echo series

EVERSHINE

# Learn and Grow
# MATHEMATICS

**Part-6**


written by:

**Anu Dugal**
MA, B.Ed, M.phil

**Darshan Lal**
B.Sc, B.Ed



**EVERSHINE PUBLISHERS**
SONI HOUSE, WZ-348, Nangal Raya, New Delhi-110046
Phone : 28111758, 28113958, Fax : 28112353
E-Mail : evershinepub@gmail.com

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# PREFACE

*We are very pleased to present the new series 'Learn and Grow mathematics'.*

*The series comprises of eight books for classes I to VIII.*

*The series has been aimed at building a strong foundation with clear concepts and providing a great deal of practice in mathematics.*

*The Subject matter has been produced in such a way that it focuses on the development of the understanding, thinking and reasoning skill of the students.*

*The subject matter has been presented keeping in mind the principle that mathematics teaching involves the mastery of one skill before progressing to another. The age, the mental level and the difficulties faced by the students at all levels have also been thought of while presenting different concepts.*

*The latest syllabus prescribed by NCERT has been strictly followed by the New Series Learn and Grow.*

*Everything has been explained elaborately with plenty of illustrations so that the things might be crystal clear.*

- *Lab Activity and Question Bank given in the end of every chapter.*
- *Model Test Papers are also given.*

*No stone has been left unturned in making the students equipped with the ability to understand and solve problems confidently. Challenging tasks and situations have been created for bright students to motivate them for academic excellence.*

*Suggestions for the improvements of the book will be gratefully acknowledged.*

*Authors*

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# 1 Knowing Our Numbers

## INTRODUCTION

We have been studying counting numbers since primary classes. We begin the counting of any thing from 'one' like 1, 2, 3, 4, 5, 6 ... and so on.

If we go on counting, the counting will never end say at any point as 101, 102, 103 ... etc. come after 100; 1001, 1002, 1003 ... etc. come after 1000; 10001, 10002, 10003 ... etc. come after 10000 and so on. There is a successor of every number.

## TEST YOUR UNDERSTANDING

(*a*) Buying a cricket ball.
(*b*) Telling a friend the location of your house.
(*c*) Telling how much pocket money you get.
(*d*) Estimating how fast an aeroplane is flying.

## NATURAL NUMBERS

If we say 10 goats, 16 apples, 50 houses, 100000 people, etc. We find that all these numbers are associated with some object and hence make a particular sense.

But if we just say 30, 75, 1400, etc. the numbers make no sense or meaning.

Hence it is obvious that a number gets a meaning only when it is associated with some object or quantity in a counting.

When we have to count a set of objects we start the counting as 1, 2, 3, 4, 5, 6, 7 ... etc. Hence these numbers are called **counting numbers or natural numbers**.

Different people had written different symbols for the natural numbers.

**Roman Symbols** for the natural numbers are : I, II, III, IV, V, VI, VII, VIII, IX, X, XI, XII ...

**Hindu - Arabic Symbols** for the natural numbers are : 1, 2, 3, 4, 5, 6, 7, 8, 9, ...

The dots at the end means so on. A natural number is simply an idea that we associate with collection of objects. We may use the word 'set' in place of collection.

**NOTE :**

- The numbers we use for counting are called natural numbers.
- The possible combination of natural numbers is endless.
- If we include the number zero or 0, then our set has a new name, which is the set of whole numbers.

We know that every number is 1 more than its previous number.

**For example:**

471, 472, 473, 474 ..... etc.

472 is 1 more than 471; 473 is 1 more than 472; 474 is 1 more than 473 and so on.

On adding 1 to a natural number, we get its successor. Therefore, a number coming next to a number is called its **successor**.

Every natural number has a successor and hence we cannot find the largest natural numbers.

**EXAMPLE :**

$4787634 + 1 = 4787635$

$9482349 + 1 = 9482350$

We also know that a number which is just before a number is called its predecessor. The predecessor of a number is 1 less than the number. We get predecessor of a given number by subtracting 1 from it.

**EXAMPLE :**

$486342 - 1 = 486341$

$897620 - 1 = 897619$

Every natural number has a predecessor except 1 because natural numbers start from 1 itself and there is no natural number which is 1 less than 1.

Besides this in the previous classes you have also learnt to compare numbers, arranging them in ascending or descending order. The word ascending means 'going up' and 'descending' means coming down. To write the given numbers in ascending order we have to start from the smallest and then write the number larger to it. Then the next larger..... the largest comes the last of all. Similarly for writing in descending order, we shall start with the greatest number, then write the nearest smaller, then the next smaller and so on, until we reach the smallest number.

**NOTE :**

- The successor of a given number is obtained by adding 1 to the given number.
- The predecessor of a number is the number past before it and it is obtained by subtracting 1 from it.

## PLACE VALUE CHART :

The basis of the number system is place value. It is this place value which gives value to the numbers.

The following place value chart is used to represent numbers.

| PERIODS | CRORES | | LAKHS | | THOUSANDS | | ONES | | |
|---|---|---|---|---|---|---|---|---|---|
| Places | Ten Crores (TC) | Crores (C) | Ten Lakhs (TL) | Lakhs (L) | Ten Thousands (T-TH) | Thousand (TH) | Hundreds (H) | Tens (T) | Ones (O) |
| | (10,00, 00,000) | (1,00, 00,000) | (10,00, 000) | (1,00,000) | (10,000) | (1000) | (100) | (10) | (1) |
| 1426927 | | | 1 | 4 | 2 | 6 | 9 | 2 | 7 |
| 71628614 | | 7 | 1 | 6 | 2 | 8 | 6 | 1 | 4 |
| 193729329 | 1 | 9 | 3 | 7 | 2 | 9 | 3 | 2 | 9 |

**NOTE :**

- While reading and writing large numbers, we use commas to divide the numbers into different periods.

**EXAMPLE :**

**Read and write the names of numbers from the following table :**

| CRORES | | LAKHS | | THOUSANDS | | ONES | | |
|---|---|---|---|---|---|---|---|---|
| Ten Crores (TC) | Crores (C) | Ten Lakhs (TL) | Lakhs (L) | Ten Thousands (T-Th) | Thousands (Th) | Hundreds (H) | Tens (T) | Ones (O) |
| | | | | | 8 | 6 | 5 | 2 |
| | | | | 9 | 6 | 7 | 4 | 1 |
| | | | 6 | 5 | 4 | 3 | 2 | 9 |
| | | 2 | 7 | 3 | 9 | 8 | 2 | 0 |
| | 9 | 5 | 3 | 2 | 0 | 4 | 7 | 1 |
| 5 | 8 | 7 | 2 | 3 | 4 | 9 | 6 | 2 |

**SOLUTION :**

The numbers in the above table are written as under :

8,652 – Eight thousand six hundred fifty-two.
96,741 – Ninety six thousand seven hundred forty one.
6,54,329 – Six lakh fifty four thousand three hundred twenty nine.
27,39,820 – Twenty seven lakh thirty nine thousand eight hundred twenty.
9,53,20,471 – Nine crore fifty three lakh twenty thousand four hundred seventy one.
58,72,34,962 – Fifty eight crore seventy two lakh thirty four thousand nine hundred sixty two.

