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A Note to the Teacher from the Author

New Countdown 4 is the sixth stage of a seven book journey into maths designed for the mathematician of today’s challenging, fast-evolving world. It carries concepts introduced earlier in the journey (place-value, the four operations, measurement, simple geometry and fractions) to a more advanced plane and introduces some exciting new ideas: multiples and factors, prime and composite numbers, prime factorization, tests of divisibility, mixed numbers and improper fractions, the concept knowledge of geometry, measuring and constructing angles, learning more of the secrets of triangles and quadrilaterals, and linking the concept of the right angle with that of perpendicular lines. Graph work begun in New Countdown 3 is developed in exciting directions.

New Countdown 4 covers all the concepts recommended for Class Four learners by all major syllabuses. It also reaches beyond them in a careful and systematic way. As in the preceding books of the series, worked examples are provided for each concept introduced, and a range of practical activities are included in an attempt to guarantee the involvement of every child.

New Countdown 4 comprises three parts, each containing work which can be covered comfortably in the time available for each term. I recommend that you follow the three parts in sequence, because later portions of the books relate directly to work done or concepts discussed in earlier portions. As before, review pages appear regularly, and a comprehensive review section is included at the end of each part.

Here are my suggestions for teaching ideas and practical activities designed to reinforce learning and add interest, variety, and a practical dimension to your classes:

**PART ONE**

To help your children grasp the point that numbers of four digits and above are organized into ‘houses’ or ‘periods’, make generous use of the board: for example, draw the ‘house of thousands’ shown on page 3 and put a succession of 4-digit numbers into it. Make sure the children understand that the ‘wall’ dividing two houses is indicated in a number by the comma. Provide plenty of practice with 4-digit and 5-digit numbers before moving on to 6-digit numbers and explaining the existence of two different numeration systems, the Pakistani and the International (see page 7). Since it is important for Pakistani students to be familiar with both systems and move confidently from one to the other, ensure plenty of ‘translation’ practice. You can develop a set of flash cards, each of which shows a number in Pakistani place-value notation on one side and the same number in International place-value notation on the other, like the number 243101 may be shown as:

\[
\begin{align*}
2,43,101 & \quad \text{and} \quad 243,101
\end{align*}
\]

Divide your class into teams which then compete to ‘translate’ a given number into the other system of numeration. Team games are also an excellent way of testing your students’ ability to present big numbers in expanded form, arrange them in ascending/descending order, identify the predecessor or successor of a given big number, and skip count accurately (in 5s, 10s, 20s, 100s, etc.)

The section on multiplication and division includes a discussion on 10 and its multiples (see pages 16 and 31). Spend plenty of time on the question of what happens to numbers when they are multiplied or divided by 10 or its multiples. This provides an excellent basis for the introduction of decimal fractions and decimal notation later in the book. Division work reaches a more advanced level here, featuring 4-digit dividends and 2-digit divisors. Plenty of practice sums are provided (pages 28-30), but you may want to prepare additional worksheets. Once again, emphasize the importance of writing the sums out neatly and keeping columns straight.
The unitary method is such a useful, everyday tool that children will enjoy using it to solve shopping puzzles and other problems. Make sure you discuss carefully the ‘trick’ questions of Exercise 3c on page 35. Ask your children to think of other problems to which the unitary method is definitely not applicable!

By now accustomed to the clock-face and its divisions, your students should have no difficulty in telling the time to the exact minute (page 37). Make sure they have lot of practice in handling 12-hour clock time and 24-hour clock time: once again, it is important that children move confidently between the two methods. When introducing timetables (page 41), arrange to have with you in class, a real railway or airlines timetable which the children can look at and discuss. You might like to prepare worksheets featuring a small section of the timetable, like that shown at the top of page 41: choose a railway line or bus route relevant to your particular region if you wish.

PART TWO

Here, factors and multiples are presented as entry-points to the marvellous patterns and linkages intrinsic to the world of maths. On page 47, a simple Venn diagram is introduced to help children visualize the idea of common multiples. I strongly recommend that you reproduce this exercise on the board, going very carefully step by step, using coloured chalk to highlight the common multiples. Encourage the children to make diagrams of their own, as suggested in exercise 2 on page 47. If their Venn loops come out strangely shaped, this doesn’t matter at all; much more important is the fact that you are giving your students a simple, no-fuss introduction to set theory!

Factors are well introduced by having the children arrange simple objects (beads, nuts, straws, etc.) in the manner shown by Sid Spacewalker on page 49. Once the concept of ‘factor’ is grasped, children should be able to distinguishing prime numbers from composite numbers (pages 52-54). On page 55, prime factorization is presented in terms of a tree, an idea which you might like to develop on your board. Team games will help your class learn the vital tests of divisibility. For example, you can divide the class into 4 teams: Team A for numbers divisible by 2, Team B for numbers divisible by 3, and so on. From a list of numbers, you read out one at random, and the teams decide whether the number is divisible by the pre-set numbers assigned to them. Marks can be deducted for wrong answers!

Your work on multiples and factors will have provided an excellent basis for the section on fractions, which includes the idea of reducing fractions to their lowest terms by identifying common factors (pages 63-64). When introducing the concept of improper fraction, be sure to reproduce on the board the simple diagrams shown on page 66. Diagrams also help to convey the point that improper fractions can be expressed as mixed numbers (and vice versa). Plenty of practice exercises are provided for the addition and subtraction of mixed numbers (without and with regrouping), but you may wish to develop additional worksheets here.

To introduce the concept of area, a variety of geometrical grids are shown (page 80). Ask your children which of the grids they think is easiest to use: in most cases they will identify the square as the most convenient measure. On page 81, half-squares are introduced, bringing the children closer to the problem of estimating the area of irregular shapes. When you discuss the two leaves shown against a grid on page 83, examine with the children, the following method for dealing with parts of squares covered:
1. If the part covered is less than half a square, ignore it.
2. If the part covered is greater than half a square, count it as a whole square.

Make sure all the children have access to squared paper as they work through this section. If a grid of centimetre squares is provided, the idea of a square centimetre can easily be introduced as the amount of space covered by one of the squares.

**PART THREE**

Here, your teaching focus is on decimal fractions and on helping children to understand this simple point: that decimal notation is an extension of place value (as used for ones, tens, hundreds, etc.) The decimal point simply makes it clear where a whole number ends and the decimal fraction begins. To use decimal fractions confidently and well, your students must understand, firstly, the notation and, secondly, the equivalence of decimal fractions and common fractions. Both ideas are explained in detail in *New Countdown 4*.

When introducing the decimal notation for hundredths (page 96), you might find it helpful to provide each child with a Xeroxed set of hundred-square grids. Ask the children to count how many squares there are in each grid (100). They can then colour one of the squares and write down the fraction that has been coloured (stage 1).

1. 

In the next stage (stage 2), ask them to colour one whole column of squares, count the number of squares coloured (10), and think how they can express this as a fraction of the whole grid. If the children think in terms of 10 small squares, they will write the fraction as \( \frac{10}{100} \). But if they think in terms of columns, they will find there are 10 columns altogether and that they have coloured one of them, or \( \frac{1}{10} \) of the grid. In decimals, this means that 0.1 of the grid is coloured. The following equivalence is now established: \( \frac{10}{100} = \frac{1}{10} = 0.1 \)

Thirdly, ask the children to colour 15 squares:

3. 

In the next stage (stage 2), ask them to colour one whole column of squares, count the number of squares coloured (10), and think how they can express this as a fraction of the whole grid. If the children think in terms of 10 small squares, they will write the fraction as \( \frac{10}{100} \). But if they think in terms of columns, they will find there are 10 columns altogether and that they have coloured one of them, or \( \frac{1}{10} \) of the grid. In decimals, this means that 0.1 of the grid is coloured. The following equivalence is now established: \( \frac{10}{100} = \frac{1}{10} = 0.1 \)

Thirdly, ask the children to colour 15 squares:
Ask them how they can express these squares as a fraction of the whole grid. They may answer in several ways: \( \frac{1}{10} + \frac{5}{100} \), or \( \frac{10}{100} + \frac{5}{100} \), or \( \frac{15}{100} \) or \( 0.1 + 0.05 \). Whichever way they choose, they will find that, in place value terms, there is no column to accommodate \( \frac{15}{100} \). At this point, the hundredths ('h') column can be introduced, and the decimal notation, 0.15, discussed. Reinforce the point that this decimal fraction can be written as:

\[
0.15 \text{ or } \frac{1}{10} + \frac{5}{100}, \text{ or } \frac{10}{100} + \frac{5}{100}, \text{ or } \frac{15}{100}
\]

Once decimal notation is understood as an extension of place-value, students should have no difficulty in handling thousandths (page 106). The discussion of the metric system (pages 114-5) reinforces understanding besides providing plenty of opportunity for practical work with decimals. A pocket calculator may be introduced here.

For the section on geometry, you might find it helpful to prepare worksheets of large-sized angles which children can measure with their protractors. Once they have gained confidence in handling the instrument, the smaller angles set out in New Countdown 4 will provide ample practice. Once again, wishing you an exciting year of teaching!

Shamlu Dudeja
Introduction

The journey till now in the New Countdown series has been very useful in exposing children to new concepts. Apart from having learnt numbers and newer strategies of working with them, the children are now able to grasp new topics. They can now work independently and their minds are ready to absorb more. New Countdown 4 follows the same activity-based ‘visual’ format of the previous books in the series.

The primary aim of the New Countdown series is to ensure that every child develops a strong affinity for mathematics (as against a fear for it). For this, the following are necessary:

- Tension-free and fun-filled atmosphere
- Concentration Building
- Logical thinking
- Questioning mind
- Ability to answer without hesitation
- Retentive memory
- Sense of discovery (rather than 'being taught')
- Lateral thinking
- Inclusion of children with different learning abilities

TENSION-FREE AND FUN-FILLED ATMOSPHERE

Such a learning environment establishes greater bonding between the children and the teacher and leads to healthier mental growth, greater confidence, and better learning. Being in a comfortable, familiar, and friendly environment itself is a confidence-building exercise.

The more confident a child is, the easier it is for him or her to absorb new concepts, as the year progresses. It is firmly believed that children begin to get more joy by learning new concepts through discovery. If the lessons are based on such mores, there is no reason why the student will not grow up to be a happy and caring child with a bright, thinking mind.

CONCENTRATION BUILDING

As children grow older, building concentration becomes imperative, and nothing helps more than a meditative mode in the morning to kick-start the power of concentration for the day.

Children may be asked to shake their arms and legs while standing in their individual positions and give out a jolly good laugh! Then, they sit down in a comfortable position without undue movement (for about 3 minutes), close their eyes, and mentally focus on whatever they wish to: it could be a favourite flower, the face of a loved one, or a scene from a recent holiday.

The kind of concentration children are likely to develop through this focusing exercise will stay with them for hours. In fact, this focusing exercise may be repeated after lunch break, once the children are back in their seats.

Note: It is essential to mention here that teachers do not mix this exercise with religious meditation, as a matter of respect for the multi-religious societies we live in.

LOGICAL THINKING

Every page in all the books in this series lay stress on logical thinking. The moment a child gets into 'logic', mode, thought, concentration, and retentive memory will be the natural outcomes.
QUESTIONING MIND
If we want our children to be above-average achievers, we should encourage them to ask as many questions as they wish to. A question from one child will invariably lead to more questions from other children in the class. This is a very healthy exercise. There may be times when the teacher does not have an immediate answer to a question; there is no need to be ashamed of this, as long as it is ensured that the answer is found within a day or two.

ABILITY TO ANSWER QUESTIONS WITHOUT HESITATION
It is important for a teacher to get into question-answer sessions with children, as often as possible. The mother of a well-known intellectual recently said that the reason for her son’s brilliant performance in life was that he always asked too many questions and offered to give answers even when he was not specifically asked. Can one say more? Apart from encouraging children to ask questions, the habit of trying to answer as many questions as possible should also be inculcated.

RETENTIVE MEMORY
Any kind of learning which is based on concentration, logical thinking, asking questions, and finding answers will automatically lead to retentive memory. And the power of retentive memory as a tool for learning at any stage in life can never be undermined.

Rote learning, at the most, uses 2 senses — listening and seeing (reading) whereas activity-based learning, on the other hand, involves touching (doing) all the time, and smelling and tasting too, on a few occasions, in addition to listening and seeing. The greater the number of senses used for a learning exercise, the better the concentration leading to improved speed of understanding, retention, logic, and application.

It would be great fun if the art and craft classes, incorporate mathematical shapes, concepts, and language off and on. The joy that children derive out of such a learning experience is an added bonus.

SENSE OF DISCOVERY
Discovery is always more joyous than being told. If a mother tells her son that the teacher loves him, the son believes her. But if he discovers the teacher’s love through a tight hug or a pat on the back, imagine the joy. The same applies to learning, in Mathematics.

The sense of joy or pleasure at discovering new things, which is missing in rote, is a great accelerator for learning. Each discovery is the result of a practical activity.

LATERAL THINKING
By this time children know several number facts and are comfortable with addition, subtraction, multiplication, and division. Concepts such as multiplication being a form of repeated addition, and division being a form of repeated subtraction, are used in everyday life without the necessity of going back to the basics. This is an example of lateral thinking.

Vertical learning would be to learn 2s tables, then 3s, then 4s, and so on. Lateral thinking would entail understanding the facts behind the tables and applying these to solve everyday problems. In today’s times, more than ever before, it is important that children think, learn to think and apply their knowledge laterally, i.e. they apply the knowledge gained from books to their environment throughout the day.
INCLUSION OF CHILDREN WITH DIFFERENT LEARNING ABILITIES

In this ‘open’ method of learning, it is possible to include children with different learning abilities. Every child works at his or her own pace without being singled out. With greater exposure, most of them will eventually fall in line with the majority.

Sometimes, learning differences get exaggerated as children advance in learning. These must be taken into account and extra classes should be held for those who are slow learners. The slow learners often have the gift of extra love: they need a hug and a pat more often than an achiever (not to forget that achievers need the hug and the pat, too!). The hug and the pat work as an elixir and must be freely used.

Similarly teachers must come up with challenges for gifted children in the form of extra exercises and innovative worksheets requiring lateral thinking. They help activate their grey cells and keep their attention and interests levels high in the classroom.

GENERAL NOTE

Starting from Book 3, the workbook style followed in junior books is changed to textbook style. Thus, it is essential that each child has a notebook to write in, as he/she works through the book. Greater use of the board will be necessary to demonstrate new ideas. Tick-marks, stars, and smileys give children confidence that they are getting their work right and hence encourage swift progress.
PART ONE

Revision (Pages 1–3)

OBJECTIVE
These pages have been provided to revise the work done in the previous year in order to reinforce and consolidate the concepts learnt so far.

LEARNING AIDS
The teacher sets up an area for number work, as was done in the previous class, to help children consolidate the concepts learnt. Counters, rulers, number charts, net bags, groupings on charts for multiplication, ….all these are useful in class 4 as well.

Place Value (Pages 4–10)

OBJECTIVE
The children have already understood the concept of ‘digit’ and have learnt to write 4-digit numbers. They can solve 4-digit additions and subtractions. They will now be introduced to 5- and 6-digit numbers.

LEARNING CURVE (10 MINS)
The children have been working with numbers up to 9999. Addition of 1 to 99,999 follows the same pattern as the addition of 1 to 9999. They now work with numbers from 10,000 to 9,99,999.

LEARNING AIDS
Exercise books having squared sheets ; 1s, 10s, 100s, 1000s, 10,000s and 100,000s tags ; House-boards and number cut-outs.

LEARNING ACTIVITY (20 MINS)
By now the children are aware that numbers don’t just stop at 9999 and that there are still bigger numbers. Thanks to television, they have already heard of bigger number names such as ten thousand and a lakh i.e. a hundred thousand etc.

Working with 5-digit numbers is merely a logical extension of 4-digit numbers and is understood easily by the 9-year olds. Concrete representation of 9999 is tedious, but worth the effort. However, it works equally well if shown pictorially as depicted in the book.

One more than 9999 makes 10,000. Thus, a new box for the 5th digit needs to be added to the ‘Thousands’ house which is denoted by T Th (Ten Thousand). Soon, children will be ready to move on to 6-digit numbers, where another house i.e. the lakhs (L) house would be added to the house-board.

In Pakistan and other parts of South Asia, the Pakistani place value system is followed wherein the number 100000 is referred to as one lakh and is written as 1,00,000. Identification of large numbers becomes easier and faster, if groups of digits are separated by commas. In Europe, America, Australia and certain other countries, 100000 is referred to as one hundred thousand and is written as 100,000.
The teacher calls out a 6-digit number. A child comes up to the house-board and fills in the digits in the appropriate places. Others write the number in their books, first in the Pakistani system and then in the International system. The children may then be asked to write this number in expanded form and then work on ‘before’ and ‘after’ exercises. This may be followed by identifying greater and smaller numbers and arranging numbers in ascending and descending order.

ADDITIONAL WORK  (10 MINS)
Place value cards make the concept clearer. Nine tags of each of the following kind may be used to drive home the concept of place value.

- Green tags with numbers 1, 2, 3 ......9.
- Red tags with numbers 10, 20, 30......90.
- Blue tags with numbers 100, 200, 300 ....900.
- Black tags with numbers 1000, 2000, 3000 ....9000.
- Brown tags with numbers 10000, 20000, 30000 ....90000.
- Yellow tags with numbers 100000, 200000, 300000 ....900000.

(Colours are arbitrary)

**Addition and Subtraction (Pages 11–13)**

**OBJECTIVE**
The children revise addition and subtraction of 4-digit numbers and continue with the same method for adding and subtracting 5-digit and 6-digit numbers.

**LEARNING CURVE  (10 MINS)**
The children can already add and subtract numbers till 9999. The sums on pages 11 and 12 introduce them to addition and subtraction of numbers with results up to 6-digit numbers. They learn how to group ones into 10s, 10s into 100s, 100s into 1000s, 1000s into 10,000s, and 10,000s into 1,00,000s (carry-over sums).

They first subtract numbers vertically then work on horizontal sums having 5 or 6 digits, which is a very good exercise. They convert 1,00,000s to 10,000s, 10,000s to 1000s, … and so on by ‘borrowing’ from the ‘higher house’. Since the methods are identical, this transition does not take long.

**LEARNING AIDS**
Charts showing various mountain peaks in the Everest range, house-board, flannelograph, charts showing addition/subtraction sums, number-strips, cut-outs of fish with small iron blobs at the back, a magnet at the end of a cord (to act as a fishing hook).

