REVISED EDITION

BASED ON THE SINGAPORE BAR MODEL METHOD

5

AS PER LATEST CBSE CURRICULUM

Content developed by

E3 EDUSOLUTIONS
TRANSFORMING LEARNING

Eupheus Learning
Our Advisors

**Yan Kow Cheong**

Yan Kow Cheong, based out of Singapore has been active on the Singapore’s mathematics educational scene for over two decades with teaching appointments at the ACS (Independent), NUS Extension, Institute of Technical Education, and Singapore Science Centre. He regularly conducts workshops and seminars for primary and secondary school students, teachers and parents.

Kow-Cheong is the author of Singapore’s best-selling Mathematical Quickies & Trickies series and the co-author of the MOE-approved Additional Maths 360. Besides editing primary and secondary MOE-approved textbooks, co-writing Teachers’ Guides, and ghost-writing assessment titles, he has also written contests questions and on-line assessment tests, and provided contents for maths apps.

A contributor to mathematics periodicals and journals, such as The Mathematics Educator, Mathematics Medley; he is also the author of The Stack Model Method: An Intuitive and Creative Approach to Solving Word Problems [Primary 3–4 & 5–6] and many other titles. His academic interests involve research in mathematics education, in particular, the psychology of learning and teaching mathematics, and creative problem solving.

Kow-Cheong writes about the good, the bad and the not-so-ugly of Singapore’s maths education and of the local educational publishing industry. Read his two maths blogs at [www.singaporemathplus.com](http://www.singaporemathplus.com) and [www.singaporemathplus.net](http://www.singaporemathplus.net).

He can be reached at: kcyan@singaporemathplus.com

**Dr. Kevin Mahoney**

Dr. Kevin Mahoney, based out of America has been a teacher of mathematics since 1989. A "math war" veteran, he has worked on wide variety of mathematics pedagogy and curricular materials in both public and private schools. In 2012, he became the first American to investigate Singapore’s elementary teaching methods at the doctoral level, publishing original academic research on the effects of Singaporean pedagogy on American math students.

Dr. Kevin worked as Math Curriculum Coordinator at an independent school outside Boston, Massachusetts. He consults with large numbers of schools and teacher training institutes in U.S., Canada, Europe and India, training the faculty and helping schools effectively implement mathematics curriculum and instruction.
**Preface**

**WOW MATHS** based on the Singapore model is a series of eight textbooks specially designed to meet the mathematical needs and wants of primary and middle school students in India, by incorporating the proven problem solving strategies and heuristics commonly used in the Singapore maths curriculum.

Besides promoting critical and creative thinking in mathematics, the WOW MATHS series introduces the **Singapore Bar (or Model) Method**-a powerful visualization and problem-solving heuristic used to solve word problems and to help students gain a better insight into mathematical concepts across all the eight grades.

**Approach**

The series infuses the **Concrete-Pictorial-Abstract** (CPA) approach of learning and teaching interwoven with the bar model method. This blend makes the teaching of mathematical concepts much simple and easier. The simpler and effective strategies will not only motivate the students to learn a new topic, concept or skill, but will also make the learning of mathematics more meaningful and relevant to their everyday life.

---

**Concrete**

Venu has 3 cars.

Siya has 2 cars.

**Pictorial**

They have 5 cars in all.

**Abstract**

\[
\begin{array}{c|c}
\text{Venu} & \text{Siya} \\
3 & 2 \\
\end{array}
\]

\[3 + 2 = 5\]
The WOW series has 15 unique features.

**WOW KIDS**
They are your Maths buddies. They stimulate interest, explain concepts and create involvement in learning.

**I Have Learnt**
Quick recap of the concepts learnt in the previous class.

**Warm Up**
Encourages active student participation and creates opportunity for interaction and discussion.

**Everyday Maths**
Relates the concepts taught to every situation and shows how mathematical concepts are applied to everyday situations.

**Mental Maths**
Trains children to perform mental calculations quickly.

**Mind It**
Cautions/Alerts children of the common mistakes and errors.

**Practice Sheet**
Consists of graded questions that test understanding and application of concepts taught with an integrated approach.

**Maths Lab Activity**
Hands on activities to further consolidate the concepts taught.

**I Can**
Consolidated check of the concepts learnt in the previous class.

**Maths Fun**
Fun-filled activities to promote learning by doing.

**Exercise**
Graded exercises assess understanding of mathematical concepts.

**Think Smart**
Helps students enhance their critical and creative thinking skills, and to arouse mathematical curiosity.

**Fact Zone**
Mathematical facts about the topics.

**Tip Teaching**
Includes suggestions/ideas for teacher and parents to make the learning of the topic comprehensive and complete.

**Addition Worksheet**
Theme based checking of how much the children have learned about the concepts taught.
Singapore Maths Curriculum is recognized around the world for its innovative and effective teaching and learning practices. Singapore uses heuristics (problem solving strategies) and Bar Model Method (an effective pedagogical strategy recognized in over 30 countries and ranked the highest in TIMSS).

Bar or the Model drawing is a powerful visualization problems solving heuristic that is used to solve both arithmetic and algebraic problems. The Model method enables word problems that we traditionally set at higher grades (using algebra) to be set at lower grades.

**The Bar (or Model) method:**
- helps students to gain a better insight into mathematical concepts such as fraction, ratio and percentage
- helps students to plan for the solution steps for solving a maths problem
- is comparable to, but is less abstract than, the algebraic method
- empowers students to solve challenging problems

Let’s solve some problems by both the traditional and bar model methods.

Venu spent \( \frac{1}{2} \) of his pocket money on a movie and \( \frac{1}{4} \) on a new pen. What fraction of his pocket money was left?

**Traditional Method**

Money spent on movie = \( \frac{1}{2} \)

Money spent on pen = \( \frac{1}{4} \)

Total money spent = \( \frac{1}{2} + \frac{1}{4} \)

\[ = \frac{2}{4} + \frac{1}{4} = \frac{3}{4} \]

Money left = \( 1 - \frac{3}{4} \)

\[ = \frac{4}{4} - \frac{3}{4} = \frac{1}{4} \]

\( \frac{1}{4} \) of his pocket money was left.

**Model Method**

Money left = \( \frac{1}{4} \)

\( \frac{1}{4} \) of his pocket money was left.
Sahil earned a profit of ₹20.00 by selling a pair of shoes for ₹300.00. What was the cost of the pair of shoes?

**Traditional Method**

Selling price (S.P.) = ₹300.00  
Profit (P) = ₹20.00  
Cost price (C.P.) = ?  
C.P. = S.P. - Profit  
C.P. = ₹300.00 - ₹20.00  
C.P. = ₹280.00  
The cost price of the pair of shoes was ₹280.00.

**Model Method**

<table>
<thead>
<tr>
<th>S.P.</th>
<th>₹300.00</th>
</tr>
</thead>
<tbody>
<tr>
<td>Profit</td>
<td>₹20.00</td>
</tr>
<tr>
<td>C.P. =?</td>
<td></td>
</tr>
<tr>
<td>Profit</td>
<td></td>
</tr>
<tr>
<td>C.P. = ₹300.00 - ₹20.00</td>
<td></td>
</tr>
<tr>
<td>C.P. = ₹280.00</td>
<td></td>
</tr>
<tr>
<td>The cost price of the pair of shoes was ₹280.00.</td>
<td></td>
</tr>
</tbody>
</table>

Bar modeling is also helpful in solving mathematical problems of higher grades.

Tanya has two brothers. She gave \( \frac{1}{6} \) of her stamp collection to one of them and \( \frac{2}{3} \) of the remainder to the other. In the end, she was left with 12 stamps. How many stamps did Tanya have at first?

**Traditional Method**

Number of stamps = \( x \)  
Stamps given to one brother = \( \frac{1}{6} x \)  
Remaining stamp collection = \( \frac{5}{6} x \)  
Stamps given to other brother = \( \frac{2}{5} \times \frac{5}{6} x = \frac{1}{3} x \)  
Remaining stamps = 12  
According to the question,  
\( \frac{1}{6} x + \frac{1}{3} x + 12 = x \)  
\( x + \frac{2}{3}x + 72 = x \)  
\( \frac{3x + 72}{6} = x \)  
\( 3x + 72 = 6x \)  
\( 3x - 6x = -72 \)  
\( -3x = -72 \)  
\( x = 24 \)  
Tanya had 24 stamps at first.

**Model Method**

<table>
<thead>
<tr>
<th>Total Stamps</th>
</tr>
</thead>
<tbody>
<tr>
<td>( ? )</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Remainder</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Given to first brother</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 units = 12</td>
</tr>
<tr>
<td>1 unit = 12 ÷ 3 = 4</td>
</tr>
<tr>
<td>6 units = 6 x 4 = 24</td>
</tr>
<tr>
<td>Tanya had 24 stamps at first.</td>
</tr>
</tbody>
</table>
Polya’s four-step model, named after the Hungarian mathematician, George Polya (1887-1985), is commonly used in mathematical problem solving.

**Step - 1**
Understanding the problem

**Step - 2**
Devising a Plan

**Step - 3**
Doing

**Step - 4**
Checking

**READ, VISUALIZE & THINK**
- Identify wanted, Given & Needed information
- Restate the problem

**CHOOSE A STRATEGY**
- Draw a model
- Work backwards
- Look for a pattern
- Guess & Check
- Simplify a problem

**SOLVE THE PROBLEM**
- Workout the solution
- Tryout different strategies

**EXPLAIN YOUR WORK**
- Check the solution
  \[ 60 + 30 = 90 \]
- Seek alternatives solutions, if required
- Extend the method to other problems
Contents

1. Numbers 11
   Maths Fun, Worksheet
2. The Four Operations 25
   Problem Solving Strategy: Look for a pattern
   Problem Solving Strategy: Work Backward
3. Factors and Multiples 48
   Think Smart, Mental Maths
4. Whole and Parts: Fractions 64
   Everyday Maths, Maths Lab
5. Whole and Parts: Decimals 82
   Maths Fun, Worksheet
6. Percentage 97
   Mental Maths, Maths Lab
7. Average 107
   Everyday Maths, Maths Lab
8. Geometry 111
   Maths Fun
9. Perimeter, Area and Volume 128
   Think Smart, Maths Lab
10. Measurement 145
    Mental Maths
11. Time and Money 158
    Problem Solving Strategy: Simplify a Problem
    Problem Solving Strategy: Make a List
12. Speed and Temperature 175
    Maths Fun
13. Symmetry, Patterns and Nets 181
    Everyday Maths, Maths Lab
14. Maps and Directions 194
    Think Smart, Worksheet
15. Data Handling 202
    Everyday Maths, Maths Lab
Practice Sheet 208
Answer Guide 220
I Have Learnt

Numbers to 99,99,999

The population of a city is 91,20,485.

91,20,485 is a 7-digit number.

It is read as, ninety-one lakh twenty thousand four hundred eighty-five.

<table>
<thead>
<tr>
<th>TL</th>
<th>L</th>
<th>TTh</th>
<th>Th</th>
<th>H</th>
<th>T</th>
<th>O</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>1</td>
<td>2</td>
<td>0</td>
<td>4</td>
<td>8</td>
<td>5</td>
</tr>
</tbody>
</table>

### Standard form

91,20,485

### Expanded form

90,00,000 + 1,00,000 + 20,000 + 0 + 400 + 80 + 5

### Face value and Place value

<table>
<thead>
<tr>
<th>Face value</th>
<th>Place value</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>5 Ones</td>
</tr>
<tr>
<td>8</td>
<td>8 Tens</td>
</tr>
<tr>
<td>4</td>
<td>4 Hundreds</td>
</tr>
<tr>
<td>0</td>
<td>0 Thousands</td>
</tr>
<tr>
<td>2</td>
<td>2 Ten Thousands</td>
</tr>
<tr>
<td>1</td>
<td>1 Lakh</td>
</tr>
<tr>
<td>9</td>
<td>9 Ten Lakhs</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Standard form</th>
<th>Expanded form</th>
</tr>
</thead>
<tbody>
<tr>
<td>91,20,485</td>
<td>90,00,000 + 1,00,000 + 20,000 + 0 + 400 + 80 + 5</td>
</tr>
</tbody>
</table>

### Forming Numbers

Form the greatest and the smallest 7-digit numbers using the digits 2, 7, 0, 8, 9, 1 and 3, without repeating any digit.

1. **Greatest Number**

   To form the greatest number, write all digits in descending order in the place value chart.

   So, 98,73,210 is the greatest number.

2. **Smallest Number**

   To form the smallest number, write all the digits in ascending order in the place value chart.

   So, 10,23,789 is the smallest number.
1. Complete the missing information in the given table.

<table>
<thead>
<tr>
<th>Standard form</th>
<th>Expanded form</th>
<th>Number name</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) 46,925</td>
<td>40,000 + 6,000 + 900 + 20 + 5</td>
<td>Forty-six thousand nine hundred twenty-five</td>
</tr>
<tr>
<td>b) 1,87,504</td>
<td>1,00,000 + 80,000 + 7,000 + 500 + 4</td>
<td></td>
</tr>
<tr>
<td>c) 25,47,923</td>
<td></td>
<td>Twenty-five lakh forty-seven thousand nine hundred twenty-three</td>
</tr>
<tr>
<td>d) 88,09,999</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2. Write the place value and face value of the encircled digits.

a) 5 \( \boxed{6} \) 2 5 8
   - Place value ______
   - Face value ______

b) 2 6 2 1 \( \boxed{0} \) 6
   - Place value ______
   - Face value ______

c) 5 \( \boxed{2} \) 9 1 3 7
   - Place value ______
   - Face value ______

3. Write down the smallest 7-digit number.

4. Form the smallest and the greatest number with the following digits without repeating the digits.

a) 4, 0, 2, 8, 7, 6, 3
   - Smallest: __________
   - Greatest: __________

b) 2, 3, 5, 9, 4
   - Smallest: __________
   - Greatest: __________

5. Fill in the blanks using > or <.

a) 7,14,935 _______ 7,41,395
   - _______

b) 10,91,243 _______ 10,09,124
   - _______

c) 4,18,689 _______ 4,18,688
   - _______

d) 31,43,434 _______ 31,44,344
   - _______

6. Arrange the numbers in

a) ascending order.
   - 6,14,945, 6,14,495, 6,49,145

b) descending order.
   - 70,71,823, 71,70,823, 77,00,823, 71,77,032
Warm Up

I have read in the newspaper that only 4 million people voted in the elections. How much is a million?

One million is equal to 10 lakhs. Million is used in the International number system.

Numbers beyond Lakhs

What do we get if 1 is added to 99,999,999?

we get 1 crore on adding 1 to 99,999,999.

The smallest 9-digit number is written as 10,00,00,000 and read as ten crore.

The crores period has two places — Ten crores and Crores.

Teaching Tip

Explain to the students that a comma is inserted between the digits of a numbers to separate each period starting from the extreme right position. This makes the reading and writing of numbers easier.
Place Value and Face Value

The **place value** of a digit is the product of the digit and the value of its place in the number.

The **face value** of a digit is the digit itself. It does not depend upon the position of the digit.

**Example**

Write the place value, face value and expanded form of 57,23,50,981.

