MATRIX OLYMPIAD

The Most Innovative Talent Recognition Exam

MATHEMATICS

Class - VI
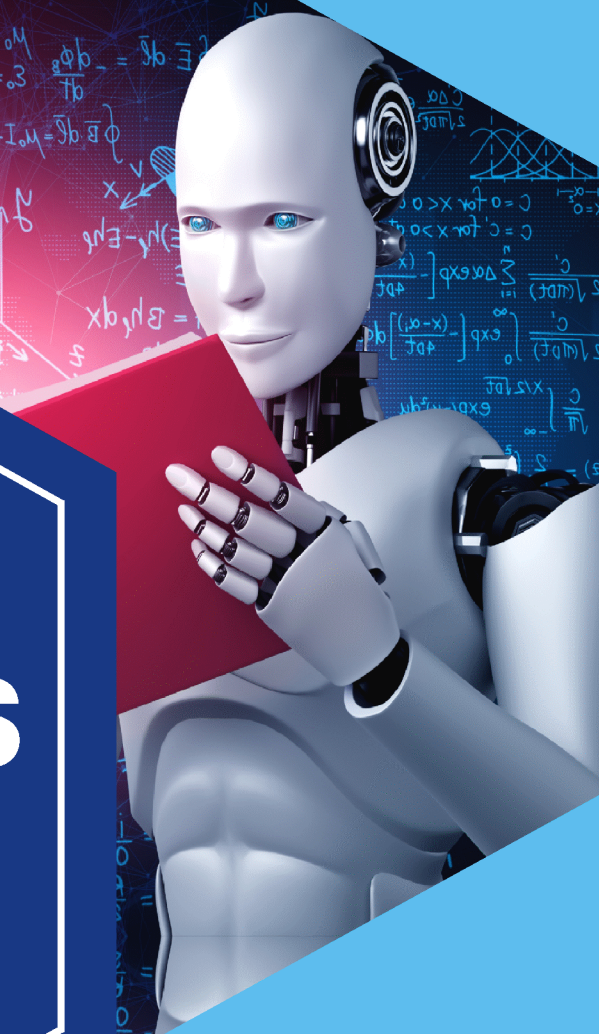
MATRIX

Few words for the Readers

Dear Reader,

"*Matrix Olympiad is established to encourage school students to go a step further than their regular studies, and get a chance and exposure to competition on a wide scale. It also helps students enhance their learning of basic cognitive skills and deeper knowledge of subjects like Science, Mathematics, English, Mental Ability, Social Studies. "Matrix Olympiad helps students nurture their minds for higher targets of tomorrow and enables them to study School for JEE, NEET, CLAT, NDA, Olympiads , NSEJS, NTSE , STSE etc.*"

The above thought has been our guiding principle while designing and collating the study material for **Matrix Olympiad** . And hence, we hope that this particular material will be helpful towards your preparation for **Matrix Olympiad**.

Our team at **MATRIX** has put in their best efforts for making this particular module interesting and relevant for you. Additional efforts have been made to ensure that the content is easy to understand and error free to the extent possible. However, there might remain some inadvertent errors in answer keys and theoretical portion and we would welcome your valuable feedback regarding the same.

If there are any suggestions for corrections, please write to us at **smd@matrixacademy.co.in** and we would be highly grateful.

Finally, we would like to end this message by a famous quote by Ernest Hemingway - "*There is no friend as loyal as a book*." So, please give your study material the time and attention it deserves, and it will surely help you reach newer heights in your fight with competition examinations.

With love and best wishes !

Team MATRIX

CONTENTS

KNOWING OUR NUMBERS

1

📖 INTRODUCTION

Counting things is easy for us now. We can count objects in large numbers, for example, the number of students in the school, and represent them through numerals. We can also communicate large numbers using suitable number names.

It is not as if we always knew how to convey large quantities in conversation or through symbols. Many thousands years ago, people knew only small numbers. Gradually, they learnt how to handle larger numbers. They also learnt how to express large numbers in symbols. All this came through collective efforts of human beings. Their path was not easy, they struggled all along the way. In fact, the development of whole of Mathematics can be understood this way. As human beings progressed, there was greater need for development of Mathematics and as a result Mathematics grew further and faster.

We use numbers and know many things about them. Numbers help us count concrete objects. They help us to say which collection of objects is bigger and arrange them in order e.g., first, second, etc. Numbers are used in many different contexts and in many ways. Think about various situations where we use numbers. List five distinct situations in which numbers are used.

We enjoyed working with numbers in our previous classes. We have added, subtracted, multiplied and divided them. We also looked for patterns in number sequences and done many other interesting things with numbers. In this chapter, we shall move forward on such interesting things with a bit of review and revision as well.

1. COMPARISON OF NUMBERS

For comparing two numbers, we have to remember the following points:

If the number of digits in the given numbers is not same, then the number with greater number of digits is greater.

If the number of digits in the given numbers is same, then

(i) Compare the digits at the first place from the left. The number with greater digit is greater.

(ii) If the numbers on the first place from the left is same, then compare the digits at the second place. The number with greater digit is greater.

Continue the process until you get unequal digits at the corresponding places.

2. ASCENDING AND DESCENDING ORDER

Arrangement of numbers from the smallest to the largest is called ascending order.

Arrangement of numbers from the largest to the smallest is called descending order.

Example 1

Compare the following :

(i) 9242 and 367   (ii) 8263 and 7893   (iii) 5640 and 5784

Solution :

(i) The number of digits in 9242 is 4. The number of digits in 367 is 3.

So, 9242 > 367.

(ii) The number of digits in both the numbers is 4. So we have to compare the digits from the left of the numbers.

∵ 8 > 7

∴ 8263 > 7893

(iii) The number of digits in both the numbers is 4. So, we have to compare the digits from the left of the numbers.

∵ 5 = 5

∴ We have to compare the second digits from the left of the numbers.

∵ 6 < 7   ∴ 5640 < 5784

Example 2

(i) Arrange the following numbers in ascending order.

5348, 6812, 5281, 356, 9812

(ii) Arrange the following numbers in descending order.

4285, 631, 2892, 3800, 4504

Solution :

(i) Ascending order of the given numbers is 356, 5281, 5348, 6812, 9812

(ii) Descending order of the given numbers is, 4504, 4285, 3800, 2892, 631

Example 3

Form the smallest and largest 4–digit number in each of the following without repeating the digits.

(i) 3, 8, 6, 1   (ii) 4, 0, 2, 3

Solution :

(i) Smallest 4–digit number formed from the digits 3, 8, 6, 1 is 1368. (Arranging the digits in ascending order)

Largest 4 – digit number formed from the digits 3, 8, 6, 1 is 8631. (Arranging the digits in descending order)

(ii) Smallest 4 – digit number formed from the digits 4, 0, 2, 3 is 2034. (If we place 0 at first place the number formed will be of 3 – digit).

Largest 4 – digit number formed from the digits 4, 0, 2, 3 is 4320.

3. INTRODUCTION TO LARGE NUMBER

Observe the given pattern :

Largest 1–digit number + 1 = Smallest 2–digit number

$$(9) + 1 = 10$$

Largest 2–digit number + 1 = Smallest 3–digit number

$$(99) + 1 = 100$$

Largest 3–digit number + 1 = Smallest 4–digit number

$$(999) + 1 = 1,000$$

Largest 4–digit number + 1 = Smallest 5–digit number

$$(9,999) + 1 = 10,000$$

This number is called ten thousand.

Also,

Largest 5–digit number + 1 = Smallest 6–digit number

$$(99,999) + 1 = 1,00,000$$

This number is called one lakh.

Continuing the process, we will get 7, 8, 9..... digit numbers; i.e.,

Largest 6–digit number + 1 = Smallest 7–digit number

$$(9,99,999) + 1 = 10,00,000 \text{ (Ten lakh)}$$

Largest 7–digit number + 1 = Smallest 8–digit number

$$(99, 99, 999) + 1 = 1,00,00,000 \text{ (One Crore)}$$

Example 1

Write the number names of each of the following :

(i) 5,04,326   (ii) 38,96,405   (iii) 1,23,40,008

Solution :

(i) 5,04,326 in words is written as;

Five lakh four thousand three hundred twenty six.

(ii) 38,96,405 in words is written as;

Thirty eight lakh ninety six thousand four hundred five.

(iii) 1,23,40,008 in words is written as;

One crore twenty three lakh forty thousand eight.

Example 2

Write the following in expanded form.

(i) 9863402   (ii) 23400

Solution :

(i) Expanded form of 9863402 is

$9 \times 1000000 + 8 \times 100000 + 6 \times 10000 + 3 \times 1000 + 4 \times 100 + 0 \times 10 + 2 \times 1$

(ii) Expanded form of 23400 is

$2 \times 10000 + 3 \times 1000 + 4 \times 100 + 0 + 0$

Example 3

Write the place value of the underlined digits in each of the following :

(i) 3<u>8</u>695   (ii) <u>4</u>020803   (iii) 326<u>1</u>52

Solution :

(i) Place value of 8 in 38695 = 8000

(ii) Place value of 4 in 4020803 = 4000000

(iii) Place value of 1 in 326152 = 100

4. SYSTEM OF NUMERATION

There are two systems of reading and writing the numbers :

● The Indian System

● The International System

The names of large numbers are read differently in India as compared to the other parts of the world. This will become clear from the following example.

Indian System	Arabs	Ten Crores	Crores	Ten lakhs	Lakhs	Ten thousands	Thousands	Hundreds	Tens	Ones
Numeral		5	4	3	6	5	9	8	0	1
International System	Billions	Hundred millions	Ten millions	Millions	Hundred thousands	Ten thousands	Thousands	Hundreds	Tens	Ones

Here, the given numeral is 543659801.

We can see that, in Indian system of numeration, it can be read/written as, "Fifty four crore thirty six lakh fifty nine thousand eight hundred one".

While in International system of numeration, it can be read/written as, "Five hundred forty three million six hundred fifty nine thousand eight hundred one".

To place commas, use following rules :

- In Indian System, first comma comes after three digits from the right and the next commas come after every next two digits.

- In International System, first comma comes after three digits from the right and the next commas come after every next three digits.

Example 1

Write the following numerals in words in both Indian and International System of Numeration.

(i) 394261   (ii) 5430030   (iii) 19860005

Solution :

	Numeral	Indian System of Numeration	International System of Numeration
(i)	394261	Three lakh ninety four thousand two hundred sixty one.	Three hundred ninety four thousand two hundred sixty one.
(ii)	5430030	Fifty four lakh thirty thousand thirty.	Five million four hundred thirty thousand thirty.
(iii)	19860005	One crore ninety eight lakh sixty thousand five.	Nineteen million eight hundred sixty thousand five.

Example 2

Place the commas in each of the following using both Indian and International System.

(i) 1232843   (ii) 920040   (iii) 86920605

Solution :

	Numeral	Indian System	International System
(i)	1232843	12,32,843	1,232,843
(ii)	920040	9,20,040	920,040
(iii)	86920605	8,69,20,605	86,920,605

5. LARGE NUMBERS IN OUR DAY TO DAY LIFE

Let us learn with the help of some illustrations.

Example 1

Mayank was asked to multiply 1936 by 36. Instead, he multiplied 1963 by 36. What is the difference between the correct answer and incorrect answer?

Solution :

correct multiplication is,

```
    1936
  ×   36
  ───────
   11616
 +58080
  ───────
   69696
```

Incorrect multiplication is,

```
    1963
  ×   36
  ───────
   11778
 +58890
  ───────
   70668
```

∴ Required difference = 70668 – 69696 = 972

Example 2

The distance between Riya's and Sameer's house is 105683 m. The distance between Sameer's and Shweta's house is 98654 m. What is the total distance (in km) Riya covers if she first goes to Sameer's house and then Shewta's house?

Solution :

Distance between Riya's and Sameer's house = 105683 m = 105 km 683 m

Distance between Sameer's and Shweta's house = 98654 m = 98 km 654 m

∴ Total distance Riya has to cover is,

```
  105 km      683 m
+  98 km      654 m
──────────────────────
  204 km      337 m
```

6. ESTIMATION

6.1 ESTIMATING BY ROUNDING OFF TO THE NEAREST TENS

If we round off 9323 to the nearest tens, then we need to observe the digit in the unit place. If the digit is between 0 and 4 (both inclusive) then we will leave the digit in the tens place unchanged. Otherwise, its value will increase by 1. The unit place digit will become zero. Here, the rounded off number will be 9320.

6.2 ESTIMATING BY ROUNDING OFF TO THE NEAREST HUNDREDS

If we round off 8612 to the nearest hundreds, then we need to observe tens place digit. If the digit is between 0 and 4 (both inclusive), then we will leave the digit in the hundreds place unchanged. Otherwise its value will increase by 1. The tens place and unit place digits will become zero. Here, the rounded off number will be 8600.

Focus Point

- We can estimate the sum and difference of two or more numbers by rounding off the numbers
- We can estimate the product and quotient of two numbers by rounding off the numbers to the greatest place.

Example 1

Estimate each of the following by rounding off to nearest thousands.

(i) 9683 + 4815   (ii) 3945 – 1243   (iii) 3042 × 1101

Solution :

(i) 9683 when rounded off   =   10000

4815 when rounded off   =   +5000

Estimated sum   =   15000

(ii) 3945 when rounded off   =   4000

1243 when rounded off   =   -1000

Estimated difference   =   3000

(iii) 3042 when rounded off   =   3000

1101 when rounded off   =   ×1000

Estimated Product   =   3000000

6.3 USE OF BRACKETS

Use of brackets allows us to avoid confusion in the problems where we need to carry out more than one number of operation. While using brackets, first turn everything inside the brackets into single number and then do the operation outside.

We can also find the product of two numbers by expanding the brackets.

Let us learn with the help of illustrations.

Example 1

Simplify :

(i) 1586 – (300 + 821)   (ii) 3281 + (241 – 130)

(iii) 126 + (15 × 13)   (iv) 198 × (42 + 58)

Solution :

(i) 1586 – (300 + 821) = 1586 – 1121 = 465

(ii) 3281 + (241 –130) = 3281 + 111 = 3392

(iii) 126 + (15 × 13) = 126 + 195 = 321

(iv) 198 × (42 + 58) = 198 × 100 = 19800

7. ROMAN NUMERALS

There is one another numeration system, called Roman Numeration. This is the oldest system of numeration and is still in common use.

Roman Numerals	I	V	X	L	C	D	M
Hindu Arabic Numerals	1	5	10	50	100	500	1000

7.1 RULES FOR ROMAN NUMBERS

Rule 1 : Repetition of a roman numeral means addition. A symbol can be repeated a maximum of three times in a numeral.

Rule 2 : Putting a symbol of smaller value 'after' a symbol of bigger value means adding the values of the symbols.

Rule 3 : Putting a symbol of smaller value 'before' a symbol of bigger value means subtracting the value of the first symbol from that of the second.

Rule 4 : If a symbol of smaller value comes in between two symbols of larger values, then its value is always subtracted from the value of the symbol immediately following it.

Focus Point

- The symbol I can be subtractd from V and X only.

- The symbol X can be subtracted from L and C only.

- A symbol V, L and D can never be subtracted nor repeated.

- A symbol of smaller value can be subtracted from a symbol of greater value just once.

- If a bar is placed over a numeral, it is multiplied by 1000. i.e., $23,000 = 23 \times 1000 = \overline{\text{XXIII}}$

  or $\overline{\text{XXIII}} = 23 \times 1000 = 23,000$

  $\overline{XXIII} = 20 \times 1000 = 20,000$

Example 1

Write the following in Hindu Arabic numeral.

(i) XXX   (ii) CC   (iii) MM

Solution :

(i) XXX = 10 + 10 + 10 = 30

(ii) CC = 100 + 100 = 200

(iii) MM = 1000 + 1000 = 2000

Example 2

Write the following in Roman numeral.

(i) 20   (ii) 300   (iii) 3

Solution :

(i) 20 = 10 + 10 = XX

(ii) 300 = 100 + 100 + 100 = CCC

(iii) 3 = 1 + 1 + 1 = III

Example 3

Write the following in Hindu Arabic numeral.

(i) XL   (ii) XC   (iii) CM

Solution :

(i) XL = 50 – 10 = 40

(ii) XC = 100 – 10 = 90

(iii) CM = 1000 – 100 = 900

Example 4

Write the following in Hindu Arabic numeral.

(i) XIV   (ii) CXL   (iii) MCD

Solution :

(i) XIV = 10 + (5 – 1) = 10 + 4 = 14

(ii) CXL = 100 + (50 – 10) = 100 + 40 = 140

(iii) MCD = 1000 + (500 – 100) = 1000 + 400 = 1400

BUILD THE CONCEPT

• For given two numbers,

(i) one with more digit is greater.

(ii) if the number of digits is same, that number is greater which has a greater left most digit.

• To form greatest or smallest numbers by using given digits, arrange the digits in descending or ascending order respectively.

• In Indian system of numeration, the first three places from right make the ones period, next two places make thousands period, next two places make lakhs period and so on.

• In International system of numeration, the first three places from right make the ones period, next three places make the thousands period, next three places make the millions period and so on.

• Estimation can be done with the help of rounding off the numbers to the nearest tens, hundreds, thousands and so on.

• Roman numerals is the another way of writing numerals. While writing roman numerals, we have to follow the following conditions :

(i) Repetition of a symbol means addition.

(ii) If a symbol of smaller value is written to the right of symbol of greater value, the smaller one is added to the greater one.

(iii) If a smaller Roman numeral is written to the left of a greater Roman numeral, the smaller one is always subtracted from the greater one.

(iv) If a smaller Roman numeral is placed between the larger two, it is always subtracted from the one immediately following it.

SE. 1

Find the greatest and smallest number from the given numbers.

56731, 57361, 51637, 51736, 53176

Ans. Here, digits of all the numbers are same. Among the five numbers, 51637 is the smallest and 57361 is the greatest.

SE. 2

Write the following numbers in the expanded form.

(i) 60,01,009

(ii) 8,56,43,210

Ans. (i) In the expanded form, 60,01,009 is written as :

$60,01,009 = 6 \times 10,00,000 + 0 \times 1,00,000 + 0 \times 10,000 + 1 \times 1,000 + 0 \times 100 + 0 \times 10 + 9$

$= 6 \times 10,00,000 + 1 \times 1,000 + 9$

(ii) In the expanded form, 8,56,43,210 is written as :

$8,56,43,210 = 8 \times 1,00,00,000 + 5 \times 10,00,000 + 6 \times 1,00,000 + 4 \times 10,000 + 3 \times 1,000 + 2 \times 100 + 1 \times 10 + 0 \times 1$

$= 8 \times 1,00,00,000 + 5 \times 10,00,000 + 6 \times 1,00,000 + 4 \times 10,000 + 3 \times 1,000 + 2 \times 100 + 1 \times 10.$

SE. 3

Write the given numbers in roman numerals :

(i) 967

(ii) 534

(iii) 385

Ans. (i) $967 = 1000 - 100 + (50 + 10 + 7) = $ CMLXVII

(ii) $534 = 500 + 10 + 10 + 10 + (5 - 1) = $ DXXXIV

(iii) $385 = 300 + (50 + 30) + 5 = $ CCCLXXXV

SE. 4

The population of Karnataka is 54,37,211; of Delhi is 7,64,46,300; of Gujarat is 12,43,998. What is combined population of the three states? Also, write the total population of three states in International System of numeration.

Ans. Population of Karnataka is 54,37,211

Population of Delhi is 7,64,46,300

Population of Gujarat is 12,43,998

∴ Total population of three states =

```
   54, 37, 211
 7, 64, 46, 300
+12, 43, 998
_____
 8, 31, 27, 509
```

i.e., Eight crore thirty one lakh twenty seven thousand five hundred and nine.

In International System 83127509 can be written as eighty three million one hundred twenty seven thousand five hundred nine.

SE. 5

Write the following in words according to Indian System of numeration :

(i) 5863496   (ii) 7425426

(iii) 25824320   (iv) 16289519

Ans. (i) Fifty eight lakh sixty three thousand four hundred ninety six.

(ii) Seventy four lakh twenty five thousand four hundred twenty six.

(iii) Two crore fifty eight lakh twenty four thousand three hundred twenty.

(iv) One crore sixty two lakh eighty nine thousand five hundred nineteen.

SE. 6

Form the largest 4 digit number using any one digit twice.

(i) 4,9,8   (ii) 7,3,0

Ans. (i) 4, 9, 8

Arranging all the digits in the descending order i.e., 9,8,4.

$\therefore$ Largest four digit number = 9984.

(ii) 7, 3, 0

Arrange all the digits in descending order i.e., 7,3,0

$\therefore$ Largest four digit number = 7730.

SE. 7

Arrange the following in descending order :

(i) 12353, 189625, 125963, 82081

(ii) 962819237, 659640, 11398

Ans. (i) 189625 > 125963 > 82081 > 12353

(ii) 962819237 > 659640 > 11398

SE. 8

Write the following in words according to International System of numeration :

(i) 123527891

(ii) 183523512

(iii) 9058009

(iv) 2348828

Ans. (i) One hundred twenty three million five hundred twenty seven thousand eight hundred ninety one.

(ii) One hundred eighty three million five hundred twenty three thousand five hundred twelve.

(iii) Nine million fifty eight thousand nine.

(iv) Two million three hundred forty eight thousand eight hundred twenty eight.

SE. 9

Make the greatest and the smallest 5 – digit numbers using any five different digits with the condition given below :

(i) Digit 8 is always at hundreds place.

(ii) Digit 1 is always at thousands place.

Ans. The digits are 9,8,7,6,5,4,3,2,1,0

(i) Keeping digit 8 at hundreds place, the greatest number is 97865 and the smallest number is 10823.

(ii) Keeping digit 1 at thousands place, the greatest number is 91876 and the smallest number is 21034.

SE. 10

Each book has 20 pages. Every day 12,800 books are printed. How many total pages are printed every day?

Ans. Each book has 20 pages.

$\therefore$ 12,800 books have $(12,800 \times 20)$ pages

= 2,56,000 pages

Hence, 2,56,000 pages are printed every day.

SE. 11

Write the numerals and place the commas,

(i) Seven crore thirty two lakh fifty four thousand two hundred sixty three

(ii) One hundred eighty five million three hundred twenty three thousand two hundred fifty one

(iii) Sixty two lakh nine thousand six hundred nineteen

(iv) Two million three hundred forty six thousand eight hundred twenty five

(v) One hundred million two hundred thousand three hundred

Ans. (i) 7,32,54,263   (ii) 185,323,251

      (iii) 62,09,619   (iv) 2,346,825

      (v) 100,200,300

SE. 12

Express the following as Hindu - Arabic numerals.

(i) CLIX   (ii) MCDX

(iii) MDCXC

Ans. (i) CLIX = 100 + 50 + (10 – 1) = 159

      (ii) MCDX = 1000 + (500 – 100) + 10 = 1410

      (iii) MDCXC = 1000 + 500 + 100 + (100 – 10)

      = 1000 + 600 + 90 = 1690

SE. 13

Arrange the following in ascending order.

(i) 39126, 39216, 42216, 38158, 41206

(ii) 99896, 98996, 99986, 99968, 89996

Ans. (i) 38158 < 39126 < 39216 < 41206 < 42216

      (ii) 89996 < 98996 < 99896 < 99968 < 99986

SE. 14

Estimate the following sum to the nearest thousands.

(i) 3298 + 6281   (ii) 1215 + 987

(iii) 3940 + 1850

Ans. (i) 3298 is round off to   3000

      6281 is round off to   + 6000

      Estimated sum   = 9000

      (ii) 1215 is round off to   1000

      987 is round off to   +1000

      Estimated sum   = 2000

      (iii) 3940 is round off to   4000

      1850 is round off to   + 2000

      Estimated sum   = 6000

SE. 15

Exchange the digits 2 and 7 of the following numbers and compare the new number with the previous one :

(i) 172984

(ii) 578582

Ans. (i) 127984, less than previous one

      (ii) 528587, less than previous one

SE. 16

Estimate the following difference to the nearest thousands.

(i) 5693 – 3254

(ii) 3961 – 1280

(iii) 7612 – 2893

Ans. (i) 5693 is round off to   6000

      3254 is round off to   - 3000

      Estimated difference.   = 3000

      (ii) 3961 is round off to   4000

      1280 is round off to   -1000

      Estimated difference.   = 3000

      (iii) 7612 is round off to   8000

      2893 is round off to   - 3000

      Estimated difference   = 5000

SE. 17

Simplify the following :

(i) 48 + (100 – 4)

(ii) 105 × (20 – 10)

(iii) 36 + (40 x 20)

Ans. (i) 48 + (100 – 4) = 48 + 96 = 144

      (ii) 105 x (20 – 10) = 105 × 10 = 1050

      (iii) 36 + (40 x 20) = 36 + 800 = 836

SE. 18

Estimate the following product to the nearest hundreds.

(i) 72×439 (ii) 96×385

(iii) 342×248

Ans. (i) 439 is round off to 400

72 is round off to 100

Estimated product = $(400 \times 100) = 40000$

(ii) 96 is round off to 100

385 is round off to 400

Estimated product = $(100 \times 400) = 40000$

(iii) 342 is round off to 300

248 is round off to 200

Estimated product = $(300 \times 200) = 60000$

SE. 19

Simplify the following by expanding brackets.

(i) 9×108 (ii) 40×150

(iii) 38×96

Ans. (i) $9 \times 108 = 9 \times (100 + 8)$

$= 9 \times 100 + 9 \times 8 = 900 + 72 = 972$

(ii) $40 \times 150 = 40 \times (100 + 50)$

$= 40 \times 100 + 40 \times 50 = 4000 + 2000 = 6000$

(iii) $38 \times 96 = 38 \times (100 - 4)$

$= 38 \times 100 - 38 \times 4 = 3800 - 152 = 3648$

SE. 20

Compare the following :

(i) 98465, 98015

(ii) 328450, 314650

(iii) 248660, 24866

Ans. (i) $98465 > 98015$

(ii) $328450 > 314650$

(iii) $248660 > 24866$

ONLY ONE CORRECT TYPE

1. The place value of the digit 6 in the number 576238 is _____.
   (A) 6200   (B) 6
   (C) 6000   (D) 1000

2. 6580 rounded off to the nearest thousands is ___.
   (A) 7000   (B) 6000
   (C) 6600   (D) 6500

3. The Roman numeral of 92 is _____.
   (A) CXII   (B) XCII
   (C) LIV   (D) LVIII

4. "Forty six thousand eight hundred forty two" in numerals is _____.
   (A) 46428   (B) 46248
   (C) 46842   (D) 64824

5. Which of the following numbers in Roman numerals is incorrect ?
   (A) LXXX   (B) LXX
   (C) LX   (D) LLX

6. How many zeroes are there in 10 lakhs ?
   (A) 6   (B) 7
   (C) 8   (D) 4

7. The Hindu–Arabic numeral for MCV is _____.
   (A) 1115   (B) 1105
   (C) 1015   (D) 1150

8. The symbol I can be subtracted from _____.
   (A) V only   (B) X only
   (C) L only   (D) Both V and X

9. Which of the following set of numbers are arranged in descending order?
   (A) 1356, 1635, 1520, 1536
   (B) 1635, 1520, 1356, 1536
   (C) 1356, 1520, 1536, 1635
   (D) 1635, 1536, 1520, 1356

10. The successor of 1 million is _____.
    (A) 2 millions   (B) 1000001
    (C) 100001   (D) 10001

11. The number 35769 rounded off to the nearest hundred is _____.
    (A) 40000   (B) 36000
    (C) 35800   (D) 35000

12. The expanded form of 40,02,382 is _____.
    (A) $4 \times 10,00,000 + 2 \times 1,00,000 + 3 \times 1,000 + 8 \times 10 + 2$
    (B) $4 \times 10,00,000 + 2 \times 1,000 + 3 \times 1,00 + 8 \times 10 + 2$
    (C) $4 \times 1,00,000 + 2 \times 10,000 + 3 \times 1,000 + 8$
    (D) None of these

13. The sum of largest 6–digit number and smallest 6–digit number is _____.
    (A) 100000   (B) 1999999
    (C) 99999   (D) 1099999

14. Which of the following numbers is written according to International System of numeration ?
    (A) 15, 26,430   (B) 1,526,430
    (C) 1,52,64,30   (D) None of these

15. The number 6242530 is written in words as ____.
    (A) Six million two hundred forty two thousand thirty.
    (B) Sixty two lakh forty two thousand five hundred thirty.
    (C) Sixty lakh forty thousand five hundred thirty.
    (D) Sixty two lakh forty two thousand five hundred thirty.

