Golden Future Series

Better Education, Bright Future

A Course Book of Mathematics

Maths Pool

6

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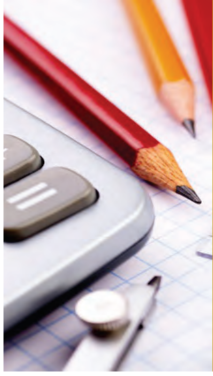


Chapter 1

Knowing the Numbers

Main Points of the Chapter

✦ Indian numeration system ✦ International numeration system ✦ Place value ✦ Expansion of numbers ✦ Estimation of numbers ✦ Rules for rounding ✦ Estimation of outcome of number operations ✦ Comparison of numbers ✦ Building of numbers ✦ Large numbers ✦ Roman numbers.

Introduction

Mathematics has three main organs– numbers, roots and figures, which come under arithmetic, algebra and geometry. But arithmetic, algebra and geometry also have large values and positions of numbers.

We can do larger calculation by using numbers now a days. We use numbers to show the value and calculations. In ancient times, we used symbols to represent the numbers.

We have ten fingers, so we can calculate the numbers till '10' easily. We use this '10'- type method which is called decimal number system. The word 'decimal' is derived from Latin word 'decem' which means 'ten'.

The numbers included in this system are– 0, 1, 2, 3, 4, 5, 6, 7, 8, 9. If we move from right to left then the values of numbers will increase according to ones, tens, hundreds, thousands, etc.

These numbers were found by Hindus. Then the businessmen of Arab took these numbers to Arab and Europe. So, this system or script came to be known as Hindu-Arabic script.

In the field of maths the discovery of zero is unique boon. Zero has brought revolution in the field of maths. If we use it on the right side then it increases its value by 10 times.

Indian Numeration System

We use Hindu-Arabic system in our daily lives. We use ten digits 0,1,2,3,4,5,6,7,8,9 to represent the numbers in this system .We can form any larger to largest number by using the digits '0' to '9'.

For example– In year 2001, the population of Delhi was 1,27,91,458, or in words- one crore, twenty seven lakhs, ninety one thousand four hundred fifty eight. This number will write in table as follow :

Crore (1,00,00,000)	Ten Lakhs (10,00,000)	Lakh (1,00,000)	Ten Thousand (10,000)	Thousands (1,000)	Hundreds (100)	Tens (10)	Ones (1)
× 1	× 2	× 7	× 9	× 1	× 4	× 5	× 8

So, $1,27,91,458 = (1 \times 1,00,00,000) + (2\times 10,00,000) + (7 \times 1,00,000) + (9 \times 10,000) + (1 \times 1000) + (4 \times 100) + (5 \times 10) + (8 \times 1)$

We can see a special pattern of Hindu–Arabic system–

$1 \times 10 = 10$; $10 \times 10 = 100$; $100 \times 10 = 1,000$; $1,000 \times 10 = 10,000$; $10,000 \times 10 = 1,00,000$; $1,00,000 \times 10 = 10,00,000$ and $10,00,000 \times 10 = 1,00,00,000$

The base of this system is 10, hence it is known as decimal number system.

In the Indian Decimal System, the commas are applied from right sides after three digits (hundreds) and then applied after every two digits.

International Numeration System

Till first 5 digits, there is no difference between indian and international systems but after that both the tables are different.

In the international system, commas are applied after every three digits from the right side.

For example, we shall write the population of Delhi 12791458 in International System in this way–

Group	Millions		Thousands			Ones		
Place	Ten Million	Million	Hundred Thousands	Ten Thousands	Thousands	Hundreds	Tens	Ones
	10,000,000	1,000,000	100,000	10,000	1,000	100	10	1
	1	2	7	9	1	4	5	8

In both systems, the values of number are as following :

1 lakh	(1,00,000)	=	100 thousands	(100,000)
10 lakh	(10,00,000)	=	1 million	(1,000,000)
1 crore	(1,00,00,000)	=	10 million	(10,000,000)

When we read any number in Indian or International system, it will be read in the form of ones.

For example, we shall read to 12791458 in both systems as-

In Indian System– One crore, twenty seven lakh, ninety one thousand and four hundred fifty eight.

In International System–Twelve millions, seven hundred ninety one thousands and four hundred and fifty eight.

Place Value

For example, take a five digit number 11111. Here '1' has different place values like this–

1 ones = 1
1 tens = 10
1 hundreds = 100
1 thousands = 1000
1 ten thousands = 10000

Expansion of Numbers

We shall write to 98, 538, 4976 and 58230 in expanded form in following way–

98 = 90 + 8
= 9 tens + 8 ones
538 = 500 + 30 + 8
= 5 hundreds + 3 tens + 8 ones
4976 = 4000 + 900 + 70 + 6
= 4 thousands + 9 hundreds + 7 tens + 6 ones
58230 = 50000 + 8000 + 200 + 30 + 0
= 5 ten thousands + 8 thousands + 2 hundreds + 3 tens + 0 ones

Example 1 : Write 425836 in Indian and International system with its numeral and word form.

Solution : In Indian System

Numeral form – 4,25, 836

Word form – Four hundred twenty five thousand and eight hundred thirty six.

In International System

Numeral form – 425, 836

Word form – Four hundred twenty five thousand and eight hundred thirty six.

Example 2 : Write the place value of every number in 75, 849.

Solution : 7 5 8 4 9

9	9 ones	=	9
4	4 tens	=	40
8	8 hundreds	=	800
5	5 thousands	=	5000
7	7 ten thousands	=	70000

Example 3 : Write the given numbers in expanded form–

45, 143, 5455, 34512

Solution :

45 = 40 + 5
= 4 tens + 5 ones

143 = 100 + 40 + 3
= 1 hundreds + 4 tens + 3 ones

5455 = 5000 + 400 + 50 + 5
= 5 thousands + 4 hundreds + 5 tens + 5 ones

34512 = 30000 + 4000 + 500 + 10 + 2
= 3 ten thousands + 4 thousands + 5 hundreds + 1 tens + 2 ones

Exercise 1.1

1. Put the commas, into these given numbers to represent them into Indian and International system :
   (a) 568213714 (b) 216147880 (c) 450837570 (d) 959418302
2. Write the given numbers in Indian and International System in words :
   (a) 462163 (b) 1432750 (c) 79185412 (d) 84514634
3. Write the place values of all the digits in given numbers :
   (a) 37855 (b) 59418 (c) 24367 (d) 12374
4. Write these numbers in expanded form :
   (a) 98 (b) 532 (c) 4321 (d) 68752
5. Find the place value of '5' in 7538543 and find their difference.
6. Write the following numbers in numerals :
   (a) Three crores twenty five lakhs two thousand five hundred twenty six.
   (b) Eight lakhs twelve thousand nine hundred one.
   (c) One million six hundred four thousand seven.
   (d) Fifteen million two hundred thousand seventeen.
7. Write the following numbers in short form :
   (a) 50000 + 7000 + 400 + 90 + 3 (b) 800000 + 90000 + 0 + 300 + 50 + 1
   (c) 700000 + 40000 + 3000 + 0 + 0 + 6 (d) 200000 + 30000 + 4000 + 500 + 60 + 7

Estimation of Numbers

We have to need calculations in our daily lives. We use estimation or rounding off when we are not having the actual values.

For example, we say that the population of Delhi is one crore twenty eight lakh. It gives real value of population of Delhi. We use approximate values in estimation.

For example, If we want to do the estimation of 884 nearest tens, it's value will be 880. If we want to do the estimation of 884 nearest hundreds, it's value will be 1000.

Rules for Rounding

Nearest Tens– See the digit of ones.

If it is less than 5, then we write it '0'.

If it is more than or equal to 5, then we will add '1' to its tens place.

Example : Nearest tens of the 12 to 10 and nearest tens of the 17 to 20.

Nearest Hundreds– See the digit of tens.

If it is less than 5, write '0' at ones and tens place.

If it is more than or equal to 5, write '0' at ones place and add '1' to hundreds place.

Example : Nearest hundreds of 132 is 100 and nearest hundreds of 165 is 200.

Nearest Thousands– See the digit of hundreds.

If it is less than 5, write '0' at ones and tens place.

If it is more than or equal to 5, write '0' at ones and tens place and add '1' to thousands place.

Example : Nearest thousands of 1265 is 1000 and nearest thousands of 1865 is 2000.

Nearest thousands, lakhs and ten lakhs can also be done by above method.

Example : Round off the given digits as indicated –

(a) 75255 till nearest ten thousands.

(b) 525133 till nearest one lakhs.

Solution : (a) 75255

We will see the thousandth place for rounding off to the nearest ten thousand. Thousandth place is of 5 digit. so, write '0' on hundreds, tens and ones place and add '1' to ten thousand.

Thus,	7	5255	=	80000
Round off up wards	(add 1)	(write 0)		

(b) 525133

We will see the ten thousandth place for rounding of to nearest lakhs. Ten thousandth place is 2, which is less than 5. So, write '0' at thousands, hundreds, tens and units place.

Thus,	5	25133	=	500000
Round off up wards	(no change)	(write 0)		

Estimation of Outcome of Number Operations

- It is carried into the following ways :
  - (a) Till thousands of 5- digits numbers
  - (b) Till hundreds of 4- digits numbers
  - (c) Till tens of 3 or 2- digits numbers
- If we want to check the purity of 4 operations (+,–,÷,×), we will do the estimation.

Estimation of Addition

Example : Add 1671, 2056 and 1348. Then verify your answer by estimation.

Solution :

Real Addition	Estimation	
1671	1700	
2056	+ 2100	
+ 1348	1300	
5075	5100	Nearest hundreds

The real sum is near to the estimated sum. So, the result seems true.

Estimation of Subtraction

Example : Subtract 585 from 7853. Verify your answer by estimation.

Solution :

Real Subtraction	Estimation	
7853	7900	
− 585	− 600	
7268	7300	Nearest hundreds

The real subtraction is near to the estimated subtraction. So, result seems true.

Estimation of Multiplication

Example : Multiply 73 and 48. Verify your result by estimation.

Solution :

Real Multiplication	Estimation	
73	70	
× 48	× 50	
584	00	
292 ×	350 ×	Nearest tens
3504	3500	

The real multiplication is near to estimated multiplication. So, the result seems true.

Estimation of Division

Example : $834 \div 49$. Verify your result by estimation.

Solution :

$= 834 \div 49$

$= 830 \div 50$ (Nearest tens)

$= 83 \div 5$ 17 (approx)

REMEMBER We often use rounding off in estimation. We can round off the numbers according to our requirements in the different numbers.

Exercise 1.2

1. Round off the given numbers as directed :
   (a) 23 and 76 to nearest tens
   (b) 543 and 674 to nearest hundreds
   (c) 8265 and 5841 to nearest thousands
   (d) 635732 to nearest lakhs
2. Solve the given numbers and verify the result by estimation :
   (a) Add 1726, 2657 and 3048
   (b) Subtract 683 from 9554
   (c) Multiply 32 and 186
   (d) Divide 120 by 24

3. Find the estimated quotients of :
   (a) $97 \div 47$ (b) $840 \div 49$

Comparison of Numbers

1. When the digits are different in two numbers : Larger digit number will be greater than smaller digit number.

Example : Compare 29815 and 9526.

Solution : 29815 → Number of digits are 5.

While 9526 → Number of digits are 4.

So, we write → 29815 > 9526 or 9526 < 29815

2. When the digits are same in two numbers : Start comparing those numbers from the left side.

If the left most digits are equal, then compare the second digits from the left. If the second digits from left are also equal then compare the third digits from the left and continue the procedure.

Example : Compare 65778 and 65742.

Solution : Start comparing from the left side.

6	5	7	7	8
6	5	7	4	2
same			change	

So, 7 will be greater than 4.

∴ 65778 > 65742 or 65742 < 65778

Building of Numbers

Suppose we have four digits 5,9,2,8. So, we have to arrange them in such away that numbers wan't repeat.By 5, 9, 2, 8 to make largest four digit number we write them in descending order. So, 9852 is largest number formed by them. Now, arrange them in ascending order to make smallest 4-digit numbers. So, 2589 is smallest number.