<table>
<thead>
<tr>
<th>TC</th>
<th>C</th>
<th>TL</th>
<th>L</th>
<th>TTh</th>
<th>Th</th>
<th>H</th>
<th>T</th>
<th>O</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>7</td>
<td>2</td>
<td>3</td>
<td>5</td>
<td>0</td>
<td>9</td>
<td>8</td>
<td>1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Place value</th>
<th>Face value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 One</td>
<td>1</td>
</tr>
<tr>
<td>8 Tens</td>
<td>80</td>
</tr>
<tr>
<td>9 Hundreds</td>
<td>900</td>
</tr>
<tr>
<td>0 Thousands</td>
<td>0</td>
</tr>
<tr>
<td>5 Ten Thousands</td>
<td>50000</td>
</tr>
<tr>
<td>3 Lakhs</td>
<td>300000</td>
</tr>
<tr>
<td>2 Ten Lakhs</td>
<td>2000000</td>
</tr>
<tr>
<td>7 Crores</td>
<td>70000000</td>
</tr>
<tr>
<td>5 Ten Crores</td>
<td>500000000</td>
</tr>
</tbody>
</table>

Therefore,

<table>
<thead>
<tr>
<th>Standard form</th>
<th>Expanded form</th>
</tr>
</thead>
<tbody>
<tr>
<td>57,23,50,981</td>
<td>50,00,00,000 + 7,00,00,000 + 20,00,000 + 3,00,000 + 50,000 + 900 + 80 + 1</td>
</tr>
</tbody>
</table>

It is read as: **fifty-seven crore twenty-three lakh fifty thousand nine hundred eighty-one**.

**Everyday Maths**

Irfan’s father has bought a piece of land and some equipment for ₹10,14,35,860.

1. Complete the cheque for Irfan’s father by writing the numbers in words in the space provided against ‘Rupees’.

2. What are the place values of 1 in the above number? ____________________
Exercise 1.1

1. Write the place value of the coloured digit in the following numbers.
   a) 12,00,61,824  b) 29,32,70,075
   c) 20,00,30,542  d) 34,00,54,205

2. Write the place value and the face value of 7 in 30,76,84,342 and 5,83,72,670.

3. Write in numerals.
   a) Forty-four crore thirty-five lakh forty thousand nine
   b) Thirty crore seventy-four lakh fifteen thousand three hundred sixty-three
   c) Seven crore twenty-five lakh nine hundred two

4. Write the expanded form of the numbers given below.
   a) 30,90,50,102  b) 29,73,40,000
   c) 5,55,45,544  d) 6,98,75,432

5. Write the following numbers in words.
   a) 26253952  b) 708291094
   c) 675290165  d) 738298000

Think Smart

1. Write the greatest 8-digit number that has the smallest odd digit at its hundreds, ten thousands and lakhs place.
2. Write the smallest 9-digit number, which has the digit 7 at all its odd positions starting from the ones place.

Indian and International System of Numeration

We already know that the Indian system of numeration has Ones period (which includes hundreds, tens and ones), Thousands period (which includes ten thousands and thousands), Lakhs period (which includes ten lakhs and lakhs) and Crores period (which includes ten crores and crores).

There is another system of numeration used globally called the International system of numeration.
Let's see the difference between the two, the Indian and the International systems.

### Place Value Chart

<table>
<thead>
<tr>
<th>Periods</th>
<th>Crores</th>
<th>Lakhs</th>
<th>Thousands</th>
<th>Ones</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indian System</td>
<td>Ten Crores</td>
<td>Ten Lakhs</td>
<td>Ten Thousands</td>
<td>Hundreds</td>
</tr>
<tr>
<td></td>
<td>10,00,00,000</td>
<td>1,00,00,000</td>
<td>10,00,000</td>
<td>1,000</td>
</tr>
<tr>
<td>International System</td>
<td>Hundred Millions</td>
<td>Ten Millions</td>
<td>Millions</td>
<td>Ten Thousands</td>
</tr>
<tr>
<td></td>
<td>1,00,00,00,000</td>
<td>10,00,00,000</td>
<td>1,00,00,000</td>
<td>10,000</td>
</tr>
</tbody>
</table>

In the **Indian number system**, the place value chart has Ones, Thousands, Lakhs and Crores periods.

In the **International number system**, the place value chart has Ones, Thousands and Millions periods.

The above table shows that:
- 1 lakh = 100 thousands
- 10 lakhs = 1 million
- 1 crore = 10 millions
- 10 crores = 100 millions

The placement of commas in the digits of a number depends on the number system being used. Commas are placed at the end of each period beginning from the extreme right position.

Let’s see how the number 227628007 is represented on the place value chart of the different number systems.

### Indian Number System

<table>
<thead>
<tr>
<th>Crores</th>
<th>Lakhs</th>
<th>Thousands</th>
<th>Ones</th>
</tr>
</thead>
<tbody>
<tr>
<td>TC</td>
<td>C</td>
<td>TL</td>
<td>L</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>7</td>
<td>6</td>
</tr>
</tbody>
</table>

22,76,28,007 will be read as: twenty-two crore seventy-six lakh twenty-eight thousand seven.
Exercise 1.2

1. Insert commas in the numbers according to the International system to separate the periods and write the digits in the place value chart.

<table>
<thead>
<tr>
<th>Numbers</th>
<th>HM</th>
<th>TM</th>
<th>M</th>
<th>HTh</th>
<th>TTh</th>
<th>Th</th>
<th>H</th>
<th>T</th>
<th>O</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) 21621332</td>
<td>2</td>
<td>2</td>
<td>7</td>
<td>6</td>
<td>2</td>
<td>8</td>
<td>0</td>
<td>0</td>
<td>7</td>
</tr>
<tr>
<td>b) 153200126</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c) 562076219</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2. Write the place value of the coloured digit using the International system of numeration.
   a) 261752812  b) 52131420  c) 298543002

3. Write the following numbers according to Indian and International number system, using both figures and words.
   a) 52012459  b) 10246189  c) 645060125  d) 907004236

4. Using the International place value chart, write the numeral for each of the following numbers, placing commas at the right place.
   a) Six hundred thousand ninety-six
   b) Eight hundred five thousand nine hundred twenty-four
   c) Twenty two million three hundred ten thousand four hundred

5. Fill in the blanks.
   a) 100 millions = _____ crore
   b) 1 million = _______ lakh
   c) There are _____ zeros in 20 million.
Comparing and Ordering Numbers

Predecessor and Successor

The number just before a given number is called its predecessor.

So, the predecessor of 45,38,62,297 is 45,38,62,296.

The number next to a given number is called its successor.

So, the successor of 3,45,62,718 is 3,45,62,719.

Comparing Numbers

Which number is smaller: 23,48,95,187 or 32,85,93,291?

Start comparing the digits in the given numbers from the extreme left.

<table>
<thead>
<tr>
<th>TC</th>
<th>C</th>
<th>TL</th>
<th>L</th>
<th>TTh</th>
<th>Th</th>
<th>H</th>
<th>T</th>
<th>O</th>
</tr>
</thead>
<tbody>
<tr>
<td>23,48,95,187</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>8</td>
<td>9</td>
<td>5</td>
<td>1</td>
<td>8</td>
</tr>
<tr>
<td>32,85,93,291</td>
<td>3</td>
<td>2</td>
<td>8</td>
<td>5</td>
<td>9</td>
<td>3</td>
<td>2</td>
<td>9</td>
</tr>
</tbody>
</table>

2 TC < 3 TC

So, 23,48,95,187 is smaller than 32,85,93,291.
Example 1
Which number is greater: 83,62,27,901 or 83,90,37,283?

<table>
<thead>
<tr>
<th>TC</th>
<th>C</th>
<th>TL</th>
<th>L</th>
<th>TTh</th>
<th>Th</th>
<th>H</th>
<th>T</th>
<th>O</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>3</td>
<td>6</td>
<td>2</td>
<td>2</td>
<td>7</td>
<td>9</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>8</td>
<td>3</td>
<td>9</td>
<td>0</td>
<td>3</td>
<td>7</td>
<td>2</td>
<td>8</td>
<td>3</td>
</tr>
</tbody>
</table>

8 TC = 8 TC  
9 TL > 6 TL  
3 C = 3 C

So, 83,90,37,283 is greater than 83,62,27,901.

Ordering Numbers
In ascending order, the numbers are arranged from the smallest to the greatest.
In descending order, the numbers are arranged from the greatest to the smallest.

Example 2
Arrange 8,71,29,684; 41,89,23,685; 41,98,92,347 and 40,57,39,712 in both ascending and descending order.

Here, there are three 9-digit numbers and one 8-digit number. So, the 8-digit number is the smallest number of all. Therefore, we need to compare the rest of the numbers only.

Ascending order: 8,71,29,684 < 40,57,39,712 < 41,89,23,685 < 41,98,92,347
Descending order: 41,98,92,347 > 41,89,23,685 > 40,57,39,712 > 8,71,29,684

Mental Maths
Match each number in column A to a number in column B such that the number in column B is 1,00,000 less than the number in column A.

<table>
<thead>
<tr>
<th>Column A</th>
<th>Column B</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) 1,00,00,000</td>
<td>i) 9,00,000</td>
</tr>
<tr>
<td>b) 7,90,52,468</td>
<td>ii) 87,54,20,025</td>
</tr>
<tr>
<td>c) 10,00,000</td>
<td>iii) 99,00,000</td>
</tr>
<tr>
<td>d) 87,55,20,025</td>
<td>iv) 7,89,52,468</td>
</tr>
</tbody>
</table>
1. Fill in the blanks.
   a) 6,26,24,536 is the successor of ___________.
   b) 7,34,97,967 is the predecessor of ____________.
   c) ____________ is the successor of 5,34,29999.
   d) ____________ is the predecessor of 18,38,55,000.

2. a) Write the successor of the greatest 8-digit number.
    b) Write the predecessor of the smallest 9-digit number.

3. Put <, > or = in the box to make a correct statement.
   a) 1,92,43,807  □  1,93,53,907
   b) 48,35,12,072  □  48,33,20,071
   c) 3,41,69,355  □  38,41,69,355
   d) 10,00,97,650  □  9,10,20,045

4. Arrange the numbers given below in ascending order.
   a) 2,27,64,123    7,52,64,123    5,28,64,123
   b) 9,90,90,982    9,90,30,900    27,90,30,900

5. Arrange the numbers given below in descending order.
   a) 73,49,37,826    73,50,44,826    73,50,04,826
   b) 9,24,40,500    4,39,499    24,47,500

Rounding Off Numbers

Rounding Off to the Nearest Ten Thousands
To round off a number to the nearest 10,000s, we look for the thousands digit.
If the thousands digit is less than 5, round off the number to the nearest lower multiple of 10,000.
If the thousands digit is 5 or greater than 5, round off the number to the nearest higher multiple of 10,000.

<table>
<thead>
<tr>
<th>L</th>
<th>TTh</th>
<th>Th</th>
<th>H</th>
<th>T</th>
<th>O</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>7</td>
<td>0</td>
<td>8</td>
<td>2</td>
<td>5</td>
</tr>
</tbody>
</table>

0 Th < 5 Th
470,825 → 470,000

The digit in the thousands place is less than 5.
So, the number is rounded off to the same ten thousand, that is, 470,000.
Rounding Off to the Nearest lakhs

To round off a number to the nearest lakhs, we look for the ten thousands digit. If the ten thousands digit is less than 5, round off the number to the nearest lower multiple of lakh. If the ten thousands digit is 5 or greater than 5, round off the number to the nearest higher multiple of lakh.

<table>
<thead>
<tr>
<th>TL</th>
<th>L</th>
<th>TTh</th>
<th>Th</th>
<th>H</th>
<th>T</th>
<th>O</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>2</td>
<td>9</td>
<td>6</td>
<td>2</td>
<td>5</td>
<td>3</td>
</tr>
</tbody>
</table>

The digit in the ten thousands place is greater than 5. So, the number is rounded up to the next lakh, that is, 53,00,000.

Exercise 1.4

Round off each number to the nearest ten thousand and lakh.

1. 3,92,718    2. 5,95,634    3. 8,29,177   4. 4,72,860
5. 6,34,589    6. 7,95,326    7. 8,54,126   8. 3,85,621
9. 28,75,899   10. 59,01,929  11. 58,49,427  12. 23,45,876

Roman Numerals

The Roman numeral system is made up of seven letters of the English alphabet to denote numbers. These letters and their corresponding values are given below.

<table>
<thead>
<tr>
<th>Roman numeral</th>
<th>I</th>
<th>V</th>
<th>X</th>
<th>L</th>
<th>C</th>
<th>D</th>
<th>M</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hindu-Arabic numeral</td>
<td>1</td>
<td>5</td>
<td>10</td>
<td>50</td>
<td>100</td>
<td>500</td>
<td>1000</td>
</tr>
</tbody>
</table>

- There is no symbol for 0 in the Roman numeral system.
- The Roman numeral system does not follow a place value system.

**Rule 1**

Repetition of letters denotes addition. Letters (I, X, C, M) can be repeated up to 3 times, unlike V, L and D, which are never repeated.

- III = 1 + 1 + 1 = 3
- XXX = 10 + 10 + 10 = 30
- CCC = 100 + 100 + 100 = 300
- MMM = 1000 + 1000 + 1000 = 3000
Rule 2
One or more letters placed after a letter of a greater value implies addition.

\[
\begin{align*}
\text{XI} &= 10 + 1 = 11 \\
\text{CLX} &= 100 + 50 + 10 = 160 \\
\text{MC} &= 1000 + 100 = 1100
\end{align*}
\]

Rule 3
One or more letters placed before the letter of a greater value implies subtraction.

\[
\begin{align*}
\text{IX} &= 10 - 1 = 9 \\
\text{XC} &= 100 - 10 = 90 \\
\text{CM} &= 1000 - 100 = 900
\end{align*}
\]

Some points to remember:
1. Only I, X or C can be subtracted.
2. V, L and D cannot be subtracted.
3. I can be subtracted from V and X only.
4. X can be subtracted from L and C only.
5. C can be subtracted from D and M only.

Rule 4
The value of some Roman numerals can be determined by writing them in expanded form.

\[
\begin{align*}
\text{CM} \times \text{VI} &= 900 + 10 + 6 = 916
\end{align*}
\]

\[
\begin{align*}
\text{2300} &= 1000 + 1000 + 100 + 100 + 100 \\
&= \text{MMCCC}
\end{align*}
\]

What number does CMXVI stand for?

\[
\begin{align*}
\text{CM} \times \text{X} \times \text{VI} &= 900 + 10 + 6 = 916
\end{align*}
\]

Mind It
14 = X, 4
14 = XI, 9
15 = V, 5
15 = XV, 10

Everyday Maths
Write the age of your family members in Roman numerals.