16. The largest 4–digit number that can be formed with the digits 0,3,6,8 (without repetition) is ___.
    (A) 0836   (B) 8036
    (C) 8603   (D) 8630

17. How many millilitres are there 1 KL ?
    (A) 100000   (B) 1000
    (C) 1000000   (D) 100

18. The estimated product of 102 × 92 is _____.

(A) 9500   (B) 9000

(C) 9800   (D) 9400

19. Which of the following numbers is the smallest ?

(A) Ten lakh three

(B) One million five thousand

(C) One million

(D) One crore

20. The piece of cloth required for a shirt is 2 m 85 cm. How much cloth will be required for 16 such shirts ?

(A) 45m 16cm   (B) 45m 60cm

(C) 50m 60cm   (D) 32m 60cm

21. Place value of a digit in a number is _____.

(A) Face value × value of the just preceding place it occupies in place value chart

(B) Face value × value of the place it occupies in the place value chart

(C) Face value

(D) None of these

22. Smallest 6–digit number formed by using 5, 0, 3, 2, 6, 1 using each digit once is _____.

(A) 032615   (B) 102356

(C) 102365   (D) 012356

23. 3,00,000 people visited a park in 200 days and same number of people visited the park everyday. How many people visited the park in 1 day ?

(A) 15,000   (B) 150

(C) 1,500   (D) 3,000

24. When a Roman numeral of smaller value is put between two numbers of greater value, it is subtracted from the numeral on its _____.

(A) Left   (B) Right

(C) Both sides   (D) Next numeral from left

25. Millions period consists of the places _____.

(A) M, TM   (B) M, TM, HM

(C) TTH, HTH, M   (D) O, T, M

PARAGRAPH TYPE

PASSAGE # I

1 kg = 1000 grams = 1000000 mg and 1 m = 100 cm = 1000 mm.

1. Convert 3 kg 15 grams into milligrams.

(A) 3015000 mg   (B) 301500 mg

(C) 3015 mg   (D) None of these

2. Neena bought 5kg 500 g wheat from the market. She filled a contain which could take 400 g of wheat. How much wheat is left out ?

(A) 5000g   (B) 5400g

(C) 5500g   (D) 5100g

3. 3m 20cm of cloth is used for one shirt. What length of cloth will be used for 3 such shirts ?

(A) 6m 90cm   (B) 9m 60cm

(C) 9600 cm   (D) 1m 60cm

PASSAGE # II

Symbol	L	C	D	M	I	X
Value	50	100	500	1000	1	10

1. What is the roman numeral of 70?

(A) XXL   (B) XXC

(C) CXX   (D) LXX

2. Find the sum of LX and XC.

(A) 160   (B) 150

(C) 140   (D) 130

3.   Hindu – Arabic numeral of MV is
      (A) 1500   (B) 1005
      (C) 1400   (D) 995

ANALYTICAL PROBLEMS

1.   Write the smallest 8-digit odd number using all odd digits.

2.   At a rock concert there 5500 spectators, out of which 750 were invites, who were given free tickets. The total collection from the sale of tickets was Rs. 5,93,750. What was the cost of 1 ticket.

3.   The headline read "A MILLION VOTED TODAY". Actually 90,018 people voted each hour for 12 hours. Did the newspaper give a sensible account of the number of votes cost in the election?

4.   I as a Roman numeral, am CMXCIX. Break me up and then can you recognise me ?

5.   The sum of my digits is 12. When rounded off to the nearest hundred. I am 500. Rounding to the nearest 10 makes me 530. What am I ?

MATCH THE COLUMN TYPE

      In this section each question has two matching lists. Choices for the correct combination of elements from List–I and List–II are given as options (A), (B), (C) and (D) out of which one is correct.

1.   Match the following.

      List–I   List–II
      (P) 1 lakh   (i) 100 tens
      (Q) 1 thousand   (ii) 1 million
      (R) 1 crore   (iii) 100 thousands
      (S) 10 lakh   (iv) 10 millions

Code:

	P	Q	R	S
(A)	i	ii	iii	iv
(B)	iii	i	ii	iv
(C)	iii	i	iv	ii
(D)	iv	ii	iii	i

2.   Match the following.

      List–I   List–II
      (P) XLIX   (i) 55
      (Q) LV   (ii) 99
      (R) XCIX   (iii) 1500
      (S) MD   (iv) 49

Code:

	P	Q	R	S
(A)	ii	iii	i	iv
(B)	iv	iii	ii	i
(C)	ii	i	iv	iii
(D)	iv	i	ii	iii

NUMERICAL PROBLEMS

      In this section, each question, when worked out will result in one integer from 0 to 9 (both inclusive).

1.   Which digit of the number 871,253,564 has the same face and place value?

2.   What is the product of digits of a round off number, if the number is 112?

3.   Estimate the difference of 8.03 and 4.50.

4.   What is sum of digits of the smallest 4–digit number formed by two different digits?

5.   What is the product of digits at the 100 thousands and ten millions place of the given number 16,732,496 ?

VERY SHORT ANSWER TYPE

1. Write expressions for the following using brackets.

   "Forty nine divided by three times the sum of five and seven".

2. Express eight crore five thousand six in numerals.

3. Rearrange the given numbers in ascending order.

   5,90,672; 5,09,762; 2,69,705; 7,06,259; 9,07,526.

4. Compare: 40017 _____ 40007.

5. What is the largest 5–digit number with 2 at ones place and 3 at tens place?

6. Write the Hindu–Arabic numeral of CCL.

7. Find the sum of the place values of 7s and 4 in 43,627,897.

8. Find the product by suitable estimation 1211 × 321

9. Write the smallest 8–digit number having five different digits.

10. Insert commas according to Indian system of numeration:

    (i) 28754263

    (ii) 3864259

SHORT ANSWER TYPE

1. Write the number names of each of the following:

   (i) 534, 567, 891   (ii) 23,46,891

   (iii) 386,212   (iv) 2,12,42,861

2. The total expenses of a birthday party of 30 boys were Rs.15,000. All shared the expenses equally. How much money was spent by each boy in the party ?

3. Use the given digits 2,3,8,9,0 without repetition and make the greatest and smallest 5–digit numbers.

4. Write the following in expanded form.

   (i) 286542   (ii) 19360654

   (iii) 1212121

5. Simplify the following using brackets.

   (i) 428 × 20   (ii) 98 × 102

   (iii) 305 × 40   (iv) 36 × 48

LONG ANSWER TYPE

1. Write the following numbers according to Indian and International system of numeration and insert commas.

   (i) 321543302   (ii) 136843

2. Rani bought 6 bags of cement, each weighing 18 kg 300g. Find the total weight of cement.

3. Exchange 2nd and 4th digits of the numeral 4,92,576 and find the new number formed. Also identify the place value of digit 5 in the new number.

4. Find the sum.

   (i) MCD + CCL + DCL

   (ii) MMCDVII + CLVII + CIII

   (iii) $\overline{\text{XXIII}}$ + $\overline{\text{XLVII}}$ + $\overline{\text{XXX}}$

   (iv) MXXVIII + DCVII + DVIII

5. Write the following in Roman numerals.

   (i) 497   (ii) 6219

   (iii) 23432   (iv) 3261

   (v) 48250   (vi) 888

   (vii) 118   (viii) 96

TRUE / FALSE TYPE

1. The symbol 'X' roman numeral cannot be subtracted.

2. The expansion of 52,936 is $5 \times 10,000 + 2 \times 1,000 + 9 \times 100 + 3 \times 10 + 6$.

3. One hundred thousand is equal to one crore.

4. 6 kL = 600000 litres.

5. Hindu – Arabic numeral for 56 is LXV.

FILL IN THE BLANKS

1. The smallest natural number is _____.

2. The symbols of Roman numerals which can never by repeated are _____.

3. One million two is written as _____.

4. Periods must be separated by using _____.

5. The place value of 5 in 2, 750,968 is _____.

Space for Notes :

1. The difference between the largest and the smallest numbers among these numbers is:

   12853, 37910, 49999, 22002, 9240

   (A) 9062   (B) 46208

   (C) 37146   (D) 40759

2. Which one of the following statements is incorrect?

   (A) Greatest single-digit number + 1 = Smallest 2-digit number.

   (B) Smallest 3-digit number – 1 = Greatest 2-digit number.

   (C) Greatest 3-digit number + 1 = Smallest 4-digit number.

   (D) Smallest 4-digit number – 1 = Greatest 5-digit number.

3. What is the Hindu-Arabic numeral for the given difference of Roman numerals ?

   $\overline{V}CM - MMXC$

   (A) 3000   (B) 4800

   (C) 3610   (D) 3810

4. The difference of the largest 6-digit number and the smallest 6-digit number formed by the digits 6, 0, 8, 3, 1, 9 without repeating the digits is:

   (A) 804942   (B) 489420

   (C) 882621   (D) 894942

5. A scending order of the given Roman numerals is:

   $\boxed{XXXIV, XLVII, XLI, LXI}$

   (A) XXXIV, LXI, XLI, XLVII

   (B) XLI, LXI, XLVII, XXXIV

   (C) XXXIV, XLI, XLVII, LXI

   (D) XLI, XXXIV, XLVII, XLI

6. Which two digits have the same place value and face value in the number 8205749?

   (A) 9 and 8   (B) 0 and 9

   (C) 0 and 8   (D) 5 and 0

7. Find the difference of the place values of 3 in the largest 6-digit number and the smallest 6-digit number formed by the digits 2, 5, 9, 0, 6, 3 without repeating any of the digits.

   (A) 29700   (B) 2970

   (C) 27000   (D) 2700

8. What is the Hindu-Arabic numeral for the given difference of Roman numerals ?

   $\overline{V}CMLXXX - MMDXC$

   (A) 3360   (B) 3270

   (C) 3410   (D) 3390

9. The difference of the largest and the smallest 6-digit numbers formed by the digits 4, 0, 8, 7, 1, 5 without repeating the digits is:

   (A) 729630   (B) 661761

   (C) 702963   (D) 770832

10. Which of the following digits have the same place value and same face value in the number 9087654?

    (A) 5 and 9   (B) 9 and 0

    (C) 0 and 4   (D) 9 and 4

11. The sum of the smallest 4-digit number and the largest 4-digit number formed by using the digits 1,0,8 where any one digit (same or different) repeated twice in both the numbers is:

    (A) 9809   (B) 9180

    (C) 9118   (D) 9818

12. Value of which one of the following Roman numerals is equal to the value of the given difference of Roman numerals ?

$(\overline{V}DLI - CDLX)$

(A) $\overline{V}CX$ (B) $\overline{V}XCI$

(C) $DXCI$ (D) $\overline{V}LXXXVIII$

13. The sum of the face value of 4 and 2 in any number having 4 and 2 as the digit, is:

(A) 4   (B) 8

(C) 2   (D) 6

14. Which one of the following has the same value as the given statement has?

$$\boxed{2 + 5 + 7 + 11 + 93 + 89 + 98 + 95}$$

(A) 200 + 200 + 200 + 200

(B) 95 + 93 + 105 + 106

(C) 100 + 100 + 100 + 100

(D) 99 + 101 + 98 + 102 + 90 + 110

Space for Notes :

Answer Key

EXERCISE I														
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**
C	A	B	C	D	A	B	D	D	B	C	B	D	B	B
16	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**
D	C	B	B	C	A	B	C	B	B	C	B	C	B	B

FILL IN THE BLANKS

1. 1   **2.** V,L,D   **3.** 1,000,002   **4.** Commas   **5.** 1,00,000

6. Greater **7.** 71   **8.** 7315   **9.** 50,000

10. 10,000; 1,000;100; 10;1

TRUE/FALSE TYPE

1. F   **2.** T   **3.** F   **4.** T   **5.** F   **6.** F   **7.** F

8. T   **9.** F   **10.** F

MATCH THE COLUMN

1. C   **2.** D   **3.** B

PARAGRAPH I

1. A   **2.** D   **3.** B

PARAGRAPH II

1. D   **2.** B   **3.** B

EXERCISE II

VERY SHORT ANSWER TYPE

1. $49 \div [3 (5 + 7)]$ **2.** 8,00,05,006   **3.** 2,69,705; 5,09,762; 5,90,672; 7,06,259; 9,07,526.

4. 40017 > 40007   **5.** 99932   **6.** 250   **7.** 40,007,007   **8.** 3,60,000   **9.** 1,00,00,234

10. (i) 2,87,54,263   (ii) 38,64,259

SHORT ANSWER TYPE

1. (i) Five hundred thirty four million five hundred sixty seven thousand eight hundred ninety one.

(ii) Twenty three lakh forty six thousand eight hundred ninety one.

(ii) Three hundred eighty six thousand two hundred twelve.

(iv) Two crore twelve lakh forty two thousand eight hundred sixty one.

2. 500   **3.** 98320, 20389   **4.** 6120   **5.** (i) 540000   (ii) 3000   (iii) 1100

6. (i) 6,050,306 (ii) 26,48,205 (iii) 808,080,808 (iv) 2,20,22,202

7. (i) Expanded form of 2,86,542 = 2 × 1,00,000 + 8 × 10,000 + 6 × 1,000 + 5 × 100 + 4 × 10 + 4.

(ii) Expanded form of 1,93,60,654 = 1 × 1,00,00,000 + 9 × 10,00,000 + 3 × 1,00,000 + 6 × 10,000 +

0 × 1,000 + 6 × 100 + 5 × 10 + 4.

(iii) Expanded form of 12,12,121 = 1 × 10,00,000 + 2 × 1,00,000 + 1 × 10,000 + 2 × 1,000 + 1 × 100 +

2 × 10 + 1

8. (i) XXVII < 29 (ii) 42 = XLII (iii) 386 > CCL (iv) 460 < DC   9. (i) 70,80,900 (ii) 4,55,055 (iii) 36,425

10. (i) 8560   (ii) 9996 (iii) 12200 (iv) 1728

LONG ANSWER TYPE

1. (i) We have, 321543302

Indian system : It is written as 32,15,43,302.

Number name – Thirty two crore fifteen lakh forty three thousand three hundred two.

International system : It is written as 321,543,302.

Number name – Three hundred twenty one million five hundred forty three thousand three hundred two.

(ii) We have, 136843

Indian system : It is written as 1,36,843

Number name – One lakh thirty six thousand eight hundred forty three.

International system : It is written as 136,843.

Number name – One hundred thirty six thousand eight hundred forty three.

2. 109 kg 800g   3. 50 thousand   4. (i) MMCCC (ii) MMDCLXVII (iii) $\overline{C}$ (iv) MMCXLIII

5. (i) CDXCVII   (ii) $\overline{VI}$CCXIX   (iii) $\overline{XXIII}$CDXXXII   (iv) MMMCCLXI

(v) $\overline{XLVIII}$CCL   (vi) DCCCLXXXVIII   (vii) CXVIII (viii) XCVI

NUMERICAL PROBLEMS

1.	1	**2.**	4	**3.**	7	**4.**	9	**5.**	8	**6.**	0	**7.**	3
8.	1	**9.**	6	**10.**	7								

SELF PROGRESS ASSESSMENT FRAMEWORK

(CHAPTER : KNOWING OUR NUMBERS)

CONTENT	STATUS	DATE OF COMPLETION	SELF SIGNATURE
Theory			
In-Text Examples			
Solved Examples			
Exercise I			
Exercise II			
Short Note-1			
Revision - 1			
Revision - 2			
Revision - 3			
Remark			

NOTES :

1. In the status, put "completed" only when you have thoroughly worked through this particular section.

2. Always remember to put down the date of completion correctly. It will help you in future at the time of revision.

WHOLE NUMBERS

2

Concepts

📖 INTRODUCTION

We learnt that counting numbers 1, 2, 3.... are called Natural numbers. For example, number of months in a year, number of candies in a box etc. In this chapter, we learn about whole numbers.

1. WHOLE NUMBERS

If we add zero (0) in the set of natural numbers, we get a new set of numbers called whole numbers.

Note. All natural numbers are whole numbers but the converse is not true.

2. PREDECESSOR AND SUCCESSOR

• The number which comes just after any number or the number that comes after adding 1 to any number is called its successor.

• The number which comes just before any number or the number that comes after subtracting 1 from a number is called its predecessor.

Example 1

Write the predecessor of each of the following:

(i) 483692   (ii) 5983210   (iii) 600000

Solution :

(i) Predecessor of 483692

$$= 483692 - 1 = 483691$$

(ii) Predecessor of 5983210

$$= 5983210 - 1 = 5983209$$

(iii) Predecessor of 600000

$$= 600000 - 1 = 599999$$

Example 2

Write the successor of each of each of the following :

(i) 986959   (ii) 3840517   (iii) 9989899

Solution :

(i) Successor of 986959 = 986959 + 1 = 986960

(ii) Successor of 3840517 = 3840517 + 1 = 3840518

(iii) Successor of 9989899 = 9989899 + 1 = 9989900

3. NUMBER LINE

To represent whole numbers on a number line follow the given steps:

- First draw a line.

- Now, mark a point 0 on it.

- Mark another point to the right of 0 and label it as 1. The distance between these two points is called unit distance.

- Now, continue marking as 2, 3, 4.... on the line with unit distance between the consecutive points.

The line given below represents whole numbers on number line.
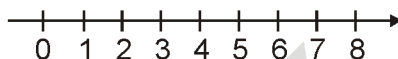
4. ADDITION ON NUMBER LINE

We can add two or more whole numbers on number line . While adding two numbers, we should move towards right of anyone of the given numbers.

Example **1**

Add 5 and 6 using number line.

Solution :
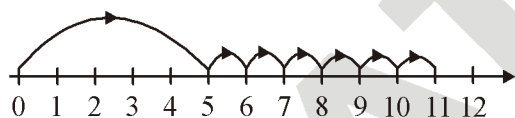
So, 5 + 6 = 11

5. SUBTRACTION ON NUMBER LINE

We can also subtract whole numbers on number line. While subtracting two numbers, we should move towards left on the number line.

Example **1**

Subtract 5 from 13 on number line.

Solution :
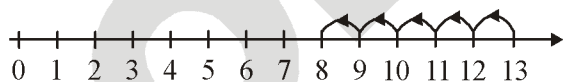
So, 13 – 5 = 8

6. MULTIPLICATION ON NUMBER LINE

As addition and subtraction, we can multiply the whole numbers on number line.

Example **1**

Multiply 5 × 2 on number line.

Solution :
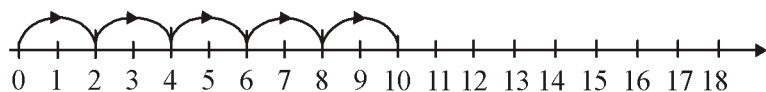
Starting from zero, we move two units at a time to the right and make 5 such moves.

So, 5 × 2 = 10

7. PROPERTIES OF WHOLE NUMBERS

7.1 PROPERTIES OF ADDITION

(i) Closure property – Suppose a and b are two whole numbers, then their sum, i.e. a + b = c will also be a whole number.

So, whole numbers are closed under addition.

(ii) Commutative property – When we add two whole numbers, say a and b in any order, their sum remains the same. This property is called commutative property.

i.e., a + b = b + a

Hence, whole numbers are commutative under addition

(iii) Associative property – Let a, b and c be three whole numbers, then (a + b) + c = a + (b + c)

So, whole numbers are associative under addition.

(iv) Additive identity – Additive identity is a number which when added to any whole number, then the value remains the same. Let a be any whole number, then 0 + a = a + 0 = a.

So, 0 is the additive identity of whole numbers.

Example 1

Find out whether 2455 + 2223 = 2223 + 2455 or not.

Solution :

L.H.S. (Left hand side) = 2455 + 2223 = 4678.

R.H.S. (Right hand side) = 2223 + 2455 = 4678.

∴ Both the sides are equal.

Example 2

Find the sum using suitable rearrangement.

(i) 1436 + 586 + 564

(ii) 364 + 517 + 636 + 983

Solution :

(i) 1436 + 586 + 564 = (1436 + 564) + 586 = 2000 + 586 = 2586

(ii) 364 + 517 + 636 + 983 = (364 + 636) + (517 + 983) = 1000 + 1500 = 2500

7.2 PROPERTIES OF MULTIPLICATION

(i) Closure property – Suppose a and b are two whole numbers, then their product, i.e. a × b = c will also be a whole number.

So, whole numbers are closed under multiplication.

(ii) Commutative property – When we multiply two whole numbers, say a and b in any order, their product remains the same and this property is called commutative property.

i.e., a × b = b × a

Hence, whole numbers are commutative under multiplication.

(iii) Associative property – Let a, b and c be three whole numbers, then (a × b) × c = a × (b × c)

So, whole numbers are associative under multiplication.

(iv) (a) Distributive property of multiplication over addition : If a, b and c are three whole numbers, then a × (b + c) = (a × b) + (a × c)

(b) Distributive property of multiplication over Subtraction : If a, b and c are three whole numbers, then a × (b – c) = (a × b) – (a × c)

(v) Multiplicative identity – Multiplicative identity is a number which when multiplied by any whole number, then the value remains the same. Let a be any whole number, then 1 × a = a × 1 = a.

So, 1 is the multiplicative identity of whole numbers.

Example 1

Find 16 × 25 using distributivity.

Solution :

16 × 25 = 16 × (20 + 5) = 16 × 20 + 16 × 5 = 320 + 80 = 400

Example 2

Find the product using suitable rearrangement :

(i) 1963 × 2 × 50   (ii) 5 × 30 × 40   (iii) 25 × 291 × 40

Solution :

(i) 1963 × 2 × 50 = 1963 × (2 × 50) = 1963 × 100 = 196300

(ii) 5 × 30 × 40 = 30 × (5 × 40) = 30 × 200 = 6000

(iii) 25 × 291 × 40 = 291 × (40 × 25) = 291 × 1000 = 291000

Example 3

Simplify : 931 × 95 − 83 × 931.

Solution :

931 × 95 − 83 × 931 = 931 × 95 − 931 × 83 (commutative law)

= 931 × (95 − 83) = 931 × 12 = 11172

7.3 PROPERTIES OF ZERO

Let a be any whole number. Then,

- a + 0 = a
- a × 0 = 0
- a − 0 = a
- a ÷ 0 is not defined.

7.4 PATTERNS IN WHOLE NUMBERS

Whole numbers can be arranged in elementary shapes made up of dots. The elementary shapes are as follows:

(i) A line   (ii) A rectangle   (iii) A square   (iv) A triangle

Every whole number should be arranged in one of these shapes only.

Focus Point

- Counting numbers are called natural numbers.
- If we add zero to the set of counting numbers, we get set of whole numbers.
- Every whole number has a successor.
- Every whole number has a predecessor except 0.
- All natural numbers are whole numbers but all whole numbers are not natural numbers.
- Whole numbers can be represented on number line.
- For adding whole numbers on number line move towards right, whereas for subtracting move towards left.

Multiplication corresponds to jump equal distance starting from zero.

(i) Properties at a Glance

Properties	Addition	Subtraction	Multiplication	Division
Closure	✔	×	✔	×
Commutative	✔	×	✔	×
Associative	✔	×	✔	×

(ii) 0 is the additive identity and 1 is the multiplicative identity of whole numbers.

(iii) Distributivity of multiplication over addition :

Let a, b, c be any three whole numbers. Then,

a × (b + c) = a × b + a × c

(iv) Division by zero is not defined.

SE. 1

Write the successor and predecessor of 2006389. Also, find their difference.

Ans. The successor of 2006389 is 2006390 and the predecessor of 2006389 is 2006388

The difference of 2006390 – 2006388 = 2.

SE. 2

Represent 4 × 4 on number line.

Ans. Start from 0, move 4 steps at a time to the right of zero. Make such four moves so that we can reach at the result.
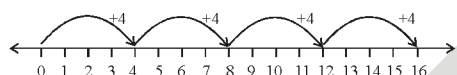
Hence, 4 × 4 = 16

SE. 3

In a school canteen, Seeta spends Rs. 35 on noodles and Rs. 20 on cold drinks everyday. How much money does Seeta spend in 1 week?

Ans. As 1 week = 7 days

Seeta spends on noodles in 7 days = 35 × 7 = Rs. 245

Seeta spends on cold drink in 7 days = 20 × 7 = Rs. 140

Thus, total money spent by Seeta in 1 week = Rs. (245 + 140) = Rs. 385

SE. 4

What is the product of successor and predecessor of 999 ?

Ans. The successor of 999 = 999 + 1 = 1000

The predecessor of 999 = 999 – 1 = 998

∴ Their product = 998 × 1000 = 998000

SE. 5

An officer bought 30 tables and 30 chairs. If the cost of a table is Rs. 500 and that of a chair is Rs. 250, how much did the officer spend ?

Ans. Cost of 1 table = Rs. 500

Cost of 1 chair = Rs. 250

Total money spent by officer on 30 tables and 30 chairs = (500 × 30) + (250 × 30) = (500 + 250) × 30

= 750 × 30 = Rs. 22500

SE. 6

Represent 1 + 6 using the number line.

Ans. Start from 1, since we add 6 to this number, we make 6 moves to the right i.e. 1 to 2, 2 to 3, 3 to 4, 4 to 5, 5 to 6, 6 to 7 as shown.

The last tip of arrow represents 7, the sum of 1 and 6.

∴ 1 + 6 = 7

SE. 7

What is the value of 500 × 681 × 0 × 501?

Ans. We have, 500 × 681 × 0 × 501

We will group the number as follows.

