1

Large Numbers

Learning Outcomes

At the end of this lesson, you will be able to:

- read and write numbers up to 8 digits in the Indian and international systems.
- write numbers in the expanded form.
- compare large numbers and arrange them in ascending/descending order.
- form greatest and smallest numbers from given digits.
- round numbers up to the nearest 10, 100 and 1000.
- write numbers 1–100 in the Roman number system.

GET STARTED

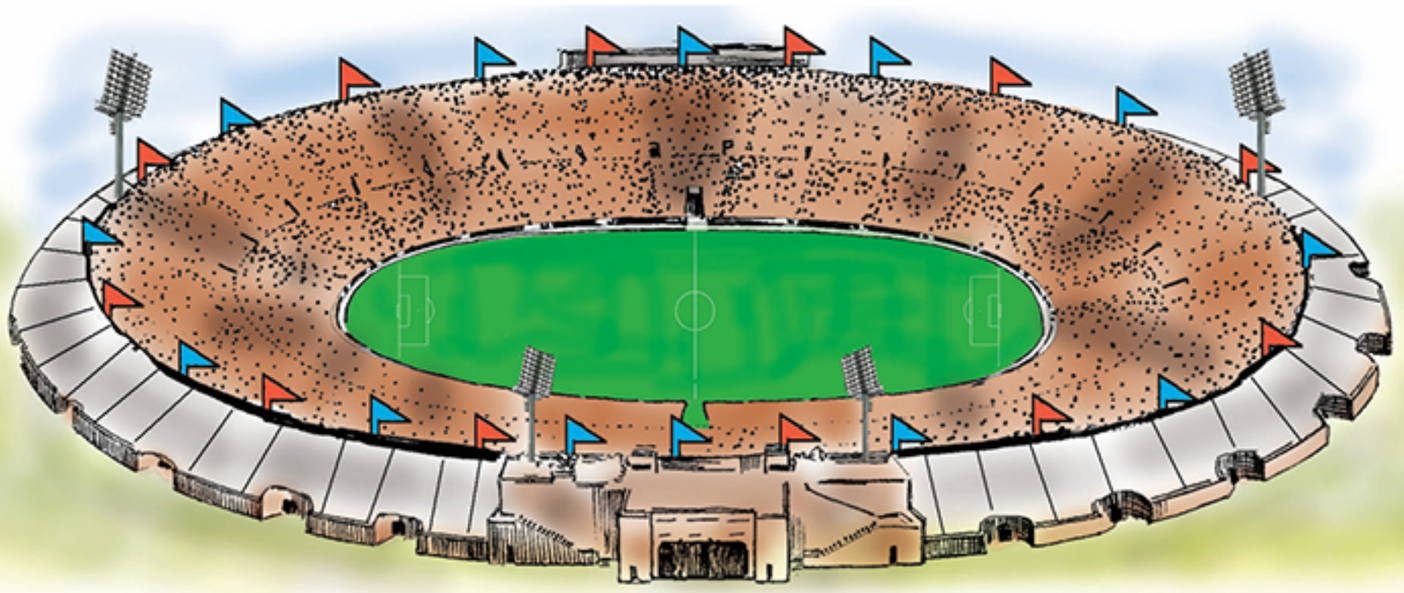
Large numbers in real life

I watched a football match in a big stadium yesterday. It could seat 10,000 people!

You mean equal to the smallest 5-digit number! The Jawaharlal Nehru stadium in Delhi is much bigger. It can seat 60,000 people.

Is there a stadium in India that can seat the number of people equal to the smallest 6-digit number?

You mean 1,00,000? I am afraid not. The closest is Salt Lake Stadium in Kolkata that can seat 85,000 people!