3. What numbers do these Roman numerals stand for?

\[
\begin{align*}
\text{a)} \text{LXXI} & \quad \text{b)} \text{XCVI} & \quad \text{c)} \text{LXXVIII} & \quad \text{d)} \text{CX} \\
\text{e)} \text{DCX} & \quad \text{f)} \text{CMXVI} & \quad \text{g)} \text{DCCCI} & \quad \text{h)} \text{LIX}
\end{align*}
\]

4. Write the Roman numerals for each of the following:

\[
\begin{align*}
\text{a)} \text{208} & \quad \text{b)} \text{370} & \quad \text{c)} \text{523} & \quad \text{d)} \text{314} \\
\text{e)} \text{752} & \quad \text{f)} \text{183} & \quad \text{g)} \text{147} & \quad \text{h)} \text{162}
\end{align*}
\]

Exercise 1.5

1. Fill in the blanks using Roman numerals.

\[
\begin{align*}
\text{a)} \text{March has } & \text{ days.} & \text{b)} \text{ A day has } & \text{ hours.} \\
\text{c)} \text{ A week has } & \text{ days.} & \text{d)} \text{ A year has } & \text{ months.} \\
\text{e)} \text{ There are } & \text{ days in a year.}
\end{align*}
\]

2. State whether each statement is true or false.

\[
\begin{align*}
\text{a)} \text{ CCC = 301} & \quad \text{b)} \text{ CX = 110} \\
\text{c)} \text{ IIX = 9} & \quad \text{d)} \text{ CML = 200}
\end{align*}
\]

3. What numbers do these Roman numerals stand for?

\[
\begin{align*}
\text{a)} \text{LXXI} & \quad \text{b)} \text{XCVI} & \quad \text{c)} \text{LXXVIII} & \quad \text{d)} \text{CX} \\
\text{e)} \text{DCX} & \quad \text{f)} \text{CMXVI} & \quad \text{g)} \text{DCCCI} & \quad \text{h)} \text{LIX}
\end{align*}
\]

4. Write the Roman numerals for each of the following:

\[
\begin{align*}
\text{a)} \text{208} & \quad \text{b)} \text{370} & \quad \text{c)} \text{523} & \quad \text{d)} \text{314} \\
\text{e)} \text{752} & \quad \text{f)} \text{183} & \quad \text{g)} \text{147} & \quad \text{h)} \text{162}
\end{align*}
\]
This table shows the approximate population of some countries in Asia in 2018. Use the data in the table given below to answer the following questions.

<table>
<thead>
<tr>
<th>Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indonesia  26,67,94,980</td>
</tr>
<tr>
<td>Bangladesh  16,63,68,149</td>
</tr>
<tr>
<td>Saudi Arabia  3,35,54,343</td>
</tr>
<tr>
<td>Thailand  6,91,83,173</td>
</tr>
</tbody>
</table>

1. Write the population of the countries given below.
   Then, fill the boxes with < or > to make each sentence true.
   a) Japan  Bangladesh
   b) Sri Lanka  Saudi Arabia
   c) Thailand  Bangladesh
   d) Indonesia  Pakistan

2. Which country has the smallest population? 
   __________

3. Which countries have population greater than 15 crores?
   ______________________________________________________________

4. Which country’s population is closest to 7 crores? 
   __________

5. Arrange the countries on the basis of their population sizes in descending order.
   a) __________
   b) __________
   c) __________
   d) __________
   e) __________
   f) __________
   g) __________
   h) __________
**Aim:**
To practice the conversion of Hindu-Arabic numerals to Roman numerals.
To practice mathematical concepts on Roman numerals.

**Requirements:**
Number cards from 0 to 9 and a bowl

**Steps:**
1. Pair the students sitting next to each other.
2. Call a student randomly and tell him/her to pick two or more cards. Ask the students to show the numbers to the class.
3. Ask the students to write the Roman numerals for the numbers shown.

<table>
<thead>
<tr>
<th>1</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>=</td>
<td>XIV</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>0</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>=</td>
<td>VIII</td>
</tr>
</tbody>
</table>

4. Pose different questions like ‘form the greatest and the smallest number’, ‘round off the numbers’, ‘add the numbers’ and so on. Students are required to give their answers in Roman numerals.

5. Ask random pairs to answer these questions.

6. The pair that gives the correct answer gets two points.

7. Repeat steps 2-6 until the time permits.

8. The pair with the maximum points will be the winner.
1. Add 2,92,821 and 6,10,238.

\[
\begin{array}{c}
1 & 2 & 9 & 2 & 8 & 2 & 1 \\
+ & 6 & 1 & 0 & 2 & 3 & 8 \\
\hline
9 & 0 & 3 & 0 & 5 & 9 \\
\end{array}
\]

\[2,92,821 + 6,10,238 = 9,03,059\]

2. Subtract 3,84,257 from 8,40,366.

\[
\begin{array}{c}
8 & 4 & 0 & 3 & 6 & 6 \\
- & 3 & 8 & 4 & 2 & 5 & 7 \\
\hline
4 & 5 & 6 & 1 & 0 & 9 \\
\end{array}
\]

\[8,40,366 - 3,84,257 = 4,56,109\]

3. Multiply 1,245 by 275.

\[
\begin{array}{c}
1 & 2 & 4 & 5 \\
\times & 2 & 7 & 5 \\
\hline
6 & 2 & 2 & 5 \\
8 & 7 & 1 & 5 & 0 \\
\hline
200 + 70 + 5 \\
1245 \times 5 \\
1245 \times 70 \\
1245 \times 200 \\
6225 + 87150 + 249000 \\
\end{array}
\]

\[1,245 \times 275 = 3,42,375\]

4. Divide 34,856 by 12.

\[
\begin{array}{c|c}
2 & 9 & 0 & 4 \\
\hline
12 & 3 & 4 & 8 & 5 & 6 \\
- & 2 & 4 \\
- & 1 & 0 & 8 \\
\hline
- & 1 & 0 & 8 \\
- & 0 \\
\hline
- & 5 & 6 \\
- & 4 & 8 \\
\hline
- & 5 & 6 & 8 \\
\end{array}
\]

\[34,856 \div 12 = 2904 \text{ R} 8\]
1. Solve the following:

   a) \[ \begin{array}{cccccc}
   L & T & Th & Th & H & T \\
   5 & 2 & 6 & 5 & 2 & 8 \\
   + & 2 & 0 & 1 & 6 & 2 & 3 \\
   \hline
   \end{array} \]
   \[ \begin{array}{cccccc}
   L & T & Th & Th & H & T \\
   \hline
   \end{array} \]

   b) \[ \begin{array}{cccccc}
   L & T & Th & Th & H & T \\
   2 & 5 & 6 & 1 & 2 & 8 \\
   + & 9 & 2 & 3 & 2 & 1 \\
   \hline
   \end{array} \]

   c) \[ \begin{array}{cccccc}
   L & T & Th & Th & H & T \\
   7 & 0 & 0 & 0 & 3 & 9 \\
   - & 4 & 6 & 2 & 3 & 4 \\
   \hline
   \end{array} \]

   d) \[ \begin{array}{cccccc}
   L & T & Th & Th & H & T \\
   4 & 7 & 0 & 8 & 3 & 9 \\
   - & 3 & 5 & 2 & 9 & 3 & 8 \\
   \hline
   \end{array} \]

   e) \[ \begin{array}{cccccc}
   L & T & Th & Th & H & T \\
   4 & 3 & 2 & 6 \\
   \times & 1 & 2 & 3 \\
   \hline
   \end{array} \]

   f) \[ \begin{array}{cccccc}
   L & T & Th & Th & H & T \\
   2 & 2 & 5 & 3 \\
   \times & 2 & 9 & 2 \\
   \hline
   \end{array} \]

   g) \[ 12 \overline{74653} \]

   h) \[ 13 \overline{89826} \]

2. a) A bike company produced 1,24,665 bikes in 2008; 1,90,895 bikes in 2009; and 2,05,725 bikes in 2010. What was the total number of bikes produced in those three years?

   b) If 4,29,527 bikes were sold in these 3 years, how many bikes were not sold?

3. If a truck can carry 6745 kg of wheat, how much wheat can 19 trucks carry?

4. A total of 12,098 nails are to be packed in 16 boxes.
   a) How many nails will each box have?
   b) How many nails will be left over?
The newspaper says that the population of three countries is 2,15,64,576; 6,24,15,305 and 1,15,23,412. How could we add these numbers?

**Example 1**
Add 2,15,64,576; 6,24,15,305 and 1,15,23,412.

First, write the numbers based on their places in columns.

<table>
<thead>
<tr>
<th>C</th>
<th>TL</th>
<th>L</th>
<th>TTh</th>
<th>Th</th>
<th>H</th>
<th>T</th>
<th>O</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>1</td>
<td>5</td>
<td>6</td>
<td>4</td>
<td>5</td>
<td>7</td>
<td>6</td>
</tr>
<tr>
<td>6</td>
<td>2</td>
<td>4</td>
<td>1</td>
<td>5</td>
<td>3</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>+</td>
<td>1</td>
<td>5</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>9</td>
<td>5</td>
<td>5</td>
<td>0</td>
<td>2</td>
<td>9</td>
<td>3</td>
</tr>
</tbody>
</table>

6 + 5 + 2 = 13, 13 Ones = 1 Ten + 3 Ones
1 + 7 + 0 + 1 = 9, 9 Tens
5 + 3 + 4 = 12
12 Hundreds = 1 Thousand + 2 Hundreds
1 + 4 + 5 + 3 = 13
13 Thousands = 1 Ten Thousand + 3 Thousands
1 + 6 + 1 + 2 = 10
10 Ten Thousands = 1 Lakh
1 + 5 + 4 + 5 = 15, 15 Lakhs = 1 Ten Lakh + 5 Lakhs
1 + 1 + 2 + 1 = 5, 5 Ten Lakhs
2 + 6 + 1 = 9, 9 Crores

2,15,64,576 + 6,24,15,305 + 1,15,23,412 = 9,55,03,293
Example 2  There are 75,13,425 men, 62,57,625 women and 11,25,875 children in a city. What is the total population of the city?

<table>
<thead>
<tr>
<th>Men</th>
<th>Women</th>
<th>Children</th>
</tr>
</thead>
<tbody>
<tr>
<td>75,13,425</td>
<td>62,57,625</td>
<td>11,25,875</td>
</tr>
</tbody>
</table>

\[ 75,13,425 + 62,57,625 + 11,25,875 = 1,48,96,925 \]

The total population of the city is 1,48,96,925.

Properties of Addition

Order Property: If the order of the two addends is changed, the sum is not affected.

\[
\begin{align*}
1,04,972 + 3,26,302 &= 4,31,274 \\
3,26,302 + 1,04,972 &= 4,31,274
\end{align*}
\]

Grouping Property: The order in which addends are grouped does not change the final sum.

\[
\begin{align*}
(52,563 + 12,345) + 21,462 &= (64,908) + 21,462 = 86,370 \\
52,563 + (12,345 + 21,462) &= 52,563 + (33,807) = 86,370
\end{align*}
\]

So, \((52,563 + 12,345) + 21,462 = 52,563 + (12,345 + 21,462)\)

Property of Zero: The sum of any number and 0 is the number itself.

\[
\begin{align*}
42,635 + 0 &= 42,635 \\
0 + 71,68,798 &= 71,68,798
\end{align*}
\]

Exercise 2.1

1. Add the following.

a) \[
\begin{align*}
\text{TL} & \quad \text{L} & \quad \text{TTh} & \quad \text{Th} & \quad \text{H} & \quad \text{T} & \quad \text{O} \\
6 & & 2 & & 1 & & 2 \\
\hspace{1.5cm}+ & & 1 & & 2 & & 3 \\
\hline & & 7 & & 3 & & 3
\end{align*}
\]

b) \[
\begin{align*}
\text{TL} & \quad \text{L} & \quad \text{TTh} & \quad \text{Th} & \quad \text{H} & \quad \text{T} & \quad \text{O} \\
2 & & 1 & & 9 & & 2 \\
\hspace{1.5cm}+ & & 1 & & 6 & & 2 \\
\hline & & 3 & & 4 & & 5
\end{align*}
\]

c) \[
\begin{align*}
\text{C} & \quad \text{TL} & \quad \text{L} & \quad \text{TTh} & \quad \text{Th} & \quad \text{H} & \quad \text{T} & \quad \text{O} \\
7 & & 5 & & 1 & & 3 \\
\hspace{1.5cm}+ & & 5 & & 1 & & 6 \\
\hline & & 2 & & 6 & & 2
\end{align*}
\]

d) \[
\begin{align*}
\text{C} & \quad \text{TL} & \quad \text{L} & \quad \text{TTh} & \quad \text{Th} & \quad \text{H} & \quad \text{T} & \quad \text{O} \\
1 & & 6 & & 2 & & 3 \\
\hspace{1.5cm}+ & & 6 & & 0 & & 7 \\
\hline & & 7 & & 3 & & 4
\end{align*}
\]
2. Find the sum of the following.
   a) $1,43,256 + 1,23,146 + 5,26,321$
   b) $7,43,925 + 5,12,45,678$
   c) $5,25,23,438 + 1,14,36,890 + 12$
   d) $6,65,23,232 + 1,42,542$

3. Fill in the blanks.
   a) $2,76,212 + 2,628 = \underline{\hspace{2cm}} + 2,76,212$
   b) $12,408 + 0 = \underline{\hspace{2cm}}$
   c) $28,482 + (51,760 + 82,884) = (28,482 + 51,760) + \underline{\hspace{2cm}}$

4. Solve the following word problems by drawing model.
   a) The population of town A is 4,12,31,527 and that of town B is 5,27,84,233. Find the total population of the two towns.
   
   b) Rajesh earned ₹52,32,000 last year. This year, he earns ₹50,12,320. What is his total earning for both years?
   
   c) In an election, 1,29,52,179 votes were found valid, 12,68,142 votes were invalid and 72,898 voters did not show up. How many votes were registered in all?
   
   d) In January, 2,68,12,528 passengers travelled by metro train to work on Day one; 2,52,23,100 travelled on Day two and 12,58,680 passengers travelled on Day three. How many passengers travelled by the metro on those three days altogether?

---

**Example 1** Subtract 71,00,799 from 9,00,91,099.

\[
\begin{array}{c|c|c|c|c|c|c|c}
\text{C} & \text{TL} & \text{L} & \text{TTh} & \text{Th} & \text{H} & \text{T} & \text{O} \\
8 & 9 & 1 & 0 & 1 & 0 & 9 & 9 \\
- & 7 & 1 & 0 & 0 & 7 & 9 & 9 \\
\hline
8 & 2 & 9 & 9 & 0 & 3 & 0 & 0 \\
\end{array}
\]

\[
9,00,91,099 - 71,00,799 = 82,99,0300
\]
Example 2  The population of a town is 98,73,562. Out of these, 52,59,623 are males. How many females are there in the town?

\[
\begin{array}{c|c}
\text{Total} & \\
\hline
\text{Males} & 52,59,623 \\
\text{Females} & ?
\end{array}
\]

\[98,73,562 - 52,59,623 = 46,13,939\]

So, there are 46,13,939 females in the town.

Properties of Subtraction

Order Property: The order of numbers involved in subtraction matters.

\[
\begin{array}{c}
2,00,000 - 1,00,000 = 1,00,000 \\
1,00,000 - 2,00,000 = ?
\end{array}
\]

Property of Zero: When zero is subtracted from a number, the difference is the number itself.

\[
\begin{array}{c}
16,25,123 - 0 = 16,25,123 \\
5,62,532 - 0 = 5,62,532
\end{array}
\]

Subtraction of the Number Itself: When a number is subtracted from itself, the difference is zero.

\[
\begin{array}{c}
9,56,71,593 - 9,56,71,593 = 0 \\
16,25,123 - 16,25,123 = 0
\end{array}
\]

Finding the Missing Minuend or Subtrahend

Example 3  Find the number from which 96,12,523 must be subtracted to give 1,96,824.

\[
\begin{array}{ccccccc}
\text{TL} & \text{L} & \text{TTh} & \text{Th} & \text{H} & \text{T} & \text{O} \\
\hline
\text{Minuend} & \text{Subtrahend} & \text{Difference} \\
9 & 6 & 1 & 2 & 5 & 2 & 3 \\
- & 9 & 6 & 1 & 2 & 5 & 2 & 3 \\
\hline
1 & 9 & 6 & 8 & 2 & 4
\end{array}
\]

• To find the missing minuend, add the given subtrahend to the difference.