(500 × 681) × (0 × 501) = 3,40,500 × 0 = 0

When we multiply the number by 0, we get as 0 a result.

SE. 8

Verify the associative property of addition and multiplication if a = 358, b = 962 and c = 142.

Ans. Associative property of addition :

We have, a = 358, b = 962, c = 142

Now, a + (b + c) = 358 + (962 + 142) = 358 + 1104 = 1462

Also, (a + b) + c = (358 + 962) + 142 = 1320 + 142 = 1462

∴ a + (b + c) = a (a + b) + c

So, associative property of addition holds true for whole numbers.

Associative property of multiplication :

a × (b × c) = 358 × (962 × 142) = 358 × 136604 = 48904232

(a × b) × c = (358 × 962) × 142 = 344396 × 142 = 48904232

∴ a × (b × c) = (a × b) × c

So, associative property of multiplication holds true for whole numbers.

SE. 9

In a city, there are 45 schools. Each school has 38 rooms and each room has 98 chairs and tables. How many chairs and table will be there in total ? Calculate it using suitable property.

Ans. Number of schools in the city = 45

Number of rooms in 45 schools = 45 × 38

Number of tables and chairs in 1 room = 98

∴ Number of tables and chairs in (45 × 38) rooms

= 98 × (45 × 38) = 98 × 1710 = 167580

So, total number of chairs and tables = 167580

SE. 10

Represent 10 – 3 on number line.

Ans.
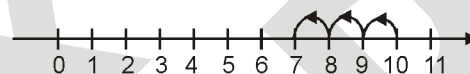
So, 10 – 3 = 7.

SE. 11

Verify the distributive property of multiplication over addition and subtraction if a = 128, b = 93, c = 16.

Ans. Distributive property of multiplication over addition :

We have, a = 128, b = 93, c = 16

Now,

a × (b + c) = 128 × (93 + 16) = 128 × 109

        = 13952

Also,

a × b + a × c = 128 × 93 + 128 × 16 = 11904 + 2048 = 13952

∴ a × (b + c) = a × b + a × c

So, distributive property of multiplication over addition holds true.

Distributive property of multiplication over subtraction :

a × (b – c) = 128 × (93 – 16) = 128 × 77 = 9856

Also, a × b – a × c = 128 × 93 – 128 × 16

= 11904 – 2048 = 9856

∴ a × (b – c) = a × b – a × c

So, distributive property of multiplication over subtraction also holds true.

SE. 12

Find the sum by suitable rearrangement.

(i) 389 + 695 + 895 + 611

(ii) 537 + 954 + 1463 + 46

Ans. (i) We have, 389 + 695 + 895 + 611

= 389 + 695 + 611 + 895

(by commutative property)

= (398 + 611) + (695 + 895) = 2590

(ii) We have, 537 + 954 + 1463 + 46

= (537 + 1463) + (954 + 46)

(by commutative property)

= 2000 + 1000 = 3000

SE. 13

Find the product by suitable rerrangement.

(i) 125 × 43 × 160

(ii) 628 × 96 × 15

125 × 43 × 160 = (125 × 160) × 43

(by commutative property)

= 20000 × 43 = 860000

(ii) 628 × 96 × 15 = (628 × 15) × 96

(by commutative property)

= 9420 × 96 = 904320

SE. 14

Simplify the following using suitable property.

(i) 496 × 450 – 496 × 380

(ii) 836 × 105

(iii) 166 × 180 × 0

Ans. (i) 496 × 450 – 496 × 380

= 496 × (450 – 380) = 496 × 70 = 34720

(ii) 836 × 105 = 836 × (100 + 5)

= 836 × 100 + 863 × 5 = 83600 + 4180 = 87780

(iii) 166 × 180 × 0 = 166 × (180 × 0) = 166 × 0 = 0

SE. 15

Use the suitable property to simplify each of the following and also name them.

(i) 148 × 16 × 125

(ii) 348 × 505

(iii) 198 × 994

(iv) 586 × 4 + 586 × 6

Ans. (i) We have, 148 × 16 × 125

By using associative property

148 × 16 × 125 = 148 × (16 × 125)

= 148 × 2000 = 296000

(ii) We have, 348 × 505 = 348 × (500 + 5)

[By distributivity of multiplication over addition]

$= 348 \times 500 + 348 \times 5 = 174000 + 1740 = 175740$

(iii) We have, $198 \times 994 = 198 \times (1000 - 6)$

[By distributivity of multiplication over subtraction]

$= 198 \times 1000 - 198 \times 6 = 18000 - 1188$

$= 196812$

(iv) We have, $586 \times 4 + 586 \times 6$

[By distributivity of multiplication over addition]

$= 586 \times (4 + 6) = 586 \times 10 = 58600$

Space for Notes :

ONLY ONE CORRECT TYPE

1. Which of the following whole numbers does not have a predecessor ?

   (A) 2   (B) 0

   (C) 1   (D) 1000

2. What is the value of n if

   $(9 \times 4) + (n \times 5) = 9 \times (4 + 5)$?

   (A) 9   (B) 4

   (C) 5   (D) none of these

3. The additive identity for the set of whole number is ____.

   (A) 1   (B) 0

   (C) 2   (D) does not these

4. What is the successor of 871929?

   (A) 872030   (B) 871930

   (C) 872930   (D) 971929

5. What is the identity element with respect to multiplication ?

   (A) 0   (B) 2

   (C) 1   (D) none of these

6. The value of $2575 \div 25 + 2575 \div 2575$ is ____.

   (A) 1   (B) 103

   (C) 104   (D) 102

7. The commutative property over multiplication states that ____.

   (A) $a + b = b + a$

   (B) $a \times b = b \times a$

   (C) $a \times (b + c) = (a \times b) + c$

   (D) $a + (b + c) = (a + b) + c$

8. If a is any natural number, then $0 \div a$ is ____.

   (A) a   (B) 1

   (C) 0   (D) not defined

9. The value of c in $(18 + 9) + 45 = 18 + (9 + c)$ is ____.

   (A) 9   (B) 54

   (C) 45   (D) 18

10. The value of $258 \times 96 + 258 \times 4$ is

    (A) 2580   (B) 258

    (C) 25800   (D) 100

11. What is the successor of predecessor of 1 lakh?

    (A) 1,00,001   (B) 1,00,000

    (C) 99,999   (D) 99,998

12. Solve : $1446 \times 0 \times 8432$

    (A) 12,192,672   (B) 1446

    (C) 8432   (D) 0

13. Whole numbers are not commutative under ____.

    (A) Multiplication

    (B) Subtraction

    (C) Addition

    (D) Both multiplication and addition

14. The population of a town is 20,000. If 500 are men and 620 are women, find the number of children?

    (A) 18,000   (B) 1,880

    (C) 18,800   (D) 18,880

15. Which of the following will not represent zero ?

    (A) $113 \times 14 \times 0$ (B) 0×0

    (C) $0 \div 2$ (D) $12 \div 0$

16. Find predecessor of 5628 + 97348.

(A) 906126   (B) 127906

(C) 102975   (D) 102976

17. Which of the following number line represents 4 + 5 ?

(A)

(B)

(C)

(D)
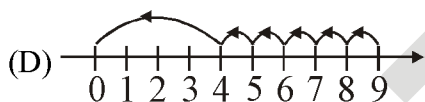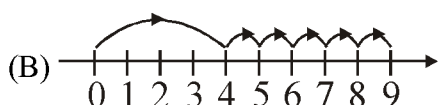
18. 98 + (52 × 10) = _____.

(A) 98 + 52 × 98 + 10

(B) 98 + 528

(C) 98 + (10 × 25)

(D) 98 + 520

19. The successor of 5832 + 94167 is _____.

(A) 99999   (B) 100006

(C) 10000   (D) 900000

20. The smallest whole number is _____.

(A) 0   (B) 1

(C) 2   (D) 3

21. 95 ÷ 0 = _____.

(A) 0 ÷ 95   (B) 1

(C) 95   (D) not defined

22. 1935 × 782 × 15 = _____.

(A) 1935 × 43 × 252   (B) 15 × 982 × 768

(C) 46 × 1935 × 225   (D) 148 × 596 × 482

23. The product of the predecessor and successor of the largest 4 – digit number formed from the digits 3, 0, 8, 2 is _____.

(A) 69222939   (B) 6922399

(C) 96222399   (D) 69222399

24. The predecessor of 1 – million is _____.

(A) 9999   (B) 99999

(C) 999999   (D) 9999999

25. Which of the following statements does not hold true for the whole numbers a, b and c ?

(A) a ÷ (b ÷ c) = (a ÷ b) ÷ c

(B) a + (b + c) = (a + b) + c

(C) a × (b × c) = (a × b) × c

(D) a + b = b + a

26. Which expression does not have the same value as the expression 9 × (6 + 46) ?

(A) 9 × 52   (B) 9 × 6 + 9 × 46

(C) (9 + 6) × (9 + 46) (D) 9 × (46 + 6)

27. There are six poles on a side of a 1 km 200 m long straight road such that there is a pole at the starting and end point of the road. If the poles are equally spaced, then what is the distance between each consecutive pole ?

(A) 200 m   (B) 210 m

(C) 230 m   (D) 240 m

28. Find the product using distributive property

    149 × 70 + 149 × 20 + 149 × 10.

    (A) 14800   (B) 34000

    (C) 14900   (D) 20800

29. Find the product of predecessor of greatest 4 – digit number and the successor of greatest 3 – digit number.

    (A) 9899000   (B) 9998000

    (C) 8989000   (D) 9989000

FILL IN THE BLANKS

1. 87 × 15 = 87 × 3 + 87 –––––– + 87 × 5.

2. 587 × 0 = _____.

3. 365 + (289 + 450) = (289 + 365) + ____.

4. _____ is the successor of 99.

5. 72 + 52 + 37 + 9 = 100 + ____.

6. The multiplicative identity for whole numbers is ____.

7. 110 + 518 = 518 + ____.

8. _____ is the only whole number which has no predecessor.

9. The expression 6 × (a + b) = 6 × a + 6 × b shows the _____ of whole numbers.

10. Smaller of any 2 whole numbers lies on ____ side on the number line.

TRUE / FALSE TYPE

1. 0 is a natural number.

2. Whole number divided by 0 is always 0.

3. Commutative property holds under subtraction.

4. The additive identity for whole numbers is 0.

5. If 78 × (x + 25) = 125 × 78, then x = 75.

6. The value of 85 × 16 × 93 × 12 × 18 × 0 × 251 × 623 = 96258349.

7. Predecessor of smallest 6 – digit number is greatest 5–digit number.

8. If a = 105, b = 516 and c = 985, then a + (b + c) is a whole number.

9. 1 is the only whole number which have predecessor.

10. The only property satisfied by subtraction of whole numbers is closure property.

PARAGRAPH TYPE

PASSAGE # I

If a, b, c are three whole numbers then :

(a + b) + c = a + (b + c) and

a × (b + c) = a × b + a × c

1. Find the value of 1546 + (984 + 5389)

    (A) 1917   (B) 2530

    (C) 7990   (D) 7919

2. Find the product of 125 × 109 ?

    (A) 10900   (B) 13625

    (C) 12500   (D) 13256

3. State the property used in the following statement.

    661 × 93 + 661 × 7 = 661 × (93 + 7)

    (A) Commutative property

    (B) Associative property

    (C) Distributive property

    (D) Closure property

PASSAGE # II

Mayank consumes each of mango juice can priced at Rs. 50 and lichi juice can priced at Rs. 60 everyday.

4. Mayank spends on lichi juice in five days is

(A) Rs. 12   (B) Rs. 300

(C) Rs. 250   (D) Rs. 200

5. Total money spent by Mayank in 3 days is

(A) Rs. 300   (B) Rs. 320

(C) Rs. 330   (D) Rs. 150

6. If Mayank consumes three cans of mango juice and 2 cans of lichi juice each day, then how much money he will spent in 3 days ?

(A) Rs. 500   (B) Rs. 650

(C) Rs. 700   (D) Rs. 810

MATCH THE COLUMN TYPE

In this section each question has two matching lists. Choices for the correct combination of elements from List – I and List – II are given as options (A), (B), (C) and (D) out of which one is correct.

1. Match the following.

List – I	List – II
(P) Distributive property shows	(i) $98 \times (25 \times 40) = (98 \times 25) \times 40$
(Q) Associative property shows	(ii) $48 \times 100 + 48 \times 2 = 48 \times (100 + 2)$
(R) Commutative property shows	(iii) 1
(S) Multiplicative identity for whole numbers is	(iv) $25 + 63 = 63 + 25$

Code :

	P	Q	R	S
(A)	1	3	4	2
(B)	2	4	1	3
(C)	2	1	4	3
(D)	3	1	4	2

2. Match the following.

List – I	List – II
(P) $1983 + 647 + 217 + 353$	(i) 124384
(Q) 736×169	(ii) 3200
(R) $569 \times 17 + 569 \ 13 + 569 \times 70$	(iii) 631000
(S) $631 \times 10 \times 467 - 367 \times 6370$	(iv) 56900

Code :

	P	Q	R	S
(A)	2	4	3	1
(B)	2	1	4	3
(C)	1	4	3	2
(D)	1	2	4	3

VERY SHORT ANSWER TYPE

1. What is the difference of the successor and predecessor of the place value of 2 in 2,35,716.

2. Find the value of $(565 \div 565) + (278 \div 278)$

3. What number should be replace by x ?

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

4. Calculate : $21 \times 95 \times 0$

5. Find the sum of $437 + 200 + 633$ using the properties of addition.

6. Find the value of $5 - 4$ by using number line.

7. 90 oranges can be packed in one box. How many boxes will be required to pack 7200 oranges ?

8. Using distributive law, find 937×1007.

9. Find the sum : $1 + 2 + 3 + 4 + 96 + 97 + 98 + 99$.

10. Write down the successor and predecessor of 2009009.

SHORT ANSWER TYPE

1. Find the product by suitable rearrangement:

    (i) $8 \times 391 \times 125$ (ii) $625 \times 86 \times 1600$

2. Find the value of each of the following.

    (i) $0 \div 1657$ (ii) $8086 \div 1$

    (iii) 1×9685 (iii) 659×0

3. In a shop, one notebook costs Rs. 15, a pencil costs Rs. 10 and a pen costs Rs. 20. How much money does Meena spend for 3 notebooks, 5 pencils and 2 pens ?

4. Find the predecessor of the difference between the smallest 7 – digit number and the largest 4 – digit number.

5. Find the value of each of the following by using suitable properties :

    (i) $8937 \times 648 + 8937 \times 122 + 8937 \times 230$

    (ii) $785 \times 94 + 785 \times 6$

    (iii) $1063 \times 127 - 127 \times 1063$

    (iv) $9936 \times 105 - 105 \times 368 \times 27$

6. Verify the distributive property of multiplication over addition if $a = 968$, $b = 846$ and $c = 154$.

7. Represent the following on number line.

    (i) $16 - 11$ (ii) $10 - 2$

8. By using the properties, find the value of

    $53 \times 17 + 40 \times 17 - 6 \times 17$

9. The cost of a purse and a steel tiffin box is Rs. 250 and Rs. 290 respectively. Find the total cost of 11 such purses and 11 tiffin boxes.

10. If $a = 40$, $b = 80$ and $c = 160$, find the value of :

    (i) $(a \div b) \div c$ (ii) $a \div (b \div c)$

    Are the two values equal ?

LONG ANSWER TYPE

1. Write the predecessor and the successor of the smallest number formed by using the digits 4, 0, 3, 5 only once.

2. Represent the following on number line.

   (i) 2 × 9   (ii) 4 + 12

   (iii) 16 – 12   (iv) 5 × 4

   (v) 8 + 9   (vi) 9 – 8

3. By using suitable properties, find the value of each of the following.

   (i) 445 + 600 + 555 + 1400

   (ii) 331 × 129 – 331 × 29

   (iii) 250 × 60 × 50 × 8

   (iv) 756 × 96

4. Find the product of the successor and predecessor of each of the following.

   (i) MCI

   (ii) CDXVI

   (iii) DCCVIII

5. Rohan has a total of Rs. 1900. He distributes one pencil to each 30 students and 1 pen to each 45 teachers. The cost of each pencil and each pen is Rs. 10 and Rs. 26 respectively. After purchasing all the items, how much money is left with Rohan if he lost Rs. 200 ?

NUMERICAL PROBLEMS

In this section, each question, when worked out will result in one integer from 0 to 9 (both inclusive).

1. What is the value of $(490 – 90) ÷ 100$?

2. If $m ÷ 18 = 0$, then find the value of m.

3. What is the hundreds place digits of the successor of 499?

4. What is the sum of the digits of successor of product of $35 × 12$?

5. What is the additive identity for whole numbers ?

6. Find 'a' so that the expression becomes

   $(a + 10) + 7 = 4 + (10 + 7)$

7. The whole number _____ has no predecessor.

8. Find the difference between the successor and predecessor of $98 × 65$.

9. What is the product of digits of sum of $1 + 12 + 3 + 8$?

10. What is the thrice of multiplicative identity for whole numbers?

Answer Key

EXERCISE I																

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
B	A	B	B	C	C	B	C	C	C	B	D	B	D	D

16	17	18	19	20	21	22	23	24	25	26	27	28	29	
C	B	D	C	A	D	C	D	C	A	C	D	C	B	

FILL IN THE BLANKS

1.7   2.0   3.450   4.100   5.70   6.1   7.110   8.0   9.Distributive property   10.Left

TRUE/FALSE TYPE

1.   F   **2.**   F   **3.**   F   **4.**   T   **5.**   F   **6.**   F   **7.**   T

8.   T   **9.**   F   **10.**   F

PARAGRAPH

1.   D   **2.**   B   **3.**   C   **4.**   B   **5.**   C   **6.**   D

MATCH THE COLUMN

1.   C   **2.**   B

EXERCISE II	

VERY SHORT ANSWER TYPE

1. 2   **2.** 2   **3.** 6   **4.** 0   **5.** 1270   **6.** 1   **7.** 80 Boxes   **8.** 943559   **9.** 400   **10.** 2009010, 2009008

SHORT ANSWER TYPE

1. (i) 391000 (ii)86000000   **2.** (i)0 (ii) 8086 (iii)9685 (iv)0   **3.** Rs. 135   **4.** 9,90,000

5. (i)8937000 (ii) 78500 (iii)0 (iv)0   **6.** Distributive property, 968000

7. (i) 5 (ii)8   **8.** 1479   **9.** Rs.5940   **10.** (i) $\dfrac{1}{320}$ (ii) 80, No

LONG ANSWER TYPE

1. 3044, 3046   **2.** (i)18 (ii) 16 (iii) 4 (iv) 20 (v) 17 (vi) 1

3. (i) 3000 (ii) 33100 (iii) 6000000 (iv)72576   **4.** (i) 1212200 (ii) 173055 (iii) 501263

5. Rs. 230

NUMERICAL PROBLEMS

1.   4   **2.**   0   **3.**   5   **4.**   7   **5.**   0   **6.**   4   **7.**   0

8.   2   **9.**   8   **10.**   3

SELF PROGRESS ASSESSMENT FRAMEWORK

(CHAPTER : WHOLE NUMBERS)

CONTENT	STATUS	DATE OF COMPLETION	SELF SIGNATURE
Theory			
In-Text Examples			
Solved Examples			
Exercise I			
Exercise II			
Short Note-1			
Revision - 1			
Revision - 2			
Revision - 3			
Remark			

NOTES :

1. In the status, put "completed" only when you have thoroughly worked through this particular section.

2. Always remember to put down the date of completion correctly. It will help you in future at the time of revision.

PLAYING WITH NUMBERS | 3

Concepts

📖 INTRODUCTION

Ramesh has 6 marbles with him. He wants to arrange them in rows in such a way that each row has the same number of marbles. He arranges them in the following ways and matches the total number of marbles.

(i) 1 marble in each row

Number of rows = 6

Total number of marbles = 1 × 6 = 6

(ii) 2 marbles in each row

Number of rows = 3

Total number of marbles = 2 × 3 = 6

(iii) 3 marbles in each row

Number of rows = 2

Total number of marbles = 3 × 2 = 6

(iv) He could not think of any arrangement in which each row had 4 marbles or 5 marbles. So, the only possible arrangement left was with all the 6 marbles in a row.

Number of rows = 1

Total number of marbles = 6 × 1 = 6

From these calculations Ramesh observes that 6 can be written as a product of two numbers in different ways as

6 = 1 × 6; 6 = 2 × 3; 6 = 3 × 2; 6 = 6 × 1

From 6 = 2 × 3 it can be said that 2 and 3 exactly divide 6. So, 2 and 3 are exact divisors of 6. From the other product 6 = 1 × 6, the exact divisors of 6 are found to be 1 and 6.

Thus, 1, 2, 3 and 6 are exact divisors of 6. They are called the factors of 6.

Try arranging 18 marbles in rows and find the factors of 18.

1. FACTORS

A factor of a number is an exact divisor of the number.

For Example 👉

Mary wants to find those numbers which exactly divide 4. She divides 4 by numbers less than 4 this way.

1)   4   (4
   -4
   ‾0
	2) 4 (2
	   -4
	   ‾0
		3) 4 (1
		   -3
		   ‾1
			4) 4 (1
			   -4
			   ‾0

Quotient is 4	Quotient is 2	Quotient is 1	Quotient is 1
Remainder is 0	Remainder is 0	Remainder is 1	Remainder is 0

4 = 1 × 4; 4 = 2 × 2; 4 = 4 × 1

She finds that the number 4 can be written as: 4 = 1 × 4; 4 = 2 × 2; 4 = 4 × 1 and knows that the numbers 1, 2 and 4 are exact divisors of 4.

These numbers are called factors of 4.

A factor of a number is an exact divisor of that number.

Observe each of the factors of 4 is less than or equal to 4.

Focus Point

- 1 is a factor of every number.
- 1 is the smallest factor of every number
- The largest factor of a number is the number itself.
- Every factor of a number is less than or equal to the number.
- Number of factors of a given number are finite.

Example 1

Write all the factors of :

(i) 128   (ii) 54

Solution :

(i) We have,

$128 = 1 \times 128$; $128 = 2 \times 64$; $128 = 4 \times 32$;

$128 = 8 \times 16$; $128 = 16 \times 8$

Thus, all the factors of 128 are 1, 2, 4, 8, 16, 32, 64, 128.

(ii) We have,

$54 = 1 \times 54$; $54 = 2 \times 27$; $54 = 3 \times 18$;

$54 = 6 \times 9$; $54 = 9 \times 6$

Thus, all the factors of 54 are 1, 2, 3, 6, 9, 18, 27, 54.

2. MULTIPLES

A multiple of any natural number is the product of that number and any non – zero whole number.

Focus Point

- A number is a multiple of each of its factors.
- Every number is a multiple of itself.
- Every multiple of a number is greater than or equal to the number.
- Number of multiples of a given number is infinite.

Example 1

Write first five multiples of :

(i) 32   (ii) 23

Solution :

(i) First five multiples of 32 are ;

$32 \times 1 = 32$; $32 \times 2 = 64$; $32 \times 3 = 96$;

$32 \times 4 = 128$; $32 \times 5 = 160$.

(ii) First five multiples of 23 are;

$23 \times 1 = 23$; $23 \times 2 = 46$; $23 \times 3 = 69$;

$23 \times 4 = 92$; $23 \times 5 = 115$

Example 2

Write all the multiples of each of the following upto 60.

(i) 12   (ii) 8   (iii) 27

Solution :

(i) Multiples of 12 upto 60 are; 12, 24, 36, 48, 60.

(ii) Multiples of 8 upto 60 are; 8, 16, 24, 32, 40, 48, 56.

(iii) Multiples of 27 upto 60 are; 27, 54.

3. EVEN NUMBERS

The numbers which are multiples of 2 i.e.; 2, 4, 6, 8, 10, 12, ... or the numbers having 0, 2, 4, 6 of 8 at ones place are called even numbers.

4. ODD NUMBERS

The numbers which are not multiples of 2 i.e.; 1, 3, 5, 7, 9, 11, ... or the numbers having 1, 3, 5, 7, or 9 at ones place are called odd numbers.

5. PRIME NUMBERS

A prime number is a natural number which has exactly two factors 1 and the number itself. Example, 23 has only 2 factors 1 and 23.

6. COMPOSITE NUMBERS

A composite number is a natural number except 1 which has more than two different factors. For example the factors of 6 are 1, 2, 3 and 6. So 6 is a composite number.

Focus Point

- 1 is neither prime nor composite.

- 2 is the only even prime number.

- Any composite number can be written as a product of prime numbers.

Example 1

Select the odd and even numbers from the following :

96342, 186481, 639123, 257770, 46819, 315768

Solution :

Odd numbers are 186481, 639123, 46819.

Even numbers are 96342, 257770, 315768

Example 2

Which of the following are prime numbers ?

96, 23, 41, 65, 91, 10, 31, 71, 43.

Solution :

Prime numbers are 23, 41, 31, 71, 43

7. PERFECT NUMBER

A number for which sum of all its factors is equal to twice the number is called a perfect number. The smallest perfect number is 6, which is the sum of 1, 2 and 3. Other perfect numbers are 28, 496 and 8128.

8. TWIN PRIME

Two prime numbers having a difference of 2 are known as twin primes.

For example 3 and 5, 5 and 7, 11 and 13 etc.

9. PRIME TRIPLET

A group of three prime numbers. In which the smallest and largest of three differ by 6. They are of the form (p, p + 2, p + 6) or (p, p + 4, p + 6).

For example 5, 7, 11 is the first prime triplet.

10. COMMON FACTORS AND COMMON MULTIPLES

Let us learn with the help of illustrations.

Example 1

Find the common factors of 48 and 72.

Solution :

Factors of 48 = ①,②,③,④,⑥,⑦,⑧,⑫, 16, ㉔, 48

Factors of 72 = ①,②,③,④, ⑥,⑧, 9, ⑫, 18, ㉔ 36, 72

∴ Common factors of 48 and 72 = 1, 2, 3, 4, 6, 8, 12 and 24.

Example 2

Find the first four common multiples of 5 and 15.

Solution :

Multiples of 5 = 5, 10, ⑮, 20, 25, ㉚, 35, 40, ㊺, 50, 55, �60, 65, ...

Multiples of 15 = ⑮,㉚, ㊺, �60 75, ...

So, first four common multiples of 5 and 15 = 15, 30, 45, 60.

11. CO–PRIME NUMBERS

The two numbers having only 1 as a common factor are called co–prime numbers. For example 2 and 3, 5 and 7, 3 and 4, 4 and 9 etc.

Note : – Co – primes are not necessarily primes.

12. DIVISIBILITY RULES

If you want to know that a number is divisible by another number or not, we generally perform division and see whether the remainder is zero or not. But it is very time consuming in case of large numbers. So, to reduce our efforts, Some divisibility tests of different numbers are given below :

Divisibility by 2

A natural number is divisible by 2 if its units digit is 0, 2, 4, 6 or 8 (i.e. unit's digit is divisible by 2)

Example 1

528 is divisible by 2, as 8 is at ones place.

