**Page 24**

**Chapter 2: Operations with Large Numbers**

**To Do**

* Add, subtract, multiply and divide large numbers
* Apply mathematical operations in real life
* Estimate the addition, subtraction, multiplication and division of large numbers

**Tune Up**  
Raghav is a great batsman of his state. In an ongoing cricket match, he is playing on 188 runs. His friends are cheering for him and holding banners. If he makes another 47 runs in this match, he will complete 15,000 runs in test matches.

* How many runs had he already scored before coming to play this match?
* What will be his total score in this match on reaching 15,000 runs?

Show your support to Raghav and write the answer to these questions.

Runs scored before this match \_\_\_\_\_\_\_  
Total score in the match on reaching 15,000 \_\_\_\_\_\_\_

In the previous chapter, we have learned about large numbers. Now, we shall learn about addition, subtraction, multiplication and division of large numbers.

**Page 25**

**Addition of Large Numbers**

The method of addition remains the same whether the numbers to be added are small or large. Let us recall the steps involved in addition.

**Step 1:** Write the numbers in the place value chart one below the other. Ensure that digits at the same place are in the same column.  
**Step 2:** Addition is done column-wise, from right to left. So, always start adding from the lowest (ones) place and move to the higher places, adding one column at a time.  
**Step 3:** Regroup (carry over) whenever the sum in a column exceeds 9.

**Example 1:** Solve 12,64,750 + 4,12,673 + 36,82,145.  
**Answer:** Sum = 53,59,568

**Example 2:** Add 32,05,815; 2,76,48,950 and 4,63,25,705.  
**Answer:** Sum = 7,71,80,470

**Apply It**  
City A, city B and city C have a population of 1,78,38,842; 46,61,452 and 17,98,954 respectively. What is the total population of these cities?

**Page 26**

**Properties of Addition**

* **Property 1:** We can add numbers in any order. If we change the order of addends, the sum does not change.  
  For example:  
  25,70,381 + 5,09,650 = 30,80,031  
  5,09,650 + 25,70,381 = 30,80,031
* **Property 2:** We often use grouping while adding more than two numbers. There is no change in the sum if the grouping is changed.  
  For example:  
  1,05,24,720 + (3,12,050 + 55,20,840) = 1,63,57,610  
  (1,05,24,720 + 3,12,050) + 55,20,840 = 1,63,57,610  
  (1,05,24,720 + 55,20,840) + 3,12,050 = 1,63,57,610
* **Property 3:** If we add zero to a number, the sum will be the number itself.  
  For example:  
  3,57,890 + 0 = 3,57,890

**Exercise 2.1**

1. Add the following numbers and mark the periods in the sum.
2. Arrange the following addends in columns and find the sum.
3. Fill in the missing digits.

**Page 27**

**Subtraction of Large Numbers**

The method of subtraction remains the same whether the numbers to be subtracted are small or large. Let us recall the steps involved in subtraction.

**Step 1:** Write the numbers in the place value chart one below the other. The greater number will come above the smaller number.  
**Step 2:** Subtraction is done column-wise, from right to left. So, always start subtracting from the lowest (ones) place and move to the higher places.  
**Step 3:** Regroup (borrow) if the digit of minuend of a place is smaller than the digit of subtrahend.

**Example 3:** Subtract 94,13,205 from 1,78,40,926.  
**Answer:** Difference = 84,27,721

**Page 28**

**Checking Subtraction by Addition**

After carrying out the subtraction operation, we should always check for the correctness of the answer. To do that, add the difference obtained to the subtrahend (the smaller number). If we get the minuend (the greater number), then the answer is correct.

**Example 4:** Subtract 14,16,300 from 6,23,42,750 and check your answer.  
**Answer:** Thus, the answer is correct.

**Example 5:** The difference between two numbers is 10,43,152. If the greater number is 35,84,769, find the other number.  
**Solution:** Greater Number = 35,84,769  
Difference = 10,43,152  
Other number = 35,84,769 – 10,43,152 = 25,41,617  
**Answer:** The other number is 25,41,617.