**LEARNING ACTIVITY  (20 MINS)**
As mentioned in previous teachers’ books, teaching of any number operation should follow the following order:
- Concrete objects
- Pictures only
- Picture and number
- Numbers
Once children are able to handle numbers, they should move from vertical to horizontal calculations and then to story sums and word problems based on the concepts learnt earlier but with larger numbers.

Children love stories. If real-life situations are related to them as stories, they understand better. Children also love to make up their own stories. It is important that they learn to connect large numbers to real-life situations. For example, they may be told that heights of different mountains can be written in 4- or 5-digit numbers, votes cast during elections or attendance at rock concerts can go up to 5-digit numbers and so on.

Addition problems like the following may be solved for them on the board.

1. The number of slices of pizzas of a particular brand consumed in Pakistan, every 30 minutes, is 63,000. How many pizzas will be consumed in 1 hour?

   \[
   \begin{array}{cccccc}
   & 6 & 3 & 0 & 0 & 0 \\
   + & 6 & 3 & 0 & 0 & 0 \\
   \hline
   1 & 2 & 6 & 0 & 0 & 0 \\
   \end{array}
   \]

   Ask them to subtract one of the numbers from the sum, and check the answer.

2. The height of a mountain peak is 24,030 ft. A commercial aircraft can fly as high as 36,250 ft. How much higher is the aircraft from the peak of the mountain if it is flying at this height?

   \[
   \begin{array}{cccccc}
   3 & 6 & 2 & 5 & 0 \\
   – 2 & 4 & 0 & 3 & 0 \\
   \hline
   1 & 2 & 2 & 2 & 0 \\
   \end{array}
   \]

   Now, the children should add this answer to the height of the mountain peak and see if the sum has been worked out correctly.

   Similarly subtraction problems like the following may also be given for practice.

1. At a rock concert in London, the number of tickets sold was 5,54,432. At another outdoor music show, the number of tickets sold was 66,630. Which show sold more and by how much?

   \[
   \begin{array}{cccccc}
   5 & 5 & 4 & 4 & 3 & 2 \\
   – 6 & 6 & 6 & 3 & 0 \\
   \hline
   4 & 8 & 7 & 8 & 2 & 0 \\
   \end{array}
   \]

   Start from the ones. 0 taken away from 2 is 2. 3 taken away from 3 is 0. 6 cannot be taken away from 4. So, one bundle of thousands needs to be opened. Now again, 6 cannot be taken away from 3, so one bundle of ten-thousands also needs to be opened. Again, as 6 cannot be taken away from 4, one bundle of lakh must be opened.

With time and practice, the children realize that the answers of addition and subtraction sums can be cross-checked by performing subtraction and addition respectively. For example,

- If, \(6 - 4 = 2\), then, \(2 + 4 = 6\)
- OR
- If, \(12 - 4 = 8\), then \(8 + 4 = 12\)

Gradually encourage the children to write numbers horizontally and then add. They may check them out later by adding vertically. Ask them to remember that:
For addition: They group ones into 10s, 10s into 100s, 100s into 1000s, 1000s to 10,000s and then 10,000s to 1,00,000s.

For subtraction: They convert 1,00,000s into 10,000s, 10,000s into 1000s, 1000s into 100s, 100s into 10s and 10s into ones.

ADDITIONAL WORK (10 MINS)
The fishing game, as suggested in Teacher’s book-3, may be used with larger numbers. Problems may be made on themes involving hamburgers prepared, sweets and chocolates eaten, pizza slices sold, etc.

Children must carry out additions and subtractions constantly using fingers, house-board, flannelograph, or anything else that is a part of their everyday school life, except calculators, as this exercise aims to train them in logic and memory. Children love to work using Flash cards as well. More photocopied addition and subtraction pages are also necessary for practice.

CLASSROOM ORGANIZATION
In a corner of the classroom, a flannelboard is put up on the wall and some number squares made from rough paper, are kept in a bowl. One child comes up to the board and puts up an addition sum. The rest of the class works it out. Then another child comes and puts up a subtraction sum…..and this goes on.

Multiplication (Pages 14–21)

OBJECTIVE
To make multiplication of large numbers quick and easy.

LEARNING CURVE (10 MINS)
Children are able to skip count using the number line and know tables at least up to 13. They are able to multiply 3-digit numbers by 2-digit numbers and also know conversion methods. Here, they move a step ahead and learn to multiply 3- and 4-digit numbers by 3-digit numbers.

LEARNING AIDS
Abacus, paper, and pencils.

LEARNING ACTIVITY (20 MINS)
Revision is the best way to start off a lesson, especially in case of multiplication because the procedure is the same in case of larger numbers also. The children revise the work done in Class 3 and then move on to multiplying numbers by 100 (and later its multiples) using the horizontal method followed by the vertical method. Based on this, they move on to multiplying by 1000 (and later its multiples).

Then, children proceed to multiplying 3-digit numbers by 2-digit numbers.

Example: Multiply 542 by 15
Children know that 15 = 1 ten + 5 ones
So, multiply 542 by 1 ten and 5 ones.
Steps: 1. First, multiply 542 by 5 ones. \(542 \times 5 = 2710\)  
\[\begin{array}{c}
542 \\
\times 15 \\
\end{array}\]
\[\begin{array}{c}
2710 \\
\end{array}\]
2. Add the 1 ten to 2710.
\[\begin{array}{c}
2710 \\
+ 5420 \\
\hline
8130 \\
\end{array}\]

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2. Then, multiply 542 by 1 ten. \((542 \times 10 = 5420)\)
3. Then, add the two products. \((2710 + 5420 = 8130)\)

The children move on to bigger numbers.

*Example:* Multiply 1237 by 35.

<table>
<thead>
<tr>
<th>Steps</th>
<th>Calculation</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. First, multiply 1237 by 5 ones. ((1237 \times 5 = 6185))</td>
<td></td>
<td>6185</td>
</tr>
<tr>
<td>2. Then, multiply 1237 by 3 tens. ((1237 \times 30 = 37110))</td>
<td></td>
<td>37110</td>
</tr>
<tr>
<td>3. Add the two products. ((6185 + 37110 = 43295))</td>
<td></td>
<td>43295</td>
</tr>
</tbody>
</table>

Gradually they are introduced to multiplication of 3-digit numbers by 3-digit numbers.

*Example:* Multiply 218 by 314.

Children know that \(314 = 3 \text{ hundreds} + 1 \text{ ten} + 4 \text{ ones}\)

So, they know they must multiply 218 by 3 hundreds, 1 ten, and 4 ones.

<table>
<thead>
<tr>
<th>Steps</th>
<th>Calculation</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. First, multiply 218 by 4 ones. ((218 \times 4 = 872))</td>
<td></td>
<td>872</td>
</tr>
<tr>
<td>2. Then, multiply 218 by 1 ten. ((218 \times 10 = 2180))</td>
<td></td>
<td>2180</td>
</tr>
<tr>
<td>3. Then, multiply 218 by 3 hundreds. ((218 \times 300 = 65400))</td>
<td></td>
<td>65400</td>
</tr>
<tr>
<td>4. Add the three products. ((872 + 2180 + 65400 = 68452))</td>
<td></td>
<td>68452</td>
</tr>
</tbody>
</table>

The pages in the book are designed to make children comfortable with multiplication as they switch between horizontal and vertical multiplications.

**ADDITIONAL WORK (10 MINS)**

Creatively made work cards are always useful. Further, memorizing multiplication facts (even in the age of computers and calculators) is highly recommended. In addition to instant speed and accuracy in every day calculations, this exercise hones up memory.

**Division (Pages 22–33)**

**OBJECTIVE**
Children learn to divide 3- and 4-digit numbers by 2-digit numbers, with or without a remainder in the end.

**LEARNING CURVE (10 MINS)**
Division is easy to comprehend if there is a sound understanding of multiplication and if children are given adequate practical experience in this area. They are already familiar with the long division method. Now, they move on to divide 3- and 4-digit numbers by 2-digit numbers.

**LEARNING AIDS**
Different types of concrete objects, number line, sorting trays are also useful to group the same number of buttons/counters in each compartment.

**LEARNING ACTIVITY (20 MINS)**
This lesson may be started after a thorough revision of the work done in the previous year. It is essential that they are conversant with the three basic terms associated with division and know how they are related to each other.
**Quotient**

\[
\begin{array}{c|ccc}
\text{Dividend} & \text{Divisor} & \text{Quotient} \\
\hline
\text{Dividend} & \div & \text{Divisor} & = & \text{Quotient}
\end{array}
\]

This can be made clear by giving an example like the one given:

**Example:** Divide 8 by 2. (It means, find the quotient)

\[
\begin{array}{c|c}
2 & 8 \\
\hline
\end{array}
\]

Here, 2 is the **divisor.** It goes outside the division sign.

8 is the **dividend.** It goes inside the sign.

4 is the **quotient.** It goes above the bar.

Give the children a number of verbal sums to solve, gradually moving from relatively simple to difficult ones. In Class 3, the children who were well versed in tables could solve division sums easily. So, in this book also they begin by completing the tables chart (given on page 23), and solving the sums given under it on the same page with the help of the chart. This not only helps them memorize the tables but also makes division easier.

At this stage children have to divide 3-digit numbers by 2-digit numbers, first without a remainder and then with a remainder. To solve sums with remainders, the following steps need to be explained:

**Example:** Divide 748 by 18

**First,** look at the hundreds in the dividend: 7 is less than the divisor 18.

So, take hundreds and tens (i.e. 7 and 4) together. As 74 is greater than 18, divide 74 by 18.

\[ 74 \div 18 = 4 \text{ r } 2. \]

So, place 4 in the tens column in the quotient and 2 in the remainder.

**Second,** take the remainder 2 tens along with

8 ones of 748 and divide by 18. \[28 \div 18 = 1 \text{ r } 10\]

Place 1 next to 4 in the quotient

**Third,** since 10 is less than 18, so 18 will not divide 10. Hence, the final answer is: \[748 \div 18 = 41 \text{ r } 10\]

Although it requires patience to grasp this method, but when it is clear, it is easy to work even with larger numbers. So, a lot of division sums need to be worked out on the board.

Children solve the sums given from page 22 to 32 in the book using the long form of division. They divide 3- and 4-digit numbers by 2-digit numbers (with and without remainder) following the same principle as shown. Questions involving real-life situations are a must. On page 31, the children learn an easy way of dividing by 10 and its multiples. It prepares them for conversions from gram to kg, millilitre to litre, and metre to km that they will come across later on in the book.

**ADDITIONAL WORK (10 MINS)**

Additional activity sheets may be provided to the children to help them do division sums correctly.
The Unitary Method (Pages 34–35)

OBJECTIVE
To introduce the children to the unitary method and encourage them to apply it in real-life situations.

LEARNING CURVE (10 MIN)
Children know that when we refer to the word ‘unit’, we are talking about 1 thing/item. They have been on shopping expeditions both in and outside the classroom. They know how to use the four operations i.e. +, −, ×, and ÷. They can apply this method for finding:
- Prices of items while shopping
- Number of km traveled by a car vis-à-vis time taken or petrol consumed
- Water collected in buckets
- Problems involving labour and money (or time)
- Electricity used by electrical gadgets
In fact, unitary method works in ALL fields, sometimes directly and sometimes inversely.

LEARNING AIDS
Classroom shop and shopping lists in the following format:
- Cauliflowers : Rs 22 a pair
- Limes : Rs 30 a dozen
- Radishes : Rs 6 for a bunch of 4

LEARNING ACTIVITY (20 MIN)
Suppose a store is selling CDs for Rs 120 a dozen. Nawfal wants only 5 CDs. How much money will he need to pay for them?

Unitary method involves finding the cost of 1 CD first.

12 CDs cost Rs 120.
Therefore, 1 CD costs Rs 120 ÷12 = Rs 10
Hence, 5 CDs cost 5 × Rs 10 = Rs 50

Many real-life problems can be solved using the unitary method.

Long distance traveling throws up opportunities where unitary method can be employed. Suppose a car is filled up with 50 litres of petrol when the needle is at the red mark and its mileage is noted down. If the needle comes back again to the red mark after traveling 500 km, we can infer that the car travels 500 km on 50 litres of petrol. Now, this information can be used to find out the amount of petrol required to travel another 200 km.

The pages in the book help children understand the significance of the unitary method in various situations in daily life. Every unitary method problem can easily become a story.

ADDITIONAL WORK (10 MIN)
A group of children work on finding costs of the items available in the shop set up in the classroom and prepare a price list in the format given above. Other children prepare their individual shopping lists based on the items available in the shop.
OBJECTIVE
Children learn to read time in a 24-hour clock. They read time by seconds and learn to add and subtract time.

LEARNING CURVE (10 MINS)
Children are familiar with the 12-hour clock. They know how to read time in hours and minutes. They are familiar with the usage of a.m. and p.m.

LEARNING AIDS
- Clock faces with movable hands on the bulletin board
- An actual clock
- Digital toy clocks
- Rubber stamps, to print clock-shapes on paper
- Time-tables such as air and railway schedules, T.V. program schedules, etc.

LEARNING ACTIVITY (20 MINS)
Children begin by recapitulating the work done in Class-3. Starting from their previous knowledge of a.m. and p.m., children learn about the 24-hour clock. The 24-hour system was introduced to do away with the confusion caused with the use of a.m. and p.m.

Every new day begins at midnight i.e. 00:00 hours. The two numbers on the left indicate the hours and the two numbers to the right indicate the minutes. There is a separator in the form of colon between the hours and the minutes (and, as we shall see later, between minutes and the seconds). The 2-digit number on the left can go from 00 to 23, and the number in the minutes column can go from 00 to 59. Thereafter, there is an increase of 1 in the hours column and the minutes turn to 00 again.

Noon is written as 12:00 and read as “12 hundred hours”. The time then moves to 12:01, 12:02 ...... 12:59 and then 1 p.m. which is written as 13:00 (13 hundred hours). In this manner, the time moves on to 23:59 just before midnight, and finally to 00:00 i.e. midnight. Once the children know how to read the time on the 24-hour clock well, they add and subtract time, first without carrying over or borrowing as in the following examples:

1. On a Sunday morning, Izaan watched a film from 7:10 h to 9:25 h. How long was the film?
   \[
   9 \text{ h} 25 \text{ min} - 7 \text{ h} 10 \text{ min} = 2 \text{ h} 15 \text{ min}
   \]
   So, Izaan watched the film for 2 hours and 15 minutes.

2. Then, in the afternoon, he went to the Club and swam with his friends, from 15:45 h to 16:50 h. How long did he swim?
   \[
   16 \text{ h} 50 \text{ min} - 15 \text{ h} 45 \text{ min} = 01 \text{ h} 05 \text{ min}
   \]
   So, Izaan swam for 1 hour and 5 minutes.
3. Which was longer, the film or his swim? By how many minutes?

Film: 02 h 15 min
Swim: 01 h 05 min

01 h 10 min = (60 + 10) min = 70 min

Thus, the film was longer by 70 minutes.

It is useful to tell children that although seeing a film is alright on Sundays but it is far better to be out in the open—swimming, playing, walking, or even reading a book.

Next, they move on to addition and subtraction, converting hours into minutes and minutes into hours, when necessary. It is like adding and subtracting money, but with a difference.

Example: Two sisters, Imsaal and Sara, went to a concert at Sandspit. They went via the Mai Kolachi Bridge and it took them 45 minutes to get to the Concert area. They were in their seats at 16:30 h. The concert started at 17:20 h and lasted for 2 hours 45 minutes. Immediately they headed for their home and reached there at 20:50 hours. Find out

a) At what time did the concert finish?

b) How long were Imsaal and Sara out of their home?

Solution:

a) Concert started at

It lasted for:

Concert finished at

[Hint: (20 + 45) min = 65 min = 1 h 05 min; Carry 1h over to the hour column.]

b) The two were in their seats at:

The time it took them to reach concert

They left home at

[Hint: To subtract 45 min from 30 min, convert 1 h into 60 min.

So, 60 + 30 = 90 min gives 90 min in the minutes column.

Now, (90 – 45)min = 45 min.]

The two reached home at

They left home at

Time spent out

There is no need to convert 1 h into 60 minutes in this case.

Similar problems, with one or two sets of calculations, may be created by the teacher for practice.

A real clock with seconds hands is necessary for children to understand the concept of seconds. Clapping, thumping a foot, or saying “Aha” every 5 seconds or every 10 seconds gives children an idea of the passage of time. The teacher points out the 60 small divisions on the clock. Each division represents a second. When the seconds hand goes all around the clock face, 60 seconds have passed or a minute has passed.

The numbers around the clock face do skip counting in 5s. Thus, the seconds hand takes 5 seconds to move from one number to the other. So, if it is on 8, we can work out that eight 5s is 40 and so the time is ‘40 seconds past the minute’.
ADDITIONAL WORK (10 MINS)
A group of children may be asked to design a railway schedule. The children in other groups solve sums based on the schedule designed. A little NASA scene can also be worked out that children may be asked to playact. The teacher sets a time-table for the take-off of an imaginary space-shuttle. One child is made the announcer and given the time-table. The announcer, with the take-off time underlined on his/her timetable, stands up at appropriate time and makes the announcement "All stations clear. In 10 seconds, the space shuttle will take-off. The COUNTDOWN begins now….10, 9, 8, 7, 6, 5, 4, 3, 2, 1 ...BLASTOFF."

PART TWO

LCM and HCF (Pages 46–59)

OBJECTIVE
To introduce children to the meaning of the words ‘factors’ and ‘multiples’ through factorization and Venn diagrams. ‘Lowest Common Multiples’ and ‘Highest Common Factors’ are new concepts to which the children are introduced. Related concepts like prime numbers, co-prime numbers, and composite numbers are also explained.

LEARNING CURVE (10 MINS)
The children already know about multiples of 10. Here they find out the multiples of other numbers and then common multiples between two numbers. Thereafter they find the LCM. Next, the children list the factors of a number and identify the common factors between two numbers. In this way they identify the HCF. To make the calculation of LCM and HCF easy, children are introduced to co-prime numbers, prime numbers, composite numbers, and prime factors.

LEARNING AIDS
Counters, an exercise copy having squared sheets, number lines for finding multiples and factors.

LEARNING ACTIVITY (20 MINS)
Using tables and skipping on number lines, children find multiples and subsequently factors. Multiple of a number $x$ may be introduced to children as a number that can be divided by $x$ without leaving any remainder.

