , 4
2	1 , 2
	1 , 1

$8\overline{)13}$ (1)

$-\ 8$

05

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

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

L.C.M = 2 x 2 x 5

L.C.M = 20

Sol: $\frac{(6x4) + (1x5) + (3x10)}{20}$

$= \frac{24+5+30}{20}$

$= \frac{59}{20}$

$= 2\ \frac{19}{20}$ **Ans:**

R.W

2	5,4,2
2	5,2,1
5	5,1,1
	1,1,1

$20\overline{)59}$ (2)

$-\ 40$

19

(5) $\frac{2}{5} + \frac{3}{4} + \frac{1}{10}$

Sol: $\frac{2}{5} + \frac{3}{4} + \frac{1}{10}$

L.C.M = 2 x 2 x 5

L.C.M = 20

$\frac{(2x4) + (3x5) + (1x2)}{20}$

$= \frac{8+15+2}{20}$

$= \frac{25}{20}$

$= 1\ \frac{5}{20}$ **Ans:**

R.W

2	5,4,10
2	5,2,5
5	5,1,5
	1,1,1

$20\overline{)25}$ (1)

$-\ 20$

05

(6) $\frac{7}{8} + \frac{3}{5} + \frac{6}{10}$

Sol: $\frac{7}{8} + \frac{3}{5} + \frac{6}{10}$

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

L.C.M = 40

$\frac{(7x5) + (3x8) + (6x4)}{40}$

$= \frac{35+24+24}{40}$

$= \frac{83}{40}$

$= 2\ \frac{3}{40}$ **Ans:**

R.W

2	8,5,10
2	4,5,5
2	2,5,5
5	1,1,1

$40\overline{)83}$ (2)

$-\ 80$

03

(7) $\frac{1}{4} + \frac{3}{6} + \frac{2}{8}$

$\frac{1}{4} + \frac{3}{6} + \frac{2}{8}$

L.C.M = 2 x 2 x2x3

L.C.M = 24

$\frac{(1x6) + (3x4) + (2x3)}{20}$

$= \frac{6+12+6}{22}$

R.W

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

(8) $\frac{2}{5} + \frac{3}{6} + \frac{7}{15}$

$\frac{2}{5} + \frac{3}{6} + \frac{7}{15}$

L.C.M = 2 x 3 x5

L.C.M = 30

$\frac{(2x6) + (3x5) + (7x2)}{30}$

$= \frac{12+15+14}{30}$

R.W

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

$= \frac{24}{24}$

$= 1$ **Ans:**

$= \frac{41}{30}$

$= 1\ \frac{11}{30}$ **Ans:**

$30\overline{)41}$ (1)

$-\ 30$

11

ADDING MIXED FRACTIONS:

Examples-1

Add $2\ \frac{1}{4}$ **and** $7\ \frac{1}{3}$

Solution:

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

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

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

Sum of whole number parts = 9

To find the sum of $\frac{1}{4}$ and $\frac{1}{3}$

L.C.M. of the denominators 4 and 3 is 12.

$\frac{1}{4} = \frac{3 \times 1}{3 \times 4} = \frac{3}{12}$

$\frac{1}{3} = \frac{4 \times 1}{4 \times 3} = \frac{4}{12}$

$\frac{1}{4} + \frac{1}{3} = \frac{3}{12} + \frac{4}{12} = \frac{7}{12}$

So $2\ \frac{1}{4} + 7\frac{1}{3} = 9 + \frac{7}{12} = 9\ \frac{7}{12}$

Another Method:

(i) Convert each mixed fraction into an improper fraction.

(ii) Add improper fractions.

The method is illustrated in the example given below:

Examples-2

Find the sum of $3\frac{1}{2}$, $2\frac{1}{4}$ **and** $2\frac{1}{6}$

Solution:

$$3\frac{1}{2} + 5\frac{1}{3} + 2\frac{1}{6} = \frac{7}{2} + \frac{16}{3} + \frac{13}{6}$$

LCM of the denominators 2, 3 and 6 = 6.

Convert each improper fraction into an equivalent fraction having denominator 6.

$$\frac{7}{2} = \frac{7\times3}{2\times3} = \frac{21}{6}$$

$$\frac{16}{3} = \frac{16\times2}{3\times2} = \frac{32}{6}$$

$$\frac{13}{6} = \frac{13}{6}$$

.

So $3\frac{1}{2} + 5\frac{1}{3} + 2\frac{1}{6} = \frac{7}{2} + \frac{16}{3} + \frac{13}{6}$

$= \frac{21}{6} + \frac{32}{6} + \frac{13}{6}$

$= \frac{21 + 32 + 13}{6}$

$= \frac{66}{6}$

$= \frac{66 \div 6}{6 \div 6}$

$= 11$

ADDITION OF ANY TYPE OF COMMON FRACTIONS:

Examples-1

Find the sum of $\frac{1}{4}$, $\frac{11}{5}$ **and** $3\frac{1}{10}$

Solution: $\frac{1}{4} + \frac{11}{5} + 3\frac{1}{10} = \frac{1}{4} + \frac{11}{5} + \frac{31}{10}$ ——— (i)

Solve $\frac{1}{4} + \frac{11}{5} + \frac{31}{10}$

L.C.M. of 4, 5 and 10 is 20

Convert each fraction into an equivalent fraction with denominator 20.

$$\frac{1}{4} = \frac{1\times5}{4\times5} = \frac{5}{20}$$

$$\frac{11}{5} = \frac{11\times4}{5\times4} = \frac{44}{20}$$

$$\frac{31}{10} = \frac{31\times2}{10\times2} = \frac{62}{20}$$

$$\frac{1}{4} + \frac{11}{5} + \frac{31}{10} = \frac{5}{20} + \frac{44}{20} + \frac{62}{20}$$

$$= \frac{111}{20}$$

$$= 5\frac{11}{20}$$ (Changed to mixed fraction)

So we see from (i) that

$$\frac{1}{4} + \frac{11}{5} + 3\frac{1}{10} = 5\frac{11}{20}$$

Exercise 3.8

Q.1. Solve each of the following:

(1) $\frac{3}{8} + 2\frac{1}{6}$

Sol: $\frac{3}{8} + 2\frac{1}{6}$

$= \frac{3}{8} + \frac{13}{6}$

L.C.M = 2 x 2 x 2 x3

L.C.M = 24

$\frac{(3x3) + (13x4)}{24}$

$= \frac{9 + 52}{54}$

$= \frac{61}{24}$

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

R.W

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

R.W

$24\overline{)\,61}$ quotient 2, -48, remainder 13

(2) $\frac{7}{5} + 3\frac{1}{5}$

Sol: $\frac{7}{5} + 3\frac{1}{5}$

$= \frac{7}{5} + \frac{16}{5}$

$= \frac{7 + 16}{5}$

$= \frac{23}{5}$

$= 4\frac{3}{5}$ **Ans:**

R.W

$5\overline{)\,23}$ quotient 4, -20, remainder 3

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

Sol: $2\frac{1}{6} + 5\frac{1}{4}$

$= \frac{13}{6} + \frac{21}{4}$

L.C.M = 2 x 2 x3

L.C.M = 12

$\frac{(13x2) + (21x3)}{12}$

$= \frac{26 + 63}{12}$

$= \frac{89}{12}$

$= 7\frac{5}{12}$ **Ans:**

R.W

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

R.W

26
+ 63
89

$12\overline{)89}$ 7, - 84, 5

(4) $\frac{7}{6} + 8\frac{1}{4}$

Sol: $\frac{7}{6} + 8\frac{1}{4}$

$= \frac{7}{6} + \frac{33}{4}$

L.C.M = 2 x 2 x3

L.C.M = 12

$\frac{(7x2) + (23x3)}{12}$

$= \frac{14 + 69}{12}$

$= \frac{83}{12}$

$= 6\frac{11}{12}$ **Ans:**

R.W

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

R.W

14
+ 68
93

$12\overline{)83}$ 6, - 72, 11

(5) $\frac{8}{6} + \frac{11}{4} + 2\frac{1}{8}$

Sol: $\frac{8}{6} + \frac{11}{4} + 2\frac{1}{8}$

$= \frac{8}{6} + \frac{11}{4} + \frac{17}{8}$

L.C.M = 2 x 2 x2x3

L.C.M = 24

$\frac{(8x4) + (11x6) + (17x3)}{24}$

$= \frac{32 + 66 + 51}{24}$

$= \frac{149}{24}$

$= 6\frac{5}{24}$ **Ans:**

R.W

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

R.W

32
66
+ 51
149

$24\overline{)149}$ 6, -144, 5

(6) $\frac{3}{4} + \frac{8}{3} + 1\frac{2}{6}$

Sol: $\frac{3}{4} + \frac{8}{3} + 1\frac{2}{6}$

$= \frac{3}{4} + \frac{8}{3} + \frac{8}{6}$

L.C.M = 2 x 2 x3

L.C.M = 12

$\frac{(3x3) + (8x4) + (8x2)}{12}$

$= \frac{9 + 32 + 16}{12}$

$= \frac{57}{12}$

$= 4\frac{9}{12}$ **Ans:**

R.W

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

$12\overline{)57}$ 7, - 48, 9

3.12 Subtraction of Common Fractions

Subtracting like Fractions:

To subtract like fractions we subtract their numerators and the denominator remains the same.

Solve $\frac{5}{9} - \frac{2}{9}$

Solution: $\frac{5}{9} - \frac{2}{9} = \frac{5 - 2}{9}$

$= \frac{3}{9}$

$= \frac{1}{3}$ (reduced to lowest term)

SUBTRACTING UNLIKE FRACTIONS:

We subtract fractions in the same way as we add them.

Subtract $\frac{7}{12}$ **from** $\frac{9}{8}$

Solution:

L.C.M. of the denominators 8 and 12 is 24

Convert each fraction to its equivalent fraction with denominator 24.

$\frac{7}{12} = \frac{7 \times 2}{12 \times 2} = \frac{14}{24}$

$\frac{9}{8} = \frac{9 \times 3}{8 \times 3} = \frac{27}{24}$

$\frac{9}{8} - \frac{7}{12} = \frac{27}{24} - \frac{14}{24}$

$= \frac{13}{24}$

Examples-2

Subtract $1\frac{3}{7}$ from $3\frac{1}{3}$

Solution:

$1\frac{3}{7} = \frac{10}{7}$ and $3\frac{1}{3} = \frac{10}{3}$

L.C.M. of 7 and 3 is 21.

$\frac{10}{7} = \frac{10 \times 3}{7 \times 3} = \frac{30}{21}$

$\frac{10}{3} = \frac{10 \times 7}{3 \times 7} = \frac{70}{21}$

So $3\frac{1}{3} - 1\frac{3}{7} = \frac{10}{3} - \frac{10}{7}$

$= \frac{70}{21} - \frac{30}{21} = \frac{70 - 30}{21}$

$= \frac{40}{21}$ (improper fraction

$= 1\frac{19}{21}$ (mixed fraction)

Exercise 3.9

Q.1. Solve the following:

(1) $\frac{5}{7} - \frac{3}{7}$

Sol: $\frac{5}{7} - \frac{3}{7}$

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

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

(2) $\frac{10}{11} - \frac{7}{11}$

Sol: $\frac{10}{11} - \frac{7}{11}$

$= \frac{10 - 7}{11}$

$= \frac{3}{11}$ **Ans:**

(3) $\frac{7}{20} - \frac{2}{20}$

Sol: $\frac{7}{20} - \frac{2}{20}$

$= \frac{7 - 2}{20}$

$= \frac{{}^{1}\cancel{5}}{\cancel{20}_{4}}$

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

(4) $\frac{9}{21} - \frac{2}{21}$

Sol: $\frac{9}{21} - \frac{2}{21}$

$= \frac{9 - 2}{21}$

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

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

(5) $\frac{7}{6} - \frac{5}{9}$

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

LCM = 2 x 3 x 3

LCM = 18

$= \frac{(7 \times 3 - (5 \times 2)}{18}$

$= \frac{21 - 10}{18}$

$= \frac{11}{18}$ **Ans:**

R.W

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

(6) $6\frac{1}{2} - 2\frac{2}{20}$

Sol: $6\frac{1}{2} - 2\frac{2}{20}$

$= \frac{13}{2} - \frac{42}{20}$

LCM = 2 x 2 x 5

LCM = 20

$= \frac{(13 \times 10) - (42 \times 1)}{20}$

$= \frac{130 - 42}{20}$

$= \frac{88}{20}$

$= 4\frac{8}{20}$ **Ans:**

R.W

2	2,20
2	1,10
5	1 , 5
	1,1

R.W

30

- 42

8

R.W

4

20) 88

- 80

8

3.13 Multiplication of Fractions, Multiplying a Fraction by a whole Number

We know that multiplication is the same as repeated addition.
So if we have to multiply $\frac{2}{3}$ by 4, we add $\frac{2}{3}$ four times.

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

Thus, we note that while multiplying a fraction by a whole number, we multiply the numerator of the fraction by the whole number, and keep the same denominator. Simplify answer by expressing it in the lowest term or as a mixed fraction.

Examples-1 **Multiply $\frac{3}{14}$ by 7.**

Solution:

$$\frac{3}{14} \times 7 = \frac{3 \times 7}{14}$$
$$= \frac{21}{14}$$
$$= \frac{3}{2} \text{ (reduced to lowest term)}$$
$$= 1\frac{3}{2} \text{ (Changed to mixed fraction)}$$

Examples-1 **Multiply $1\frac{3}{4}$ by 3.**

Solution:

$$1\frac{3}{4} \times 3 = \frac{7}{4} \times 3$$
$$= \frac{21}{4}$$
$$= 5\frac{1}{4}$$

Exercise 3.10

Q.1: Find the product of each of the following:

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

Sol: $\frac{5}{6} \times 6$

$= \frac{5}{\cancel{6}} \times \cancel{6}^{1}$

$= 5 \times 1$

$= 5$ Ans:

(2) $\frac{3}{11} \times 5$

Sol: $\frac{3}{11} \times 5$

$= \frac{15}{11}$

$= 1\frac{4}{11}$ Ans:

$$11\overline{)15}\ 1$$
$$-\ 11$$
$$4$$

(3) $\frac{2}{3} \times 7$

Sol: $\frac{2}{3} \times 7$

$= \frac{14}{3}$

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

$$3\overline{)14}\ 4$$
$$-\ 12$$
$$2$$

(4) $\frac{10}{11} \times 33$

Sol: $\frac{10}{11} \times 33$

$= \frac{10}{\cancel{11}_{1}} \times \cancel{33}^{3}$

$= 10 \times 3$

$= 30$ Ans:

(5) $1\frac{6}{7} \times 2$

Sol: $1\frac{6}{7} \times 2$

$= \frac{13}{7} \times \frac{2}{1}$

$= \frac{26}{7}$

$= 3\frac{5}{7}$ Ans:

R.W

$7\overline{)26}$ 3

-21

5

(6) $2\frac{3}{5} \times 5$

Sol: $2\frac{3}{5} \times 5$

$= \frac{13}{\cancel{5}} \times \frac{\cancel{5}}{1}$

$= 13 \times 1$

$= 13$ Ans:

(7) $8\frac{1}{6} \times 8$

Sol: $8\frac{1}{6} \times 8$

$= \frac{49}{\cancel{6}_3} \times \frac{\cancel{8}^4}{1}$

$= \frac{49}{3} \times \frac{4}{1}$

$= \frac{196}{3}$

$= 65\frac{1}{3}$ Ans:

R.W

$49 \times 4 = 196$

$3\overline{)196}$ 65

-18

16

-15

1

(8) $9\frac{1}{8} \times 6$

Sol: $9\frac{1}{8} \times 6$

$= \frac{73}{\cancel{8}_4} \times \frac{\cancel{6}^3}{1}$

$= \frac{73}{4} \times \frac{3}{1}$

$= \frac{219}{4}$

$= 54\frac{5}{4}$ Ans:

R.W

$73 \times 3 = 219$

$4\overline{)219}$ 54

-20

19

-16

05

(9) $\frac{13}{16} \times 4$

Sol: $\frac{13}{16} \times 4$

$= \frac{13}{\cancel{16}_4} \times \frac{\cancel{4}^1}{1}$

$= \frac{13}{4}$

$= 3\frac{1}{4}$ Ans:

$4\overline{)13}$ 3

-12

1

(10) $2\frac{1}{10} \times 5$

Sol: $2\frac{1}{10} \times 5$

$= \frac{21}{\cancel{10}_2} \times \frac{\cancel{5}^1}{1}$

$= \frac{21}{2}$

$= 10\frac{1}{2}$ Ans:

$2\overline{)21}$ 10

-20

1

MULTIPLYING A FRACTION BY A FRACTION:

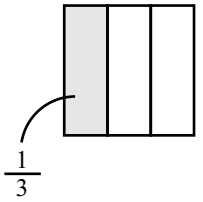
Examples-1 Find $\frac{1}{2} \times \frac{1}{3}$

Solution:

$\frac{1}{2} \times \frac{1}{3}$ can also be understood as $\frac{1}{2}$ of $\frac{1}{3}$

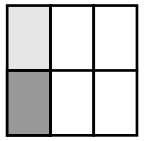
Look at the figures:

Fig. 1



$\frac{1}{3}$

Fig. 2



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

In fig. 1 coloured portion indicates $\frac{1}{3}$ of the whole figure.

In fig. 2 coloured portion indicates $\frac{1}{2}$ of $\frac{1}{3}$ which is $\frac{1}{6}$ th part of the whole figure.

So, $\frac{1}{2}$ of $\frac{1}{3} = \frac{1}{2} \times \frac{1}{3} = \frac{1 \times 1}{2 \times 3} = \frac{1}{6}$

Thus in multiplication of fractions, the numerator is multiplied by numerator and the denominator is multiplied by denominator

Examples-2 Find $\frac{2}{5} \times \frac{3}{7}$

Solution:

$\frac{2}{5} \times \frac{3}{7} = \frac{2 \times 3}{5 \times 7} = \frac{6}{35}$

Examples-3 Find $\frac{2}{5} \times 1\frac{3}{7}$

Solution: $\frac{7}{5} \times 1\frac{3}{8} = \frac{7}{5} \times \frac{11}{8}$

$= \frac{7 \times 11}{5 \times 8}$

$= \frac{77}{40}$

$= 1\frac{37}{40}$

Exercise 3.11

Q.1. Find.

(1) $\frac{1}{3} \times \frac{5}{2}$

Sol: $\frac{1}{3} \times \frac{5}{2}$

$= \frac{5}{6}$ **Ans:**

(2) $\frac{3}{2} \times \frac{2}{5}$

First method:

Sol: $\frac{3}{2} \times \frac{2}{5}$

$= \frac{\cancel{6}^{3}}{\cancel{10}_{5}}$

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

Second method:

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

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

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

(3) $\frac{8}{3} \times \frac{2}{5}$

Sol: $\frac{8}{3} \times \frac{2}{5}$

$= \frac{16}{15}$ **Ans:**

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

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

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

$= \frac{3}{8}$ **Ans:**

(5) $2\frac{1}{3} \times 2\frac{1}{4}$

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

$= \frac{7}{\cancel{3}_{1}} \times \frac{\cancel{9}^{3}}{4}$

$= \frac{21}{4} = 5\frac{1}{4}$ **Ans:**

```
      5
  4 ) 21
    - 20
      1
```


(6) $4\frac{1}{5} \times 4\frac{1}{7}$

Sol: $4\frac{1}{5} \times 4\frac{1}{7}$

$= \frac{\cancel{21}^{3}}{5} \times \frac{29}{\cancel{7}_{1}}$

$= \frac{3}{5} \times \frac{29}{1}$

$= \frac{87}{5}$

$= 17\frac{2}{5}$ **Ans:**

R.W

```
      17
  5 ) 87
    - 5
     37
    - 35
      2
```

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

Sol: $\frac{8}{3} \times 3\frac{1}{8}$

$= \frac{\cancel{8}^{1}}{3} \times \frac{25}{\cancel{8}_{1}}$

$= \frac{1}{3} \times \frac{25}{1}$

$= \frac{25}{3} = 8\frac{1}{3}$ **Ans:**

R.W

```
      8
  3 ) 25
    - 24
      1
```

(8) $5\frac{1}{7} \times \frac{14}{2}$

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

$= \frac{\cancel{36}^{18}}{\cancel{7}_{1}} \times \frac{\cancel{14}^{2}}{\cancel{2}_{1}}$

$= 18 \times 2 = 36$ Ans:

(9) $8\frac{1}{5} \times 3\frac{1}{3}$

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

$= \frac{41}{\cancel{5}_{1}} \times \frac{\cancel{10}^{2}}{3}$

$= \frac{82}{3}$

$= 27\frac{1}{3}$ **Ans:**

R.W

```
      27
  3 ) 82
    - 6
     22
    - 21
      01
```

(10) $\frac{12}{15} \times \frac{35}{48}$

Sol: $\frac{12}{15} \times \frac{35}{48}$

$= \frac{\cancel{12}^{1}}{15} \times \frac{35}{\cancel{48}_{4}}$

$= \frac{1}{\cancel{15}_{3}} \times \frac{\cancel{35}^{7}}{4}$

$= \frac{7}{12}$

$= \frac{7}{12}$ **Ans:**

3.14 Commutative Property of Addition and Multiplication of Fractions:

COMMUTATIVE PROPERTY OF ADDITION OF FRACTIONS:

Examples-1 Show that $1\frac{1}{2} + \frac{3}{8} = \frac{3}{8} + 1\frac{1}{2}$

Solution:

L.H.S $= 1\frac{1}{2} + \frac{3}{8} = \frac{3}{2} + \frac{1}{2}$

$= \frac{3 \times 4}{2 \times 4} + \frac{3}{8}$

$= \frac{12}{8} + \frac{3}{8}$

$= \frac{15}{8}$

L.H.S $= \frac{8}{3} + 1\frac{1}{2} = \frac{3}{8} + \frac{3}{2}$

$= \frac{3}{8} + \frac{3 \times 4}{2 \times 4}$

$= \frac{3}{8} + \frac{12}{8}$

$= \frac{15}{8}$

Hence $1\frac{1}{2} + \frac{3}{8} = \frac{3}{8} + 1\frac{1}{2}$

From the example it is evident that the result remains the same when we add two fractions in any order. This is called commutative property of addition of fractions

Commutative property of multiplication of two fractions:

Examples-1 Show that $1\frac{1}{2} \times \frac{5}{3} = \frac{5}{3} \times 1\frac{1}{2}$

Solution:

L.H.S= $1\frac{1}{2} \times \frac{5}{3} = \frac{\cancel{3}}{2} \times \frac{5}{\cancel{3}} = \frac{5}{2}$

R.H.S= $\frac{5}{3} \times 1\frac{1}{2} = \frac{5}{\cancel{3}} \times \frac{\cancel{3}}{2} = \frac{5}{2}$

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

So when we multiply two fractions in any order, the result remains the same. This is called commutative property of multiplication of fractions.