Example 2

329 is not divisible by 2, as 9 is not even.

Divisibility by 3

A natural number is divisible by 3 if the sum of its digits is divisible by 3.

Example 3

681 : 6 + 8 + 1 = 15 and 15 is divisible by 3. So, 681 is divisible by 3.

Example 4

257 : 2 + 5 + 7 = 14 but 14 is not divisible by 3. So. 257 is not divisible by 3.

Divisibility by 4

A natural number is divisible by 4 if the number formed by its last two (i.e. ten's and unit's) digits is divisible by 4.

Example 5

1812 is divisible by 4 as 12 is divisible by 4.

Example 6

4013 is not divisible by 4 as 13 is not divisible by 4.

Divisibility by 5

A natural number is divisible by 5 if its last (unit's) digit is 0 or 5.

Example 7

485 is divisible by 5.

Example 8

759 is not divisible by 5.

Divisibility by 6

A natural number is divisible by 6 if it is divisible by 2 as well as by 3.

Example 9

114 : 114 is divisible by 2, as 4 is at ones place and 1 + 1 + 4 = 6 and 6 is divisible by 3. So, 114 is divisible by 3. Therefore, 144 is divisible by 6.

Example 10

308 : 308 is divisible by 2, as 8 is at ones place but 3 + 0 + 8 = 11 and 11 is not divisible by 3. So, 308 is not divisible by 3. Therefore, 308 is not divisible by 6.

Divisibility by 7

Difference of double of last digit and the number formed by the remaining digits is divisible by 7.

Note : You can apply this rule to that answer again if you want.

Example 11

602 : Double of 2 is 4. Now, 60 – 4 = 56 and 56 is divisible by 7. So, 602 is divisible by 7.

Example 12

505 : Double of 5 is 10. Now, 50 – 10 = 40 and 40 is not divisible by 7. So, 505 is not divisible by 7.

Divisibility by 8

A natural number is divisible by 8 if the number formed by its last three (Hundred's, ten's and unit's) digits is divisible by 8.

Example 13

519816 : 816 is divisible by 8. So, the number is divisible by 8.

Example 14

612302 : 302 is not divisible by 8. So, the number is not divisible by 8.

Divisibility by 9

A natural number is divisible by 9 if the sum of its digits is divisible by 9.

Example 15

1269 : 1 + 2 + 6 + 9 = 18 and 18 is divisible by 9. So, 1269 is divisible by 9.

Example 16

2013 : 2 + 0 + 1 + 3 = 6 and 6 is not divisible by 9. So, 2013 is not divisible by 9.

Divisibility by 10

A natural number is divisible by 10 if its last (unit's) digit is 0.

Example 17

420 is divisible by 10, as 0 is at ones place.

Example 18

231 is not divisible by 10.

Divisibility by 11

A natural number is divisible by 11 if the difference of the sums of digits at the alternative places (starting from unit's place) is divisible by 11.

Example 19

1364 : (3+4) – (1+6) = 0. So, 1364 is divisible by 11.

Example 20

3729 : (7+9) – (3+2) =11, divisible by 11. So, 3729 is divisible by 11.

Example 21

25176 : (5 + 7) – (2 + 1 + 6) = 3, not divisible by 11, so 25176 is not divisible by 11.

Divisibility by 12

A number is divisible by 12 if it is divisible by 3 and 4.

Example 22

948 : 9 + 4 + 8 = 21 and 21 is divisible by 3. So, 948 is divisible by 3. Also, 48 is divisible by 4, So, 948 is divisible by 4. Therefore, 948 is divisible by 12.

Example 23

426 : 4 + 2 + 6 = 12 and 12 is divisible by 3. So, 426 is divisible by 3. But 26 is not divisible by 4. So, 426 is not divisible by 4. So, 426 is not divisible by 12.

Shortcut rule for the divisibility by 7 and 13:

A number can be divisible by 7, and 13 if and only if the difference of the number formed by the last three digits and the number formed by the rest digits is divisible by 7, and 13 respectively.

Example 1

Check that 137125 is divisible by 7 or not.

Solution :

So we take the difference as given below

137 − 125 = 85

Since, the difference divisible by 7. Hence the given number is also divisible by 7.

Example 2

Check whether 12478375 is divisible by 13 or not.

Solution :

Step 1 : 12478 − 375 = 12103

Step 2 : 12 − 103 = − 91

Since 91 is divisible by 13 hence 12478375 is also divisible by 13.

In addition to the given divisibility tests, some divisibility rules are as follows :

Rule : 1 – If two given numbers are divisible by any number, then their sum is also divisible by the number.

Rule : 2 – If two given numbers are divisible by any number, then their difference is also divisible by the number.

Rule : 3 – If any number is divisible by two co-prime numbers, then it is also divisible by the product of those co-prime numbers.

Rule : 4 – If any number is divisible by another number then each of the factors of another number divides the given number.

Focus Point

- All numbers divisible by 2 are even.
- Numbers divisible 3 may be even or odd.
- Numbers which are divisible by 2 and 3 are divisible by 6.
- Numbers which are divisible by 4 are also divisible by 2.
- Numbers which are divisible by 8 are also divisible by 2 and 4.
- Numbers which are divisible by 9 are also divisible by 3.
- Numbers which are divisible by 10 are also divisible by 2 and 5.

14. PRIME FACTORISATION

We are familiar with the terms factors and multiples. So let us factorise 36 in different ways as:

36 = 1 × 36,   36 = 2 × 18,   36 = 3 × 12,   36 = 4 × 9,

36 = 6 × 6,   36 = 2 × 2 × 9,   36 = 2 × 6 × 3,   36 = 3 × 3 × 4,   36 = 2×2×3×3

Here we observe that when we factorise 36 = 2×2×3×3, then all its factors are primes. Such factorisation of a number is called prime factorisation.

Thus if a natural number is expressed as the product of prime numbers, then the factorisation of the number is called its prime factorisation.

There are two method to find the prime factors of a number.

(i) Short division method / continuous division.

(ii) Factor tree.

Example 1

Prime factorisation for number 90.

Method 1 :– Short division/continuous division

Start dividing by the smallest prime factor until we cannot divide any more. Then continue dividing by the next higher prime factor. Repeat the process till you get.

$$
\begin{array}{c|c}
2 & 90 \\
\hline
3 & 45 \\
\hline
3 & 15 \\
\hline
5 & 5 \\
\hline
& 1
\end{array}
$$

This prime factorisation of 90 is 2 × 3 × 3 × 5

Method 2 :– Factor tree.

Step 1 : Write the number to be factorised at the top.

Step 2 : Choose any pair of factors as branches. If either of these factors is a composite number, factorise it again.

Step 3 : Choose a pair of factors of each composite number. Continue the branches till we reach prime factors.

Step 4 : Keep factorising till we have a row of prime factors.

```
                90                                          90
         3   X   30                                  2   X   45
      3  X  3  X  10                              2  X  5  X  9
   3  X  3  X  2  X  5                         2  X  5  X  3  X  3
```
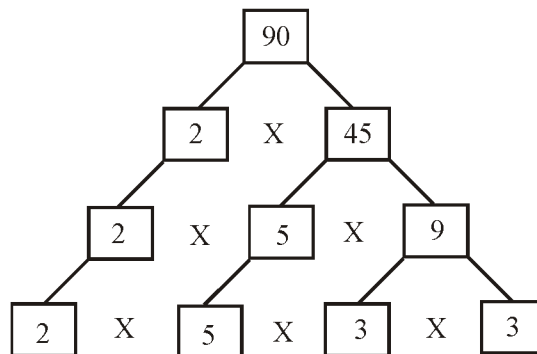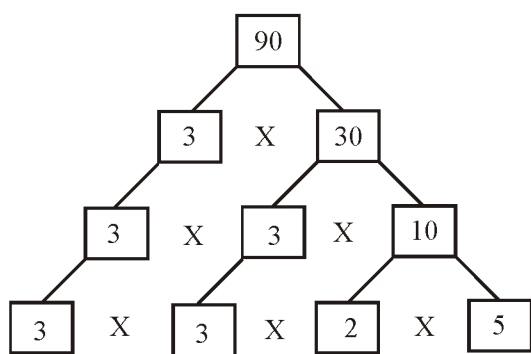
Remark:

To find prime factorisation of any natural number we can use divisibility test or we use the following method.

Example 1

Using short division method, find the prime factorisation of :

(i) 198   (ii) 264

Solution :

(i)

```
 2 | 198
 3 |  99
 3 |  33
11 |  11
   |   1
```

Prime factorisation of 198 is 2 × 3 × 3 × 11.

(ii)

```
 2 | 264
 2 | 132
 2 |  66
 3 |  33
11 |  11
   |   1
```

Prime factorisation of 264 is 2 × 2 × 2 × 3 × 11.

Example 2

Using factor tree, find the prime factors of :

(i) 92   (ii) 36

Solution :

(i) Factor tree of 92 is ,

```
       92
      /  \
     2    46
         /  \
        2    23
```
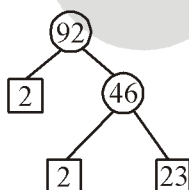
∴ Prime factorisation of 92 = 2 × 2 × 23

(ii) Factor tree of 36 is ,
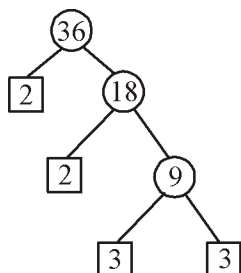
$\therefore$ Prime factorisation of $36 = 2 \times 2 \times 3 \times 3$

15. HIGHEST COMMON FACTOR (H.C.F) OR GREATEST COMMON DIVISOR (G.C.D)

The highest factor among all the common factors of two or more numbers is called the Highest Common Factor (HCF) or Greatest Common Divisor (GCD).

Let us learn to find the HCF by different methods.

1. Long Division Method   2. Prime Factorisation Method   3. Common Division Method

15.1 LONG DIVISION METHOD

In continuous division method, we divide the larger number by the smaller number and get a remainder. Then we divide the first divisor by the remainder and get a new remainder. Continue this process till the last remainder is zero. The last divisor in this process is the H.C.F. of the given two numbers.

Eg: Find the HCF of 180 and 324

$\therefore$ HCF of 180 and 324 is 36.

To find the H.C.F. of three or more numbers, we proceed as:

(i) Find the H.C.F. of any two given numbers.

(ii) Find the H.C.F. of the third number with the H.C.F. of step (i).

(iii) H.C.F. obtained in step (ii) is the required H.C.F. of the three given numbers.

(iv) For more numbers, we continue this process.

Eg: Find the HCF of 24, 32 and 44.

First consider 24 and 32.

```
24 | 32 | 1
   | 24 |
      8 | 24 | 3
      |  24 |
      |   0 |
```

Now, consider 8 and 44

```
8 | 44 | 5
  | 40 |
     4 | 8 | 2
     | 8 |
     | 0 |
```

∴ HCF of 24, 32 and 44 = 4

15.2 PRIME FACTORISATION METHOD

In prime factorisation method, we find the prime factorisation of each of the given numbers. Then H.C.F. is equal to the product of all the different common prime factors of the given numbers using each common factor the least number of times it appears in the prime factorisation of the given numbers.

Eg: Find the HCF of 60 and 216.

```
2 | 60          2 | 216
2 | 30          2 | 108
3 | 15          2 | 54
  |  5          3 | 27
                3 | 9
                3 | 3
```

60 = 2 × 2 × 3 × 5   216 = 2×2×2×3×3×3

⇒ HCF = 12

15.3 COMMON DIVISION METHOD

In this method, we find the smallest common prime factor of the given numbers, then divide all the numbers by the common prime factor and write the quotients just below the corresponding numbers. Divide the quotients by the smallest common prime factor till there is no common prime factor left by which all quotients can be divide. The product of the common prime factors is the HCF of the numbers.

Example 1

Find the HCF of 42, 84 and 24 by common division method.

Solution :

```
2 | 42, 84, 24
3 | 21, 42, 12
  |  7, 14, 4
```

∴ HCF of 42, 84 and 24 = 2 × 3 = 6.

Example 2

Find the HCF of 120, 180, 250 by prime factorisation method.

Solution :

```
2 | 120      2 | 180      2 | 250
2 | 60       2 | 90       5 | 125
2 | 30       3 | 45       5 | 25
3 | 15       3 | 15       5 | 5
5 | 5        5 | 5        | 1
  | 1          | 1
```

Prime factorisation of 120 = 2 × 2 × 2 × 3 × 5
Prime factorisation of 180 = 2 × 2 × 3 × 3 × 5
Prime factorisation of 250 = 2 × 5 × 5 × 5

So, HCF of 120, 180, 250 = 2 × 5 = 10

16. LEAST COMMON MULTIPLE (L. C. M)

L.C.M of two natural numbers is equal to the smallest natural number which is a multiple of both the numbers.

Thus, L.C.M. is equal to the smallest element of the set of common multiples of the given natural numbers.

Eg: Find the LCM of 6 and 12.

Multiples of 6 = {6, 12, 18, 24, 30, 36,...........}

Multiples of 12 = {12, 24, 36,...............}

Set of common multiples 6 and 12 = {12, 36.....}

The smallest element of this set = 12

∴ LCM = 12

There are two methods to find the L.C.M of a number.

(i) Prime Factorisation Method.

(ii) Common Division Method

16.1 PRIME FACTORISATION METHOD

In this method, first we find the prime factors of each number and then we identify the common prime factors. The product of common prime factors with the other factors is LCM of given numbers.

Example **1**

Find the LCM of 128 and 208 by prime factorisation method.

Solution :

2	128
2	64
2	32
2	16
2	8
2	4
2	2
	1

2	208
2	104
2	52
2	26
13	13
	1

∴ Prime factorisation of 128 and 208 are:

$128 = 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2$

$208 = 2 \times 2 \times 2 \times 2 \times 13$

∴ LCM of 128 and 208 = $2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 13 = 1664$

16.2 COMMON DIVISION METHOD

In this method, first we find the smallest prime number which exactly divides the given numbers and write the quotients below the corresponding numbers. Divide the quotients by the smallest common prime numbers till we get 1 as the quotient of each of number. Product of the divisors is the LCM of the given numbers.

Example **1**

Find the LCM of 125, 350 and 245 by common division method.

Solution :

2	125, 350, 245
5	125, 175, 245
5	25, 35, 49
5	5, 7, 49
7	1, 7, 49
7	1, 1, 7
	1, 1, 1

∴ LCM of 125, 350 and 245 = $2 \times 5 \times 5 \times 5 \times 7 \times 7 = 12250$

Note : For any two numbers a and b, we have a × b = (LCM of a, b) × (HCF of a, b)

BUILD THE CONCEPT

Product of H.C.F. and L.C.M. of two natural numbers is equal to the product of the two numbers.

H.C.F. × L.C.M. = Product of the two numbers.

SE. 1

Find a perfect number between 25 and 30.

Ans. Numbers between 25 and 30 are 26, 27, 28, 29.

Factors of 26 are 1, 2, 13, 26. Sum of factors = 1 + 2+ 13 + 26 = 42

Which is not equal to 26 (i.e. 52)

∴ 26 is not a perfect number

Similarly we can check 27 and 29 are not perfect numbers.

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

Sum of factors = 1 + 2 + 4 + 7 + 14 + 28 = 56 = 2 × 28

∴ 28 is a perfect number.

SE. 2

Which of the following numbers are divisible by 3 ?

(i) 932105   (ii) 4980204   (iii) 262242

Ans. (i) Here, the sum of digits in the given number 932105 is = 9 + 3 + 2 + 1 + 0 + 5 = 20, which is not divisible by 3.

∴ 932105 is not divisible by 3.

(ii) Here, the sum of digits in the given number 4980204 is

∴ 4980204 is divisible by 3.

(iii) Here, the sum of digits in the given number 262242 is

= 2 + 6 + 2 + 2 + 4 + 2 = 18, which is divisible by 3.

∴ 262242 is divisible by 3.

SE. 3

Which of the following numbers are divisible by 4 ?

(i) 75020   (ii) 987542

Ans. (i) Here, the number formed by the last two digits = 20, which is divisible by 4.

∴ 75020 is divisible by 4.

(ii) Here, the number formed by the last two digits = 42, which is not divisible by 4.

∴ 987542 is not divisible by 4.

SE. 4

Which of the following numbers are divisible by 5 ?

(i) 198645   (ii) 384050

(iii) 196450

Ans. (i) Here, unit's digit = 5 ∴ 198645 is divisible by 5.

(ii) Here, unit's digit = 0 ∴ 384050 is divisible by 5.

(iii) Here, unit's digit = 0 ∴ 196450 is divisible by 5.

SE. 5

Which of the following numbers are divisible by 6 ?

(i) 24056   (ii) 98274

Ans. (i) Here, the unit's digit = 6

∴ the given number is divisible by 2.

Also, the sum of the digits = 2 + 4 + 0 + 5 + 6 = 17 which is not divisible by 3, so the given number is not divisible by 3. Hence, 24056 is not divisible by 6.

(ii) Here, the unit's digit = 4

∴ the given number is divisible by 2

Also, the sum of the digits = 9 + 8 + 2 + 7 + 4 = 30

Which is divisible by 3, so the given number is divisible by 3.

Hence, the given number 98274 is divisible by 6.

SE. 6

Which of the following numbers are divisible by 8 ?

(i) 987048   (ii) 5719842

Ans. (i) Here, the number formed by the last three digits = 048

i.e. 48 which is divisible by 8.

∴ 987048 is divisible by 8.

(ii) Here, the number formed by the last three digits = 842, which is not divisible by 8.

∴ 5719842 is not divisible by 8.

SE. 7

Which of the following numbers are divisible by 9?

(i) 634680   (ii) 4204561

Ans. (i) Here, the sum of digits = 6 + 3 + 4 + 6 + 8 + 0 = 27,

which is divisible by 9.

634680 is divisible by 9.

(ii) Here, the sum of digits = 4 + 2 + 0 + 4 + 5 + 6 + 1 = 22,

which is not divisible by 9.

∴ 4204561 is not divisible by 9.

SE. 8

Which of the following numbers are divisible by 10?

(i) 500505   (ii) 8179320

Ans. (i) Here, unit's digit = 5

∴ 500505 is not divisible by 10.

(ii) Here, unit's digit = 0

∴ 8179320 is divisible by 10.

SE. 9

Which of the following numbers are divisible by 11?

(i) 2221582   (ii) 2455439

Ans. (i) Here, the sums of the digits at the alternate places are 2 + 5 + 2 + 2 and 8 + 1 + 2 i.e. 11 and 11

Their difference = 11–11 = 0, which is divisible by 11.

∴ 2221582 is divisible by 11.

(ii) Here, the sums of the digits at the alternate places are 9 + 4 + 5 + 2 and 3 + 5 + 4 i.e. 20 and 12

Their difference = 20 – 12 = 8, which is not divisible by 11.

∴ The given number 2455439 is not divisible by 11.

SE. 10

Express the following numbers as the product of primes.

(i) 90   (ii)675   (iii)1089

Ans. (i)

2	90	(90 is divisible by prime 2)
3	45	(45 is divisible by prime 3)
3	15	(15 is divisible by prime 3)
	5	(5 is itself by prime)

∴ 90 = 2 × 3 × 3 × 5

(ii)

3	675	(675 is divisible by prime 3)
3	225	(225 is divisible by prime 3)
3	75	(75 is divisible by prime 3)
5	25	(25 is divisible by prime 5)
	5	(5 is itself by prime)

∴ 675 = 3 × 3 × 3 × 5 × 5

(iii)

3	1089	(1089 is divisible by prime 3)
3	363	(363 is divisible by prime 3)
11	121	(121 is divisible by prime 11)
	11	(11 is itself by prime)

SE. 11

Find the H.C.F. of 16 and 24.

Ans. Factors of 16 = 1, 2, 4, 8, 16

Factors of 24 = 1, 2, 3, 4, 6, 8, 12, 24

Common factors of 16 and 24 = 1, 2, 4, 8

The greatest or largest (or highest) factor of this set is 8.

∴ H.C.F. of 16 and 24 = 8

SE. 12

Find the H.C.F. of 72, 192 and 324.

Ans. Factors of 72 = 1, 2, 3, 4, 6, 12, 18, 24, 36, 72

Factors of 192 = 1, 2, 3, 4, 6, 8, 12, 16, 24, 32, 48, 64, 96, 192

Factors of 324 = 1, 2, 3, 4, 6, 9, 12, 27, 36, 54, 81, 108, 162, 324

Common factors of 72, 192 and 324 = 1, 2, 3, 4, 6, 12

The highest factor is 12.

∴ H.C.F. of 72, 192, 324 = 12

SE. 13

Find the L.C.M. of 6 and 9.

Ans. Set of multiples of 6 = M(6) = {6, 12, 18, 24, 30, 36, ...}

Also the set of multiples of 9 = M(9) = {9, 18, 27, 36, ...}

Set of common multiples of 6 and 9 = 18, 36, ...

The smallest element of this set is 18.

∴ L.C.M. of 6 and 9 = 18.

SE. 14

Find the L.C.M. of 6 and 9 by division method.

Ans.

$$\begin{array}{c|cc} 2 & 6, & 9 \\ \hline & 2, & 3 \end{array}$$

(3 is a common factor of 6 and 9) (2 and 3 have no common factor)

∴ L.C.M. = 3 × 2 × 3 = 18.

SE. 15

Find the L.C.M. of 6 and 9 by prime factorisation method

Ans. 6 = 2 × [3]   9 = [3] × 3

We find that 2 occurs once where as 3 occurs a prime factor maximum 2 times.

∴ L.C.M. = 2 × 3 × 3 = 18.

SE. 16

Prove that for the numbers 24 and 40,

H.C.F. × L.C.M. = Product of the two numbers 24 and 40

Ans. Given numbers are 24 and 40.

24 = 2 × 2 × 2 × 3   40 = 2 × 2 × 2 × 5

∴ H.C.F. = 2 × 2 × 2 = 8

L.C.M. = 2 × 2 × 2 × 3 × 5 = 120

∴ H.C.F. × L.C.M. = 8 × 120 = 960 ....(1)

Also the product of the two numbers = 24 × 40 = 960....(2)

From (1) and (2), we get the required result.

SE. 17

If the product of two numbers is 336 and their H.C.F. is 4, find their L.C.M.

Ans. We know H.C.F. × L.C.M. = Product of two numbers

∴ 4 × L.C.M. = 336 i.e. L.C.M. = $\dfrac{336}{4}$ = 84

SE. 18

Determine the HCF of 14 and 20.

Ans. The factors of 14: 1,2,7,14

The factors of 20 : 1,2,4,5,10,20

The common factors of 14 and 20 is 1, 2.

∴ The HCF of 14 and 20 is 2. (Choose the largest common factor).

SE. 19

What is the HCF of 6 and 12 ?

Ans.

Common factor →

$$2 \begin{array}{|c} 6, 12 \end{array}$$
$$3 \begin{array}{|c} 3, 6 \end{array}$$
$$1, 2$$

The division stops here because 1 and 2 do not have any common factors except 1.
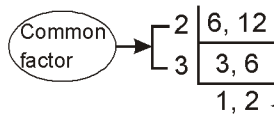
HCF = 2 × 3 (Multiply the common factors) = 6

SE. 20

Is 180 a common multiple of 3, 4 and 5 ?

Ans. 180 ÷ 3 = 60

180 ÷ 4 = 45

180 ÷ 5 = 36

∴ 180 is a common multiple of 3, 4 and 5.

SE. 21

Identify the common factors of 6, 8 and 12

Ans. The factors of 6: 1, 2, 3, 6

The factors of 8: 1, 2, 4, 8

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

∴ The common factors of 6, 8 and 12 are 1 and 2.

SE. 22

Is 4 a common factor of 36, 44 and 100 ?

Ans. To determine whether 4 is a common factor, carry out the division method.

36 ÷ 4 = 9

44 ÷ 4 = 11

100 ÷ 4 = 25

36, 44 and 100 are all divisible by 4.

∴ 4 is a common factor of 36, 44 and 100.

SE. 23

Find the factor of 20

Ans. 20 = 1 × 20 = 2 × 10 = 4 × 5

The factors of 20 are = 1, 2, 4, 5, 10, 20

Space for Notes :

ONLY ONE CORRECT TYPE

1. 55 is not a multiple of _____ .
   (A) 1   (B) 5
   (C) 22   (D) 11

2. Which of the following is a perfect number ?
   (A) 60   (B) 25
   (C) 36   (D) 6

3. The sum of the factors of 35 is _____ .
   (A) 84   (B) 13
   (C) 40   (D) 48

4. Which of the following numbers has a LCM 60 ?
   (A) (12, 5, 7)   (B) (12, 5, 60)
   (C) (2, 6, 10)   (D) (3, 6, 10)

5. 532460 is not divisible by _____ .
   (A) 10   (B) 5
   (C) 3   (D) 4

6. The number 53 is a _____ .
   (A) Odd   (B) Prime
   (C) Composite   (D) Both odd and prime

7. HCF of 70, 105 and 175 is _____ .
   (A) 35   (B) 135
   (C) 1050   (D) 7

8. I am the fifth multiple of the LCM of 2 and 7. What number am I?
   (A) 80   (B) 70
   (C) 75   (D) 65

9. Determine the number nearest to 100000 but greater than 100000 which is exactly divisible by each of 8, 15 and 21.
   (A) 100800   (B) 100900
   (C) 100700   (D) 100600

10. Which of the following is not a pair of twin primes between 10 and 40 ?
    (A) (11, 13)   (B) (21, 23)
    (C) (17, 19)   (D) (29, 31)

11. The least prime number with consecutive digits is _____ .
    (A) 43   (B) 19
    (C) 53   (D) 23

12. The greatest number that exactly divides 81 and 153 is _____ .
    (A) 3   (B) 10
    (C) 9   (D) 11

13. 96 is not a multiple of _____ .
    (A) (5, 15)   (B) (3, 8)
    (C) (8, 12)   (D) (4, 24)

14. Replace y by the non–zero digit, if the number 68y70 is divisible by 6.
    (A) 2   (B) 3
    (C) 1   (D) 4

15. What is the sum of prime numbers between 11 and 20 ?
    (A) 40   (B) 59
    (C) 49   (D) 50

16. Eight added to 9th multiple of 11 gives _____ .
    (A) 170   (B) 107
    (C) 19   (D) 91

17. Seema saves Rs. 10 per day. In how many days she would be able to save money in multiples of 1000?
    (A) 10,000
    (B) 1000
    (C) 100
    (D) 1100

18. The number of numbers having exactly one factor is _____.
   (A) 0   (B) 2
   (C) 1   (D) 3

19. The LCM of 504, 1260, 60 is _____.
   (A) 420   (B) 2520
   (C) 252   (D) 126

20. The sum of an even number and an odd number is ____.
   (A) Odd   (B) Even
   (C) Both even and odd (D) Prime

21. Without actual division, find which of the following numbers is exactly divisible by 2, 3 and 5 ?
   (A) 185   (B) 5875
   (C) 3540   (D) 709

22. What is the largest perfect number less than 50 ?
   (A) 6   (B) 28
   (C) 51   (D) 56

23. If a number is divisible by both 5 and 7, then it must neccessarily be divisible by _____.
   (A) 5 + 7   (B) 7 – 5
   (C) 5 × 7   (D) 42

24. 7120 is not divisible by _____.
   (A) 5   (B) 10
   (C) 6   (D) 8

25. Which of the following numbers is not prime ?
   (A) 161   (B) 137
   (C) 127   (D) 353

26. The greatest common factor of 120 and 192 is ___.
   (A) 12   (B) 24
   (C) 48   (D) 84

27. The least 5 – digit number which is exactly divisible by each of 2, 3, 4, 5, 6 and 7 is _____.
   (A) 9650   (B) 420
   (C) 10,080   (D) 9660

28. Which of the following is not equal to $2 \times 3 \times 5$?
   (A) LCM of 15 and 2
   (B) HCF of 90 and 150
   (C) LCM of 30 and 25
   (D) Prime factorisation of 30

29. Which of the following number is a 6th multiple of 19 ?
   (A) 114   (B) 95
   (C) 171   (D) 361

30. Which place of digit should be divisible by 4 so that the number is divisible by 4?
   (A) Ten's   (B) Unit's
   (C) Hundred's   (D) None of these

FILL IN THE BLANKS

1. The smallest even prime number is ___.
2. The product of two odd numbers is ____.
3. The seventh multiple of 16 is _____.
4. LCM of 150, 15, 25 is ____.
5. 53 is a _____ number.
6. 54 is _____ of 9 and 6.
7. Two numbers having 1 as their common factor are called ____.
8. HCF of 96 and 39 is _____.
9. _____ is neither a prime nor a composite number.
10. A number is divisible by 6 if it is divisible by ____.