Examples:
12 ÷ 3 = 4 (remainder 0); so 12 is a multiple of 4.
100 ÷ 10 = 10 (remainder 0); so 100 is a multiple of 10.

It is easy to mark multiples on number lines:

Multiples of 2: 2, 4, 6, 8, 10, 12, 14, 16, 18 ..... 
Multiples of 3: 3, 6, 9, 12, 15, 18 .....
So, common multiples of 2 and 3 are 6, 12, 18 ….. and the lowest amongst these is 6 which is referred to as the LCM of 2 and 3. Note that multiples of 2 and 3 are infinite and common multiples of 2 and 3 are also infinite but the LCM is unique. This fact holds for all numbers.

Children find the multiples of different numbers by repeated addition and by skipping on a number line. Once they are comfortable with listing multiples, they identify the common multiples (and the LCM) of any two (or more) given numbers using Venn diagrams, as depicted below:

Factors are introduced once children know how to calculate the LCM of numbers. The children are divided into groups and the teacher distributes 72 counters to each group. They are then asked to group the counters in 6 different ways, taking 12 counters at a time.

**Possible solution:**

<table>
<thead>
<tr>
<th>1)</th>
<th>2)</th>
<th>3)</th>
<th>4)</th>
<th>5)</th>
<th>6)</th>
</tr>
</thead>
<tbody>
<tr>
<td>★ ★ ★ ★ ★ ★ ★ ★ ★ ★</td>
<td>★ ★ ★ ★ ★ ★ ★ ★ ★ ★</td>
<td>★ ★ ★ ★ ★ ★ ★ ★ ★ ★</td>
<td>★ ★ ★ ★ ★ ★ ★ ★ ★ ★</td>
<td>★ ★ ★ ★ ★ ★ ★ ★ ★ ★</td>
<td>★ ★ ★ ★ ★ ★ ★ ★ ★ ★</td>
</tr>
<tr>
<td>12 × 1 = 12</td>
<td>6 × 2 = 12</td>
<td>4 × 3 = 12</td>
<td>3 × 4 = 12</td>
<td>2 × 6 = 12</td>
<td>1 × 12 = 12</td>
</tr>
</tbody>
</table>

Taking 12 counters at a time, the children arrange them in ones, twos, threes, fours, sixes, and twelves, *with no remainder*. These numbers 1, 2, 3, 4, 6, and 12 are, therefore, the factors of number 12. Using counters and other numbers for practice, the children discover that 1 *is a factor of every number, and the number itself is always its own factor.*

**Example:** Write down some common factors of 12 and 18 and find their HCF.

Factors of 12: 1, 2, 3, 4, 6, 12

Factors of 18: 1, 2, 3, 6, 9, 18

The common factors are 1, 2, 3, and 6. Here, 6 is the *Highest Common Factor or HCF* of 12 and 18. Factors can also be obtained by moving back on a number line from a multiple. For example, to obtain the factors of 12,

a) go back in steps of 4, 3 times (fig. a). You reach 0, so 3 and 4 are factors.

Or

b) go back in steps of 3, 4 times (fig. b): You reach 0, so 4 and 3 are factors.

Or
c) go back in steps of 2, 6 times (fig. c): You reach 0, so 2 and 6 are factors.

Or

d) go back in steps of 6, 2 times (fig. d): You reach 0, so 6 and 2 are factors.

Factors can be understood using repeated subtraction too:

1) Since 12 – 4 = 8, 8 – 4 = 4, 4 – 4 = 0, so 4 divides 12 exactly 3 times. Hence, we conclude that 3 and 4 are factors of 12 and 12 is a multiple of 3 and 4.

2) Since 18 – 6 = 12, 12 – 6 = 6, 6 – 6 = 0, so 6 divides 18 exactly 3 times. Hence, 3 and 6 are factors of 18 and 18 is a multiple of 3 and 6.

Thus, a factor of a number $y$ may be defined as a number, of which $y$ itself is an exact multiple e.g. 5 is a factor of 30. It is important that children see the relationship between multiples and factors.

There are certain numbers, which have only two different factors i.e. the number itself and the number 1. Such numbers are called prime numbers e.g. 5, 11, and 37 are prime numbers because the only way they can be factorised is as follows:

a) $5 = 1 \times 5$

b) $11 = 1 \times 11$

c) $37 = 1 \times 37$

All other numbers that have 3 or more factors are referred to as composite numbers. (Interesting fact: Composite numbers can always be arranged in exact rectangles)

At times there are two (or more) numbers in a group, which have only 1 as their common factor. Such numbers are known as co-prime numbers e.g. as $2 = 1 \times 2$ and $3 = 1 \times 3$, so 1 is the only common factor between 2 and 3. Therefore, 2 and 3 are co-prime numbers. Now, look at the factorizations of 14 and 15 given below:

$14 = 1 \times 14 = 2 \times 7$. Thus 1, 2, 7, and 14 are the factors of 14.

$15 = 1 \times 15 = 3 \times 5$. Thus 1, 3, 5, and 15 are the factors of 15.

Since 1 is the only common factor between 14 and 15, they are co-prime numbers. The activity given on page 53 helps children identify prime numbers.

**Prime factorization:** When we factorize the composite number 18 as $3 \times 6$, we notice that one factor is a prime number (3) and the other is a composite number (6). We move on to break this composite number further into its prime factors ($2 \times 3$). This gives us the prime factors of the original number viz. 2, 3, and 3. This process is called prime factorization. LCM and HCF can also be found using prime factorization.
Example: Find the LCM and HCF of 18 and 24.
We first use the division method (given on page 57 of the book) to find the prime factors of the two given numbers.
First find prime factors of 18:

\[
\begin{array}{c|c}
2 & 18 \\
3 & 9 \\
3 & 3 \\
1 & \\
\end{array}
\]

Thus, \(18 = 2 \times 3 \times 3\). Now, find prime factors of 24:

\[
\begin{array}{c|c}
2 & 24 \\
2 & 12 \\
2 & 6 \\
3 & 3 \\
1 & \\
\end{array}
\]

So, \(24 = 2 \times 2 \times 2 \times 3\). Since \(2 \times 3\) are the two of common prime factors of 18 and 24, we say that 6 is the the HCF of these two numbers. Now, to find the LCM of 18 and 24, multiply HCF by the rest of the factors. Thus, the LCM = \(2 \times 3 \times 2 \times 2 = 6 \times 12 = 72\)

Alternatively, the LCM of two numbers can also be obtained by multiplying together all the prime factors of the two numbers, but considering the common factors only once. Thus, the LCM of 18 and 24 = \(2 \times 3 \times 2 \times 2 \times 3 = 72\).

ADDITIONAL WORK (10 MINS)
The multiple game can be played with the children as an introduction to the LCM lesson. One student is asked to read the numbers one through sixty aloud but slowly. Two other students are assigned a number each and told to make some noise like clap, or call out “Aha” when a multiple of their number is called.
The rest of the children listen and observe. When the two students make a noise at the same number, the rest of the class says STOP. They realize that this number must be the first common multiple of both numbers, and hence the Lowest Common Multiple i.e. LCM. This game can be great fun.

Fractions (Pages 60–78)

OBJECTIVE
To revise the concepts learnt in Class 3 and introduce new types of fractions to the children as well as the basic operations that can be carried out on them.

LEARNING CURVE (10 MINS)
The children already know how to add and subtract 'like' fractions. Here, they learn to write 'mixed' fractions and add and subtract 'unlike' fractions.
Learning Aids

10 strips of paper, plasticine solids such as cylinders or cubes. Fraction stories, Number lines.

Learning Activity (20 Mins)

The teacher begins with a recapitulation of the work done in Class 3. She explains that when we multiply or divide the numerator and the denominator of a fraction by the same number (not 0), we get an equivalent fraction.

Example:

\[
\frac{1\times2}{3\times2} = \frac{2\times2}{6\times2} = \frac{4}{12}
\]

A fraction is said to be in its lowest terms when its numerator and denominator cannot be reduced any further. In the above case, \(\frac{1}{3}\) is in its lowest terms. To find out whether a fraction is in its lowest terms, we have to remember the common factors of the numerator and denominator, their HCF and of course, the tests of divisibility.

Example: Is \(\frac{18}{63}\) in its lowest terms?

We follow the two steps listed below:

1. By the tests of divisibility we establish that the numerator and denominator can be divided by 9.
2. By prime factorization, we find that the HCF of 18 and 63 is 9.

Therefore, we reduce the fraction \(\frac{18}{63}\) to its lowest terms by dividing the numerator and the denominator by 9. Thus, we get \(\frac{18\div9}{63\div9} = \frac{2}{7}\). So, the fraction \(\frac{18}{63}\) is not in its lowest terms.

Children already know that proper fractions are those fractions where the numerator is less than the denominator. e.g. \(\frac{3}{4}\). A proper fraction always refers to a part less than one whole. But, what happens when the numerator is equal to the denominator? Such a fraction is always equal to 1 e.g. \(\frac{3}{3} = 1\), \(\frac{4}{4} = 1\), \(\frac{100}{100} = 1\).

Now let’s move a step ahead and explore as to what happens when the numerator is bigger than the denominator? Look at the fraction \(\frac{4}{3}\).
We know that \( \frac{3}{3} = 1 \), so, \( \frac{4}{3} = \frac{3}{3} + \frac{1}{3} = 1 \frac{1}{3} \). Fractions like \( \frac{4}{3} \) whose value is more than 1 are referred to as improper fractions. When written as \( 1 \frac{1}{3} \), it becomes a mixed fraction. An improper fraction can be changed to a mixed fraction as follows:

\[
\text{Numerator} \div \text{Denominator} = \text{Dividend} \div \text{Divisor} = \text{Quotient} \div \text{Dividend} = \text{Quotient} \div \text{Divisor} = \text{Remainder} \div \text{Divisor}.
\]

Every mixed fraction has two parts — a whole number and a proper fraction. The quotient (shown above) is the whole number in the mixed fraction, remainder is the numerator and divisor is the denominator of the proper fraction contained in the mixed fraction. To change a mixed fraction to an improper fraction, simply reverse the operations shown above i.e.

- Multiply the whole number (quotient) with the denominator
- Add it to the numerator and place this number as the new numerator
- Divisor remains the denominator

Thus, the mixed fraction \( 1 \frac{2}{3} \) can be expressed as an improper fraction as follows:

\[
\frac{(1 \times 3) + 2}{3} = \frac{5}{3}
\]

**Example:** Suppose there are 16 chocolate bars which need to be shared by 3 children. What fraction does each child get?

16 can be divided into 3 equal parts by dividing it by 3 i.e. \( \frac{16}{3} \).

So each child gets \( \frac{16}{3} \) bars of chocolate

\[
= 5 \text{ whole bars and } \frac{1}{3} \text{ rd of the } 16^{th} \text{ bar.}
\]

\[
= 5 \frac{1}{3} \text{ bars}
\]

Thus 16 chocolate bars divided amongst 3 children is equivalent to \( 5 \frac{1}{3} \) bars per child. Hence, when a number is divided into equal parts and it has a remainder, the answer can be expressed as a mixed fraction, as in the case of chocolate bars above.
Example: Express $20 \div 3$ as a mixed fraction.

![Diagram showing division of 20 by 3]

\[
\begin{array}{c}
3 \overline{)20} \\
\underline{-18} \\
\hline
\quad 2 \\
\end{array}
\]

Hence, as is evident from the illustration also, $20 \div 3 = 6 \frac{2}{3}$.

Children work with different sets of objects (as in the first example) and individual number lines (as in the second example) and write the answers as mixed fractions.

**Comparing fractions:** Children have already learnt how to compare like fractions and unlike fractions having the same numerator in Class 3. After a brief re-look at such comparisons, the children move on to comparing unlike fractions in general.

**Example:** Which is greater: $\frac{5}{6}$ or $\frac{11}{15}$?

First convert the given fractions to equivalent fractions with a common denominator (like fractions) by finding the LCM of the denominators. Since LCM of 15 and 6 is 30, so we write the following equivalent fractions:

\[
\frac{5}{6} = \frac{25}{30} \quad \text{and} \quad \frac{11}{15} = \frac{22}{30}
\]

Now: $\frac{25}{30} > \frac{22}{30}$

$\therefore \frac{5}{6} > \frac{11}{15}$

**Addition and subtraction of fractions:** Children know how to add/ subtract like fractions. In this book, they learn how to add/subtract mixed fractions containing like fractions and/or unlike fractions:

**Example:** Solve: $3 \frac{1}{3} + 4 \frac{3}{4}$

Add the whole numbers of the two mixed numbers separately and the fractional parts separately. Thus,

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

\[
= 3 + 4 + \frac{4}{12} + \frac{9}{12} \quad \text{(convert unlike fractions into like fractions)}
\]

\[
= 7 + \frac{13}{12} \quad \text{(add whole numbers and fractions separately)}
\]

\[
= 7 + 1 \frac{1}{12}
\]

\[
= 8 \frac{1}{12}
\]
ADDITIONAL WORK  (10 MINS)
Additional activity sheets prepared by the teacher are always useful.

**Area and Perimeter (Pages 80–87)**

**OBJECTIVE**
Children learn to calculate the area and perimeter of the given shapes.

**LEARNING CURVE  (10 MINS)**
The children must have worked with solid blocks in their junior classes, dipped their surfaces in colour and stamped them on newspapers. This is an excellent exercise to give the children an idea of the flatness of a surface and its area, vis-à-vis the solids they could hold in their hands. Thus, they have an idea that ‘area’ refers to the amount of flat space occupied by a body like the space occupied by a carpet, a board, a tabletop, or a handkerchief.

In Class 3, children have calculated perimeters of triangles and rectangles and hence know what perimeter means. Here, they calculate areas and perimeters of different shapes.

**LEARNING AIDS**
Measuring tape, trundle wheel, exercise books with squared sheets, small flat objects that fit in the exercise book such as playing cards, stickers, postcards and stamps, a chart with some alphabets and numerals drawn with squares in the background, squares with sides measuring 1 cm, 2 cm, or 5 cm.

**LEARNING ACTIVITY  (20 MINS)**
The children begin by recapitulating the work done in Class 3. They compare surfaces to see which occupies more area. Using their exercise book, children calculate the area (number of squares) of simple shapes like the alphabets L and H given in squared sheets below:

```
The L shape occupies 16 squares while the H shape occupies 21 squares. So, H covers a larger area than L. The same shapes are drawn on different sheets with squares of different sizes. Children observe that the area of H remains larger on all sizes of squares.
```

The children learn about the units in which area is expressed like cm² and m². Area of a square with side 1 cm (i.e. the space occupied by it) is written as 1 cm² and referred to as 1 cm squared. Similarly, area of a square with side 1 m is 1 m² or 1 metre squared.
The letter L shown above has an area of 16 cm² and the letter H has an area of 21 cm², because they are drawn on a square grid of 1 cm. A square with side 2 cm will contain 4 small squares with side 1 cm as shown below. Therefore, the area of this square would be 4 cm².

The children may be asked to verify that the perimeter of the square with side 1 cm is 4 cm while that of a square of side 2 cm is 8 cm. With the help of illustrations or paper cut-outs, children work with different shapes and calculate:

- the area in cm², by counting the number of squares.
- the perimeter in cm, by measuring the sides with a ruler.

Once the children have had enough practice with practical and pictorial examples, they are able to calculate the areas using formulas rather than actually measuring them.

**Example:** Find the area of a rectangle having length 3 cm and breadth 5 cm.

Area of a rectangle = \( l \times b \) cm² = 3 cm × 5 cm = 15 cm².
Perimeter = 2 (\( l + b \)) cm = 2 (3 + 5) cm = 16 cm

**ADDITIONAL WORK (10 MINS)**

The children can measure their classroom with a trundle wheel or they may even measure their desk tops, books, and window-panes and calculate area and perimeter of each surface. It would be interesting for children to see that ‘looks can be very deceptive’. An area of 20 cm² spread over different shapes, such as a rectangle, a square, letter H, or letter L may not look equal. It is also important to bring to the notice of the class that all shapes with same area will not have the same perimeter.

**Examples:**

1) For a square with side 4 cm:
   
   Area = 16 cm² and Perimeter = 16 cm.

2) For a rectangle having \( l = 8 \) cm and \( b = 2 \) cm:

   Area = 8 × 2 = 16 cm² and Perimeter = 20 cm

3) For a rectangle having \( l = 16 \) cm and \( b = 1 \) cm:

   Area = 16 cm² and Perimeter = 34 cm

Thus, if there are two gardens of the same area, one having \( l = 8 \) m & \( b = 2 \) m and the other having \( l = b = 4 \) m, the area of grass grown in both of them would be same (i.e. 16 m²) but both will need different lengths of barbed wire for the fence since their perimeter is different.
PART THREE

Decimals (Pages 89–111)

OBJECTIVE
Children learn the meaning of the word decimal, its usage and carry out the four operations with decimal fractions. (A number with a decimal point may be referred to as a ‘decimal fraction’.)

LEARNING CURVE (10 MINS)
Children have used the decimal point when working with money in Class 3. In this book they learn about decimal places: tenths, hundredths, and thousandths and carry out the four basic mathematical operations with decimal fractions.

LEARNING AIDS
An exercise copy with squared sheets; small cubes (with sides of 1 cm), rods of 10 cubes, slabs of 100 cubes, a big cube of 1000 small cubes, all with hooks on one end to hang them from.

LEARNING ACTIVITY (20 MINS)
In Class 3, while studying about money, children used the decimal symbol without knowing its name or its value. To them, a decimal point was a substitute for ‘and’. The name ‘decimal’ comes from the Latin word decimus, which means ‘tenth’ i.e. one-tenth part of a single whole and is denoted by \( \frac{1}{10} \), meaning thereby \( 1 \div 10 \).

Children begin with concrete examples of objects divided into 10 equal parts. A strip of 10 equal portions may be shown to them with the explanation that if the whole strip is considered to be 1, each part would be equal to \( \frac{1}{10} \) of the whole. This tenth part is also shown using a ‘decimal point’ as follows:

\[
\begin{array}{ccc}
\text{Ones} & \cdot & \text{tenths} \\
0 & . & 1 \\
\end{array} = 1 \div 10
\]

This is written as 0.1 and read as 'zero point one'. It is important to remember that a ‘decimal point’ does not occupy a separate ‘column’ or a ‘place’. It sits to the right and at the base of the number in the Ones column. The columns to the left of the decimal point continue to be called Ones, Tens, Hundreds…. as we all know. The column to the right of the decimal point is the tenths column and is denoted by ‘t’.