Exercise 3.12

Q.1: Show that:

(1) $\frac{1}{2} + \frac{2}{3} = \frac{2}{3} + \frac{1}{2}$

LHS = RHS

Sol: $\frac{1}{2} + \frac{2}{3} = \frac{2}{3} + \frac{1}{2}$

LCM = 2 x 3 = 6

R.W

2	2 , 3
3	1 , 3
	1 , 1

$= \frac{(1x3) + (2x2)}{6} = \frac{(2x2) + (1x3)}{6}$

$= \frac{3 + 4}{6} = \frac{4 + 3}{6}$

$= \frac{7}{6} = \frac{7}{6}$

$= 1\frac{1}{6} = 1\frac{1}{6}$

R.W

$6 \overline{)\,7}$ quotient 1, $-\,6$, remainder 1

Hence proved LHS = RHS.

(2) $\frac{5}{4} + 1\frac{2}{4} = 1\frac{2}{4} + \frac{5}{4}$

LHS = RHS

Sol: $\frac{5}{4} + 1\frac{2}{4} = 1\frac{2}{4} + \frac{5}{4}$

R.W

$4 \overline{)\,11}$ quotient 2, $-\,8$, remainder 3

$= \frac{5}{4} + \frac{6}{4} = \frac{6}{4} + \frac{5}{4}$

$= \frac{5+6}{4} = \frac{6+5}{4}$

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

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

Hence Proved LHS = RHS

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

LHS = RHS

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

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

Hence Proved LHS = RHS

(4) $1\frac{2}{5} \times 3\frac{1}{4} = 3\frac{1}{4} \times 1\frac{2}{5}$

LHS = RHS

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

$= \frac{7}{5} \times \frac{13}{4} = \frac{13}{4} \times \frac{7}{5}$

$= \frac{91}{20} = \frac{91}{20}$

Hence Proved LHS = RHS

R.W

$20\overline{)91}$ (4, - 80, 11)

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

LHS = RHS

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

LCM = 2 x 2 = 4

$= \frac{(1x1)+(3x2)}{4} = \frac{(3x2)+(1x1)}{4}$

$= \frac{1+6}{4} = \frac{6+1}{4}$

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

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

Hence proved LHS = RHS.

R.W

2	2 , 4
2	1 , 2
	1 , 1

R.W

$4\overline{)7}$ (1, - 4, 3)

(6) $\frac{5}{4} \times \frac{10}{15} = \frac{10}{15} \times \frac{5}{4}$

LHS = RHS

Sol: $\frac{5}{4} \times \frac{10}{15} = \frac{10}{15} \times \frac{5}{4}$

$= \frac{5}{\cancel{4}_2} \times \frac{\cancel{10}^5}{15} = \frac{\cancel{10}^5}{5} \times \frac{5}{\cancel{4}_2}$

$= \frac{\cancel{5}^1}{2} \times \frac{5}{\cancel{15}_3} = \frac{5}{\cancel{15}_3} \times \frac{\cancel{5}^1}{2}$

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

$= \frac{5}{6} = \frac{5}{6}$

Hence Proved LHS = RHS

3.15 Associative property of Addition and Multiplication of Fractions

ASSOCIATIVE PROPERTY OF ADDITION OF FRACTIONS:

Examples-1 Solve $\frac{1}{2} + \frac{2}{3} + \frac{1}{4}$

Solution: **We can solve it in two ways:**

$\frac{1}{2} + \left(\frac{2}{3} + \frac{1}{4}\right)$

$= \frac{1}{2} + \left(\frac{8}{12} + \frac{3}{12}\right)$

$= \frac{1}{2} + \frac{11}{12}$

$= \frac{6}{12} + \frac{11}{12}$

$= \frac{17}{12}$

$\left(\frac{1}{2} + \frac{2}{3}\right) + \frac{1}{4}$

$= \left(\frac{3}{6} + \frac{4}{6}\right) + \frac{1}{4}$

$= \frac{7}{6} + \frac{1}{4}$

$= \frac{14}{12} + \frac{3}{12}$

$= \frac{17}{12}$

$\frac{1}{2} + \left(\frac{2}{3} + \frac{1}{4}\right) = \left(\frac{1}{2} + \frac{2}{3}\right) = \frac{1}{4}$

This property is called associative property of addition of fractions

Examples-2

Solve $\frac{1}{2} \times \frac{4}{3} \times 1\frac{7}{6}$

Solution:

$$\left(\frac{1}{2} + \frac{4}{3}\right) \times 1\frac{7}{6}$$
$$= \left(\frac{1}{2} + \frac{\cancel{4}^{2}}{3}\right) \times 1\frac{7}{6}$$
$$= \frac{\cancel{2}}{3} \times \frac{13}{\cancel{6}_{3}}$$
$$= \frac{13}{9}$$

Thus $\left(\frac{1}{2} + \frac{4}{3}\right) \times 1\frac{7}{6}$

$$\frac{1}{2} \times \left(\frac{4}{3} \times 1\frac{7}{6}\right)$$
$$= \frac{1}{2} \times \left(\frac{\cancel{4}^{2}}{3} \times 1\frac{7}{\cancel{6}_{3}}\right)$$
$$= \frac{1}{\cancel{2}_{1}} \times \frac{\cancel{26}^{13}}{9}$$
$$= \frac{13}{9}$$
$$= \frac{1}{2} \times \left(\frac{4}{3} \times 1\frac{7}{6}\right)$$

This property is known as associative property of multiplication of fraction

Exercise 3.13

Q.1: Simplify:

(1) $\left(\frac{\mathbf{1}}{\mathbf{2}} + \frac{\mathbf{3}}{\mathbf{4}}\right) + \frac{\mathbf{1}}{\mathbf{4}} = \frac{\mathbf{1}}{\mathbf{2}} + \left(\frac{\mathbf{3}}{\mathbf{4}} + \frac{\mathbf{1}}{\mathbf{4}}\right)$

Sol: LHS = RHS

$$\left(\frac{1}{2} + \frac{3}{4}\right) + \frac{1}{4} = \frac{1}{2} + \left(\frac{3}{4} + \frac{1}{4}\right)$$

Take LHS.

$$= \left(\frac{1}{2} + \frac{3}{4}\right) + \frac{1}{4}$$

L.C.M = 2 x 2 = 4

$$= \left(\frac{(1x2) + (3x1)}{4}\right) + \frac{1}{4}$$
$$= \left(\frac{2 + 3}{4}\right) + \frac{1}{4}$$

$$= \left(\frac{5}{4}\right) + \frac{1}{4} = \frac{5}{4} + \frac{1}{4}$$
$$= \frac{5 + 1}{4}$$
$$= \frac{\cancel{6}^{3}}{\cancel{4}_{3}} = \frac{3}{2} \text{ or } 1\frac{1}{2}$$

R.W

2	2 , 4
2	1 , 2
	1 , 1

Take RHS

$$= \frac{1}{2} + \left(\frac{3}{4} + \frac{1}{4}\right)$$
$$= \frac{1}{2} + \left(\frac{3 + 1}{4}\right)$$
$$= \frac{1}{2} + \frac{4}{4} = \frac{(1 \text{ x } 2) + (4 \text{x } 1)}{4} = \frac{2 + 4}{4} = \frac{\cancel{6}^{3}}{\cancel{4}_{2}}$$
$$= \frac{3}{2} = 1\frac{1}{2} \quad \text{Ans:}$$

(2) $\left(\frac{\mathbf{1}}{\mathbf{2}} \times \frac{\mathbf{3}}{\mathbf{4}}\right) \times \frac{\mathbf{1}}{\mathbf{4}} = \frac{\mathbf{1}}{\mathbf{2}} \times \left(\frac{\mathbf{3}}{\mathbf{4}} \times \frac{\mathbf{1}}{\mathbf{4}}\right)$

Sol: LHS = RHS

$$\left(\frac{1}{2} \times \frac{3}{4}\right) \times \frac{1}{4} = \frac{1}{2} \times \left(\frac{3}{4} \times \frac{1}{4}\right)$$

Take LHS.

$$= \left(\frac{1}{2} \text{ x } \frac{3}{4}\right) + \frac{1}{4}$$
$$= \frac{3}{8} \text{ x } \frac{1}{4}$$
$$= \frac{3}{32}$$

Take RHS

$$= \frac{1}{2} \text{ x } \left(\frac{3}{4} \text{ x } \frac{1}{4}\right)$$
$$= \frac{1}{2} \text{ x } \frac{3}{16}$$
$$= \frac{3}{32} \quad \text{Ans:}$$

(3) $\left(\frac{1}{3} \times \frac{1}{4}\right) \times \frac{1}{6} = \frac{1}{3} \times \left(\frac{1}{4} \times \frac{1}{6}\right)$

Sol: LHS = RHS

$\left(\frac{1}{3} \times \frac{1}{4}\right) \times \frac{1}{6} = \frac{1}{3} \times \left(\frac{1}{4} \times \frac{1}{6}\right)$

Take LHS:

$= \left(\frac{1}{3} \times \frac{1}{4}\right) \times \frac{1}{6}$

$= \frac{1}{12} \times \frac{1}{6}$

$= \frac{1}{72}$

Take RHS

$= \frac{1}{3} \times \left(\frac{1}{4} \times \frac{1}{6}\right)$

$= \frac{1}{3} + \frac{1}{24}$

$= \frac{1}{72}$ Ans:

(4) $\left(\frac{1}{3} + \frac{1}{4}\right) + \frac{1}{6} = \frac{1}{3} + \left(\frac{1}{4} + \frac{1}{6}\right)$

Sol: LHS = RHS

Take LHS:

$\left(\frac{1}{3} + \frac{1}{4}\right) + \frac{1}{6} = \frac{1}{3} + \left(\frac{1}{4} + \frac{1}{6}\right)$

$= \left(\frac{(1x4) + (1x3)}{12}\right) + \frac{1}{6}$

$= \frac{4 + 3}{12} + \frac{1}{6}$

$= \frac{7}{12} \times \frac{1}{6}$

$=$ LCM = 2 x 2 x 3= 12

$= \frac{(7x1) + (1x2)}{12}$

R.W

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

$= \frac{7 + 2}{12} = \frac{^{3}\cancel{9}}{\cancel{12}_{4}} = \frac{3}{4}$

Take RHS

$\frac{1}{3} + \left(\frac{1}{4} + \frac{1}{6}\right)$

Sol: $\frac{1}{3} + \left(\frac{1}{4} + \frac{1}{6}\right)$

R.W

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

LCM = 2 x 2 x 3 = 12

$= \frac{(1 \times 3) + (1 \times 2)}{12}$

$= \frac{3 + 2}{15}$

$= \frac{3 + 2}{12}$

$= \frac{5}{12}$

$= \frac{1}{3} + \frac{5}{12}$

LCM = 2 x 2 x 3 = 12

$= \frac{(1 \times 4) + (5 \times 1)}{12}$

$= \frac{4 + 5}{12} = \frac{^{3}\cancel{9}}{\cancel{12}_{4}} = \frac{3}{4}$ Ans:

R.W

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

3.16 Division of a Fraction

1.We first learn what are reciprocal numbers.

Two numbers are reciprocal of each other, if their product is 1.

2 and $\frac{1}{2}$ are reciprocal numbers because $2 \times \frac{1}{2} = 1$

$\frac{3}{4}$ and $\frac{4}{3}$ are reciprocal fractions (numbers) because:

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

We can obtain the reciprocal of a fraction by interchanging the position of its numerator and its denominator.

Examples-1

Write reciprocals of the following:

$\frac{5}{4}$, $\frac{11}{16}$, $\frac{25}{29}$, $\frac{108}{157}$

Solution:

$\frac{4}{5}$, $\frac{16}{11}$, $\frac{29}{25}$, $\frac{108}{157}$

2. Division:

We know that multiplication is a process of repeated addition.

$2 \times 2 = 2 + 2 + 2 = 6$

Since division is the reverse process of multiplication, by 6 2. We mean how many times 2 is included in 6, or in other words, how many times, we subtract 2 from 6;

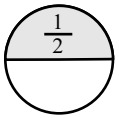
$$\begin{array}{r} 6 \\ -\ 2 \\ \hline 4 \\ -\ 2 \\ \hline 2 \\ -\ 2 \\ \hline 0 \end{array}$$

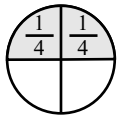
Answer is three times, therefore $6 \div 2 = 3$

3. Division of a fraction by a fraction:

Examples-1 **Divide $\frac{1}{2}$ by $\frac{1}{4}$**

Solution: We want to find out how many quarters of a whole are included in half of a whole.





Evidently two quarters of a whole are included in half of a whole.

$\therefore \frac{1}{2} \div \frac{1}{4} = 2$

Examples-1 **Divide $6\frac{1}{4}$ by $2\frac{1}{4}$**

Solution:

We have to divide $\frac{27}{4}$ by $\frac{9}{4}$, let us find out how many times $\frac{9}{4}$ is included in $\frac{27}{4}$ or how many times $\frac{9}{4}$ can be subtracted from $\frac{27}{4}$.

$$\begin{array}{r} \frac{27}{4} \\ -\ \frac{9}{4} \\ \hline \frac{18}{4} \\ -\ \frac{9}{4} \\ \hline \frac{9}{4} \\ -\ \frac{9}{4} \\ \hline 0 \end{array}$$

This can be done three times.

$\therefore \ 6\frac{3}{4} \div 2\frac{1}{4} = \frac{27}{4} \div \frac{9}{4}$

$= 3$

Let us look at the results of these examples.

$\frac{1}{2} \div \frac{1}{4} = 2 = \frac{1}{\cancel{2}} \times \frac{\overset{2}{\cancel{4}}}{1}$

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

We notice that $\frac{4}{1}$ and $\frac{4}{9}$ are reciprocals of $\frac{1}{4}$ and $\frac{9}{4}$.

Hence:

If one fraction is to be divided by another then first fraction is multiplied by the reciprocal of the second fraction.

Examples-1

Find $4 \div \frac{1}{8}$

Solution:

$$4 \div \frac{1}{8} = \frac{4}{1} \div \frac{1}{8}$$

$$= \frac{4}{1} \div \frac{8}{1}$$

$$= \frac{32}{1} = 32$$

Examples-1

Find $\frac{1}{5} \div 3$

Solution:

$$\frac{1}{5} \div 3 = \frac{1}{5} \div \frac{3}{1}$$

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

$$= \frac{1}{15}$$

Exercise 3.14

Q.1: Solve:

(1) $\frac{3}{4} \div 1\frac{1}{2}$

Sol: $\frac{3}{4} \div 1\frac{1}{2}$

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

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

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

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

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

(2) $3\frac{1}{4} \div 1\frac{1}{2}$

Sol: $3\frac{1}{4} \div 1\frac{1}{2}$

$= \frac{13}{4} \div \frac{3}{2}$

$= \frac{13}{\cancel{4}_{2}} \times \frac{\cancel{2}^{1}}{3}$

$= \frac{13}{2} \times \frac{1}{3}$

$= \frac{13}{6}$

$= 2\frac{1}{6}$ **Ans:**

(3) $\frac{1}{3} \div \frac{3}{4}$

Sol: $\frac{1}{3} \div \frac{3}{4}$

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

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

(4) $\frac{1}{4} \div \frac{2}{9}$

Sol: $\frac{1}{4} \div \frac{2}{9}$

$= \frac{1}{4} \times \frac{9}{2}$

$= \frac{9}{8}$ **Ans:**

R.W

$$8\overline{)\,9\,}\;1$$
$$-\,8$$
$$1$$

(5) $\frac{3}{11} \div \frac{5}{6}$

Sol: $\frac{3}{11} \div \frac{5}{6}$

$= \frac{3}{11} \times \frac{5}{6}$

$= \frac{18}{55}$ **Ans:**

(6) $12 \div 4\frac{1}{4}$

Sol: $12 \div 4\frac{1}{4}$

$= \frac{12}{1} \div \frac{17}{4}$

$= \frac{12}{1} \times \frac{4}{17}$

$= \frac{48}{17}$

$= 2\frac{14}{17}$ **Ans:**

R.W

$$17\overline{)\,48\,}\;2$$
$$-\,34$$
$$14$$

(7) $1\frac{7}{8} \div 4$

Sol: $1\frac{7}{8} \div \frac{4}{1}$

$= \frac{15}{8} \times \frac{1}{4}$

$= \frac{15}{32}$ **Ans:**

(8) $3\frac{5}{6} \div 1\frac{1}{6}$

Sol: $3\frac{5}{6} \div 1\frac{1}{6}$

$= \frac{23}{6} \div \frac{7}{6}$

$= \frac{23}{\cancel{6}} \times \frac{\cancel{6}}{7}$

$= \frac{23}{7}$ **Ans:**

(9) $10\frac{1}{2} \div 5$

Sol: $10\frac{1}{2} \div 5$

$= \frac{21}{2} \div \frac{5}{1}$

$= \frac{21}{2} \times \frac{1}{5}$

$= \frac{21}{10}$

$= 2\frac{1}{10}$ **Ans:**

(10) $18 \div 3\frac{1}{3}$

Sol: $18 \div 3\frac{1}{3}$

$= \frac{18}{1} \div \frac{10}{3}$

$= \frac{\cancel{18}^{9}}{1} \times \frac{3}{\cancel{10}_{5}}$

$= \frac{9}{1} \times \frac{3}{5}$

$= \frac{27}{5}$ **Ans:**

3.17 WORD PROBLEMS ON FRACTIONS

Examples-1

Amjad studied for $1\frac{1}{2}$ hours in the morning and $2\frac{1}{4}$ hours in the evening. How many hours did he study altogether.

SOLUTION:

Amjad studied in the morning for $1\frac{1}{2} = \frac{3}{2}$ hours

In the evening he studied for $2\frac{1}{4} = \frac{9}{4}$ hours

Altogether he studied for $\frac{3}{2} + \frac{9}{4}$ hours

$= \frac{6}{4} + \frac{9}{4}$ hours

$= \frac{15}{4}$ hours

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

Examples-2

The price of one metre of cloth is $10\frac{1}{2}$ rupees. Find the price of $\frac{2}{3}$ metre of cloth.

Solution:

Price of one metre of cloth $= 10\frac{6}{4}$ rupees.

Price of $\frac{2}{3}$ metre of cloth $= 10\frac{6}{4} \times \frac{2}{3}$ rupees.

$= \frac{\cancel{21}^{7}}{\cancel{2}} \times \frac{\cancel{2}}{\cancel{3}}$ rupees.

$= 7$ rupees.

Examples-3

The cost of $4\frac{1}{2}$ metres of cloth is Rs.$105\frac{3}{4}$. Find the cost of 1 metre of cloth.

Solution:

The cost of $4\frac{1}{2}$ metres of cloth $=$ Rs.$105\frac{3}{4}$

The cost of 1 metres of cloth $= 105\frac{3}{4} \div 4\frac{1}{2}$ rupees.

$= \frac{423}{4} \div \frac{9}{2}$ rupees.

$= \frac{423}{4} \times \frac{2}{9}$ rupees.

$= \frac{47}{2}$ rupees.

$= 23\frac{1}{2}$ rupees.

Exercise 3.15

Q.1: A plank is $2\frac{3}{4}$ metres long, another plank is $\frac{5}{6}$ metres long. What is the total length.

Sol:

A plank is $2\frac{3}{4}$ metres long.

Another plank is $\frac{5}{6}$ metres long.

Total length =?

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

R.W

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

$= \frac{11}{4} + \frac{5}{6}$

L.C.M = 2 x 2 x 3 = 12

$= \frac{(11 \times 3) + (5 \times 2)}{12}$

$= \frac{33 + 10}{12}$

$= \frac{43}{12}$

$= 3\frac{7}{12}$ **Ans:**

R.W

12) 43 (3
- 36
07

Q.2: Naila walks $1\frac{3}{4}$ kilometres in the morning and $1\frac{1}{5}$ kilometres in the evening. Find the total distance he walks.

