



Government of Karnataka

MATHEMATICS

Revised



Part II

Karnataka Text Book Society (R.)

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PART II

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MULTIPLICATION



After studying this Chapter you can,

- find the product of two 3-digit numbers,
- multiplication of a 4-digit number by a 1 & 2 digit number,
- multiplication of a 5-digit number with a 1- digit number,
- solve verbal problems based on multiplication.

We already know that 'multiplication' is one of the basic mathematical operations. 'Multiplication' is repeated addition. You can multiply two numbers at a time.

The number to be multiplied is called the '**multiplicand**'. The number which multiplies the given number is called the '**multiplier**', the result of multiplication is called the '**product**'.

$$\text{multiplicand} \times \text{multiplier} = \text{product}$$

Properties of Multiplication

1. The product of any number and zero is always zero.
Example : $12 \times 0 = 0$, $8 \times 0 = 0$
2. The product of any number and 1 is always the number itself.
Example : $9 \times 1 = 9$, $6 \times 1 = 6$
3. The product remains the same when we interchange multiplicand and multiplier.
Example : $4 \times 7 = 28$, $7 \times 4 = 28$.

Revision Exercise

I. Find the product of the following.

- | | |
|-------------------|---------------------|
| 1) 35×0 | 4) 1×235 |
| 2) 164×1 | 5) $0 \times 1,001$ |
| 3) 100×0 | 6) 1×55 |

II. Find the product of the following.

- | | |
|--------------------|--------------------|
| 1) 45×16 | 4) 18×42 |
| 2) 63×31 | 5) 83×17 |
| 3) 162×17 | 6) 234×22 |

III. Solve the following problems.

- 1) Cost of one note book is ₹ 16, What is the cost of 12 note books?
- 2) The school fee of a student is ₹ 38. What is the total fee of 128 students?
- 3) 63 students went on one day excursion with their class teacher. The class teacher collected ₹ 150 from each student towards travel and lunch expenses. What is the total amount collected?
- 4) The cost of a bag containing 10 kg. rice is ₹ 285. Find the cost of 25 bags of rice.
- 5) The head master decides to give first and second prize for various competitions. 16 students got first prize and 16 students got second prize. If the cost of first and second prize is ₹ 11 and ₹ 9 respectively, find the total amount required by head master to buy the prizes.

Multiplication of a 3-digit number by another 3-digit number :

Example 1

Find the product of 156 and 267.

$$\begin{array}{r} 267 \\ \times 156 \\ \hline \text{1st row} 1602 \\ \text{2nd row} 15600 \\ \text{3rd row} 160200 \\ \hline 41652 \end{array}$$

Steps involved in multiplication

1. Multiply : $267 \times 6 = 1,602$. Write the product in first row to left side from the units place.

2. Multiply : $267 \times 5 = 1,335$. Write the product in second row starting from the tens place to the left side.
3. Multiply : $267 \times 1 = 267$. Write the product in third row starting from the hundreds place to the left side.
4. Add the digits in these three rows.

Therefore $267 \times 156 = 41,652$

Example 2

A note book contains 192 pages. How many pages do such 250 note books contain ?

Number of note books = 250.	$\begin{array}{r} 250 \\ \times 192 \\ \hline 500 \end{array}$
Number of pages in each note book = 192.	$\begin{array}{r} 250 \\ \times 192 \\ \hline 500 \end{array}$
$\therefore$ Total number of pages in 250 note books	$\begin{array}{r} 250 \\ \times 192 \\ \hline 500 \end{array}$
$= 250 \times 192$	$\begin{array}{r} 250 \\ \times 192 \\ \hline 500 \end{array}$
$= 48,000$	$\begin{array}{r} 250 \\ \times 192 \\ \hline 500 \end{array}$

$\therefore$ There are 48,000 pages in 250 note books.