**Properties of Subtraction**

* **Property 1:** We cannot change the order of numbers in subtraction.
* **Property 2:** When 0 is subtracted from a number, the difference is the number itself.
* **Property 3:** When a number is subtracted from itself, the difference is 0.

**Page 29**

**Exercise 2.2**

1. Subtract the following numbers and mark the periods in the answer.
2. Subtract and check your answer.
3. Arrange the following numbers in columns and find the difference.
4. Fill in the missing digits.
5. By how much is 74,39,770 greater than 59,25,017?
6. What should be added to 4,95,321 to get 43,09,223?
7. Which is greater, the sum of 3,20,63,145 and 1,54,22,021 or the difference between 7,32,35,831 and 4,32,28,762? Also, calculate the difference between the given sum and difference.
8. By how much is the difference between 8,14,52,988 and 3,21,53,209 less than 6 crore?

**Page 30**

**Addition and Subtraction in Real Life**

We need to add whenever we encounter words such as ‘total’, ‘in all’, ‘altogether’, ‘more’, ‘together’, ‘sum’, ‘combined’ and ‘overall’.

We need to subtract whenever we encounter words such as subtract, difference, left, remaining, balance and so on.

**Example 6:** A computer manufacturing company earned ₹10,17,609 by selling computers in the first 6 months of the year 2019. Out of these, it earned ₹4,33,000 in January and February and ₹3,20,656 in March and April. How much did it earn in May and June?  
**Solution:**  
Earning in Jan and Feb = ₹4,33,000  
Earning in March and April = + ₹3,20,656  
Earning Jan–April = ₹7,53,656  
Total earning in 6 months = ₹10,17,609  
Earning May–June = ₹10,17,609 – ₹7,53,656 = **₹2,63,953**

**Page 31**

**Exercise 2.3**

1. There are 9,24,09,540 women, 7,65,85,372 men and 3,78,49,075 children in a city. What is the total population of the city? How many more women are there than men?
2. Sumita earns ₹58,723 more than her brother Saurabh per year. If Sumita earns ₹5,45,920 per year, find Saurabh’s salary per year.
3. Samika has spent 2,59,200 seconds on her project. If she was given 3,60,000 seconds to prepare it, how much more time does she have?
4. A dam discharged 1,42,39,053 gallons of water to an irrigation canal in May. It discharged 80,46,190 gallons in June. How much water is discharged to the canal in these 2 months?
5. A reputed airline requires a pilot to have 4,00,000 hours of flying experience before promotion. If Vinayak has completed 3,46,928 hours, how many more hours experience does he need to qualify for the promotion?
6. Candidates A, B and C had contested for an election. The total number of votes was 75,95,344. Find the votes polled for candidate C if A and B got 23,95,710 and 32,10,001 votes, respectively. Who won the election?
7. Universal Public School has two libraries. The number of books in the junior library is 48,473 and the number of books in the senior library is 73,602. What is the total number of books in both the libraries? How many more books does the senior library have than the junior library?

**Page 32**

**Multiplication of Large Numbers**

Multiplication refers to repeated addition. It is a quicker way of finding the sum when a number is added to itself multiple times.

**Step 1:** Write the numbers in the place value chart one below the other. The multiplicand is placed above the multiplier.

**Step 2:** Multiplication is done column-wise, from right to left.

**Step 3:** If the multiplier has more than one digit, then multiply the multiplicand by each digit separately. Start with the multiplier digit at the smallest place. When multiplication by one digit is complete, then move to the next digit.