Ascending order : When the numbers are arranged from the smallest to the greatest orders, then it is called ascending order.

Example : 36, 71,034; 47, 86, 336; 48, 14,352

Descending order : When the numbers are arranged from the greatest to the smallest orders then it is called descending order.

Example : 48,17, 325 ; 47,86,336; 36,71, 034

Successor : The number which comes the immediate next to the other number is called its successor.

Example : 56,61,679 + 1 = 56,61,680

Thus, 56,61,680 is the successor of 56,61,679.

Predecessor : The number which comes the immediate before to the other number is called its predecessor.

Example : 48,69,800 – 1 = 48,69,799

Thus, 48,69,799 is the predecessor of 48,69,800.

For finding successor, we add '1' to the smaller number. For finding predecessor, we subtract '1' from the larger number.

Large Numbers

We have studied in the earlier classes that–

6- digit numbers lie between 1,00,000 to 9,99,999.

7- digit numbers lie between 10,00,000 to 99,99,999.

8- digit numbers lie between 1,00,00,000 to 9,99,99,999.

You've also studied that–

1 lakh or 1,00,000	=	100 thousands or 100,000
10 lakh or 10,00,000	=	1 million or 1,000,000
1 crore or 1,00,00,000	=	10 million or 10,000,000

All the above numbers are example of large numbers.

Use of Large Numbers

We use such numbers in selling or buying of lands, cars, machines, etc.

Example : 1. Cost of one house is ₹ 15,00,000.
2. Cost of one car is ₹ 4,50,000.
3. The population of Delhi in 2011 was 1,67,53,235.

Approximation of Large Numbers:

The population of Delhi in the year 2011 was 1,67,53,253 then you can say it approximately 1 crore and 70 lakhs. It will give a better idea of the population.

In other words, approximation is analysis.

Example : A school has 2460 students. Each student pays ₹ 780 as fee per month. Find the total estimated fees collected by the school.

Solution :

Fee of one student	=	₹ 780
Total students	=	2460
Total fee per month	=	₹ 780 × 2460
	=	₹ 19,18,800
Approximated amount of fee	=	₹ 19,00,000
or	=	₹ 19 lakh

Ans.

Exercise 1.3

1. Fill the appropriate signs $=$, $>$ and $<$ in the boxes :
   (a) 25878 ☐ 2769 (b) Hundred thousands ☐ one lakhs
   (c) 999 + 1 ☐ 10000 (d) 1 Million ☐ Ten Lakhs
   (e) 4 × 1000 ☐ 400000 (f) 1 crore ☐ 1 million
2. Find the largest and smallest numbers by using the digits 4, 3, 8, 1. Do not repeat the digits.
3. Arrange in the ascending order :
   (a) 67, 61,048; 81,61,037; 51,09,861
   (b) 29,37,453; 29,37,543; 29, 28, 453
4. Arrange in the descending order :
   (a) 19,41,752; 19,41,572; 14,91,752
   (b) 55,55,35,015; 55,53,55,015; 55,53,55,105
5. Write the successor of each number :
   (a) 2,46,790 (b) 29,79,999 (c) 1,46,589

6. Write the predecessor of each number :
   (a) 5,37,50,000 (b) 1,85,87,000 (c) 63,74,380
7. Write these numbers in approximated values :
   (a) 999 (b) 1,29,680 (c) 59,78,512
8. Find the approximated multiplication of 5,348 and 197.

Word Problems : Number Operations

We know

(a) 1 kilometer = 1,000 meters (m)
    1 meter = 100 centimeters (cm)
    1 centimeter = 10 millimeters (mm)

or

1 kilometer = $1 \times 1{,}000 \times 100$ cm = 1,00,000 cm
1meter = $1 \times 100 \times 10$ mm = 1,000 mm

(b) 1 kilogram = 1,000 grams
    1 gram = 100 centigrams
    1 centigram = 10 milligram

or

1 kg = $1 \times 1{,}000 \times 100$ cgm = 1,00,000 cgm
1 gm = $1 \times 100 \times 10$ mg = 1,000 mg

Addition– If we want to add the units of length or weight then we arrange them in the columns and keep the right units up and down.

Example : Simplify :
(a) 4562 km 300 m + 2357 km 650 m + 8481 km 700 m
(b) 2729 kg 70 gm + 8512 kg 400 gm + 4750 kg 300 gm

Solution : (a)

	Km	m
	①	
	4 5 6 2	3 0 0
	2 3 5 7	6 5 0
+	8 4 8 1	+ 7 0 0
	1 5 4 0 1	6 5 0

Ans.

$\because$ 1000 m = 1 km
$\therefore$ 1000 m or 1 km carry to km columm.

Solution : (b)

	Kg	gm
	2 7 2 9	0 70
	8 5 1 2	+ 4 0 0
+	4 7 5 0	3 0 0
	1 5 9 9 1	7 7 0

Ans.

Subtraction– To subtract the units of length or weight :
(i) We arrange them in columns as addition. (ii) We convert bigger units into smaller units.

Example : (a) Subtract 1385 kg 812 gm from 3276 kg 50 gm. (b) Subtract 2745 km 365 m from 3415 km 225m.

Solution : (a) Subtraction by Direct Process–

	Kg	gm
	⑤	
	3 2 7 ~~6~~	1 0 5 0
–	1 3 8 5	– 8 1 2
	1 8 9 0	2 3 8

Ans.

We can't subtract 812 gm from 50 gm. So we take 1 kg or 1000 gm as carry.
50 + 1000 = 1050 gm

By Conversion Process :

3276 kg 50 gm = (3276 × 1000 gm) + 50 gm

= 3276000 gm + 50 gm = 3276050 gm

and 1385 kg 812 gm = (1385 × 1000 gm) + 812 gm

= 1385000 gm + 812 gm = 1385812 gm

$$\begin{array}{r} 3\,2\,7\,6\,0\,5\,0 \text{ gm} \\ -\,1\,3\,8\,5\,8\,1\,2 \text{ gm} \\ \hline 1\,8\,9\,0\,2\,3\,8 \text{ gm} \\ \hline \end{array}$$

Change gm into kg = 1890 kg 238 gm **Ans.**

(b) **Subtraction by Direct process :**

Km	m
3 4 1 ~~5~~ (4)	2 2 5 (1)
– 2 7 4 5	– 3 6 5
6 6 9	8 6 0

Ans.

> We can't subtract 365 m from 225 m. So we take carry as 1km or 1000 m from column.
>
> 225 + 1000 = 1225m

By conversion process :

3415 km 225 m = (3415 × 1000 m) + 225 m

= 3415000 m + 225 m = 3415225 m

and 2745 km 365m = (2745 × 1000 m) + 365 m

= 2745000 m + 365 m = 2745365 m

$$\begin{array}{r} 3\,4\,1\,5\,2\,2\,5 \text{ m} \\ -\,2\,7\,4\,5\,3\,6\,5 \text{ m} \\ \hline 6\,6\,9\,8\,6\,0 \text{ m} \\ \hline \end{array}$$

Change gm into km = 669 km 860 m **Ans.**

Multiplication– We can multiply the units of length and weight by two ways :

(a) Direct Process (b) By conversion Process

Example : Multiply 712 km 150 m by 12.

Solution : (a) **Multiply by Direct process :**

Km	m
7 1 2	1 5 0
	× 1 2
8 5 4 5	8 0 0

Ans.

(b) **By Conversion Process :**

712 km 150 m = (712 × 1000m) + 150m 712150 m

= 712000 m + 150m = 712150m

= 712150 m × 12

= 712150 m

$$\begin{array}{r} \times\ 12 \text{ m} \\ \hline 1424300 \\ 712150 \\ \hline 8545800 \text{ m} \\ \hline \end{array}$$

Change m into km = 8545 km 800m **Ans.**

Divide – For division of units of length & weight, we must do it by changing them into smaller units.

Example : Divide 32 kg 751 gm by 9.

Solution : 32 kg 751 gm ÷ 9

32 kg 751 gm

= (32 × 1000 gm) + 751 gm

= 32000 gm + 751 gm

= 32751 gm

= 32751 gm ÷ 9

= 3639 gm

```
9)32751(3639
 -27
   57
 - 54
    35
  - 27
     81
   - 81
      ×
```

On changing gm into kg = 3 kg 639 gm **Ans.**

Exercise 1.4

1. Mr. Verma used 3715 kg 400 gm steel in the construction of his house. Mr. Sharma used 4825 kg 250 gm steel in his house. Find the sum and difference of the steel used in both the houses. Write your answer in kg and gm form and also in gm form only.
2. Two fields have their perimeters as 378 m 80 cm and 750 m 70 cm. Find the total perimeter of both fields. Write your answer in m and cm form and also only in cm form.
3. One bullock-cart carriers 1745 kg 700 gm sugar. How much quantity of sugar is carried by 15 such carts? Write your answer in kg and gm form and also only in gm form.
4. One field has perimeter of 475 m 50 cm. Mohan takes 5 rounds of that field. Find the total distance covered by him. Write your answer in m and cm form and only in cm form.
5. Reena has 254 m and 25 cm long ribbon. She divides that ribbon into 15 friends. Find the length of each part of ribbon got by everyone.
6. Ramesh had 65 kg 520 gm sweets. He distributed that sweet into 9 friends . How much part would everybody get? Write your answer in kg and gm form and also only in gm form.

Roman Numbers

Like the Hindu–Arabic numerals, Roman System is another system to write the numbers. In Roman Number System, we use the 7 symbols only to represent the numbers. It is another form of writing the numbers.

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

We follow the following rules to write Roman numbers :

1. If one smaller symbol comes after one larger symbol then we add the both values ; as-

XI = 10 + 1 = 11

XXVI = 10 + 10 + 5 + 1 = 26

2. If the smaller symbol comes before a larger symbol then we subtract their values ; as–

IX = 10 – 1 = 9

XL = 50 – 10 = 40

3. We always add the repeated values of symbols; as –

III = 1 + 1 + 1 = 3

XXX = 10 + 10 + 10 = 30

CC = 100 + 100 = 200

4. Except V, L and D, other symbols can be repeated but not more than three times.
5. We never subtract V, L and D symbols.

Exercise 1.5

1. Write the Roman numerals of :

(a) 87 (b) 95 (c) 79 (d) 76
(e) 96 (f) 48 (g) 89 (h) 33
(i) 990 (j) 848 (k) 950 (l) 475

2. Write in Hindu-Arabic numeral form :

(a) XCIX (b) CMXCIX (c) LXXII (d) LXXV
(e) XCI (f) XCIII (g) DCLV (h) LIII

3. Fill $>$ or $<$ in the blank :

(a) LX ___ XL (b) C ___ XCIX (c) XLIX ___ L
(d) DCCC ___ M (e) XXXVIII ___ XL (f) M ___ CMLXX

4. Write the given numbers in ascending order :

(a) LX, XLIX, LI, XL (b) DCC, CD, DC, CCC (c). XC, LXXX, CC, CL

5. Add the following Roman numbers :

(a) XL + VIII (b) CD + XL + IV (c) CM + XC + IV
(d) LXXX + LX (e) XC + VIII

Remember Now-a-days we use K to represent 1000. But it is not a roman symbol. This symbol represents the 'kilo' word; which means 1000. So, in this symbolic system 2 K means 2000, 3 K means 3000 and so on.

SUMMARY

- 0, 1, 3, 4, 5, 6, 7, 8 and 9 are Hindu-Arabic numbers.
- Numbers have two systems– Indian and International Numeration System.
- The value of a number is different from the place values of the digits.
- To read a number, always start from the left side by applying commas according to the systems.
- We use estimation of numbers to do the calculations approximately.
- The number having more digits is always greater than the number having lesser digits.
- If two numbers have equal number of digits then we start comparing them from the left side.

- Therefore, we use large number in selling or buying of lands, house, cars, machines, etc.
- We have seven basic Roman numbers:
  I, V, X, L, C, D and M.