Sol:

Naila walks $1\frac{3}{4}$ kilometres in the morning.

She walks $1\frac{1}{5}$ kilometres in the evening.

Total distance he walks = ?

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

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

L.C.M = 2 x 2 x 5 = 20

$= \frac{(7 \times 5) + (6 \times 4)}{20}$

$= \frac{35 + 24}{20}$

$= \frac{59}{20}$

$= 2\frac{19}{20}$ **Ans:**

R.W

2	4 , 5
2	2 , 5
5	1 , 5
	1, 1

R.W

35
+24
59

R.W

20) 59 (2
- 40
19

Q.3: The height of the tallest boy in the class is $1\frac{3}{8}$ metres and that of the shortest boy is $\frac{3}{4}$ metres, what is the difference in their heights.

Sol:

The height of the tallest boy in is = $1\frac{3}{8}$

The height of the shortest boy is = $\frac{3}{4}$

The difference in heights = ?

$= 1\frac{3}{8} + \frac{1}{4}$

$= \frac{11}{8} + \frac{1}{4}$

L.C.M = 2 x 2 x 2 = 8

$= \frac{(11 \times 1) - (1 \times 2)}{8}$

$= \frac{11 - 2}{8}$

$= \frac{9}{8}$

$= 1\frac{1}{8}$ **Ans:**

Ans: The difference between the height of two boys is = $1\frac{1}{8}$

R.W

2	8 , 4
2	4 , 2
2	2 , 1
	1 , 1

R.W

8) 9 (1
- 8
1

Q.4: Naila took $\frac{1}{2}$ hour to go to school, she studied for 5 hours and took $\frac{3}{4}$ hours to return home. How long did she stay outside.

Sol:

Naila took $\frac{1}{2}$ hour to go to school.

She studied for 5 hours in school.

She took $\frac{3}{4}$ hours to return home.

Total time she spent outside = ?

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

L.C.M = 2 x 2 = 4

$= \frac{(1 \times 2) + (5 \times 4) + (3 \times 1)}{4}$

$= \frac{2 + 20 + 3}{4}$

R.W

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

R.W

4) 25 (6
- 24
01

$= \frac{25}{4}$

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

Ans: She spent $6\ \frac{1}{4}$ time outside.

Q.5: Nadia bought $2\frac{1}{2}$ kg. of potatoes, $1\frac{3}{4}$ kg of brinjal and $\frac{1}{2}$ kg. Of tomatoes. How many kilograms of vegetable did she buy in all?

Sol:

Nadia bought $2\frac{1}{2}$ kg. of potatoes.

She bought $1\frac{3}{4}$ kg of brinjal.

She bought $\frac{1}{2}$ kg of tomatoes.

Total vegetable = ?

R.W

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

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

$= \frac{5}{2} + \frac{7}{4} + \frac{1}{2}$

L.C.M = 2 x 2 = 4

$= \frac{(5 \times 2) + (7 \times 1) + (1 \times 2)}{4}$

$= \frac{10 + 7 + 2}{4}$

$= \frac{19}{4}$

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

R.W

$4\overline{)19}$ quotient 4, -16, remainder 3

Ans: She bought $4\ \frac{1}{4}$ vegetables.

Q.6: Aslam spends $5\ \frac{1}{2}$ hours at school, and enjoys $\frac{1}{5}$ hour recess. Find the number of hours he studied at school.

Sol:

Aslam spends $5\frac{1}{2}$ hours at school

He enjoys $\frac{1}{5}$ hour recess.

Number of hours he studied at school = ?

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

$= \frac{11}{2} - \frac{1}{5}$

L.C.M = 2 x 5 = 10

$= \frac{(11 \times 5) - (1 \times 2)}{10}$

$= \frac{55 - 2}{10}$

$= \frac{53}{10}$

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

R.W

2	2 , 5
5	1 , 5
	1 , 1

R.W

$10\overline{)53}$ quotient 5, -50, remainder 03

Ans: Aslam studied $5\ \frac{3}{10}$ hours in school.

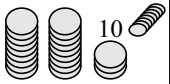
CHAPTER NO.4

DECIMALS/DECIMAL FRACTIONS

Decimals are another form to express fractions which have the denominators 10,100,1000 or multiples of ten with the help of using a dot(.). Following examples will help you to understand hundredth, thousandth etc. The Dot (.) is called the Decimal point.

Tenths

Examples-1

We see	We think of	Use Fraction	Use Decimal	We say
	2 Tens 4 Ones and 8 tenths	$23\frac{8}{10}$	23.8	Twenty Three and Eight Tenths
	1 Ten 8 Ones and 4 tenths	$18\frac{4}{10}$	18.4	Eighteen and Four tenths
	1 and 2 tenths	$1\frac{2}{10}$	1.2	One and Two Tenths
	7 tenths	$\frac{7}{10}$	0.7	Seven tenths

Examples-1

We Read	Write in Fraction	Converted into Decimal form
Three Tenths	$\frac{3}{10}$	0.3
Seven Tenths	$\frac{7}{10}$	0.7
One and Three Tenths	$1\frac{3}{10}$	1.3
One and Seven Tenths	$1\frac{7}{10}$	1.7
Three and Five Tenths	$3\frac{5}{10}$	3.5
Seven and Nine Tenths	$7\frac{9}{10}$	7.9
Twenty Seven, and Three Tenths	$27\frac{3}{10}$	27.3
Forty six and Seven Tenths	$46\frac{8}{10}$	46.8
Fifty Nine and Eight Tenths	$59\frac{8}{10}$	59.8
Eighty Two and Five Tenths	$82\frac{5}{10}$	82.5

Exercise 4.1

Q.1. Write the following in decimal fractions.

1. Four tenths.

Ans: 0.4

2. Eight and Seven tenths.

Ans: 8.7

3. Nine and three tenths.

Ans: 9.3

4. Twenty three and seven tenths.

Ans: 23.7

5. Ten and four tenths.

Ans: 10.4

Q.2. Write the following in decimal fraction:

1. $3\frac{4}{10}$

Sol: $3\frac{4}{10}$

$= \frac{34}{10}$

$= 3.4$ **Ans:**

R.W

$10\overline{)34}$ 3.4

-30

40

-40

00

2. $7\frac{2}{10}$

Sol: $7\frac{2}{10}$

$= \frac{72}{10}$

$= 7.2$ **Ans:**

R.W

$10\overline{)72}$ 7.2

-70

20

-20

00

3. $\frac{9}{10}$

Sol: $\frac{9}{10}$

$= 0.9$ **Ans:**

R.W

$10\overline{)90}$ 0.9

-90

00

4. $9\frac{1}{10}$

Sol: $9\frac{1}{10}$

$= \frac{91}{10}$

$= 9.1$ **Ans:**

R.W

$10\overline{)91}$ 9.1

-90

10

-10

00

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

Sol: $10\frac{3}{10}$

$= \frac{103}{10}$

$= 10.3$ **Ans:**

R.W

$10\overline{)103}$ 10.3

-100

30

-30

00

6. $16\frac{5}{10}$

Sol: $16\frac{5}{10}$

$= \frac{165}{10}$

$= 16.5$ **Ans:**

R.W

$10\overline{)165}$ 16.5

-10

65

-60

50

-50

00

Q.3. Write the following in ordinary fraction:

1. 0.2

Sol: 0.2

$= \frac{{}^{1}\cancel{2}}{\cancel{10}_{5}}$

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

2. 0.7

Sol: 0.7

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

3. 0.9

Sol: 0.9

$= \frac{9}{10}$ **Ans:**

4. 0.3

Sol: 0.3

$= \frac{3}{10}$ **Ans:**

5. 1.2

Sol: 1.2

$= \frac{{}^{6}\cancel{12}}{\cancel{10}_{5}}$

$= \frac{6}{5}$ **Ans:**

6. 3.4

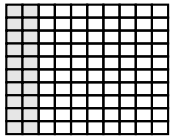
Sol: 3.4

$= \frac{{}^{17}\cancel{34}}{\cancel{10}_{5}}$

$= \frac{17}{5}$ **Ans:**

Hundredth

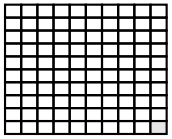
Study the following examples very carefully note the shaded parts are



Each Column is of 10/100 or 1/10 so 2 columns are 2 Tenths

$\frac{2}{10}$

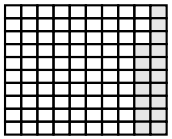
0.2



1 Hundredth

$\frac{1}{100}$

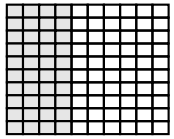
0.01



17 Hundredths

$\frac{17}{100}$

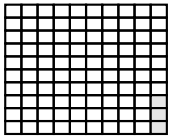
0.17



Each Column is of 10/100 or 1/10 so 4 columns are 3 Tenths

$\frac{4}{10}$

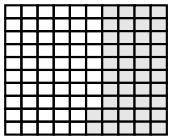
0.3



3 Hundredth

$\frac{3}{100}$

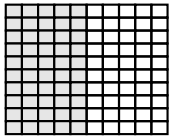
0.03



42 Hundredths

$\frac{42}{100}$

0.42

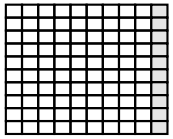


Similarly it is

5 Tenths

$\frac{5}{10}$

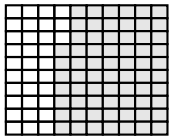
0.5



10 Hundredths

$\frac{10}{100}$

0.10



67 Hundredths

$\frac{67}{100}$

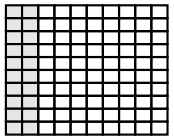
0.67

0.10	=	1	tenth	and	0	hundredths
0.17	=	1	tenth	and	7	hundredths
0.42	=	4	tenths	and	2	hundredths
0.67	=	6	tenths	and	7	hundredths

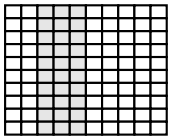
PRACTICE

What fraction of the following squares is coloured?

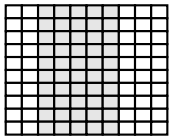
A: Change the fraction in the decimal form.



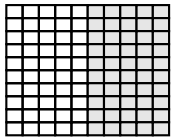
(i)



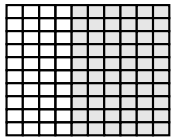
(ii)



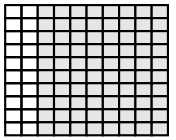
(iii)



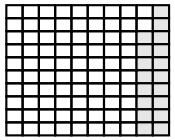
(iv)



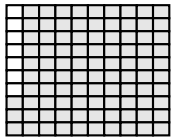
(v)



(vi)



(vii)



(viii)

Exercise 4.2

Q.1. Write the missing number:

(1) $7.36 = 7.36 = 7\frac{36}{100}$

(2) $2.84 = 2\frac{84}{1000}$

(3) $6.85 = \frac{6}{100}\frac{85}{100}$

(4) $5.18 = 5\frac{18}{100}$

(5) $28.63 = \frac{28}{100}\frac{63}{100}$

(6) $38.82 = 38\frac{82}{100}$

(7) $12.3 = 12\frac{3}{10}$

(8) $72.6 = 72\frac{6}{10}$

(9) $68.8 = \frac{68}{10}\frac{8}{10}$

(10) $68.8 = 68\frac{8}{10}$

4.3 Thousandths

You have seen that we can write 62 $\frac{18}{100}$ more simply as 62.18 by writing a decimal point after the whole number 62. Thus the digits 13 placed on the right of the decimal point shows the number in hundredths the illustration shown the place value system of decimal fractions is explained.

Examples-1

Study the place values of a decimal fraction 8976.542.

Thousands	Hundreds	Tens	Ones.	Tenth	Hundredths	Thousandths
8	9	7	6	5	4	2

$\frac{5}{10}$

The 5 in the tenths place means $\frac{4}{100}$ = .5

The 4 in the hundredths place means $\frac{2}{1000}$ = .04

The 2 in the Thousandths place means $\frac{781}{1000}$ = .002

So the Total decimal in .542 on the right of the whole number 8976 i.e 8976.542

Write the following as mixed fraction (Hint .6.781 = 6

Exercise 4.3

Q.1: (Write 1 below the decimal point and write zeroes for the number of digits of the decimal)

1. 6.781

Sol:

$6\frac{781}{1000}$ Ans:

2. 9.573

Sol:

$9\frac{573}{1000}$ Ans:

3. 15.981

Sol:

$15\frac{981}{1000}$ Ans:

4. 16.071

Sol:

$16\frac{71}{1000}$ Ans:

5. 9.005

Sol:

$9\frac{5}{1000}$ Ans:

6. 35.051

Sol:

$35\frac{15}{1000}$ Ans:

7. 154.801

Sol:

$154\frac{180}{1000}$ Ans:

8. 469.309

Sol:

$469\frac{309}{1000}$ Ans:

9. 589.081

Sol:

$589\frac{81}{1000}$ Ans:

10. 135.359

Sol:

$135\frac{359}{1000}$ Ans:

Q.2: Write the missing number:

(1) 6.3 = $6\frac{3}{10}$ **(2)** 7.01 = $7\frac{1}{100}$ **(3)** 15.70 = $15\frac{70}{100}$

(4) 0.047 = $\frac{47}{1000}$ **(5)** .062 = $\frac{62}{1000}$ **(6)** 3.009 = $3\frac{9}{1000}$

(7) 92.001= $92\frac{1}{1000}$ **(8)** .035 = $\frac{35}{1000}$ **(9)** 3.281 = $3\frac{281}{1000}$

(10) $\frac{301}{1000}$ = 0.301 **(11)** $\frac{231}{100}$ = 2.31 **(12)** $\frac{3.62}{100}$ = 36.2

4.4 Addition and subtraction of decimal fractions:

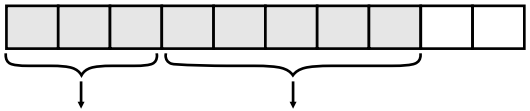
Examples-1

Study the following examples carefully

Add 3/10 and 5/10

Solution:

(a) Horizontal:



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

$0.3 + 0.5$

$0.3 + 0.5 = 0.8$

(b) Vertical:

$$\begin{array}{r} 0.3 \\ +0.5 \\ \hline 0.8 \end{array}$$

Examples-2

Solve: $\frac{2}{10} + \frac{4}{10}$

$\frac{2}{10} = 0.2$

$\frac{+4}{10} = 0.4$

$\frac{2}{10} + \frac{4}{10}$

$= 0,2 + 0.4$

Second Method

$\frac{2}{10} + \frac{4}{10}$

$\frac{2+4}{10} = \frac{6}{10}$

$= 0.6$ **Ans:**

Examples-3

Solve: $\frac{7}{10} - \frac{2}{10}$

$\frac{7}{10} = 0.7$

$\frac{-2}{10} = 0.2$

$\frac{7}{10} - \frac{2}{10} = 0.7-0.2=0.5$

Second Method

$\frac{7}{10} - \frac{2}{10}$

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

$= 0.2$ **Ans:**

Explanation:

In the examples 1, 2 and 3 we have seen that addition and subtraction of decimal fraction is done similar to addition and subtraction of natural numbers. In decimal fractions we write decimal under the decimal point and then add or subtract in ordinary way of addition and subtraction.

Examples-4

Add 3.7 and 4.6

Unit tenth

$$\begin{array}{r} {\scriptstyle 1} \\ 3.7 \\ +\ 4.6 \\ \hline 8.3 \end{array}$$

In this case we add tenth column that is 6 + 7 = 13 tenths. As we know that 10 tenths make 1 unit. So we put 1 unit on units column. The remainder 3 can be written under the tenths column. Then we add the unit column so 1 unit plus 3 units plus 4 units become 8 units, therefore we write 8 under unit's column.

Hence : $3.7 + 4.6 = 8.3$

Examples-5

Add. 164.63 and 223.92

Solution:

$$\begin{array}{r} {\scriptstyle 1} \\ 164.63 \\ 223.92 \\ \hline 388.55 \end{array}$$

Exercise 4.4

Q.1: Add the following

1. $\frac{2}{10} + \frac{5}{10}$

First method

Sol: $\frac{2}{10} + \frac{5}{10}$

$= 0.2 + 0.5$

$= 0.7$ **Ans:**

R.W

$$\begin{array}{r} 0.2 \\ +\ 0.5 \\ \hline 0.7 \end{array}$$

R.W

$10\overline{)\,20}$ 0.2

$-\ 20$

00

$10\overline{)\,50}$ 0.5

$-\ 50$

00

Second method

$$\frac{2}{10} + \frac{5}{10}$$

$$= \frac{2+5}{10}$$

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

$$= 0.7 \quad \textbf{Ans:}$$

2. $\frac{\mathbf{21}}{\mathbf{100}} + \frac{\mathbf{37}}{\mathbf{100}}$

R.W

0.21
+ 0.37
0.58

R.W

100) 210 (0.21
- 200
100
100
000

100) 370 (0.37
- 300
700
700
000

Sol: $\frac{21}{100} + \frac{37}{100}$

$= 0.21 + 0.37$

$= 0.58 \quad$ **Ans:**

Second method

$$\frac{21}{100} + \frac{37}{100}$$

$$= \frac{21+37}{100}$$

$$= \frac{58}{100}$$

$= 0.58$ **Ans:**

R.W

100) 580 (0.58
- 500
800
- 800
000

3. $\frac{\mathbf{31}}{\mathbf{100}} + \frac{\mathbf{73}}{\mathbf{100}}$

R.W

0.31
0.73
1.04

R.W

100) 310 (0.31
- 300
100
100
000

100) 730 (0.73
- 700
300
300
000

Sol: $\frac{31}{100} + \frac{73}{100}$

$= 0.31 + 0.73$

$= 1.04 \quad$ **Ans:**

Second method

$$\frac{31}{100} + \frac{73}{100}$$

$$= \frac{104}{100}$$

$= 0.04$ **Ans:**

R.W

100) 104 (0.04
- 400
400
400
000

R.W

31
73
104

4. $\frac{\mathbf{125}}{\mathbf{1000}} + \frac{\mathbf{12}}{\mathbf{1000}}$

R.W

0.125
0.012
0.137

R.W

1000) 1200 (0.012
- 1000
2000
- 2000
0000

1000) 1200 (0.012
- 1000
2000
- 2000
0000

Sol: $\frac{125}{1000} + \frac{12}{1000}$

$= 0.125 + 0.012$

$= 0.137 \quad$ **Ans:**

Second method

$$\frac{125}{1000} + \frac{12}{1000}$$

$$= \frac{125+12}{1000}$$

$$= \frac{137}{1000}$$

$= 0.137 \quad$ **Ans:**

R.W

1000) 1370 (0.137
- 1000
3700
- 3000
7000
- 7000
0000

5.
$$\begin{array}{r} 8.38 \\ +\,6.75 \\ \hline 15.13 \end{array}$$

6.
$$\begin{array}{r} 64.\ 3 \\ 3.72 \\ +\ 94.51 \\ \hline 162.53 \end{array}$$

7. 4.63 + 7.6 + 25.8

Sol:
$$\begin{array}{r} 4.\ 63 \\ 7.6 \\ +\ 25.8 \\ \hline 38.03 \end{array}$$

8. 8.23 + 5.29 + 84.79

Sol:
$$\begin{array}{r} 8.23 \\ 5.29 \\ +\ 84.79 \\ \hline 98.31 \end{array}$$

Q.2: Subtract the following:

1. $\frac{6}{10} - \frac{3}{10}$

First method

Sol: $\frac{6}{10} - \frac{3}{10}$

$= 0.6 - 0.3$

$= 0.3$ **Ans:**

R.W
$$\begin{array}{r} 0.6 \\ -0.3 \\ \hline 0.3 \end{array}$$

R.W
$$10\overline{)\,60}\ (0.6)\quad -60\quad 00$$

R.W
$$10\overline{)\,30}\ (0.3)\quad -30\quad 00$$

Second method

$\frac{6}{10} - \frac{3}{10}$

$= \frac{6 - 3}{10}$

$= \frac{3}{10}$

$= 0.3$ **Ans:**

R.W
$$10\overline{)\,30}\ (0.3)\quad -30\quad 00$$

2. $\frac{25}{100} - \frac{15}{100}$

Sol: $\frac{25}{100} - \frac{15}{100}$

$= 0.25 - 0.15$

$= 0.10$ **Ans:**

R.W
$$\begin{array}{r} 0.6 \\ -0.3 \\ \hline 0.3 \end{array}$$

R.W
$$100\overline{)\,250}\ (0.25)\quad -200\quad 500\quad -500\quad 000$$

R.W
$$100\overline{)\,150}\ (0.15)\quad -100\quad 500\quad -500\quad 000$$

Second method

$\frac{25}{100} - \frac{15}{100}$

$= \frac{25 - 15}{100}$

$= \frac{10}{100} = \frac{1}{10}$

$= 0.10$ **Ans:**

R.W
$$100\overline{)\,100}\ (0.10)\quad -100\quad 000$$

3. $\frac{29}{100} - \frac{19}{100}$

Sol: $\frac{29}{100} - \frac{19}{100}$

$= 0.29 - 0.195$

$= 0.10$ **Ans:**

R.W
$$100\overline{)\,290}\ (0.29)\quad -200\quad 900\quad -900\quad 000$$

R.W
$$100\overline{)\,190}\ (0.19)\quad -100\quad 900\quad -900\quad 000$$

Second method

$\frac{29}{100} - \frac{19}{100}$

$= \frac{29 - 19}{100}$

$= \frac{10}{100}$

$= 0.10$ **Ans:**

R.W
$$100\overline{)\,100}\ (0.1)\quad -100\quad 000$$

4. $\frac{74}{100} - \frac{62}{100}$

Sol: $\frac{74}{100} - \frac{62}{100}$

$= 0.47 - 0.62$

$= 0.12$ **Ans:**

R.W

$0.74 - 0.62 = 0.12$

R.W

$100 \overline{)740}\ 0.74$, -700, 400, -400, 000

R.W

$100 \overline{)620}\ 0.62$, -600, 200, -200, 000

Second method

$\frac{74}{100} - \frac{62}{100}$

$= \frac{24 - 62}{100}$

$= \frac{12}{100} =$

$= 0.12$ **Ans:**

R.W

$100 \overline{)120}\ 0.12$, -100, 200, -200, 000

5. $8.269 - 5.157 = 3.112$ **Ans:**

6. $28.81 - 15.07$

Sol: $28.81 - 15.07 = 13.74$ **Ans:**

7. $6.856 - 3.256$

Sol: $6.856 - 3.256 = 3.600$ **Ans:**

8. $1.853 - .380$

Sol: $1.853 - 0.380 = 1.473$ **Ans:**

4.5 Multiplication of decimal fraction with a whole number:

Solve 4.7 x 6

Solve 4.7 x 6

T.U.	Tenth
4	7
4	x6
28	2

EXPLANATION:

In example 1 we multiply 6 with 7 and get 42 tenths. We write 2 in tenths column and carry 4 units to the unit column. The product of 6 and 4 is 24 now we add 4 into it so we get 28. We write 28 below the unit and ten column.