Check what you know

1. The greatest 6-digit number is: **9**,**99**,**999**.

It is read as: **nine lakh ninety-nine thousand nine hundred ninety-nine**

a) Write the greatest 6-digit number in the place-value chart.

period →	Lakhs period	Thousands period		Ones period		
place →	Lakhs	Ten thousands	Thousands	Hundreds	Tens	Ones

b) Write the expanded notation for the greatest 6-digit number:

9,99,999 = 9,00,000 + _____ + _____ + _____ + _____ + _____

2. a) Arrange in ascending order: 4,67,453 77,453 74,753 4,67,360

b) Arrange in descending order: 5,47,343 6,00,000 5,99,999 6,00,101

3. Use the digits 1, 4, 0, 9, 7, 2 to:

a) build the greatest 6-digit number and write its number name.

b) build the smallest 6-digit number and write its number name.

c) write the expanded form of both numbers.

4. a) Round 456 to the nearest: i. 10 ii. 100 iii. 1000

b) Write the Roman numeral for: i. 9 ii. 39 iii. 26

CONCEPTS SECTION

◆ 7-digit numbers

The population of city A on 15 April 2005, was 9,99,999.

1 child was born on 16 April 2005. What is the population of the city now?

To express the population now, we have to extend the number system beyond the greatest 6-digit number.

9,99,999 + 1 = 10,00,000

10,00,000 is the smallest **7-digit number**.

It is read as **10 lakh**.

$$\begin{array}{r} 9,99,999 \\ +\quad\quad 1 \\ \hline 10,00,000 \end{array}$$

10 lakh is written in the place-value chart as:

Lakhs period		Thousands period		Ones period		
Ten lakhs	Lakhs	Ten thousands	Thousands	Hundreds	Tens	Ones
1	0	0	0	0	0	0

The new place value added is **ten lakhs**. It is in the lakhs period.

23,60,543 is a 7-digit number. It is read as:

23,60,543

Twenty-three lakh sixty thousand five hundred forty-three

It is written in the expanded form as:

20,00,000 + 3,00,000 + 60,000 + 500 + 40 + 3

Example 1: Write the number, with commas at the right places: Forty-six lakh six thousand five hundred one.

Forty-six lakh | six thousand | five hundred one

46, 06, 501

EXERCISE 1

1. **Write the number names and the expanded forms.**

   a) 23,89,009 b) 56,32,123 c) 40,00,304

2. **Write the numbers and the expanded forms.**

   a) Fifty lakh sixty-six thousand nine hundred ten

   b) Thirty-two lakh five thousand ninety-three

   c) Seventy-eight lakh fifty-six thousand

3. **Which is the greatest 7-digit number? Show it on a place-value chart.**

◆ 8-digit numbers

The population of city A grew very fast. On 15 April 2015 it was 99,99,999.

1 more child was born on 16 April 2015. What is the population of the city now?

99,99,999 is the greatest 7-digit number. So to express the population now, we have to extend the number system beyond 7 digits.

99,99,999 + 1 = 1,00,00,000

1,00,00,000 is the smallest **8-digit number.**

It is read as **1 crore**.

$$\begin{array}{r} 99,99,999 \\ +\quad\quad 1 \\ \hline 1,00,00,000 \end{array}$$

1 crore is written on the place value chart as:

Crores period	Lakhs period		Thousands period		Ones period		
Crores	Ten lakhs	Lakhs	Ten thousands	Thousands	Hundreds	Tens	Ones
1	**0**	**0**	**0**	**0**	**0**	**0**	**0**

To show 8-digit numbers, a new period called the **crores period** has been added.

The new place value added is **crores**. It is in the crores period.

3,24,08,345 is an 8-digit number. It is read as: **3,24,08,345**

Three crore twenty-four lakh eight thousand three hundred forty-five

It is written in the expanded form as:

3,00,00,000 + 20,00,000 + 4,00,000 + 8000 + 300 + 40 + 5

EXERCISE 2

1. **Write the number names and expanded forms.**

   a) 8,76,89,129 b) 6,74,20,098 c) 5,20,52,060

2. **Write the number and the expanded form.**

   a) Six crore fifty-five lakh sixty thousand eight hundred eight

   b) One crore one lakh one hundred one

   c) Five crore thirty lakh fifty-five thousand ninety-nine

3. **Which is the greatest 8-digit number? Show it on a place value chart.**

◆ Comparing numbers

You have learnt to compare 6-digit numbers in Class 4. The same method is used to compare bigger numbers.