So, 96,12,523 must be subtracted from 98,09,347 to get 1,96,824.
Teaching Tip
Make students observe that the properties of addition and subtraction hold true for both greater and smaller numbers, except for: A greater number cannot be subtracted from a smaller number.
5. Solve the following questions by drawing model.

a) Find the number from which 28,84,321 must be subtracted to get 11,23,123.

b) In an election, party A got 28,62,199 votes and party B got 27,28,164 votes. Who got more votes; and how many more?

c) Rajesh bought a house for ₹1,78,25,194. He sold it for ₹1,99,000 less than what he had paid. How much did he sell the house for?

d) Suman earned ₹25,28,000 in two years. Her sister, Seema, earned ₹2,99,000 less than her. How much money did Seema earn?

Problems on Addition and Subtraction

Example 1
Evaluate 1,56,25,823 + 3,12,96,253 – 41,32,103.

1. Add 1,56,25,823 and 3,12,96,253.

<table>
<thead>
<tr>
<th>C</th>
<th>TL</th>
<th>L</th>
<th>TTh</th>
<th>Th</th>
<th>H</th>
<th>T</th>
<th>O</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>5</td>
<td>6</td>
<td>2</td>
<td>5</td>
<td>8</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>+</td>
<td>3</td>
<td>1</td>
<td>2</td>
<td>9</td>
<td>6</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>6</td>
<td>9</td>
<td>2</td>
<td>0</td>
<td>7</td>
<td>6</td>
</tr>
</tbody>
</table>

2. Subtract 41,32,103 from the sum of the first two numbers.

<table>
<thead>
<tr>
<th>C</th>
<th>TL</th>
<th>L</th>
<th>TTh</th>
<th>Th</th>
<th>H</th>
<th>T</th>
<th>O</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>6</td>
<td>8</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>–</td>
<td>4</td>
<td>1</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>2</td>
<td>7</td>
<td>8</td>
<td>9</td>
<td>9</td>
<td>7</td>
</tr>
</tbody>
</table>

1,56,25,823 + 3,12,96,253 – 41,32,103 = 4,27,89,973

Example 2
In the first year, a farm produced 69,23,123 kg of oranges. In the second year, it produced 75,19,233 kg of oranges. If 2,69,002 kg were rotten and the farm sold the remaining quantity, how many oranges were sold in both years?

Here, we need to find the total production of oranges in both years.

<table>
<thead>
<tr>
<th>69,23,123</th>
<th>75,19,233</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>First year</strong></td>
<td><strong>Second year</strong></td>
</tr>
</tbody>
</table>

69,23,123 + 75,19,233 = 1,44,42,356

The total oranges produced was 1,44,42,356.

Now, subtract the rotten oranges from the total oranges produced.
1. Evaluate the following.
   a) \(38,93,529 + 4,82,139 - 16,253\)
   b) \(78,99,900 + 9,72,83,214 - 9,99,999\)
   c) \(71,49,658 + 21,998 - 129\)
   d) \(34,29,614 + 3,39,93,244 - 6,918\)

2. Solve the following questions by drawing model.
   a) A large stadium can hold 2,16,000 people. On a particular day, there were 1,19,880 people, of which 64,655 were women. How many were men? How many seats were vacant?
   b) The total number of men, women and children in a town is 98,25,187. If the number of men is 43,27,834 and the number of women is 37,28,153; how many children are there in the town?
   c) A society collected ₹12,35,820 for charity fund in one year and ₹28,25,320 in another year. If they used ₹26,72,500 out of the total amount collected in the two years, how much money are they left with now?
   d) Find the number which when subtracted from the sum of 3,41,329 and 9,17,38,547 gives 49,39,435 as the difference.

Think Smart

Subtract the sum of the greatest 5-digit and 6-digit numbers from the difference of the greatest 8-digit and the smallest 7-digit numbers.

Exercise 2.3

1. Evaluate the following.
   a) \(38,93,529 + 4,82,139 - 16,253\)
   b) \(78,99,900 + 9,72,83,214 - 9,99,999\)
   c) \(71,49,658 + 21,998 - 129\)
   d) \(34,29,614 + 3,39,93,244 - 6,918\)

2. Solve the following questions by drawing model.
   a) A large stadium can hold 2,16,000 people. On a particular day, there were 1,19,880 people, of which 64,655 were women. How many were men? How many seats were vacant?
   b) The total number of men, women and children in a town is 98,25,187. If the number of men is 43,27,834 and the number of women is 37,28,153; how many children are there in the town?
   c) A society collected ₹12,35,820 for charity fund in one year and ₹28,25,320 in another year. If they used ₹26,72,500 out of the total amount collected in the two years, how much money are they left with now?
   d) Find the number which when subtracted from the sum of 3,41,329 and 9,17,38,547 gives 49,39,435 as the difference.

Multiplication

Example 1  Multiply 34,728 by 35.

1. Multiply by Ones.

   \[
   \begin{array}{cccccc}
   & \text{L} & \text{TTh} & \text{Th} & \text{H} & \text{T} & \text{O} \\
   & 3 & 4 & 7 & 2 & 8 \\
   \times & 3 & 5 \\
   \hline
   1 & 7 & 3 & 6 & 4 & 0 \\
   \end{array}
   \]

2. Multiply by Tens.

   \[
   \begin{array}{cccccc}
   \text{TL} & \text{L} & \text{TTh} & \text{Th} & \text{H} & \text{T} & \text{O} \\
   1 & 0 & 4 & 1 & 8 & 4 & 0 \\
   \hline
   \end{array}
   \]

3. Add the products of Ones and Tens.

   \[
   \begin{array}{cccccc}
   \text{TL} & \text{L} & \text{TTh} & \text{Th} & \text{H} & \text{T} & \text{O} \\
   1 & 2 & 1 & 5 & 4 & 8 & 0 \\
   \end{array}
   \]

\[34,728 \times 35 = 12,15,480\]
Example 2  Multiply 64,728 by 415.

1. Multiply by Ones.

\[
64,728 \times 415 = 2,68,62,120
\]

Example 3  Multiply 1,39,645 by 57.

1. Multiply by Ones.

\[
1,39,645 \times 57 = 79,59,765
\]

Example 4

A wholesaler has 46 packets of greeting cards. Each packet contains 3675 greeting cards. How many greeting cards are available with the wholesaler?

\[
3675 \times 46 = 1,69,050
\]

So, 1,69,050 greeting cards are available with the wholesaler.
Properties of Multiplication

**Order Property of Multiplication:** If the order of two numbers is changed in a multiplication sum, the product remains the same.

\[
\begin{align*}
1,35,891 \times 9 &= 12,23,019 \\
9 \times 1,35,891 &= 12,23,019
\end{align*}
\]

**Grouping Property of Multiplication:** If the grouping of numbers in a multiplication sum is changed, the product remains the same.

\[
\begin{align*}
15 \times (10 \times 12) &= 15 \times 120 \\
&= 1800 \\
(15 \times 10) \times 12 &= 150 \times 12 \\
&= 1800 \\
(15 \times 12) \times 10 &= 180 \times 10 \\
&= 1800
\end{align*}
\]

**Property of Zero:** If a number is multiplied by 0, the product is zero.

\[
\begin{align*}
5263 \times 0 &= 0 \\
0 \times 5263 &= 0
\end{align*}
\]

**Property of One:** If a number is multiplied by 1, the product is the number itself.

\[
\begin{align*}
5 \times 1 &= 5 \\
55 \times 1 &= 55 \\
555 \times 1 &= 555
\end{align*}
\]

**Distributive Property of Multiplication:** The product of the sum (or difference) of two numbers with a third number remains the same, even if the two numbers are multiplied separately by the third number and then added (or subtracted).

\[
\begin{align*}
(50 + 20) \times 10 &= 70 \times 10 = 700 \\
(50 + 20) \times 10 &= (50 \times 10) + (20 \times 10) \\
&= 500 + 200 = 700 \\
(50 - 20) \times 10 &= 30 \times 10 = 300 \\
(50 - 20) \times 10 &= (50 \times 10) - (20 \times 10) \\
&= 500 - 200 = 300
\end{align*}
\]

**Lattice Method of Multiplication**

The lattice method is an another way of multiplying numbers. In this method, numbers are multiplied using grid. This method breaks the whole process of multiplication into smaller steps.

**Example 5** Multiply 4381 by 243.

**Step 1**

First, draw a grid having as many rows and columns as the number of digits in the multiplicand and the multiplier have. Here is the grid shown for multiplying a 4-digit number by a 3-digit number.
Step 2
Draw a diagonal through each box from the upper right corner to the lower left corner and write one number at the top and the other down the right side.

Step 3
Multiply the digits at the head of each row and column. Write the product in the square of the grid so that the tens are in the upper (diagonal) half of the square and the ones are in lower half.
Further, if the product does not have a tens digit, write a zero in the vacant triangle.
For example 3 × 1 = 3, so we write 0 in the upper half of the square and 3 in lower half i.e. 03.

Step 4
Now, add the numbers in the grid along the diagonals, starting from the lower right corner and carry tens into the top of the next diagonal.

Step 5
Write the answer using digits starting down the left of the grid and continuing across the bottom.

\[
4381 \times 243 = 10,64,583
\]

Exercise 2.4

1. Fill in the blanks.
   a) \(37 \times \underline{\quad} = 0\)  
   b) \(15 \times (\underline{\quad} \times 12) = (23 \times \underline{\quad}) \times 15\)
   c) \(0 \times 1396 = \underline{\quad}\)  
   d) \(179 \times 855 = 855 \times \underline{\quad}\)
   e) \(92,159 \times \underline{\quad} = 92,159\)  
   f) \((12 \times 33) \times 21 = \underline{\quad} \times (21 \times 33)\)

2. Find the product by direct multiplication and using the lattice method.
   a) 3,782 and 29  
   b) 8,603 and 273  
   c) 9,027 and 406

3. Solve the following word problems.
   a) A trip was organised for 6287 people by the RWA during their winter holidays. Each person paid ₹525 for it. How much money was collected altogether?
b) A container can hold 37,827 litres of a liquid. If there are 125 such containers, how much liquid will be stored in them?

c) In a factory 37,629 items are produced every day. How many items will be produced in one year and 2 weeks? (Hint: one year = 365 days).

d) Multiply the greatest 5-digit number by the greatest 3-digit number.

**Problem Solving Strategy: Look for a Pattern**

<table>
<thead>
<tr>
<th>Numbers</th>
<th>Product</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Th</td>
</tr>
<tr>
<td>$3 \times 10$ =</td>
<td>3</td>
</tr>
<tr>
<td>$3 \times 100$ =</td>
<td>3</td>
</tr>
<tr>
<td>$3 \times 1000$ =</td>
<td>3</td>
</tr>
</tbody>
</table>

How many zeros will be there in the product of 3 and 10000?

$$3 \times 10 = 30$$
1 zero         1 zero

$$3 \times 100 = 300$$
2 zeros         2 zeros

$$3 \times 1000 = 3000$$
3 zeros           3 zeros

$$3 \times 10000 = 30000$$
4 zeros           4 zeros

Look for a pattern.

The total number of zeros on both the sides of ‘equal to’ sign is the same.

Put 4 zeros in the product of 3 and 10000.

To multiply a number by 10, 100, 1000 and so on, put as many zeros in the product as the total number of zeros in multiplicand and in the multiplier.

**Exercise 2.5**

Find the product of the following.

1. $7 \times 10$
2. $4 \times 100$
3. $9 \times 1000$
4. $23 \times 10$
5. $47 \times 100$
6. $89 \times 1000$
7. $189 \times 10$
8. $307 \times 100$
9. $924 \times 1000$
10. $30 \times 10$
11. $60 \times 100$
12. $80 \times 1000$
Example 1  Divide 65,751 by 31.

1. Divide the Thousands.
   \[ \frac{65}{31} = 2 \]
   \[ \frac{6}{2} \]
   \[ \frac{3}{5} \]

2. Divide the Hundreds.
   \[ \frac{65}{31} = 2 \]
   \[ \frac{-6}{2} \]
   \[ \frac{-3}{7} \]
   \[ \frac{-2}{3} \]

3. Divide the Tens.
   \[ \frac{65}{31} = 2 \]
   \[ \frac{-6}{2} \]
   \[ \frac{-3}{1} \]
   \[ \frac{6}{5} \]
   \[ \frac{-6}{2} \]
   \[ \frac{3}{1} \]

4. Divide the Ones.
   \[ \frac{65}{31} = 2 \]
   \[ \frac{-6}{2} \]
   \[ \frac{-3}{1} \]
   \[ \frac{6}{5} \]
   \[ \frac{-6}{2} \]
   \[ \frac{3}{1} \]

65 Th ÷ 31  37 H ÷ 31  65 T ÷ 31

We can check our answer by using the relationship:
Dividend = Divisor × Quotient + Remainder
= 31 × 2121 + 0
= 65,751 + 0
= 65,751
So, the answer is correct.

Example 2  Divide 90,872 by 431.

1. Divide the Ten Thousands.
   \[ \frac{90}{431} \]
   9 < 431
   Division is not possible.

2. Divide the Thousands.
   \[ \frac{908}{431} \]
   90 < 431
   Division is not possible.

3. Divide the Hundreds.
   \[ \frac{908}{431} \]
   908 ÷ 431
   908 H ÷ 431

4. Divide the Tens.
   \[ \frac{908}{431} \]
   467 Tens ÷ 431
   467 Tens ÷ 431

5. Divide the Ones.
   \[ \frac{908}{431} \]
   467 Tens ÷ 431
   467 Tens ÷ 431
   Since 362 < 431, put a zero in the quotient.

90,872 ÷ 431 = 210 R 362
Example 3  Divide 9,34,398 by 9.

1. Divide the Lakhs.
   \[ \frac{1}{9} \] \( \underline{934398} \)
   \[ \underline{9} \] \( \underline{9} \)
   \[ \underline{0} \]

2. Divide the Thousands.
   \[ \frac{103}{9} \] \( \underline{934398} \)
   \[ \underline{9} \] \( \underline{0} \]
   \[ \underline{34} \]
   \[ \underline{27} \]

3. Divide the Hundreds.
   \[ \frac{1038}{9} \] \( \underline{934398} \)
   \[ \underline{9} \] \( \underline{0} \]
   \[ \underline{34} \]
   \[ \underline{27} \]
   \[ \underline{73} \]
   \[ \underline{72} \]
   \[ \underline{19} \]
   \[ \underline{18} \]
   \[ \underline{1} \]

4. Divide the Tens.
   \[ \frac{10382}{9} \] \( \underline{934398} \)
   \[ \underline{9} \] \( \underline{0} \]
   \[ \underline{34} \]
   \[ \underline{27} \]
   \[ \underline{73} \]
   \[ \underline{72} \]
   \[ \underline{19} \]
   \[ \underline{18} \]
   \[ \underline{18} \]
   \[ \underline{0} \]

Example 4  Divide 6,21,575 by 25.