Multiplication of a 4-digit number by 1 or 2-digit number :

Example 1

Multiply 2,468 by 7

Step 1

Multiplicand	2 4 6	8	Multiply : $8 \times 7 = 56$
Multiplier	$\times$	7	Write 6 in units place and carry 5 to tens place.
Product		6	

Step 2

$$\begin{array}{r} 5 \\ 24\boxed{6}8 \\ \times \boxed{7} \\ \hline 76 \\ \hline \end{array}$$

Multiply : $6 \times 7 = 42$

Add 5 to product, i.e., $5 + 42 = 47$

Write 7 in tens place and 4 to hundreds place.

Step 3

$$\begin{array}{r} 4 \\ 2\boxed{4}68 \\ \times \boxed{7} \\ \hline 276 \\ \hline \end{array}$$

Multiply : $4 \times 7 = 28$

Add 4 to product, i.e., $4 + 28 = 32$

Write 2 in hundreds place and carry 3 to thousands place.

Step 4

$$\begin{array}{r} 3 \\ \boxed{2}468 \\ \times \boxed{7} \\ \hline 17276 \\ \hline \end{array}$$

Multiply: $2 \times 7 = 14$

Add 3 to product, i.e., $3 + 14 = 17$

Write 17 as last two digits.

So, product of 2,468 and 7 is 17,276

Example 2

Find the product of 1,376 and 34.

Steps involved in multiplication

$$\begin{array}{r} 1\ 3\ 7\ 6 \\ \times \quad 3\ 4 \\ \hline 1^{\text{st}} \text{ row} \quad 5\ 5\ 0\ 4 \end{array}$$

$$\begin{array}{r} 2^{\text{nd}} \text{ row} \quad 4\ 1\ 2\ 8 \\ \hline 4\ 6\ 7\ 8\ 4 \end{array}$$

1. Multiply : $1,376 \times 4 = 5,504$. Write the product in first row to left side from the units place.

2. Multiply : $1,376 \times 3 = 4,128$. Write the product in second row starting from the tens place to the left side.

3. Add the digits in these two rows.

$$\therefore 1,376 \times 34 = 46,784$$

- 3) A garment factory manufactures 2,718 dresses in a day. Find the number of dresses manufactured in 23 working days.

Number of dresses manufactured in one day = 2,718	2 7 1 8
Number of working days = 23	× 2 3
Total Number of dresses manufactured in 23 working days	<u>8 1 5 4</u>
= 2,718 × 23	5 4 3 6
= 62,514	<u>6 2,5 1 4</u>

∴ 62,514 dresses were manufactured in 23 working days.

Multiplication of a 5-digit number by 1-digit number.

Example 1

Multiply 10,843 by 8

Multiplicand	1 0 8 4 3
Multiplier	× 8
Product	<u>8 6, 7 4 4</u>

Multiply : $10,843 \times 8 = 86,744$.

Write the product in first row to left side from the units place.

∴ $10,843 \times 8 = 86,744$.

Example 2

Multiply 21,807 by 4

2 1 8 0 7	Multiply : $21,807 \times 4 = 87,228$. Write the product
× 4	in first row to left side from the units place.
<u>8 7, 2 2 8</u>	∴ $21,807 \times 4 = 87,228$.

Exercise 1.1

I. Multiply

1) 146×173

2) 178×142

3) 163×134

4) 183×208

5) 150×107

6) 248×212

7) 316×100

8) 100×523

II. Multiply

1) $2,861 \times 9$

2) $3,947 \times 7$

3) $7,254 \times 6$

4) $6,041 \times 5$

5) $8,028 \times 8$

6) $4,395 \times 9$

III. Find the product.

1) $9,025 \times 10$

2) $2,549 \times 20$

3) $3,746 \times 23$

4) $4,756 \times 19$

5) $2,439 \times 31$

6) $1,258 \times 13$

7) $1,028 \times 37$

8) $2,375 \times 16$

IV. Multiply

1) $21,497 \times 3$

2) $15,746 \times 5$

3) $11,048 \times 7$

4) $10,039 \times 9$

V. Solve the following problems.

- 1) Mr. Siddappa is a fruit selling agent who exports oranges. One box contains 144 oranges. If he export 259 boxes of oranges, find the total number of oranges exported.
- 2) In a protected forest area, 160 trees are planted in each row and 108 trees in each column. Find the total number of trees planted in the forest area.
- 3) A dealer buys 27 bicycles for his show room. Cost of each bicycle is ₹ 2,067. Find the total amount paid by the dealer.
- 4) A farmer grew 23 quintals of wheat. He sold them for ₹ 1,935 per quintal. How much amount did the farmer get by selling wheat ?