- The number with more digits is always greater.

Example 1: 2,12,34,020 > 99,99,999

(8-digit number) > (7-digit number)

2,12,34,020

99,99,999

- If the number of digits is the same, compare the leftmost digits first. If these are the same, compare the next digits on the right. Continue until you find two digits that are different.

Example 2: Compare 2,34,61,424 and 2,34,90,326

Both are 8-digit numbers.

Starting from the left, the first **3 digits** are the same. **2 , 3 4 , 6 1 , 4 2 4**

Compare the **fourth digit**: **6** < **9** **2 , 3 4 , 9 0 , 3 2 6**

Therefore, 2,34,61,424 < 2,34,90,326

Before and after

You can get the number just before a large number by **subtracting 1 from it**.

The number before 3,45,666 is 3,45,666 – 1 = 3,45,665

The number before 48,90,300 is 48,90,300 – 1 = 48,90,299

The number just before another number is called its **predecessor**.

You can get the number just after a large number by **adding 1 to it**.

The number after 2,66,367 is 2,66,367 + 1 = 2,66,368

The number after 65,90,199 is 65,90,199 + 1 = 65,90,200

The number just after another number is called its **successor**.

EXERCISE 3

1. Compare the numbers. Fill in the blanks with <, > or =.

a) 86,32,489 ____ 1,32,00,123

b) 80,04,875 _____ 80,40,578

c) 7,54,68,788 ____ 7,54,86,788

d) 2,50,40,302 ____ 2,50,40,203

2. Write the number before.

a) 34,63,482

b) 1,23,45,010

c) 10,00,000

3. Write the number after.

a) 96,82,545

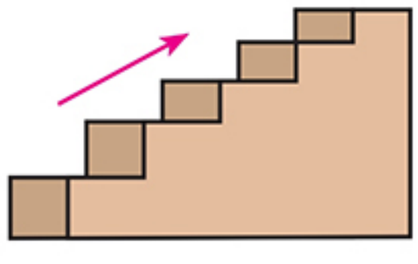
b) 1,29,39,999

c) 99,99,099

4. Arrange in ascending order.

a) 18,18,745 81,18,745 1,18,81,745 8,08,745

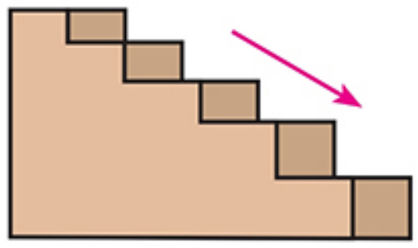
b) 1,22,22,622 22,26,222 22,62,222 1,22,26,222



5. Arrange in descending order.

a) 6,78,09,234 6,87,09,234 6,87,90,234 6,78,90,234

b) 1,32,48,131 2,32,45,234 1,32,58,214 2,33,98,789



6. Make the smallest and greatest 7-digit numbers, without repeating digits.

a) 3, 4, 9, 1, 2, 5, 6 b) 5, 6, 7, 0, 4, 3, 2

7. Make the smallest and greatest 8-digit numbers, by repeating digits as required.

a) 1, 9, 4, 5, 6, 7 b) 3, 0, 8, 5, 6, 4, 2

◆ International place-value system

Most countries of the world follow a place-value system that is slightly different from the Indian place-value system. It is called the **international place-value system**.

The numbers up to 5-digits are read in the same way in both systems. The difference starts from 6-digit numbers.

Look at the table. Notice the difference in the periods (the places where commas are put to separate the periods) and in the names of places.