1. Divide the Lakhs.
   \[ \frac{25}{621575} \]
   \[ 25 \] \( \underline{621575} \)
   \[ 621575 \]

2. Divide the Ten Thousands.
   \[ \frac{2}{25} \] \( \underline{621575} \)
   \[ \underline{50} \]
   \[ \underline{121} \]

3. Divide the Thousands.
   \[ \frac{24}{25} \] \( \underline{621575} \)
   \[ \underline{50} \]
   \[ \underline{121} \]
   \[ \underline{100} \]
   \[ \underline{21} \]

4. Divide the Hundreds.
   \[ \frac{248}{25} \] \( \underline{621575} \)
   \[ \underline{50} \]
   \[ \underline{121} \]
   \[ \underline{100} \]
   \[ \underline{215} \]
   \[ \underline{200} \]
   \[ \underline{15} \]

5. Divide the Tens.
   \[ \frac{2486}{25} \] \( \underline{621575} \)
   \[ \underline{50} \]
   \[ \underline{121} \]
   \[ \underline{100} \]
   \[ \underline{215} \]
   \[ \underline{200} \]
   \[ \underline{157} \]
   \[ \underline{150} \]
   \[ \underline{7} \]

6. Divide the Ones.
   \[ \frac{24863}{25} \] \( \underline{621575} \)
   \[ \underline{50} \]
   \[ \underline{121} \]
   \[ \underline{100} \]
   \[ \underline{215} \]
   \[ \underline{200} \]
   \[ \underline{157} \]
   \[ \underline{150} \]
   \[ \underline{75} \]
   \[ \underline{75} \]
   \[ \underline{0} \]

9,34,398 ÷ 9 = 1,03,822

6,21,575 ÷ 25 = 24,863
Example 5

A total of 1,30,893 loaves of bread are to be delivered to 23 bakeries across the city. If an equal quantity of loaves are delivered to each bakery, how many loaves of bread does each bakery get?

Number of loaves of bread = 1,30,893
Number of bakeries = 23
Number of loaves each bakery gets = 1,30,893 ÷ 23

\[
\begin{array}{c}
23 \overline{)130893} \\
-115 \\
\hline
158 \\
-138 \\
\hline
209 \\
-207 \\
\hline
23 \\
-23 \\
\hline
0
\end{array}
\]

\[1,30,893 ÷ 23 = 5,691\]

So, each bakery gets 5,691 loaves of bread.

Properties of Division

Property of Zero: If 0 is divided by a number other than 0, the quotient is 0.

\[0 ÷ 15 = 0\]
\[0 ÷ 6,80,090 = 0\]

Property of One: When any number is divided by 1, the quotient is the number itself.

\[12 ÷ 1 = 12\]
\[3,43,952 ÷ 1 = 3,43,952\]

Property of Number Itself: If a number is divided by itself (except 0), the quotient is one.

\[12 ÷ 12 = 1\]
\[6,14,992 ÷ 6,14,992 = 1\]
Quotient of Numbers Ending with Zeros

1. To divide a given number by 10, remove one zero from the end of the dividend.
2. To divide a number by 100, remove two zeros from the end of the dividend.
3. To divide a number by 1000, remove three zeros from the end in the dividend.

<table>
<thead>
<tr>
<th>Division</th>
<th>Quotient</th>
</tr>
</thead>
<tbody>
<tr>
<td>TTh Th H T O</td>
<td></td>
</tr>
<tr>
<td>900000 ÷ 10    =</td>
<td>9 0 0 0 0</td>
</tr>
<tr>
<td>900000 ÷ 100   =</td>
<td>9 0 0 0</td>
</tr>
<tr>
<td>900000 ÷ 1000  =</td>
<td>9 0 0</td>
</tr>
<tr>
<td>900000 ÷ 10000 =</td>
<td>9 0</td>
</tr>
</tbody>
</table>

Fact Zone

When a number is divided by 10, the remainder is the digit in the ones place.

Exercise 2.6

1. Find the quotient and the remainder, then verify your answer:
   a) 42,224 ÷ 12   b) 23,484 ÷ 57   c) 70,437 ÷ 781
   d) 2,73,016 ÷ 38  e) 24,648 ÷ 320   f) 7,70,080 ÷ 8
   g) 4,04,092 ÷ 11  h) 3,36,948 ÷ 94  i) 5,94,206 ÷ 872

2. Fill in the blanks.
   a) 73,262 ÷ 1 = _____________  b) 0 ÷ 5262 = _____________
   c) 5290 ÷ _____________ = 529  d) _____________ ÷ 2190 = 0
   e) 91,526 ÷ 91,526 = _________  f) 2,17,123 ÷ _____________ = 1

3. Find the quotient and the remainder.
   a) 65,000 ÷ 10 = _____________  b) 2,835 ÷ 1000 = _____________
   c) 3,72,632 ÷ 10= _____________  d) 9,21,500 ÷ 100 = _____________
   e) 6,25,300 ÷ 10 = _____________  f) 8,88,000 ÷ 100 = _____________

4. Solve the following word problems.
   a) In a large container, there are 14,335 litres of juice. If the juice is to be filled equally into 47 small containers, how much juice must be poured in each small container?
Example 1

Venu bought 32 boxes of cherries. There were 140 cherries in each box. He packed them into bags of 35 cherries each. How many bags does he need?

First, find the total number of cherries.

Total number of cherries = Number of boxes × Number of cherries in each box
= 32 × 140
= 4480

There were 4480 cherries.

Now, find the number of bags.

Number of bags = Total number of cherries ÷ Number of cherries in each bag
= 4480 ÷ 35 = 128

Venu needs 128 bags.

Example 2

Irfan bought a refrigerator and 15 TV sets for ₹9,80,630. If the refrigerator costs ₹35,000, find the cost of each TV set.

First, find the cost of 15 TV sets.

Cost of 15 TV sets = Total cost – Cost of refrigerator

\[
\begin{array}{c}
9 \quad 8 \quad 0 \quad 6 \quad 3 \quad 0 \\
- \quad 3 \quad 5 \quad 0 \quad 0 \quad 0 \\
\hline
9 \quad 4 \quad 5 \quad 6 \quad 3 \quad 0 \\
\end{array}
\]

The cost of 15 TV sets is ₹9,45,630.
Now, find the cost of each TV set.
Cost of 1 TV set = Cost of 15 TV sets ÷ Number of TV sets
= ₹9,45,630 ÷ 15 = ₹63,042
Each TV set costs ₹63,042.

Exercise 2.7

Solve the following word problems.

1. A wholesale shop sold 1215 packets of spoons. There were 26 spoons in one packet. How many spoons were sold? If these spoons were sold for ₹3 per spoon, how much money was collected from the sale of spoons?

2. There are 16 libraries in a town. The total number of books in all the libraries is 7,25,986. If one library has 1,00,006 books and all the other 15 libraries have an equal number of books, how many books does each library have?

3. A total of 17,226 children from 27 different schools participated in a sport event. If an equal number of students participated from each school,
   a) how many students from each school took part in the event?
   b) if each student was given ₹500 at the event, how much money was given away?

4. Mohit earned ₹58,000 per month for a year. His sister earned ₹2,89,000 that same year. How much money did both of them earn together in that year?

Problem Solving Strategy: Work Backward

Example
If you subtract 54 from a number and then divide by 12, the quotient is 173. What was the original number?

Step 1
The given quotient is 173.
It was obtained by dividing a number by 12.
So, we multiply 173 by 12.
173 × 12 = 2076

Step 2
The product of 2076 was obtained by subtracting 54 from the required number.
Therefore, we add 54 to 2076 to get the required number.
2076 + 54 = 2130
So, the required number is 2130.
Exercise 2.8

1. If you subtract 30 from a number and then divide by 22, the quotient is 432. What was the original number?

2. If you add 9 to a number and then multiply by 12, the product is 324. What was the original number? [Hint: Start by dividing 324 by 12]

Estimation in Operations

Estimate the answer of each of the following.

1. \(2,960 + 1,730\)  
   - Rounding off to the nearest 1000:
     - 2960 rounded to nearest 1000: 3000
     - 1730 rounded to nearest 1000: 2000
   
   Estimated sum: 5000
   
   Actual sum: 4690

   The estimated sum is close to the actual sum.

2. \(9,300 - 6,420\)  
   - Rounding off to the nearest 1000:
     - 9300 rounded to nearest 1000: 9000
     - 6420 rounded to nearest 1000: 6000
   
   Estimated difference: 3000
   
   Actual difference: 2880

   The estimated difference is close to the actual difference.

3. \(4,465 \times 8\)  
   - Rounding off to the nearest 1000:
     - 4465 rounded to nearest 1000: 4000
     - 8 rounded to nearest 10: 1
   
   Estimated product: 32000
   
   Actual product: 35720

   The estimated product is close to the actual product.

4. \(24,581 \div 47\)
   
   Rounding off to the nearest thousand:
   - 24581 rounded to nearest thousand: 25000
   
   Rounding off to the nearest ten:
   - 47 rounded to nearest ten: 50
   
   Estimated quotient = 500
   
   Actual quotient = 523

   The estimated quotient is close to the actual quotient.
Exercise 2.9

1. The table below shows how much Mohan spent on some items.

<table>
<thead>
<tr>
<th>Item</th>
<th>Amount in (₹)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Car</td>
<td>4,29,575</td>
</tr>
<tr>
<td>Washing Machine</td>
<td>11,625</td>
</tr>
<tr>
<td>Car Stereo</td>
<td>5,435</td>
</tr>
<tr>
<td>Head Phone</td>
<td>1,970</td>
</tr>
</tbody>
</table>

Round off each amount to the nearest thousand and estimate:

a) total amount spent on washing machine and a car stereo.
b) the difference of the cost of car stereo and the cost of a head phone.

2. Estimate the value of:
   a) 8379 \times 8  
   b) 7700 + 5420  
   c) 9370 - 5200  
   d) 6630 \times 5

3. Sixteen families went on a trip, which cost them ₹2,16,352. If each family spent the same amount, how much did each family pay? Find the estimated answer and the actual answer.

Mental Maths

1. Write the sum of the digits of the current year.
2. Write two multiplication problems that give a product of 10,000.
3. In a division sum, we can have the same divisor and remainder. Yes or No?
4. Estimate the value of:
   a) 1,972 + 10,322  
   b) 575 \times 124  
   c) 21,994 - 6,159
Solve the following crossword puzzle using the clues given below.

Across
1. 3,50,27,326 + 3,50,738
2. 45,76,468 – 45,75,340
3. 3,25,260 ÷ 45
4. Remainder in 5,374 ÷ 21
5. Quotient in 31,437 ÷ 18
6. Remainder in 1,606 ÷ 13

Down
1. Round off 1,80,845 to the nearest hundred.
2. (25 + 50) × 80
3. 4148 ÷ 17
4. Number of pens bought for ₹1,234 at ₹19 per pen.
5. (739 × 25) × 4
6. (57,984 × 15) × 0
Aim: To understand order of operations.

Requirements: Number cards (as shown on the sample number card and write different numbers in circles on top and set a target number.)

Steps:

1. Pair the students sitting next to each other.

2. Distribute a set of 8 numbers cards to them. (Hint: The following number combinations can be used to create cards.)

<table>
<thead>
<tr>
<th>Numbers</th>
<th>Target</th>
</tr>
</thead>
<tbody>
<tr>
<td>6, 1, 2, 5, 8</td>
<td>8</td>
</tr>
<tr>
<td>2, 6, 3, 1, 9</td>
<td>6</td>
</tr>
<tr>
<td>3, 7, 8, 10, 5</td>
<td>6</td>
</tr>
<tr>
<td>8, 2, 7, 1, 6</td>
<td>4</td>
</tr>
<tr>
<td>1, 9, 7, 10, 3</td>
<td>10</td>
</tr>
<tr>
<td>1, 10, 2, 8, 6</td>
<td>2</td>
</tr>
<tr>
<td>7, 2, 10, 8, 1</td>
<td>10</td>
</tr>
<tr>
<td>6, 3, 1, 7, 8</td>
<td>3</td>
</tr>
</tbody>
</table>

3. Instruct the students to combine 5 numbers on each card using the four arithmetic operations (+, −, ÷, ×) to arrive at the ‘target number’.

For example,

<table>
<thead>
<tr>
<th>7</th>
<th>8</th>
<th>5</th>
<th>10</th>
<th>3</th>
<th>Target: 9</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>+</td>
<td>10</td>
<td>+ 3</td>
<td>-</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>= 9</td>
</tr>
</tbody>
</table>

4. Each pair gets 10 points for every successful target.

The pair which gets the maximum points is the winner.
Factors

A factor is a number that divides a number without leaving any remainder. The factors of 12 can be found as:

- 1 × 12
- 2 × 6
- 3 × 4
- 4 × 3
- 6 × 2
- 12 × 1

So, the six factors of 12 are 1, 2, 3, 4, 6 and 12.

Multiples

A multiple is the result of multiplying a number by another number.

- 3 × 1 = 3
- 3 × 2 = 6
- 3 × 3 = 9
- 3 × 4 = 12

Multiples of 3 are 3, 6, 9, 12, 15, 18, 21, 24, 27, . . .

- 4 × 1 = 4
- 4 × 2 = 8
- 4 × 3 = 12
- 4 × 4 = 16

Multiples of 4 are 4, 8, 12, 16, 20, 24, 28, . . .

The first two common multiples of 3 and 4 are 12 and 24.
1. Write the factors of the following numbers.
   a) 64 _________________  b) 72 _________________
   c) 50 _________________  d) 120 _________________

2. Write the first five multiples of these numbers.
   a) 3 _________________  b) 4 _________________
   c) 6 _________________  d) 9 _________________

3. Place the numbers given below in the respective sections of the circle:
   a) Numbers
      10, 15, 6, 16, 21, 4, 18, 9, 14, 27, 24, 8, 30, 12, 33, 20
   b) Numbers
      21, 15, 35, 40, 100, 93, 48, 57, 30, 60, 45, 80, 120, 66, 114, 70

4. Complete the sentence.
   The factor of a number can be either __________ than or equal to a number
   while a multiple is always __________ than or equal to that number.
A number is said to be a factor of another number, if it divides the number exactly without remainder.

\[ 18 = 1 \times 18 \]
\[ 18 = 2 \times 9 \]
\[ 18 = 3 \times 6 \]

1, 2, 3, 6, 9, 18 divide 18 without leaving any remainder.

So, 1, 2, 3, 6, 9 and 18 are the six factors of 18.

Similarly,

\[ 30 = 1 \times 30 \]
\[ 30 = 2 \times 15 \]
\[ 30 = 3 \times 10 \]
\[ 30 = 5 \times 6 \]

So, 1, 2, 3, 5, 6, 10, 15 and 30 are the eight factors of 30.

Properties of Factors

1. 1 is the factor of every number.
2. Every number is the factor of itself.
3. Every factor of a number is less than or equal to the given number.
**Common Factors**

The factors of 18 are \(1, 2, 3, 6, 9, 18\).

The factors of 30 are \(1, 2, 3, 5, 6, 10, 15, 30\).

The **common factors** of two or more numbers are the common numbers that can divide those numbers exactly without leaving a remainder.

---

**Think Smart**

I am a 2-digit number. I am a factor of 36 and also a multiple of 4. What number am I?

---

**Multiples**

\[
\begin{align*}
1 \times 7 &= 7 \\
2 \times 7 &= 14 \\
3 \times 7 &= 21 \\
4 \times 7 &= 28
\end{align*}
\]

The numbers 7, 14, 21 and 28 are the first four multiples of 7.

The **multiple** of a number is obtained by multiplying the number with any number (except zero).

---

**Properties of Multiples**

1. Every number is a multiple of 1.
2. Every multiple of a number is either greater than or equal to that number.
3. Every number is the smallest multiple of itself.

---

**Common Multiples**

The multiples of 5 are \(5, 10, 15, 20, 25, 30, 35, 40, 45\) and so on.

The multiples of 15 are \(15, 30, 45, 60, 75\) and so on.

The common multiples of 5 and 15 are \(15, 30, 45, \ldots\).

The **common multiples** of two or more numbers are the common numbers that can be divided by those numbers without leaving a remainder.
**Prime Numbers**

Prime numbers are the numbers that have only two factors, 1 and the number itself.