It takes 10 tenths to make a whole. (Children know this from definition of fractions). The decimal point simply separates the whole from the fractional number. 1 ‘whole’ is written as 1.0
Using the calculator, children solve many other sums to get the 'instant' feel of tenths in decimal fractions e.g. \( \frac{2}{10} = 0.2, \frac{3}{10} = 0.3, \ldots \) upto \( \frac{10}{10} = 1 \) or a 'whole'. They may further move on to explore \( \frac{11}{10} = 1.1, \frac{12}{10} = 1.2 \) and so on.

As a practice exercise, children write down the area covered by the shaded portion in a figure as a decimal fraction. Many such figures can be given for practice.

**Example:**

```
    +-----------+-----------+-----------+
   |           |           |           |
  +---+-------+-------+-------+---+---+
  |   |       |       |       |   |   |
  +---+-------+-------+-------+---+---+
  |   |       |       |       |   |   |
  +---+-------+-------+-------+---+---+
```

\( \frac{4}{10} \) or 0.4

The children then look at the 1 metre ruler carefully. They note that there are 100 divisions and this smaller unit is called a centimetre, denoted by 'cm'. (the term *centi* stands for \( \frac{1}{100} \)). They also notice that each centimetre is further sub-divided into ten smaller parts, each known as a millimetre (mm). So, a millimetre is one-thousandth of a metre (*milli* stands for \( \frac{1}{1000} \)).

The children should remember the following conversions by heart.

- \( 1 \text{ m} = 10 \text{ dm} \) (dm stands for 'decimetre')
- \( 1 \text{ m} = 100 \text{ cm} \)
- \( 1 \text{ m} = 1000 \text{ mm} \)

The above information can also be written as:

- \( 10 \text{ dm} = 1 \text{ m} \) or \( 1 \text{ dm} = \frac{1}{10} \text{ m} \) (0.1 m)
- \( 100 \text{ cm} = 1 \text{ m} \) or \( 1 \text{ cm} = \frac{1}{100} \text{ m} \) (0.1 dm)
- \( 1000 \text{ mm} = 1 \text{ m} \) or \( 1 \text{ mm} = \frac{1}{1000} \text{ m} \) (0.1 cm)

(It may be noted that 'decimetre' is not used frequently. It has been shown here only to complete the sequence.)

The children may now measure a set of given lines in their books and on the blackboard, and write down the measurements as decimals as well as fractions in centimetres.

\[
\text{AB} = 93 \text{ mm} = 9.3 \text{ cm} \text{ or } \text{AB} = \frac{93}{10} \text{ cm}
\]

**The four operations with decimal fractions:** Addition and subtraction of decimal fractions is exactly the same as for whole numbers. But the decimal points of all numbers must always be kept aligned (one exactly below the one above it).
Example:

1)  

<table>
<thead>
<tr>
<th>Tens</th>
<th>Ones</th>
<th>Ones</th>
<th>tenths</th>
</tr>
</thead>
<tbody>
<tr>
<td>14</td>
<td>3</td>
<td>14 .</td>
<td>3</td>
</tr>
<tr>
<td>+ 29</td>
<td>+ 2 . 9</td>
<td>+ 2 . 9</td>
<td></td>
</tr>
<tr>
<td>7 2</td>
<td>7 . 2</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(12 tenths make 1 whole and 2 tenths. This one whole is carried over to Ones column)

2)  

<table>
<thead>
<tr>
<th>Tens</th>
<th>Onses</th>
<th>Ones</th>
<th>tenths</th>
</tr>
</thead>
<tbody>
<tr>
<td>78</td>
<td>133</td>
<td>78 . 133</td>
<td></td>
</tr>
<tr>
<td>- 27</td>
<td>- 2 . 7</td>
<td>- 2 . 7</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5 . 6</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Children may be asked to practically understand the concept by using graph paper and metric cubes and rods. Soon, they are able to handle decimal points with extreme ease.

Multiplication of decimal fractions is also carried out exactly the same way as for whole numbers. Here also, however, it is essential to align the decimal points correctly.

Example:

<table>
<thead>
<tr>
<th>Th</th>
<th>H</th>
<th>T</th>
<th>O</th>
<th>H</th>
<th>T</th>
<th>O</th>
<th>. t</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>3</td>
<td>14</td>
<td>2</td>
<td>2</td>
<td>3</td>
<td>14</td>
<td>. 2</td>
</tr>
<tr>
<td>× 7</td>
<td>× 7</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2394</td>
<td>239 . 4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Practically, multiplication may be displayed by placing 4 strips of 1.7 cm length side by side.

1.7 cm  1.7 cm  1.7 cm  1.7 cm

Add the lengths repeatedly and we get the total length to be 6.8 cm. Now, multiply 1.7 with 4 as follows:

<table>
<thead>
<tr>
<th>T</th>
<th>O</th>
<th>. t</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>× 4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 . 8</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(28 tenths = 2 Ones and 8 tenths. Carry over 2)

∴ 4 x 1.7 cm = 6.8 cm. Thus, multiplication is nothing but repeated addition.

Now students may be introduced to ‘hundredths’. When a big square is divided into hundred equal parts, each part is called ‘one hundredth’. It is written as \(\frac{1}{100}\) or 0.01. The children may be shown a big cube which may then be divided into hundred equal small cubes. If the big cube is considered as a whole(1), then the slab is a tenth (0.1), and the rod is a hundredth (0.01). (See the diagram shown on page 31.)

The position of ‘hundredth’ is to the right of the tenths (t) column and is denoted by ‘h’ as shown below:

<table>
<thead>
<tr>
<th>H</th>
<th>T</th>
<th>O</th>
<th>t</th>
<th>h</th>
</tr>
</thead>
<tbody>
<tr>
<td>(\frac{1}{10})</td>
<td>(0)</td>
<td>(0)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>(\frac{1}{100})</td>
<td>(0)</td>
<td>(0)</td>
<td>(0)</td>
<td>1</td>
</tr>
</tbody>
</table>
The children work with hundredths in exactly the same way as they worked with tenths…. In fact, in the entire decimal number system, the value of numbers goes up 10 times from one column to the next, as one goes left, and becomes $\frac{1}{10}$th, from one column to the next as one goes to the right. This continues across all the columns to the left and the right of the decimal point.

Multiplication by 10 or 100: When we multiply a number by 10, we move the decimal point one place to the right and when we multiply the number by 100, we move the decimal point two places to the right.

*Example:* There are Rs 14.00 in a bag. There are many such bags.

(i) If there were 10 such bags, how much money would there be altogether?

Total money = 10 × Rs 14.00 = Rs 140.00

Note that 10 has one zero. When a decimal fraction is multiplied by 10, the decimal point shifts one place to the right, or the number shifts one place to the left.

(ii) If there were 100 such bags, how much money would there be altogether?

Total money = 100 × Rs 14.00 = Rs 1400.00

Note that 100 has two zeroes. The same rule applies viz. the decimal point shifts two places to the right.

Division of decimal fractions is also carried out in exactly the same way as of whole numbers. 2 strips of squared paper may be taken having 10 squares on each and then another strip having 8 squares may be kept along with them.

A child is asked to group them into two equal halves having 1 strip of 10 squares and 1 strip of 4 squares in each group. This activity serves as a practical demonstration of the sum 2.8 ÷ 2 which can be mathematically worked out as shown alongside:

\[
\begin{array}{c|c}
2.8 & 08 \\
- 2 & - 8 \\
\hline
0 & \end{array}
\]

\[
\therefore 2.8 ÷ 2 = 1.4
\]

Division by 10 or 100: When a decimal fraction is divided by 10, we move the decimal point by one place to the left, and when divided by 100, the decimal point is moved left by two points.

*Example:* Rs 140.00 is to be distributed equally in a number of bags.

(i) If there were 10 such bags, how much money would there be in each one?

Note that 10 has one zero. When a number is divided by 10, the decimal point moves one place to the left, or the number moves one place to the right. Thus, money in each bag = \( \frac{140.00}{10} = 14.00 \)

(ii) If there were 100 such bags, how much money would there be in each bag?

Since 100 has two zeroes, the same rule applies and the decimal point moves two places to the left, or the number moves two places to the right.

Thus, money in each bag = \( \frac{140.00}{100} = 1.40 \)

Once the concept of working with decimal points is clear, these same divisions can be worked on calculators to check the answers.

*Decimals and money:* The children have worked with decimal point while studying money. They had been putting the point after the rupees and before the paisa. Now they know that, because 100 paisa make a rupee, so paisa is expressed as tenths or hundredths when money is written in Rupees.
Decimals and measurement: Children know that:

1 m = 100 cm. Thus, 1 cm = \frac{1}{100} m = 0.01 m (one hundredth of a metre)

Also, 1 cm = 10 mm and, therefore, 1 m = 1000 mm.

Hence, 1 mm = \frac{1}{1000} mm = 0.001 m (one thousandth of a metre)

The ‘thousandths’ column comes to the right of the hundredths (h) column and is denoted by ‘th’:

<table>
<thead>
<tr>
<th>H</th>
<th>T</th>
<th>O</th>
<th>t</th>
<th>h</th>
<th>th</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>0</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Children work with thousandths in exactly the same way as they work with hundredths and tenths.

ADDITIONAL WORK (10 MINS)

There are countless real-life situations where we use metric system daily. These must be utilized for additional work.

It is interesting to talk about time: Why has time (years, months, weeks, days, hours, minutes, or seconds) not been converted into the metric measurement pattern as yet? Is it possible for time to be metric? If not, why not?

Measurement (Pages 112-120)

OBJECTIVE

Children understand and use: the four operations (+, −, ×, and ÷) with accuracy, the metric system of length upto 2 places of decimals. They now work with the entire metric system.

LEARNING CURVE (10 MINS)

In the previous unit, children have worked with length, expressed in decimal fractions. They will now work with all the metric units of length, weight, and capacity:

Kilo Hecto Deca Deci Centi Milli

LEARNING AIDS

Pieces of ribbon and rope for length, different objects like balls and stones for weight, unbreakable glasses, cups, and jugs of various sizes for capacity.

LEARNING ACTIVITY (20 MINS)

The children have already worked with concepts of length, weight, and capacity in the previous classes. In this chapter, they are introduced to the following prefixes used in the metric system alongwith the basic units of measurement, for bigger or smaller measurements.
Prefix | Meaning |
---|---
Kilo (K) | Thousand times ($\times 1000$)
Hecto (H) | Hundred times ($\times 100$)
Deca (D) | Ten times ($\times 10$)
Deci (d) | One tenth ($\div 10$)
Centi (c) | One hundredth ($\div 100$)
Milli (m) | One thousandth ($\div 1000$)

The chart shows the order followed in the metric system to represent bigger and smaller measurements. The prefixes Hecto, Deca, and deci are, however, not used frequently. Mnemonics can help the children to learn this order quickly.

For length, they may use:

**King Henry Digs mud during cold months!**

Km  Hm  Dm  m  dm  cm  mm

For weight, they may use:

**King Henry Digs gold during cold months!**

Kg  Hg  Dg  g  dg  cg  mg

For volume, they use:

**King Henry Digs love during cold months!**

Kl  Hl  Dl  l  dl  cl  ml

Since the thousandth place in the metric system has been touched upon in the previous Unit, working with hundreds and thousands of metres, grams, and litres, would not pose a big problem. In fact, the metric system was introduced universally to make calculations easier. Computers and calculators would have been of no use with non-metric systems such as rupee and paise, pounds and pennies, pounds and ounces, gallons, miles, yards etc.

It is useful to talk about areas where the above mentioned prefixes are frequently used for measurements.

**For example:**

Kilometres: Distance between cities, speed of cars and aeroplanes, height of mountains, etc.

Metres: Length of fabric, depth of a river, height of ships and buildings, speed of a boat, etc.

Centimetres: Size of pens, books or screen of a computer, depth of a glass or a jug, measurement of a cupboard, airconditioner or a fridge, etc.

Millimetres: Length of the tip of an injection, length of a nail, diameter of a ring, thickness of the lenses of a pair of glasses, thickness of a gold bangle, etc.

Kilograms: Weight of vegetables, fruits , suitcase, etc.

Grams: Weight of pulses, packet of biscuits, gold, etc.

Milligrams: Weight of medicines and precious metals.

Kilolitres: Capacity of oil tanker or water storage tank, amount of water in a dam or a swimming pool, waste from factories, etc.
Litres: Capacity of waterbottles, buckets, amount of petrol in vehicles, etc.
Millilitres: Capacity of bottles of medicine, amount of juice/milk in polypacks. graduations on measuring cups in the kitchens, etc.
Children may be encouraged to create word problems using this vast variety of topics, in addition to solving problems given in the book.

ADDITIONAL WORK (10 MINS)
Children work in pairs or in groups. They design work cards for other groups and work on the ones given to them.

CLASSROOM ORGANIZATION
The classroom needs to be set up in such a way that it provides a large number of objects for measurement and has some measuring equipment too—Measuring tapes and rulers; Weighing scales, a beam balance and a spring balance; Measuring cups, cylinders, glasses, test tubes, flat saucers, large containers.
After working with several containers of different shapes and sizes, children try to ‘guess’ the capacity of each one.

Geometry (Pages 121–137)
OBJECTIVE
The children learn about a straight line, a curved line, an angle, and some common shapes in a more formal manner. They learn how to construct and measure angles using the protractor. They are introduced to properties of angles in a triangle and in different types of quadrilaterals.

LEARNING CURVE (10 MINS)
Children know the basic geometric shapes, such as a triangle and a quadrilateral. They know what parallel lines are and they have worked with line segments. Here they learn how to measure and construct angles using a protractor. They learn more about triangles and quadrilaterals.

LEARNING AIDS
A geometry box, a Japanese fan, some strips of paper.

LEARNING ACTIVITY (20 MINS)
The children begin by revising what line segments are. They learn that a ray is a line that has only one end point and goes on forever in the other direction.

Angle: A Japanese fan is used to introduce the lesson on angles. The teacher turns one arm of the fan so that the gap between the two arms increases. Angle is the special word used to describe the amount of turn between the two arms. Its symbol is ∠. The unit to measure angles is called degree and is written as °.

Angles have special names. As the teacher widens the gaps between the two arms of the fan, she keeps on naming the different angles:
1. When one arm is horizontally straight and the other is vertically straight, a right angle is formed.
2. When the angle is smaller than a right angle, it is called an acute angle.
3. When an angle is bigger than a right angle, but not big enough to form a straight line, it is called an *obtuse angle*.

4. When the angle goes beyond the straight line, it is called a *reflex angle*.

The concept of angles can be taught using two strips of paper as well. The fan and the strips can be illustrated as a drawing wherein the arms of the fan or the two strips become the arms BA and BC of the drawing as shown below:

![Diagram of angles](image)

Point B is referred to as the vertex. This angle can be named as $\angle ABC$ or $\angle CBA$.

The children are then informed that angles can be measured using a protractor. They observe the shape of the protractor and the numbers on it. They see that the numbers go from 0 to 180 both clockwise and anti-clockwise on the semicircular protractor.

In order to construct an angle, the children draw a horizontal, straight, line AB first. They place the protractor in such a way that the middle of its bottom line is exactly on A. The teacher calls out a number, say 70. The children put a point, say C, on the paper where they see the number 70 on the protractor and then join the points A and C to make the arm AC of the resulting angle. The measure of this angle is $70^\circ$ and we write, $\angle CAB = 70^\circ$.

![Diagram of angle construction](image)

The children then measure and construct several angles using the protractor. Thereafter the teacher demonstrates that when the fan makes a complete turn, a circle is constructed and the central angle of a circle is $360^\circ$.

**Triangle:** Children know that a triangle is a shape that has three sides and three vertices. In addition to this, they now know that it has three angles. Triangles can be classified into three groups according to their sides or their angles. Using the paper folding technique, it is easy to see that the 3 angles of any triangle add up to $180^\circ$. This fact can also be verified by measuring the 3 angles with a protractor.

Any two triangles (with at least one side equal) placed together along the equal side form a quadrilateral. If the four angles of a quadrilateral are torn off, placed together on a sheet of paper and measured, the angles add up to $360^\circ$ (equal to a full turn of the arm of a Japanese fan).

And, there is proof within proof. If any quadrilateral is cut into two parts across either of the two diagonals, two triangles are formed which can be either different in size or equal in size. The angles of each one add up to $180^\circ$ and the angles of both triangles add up to $360^\circ$.

These are interesting experiments to perform, which later go on to show how the two halves of a parallelogram, even though identical in size and shape (congruent), need to be flipped to coincide.

**Quadrilateral:** Children are aware that quadrilaterals are shapes which have four sides. They now know that quadrilaterals have four angles too! With the help of the protractor, the children then measure the four angles of several quadrilaterals. On adding up the measures of each of the four
angles of the quadrilateral, children find that the angles add up to 360°. They also notice that squares and rectangles have four right angles.

A new word ‘perpendicular’ is introduced to the vocabulary of the children. They are taught that when one line is at right angles to another or crosses another line at right angles, then the two lines are said to be perpendicular to each other e.g. the trees stand ‘perpendicular’ to the ground, or when we sit, our back should be ‘perpendicular’ to our thighs etc.

**ADDITIONAL WORK (10 MINS)**

Yoga formations can be used to demonstrate the different angles. A child stands in front of the class and holds two small flags in his/her hand. He/She moves his/her arms around and the children call out the name of the angle formed.

The children can also be asked to write down the angle made by the hour hand and the minute hand, at any given time like 1 o’clock, 2 o’clock, and so on. Other similar questions can be asked. What angle is formed when the time is 12 o’clock? How many times during the day do the two hands form an angle of 0°. The two hands of the clock make an angle of 60° at 2 o’clock. At what other time (in whole hours) will the hands make an angle of 60°? Children study the formation of angles between the two hands as the minute hand moves from, say, 4 o’clock to 5 o’clock.

**Graphs (Pages 138–140)**

**OBJECTIVE**

Children learn to find relationships between given sets of data quickly, using column graphs and pie graphs.

**LEARNING CURVE (10 MINIS)**

The children have worked with pictographs and block graphs earlier. Here they work with column and pie graphs.