Multiple Choice Questions (MCQs)

1. How many 5-digit numbers are there?
   (a) 89999 ☐ (b) 90000 ☐ (c) 5000 ☐ (d) 50000 ☐
2. What is the correct estimation of 5894-2059?
   (a) 3830 ☐ (b) 3800 ☐ (c) 4000 ☐ (d) 3835 ☐
3. If one number has more digits than the other number, first number will be :
   (a) larger ☐ (b) smaller ☐ (c) equal ☐ (d) none of these ☐
4. How many centimeters are there in one kilometer?
   (a) 1000 ☐ (b) 100000 ☐ (c) 100 ☐ (d) 10000 ☐
5. Correct Roman numeral for 40 is :
   (a) XXXX ☐ (b) LX ☐ (c) XL ☐ (d) XLC ☐

MENTAL MATHS

1. Make the smallest 5- digit number by using the digits 0 and 5. You can repeat these numbers.
2. Write the place value of 4 in 314761938.
3. Write three crore five lakh seventy in numerals.
4. If the nearest tens of a number is 50, then find the estimation number.
5. How many milligrams are there in 1 kg?

LAB ACTIVITY

Aim– To understand the concept of place value.

Materials Required– One strip of paper, pencil.

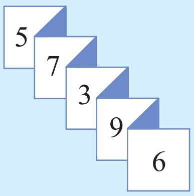
Procedure–

(i) Measure the length of paper strip and divide it into 9 equal parts.

(ii) Write a 5-digits number. Let it be-57396.
Now write '5' in first part, 0, 000 + in second part. Write '7' in third part and 000 + in fourth part. Write '3' in fifth part and 00 + in sixth part. Write '9' in seventh part and 0 + in eight part. Write '6' in nineth part.

5	0,000+	7	000+	3	00+	9	0+	6

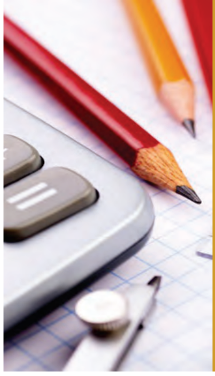
(iii) Fold the strip as shown–



(iv) We see that the number becomes 57,396.

(v) When we unfold this strip it spreads like a snake and then it will show us all the expanded form of the number.
57,396 = 50, 000 + 7, 000 + 300 + 90 + 6.

Natural Numbers and Whole Numbers



Chapter
2

Main Points of the Chapter

✦ Natural numbers ✦ Whole numbers ✦ Even and odd whole numbers ✦ The number zero ✦ Properties of addition of whole numbers ✦ Properties of subtraction of whole numbers ✦ Properties of multiplication of whole numbers ✦ Properties division of whole numbers.

Natural Numbers

Those numbers which are used to represent a particular value are called natural number. All numbers except '0' (zero) are natural numbers.

1, 2, 3, 4, 5, 6, 7, 8, 9 are natural numbers. We use these numbers for calculations, so these are called mathematical numbers. These are represented by 'N'.

Whole Numbers

All the numbers including zero are called whole numbers.

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

Representing the whole numbers on a number line– A line has no end points. So, we start the numbers from zero at the one end and continue the numbers till second end as shown in the figure.

We see here numbers are arranged in ascending order.

There is no whole number between the two whole numbers. For example, There is no any whole number between 0 and 1 or 1 and 2.

Even and Odd Whole Numbers

Whole numbers are of 2 types – even and odd.

The numbers which are divisible by 2, are called even whole numbers. For example : 2, 4, 6, 8, 10, 12 and 14 are even numbers between 1 to 15.

The numbers which are not divisible by 2, are called odd whole numbers. For examples : 3, 5, 7, 9, 11 and13 are odd numbers between 1 to 15.

REMEMBER

1. '1' is the smallest and first natural number.
2. '0' (zero) is the first whole number.

The Number Zero

'Zero' number does not have any value. It is valueless. It is represented by '0'It is a whole number but not a natural number. In number system, zero has its own value.

But if we write tens or more than tens digit then '0' has its significant value. Similarly, we can form any larger number, by using zeroes. If we write a tens digits or more, it effects the value of '0'. On removing '0' from 10, it becomes '1' which is 10 times less than its initial value. If we add '0' to 10 then it becomes 100 which increases its value 10 times. But, zero on left side does not affect the number. '0' also affects the number value when it is in middle. For example between 2 and 8 is situated two zeroes in 2008 and value of number is two thousand eight. We remove both the zeroes then the value becomes 28, which changes the value of original number. So, zero has its importance and we cannot ignore it.

Important Points Regarding 'Zero'–

- Zero was discovered by Indian Mathematician 'Aryabhatta'.
- Zero is the first number of whole numbers.
- If a number has its power as zero then the value becomes '1'.
- If we add zero to any number then the value of number does not change; as $15 + 0 = 15$.
- If we multiply any number by zero then the total value becomes zero; as $15 \times 0 = 0$.

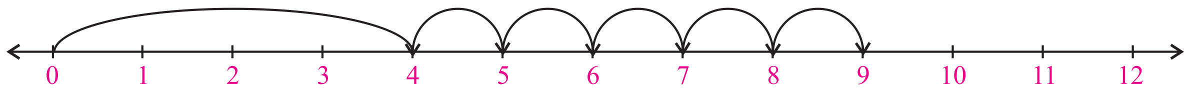
Operations of numbers on number line

We can show these operations on number line also–

Addition on number line – We show addition on number line.

Example : Show the sum of 4 and 5 on number line.

Solution : $4 + 5 = \boxed{?}$



$\therefore$ $4 + 5 = 9$. The point of arrow is on 4.

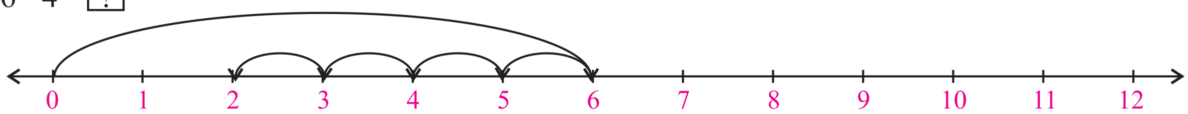
First count '4' then move '5' steps ahead. In the fifth step, last arrow point is on '9'.

So, total becomes '9'. So, $4 + 5 = 9$.

Subtraction on number line – It is opposite of addition. We can show it on number line.

Example : Show the subtraction 6 and 4 on number line.

Solution : $6 - 4 = \boxed{?}$



The point of arrow is on '6'. Starting from 6, we come 4 steps back.

So, $6 - 4$ becomes 2. So, $6 - 4 = 2$.

Multiplication on number line – We can show the multiplication of two whole numbers on number line.

Example : Show the multiplication of 2 and 4 on number line.

Solution : Multiplication is a process of adding a number again and again.

By starting from '0' and adding '2' four times, we get '8'. We move 2 steps once. In fourth step, we reach on '8'.

Add '2' 4 times. $(2 + 2 + 2 + 2 = 8)$

$\therefore$ $2 \times 4 = 8$

Division on number line – Division is short process of repeated subtraction of a number.

Example : Show the division of 9 by 3 on number line.

We first from 9 and then jump on 3-ones. We move further till we reach zero. Then we count 3, 6 and 9.

So, $9 \div 3 = 3$.

Exercise 2.1

1. Write the smallest natural number.
2. Write the smallest whole number.
3. How many whole numbers come between 91 and 111?
4. Are all natural numbers the whole numbers?
5. Can we find the largest natural number?
6. Write all whole numbers between 50 and 70?
7. Write all odd whole numbers between 151and 161?
8. Add these numbers by using number line :
   (a) $1 + 5$ (b) $2 + 6$ (c) $5 + 4$
9. Subtract these numbers by using number line :
   (a) $7 - 3$ (b) $12 - 5$ (c) 9–4
10. Multiply these numbers by using number line :
   (a) 2×5 (b) 3×3 (c) 4×2
11. Divide these numbers by using number line :
   (a) $8 \div 2$ (b) $12 \div 4$ (c) $10 \div 5$

Properties of Addition of Whole Numbers

Closure Property – The sum of two whole numbers is always a whole number.

If a and b are whole numbers then $a + b$ will also a whole number.

Example : $6 + 5 = 11$ and $15 + 6 = 21$

Commutative Property – The addition of any two whole numbers in any order then result is same.

If a and b are whole numbers then

$$a + b = b + a$$

Example : $4 + 7 = 11$ and $7 + 4 = 11$ So, $4+7=7+4=11$

Associative Property – If we add any three numbers in any order then the result is same.

If a, b, c are three whole numbers then

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

Example : $3 + (4 + 5) = 3 + 9 = 12$ and $(3 + 4) + 5 = 7 + 5 = 12$

So, $3 + (4+5) = (3 + 4) + 5 = 12$

Additive Identity – We add zero to any number then the number remains same.

If 'a' is a whole number then

$$a + 0 = 0 + a = a$$

Example : 143 + 0 = 143 and 2851 + 0 = 2851.

'0' (zero) is called additive identity

Example : Add by using suitable identity. Write name of property also.

(i) 1637 + 1305 + 363 (ii) 2062 + 353 +1438 + 547

Solution: (i) 1637 + 1305 + 363

In the first number 7 is at ones place and in third number 3 is at ones place. Add 7 and 3, we get 10. Thus we get 0 at ones place, so we first commutative and associative.

= 1637 + 363 + 1305 (Associative Prop.)

= (1637 + 363) + 1305 (Commutative Prop.)

= 2000 + 1305 = 3305 **Ans.**

(ii) $2062 + 353 + 1438 + 547$

$= 2062 + 1438 + 353 + 547$ (Associative Prop.)

$= (2062 + 1438) + (353 + 547)$ (Commutative Prop.)

$= 3500 + 900 = 4400$ **Ans.**

Exercise 2.2

1. Add the numbers and verify your result by commutative property :
   (a) $2345 + 67089$ (b) $135 + 24689$
2. Find the sum and verify it by associative property :
   (a) $(15409 + 112) + 591$ (b) $(2359 + 641) + 10000$
3. Add the numbers (Use proper property) :
   (a) $18 + 5 + 2 + 6$ (b) $637 + 908 + 363$
4. A student wrote $5 + 34 + 25 + 36$ at the place of $5 + 25 + 34 + 36$. Which property did the student use?
5. Fill in the blanks :
   (a) $12345 + (679 + 321) = (12345 +$ _____ $) + 321$
   (b) $1005 + 283 =$ _______ $+ 1005$
   (c) $30507 + 0 =$ _______
   (d) ______ $+ 605 = 605$
   (e) $38625 + 15259 + 42659 = ($ _____ $+ 15259) + 42659$

Properties of Subtraction of Whole Numbers

Closure Property – If a and b are whole numbers and $a \geq b$ only then we can apply closure property.

Example : $14 - 6 = 8$ (whole number) because $14 > 6$

$6 - 14 = -8$ (not a whole number) because $6 < 14$

Commutative Property – This property does not hold for two numbers in subtractions.

If a and b are whole numbers then (a – b) is not equal to (b – a).

$11 - 5 = 6$ and $5 - 11 = -6$

$\because$ $6 \neq -6$ So, $11 - 5 \neq 5 - 11$

Associative Property – This property also does not hold for three numbers in subtractions.

If a, b and c are whole numbers and $c \neq 0$, then $(a - b) - c$ is not equal to $a - (b - c)$.

If $a = 30$, $b = 14$ and $c = 4$, then

$(30 - 14) - 4 = 16 - 4 = 12$ and

$30 - (14 - 4) = 30 - 10 = 20$

So, $(30 - 14) - 4 \neq 30 - (14 - 4)$

Property of Zero – If we subtract zero from a number then we get the same number again.

Example : $(25 - 0) = 25$ and $(0 - 25) = -25$ (not a whole number)

So, in subtraction does not hold closure property.

Exercise 2.3

1. Verify $(a - b) \neq (b - a)$:
   (a) 112, 62 (b) 439, 122 (c) 170, 230

2. Verify $a-(a-b) \neq (a-b)-c$:

(a) 210, 410, 310 (b) 685, 965, 325 (c) 225, 710, 445

3. Subtract the following :

(a) $73218-46006$ (b) $29811-23541$ (c) $543691-55324$

4. Find the difference of largest 5-digits number and smallest 6-digits number.

5. Write correct digit in place of '*':

(a)
```
  5 3 7 6
– * * 5 9
---------
  2 5 * *
```
(b)
```
  6 0 0 2 3 0
– 4 8 * * * 6
-------------
  * 1 7 0 2 4
```
(c)
```
  5 7 * 9
– * * 4 6
---------
  3 6 8 *
```

Properties of Multiplication of Whole Numbers

The multiplication is similar to addition. So, properties of addition also hold for multiplication.