<table>
<thead>
<tr>
<th>Number</th>
<th>Factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>1, 2</td>
</tr>
<tr>
<td>3</td>
<td>1, 3</td>
</tr>
<tr>
<td>5</td>
<td>1, 5</td>
</tr>
<tr>
<td>7</td>
<td>1, 7</td>
</tr>
</tbody>
</table>

2, 3, 5, 7, ... are prime numbers that can be divided only by 1 and themselves.

**Composite Numbers**

Composite numbers are the numbers that have more than 2 factors.

<table>
<thead>
<tr>
<th>Number</th>
<th>Factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>1, 2, 4</td>
</tr>
<tr>
<td>6</td>
<td>1, 2, 3, 6</td>
</tr>
<tr>
<td>12</td>
<td>1, 2, 3, 4, 6, 12</td>
</tr>
</tbody>
</table>

1 is neither prime nor composite. It is a unique number.

**Twin Prime Numbers**

Pairs of prime numbers that differ by 2 are called twin prime numbers.

3 and 5 are twin prime numbers. 5 and 7 are also twin prime numbers.

Examples of twin prime numbers are: 3 and 5, 5 and 7, and 11 and 13.

**Co-prime or Relatively Prime Numbers**

A pair of numbers not having any common factors other than 1 are said to be co-prime.

Factors of 14 = 1, 2, 7, 14    No common factors except 1
Factors of 15 = 1, 3, 5, 15
So, 14 and 15 are co-prime numbers.

Any two consecutive numbers are always co-prime.

---

**Think Smart**

I am a 3-digit number. The sum of my digits is 5 and I am prime too. If my ones and hundreds digits are interchanged, I still remain prime. What number am I?
1. **Fill in the blank.**
   a) 1 is _________ prime _________ composite.
   b) _________ is the smallest odd composite number.
   c) 53 and 55 are pair of _________ numbers.
   d) 4 is the _________ even composite number.

2. **Find the factors of following numbers.**
   a) 85  
   b) 72  
   c) 108  
   d) 122

3. **Find the common factors of each set of numbers.**
   a) 12, 18  
   b) 14, 21  
   c) 28, 30, 42  
   d) 20, 35, 45

4. **Write down the first five multiples of following number.**
   a) 19  
   b) 25  
   c) 32  
   d) 37

5. **Find the first three common multiples of the following numbers.**
   a) 18, 6  
   b) 14, 4  
   c) 5, 10, 15  
   d) 15, 12, 6

6. **Underline the prime numbers and circle the composite numbers.**

   
<table>
<thead>
<tr>
<th>4</th>
<th>16</th>
<th>8</th>
<th>3</th>
<th>11</th>
<th>15</th>
<th>25</th>
<th>31</th>
</tr>
</thead>
<tbody>
<tr>
<td>29</td>
<td>56</td>
<td>22</td>
<td>103</td>
<td>17</td>
<td>26</td>
<td>13</td>
<td>47</td>
</tr>
</tbody>
</table>

7. **Which of the following pairs of numbers are co-prime?**
   a) 5 and 15  
   b) 21 and 27  
   c) 7 and 42  
   d) 12 and 17

8. **Which of the following pairs of numbers are twin primes?**
   a) 8 and 9  
   b) 13 and 15  
   c) 31 and 33  
   d) 41 and 43

---

**Maths Fun**

1. Divide the class into groups of 2.
2. Each group prepares a factor game board on a piece of paper and writes number 1 to 50 on it.
3. The first player selects a number and circles it in orange.
4. The second player circles all the factors of the first player’s number in blue.
5. The players swap roles the game continues. Players can only circle the numbers that have not been circled.
6. The game ends when no more numbers can be circled. The player with the most circled numbers is the winner.
Divisibility Rules

The divisibility rules help us perform quick calculations and find whether a number divides the other number completely or not.

<table>
<thead>
<tr>
<th>Divisible by</th>
<th>Rules</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>The unit digit of a number is even or zero. (0, 2, 4, 6, 8)</td>
<td>56, 90 and 126 are divisible by 2</td>
</tr>
<tr>
<td>3</td>
<td>The sum of the digits of a number is divisible by 3.</td>
<td>381 (3 + 8 + 1 = 12 and 12 ÷ 3 = 4) Yes</td>
</tr>
<tr>
<td>4</td>
<td>The last two digits are divisible by 4.</td>
<td>216 (16 ÷ 4 = 4) Yes 314 (14 ÷ 4 = 3 R 2) No 300 Yes</td>
</tr>
<tr>
<td>5</td>
<td>The unit digit is 0 or 5.</td>
<td>275, 40 and 150 are divisible by 5</td>
</tr>
<tr>
<td>6</td>
<td>The number is divisible by both 2 and 3.</td>
<td>216 (it is even, and 2 + 1 + 6 = 9 and 9 ÷ 3 = 3) Yes</td>
</tr>
<tr>
<td>8</td>
<td>The last three digits are divisible by 8.</td>
<td>41816 (816 ÷ 8 = 102) Yes 41302 (302 ÷ 8) No</td>
</tr>
<tr>
<td>9</td>
<td>The sum of the digits is divisible by 9.</td>
<td>1629 (1 + 6 + 2 + 9 = 18, and again 1 + 8 = 9) Yes</td>
</tr>
<tr>
<td>10</td>
<td>The number ends in 0.</td>
<td>200, 30 and 550 are divisible by 10</td>
</tr>
<tr>
<td>11</td>
<td>The difference of sum of digit at odd places and sum of digits at even places is 0 or divisible by 11.</td>
<td>1364 [(3 + 4) – (1 + 6) = 0] Yes 72831 [(7 + 8 + 1) – (2 + 3) = (16 – 5) = 11] and (11 ÷ 11 = 1) Yes</td>
</tr>
<tr>
<td>12</td>
<td>The number is divisible by both 3 and 4.</td>
<td>648 ÷ 3 (6 + 4 + 8 = 18 and 18 ÷ 3 = 6) Yes 648 ÷ 4 (48 ÷ 4 = 12) Yes</td>
</tr>
</tbody>
</table>

Exercise 3.2

1. Encircle the numbers which are divisible by
   a) 2 : 72, 58, 21145, 9190, 1212, 811, 131
   b) 3 : 56, 128, 92070, 1352, 7173
   c) 6 : 912, 1324, 1623, 4194, 5214
   d) 10 : 130, 2105, 6189, 10750, 31100

2. Encircle the numbers which are divisible by both 3 and 5.
   500, 315, 215, 700, 555, 1945

3. Encircle the numbers which are divisible by 9.
   1647, 1161, 40706, 69461, 38924

4. Is 41253 divisible by 11?
Prime Factorisation

Writing a number as a product of its factors is called **factorisation**.

A factorisation in which every factor is a prime number is called **prime factorisation** of the number.

The prime factorisation can be done by the following two methods.

1. Factor Tree Method
2. Division Method

**Example**  Find the prime factorisation of 36.

**Method 1: Factor Tree Method**

```
\[ \begin{array}{c}
36 \\
\downarrow \\
2 \\
\downarrow \\
18 \\
\downarrow \\
2 \\
\downarrow \\
9 \\
\downarrow \\
3 \\
\downarrow \\
3 \\
\end{array} \]
```

Separate the smallest prime factor in each step.

Continue factorising till all the factors are prime.

\[36 = 2 \times 2 \times 3 \times 3\]

**Method 2: Division Method**

```
\[ \begin{array}{c|c}
2 & 36 \\
\hline
2 & 18 \\
\hline
3 & 9 \\
\hline
3 & 3 \\
\end{array} \]
```

Divide by the smallest prime factor that divides 36 exactly. Here, it is 2.

Repeat until you get a prime number that cannot be divided further.

\[36 = 2 \times 2 \times 3 \times 3\]

So, the prime factorisation of 36 is \(2 \times 2 \times 3 \times 3\).

**Exercise 3.3**

1. **Find the prime factorisation of the following using factor tree method.**
   
   a) 8    b) 15    c) 20    d) 24
   
   e) 33    f) 60    g) 72    h) 112

2. **Find the prime factorisation of the following using division method.**
   
   a) 12    b) 16    c) 22    d) 30
   
   e) 44    f) 45    g) 100    h) 148

**Highest Common Factor (HCF)**

The **Highest Common Factor** (HCF) of two or more given numbers is the greatest number which divides all the given numbers exactly leaving no remainder.
HCF by Prime Factorisation Method

Example 1 Find the HCF of 44 and 132 by prime factorisation method.

1. Find the prime factorisation of 44.
   
   44 = 2 × 2 × 11

2. Find the prime factorisation of 132.
   
   132 = 2 × 2 × 3 × 11

3. Circle the common factors in the numbers.
   
   44 = 2 × 2 × 11
   132 = 2 × 2 × 3 × 11

4. Find the product of the common factors.
   
   2 × 2 × 11 = 44

HCF of 44 and 132 is 44.

Example 2 Find the HCF of 25, 45 and 125 by prime factorisation method.

1. Find the prime factorisation of 25.
   
   25 = 5 × 5

2. Find the prime factorisation of 45.
   
   45 = 3 × 3 × 5

3. Find the prime factorisation of 125.
   
   125 = 5 × 5 × 5

4. Circle the common factors in the numbers.
   
   25 = 5 × 5
   45 = 3 × 3 × 5
   125 = 5 × 5 × 5

HCF of 25, 45 and 125 is 5.

HCF by Common Division Method

Example 3 Find the HCF of 55, 60 and 75 by common division method.

1. Arrange the given numbers.
   
   55, 60, 75

2. Divide the numbers by the lowest common prime number.
   
   5 | 55, 60, 75
   11, 12, 15
   Quotient

3. Continue the process as long as numbers can be divided by common prime numbers.
   
   Here, factorisation cannot continue further, since 11 and 12, 11 and 15 are co-primes.

4. The common factor of 55, 60 and 75 is 5. Here, common factor is the required HCF.

HCF of 55, 60 and 75 is 5.
Fact Zone

The HCF of two or more numbers is the product of their common factors.

HCF by Long Division Method (Continued Division Method)

**Example 4** Find the HCF of 18 and 30 by long division method.

1. Divide the larger number by the smaller number.
   
   \[
   18 \div 30 = 1 \text{ remainder } 12
   \]

2. Divide the first divisor by the first remainder.
   
   \[
   12 \div 18 = 1 \text{ remainder } 6
   \]

3. Divide the second divisor by the second remainder. Continue till you find a divisor that leaves no remainder.
   
   \[
   6 \div 12 = 2 \text{ remainder } 0
   \]

The divisor that leaves no remainder is called the HCF of the two numbers.

HCF of 18 and 30 is 6.

**Exercise 3.4**

1. **Find HCF by common division method.**
   a) 16, 42, 72  
   b) 99, 33, 121  
   c) 81, 117, 135

2. **Find HCF by continued division method.**
   a) 60 and 95  
   b) 96 and 150  
   c) 42, 72 and 108  
   d) 575, 75 and 290  
   e) 90, 120 and 980  
   f) 16, 380 and 700

**Least Common Multiple (LCM)**

The **Least Common Multiple** (LCM) of two or more given numbers is the smallest number which is a multiple of both numbers.

**Example 1**

Find the LCM of 12 and 20.

- 12 = 2 × 2 × 3
- 20 = 2 × 2 × 5

LCM = 2 × 2 × 3 × 5 = 60

The shaded and unshaded parts show the LCM of the two numbers.
LCM by Prime Factorisation Method

Example 2  Find the LCM of 60 and 75 by prime factorisation method.

1. Find the prime factors of 60.
   \[
   \begin{array}{c|c}
   \text{Factor} & \text{Factors} \\
   \hline
   2 & 60 \\
   2 & 30 \\
   3 & 15 \\
   5 & 5 \\
   \hline
   & 1 \\
   \end{array}
   \]
   \[
   60 = 2 \times 2 \times 3 \times 5
   \]

2. Find the prime factors of 75.
   \[
   \begin{array}{c|c}
   \text{Factor} & \text{Factors} \\
   \hline
   3 & 75 \\
   5 & 25 \\
   5 & 5 \\
   \hline
   & 1 \\
   \end{array}
   \]
   \[
   75 = 3 \times 5 \times 5
   \]

3. List out the common and uncommon factors of both the numbers.
   \[
   \begin{array}{c|c}
   \text{Common Factors} & \text{Uncommon Factors} \\
   \hline
   2 \times 2 & 3 \times 5 \times 5 \\
   \end{array}
   \]

4. The product of the common and uncommon factors is the LCM.
   \[
   \begin{array}{c|c|c|c|c|c|c}
   & 3 & 5 & 5 \\
   \hline
   60 & 2 & 2 & 3 & 5 \\
   75 & 3 & 5 & 5 \\
   \hline
   \end{array}
   \]
   \[
   60 = 2 \times 2 \times 3 \times 5 \\
   75 = 3 \times 5 \times 5 \\
   \]
   \[
   \begin{array}{c|c}
   & 3 \times 5 \times 5 \\
   \hline
   60 & 2 \times 2 \times 3 \times 5 \times 5 \\
   75 & 3 \times 5 \times 5 \\
   \hline
   \end{array}
   \]
   \[
   \begin{array}{c|c|c|c|c|c|c}
   & 3 \times 5 \times 5 \\
   \hline
   60 & 2 \times 2 \times 3 \times 5 \times 5 \\
   75 & 3 \times 5 \times 5 \\
   \hline
   \end{array}
   \]
   \[
   2 \times 2 \times 3 \times 5 \times 5 = 300
   \]

LCM of 60 and 75 is 300.

Example 3  Find the LCM of 24, 36 and 48 by prime factorisation method.

1. Find the prime factorisation of 24.
   \[
   \begin{array}{c|c}
   \text{Factor} & \text{Factors} \\
   \hline
   2 & 24 \\
   2 & 12 \\
   2 & 6 \\
   3 & 3 \\
   \hline
   & 1 \\
   \end{array}
   \]
   \[
   24 = 2 \times 2 \times 2 \times 3
   \]

2. Find the prime factorisation of 36.
   \[
   \begin{array}{c|c}
   \text{Factor} & \text{Factors} \\
   \hline
   2 & 36 \\
   2 & 18 \\
   3 & 9 \\
   3 & 3 \\
   \hline
   & 1 \\
   \end{array}
   \]
   \[
   36 = 2 \times 2 \times 3 \times 3
   \]

3. Find the prime factorisation of 48.
   \[
   \begin{array}{c|c}
   \text{Factor} & \text{Factors} \\
   \hline
   2 & 48 \\
   2 & 24 \\
   2 & 12 \\
   2 & 6 \\
   3 & 3 \\
   \hline
   & 1 \\
   \end{array}
   \]
   \[
   48 = 2 \times 2 \times 2 \times 2 \times 3
   \]

4. The product of the common and uncommon factors is the LCM.
   \[
   \begin{array}{c|c|c|c|c|c|c}
   & 2 & 2 & 2 & 3 \\
   \hline
   24 & 2 & 2 & 2 & 3 \\
   36 & 2 & 2 & 3 & 3 \\
   48 & 2 & 2 & 2 & 2 & 3 \\
   \hline
   \end{array}
   \]
   \[
   LCM = 2 \times 2 \times 2 \times 2 \times 3 \times 3 = 144
   \]

Make sets of all common factors. Take only one factor out of a set of common factors and multiply them with non-common factors.