**LEARNING AIDS**

Charts with columns, A cake/pizza/chappati cut-out, a collection of different types of data

**LEARNING ACTIVITY (20 MINIS)**

The children are shown a sample data:

<table>
<thead>
<tr>
<th>Mon</th>
<th>Tues</th>
<th>Wed</th>
<th>Thurs</th>
<th>Fri</th>
<th>Sat</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>50</td>
</tr>
<tr>
<td>10</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

A Science fest is on for senior students from different schools. A column graph showing the number of students of OUP school who attended the fest each day in a week is given above. Each unit along the vertical column stands for 10 students.
A glance at the graph is enough to show the relationship between the two sets of data like a) Maximum number of students of OUP school attended the fest on Saturday, b) The attendance was minimum on Monday and Wednesday etc.

Similarly, different types of data for the students of a given class such as their favourite food items in the school canteen, favourite books of authors from Pakistan, or favourite players from the Indian cricket team can be shown by way of graphs and analyzed for interesting relationships.

A pie chart is also an interesting way of representing data. The basic knowledge required to construct a pie graph is that the whole of the given data has to be represented in terms of angles in degrees and all these angles must add up to 360°. Look at the following pie graph.

If the total number of pizzas consumed is given to be 90, and if Nawfal’s portion measures 120° at the centre, then Nawfal has consumed \( \frac{1}{3} \) of 90 = 30 pizzas in a month because 120 = \( \frac{1}{3} \) of 360.

Other children have also consumed pizzas in proportion to the angle of their corresponding section at the centre.

ADDITIONAL WORK (10 MINS)

Data may be collected on a variety of topics like:

1. Children who actively do eco-friendly projects, or those who save electricity, recycle paper, recycle gifts, paint, and re-use glass bottles (as flower vases), don’t sharpen pencils too often, re-use greetings cards as gifts tags, use plastics sparingly, etc.
2. The number of hours for which students view TV.
3. Favourite hobbies of students like reading, singing, playing games, etc.
4. Weights of children (it is advisable to talk about obesity in children in a very subtle manner, especially if there are obese children in the class)
5. Favourite cricket stars of the students.

Each of the topics listed in serial no. 1 is a project in itself and must be followed seriously in the classroom itself by switching off fans and lights, discouraging wastage of paper, or avoiding sharpening pencils too frequently.

Worksheets (Pages 148–154)

All the topics covered in the text book are revised in the worksheets in a condensed form. Hence, the same objectives and learning activities apply as have been discussed in the previous pages in this book.
Maths Lab Activities (Pages 155–159)

In this portion, certain activities have been suggested for lateral growth of children and to make lessons more meaningful. These are only a sample upon which more Maths Lab Activities may be planned.

The given activities cater to:

- Creating clues for crossword puzzles.
- Finding a special pattern in day-to-day occurrences like Time and Date.
- Learning the role of decimal point.
- Usage of grids for quick multiplication
- Understanding ‘high value’ and ‘low value’ concepts using a game.
- Identifying prime numbers.

Answers

PART ONE

Pages 1–3

(2) (a) 391 (b) 17 (c) vi (d) 230 (e) 59 (f) 7009 (g) 18 (h) 36
     (i) xxiv (j) 70 (k) \( \frac{3}{8} \) (l) 1642, 1648 (m) Rs 36 (n) Rs 6.10
(4) (a) 9009 (b) 5024 (c) 7937
(5) (a) 15 (b) 460 (c) 58 (d) 3m 25cm (e) 4 (f) 3l 662ml (g) 9007g
     (h) 903cm (i) 105min (j) 60
(6) Both measure 4.7cm.
(8) (a) Rs 154 (b) Rs 9300 (c) 448g (d) 9830
(9) (a) 4728 (b) 8184
(10) (a) 79 r2 (b) 74 (c) 81
(11) (a) \( \frac{3}{3} = 1 \) (b) \( \frac{10}{10} = 1 \) (c) \( \frac{6}{7} \) (d) \( \frac{7}{11} \)
(12) (a) \( \frac{8}{12}, \frac{10}{15} \) (b) \( \frac{4}{20}, \frac{5}{25} \)
(13) (a) 3799, 3809 (b) 5902, 6002 (c) 3101, 4101, 5101
(14) (a) 9821, 9811 (b) 4194, 3994 (c) 6520, 6515 (d) 7419, 7319, 7219
(15) (a) hundred (b) units/ones (c) thousand
(16) (a) 5000+600+90+2 (b) 8000+600+0+1 (c) 4000+0+20+9 (d) 1000+0+0+1
     (e) 3000+700+20+8 (f) 6000+900+0+7
(17) (a) 99 (b) 100 (c) 999 (d) 1000
(18) (a) largest 9652 smallest 2569
(19) (a) 8000+600+90+5 (b) 3000+200+90 (c) 9000+300+50+1 (d) 5000+0+60+4
     (e) 3000+100+90+5 (f) 7000+600+70+6
(20) 8731+1378=10,109
Page 4
(2) (a) 18,000  (b) 23,000  (c) 42,000  (d) 70,000  (e) 50,000  (f) 44,000
(3) (a) 23,124  (b) 53,400  (c) 49,639  (d) 80,964  (e) 15,503  (f) 12,550
(4) (a) 81,647  (b) 19,025  (c) 71,116

Page 5
(1) (a) hundred  (b) ten thousand  (c) tens  (d) units/ones  (e) hundred  (f) thousand
(2) (a) 92,430  (b) 80,642  (c) 50,703  (d) 43,100  (e) 70,027  (f) 24,309  (g) 68,088
(3) (a) 70,000+1000+600+20+3
(b) 80,000+2000+500+90+0
(c) 60,000+0+900+0+2
(d) 10,000+4000+0+70+5
(e) 50,000+1000+0+20+9
(f) 10,000+0+500+0+3
(g) 40,000+500+0+5
(h) 30,000+4000+600+50+0
(i) 90,000+9000+0+90+9
(j) 10,000+2000+400+70+0
(4) (a) 85,486  (b) 64,599  (c) 16,009  (d) 32479
(e) 51,299  (f) 98,999  (g) 48,289  (h) 70,999
(5) (a) 42,490  (b) 91,000  (c) 70,610  (d) 19,010
(e) 18,100  (f) 10,001  (g) 24,000  (h) 38,000
(6) (a) <  (b) > (c) =  (d) > (e) >  (f) >  (g) <

Page 6
(2) (a) 3,00,000  (b) 9,00,000  (c) 1,00,000  (d) 12,00,000
(3) (a) 3,40,816  (b) 2,90,062  (c) 9,00,700  (d) 3,01,010
(4) (a) 5,10,937  (b) 9,06,403  (c) 1,96,021  (d) 2,40,682
(5) (a) 5,19,302  (b) 9,02,516  (c) 4,00,951

Page 7
(1) (a) 8,54,029  (b) 4,05,300  (c) 7,03,164  (d) 1,62,802  (e) 3,00,698  (f) 8,20,036
(2) (a) 753,028  (b) 270,042  (c) 400,028  (d) 909,510
(3) (a) 1,04,695  (b) 4,50,104  (c) 5,00,629  (d) 6,42,003
(5) (a) 438,118  (b) 699,570

Pages 8–9
(1) (a) 9 thousand  (b) 4 hundred  (c) ninety  (d) thousand
(2) (a) 751,308  (b) 190,293  (c) 578,052  (d) 409,685
(e) 260,740  (f) 315,106  (g) 999,999  (h) 872,179
(3) (a) 700,000+50,000+2000+100+10+9
(b) 100,000+20,000+0+600+40+0
(c) 800,000+0+4000+600+20+3
(d) 300,000+50,000+8000+0+30+7
(e) 900,000+50,000+0+800+50+1
(f) 600,000+0+6000+600+60+6

(4) (a) 484,304 (b) 399,999 (c) 503,000 (d) 246,190
(5) (a) 963,379 (b) 102,099 (c) 592,999 (d) 899,089
(6) (a) 148,412 (b) 230,006 (c) 602,570
(7) (a) 125,426 (b) 247,307
(8) (a) 300,000; 400 (b) 500,000; 10; 2 (c) 40,000; 20 (d) 50,000; 600
    (e) 900,000; 90,000; 9000; 90; 9 (f) 400,000; 3
(9) (a) = (b) = (c) > (d) > (e) =
(10) (a) 205,938; 501,695; 502,398; 520,480
    (b) 458,431; 462,591; 642,589; 824,941; 824,951
    (c) 100,899; 100,901; 101,000; 101,010; 101,100
    (d) 346,999; 348,290; 384,029; 388,429
    (e) 124,546; 125,456; 125,556; 125,654; 142,456

Page 10

(1) (a) 102,900; 103,000; (b) 385,900; 386,000
    (c) 423,000; 423,100; 423,200 (d) 909,900; 910,000
(2) (a) 81,800 (b) 115,250; 117,250 (c) 507,499; 508,499; 600,000
(3) (a) 406,513 (b) 739,648 (c) 249,946 (d) 111,032 (e) 850,050
(4) (a) 48,554; 48,504; 48,450; 47,950
(5) (A) (B)
    (a) 012,357 753,210
    (b) 488,899 998,884
    (c) 146,789 987,641
    (d) 255,689 986,552
    (e) 124,689 986,421
    (f) 34,678 87,643
    (g) 023,458 854,320
    (h) 233,488 884,332

Page 11

(1) (a) 8343 (b) 7238
(2) (a) (i) 943 (ii) 953 (iii) 943
    (b) (i) 812 (ii) 802 (iii) 802
(3) (a) 3, 0, 3 (b) 1, 4, 3 (c) 0, 3, 1 (d) 2, 2, 5
(4) (a) 78,863 (b) 923,395 (c) 498,343 (d) 610,710
(5) (a) 25,660 (b) 69,440 (c) 374,463 (d) 372,972 (e) 507,116 (f) 227,425
(6) (a) 1,25,200 (b) 201,000 (c) 4,61,000 (d) 510,000
(1) (a) 643  (b) 1269  (c) 2,377  (d) 2,102
(2) (a) 2660  (b) 8686
(3) (a) 8, 3, 6, 8  (b) 9, 6, 9, 3  (c) 0, 2, 5, 8  (d) 7, 2, 8, 6
(4) (a) 6,52,142  (b) 17,328  (c) 3,53,249  (d) 2,52,476
(5) (a) 23,889  (b) 153,676  (c) 10,267  (d) 139,176  (e) 624,745
(6) (a) 1,46,852  (b) 499,900  (c) 305,003  (d) 809,900
(7) (a) 385,120  (b) 283,820  (c) 504,900  (d) 68,510

Page 13
(1) (a) 115, 810  (b) 2266  (c) 155,543  (d) 41,434  (e) 90,001  (f) 836,780
(2) (a) 6900  (b) 100,090  (c) 16,905  (d) twenty thousand  (e) 39,310  (f) 2500g 724  (h) 250,000  (i) 100,999  (j) 915

Page 14
Headwork Tower:
(a) 250  (b) 8  (c) 1215  (d) 92  (e) 4200  (f) 0  (g) 8  (h) 94  (i) 9

Attic:  (a) 2  (b)  (c) 2  (d) 1

Roman Room: (a) 21  (b) 90  (c) 40  (d) 36  (e) 99  (f) 28

Tens and Multiples Den: x10: (a) 640  (b) 1280.
  x 20: (a) 100  (b) 500x50: (a) 5500  (b) 1500x100: (a) 3,200  (b) 10,000

Page 15
(1) (a) 690  (b) 4752  (c) 2845  (d) 6372  (e) 9168  (f) 9922
(2) (a) 390  (b) 294  (c) 4640  (d) 1248  (e) 1020  (f) 550  (g) 242
(3) (a) 7546  (b) 5892  (c) 3600  (d) 1260  (e) 5200  (f) 3900  (g) 9528
  (h) 9040  (i) 4875  (j) 1512  (k) 798  (l) 1826  (m) 3675  (n) 4698
  (o) 7800  (p) 5580  (q) 4056  (r) 17,472

Pages 16–18
(1) (a) 5810  (b) 91230  (c) 6290  (d) 70820
(2) (a) 47500  (b) 569,200
(3) (a) 582,000  (b) 205,000
(4) (a) 190,000  (b) 950,000
(5) (a) 1000  (b) 10  (c) 480  (d) 560,000  (e) 10,000  (f) 67
(6) (a) 700,000cm  (b) 496,000cm
(7) (a) 54,000  (b) 144,000  (c) 198,000  (d) 3570  (e) 266,000  (f) 174,000
(8) (a) 162,000  (b) 144,000  (c) 249,000  (d) 500,000
(9) (a) 300 min  (b) 1920 min  (c) 1260 min  (d) 2160 min
(10) (a) 800  (b) 5100  (c) 4900  (d) 50,000
(11) (a) 1120; 112,00; 11,200
  (b) 4800; 48000; 480,000
  (c) 3320; 33,200; 332,000
  (d) 5320; 53200; 532000
(12) (a) 63000cm  (b) 120,000cm  (c) 8400cm  (d) 382,100cm
(13) (a) 47,000m  (b) 309,000m  (c) 100,000m  (d) 4,000m
(14) (a) 560,000kg  (b) 999,000kg  (c) 111,000kg  (d) 493,000kg
(15) (a) 14,000l  (b) 902,000l  (c) 39,000l  (d) 800,000l

Page 19

(1) (a) 46,296  (b) 19,520  (c) 24,220  (d) 36,852  (e) 25,811  (f) 37,944
(2) (a) 46,438  (b) 37,937  (c) 76,704  (d) 56,146  (e) 45927  (f) 45,600
(3) (a) 12,672  (b) 25,830  (c) 31,200  (d) 55,216  (e) 22,750

Page 20

(1) (a) 47,663  (b) 76,156  (c) 18,095  (d) 17,064
(2) (a) 1312  (b) 1760  (c) 28,440
(3) (a) 33,696  (b) 69,687  (c) 50,991  (d) 61,750
(4) (a) 4800  (b) 18,000  (c) 23,000  (d) 4860  (e) 250,000  (f) 1260  (g) 1050  (h) 21,500

Page 21

(1) (a) 39,216  (b) 166,656
(2) (a) 90,000l  (b) 118,150l  (c) 80,640min
(3) (a) 50,552  (b) 44,472
(4) (a) 160,782  (b) 183,616
(5) (a) 196,80  (b) 305,200  (c) 48300  (d) 232,200  (e) 115,200  (f) 407,400

Page 22

(1) (a) ×  (b) ÷  (c) ÷  (d) ×
(2) (a) 50  (b) 150  (c) 20  (d) 70
(3) (a) 12  (b) 6  (c) 9  (d) 31
(4) (a) 9  (b) Rs 6
(5) (a) 200  (b) 1400  (c) 900  (d) 1100
(6) (a) 5  (b) 57 r4  (c) 21  (d) 100
(7) (a) 40  (b) 800  (c) 80
(8) (a) 10  (b) 64  (c) 45
(9) (a) 50  (b) 405  (c) 392
(10) (a) 62 r3  (b) 18  (c) 41 r1

Page 23

(2) (a) 7  (b) 8  (c) 8  (d) 7  (e) 8  (f) 8
(3) (a) 7 r9  (b) 10 r5  (c) 5 r2  (d) 6 r5  (e) 9 r7

Pages 24–25

(1) (a) 29 r2  (b) 58 r3  (c) 22 r5  (d) 40  (e) 35 r5  (f) 32 r10
(2) (a) 62  (b) 25 r9  (c) 31 r4  (d) 37 r11
(3) (a) 1215  (b) 1792  (c) 972  (d) 2601  (e) 1521  (f) 2888  (g) 1728  (h) 1764  (i) 891  (j) 1575
(4) (a) 600 (b) 120 (c) 250 (d) 790 (e) 454.54
(5) (a) 102 (b) 48 (c) 39 (d) 105 (e) 72 (f) 66
(7) (a) 5 (b) 9 (c) 5 (d) 9 (e) 8
(8) (a) 420 r4 (b) 7 r8 (c) 3 r9 (d) 8 (e) 51 r3

Pages 26–27
(1) (a) 11 r14 (b) 11 r32 (c) 26 r7 (d) 23 r11
     (e) 14 r17 (f) 18 r30 (g) 11 r12 (h) 18 r30
(2) (a) 17 r9 (b) 10 r40 (c) 26 r7 (d) 23 r11
     (e) 21 r6 (f) 34 r10 (g) 80 r8 (h) 13 r50
(3) (a) 16 r1 (b) 11 r13 (c) 11 r37 (d) 18 r34 (e) 10 r28 (f) 18 r45
(4) (a) 5 r2 (b) 8 r1 (c) 5 r44 (d) 13 r2
(5) (a) 4 r18 (b) 8 r11 (c) 8 r17 (d) 18 r13 (e) 8 r32 (f) 8 r40
(6) (a) 4 r9 (b) 25 r23 (c) 8 r8 (d) 5 r52 (e) 11 r9 (f) 10 r50
(7) (a) 32 (b) 2 (c) 18.13

Page 28
(1) (a) 144 r10 (b) 40 r24 (c) 209 r6 (d) 55 r12 (e) 130 r39 (f) 53 r17 (g) 159
     (h) 371 r10 (i) 80 r12 (j) 76 r60
(2) (a) 159 r7 (b) 108 r32 (c) 57 r26 (d) 91 r41 (e) 66 r37
     (f) 212 r3 (g) 89 r21 (h) 67 r9 (i) 69 (j) 82 r18

Page 29
(1) (a) 25 r4 (b) 85 r9 (c) 26 r27 (d) 144 r13 (e) 15 r47 (f) 111 r20
(2) (a) 23 r8 (b) 65 r52 (c) 129 r30 (d) 433 r12
     (e) 37 r4 (f) 14 r61 (g) 41 r4 (h) 55 r5
(3) (a) 100 (b) 650 (c) 400 (d) 300 (e) 120

Page 30
(1) (a) 176 (b) 100 (c) 13 boxes (d) Rs 1935 (e) 45 (f) 2314
(2) (a) 15 (b) 273 (c) 43 (d) 308

Page 32
(1) (a) 200 (b) 30 (c) 672 (d) 77 (e) 12,400 (f) 500
(2) (a) 42 r2 (b) 110 r3 (c) 895 r2 (d) 9630 r2 (e) 7011 r1 (f) 8460 r5

Page 33
(1) (a) 360 (b) 146 (c) 32 (d) 51 r1 (e) 415,500 (f) 6 r2 (g) 209 (h) 510
(2) (a) 13,591 (b) 168 r11 (c) 27,648 (d) 578,856
     (e) 99,409 (f) 3185 (g) 78 r39 (h) 50,601
(3) (a) 18,600 (b) 9081 (c) 135 (d) 682 (e) 31,303
Page 35
(1) (a) Rs 9 (b) Rs 990 (c) Rs 460
(2) (a) Rs 10,500 (b) 216km
(3) (b) 22cm (c) 1 cat