**NOTE :**

❖ **1 Lakh** = 100 thousand **1 Crore** = 100 lakh
**T -Th** is a 5-digit number **L** is a 6-digit number **TL** is a 7-digit number
**C** is a 8-digit number **TC** is a 9-digit number

**EXAMPLE :**

**Express the following numbers in figures :**

(*a*) Eight lakh thirty six thousand sixty three.
(*b*) Five crore fifty lakh eighty eight thousand eight.
(*c*) Eighty five lakh forty eight thousand twenty six.

**SOLUTION :**

(*a*) 8, 36, 063
(*b*) 5, 50, 88, 008
(*c*) 85, 48, 026

## PLACE VALUE AND FACE VALUE

Every digit has two values - the place value and the face value. The face value of a digit does not change while its place value change according to its position and number.

Face value of a digit in a numeral is the digit itself.

Place value of a digit in a numeral depends upon the place it holds in place-value chart.

**EXAMPLE :**

**Write face value and place value of '5' in each of the numerals given below :**

**(a) 15, 64, 214 (b) 54, 63, 729 (c) 5, 38, 24, 136 (d) 16, 34, 615 (e) 11, 58, 314**

**SOLUTION :**

| Numbers | Face Value of 5 | Place Value of 5 |
|---|---|---|
| (*i*) 15, 64, 214 | 5 | 5 × 1,00,000 = 5,00,000 |
| (*ii*) 54, 63, 729 | 5 | 5 × 10,00,000 = 50,00,000 |
| (*iii*) 5, 38, 24, 136 | 5 | 5 × 1,00,00,000 = 5,00,00,000 |
| (*iv*) 16, 34, 615 | 5 | 5 × 1 = 5 |
| (*v*) 11, 58, 314 | 5 | 5 × 10,000 = 50,000 |

**NOTE :**

Face-value of a digit remains as it is, whichever place it holds in the place-value chart.

- Place value of a digit = Face value × Position value
- Place value of 0 is '0' itself wherever it may be.

## INTERNATIONAL SYSTEM OF NUMERATION

The international system is followed by most of the countries of the world. In this system also, a number is split up into groups or periods. Starting from the right, the groups are called ones, thousands, millions, billions and trillions. The ones in turn are split into hundreds, tens and units. Given below is the place value chart in the international system.

| TRILLIONS | | | BILLIONS | | MILLIONS | | | THOUSANDS | | | ONES | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Periods | Ten Trillion | Trillion | Ten Billion | Billion | Hundred Million | Ten Million | Million | Hundred Thou-sand | Ten Thou-sand | Thou-sands | Hun-dred | Ten (10) | Units (1) |
| (10,00, 00,00, 00,000) | (1,00, 00,00, 00,000) | (10,00, 00,00, 000) | (1,00, 00,00, 000) | (10,00, 00,000) | (1,00, 00, 000) | (10,00, 000) | (1,00, 000) | (10, 000) | (1000) | (100) | (10) | (1) | |
| Places | | | | 4 | 6 | 2 | 5 | 9 | 4 | 7 | 4 | 8 | 8 |

**EXAMPLE :**

**Insert commas suitably and write the names according to International System of Numeration for each of the following:**

**(a) 78921092 (b) 7452283 (c) 99985102 (d) 48049831**

**SOLUTION :**

On keeping given numbers in International Place Value Chart, we have

| PERIODS | BILLIONS (B) | | MILLIONS (M) | | | THOUSANDS (TH) | | | HUNDREDS (H) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Numbers | TB | B | HM | TM | M | HTh | TTh | Th | H | T | O |
| (*a*) 78,921,092 | | | | 7 | 8 | 9 | 2 | 1 | 0 | 9 | 2 |
| (*b*) 7,452,283 | | | | | 7 | 4 | 5 | 2 | 2 | 8 | 3 |
| (*c*) 99,985,102 | | | | 9 | 9 | 9 | 8 | 5 | 1 | 0 | 2 |
| (*d*) 48,049,831 | | | | 4 | 8 | 0 | 4 | 9 | 8 | 3 | 1 |

(*a*) **78,921,092 :** Seventy-eight million nine hundred twenty-one thousand ninety-two.
(*b*) **7,452,283 :** Seven million four hundred fifty two thousand two hundred eighty-three.
(*c*) **99,985,102 :** Ninety-nine million nine hundred eighty-five thousand one hundred two.
(*d*) **48,049,831 :** Forty-eight million forty-nine thousand eight hundred thirty-one.

**EXAMPLE :**

**Read these numbers**

**(a) 527864** **(b) 95432** **(c) 18950049** **(d) 70002509**

**Write these numbers using placement boxes and then using commas in Indian as well as International System of Numeration.**

**SOLUTION :**

We will read these numbers as :

(*a*) 5,27,864 : Five lakh twenty-seven thousand eight hundred sixty-four.
(*b*) 95,432 : Ninety-five thousand four hundred thirty-two.
(*c*) 1,89,50,049 : One crore eighty-nine lakh fifty thousand forty-nine
(*d*) 7,00,02,509 : Seven crore two thousand five hundred nine.

**Using placement boxes :**

**INDIAN SYSTEM OF NUMERATION**

| | Ten-Crore (T-Cr) | Crores (Cr) | Ten-Lakh (T-L) | Lakh (L) | Ten-Thousand (T-TH) | Thousand (TH) | Hundred (H) | Tens (T) | Ones (O) |
|---|---|---|---|---|---|---|---|---|---|
| (*a*) | | | | 5 | 2 | 7 | 8 | 6 | 4 |
| (*b*) | | | | | 9 | 5 | 4 | 3 | 2 |
| (*c*) | | 1 | 8 | 9 | 5 | 0 | 0 | 4 | 9 |
| (*d*) | | 7 | 0 | 0 | 0 | 2 | 5 | 0 | 9 |
| | Hundred-Millions (H-M) | Ten-Millions (T-M) | Millions (M) | Hundred-Thousand (H-TH) | (T-TH) | (TH) | (H) | (T) | (O) |

**Using commas :** In Indian system we put commas first time after 3-digits from right and then after 2-digits. But in International system we put commas after 3-digits from right.