Q.1. Solve the following:

(1) 0.4 x 2

Sol: $0.4 \times 2 = 0.8$ **Ans:**

(2) 0.7 x 3

Sol: $0.7 \times 3 = 2.1$ **Ans:**

(3) 0.9 x 6

Sol: $0.9 \times 6 = 5.4$ **Ans:**

(4) 1.2 x 3

Sol: $1.2 \times 3 = 3.6$ **Ans:**

(5) 3.4 x 5

Sol:
$$\begin{array}{r} 3.4 \\ \times\ 5 \\ \hline 17.0 \end{array}$$
Ans:

(6) 5.31 x 6

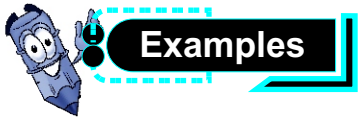
Sol:
$$\begin{array}{r} 1.2 \\ \times\ 3 \\ \hline 3.6 \end{array}$$
Ans:

(7) 35.7 x 7

Sol:
$$\begin{array}{r} 35.7 \\ \times\ 7 \\ \hline 249.9 \end{array}$$
Ans:

(8) 64.4 x 8

Sol:
$$\begin{array}{r} 64.4 \\ \times\ 8 \\ \hline 515.2 \end{array}$$
Ans:



Multiply 3.2 by 12

Explanation:

In this case we can carry out multiplications easily. The terms are 3.2 & 12. Forget for the time being that there is any decimal. In either of the terms now the terms become 32 x 12 Multiply them in an ordinary way you will get 384 as follows.

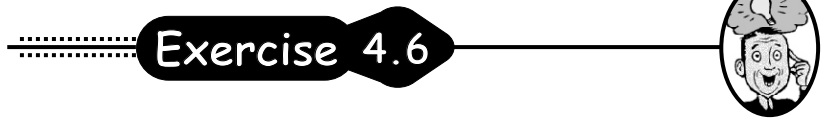
$$\begin{array}{r} 32 \\ \times\ 12 \\ \hline 64 \\ 32\text{x} \\ \hline 384 \end{array}$$

The first term (3.2) has only one digit to the right of the decimal point and by ordinary multiplication we arrived at the product of 384, now count one digit form the right side and place the decimal point. Thus the product will become 38.4 = 38.4

Solve 1.34 x 21

Step (1)	Step (2)
Multiplication of ordinary number $\begin{array}{r} 134 \\ \times\ 21 \\ \hline 134 \\ 168\text{x} \\ \hline 1814 \end{array}$	$1814. \\ = 18.14$

We see that he first term (1.34) contains two digits to the right of the decimal point so in the answer of the ordinary product we put the decimal after two digits counted from the right side. And we get 18.14 as the result.



A. First multiply like ordinary number then put the decimal points.

1. 38.8 x 12

Sol:
$$\begin{array}{r} 388 \\ \times\ 12 \\ \hline 776 \\ +388\text{x} \\ \hline 465.6 \end{array}$$
38.8 x 12 = 465.6 **Ans:**

2. 56.8 x 11

Sol:
$$\begin{array}{r} 568 \\ \times\ 11 \\ \hline 568 \\ 568\text{x} \\ \hline 624.8 \end{array}$$
56.8 x 11 = 624.8 **Ans:**

3. 58.3 x 12

Sol:
$$\begin{array}{r} 583 \\ \times\ 12 \\ \hline 1166 \\ +583\text{x} \\ \hline 699.6 \end{array}$$
58.3 x 12 = 699.6 **Ans:**

4. 45.8 x 36

Sol:
$$\begin{array}{r} 458 \\ \times\ 36 \\ \hline 2748 \\ +1374\text{x} \\ \hline 1648.8 \end{array}$$
45.8x36 = 1648.8 **Ans:**

5. 82.9 x 15

Sol:

$$\begin{array}{r} 829 \\ \times\ 15 \\ \hline 4145 \\ +\ 829x \\ \hline 1243.5 \end{array}$$

82.9 x 15 = 1243.5 **Ans:**

6. 41.5 x 38

Sol:

$$\begin{array}{r} 41.5 \\ \times\ 38 \\ \hline 3320 \\ +\ 1245x \\ \hline 1577.0 \end{array}$$

41.5 x 38 = 1577.0 or 1577 **Ans:**

7. 63.5 x 44

Sol:

$$\begin{array}{r} 635 \\ \times\ 44 \\ \hline 2540 \\ +2540x \\ \hline 2794.0 \end{array}$$

63.5 x 44 = 2794.0 or 2794 **Ans:**

8. 80.9 x 57

Sol:

$$\begin{array}{r} 809 \\ \times\ 57 \\ \hline 5663 \\ +\ 4045x \\ \hline 4611.3 \end{array}$$

80.9 x 57 = 4611.3 **Ans:**

Q.2: Solve:

(I). A box contains 38.25 kg. of soap powder. Find the total weight of 38 such boxes.

Sol:

Weight of 1 box of soap powder = 38.25kg

Weight of 38 such boxes = ?

$$\begin{array}{r} 38.25 \\ \times\ 38 \\ \hline 30600 \\ +\ 11475x \\ \hline 1453.50 \end{array}$$

Ans: The weight of 38 boxes = 145.5kg

(Ii) An electric motor takes 49.67 minutes to fill a water tank. How much time is required to fill 97 water tanks?

Sol:

An electric motor takes 49.67 minutes to fill a water tank =?

It takes to fill 97 water tanks = ?

$$\begin{array}{r} 49.67 \\ \times\ 97 \\ \hline 34769 \\ +44703x \\ \hline 4817.99 \end{array}$$

Ans: An electric motor takes 4817.99minutes to fill 97 water tanks.

(Iii) The cost of a cricket bat is Rs. 285 .95. How much will be the cost of 83 such bats?

Sol:

Cost of a cricket bat is Rs. 285.95

Cost of 83 bats = ?

$$\begin{array}{r} 285.95 \\ \times\ 83 \\ \hline 85785 \\ +228760x \\ \hline 23733.85 \end{array}$$

Ans: The cost of 83 is Rs.23733.85

(Iv) A shopkeeper gets a profit of rupees 49.75 by selling a pair of shoes. He sold 69 such pairs. Calculate the profit which he earned.

Sol:

A shopkeeper gets a profit of rupees 49.75 by selling a pair of shoes.

Profit of 69 =?

$$\begin{array}{r} 49.75 \\ \times\ 69 \\ \hline 44775 \\ +\ 29850x \\ \hline 3432.75 \end{array}$$

Ans: A shopkeeper earned 3432.75 profit for selling 69 pairs of shoes.

(v) A man covers 135.65 k.m. in a trip between two places. How many kilometers will he cover in 43 such trips?

Sol:

A man covers 135.6 km in a trip.

Distance covering in 43 trips =?

$$\begin{array}{r} 135.6 \\ \times\ 43 \\ \hline 4068 \\ +\ 5424x \\ \hline 5830.8 \end{array}$$

Ans: He covers 5830.8 km in 43 trip.

(vi) A tin contains 99.99 litres of orange juice. Calculate the juice contained in 78 such tins.

Sol:

A tine contains 99.99 litres. Of juice.

Juice in 78 tins =?

$$\begin{array}{r} 99.99 \\ \times\ 78 \\ \hline 79992 \\ +\ 69993x \\ \hline 7733.22 \end{array}$$

Ans: 78 tins contain 7799.22 litres of juice.

(vii) In a spool there is 85.58 meters adhesive tape. How many metres of tape do 76 such spools contain?

Sol:

In a spool, there is 85.58 meter adhesive tape.

Tape in 76 spools = ?

$$\begin{array}{r} 85.58 \\ \times\ 76 \\ \hline 51348 \\ +\ 59906x \\ \hline 6504.08 \end{array}$$

Ans: There is 6504.08 meters tape in 76 spools.

(viii) A box of paper pins weighs 53.85 kilograms. Find the weight of 32 boxes of paper pins.

Sol:

A man covers 135.6 km in a trip.

Distance covering in 43 trips =?

$$\begin{array}{r} 53.85 \\ \times\ 32 \\ \hline 10770 \\ +\ 16155x \\ \hline 1723.20 \end{array}$$

Ans: The weight of 32 paper pin box is 1723.20kg.

(ix) A sack of sugar weighs 243.62 kg. What is the weight of 29 sacks of sugar?

Sol:

The weight of a sack of sygar = 243.62kg.

The weight of 29 sacks of sugar = ?

$$\begin{array}{r} 243.62 \\ \times\ 29 \\ \hline 219258 \\ +\ 48724x \\ \hline 7064.98 \end{array}$$

Ans: The weight of 29 sacks of sugar is 7067.96

(x) A man reads 5.5 pages in an hour. How many pages will he read in 24 hours?

Sol:

A man reads 5.5 pages in an bour.

Pages are reading in 24 hours.

$$\begin{array}{r} 5.5 \\ \times\ 24 \\ \hline 220 \\ +110x \\ \hline 132.0 \end{array}$$

Ans: A man reads 132 page in 24 hours.

4.5 Multiplication of Decimal number 10,100,1000

Examples-1 1.5 x 10 = 1.5 or 15.0

Whenever we multiply the decimal fraction by 10 we shift the decimal point one place to the right.

Examples-2 1.23 x 10 = 12.3 or 12.30

Decimal is shifted one place to the right when a decimal fraction is multiplied by 10.

Examples-3 15.64 x 10 = 156.4 ⟶ 156.40

Examples-4

$$\begin{array}{r} 1.34 \\ \times\ 10 \\ \hline 13.4.0 \end{array}$$

Dot shifted one place to the right

Examples-5 6.85 x 10 = 68.5

Examples-6 3.91 x 10 = 39.1

Examples-7 63.5 x 10 = 635.0

Examples-8 32.1 x 10 = 321.0

Exercise 4.7

Q.1. Solve the following (First is done for you).

1.	3.5 x 10 = 35.0		7.	3.0 x 10	**30**
2.	84.2 x 10	**842.0**	8.	5.0 x 10	**50**
3.	0.321 x 10	**3.21**	9.	3.94 x 10	**39.4**
4.	32.62 x 10	**326.2**	10.	1.96 x 10	**19.6**
5.	17.05 x 10	**170.5**	11.	25.50 x 10	**1275**
6.	90.006 x 10	**900.06**	12.	35.00 x 10	**350**

Q.2. Solve the following (First is done for you.)

If you multiply a decimal fraction by 100 then the decimal point is shifted to two places to the right eg. 9.5625 x 100 = 956.25)

1.	95.620 x 100 = 9562.0		6.	83.621 x 100	**98600**
2.	211.061 x 100	**21106.1**	7.	121.011 x 100	**850360**
3.	0.8216 x 100	**82.16**	8.	32.931 x 100	**19010**
4.	6.801 x 100	**680.1**	9.	3.549 x 100	**36150**
5.	2.135 x 100	**213.5**	10.	5.216 x 100	**54162**

Q.3. Solve the following (First is done for you.)

If you multiply a decimal fraction by 1000 then the decimal point is shifted to three places to the right eg.

1.	5.6 x 1000 = 5600.0		6.	98.6 x 1000	**95600**
2.	6.95 x 1000	**6950.0**	7.	850.360 x 1000	**850360**
3.	32.60 x 1000	**32600**	8.	19.01 x 1000	**19010**
4.	5.79 x 1000	**5790.0**	9.	36.15 x 1000	**36150**

5. 7.10 x 1000 **7100.0** 10. 54.162 x 1000 **54162**

We can multiply the decimal fractions by other number also in the following manner.

Solve 345.601 x 30

Solution: 345.601 x 10 x 3 (30 is divided into

= (345.601 x 10) x 3 fraction 10 x 3)

= 3456.01 x 3

= 10368.03 Ans.

Solve 364.57 x 106

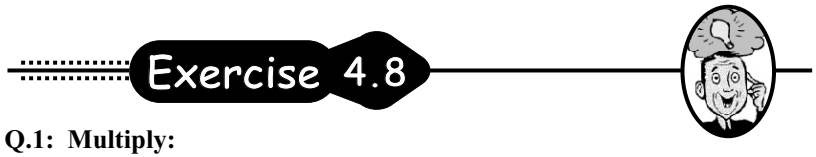
Solution:

= (364.57 x 100 + 6) (106 is divided into

= (364.57 x 100) + (364.57 x 6) two parts 100 + 6)

= 36457 + 2187.42

= 38644.42 Ans.



Q.1: Multiply:

1. 0.34 x 100

Sol: First method

$$\begin{array}{r} 0.34 \\ \times 100 \\ \hline 000 \\ 000x \\ 034xx \\ \hline 034.00 \end{array}$$

Second method

0.34 x 100
0.34 x 10 x 10
(0.34 x 10) x 10
= 3.4 x 10
= 34 Ans:

R.W	R.W
0.34	3.4
x 10	x 10
000	00
034x	34x
03.40	34.0

2. 2.61 x 100

Sol: First method

$$\begin{array}{r} 2.61 \\ \times 100 \\ \hline 000 \\ 000x \\ 261xx \\ \hline 261.00 \end{array}$$

Second method

= 2.61 x 100
= 2.61 x 10 x 10
= (2.61 x 10) x 10
= 26.1 x 10
= 261 Ans:

R.W	R.W
2.61	26.1
x 10	x 10
000	000
261x	261x
26.10	261.0

3. 32.61 x 100

Sol: First method

```
  32.61
 x100
  0000
 0000x
3261xx
3261.00
```

Second method

= 32.61 x 100
= 32.61 x 10x10
= (32.61x10)x10
= 326.1x10
= 3261 Ans:

R.W

```
 32.61
 x 10
 0000
3261x
326.10
```

R.W

```
 326.1
 x 10
 0000
3261x
3261.0
```

4. 8.001 x 130

Sol: First method

```
  8.001
 x130
  0000
24003x
8001xx
1040.130
```

OR 1040.13

Second method

= 8.001 x 130
= (8.001x 100+30)
= (8.001x 100) + (8.001x30)
= 800.1)+(240.03)
= 800.1 + 240.03
= 1040.13 Ans:

R.W

```
 8.001
 x 100
 0000
0000x
8001xx
800.100
```

R.W

```
 8.001
 x  30
 0000
24003x
240030
```


5. 10.04 x 150

Sol: First method

```
  10.04
 x150
  0000
 5020x
1004xx
1506.00
```

OR 1506

Second method

= 10.04 x 150
= 10.04x100+10.04x50
= 1004 + (10.04x5 x 10
= 1004 + (50.20 x 10)
= 1004 + 502.00
= 1506.00

or 1506 Ans:

R.W

```
 10.04
 x 100
 0000
0000x
1004xx
1004.00
```

R.W

```
 10.04
 x   5
 50.20
```

R.W

```
 50.20
 x  10
 0000
5020x
502.00
```

6. 10.621 x 80

Sol: First method

```
  10.621
 x  80
  00000
 84968x
849.680
```

Second method

= 10.621 x 80
= 10.621 x 8 x 10
= 84.968 x 10
= 849.680 Ans:

R.W

```
 10.621
 x   8
 84.968
```

R.W

```
 84.968
 x  10
 00000
84968x
849.680
```

7. 3.84 x 100

Sol: First method

```
   3.84
  x100
   000
  000x
 384xx
 384.00
```

R.W

```
   3.84
  x  10
   000
  384x
  38.40
```

Second method

= 3.84 x 100
= 3.84 x 10 x 10
= 38.40 x 10
= 384.00 Ans:

R.W

```
   38.40
  x  10
   0000
  3840x
  384.00
```

8. 0.1 x 100

Sol: First method

```
    0.1
  x100
    00
   00x
  01xx
  010.0
```

R.W

```
    0.1
  x  10
    00
   01x
  0.10
```

Second method

= 0.1 x 100
= 0.1 x 10 x 10
= 0.10 x 10
= 010.0 Ans:

R.W

```
   0.10
  x  10
   000
  010x
  010.0
```

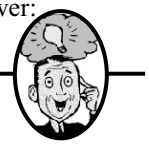

Division of Decimal Fraction:

The process of division of decimal fraction is the same as in the case of whole numbers but in this case it must be remembered to put a decimal point in the answer directly above the point in the number which is being divided.

0.9214 ÷ 34

Dividing Hundredths	Dividing thousandths	Dividing Ten thousandths
Step-1 02 34) 0.9214 - 68 24	**Step-2** .027 34) 0.9214 - 68 241 - 238 3	**Step-3** .0271 34) 0.9214 - 68 241 - 238 34 34 xx

(0.9 can not be divided by 34 so we take .92 and have a "0" after decimal in the quotient) So quotient = 0.0271 Remainder "0" Answer:



Exercise 4.9

Q.1:Divide the following:

1. 25.78 ÷ 2

Sol:

```
      12.89
  2 ) 25.78
    - 2
      05
    - 4
      17
    - 16
      18
    - 18
      00
```

Ans: 12.89

2. 3.75 ÷ 3

Sol:

```
      1.25
  3 ) 3.75
    - 3
      07
    - 6
      15
    - 15
      00
```

Ans: 1.25

3. 39.28 ÷ 4

Sol:

$$\begin{array}{r} 9.82 \\ 4\overline{)\,39.28} \\ -\,36 \\ \hline 032 \\ -\,32 \\ \hline 008 \\ -\,8 \\ \hline 0 \end{array}$$

Ans: 9.82

4. 69.50 ÷ 5

Sol:

$$\begin{array}{r} 13.90 \\ 5\overline{)\,69.50} \\ -\,5 \\ \hline 19 \\ -\,15 \\ \hline 0450 \\ -\,450 \\ \hline 000 \end{array}$$

Ans: 13.90

5. 3.600 ÷ 5

Sol:

$$\begin{array}{r} 0.720 \\ 5\overline{)\,3.600} \\ -\,35 \\ \hline 0100 \\ -\,100 \\ \hline 000 \end{array}$$

Ans: 0.720

6. 24.15 ÷ 7

Sol:

$$\begin{array}{r} 3.45 \\ 7\overline{)\,24.15} \\ -\,21 \\ \hline 31 \\ -\,28 \\ \hline 35 \\ -\,35 \\ \hline 00 \end{array}$$

Ans: 3.45

7. 32.224 ÷ 8

Sol:

$$\begin{array}{r} 4.028 \\ 8\overline{)\,32.224} \\ -\,32 \\ \hline 0022 \\ -\,16 \\ \hline 64 \\ -\,64 \\ \hline 00 \end{array}$$

Ans: 4.028

8. 431.20 ÷ 8

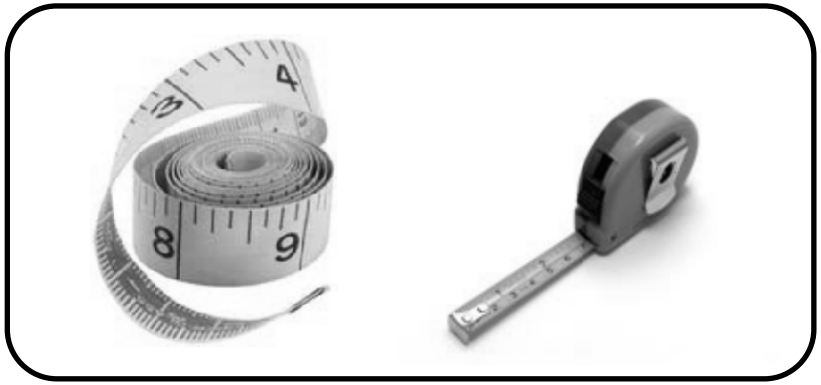
Sol:

$$\begin{array}{r} 53.90 \\ 8\overline{)\,431.20} \\ -\,40 \\ \hline 031 \\ -\,24 \\ \hline 720 \\ -720 \\ \hline 000 \end{array}$$

Ans: 53.90

CHAPTER NO.5

MEASUREMENT



5.1 Measurement of Length

Length is measured in centimetres, metres and kilometres.