Page 36
(1) (a) 7th (b) 6th (c) 25th Jan (d) 26th June (e) 5th Dec
(f) 3rd June (g) 23rd July (h) 8th April (i) Wednesday 1st Jan
(2) (a) 16.7.49 (b) 23.5.81
(3) (a) Tuesday (b) Sunday (c) Sunday (d) Saturday (e) Saturday (f) Friday

Pages 37–40
(1) (a) 12:15; 15 minutes past 12
(b) 11:20; 20 minutes past 11
(c) 4:30; half past 4
(2) (a) 1:35; 25 minutes to 2
(b) 3:45; 15 minutes to 4
(c) 6:50; 10 minutes to 7
(3) (a) 3:20 (b) 10:15 (c) 10:35 (d) 1:45 (e) 9:50
(4) (a) 4:53; 7 minutes to 5 (b) 1:22; 22 minutes past 1 (c) 2:27; 27 minutes past 2

(5) (a) ![Clock with time 12:15](image1)
(b) ![Clock with time 11:20](image2)
(c) ![Clock with time 4:30](image3)
(d) ![Clock with time 1:35](image4)
(e) ![Clock with time 3:45](image5)
(f) ![Clock with time 6:50](image6)

(6) (a) 12:33 (b) 6:46 (c) 2:17 (d) 8:47 (e) 1:29
(7) (a) 17 minutes past 1 (b) 40 minutes past 4 or 20 minutes to 5
(c) 38 minutes past 9 or 22 minutes to 10
(8) (a) 21 minutes past 6; 2:48; 10:45; 11 minutes to 9; 1:44; 3 minutes past 5
(9) (a) 9:24 (b) 11:25 (c) 7:15 (d) 5:55 (e) 2:42 (f) 4:45 (g) 1:10
(10) (a) 130 minutes (b) 600 minutes (c) 335 minutes (d) 303 minutes
(11) (a) 5:35am (b) 5:00am (c) 2:28am (d) 3:45am
(12) (a) 5:30pm (b) 9:45pm (c) 5:48pm (d) 1:37pm (e) 11:30pm (f) 4:15pm
(13) (a) 9:15am (b) 11:40am (c) 1:10pm (d) 3am
(14) (a) 3:30am (b) 10:05pm (c) 10:20pm (d) 8am
(15) (a) 21:00 (b) 00:02 (c) 14:00 (d) 20:23 (e) 15:15 (f) 23:05
(16) (a) 5:20am  (b) 5:16pm  (c) 12:00am  (d) 12:45am  (e) 12 noon
(17) (a) 21:10; 9:10pm  (b) 12:10

Page 41

(1) (a) 3 hr 35 min  (b) Bus 1  (c) 5 hr 9 min  (d) 10 hr 30 min
(2) (a) 9 hr 26 min  (b) 11 hr 55 min  (c) Train 1; 1 hr 35 min

Page 42

(1) (a) 495 min  (b) 1440 min  (c) 620 min  (d) 1105 min
(2) (a) 4 hr 35 min  (b) 9 hr 35 min  (c) 6 hr 40 min  (d) 13 hr 30 min
(3) (a) 1 hr 40 min  (b) 2 hr 13 min  (c) 5 hr 18 min
(4) (a) 46 min  (b) 4 hr 55 min

Page 43

(1) (a) 300 sec  (b) 1500 sec
(2) (a) 195 sec  (b) 1290 sec  (c) 5418 sec
(3) (a) 1 min 25 sec  (b) 3 min 20 sec  (c) 1 min 43 sec  (d) 5 min 16 sec
(4) (a) 7200 sec  (b) 32400 sec  (c) 14400 sec  (d) 86400 sec
(5) (a) 4500 sec  (b) 7500 sec  (c) 6240 sec  (d) 8400 sec
(6) (a) 72 sec  (b) 31 sec  (c) 120 sec  (d) 660 sec  (e) 345 sec

Page 44

(1) (a) 1 hr 15 min; 1 hr 40 min; 45 min; 1 hr 17 min; 2 hr 5 min; 1 hr 15 min
(2) (a) 2 hr 50 min  (b) 3 hr 45 min  (c) 3:15pm
(3) (a) 148 min  (b) Twenty-first April two thousand and fourteen
   (c) 18:32  (d) 1 hr 24 min  (e) 3.9.72  (f) 7:40pm
   (g) 10:01am  (h) 3900 sec  (i) 7th May
(4) (a) 8 hr 50 min  (b) 2 hr 17 min

Page 45

(1) (a) 18,047  (b) 3, 02, 864
(2) (a) 20000 + 7000 + 0 + 20 + 9  (b) 5,00,000 + 0 + 9000 + 600 + 20 + 4
(3) (a) 62924, 63024  (b) 180699, 181699
(4) (a) 864509  (b) 718240
(5) (a) 201637  (b) 180768
(6) (a) 27,900  (b) 150,700  (c) 73,100
(7) (a) 5 r16  (b) 63 r18  (c) 147 r38  (d) 9 r72  (e) 230 r49  (f) 9627 r4
(8) (a) 49000  (b) 14000  (c) 68000  (d) 501000  (e) 164000  (f) 9000
(9) (a) 7 l  (b) 31 l 112 ml  (c) 6 l 240 ml  (d) 3950 l 41 ml  (e) 96 l 600 ml  (f) 29 l 500 ml
(10) (a) 49996  (b) 88380  (c) 31185  (d) 669,900
(11) (a) 7 r12  (b) 7 r10  (c) 87 r21  (d) 133 r7
(12) (a) 45  (b) 3 km  (c) 1:50pm
Page 46

(1) 8, 12, 28, 40  (2) 27, 81, 99, 126, 135, 144
(3) (a) 12, 24  (b) 15
(4) (a) 3, 6, 9, 12, 15, 18, 21, 24, 27, 30
   4, 8, 12, 16, 20, 24, 28, 32
   (b) 2, 4, 6, 8, 10, 12, 14, 16, 18, 20
      5, 10, 15, 20

Page 47

(1) (a) 4, 8, 12, 16, 20, 24,  (b) 3, 6, 9, 12, 15, 18, 21, 24
   (c) 12, 24  (d) 3, 6, 9, 15, 18, 21  (e) 1, 2, 5, 7, 10, 11, 13, 14, 17, 19, 22, 23
(2) (a) 4, 8, 12, 16, 20, 24, 28
   (b) 6, 12, 18, 24, 30
   (c) 6, 12, 18, 24, 30
   (d) 1, 2, 3, 5, 7, 9, 10, 11, 13, 14, 15, 17, 19, 21, 22, 23, 25, 26, 27, 29
   (e) 12, 24

Page 48

(1) (a) 6  (b) 12  (c) 24
(2) (a) 8, 16, 24, 32, 40; 12, 24, 36, 48, 60; LCM = 24
(1) (a) 20  (b) 42  (c) 12  (d) 24
(4) (a) even  (b) even  (c) odd

Page 49

(1) 20, 2, 5, 4
(2) (a) 1, 3, 5, 15  (b) 1, 11  (c) 1, 2, 3, 6, 9, 18  (d) 1, 3, 7, 21
   (e) 1, 2, 3, 4, 6, 8, 12, 24  (f) 1, 3, 9

Page 50

(1) (a) Yes  (b) No  (c) Yes  (d) Yes  (e) Yes
(2) (a) 3  (b) 9  (c) 8  (d) 6  (e) 6  (f) 5
(3) (a) 12 = 1, 2, 3, 4, 6, 12
   15 = 1, 3, 5, 15
   CF = 1, 3
   (b) 25 = 1, 5, 25
   15 = 1, 3, 5, 15
   CF = 1, 5
   (c) 16 = 1, 2, 4, 8, 16
   20 = 1, 2, 5, 10, 20
   CF = 1, 2
   (d) 10 = 1, 2, 5, 10
   32 = 1, 2, 4, 8, 16, 32
   CF = 1, 2
(4) (a) 8  (b) 25  (c) 6  (d) 7
Page 51

(1)  (a) \(CF = 1, 3\)  (b) \(CF = 1, 5\)  (c) \(CF = 1, 2\)
    \(HCF = 3\)  \(HCF = 5\)  \(HCF = 2\)
    (d) \(CF = 1, 3, 9\)  (e) \(CF = 1, 2, 4\)  (f) \(CF = 1, 7\)
    \(HCF = 9\)  \(HCF = 4\)  \(HCF = 7\)

(2)  (a) \(T\)  (b) \(F\)  (c) \(F\)  (d) \(T\)  (e) \(F\)  (f) \(F\)

(3)  \(c\) and \(d\)

Page 52

(1)  (a) 8 = 1, 2, 4, 8; 9 = 1, 3, 9; 10 = 1, 2, 5, 10; 11 = 1, 11; 12 = 1, 2, 3, 4, 6, 12; 13 = 1, 13;
    14 = 1, 2, 7, 14; 15 = 1, 2, 3, 5, 15; 16 = 1, 2, 4, 8, 16; 17 = 1, 17; 18 = 1, 2, 3, 6, 9, 18

(2)

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(4)  \(b, g, h, i, j, l\)

Pages 53–54

(1)  They are also multiples of 2 and 3.  (2)  26

(3)  (a) \(C\)  (b) \(C\)  (c) \(C\)  (d) \(P\)  (e) \(C\)  (f) \(P\)

(4)  (a) 2 has only 2 factors, itself and number 1
    (b) 15p 33c  (c) 37  (d) 2  (e) 99

Page 55

(1)  (a) \[\begin{array}{c}
3 \\ \times \\
5 
\end{array}\]
    (b) \[\begin{array}{c}
2 \\ \times \\
10 
\end{array}\]
    (c) \[\begin{array}{c}
2 \\ \times \\
7 
\end{array}\]
    (d) \[\begin{array}{c}
2 \\ \times \\
4 
\end{array}\]
    (e) \[\begin{array}{c}
3 \\ \times \\
7 
\end{array}\]
    (f) \[\begin{array}{c}
2 \\ \times \\
11 
\end{array}\]
    (g) \[\begin{array}{c}
2 \\ \times \\
8 
\end{array}\]
    (h) \[\begin{array}{c}
3 \\ \times \\
9 
\end{array}\]
    (i) \[\begin{array}{c}
2 \\ \times \\
3 \\ \times \\
7 
\end{array}\]

(3)  (a) 101, 103, 107, 109, 113, 137, 139, 149, 151, 157, 163, 167, 173, 179, 181, 191, 193, 197, 199
    (b) 2, 4, 2, 4, 2, 10, 8, 6, 5, 4, 6, 6, 2, 10, 2, 5, 2
(1) a, b, e, f  (2) a, b, d  (3) b, c, d  (4) a, c, d

Pages 57-58

(1) (a) PF = \(2 \times 2 \times 2 \times 3 \times 3\)  \(\text{LCM} = 48\)
(b) PF = \(2 \times 2 \times 2 \times 2 \times 3\)  \(\text{LCM} = 48\)
(c) PF = \(2 \times 2 \times 5 \times 5\)  \(\text{LCM} = 100\)
(d) PF = \(2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 3\)  \(\text{LCM} = 96\)
(2) (a) 84 = \(2 \times 2 \times 3 \times 7\)
(b) 117 = \(3 \times 3 \times 13\)
(c) 333 = \(3 \times 3 \times 37\)
(d) 126 = \(2 \times 3 \times 3 \times 7\)
(e) 520 = \(2 \times 2 \times 2 \times 5\)
(f) 99 = \(3 \times 3 \times 11\)
(3) (a) 2  (b) 12  (c) 7  (d) 6  (e) 3  (f) 11
(4) (a) 6 and 60  (b) 3 and 504  (c) 16 and 48
(d) 12 and 180  (e) 3 and 312  (f) 11 and 264
(5) (a) 150; 5; 30; 150  (b) 1536; 8; 192; 1536
(c) 540; 6; 90; 540  (d) 1960; 7; 280; 1960
(6) (a) \(2 \times 5 \times 23\)
(b) \(2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 5 \times 5\)
(c) \(3 \times 3 \times 3 \times 17\)
(d) \(3 \times 3 \times 5 \times 101\)

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(1) (a) 3  (b) 6  (c) 7  (d) 5
(2) \(\begin{array}{cccc}
4 & 8 & 12 & 20 \\
16 & 24 & 28 & 40 \\
32 & 36 & 50 & 60 & 70 & 80 & 90 & 100
\end{array}\)  \(\text{LCM} = 20\)
(3) (a) 20  (b) 24  (c) 12  (d) 20
(4) (a) 1, 2, 11, 22  (b) 1, 2, 3, 4, 6, 8, 12, 16, 24, 48
(c) 1, 3, 7, 9, 21, 63  (d) 1, 2, 4, 8, 16, 32
(e) 1, 3, 13, 39  (f) 1, 2, 7, 8, 28, 56
(5) (a) CF = 1, 2, 4  (b) CF = 1, 2, 4, 7, 14, 28
HCF = 4  HCF = 28
(c) CF = 1, 2, 3, 4, 6, 12  (d) CF = 1, 2, 3, 4, 6, 12, 24
HCF = 12  HCF = 24
(6) (a) CF = 1, 2, 4  (b) CF = 1, 7  (c) CF = 1, 3
HCF = 4  HCF = 7  HCF = 3
(d) CF = 1, 2, 4  (e) CF = 1, 2  (f) CF = 1, 3, 9
HCF = 4  HCF = 2  HCF = 9
(7) a and d  (8) c, d, g, h, i
(9) (a) F  (b) F  (c) T  (d) F  (e) F  (f) T  (g) T  (h) F
(10) (a) \(240 = 2 \times 2 \times 2 \times 2 \times 3 \times 5\)
(d) \(603 = 3 \times 3 \times 67\)
(c) \(715 = 5 \times 11 \times 13\)
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(a) $\frac{2}{6}$  (b) $\frac{5}{8}$  (c) $\frac{4}{8}$  (d) $\frac{2}{5}$

(b) $\frac{5}{7}$  (b) $\frac{3}{10}$

(a) <  (b) >  (c) =  (d) >

(b) $\frac{6}{7}$  (b) $\frac{4}{7}$  (c) $\frac{3}{7}$  (d) $\frac{2}{7}$

(c) $\frac{7}{8}$  (b) $\frac{3}{8}$  (c) $\frac{1}{8}$  (d) $\frac{5}{8}$

(d) $\frac{8}{10}$  (b) $\frac{6}{10}$  (c) $\frac{2}{9}$  (d) $\frac{6}{9}$

(a) Unlike fractions  (b) bigger  (c) greater  (d) greater

(a) $\frac{7}{10}$  (b) $\frac{4}{9}$  (c) $\frac{8}{9}$

(a) 6 tickets  (b) 410km  (c) 20kg  (d) Rs 4105

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(a) $\frac{1}{4}$, $\frac{2}{8}$, $\frac{4}{16}$  (b) $\frac{3}{15}$, $\frac{6}{10}$, $\frac{9}{15}$  (c) $\frac{2}{3}$, $\frac{4}{6}$, $\frac{8}{12}$

(b) $\frac{1}{5}$, $\frac{2}{10}$, $\frac{3}{15}$  (b) $\frac{2}{5}$, $\frac{4}{10}$, $\frac{6}{20}$  (c) $\frac{2}{7}$, $\frac{6}{21}$, $\frac{8}{35}$  (d) $\frac{1}{2}$, $\frac{2}{4}$, $\frac{3}{6}$

(e) $\frac{3}{4}$, $\frac{6}{8}$, $\frac{9}{12}$  (f) $\frac{3}{10}$, $\frac{6}{20}$, $\frac{9}{30}$, $\frac{12}{40}$

(a) 2  (b) 500  (c) 4  (d) 100  (e) 21  (f) 80  (g) 15  (h) 22  (i) 20  (j) 42

(b) $\frac{2}{60}$, $\frac{3}{90}$, $\frac{4}{120}$, $\frac{5}{150}$  (b) $\frac{4}{80}$, $\frac{6}{120}$, $\frac{8}{160}$, $\frac{10}{200}$  (c) $\frac{14}{24}$, $\frac{21}{36}$, $\frac{28}{48}$, $\frac{35}{60}$

(d) $\frac{8}{40}$, $\frac{12}{60}$, $\frac{16}{80}$, $\frac{20}{100}$  (e) $\frac{6}{32}$, $\frac{9}{48}$, $\frac{12}{64}$, $\frac{15}{80}$  (f) $\frac{16}{28}$, $\frac{24}{42}$, $\frac{32}{56}$, $\frac{40}{70}$

Pages 63–64

(a) $\frac{4}{8}$, $\frac{2}{4}$, $\frac{1}{2}$  (b) $\frac{4}{16}$, $\frac{2}{8}$, $\frac{1}{4}$  (c) $\frac{4}{20}$, $\frac{2}{10}$

(b) 5  (b) 24  (c) 10  (d) 3  (e) 6  (f) 54  (g) 30  (h) 5

(c) $\frac{4}{5}$  (b) $\frac{3}{8}$  (c) $\frac{3}{10}$  (d) $\frac{4}{5}$  (e) $\frac{4}{10}$

(f) $\frac{1}{2}$  (g) $\frac{1}{3}$  (h) $\frac{7}{9}$  (i) $\frac{4}{5}$

(b) $\frac{3}{7}$  (c) $\frac{3}{10}$

(a) $\frac{3}{4}$  (b) $\frac{3}{5}$  (c) $\frac{5}{6}$

(d) $\frac{3}{4}$  (e) $\frac{2}{3}$  (f) $\frac{1}{3}$

(a) 4  (b) 1  (c) 5  (d) 7
(7) (a) $\frac{3}{5}$ (b) $\frac{1}{10}$ (c) $\frac{30}{31}$ (d) $\frac{4}{9}$ (e) $\frac{5}{7}$ (f) $\frac{33}{110}$

(8) (a) 16 (b) $\frac{1}{2}$

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(1) (a) a (2) (a) $\frac{3}{20}$ $\frac{1}{10}$ $\frac{11}{20}$ $\frac{18}{20}$ (b) $\frac{11}{25}$ $\frac{15}{25}$ $\frac{17}{25}$ $\frac{21}{25}$ $\frac{22}{25}$

(3) a, b, d are like fractions; c, e, f are unlike fractions.