TRUE / FALSE TYPE

1. 44 is a common factor of 22 and 88.
2. Every number is a multiple of itself.
3. If a number has 0 in its ones place, then it is divisible by 4.
4. There are 5 prime numbers less than 17.

5. The sum of two even numbers is always even.

6. All composite numbers are even numbers.

7. The smallest 2–digit prime number is 13.

8. All numbers divisible by 9 are also divisible by 3.

9. Every prime number other than 2 is even.

10. HCF of two co–prime numbers is 1.

PARAGRAPH TYPE

PASSAGE # I

Geeta have 50 red beads, 100 white beads and 120 blue beads. She wants to make a bracelet so that she can use beads of each colour.

1. What is the largest number of bracelets she can make ?

   (A) 15   (B) 25

   (C) 10   (D) 30

2. If she wants to use equal number of white and blue beads. What is the minimum number of beads of each colour she require?

   (A) 600   (B) 100

   (C) 200   (D) 300

3. If she has 20 bracelets with each colour of beads in it. It is the maximum number of bracelets, which of the following number of beads she used in the bracelets?

   (A) 15 red, 20 white, 25 blue

   (B) 40 red, 60 white, 80 blue

   (C) 12 red, 24 white, 36 blue

   (D) 10 red, 15 white, 30 blue

PASSAGE # II

If 'a' is a factor of both b and c, then a is a factor of (b – c) and (b + c).

4. If 64 and 48 are divisible by 4 then what is the difference of the given numbers so that it is divisible by 4?

   (A) 12   (B) 18

   (C) 20   (D) 16

5. If the value of $a = 6$, $b = 2$ then what is the minimum value of 'c' so that 'a' is a factor of $b + c$?

   (A) 4   (B) 5

   (C) 10   (D) 7

6. What is the product of sum and difference of the two numbers 625 and 500 so that it becomes a multiple of 25?

   (A) 1125   (B) 140625

   (C) 125   (D) 31250

MATCH THE COLUMN TYPE

In this section each question has two matching lists. Choices for the correct combination of elements from List–I and List–II are given as options (A), (B), (C) and (D) out of which one is correct.

1. Match the following :

List–I	List–II
(P) A number divisible by 12 is	(i) 610
(Q) A number divisible by 10 is	(ii) 121
(R) A number divisible by 11 is	(iii) 432
(S) A number divisible by 3 but not by 6 is	(iv) 2817

Code :

	P	Q	R	S
(A)	i	ii	iii	iv
(B)	iii	iv	i	ii
(C)	iii	i	ii	iv
(D)	iv	iii	ii	i

2. Match the following :

List – I	List–II
(P) 8th multiple of 15	(i) not a prime number
(Q) LCM of 18, 24, 27 is	(ii) 216
(R) 33481 is	(iii) 12
(S) HCF of 48, 72, 108 is	(iv) 120

Code:

	P	Q	R	S
(A)	iv	ii	i	iii
(B)	ii	iv	i	iii
(C)	i	iii	ii	iv
(D)	iv	iii	ii	i

3. Match the following :

List–I	List–II
(P) Number ends in 0,5	(i) 9
(Q) Even prime number is	(ii) is divisible by 5
(R) Smallest composite odd number	(iii) 2
(S) HCF of 72 and 60	(iv) 12

Code :

	P	Q	R	S
(A)	iii	ii	iv	i
(B)	ii	iii	i	iv
(C)	iv	iii	ii	i
(D)	ii	iii	iv	i

VERY SHORT ANSWER TYPE

1. Determine the prime factorisation of 840.

2. Write all the prime numbers between 1 and 50.

3. Define a composite number.

4. Find the LCM of 40, 144 and 180.

5. Write the first five multiples of 13.

6. Check if 401 is a prime number.

7. List all 2–digit prime numbers, in which both the digits are also prime numbers.

8. What is the least number divisible by 16, 20 and 24 ?

9. Find the sum of all the prime numbers between 1 and 20.

10. Find the HCF of 36, 56, 86.

SHORT ANSWER TYPE

1. Find the largest number which divides 245 and 1029 leaving remainder 5 in each case.

2. Three city tour buses leave the bus stop at 9.00 a.m. Bus A returns in every 30 minutes, Bus B returns in every 20 minutes and Bus C returns in every 45 minutes. What is the next time, all buses will return at the same time to the bus stop ?

3. Find the greatest number of 5–digits which when divided by 3, 5, 8 and 12 will have 2 as remainder.

4. State whether the number 27 and 29 are twin primes or co–primes.

5. Check the divisibility of 226180 by 2, 3, 5.

6. A rectangular room is 20 m 16 cm long and 15 m 60 cm wide. It is paved with square tiles of the same size. Find the greatest size of each tile.

7. Find the LCM of 14, 21 and 35 by prime factorisation method.

8. Find the HCF of the numbers 276, 348 and 444.

9. Define co–prime numbers. Write down three examples.

10. Write the smallest 4—digit number and express it as product of prime.

LONG ANSWER TYPE

1. Find the LCM and HCF of 54, 108 and 288 by prime factorisation method.

2. The floor of a room 9 m × 6.75 m is to be paved by square marble slabs. Find the maximum size of each slab. How many slabs will be required in all ?

3. Using divisibility tests, determine whether '438340' is divisible by 3, 4, 8, 10 or not.

4. Replace the star (*) by the smallest number, so that

   (i) 78 * 964 may be divisible by 9.

   (ii) 75 * may be divisible by 4.

   (iii) 2 * 345 may be divisible by 3.

5. Using properties of divisibility, check whether 1500 is divisible by 30? Also state the property used.

NUMERICAL PROBLEMS

In this section, each question, when worked out will result in one integer from 0 to 9 (both inclusive).

1. Which number is a factor of every number?

2. What is the GCD of 12, 18, 21?

3. What should be the last digit of the given number so that the number is divisible by 10 ?

4. What is the smallest even composite number ?

5. If the nth multiple of 5 is 25. Find the value of n.

6. Find the missing digit to make 156 * 9 divisible by 11 ?

7. What is the product of the digits of the number which is 6 more than the HCF of 12 and 144?

8. What will be the ones place digit of largest prime number less than 30 ?

9. What should be the difference of two prime numbers so that the pair is twin–prime?

10. What is the common prime factor of 6 and 21 ?

Space for Notes :

Answer Key

EXERCISE I														
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
C	D	D	B	C	D	A	B	A	B	D	C	A	B	C
16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
B	C	C	B	A	C	B	C	C	A	B	C	C	A	D

FILL IN THE BLANKS

1.   2   **2.**   Odd   **3.**   112   **4.**   150   **5.**   Odd prime   **6.**   Multiple

7.   Co–prime   **8.**   3   **9.**   1   **10.**   Both 2 and 3

TRUE/FALSE TYPE

1.   F   **2.**   T   **3.**   F   **4.**   F   **5.**   T   **6.**   F   **7.**   F

8.   T   **9.**   F   **10.**   T

PARAGRAPH

1.   C   **2.**   A   **3.**   B   **4.**   D   **5.**   A   **6.**   B

MATCH THE COLUMN

1.   C   **2.**   A   **3.**   B

EXERCISE II

VERY SHORT ANSWER TYPE

1. $2^3 \times 3 \times 5 \times 7$ **2.**   2, 3, 5, 7, 11, 13, 17, 19, 23, 29, 31, 37, 41, 43, 47

3.   A natural number greater than 1 which is not prime is called composite number   **4.**   720

5.   13, 26, 39, 52, 65   **6.**   401 is a prime number   **7.**   23, 37, 53 and 73   **8.**   240

9.   77   **10.**   2

SHORT ANSWER TYPE

1.   16   **2.**   12 Noon   **3.**   99962   **4.**   27 and 29 are co-prime numbers

5.   226180 is divisible by 2 and 5   **6.**   24   **7.**   210   **8.**   12

9.   (2, 3), (8, 13), (16, 25)   **10.** $2^3 \times 5^3$

LONG ANSWER TYPE

1.   864   **2.**   12   **3.**   It is divisible by 4 and 10, But is not divisible by 3 and 8

4.   (i) 2,   (ii) 2,   (iii) 1

NUMERICAL PROBLEMS

1.   1   **2.**   3   **3.**   0   **4.**   4   **5.**   5   **6.**   0   **7.**   8

8.   9   **9.**   2   **10.**   3

SELF PROGRESS ASSESSMENT FRAMEWORK

(CHAPTER : PLAYING WITH NUMBERS)

CONTENT	STATUS	DATE OF COMPLETION	SELF SIGNATURE
Theory			
In-Text Examples			
Solved Examples			
Exercise I			
Exercise II			
Short Note-1			
Revision - 1			
Revision - 2			
Revision - 3			
Remark			

NOTES :

1. In the status, put "completed" only when you have thoroughly worked through this particular section.

2. Always remember to put down the date of completion correctly. It will help you in future at the time of revision.

Space for Notes :

BASIC GEOMETRICAL IDEAS | 4

📖 INTRODUCTION

The part of mathematics that deals with such objects as points, lines, planes and space is called geometry. Some of the geometrical objects are triangle, rectangle, circle, etc.

The English word Geometry has been derived from the Greek word geometron which means to measure the Earth'. Geometrical idea have developed over centuries to cater to needs in art, architecture etc. Here, we will discuss some basic concepts in geometry.

1. POINT

A point shows an exact location of an object. It is the basic unit of geometry. It is represented with the help of a dot. It is named by using a single capital English alphabet.

·A

This is point A

A point has no length and no breadth.
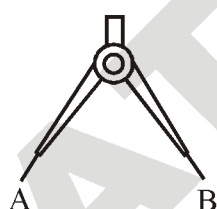
A   B
The tip of   The sharpened   The pointed
a compass   end of a pencil   end of a needle

2. LINE, LINE SEGMENT AND RAY

2.1 LINE

A line is a collection of points going endlessly in both directions along a straight path.

The symbol for a line is ↔.

A   B

The arrows show that the line goes on endlessly in both directions. A and B are two points on the line. We call it line AB and write it as $\overrightarrow{AB}$ or $\overrightarrow{BA}$. It can also be named by means of any small English letter, say l.

l

If two or more lines meet each other at one point then they are called intersecting lines. Two intersecting lines have one common point.
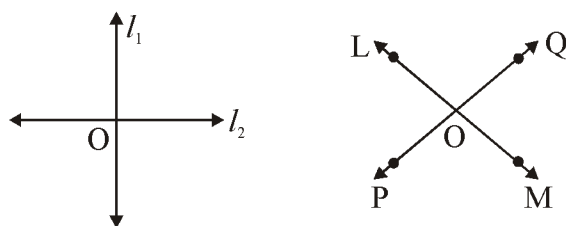
2.2 PARALLEL LINES

If two or more lines do not meet each other however far they are extended, then they are called parallel lines.
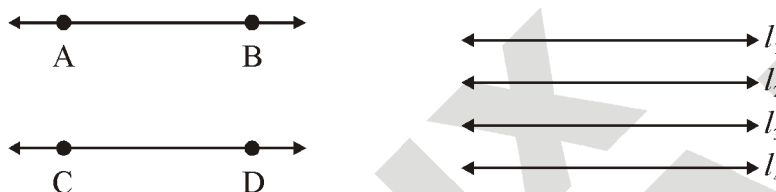
The opposite edges of a book, table ruler etc. are good example of parallel lines.

2.3 LINE SEGMENT

A line segment is part of a line. It has two endpoints and has a fixed length.

We name the segment by its endpoints.

The symbol for a line segment is "_____".

Points P and Q are the two endpoints of the line segment PQ as shows above. We write it as $\overline{PQ}$ or $\overline{QP}$.

2.4 RAY

You must have noticed rays of light coming out of a torch or car headlights. A ray is part of a line. It has one endpoint and goes on endlessly in one direction. The endpoint is mentioned first while naming a ray.
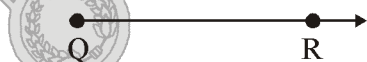
Ray QR is written as $\overrightarrow{QR}$. It is important to note that $\overrightarrow{RQ}$ is not a ray as Q is an end point.

2.5 COLLINEAR POINTS

Three or more points in a plane are said to be collinear if they all lie on the same line.

In the given Fig, points A, B, C and D are collinear because only one line l passes through all of them.
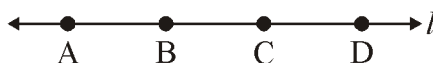
If the points do not lie on a line, they are called non-collinear points.

We have learnt earlier that through two given distinct points we can always draw a line. Thus two distinct points are always collinear. But given three distinct points may or may not be collinear. So we talk of collinearity of three or more distinct points.

Example **1**

In figure name :

(i) Four non-collinear points.

(ii) Point of intersection of the lines *l* and m.

(iii) Point of intersection of the lines r and n.

(iv) Point of intersection of the lines q and n.

(v) Point of intersection of the lines p and q.

(vi) Four line segments.

(vii) Two points on the line q.
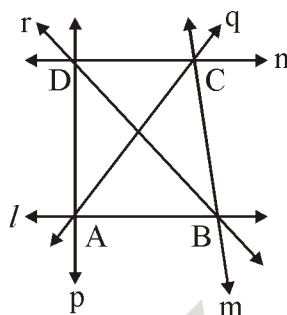
Solution :

(i) A, B, C, D   (ii) B   (iii) D   (iv) C

(v) A   (vi) $\overline{AB}, \overline{BC}, \overline{CD}, \overline{AD}$ (vii) A, C

2.6   CONCURRENT LINES

Three or more lines in plane are said to be concurrent if they all pass through the same point. In below figure, the line *l*, m, n,.........all pass through a common point O. Such lines are said to be concurrent lines and we say that they are concurrent at O. The point O is called the point of concurrency.
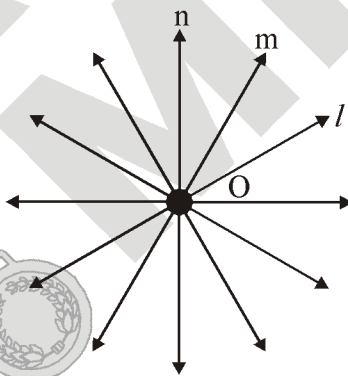
The point of concurrency of three or more lines in a plane is also called the point of intersection of these given lines. Now look at below figure, the lines *l*, m, n, t are not concurrent lines but are intersecting lines. The points A, B, C, ... are the points of intersection of the lines l, m, n, ...but none of them is a point of concurrency. In this case the point of intersection is not point of concurrency.
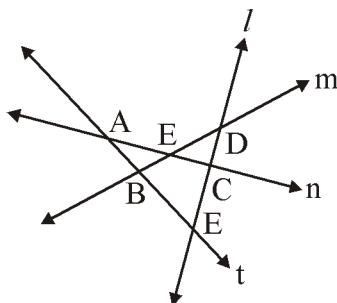
Focus Point

- We have learnt earlier that through two given distinct points we can always draw a line. Thus two distinct points are always collinear. But given three distinct points may or may not be collinear. So we talk of collinearity of three or more distinct points.

- As collinearity is defined for three or more points, we define concurrency for three or more lines.

3. CURVES

When you draw lines on a piece of paper without lifting the pencil and without using a scale, the shapes that you get are called curves. Some examples are shown below.

Simple Curve : A curve that does not cross itself is called a simple curve. The figures shown below are simple curves.

(a)   (b)   (c)
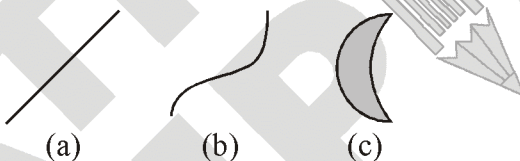
4. ANGLE

An angle is formed when two rays meet at a common point called a vertex. Each of these rays is called an arm of the angle. An angle is represented by the symbol ∠.
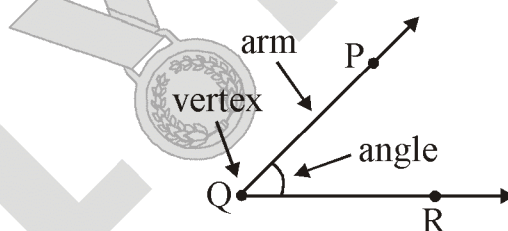
In figure $\overrightarrow{QR}$ and $\overrightarrow{QP}$ meet at the vertex Q to from an angle PQR. We write it as ∠PQR or ∠RQP or ∠Q. An angle can also be formed by the intersection of line segment.

4.1 INTERIOR OF AN ANGLE

The space within the arms of an angle, produced indefinitely, is called the interior of the angle. In figure points P, Q and R are said to lie in the interior of the angle.
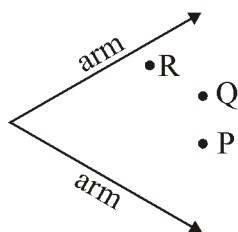
4.2 EXTERIOR OF AN ANGLE

The space outside the arms of an angle, produced indefinitely, is called the exterior of the angle. Point A, B and C lie in the exterior of the angle shown in figure.
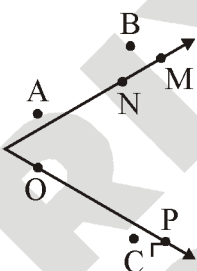
M, N, O and P are points on the angle and are, therefore, part of the angle.

4.3 ADJACENT ANGLES

Two angles which have a common arm, a common vertex and lie on either side of the common arm are called adjacent angles. In figure ∠AOB and ∠BOC are adjacent angles as they have a common arm $\overrightarrow{OB}$, a common vertex O and both the angles AOB and BOC are on either side of the common arm $\overrightarrow{OB}$. Both the angles are distinct angles and no part of ∠AOB is a part of ∠BOC and vice versa.
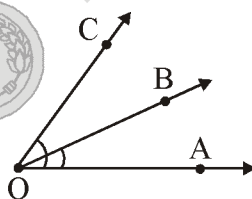
4.4 LINEAR PAIR

Two adjacent angles are said to form a linear pair of angles, if their non-common arms are two opposite rays, in figure. OA and OB are two opposite rays and ∠AOC and ∠BOC are the adjacent angles. Therefore, ∠AOC and ∠BOC form a linear pair.

∠AOC + ∠BOC = 180°
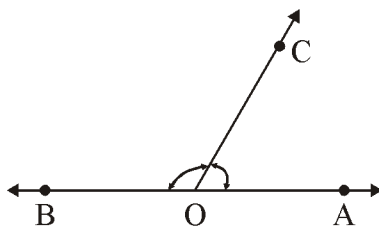
4.5 VERTICALLY OPPOSITE ANGLES

Two angles formed by two intersecting lines having no common arm are called vertically opposite angles.
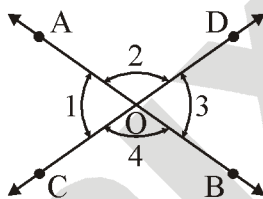
4.6 COMPLEMENTARY ANGLES

If the sum of the measures of two angles is 90°, then the angles are called complementary angles and each is called a complement of the other. Angles of measures 35° and 55° are complementary angles.

4.7 SUPPLEMENTARY ANGLES

Two angles are said to be supplementary angles if the sum of their measures is 180°, and each of them is called a supplement of the other. Angles of measures 55° and 125° are supplementary angles.

5. OPEN AND CLOSED FIGURES

5.1 OPEN FIGURES

The figures that do not begin and end at the same point are called open figures.

5.2 CLOSED FIGURES

The figures that begin and end at the same point are called closed figures. They are also called closed curves. The closed curves that do not cross themselves are called simple closed curve.

For example : Triangle, circle, ellipse, rectangle, square, etc. are all closed figures.

Interior and Exterior of closed figures : There are three parts in a closed curve.

(a) Interior (inside) of the curve.

(b) Exterior (outside) of the curve.

(c) Boundary of (on) the curve.

The interior of a curve together with its boundary is called its region.

A lies in the interior of the curve, B on its boundary and C lies in its exterior.

6. POLYGON

Polygon is a closed figure made by joining three or more line segments (not curves), where each line segments intersects exactly two other line segments. For example, triangle, quadrilateral, pentagon, etc., are all examples of polygon.

If all sides of a polygon are equal and all angles are also equal, then it is called a regular polygon. Sides, vertices, and diagonals.

Consider the given figure. This is a polygon.
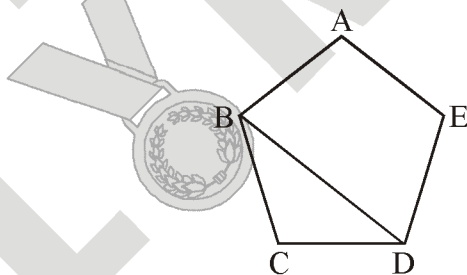
(a) The line segment forming a polygon are called its side. In the given polygon $\overline{AB}, \overline{BC}, \overline{CD}, \overline{DE}, \overline{EA}$ are sides.

(b) Any two sides with a common end point are called adjacent sides.

(c) The meeting point of a pair of sides is called vertex. Side $\overline{AB}$ and $\overline{BC}$ meet at B, so B is a vertex of the polygon ABCDE. Similar, A, C, D, and E are the other vertices.

(d) The end points of the same side are called adjacent vertices. Vertices A and B are adjacent vertices but A and C are not.

(e) The line joining two non-adjacent vertices of a polygon is called a diagonal. Since A and C are non-adjacent vertices, so $\overline{AC}$ is a diagonal.

7. TRIANGLE

A triangle is a closed figure made of three line segments. In figure, line segments $\overline{AB}, \overline{BC}$ and $\overline{CA}$ form a closed figure. The figure given below is a triangle and is denoted by ΔABC. This triangle can also be named as ΔABC, ΔBCA, ΔCAB, ΔCBA, ΔBAC, or ΔACB.
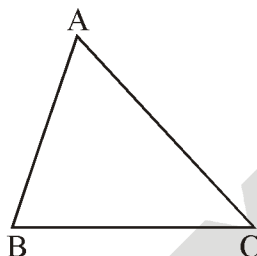
The line segments forming a triangle are the three sides of the triangle. In the above figure, $\overline{AB}, \overline{BC}$ and $\overline{CA}$ are the three sides of the triangle.

The point where any two of the three line segments of triangle intersect is called the vertex of the tirnalge. A triangle has three vertices. In the given figure, A, B and C are the three vertices.

When two line segments intersect, they form an angle at that point. In the above triangle $\overline{AB}$ and $\overline{BC}$ intersect at B and form an angle at that vetex. This angle at B is read as $\angle B$ or $\angle ABC$ or $\angle CBA$. Thus a triangle has three angles, ΔABC has three angles namely $\angle A$, $\angle B$ and $\angle C$.

Look at ΔABC in figure below points P and Q are in the interior of ΔABC. The region within the boundary of ΔABC is called interior region of the triangle.
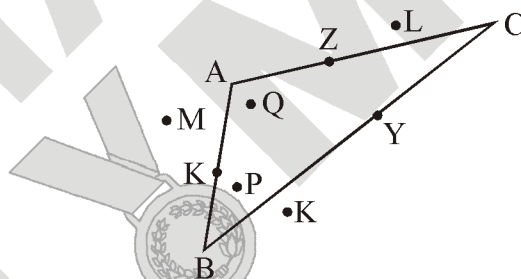
Note that ΔABC only refers to the boundary of the figure and not its interior. Points X, Y and Z are on the boundary of the ΔABC and hence they are on ΔABC. The interior region along with the boundary is known as the triangular region. Points K, L and M are on the exterior of ΔABC.

7.1 MEDIANS OF A TRIANGLE

A line segment joining a vertex to the mid-point of the side opposite to the vertex is called a median of the triangle.
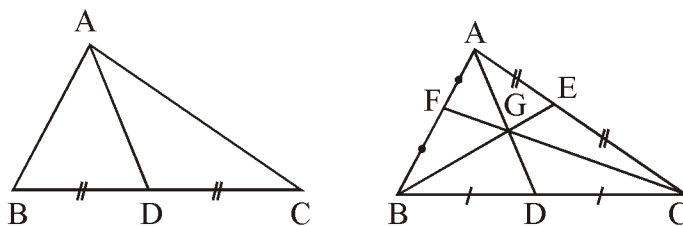
Thus, in the above figure, D is the mid-point of BC and AD is a median. Obviously, every triangle has three medians, one from each vertex.

The point G where all the median of triangle intersectes is known as centroid.

7.2 ALTITUDES OF A TRIANGLE

An altitude of a triangle is the perpendicular drawn from a vertex to the opposite side (produced if necessary).
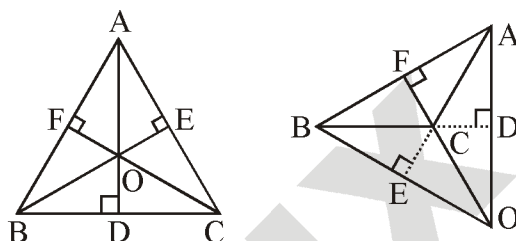
Clearly, every triangle has three altitudes, one from each vertex.

If we take BC as the base, then AD is called the height of the triangle.

The point O where all the altitudes of a triangle meets is known as orthocentre.