Closure Property – The product of two whole numbers is always a whole number.

If a and b are two whole numbers then $a \times b = c$, where c is also a whole number.

Example : $4 \times 6 = 24$

Commutative Property – The product of two whole numbers in any order remains same.

If a and b whole numbers, then

$$a \times b = b \times a$$

Example : $15 \times 5 = 75, \quad 5 \times 15 = 75$

So, $15 \times 5 = 5 \times 15$

Associative Property – The three whole numbers hold the property and their product is same where.

If a, b, c are three whole numbers, $(a \times b) \times c = a \times (b \times c)$

Example : $(3 \times 4) \times 5 = 12 \times 5 = 60$

$3 \times (4 \times 5) = 3 \times 20 = 60$

So, $(3 \times 4) \times 5 = 3 \times (4 \times 5)$

Multiplicative Identity – If we multiply '1' in any whole number then the number become same.

If a is a whole number, $a \times 1 = a$

Example : $25 \times 1 = 25$,

1 is called multiplicative identity.

Multiplication by Zero – If we multiply a number by zero then the whole value becomes zero.

If a is a whole number then $\Rightarrow \quad a \times 0 = 0 \times a = 0$

Example : $12 \times 0 = 0, \quad 0 \times 12 = 0$

So, $12 \times 0 = 0 \times 12 = 0$

Distributive Property – If a, b, c are three whole numbers then,

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

Example : $4 \times (5 + 6) = 4 \times 11 = 44$,

$4 \times 5 + 4 \times 6 = 20 + 24 = 44$

$4 \times (5 + 6) = 4 \times 5 + 4 \times 6$

This rule comes true for 4 digits also.

$a \times (b + c + d + e) = a \times b + a \times c + a \times d + a \times e$

Also, on subtractions –

If a, b and c are three whole numbers and $b > c$,

So, $a \times (b - c) = a \times b - a \times c$

Example : $8 \times (5-3) = 8 \times 2 = 16$

$8 \times 5 - 8 \times 3 = 40 - 24 = 16$

So, $8 \times (5-3) = 8 \times 5 - 8 \times 3$

Example : Find the product of :

(a) $25 \times 575 \times 4$ (b) $125 \times 40 \times 8 \times 25$

Solution : (a) $25 \times 575 \times 4$

$= (25 \times 4) \times 575$ (Closure prop.)

$= 100 \times 575 = 57500$ **Ans.**

(b) $125 \times 40 \times 8 \times 25$

$= 125 \times 8 \times 40 \times 25$ (Closure prop.)

$= 1000 \times 1000 = 10{,}00{,}000$ **Ans.**

Example : Solve the multiplication by distributive property :

(a) 225×104 (b) 125×92

Solution : (a) $225 \times 104 = 225 \times (100 + 4)$

$= 225 \times 100 + 225 \times 4$

$= 22500 + 900$

$= 23,400$ **Ans.**

(b) $125 \times 92 = 125 \times (100 - 8)$

$= 125 \times 100 - 125 \times 8$

$= 12500 - 1000$

$= 11{,}500$ **Ans.**

Example : Find the value of $472 \times 6 + 472 \times 3 + 472$.

Solution : $472 \times 6 + 472 \times 3 + 472$

$= 472 \times 6 + 472 \times 3 + 472 \times 1$

$= 472 \times (6 + 3 + 1)$ (Distributive prop.)

$= 472 \times 10$

$= 4720$ **Ans.**

Example : Find the value $665 \times 10 \times 461 - 361 \times 6650$.

Solution : $665 \times 10 \times 461 - 361 \times 6650$

$= (665 \times 10) \times 461 - 361 \times 6650$ (Commutative prop.)

$= 6650 \times 461 - 6650 \times 361$

$= 6650 \times (461 - 361)$

$= 6650 \times 100 = 6,65,000$ **Ans.**

Exercise 2.4

1. Fill in the blanks with suitable whole number :

(a) $34512 \times 1 =$ ______ (b) $62518 \times 0 =$ ______

(c) $572 \times 48 = 48 \times$ ______ (d) $16 \times 104 = 16 \times (100 +$ ______$)$

(e) $38 \times 95 = 38 \times (100 -$ ______$)$

2. By using correct property, find the value of $25 \times 8 \times 40 \times 125$
3. Solve by using distributive property :
   (a) 995×275 (b) 258×1008
4. Solve $2115 \times 2115 - 2115 \times 115$ by using correct property.
5. Solve $(425 \times 48) + (425 \times 16) - (425 \times 35) - (425 \times 9)$ by using correct property.

Properties of Division of Whole Numbers

Closure Property – This property does not hold in division. If a and b are whole numbers, $a \div b$ may or may not be a whole number.

Example : $8 \div 2 = 4$ (whole number)
$8 \div 3 = 8/3$ (not a whole number)

Division by Zero – We cannot divide any number by zero. It is meaningless.

Division of Zero by Whole Number – If we divide zero by any whole number then the answer becomes zero.

Example : $0 \div 8 = 0$

Division of Same Whole Number by Another Same Whole Number – If we divide a whole number by another whole number then the answer becomes one.

If 'a' is non-zero number then $a \div a = 1$.

Example : $52 \div 52 = 1$

Division of a Non-zero Whole Number by 1 : If we divide a non-zero whole number by 1 then we again get the same number.

If 'a' is a non-zero number then $a \div 1 = a$

Example : $95 \div 1 = 95$

Division Rule – It is given by :

Dividend = Divisor × Quotient + Remainder, where Remainder < Divisor.

Example : $1000 \div 35$ Here, 28 is quotient and 20 is remainder.
$1000 = 35 \times 28 + 20$ So, remainder (20) < divisor (35)

Other Rules – 1. Division of whole numbers is not commutative.

Example : Let numbers be 8 and 4.

So, $8 \div 4 \neq 4 \div 8$, $8 \div 4 = 2$, But, $4 \div 8 = \frac{4}{8} = \frac{1}{2}$

2. Division of whole numbers is also not associative.

Example : $(75 \div 15) \div 3 = 5 \div 3 = \frac{5}{3}$
$75 \div (15 \div 3) = 75 \div 5 = 15$
So, $(75 \div 15) \div 3 \neq 75 \div (15 \div 3)$

Example : Solve : $69{,}143 \div 45$

Solution :

```
45) 69143 (1536
   -45
    241
   -225
     164
    -135
      293
     -270
       23
```

Verification: Dividend = Divisor × Quotient + remainder
$69{,}143 = 45 \times 1536 + 23$
$= 69{,}120 + 23$
$= 69{,}143$

Quotient = 1536
Remainder = 23 **Ans.**

Example : Find that number which give quotient as 18 and remainder as 15 when divided by 22.

Solution: Dividend = Divisor × Quotient + Remainder

$= 22 \times 18 + 15$

$= 396 + 15 = 411$ **Ans.**

REMEMBER 1 is the only digit which dividend, divisor and quotient is equal.
i.e., $1 \div 1 = 1$

Exercise 2.5

1. Fill in the blanks :
   (a) $257 \div 0 =$ ______ (b) $825 \div$ ______ $= 825$
   (c) $163 \div 163 =$ ______ (d) $436 \div 1 =$ ______
   (e) $0 \div 303 =$ ______ (f) $765 \div$ ______ = Meaningless
2. Find the quotient and remainder :
   (a) $1947 \div 32$ (b) $15035 \div 100$ (c) $95234 \div 215$
3. Find the values of :
   (a) $476 + (620 \div 62)$ (b) $72450 \div (583 - 58)$
   (c) $694 - (625 \div 25)$ (d) $(15625 \div 125) \div 125$
4. Find a number which gives quotient as 20 and remainder as 18 when dividend by 35.
5. Is there any whole number 'n', for which $n \div n = n$ becomes true?
6. If p and q are non-zero digits then tell if $p \div q = q \div p$ is true? Give an example also.

SUMMARY

- Counting numbers as 1, 2, 3 .... are called natural numbers.
- All the numbers including zero are called whole numbers.
- Zero was discovered by Indian mathematician.
- Whole numbers have closure property for addition and multiplication only, but they don't hold such property for subtraction and division.
- Addition and multiplication are commutative for whole numbers.
- Whole numbers don't hold associative property for subtractions and division.
- Division rule is–
  Dividend = Divisor × Quotient + Remainder
  where, Remainder < Quotient

Multiple Choice Questions (MCQs)

1. Smallest whole number is :
   (a) 0 ☐ (b) 1 ☐ (c) 2 ☐ (d) None ☐

2. How many whole numbers exist between 32 and 53?
   (a) 22 ☐ (b) 21 ☐ (c) 20 ☐ (d) None ☐
3. The multiplicative identity of whole number is :
   (a) 2 ☐ (b) 1 ☐ (c) 0 ☐ (d) None ☐
4. The property shown by $(5 \times 9) \times 7 = 5 \times (9 \times 7)$ is :
   (a) Closure ☐ (b) Commutative ☐ (c) Associative ☐ (d) None ☐
5. If 'a' is a whole number, $\frac{a}{0} = ?$
   (a) 0 ☐ (b) a ☐ (c) Meaningless ☐ (d) None ☐

MENTAL MATHS

1. 2, 4, 6, 8 are what type of numbers?
2. What do we call those numbers which are not divisible by 2?
3. Two whole numbers have their product as zero. Tell those numbers by assumption?
4. Out of 530 and 503, tell which number lies on the right side and left side of the number line?

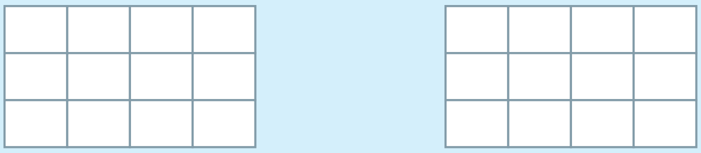
LAB ACTIVITY

Aim – To show the commutative property of whole number.

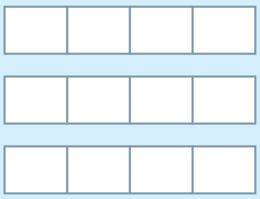
Materials Required – Square sheets, scissors.

Procedure –

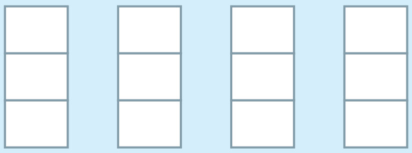
(i) Cut two of square sheet of 4×3 measurement.



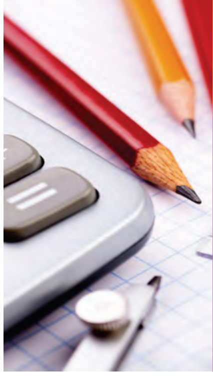
(ii) Cut first part of square sheet into 3 equal strips of 4 squares.



(iii) Cut the second part of square sheet into 4 equal strips of 3 squares.



(iv) Each 3 strips of 4 squares	Each 4 strips of 3 squares :
$3 \times 4 = 12$	$4 \times 3 = 12$



Chapter 3

Negative Numbers and Integers

Main Points of the Chapter

✦ Negative numbers ✦ Representation of integers on number line ✦ Absolute value of integers ✦ Addition of integers ✦ Subtraction of integers ✦ Multiplication of integers ✦ Division of integers ✦ Power of integers ✦ Brackets ✦ BODMAS rule.

Negative Numbers

We see many unfavoruble conditions in our daily life as– profit and loss, income and expenditure, upwards and downwards the sea-level, temperature above and below than 0°C.

For example : we assume the sea level at zero '0' height. If a bird flies above 50 meters then we will show its height as 50 meters above the sea level. If a submarine goes 50 meters down the sea level. We will show its depth as 50 meters below the sea level.

Likewise, we write temperature above 0°C as 15°C.

Likewise, we write temperature below 0°C as –15°C.

In the above situations, 50 and 15 are positive number but –50 and –15 are negative number. In mathematics, numbers with (–) sign are called negative numbers. '–' is read as negative.