**Step 4:** If there is a carry-over, add it to the product of the next column.

**Multiplication by a 1-Digit Multiplier**

**Example 7:** Multiply 2,50,761 by 3.  
**Answer:** Product = 7,52,283

**Multiplication by a 2-Digit Multiplier**

**Example 8:** Multiply 1,34,259 by 23.  
**Answer:** Product = 30,87,957

**Multiplication by a 3-Digit Multiplier**

**Example 9:** Multiply 31,268 by 204 and 214.

**Page 33**

**Multiplication by a 4-Digit Multiplier**  
Example 10: Multiply 5,283 by 3,612.  
Solution:  
5 2 8 3  
× 3 6 1 2  
——————  
1 0 5 6 6 → 5283 × 2  
3 1 6 9 8 0 0 → 5283 × 600  
1 5 8 4 9 0 0 0 → 5283 × 3000  
Answer: Product = 1,90,82,196

**Multiplication by 10 and its Multiples**

* When the multiplier is 10, 100, 1000 and so on, put as many zeroes to the product as there are in the multiplier.  
  Example: 1,753 × 10 = 17,530  
  572 × 100 = 57,200
* When the multiplier is a multiple of 10, 100, 1000 and so on, multiply with the non-zero part first and then put the zeroes.  
  Example: 637 × 30  
  5,308 × 4,000

**Page 34**

Step 1: Carry out the multiplication with the non-zero part of the multiplier.  
637 × 3 = 1,911  
5,308 × 4 = 21,232

Step 2: Count the zero(s) of the multiplier. Put the same number of zeroes to the extreme right of the product.  
637 × 30 = 19,110  
5,308 × 4,000 = 2,12,32,000

**When both the multiplicand and the multiplier have zeroes, follow the steps given in the following example.**

Example 11: Multiply 1,520 by 6,000.  
Step 1: Multiply the non-zero parts of the multiplicand and the multiplier.  
152 × 6 = 912

Step 2: Count the zero(s) of the multiplicand and the multiplier. Put the same number of zeroes to the extreme right of the product.  
1,520 × 6,000 = 91,20,000

**Multiplication by 5, 25, 50**

To multiply a number by 5, first multiply it by 10 and then divide it by 2.  
To multiply a number by 25, first multiply it by 100 and then divide it by 4.  
To multiply a number by 50, first multiply it by 100 and then divide it by 2.

Examples:  
6,352 × 5 = (6,352 × 10) ÷ 2 = 63,520 ÷ 2 = **31,760**  
9,536 × 25 = (9,536 × 100) ÷ 4 = 9,53,600 ÷ 4 = **2,38,400**  
9,999 × 50 = (9,999 × 100) ÷ 2 = 9,99,900 ÷ 2 = **4,99,950**

**Lattice Multiplication**

Lattice multiplication is a method of multiplying two large numbers using a grid. This method breaks the multiplication process into smaller steps, which makes multiplication of large numbers easier.

**Page 35**

Example 12: Multiply 2,314 × 157.  
Solution:

1. Count the number of digits in multiplicand and multiplier.  
   2,314 (4 digits) × 157 (3 digits)
2. Draw a grid with 4 columns and 3 rows, depicting the multiplicand and multiplier, respectively (as shown).
3. Multiply each digit of the multiplicand with one digit of the multiplier at a time.
4. Write the product in each square such that the **tens are in the upper half** of the square and the **ones are in the lower half**. If the product does not have a tens digit, record a zero in the upper half.
5. Now, add the numbers in the grid along the diagonals, starting from the lower right corner.
6. Add any carry over to the sum of the next diagonal.

To find the answer, read the digits starting down the left of the grid and continuing across the bottom.

Here, the product of 2314 × 157 is 3,63,298.