8. QUADRILATERAL

A quadrilateral is a closed figure formed by four line segments.
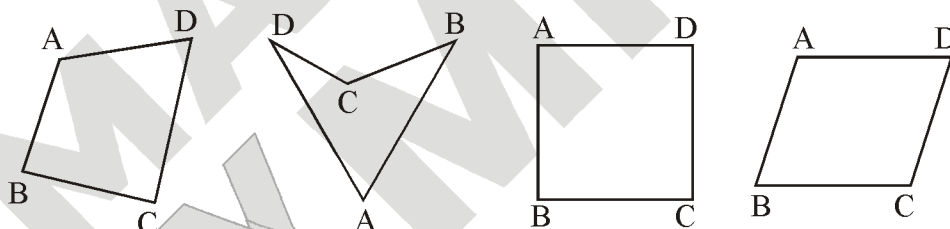
All the shapes shown above are quadrilaterals as they are all boundary by four line segments.

A quadrilateral has four sides, four vertices, and four angles. In the above figure $\overline{AB}, \overline{BC}, \overline{CD}$ and $\overline{DA}$ constitute the sides, and $\angle A$, $\angle B$, $\angle C$ and $\angle D$ are the four angles. These quadrilaterals are read as quadrilateral ABCD.

Elements of a quadrilateral

8.1 ADJACENT SIDES

In the quadrilateral PQRS there are four sides, namely $\overline{PQ}, \overline{QR}, \overline{RS}$ and $\overline{SP}$.
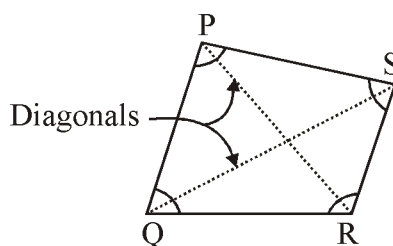
The two sides of a quadrilateral having a common endpoint are called adjacent sides. Thus, sides $\overline{PQ}$ and $\overline{QR}$ are adjacent sides having the common endpoint Q. Sides $\overline{QR}$ and $\overline{RS}$ are also adjacent sides having the common endpoint R. Similarly, $\overline{RS}$ and $\overline{SP}$ are adjacent sides, and $\overline{SP}$ and $\overline{PQ}$ are also adjacent sides.

8.2 OPPOSITE SIDES

The sides $\overline{PQ}$ and $\overline{RS}$ are called opposite sides. Similarly, $\overline{QR}$ and $\overline{SP}$ are also opposite sides. They have no common end point.

8.3 ADJACENT ANGLES

Two angles of a quadrilateral which have a common arm are called adjacent angles.

Therefore $\angle P$ and $\angle Q$ are adjacent angles as they have a common arm $\overline{PQ}$. Similarly, $\angle Q$ and $\angle R$; $\angle R$ and $\angle S$; $\angle S$ and $\angle P$ are also adjacent angles.

8.4 OPPOSITE ANGLES

$\angle P$ and $\angle R$ are opposite angles as they have no common arm.

Similarly, $\angle Q$ and $\angle S$ are also opposite angles.

8.5 DIAGONALS

The line segments joining the opposite vertices are called the diagonals of the quadrilateral. $\overline{QS}$ and $\overline{PR}$ are the two diagonals of the quadrilateral PQRS.

8.6 INTERIOR AND EXTERIOR OF QUADRILATERAL

The region inside the quadrilateral ABCD is called its interior and that outside is called the exterior. In the given figure, four points P, Q, R and S are marked. P and Q are side to be in the interior of the quadrilateral ABCD, R is on the quadrilateral ABCD, while S is in the exterior of the quadrilateral ABCD.
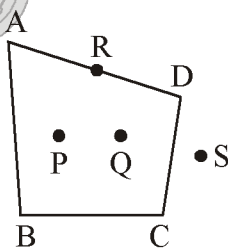
The interior of the quadrilateral ABCD along with the quadrilateral ABCD is called the quadrilateral region of ABCD, i.e., P, Q and R are points in the quadrilateral region of the quadrilateral ABCD. A quadrilateral has four angles and the sum of all four angles of a quadrilateral is 360°.

9. CIRCLES

A circle is a simple closed curve all of whose points are at the same distance from a given point O in the same plane.

The given point O is called the centre of the circle.

Parts of a circle :

A line segment joining the centre of a circle to any point on the circle is called a radius of that circle.

A line segment joining any two points on a circle is called a chord of that circle.

A chord that passes through the centre of a circle is called a diameter of that circle.
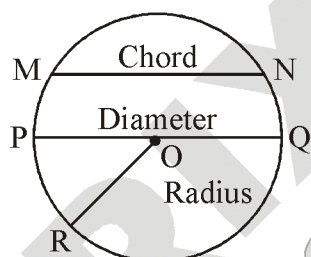
Focus Point

• A diameter is the longest chord of a circle.

• The diameter is twice the radius.

• The distance around a circle is called the circumference.

9.1 SECANT

A line which intersects or meets the circle at two distinct points is called a secant.
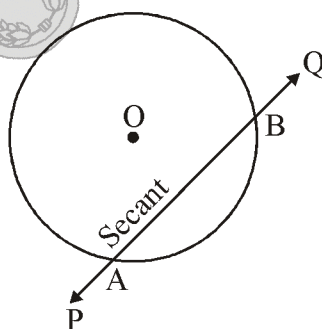
9.2 ARC

A part (continuous) of a circle is called an arc.
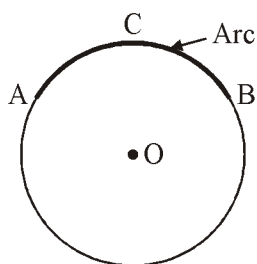
9.3 SEMI-CIRCLE

A diameter divides a circle into two equal parts which are called semi-circles.
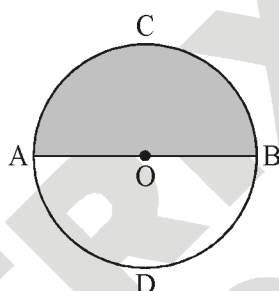
9.4 SEGMENT

A chord AB of a circle divides the area enclosed by it into two parts which are called segments. The smaller part is called a minor segment and the larger part a major segment. The chord also divides the circumference of the circle into two parts. The smaller part is called a minor arc because it is less than a semicircle an the larger part a major arc because it is greater than a semi-circle.
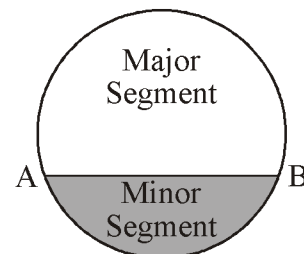
9.5 SECTOR AND QUADRANT

The part of a circle enclosed by any two radii of the circle is called a sector of the circle.
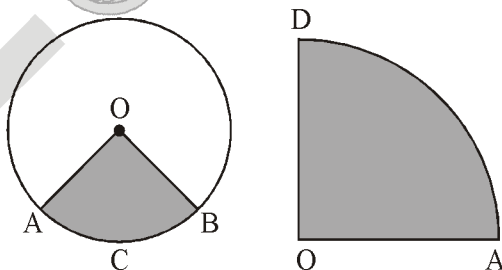
In this figure OACB is a sector.

If the two radii are at right angles to each other the sector is called a quadrant. A quadrant is thus $\frac{1}{4}$ th of a circle.

In the figure AOD is a quadrant.

9.6 CONCENTRIC CIRCLES

Two or more circles drawn with the same centre are

called concentric circles.
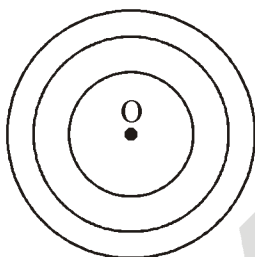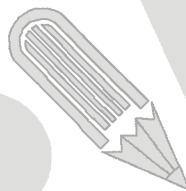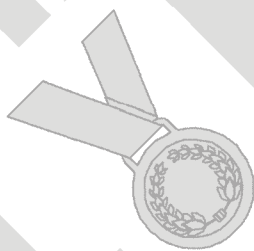
SE. 1

The number of common points in the two angles marked in given figure is _____.
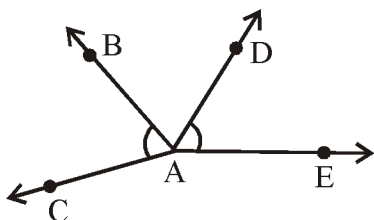
Ans. One : The two angles marked; ∠CAB and ∠DAE.

The number of common point is 1 and that is A.

SE. 2

Name the points:

(i) on ∠POQ

(ii) In the interior of ∠POQ

(iii) In the exterior of ∠POQ
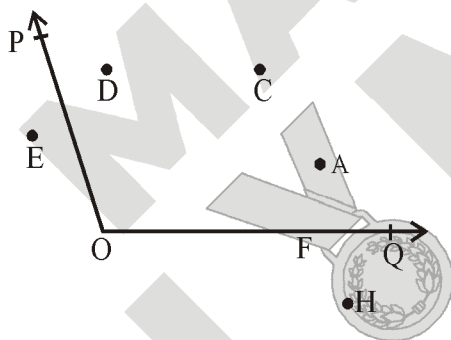
Ans. (i) The point on ∠POQ is F.

(ii) The points lying in the interior of ∠POQ are D, C, A.

(iii) The points lying in the exterior of ∠POQ are E and H.

SE. 3

In the given figure, name :
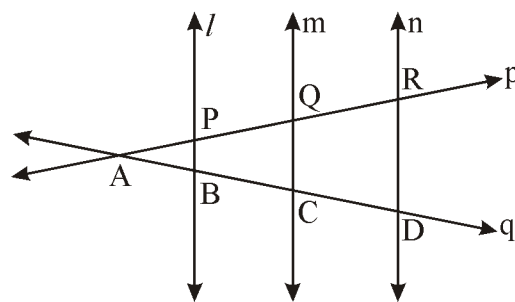
(i) all pairs of parallel lines

(ii) all pairs of intersecting lines

(iii) lines whose point of intersection is P

(iv) lines whose point of intersection is C

(v) lines whose point of intersection is R

(vi) collinear points

Ans. (i) Pairs of parallel lines : *l* and m; m and n; *l* and n.

(ii) Pairs of intersecting lines : *l*, p; m, p; n, p; *l*, q; m, q; n, q; p, q.

(iii) P is the point of intersection of lines *l* and p.

(iv) C is the point of intersection of lines m and q.

(v) R is the point of intersection of n and p.

(vi) Collinear points are: A, P, Q, R and A, B, C, D.

SE. 4

In given figure, name all rays with initial points as A, B and C respectively.

Ans. $\overrightarrow{AP}, \overrightarrow{AB}, \overrightarrow{AC}, \overrightarrow{AQ}, \overrightarrow{BP}, \overrightarrow{BA}, \overrightarrow{BC}, \overrightarrow{BQ}, \overrightarrow{CP}, \overrightarrow{CA}, \overrightarrow{CB}, \overrightarrow{CQ}$

SE. 5

In the given figure, O is the centre of the circle.
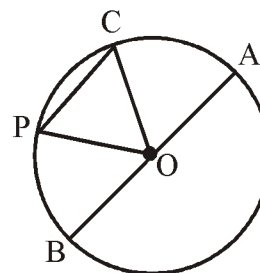
(a) Name all chords of the circle.

(b) Name all radii of the circle.

(c) Name of chord, which is not the diameter of the circle.

(d) Shade sectors OAC and OPB.

(e) Shade the minor segment of the circle formed by CP.

Ans. (a) Chords : PC and BA.

(b) Radii : PO, OC , OB and OA.

(c) PC is a chord which is not the diameter of the circle.

(d)   (e)
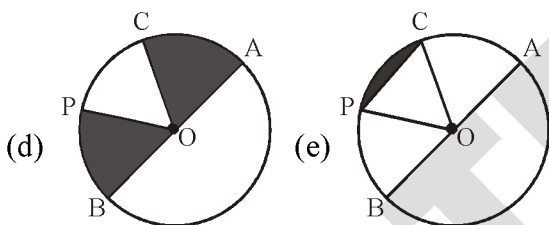
SE. 6

Draw a sketch of quadrilateral EFGH. State:

(i) Two pairs of adjacent sides

(ii) Vertices

(iii) two pairs of opposite sides
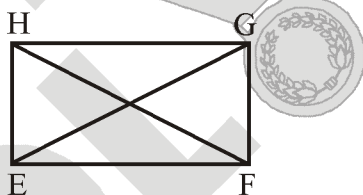
(iv) Diagonals

Ans.

EFGH is quadrilateral.

(i) Two pairs of adjacent sides are EF, FG GH, HE.

(ii) E, F, G and H are four vertices of quadrilateral EFGH.

(iii) Opposite sides are EF and GH; FG and HE.

(iv) EG and FH are two diagonals.

SE. 7

Classify the following curves as open or closed.

(i)   (ii)
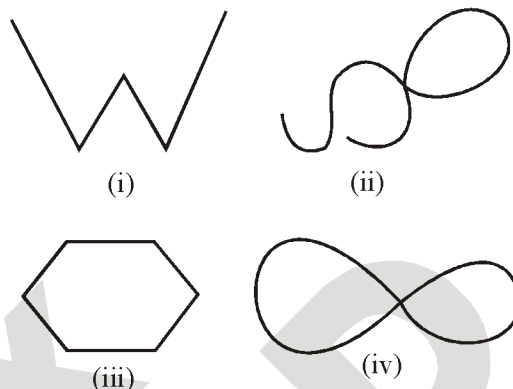
(iii)   (iv)

Ans. Open Curve : (i) & (ii)

Closed Curve : (iii) & (iv)

SE. 8

In figure, write another name for the following angles:
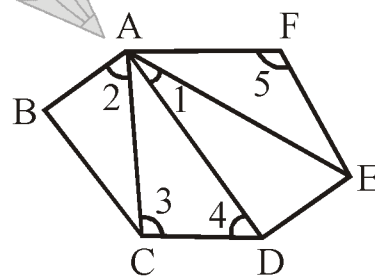
(i) ∠1   (ii) ∠2   (iii) ∠3

(iv) ∠4   (v) ∠5

Ans. (i) ∠DAE   (ii) ∠BAC   (iii) ∠ACD

(iv) ∠CDA   (v) ∠AFE

SE. 9

SE.9 In the given figure, name :
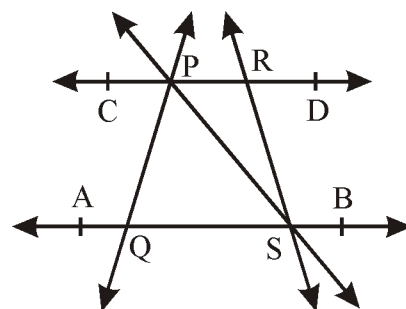
(i)   Four pairs of intersecting lines

(ii) Four collinear points

(iii) Three non-collinear points

(iv) Three lines whose point intersection is P

Ans. (i) Four pairs of intersecting lines are :

PQ, PS; RS, PS; AB, PQ; AB, RS

(ii) Four collinear points are : A, Q, 5 and B.

(iii) Three non-collinear points are : P, Q and S.

(iv) Three lines whose point of intersection is P

are : PS, CD and PQ.

SE. 10

How many diagonals does each figure have ?
Name them.

(i)   (ii)   (iii)

Ans. (i)
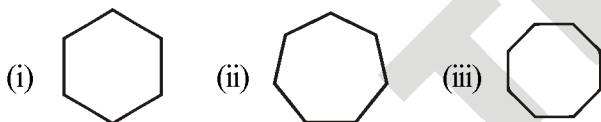
Diagonals are: AC, AD, AE, BD, BE, BF,

CE, CF, DF. Hence, there are 9 diagonals.

(ii)
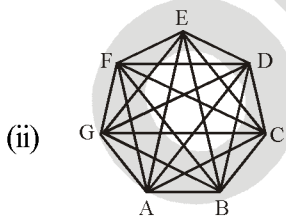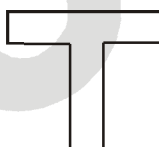
Diagonals are :   AC, AD, AE, AF, BD, BE, BF,

BG, CE, CF, CG, DF, DG, EG.

Hence, there are 14 diagonals.

(iii)
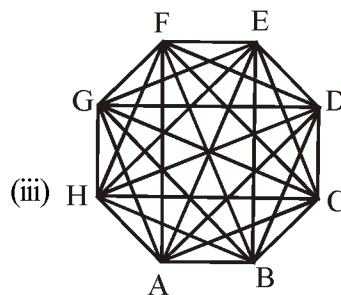
Diagonals are :   AC, AD, AE, AF, AG, BD, BE,

BF, BG, BH, CE, CF, CG, CH, DF, DG, DH,

EG, EH, FH. Hence, there are 20 diagonals.

ONLY ONE CORRECT TYPE

1. A line has :
   (A) fixed length
   (B) infinite length
   (C) no length
   (D) none of these

2. A point where three or more lines meet is called the_____.
   (A) point of concurrence
   (B) meeting point
   (C) collinear point
   (D) non-collinear point

3. A ray has :
   (A) one end point
   (B) two end points
   (C) same plane
   (D) none of these

4. We can draw _____ line (s) passing through two points.
   (A) one   (B) two
   (C) three   (D) infinite

5. The figure shows $\xrightarrow[O \quad A]{}$
   (A) $\overrightarrow{OA}$ (B) $\overrightarrow{AO}$
   (C) $\overrightarrow{O}$ (D) $\overrightarrow{A}$

6. In the figure, the curve is

   (A) an open curve
   (B) a closed curve
   (C) a simple closed curve
   (D) none of these

7. Which of the following is a polygon?

   (A)   (B)

   (C)   (D)
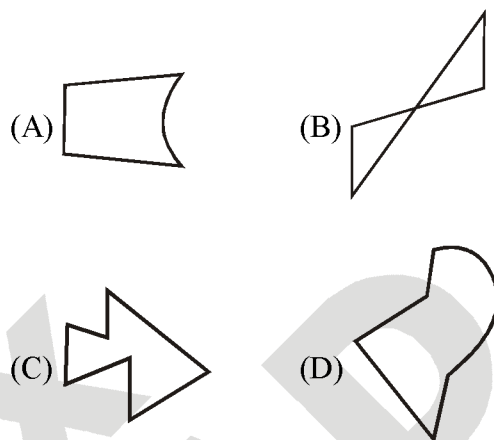
8. The join of two vertices of polygon which are not adjacent is called_____.
   (A) A side   (B) A diagonal
   (C) An angle   (D) None of these

9. An angle has:
   (A) One vertex and one arm
   (B) One vertex and two arms
   (C) Two vertex and Two arms
   (D) None of these

10. $\angle AOB$ can also named as:
    (A) $\angle ABO$ (B) $\angle BAO$
    (C) $\angle BOA$ (D) None of these

11. A closed figure formed by joining three non-collinear points is called_____.
    (A) A triangle   (B) An angle
    (C) A curve   (D) None of these

12. A polygon having three sides is called a _____.
    (A) Curve   (B) Triangle
    (C) Quadrilateral   (D) None of these

13. Quadrilateral is a polygon having:
    (A) Two sides   (B) Three sides
    (C) Four sides   (D) None of these

14. A circle is
   (A) a polygon   (B) an open curve
   (C) a closed curve   (D) none of these

15. A line segment joining any two points on the circle is called a _____
   (A) radius   (B) diameter
   (C) chord   (D) secant

16. The length of the boundary of a circle is called its.
   (A) arc   (B) circumference
   (C) diameter   (D) none of these

17. How many pairs of opposite sides are there in a quadrilateral ?
   (A) 1   (B) 2
   (C) 3   (D) 4

18. Which of the following pair of line segments are not parallel, as shown in the figure?
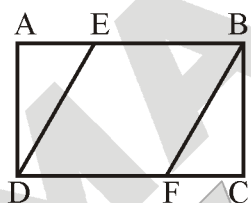
   (A) AD, BC   (B) AE, FC
   (C) DE, BF   (D) AB, BC

19. Which of the following figure is not a closed figure.

   (A)   (B)
   (C)   (D)

20. An arc is a continuous part of the _____ of the circle.
   (A) Diameter   (B) Major segment
   (C) Circumference   (D) Chord

TRUE / FALSE TYPE

1. Only one ray can be drawn with a given initial point.

2. Two planes intersect in a line.

3. The interior of a triangle, and the triangle itself make the triangular region.

4. In a quadrilateral PQRS, P and R are a pair of adjacent angles.

5. The line segments joining the cente of the circle of and any point on the circle are all equal.

FILL IN THE BLANKS

1. A line segment has a _____ length

2. A ray has _____ end points.

3. A line has _____ end points.

4. A ray has no _____ length.

5. A line _____ be drawn on a paper.

MATCH THE COLUMN TYPE

In this section each question has two matching lists. Choices for the correct combination of elements from List-I and List-II are given as option (a), (b), (c) and (d) out of which one is correct.

1. Match the following :
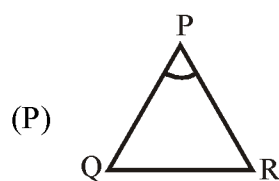
   List-I   **List-II**

   (P)   (a) Collinear points

   (Q)   (b) ∠QPR
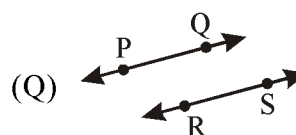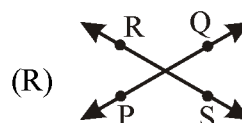
   (R)   (c) Parallel Lines

   (S)   (d) Intersecting Lines
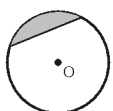
Code:
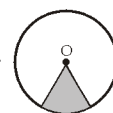
	P	Q	R	S
(1)	a	d	c	b
(2)	b	c	a	d
(3)	b	c	d	a
(4)	b	d	c	a

2. Match the following :

List-I   **List-II**

(P) Shaded part of (a) Sector

represents

(Q) Shaded part of (b) segment

represents

(R) Here PQ is a (c) Chord

(S) Here PQ is a (d) Diameter

Code:

	P	Q	R	S
(1)	a	b	d	c
(2)	b	a	d	c
(3)	a	b	c	d
(4)	b	a	c	d

PARAGRAPH TYPE

PASSAGE # I

A polygon is entirely made up of straight lines only. A hexagon ABCDEF is a six-sided polygon.
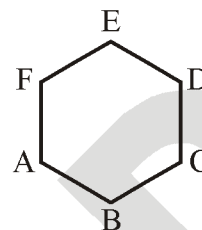
1. How many diagonals are there in the hexagon ?
(A) 7　　(B) 8
(C) 9　　(D) 10

2. How many line segments are there in the hexagon ?
(A) 5　　(B) 6
(C) 7　　(D) 8

3. How many angles are there in the hexagon ?
(A) 5　　(B) 6
(C) 7　　(D) 8

VERY SHORT ANSWER TYPE

1. Count the number of line segments drawn in the following figure and name them.
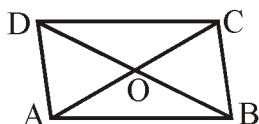
2. Which of the following are polygons ?
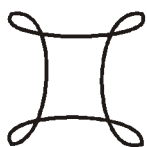
   (A)   (B)   (C)

3. From the given figure, write the names of the rays drawn in the same directions :
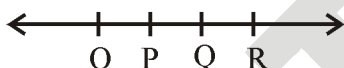
4. Name the vertices and sides of the given triangle.
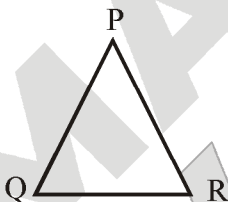
5. Identify the open and closed curves.

   (1)   (2)   (3)   (4)
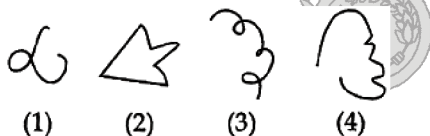
6. Name the pair of all intersecting lines in the given figure.
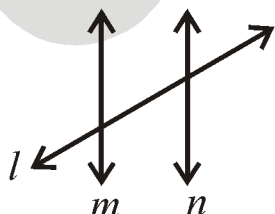
7. Write the points, which lie
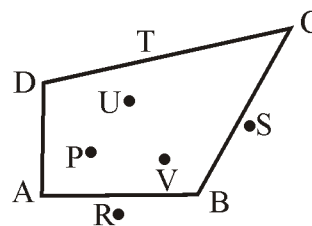
   (i)   in the interior of quadrilateral ABCD.

   (ii) in the exterior of quadrilateral ABCD.

   (iii) on the boundary of quadrilateral ABCD.

8. If the line l passing through the points A and B also passes through the point C then what are the three points A, B and C called ?

9. In the given figure, write another name for :

   (i) $\angle 1$ (ii) $\angle 2$

   (iii) $\angle 3$
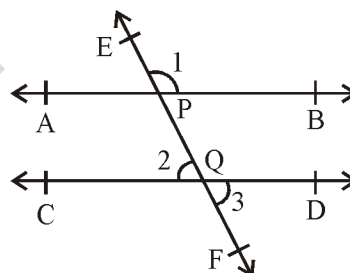
10. In the given figure, name the poins which are
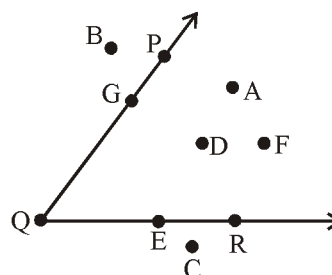
    (i)   in the interior of $\angle PQR$

    (ii) in the exterior of $\angle PQR$

    (iii) on $\angle PQR$

SHORT ANSWER TYPE

1. Study the given figure and answer the following questions.
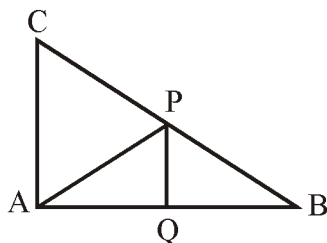
(i) Name all the triangles formed in the given figure.

(ii) Which two points lie on sides BC and AB respectively ?

(iii) Name any two line segments inside the triangle ABC.

2. In the given figure, name the following :
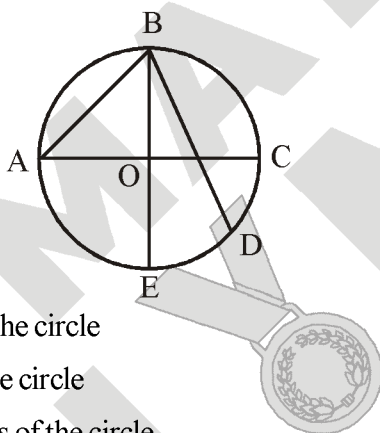
(i) centre of the circle

(ii) radii of the circle

(iii) diameters of the circle

(iv) chords of the circle

(v) two minor and major arcs

3. How many angles are formed in the following figure? Write the adjacent angles also.
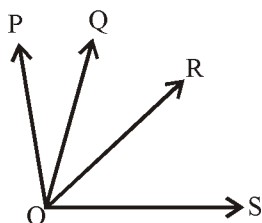
4. In the given figure, name :
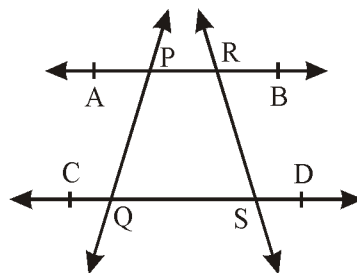
(i) four line segments

(ii) four rays

(iii) two non-intersecting line segments

5. Name the six parts of the circle numbered in the diagrams below.
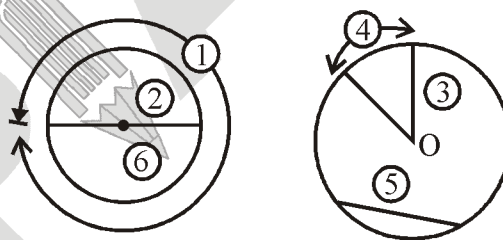
6. In the given figure, PQRS is a quadrilateral :
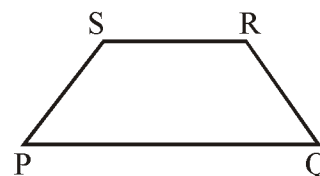
(i) How many pairs of adjacent sides are there? Name them.