(*a*) 527864 = 5,27,864 ← (Indian System)
= 527,864 ← (International System)
(*b*) 95432 = 95,432 ← (Indian System)
= 95,432 ← (International System)
(*c*) 18950049 = 1,89,50,049 ← (Indian System)
= 18,950,049 ← (International System)
(*d*) 70002509 = 7,00,02,509 ← (Indian System)
= 70,002,509 ← (International System)

**EXAMPLE :**

**Place commas correctly and write the numbers :**

**(a) Seventy three lakh seventy five thousand three hundred seven.**

**(b) Nine crore five lakh forty one.**

**(c) Seven crore fifty two lakh twenty one thousand three hundred two.**

**(d) Fifty eight million four hundred twenty three thousand two hundred two.**

**(e) Twenty three lakh thirty thousand ten.**

**SOLUTION :**

(a) 73,75,307 (b) 9,05,00,041

(c) 7,52,21,302 (d) 58,423,202

(e) 23,30,010.

**EXAMPLE :**

**Insert commas suitably and write the names according to Indian System of Numeration :**

**(a) 87595762 (b) 8546283**

**(c) 99900046 (d) 98432701**

**SOLUTION :**

(a) 8,75,95,762 – Eight crore seventy five lakh ninety-five thousand seven hundred sixty-two.

(b) 85,46,283 – Eighty-five lakh forty-six thousand two hundred eighty-three.

(c) 9,99,00,046 – Nine crore ninety-nine lakh forty-six.

(d) 9,84,32,701 – Nine crore, eighty-four lakh thirty-two thousand seven hundred one.

**EXAMPLE :**

**Write the following numbers in Indian place value system and international place value system. Also write the number names.**

**(a) 438057632 (b) 63498645 (c) 893445632**

**SOLUTION :**

**INDIAN SYSTEM**

| | Arabs | | Crores | | Lakhs | | Thousands | | Ones | | | ← Periods |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | TA | A | TC | C | TL | L | TTh | Th | H | T | O | ← Places |
| (a) | | | 4 | 3 | 8 | 0 | 5 | 7 | 6 | 3 | 2 | |
| (b) | | | | 6 | 3 | 4 | 9 | 8 | 6 | 4 | 5 | |
| (c) | | | 8 | 9 | 3 | 4 | 4 | 5 | 6 | 3 | 2 | |

**Number Names :**

(a) Forty three crore eighty lakh fifty seven thousand six hundred thirty two.

(b) Six crore thirty four lakh ninety eight thousand six hundred forty five.

(c) Eighty nine crore thirty four lakh forty five thousand six hundred thirty two.

**INTERNATIONAL SYSTEM**

| Billions | | | Millions | | | Thousands | | | Ones | | | ← Periods |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| HB | TB | B | HM | TM | M | HTh | TTh | Th | H | T | O | ← Places |
| | | | 4 | 3 | 8 | 0 | 5 | 7 | 6 | 3 | 2 | |
| | | | | 6 | 3 | 4 | 9 | 8 | 6 | 4 | 5 | |
| | | | 8 | 9 | 3 | 4 | 4 | 5 | 6 | 3 | 2 | |

**Number Names :**

(*a*) Four hundred thirty eight million fifty seven thousand six hundred thirty two.

(*b*) Sixty three million four hundred ninety eight thousand six hundred forty five.

(*c*) Eight hundred ninety three million four hundred forty five thousand six hundred thirty two.

## EXERCISE : 1.1

**1. Write the following numbers in Indian place value chart :**

(*a*) 634957823 (*b*) 243682175 (*c*) 586049325

(*d*) 30468927 (*e*) 873482945

**2. Write the following numbers in International place value chart :**

(*a*) 34875629 (*b*) 48632954 (*c*) 5860490382

(*d*) 976458272 (*e*) 2630481756

**3. Put commas to separate the periods and write the number names of the following numbers according to Indian system :**

(*a*) 48307549 (*b*) 18634254 (*c*) 831963476

(*d*) 454879368 (*e*) 349086272 (*f*) 954632817

**4. Put commas to separate the periods and write the number names of the following numbers according to International system :**

(*a*) 830476058 (*b*) 586347281 (*c*) 76459832

(*d*) 462863926 (*e*) 95386329 (*f*) 146732187

**5. Write the following numbers in expanded form :**

(*a*) 24673258 (*b*) 68276954 (*c*) 81762345

(*d*) 29053426 (*e*) 786243528 (*f*) 528032490

**6. Write the corresponding numeral for each of the following :**

(*a*) $(4 \times 10000000) + (8 \times 1000000) + (7 \times 100000) + (2 \times 10000) + (6 \times 1000) + (5 \times 100) + (2 \times 10) + (4 \times 1)$

(*b*) $(3 \times 10000000) + (6 \times 100000) + (2 \times 10000) + (6 \times 1000) + (3 \times 100) + (5 \times 10) + (4 \times 1)$

(*c*) $(8 \times 100000000) + (3 \times 1000) + (2 \times 100) + (5 \times 10) + (7 \times 1)$

(*d*) $(7 \times 100000000) + (6 \times 10000000) + (2 \times 1000000) + (4 \times 100000)$

**7. Write the place value of the coloured digit in each of the following numbers :**

(*a*) 32418626 (*b*) 493625863 (*c*) 813498763

(*d*) 64303596 (*e*) 735246926 (*f*) 243598034

**8. Write the numeral for each of the following :**

(*a*) Six crore seventy-five thousand six hundred five.

(*b*) Seventeen crore seventeen lakh seventeen.

(*c*) Fifty-six lakh fifty thousand two hundred seven.

(*d*) Three lakh sixty two thousand five hundred forty-seven.

(*e*) Two crore five hundred twelve.

9. **Determine the product of the place values of two fives in 450758.**

10. **Determine the difference of the place value of two sevens in 257839705.**

11. **Tick (✓) the correct alternative :**

(*a*) The predecessor of 90000 is :

(*i*) 8999 (*ii*) 9001 (*iii*) 89999 (*iv*) 90001

(*b*) The smallest 8-digit number is :

(*i*) One lakh (*ii*) Ten lakh (*iii*) One crore (*iv*) Ten crore

(*c*) The greatest 6 digit number formed using all the digits from 1 to 5 is :

(*i*) 123455 (*ii*) 554321 (*iii*) 543211 (*iv*) 112345

(*d*) The smallest 6-digit number formed using only one digit is :

(*i*) 222222 (*ii*) 555555 (*iii*) 999999 (*iv*) 111111

(*e*) The successor of 199999 is :

(*i*) 200000 (*ii*) 20000 (*iii*) 2000000 (*iv*) 120000

(*f*) In International place value chart the third period is :

(*i*) Ones (*ii*) Hundreds (*iii*) Thousands (*iv*) Millions

(*g*) One crore is equal to :

(*i*) 1 million (*ii*) 10 millions (*iii*) 100 millions (*iv*) 1 billion

## COMPARISON OF NUMBERS

If two numbers are given then there are two possibilities.