Table of Length

100 centimetres (cm) = 1 metre (m)
1000 metres (m) = 1 kilometre (km)

UNIT OF LENGTH:

We have learnt in the previous classes that kilometre, Metre and Centimetre are used for measuring length. Long distances are measured in Kilometres. Metre is used to measure length of cloth or different objects. Smaller lengths are measured in decimetres, centimetres and in millimetres.

We write;

'km' for kilometre.
'm' for metre.
'dm' for decimetre.
'cm' for centimetre.
'mm' for millimetres.

Following is the relationship between units of length.

1 kilometre	=	1000 metres
1 metre	=	100 centimetres
1 decimetre	=	10 centimetres
1 centimetre	=	10 millimetres
1 decimetre	=	100 millimetres

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

CONVERSION OF UNITS OF LENGTH

Convert 7 kilometres into metres.

Solution:

1	kilometre	=	1000 metres
7	kilometres	=	7 x 1000 metres
7	kilometres	=	7000 metres
7	km	=	7000 m

To convert kilometres into metres, multiply the numbers of kilometres by 1000.

Convert 9000 metres into kilometres.

Solution:

9000 metres = (9000 ÷ 1000) kilometres

9000 metres = $\frac{9\cancel{000}}{1\cancel{000}}$ kilometres

= 9 kilometres

9000 m = 9 km

To change metres into divide the numbers of metrs by 1000.

Convert 8 kilometres 250 metres into metres.

Solution:

1	kilometre	=	1000 metres
8	kilometres	=	8 x 1000 metres
8	km	=	8000 m
8	km250 m	=	8000 m + 250 m
8	km 250 m	=	8250 m

To convert kilometres into metres, multiply the number of kilometres by 1000 and then add the remaining metres in it.

Convert 5 metres into centimetres

Solution:

1	metre	=	100 centimetres
5	metres	=	100 x 5 centimetres
5	metres	=	500 centimetres
	5m	=	500cm

Convert 600 centimetres into metres

Solution: To change centimetres into metres, we divide the number of centimeters by 100.

600 cm = (600 ÷ 100) m

600 cm = $\frac{6\cancel{00}}{1\cancel{00}}$ metres

600 cm = 6m

Examples-6

Convert 9 metres 70 centimetres into centimetres.

Solution:

1 metre = 100 centimetres
9 metres = 100 x 9 centimetres
9 metres = 900 cm
So, 9 m 70 cm = 900 cm + 70 cm
= 970 cm

Remember:
To change metres and centimetres into centimetres, multiply the number of metres by 100 convert them into centimetres. Add the remaining centimetres in it.

Addition and subtraction in centimetres, metres and kilometres:

Examples-1

Solve:

m	cm
3	25
1	40
+ 3	81

Solution:

m	cm
1	
3	25
1	40
3	81
+ 8	46
16	92

Examples-2

Solve:

km	m
23	789
+ 17	243
41km	32m

Solution:

km	m
23	789
+ 17	243
41	032

Examples-3

The height of two girl are 1m 20cm and 1m 5cm respectively. Find the difference in their heights.

Solution:

	m	cm
Height of the first girl	1	20
Height of second girl	1	05
Difference	0	15

Hence, the difference of heights is 15cm.

Examples-4

Amara travelled a distance of 1km 570m and Adeel 2km 368m for reaching school. Find how much more distance is travelled by Adeel.

Solution:

	km	m
	(1)	(1)
Distance travelled by Adeel	2	368
Distance travelled by Amara	1	570
Difference	0	798

Hence, Adeel travelled 798m more.

Exercise 5.1

Q.1: SOLVE:

(1)

m	cm
3	20
1	40
+ 3	81
8m	41cm

Ans:

(2)

m	cm
3	200
1	715
+5	600
10m	515cm

Ans:

(3)

m	cm
8	48
+ 3	50
11m	98cm

Ans:

(4)

m	cm
5	340
+3	450
8m	790cm

Ans:

(5)

	m	cm
	5	345
+	2	155
	7m	500cm

Ans:

(6)

	m	cm
	7	315
+	1	225
	8m	540cm

Ans:

7. The length of a piece of rope is 1m 75cm. It is joined with another piece of rope having length 11m 90cm. Find the total length of the rope.

Sol:

	c	cm
	1	7 5
	+11	90
	12m	165cm

Ans:

8. Arshad covered 95 km by car from Hyderabad to Thatta. Salma covered 90 km by train from Karachi to Thatta. Find the total distance they covered.

Find the total distance they covered.

Sol:

95	km
90	km
185	km

Ans: The total distance covered is 185km

5.2 Measurement of weight

The unit of weight is Gram. In daily life, the weights of grams and kilograms are used. In short a kilogram is written as kg.

Table of weights

1 Kilogram (Kg) = 1000 gram (g)
1 Quintal (q) = 100 Kilogram (kg)

Addition and subtraction in Grams, Kilograms and Quintals:

Examples-1

Solve:

	kg	g
	4	700
+	2	400

Solution:

	kg	g
	(1)	
	2	700
+	4	400
	7	100

Thus the total weight is 7 kg and 100g.

Note: 1100 gm = 1000 gm + 100gm
= 1kg + 100g

Examples-2

Solve:

	kg	g
	2	90
+	2	30

Solution:

	kq	g
	(1)	
	2	90
+	2	30
	5	20

Thus the total weight is 5 q and 20 kg.

Note: 120 kg = 100 kg + 20 kg
= 1q + 20 kg

Addition and subtraction in Grams, Kilograms and Quintals:

Examples-3

Solve:

	kg	g
	4	200
-	4	225

Solution:

	kg	g
	③	
	4	200
-	3	225
	0	975

Hence the difference is 975 g. (**Note:** 1 kg = 1000 gm)

Examples-4

Solve:

Kg	g
3	80
- 1	90

Solution:

	kg	g
	②	
	3	80
-	1	90
	1	90

Hence the difference of weight is 1 q 90 kg.

Examples-5

Sanam bought 2 kg 300 g of mangoes and Salma bought 3 kg 750g mangoes. How much mangoes they bought?

Solution:

	kg	g
	①	
	2	300
+	3	750
	6	50

They bought 6 kg and 50g of mangoes.

Examples-6

Ahmar purchased 2kg 50g flour for his family but his family consumed 1kg 60g flour. How much flour has been left.

Solution:

	kg	g
	①	
	2	50
-	1	60
	0	60

Hence, the flour left is 90 kg.

Exercise 5.2

Q.1: Subtract:

(1)

kg	g
19	700
-17	400
2 kg	300g

Ans:

(2)

kg	g
13	300
-10	200
3 kg	100g

Ans:

(3)

kg	g
13	75
- 11	27
2kg	48g

Ans:

(4)

kg	g
17	79
- 12	89
4 kg	990g

Ans:

Word problems:

5. Irtaza purchased 1kg 250g of sweets. She purchased 1kg 750g of sweets from another shop. Find the total weight of sweets she purchased.

Hint (Add)

Sol:

	1 kg	250g
	+ 2 kg	+ 750g
	3 kg	1000g

Ans:

6. Maheen purchased 1 kg 250g of tomatoes and 2kg 400g of potatoes. Find the total weight of the vegetable she purchased.

Hint (Add)

Sol:

	1 kg	250g
	+ 2 kg	+ 400g
	3 kg	650g

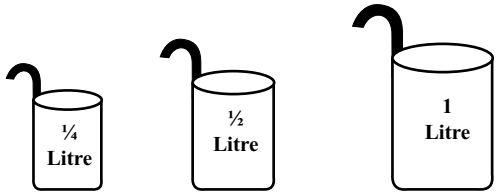
Ans:

5.3 Measurement of Capacity

In our daily life we measure milk, juice, kerosene oil, diesel, petrol and other liquids in litres.

The unit of capacity is litre.

1 litre (1) = 1000 milli litre (ml)



Addition and Subtraction in Milli litres and Litres:

Examples-1

Solve:

	l	ml
	6	800
+	2	300

Solution:

	l	ml
	①	
	9	800
+	2	300
	12	100

Examples-2

Solution:

Solve:

	l	ml
	7	500
-	4	600

	l	ml
	⑧	
	7	500
-	4	600
	2	900

Examples-3

Zeenat drank 500ml of Juice in the first two days of the week and 650ml in the remaining days of the week. Find the total quantity of juice she drank.

Solution:

	l	ml
In first two days	0	500
In remaining days +	0	650
Total quantity of juice	1	150

Hence; she drank 1(l) 150(ml) juice in the week.

Examples-4

The tank of Fraheen's car contains 39(l) 590 (ml) of petrol. It consumed 20 (l) 750 (ml of petrol. How much petrol was left over?

Solution:

	l	ml
	①	
Total petrol in the tank	39	590
Petrol consumed -	20	750
Remaining petrol	18	840

Hence; the remaining petrol in the tank of car was 18(l) 840(ml)

Examples-5

Solve:

	l	*ml*
(i)	17	547
+	11	675
	29	**222**

(ii)	47.758 *l*	
+	29.462 *l*	
	77.220 *l*	

	l	*ml*
(iii)	19	65
+	16	52
	36	**17**

(iv)	35.75 d *l*
+	25.45 d *l*
	61.20 d *l*

Examples-6

Solve:

(i)
	l	ml
	17	455
-	12	565
	4	**890**

(ii)
	26.650 l
-	15.760 l
	10.890 l

(iii)
	l	ml
	29	25
-	16	35
	12	**90**

(iv)
	35.56 dl
+	13.70 dl
	21.86 dl

Examples-7

There is 35 litres 475 millilitres of diesel in the tank of a truck. If 47 litres 685 millilitres more diesel is added in the tank, how much diesel will be there in the tank.

Solution:
	l	ml
	1 1	
	35	475
+	47	685
	83	**160**

475 ml
+ 685 ml
1160 ml

1160 ml = 1000 ml + 160 ml
= 1 l + 160 ml
= 1 l 160 ml

Examples-8

A shopkeeper had 75 decilitres 85 millilitres of kerosene oil. He purchased 65 decilitres 35 millilitres more oil. How much oil had he?

Solution:
	dl	ml
	1 1	
	75	85
+	65	35
	141	20

85 ml
+ 35 ml
120 ml

120 ml = 100 ml + 20 ml
= 1 dl + 20 ml
= 1 dl 20 ml

Examples-9

There is 115 litres 735 millilitres water in a tank. If 96 litres 825 millilitres water is used from it. How much water will left in the tank?

Solution:
	l	ml
	(114)	(1735)
	~~115~~	~~735~~
-	96	825
	18	**910**

As we can not subtract 825 ml from 735 ml. So, we borrow 1 l = 1000 ml. Now 1000 ml + 735 ml = 1735 ml

1735 ml - 825 ml = 910 ml

Exercise 5.3

Q.1: Solve:

(i)
	l	ml
	19	576
+	17	638
	37l	214ml

(ii)
	89.685 l
+	39.483 l
	129.168 l

(iii)
	dl	ml
	42	75
+	25	35
	68dl	10ml

(iv)
	75.348 dl
+	35.814 dl
	111.162 dl

Q.2: Solve:

(i)
	l	ml
	37	457
-	13	753
	23l	704ml

(ii)
	55.635 l
-	34.735 l
	20.900 l

(iii)
	dl	ml
	75	35
-	47	45
	27dl	90ml

(iv)
	95.39 dl
-	36.75 dl
	58.64 dl

Q.3: A milkseller had 65*l*, 865 ml of milk. He purchased 25*l*, 395 ml more milk . How much milk had he?

	65l	865ml
+	25l	395ml
	91l	260ml

Ans: A milk seller had 91l and 260ml of milk.

Q.4: There is 15 d*l* , 55 ml water in a tub. If 9 d*l* , 65 ml more water is added to it. How much water will be in the tub.

	15dl	55ml
+	9dl	65ml
	25dl	20ml

Q.5: A shopkeeper purchased 195 d*l* , 39 ml of kerosene oil. He sold 75 d*l* , 43 ml of oil. How much oil is left?

	195dl	39ml
-	75dl	43ml
	120dl	96ml

Q.6: A milkman has 92 *l*, 785 ml of milk. He sold 85 *l*, 695 ml of milk. How much milk is left?

	92l	785ml
-	85l	695ml
	7l	90ml

CHAPTER NO.6

GEOMETRY

Main definitions:

(1) POINT:

'Such shortest sign having no length and width is called point.

(2) SINE SEGMENT:

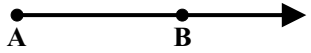
The group of points having no face but have two tail from both ends is called line segment. Line segment can be measured.

FOR EXAMPLE:

(3) RAY:

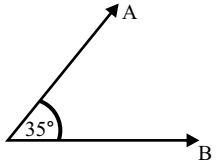
The group of points having a face and a tail is called ray. It is denoted by arrow as AB.

FOR EXAMPLE:



(4) Angle:

An angle is the union of two rays. **For example:**



Types of angle:

There are six types of angle.

(i) Acute angle.

(ii) Obtuse angle.

(iii) Right angle.

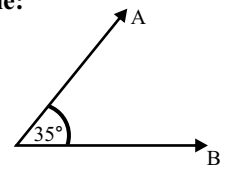
(iv) Straight angle.

(v) Reflex angle.

(vi) Complete angle.

(5) ACUTE ANGLE:

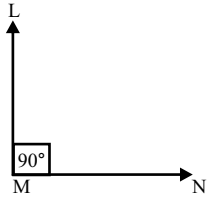
An angle which is less than 90° is called an acute angle.
For example:



Right angle.

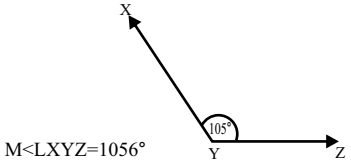
Such angle whose measure is y 90° is called right angle.

M<LMN=90°



(6) OBTUSE ANGLE:

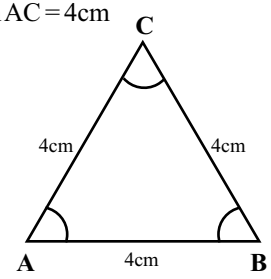
Such angle whose measure mentis greater than 90° and less than 180° is called Obtuse angle.



(7) EQUILATERALTRIANGLE OR EQUAL:

Such triangle whose three sides are same in measurement, it is called equilateral triangle equil ateral triangle.

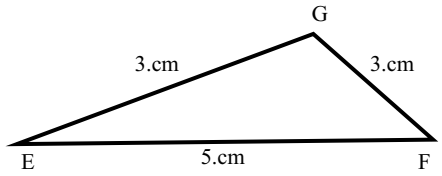
$m\overline{AB} = m\overline{BC} = m\overline{AC} = 4cm$



(8) ISOSCELES TRIANGLE:

Such triangle whose a pair of sides and a pair of angles is congrent is called isosceles Triangle.

Here Δ FFG is isosceles Triangle.

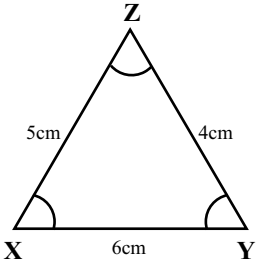


$m\overline{EF} = 5cm$ $m\overline{EG} = 3cm$

(9) SCALENE TRIANGLE:

Such triangle whose all sides are different in measurement and all angles are also different in measurement is called scalene triangle.

Here Δ XYZ is isosceles Triangle.



$m\overline{XZ} = 5cm$ $m\overline{YZ} = 4cm$, $m\overline{XY} = 6cm$

(10) QUADRILATERAL:

Any diagram having four sides is called quadrilateral. All angles of quadrilateral of 90°.

(11) PERIMETER TRIANGLE:

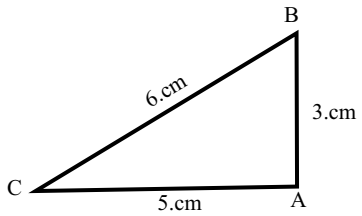
The total length of closed diagram is called perimeter.

(12) PRIMETER OF A TRIANGLE:

The sum of three sides of a triangle is called perimeter of a triangle.

For example:

mAB = 3cm
m BC = 6cm
m AC = 5cm



= m AB + m m BC + m AC
= 3 + 6 + 5
= 14 cm

6.1 Measurement of Line Segment

In class 3 you have studied the concept of line segment. In this section you will learn to measure the images of given line segments. As you know, instead of calling images of line segments, we just call line segments or more briefly segments. In symbols segment AB is denoted by $\overline{AB}$.

You are familiar with a ruler and you have been using it to draw lines and segments. You must have noted that one one of its edges centimetres are marked. Each centimetre is divided into 10 millimetres, which are also marked on the ruler. Now we shall measure given segments in centimeters and millimetres with the help of a ruler.

We are given the following segment and we want to measure it.

Method place the ruler along **AB.** The "o" mark on the ruler should be exactly below the point A (as shown in the picture). Now read the mark on the ruler which is exactly below the point B. Tis mark is "8".

Thus measure of **AB** is 8 cm.

Instead of writing measure of **AB** we briefly write m$\overline{\mathbf{AB}}$ m**AB** is read as measure of line segment **AB**.

Please remember that:

(i) **AB** is geometric figure whereas m**AB** is a number.

(Ii) m**AB** is the shortest distance between the point A and the point B.

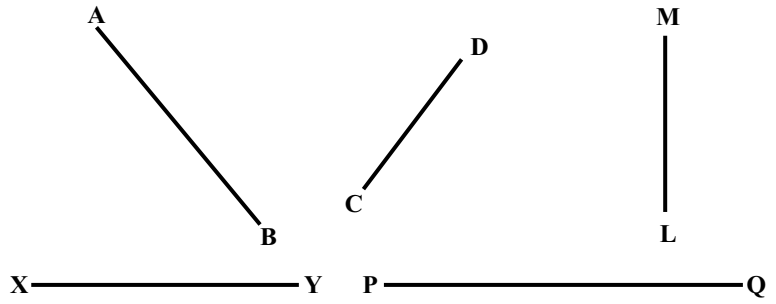
Please note that a "path" is a geometric figure but distance is merely a number.

Hence for the above image of the line segment **AB**, we say that:

m**AB** = 8 cm or distance between the points A and B = 8 cm.

Examples-1

Measure the following segments:



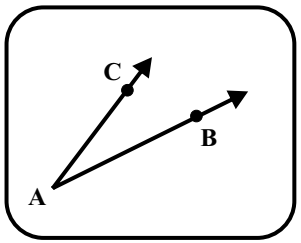
In the above example :

m$\overline{AB}$ = 5cm, m$\overline{CD}$ = 4cm, m$\overline{LM}$ = 3 cm,

m$\overline{XY}$ = 4 cm 5 cm = 4.5 cm and

m$\overline{PQ}$ = 7 cm 3 mm = 7.3 cm.

2. Angle



Please look at the opposite figure.

We note the following:

(i) AB and AC are two rays.

(ii) A is the end point of ray Ab.

(iii) A is the end point of ray AC

Thus A is the common end point of both rays AB and AC

This picture shows an ANGLE. In symbols an angle is denoted by "^" The angle shown in the above picture is written as BAC. BAC is read as "angle BAC"

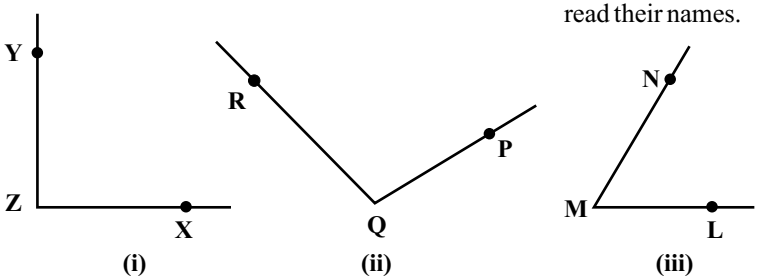
we may also write it as $\hat{}$CAB. CAB is read as angle CAB". Please note that usually we write it as $\hat{A}$ and read it as $\hat{}$ "angle A".

Please remember that in reading the name of an angle the common end point of the rays making the angle should be in the middle.

Hence the angle shown in the above picture can NOTE be written as ABC, ACB or BCA etc.

Examples-2

The pictures given below show some angles. Write and read their names.



(i) (ii) (iii)

The angle shown in picture (i) is written as $X\hat{Z}Y$ or $Y\hat{Z}S$ or Z and is read as angle XYZ or angle YZX or angle Z.

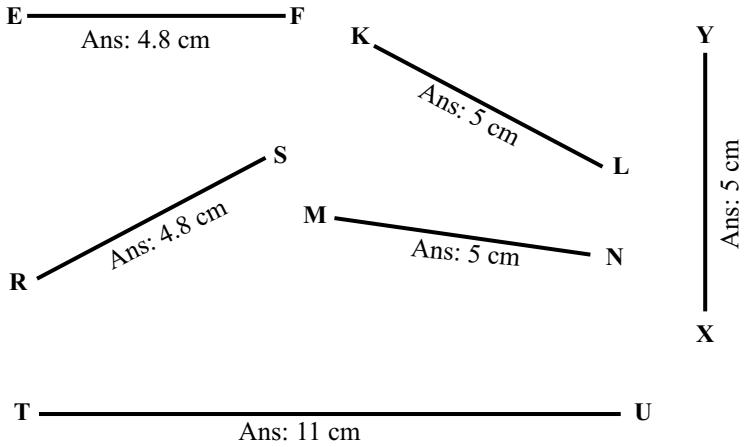
The angle shown in picture (ii) is written as $P\hat{Q}R$ or $R\hat{Q}P$ or Q and is read as angle PQR or angle RQP or angle Q.