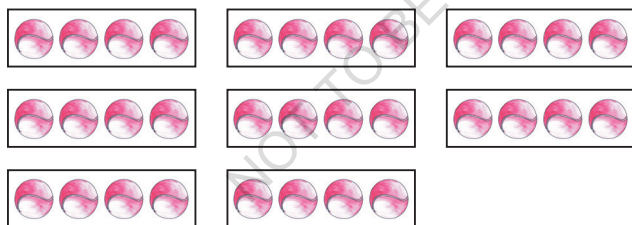
After studying this Chapter you can,

- divide the numbers by standard division algorithm method,
- divide a 5-digit number by another 1 or 2-digit number by using standard division algorithm method,
- solve verbal problems based on division of numbers.

In the previous class we have learnt how to do division by the method of grouping in equal numbers and repeated subtraction.

Observe the following examples.

1. Division by grouping



When 32 balls are grouped in 4 each, it makes 8 groups.

$$\therefore 32 \div 4 = 8$$

2. Division by repeated subtraction.

$$32 - 4 = 28$$

$$20 - 4 = 16$$

$$8 - 4 = 4$$

$$28 - 4 = 24$$

$$16 - 4 = 12$$

$$4 - 4 = 0$$

$$24 - 4 = 20$$

$$12 - 4 = 8$$

Subtraction is done 8 times.

$$\therefore 32 \div 4 = 8$$

Revision Exercise

I. Encircle the objects as shown in the example and write the answer in given box

Example :



a.  $10 \div 5 = \boxed{}$

b.  $20 \div 4 = \boxed{}$

c.  $15 \div 3 = \boxed{}$

d.  $9 \div 3 = \boxed{}$

II. Divide the following using repeated subtraction method.

a. $12 \div 4$

b. $25 \div 5$

c. $42 \div 7$

d. $30 \div 10$

e. $75 \div 15$

Now let us learn the process of division by other ways.

Division is reverse process of multiplication

$$8 \times 4 = 32$$

$$32 \div 8 = 4$$

$$32 \div 4 = 8$$

It is easy to follow these methods when the numbers are small.

Suppose we have to divide 84 by 4. It is time consuming and difficult to follow the above methods. A standard method is followed in any division process. Now let us learn this method of division.

Example 1

Divide 84 by 4.

$$\begin{array}{r} 21 \leftarrow \text{Quotient} \\ \text{Divisor} \rightarrow 4 \overline{) 84} \leftarrow \text{Dividend} \\ \underline{8} \downarrow \\ 04 \\ \underline{4} \\ 0 \leftarrow \text{Remainder} \end{array}$$

Steps involved in division

1. Start division from the digit in highest place of the dividend. Here, 8 is in tens place.
2. $4 \times 2 = 8$. Write 2 as the first digit of the quotient and 8 below the first digit of dividend from left.
3. Subtract : $8 - 8 = 0$. Write the remainder 0.
4. Bring down 4 of units place. Divide this 4 by the divisor 4. $4 \times 1 = 4$. Write 1 as the next digit of the quotient and 4 below 4.
5. Subtract : $4 - 4 = 0$. Write the last remainder 0.

This method of division is called Standard Division Algorithm.

Example 2

Divide 49 by 2 using standard division algorithm.

$$\begin{array}{r} 24 \leftarrow \text{Quotient} \\ \text{Divisor} \rightarrow 2 \overline{) 49} \leftarrow \text{Dividend} \\ \underline{4} \downarrow \\ 09 \\ \underline{0} \\ 08 \\ \underline{0} \\ 1 \leftarrow \text{Remainder} \end{array}$$

Steps involved in division algorithm

1. Start division from the digit in highest place of the dividend.
Here it is started from 4 of tens place.
2. $2 \times 2 = 4$. Write 2 as the first digit of the quotient and 4 below first digit of dividend from left.
3. Subtract : $4 - 4 = 0$. Write the remainder 0.
4. Bring down 9. Divide this 9 by divisor 2. $2 \times 4 = 8$. Write 4 as the next digit of the quotient and 8 below 9.
5. Subtract : $9 - 8 = 1$. Write the last remainder 1.