**Case I :** When the two numbers have different number of digits :

### EXAMPLES

**EXAMPLE**

**Compare 643859 and 34165.**

**SOLUTION :**

643859 has 6 digits

34165 has 5 digits

$\therefore$ 643859 is greater than 34165

or, $643859 > 34165$

**Case II :** When the two numbers have the same number of digits :

To compare such numbers, we proceed as follows :

(*a*) First compare the digits at the left most place in both the numbers.

(*b*) If they are equal, compare the second digits from the left. If the second digits from the left are also equal, compare the third digits from the left. Continue until you find unequal digits at the corresponding places. Now, the number with greater such digit is the greater of the two.

**EXAMPLE**

**Compare 45967 and 45861.**

**SOLUTION :**

45967 and 45861 have the same number of digits. Compare the digits on the extreme left side, we find $4 = 4$, $5 = 5$.

On comparing the digits at the hundreds place in both the numbers, we find that 9 in 45967 is greater than 8 in 45861.

$\therefore$ $45967 > 45861$

## ASCENDING OR DESCENDING ORDER OF NUMBERS

Ascending means increasing order and Descending means decreasing order.

e.g. 25536, 38952, 385081, 365062.

| | | | | |
|---|---|---|---|---|
| Ascending order : | 25536 | 38952 | 365062 | 385081 |
| Descending order : | 385081 | 365062 | 38952 | 25536 |

**EXAMPLE:**

**Arrange the following numbers in ascending and descending order :**

**8625 9052 1716 7263 305 329 369**

**SOLUTION :**

There are four 4-digit numbers.

Among 4-digit numbers the digit at the thousands place is :

$9 > 8 > 7 > 1$

$\therefore$ $9052 > 8625 > 7263 > 1761$

Among 3 digit numbers :

At hundreds place 3 is there in every number. So let's compare the digit at tens place.

$6 > 2 > 0$

$\therefore$ $369 > 329 > 305$

$\therefore$ The numbers in ascending order are :

$9052 > 8625 > 7263 > 1761 > 369 > 329 > 305$

The numbers in descending order are :

$305 < 329 < 369 < 1716 < 7263 < 8625 < 9052$

**EXAMPLE :**

**Find the smallest 6-digit natural number :**

**(a) Ending in 9 (b) Having four different digits**

**SOLUTION :**

(*a*) The smallest natural number ending in 9 = 100009

(*b*) The smallest 6-digit natural number having four different digits = 100023

## EXERCISE : 1.2

1. **Arrange the following numbers in ascending order :**
   (*a*) 7985, 7085, 0785, 7805 (*b*) 643005, 5079, 789, 6985, 7352
2. **Arrange the following numbers in descending order :**
   (*a*) 69905, 3075, 1236, 9265 (*b*) 5083, 40986, 6104, 7209
3. **Write a 5 digit number. Form a new number by reversing its digit. Write which of two numbers is greater.**
4. **Runs scored by world's 5 top Batsmen in a year are given in table :**

   Arrange them in descending order and find out which batsman scored the maximum runs.

| Batsmen | Runs |
|---|---|
| A | 6259 |
| B | 5963 |
| C | 6296 |
| D | 5686 |
| E | 7224 |

5. **Write the predecessor and successor of the following numbers :**
   (*a*) 2448766 (*b*) 97634582 (*c*) 48649357 (*d*) 86329576
   (*e*) 763485419 (*f*) 632018760
6. **Using symbols < or > in the place holder, compare each of the following :**
   (*a*) 4325 ☐ 6751 (*b*) 210934 ☐ 89948 (*c*) 5207324 ☐ 5217324 (*d*) 56701 ☐ 67025
   (*e*) 74988350 ☐ 74894612
7. **Write all 3-digit numbers of different digits formed by using the digits 3, 1, 0, 5 and 7.**
8. **Find the difference between face value and place value of 5 in 65237921.**

## ROMAN NUMERAL SYSTEM

After learning Indian and International system of numeration it is necessary to learn Roman system as well. Roman system was invented long ago before the invention of International system. Roman numerals can not be arranged in a place value chart as there is no symbol for zero.

In Roman system all the numbers are written by the use of seven symbols.

**The basic symbols for the corresponding numbers are :**

| Symbol | I | V | X | L | C | D | M |
|---|---|---|---|---|---|---|---|
| Number | 1 | 5 | 10 | 50 | 100 | 500 | 1000 |

## RULES TO READ NUMBERS WRITTEN IN ROMAN SYSTEM

1. If a Roman numeral is repeated, add its value as many times as it occurs.

   Also notes : ☞ Repetition is not allowed more than 3 times. ☞ V, L and D are never repeated.

   ☞ Only I, X, C and M can be repeated.

   II = I + 1 = 2

   CXX = 100 + 10 + 10 = 120

2. Any smaller Roman numeral written on the right of a larger numeral is added to it.

   XI = 10 + 1 = 11 LX = 50 + 10 = 60

3. If a smaller Roman numeral is written to the left of a larger Roman numeral, it is subtracted from it.

   XL = 50 – 10 = 40 CM = 1000 – 100 = 900

4. If a smaller numeral is placed between two larger numerals, then the smaller numeral is subtracted from the larger numeral on the right side of it.

   CXC = 100 + (100 – 10) = 100 + 90 = 190

   LXIV = 50 + 10 + (5 – 1) = 60 + 4 = 64

5. If a bar is placed over a numeral, it is multiplied by 1000.

   $\overline{V}$ = 5000, $\underline{L}$ = 50000.

   Following the about rules, we get

## ROMAN NUMERAL TABLE

| | | | |
|---|---|---|---|
| 1. I | 14. XIV | 27. XXVII | 150. CL |
| 2. II | 15. XV | 28. XXVIII | 200. CC |
| 3. III | 16. XVI | 29. XXIX | 300. CCC |
| 4. IV | 17. XVII | 30. XXX | 400. CD |
| 5. V | 18. XVIII | 31. XXXI | 500. D |
| 6. VI | 19. XIX | 40. XL | 600. DC |
| 7. VII | 20. XX | 50. L | 700. DCC |
| 8. VIII | 21. XXI | 60. LX | 800. DCCC |
| 9. IX | 22. XXII | 70. LXX | 900. CM |
| 10. X | 23. XXIII | 80. LXXX | 1000. M |
| 11. XI | 24. XXIV | 90. XC | 1600. MDC |
| 12. XII | 25. XXV | 100. C | 1700. MDCC |
| 13. XIII | 26. XXVI | 110. CX | 1900. MCM |

## CONVERSION OF A NUMBER FROM HINDU-ARABIC SYSTEM OF NUMERATION TO ROMAN SYSTEM OF NUMERATION

(*a*) Obtain the number.
(*b*) Write the number in expanded form.
(*c*) Write the Roman numeral for each numeral in expanded form.
(*d*) Put them together and the required number is obtained.