Teaching Tip
Explain to the students the difference of HCF and LCM. Although HCF is mentioned as the largest, greatest, or highest number, it is always smaller than the LCM of given numbers. Though LCM is mentioned as the smallest, or least, it is always greater than the HCF of given numbers.
LCM by Common Division Method

**Example 4** Find the LCM of 25 and 45 by common division method.

1. Arrange the numbers in a line to find the LCM.
   
   \[
   25, 45
   \]

2. Start dividing by the smallest possible common prime number, which is 5.
   
   \[
   \begin{array}{c|cc}
   & 25, 45 \\
   \hline
   5 & 5, 9 \\
   \end{array}
   \]

3. Continue dividing until we get 1 as quotient for all numbers.
   
   \[
   \begin{array}{c|cc}
   & 5, 9 \\
   \hline
   3 & 1, 3 \\
   \end{array}
   \]

4. Write LCM as product of all factors.
   
   \[
   \text{LCM} = 5 \times 5 \times 3 \times 3 = 225
   \]

So, the LCM of 25 and 45 is 225.

**Exercise 3.5**

1. **Find the LCM of each set of numbers given below using the prime factorisation method.**
   
   a) 4, 6 and 8  
   b) 35 and 75  
   c) 144 and 200  
   d) 40, 60 and 80  
   e) 60, 72 and 320  
   f) 24, 32 and 60  
   g) 30, 40 and 60  
   h) 12, 24 and 56  
   i) 35, 147 and 231

2. **Find the LCM of numbers given below using the common division method.**
   
   a) 63 and 105  
   b) 42 and 56  
   c) 16, 40 and 56  
   d) 12, 20 and 32  
   e) 125, 75 and 275  
   f) 45, 18 and 63

**Relationship between HCF and LCM**

Find the LCM and HCF of 36 and 42.

Prime factorisation of 36 = \(2 \times 2 \times 3 \times 3\).

Prime factorisation of 42 = \(2 \times 3 \times 7\).

The HCF is \(2 \times 3 = 6\)

The LCM is \(2 \times 3 \times 2 \times 3 \times 7 = 252\)

\[\text{First Number } \times \text{ Second Number } = \text{ HCF } \times \text{ LCM}\]

\[36 \times 42 = 6 \times 252 \]

\[1512 = 1512\]

So, the product of two numbers is equal to the product of their HCF and LCM.
Example
The LCM of two numbers, 42 and 77 is 462. What is their HCF?

\[
\text{HCF of two numbers} = \frac{\text{Product of two numbers}}{\text{LCM of two numbers}}
\]

\[
\text{HCF of 42 and 77} = \frac{42 \times 77}{462} = 7
\]

So, the HCF of 42 and 77 is 7.

Some Facts about HCF and LCM
• The HCF of two numbers is always less than any of the numbers.
• The HCF of two co-prime numbers is always 1.
• The LCM of two numbers that are co-prime is the product of two numbers.
  The LCM of 3 and 5 = 3 \times 5 = 15
• If a number is a factor of another number, then their LCM is the greater number.
  The LCM of 3 and 15 is 15.

Exercise 3.6
1. Fill in the blanks.
   a) The HCF of two consecutive numbers is ________ .
   b) The HCF of two numbers is less than or equal to the ________ number.
   c) The LCM of two numbers is greater or equal to the ________ number.
   d) The ________ of two co-prime numbers is their product.

2. Solve the following:
   a) If the product of the HCF and the LCM of two numbers is 1000 and one of the two numbers is 25, find the second number.
Example 1

Three children step off together for the morning walk. Their steps measure 20 cm, 25 cm and 30 cm respectively. At what distance from their start will the three children step together again?

For the children to step together again, the length of the steps of the children must be a multiple of the measurement of their steps. In other words, the length of the steps must be the lowest common multiple of their combined steps.

Measurement of steps of the children = 20 cm, 25 cm and 30 cm.

LCM of their steps i.e. 20, 25 and 30.

\[2 \times 2 \times 3 \times 5 \times 5 = 300\]

LCM of 20, 25 and 30 is 300.

300 cm = 3 m

So, the three children will step together again at the distance of 3 m from their start.

Example 2

A room is 6 m 70 cm long and 3 m 50 cm wide. What is the dimension of the largest square tile that can be fixed on the floor so that the tiles need not be cut to fit the floor?

For the square tile to fit exactly the length and the breadth of the room, the length of the side of the square tile must be a factor of both the length and the breadth. In other words, the side of the tile must be the highest common factor of both the length and the breadth of the room.

The length of the room = 6 m 70 cm = 670 cm

The breadth of the room = 3 m 50 cm = 350 cm

HCF of the length and breadth of the room, i.e., the HCF of 670 and 350.

The HCF of 670 and 350 = 2 \times 5 = 10

So, the side of the square tile is 10 cm.
Solve the following.

1. A gardener waters one plant every 7 days and other plants every 3 days. If he has watered all the plants together today, after how many days will the gardener water all the plants together again?

2. Three bells ring at intervals of 10, 12 and 15 minutes. If they rang together at 8:30 a.m., when will they ring together again?

3. Three cans contain 12 litres, 16 litres and 24 litres of milk. A mug is filled equal number of times from each can. What is the largest capacity of the mug?

Mental Maths

Write the number 1 to 20 in the given figure in the correct place and answer the following questions.

1. List the odd primes.
2. List the even primes.
3. Which are more, even primes or odd primes?
4. Find the LCM of odd primes.
5. Find the HCF of the even composites.
6. Are there any twin prime numbers?
Aim: To find the prime numbers from 1 to 100 by the method of the sieve of Eratosthenes.

Requirements: Coloured pens

<p>| | | | | | | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>8</td>
<td>9</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>12</td>
<td>13</td>
<td>14</td>
<td>15</td>
<td>16</td>
<td>17</td>
<td>18</td>
<td>19</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>22</td>
<td>23</td>
<td>24</td>
<td>25</td>
<td>26</td>
<td>27</td>
<td>28</td>
<td>29</td>
<td>30</td>
<td></td>
</tr>
<tr>
<td>31</td>
<td>32</td>
<td>33</td>
<td>34</td>
<td>35</td>
<td>36</td>
<td>37</td>
<td>38</td>
<td>39</td>
<td>40</td>
<td></td>
</tr>
<tr>
<td>41</td>
<td>42</td>
<td>43</td>
<td>44</td>
<td>45</td>
<td>46</td>
<td>47</td>
<td>48</td>
<td>49</td>
<td>50</td>
<td></td>
</tr>
<tr>
<td>51</td>
<td>52</td>
<td>53</td>
<td>54</td>
<td>55</td>
<td>56</td>
<td>57</td>
<td>58</td>
<td>59</td>
<td>60</td>
<td></td>
</tr>
<tr>
<td>61</td>
<td>62</td>
<td>63</td>
<td>64</td>
<td>65</td>
<td>66</td>
<td>67</td>
<td>68</td>
<td>69</td>
<td>70</td>
<td></td>
</tr>
<tr>
<td>71</td>
<td>72</td>
<td>73</td>
<td>74</td>
<td>75</td>
<td>76</td>
<td>77</td>
<td>78</td>
<td>79</td>
<td>80</td>
<td></td>
</tr>
<tr>
<td>81</td>
<td>82</td>
<td>83</td>
<td>84</td>
<td>85</td>
<td>86</td>
<td>87</td>
<td>88</td>
<td>89</td>
<td>90</td>
<td></td>
</tr>
<tr>
<td>91</td>
<td>92</td>
<td>93</td>
<td>94</td>
<td>95</td>
<td>96</td>
<td>97</td>
<td>98</td>
<td>99</td>
<td>100</td>
<td></td>
</tr>
</tbody>
</table>

Steps:

1. Ask the students to colour number 1 on the number grid as number 1 is neither prime nor composite.
2. Then, colour number 2 and cross out all its multiples. Colour number 3 and cross out all its multiples.
3. Next, colour number 5 and cross out all its multiples. Colour number 7 and cross out all its multiples.
4. Finally, colour the remaining number on the grid. All these numbers are prime numbers from 1 to 100. Inform them that this method of finding the prime number is called sieve of Eratosthenes.
Types of Fractions

A fraction that is less than a whole is called a **proper fraction**. For example, \(\frac{1}{3}\) and \(\frac{2}{3}\) are proper fractions.

A fraction that is equal to or more than a whole is called an **improper fraction**. For example, \(\frac{3}{3}, \frac{4}{3}, \frac{5}{3}, \frac{6}{3}\) are improper fractions.

When a whole number is combined with a fraction, it is called a **mixed fraction**. For example, \(1\frac{1}{3}\) and \(1\frac{2}{3}\) are mixed fractions.

Tina ate \(\frac{1}{3}\) of a pizza, Siya ate \(\frac{5}{4}\) of pizzas and Irfan ate \(1\frac{1}{2}\) of pizzas.

1. How much pizza did Tina and Siya eat together?

\[
\frac{1}{3} + \frac{5}{4}
\]

The denominator 3 cannot be made equivalent to 4.

So, we find the first common multiple of the denominators, 3 and 4.

- Multiples of 3: 3, 6, 9, (12), \ldots
- Multiples of 4: 4, 8, (12), 16, \ldots

12 is the first common multiple of 3 and 4.
Convert an improper fraction into a mixed fraction: \( \frac{15}{12} = 1 \frac{3}{12} \).

We can also add fractions by converting improper fractions into mixed fraction.
\[
\frac{1}{3} + \frac{5}{4} = 1 + \left( \frac{1}{3} + \frac{1}{4} \right) = 1 + \left( \frac{4}{12} + \frac{3}{12} \right) = 1 + \frac{7}{12} = 1 \frac{7}{12}
\]
So, Tina and Siya ate \( 1 \frac{7}{12} \) of pizzas altogether.

2. How much more pizza did Irfan eat than Siya?

We can also subtract two given mixed fractions by converting them into improper fractions.
\[
1 \frac{1}{2} - 1 \frac{1}{4} = \frac{3}{2} - \frac{5}{4}
\]
Form like fractions, and subtract.
\[
= \frac{3 \times 2}{2 \times 2} - \frac{5}{4} = \frac{6}{4} - \frac{5}{4} = \frac{1}{4}
\]
So, Irfan ate \( \frac{1}{4} \) more pizza than Siya.
1. Evaluate the following:
   a) \( \frac{3}{10} + \frac{2}{5} \)
   b) \( 2\frac{3}{4} - 1\frac{1}{4} \)

2. What fraction does each letter represent?
   a) \( \frac{1}{10}, \frac{2}{10}, \frac{3}{10} \)
   b) \( \frac{4}{6}, \frac{5}{6} \)

3. Which fraction is smaller?
   a) \( \frac{2}{10}, \frac{2}{7} \)
   b) \( \frac{5}{7}, \frac{5}{9} \)
   c) \( \frac{13}{14}, \frac{5}{6} \)
   d) \( \frac{3}{13}, \frac{4}{14} \)

4. Write the fraction represented by the shaded parts. Also express it in simplest form.
   a) \( \frac{3}{4} + \frac{5}{14} \)
   b) \( \frac{7}{16} - \frac{3}{8} \)
   c) \( \frac{2}{7} + \frac{1}{4} - \frac{1}{7} \)
   d) \( 2\frac{6}{7} - 1\frac{1}{14} \)
   e) \( 2\frac{3}{4} + 1\frac{3}{4} \)
   f) \( \frac{7}{10} + \frac{1}{2} + \frac{1}{5} \)
   g) \( \frac{19}{21} - \frac{4}{21} - \frac{7}{21} \)
   h) \( \frac{7}{8} - \frac{1}{2} \)

6. Siya’s father filled \( 7\frac{1}{2} \) L of petrol in his car and he used up \( 7\frac{1}{4} \) L on a visit to the zoo with her. How much petrol is left in his car?

7. Seema used \( 1\frac{1}{2} \) kg of sugar for pudding and \( \frac{3}{4} \) kg for ice-cream. How much sugar did she use in total?
We add $\frac{1}{3}$ piece of pizza seven times as follows:

$$\frac{1}{3} + \frac{1}{3} + \frac{1}{3} + \frac{1}{3} + \frac{1}{3} + \frac{1}{3} + \frac{1}{3} = \frac{7}{3} = 2 \frac{1}{3}$$

So, 7 times $\frac{1}{3} = 7 \times \frac{1}{3} = \frac{7}{3} = 2 \frac{1}{3}$

Remember multiplication is repeated addition.

Fact Zone

A fraction multiplied by 0 equals 0.
Multiplication of Fractions

Multiplication of Proper Fractions

1. By a Whole Number

Example 1
Multiply $\frac{1}{2}$ by 4

So, $\frac{1}{2}$ by 4 = $\frac{1}{2} \times 4 = 2$

Example 2
What is $\frac{1}{4}$ of 12?

Divide 12 into 4 equal groups. Each group is $\frac{1}{4}$ of 12.

So, $\frac{1}{4}$ of 12 = $\frac{1}{4} \times 12 = 3$

'of' means '×'.

Here is another way. Divide 12 into 4 equal parts. Shaded part = $\frac{1}{4}$.

So, $\frac{1}{4}$ of 12 is 3.

2. By a Proper Fraction

Example 3
Bharti had $\frac{3}{4}$ kg tomatoes. She used $\frac{2}{3}$ of it to make soup. How much tomatoes did she use?

Method 1

4 units = 1 kg
1 unit = $\frac{1}{4}$ kg

From the model, we see that Bharti used 2 units of tomatoes to make soup.

So, she used $\frac{1}{2}$ kg of tomatoes.
Method 2

\[
\frac{2}{3} \text{ of } \frac{3}{4} \text{ kg} = ?
\]

\[
= \frac{2}{3} \times \frac{3}{4} \text{ kg}
\]

(Dividing both numerator and denominator by the common factor 2.)

\[
= \frac{1}{3} \times \frac{3}{2} \text{ kg}
\]

(Dividing both numerator and denominator by the common factor 3.)

\[
= \frac{1 \times 1}{1 \times 2} = \frac{1}{2} \text{ kg}
\]

So, Bharti used \(\frac{1}{2}\) kg tomatoes to make soup.

Method 3

\[
= \frac{2}{3} \times \frac{3}{4} \text{ kg}
\]

\[
= \frac{6}{12} \text{ kg} = \frac{1}{2} \text{ kg}
\]

We can use any of these methods to find the product of two fractions. The answer is the same in each case.

Multiplication of Improper / Mixed Fractions

1. By a Whole Number

Example 4

Find the product of \(2 \frac{1}{3}\) and 5.

\[
5 \times 2 \frac{1}{3}
\]

\[
2 \frac{1}{3}
\]

\[
5 \times \frac{7}{3}
\]

\[
\frac{7}{3}
\]

\[
11 \frac{2}{3}
\]
We can also find the product by converting mixed fractions into improper fractions.

Example 5
Venu and Irfan ate \(2 \frac{1}{4}\) cookies each. How many cookies did they eat altogether?

\[
2 \frac{1}{4} \times 2 = \frac{9}{4} \times 2
\]
\[
= \frac{9 \times 1}{2}
\]
\[
= 4 \frac{1}{2}
\]

So, Venu and Irfan together ate \(4 \frac{1}{2}\) cookies.

2. By a Proper Fraction

Example 6
Find the product of \(\frac{6}{5}\) and \(\frac{3}{4}\).

Step 1 \(\frac{6}{5} = 1 \frac{1}{5}\)
Divide the bars vertically into parts equal to the denominator, that is, 5.

Step 2 Now, divide the bars horizontally into parts equal to the denominator of the proper fraction, that is, 4.