So, all natural and whole number when represented with '–' sign are called negative numbers.

These number are also known as inverse of their corresponding positive numbers. Example, – 1 is the inverse of 1 and –5 is the inverse of 5.

Negative numbers always give zero on adding to their inverse. Example, $-6+6=0$, $-9+9=0$, etc (except 0), we use positive and negative numbers also in calculations. We can also arrange them in groups as –

–4, –3, –2, –1, 0, 1, 2, 3, 4 ......

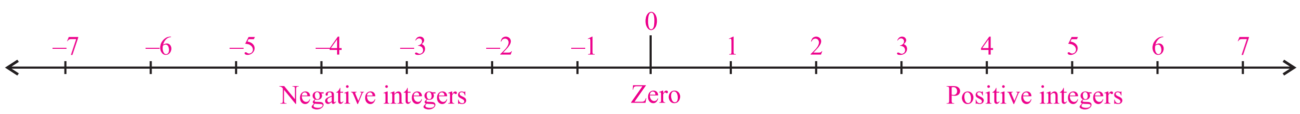
These numbers are called integers.

So, the natural numbers 1, 2, 3, 4,...... are called positive number. –1, –2, –3, –4, ... are called negative numbers. '0' is neither negative nor positive. It is a whole number.

Representation of Integers on Number Line

By a number line, we can understand the zero, positive and negative numbers easily.

We will show negative integers on left side of zero and positive numbers on the right side of zero.



As we move right from zero then we get the larger number. If we move left from zero, we get smaller number.

Here, $-1 > -2$ (–1 is larger than – 2)

Thus $-3 > -4$, $-8 > -9$ etc.

Absolute Value of Integers

The absolute value of integers show its distance from zero. This distance can be + *ve* or – *ve*.

But in the absolute value, we cannot take positive or negative sign, absolute value is always positive. The absolute value is represented by two vertical lines (| |).

For example : $|-5| = 5$. So, 5 is the absolute value of –5.

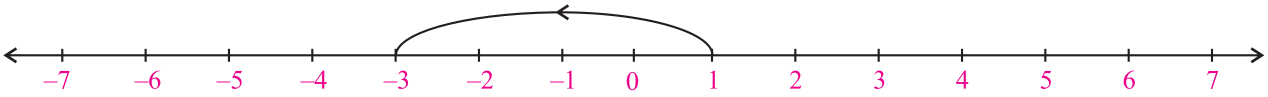
REMEMBER

1. '0' is the smallest of each positive integers.
2. '0' is the largest of each negative integers.
3. Each positive integer is greater than each negative integer.
4. –1 is the largest negative integer.
5. The more value of positive integers increases than the less value of negative integers comes.
6. The number has larger value on the right side of zero.
7. The number has smaller value of the left side of zero.

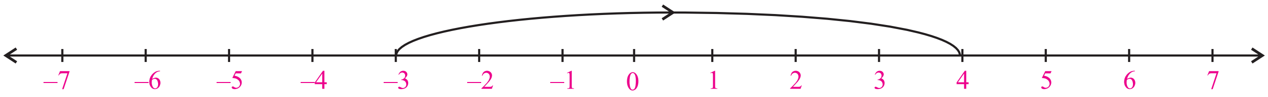
Example : Represent an integer on number line which is :

(a) 4 less than 1. (b) 7 more than –3

Solution : (a) Starting from 1, we move 4 steps to left and get –3.



(b) Starting from –3 on number line, we move 7 steps to right and get 4.



Example : Find the values of :

(a) $|-8|$ (b) $-|6|$ (c) $|10|+|-10|$ (d) $|-7|+|-8|$

Solution: (a) $|-8| = 8$ (b) $-|6| = -(6) = -6$

(c) $|10|+|-10| = 10+10 = 20$ (d) $|-7|+|-8| = 7+8 = 15$ **Ans.**

Exercise 3.1

1. Use + or – to represent following conditions :
   (a) 8°C down from 0°C (b) 45°C above 0°C
   (c) 500 m above sea level (d) 100 m below sea level
   (e) profit of ₹ 100 (f) Loss of ₹ 200
2. Represent following numbers on a number line by (↑) sign :
   (a) 0 (b) –5 (c) 7 (d) –8 (e) 9
3. Fill > or < in boxes :
   (a) –7 ☐ – 14 (b) 0 ☐ –5 (c) –8 ☐ 1
   (d) 6 ☐ 0 (e) –6 ☐ –25 (f) 7 ☐ 4
4. Write the integer coming at the right side of these pairs :
   (a) –3, –6 (b) 0, –5 (c) –4, 8 (d) 2, 9
5. Write all the integers coming between :
   (a) 0 and 5 (b) –1 and 4 (c) –5 and 0 (d) –6 and –1
6. Write these integers in ascending order :
   (a) –1, –7, 6, –3, 12 (b) 6, 9, –8, 0, –2
7. Write these integers in descending order :
   (a) –6, 2, –12, 0, 5 (b) 15, –8, –3, –5, 10
8. Represent the integers on number line which is :
   (a) –3 less than 2 (b) 7 more than –1 (c) 6 less than 0 (d) 5 more than

9. Write the absolute values of :

(a) |17| (b) |–23| (c) |–153| (d) |243|

10. Find the values of :

(a) |–8| – |–6| + |15| (b) |24| + |–6| + |–13|

(c) |20| – |–25| + |5| (d) |16| + |–8| – |–8|

11. Write the inverse of given integers :

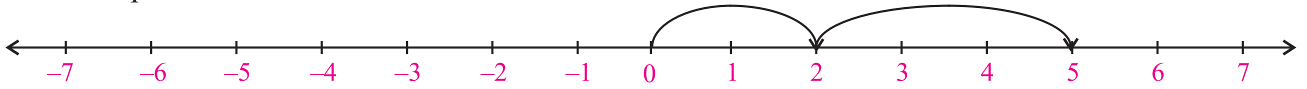
(a) –8 (b) –25 (c) + 7 (d) +143 (e) –70

Addition of Integers

1. **Addition of Positive Integers –** We add numerical value of positive numbers and show their sum with (+) sign. If we add two positive integers then the answer also becomes positive.

Example: (+ 2) + (+3) = + 5

We will represent it on number line as follows–

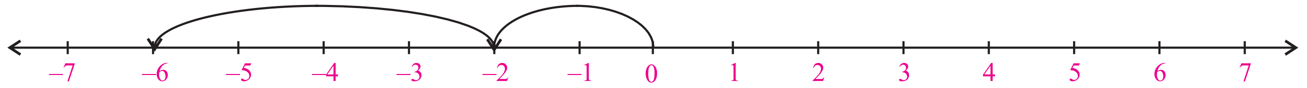


For this, we count 2 steps right from the zero and then 3 steps right from 2 and so we get 5.

2. **Sum of Negative Integers –** We add two numerical value of negative numbers and show thier sum with (–) sign. So their sum will be negative.

Example : (– 2) + (–4) = – 6

We will represent it on the number line as follows –



For this, we count 2 steps left from the zero and from 2, we move 4 steps to left then we get the sum of –2 and – 4 as '–6'.

3. **Sum of Positive & Negative Integers –** The sum of positive and negative integer will always their difference. If we subtract one positive from bigger integer then it will be subtracted with the sign of bigger number as :

For non-zero numbers a > 0, b > 0–

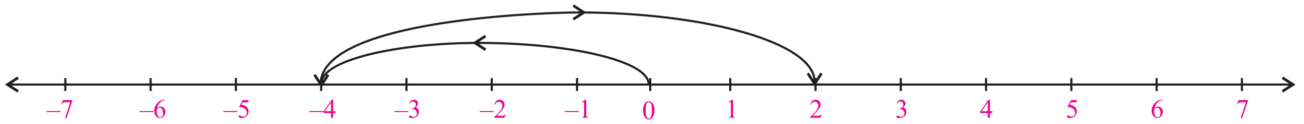
$+a + (-b) = +(a - b)$ if $a > b$

$+a + (-b) = -(b - a)$ if $b > a$

$(-a) + (+b) = -(a - b)$ if $a > b$

$(-a) + (+b) = +(b - a)$ if $b > a$

Example : On adding – 4 and 6 we get '2'. It will be shown on number line as :



For this, we count 4 left from the zero and then move '6' towards right from so, we get +2 on the left side form the zero.

Properties of Sum of Integers –

1. The sum of two integers is an integers.
2. Addition of integers is commutative so, $a + b = b + a$.
3. If a, b, c are integers, so $a + (b + c) = (a + b) + c$.
4. If we add zero to an integer then the result will be same integer, $a + 0 = 0 + a = a$.
5. If a, b, c are integers and $a > b$ so, $a + b > b + c$ and if $a < b$, then $a + c < b + c$.
6. The sum of an integer and its inverse is zero. If 'a' is an integer then $a + (-a) = 0$.

Exercise 3.2

1. Show on the number line :
   (a) $-8+6$ (b) $9+(-5)$ (c) $-7+(-4)$
   (d) $-2+(-3)+5$ (e) $7+2+(-8)$ (f) $(-5)+(-3)+(-2)$
2. Find the sum of these integers :
   (a) $-143, 117$ (b) $425, -405$ (c) $-303, -101$
   (d) $-2137, 0$ (e) $0, 830$ (f) $512, 618$
3. Simplify :
   (a) $(-4)+47+(-16)+(-32)$ (b) $63+(-7)+(-18)$
   (c) $-289+400+(-145)$ (d) $100+(-34)+(-66)$
4. By using the properties of integers, fill in the blanks :
   (a) $(-18)+7=7+$ _____ (b) $(-25)+0=$ _____ (c) $(-55)+$ _____ $=-55$
   (d) $(-3)+[4+(-5)]=(-3+4)+$ _____ (e) $24+(-24)=$ _____ (f) $58+$ _____ $=0$

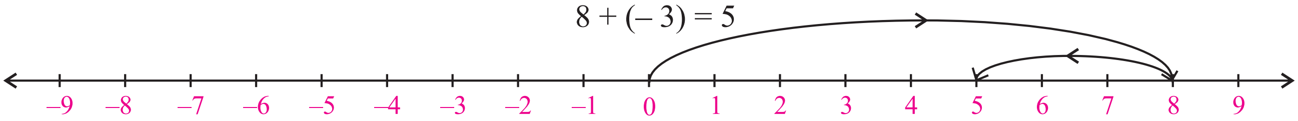
Subtraction of Integers

This process is opposite of addition. It is presented by (–) minus sign. It is a process of adding a negative integerand follow the addition rule to a positive integers. We change the sign of the numbers as shown here to perform the subtraction.

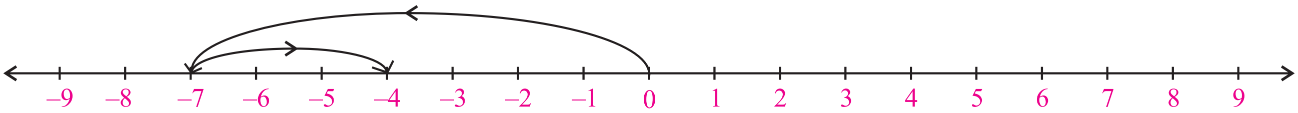
$$a-b = a+(-b)$$
$$7-4 = 7+(-4)=3$$

On number line, the process is as follows–

$8+(-3)=5$



Similarly, $(-7) - (-3)=(-7) + (+3) = -4$



Properties of Subtraction of Integers–

1. If a and b are integezrs then $(a-b)$ will also be an integer–

   Example : $8-2 = -6$

   $-3-6= -9$

   Here -6 and -9 are whole numbers.
2. If 'a' is an integer then $a-0=a$.

   Example : $7-0 = 7$

   $-4-0 = -4$
3. If a, b, c are integers and if $a>b$ so, $a-c>b-c$,

   Example : $a=9$, $b=4$ and $c=2$

   $a-c = 9-2 = 7$

   $b-c = 4-2 = 2$

   So, $7>2$

Predecessor of an integer – For finding predecessor of an integer, we subtract 1 from it.