**NOTE :**

- O has no Roman numeral.
- I can be subtracted only from V and X.
- C can be subtracted only from D and M.
- V, L and D are never subtracted.
- I or V is never written to the left of L or C.
- A digit can never be repeated four times.
  e.g. we cannot write IIII.

## EXAMPLES

**EXAMPLE**

**1. Write the following in Roman numbers :**

**(*a*) 98 (*b*) 139 (*c*) 364**
**(*d*) 127 (*e*) 164 (*f*) 342**

**SOLUTION :**

(*a*) 98 = XCVIII (*b*) 139 = CXXXIX
(*c*) 364 = CCCLXIV (*d*) 127 = CXXVII
(*e*) 164 = CLXIV (*f*) 342 = CCCXLII

**2. Write the following in Hindu - Arabic numerals :**

**(*a*) XXIX (*b*) XLV (*c*) LXXXIX**
**(*d*) XCIX (*e*) CLXV (*f*) CCXXVIII**

**SOLUTION :**

(*a*) XXIX = XX + IX = 20 + 9 = 29
(*b*) XLV = XL + V = 40 + 5 = 45
(*c*) LXXXIX = L + XXX + IX = 50 + 30 + 9 = 89
(*d*) XCIX = XC + IX = 90 + 9 = 99
(*e*) CLXV = CL + X + V = 150 + 10 + 5 = 165
(*f*) CCXXVIII = CC + XX + VIII = 200 + 20 + 8 = 228

## EXPANDED FORM AND SHORT FORM

We know that writing the place value of all the digits of a number together with a plus sign between them is called writing the number in expanded form.

And on the contrary, writing face value of different digits in a number at their appropriate place according to the place value chart assignment is called writing the number in short form.

**EXAMPLE**

**Write the expanded form of the following numbers :**

**(*a*) 486305734 (*b*) 963486457**

**SOLUTION :**

(*a*) 486305734
= 400000000 + 80000000 + 6000000 + 300000 + 0 + 5000 + 700 + 30 + 4

(*b*) 963486457
= 900000000 + 60000000 + 3000000 + 400000 + 80000 + 6000 + 400 + 50 + 7

## EXERCISE 1.3

**1. Write the following numbers in expanded form :**

(*a*) 3462729 (*b*) 86279654 (*c*) 7136256
(*d*) 954302 (*e*) 3245648 (*f*) 54830902

2. **Write the corresponding numeral for each of the following :**

(*a*) $(6 \times 10000000) + (7 \times 1000000) + (5 \times 100000) + (1 \times 10000) + (4 \times 1000) + (9 \times 100) + (3 \times 10) + (5 \times 1)$

(*b*) $(3 \times 10000000) + (6 \times 100000) + (2 \times 10000) + (6 \times 1000) + (3 \times 100) + (5 \times 10) + (4 \times 1)$

(*c*) $(7 \times 100000000) + (6 \times 10000000) + (2 \times 1000000) + (4 \times 100000)$

3. **Write the following in Roman Numerals :**

(*a*) 69 (*b*) 98 (*c*) 92

(*d*) 197 (*e*) 598 (*f*) 614

(*g*) 1679 (*h*) 2359

4. **Write the following in Hindu-Arabic numerals :**

(*a*) XV (*b*) XXVI (*c*) XXXIX

(*d*) LXII (*e*) LVIII (*f*) LXXVII

(*g*) LXXXV (*h*) XCI (*i*) XCIV

5. **Insert <, > in the given boxes :**

(*a*) XV ☐ XIII (*b*) XCVI ☐ XCIV (*c*) LXXXIX ☐ XC

(*d*) CVIII ☐ CXXVIII (*e*) XLIV ☐ XLIX (*f*) LX ☐ XC

6. **Tick (✓) the correct alternative.**

(*a*) Roman Numeral system uses :

(*i*) 4 symbols (*ii*) 5 symbols (*iii*) 6 symbols (*iv*) 7 symbols

(*b*) The value of LX is :

(*i*) 60 (*ii*) 110 (*iii*) 1100 (*iv*) 600

(*c*) LXIX is equal to :

(*i*) 99 (*ii*) 49 (*iii*) 69 (*iv*) 599

(*d*) The Roman Numeral for 600 is :

(*i*) CX (*ii*) DC (*iii*) LX (*iv*) MX

## ESTIMATION

We often come across figures which are not exact. For example, around 15000 people went for Amarnath yatra this year or around 5000 people attend the exhibition. These are just estimated figures. Estimation is also required in finding the sum, difference or product of numbers.

## HOW TO ESTIMATE OR ROUND OFF ?

Estimation or Rounding off can be done to the nearest tens, hundreds, thousands and ... so on.

**Steps :**

- Obtain the number.
- Underline the digit at the required place where estimation is to be done.
- Replace all the digits to the right of it by 0.
- Examine the digit immediately.
- If it is 5 or more than 5; add 1 to the digit to be rounded off and let the digits to the left of it remain the same.
- If it is less than 5, the digit at the required place will remain the same.

**EXAMPLE**

**Round off the following numbers to the nearest tens:**

**(a) 74 (b) 87 (c) 85 (d) 193**

**SOLUTION :**

(a) 74

Estimating 74 to the nearest ten.

– Underline the digit at tens place i.e. 7.

– Since the digit to its immediate right is 4 i.e. less than 5; we replace 4 by 0 and the digit at tens place, i.e., 7 remains the same.

Hence 74 rounded off to the nearest ten is 70.

(b) 87

Ones digit in 87 is 7, which is greater than 5. So, we replace the ones digit by 0 and increase the tens digit by 1 to get the rounded off number.

Hence, rounded off number = 90.

(c) 85

The given number is 85.

Since, it is to be rounded off to the nearest tens and the digit at the ones place is 5; we add 1 to the tens digit and we replace 5 by 0.

Hence, rounded off number = 90.

(d) 193

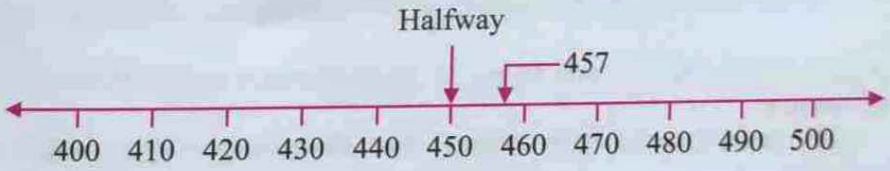
It is to be rounded off to the nearest tens and the digit at the next immediate right place is 3, i.e. less than 5.