Step 3 Put crosses equal to the numerator of the proper fraction in each shaded row. Here, we put crosses in 3 rows.

\[
\text{Product} = \frac{\text{Number of crosses}}{\text{Parts into which a whole is divided}}
\]
\[
= \frac{18}{20} = \frac{9}{10}
\]
So, the product of $\frac{6}{5} \times \frac{3}{4}$ is $\frac{9}{10}$

We can also find the product in this way.

\[
\frac{\frac{3}{5} \times \frac{3}{4}}{\frac{5}{2}} = \frac{\frac{3 \times 3}{5 \times 2}}{\frac{9}{10}}
\]

\[
\frac{\frac{3 \times 3}{5 \times 2}}{\frac{9}{10}} = \frac{\frac{9}{10}}{\frac{9}{10}} = \frac{9}{10}
\]

Example 7

What is $\frac{5}{7}$ of $1\frac{8}{9}$?

= $\frac{5}{7}$ of $\frac{17}{9}$

= $\frac{5}{7} \times \frac{17}{9}$ (Replace ‘of’ by ‘×’)

= $\frac{5 \times 17}{7 \times 9}$ (Multiply the numerators and denominators)

= $\frac{85}{63} = 1\frac{22}{63}$ (Find the product and convert it into mixed fractions)

3. By an Improper Fraction

Example 8

How much is $\frac{16}{9}$ of $\frac{3}{2}$?

\[
\frac{16}{9} \text{ of } \frac{3}{2} = \frac{8 \times 16}{3 \times 1} \times \frac{3}{2} \times \frac{2}{2} = \frac{8}{3} = 2\frac{2}{3}
\]

We can find the product of mixed fractions in the same way by converting them into improper fractions first.

Everyday Maths

At a function there were 2700 people. $\frac{2}{9}$ were men, $\frac{2}{9}$ were women and rest were children.

1. How many were children?
2. Find the total number of men and women.
Example 9
The length of a path is $1 \frac{11}{31}$ m. Karan walked $5 \frac{1}{6}$ times of the length of the path. How much distance did he cover?

\[
5 \frac{1}{6} \times 1 \frac{11}{31} = \frac{31}{6} \times \frac{42}{31} = \frac{31}{6} \times \frac{42}{31} = \frac{1}{6} \times \frac{42}{1} = 7
\]

So, Karan covered a distance of 7 km.

Mental Maths

Complete the fraction square.

| $\frac{8}{3}$ | $\times$ | $\frac{1}{5}$ | $=$ | ___ |
| $\times$ | $\times$ | $\times$ |
| $\frac{7}{4}$ | $\times$ | $\frac{17}{21}$ | $=$ | ___ |

So, Karan covered a distance of 7 km.

Exercise 4.1

1. What is $\frac{3}{4}$ of $\frac{4}{5}$ kg?

\[
\text{5 units} = \underline{\text{___________}}
\]
\[
\text{1 unit} = \underline{\text{___________}}
\]
\[
\text{3 units} = \underline{\text{___________}}
\]

2. What is:

a) $\frac{1}{5}$ of 10?    b) $\frac{1}{6}$ of 18?    c) $\frac{1}{4}$ of 20?
3. Evaluate:
   a) \( \frac{2}{4} \times \frac{8}{14} \)  
   b) \( \frac{2}{6} \times \frac{5}{3} \)  
   c) \( \frac{1}{2} \times 0 \)  
   d) \( \frac{24}{5} \times \frac{5}{3} \)  
   e) \( 1\frac{4}{3} \times \frac{2}{5} \)  
   f) \( 1\frac{6}{7} \times 3\frac{1}{3} \)  

4. The area of a rectangle is the product of its length and its breadth. What is the area of the rectangle shown? Write your answer as square centimetres.

5. Express each answer in its simplest form.
   a) \( \frac{1}{2} \times \frac{2}{5} \)  
   b) \( \frac{5}{8} \times \frac{14}{5} \)  
   c) \( 1\frac{3}{4} \times \frac{2}{5} \)  
   d) \( \frac{9}{7} \times \frac{21}{27} \)  

6. Mrs. Kher requires \( \frac{15}{4} \) m of cloth to make a curtain. How much cloth does she need for 9 such curtains?

Think Smart
Rohit spent \( \frac{1}{3} \) of his money on a wallet and \( \frac{1}{4} \) of the remainder on a belt.
1. What fraction of his money did he spend on the belt?
2. What fraction of his money was left after buying the wallet and the belt?

Division of Fractions
Reciprocal
Two numbers whose product is 1 are called reciprocal or multiplicative inverse of each other. The reciprocal of a fraction is obtained by interchanging the numerators and denominator of the fraction. In other words, the numerator becomes the denominator and the denominator becomes the numerator.

Example 1
Find the reciprocal of 9.
We can write 9 as: \( \frac{9}{1} \)
Interchanging the numerator and denominator, we get \( \frac{1}{9} \).
So, the reciprocal of 9 is \( \frac{1}{9} \).
<table>
<thead>
<tr>
<th>Fraction</th>
<th>Multiplicative inverse or reciprocal</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 (Whole number)</td>
<td>(\frac{1}{6}) (Proper fraction)</td>
</tr>
<tr>
<td>(\frac{2}{3}) (Proper fraction)</td>
<td>(\frac{3}{2}) (Improper fraction)</td>
</tr>
<tr>
<td>(\frac{5}{3}) (Improper fraction)</td>
<td>(\frac{3}{5}) (Proper fraction)</td>
</tr>
<tr>
<td>(1\frac{7}{9}) (Mixed fraction) = (\frac{16}{9})</td>
<td>(\frac{9}{16}) (Proper fraction)</td>
</tr>
</tbody>
</table>

**Division of a Whole Number by a Fraction**

**Example 2**

Divide 2 by \(\frac{1}{3}\).

![Diagram showing division of a whole number by a fraction]

From the model, we see that each whole is divided into 3 parts and 2 wholes are divided into 6 parts.

We can also solve it as follows:

\[2 \div \frac{1}{3} = 2 \times 3 = 6\]

Reciprocal of \(\frac{1}{3}\) = 3

**Division of Proper Fraction**

1. **By a Whole Number**

   **Example 3**

   Divide \(\frac{1}{3}\) by 2.

   \[\frac{1}{3} \div 2 = \frac{1}{3} \times \frac{1}{2}\]

   ![Diagram showing division of a proper fraction by a whole number]

   \[\frac{1}{2} \times \frac{1}{3} = \frac{1}{2} \times 3 = \frac{1}{6}\]

   So, \(\frac{1}{3} \div 2 = \frac{1}{6}\)
Example 4
Four children share \(\frac{4}{5}\) of a cake equally. What fraction of the cake does each child get?

Reciprocal of 4 is \(\frac{1}{4}\).

\[
\frac{4}{5} \div 4 = \frac{4}{5} \times \frac{1}{4} = \frac{1}{5}
\]

We can also solve it another way as:

\[
\frac{4}{5} \div 4 = \frac{4}{5} \times \frac{1}{4}
\]

Each child gets \(\frac{1}{5}\) of the cake.

2. By a Proper Fraction
Example 5
Divide \(\frac{1}{3}\) by \(\frac{1}{4}\)

\[
\frac{1}{3} \div \frac{1}{4} = \frac{1}{3} \times 4
\]

So, \(\frac{1}{3} \div \frac{1}{4} = \frac{1}{3} \times 4 = \frac{4}{3} = 1\frac{1}{3}\).

Example 6
How many \(\frac{1}{6}\) are there in \(\frac{1}{2}\)?

\[
\frac{1}{2} \div \frac{1}{6} = \frac{1}{2} \times 6
\]

Reciprocal of \(\frac{1}{6}\) = 6

\[
\frac{1}{2} \div \frac{1}{6} = \frac{1}{2} \times \frac{3}{6} = 3
\]

So, there are three \(\frac{1}{6}\) in \(\frac{1}{2}\).
Division of Improper Fraction

1. By a Whole Number

Example 7  Divide $\frac{6}{5}$ by 4.

$$\frac{6}{5} \div 4 = \frac{6}{5} \times \frac{1}{4}$$

Reciprocal of 4 = $\frac{1}{4}$

We can solve similar problems of mixed fractions by converting them into improper fraction.

$$\frac{6}{5} = 1 \frac{1}{5}$$

So, $\frac{6}{5} \div 4 = \frac{6^3}{5} \times \frac{1}{4} = \frac{3}{10}$

Example 8  A coil of wire $\frac{5}{3}$ m long, is cut into 10 equal pieces. How long is each piece of the wire?

$$\frac{5}{3} \div 10 = \frac{1}{6}$$

From the model we see that each piece is $\frac{1}{6}$ m. We can also solve it as:

$$\frac{5}{3} \div 10 = \frac{5}{3} \times \frac{1}{10} = \frac{1}{6}$$

Each piece is $\frac{1}{6}$ m long.

2. By a Proper Fraction

Example 9  Divide $\frac{25}{8}$ by $\frac{5}{6}$.

$$\frac{25}{8} \div \frac{5}{6} = \frac{25 \times 5}{8 \times 6} = \frac{6}{5}$$

Reciprocal of $\frac{5}{6} = \frac{6}{5}$

$$\frac{3}{4} \frac{15}{12} - \frac{3}{4} = 3 \frac{3}{4}$$
Example 10

Siya cut $3\frac{1}{2}$ rectangular paper strips into a number of pieces. Each piece was $\frac{1}{2}$ of the paper strip. How many pieces did Siya cut the paper strip into?

Number of pieces = $3\frac{1}{2} \div \frac{1}{2}$

From the model, we see that there are 7 halves in $3\frac{1}{2}$.

$3\frac{1}{2} \div \frac{1}{2} = 7$

Siya cut the $3\frac{1}{2}$ rectangular paper strips into 7 pieces.

We can also solve it as follows

$3\frac{1}{2} \div \frac{1}{2} = \frac{7}{2} \div \frac{1}{2}$

$= \frac{7}{2} \times \frac{2}{1}$

$3\frac{1}{2} \div \frac{1}{2} = \frac{7}{1} = 7$

3. By an Improper Fraction

Example 11

Divide $\frac{5}{4}$ by $\frac{4}{3}$.

$\frac{5}{4} \div \frac{4}{3} = \frac{5}{4} \times \frac{3}{4}$

Reciprocal of $\frac{4}{3} = \frac{3}{4}$

$\frac{5}{4} \times \frac{3}{4} = \frac{15}{16}$ (of the whole 16 parts)
**Example 12**

What fraction do we get when $\frac{5}{4}$ is divided by $1\frac{1}{2}$?

Remember to convert the mixed fraction into an improper fraction.

$\frac{5}{4} \div 1\frac{1}{2} = \frac{5}{4} \times \frac{2}{3} = \frac{5}{6}$

**Exercise 4.2**

1. Solve.
   a) Divide $\frac{1}{2}$ by 4
      
      \[ \frac{1}{2} \div 4 = \frac{1}{2} \times \frac{1}{4} \]

   b) Divide $\frac{2}{3}$ by 3
      
      \[ \frac{2}{3} \div 3 = \frac{2}{3} \times \frac{1}{3} \]

2. Evaluate the following:
   a) $2\frac{4}{5} \div 2\frac{1}{2}$
   b) $6\frac{2}{5} + 1\frac{3}{5}$
   c) $3\frac{1}{5} + \frac{5}{3}$
   d) $4\frac{35}{4} \div 2\frac{1}{2}$

3. Eight children share $\frac{4}{5}$ L of a fruit juice equally. What fraction of the fruit juice does each child get?

4. How many packets each weighing $\frac{3}{10}$ kg can be made from 15 kg of sweets?

5. The perimeter of a square board is $\frac{8}{7}$ m. What is the length of each side of the board?

---

**Solving Word Problems Through Model Method**

**Example 1**

A total of 50 children went to a Science Fair. $\frac{2}{5}$ of them were girls.

a) How many girls had gone to the fair?

b) What is the number of boys in the group?
Denominator is 5, so we draw a model of 5 units.

**Method 1**

5 units = 50
1 unit = $50 ÷ 5 = 10$

a) 2 units = $2 × 10 = 20$ (girls)
   20 girls had gone to the fair.

b) 3 units = $3 × 10 = 30$ (boys)
   There were 30 boys in the group.

**Method 2**

a) $\frac{2}{5}$ of 50 were girls:
   
   $$\frac{2}{5} \times 50 = 20$$
   20 girls had gone to the fair.

b) $\frac{3}{5}$ of 50 were boys:
   
   $$\frac{3}{5} \times 50 = 30$$
   There were 30 boys in the group.

**Example 2** Six children share $\frac{3}{4}$ of a pizza equally. What fraction of the pizza does each child get?

**Method 1**

$$\frac{3}{4} ÷ 6 = \frac{1}{6} \text{ of } \frac{3}{4}$$

$$= \frac{1}{6} \times \frac{3}{4}$$

$$= \frac{1}{8}$$

**Method 2**

$$\frac{3}{4} ÷ 6 = \frac{1}{6} \times \frac{1}{6^2}$$

$$= \frac{1}{8}$$

Dividing by 6 is equivalent to multiplying by $\frac{1}{6}$. 
Example 3  Half a rectangular chocolate is shared among 3 girls. What fraction of chocolate will each girl get?

Method 1

\[
\frac{1}{2} \div 3 = \frac{1}{3} \text{ of } \frac{1}{2} = \frac{1}{3} \times \frac{1}{2} = \frac{1}{6}
\]

Each girl will get \( \frac{1}{6} \) of the chocolate.

Method 2

3 units = \( \frac{1}{2} \)

1 unit = \( \frac{1}{2} \div 3 = \frac{1}{6} \)

Each girl will get \( \frac{1}{6} \) of the chocolate.

Exercise 4.3

Solve the following word problems.

1. There are 1400 pupils in a school. \( \frac{2}{7} \) of the pupils are boys and the rest of them are girls. Find the number of boys and girls in the school.

2. Simran has 8 marbles. Ritu has \( 1\frac{3}{4} \) times as many marbles as Simran. How many marbles does Ritu have?

3. The perimeter of a park is \( 4\frac{1}{2} \) m. A man completed 4 rounds of this park. How far did he walk altogether?

4. Three-fifths of a sum of money was shared equally among 3 girls. What fraction of the money did each girl get?

5. A coil of wire \( \frac{8}{9} \) m long, is cut into 4 equal pieces. What is the length of each piece?

6. Dhruv poured \( \frac{9}{10} \) L of syrup equally into 6 glasses. How much syrup was there in each glass?

7. In an exam a student attempted 35 questions. If \( \frac{5}{7} \) of the questions he attempted were correct, how many questions did he get incorrect?
Objective: To develop an understanding of multiplication of the fractions.

Requirements: Square paper, sketch pens

Steps:
To solve: $\frac{1}{3} \times \frac{2}{5}$

1. Since the two denominators are 3 and 5, the students draw a rectangle measuring 3 squares by 5 squares on the square paper.

2. One student colours $\frac{1}{3}$ of the rectangle in yellow.

3. The second student crosses $\frac{2}{5}$ of the yellow shaded squares in green.

What fraction of the rectangle is both shaded and crossed? ($\frac{2}{15}$ of the squares that lie inside the rectangle are both shaded and crossed.)

This shows that $\frac{1}{3}$ of $\frac{2}{5} = \frac{2}{15}$

So, $\frac{1}{3} \times \frac{2}{5} = \frac{2}{15}$

Repeat the above steps for these multiplications.

a) $\frac{1}{3} \times \frac{3}{4} = \square$

b) $\frac{2}{3} \times \frac{2}{5} = \square$

c) $\frac{1}{3} \times \frac{4}{6} = \square$

d) $\frac{2}{3} \times \frac{3}{4} = \square$