(ii) How many pairs of opposite sides are there: Name them.

(iii) How many pairs of adjacent angles are there? Name them,

(iv) How many pairs of opposite angles are there? Name them.

7. In the given figure,
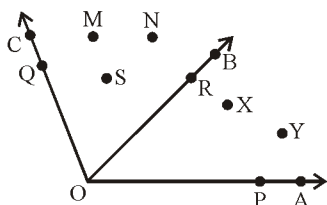
(i) Name the angle which contains the points M, N and S in its interior,

(ii) Name the angle which has X and Y as points in its interior,

(iii) Name the angle which contains the points R, S and Y in its interior,

(iv) List the points which are in the exterior of ∠AOB.

(v) List the points which are on the angle ∠AOC.

8. In the given figure name :

(i) all the triangles

(ii) the sides opposite to ∠C

(iii) all the line segments

(iv) the angle opposite to BC
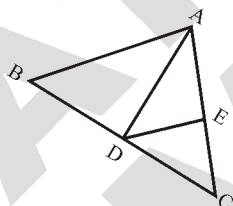
9. In the given circle, find the following :

(i) three radii

(ii) three chords

(iii) a diameter

(iv) a triangle that has the centre of the circle as vertex.
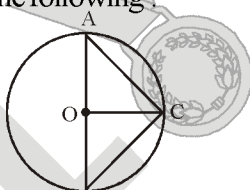
10. How many points are marked in the following figures ? Name them.

(i)

(ii)
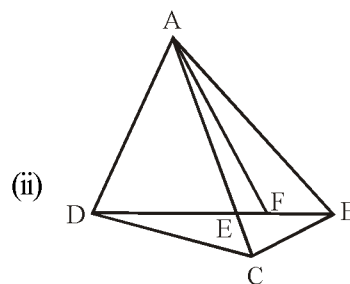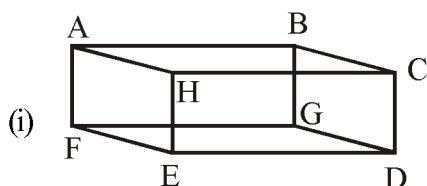
LONG ANSWER TYPE

1. Rays OP, OQ and OR have a common end point O forming several angles. The angles shown are 1, 2 and 3.
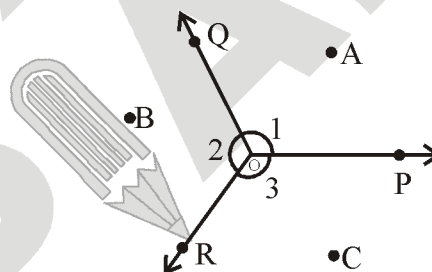
(a) Rename the angle using alphabets.

(b) Name two points in the exterior of angles :

(i) POQ

(ii) QOR

(iii) ROP

(c) Name two points each of which lie on the angles :

(i) POR (ii) POQ

2. From the given circle, name the following

(i) a chord

(ii) a point in the interior and a point in the exterior

(iii) a sector

(iv) a segment

(v) an arc.
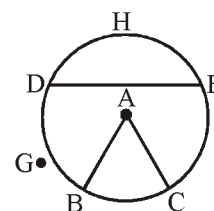
3. From the figure, name :
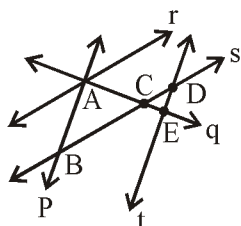
(i) a line segment on s

(ii) the line p in two other ways

(iii) all the line segments on line q

(iv) the line t in two other ways

4. In the given figure, name the angles indicated

(i) $\angle 16$ (ii) $\angle 4$ (iii) $\angle 12$ (iv) $\angle 10$

(v) $\angle 1$ (vi) $\angle 11$ (vii) $\angle 3$ (viii) $\angle 15$

(ix) $\angle 7$ (x) $\angle 2$

5. In a ΔPQR mark
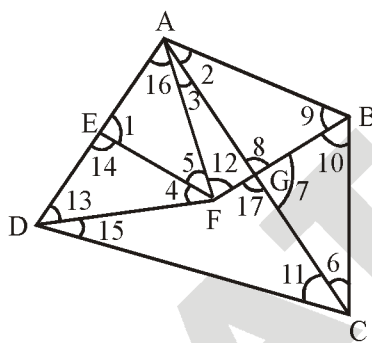
(i) the points A, B, C on the exterior of ΔPQR

(ii) the points X, Y, Z in the -interior of ΔPQR

(iii) the points H, J, I on ΔPQR.

NUMERICAL PROBLEMS

In this section, each question, when worked out will result in one integer from 0 to 9 (both inclusive).

1. How many lines can pass through two given points?

2. How many Line segments will we get after joining the points A, B, C and D?

•A   •B

•C   •D

3. Count the pair of intersecting lines.
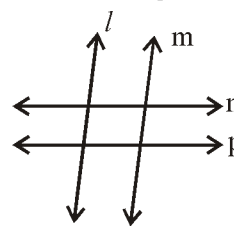
4. How many triangles are there in the given figure?

5. If OA = 3 cm, then find the radius OB (in cm), where O is the centre of the circle.
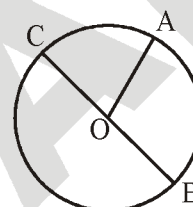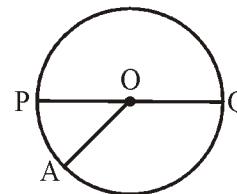

6. How many sides are there in the given polygon ?
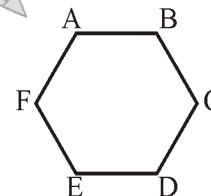
7. How many points are marked in the shown figure?
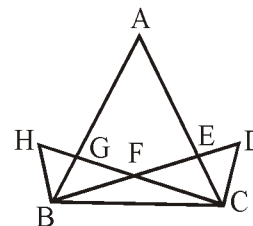
8. In how many directions can a line extended ?

9. If OA = 2cm, then find the length of PQ, where O is the centre of circle.

10. A diameter divides the circle into k equal halves. Then k is

Answer Key

EXERCISE I														
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
B	A	A	A	A	A	C	B	B	C	A	B	C	C	C
16	17	18	19	20										
B	B	D	C	C										

TRUE / FALSE

1. F **2.** T **3.** T **4.** F **5.** T

FILL IN THE BLANKS

1. Fixed **2.** One **3.** No **4.** Fixed **5.** Cannot

MATCH THE COLUMN

1. C **2.** B

PARAGARPH

1. C **2.** B **3.** B

EXERCISE II

VERY SHORT ANSWER TYPE

1. Number of line segment = 10 (AB, BC, CD, DA, OD OB, OC, OA, DB, AC)

2. Only (c) is a polygon as it is made up of line segments.

3. $\overrightarrow{OR}, \overrightarrow{PR}, \overrightarrow{QR}$ or $\overrightarrow{PO}, \overrightarrow{QO}, \overrightarrow{RO}$

4. Vertices : P, Q and R Sides : PQ, QR and RP

5. (1) Open Curve   (2) Closed Curve   (3) Open Curve   (4) Open Curve

6. Pair of intersecting lines are : *l*, m; *l*, n

7. (i) P, U, V   (ii) R, S   (iii) A, B, C, D, T

8. (i) Collinear

9. (i) $\angle$ EPB   (ii) $\angle$ PQC   (iii) $\angle$ FQD

10. (i) Points A, D and F

     (ii) Points B and C

     (iii) Points P, G, Q, E and R

SHORT ANSWER TYPE

1.   (i) ΔABC, ΔBPQ, ΔAPQ, ΔAPC and ΔAPB   (ii) P and Q   (iii) AP and PQ

2. (i) O   (ii) OA, OB, OC and OE   (iii) AC and BE   (iv) AB, BD, BE and AC

     (v) Minor arcs = $\overparen{AED}$ and $\overparen{BCD}$

       Major arcs = $\overparen{ABD}$ and $\overparen{BDA}$

3. Number of angles = 6

($\angle$ SOR, $\angle$ ROQ, $\angle$ QOP, $\angle$SOQ, $\angle$ ROP, $\angle$ SOP)

Adjacent angles : $\angle$ SOR, $\angle$ ROQ; $\angle$ ROQ, $\angle$ QOP; $\angle$ SOR, $\angle$ ROP; $\angle$QOP, $\angle$ SOQ.

4. (i) $\overrightarrow{PR}, \overrightarrow{PQ}, \overrightarrow{RS}, \overrightarrow{QS}$ (ii) $\overrightarrow{PA}, \overrightarrow{QC}, \overrightarrow{RB}, \overrightarrow{SD}$ (iii) $\overleftrightarrow{AB}$ and $\overleftrightarrow{CD}$

5. (i) Circumference   (ii) Diameter   (iii) radius;   (iv) arc;   (v) chord

(vi) semi- circle

6. (i) Four pairs : PQ, QR; QR, RS; RS, SP and SP, PQ.

     (ii) Two pairs : PQ, RS and PS, QR

(iii) Four pairs : ∠P, ∠Q; ∠Q, ∠R; ∠R, ∠S and ∠S, ∠P.

(iv) Two pairs : ∠P, ∠R and ∠Q, ∠S

7. (i) ∠BOC   (ii) ∠AOB   (iii) ∠AOC   (iv) M, N, S, C, Q   (V) P, Q, C, O, A

8. (i) ΔABC, ΔADC, ΔABD, ΔADE, ΔEDC   (ii) $\overline{AB}$, $\overline{AD}$ and $\overline{DE}$

(iii) $\overline{AB}, \overline{BC}, \overline{AC}, \overline{BD}, \overline{DC}, \overline{AE}, \overline{EC}, \overline{AD}, \overline{DE}$

(iv) ∠BAC

9. (i) Three radii : $\overline{OA}, \overline{OB}, \overline{OC}$

(ii) Three chords : $\overline{AC}, \overline{BC}, \overline{AB}$

(iii) Diameter : $\overline{AB}$

(iv) A triangle that has the centre of the circle as vertex is ΔAOC and ΔBOC.

10. (i) 8 points : A, B, C, D, E, F, G, H   (ii) 6 points : A, B, C, D, E, F

LONG ANSWER TYPE

1. (a) ∠POQ, ∠QOR, ∠ROP   (b) (i) B, C   (ii) A, C   (iii) A, B   (c) (i) P, R   (ii) P, Q

2. (i) DE   (ii) Interior : A Exterior : G   (iii) ABC (shaded)   (iv) DEHD (shaded)   (v) $\overset{\frown}{BC}$ or $\overset{\frown}{DHE}$

3. (i) $\overline{BC}$ (ii) $\overrightarrow{AB}, \overrightarrow{BA}$ (iii) $\overrightarrow{AC}, \overrightarrow{CE}, \overrightarrow{AE}$ (iv) $\overrightarrow{DE}, \overrightarrow{ED}$

4. (i) ∠EAF   (ii) ∠EFD   (iii) ∠AFG   (iv) ∠GBC   (v) ∠AEF   (vi) ∠GCD   (vii) ∠FAG

(viii) ∠CDF   (ix) ∠BGC   (x) ∠GAB

5.
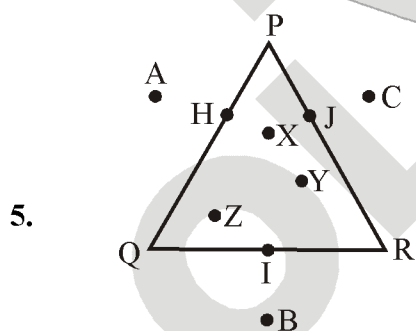
NUMERICAL PROBLEMS

1. 1   **2.** 6   **3.** 4   **4.** 8   **5.** 3   **6.** 6   **7.** 8

8. 2   **9.** 4   **10.** 2

SELF PROGRESS ASSESSMENT FRAMEWORK

(CHAPTER : BASIC GEOMETRICAL IDEAS)

CONTENT	STATUS	DATE OF COMPLETION	SELF SIGNATURE
Theory			
In-Text Examples			
Solved Examples			
Exercise I			
Exercise II			
Short Note-1			
Revision - 1			
Revision - 2			
Revision - 3			
Remark			

NOTES :

1. In the status, put "completed" only when you have thoroughly worked through this particular section.

2. Always remember to put down the date of completion correctly. It will help you in future at the time of revision.

Space for Notes :

INTEGERS

5

📖 INTRODUCTION

Numbers greater than 0 are called positive numbers. Extending the number line to the left of 0 allows us to represent negative numbers, numbers that are less than 0.

Negative numbers   zero   Positive number

$$-5 \quad -4 \quad -3 \quad -2 \quad -1 \quad 0 \quad 1 \quad 2 \quad 3 \quad 4 \quad 5$$
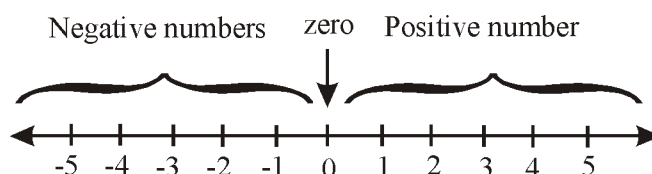
When a single + sign or no sign is in front of a number, the number is a positive number. When a single – sign is in front of a number, the number is a negative number.

-5 indicates "negative five".

5 and + 5 indicate's "positive five".

The number 0 is neither positive nor negative.

1. READING AND WRITING INTEGERS

● The sign of an integer is read first before the number.

Example 1

: -5 is read as 'negative five'

$+9$ is read as 'positive 9' or simply 'nine'.

0 is an integer but it is not positive nor negative.

2. REPRESENTING INTEGERS ON NUMBER LINES

Integers can be represented on a number line.

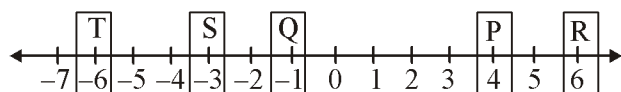The number line shows that every integer has an opposite number except '0'.

Negative integers are to the left of zero.

Positive integers are to the right of zero.

$$-4 \quad -3 \quad -2 \quad -1 \quad 0 \quad 1 \quad 2 \quad 3 \quad 4 \quad 5$$
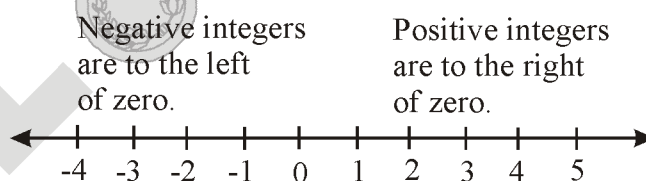
Example 1

Find the values of P, Q, R, S and T on the given number line.

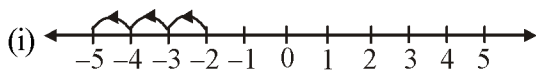T   S   Q   0   1   P   5   R
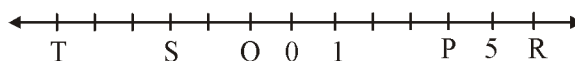
Solution :

We have,

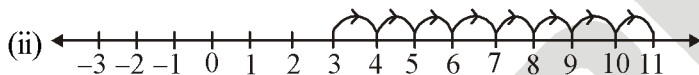So, P = 4, Q = –1, R = 6, S = –3, T = –6

Example 2

Draw a number line and answer the following :

(i) If we move 3 number to the left of –2, which number will we get ?

(ii) If we move 8 number to the right of 3, which number will we get ?

Solution :

(i)

So, if we move 3 number to the left of –2, we reach at –5.

(ii)

So, if we move 8 number to the right of 3, we reach at 11.

## 3. COMPARING THE VALUES OF TWO INTEGERS

Number line can be used to compare the values of two integers.

3.1 HORIZONTAL NUMBER LINE

(A) On a horizontal number line, an integer is greater than the integer on its left.

(B) On a horizontal number line, an integer is less than the integer on its right.

4 lies to the right of 1.
∴ 4 > 1

-2 lies to the left of 1.
∴ -2 < 1
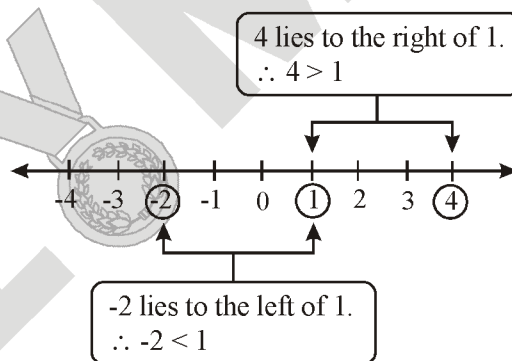
3.2 VERTICAL NUMBER LINE

(A) On a vertical number line, an integer is greater than the integer below it.

(B) On a vertical number line, an integer is less than the integer above it.
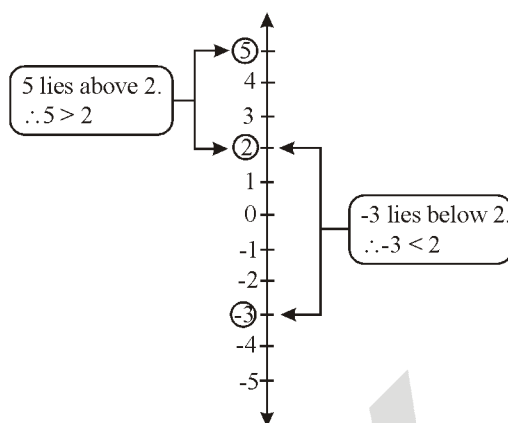
4. ARRANGING INTEGERS IN ORDER

1. Number lines can be used to arrange order, integers in increasing or decreasing order.

2. The value of integers on a horizontal number line increases from left to right and decreases from right to left.
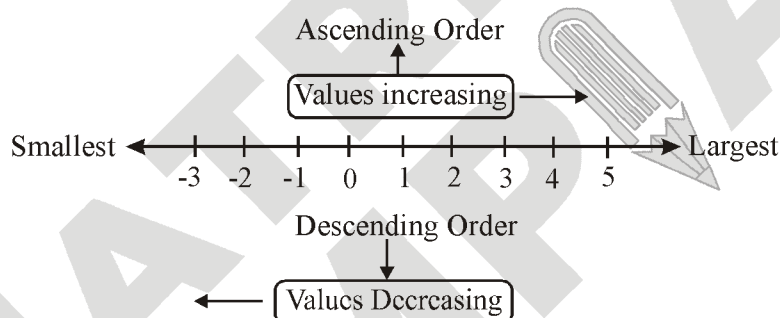
5. WRITING POSITIVE AND NEGATIVE INTEGERS TO REPRESENT WORD DESCRIPTIONS

1   A Positive or negative number is used to denote :

(A) An increase or a decrease in value

Example 1

(i) Rs. 70 withdrawn is denoted by – Rs. 70.

Example 2

(ii) Rs. 70 deposited is denoted by + Rs. 70.

(B) Values more than zero or values less than zero

Example 1

(i) –18 °C denotes a temperature that is 18 °C below 0 °C.

Example 2

(ii) + 18 °C denotes a temperature that is 18 °C above 0 °C.

(C) A positive direction or a negative direction (opposite direction)

Example 1

(i) –20 °C denotes an anticlockwise rotation of 20°.

Example 2

(ii) + 20 °C denotes a clockwise rotation of 20°.

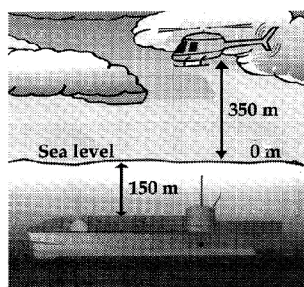## Example 3

(iii) +5 m denotes a direction 5 m to the right.

Example 4

(iv) –5 m denotes a direction 5 m to the left.

(D) Position above or below sea level

Example 1

(i) Sea level is taken as 0 m.

Example 2

(ii) The helicopter flies 350 m above sea level or +350 m.

Example 3

(iii) The submarine lies 150 m below sea level or –150 m.

6. PROPERTIES OF INTEGERS

6.1 ADDITION AND SUBTRACTION OF INTEGERS

(A) If a and b are two integers then

$a + b = c$

where c is also an integer.

(B) For any two integers a and b

$a + b = b + a$

Which means that if we change the order of the integers, even then their sum does not change.

(C) For any three integers a, b and c

$(a + b) + c = a + (b + c)$

This means that even if we rearrange the integers their sum does not change.

(D) If a is any integer then $a + 0 = a$

This means that the sum of any integer and zero is the integer itself.

Example 1

$-10 + 0 = -10$

$6 + 0 = 6$

$-15 + 0 = -15$

(E) For every integer a (which is not zero) there is another integer –a such that

Example 1

$a + (-a) = 0$

$3 + (-3) = 0$

$5 + (-5) = 0$

$6 + (-6) = 0$

(F) The difference of any two integers is an integer i.e. If a and b are two integers then $a - b = c$, where c is also an integer.

(G) In the whole numbers, 0 has no predecessor, but in integers –1 is the predecessor of 0, –2 is the predecessor –1 and so on. Thus if a is any integer, then a –1 is its predecessor.

(H) If a is any integer then $a - 0 = a$

Like signs	Unlike signs
$+ (+y) = + y$	$+ (-y) = - y$
$- (-y) = + y$	$- (+y) = - y$

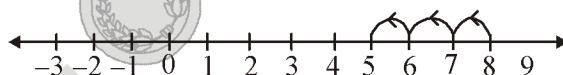**Example** 1

Add the following on the number line.

(i) 8 and –3   (ii) –5 and 3

Solution :

(i) We have 8 and –3.

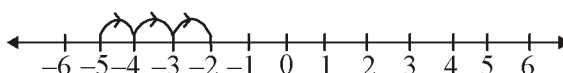First we mark the integer 8 on the number line and then move 3 steps to the left.

So, we reach at 5.

∴ $8 + (-3) = 5$

(ii) We have –5 and 3

First we mark the finteger –5 on the number line and then move 3 steps to the right.

So, we reach at –2.

∴ $(-5) + 3 = -2$

Example 2

Subtract the following :

(i) (–9854) – (3864)   (ii) (4239) – (–2105)

Solution :

(i) (–9854) – (3864)

Negative of 3864 = –3864

∴ (–9854) – (3864) = (–9854) + (–3864) = – (9854 + 3864) = – 13718

(ii) 4239 – (–2105)

Negative of –2105 = 2105

∴ 4239 – (–2105) = 4239 + (2105) = 6344

6.2 MULTIPLYING INTEGERS

1. The multiplication of an integer with a positive integer is the repeated addition of the integer.

2. Rules for multiplication of integers :

Integrer		Integer		Product
(i) (+)	×	(+)	=	+
(ii) (+)	×	(–)	=	–
(iii) (–)	×	(+)	=	–
(iv) (–)	×	(–)	=	+
(v) (+)	×	0	=	0
(vi) (–)	×	0	=	0

(A) The product of two integers is positive when both integers have like signs [as in (i) and (iv)].

(B) The product of two integers is negative when both integers have unlike signs [as in (ii) and (iii)].

(C) The product of an integer and zero is always zero [as is (v) and (vi)].

Property 1 : If a and b are integers than a × b is also an integer

Property 2 : If a and b are two integers then a × b = b × a

Property 3 : If a, b and c are any three integers then a × (b × c) = (a × b) × c

(A) When the number of negative integers in a product is ODD, the product is negative.

(B) When the number of negative integers in a product is EVEN, the product is positive.

6.3 DIVIDING INTEGERS

1. The division of an integer with a positive integer is a process of equal grouping or sharing.

2. The division of negative integer by a negative integer is also a process of equal grouping.

3. Rules for division of integers :

	Integer		Integer		Quotient
(A)	(+)	÷	(+)	=	+
(B)	(+)	÷	(−)	=	−
(C)	(−)	÷	(+)	=	−
(D)	(−)	÷	(−)	=	+
(E)	0	÷	(+)	=	0
(F)	0	÷	(−)	=	0

Property 1 : If 'a' and 'b' are two integers then a ÷ b is not always an integer.

Property 2 : For any integer 'a' (a ≠ 0)

$$a \div a = 1 \text{ and } a \div 1 = a$$

Property 3 : For any integer 'a' (a ≠ 0)

$$a \div (-1) = -a, \text{ and } a \div (-a) = -1$$

Property 4 : For any non–zero integer 'a', 0 ÷ a = 0

7. BODMAS

The order was given by the word BODMAS.

Where,   B stands for 'bracket'

            O stands for 'of'

            D stands for 'division'

            M stands for 'multiplication'

            A stands for addition'

            S stands for 'subtraction'

The following are the different kinds of brackets :

(i)   '−' generally known as the bar bracket or vinculum.

(ii)   ( ) generally known as circular brackets or small brackets or parentheses or common brackets.

(iii)   { } generally known as curly brackets or flower brackets.

(iv)   [ ] generally known as rectangular, square or big brackets.

We remove in the following order

1. −

2. ( )

3. { }

4. [ ]

SE. 1

Use integers to represent the following temperatures.

(A) 18 °C below freezing point (0 °C)
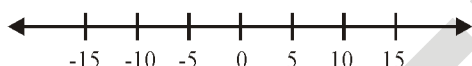
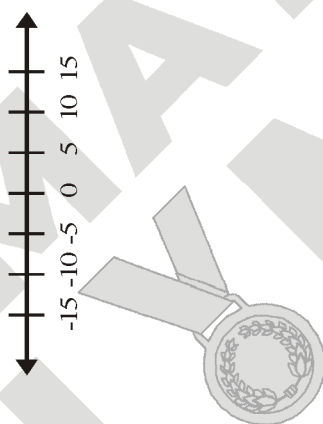(B) 18 °C above freezing point (0 °C)

Ans. (A) – 18 °C

(B) 18 °C

SE. 2

Draw a horizontal and vertical number line to show the following integers.

–15, –10, –5, 0, 5, 10, 15

Ans. (A) Horizontal number line:

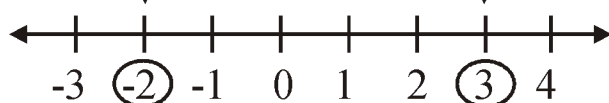$$\longleftarrow \overset{-15 \quad -10 \quad -5 \quad 0 \quad 5 \quad 10 \quad 15}{\mid \quad \mid \quad \mid \quad \mid \quad \mid \quad \mid \quad \mid} \longrightarrow$$

(B) Vertical number line:

SE. 3

Which integer is smaller, –2 or 3?