The angle shown in picture (iii) is written as $L\hat{M}N$ or $N\hat{M}L$ or $\hat{M}$ and is read as angle LMN or angle NML or angle M.

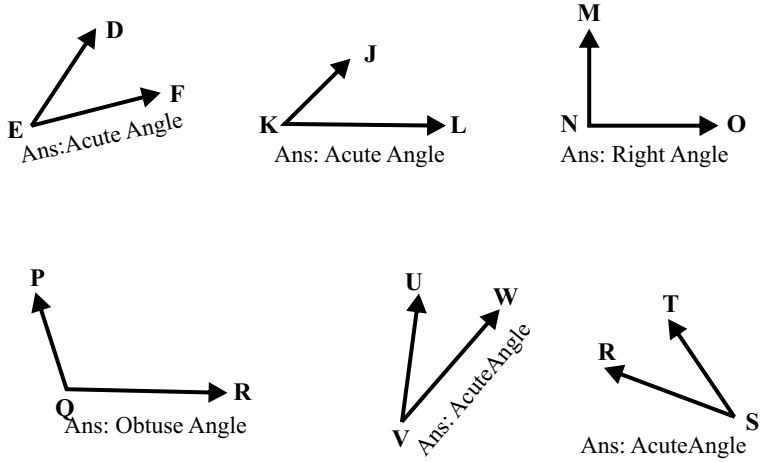
Note: An angle may also be denoted by the symbol "L".

Exercise 6.1

Q.1. Measure the following segments:

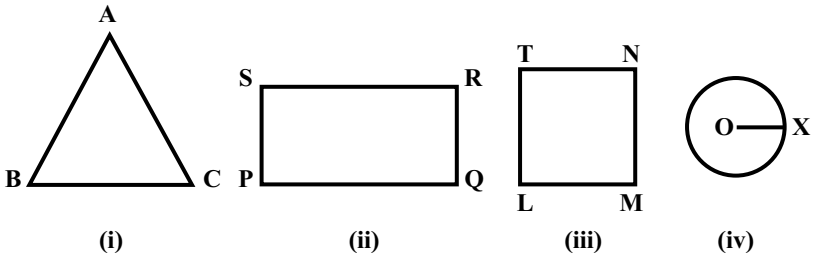


Q.2. Write names of angles shown in the pictures given below:



3. Construction of Boundary and Region

In lower classes you have studied the concepts of open and closed figures. Now consider the following figures:



(i) (ii) (iii) (iv)

All the above figures are closed figures.

(1) Figure (i) shows a triangular shape. It is called a TRIANGULAR REGION. Triangle ABC is the BOUNDARY and coloured part is the interior of the rectangle.

(2) Figure (ii) shows a RECTANGULAR REGION.

Rectangle PQRS is the boundary and coloured part is the interior of the rectangle.

(3) Figure (iii) shows a SQUARE REGION. Square LMNT is the boundary and coloured part is the interior of the square.

(4) Fig(iv) shows a CIRCULAR REGION. The circle with centre O and radius OX is boundary and coloured part is the interior of the cirlce.

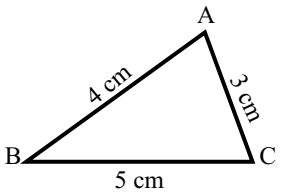
Please remember that, a region consists of two parts BOUNDARY and INTERIOR.

4. Concept of Perimeter

The MEASURE of the BOUNDARY of a REGION is called its PERIMETR.

(a) In the opposite picture a triangular region is shown.

Triangle ABC is the boundary of this region.



$\overline{AB}$, $\overline{AC}$, $\overline{BC}$ are the sides of triangle ABC.

$m\overline{AB} = 4$ cm, $m\overline{AC} = 3$ cm and

$m\overline{BC} = 5$ cm.

Hence perimeter of tiangular region

ABC = 4 + 3 + 5 = 12 cm

Please remember that:

Perimeter of a triangle = Sum measures of its sides

Find perimeter of the triangle PQR, if $m\overline{PQ}$ = 6 cm 4 cm, $m\overline{PR}$ = 8 cm 9mm, $m\overline{QR}$ = 9 cm 2mm.

Solution:

$m\overline{PQ}$ = 6 cm 4 mm = 6.4 cm.

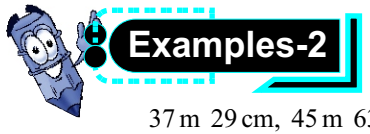
$m\overline{PR}$ = 8 cm 9 mm = 8.9 cm.

$m\overline{QR}$ = 9 cm 2 mm = 9.2 cm.

Perimeter of triangle PQR = $m\overline{PQ} + m\overline{PR} + m\overline{QR}$

= 6.4 cm + 8.9 cm + 9.2 cm = 24.5 cm

= 24 cm 5 mm.



The measures of the sides of a triangular piece of land are as under:

37 m 29 cm, 45 m 63 cm and 58 m 21 cm.

What is the perimeter of this piece of land?

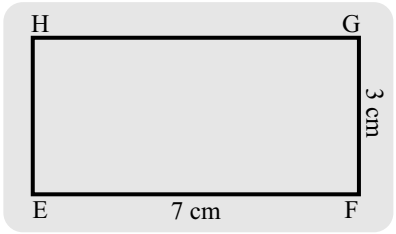
perimeter = 37 m 29 cm + 45 m 63 cm + 58 m 21 cm

= 37.29 + 45 m 63 cm + 58 m 21 cm

= 141.13m = 141 m 13 cm.

Please note that instead of writing perimeter of a triangular or a rectangular or a square region, we simply write perimeter of a triangle or a rectangle or a square.

(b) In the following picture a rectangular region is shown. Rectangle EFGH is its BOUNDARY.



$\overline{EF}$, $\overline{FG}$, $\overline{GG}$, $\overline{EH}$ are

sides of rectangle EFGH.

We know that the measures of opposite sides of a rectangle are equal.

Thus $m\overline{GH} = m\overline{EF} = 7$ cm.

$m\overline{EH} = m\overline{FG} = 3$ cm.

Hence perimeter of rectangle EFGH

$= 7+3+7+3 =$ cm.

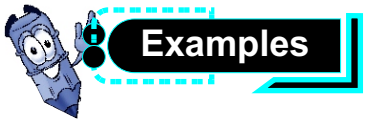
Please note that perimeter of a rectangle = Sum of measures of its sides.

Since opposite sides of a rectangle are equal in measure we may also note that:

Perimeter of a rectangle = 2 (Sum of measures of its adjacent sides).

Now in the above example perimeter of the rectangle may also the found as under:

Perimeter of rectangle EFGH = 2 (7 + 3) = 2 x 10 = 20 cm.



The measures of adjacent sides of a rectangular playground 125m 75cm and 87m 50cm. What is its perimeter?

Solution: Perimeter of the ground:

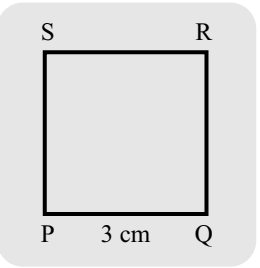
$= 2(125\text{ m }75\text{ cm} + 87\text{m }50\text{cm})$

$= 2(125.75 + 87.50) = 2 \times 213.25)$

$= 426.50$ m.

(c) In the following picture a square region is shown. Square PQRS is the boundary of this region. $\overline{PQ}$,$\overline{QR}$, $\overline{RS}$, $\overline{PS}$ are side of square PQRS.We know that measures of all the sides of a square are equal.

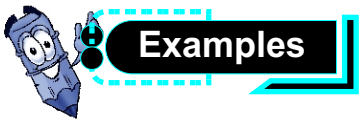
Thus mPQ = mQR = mRS = mPS = 3cm. Hence perimeter of square PQRS $= 3+3+3+3 =$ 12 cm.



Like rectangle perimeter of a square = Sum of measures of its sides.

Since all the sides of a square are equal in measure, we may also note that:

Perimeter of a Square = 4 x measure of its sides



The measure of a side of a square pool is 18m. Find perimeter of the pool.

Solution: Perimeter = 4 x 18 = 72m.

Solved Example: The perimeter of a triangular piece of land is 125m 75cm. If the sum of lengths of its two sides is 72m 37cm, what is the length of the third side?

Solution: Length of third side = 125.75 - 72.37

= 53.38m = 53m 38cm

(2) The perimeter of a rectangular plot is 496m 18cm. The length of its one side is 158m 87cm. What is the length of the other sides?

Solution: Length of the side opposite to given side = 158m 87cm. Sum of lengths of other two sides.

$= 496.18 - 2(158.87) = 496.18 - 317.74 = 178.44$m.

Therefore length of each of required sides

$= 178.44 \div 2 = 89.22$m

= 89m 2cm

(3) The perimeter of a square garden is 954.72 metres. Find the length of its side.

Solution: Length of side $= 954.72 \div 4$

Solution: Length of side = 954.72 4

= 238.68m = 238m 680cm.

(4) The measures of adjacent sides of a rectangular plot are 63m 50cm and 78m 90cm. Find the cost of fixing a fence along its boundary if the cost of fence per metre is Rs.12.25.

Solution: Perimeter of the plot = 2(63.50 + 78.90)

= 2 x 142.40 = 284.80m

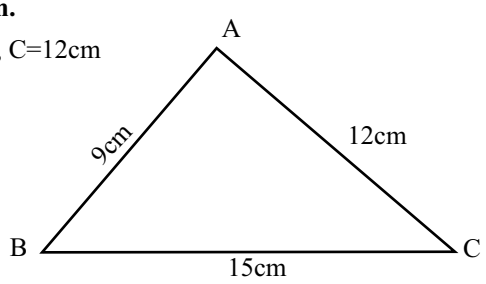
Cost = 284.80 x 12.25 = Rs.2560.

Exercise 6.2

Q.1. Find perimeters of triangles, the lengths of whose sides are given below:

(1) 9cm, 15cm, 12cm.

Sol: A=9cm, B= 15cm, C=12cm



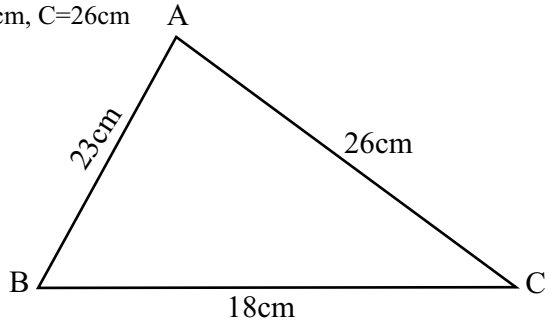
Hence: Perimeter of triangle = A + B + C

Perimeter of triangle = 9 + 15 + 12

Perimeter of triangle = 36 Ans:

(2) 23cm, 18cm, 26cm,

Sol: A=23cm, B= 18cm, C=26cm



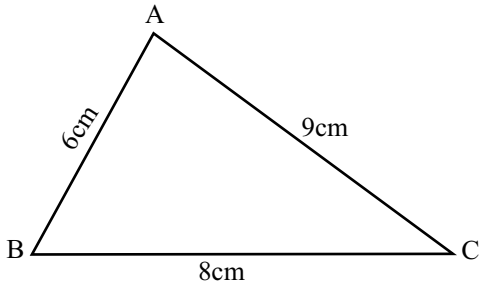
Hence: Perimeter of triangle = A + B + C

Perimeter of triangle = 23 + 18 + 26

Perimeter of triangle = 67 Ans:

(3) 6cm 8cm, 9cm .

Sol: A=6cm, B= 8cm, C=9cm



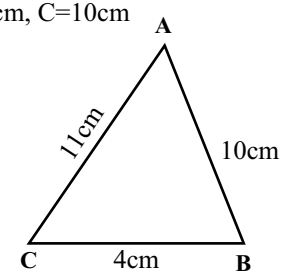
Hence: Perimeter of triangle = A + B + C

Perimeter of triangle = 6 + 8 + 9

Perimeter of triangle = 23 Ans:

(4) 11cm 4cm, 10cm.

Sol: A=11cm, B= 4cm, C=10cm



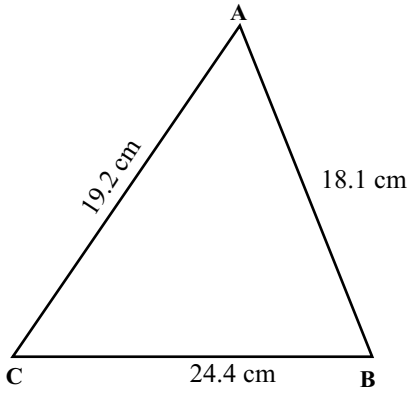
Hence: Perimeter of triangle = A + B + C

Perimeter of triangle = 11 + 10 + 4

Perimeter of triangle = 25 Ans:

(5) 19.2cm, 24.4cm, 18.1cm.

Sol:

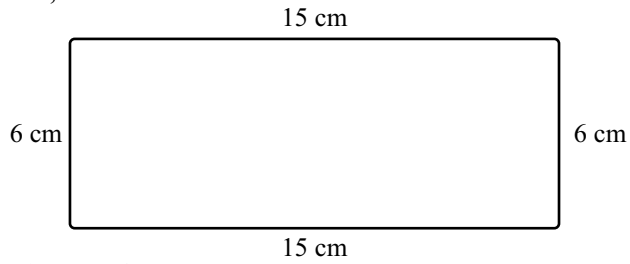


Hence: Perimeter of triangle = A + B + C
Perimeter of triangle = 19.2 + 18.1 + 24.4
Perimeter of triangle = 61.7 cm Ans:

Q.2. Measures of adjacent sides of rectangles are given below. Find their perimeters.

(1) 15cm, 6cm.

Sol:

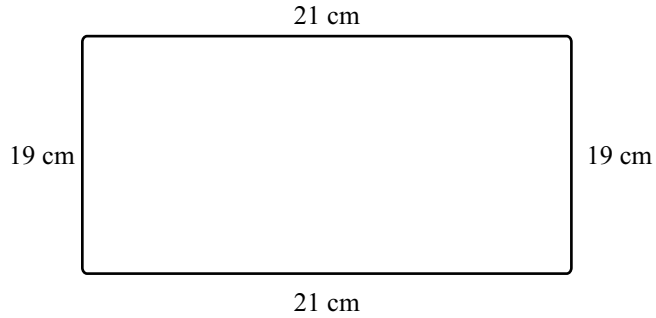


Let: L = 15, W = 6 cm

Then: Perimeter of triangle = 2 (L+W)
Perimeter of triangle = 2 (15+6)
Perimeter of triangle = 2 (21)
Perimeter of triangle = 42 cm Ans:

(2) 21cm, 19cm.

Sol:

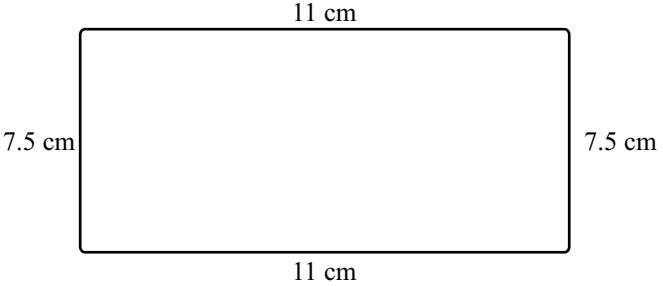


Let: L = 21cm, W = 19 cm

Then: Perimeter of triangle = 2 (L+W)
Perimeter of triangle = 2 (21+19)
Perimeter of triangle = 2 (40)
Perimeter of triangle = 80 cm Ans:

(3) 7.5cm, 11.2cm.

Sol:

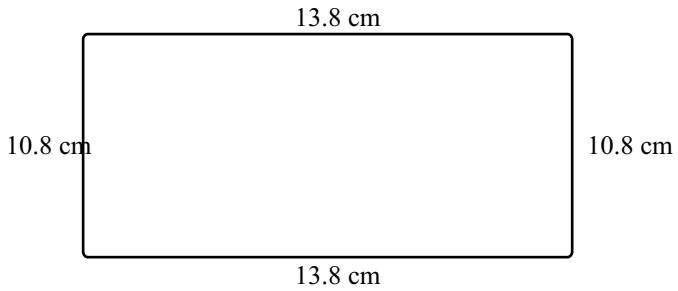


Let: L = 11.2 cm, W = 7.5 cm

Then: Perimeter of triangle = 2 (L+W)
Perimeter of triangle = 2 (11.2 + 7.5)
Perimeter of triangle = 2 (18.7)
Perimeter of triangle = 37.4 cm Ans:

(4) 13.8cm, 10.8cm.

Sol:

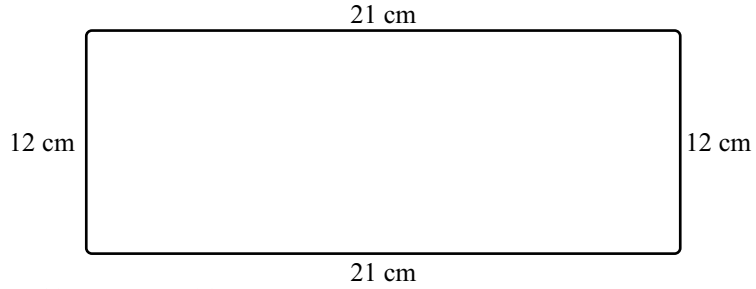


Let: L = 13.8 cm, W = 10.8 cm

Then: Perimeter of triangle = 2 (L+W)
Perimeter of triangle = 2 (13.8 + 10.8)
Perimeter of triangle = 2 (24.6)
Perimeter of triangle = 49.2 cm Ans:

(5) 12cm , 21cm

Sol:



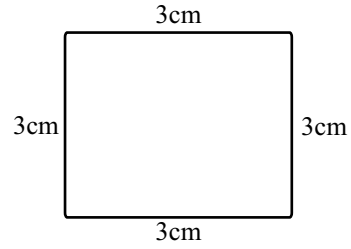
Let: L = 12 cm, W = 21 cm

Then: Perimeter of triangle = 2 (L+W)
Perimeter of triangle = 2 (21 + 12)
Perimeter of triangle = 2 (33)
Perimeter of triangle = 66 cm Ans:

Q.3. Lengths of sides of squares are given below. Find their perimeters:

(1) 3cm

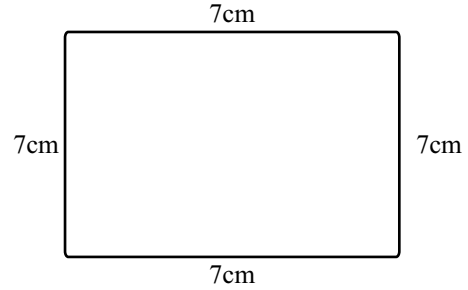
Sol:



Then: Perimeter of square = L + L + L + L
Perimeter of square = 3 + 3 + 3 + 3
Perimeter of square = 12cm Ans:

(2) 7 cm

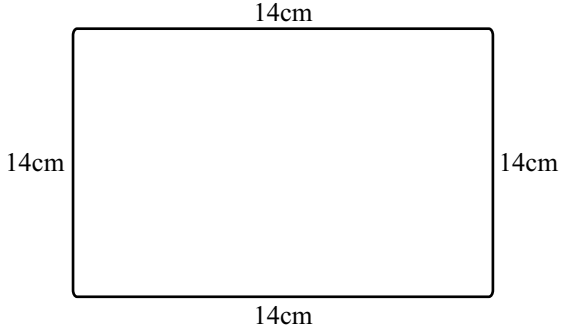
Sol:



Then: Perimeter of square = L + L + L + L
Perimeter of square = 7 + 7 + 7 + 7
Perimeter of square = 28cm Ans:

(3) 14cm

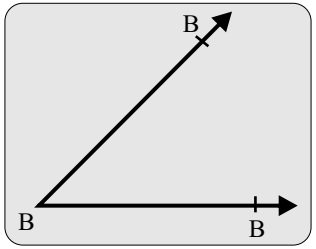
Sol:



Then: Perimeter of square = L + L + L + L
Perimeter of square = 14 + 14 + 14 + 14
Perimeter of square = 56cm Ans:

Concept of an Angle

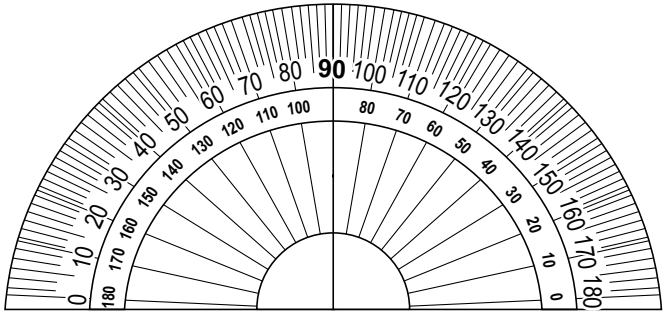
The figure formed by two rays with a common end point is called an angle. In the figure, rays BA and BC having a common end pint B, form an angle. We read the angle as angle ABC or angle CBA. We use the symbol '$\angle$' for angle. So we can write angle ABC as $\angle ABC$ and CBA as $\angle CBA$. The rays are called the arms of the angle. The point B is called the vertex of the angle.



Measuring an Angle

The unit for measurement of an angle is called degree. The symbol of degree is "°", written above the number to its right.

For 25 degree, 30 degree, 45 degree, 60 degree etc we write as 25°, 30°, 60°, etc.