Why tens place is divided first ?

Consider the division of 42 by 3

$$\begin{aligned} & 42 \div 3 \\ = & (40 + 2) \div 3 \\ = & (30 + 12) \div 3 \\ = & (30 \div 3) + (12 \div 3) \\ = & 10 + 4 \\ = & 14 \end{aligned}$$

Example 3

Srinivasa has a chocolate box having 32 pieces. He wanted to share it equally among his 8 friends. How many pieces does each friend get?

Number of pieces in the chocolate box = 32 (Dividend)

Number of friends = 8 (Divisor)

Now, divide 32 by 8 to find the number of chocolate pieces each friend gets.

The quotient gives us the answer.

$$\begin{array}{r}
 \underline{4} \leftarrow \text{Quotient} \\
 \text{Divisor} \rightarrow 8 \overline{) 32} \leftarrow \text{Dividend} \\
 \underline{32} \\
 00 \leftarrow \text{Remainder}
 \end{array}$$

Steps involved in division

- 1) 3 is less than 8. Therefore take two digits from left side. It is 32.
- 2) $8 \times 4 = 32$. Write 4 as the first digit of the quotient and 32 below the dividend.
- 3) Subtract : $32 - 32 = 0$. Write 0 as remainder.

$\therefore$ each friend gets 4 pieces of chocolate.

Observe the following table.

Sl No	Dividend	Divisor	Quotient	Remainder	Divisor $\times$ Quotient + Remainder
1	16	3	5	1	$3 \times 5 + 1 = 15 + 1 = 16$
2	26	4	6	2	$4 \times 6 + 2 = 24 + 2 = 26$
3	40	5	8	0	$5 \times 8 + 0 = 40 + 0 = 40$
4	75	7	10	5	$7 \times 10 + 5 = 70 + 5 = 75$

The value obtained in the last column is equal to dividend given in the second column.

From the above table it follows that

$$(\text{Divisor} \times \text{Quotient}) + \text{Remainder} = \text{Dividend}$$

$$\therefore \text{Dividend} = (\text{Divisor} \times \text{Quotient}) + \text{Remainder}$$

This is standard division formula.

You can verify division of two numbers using this formula.

Example 4

Divide 125 by 5 using standard division algorithm.

$$\begin{array}{r} \overline{2 \ 5} \\ 5 \overline{) 1 \ 2 \ 5} \\ \underline{1 \ 0} \downarrow \\ 0 \ 2 \ 5 \\ \overline{2 \ 5} \\ \underline{0 \ 0} \end{array}$$

Steps involved in division

1. 1 less than 5. Therefore take two digits from left side i.e., 12.
2. $5 \times 2 = 10$. Write 2 as the first digit of the quotient and 10 below the dividend.
3. Subtract : $12 - 10 = 2$. Write remainder 2.
4. Bring down 5. The number becomes 25. $5 \times 5 = 25$. Write 5 as the next digit of the quotient and 25 below 25.
5. Subtract : $25 - 25 = 0$. Write 0 as the last remainder.

Verification

$$\begin{array}{rclclcl} \text{Dividend} & = & (\text{Divisor} \times \text{Quotient}) & + & \text{Remainder} \\ 125 & = & (5 \times 25) & + & 0 \\ 125 & = & 125 & + & 0 \\ 125 & = & 125 & & \end{array}$$

Example 5

Divide 218 by 2

$$\begin{array}{r} \overline{1 \ 0 \ 9} \\ 2 \overline{) 2 \ 1 \ 8} \\ \underline{2} \downarrow \\ 0 \ 1 \downarrow \\ \underline{0} \downarrow \\ \underline{1 \ 8} \\ \underline{1 \ 8} \\ \underline{0 \ 0} \end{array}$$