-2 lies to the left of 3.
Therefore, -2 is less than 3.

Ans.

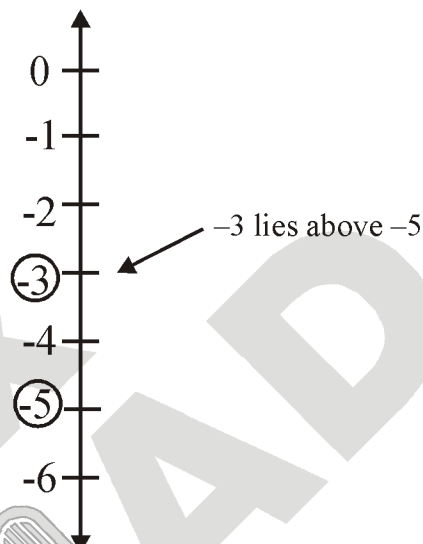$$\longleftarrow \overset{-3 \quad \textcircled{-2} \quad -1 \quad 0 \quad 1 \quad 2 \quad \textcircled{3} \quad 4}{\mid \quad \mid \quad \mid \quad \mid \quad \mid \quad \mid \quad \mid \quad \mid} \longrightarrow$$

Therefore, –2 is smaller integer.

SE. 4

Which integer is greater – 3 or – 5?

$$0$$
$$-1$$
$$-2$$
$$\textcircled{-3} \quad \longleftarrow \text{–3 lies above –5}$$
$$-4$$
$$\textcircled{-5}$$
$$-6$$

Ans. Therefore, –3 is greater than –5

SE. 5
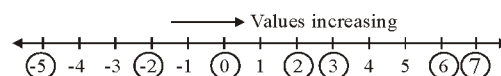
(A) Arrange the following integers in ascending order.

–5, 3, –2, 5, –8, –5, – 1

(A) Arrange the following integers in descending order.

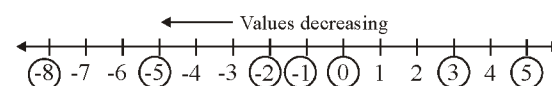3, –1, –2, 5, –8, –5

Ans. Arrange the integers on a number line.

(A) Ascending order: From smallest to largest

Values increasing →

$$\overset{\textcircled{-5} \; -4 \; -3 \; \textcircled{-2} \; -1 \; \textcircled{0} \; 1 \; \textcircled{2}\textcircled{3} \; 4 \; 5 \; \textcircled{6}\textcircled{7}}{}$$

∴ Integers in increasing order:

–5, 3, –2, 6, 2, 7, 0

(B) Descending order: From largest to smallest.

← Values decreasing

$$\overset{\textcircled{-8} \; -7 \; -6 \; \textcircled{-5} \; -4 \; -3 \; \textcircled{-2}\textcircled{-1} \; \textcircled{0} \; 1 \; 2 \; \textcircled{3} \; 4 \; \textcircled{5}}{}$$

∴ Integers in decreasing order:

5, 3, –1, –2, –5, –8

SE. 6

Determine the largest and the smallest integers from the following integers.

–12, 7, 8, 0, –9, 5, –10

Ans. Arrange the integers in ascending order:

–12, –10,–9, 0, 5, 7, 8

∴ The largest integer is 8 and the smallest integer is –12.

SE. 7

Fill in the blanks in the sequence below.

–15, –10, ☐, ☐, ☐, 10, 15

-15,   -10,   -5,   0,   5,   10,   15

+5   +5   +5   +5   +5   +5

Ans.

Differnce between consecutive integers = -10 - (-15) = 5

SE. 8

Use a positive or a negative number to denote each of the following.

(A) (i) 18 m above sea level

(ii) 8 m below sea level

(B) (i) Profit of Rs. 188

(ii) Loss of Rs. 254

(C) (i) 15 km to the east

(ii) 30 km to the west

Ans. (A)(i) + 18 m   (ii) – 8 m

(B) (ii) + Rs. 188   (ii) –Rs. 254
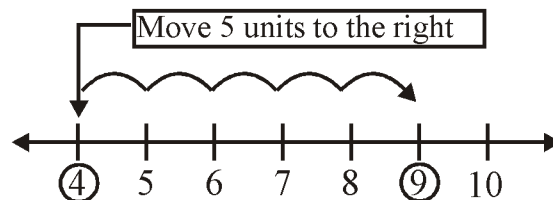
(C) (i) + 15 km   (ii) –30 km
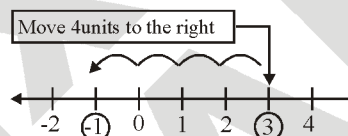
SE. 9

Solve the following

(A) 4 + (+5)

(B) 3 + (–4)

Ans. (A) Start from number 4, move 5 units to the positive direction (+5).

∴ $4 + (+5) = 4 + 5 = 9$

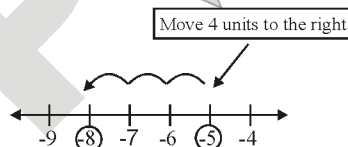Move 5 units to the right

④ 5 6 7 8 ⑨ 10

(B) Start from number 3, move 4 units to negative direction (– 4).

Move 4units to the right

-2 ⊖① 0 1 2 ③ 4

∴ $3 + (–4) = 3 – 4 = –1$

SE. 10

Evaluate –5 + (–3)

Move 4 units to the right

Ans.
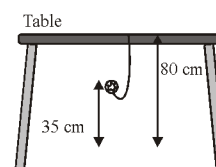
-9 ⊖⑧ -7 -6 ⊖⑤ -4

∴ $–5 + (–3) = –5 – 3$

$= – 8$

SE. 11

Simplify : $–3 + 7 + (–8)$

Ans. $–3 + 7 + (–8)$

$= –3 + 7 – 8$

$= 4 – 8 = – 4$

SE. 12

The diagram below show a pendulum tided to a string.

Table

80 cm

35 cm

When the pendulum was released from the table, it dropped to a height of 80 cm below the table. It was then pulled 35 cm up. How far is the pendulum from the table now?

Ans. The distance of the pendulum from the table

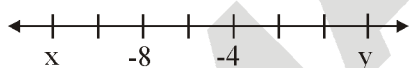= –80 + 35

= –45 cm

∴ The pendulum is 45 cm below the table.

SE. 13

The temperature of a town is –14 °C at night. During the day, the temperature increases by 7 °C. What is the temperature of the town during the day?

Ans. The question involves the sum of negative integer and a positive integer.

–14 °C + 7 °C = – 7 °C

SE. 14

The diagram shows a number line.

Find the value of x + y.

Ans. First, find the pattern of the number sequence. Then, find the value of x and y. Add x and y.

2 divisions = 4

∴ 1 division = 2

x = –8 + (–4) = – 12   (Two divisions to the left means (–4))

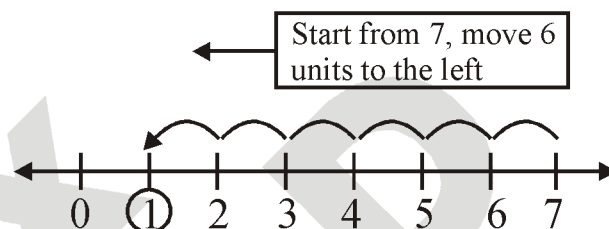y = – 4 + 6 = 2   (Three divisions to the right means (+6))

∴ x + y = – 12 + 2

= – 10

SE. 15

Solve the following

(A) 7 – (+6)

(B) – 8 – (–3)
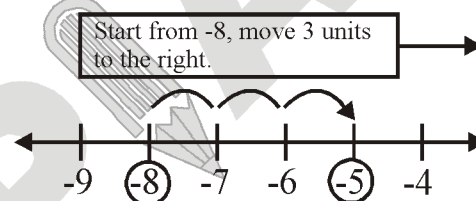
Ans. (A)

∴ 7 – (+6) = 7 – 6 = 1

(B) Start from –8, move 3 units to the right.

∴ 8 – (–3) = –8 + 3

= – 5

SE. 16

Simplify : – 8 – (+3) – (–5).

Ans. = – 8 – 3 + 5

= – 11 + 5

= – 6

SE. 17

A diver was diving 100 m below sea level. He went down 20 m and came up 35 m again. How far below sea level did he dive?

Ans. Initial position = – 100 m

Final position = – 100 m (–20 m) + 35 m

= – 100 m – 20 m + 35 m

= – 85 m

∴ He is 85 m below sea level.

SE. 18

Find the products of the following.

(A) $25 \times (-4)$ (B) $(-15) \times (-6)$

(C) $(-18) \times 0$ (D) $4 \times (-2) \times (-3)$

Ans. (A) $25 \times (-4) \leftarrow [\ (+) \times (-) = -]$

$= -(25 \times 4)$

$= -100$

(B) $(-15) \times (-6) \leftarrow [(-) \times (-) = +]$

$= (15 \times 6)$

$= 90$

(C) $(-18) \times 0 = 0$

(D) $4 \times (-2) \times (-3) \leftarrow [\ (-)(-) = +]$

$= 4 \times 6 = 24$

Space for Notes :

ONLY ONE CORRECT TYPE

1. A whale swimming on the water's surface dives 250m. It then dives another 75 m. Which expression represents this situation ?
    (A) –75 + 250   (B) –250 + (–75)
    (C) –250 + 75   (D) 250 + 75

2. Which set of integers is written in ascending order ?
    (A) 113, –200, 153, 84
    (B) –46, –68, –101, 260
    (C) 54, 80, –125, 150
    (D) –361, –316, –163, –136

3. Which situation could be best represented by –60 ?
    (A) Height of 60 m above the ground
    (B) Profit of Rs. 60 in a bank
    (C) Lost by 60 goals
    (D) A time after 60 years

4. The value of 100 + (–75) + (–89) + (69) is _____.
    (A) 169   (B) 5
    (C) 164   (D) –5

5. When we add two negative integers, we always get ____.
    (A) positive integer   (B) negative integer
    (C) –1   (D) 0

6. Which expression has a value greater than – 3 ?
    (A) 4 + (–9)   (B) 3 + (–8) + 1
    (C) –10 + 8   (D) –1 + (–5) + 2

7. Which of the following number line represents (–5) + 8 ?

    (A)

    (B)

    (C)

    (D)
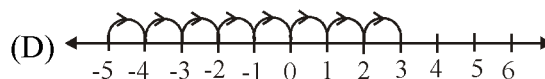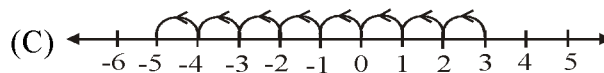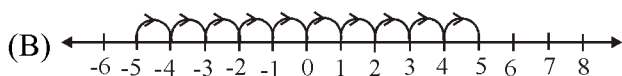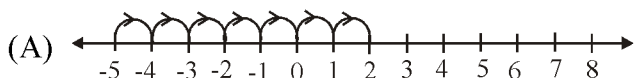
8. What is the value of 116 – 61 – 33 + (–12) ?
    (A) 10   (B) 15
    (C) –25   (D) –15

9. Which of the following represents negative integer ?
    (A) 25°C above freezing point
    (B) 2 km below sea – level
    (C) A deposit of Rs. 2589
    (D) Gain of Rs. 1987

10. The point A is on a mountain which is 5700 metres above sea–level and the point B is in a mine which is 39600 metres below sea–level.
    Find the vertical distance between A and B.
    (A) 33900 m   (B) 45300 m
    (C) 17400 m   (D) 43600 m

11. Which of the following statements is not true ?
    (A) 5128 – (–2459) > (–687) – (–1040)
    (B) –584 – (347) < 960 – (728)
    (C) 6250 + (–3012) > 6240 – (–271)
    (D) –888 + (3002) > 1001 – (–13)

12. The additive inverse of the sum of the integers –9853 and –3187 is _____.
    (A) 6666   (B) 4031
    (C) 10340   (D) 13040

13. Which of the following represents the given number line ?

    (A) 4 + (–6)   (B) 4 – (–6)
    (C) –2 + (6)   (D) (–2) – (–6)

14. The successor of 498 + (–1015) is _____.

(A) –517   (B) –516

(C) 516   (D) 517

15. Which of the following is greatest ?

(A) –986   (B) –347

(C) –425   (D) –1058

16. The sum of two integers is 345. If one of them is – 239, then the other is _____.

(A) 584   (B) 522

(C) –548   (D) –522

17. Which sum is not negative?

(A) –38 + (–24)   (B) –61 + 43

(C) –53 + 72   (D) –25 + 0

18. Find an integer 'P' such that P + (–9) = 0.

(A) 8   (B) 0

(C) 9   (D) –9

19. If we move 8 steps to the left of 1 on the number line, where will we reach ?

(A) 9   (B) –8

(C) 6   (D) –7

20. Which of the following are arranged in descending order ?

(A) –428, –386, –213, 428, 936

(B) –881, –954, –927, –1018, –3261

(C) 428, –628, –936, –1059, –2361

(D) none of these

21. Piyush travelled 298 km north and Amit travelled 890 km south from the same point. Find the distance between the final destination of the two.

(A) 1190 m   (B) 600 m

(C) 1188 m   (D) 592 m

22. For any two integers p and q, p + q = q + p. This property is known as _____.

(A) Associative   (B) Commutative

(C) Closure   (D) Additive identity

23. On the number line, –50 lies to the ___.

(A) Left of –60   (B) Right of 50

(C) Right of –60 (D) Right of 0

24. Add (–345) and 428 and then subtract 960 from the result. The answer will be _____.

(A) –877   (B) 877

(C) –536   (D) 536

25. When we add a positive integer and a negative integer, then the resultant sign will be _____.

(A) Always negative

(B) Always positive

(C) Sign of bigger numerical value

(D) Sign of smaller integer

26. Simplify :

[823 + (–398)] + [413 – 312 + (–400)] – (–30) + 286 – {(–115) + 117}

(A) –440   (B) –287

(C) 287   (D) 440

27. Find the greatest integer that could replace the □ in order to make the sentence true.

|–28| + |85–16| – |□| = 4

(A) –93   (B) 93

(C) 101   (D) –101

28. If m and n represent two integers other than zero, then |m| + |n| _____.

(A) Must be negative   (B) Must be positive

(C) Must be 0   (D) May be 0

29. Find : 1 – 2 + 3 – 4 + 5 – 6 + ... + 17 – 18 + 19 –20

(A) –10   (B) 100

(C) 10   (D) –100

30. If the deepest point in the sea is 11690 m below sea–level and the highest mountain top is 5845 m above sea–level , then the difference in these elevations is _____.
    (A) 17535 m   (B) 20446 m
    (C) 21406 m   (D) 5845 m

FILL IN THE BLANKS

1. The number which is 461 less than –482 is _____.
2. _____ is smaller than every positive integer as well as a whole number.
3. The successor of –508 is_____.
4. The value of –2319 + (–512) – (–2805) is _____.
5. _____ is greater than every negative integer but less than every positive integer.
6. –623 is _____ than –632.
7. A depth of 21 m below sea–level is represented by _____.
8. An integer lies between –3 and –1 is_____.
9. One less than the given number gives its _____.
10. The value of 40 + (–12) + 16 – (–9) + 5 is _____.

PARAGRAPH TYPE

PASSAGE # I

During a week in the month of December, Shimla recorded the following temperatures :
–3°C, –6°C, 2°C, 1°C, –4°C, 0°C and 9°C.

1. The difference between the highest and lowest temperature during the week was
   (A) 11°C   (B) 15°C
   (C) 13°C   (D) 10°C

2. The freezing point is
   (A) 100°C   (B) 10°C
   (C) 0°C   (D) –100°C

3. The ascending order of the given temperatures is
   (A) –3°C, –6°C, 2°C, –1°C, –4°C, 0°C, 9°C
   (B) 9°C, 2°C, 1°C, 0°C, –3°C, –4°C, –6°C
   (C) –6°C, –4°C, –3°C, 0°C, 1°C, 2°C, 9°C
   (D) None of these

PASSAGE # II

If * is an operation on integers such that for integers a and b, a * b = a – (–b) + (–930)

4. The value of 292 * 485 is
   (A) –153   (B) –243
   (C) –186   (D) –31

5. If a = 258, b = 387, c = 999, then (a * b) * c =
   (A) –285   (B) 285
   (C) –216   (D) 216

6. If a = –283, b = 942, c = –538, d = 967, then the value of (a * b) – (c * d) =
   (A) 230   (B) –271
   (C) –501   (D) –230

TRUE / FALSE TYPE

1. –20 is to the right of –15 on the number line.
2. –411, –813, –915, –975 are arranged in ascending order.
3. While comparing two negative integers, the one with the smaller absolute value is greater.
4. The expression –982 + (–111) and –111 + (–982) has the same value.
5. When two positive integers are added, we get a negative integer.
6. 0 is the additive inverse of 5.
7. (–916) + 852 + (–513) + 326 = 251
8. Addition of integers commutative but not associative.
9. Subtraction of integers holds closure property.
10. The additive identity of integers is 0.

MATCH THE COLUMN TYPE

In this section each question has two matching lists. Choices for the correct combination of elements from Column I and Column II are given as options (A), (B), (C) and (D) out of which one is correct.

1. Match the statements given is Column – I which can be represented by the integers given in Column – II.

Column I	Column II
(P) An increase of 50 points	(i) –20
(Q) A temperature drop by 20°C	(ii) +50,000
(R) 50 minutes before flight time	(iii) –50
(S) Increase in population by 50,000	(iv) +50

Code :

	P	Q	R	S
(A)	3	4	1	2
(B)	1	2	3	4
(C)	3	1	4	2
(D)	4	1	3	2

2. Match the following :

Column I	Column II
(P) $(-516) + \{(-327) - (-925)\} =$	1. –10000
(Q) $-45632 - (-35632) =$	2. –42
(R) $\{-380 - (675)\} - \{865 + (-493)\}$	3. 82
(S) $\{-340 - (-170)\} - \{-(45) - 83\}$	4. –1427

Code :

	P	Q	R	S
(A)	1	3	4	2
(B)	3	1	2	4
(C)	2	1	4	3
(D)	3	1	4	2

VERY SHORT ANSWER TYPE

1. Which integer represents the opposite of "depositing Rs. 1,50,000 ?"

2. Which number will we reach if we move three steps to the right of –118 ?

3. In which direction and how many steps should we move from –14 to reach –7 ?

4. Add the successor and predecessor of –129.

5. Write five negative integers less than – 120.

6. Define additive inverse.

7. Which is smaller –215 + (–318) or –425 – (–712) ?

8. Find the value of (–45) + (–387) – (425) + 115.

9. If a = –215, b = –816 and c = 312, then verify associative law of addition.

10. On subtracting –895 from the sum of 436 and (–15), which number will we get ?

SHORT ANSWER TYPE

1. On a particular day, the temperature at Nainital in the morning was 20°C but by midnight, it fell down to 11°C. The temperature at Delhi in the morning on the same day was 40°C but fell down 12°C by the midnight. Which fall is greater ?

2. Using the number line, write the following integers.
   (i) –9 less than –5   (ii) –4 more than 3

3. On the number line which numbers lie between –6 and –2 and which is the greatest number and the smallest number among them ?

4. Find the sum :
   (i) 1393 + (–407) + (–872) + 690
   (ii) 703 + (–3) + (–1) + 1 + (–400) + 0

5. Evaluate :
   (i) |–7| × |–2| (ii) |17| – |–15|
   (iii) |7–3| × |5–5|

6. The base of an iceberg is 7 km below sea level. The top is 10 km above the base. How high above the sea level is the tip of the iceberg ?

7. Find the value of each of the following :
   (i) |–3| + 0   (ii) |–13| + 0
   (iii) 12 + |–8| (iv) |–16| – 12
   (v) |–| – 10 || (vi) |–12| – 12

8. Subtract :
   (i) –2459 from 5128   (ii) –1040 from –687
   (iii) 347 from –58   (iv) –728 from 0

9. Replace * by '<' or '>' in each of the following to make the statement true.
   (i) (–7) + (–8) ✳ (–7) – (–8)
   (ii) (–6) – (–12) ✳ (–6) + (–12)
   (iii) (–13) – (40) ✳ 13 – 40
   (iv) 25 + (–8) ✳ (–25) – (8)

10. Check whether the following are true .
   (i) |–8 + (–6) | = |–3| + |–5|
   (ii) | 2+ (–7) | = | 2 | + |–7|
   (iii) |–15 – (–4) | = | –15| – |–4|
   (iv) | –2 –3| = | (–2) + (–3)|

LONG ANSWER TYPE

1. Given below is a number line representing integers. Mark and write the integers corresponding to the following points.
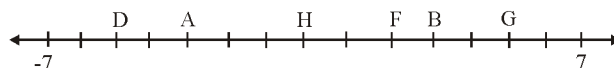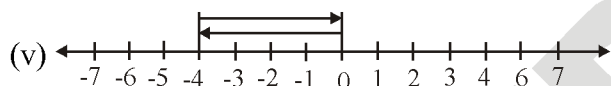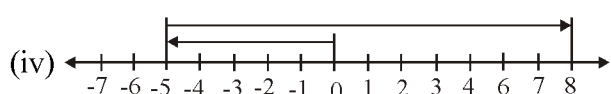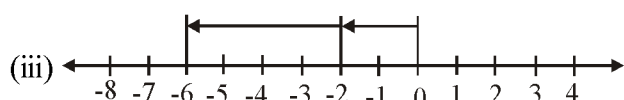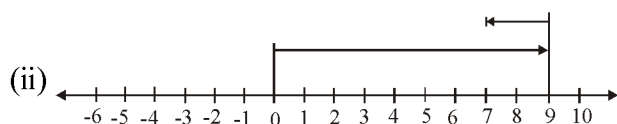

   (i) A   (ii) B
   (iii) D   (iv) F
   (v) G   (vi) H

   Which of the following points represent a pair of opposites ?

2. Write the addition sentence shown by the following number lines.

(i)

(ii)

(iii)

(iv)

(v)
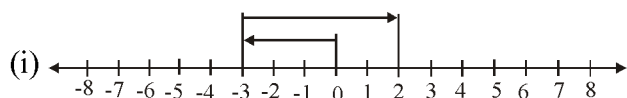
3. Find the value of

(i) $65 + (-10) + (-95) + 50$

(ii) $(-12) + (-6) + (-3) - (-13)$

Plot the value of each part on the number line and also tell the additive inverse.

4. The second tallest peak in the word K2 (Godwin Austen) along the Pakistan/China border is 28,250 feet (approx. 8,611 metres) above mean sea–level. The lowest points in all the oceans on earth is in the Dead Sea at – 1312 feet (approx. –400 metres) below mean sea–level. What is the difference between these two points in feet as well as in metres ?

5. Find the value of the following.

(i) $412 + (-98) + (-84) + (-7) + 35$

(ii) $-21 + (-9) + 63 + (-22) + (-228) + 137$

(iii) $-12 + (-98) - (-84) + (-7)$

(iv) $-12 - [(-15) + (-2) + (-2) + (-3)]$

NUMERICAL PROBLEMS

In this section, each question, when worked out will result in one integer from 0 to 9 (both inclusive).

1. What is the additive inverse of -4 ?

2. What is the value of $\{(-289) + 290\} - (315) - (-314)$?

3. What is the sum of 720 and its additive inverse ?

4. How much is -25 less than -16 ?

5. What is the successor of $12 + (-11)$?

6. Find the value of $||-819| + |525|| - ||819| + |-525||$.

7. How many steps should we move from -8 to reach -2 ?

8. What is the negative of x if value of x is $-10 - (-3)$?

9. What is the smallest positive integer ?

10. What is the sum of the digits of the difference $48 - (-24)$?

EXERCISE I

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
B	D	C	B	B	C	D	A	B	B	C	D	A	B	B

16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
A	C	C	D	C	C	B	C	A	C	D	B	B	A	A

FILL IN THE BLANKS

1. –943   2.0   3. – 507   4. –26   5. 0   6. Greater: As –623 > –632

7. –21   8. –2   9. Predecessor   10. 58

PARAGRAPH

1.   B   2.   C   3.   C   4.   A   5.   C   6.   A

TRUE / FALSE

1. F   2. F   3. T   4. T   5. F   6.F   7.F   8.F   9.T   10.T

MATCH THE COLUMN

1.   D   2.   D

EXERCISE II

VERY SHORT ANSWER TYPE

1. -1,50,000   **2.** -115   **3.** Right direction and 7 steps   **4.** -258

6. $x + (-x) = 0$ **7.** $-215 + (-318)$ **8.** -742   **9.** -719   **10.** 1316

SHORT ANSWER TYPE

1. Delhi   **2.** (i)4 (ii)-1   **3.** -5, -4, -3, and greatest number is -3 and smallest number is -5.

4. (i) 804 (ii)300   **5.** (i) 14(ii)2 (iii)0   **6.** 3km   **7.** (i)3 (ii)13 (iii)20 (iv)4 (v)10 (vi)0

8. (i)7587 (ii)353 (iii) –405 (iv)728   **9.** (i) <, (ii) >, (iii) <, (iv) >,

10. (i) Not true (ii) Not true (iii) True (iv) True

LONG ANSWER TYPE

1. (i) A = – 3 (ii) B = 3 (iii) D = –5 (iv) F = 2 (v) G = 5 (vi) H = 0; A and B, D and G

2. (i) 2 (ii) 7 (iii) –6 (iv) 8 (v) 0   **3.** (i)10; additive inverse is –10 (ii) –8; additive inverse is 8.

4. 9011m   **5.** (i) 258 (ii) –80 (iii) –33 (iv) 10

NUMERICAL PROBLEMS

1.	4	**2.**	0	**3.**	0	**4.**	9	**5.**	2	**6.**	0	**7.**	6

8.	7	**9.**	1	**10.**	9

SELF PROGRESS ASSESSMENT FRAMEWORK

(CHAPTER : INTEGERS)

CONTENT	STATUS	DATE OF COMPLETION	SELF SIGNATURE
Theory			
In-Text Examples			
Solved Examples			
Exercise I			
Exercise II			
Short Note-1			
Revision - 1			
Revision - 2			
Revision - 3			
Remark			

NOTES :

1. In the status, put "completed" only when you have thoroughly worked through this particular section.

2. Always remember to put down the date of completion correctly. It will help you in future at the time of revision.

Space for Notes :

MATRIX
JEE Division | NEET Division
Piprali Road, Sikar, Rajasthan 332001 | 01572-241911, 01572-243911

MATRIX HIGH SCHOOL
Pre-foundation & Schooling Division
Piprali Road, Sikar, (Raj.) 332001 | Bikaner Bypass Road, Near Gokulpura Village, Sikar (Raj.) 332021 | 01572-242911

Scan QR to Register

Visit us www.mof.matrixedu.in

@matrixsikar @matrix_sikar @MatrixSikar /c/matrixacademy