(4) (a) $\frac{5}{16}$ $\frac{5}{15}$ $\frac{5}{12}$ $\frac{5}{9}$ (b) $\frac{6}{13}$ $\frac{6}{12}$ $\frac{6}{11}$ $\frac{6}{7}$ (c) $\frac{8}{17}$ $\frac{8}{16}$ $\frac{8}{14}$ $\frac{8}{12}$ (d) $\frac{10}{22}$ $\frac{10}{19}$ $\frac{10}{18}$ $\frac{10}{11}$

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(1) (a) $\frac{2}{5}$ $\frac{4}{5}$ (b) $\frac{2}{3}$ $\frac{3}{3}$ $\frac{1}{3}$ (c) $\frac{3}{6}$ $\frac{4}{6}$ $\frac{6}{6}$

(2) (a) $\frac{3}{3}$ $\frac{4}{3}$ (b) $\frac{12}{11}$ $\frac{15}{11}$ (c) $\frac{7}{6}$ $\frac{9}{6}$ (d) $\frac{12}{10}$ $\frac{10}{10}$

(3) Proper: $\frac{6}{13}$, $\frac{4}{19}$, $\frac{7}{15}$, $\frac{10}{11}$, $\frac{99}{100}$; Improper: $\frac{5}{5}$, $\frac{7}{6}$, $\frac{8}{8}$, $\frac{18}{15}$, $\frac{12}{4}$, $\frac{10}{11}$, $\frac{100}{100}$

Pages 67–69

(1) (a) (i) $\frac{8}{6}$ (ii) $\frac{2}{6}$ (b) (i) $\frac{3}{4}$ (ii) $\frac{8}{19}$ (iii) $\frac{3}{8}$

(2) (a) 8 (b) 12 (c) 6 (3) (a) 7 (b) 13 (c) 12 (4) (a) $\frac{18}{6}$ (b) $\frac{20}{10}$

(c) $\frac{16}{4}$ (d) $\frac{35}{5}$ (e) $\frac{18}{3}$ (f) $\frac{40}{8}$

(5) (a) 3 (b) 2 (c) 3 (d) 3 (e) 4 (f) 2 (g) 4 (h) 6 (i) 8

(6) (a) 13 (b) 23 (c) 31 (d) 17 (e) 21 (f) 22 (g) 26 (h) 70

(7) (a) 4 $\frac{1}{2}$ (b) $\frac{3}{4}$ (c) $\frac{5}{8}$ (d) $\frac{2}{3}$ (e) $\frac{7}{17}$ (f) $\frac{3}{11}$ (g) $\frac{1}{3}$ $\frac{3}{5}$

(h) $\frac{2}{10}$ $\frac{20}{10}$ (i) $\frac{6}{8}$ $\frac{1}{5}$ (j) $\frac{5}{8}$ (k) $\frac{1}{3}$ (l) $\frac{5}{6}$

(8) (a) $\frac{3}{2}$ $\frac{1}{2}$ (b) $\frac{5}{2}$ $\frac{1}{2}$ (c) $\frac{3}{2}$ $\frac{1}{2}$ (d) $\frac{7}{4}$ $\frac{3}{4}$ (e) $\frac{3}{2}$ $\frac{1}{2}$

(f) $\frac{12}{7}$ $\frac{1}{5}$ (g) $\frac{3}{2}$ $\frac{1}{2}$ (h) $\frac{3}{2}$ $\frac{1}{2}$ (i) $\frac{3}{2}$ $\frac{1}{2}$ (j) $\frac{4}{3}$ $\frac{1}{3}$

(k) $\frac{10}{3}$ $\frac{1}{3}$ (l) $\frac{4}{3}$ $\frac{1}{3}$

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(1) (a) $\frac{5}{1}$ (b) $\frac{8}{7}$ (c) $\frac{10}{3}$ $\frac{4}{4}$ (d) $\frac{7}{3}$ $\frac{7}{7}$ (e) $\frac{5}{3}$ $\frac{3}{4}$ (f) $\frac{5}{8}$ (g) $\frac{3}{1}$ $\frac{1}{3}$

(h) $\frac{13}{2}$ (i) $\frac{7}{1}$ $\frac{2}{3}$ (j) $\frac{9}{2}$ $\frac{3}{3}$

(2) (a) $\frac{1}{5}$ (b) $\frac{10}{11}$ (c) $\frac{3}{3}$ (d) $\frac{6}{2}$ $\frac{3}{3}$ (e) $\frac{2}{3}$ (f) $\frac{4}{1}$ $\frac{5}{5}$

(3) (a) $\frac{18}{10}$ $\frac{9}{5}$ (b) $\frac{100}{50}$ $\frac{2}{1}$ (c) $\frac{25}{15}$ $\frac{5}{3}$ (d) $\frac{84}{40}$ $\frac{21}{10}$ (e) $\frac{30}{18}$ $\frac{5}{3}$

(f) $\frac{56}{49}$ $\frac{8}{7}$ (g) $\frac{15}{12}$ $\frac{5}{4}$ (h) $\frac{60}{35}$ $\frac{12}{7}$
Pages 71–72

(1) (a) > (b) > (c) > (d) >
(2) (a) > (b) < (c) < (d) <
(3) (a) $\frac{2}{4}$ and $\frac{1}{4}$ (b) $\frac{9}{15}$ and $\frac{7}{15}$ (c) $\frac{4}{6}$ and $\frac{5}{6}$ (d) $\frac{11}{18}$ and $\frac{3}{18}$
(4) (a) $\frac{3}{6}$, $\frac{4}{6}$ (b) $\frac{3}{18}$, $\frac{4}{18}$ (c) $\frac{12}{15}$, $\frac{5}{15}$ (d) $\frac{9}{24}$, $\frac{10}{24}$ (e) $\frac{6}{20}$, $\frac{15}{20}$
(f) $\frac{4}{14}$, $\frac{5}{14}$ (g) $\frac{1}{4}$, $\frac{2}{5}$ (h) $\frac{9}{12}$, $\frac{10}{12}$
(5) (a) > (b) < (c) < (d) < (e) > (f) > (g) < (h) <
(6) (a) $\frac{9}{20}$, $\frac{7}{10}$, $\frac{4}{5}$ (b) $\frac{4}{9}$, $\frac{13}{18}$, $\frac{5}{6}$ (c) $\frac{3}{9}$, $\frac{2}{3}$, $\frac{5}{6}$
(d) $\frac{5}{8}$, $\frac{11}{16}$, $\frac{12}{16}$ (e) $\frac{3}{8}$, $\frac{3}{4}$, $\frac{5}{6}$ (f) $\frac{1}{4}$, $\frac{3}{10}$, $\frac{7}{20}$
(g) $\frac{8}{21}$, $\frac{4}{7}$, $\frac{2}{3}$ (h) $\frac{3}{8}$, $\frac{5}{12}$, $\frac{11}{24}$

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(1) (a) $\frac{11}{12}$ (b) $\frac{11}{21}$ (c) $\frac{7}{18}$ (d) $\frac{11}{14}$
(2) (a) $1 \frac{1}{2}$ (b) $1 \frac{2}{15}$ (c) $1 \frac{1}{2}$ (d) $1 \frac{2}{15}$
(3) (a) $1 \frac{1}{6}$ (b) $1 \frac{1}{2}$ (c) $1 \frac{1}{3}$ (d) $1 \frac{1}{2}$
(4) (a) $6 \frac{7}{10}$ (b) $11 \frac{5}{7}$ (c) $12 \frac{7}{9}$ (d) $21 \frac{3}{4}$

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(1) (a) $7 \frac{7}{10}$ (b) $5 \frac{5}{8}$ (c) $7 \frac{11}{18}$ (d) $11 \frac{9}{10}$ (2) (a) $2 \frac{4}{5}$ m
(3) (a) $6 \frac{1}{10}$ (b) $11 \frac{1}{2}$ (c) $4 \frac{1}{8}$ (d) $11 \frac{1}{10}$ (4) (a) $5 \frac{3}{8}$ (b) $11$ (c) $8$ (d) $17 \frac{2}{9}$

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(1) (a) $\frac{5}{12}$ (b) $\frac{7}{18}$ (c) $\frac{3}{5}$ (d) $\frac{5}{8}$ (2) (a) $1 \frac{3}{8}$ (b) $2 \frac{5}{12}$ (c) $2 \frac{3}{10}$ (d) $1 \frac{1}{10}$
(3) (a) $\frac{1}{8}$ (b) $\frac{1}{8}$ (c) $\frac{1}{8}$ (d) $\frac{3}{20}$ (e) $\frac{5}{8}$ (f) $\frac{1}{2}$ (4) (a) $\frac{1}{4}$ (b) $\frac{1}{8}$ (c) $\frac{1}{5}$ (d) $\frac{5}{12}$

Pages 76–78

(1) (a) $2 \frac{3}{8}$ (b) $5 \frac{1}{3}$ (c) $4 \frac{1}{12}$ (d) $2 \frac{11}{18}$ (e) $5 \frac{1}{2}$ (f) $5 \frac{7}{12}$ (2) (a) $19 \frac{9}{24}$ m (b) $9 \frac{7}{20}$ l
(3) (a) $\frac{7}{12}$ (b) $1 \frac{1}{10}$ (c) $3 \frac{7}{10}$ (d) $2 \frac{3}{4}$ (e) $1 \frac{5}{8}$
(f) $1 \frac{9}{10}$ (g) $2 \frac{13}{20}$ (h) $6 \frac{1}{12}$ (i) $1 \frac{5}{12}$ (j) $3 \frac{7}{12}$
(4) (a) $3 \frac{11}{30}$ (b) $4 \frac{11}{12}$ (c) $1 \frac{3}{8}$ (d) $4 \frac{1}{2}$ (5) (a) $4 \frac{1}{14}$ (b) $4 \frac{13}{20}$ (c) $2 \frac{1}{8}$ (d) $3 \frac{7}{10}$
(e) $5 \frac{1}{3}$ (f) $6 \frac{2}{5}$ (6) (a) $6 \frac{3}{4}$ kg (b) $11 \frac{13}{20}$ l
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(1) (a) 6 (b) 30 (c) 9 (d) 35 (e) 21 (f) 30
(2) (a) $\frac{2}{3}$ (b) $\frac{4}{5}$ (c) $\frac{2}{3}$ (d) $\frac{4}{5}$ (e) $\frac{9}{28}$ (f) $\frac{3}{8}$ (3) (a) $\frac{25}{30}$ (b) $\frac{35}{50}$ (c) $\frac{2}{3}$
(4) (a) $\frac{42}{7}$ (b) $\frac{21}{3}$ (c) $\frac{40}{10}$ (d) $\frac{40}{4}$ (5) (a) $\frac{5}{2}$ (b) $\frac{4}{4}$ (c) $\frac{2}{5}$
(6) (a) $\frac{11}{3}$ (b) $\frac{35}{6}$ (c) $\frac{19}{10}$ (d) $\frac{14}{5}$ (e) $\frac{73}{9}$ (f) $\frac{31}{4}$ (g) $\frac{32}{7}$ (h) $\frac{77}{8}$ (i) $\frac{66}{7}$
(7) (a) $2\frac{2}{5}$ (b) $1\frac{2}{5}$ (c) $1\frac{1}{5}$ (d) $1\frac{2}{5}$ (e) $1\frac{5}{7}$ (f) $2\frac{2}{3}$
(8) (a) $6\frac{1}{9}$ (b) $4\frac{1}{6}$ (c) $6\frac{1}{5}$ (d) $4\frac{1}{7}$
(9) (a) $\frac{8}{20}$ and $\frac{17}{20}$ (b) $\frac{15}{20}$ and $\frac{12}{20}$ (c) $\frac{9}{24}$ and $\frac{5}{24}$ (d) $\frac{27}{36}$ and $\frac{10}{36}$
(10) (a) $16\frac{1}{20}$ (b) $5\frac{14}{15}$ (c) $12\frac{1}{8}$ (d) $7\frac{1}{30}$

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(1) 126 (2) 168 (3) 11 (4) 200 (5) 13 (6) 16 (7) 61, 97 (8) $2\frac{3}{4}$ (9) 403 (10) 750 (11) 20 (12) 6 (13) 2, 3 (14) 8255 (16) $4\frac{1}{10}$ (17) $4\frac{7}{8}$ (18) 210

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(3) (a) c, j (b) b, d, f (c) largest i; smallest a, c, j

Pages 81–82

(1) (a) E (b) C (c) Both are equal (2) (a) AB (b) AB (c) BC
(3) a = 9, b - 11, c = 11, d = 12, e = 7, f = 8 (5) (a) $8\frac{1}{2}$ (b) 13 (c) 13 (d) $13\frac{1}{2}$
(6) (a) 4 (b) 8 (c) 13 (d) 9

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(1) (a) 5cm$^2$ (b) 9cm$^2$ (3) i (a) 7cm$^2$ (b) 12cm$^2$ (c) 6cm$^2$ (d) 4cm$^2$

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(1) (i) a = 16cm b = 14cm c = 22cm (ii) c and b
(4) 20cm$^2$/24cm; 63cm$^2$/32cm; 56cm$^2$/30cm; 44cm$^2$/30cm
(5) 9m, 4cm, 9cm, 12cm (6) 4cm, 9cm, 5cm, 2cm, 50cm
(7) (a) 105cm$^2$ (b) 2m$^2$, 6m (8) (a) 24m$^2$ (b) 21m$^2$ (c) 12m$^2$ (d) 21m$^2$
(9) 43m$^2$ (10) (a) 9m (b) 6m (c) 3m (d) 125m

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(1) (a) 56 (b) 60 (c) 12 (d) 21
(2) (a) 1, 2, 3, 4, 6, 8, 12, 24 (b) 1, 19 (c) 1, 2, 3, 4, 6, 8, 12, 16, 24, 48
(3) (a) 4 (b) 9 (4) b (5) (a) prime (b) 1, 5, prime (c) 1, 2, 5, 10, composite

(6) (a) $28 = 2 \times 2 \times 7$
(b) $70 = 7 \times 2 \times 5$
(c) $108 = 3 \times 3 \times 12$
(7) (a) 3x3x107  (b) 5x5x41  (c) 2x71
(8) (a) 144  (b) 168  (9) (a) 12 and 240  (b) 15 and 75  (10) (a) <  (b) <  (c) >  (d) =
(11) (a) 3 $\frac{1}{9}$  (b) 5 $\frac{1}{2}$  (c) 3  (12) (a) 15 $\frac{13}{15}$  (b) 5 $\frac{5}{12}$  (c) 10 $\frac{17}{24}$  (d) 18 $\frac{5}{12}$
(13) (a) once  (b) $\frac{5}{6}$

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(1) (a) 0.2, 0.3, 0.4, 0.5, 0.6, 0.7, 0.8, 0.9, 1.0  (b) 0.5, 1  (c) 0.2, 0.4, 0.6, 0.8, 1.0
(2) (a) $\frac{2}{10}$  (b) $\frac{3}{10}$  (3) (a) 0.2  (b) 0.8  (c) 0.9
(6) (a) $1 \frac{9}{10} = 1.9cm$  (b) $2 \frac{1}{10} = 2.1cm$  (c) $1 \frac{4}{10} = 1.4cm$  (d) $2 \frac{7}{10} = 2.7cm$  (e) $2 \frac{1}{2} = 2.5cm$

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(3) (a) $2 \frac{7}{10}$  (b) $9 \frac{4}{10} = 9 \frac{2}{5}$  (c) $11 \frac{4}{10} = 11 \frac{2}{5}$  (d) $4 \frac{9}{10}$  (e) $\frac{6}{10} = \frac{3}{5}$  (f) $9 \frac{5}{10} = 9 \frac{1}{2}$
(4) (a) $1 \frac{1}{2} = 1.5cm$  (b) $\frac{9}{10} = 0.9cm$
(5) (a) 10.1  (b) 0.4  (c) 15.3  (d) 14.5  (e) 1.7  (f) 21.1
(6) (a) $2.1 = 2 \frac{1}{10}$  (b) $1.8 = 1 \frac{8}{10} = 1 \frac{4}{5}$  (c) $2.1 = 2 \frac{1}{10}$
(8) (b) 024.5  (c) 410.1  (d) 100.2  (e) 500.9  (f) 800.7
(10) (a) 775.9  (b) 749.9  (c) 991.4  (11) (a) 846.1  (b) 218.4  (c) 322.7  (d) 132.5
(12) (a) 944.1  (b) 956.7  (c) 856.3  (d) 3039.1
(13) (a) 146.9  (b) 460.8  (c) 145.7  (d) 135.6  (e) 372.6
(14) (a) 191.5  (b) 2716.8  (c) 665.9  (d) 2618.7
(15) (a) 23.8kg  (b) 94m  (16) (a) 30.1  (b) 135.4  (e) 218.2  (d) 106.7
(17) (a) 20.3  (b) 1016.4  (c) 156.4  (d) 210.3
(18) (a) 21.2m  (b) 150.1g  (c) 4.6l  (d) 23l

Pages 96–98

(1) (a) $\frac{4}{100} = 0.04$  (b) 0  (c) $\frac{7}{100} = 0.07$  (d) $\frac{3}{100} = 0.03$  (e) $\frac{21}{100} = 0.21$  (f) $\frac{33}{100} = 0.33$
(g) $\frac{65}{100} = 0.65$  (h) $\frac{55}{100} = 0.55$  (i) b, d, a, c, e, f, h, g  (ii) 1.05; 0.21  (iii) h, 0.22
(4) (a) 0.46  (b) 0.07  (c) 0.16
(5) (a) $\frac{15}{100} = \frac{3}{20}$  (b) $\frac{56}{100} = \frac{14}{25}$  (c) $\frac{10}{100} = \frac{1}{10}$  (d) $\frac{3}{100}$  (e) $\frac{1}{100}$  (f) $\frac{33}{100}$
(6) (a) <  (b) <  (c) =  (d) <  (e) =  (f) =  (7) (a) 0.35  (b) 0.09  (c) 0.8  (d) 0.14
(8) (b) 500.51  (c) 605.05  (d) 328.01  (e) 999.99  (f) 695.65
(9) (a) 2.43, 2.45, 2.47, 2.48  (b) 6.78, 7.86, 8.76, 8.78  (c) 3.80, 3.81, 8.30, 8.31
(10) (a) 19 $\frac{47}{50}$  (b) 493 $\frac{1}{10}$  (c) 24 $\frac{1}{5}$  (d) 738 $\frac{2}{25}$  (e) 35 $\frac{9}{10}$  (f) 415 $\frac{17}{20}$
Page 99

1. (a) \( \frac{25}{100} = 0.25 \)   
   (b) \( \frac{15}{100} = 0.15 \)   
   (c) \( \frac{36}{100} = 0.36 \)   
   (d) \( \frac{4}{10} = 0.4 \)   
   (e) \( \frac{8}{100} = 0.08 \)

(f) \( \frac{40}{100} = 0.40 \)   
(g) \( \frac{8}{10} = 0.8 \)   
(h) \( \frac{30}{100} = 0.30 \)   
(i) \( \frac{75}{100} = 0.75 \)

2. (a) \( \frac{1}{4} \)   
   (b) \( \frac{18}{25} \)   
   (c) \( \frac{5}{10} \)   
   (d) \( \frac{3}{10} \)   
   (e) \( \frac{11}{25} \)   
(f) \( \frac{6}{5} \)

Page 100

1. (a) Rs 60.10   
   (b) Rs 5.05   
   (c) Rs 100.88   
   (d) Rs 6025.25   
   (e) Rs 300.50   
(f) Rs 873.05

2. (a) one hundred and five rupees and fifty paise   
   (b) four thousand and twenty rupees 
   and twenty-five paise   
   (c) three hundred and ten rupees and ten paise   
   (d) one thousand six hundred and fifty-nine rupees and fifty paise.