Example: Predecessor of 4 = $4-1=3$

Predecessor of 0 = $0-1=-1$

Predecessor of –3 = $-3-1=-4$

Subtracting a larger positive number from a smaller positive number–

While doing this process, the answer will come in negative form because we are subtracting larger number from a smaller number and we will put –*ve* sign before the difference.

Example: $20-150=-(150-120)=-30$

Remember

$+(+a)=+a$

$+(-a)=-a$

$-(+a)=-a$

$-(-a)=+a$

Example : Find the sum of :

$1+(-1)+1+(-1)+1+(-1)+ \dots\dots\dots$

(i) If number of terms is 119.

(ii) If number of terms is 220.

Solution : $1+(-1)+1+(-1)+1+(-1)+ \dots\dots\dots$

Here, first term = 1

Sum of 2 terms = $[1+(-1)=0$

Sum of 3 terms = $[1+(-1)+1]=1$

Sum of 4 terms = $[1+(-1)+1+(-1)=0$

So, it is clear that if terms are even then result is 0. If terms are odd then result is 1.

(a) If terms = 119, it is odd then answer is 1.

(b) If terms = 220, it is even then answer is 0.

Exercise 3.3

1. Subtract the second integer from first integer :

(a) 2, 6 (b) 12, 5 (c) –11, 8 (d) 3, –9
(e) 0, –125 (f) –112, –218 (g) –325, 0 (h) 88, 0

2. Find the value of :

(a) $(3-4)+(3-4)$ (b) $-25-(-12)$ (c) $-11+30-16-2$
(d) $50-(-45)-(-2)$ (e) $16-[(-2)+12]$ (f) $-8-7-(-25)$

3. Subtract –6 from 8. Subtract 8 from –6. Are the results same?
4. Subtract the sum of –520 and 180 from –50.
5. If two integers have sum of 50, one of them is –25, find the other one.
6. Subtract the sum of 998 and –486 from sum of –290 and 732.
7. Fill in the blanks :

(a) $-4+$ _____ $=-12$ (b) $17+$ _____ $=0$ (c) _____ $-215=-64$

8. Find the sum of :

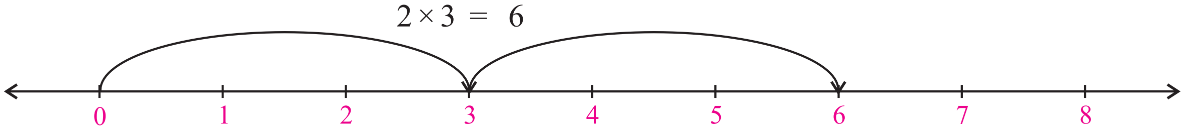
$2+(-2)+2+(-2)+2+(-2)+ \dots\dots\dots$

(a) If number of terms is 238. (b) If number of terms is 149.

Multiplication of Integers

We can understand this process by number line as –

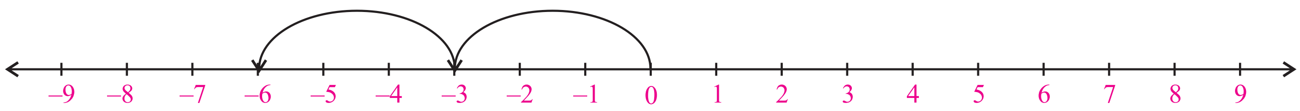
$2\times 3 = 6$



$2\times 3=3+3=6$

Similarly multiplying a positive integer by a negative integer–

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



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

So, multiplication of 2 negative integers–

$(-2) \times (-3) = (-1)(2) \times (-1)(3) = (-1) \times (-1) \times 2 \times 3$

$= -(-1) \times 6 = 6$

Rules of Multiplication–

1. The product of two opposite signed integers is always a negative integers.

   Example : $-4 \times 2 = -|4| \times |2| = -8$

2. The product of two same signed integers is always a positive integer.

   Example : $4 \times 2 = |4| \times |2| = 8$

   $-4 \times -2 = |4| \times |2| = 8$

REMEMBER

$(+) \times (+) = (+)$

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

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

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

Properties of multipllication of integers–

1. If a and b are integers then their product $(a \times b)$ will also be an integer.

   Example : $3 \times 2 = 6,$

   $(-2) \times 4 = -8$

   $(-5) \times (-6) = 30$ All are integers.

2. Multiplication of two integers is commutative.

   $\therefore$ $a \times b = b \times a$

   Example : $-2 \times 3 = 3 \times -2$

   $-6 = -6$

3. Multiplication of three integers a, b and c is associative.

   $\therefore$ $a \times (b \times c) = (a \times b) \times c$

   Example : $-2 \times (3 \times 5) = -2 \times 15 = -30$

   $(-2 \times 3) \times 5 = -6 \times 5 = -30$

4. On multiplying an integer 'a' by 1, we will get the same integer. 'a'

   $\therefore$ $a \times 1 = 1 \times a = a$

   Example : $-6 \times 1 = 1 \times -6 = -6$

   $8 \times 1 = 1 \times 8 = 8$

5. On multiplying an integer by 0, we will get '0' as answer.

   $\therefore$ $a \times 0 = 0 \times a = 0$ a is whole number.

   Example : $7 \times 0 = 0 \times 7 = 0$

   $(-2) \times 0 = 0 \times (-2) = 0$ (distributive law)

6. If a, b and c are integers, then–

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

   $a \times (b - c) = a \times b - a \times c$ (distributive law)

   $\Rightarrow$ $3 \times (2 + 5) = 3 \times 7 = 21$

   $3 \times (2 + 5) = 3 \times 2 + 3 \times 5 = 6 + 15 = 21$

   $2 \times (4 - 8) = 2 \times -4 = -8$

   $2 \times (4 - 8) = 2 \times 4 - 2 \times 8 = 8 - 16 = -8$

7. If a, b, c are integers and $a > b$, then:
$a \times c > b \times c$, where c is positive number.
$a \times c < b \times c$, where c is negative number.
Example :

$$\begin{array}{lrcl} \text{Let} & a = 12, b = 8 \ \& \ c = 2\,(a > b) & & \\ & 12 \times 2 & > & 8 \times 2 \\ & 24 & > & 16 \\ \therefore & a \times c & > & b \times c \\ \text{Let} & a & = & 12,\ b = 8\ \& = -2\,(a > b) \\ & 12 \times -2 & < & 8 \times -2 \\ & -24 & < & -16 \\ \therefore & a \times c & < & b \times c \end{array}$$

Exercise 3.4

1. Find the product of :
   (a) $(-2) \times 15$ (b) $8 \times (-125)$ (c) $(-18) \times (-30)$
   (d) $(-5) \times 36 \times (-2)$ (e) $(-9) \times (-9) \times (-9)$ (f) $(-7) \times (-143) \times 0$
2. Find the value of :
   (a) $(-175) \times (-56) + (-175) \times (-44)$
   (b) $(-70) \times (10 - 5 - 43 + 98)$
   (c) $10625 \times (-2) + (-10625) \times 98$
3. If $a \times (-1) = -20$, then 'a' is positive or negative?
4. If $a \times (-1) = 20$, then 'a' is positive or negative?
5. Compare the values of :
   (a) $[(-2) - (5)] \times (-6)$ and $(-2) - 5 \times (-6)$
   (b) $(8 + 9) \times 10$ and $8 + 9 \times 10$
   (c) $(6 - 7) \times 10$ and $6 - 7 \times 10$
6. Verify the following :
   (a) $15 \times [6 + (-2)] = 15 \times 6 + 15 \times (-2)$
   (b) $(-21) \times [(-4) + (+14)] = (-21) \times (-4) + (-21) \times (+14)$

Division of Integers

There are two rules based on the positive and negative sign of integers for division :

1. If dividend and divisor are of same sign then the quotient will be positive.
   Example : $8 \div 2 = 4$, $-8 \div (-2) = 4$
2. If dividend and divisor are of opposite sign then the quotient will be negative.
   Example : $-8 \div 2 = -4$, $8 \div (-2) = -4$

Properties of division of integers –

1. If a and b are integers then $a \div b$ can or cannot be an integer.
   Example : $8 \div 3 = \frac{8}{3}$ (It is non-integer)
2. The division of one non-zero integer a by same integer 'a' gives '1'.
   So, $a \div a = 1$
   Example : $2 \div 2 = 1$ $-3 \div -3 = 1$

3. The division of one integer a by 1 gives the same integer. (So, $a \div 1 = a$)

Example : $8 \div 1 = 8$

4. The division of a by 0 ($a \div 0$) is meaningless, so we cannot divide a number by '0'.

5. The division of 0 by a non-zero integer ($0 \div a$) gives zero.

Example : $0 \div 3 = 0$

6. If a, b, c are integers and $a > b$, then –

$a \div c > b \div c$ Where c is positive number.

$a \div c < b \div c$ Where c is negative number.

Example :

If $a = 9, b = 6$ and $c = 3$, then

$a \div c = 9 \div 3 = 3$ and $b \div c = 6 \div 3 = 2$

Here, $a > b$ and c is positive number.

$a \div c > b \div c$

If $a = 9, b = 6$ and $c = -3$, so

$a \div c = 9 \div (-3) = -3$

$b \div c = 6 \div (-3) = -2$

$-3 < -2$

$\therefore$ $a \div c < b \div c$

Remember

$(-) \div (+) = (-)$
$(+) \div (+) = (+)$
$(+) \div (-) = (-)$
$(-) \div (-) = (+)$

Exercise 3.5

1. Find the quotient of each of the following :

(a) $32 \div (-8)$ (b) $(-45) \div (-15)$ (c) $(-21) \div 3$ (d) $0 \div (-13)$

(e) $(-125) \div 0$ (f) $(203) \div (-1)$ (g) $(-620) \div 1$ (h) $328 \div (-328)$

(i) $(-225) \div (-25)$ (j) $(-435) \div 435$ (k) $28 \div (-7)$ (l) $(-81) \div (-9)$

2. Fill in the blanks :

(a) $778 \div$ ____ $= 1$ (b) $-231 \div$ ____ $= 1$ (c) $927 \div 0 =$ ____

(d) $0 \div 540 =$ ____ (e) ____ $\div 21 = -3$ (f) ____ $\div 1 = -820$

3. Write True or False for these statements :

(a) $0 \div (-8) = -0$ (b) $(-28) \div 0 = 0$ (c) $(-21) \div (-7) = -3$

(d) $(-32) \div (8) = -4$ (e) $(-37) \div (-1) = 37$ (f) $17 \div (-1) = -17$

Powers of Integers

Sometimes we multiply a number by itself many times. When we multiply a number many times then we use a suitable method to represent that.

Example :

$4 = 4^1$ (don't write power 1)

$4 \times 4 = 4^2$ (four raised to the power 2)

$4 \times 4 \times 4 = 4^3$ (four raised to the power 3)

$4 \times 4 \times 4 \times 4 = 4^4$ (four raised to the power 4)

Here, in these numbers 4 is base and 1, 2, 3, 4 are powers.

1. If the base is negative number and power is even number then value is positive.

Example : $(-3)^2 = (-3) \times (-3) = 9$

2. If the base is negative and power is positive odd, and on the value becomes negative.

Example : $(-2)^3 = (-2) \times (-2) \times (-2) = -8$

3. The powers in multiplications always add up and the powers in division always subtract up.

Example : $(-4)^5 \times (-4)^2 = (-4)^{5+2} = (-4)^7$

$(7)^6 \div (7)^2 = (7)^{6-2} = (7)^4$

Brackets

If we want to perform two or more operations among the numbers then we group them. Then we use the brackets mostly for this. The commonly use bracket are as follows :

–	=	Vinculum
( )	=	Round Brackets
{ }	=	Braces
[ ]	=	Square Brackets

The left part of bracket represents the starting and the right part of bracket represents the ending of bracket.

The brackets are operated in the following sequence :

1. First we solve vinculum, then round bracket, then braces then square brackets rule is that brackets can be in any order but we remove the inner brackets first and solve them.
2. If the positive sign (+) is present outside the bracket then the inner values will not change.
3. If the negative sign (–) is present outside the brackets then the inner signs will becomes change. (–) sign becomes change (+) and (+) sign becomes (–) change.
4. If there is a number without sign outside the bracket, then it will be multiplied.
5. We must solve a bracket before opening it.
6. The simplification follow firstly division, then multiplication then addition then subtraction.