Answer: Product = **3,63,298**

**Properties of Multiplication**

Property 1: When two numbers are multiplied together, the product is the same regardless of the order of the multiplicand and the multiplier.  
Example: 42,745 × 294 = 294 × 42,745 = 1,25,67,030

**Page 36**

Property 2: When three or more numbers are multiplied, the product is the same regardless of the grouping of the numbers.  
Example: 7,256 × 4 × 5 = (7,256 × 4) × 5 = (7,256 × 5) × 4 = 7,256 × (4 × 5)

Property 3: Any number multiplied by 1 gives that number itself.  
Example: 2,315 × 1 = 2,315

Property 4: Any number multiplied by 0 gives zero as the product.  
Example: 3,462 × 0 = 0 × 3,462 = 0

**Exercise 2.4**

1. Find the product.  
   a) 966 × 38  
   b) 1,518 × 19  
   c) 294 × 16  
   d) 482 × 27  
   e) 4,258 × 369  
   f) 8,731 × 402  
   g) 8,726 × 109  
   h) 3,827 × 2,135  
   i) 5,009 × 1,837  
   j) 6,492 × 222  
   k) 1,987 × 130  
   l) 509 × 328
2. Multiply the following numbers.  
   a) 3 × 100  
   b) 348 × 1,000  
   c) 652 × 20  
   d) 200 × 87  
   e) 10,000 × 934  
   f) 7,000 × 500
3. Using the Lattice method, find the product of the following numbers.  
   a) 1,215 × 125  
   b) 576 × 32  
   c) 425 × 367  
   d) 999 × 888

**Multiplication in Real Life**

Example 13: If a store sells 1,258 cartons of mineral water in a day, how many cartons of mineral water will be sold in the month of June (assuming that equal number of cartons are sold in a day)?

Solution:  
Number of cartons of mineral water sold in 1 day = 1,258  
Number of cartons of mineral water sold in 30 days = 1,258 × 30 = 37,740

Answer: 37,740 cartons will be sold in the month of June.

## **Page 37**

**Example 14:**  
The cost of a wooden table is ₹2,375. A government office purchased 236 such tables. How much money was spent in all?

**Solution:**  
Cost of 1 table = ₹2,375  
Cost of 236 tables = ₹2,375 × 236 = ₹5,60,500

**Answer:** The office spent **₹5,60,500** in buying 236 tables.

**Exercise 2.5**

1. Mary deposits ₹2,500 every month in her account. How much money would she have deposited in 15 months?
2. New Creation School is preparing for its annual day function. They have planned to decorate the school building with 15,340 strings of lights and each string of light has 112 bulbs. How many bulbs will there be for decoration?
3. At the college cafeteria, a big thali costs ₹225 and a small thali costs ₹125. The college students purchased 110 big and 154 small thalis on a day. How much money did the college cafeteria collect for large and small thalis—separately and totally?
4. The cost of a laptop is ₹39,565. Find the total spending on laptops which are given to 212 employees of a company.
5. 2,550 oranges were packed in one carton. How many oranges were packed in 275 such cartons?

## **Page 37 (continued)**

**DIVISION OF LARGE NUMBERS**

Division is the repeated subtraction of a number. It is a quicker way of finding the difference when a number is subtracted to itself multiple times.

* The number which is being divided is called the **dividend**.
* The number by which we divide is called the **divisor**.

A simple example is shown:

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Divisor → 7 ) 3 5 ← Dividend

- 3 5

————

0 ← Remainder

Quotient → 5

## **Page 38**

* The answer to division is called the **quotient**.
* The number which is left over after division is called the **remainder**.
* The result can be verified by using the following formula:  
  **Divisor × Quotient + Remainder = Dividend**

**Division by a 2-Digit Divisor**

**Example 15:**  
Find the quotient and remainder when 26,775 is divided by 25. Also, check your answer.

**Solution:** The division is carried out from left to right.

**Step 1:**  
2 < 25 (the divisor). So, write 0 at the ten thousands place in the quotient and club 2 with the next digit 6.  
26 > 25  
25 × 1 = 25 ✔  
Write 1 at the thousands place in the quotient.  
Subtract 25 from 26.

**Step 2:**  
Bring down the next digit 7.  
17 < 25. So, write 0 at the hundreds place in the quotient and bring down another digit 7.  
177 > 25  
25 × 7 = 175 ✔  
Write 7 at the tens place in the quotient.