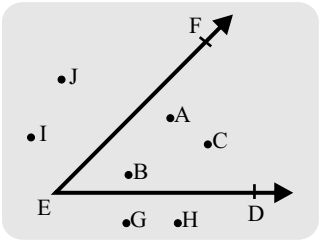
PROTECTOR

The angles are measured with the help of a protractor. It is a geometrical instrument which has two edges, one straight and the other curved one, as shown in above figure.

The straight edge is called its base line.

The curved edge is graduated from 0 to 180 degrees in both clockwise as well as anti clockwise direction.

INTERIOR AND EXTERIOR OF AN ANGLE:

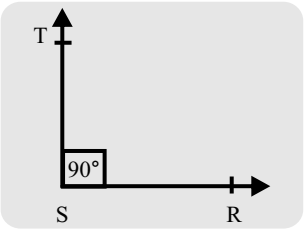


In the opposite figure $\angle$ DEF divides the region of the plane into two parts. These parts are interior and exterior of the angle. The part containing points A, B and C is interior of the angle. The part containing points G, H, I, J, is exterior of the angle.

Those points which are inside an angle is called interior of the angle. Those points which are outside an angle is called exterior of the angle.

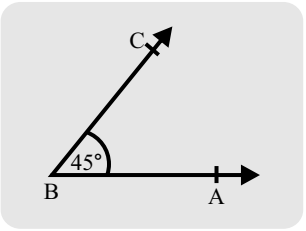
KINDS OF ANGLES:

1. Right Angle:



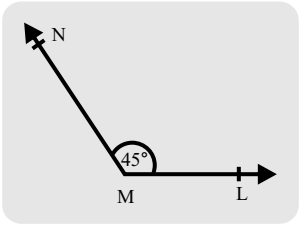
An angle whose measure is equal to 90° is called a right angle. In the figure the measure of $\angle RST$ is 90°. So, it is a right angle.

2. Acute Angle:



An angle whose measure is less than 90° is called an acute angle. In the figure the measure of $\angle ABC$ is 45°, which is less than 90°. It is an acute angle.

3. Obtuse Angle:



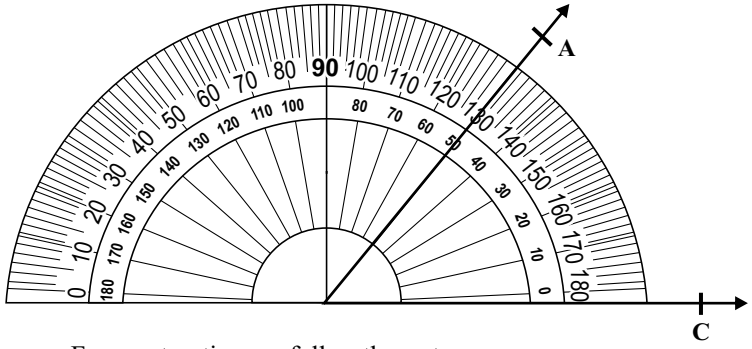
An angle whose measure is greater than 90° and less than 180°, is called an obtuse angle.

In the figure the measure of $\angle$ LMN is 120° which is greater than 90° and less than 180° is an obtuse angle. So, $\angle$ LMN is an obtuse angle.

CONSTRUCTING AND MEASURING ANGLES WITH PROTRACTOR

Examples-1

Construct an angle of 50° with the help of protractor.



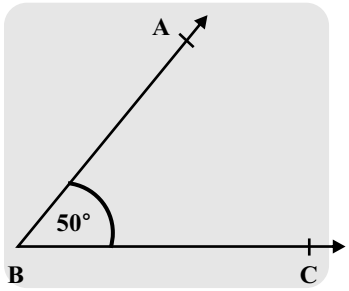
For construction, we follow these steps:

(i) Draw a ray $\overrightarrow{BC}$ with the help of a ruler.

(ii) Place the centre of the straight edge of the protractor on point B which is the vertex of the angle.

(iii) Adjust the protractor so that the straight edge falls along BC.

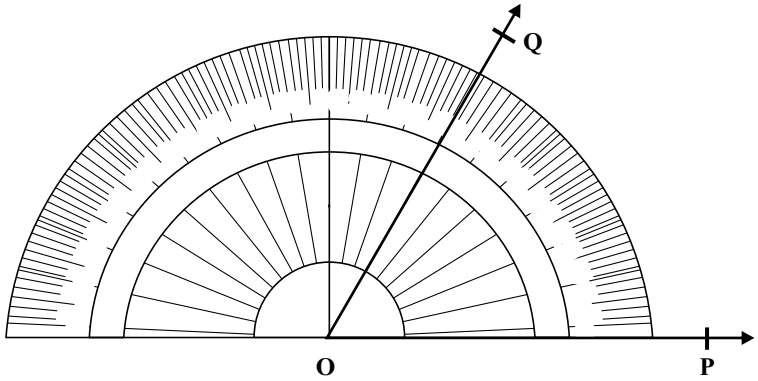
(iv) Read the scale at the point where the other arm AB of the angle crosses the scale on the protractor. Here, arm AB falls on the 50 degree mark of the protractor.



(v) Remove the protractor and draw the ray $\overrightarrow{BA}$. So we say the measure of the angle ABC is 50°, or m $\angle$ ABC = 50°

Examples-2

Draw an angle of 60° with the help of a protractor.

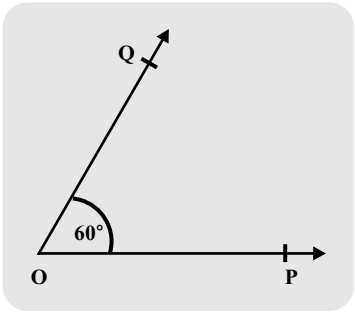


Steps of Construction:

(i) Draw a ray $\overrightarrow{OP}$ with the help of a ruler.

(ii) Place a protractor, so that its straight edge lies along the ray OP and the centre point of the straight edge coincides with end point O of the ray. point B which is the vertex of the angle.

(iii) Mark a point Q corresponding to the mark 60° counting from zero on the scale of the protractor.



(iv) Now remove the protractor and draw the ray $\overrightarrow{OQ}$.

(v) $\angle$ POQ is the required angle of 60°

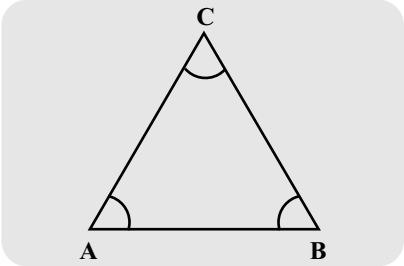
KINDS OF TRIANGLES:

There are six type of Δ Triangle.

In previous class, we have learnt the kinds of triangle with respect to its sides. Here we shall learn the kinds of triangle according to its angles.

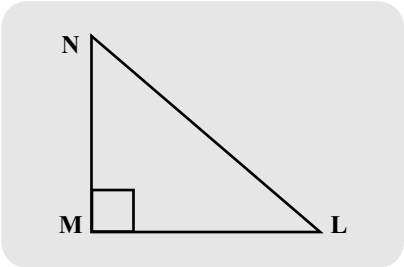
1. Acute Triangle:

A triangle in which all angles are acute is called an acute triangle. In the triangle ABC, all the angles are acute angles, So Δ ABC is an acute triangle.



2. Right Triangle:

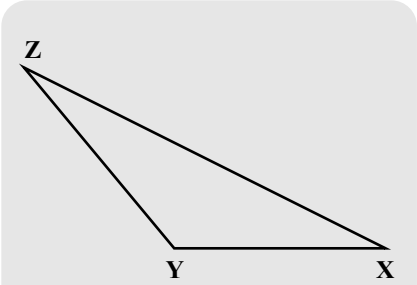
A triangle in which there is one angle with measure equal to 90° is called a right triangle. In the triangle LMN one angle is 90°. So Δ LMN is a right triangle.



3. Obtuse Triangle:

A triangle in which one angle is an obtuse angle is called an obtuse triangle. In the triangle angle XYZ is an obtuse angle.

So Δ XYZ is an obtuse triangle.



Exercise 6.3

Q.1. Fill in the blanks:

(i) The figure formed by two rays with a **common** end point is called an angle.

(ii) The common **point** is known as the **vertex** of the angle.

(iii) The points which are inside an angle is called **interior** of the angle.

(iv) The points which are **outside** an angle is called exterior of the angle.

(v) An angle whose measure is less than 90° is called **an acute angle**.

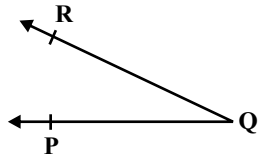
(vi) An angle whose measure is greater than 90° and less than 180° is called an **obtuse** angle.

(vii) An angle whose measure is equal to 90° is called **right** angle.

(viii) A triangle in which measure of one angle is 90° is called **right** triangle.

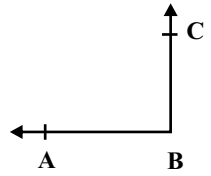
2. Write the names of arms and vertices of the following angles:

(i)



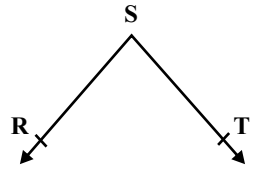
Ans: Arms are Q and $\overline{QP}$ and vertex is point Q.

(ii)



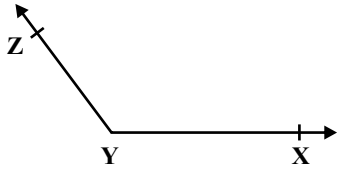
Ans: Arms are $\overline{BA}$ and $\overline{BC}$; vertex is point B.

(iii)



Ans: Arms are $\overline{SR}$ and $\overline{ST}$ and vertex is point S.

(iV)



Ans: Arms are $\overline{YZ}$, $\overline{YX}$ and vertex is point B.

Q.3. Draw angles of the following measurement with the help of a protractor:

(i) m∠PQR = 45°

(ii) m∠ABC = 65°

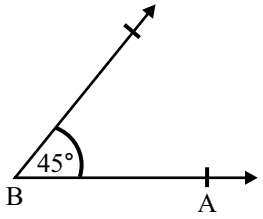
(iii) m∠DEF = 75°

(iv) m∠ RST = 90°

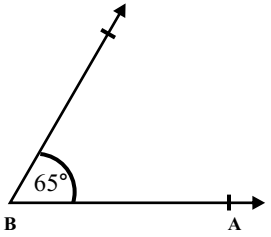
(v) m∠XYZ = 130°

(vi) m∠LMN = 155°

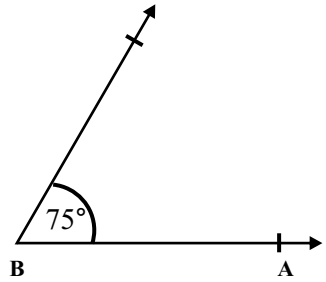
(i) m∠PQR = 45°



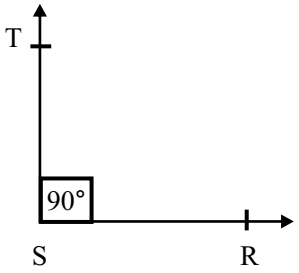
(ii) m∠ABC = 65°



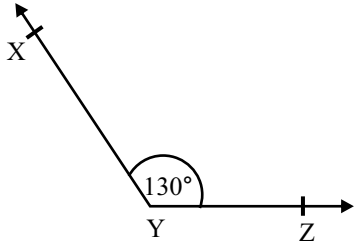
(iii) m∠DEF = 75°



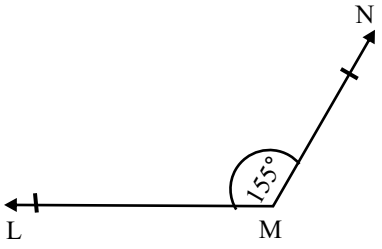
(iv) m∠ RST = 90°



(v) m∠XYZ = 130°

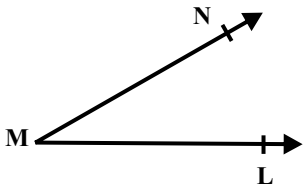


(vi) m∠LMN = 155°



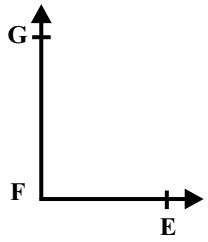
Q.4. Measure the following angles with the help of protractor.

(i)



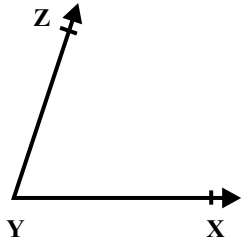
Ans = 30°

(ii)



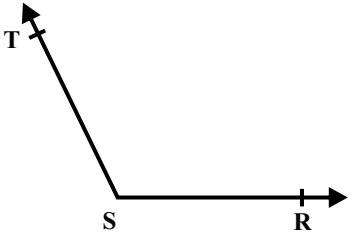
Ans = 90°

(iii)



Ans = 70°

(iv)



Ans = 115°

DRAWING A LINE PERPENDICULAR TO A GIVEN LINE

If two lines make an angle of 90° with each other then they are perpendicular to each other.

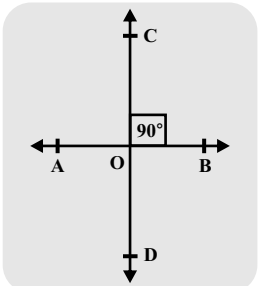
The symbol for perpendicular is

Examples

Draw a line CD perpendicular to a line AB.

$\overleftrightarrow{CD} \perp \overleftrightarrow{AB}$

To draw $\overleftrightarrow{CD} \perp \overleftrightarrow{AB}$ we follow the steps given below:



(1) Draw $\overleftrightarrow{AB}$ with the help of a ruler.

(2) Mark a point O on $\overleftrightarrow{AB}$.

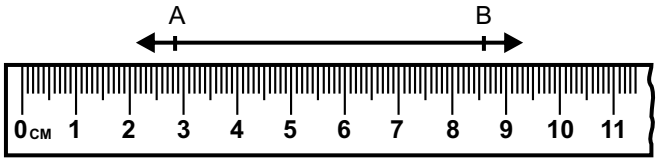
(3) Place the centre of the protractor on point O and mark a point C at 90°.

(4) Remove the protractor and draw $\overleftrightarrow{CD}$.

So, $\overleftrightarrow{CD} \perp \overleftrightarrow{AB}$ and also $\overleftrightarrow{AB} \perp \overleftrightarrow{CD}$

CONCEPT OF HORIZONTAL AND VERTICAL LINES

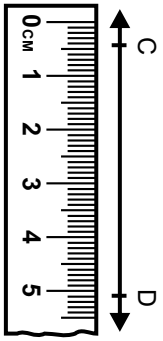
Place a ruler across a page. Draw a line as shown in the figure below:



Line AB is a horizontal line.

Now place a ruler straight from the top towards the bottom of a page. Draw a line as shown in the figure

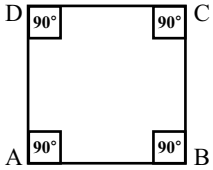
The line CD is a vertical line.



SQUARE AND A RECTANGLE

Square:

A square is a quadrilateral in which all the four sides are equal and all the angles are right angles.



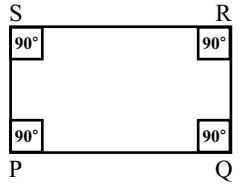
The figure ABCD is a square because,

$m\overline{AB} = m\overline{BC} = m\overline{CD} = m\overline{DA}$

and $m\angle A = m\angle B = m\angle C = m\angle D = 90°$

Rectangle:

A rectangle is a quadrilateral in which the opposite sides are equal and all the angles are right angles. The figure PQRS is a rectangle because,



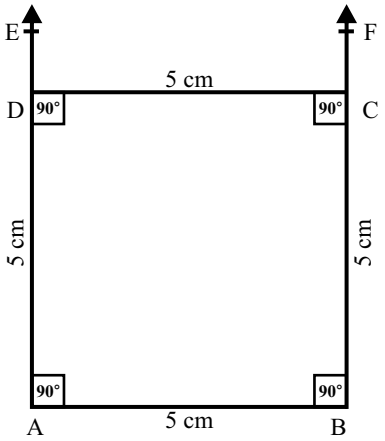
$m\overline{PQ} = m\overline{SR}$, $m\overline{QR} = m\overline{PS}$

and $m\angle P = m\angle Q = m\angle R = m\angle S = 90°$

CONSTRUCTION OF A SQUARE:

Examples

Construct a square of side 5 cm.



To construct a square we follow the steps given below:

(i) Draw $\overline{AB}$ = 5cm

(ii) At point A and B draw angles of measure 90° with the help of protractor.

(iii) Cut off $\overline{AD}$ from $\overline{AE}$ equal to 5cm.

(iv) Cut off $\overline{BC}$ from BF equal to 5 cm.

(v) Join C and D.

ABCD is the required square.

CONSTRUCTION OF A RECTANGLE:

Examples

Construct a rectangle of the given measurement.

$m\overline{LM} = m\overline{ON} = 6\,cm$

$m\overline{LO} = m\overline{MN} = 4\,cm$

To construct a rectangle we follow the steps given below:

(i) Draw $\overline{LM} = 6cm$

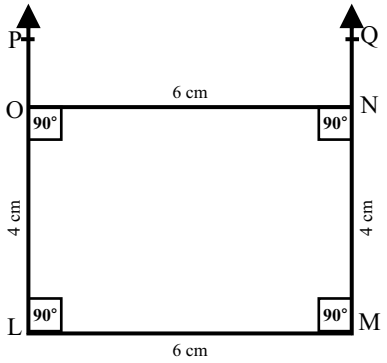
(ii) At point L and M draw angles of measure 90° with the help of protractor.

(iii) Cut off $\overline{LO}$ from $\overrightarrow{MN}$ equal to 4cm.

(iv) Cut off $\overline{LM}$ from $\overrightarrow{ON}$ equal to 6cm.

(v) Join O and N.

LMNO is the required rectangle.



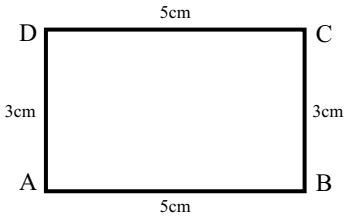
PERIMETER OF A RECTANGLE AND A SQUARE:

Sum of measure of the lengths of all the sides of any closed figure is called its perimeter.

Examples-1

Find the perimeter of the rectangle ABCD when $m\overline{AB} = 5cm$ and $m\overline{BC} = 3cm$

Solution: Perimeter of the rectangle is the total length of all its sides.



So, perimeter of the rectangle ABCD

= mAB + mBC + mCD + mDA

= 5cm + 3cm + 5cm + 3cm

= 5cm + 5cm + 3cm + 3cm

= 5cm + 5cm + 3cm + 3cm

= 2 (5) CM + 2(3) cm

= 10 cm + 6 cm

= 16cm

From the above example we note that;

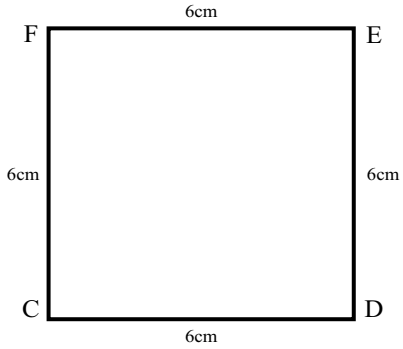
Perimeter of the rectangle = 2 (length) + 2 (breadth)

= 2 (length + 2 breadth)

Examples-2

Find the perimeter of the square CDEF, where measure of a side is 6cm.

Solution:



Perimeter of the square CDEF = $m\overline{CD} + m\overline{DE} + m\overline{EF} + m\overline{FC}$

= 6cm + 6cm + 6cm + 6cm

= 4 (6) cm

= 24 cm

In case of a square, the length and breadth are equal.

Perimeter of square = side + side + side + side

Perimeter of square = 4 x side.

Exercise 6.4

Q.1. Fill in the blanks:

(i) If two lines make an angles of 90° with each other, they are **Perpendicular** to each other.

(ii) In a square all the four sides are **Equal** and all the angles are **Right**.

(iii) In a rectangle the opposite **Side** are equal and all the angles are **Right**.

(iv) Perimeter of a rectangle = 2 (**Length** + **Breadth**).

(V) Perimeter of a square = **4 x sides**.

Q.2. Construct a square PQRS such that m$\overline{PQ}$ = 4cm.

Sol:

To construct a square we follow the steps given below:

(i) Draw $\overline{PQ}$ = 4cm

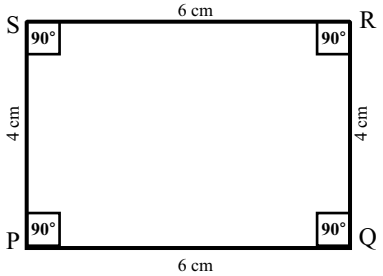
(ii) At point P and Q draw angles of measure 90° with the help of protractor.

(iii) Cut off $\overline{PS}$ from AT equal to 4cm.

(iv) Cut off $\overline{QR}$ from $\overline{QU}$ equal to 5cm.

(v) Join R and S.

Hence: PQRS is the required square.



Q.3. Construct a rectangle ABCD such that m$\overline{AB}$ = 4.5cm and m$\overline{BC}$ = 3cm.