BODMAS Rule

BODMAS is made from different letters. These different letters show the different mathematical process which are solved by the order of BODMAS.

We follow this rule to solve the series of integers as–

B	=	Brackets
O	=	of
D	=	Division
M	=	Multiplication
A	=	Addition
S	=	Subtraction

Means, while solving the questions, we solve the bracket first then we solve the 'of' part then division, multiplication, addition and subtraction.

Example : $(15)^6$ – Find its base and power.

Solution : Base = 15, Power = 6

Example : $5 \times 5 \times 5 \times 5 \times 5$, change it into power rotation.

Solution : $5 \times 5 \times 5 \times 5 \times 5 = 5^5$

Example : Find the value of 4^3.

Solution: $4^3 = 4 \times 4 \times 4 = 64$

Example: $(-6)^8 \div (-6)^4$

Sol : $$(-6)^{8-4} = (-6)^4 = \frac{(-6)\times(-6)\times(-6)\times(-6)\times(-6)\times(-6)\times(-6)\times(-6)}{(-6)\times(-6)\times(-6)\times(-6)}$$

$$= (-6)\times(-6)\times(-6)\times(-6) = 1296$$

Example : Simplify : $14-[9-\{16-(18-\overline{6+3-12})\}]$

Sol : $14-[9-\{16-(18-\overline{6+3-12})\}] = 14-[9-\{16-(18+3)\}]$

$= 14-[9-\{16-21\}] = 14-[9-\{-5\}]$

$= 14-[9+5] = 14-14 = 0$

Exercise 3.6

1. Write the base and exponent in each :
   (a) $(-5)^4$ (b) 6^7 (c) 1^1 (d) $(-38)^8$ (e) $(-8)^1$
2. Write the following in exponential form :
   (a) $12\times12\times12\times12\times12\times12$
   (b) $(-15)\times(-15)\times(-15)\times(-15)\times(-15)$
3. Find the value of :
   (a) $2^3\times2^6$ (b) $(-2)^8\div(-2)^6$ (c) $(-5)^5\div(-5)^3$
4. Verify the following :
   (a) $(-2)^3\times(-2)^2=(-2)^5$ (b) $3^5\div3^2=3^3$ (c) $4^3\div2^5$
5. Simplify the following :
   (a) $20+\{10-5+(7-3)\}$ (b) $7-\{13-2(4 \text{ of } -4)\}$
   (c) $2-[3-\{6-(5-\overline{4-3})\}]$ (d) $50-10\times2 \text{ of } 5+(40-4)\div9$

SUMMARY

- The integers 1, 2, 3, 4, 5 .... are positive integers.
- The integers .... –5, –4, –3, –2, –1 are negative integers.
- Integer 0 is neither positive nor negative.
- When we write an integer without considering its sign then it is called its absolute value.
- Every positive integer is greater than negative integer.
- The integers with same signs are added with their signs and sign is also show in result. We keep the sign of bigger number in the result.
- The integers with opposite signs are subtracted in accordance with the largest valued integer.
- The meaning of subtracting an integer from another integer is their addition with opposite sign.
- If we find the product of two numbers, then the following sign-rules are used:
  $(+)\times(+)=(+), (-)\times(-)=(+), (+)\times(-)=(-), (-)\times(+)=(-)$
- $a^n = a\times a\times a\times a$ ...... n times.
- BODMAS rule is always followed in accordance to the brackets.

Multiple Choice Questions (MCQs)

1. Largest positive integer is :

   (a) 0 ☐ (b) –1 ☐ (c) –0 ☐ (d) None ☐

2. The successor of –2 is :

   (a) –3 ☐ (b) –1 ☐ (c) 0 ☐ (d) 3 ☐

3. $8 \div 0 = ?$

   (a) 8 ☐ (b) 1 ☐ (c) 0 ☐ (d) Meaningless ☐

4. $(-8) \times (-8) = ?$

   (a) –64 ☐ (b) 64 ☐ (c) 16 ☐ (d) –16 ☐

5. The answer on subtracting –9 from zero is :

   (a) –9 ☐ (b) 9 ☐ (c) 0 ☐ (d) 90 ☐

MENTAL MATHS

1. What is integer opposite to 0?
2. What is the distance between – 5 to 5 on number line?
3. Which temperature is greater: –3°C or –5°C?
4. Write in integers :
   (a) Gain of ₹ 500
   (b) 800 m below sea level.
5. Find the value of :
   $(-9) \times 6 + (-9) \times 4$

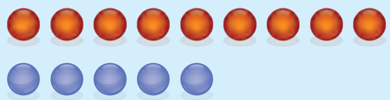
LAB ACTIVITY

Aim– To find the sum of two integers.

Materials Required– Glass balls or buttons of various colours.

Procedure–

(i) Let us add (–9) and (+5).
(ii) Take 9 red glass balls & arrange them in a row to show –9.
(iii) Take 5 blue glass balls & arrange them in the next row to show + 5.
(iv) Now make pairs of 1 red & 1 blue marble which will give zero (0), $(-1) + (+1) = 0$.
(v) Now 4 marbles will remain which will show (–4), red in colour.
(vi) So, $-9 + (+5) = -4$.



ANSWER SHEET

Chapter-1

Exercise 1.1

1. (a) 56,82,13,714; 568,213,714 (b) 21,61,47,880; 216,147,880 (c) 45,08,37,570; 450,837,570 (d) 95,94,18,302; 959,418,302 2. (a) Four lakhs sixty two thousand one hundred sixty three ; Four hundred sixty two thousands one hundred sixty three. (b) Fourteen lakh thirty two thousand seven hundred fifty ; One million four hundred thirty two thousands seven hundred fifty. (c) Seven crores ninety one lakh eighty five thousand four hundred twelve ; Seventy nine millions one hundred eighty five thousands four hundred twelve. (d) Eight crore forty five lakhs fourteen thousands six hundred thirty four ; Eighty four millions five hundred fourteen thousands, six hundred thirty four 3. (a) 5, 50, 800, 7000, 30000 (b) 8, 10, 400, 9000, 50000 (c) 7, 60, 300, 4000, 20000 (d) 4, 70, 300, 2000, 10000 4. (a) 90 + 8 (b) 500 + 30 + 2 (c) 4000 + 300 + 20 + 1 (d) 60000 + 8000 + 700 + 50 + 2 5. 499500 6. (a) 3,25,02,526 (b) 8,12,901 (c) 1,604,007 (d) 15,200,017 7. (a) 57493 (b) 890351 (c) 743006 (d) 234567

Exercise 1.2

1. (a) 20, 80 (b) 500, 700 (c) 8000, 6000 (d) 600000 2. (a) 7431, 8000 (b) 8871, 9300 (c) 5952, 6000 (d) 5,5 3. (a) 2 (b) 16

Exercise 1.3

1. (a) > (b) = (c) < (d) = (e) < (f) > 2. 8431, 1348 3. (a) 51,09,861; 67,61,048; 81,61,037 (b) 29,28,453; 29,37,453; 29,37,553 4.(a) 19,41,752; 19,41,572; 14,91,752 (b) 55,55,35,015; 55,53,55,105; 55,53,55,015 5. (a) 2,46,791 (b) 29,80,000 (c) 1,46,590 6.(a) 5,37,49,999 (b) 1,85,86,999 (c) 63,74,379 7. (a) 1000 (b) 1,30,000 (c) 60,00,000 8. 1,00,00,000

Exercise 1.4

1. Total steel used = 8540kg 650 gm, 8540650 gm, Difference = 1109 kg 850 g, 1109850 gm 2. 1129 m 50 cm, 112950 cm 3. 26185 kg 500 gm, 26185500 gm 4. 2377 m 50 cm, 237750 cm 5. 16 m 95 cm, 1695 cm 6. 7 kg 280 gm, 7280 gm

Exercise 1.5

1. (a) LXXXVII (b) XCV (c) LXXIX (d) LXXVI (e) XCVI (f) XLVIII (g) LXXXIX (h) XXXIII (i) XM (j) DCCCXLVIII (k) CML (l) CDLXXV 2. (a) 99 (b) 999 (c) 72 (d) 75 (e) 91 (f) 93 (g) 655 (h) 53 3. (a) > (b) > (c) < (d) < (e) < (f) > 4.(a) XL, XLIX, LIX, LI, LX (b) CCC, CD, DC, DCC (c) LXXX, XC, CL, CC 5.(a) XLVIII (b) CDXLIV (c) CMXCIV (d) LXXXIX (e) XCVIII

M.C.Q

1. (b) 2. (c) 3. (a) 4. (b) 5. (c)

MENTAL MATHS

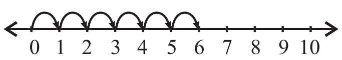
1. 50000 2. 40,00,000 (forty lakhs) 3. 3,05,00,070 4. 45, 46, 47, 48, 49 5. 1,00,000 mg

Chapter-2

Exercise 2.1

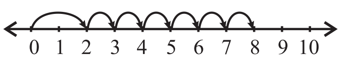
1. 1 2. 0 3. 19 4. Yes 5. No 6. 51,52,53,54,55,56,57,58,59,60,61,62,63, 64,65,66,67,68,69 7. 153, 155, 157, 159

8. (a)



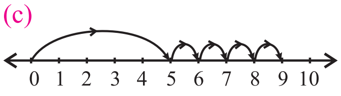
1+5 = 6

(b)



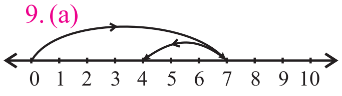
2+6 = 8

(c)



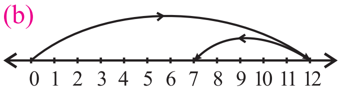
5+4 = 9

9. (a)



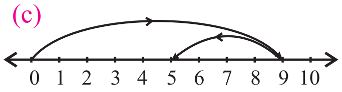
7–3 = 4

(b)



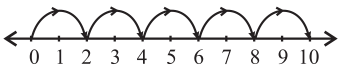
12–5 = 7

(c)



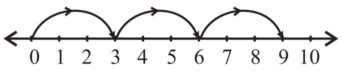
9–4 = 5

10. (a)



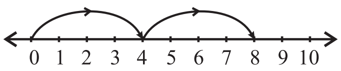
2×5 = 10

(b)



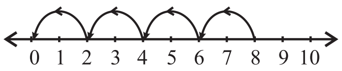
3×3 = 9

(c)



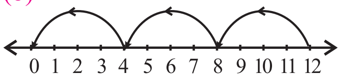
4×2 = 8

11. (a)



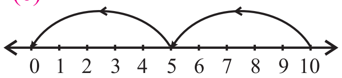
8÷2 = 4

(b)



12÷4 = 3

(c)



10÷5 = 2

Exercise 2.2

1. (a) 69434 (b) 24824 2. (a) 16112 (b) 13000 3. (a) 31 (b) 1908 4. associative property 5. (a) 679 (b) 283 (c) 30507 (d) 0 (e) 38625

Exercise 2.3

1. Do yourself 2. Do yourself 3. (a) 27212 (b) 6270 (c) 488367 4. 11112 5. (a) $\begin{array}{r}5376\\-2859\\\hline 2517\end{array}$ (b) $\begin{array}{r}600230\\-483206\\\hline 117024\end{array}$ (c) $\begin{array}{r}5729\\-2046\\\hline 3683\end{array}$

Exercise 2.4

1. (a) 34512 (b) 0 (c) 572 (d) 4 (e) 5 2. 1000000 3. (a) 273625 (b) 260064 4. 4230000 5. 8500

Exercise 2.5

1. (a) Meaningless (b) 1 (c) 1 (d) 436 (e) 0 (f) 0 2. (a) Quotient– 60, Remainder–27 (b) Quotient–150, Remainder–35 (c) Quotient–442, Remainder–204 3. (a) 486 (b) 138 (c) 669 (d) 1 7. 7185. Yes,1 6. Do yourself

M.C.Q

1. (a) 2. (c) 3. (b) 4. (c) 5. (c)

MENTAL MATHS

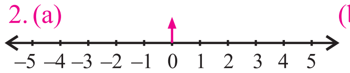
1. even numbers 2. odd numbers 3. Do yourself 4. Right = 530, Left=503