We replace the unit's digit by 0 and other digits remain the same.

Hence, rounded off number = 190.

## ESTIMATING A NUMBER TO THE NEAREST 100

To round off a number to the nearest hundred, we take the nearest multiple of 100 for that number. For example to round off 457 to the nearest hundred, the multiple of 100 that we consider are 400 and 500.




450 is halfway between 400 and 500 and 457 > 450 which shows that 457 is nearer to 500 than 400. So, we take 457 as 500, when we round off to the nearest hundred.

## ESTIMATING A NUMBER TO THE NEAREST 1000

To round off a number to the nearest thousand, we consider the nearest multiple of 1000 for that number.

**EXAMPLE**

**Round off each of the following numbers to nearest hundreds :**

**(a) 5839 (b) 9472**

**SOLUTION :**

(a) The given number is 5839. Its tens digit is 3, which is less than 5. So, we replace each of the tens and ones place by 0 and keep the other digit as they are to round off the given number to nearest hundreds.

Hence, 5839 is rounded off to nearest hundred as 5800.

(*b*) The given number is 9472. Its tens digit is 7, which is greater than 5. So, we increase the digit at hundreds place by 1 and replace each one of the digits.

Hence, 9472 is rounded off to nearest hundred as 9500.

**EXAMPLE**

**Round off the following numbers to the nearest thousand.**

**(*a*) 2351** **(*b*) 1734**

**SOLUTION :**

(*a*) The given number is 2351. Its hundred digit is 3, which is less than 5. So, we replace each of the hundreds, tens and ones digit by 0 and keep the other digits as they are.

Hence, the rounded off number is 2000.

(*b*) The given number is 1734. Its hundreds digit is 7, which is greater than 5. So, we add 1 to the thousands digit and replace other digits by 0.

Hence, the rounded off number is 2000.

## ESTIMATION IN SUM, DIFFERENCE, PRODUCT AND QUOTIENT

Mr. Dua owns a sports goods store. He has 48 tennis rackets on display and another 97 in the godown. He wants to estimate how many tennis rackets he has in the stock.

$$\begin{array}{r} 48 \\ +\,97 \\ \hline \end{array} \longrightarrow \begin{array}{r} 50 \\ +\,100 \\ \hline 150 \end{array}$$

Mr. Dua has about 150 rackets in the stock.

To estimate a sum, you find a number that is near the sum.

- To estimate the sum of 37 and 52, you use only tens.

$$\begin{array}{r} 37 \\ +\,52 \\ \hline \end{array} \longrightarrow \begin{array}{l} \text{Is 37 nearer to 30 or to 40 ?} \\ \text{Is 52 nearer to 50 or to 60 ?} \\ \hline \text{Then } 37 + 52 \text{ is nearer to } 40 + 50 \end{array} \longrightarrow \begin{array}{r} 40 \\ +50 \\ \hline 90 \end{array}$$

- To estimate the sum of 421 and 167, you round the given numbers to the nearest hundreds.

To the nearest hundred,

421 rounds to

and 167 rounds to

Then $421 + 167$ is nearer to $400 + 200$ $\longrightarrow$ $\begin{array}{r} 400 \\ +\,200 \\ \hline 600 \end{array}$

- To estimate the sum of 1234 and 796, we round the given numbers to the nearest hundreds.

To the nearest hundred,

1234 round to 1200

796 round to 800

$\therefore$ $1234 + 796$ is nearer to $1200 + 800 = 2000$.

## EXAMPLES

**EXAMPLE–1**

**Estimate the difference of 108734 – 47599 to nearest hundreds and to nearest tens.**

**SOLUTION :**

108734 rounded off to 108700 ┐ ← Nearest
47599 rounded off to 47600. ┘ hundreds

$\therefore$ Required estimated difference is 61100.

and

108734 rounded off to 108730 ┐ ← Nearest
47599 rounded off to 47600 ┘ tens

$\therefore$ Required estimated difference = 61130

**EXAMPLE–2**

**Estimate 472 × 158 by rounding off first number upwards and second number downwards.**

**SOLUTION :**

On rounding up 472, we have 500

and on rounding down 158, we have 100.

∴ Required estimated product = 500 × 100 = 50000.

**EXAMPLE–3**

**Estimate 578 × 369 by rounding off first number downwards and second number upwards.**

**SOLUTION :**

On rounding down 578,we have 500.

On rounding up 369, we have 400.

∴ Required estimated product = 500 × 400 = 2,00,000.

**EXAMPLE–4**

**Estimate quotient for 868 ÷ 38 and 725 ÷ 23.**

**SOLUTION :**

868 ÷ 38 is approximately equal to 900 ÷ 40 = 22.5 = 23

and 725 ÷ 23 will be approximately equal to 700 ÷ 20 = 35.

## EXERCISE 1.4

1. **Estimate the sum to the nearest tens for each of the following :**
   (*a*) 63 + 78 (*b*) 268 + 131 (*c*) 5692 + 268
   (*d*) 98 + 75 (*e*) 87 + 36 (*f*) 58 + 37
2. **Estimate the sum to the nearest hundreds for each of the following :**
   (*a*) 361 + 205 (*b*) 580 + 297 (*c*) 912 + 293
   (*d*) 752 + 314 (*e*) 876 + 134 (*f*) 642 + 212
3. **Estimate the sum to the nearest thousands for each of the following :**
   (*a*) 6925 + 1038 (*b*) 5413 + 1975 (*c*) 2872 + 1392
   (*d*) 9026 + 2732 (*e*) 8972 + 3215 (*f*) 3871 + 2756
4. **Estimate the following by rounding off each number to its greatest place :**
   (*a*) 439 + 334 + 4317 (*b*) 8325 – 491 (*c*) 108734 – 47599
   (*d*) 898 × 785 (*e*) 9 × 795 (*f*) 87 × 317
5. **Find the estimate quotient for each of the following by rounding off each number to its greatest place :**
   (*a*) 878 ÷ 28 (*b*) 745 ÷ 24 (*c*) 4489 ÷ 394

## CHAPTER WRAP UP

1. Counting numbers 1, 2, 3, 4, 5, 6,.....etc. are knows as natural numbers.
2. 1 is the smallest natural number.
3. 0, 1, 2, 3, 4, 5, 6, 7, 8 and 9 are called digits and a group of digits denoting a number is called a numeral or a number.
4. The method of representing a number in digits or figures is called notation and the method of expressing a number in words is called numeration. There are two methods of numeration : (1) Indian system of numeration and (2) International system of numeration.