Sol:

To construct a rectangle we follow the steps given below:

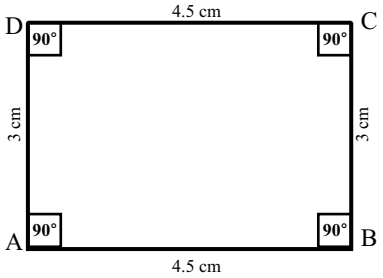
(i) Draw $\overline{AB}$ = 4.5cm

(ii) At point A and B draw angles of measure 90° with the help of protractor.

(iii) Cut off $\overline{AC}$ from $\overline{BC}$ equal to 3cm.

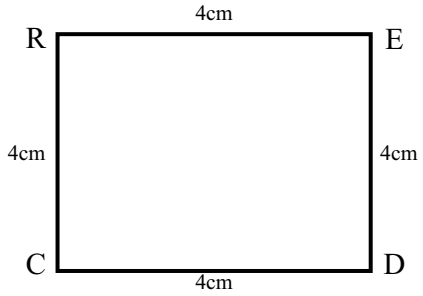
(iv) Join D and C.

Hence: ABCD is the required rectangle.



Q.4. Find the perimeter of a square having each side of measure 4cm.

Sol:



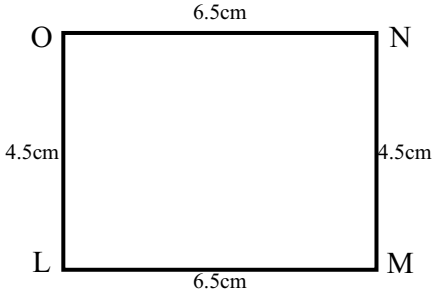
Perimeter of square CDEF = m$\overline{CD}$ + m$\overline{DE}$ + m$\overline{EF}$ + m$\overline{FC}$

Perimeter of square CDEF = 4 + 4 + 4 + 4

Perimeter of square CDEF = 16 cm

Q.5. Find the perimeter of a rectangle LMNO such that, m$\overline{LM}$ = 6.5cm and m$\overline{MN}$ = 4.5 cm.

Sol:



Perimeter of rectangle LMNO = m$\overline{LM}$ + m$\overline{MN}$ + m$\overline{NO}$ + m$\overline{OL}$
Perimeter of rectangle LMNO = 6.5 + 4.5 + 6.5 + 4.5
Perimeter of rectangle LMNO = 11 + 11
Perimeter of rectangle LMNO = 22 cm

CHAPTER NO.7

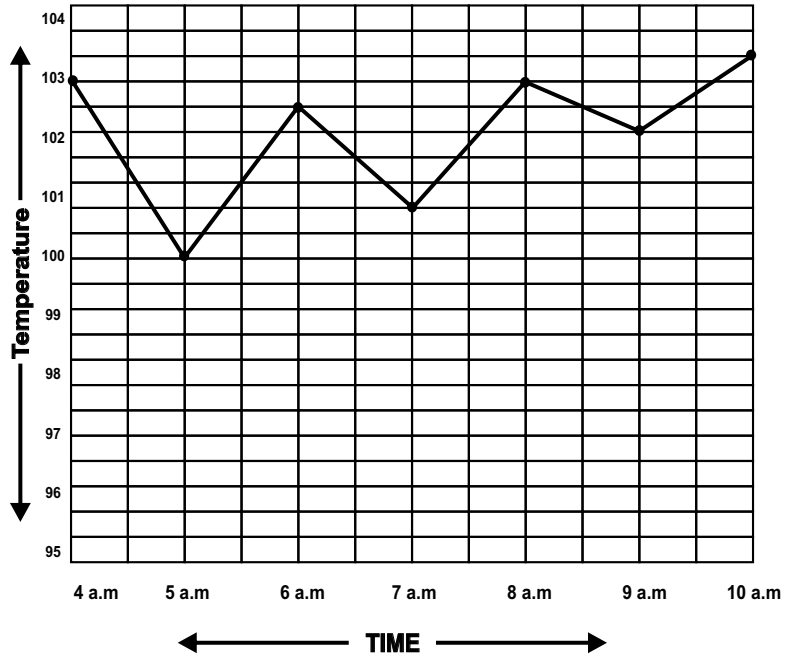
GRAPHS

7.1 LINE GRAPHS

We learnt in class III about bar graph. Here we shall learn how to read a line graph and draw information from it. In line graph, the information is represented by line segments.

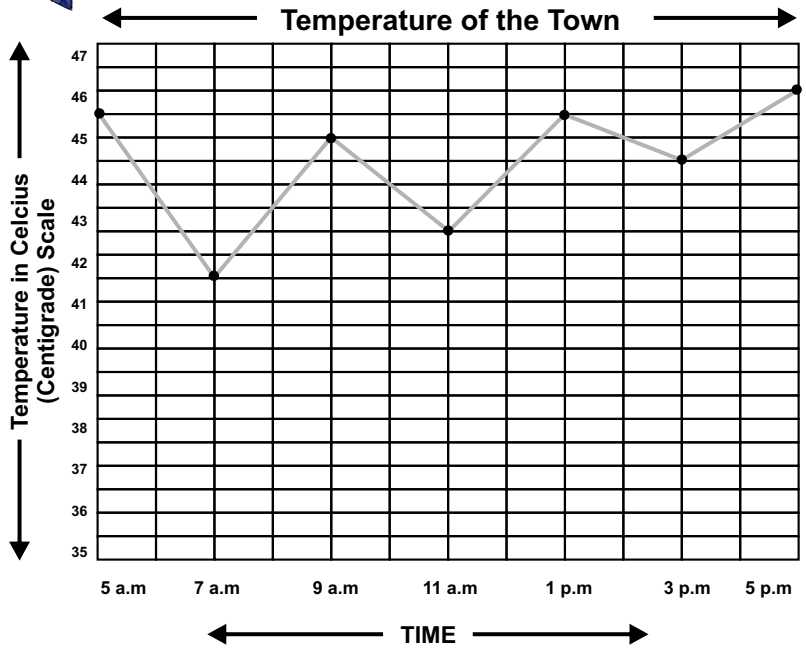
This is the figure of a line graph representing temperature of a patient. Time is shown on horizontal axis, Temperature is shown on vertical axis.

Temperature of a patient



Examples-1

The temperature of a town on a certain day is shown in the following line graph.



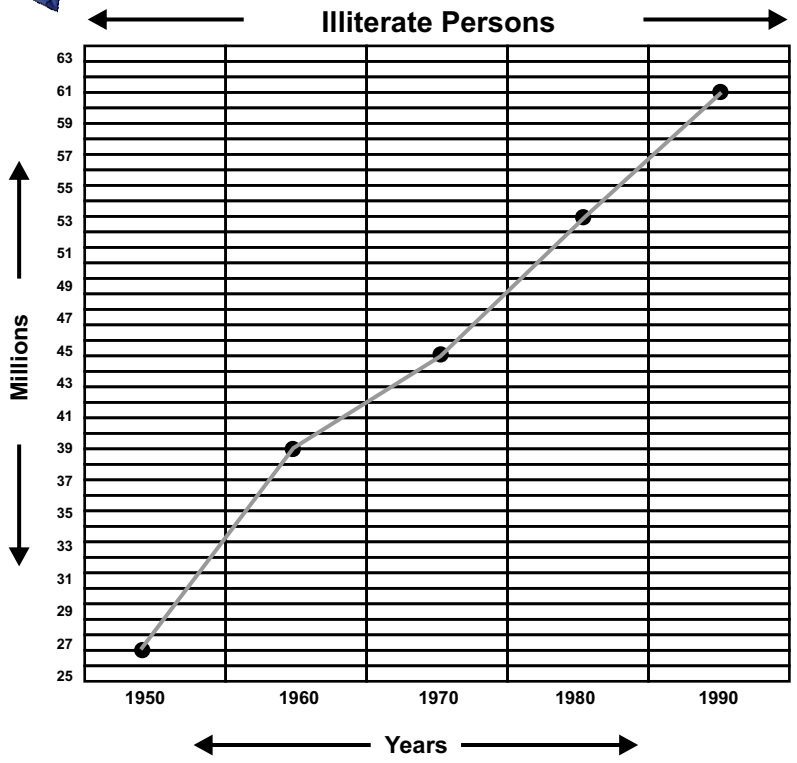
Look at the graph and answer the following questions:

1.Was the temperature highest at 1 p.m?	Yes
2.What was the temperature at 9 a.m?	40°C
3.At what time the temperature was the lowest?	at 5 a.m
4.Were the temperatures same at 7 a.m and 5 p.m?	Yes
5.What was the temperature at 1 p.m?	46°C
6. Prepare the chart of the graph:	

Time	5 a.m	7 a.m	9 a.m	11 a.m	1 p.m	3 p.m	5 p.m
Temp:	35°C	37 °C	40 °C	42 °C	46 °C	43 °C	37 °C

Examples-2

The following line graph shows the number of illiterate of a country in different years.



Look at the graph and answer the following questions:

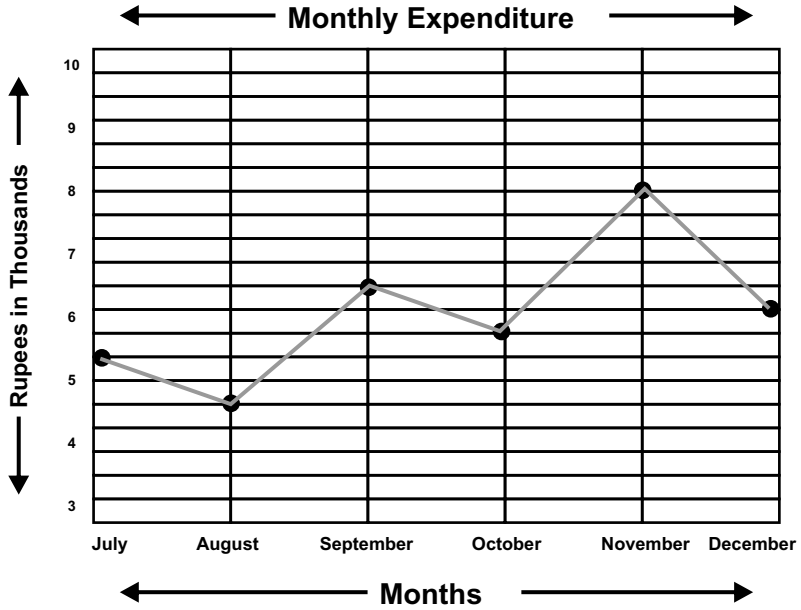
1. How many illiterate persons were in 1970?	45 millions
2. In which year was number of illiterate persons highest?	1990
3. What was the number of illiterate persons in 1960?	39 millions
4. How many illiterate persons were in 1990?	61 millions
5. In which year was the number of illiterate persons the least?	1950

6. Prepare the chart of the graph:

Year	1950	1960	1970	1980	1990
Number of illiterate	27	39	45	53	61

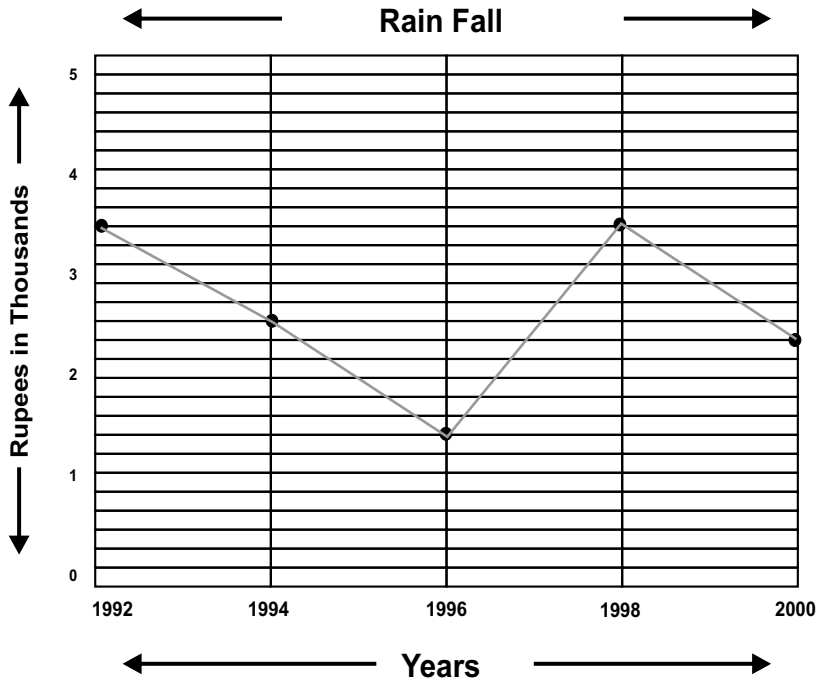
Exercise 7.1

Q.1. The monthly expenditure of a family for-six months is shown by the following line graph:



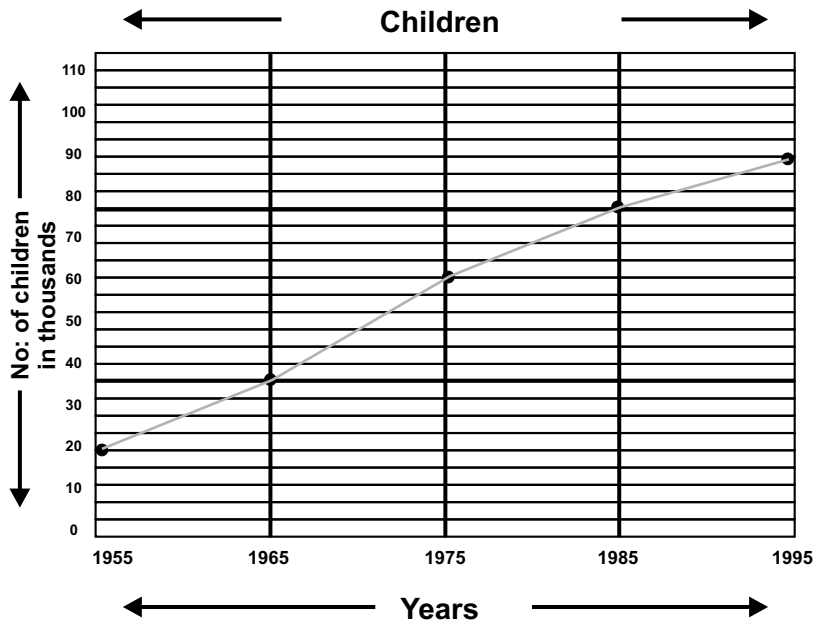
Look at the graph and answer the following questions:
Q.1: In which month the expenditure was the least?
Ans: August
Q.2: In which month the expenditure was the greatest?
Ans: November
Q.3: What was the expenditure in the month of August?
Ans: 8000
Q.4: What was the expenditure in the month of October?
Ans: Rs. 6000

Q.2. The following line graph shows the rainfall record of a town:



Look at the graph and answer the following questions:
Q.1: How many millimeters of rainfall was recorded in 1992?
Ans: 4mm
Q.2: In which year was the highest rainfall recorded ?
Ans: 1992, 1998
Q.3: How many millimeters of rainfall was recorded in 1998?
Ans: 4 mm
Q.4: In which year was the least rainfall recorded?
Ans: 1996
Q.5: How many millimeters of rainfall was recorded in 2000?
Ans: 3 mm

Q.3. The number of children in a city is shown in the following line graph:



Look at the graph and answer the following questions:

Q.1: What was the number of children in 1985?

Ans: 100,000

Q.2: What was the number of children in 1965?

Ans: 50,000

Q.3: What was the number of children in 1975?

Ans: 80,000

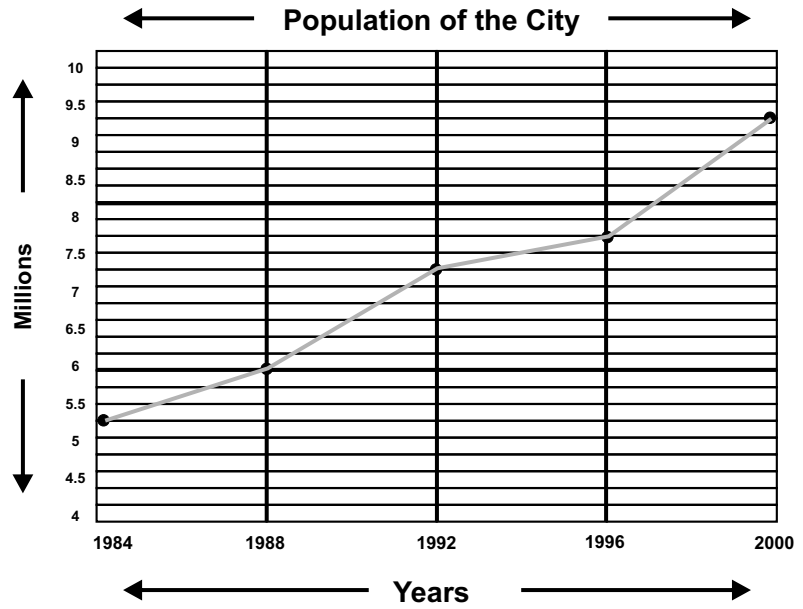
Q.4: In which year was the number o f children highest?

Ans: 1995

Q.5: In which year was the number of children least?

Ans: 1995

Q.4. The population of a certain city is shown in the following line graph.



Look at the graph and answer the following questions:

Q.1: What was the population of the city in 1992?

Ans: 8 million

Q.2: What was the population of the city in 1988?

Ans: 6.5 million

Q.3: What was the population of the city in 2000?

Ans: 10 million

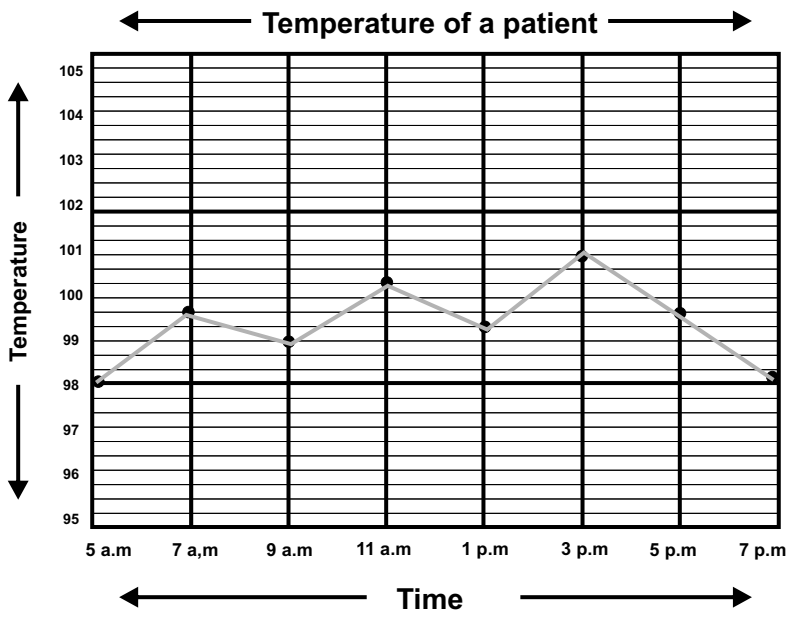
Q.4: In which year was the population least?

Ans: 1984

Q.5: In which year was the population highest?

Ans: 2000

Q.5. The record of the temperature of a patient on a certain day is shown in the following line graph.



Look at the graph and answer the following questions:

Q.1: What was the temperature at 3 p.m?

Ans: 104°F

Q. 2: What was the temperature at 5 p.m?

Ans: 102°F

Q.3: At what time the patient had the highest temperature?

Ans: 3 m.p

Q.4: At what time the patient had the lowest temperature?

Ans: 59.m

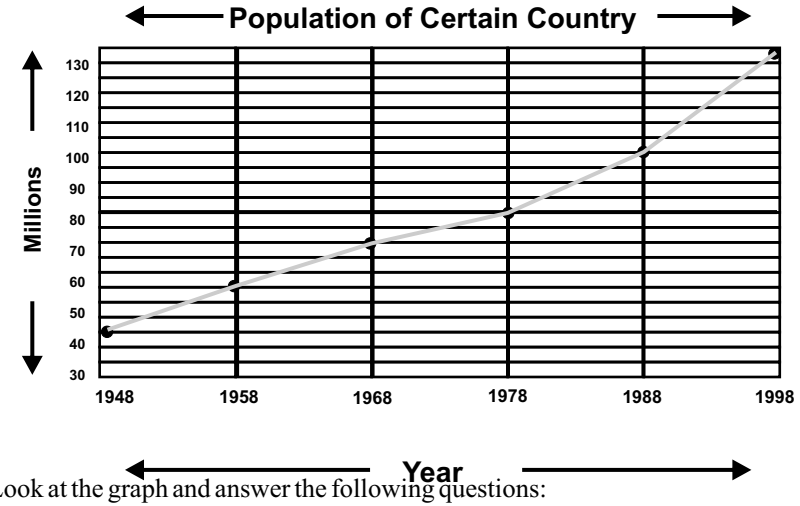
Q.5: After what time the temperature had been decreasing?

Ans: 3 p.m

Q.6: At what times the temperature were equal?

Ans: 7 a.m, 1 p.m, 5 p.m, 5 p.m, 7 p.m

Q.6. The population of certain country is shown in the following line graph:



Look at the graph and answer the following questions:

Q.1: What was the population in 1968?

Ans: 70 million

Q.2: In which year the population was the least?

Ans: 1948

Q.3: What was the population in 1988?

Ans: 100 million

Q.4: In which year the population was the highest?

Ans: 1998

Q.5: Is the population of the country increasing or decreasing?

Ans: Increasing