Chapter-3

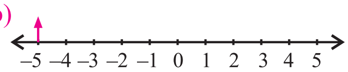
Exercise 3.1

1.(a) –8°C (b) +45°C (c) +500 m (d) –100 m (e) +₹100 (f) –₹200

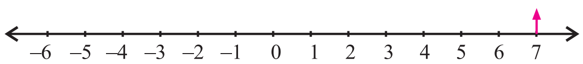
2. (a)



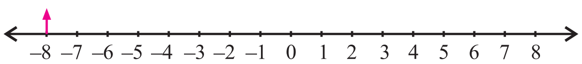
(b)



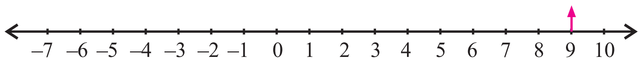
(c)



(d)

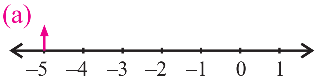


(e)

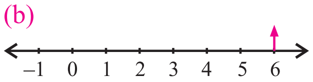


3. (a) > (b) > (c) < (d) > (e) > (f) > 4. (a) –3 (b) 0 (c) 8 (d) 9 5. (a) 1, 2, 3, 4 (b) 0, 1,2,3 (c) –4,–3,–2, –1 (d) –5, –4, –3, –2 6. (a) –7, –3, –1, 6, 12 (b) –8, –2, 0, 6, 9 7. (a) 5, 2, 0, –6, –12 (b) 15, 10, –3, –5, –8

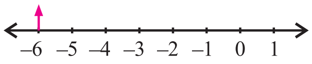
8. (a)



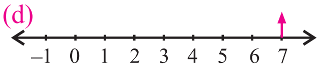
(b)



(c)



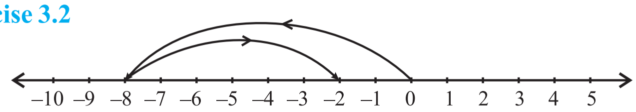
(d)



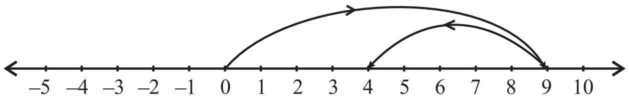
9. (a) 17 (b) 23 (c) 153 (d) 243 10. (a) 17 (b) 43 (c) 0 (d) 16 11. (a) +8 (b) +25 (c) –7 (d) –143 (e) +70

Exercise 3.2

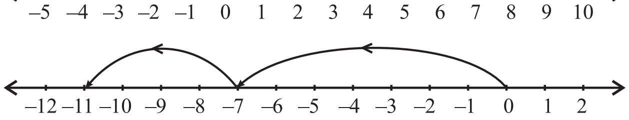
1.(a)



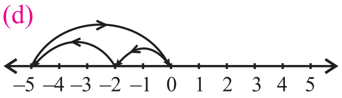
(b)



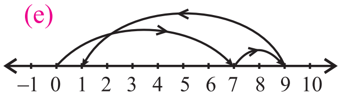
(c)



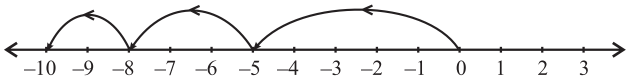
(d)



(e)



(f)



2. (a) –26 (b) 20 (c) –404 (d) –2137 (e) 830 (f) 1130 3. (a) –5 (b) 38 (c) –34 (d) 0 4. (a) (–18) (b) –25 (c) 0 (d) (–5) (e) 0 (f) (–58)

Exercise 3.3

1.(a) –4 (b) 7 (c) –19 (d) 12 (e) –125 (f) 106 (g) –325 (h) 88 2. (a) –2 (b) –13 (c) 1 (d) 97 (e) 6 (f) 10 3. 14, –14, No 4. 290 5. 75 6. –70 7.(a) (–8) (b) (–17) (c) 151 8.(a) 0 (b) 2

Exercise 3.4

1.(a) –30 (b) –1000 (c) 540 (d) 360 (e) –729 (f) 0 2. (a) 17500 (b) –4200 (c) 1062500 3. Positive 4. Negative 5. (a) [(–2) – (5)]× (–6) (b) (8+9) × 10 (c) (6–7) × 10 6. Do yourself

Exercise 3.5

1.(a) –4 (b) 3 (c) –7 (d) 0 (e) Meaningless (f) –203 (g) –620 (h) –1 (i) 9 (j) –1 (k) –4 (l) 9 2. (a) 778 (b) –231 (c) Meaningless (d) 0 (e) –63 (f) –820 3 . (a) False (b) False (c) False (d) True (e) True (f) True

Exercise 3.6

1.(a) Base (–5), Power (4) (b) Base (6), Power (7) (c) Base (1), Power (1) (d) Base (–38), Power (8) (e) Base (–8), Power (1) 2. (a) $(12)^6$ (b) $(–15)^5$ 3 . (a) 512 (b) 4 (c) 25 4. Do yourself 5. (a) 29 (b) 183 (c) 1 (d) 270

M.C.Q

1. (d) 2. (b) 3. (d) 4. (b) 5. (b)

MENTAL MATHS

1. 0 2. 10 3. –3°C 4. (a) +500, (b) –800, 5. 90

Chapter-4

Exercise 4.1

1.(a) 1, 5, 25 (b) 1, 89 (c) 1, 2, 3, 4, 6, 9, 12, 18, 36 (d) 1, 5, 19, 95 (e) 1, 2, 3, 4, 6, 9, 12, 18, 27, 36, 54, 108 (f) 1, 5, 25, 125 (g) 1, 2, 3, 4, 6, 8, 9, 12, 16, 18, 24, 36, 48, 72, 144 (h) 1, 11, 23, 253 2.(a) 9792 (b) 11430 (c) 14706 3.(a) 7, 14, 21, 28, 35 (b) 15, 30, 45, 60, 75 (c) 18, 36, 54, 72, 90 (d) 19, 38, 57, 76, 95 (e) 22, 44, 66, 88, 110 (f) 33, 66, 99, 132, 165 (g) 47, 94, 141, 188, 235 (h) 53, 106, 159, 212, 265 4.(a) 19, 23, 29, 31, 37, 41, 43, 47, 53 (b) 89, 97, 101, 103, 107, 109, 113, 127, 131, 137, 139, 149, 151, 157 (c) 107, 109, 113, 127, 131, 137, 139 149, 151, 157, 163, 167, 173 (d) 151, 157, 163, 167, 173, 179, 181, 191, 193, 197, 199 5.(a) 11 (b) 29 (c) 17 (d) 79 (e) 89, (f) 109 6.(a) no (b) yes (c) yes (d) no 7.(a) 17+23 (b) 41+43 (c) 61+37 (d) 47+53 8. yes, 9 9. 1, 3, 7, 9 10. (a) false (b) false (c) false (d) true (e) true

Exercise 4.2

1. **divisible by 2;** (a), (b) , (f), (g), (h), (k), (l) **divisible by3;** (a), (b), (c), (d), (e), (f), (g), (h), (j), (k) **divisible by6;** (a), (b) , (f), (g), (h), (k) **divisible by9;** (a), (b) , (c), (e), (f), (g), (j), (k) 2. **divisible by 4;** (a), (b) , (c), (d), (e), (f), (g), (i), (k) **divisible by8;** (c), (d) , (f), (g), (i) 3. **divisible by 5;** (a), (b) , (d), (e), (g), (j), (k), (l) **divisible by 10;** (a), (d) , (g), (j) 4. **divisible by11;** (a), (c) , (f) 5.(a) 2 (b) 0 (c) 1 (d) 1 (e) 0 (f) 1 6.(a) 7 (b) 5 (c) 3 (d) 3 (e) 8 (f) 5 7.79¸ 83, 103, 331, 353 8. (a) true (b) false (c) true (d) true (e) false

Exercise 4.3

1. 2×2×3×3 2. 2×2×2×2×2×2×2 3. 7×7×13 4. 3×3×3×5×7 5. 2×2×2×2×3×3×7 6. 2×2×3×3×3×5 7. 2×2×2×2×2×2×3×3×3 8. 8×11×79 9. 2×2×3×3×5×5×7×7 10. 2×2×2×2×2×2×2×2×2×2 11. 2×5×11×13×17 12. 2×2×3×3×5×7 13. 5×5×7×7×11×13 14. 2×3×5×7×19×23 15. 3×3×3×3×3×3×3×3 16. 11×11×11×13

Exercise 4.4

1.(a) 1 (b) 9 (c) 18 (d) 225 (e) 13 (f) 10 (g) 12 (h) 53 (i) 1 2.(a) 9 (b) 3 (c) 36 (d) 13 (e) 3 (f) 9 (g) 53 (h) 36 (i) 58 3. Do yourself 4. 83 5.17 6. 16 7. 25 cm 8. 75 cm, 9. 5 ml 10. 17

Exercise 4.5

1.(a) 60 (b) 24 (c) 24 (d) 36 (e) 30 (f) 24 2.(a) 300 (b) 2160 (c) 720 (d) 3465 (e) 90 (f) 180 (g) 18480 (h) 5760 (i) 90 3.(a) 90 (b) 150 (c) 1320 (d) 480 (e) 520 (f) 864 (g) 5250 (h) 9450 (i) 5100 4. 608, 5. 2172 6. 10080 7.102600 8.12:00 noon 9. 720 cm 10. 2700 cm

Exercise 4.6

1. 221 2. 435 3. 5148 4. 5775 5. 123

M.C.Q

1. (d) 2. (b) 3. (b) 4. (c)

MENTAL MATHS

1. 1 2. yes 3. 98 4. 100 5. 2

Chapter-5

Exercise 5.1

1.(a) 0.3 (b) 0.45 (c) 0.555 (d) 2.238 (e) 5.09 (f) 2.7 2. (a) $\frac{9}{1000}$ (b) $\frac{158}{10}$ (c) $\frac{22143}{1000}$ (d) $\frac{75}{100}$ (e) $\frac{980}{100}$ (f) $\frac{525}{100}$ 3. (a) $\frac{4}{5}$ (b) $\frac{3}{5}$ (c) $\frac{1}{40}$ 4. (a) $40 + 5 + \frac{4}{10} + \frac{8}{100}$ (b) $10+4+ \frac{7}{10} + \frac{5}{100} + \frac{6}{1000}$ (c) $\frac{7}{10} + \frac{7}{100} + \frac{9}{1000}$ 5.(a) 0.121, 1.210, 12.100 (b) 0.08, 80.00, 8.50 (c) 5.610, 0.561, 561.000 6. (a) $\frac{5}{1000}$ or 0.005 (b) $\frac{7}{10}$ or 0.7 (c) $\frac{8}{10000}$ or 0.0008 (d) 600

Exercise 5.2

1.(a) 23.8 (b) 42.45 (c) 197.018 (d) 28.50 (e) 18.318 (f) 76.554 2.(a) 15.152 (b) 39.28 (c) 1.757 (d) 14.55 (e) 50.44 (f) 0.111 3. 53.50 m 4. ₹249 5. 9.250 kg 6. 49 kg

Exercise 5.3

1.(a) ₹ 0.05 (b) ₹ 0.75 (c) ₹ 0.35 (d) ₹ 2.05 (e) ₹ 80.35 (f) ₹ 155.60 2. (a) 0.006 kg (b) 0.095 kg (c) 0.125 kg (d) 8.004 kg (e) 12.038 kg (f) 143.143 kg 3. (a) 0.02 m (b) 0.65 m (c) 2.18 m (c) 4.07 m (e) 15.48 m (f) 335.25 m 4. (a) 0.007 km (b) 0.053 km (c) 0.482 km (d) 5.432 km (e) 12.065 km (f) 22.225 km 5. (a) 0.009 l (b) 0.028 l (c) 0.230 l (d) 1.225 l (e) 6.055 l (f) 3.725 l

M.C.Q

1. (b) 2. (c) 3. (d) 4. (d) 5. (a)

MENTAL MATHS

1. 5.769 2. zero point seven three five 3. 15.01 4. $\frac{7}{1000}$ 5. $\frac{3}{4}$