Number	No. of digits	Indian system	International system
10000	5	10,000 – ten thousand	10,000 – ten thousand
100000	6	1,00,000 – one lakh	100,000 – one hundred thousand
1000000	7	10,00,000 – ten lakh	1,000,000 – one million
10000000	8	1,00,00,000 – one crore	10,000,000 – ten million

The Indian system uses lakhs and crores. The international system uses **millions**:

1 million = 10 lakh, 10 million = 1 crore

In the Indian system, the ones period has 3 places; the thousands, lakhs and crores periods have 2 places each.

In the international system the ones, the thousands and millions periods all have 3 places.

The place-value chart in the international system for numbers up to 8 digits is:

Millions		Thousands			Ones		
Ten millions	Millions	Hundred thousands	Ten thousands	Thousands	Hundreds	Tens	Ones
5	6	3	1	0	5	2	9

Look at the number 56310529 in the chart.

It is written as: 5 6 , 3 1 0 , 5 2 9

It is read as: **Fifty-six million three hundred ten thousand five hundred twenty-nine**

In the Indian system, it is written as: 5 , 6 3 , 1 0 , 5 2 9

It is read as: **Five crore sixty-three lakh ten thousand five hundred twenty-nine**

Example 1: Write 34590234 in figures and words in the two systems.

Indian system: 3,45,90,234

Three _____ forty-five _____ ninety _____ two _____ thirty-four

International system: 34,590,234

Thirty-four _____ five hundred ninety _____ two _____ thirty-four.

EXERCISE 4

1. **Write these numbers in figures and words in the Indian and international systems.**

   a) 369512 b) 2397010 c) 32954602 d) 60032051

2. **Census (counting of population) in India was done in 2011. The populations of some states of India in 2011 were as follows. Write the population numbers in words.**

   a) West Bengal: 91,276,115

   b) Karnataka: 61,095,297

   c) Himachal Pradesh: 6,864,602

   d) Delhi: 1,67,87,941

   e) Punjab: Twenty-seven million seven hundred forty-three thousand three hundred thirty-eight

   f) Goa: One million four hundred fifty-eight thousand five hundred forty-five

   g) Kerala: Thirty-three million four hundred six thousand sixty-one

   h) Meghalaya: Twenty-nine lakh sixty-six thousand eight hundred eighty-nine

4. **Give the place value of the digit in red, in both the Indian and the international systems.**

   a) 321650 b) 2389435 c) 70453271 d) 56409274

◆ Rounding numbers

Headline of a news item in a newspaper says:

> Delhi zoo to increase the number of animals from 1550 to 2000

The figures 1550 and 2000, are not the exact numbers of animals. These are approximate numbers that give us an idea of the number of animals. But they convey the plan of the zoo very well to us.

If the newspaper were to give exact figures, the headline would be:

> Delhi zoo to increase the number of animals from 1532 to 1986

The numbers here do not help in improving our understanding of the plan of the zoo, and in fact make it more difficult to follow.

The numbers 1550 and 2000, are **rounded numbers**. They are useful in several everyday life situations.

Rounding to the nearest 10

To round a number to the nearest 10, find which multiple of 10 the number is closest to.

Example 1: 362 lies between 360 and 370. It is closer to 360.

Therefore, 362 is rounded to 360.

If a number is at the midway point, it is always rounded up.

Example 2: 365 is rounded up to 370.

Rounding to the nearest hundred

To round a number to the nearest 100, find which multiple of 100 the number is closest to.

Example 3: 2340 lies between 2300 and 2400. It is closer to 2300.

Therefore, 2340 is rounded to 2300.

Example 4: Using the midway point rule, 2350 is rounded up to 2400.

Rounding to the nearest thousand

To round a number to the nearest 1000, find which multiple of 1000, the number is closest to.

Example 5: 82,854 lies between 82,000 and 83,000. It is closer to 83,000.

Therefore, 82,854 is rounded to 83,000.

Example 6: Using the midway point rule, 82,500 is rounded up to 83,000.