5. In order to estimate or round off a number to the nearest :

(i) **Tens :**

(*a*) replace the ones digit by 0 and keep other digits as same, if the digit at ones place is less than 5.

(*b*) increase tens digit by 1 and replace the ones digit by 0, if the digit at ones place is greater than or equal to 5.

(ii) **Hundreds :**

(*a*) replace each one of the digits at tens and ones place by 0 and keep all other digits as they are, if the digit at tens place is less than 5.

(*b*) increase the digit at hundreds place by 1 and replace each one of the digit at tens and ones place by 0, if the digit at tens place is greater than or equal to 5.

(iii) **Thousands :**

(*a*) replace each one of the digits at hundreds, tens and ones place by 0 and keep all other digits as they are, if the digit at hundreds place is less than 5.

(*b*) increase the digit at thousands place by 1 and replace each one of the digit at hundreds, tens and ones place by 0, if the digit at hundreds place is greater than or equal to 5.

6. The Roman numerals with the corresponding Hindu-Arabic numerals are :

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

To get the values of given Roman numerals, we use the following rules :

(*i*) If a symbol is repeated, its value is added as many times as it occurs.

(*ii*) If a symbol of smaller value is written to the right of a symbol of greater value, we add its value to the value of greater symbol.

(*iii*) If a symbol of smaller value is written to the left of a symbol of greater value, its value is subtracted from the value of the greater symbol.

(*iv*) The symbols V, L and D are never written to the left of a symbol of greater value.

(*v*) If a smaller numeral is placed between two larger numerals, it is always subtracted from the larger numeral immediately following it.

(*vi*) If a bar is placed over a numeral, it is multiplied by 1000.

## LAB ACTIVITY

**Objective :** To develop a flexible and mobile scale to represent a number, having 8-digits or less.

**Materials Required :** 8-different colour squared thick papers; Rope/wire; Gum stick; Ruler; Pens of different colours.

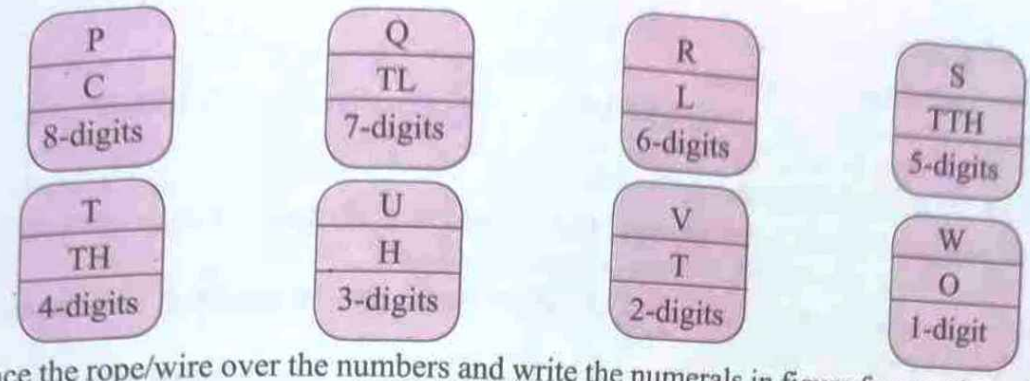
**Preparation :** Students in pair will carry out the activity.

### Steps to be followed :

(*a*) Fix up rope or wire at the ends on the table or wall or card sheet.

(*b*) Mark the points P,Q,R,S,T,U,V,W on rope or wire by pasting 8-different colour squared thick papers.

(*c*) Write on coloured square papers as shown below :




(*d*) Now, place the rope/wire over the numbers and write the numerals in figure form and word form, as learnt in this chapter.

(*e*) Using above scale, try for numbers :
3,40,90,467 ; 29,628 and 1,027.

**NOTE :**

While placing number on a rope (mobile scale), first count number of digit and accordingly set, i.e., from left/extreme right end to end, we start setting of numbers. For example : 9,88,45,325 has 8-digits, here 5 is first digit, 2 is second, 3 is third and so on, 9 is eight digit. So fix up 5 at 1-digit place and 2 at 2-digit place and lastly 9 at 8-digit place and write number in words.

## QUESTIONS BANK

### A. Multiple Choice Questions.

(*a*) Place value of 4 in 304,116,218 is :
(*i*) Million (*ii*) 4 million (*iii*) 4 (*iv*) 4 thousand

(*b*) Expanded form of 98704 is :
(*i*) 90000 + 8000 + 700 + 4 (*ii*) 90000 + 8000 + 700 + 40
(*iii*) 9000 + 800 + 70 + 4 (*iv*) none of these

(*c*) The standard numeral for forty crore, thirty-six lakh, seventy-one thousand, nine hundred nine is :
(*i*) 4,36,71,909 (*ii*) 40,36,71,099
(*iii*) 40,36,71,909 (*iv*) 40,63,17,909

(*d*) Which of the following is meaningless?
(*i*) VX (*ii*) IXIV (*iii*) XIIV (*iv*) all of these

(*e*) Simi's date of birth is 28th March. Express the date in Roman system.
(*i*) XXI (*ii*) XIXX (*iii*) IIX (*iv*) XXVIII

### B. Fill in the blank.

(*a*) We represent 9 as _____.
(*b*) One lakh is equal to _____ thousands.
(*c*) Which is greater XCII or 82 _____.
(*d*) Round off 12,46,193 to the nearest thousand _____.

### C. Short Answer Type Questions.

(*a*) How many millions make a billion?
(*b*) Write each of the following in expanded form :
(*i*) 69007 (*ii*) 384502 (*iii*) 46732

(c) Write the Roman numerals in (1) 1008 (2) 2718

(d) Write in Hindu- Arabic numerals:

(i) XXVI (ii) XXIX (iii) LXXII

## D. Long Answer Type Questions.

(a) A cloth merchant has an order to supply 13000 m cloth. He has 145 rows of cloth each measuring 85 m 50 cm. How much cloth does he need to buy more?

(b) A leading newspaper has 28 pages and 12870 copies are printed everyday. How many pages in all are printed in the month of April?

(c) A vehicle covers 675 km in 15 hours. At what speed was the vehicle moving?

(d) Divide 8080800 by 7536 and find the quotient and remainder.

(e) Write the greatest and smallest number of 4-digit using all the digits 8, 0, 5.