3. (a) Rs 162.60   
   (b) Rs 159.55   
   (c) Rs 222.90

Page 101

1. (a) 2212.30   
   (b) 8518.40   
   (c) 4154.80   
   (d) 101.80   
   (e) 14601.00   
(f) 209.10

2. (a) Rs 302.20, Rs 320.05, Rs 320.10   
   (b) Rs 99.90, Rs 100.00, Rs 100.05
(c) Rs 417.95, Rs 418.80, Rs 418.85

3. (a) 13285.40   
   (b) Rs 397

Page 102

1. (a) 738.55   
   (b) Rs 604.65   
   (c) Rs 206.20

2. (a) 549.45   
   (b) Rs 686.85   
   (c) Rs 1612.55

3. (a) 32.20   
   (b) Rs 96.15   
   (c) Rs 540.60   
   (d) Rs 104.50

Page 103

1. (a) 3.87m   
   (b) 4.05m   
   (c) 1.15m   
   (d) 11.02m

2. (a) 2m 25cm   
   (b) 16m 83cm   
   (c) 10m 2cm   
   (d) 240m 3cm

3. (a) \( \frac{1869}{100} \)   
   (b) \( \frac{103}{25} \)   
   (c) \( \frac{447}{100} \)   
   (d) \( \frac{361}{10} \)

4. (a) 16.61   
   (b) 222.21   
   (c) 5.71   
   (d) 35.83

5. (a) 54.46   
   (b) 296.81   
   (c) 114.29   
   (d) 284.41   
   (e) 178.23

6. (a) 3.6m   
   (b) 23.75m   
   (c) 4.56m

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1. (a) 26.83m   
   (b) 32.67m   
   (c) 40.19m

2. (a) 93.1   
   (b) 717.15   
   (c) 392.22   
   (d) 7033.6

3. (a) 431.5   
   (b) 874.35   
   (c) 1687.4   
   (d) 2751.25   
   (e) 6637.1   
(f) 2055.9

4. (a) 6.31   
   (b) 12.61   
   (c) 2.11   
   (d) 4.23

5. (a) 9.51   
   (b) 34.21   
   (c) 23.81   
   (d) 231.13   
   (e) 51.41   
(f) 13.85

6. (a) 6.9m   
   (b) 23.75m   
   (c) 4.56m

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1. (a) 6.05   
   (b) 30.75   
   (c) 374.09   
   (d) 691.43

2. (a) <   
   (b) <   
   (c) =   
   (d) >   
   (e) =   

3. (a) \times   
   (b) \div   
   (c) \div   
   (d) \times   
   (e) \div

4. (a) A = 7.5cm², P = 12cm   
   (b) A = 13.69cm², P = 14.8cm   
   (c) A = 13.5cm² P = 15.8cm
Pages 106–107

(1) (a) thousandths (b) tens (c) tenths (d) hundredths (e) thousandths
   (f) hundred

(4) (a) 80 (b) 10 (c) 30 (d) 5 (e) 16

(6) (a) 0.018 (b) 0.051 (c) 0.027 (d) 0.073

(7) (a) $\frac{2}{1000}$ (b) $\frac{8}{1000}$ (c) $\frac{67}{1000}$ (d) $\frac{11}{1000}$ (f) $\frac{9}{1000}$

Page 108

(1) (a) 3.9, 4.0 (b) 6.31, 6.32, 6.33 (c) 13.50 (d) 8.120, 8.122

(2) (a) > (b) < (c) < (d) > (e) >

(3) (a) 1.01, 1.04, 1.09, 1.10 (b) 2.514, 4.502, 4.504, 4.506 (c) 0.06, 0.6, 0.008, 0.8, 1.8
   (d) 5.301, 5.319, 5.32, 5.331 (e) 2.092, 2.943, 3.002, 3.905

Page 109

(1) (a) 1 (b) 3 (c) 3 (d) 2 (e) 3 (f) 3 (g) 3 (h) 2

Page 110

(1) (a) 0.078 (b) 0.164 (c) 0.284 (d) 0.515 (e) 0.434 (f) 0.444

(3) (a) $2\frac{78}{125}$ (b) $3\frac{7}{750}$ (c) $5\frac{1}{100}$ (d) $20\frac{1}{200}$

Page 111

(2) (a) F (b) F (c) T (d) T (e) F (f) T (g) T (h) T

Pages 112–113

(1) (a) 3.049 (b) 0.629 (c) 0.492 (d) 11.038 (e) 10.501 (f) 87.601

(3) (a) 2493l (b) 95l (c) 10069l (d) 22608l (e) 802l (f) 905l

(4) (a) 5.595km (b) 10.408kl (c) 4.602km (d) 9.115kg (e) 10.538kg
Page 115

(1) (a) 100 (b) 0.01 (c) 0.001 (d) 10 (e) 1000 (f) 200 (g) 0.1
   (h) 0.1 (i) 0.01 (j) 3000 (k) 0.004 (l) 20

Pages 116–117

(1) (a) 2000 (b) 6 (c) 4 (d) 7 (e) 2100
(2) (a) 0.624m (b) 7.083m (c) 1.083m (d) 0.062m (e) 4.002m (f) 0.140m
(3) (a) 70.4cm (b) 140.1cm (c) 123.8cm (d) 0.5cm (e) 5.1cm (f) 20.2cm
(6) (a) 135mm (b) 123mm (c) 378mm (d) 1608mm (e) 6100mm (f) 9003000mm
(7) (a) 0.604kg (b) 4.001kg (c) 0.015kg (d) 0.843kg (e) 8.32kg
   (f) 0.002kg (g) 0.007kg (h) 14.930kg
(8) (a) 8000mg (b) 95000mg (c) 16000mg (d) 3000mg (e) 24000mg (f) 50000mg
(9) (a) 0.052 (b) 0.006 (c) 0.614 (d) 5.943
(10) (a) 2400 (b) 3020 (c) 5960 (d) 6801 (e) 100 (f) 4
(11) (a) 1.44g (b) 1.076g (c) 3.896g
(12) (a) 2041l (b) 10004l (c) 634l (d) 960l (e) 4150l (f) 1104l
(13) (a) 0.005l (b) 0.023l (c) 0.016l (d) 0.908l
(14) (a) 0.023kl (b) 0.008kl (c) 0.691kl (d) 0.059kl (e) 0.104kl (f) 0.005kl
(15) (a) 14010l (b) 20639l (c) 7240l (d) 1051l (e) 3l (f) 8006l
(16) (a) 3.155 (b) 4.148 (c) 0.590 (d) 51.456

Pages 118–119

(1) (a) 23.75km (b) 2.25m (c) 1.20mm (d) 23.77m (e) 7km 500m (f) 4.15m
(2) (a) 2km 30m (b) 206m (c) 10kg 22g
(3) (a) 3.5kg (b) 70.269kg (c) Rice, 3.500kg (d) 0.358kg
(4) (a) 6l (b) 9000l (c) 2.4l (d) 27l (e) 15.625l
(5) (a) 0.03m (b) 2.39m (c) 850g (d) 1l (e) 10

Page 120

(1) (a) 1 (b) 9 (c) 3 (d) 6 (e) 4 (f) 4 (g) 2
(2) (a) 0.003 (b) 0.9 (c) 0.069 (d) 0.08 (e) 0.72 (f) 0.501
(3) (a) < (b) = (c) > (d) > (e) < (f) <
(4) (a) \(\frac{35}{100}\) (b) 10 \(\frac{9}{100}\) (c) \(\frac{6}{10}\) (d) \(\frac{93}{100}\) (e) \(\frac{3}{100}\) (f) \(\frac{20}{100}\)
(5) (a) 34.22 (b) 26.27 (c) 418.53 (d) 9.379 (e) 2.089 (f) 2.156
(6) (a) 59.46 (b) 0.004 (c) 0.08 (d) 0.015 (e) 0.102 (f) 0.24
   (g) 1600 (h) 0.129 (i) 8.90 (j) 0.13l
(7) (a) 597 (b) 0.621 (c) 13.914 (d) 81.155 (e) 1.633 (f) 0.346 (g) 10.13 (h) 260

Pages 123–124

(2) (a) acute (b) right (c) right (d) straight
   (e) reflex (f) obtuse (g) acute (h) reflex
(3) (a) AB and BC (b) WX and XY (4) (a) L (b) T
Page 125
(1) (a) a and d

Page 127
(1) (a) 90°  (b) 90°  (c) 36°  (d) 180°  (e) 126°  (f) 270°  (g) 180°

Page 133
(2) (a) b, c, d; a, e, ; f, g

Page 138
(1) (a) 8  (b) pink  (c) 7  (d) 30  (e) 36  (f) 4
(2) (a) 10  (b) 5  (c) 10  (3) (a) Rs 3000  (b) Rs 1500  (c) Wednesday

Page 139
(1) (a) 2  (b) 3 yrs  (c) 4 kg  (d) 2 yrs  (e) Sid  (f) 1000
  (g) yes  (h) 200  (i) 4 m  (j) 50 kg

Page 140
(1) (a) yellow  (b) blue  (c) green  (2) (a) swimming  (b) cricket  (c) football

Pages 141–145
(1) (a) 47,203  (b) 657,031  (c) 80,614  (d) 920,037
(2) (a) >  (b) =  (c) <  (d) <  (e) >
(3) (a) 889,999  (b) 999,999  (c) 151,599  (d) 8489
(4) (a) hundred  (c) hundredth  (d) lakh
(5) (a) six hundred and sixty  (b) zero point 12  (c) 2 $\frac{1}{2}$ kg
(6) (a) 200,000 + 0 + 6000 + 900 + 40 + 2
  (b) 600000 + 90000 + 5000 + 0 + 80 + 1
  (c) 20000 + 7000 + 600 + 40 + 8
  (d) 800000 + 70000 + 3000 + 0 + 0 + 8
  (e) 100000 + 0 + 0 + 900 + 0 + 5
  (f) 700000 + 30000 + 0 + 800 + 50 + 1
(7) (a) 124,194  (b) 30.037  (c) 23,326  (d) 4.443
(8) (a) 578.464  (b) 6.424  (c) 40.668  (d) 7.677
(9) (a) 180, 1800, 18000
  (b) 2150, 21500, 215000
  (c) 4090, 40900, 409000
  (d) 3800, 38000, 380000
(10) (a) 7888  (b) 336138  (c) 175,770  (d) 1279.8
  (e) 14252  (f) 4361.8  (g) 60.837  (h) 4057.75
(11) (a) 610  (b) $\frac{3}{100}$  (c) 4021  (d) 3.018  (e) 84,256
(12) (a) 63 r3  (b) 461 r4  (c) 31 r3  (d) 322 r11  (e) 15 r 32
  (f) 90 r64  (g) 37 r18  (h) 89 r11  (i) 19 r19  (j) 89 r25
(13) (a) Rs 1175.30  (b) 450 ml
(14) (a) 4260, 426, 42.6  (b) 30295.1, 3029.51, 302.951  (c) 1879, 187.9, 18.79
   (d) 7552.4, 755.24, 75.524  (e) 624450.8, 6245.08, 624.508  (f) 81902.5, 8190.25, 819.025
(15) (a) Rs 36.75  (b) 96 m  (16) (a) May  (b) July  (c) December  (d) October
(17) (a)  
   (b)  
   (c)  
   (d)  
(18) (a) 5:11h  (b) 7:15h  (c) 3:48h  (d) 9:45h
(19) (a) 10:15am  (b) 3:48am  (c) 2:35am  (d) 1:30pm
(20) (a) 11:10am  (b) 10:35am  (c) 4:28am  (d) 2:06pm
(21) (a) 7:15h  (b) 22:17  (c) 21:25h  (d) 15:42h
(22) (a) 1:40pm  (b) 4:10pm  (c) 11:12mp  (d) 11:00pm
(23) (a) 202min  (b) 436min  (c) 118min  (d) 347min
(24) (a) 6h 8min  (b) 1hr 50min  (c) 10h 35min
(25) (a) 60  (b) 35  (c) 19  (d) 59
(26) (a) 2820  (b) 7680  (c) 5700  (d) 6360
(27) (a) 6:45  (b) 4hr 45min
(28) (a) 7  (b) 18  (c) 8  (d) 2  (29) prime c, d, f; composite a, b, e.
(30) (a) 96  (b) 105  (c) 80  (d) 170  (31) (a) 7  (b) 6  (c) 8  (d) 480
(32) (a) \(\frac{7}{8}\)  (b) \(\frac{11}{21}\)  (c) \(\frac{2}{3}\)  (d) 18.23  (e) 5.5  (f) 100.0182
(34) (a) \(\frac{11}{3}\)  (b) \(\frac{36}{7}\)  (c) \(\frac{67}{10}\)
(35) (a) \(\frac{3}{8}\)  (b) \(\frac{3}{8}\)  (c) 6 \(\frac{1}{9}\)  (36) (a) \(\frac{2}{3}\)  (b) 17  (c) \(\frac{6}{7}\)  (d) 11 \(\frac{1}{2}\)
   (e) 6 \(\frac{1}{2}\)  (f) 8 \(\frac{4}{5}\)
(37) (a) \(<\)  (b) \(<\)  (c) \(<\)
(38) (a) 8 \(\frac{7}{11}\)  (b) 9 \(\frac{11}{12}\)  (c) \(\frac{8}{15}\)  (d) 5 \(\frac{1}{3}\)  (e) 4 \(\frac{6}{10}\)  (f) 3 \(\frac{9}{10}\)
(39) (a) 3 \(\frac{4}{5}\)  (b) 21 \(\frac{21}{25}\)  (c) \(\frac{729}{100}\)  (d) \(\frac{999}{100}\)  (e) 10 \(\frac{3}{50}\)  (f) 5 \(\frac{21}{200}\)
(40) (a) 20  (b) 38  (c) 63  (41) (a) 13.5m\(^2\)  (b) 225m\(^2\)  (c) 12.5m\(^2\)
(42) (a) 11m \(\) (b) 1456m\(^2\)  (c) 14cm  (43) (a) 0.8  (b) 0.49  (c) 0.23  (d) 0.042
(44) (a) 1.2  (b) 11.049  (c) 4.22  (d) 3.263  (e) 5.06  (f) 5.009
(45) (a) 3 \(\frac{4}{5}\)  (b) 2 \(\frac{1}{50}\)  (c) 42 \(\frac{41}{100}\)  (d) 3824 \(\frac{24}{25}\)
(46) b and f  (47) (a) 62.005  (b) 143.010  (c) 12.460
(48) (a) 200  (b) 40  (c) 0.1  (d) 0.002  (49) (a) 0.042  (b) 0.068  (c) 0.015
(50) (a) 14320  (b) 285100  (c) 41  (d) 6253
(51) (a) 1642  (b) 64720  (c) 10020  (d) 20165
(52) (a) 39.85  (b) 0.042  (c) 0.002
(53) (a) acute (b) acute (c) obtuse (d) right
(54) (a) $90^\circ$ (b) $70^\circ$ (c) $60^\circ$ (d) $75^\circ$
(55) (a) scalene (b) $90^\circ$ (c) metre, gram, litre (d) degree; 360 (e) pie

Page 147
(1) a (2) c (3) a (4) d (5) b (6) c (7) d (8) a (9) d (10) a

Page 148
(1) 2, 5 (2) 105 (3) 225 (4) 2 (5) 6 (6) 4 (7) 12 (8) 8109 (9) $\frac{1}{4}$ (10) 2
(11) 23 (12) 240 (13) No (14) 70,100

Page 149
(1) 7250 (2) 49940 (3) 26250 (4) 240
(5) Rs 17550 (6) 670914 (7) 525000 (8) 25

Page 150
(1) d (2) d (3) b (4) b (5) b (6) a (9) b (4) c (9) d (3) (e) 2

Page 151
(1) (a) 42040 (b) 44 (c) 16 (d) $\frac{695}{1000}$ (e) 495
(2) (a) 8,49,210 (b) 39,49,109 (c) 1,40,600
(3) (a) 69,09,089 (b) 30,19,999 (c) 5,00,489
(4) 24, 1200 (5) 16, 24, 4960, 9608 (6) 3, 6, 2, 9, 1
(7) 9, 3, 7, 1 (8) (a) T (b) T (c) T (d) T (9) $2 \times 2$; $5 \times 5$

Page 152
(1) (a) $1 \frac{1}{5}$ (b) $15 \frac{3}{7}$ (c) $4 \frac{2}{3}$ (d) $3 \frac{1}{6}$ (e) $4 \frac{1}{2}$ (f) $4 \frac{1}{2}$ (g) 3 (h) 5 $\frac{3}{5}$
(2) (a) 88 (b) 49 (c) 45 (d) 72 (e) 28 (f) 160
(g) 120 (h) 6000 (i) 120 (j) 4900 (k) 19 (l) 1000
(3) (a) 8 (b) 30 (c) 18 (d) 10 (e) 60 (f) 100 (g) 10 (h) 9 (i) 8 (j) 20

Page 153
Ans of 1–5 is (a) (6) 39 (7) (a) 266 (b) 798 m

Page 154
Section I (1) $\frac{1}{4}$ (2) $\frac{4}{7}$ (3) $\frac{1}{4}$
Section II (1) (a) $\frac{32}{35}$ (b) $\frac{1}{5}$ (c) $\frac{1}{4}$ (2) (a) 16 (b) 6 (c) 36 (3) $\frac{1}{6}$
Section III (1) a (2) (a) = (b) > (c) > (d) >