**Step 3:**  
Bring down the next digit 5.  
25 goes into 25 one time.  
Write 1 at the ones place in the quotient.

✅ **Answer:** Quotient = 1071, Remainder = 0

**Check:** Divisor × Quotient + Remainder = 25 × 1071 + 0 = 26,775

## **Page 39**

**Division by a 3-Digit Divisor**

**Example 16:**  
Divide 53,978 by 122.

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4 4 2

122 ) 5 3 9 7 8

- 4 8 8

\_\_\_\_\_\_\_

5 0 9

- 4 8 8

\_\_\_\_\_\_\_

2 1 8

- 2 4 4

\_\_\_\_\_\_\_

5 4

✅ **Answer:** Quotient = 442, Remainder = 54

**Example 17:**  
Divide 3,84,927 by 268.

✅ **Answer:** Quotient = 1436, Remainder = 79

**Division by 10 and its Multiple**

Count the number of zeroes in the divisor. The same number of digits on the extreme right of the dividend will form the remainder. The rest of the digits form the quotient.

**Examples:**

* 335 ÷ 10: Quotient = 33, Remainder = 5
* 4,268 ÷ 100: Quotient = 42, Remainder = 68
* 78,965 ÷ 1,000: Quotient = 78, Remainder = 965
* 8,32,456 ÷ 10,000: Quotient = 83, Remainder = 2,456

**Properties of Division**

**Property 1:** Any number divided by 1 will give the same number as the quotient.  
Example: 35,674 ÷ 1 = 35,674

**Property 2:** Any number divided by itself will give 1 as the quotient.  
Example: 35,674 ÷ 35,674 = 1

**Property 3:** When we divide 0 by any number except 0, the quotient is always 0.

## **Page 40**

**Exercise 2.6**

1. Complete the given table, where Q = Quotient and R = Remainder.

| **Number** | **Divided by 10** | **Divided by 100** | **Divided by 1,000** | **Divided by 10,000** |
| --- | --- | --- | --- | --- |
| 30,788 |  |  |  |  |
| 1,42,825 |  |  |  |  |
| 6,31,083 |  |  |  |  |

1. Divide the following and find the quotient and the remainder.  
   a) 8,976 ÷ 11  
   b) 6,589 ÷ 12  
   c) 5,268 ÷ 17  
   d) 9,575 ÷ 15  
   e) 6,382 ÷ 25  
   f) 24,720 ÷ 60  
   g) 31,865 ÷ 45  
   h) 25,615 ÷ 105  
   i) 47,492 ÷ 124  
   j) 46,670 ÷ 200  
   k) 2,90,265 ÷ 215  
   l) 6,96,856 ÷ 246  
   m) 15,57,654 ÷ 137  
   n) 62,240 ÷ 250  
   o) 89,23,787 ÷ 570
2. Divide the following and check your answer.  
   a) 56,437 ÷ 12  
   b) 4,578 ÷ 32  
   c) 65,839 × 276  
   d) 23,546 ÷ 10  
   e) 2,00,045 ÷ 100  
   f) 7,77,756 ÷ 225  
   g) 9,09,099 ÷ 398

**Division in Real Life**

**Example 18:**  
Lata earned ₹1,15,230 from a summer job which she took up for 6 months. What was her monthly salary? If she had continued working there, what would have been her annual income?

Solution: Amount earned by Lata in 6 months = ₹1,15,230  
Therefore, Monthly salary = ₹1,15,230 ÷ 6 = ₹19,205

Thus, Lata’s monthly salary was **₹19,205**.

Annual income: ₹19,205 × 12 = **₹2,30,460**

## **Page 41**

**Exercise 2.7**

1. There were 62,910 participants from 45 countries in a youth sports meet. How many youths participated from each country (assume that there were equal number of participants from each country)?
2. Government distributed ₹66,56,800 equally among 53 families affected by floods. How much money did each family get?
3. Neha won ₹24,78,900 in a lottery. If she has to distribute this amount equally among 10 of her relatives, how much money would each relative get?
4. There are 99,89,001 number of apples packed in 999 cartons. How many apples are packed in each carton?