Using a short cut

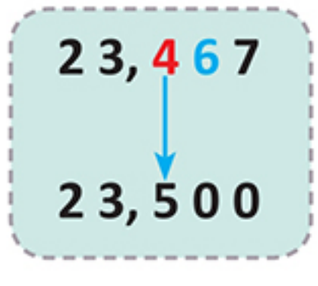
Example 7: Round 23,467 to the nearest: a) 100 b) 1000

a) Find the digit in the hundreds place, i.e. 4

See the digit on its right, i.e. 6

Since 6 > 5, add 1 to the digit in the hundreds place, and change all the digits after that to 0.

So, the rounded number is **23,500**.



b) Find the digit in the thousands place, i.e. 3

See the digit on its right, i.e. 4

Since 4 < 5, do not change the digit in the thousands place, but change all the digits after that to 0.

So, the rounded number is **23,000**.

Example 8: Round 48,540 to the nearest 1000.

Digit in the thousands place = 8 Digit on its right = 5

Applying the midway point rule, add 1 to the digit in the thousands place, and change all the digits after that to 0.

The rounded number is **49,000**.

EXERCISE 5

1. Round to the nearest 10.

a) 263 b) 8745 c) 24,666 d) 12,007 e) 83,550

2. Round to the nearest 100.

a) 687 b) 3863 c) 24,550 d) 49,005 e) 99

3. Round to the nearest 1000.

a) 6592 b) 999 c) 26,438 d) 9999 e) 88,645

4. 48,563 people saw the cricket match between India and Sri Lanka. Round the number to the nearest 100 for a newspaper headline.

5. The head of a bank gets a salary of ₹ 2,34,741 per month. Round the salary to the nearest 1000.

◆ Roman numbers

You learnt in Class 4, that the Romans had a system of writing numbers in which the following 7 symbols or numerals were used.

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

The Roman number system does not have a symbol for 0, and it does not use the place-value system to write numbers. That is why it is difficult to write large numbers in the Roman number system.

Writing numbers 1–100

The symbols I, V, X, L and C are used to write numbers 1–100, according to the following rules.

Rule 1: Numerals I and X can be repeated. Repetition means addition. I and X can be repeated **up to three times**.

II = 1 + 1 = 2
XXX = 10 + 10 + 10 = 30

Rule 2: A numeral written **after** a numeral of bigger value is **added**.

VII = 5 + 2 = 7
XXV = 10 + 10 + 5 = 25
LX = 50 + 10 = 60

Rule 3: A numeral written **before** a numeral of bigger value is **subtracted**.

IV = 5 – 1 = 4
IX = 10 – 1 = 9
XC = 100 – 10 = 90

Rule 4: If a number is placed between two numbers of greater value, it is subtracted from the number on the right.

I can be subtracted from V and X.

X can be subtracted from L and C.

V and L are never subtracted.

XIV = 10 + (5 – 1) = 14
XXIX = 10 + 10 + (10 – 1) = 29
LIX = 50 + (10 – 1) = 59

EXERCISE 6

1. Write the Hindu–Arabic numerals for:

a) XXXIX b) XL c) LX d) XLIV e) LXV

f) LXX g) LXXX h) LXXV i) LVII j) XCVIII

2. Write the Roman numerals for:

a) 45 b) 58 c) 63 d) 68 e) 72

f) 77 g) 84 h) 89 i) 91 j) 99

SKILLS SECTION (calculation, application and analysing skills)

Mental Maths

1. What is 1 less than 4,00,00,000?
2. 90,000,000 is 1 more than which number?
3. What is 499 rounded to the nearest 1000?
4. By how much is 4,66,77,888 more than 4,66,77,887?
5. What is the successor of the greatest 7-digit number?
6. How many lakhs is equal to 1 million?
7. Which is greater—345 rounded to the nearest 10 or rounded to the nearest 100?
8. Which of these cannot be repeated—I, V, X?
9. What is the sum of the place values of 6 in 6,78,216?