## ANSWERS

## EXERCISE 1.1

1. Indian Place Value Chart

| | TM | Arabs | TC | Crore | Lakh | T-Thousand | Thousand | Hundred | Ten | One |
|---|---|---|---|---|---|---|---|---|---|---|
| (a) | | 6 | 3 | 4 | 9 | 5 | 7 | 8 | 2 | 3 |
| (b) | | 2 | 4 | 3 | 6 | 8 | 2 | 1 | 7 | 5 |
| (c) | | 5 | 8 | 6 | 0 | 4 | 9 | 3 | 2 | 5 |
| (d) | | | 3 | 0 | 4 | 6 | 8 | 9 | 2 | 7 |
| (e) | | 8 | 7 | 3 | 4 | 8 | 2 | 9 | 4 | 5 |

2. International Place Value Chart

| | Billion | | | Million | | | Thousand | | | Ones | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | HB | TB | B | HM | TM | M | HTH | TTH | TH | H | T | O |
| (a) | | | | | 3 | 4 | 8 | 7 | 5 | 6 | 2 | 9 |
| (b) | | | | | 4 | 8 | 6 | 3 | 2 | 9 | 5 | 4 |
| (c) | | | 5 | 8 | 6 | 0 | 4 | 9 | 0 | 3 | 8 | 2 |
| (d) | | | | 9 | 7 | 6 | 4 | 5 | 8 | 2 | 7 | 2 |
| (e) | | | 2 | 6 | 3 | 0 | 4 | 8 | 1 | 7 | 5 | 6 |

3. (a) 4,83,07,549 (b) 1,86,34,254 (c) 83,19,63,476 (d) 45,48,79,368 (e) 34,90,86,272 (f) 95,46,32,817

4. (a) 830,476,058 (b) 586,347,281 (c) 76,459,832 (d) 462,863,926 (e) 95,386,329 (f) 146,732,187

5. (a) $2 \times 10000000 + 4 \times 1000000 + 6 \times 100000 + 7 \times 10000 + 3 \times 1000 + 2 \times 100 + 5 \times 10 + 8$

(b) $6 \times 10000000 + 8 \times 1000000 + 2 \times 100000 + 7 \times 10000 + 6 \times 1000 + 9 \times 100 + 5 \times 10 + 4$

(c) $8 \times 10000000 + 1 \times 1000000 + 7 \times 100000 + 6 \times 10000 + 2 \times 1000 + 3 \times 100 + 4 \times 10 + 5$

(d) $2 \times 10000000 + 9 \times 1000000 + 0 + 5 \times 10000 + 3 \times 1000 + 4 \times 100 + 2 \times 10 + 6$

(e) $7 \times 100000000 + 8 \times 10000000 + 6 \times 1000000 + 2 \times 100000 + 4 \times 10000 + 3 \times 1000 + 5 \times 100 + 2 \times 10 + 8$

(f) $5 \times 100000000 + 2 \times 10000000 + 8 \times 1000000 + 0 + 3 \times 10000 + 2 \times 1000 + 4 \times 100 + 9 \times 10 + 0$

6. (a) 48726524 (b) 30626354 (c) 800003257 (d) 762400000

7. (a) 8000 (b) 3000000 (c) 10000000 (d) 0 (e) 30000000 (f) 200000000

8. (a) 6,00,75,605 (b) 17,17,00,017 (c) 56,50,207 (d) 3,62,547 (e) 2,00,00,512

9. 2500000 **10.** 6999300

11. (a)–(iii), (b)–(iii), (c)–(ii), (d)–(iv), (e)–(i), (f)–(iii), (g)–(ii)

## EXERCISE 1.2

1. (*a*) 0785, 7085, 7805, 7985 (*b*) 789, 5079, 6985, 7352, 643005
2. (*a*) 69905, 9265, 3075, 1236 (*b*) 40986, 7209, 6104, 5083
3. 65342 > 24356
4. 7224, 6296, 6259, 5963, 5686
5. (*a*) Succ = 2448767, Pred = 2448765
   (*b*) Succ = 97634583, Pred = 97634581
   (*c*) Succ = 48649358, Pred = 48649356
   (*d*) Succ = 86329577, Pred = 86329575
   (*e*) Succ = 7634 85420, Pred = 763485418
   (*f*) Succ = 632018761, Pred = 632018759
6. (*a*) < (*b*) > (*c*) < (*d*) < (*e*) >
7. 103, 310, 130, 507, 705, 513, 501, 731, 713, 137, 503, 701, 703, 571
8. 4999995

## EXERCISE 1.3

1. (*a*) $3 \times 1000000 + 4 \times 100000 + 6 \times 10000 + 2 \times 1000 + 7 \times 100 + 2 \times 10 + 9$
   (*b*) $8 \times 10000000 + 6 \times 1000000 + 2 \times 100000 + 7 \times 10000 + 9 \times 1000 + 6 \times 100 + 5 \times 10 + 4$
   (*c*) $7 \times 1000000 + 1 \times 100000 + 3 \times 10000 + 6 \times 1000 + 2 \times 100 + 5 \times 10 + 6$
   (*d*) $9 \times 100000 + 5 \times 10000 + 4 \times 1000 + 3 \times 100 + 0 \times 10 + 2$
   (*e*) $3 \times 1000000 + 2 \times 100000 + 4 \times 10000 + 5 \times 1000 + 6 \times 100 + 4 \times 10 + 8$
   (*f*) $5 \times 10000000 + 4 \times 1000000 + 8 \times 100000 + 3 \times 10000 + 0 \times 1000 + 9 \times 100 + 0 \times 10 + 2$
2. (*a*) 67514935 (*b*) 3626354 (*c*) 76240000
3. (*a*) LXIX (*b*) XLVIII (*c*) XLII (*d*) CXCVII
   (*e*) DXCVIII (*f*) DCXIV (*g*) MDCLXXIX (*h*) MMCCCLIX
4. (*a*) 15 (*b*) 26 (*c*) 39 (*d*) 62 (*e*) 58 (*f*) 77
   (*g*) 85 (*h*) 91 (*i*) 94
5. (*a*) > (*b*) > (*c*) < (*d*) > (*e*) < (*f*) <
6. (*a*) (*iv*) (*b*) (*i*) (*c*) (*i*) (*d*) (*i*)

## EXERCISE 1.4

1. (*a*) 140 (*b*) 400 (*c*) 5960 (*d*) 180 (*e*) 130 (*f*) 100
2. (*a*) 600 (*b*) 900 (*c*) 1200 (*d*) 1100 (*e*) 1000 (*f*) 800
3. (*a*) 8000 (*b*) 7000 (*c*) 4000 (*d*) 12000 (*e*) 12000 (*f*) 7000
4. (*a*) 4700 (*b*) 7500 (*c*) 50,000 (*d*) 720000 (*e*) 8000 (*f*) 27000
5. (*a*) 30 (*b*) 35 (*c*) 10