**ESTIMATION IN OPERATIONS**

In our daily life, we come across several situations involving the use of numbers. Sometimes, for our convenience, we do not use exact or actual numbers. We use numbers that are easy to work with and close enough to the exact numbers.

**Example 19:**  
Aditya scored 1,489 points in a video game and Rahul scored 2,822 points. About how many points did they score together?

**Solution:**

|  | **Actual** | **Estimated** |
| --- | --- | --- |
| Number of points scored by Aditya | 1,489 | 1,000 (nearest 1000) |
| Number of points scored by Rahul | 2,822 | 3,000 (nearest 1000) |

Estimated total = 1,000 + 3,000 = **4,000**

✅ **Answer:** Aditya and Rahul scored about **4,000 points.**

## **Page 42**

**Estimating Difference**

**Example 20:**  
There are 15,932 leaves on a tree. 1,293 leaves fall during a thunderstorm. About how many leaves are left on the tree?

|  | **Actual** | **Estimated** |
| --- | --- | --- |
| Number of leaves on the tree | 15,932 | 16,000 (nearest 1000) |
| Number of leaves fallen | 1,293 | 1,000 (nearest 1000) |

Estimated leaves left = 16,000 – 1,000 = **15,000**

✅ **Answer:** There are about **15,000 leaves** left on the tree.

**Estimating Product**

**Example 21:**  
In a library, 489 books are kept on one shelf. There are 722 shelves in the library. About how many books are there in the library (assume that equal number of books are kept on each shelf)?

|  | **Actual** | **Estimated** |
| --- | --- | --- |
| Number of books on 1 shelf | 489 | 500 (nearest 100) |
| Number of shelves | 722 | 700 (nearest 100) |

Estimated total books = 500 × 700 = **3,50,000**

✅ **Answer:** There are about **3,50,000 books** in the library.

**Estimating Quotient**

**Example 22:**  
Shobana saves a fixed sum of money every month. If she saves ₹49,880 in a year, about how much does she save in a month?

|  | **Actual** | **Estimated** |
| --- | --- | --- |
| Money saved in a year | 49,880 | 50,000 (nearest 1000) |
| Period of saving | 12 | 10 (nearest 10) |

Estimated saving per month = 50,000 ÷ 10 = **5,000**

✅ **Answer:** Shobana saves about **₹5,000** in a month.

## **Page 44**

**2.** Manisha has a target to read 45 pages of a book daily. If the book has 765 pages, estimate in how many days she will be able to complete the book. What is the actual time required to complete the book?

**3.** The membership fees of a particular club is ₹5,225 per year. If 6,754 people are members of that club, what will be the total fee collected by the club in a year?

**4.** The sum of 24,93,700 and 35,82,419 is subtracted from 8,50,12,796. What is the result?

**5.** The average lifespan of a male housefly is 28 days. Convert the time period of housefly’s lifespan into number of minutes and seconds.

### ****Mental Maths****

**Understand**  
Numbers can be added and multiplied in any order.

Example:  
175 + 234 + 25 = 234 + 175 + 25

175 + 234 + 25 = 234 + 175 + 25  
(regrouping) = 234 + 200 = 434

8 × 167 × 125 = 167 × 8 × 125 (regrouping)  
= 167 × 1,000 = 1,67,000

**Perform**

1. Add/multiply the following:  
   a) 350 + 18,624 + 250  
   b) 1,250 + 3,678 + 3,750  
   c) 2,700 + 5,468 + 1,300  
   d) 50 × 369 × 2  
   e) 40 × 972 × 25  
   f) 1,250 × 869 × 8

### ****Maths in Action****

We can easily remember the numbers which are in the multiples of 100. That is why most of the large values such as population or government expenditure are expressed in approximate values.