Mixed Bag

1. Choose the correct answer.

a) The place value of the seventh digit from the right is:

i. Ten lakhs ii. Ten thousands iii. Millions iv. Both i and iii

b) 1 crore is equal to:

i. Ten lakh × 10 ii. Ten million iii. Greatest 7 digit number + 1 iv. All of these

c) 2,11,34,678 is bigger than which of the following?

i. 2,34,678 ii. 2,21,34,678 iii. 34,500,000 iv. 2,11,34,679

d) 45,604 is rounded to 45,600. It is rounded to the nearest:

i. 10 ii. 100 iii. 1000 iv. Both i and ii

e) Which of these is a valid Roman number?

i. VVV ii. IIII iii. LXXX iv. XLL

2. Give the number names and the expanded forms in the system in which these numbers are written.

a) 4,30,47,906 b) 54,00,095 c) 28,610,706 d) 5,600,208

3. Write in figures.

a) Twenty lakh fifty-three thousand five hundred five

b) Five crore seven lakh nine hundred ninety

c) Sixty million one hundred twenty thousand five hundred ten

d) Eight million four hundred thousand five hundred forty-nine

4. Answer these questions.

a) How many lakhs in a million?

b) How many lakhs in a crore?

c) How many millions in a crore?

d) How many thousands in a lakh?

e) How many thousands in a million?

5. Give the place value of the digit in red, in both the Indian and the international systems.

a) 832483 b) 2908651 c) 74660739 d) 35498706

6. Compare the numbers. Fill in the blanks with <, > or =.

a) 36,56,438 ____ 1,36,56,438

b) 61,04,876 _____ 16,40,876

c) 9,36,48,121 ____ 9,36,84,121

d) 76,050,403 ____ 76,050,433

7. Write the number before: a) 2,45,50,236 b) 34,345,900 c) 1,000,000

8. Write the number after: a) 65,72,550 b) 9,33,99,099 c) 9,999,999

9. Arrange in ascending order.

a) 27,27,345 27,27,745 2,72,72,745 2,07,745

b) 19,999,622 9,996,222 9,969,222 19,996,222

10. Arrange in descending order.

a) 5,67,06,432 5,76,06,432 5,67,80,234 6,67,80,243

b) 1,296,311 12,296,311 13,296,311 23,296,311

11. Make the smallest and greatest 8-digit numbers, without repeating digits.

a) 2, 4, 8, 1, 3, 5, 6, 9 b) 1, 9, 7, 0, 8, 3, 2, 4

12. Make the smallest and greatest 7-digit numbers, by repeating digits as required.

a) 7, 5, 3, 6, 8 b) 5, 2, 8, 7, 6, 0

13. Round the numbers in the information given below.

a) There were 7231 birds in the Sultanpur Bird Sanctuary in October 2014. (nearest 100)

b) The village panchayat in Rampur spent ₹ 35,456 on cleaning a polluted pond in the village. (nearest 1000)

c) The distance from the earth to the moon is 3,84,400 km. (nearest 1000)

d) The population of Rampur village is 23,678. (nearest 100)

14. Write Roman numbers 40–100 in your notebook.

Higher Order Thinking Skills

1. A student was given four number cards. She was asked to pick some cards and form numbers using them.

Which of these numbers can she form?

a) a 2-digit number greater than 89

b) a 2-digit number less than 39

c) a 3-digit number less than 436

d) a 3-digit number greater than 756

2. Rohit's birthday is in February.

- **The date is a 2-digit number with one of the digits 1,2,4, 6 or 8 in the one's place.**
- **The sum of its digits is a 2-digit number.**

Which of these is Rohit's birthday? a) 21 Feb b) 28 Feb c) 19 Feb d) 30 Feb

3. Sania thought of a number.

- **When rounded to the nearest 100 it gives 4800.**
- **When rounded to the nearest 1000, it gives 5000.**

Which of these could be Sania's number? a) 4745 b) 4775 c) 4855 d) 5010

4. If I replace one of the digits of 2378 by 8, the number increases by 500. Which digit is it?

a) 2 b) 3 c) 7 d) 8

5. I have these number cards.

Using them, I formed the nearest possible number to 30,000.

Which of these is my number? a) 32945 b) 29345 c) 39542 d) 29543

Problem Solving

A plot of land costs two lakh fifty-three thousand rupees. Building a house costs five lakh eighty-four thousand rupees. Akbar has one million rupees. Which of the following can he do?

1. Buy two plots of land.
2. Buy one plot of land and build a house.
3. Buy two plots of land and build a house on one of them.

If Akbar wants to buy two plots of land and build two houses, how much more money does he need, rounded to the nearest lakh?

Cross-curricular Practice

Light travels very fast. It goes 2,99,792 km in 1 SECOND!! The distance it travels in 1 second is normally rounded to 3,00,000 km. How is this rounded?
(Hint: Round it to the nearest 10, 100, 1000, 10,000, … and check.)

Everyday Maths

The table shows the prices of old cars being sold by a dealer.

1. What does 'Price in '0000s' mean?
2. Write the real prices of each car.

Make	Year	Price in '0000s
Maruti Dzire	2009	32
Ford Ecosport	2013	65
Hyundai Accent	2008	25
Mahindra Bolero	2010	45
Tata Indigo	2012	28

Heritage: Vedic Maths

Indians knew about very large numbers even during the Vedic Period. By the time of the Yajurveda, they knew about numbers as large as 1,000,000,000,000!

ACTIVITIES SECTION

Maths Lab Activity

Colour numbers that round to 3700 red, 3600 blue and 3500 yellow.

3649	3718	3467	3732	3554	3499
3639	3619	3640	3748	3549	3507

Fun Activity

Supergirl Divya was tracking messages between two spies when she came across a strange e-mail. "Ha ha ha, what a stupid message!" laughed her assistant. "They don't know how to spell!"

"No, it's a coded message", said Divya. "I have their secret number!"

The message is given below. Can you crack the code and find the 2-digit secret number?
(*Hint*: Look only at the symbols used in the Roman system)

VISITOR+EXPIRIENSING+SIX–HOUR+TO+LIVE

Project

1. Work in groups of 3 or 4 to find out the lengths of the 5 longest rivers in the world in kilometres. Write their lengths rounded to the nearest 100 kilometres.
2. Find out the heights of the 5 highest mountain peaks in the world in metres. Write their heights rounded to the nearest 100 metres.

WORKSHEET

A

1. Write the number name in the Indian system: 24,10,235

   _____

2. Fill in the blanks: 100 lakhs = _____ crore(s)

3. Write the number name in the International system: 96,340,356

   _____

4. Write the Roman numbers for: a) 25_____ b) 83 _____

5. Round 139 to the nearest 10.

B

1. Write the number name for 40025016 in both the Indian and the international systems.

   Indian: _____

   International: _____

2. Fill in the blanks: 1 million =_____ lakhs

3. Write the numeral for sixty-five million, five thousand seventeen. _____

4. Write the Roman numbers for: a) 29 _____ b) 56 _____

5. Round 27,454 to the nearest a) 1000 _____ b) 100 _____

C

1. Write the number name of the largest 8-digit number and the smallest 7-digit number in both the Indian and the international system.

   Largest 8-digit – Indian: _____

   Largest 8-digit – International: _____

   Smallest 7-digit – Indian: _____

   Smallest 7-digit – International: _____

2. Fill in the blanks: 100 crores = _____ million(s)

3. Use all the digits 2,4,3,8,7,0,1,9 only once to form the smallest and largest possible numbers. Write them in both the Indian and the international system.

   Smallest – Indian: _____ Smallest – international: _____

   Largest – Indian: _____ Largest – international: _____

4. Write the Roman numbers for: a) 99 _____ b) 48 _____

5. Round 17,639 to: a) the nearest 1000 _____ b) the nearest 100 _____ c) the nearest 10 _____