Steps involved in division

1. $2 \times 1 = 2$. Write 1 as the first digit of the quotient and 2 below the dividend.
2. Subtract : $2 - 2 = 0$. Write 0.
3. Bring down 1. The number becomes 1. $2 \times 1 = 2$. 2 is greater than 1. $2 \times 0 = 0$. 0 is less than 1. Write 0 as the next digit of the quotient and 0 below 1.
4. Subtract : $1 - 0 = 1$. Write the remainder 1.
5. Bring down 8. The number becomes 18. $2 \times 9 = 18$. Write 9 in quotient place and 18 below 18.
6. Subtract : $18 - 18 = 0$. Write 0 as remainder.

Verification

$$\text{Dividend} = (\text{Divisor} \times \text{Quotient}) + \text{Remainder}$$

$$218 = (2 \times 109) + 0$$

$$218 = 218 + 0$$

$$218 = 218$$

Example 6

Divide 185 by 12 using standard division algorithm.

$$\begin{array}{r} 15 \\ 12 \overline{) 185} \\ \underline{12} \\ 6 \\ \underline{6} \\ 0 \\ \underline{0} \\ 0 \end{array}$$

Verification

$$\text{Dividend} = (\text{Divisor} \times \text{Quotient}) + \text{Remainder}$$

$$185 = (12 \times 15) + 5$$

$$185 = 180 + 5$$

$$185 = 185$$

Example 7

Divide 648 by 15

$$\begin{array}{r} 43 \\ 15 \overline{) 648} \\ \underline{60} \\ 48 \\ \underline{45} \\ 3 \end{array}$$

Verification

Dividend = (Divisor × Quotient) + Remainder

$$648 = (15 \times 43) + 3$$

$$648 = 645 + 3$$

$$648 = 648$$

Example 8

Total expenditure of one day excursion for 17 students is ₹ 7,225.
Find how much amount each student has to pay ?

Number of students who went for one day
excursion = 17

Total expenditure for one day excursion = ₹ 7,225

$$\begin{aligned} \therefore \text{Amount to be paid by each student} &= 7225 \div 17 \\ &= ₹ 425. \end{aligned}$$

$\therefore$ Amount to be paid by each student is ₹ 425.

$$\begin{array}{r} 425 \\ 17 \overline{) 7225} \\ \underline{68} \\ 42 \\ \underline{34} \\ 85 \\ \underline{85} \\ 00 \end{array}$$

Verification

Dividend = (Divisor × Quotient) + Remainder

$$7,225 = (17 \times 425) + 0$$

$$7,225 = 7,225 + 0$$

$$7,225 = 7,225$$

Example 9

Anita has brought 1,123 pieces of sweets to distribute among 25 friends. How many pieces of sweets does each friend get ? How many pieces of sweets are left with Anita after distribution ?

Number of pieces of sweets brought by Anita = 1,123

Number of friends = 25

Number of pieces of sweets each one gets = $1123 \div 25$
 $= 44$

$$\begin{array}{r} 44 \\ 25 \overline{) 1123} \\ \underline{100} \\ 123 \\ \underline{100} \\ 23 \end{array}$$

$\therefore$ Each one gets 44 pieces of sweets.

$\therefore$ 23 pieces of sweets are left with Anita.

Steps involved in division

1. 11 is less than 25. Therefore take three digits from left side i.e., 112.
2. $25 \times 4 = 100$. Write 4 as the first digit of the quotient place and 100 below the dividend.
3. Subtract : Write the remainder 12. $112 - 100 = 12$.
4. Bring down 3. The number now becomes 123. $25 \times 4 = 100$. Write 4 as the next digit in the quotient and 100 below 123.
5. Subtract : $123 - 100 = 23$. Write the last remainder 23.

Verification

Dividend = (Divisor $\times$ Quotient) + Remainder

$$1,123 = (25 \times 44) + 23$$

$$1,123 = 1,100 + 23$$

$$1,123 = 1,123$$

Example 10

Divide 56,083 by 11.

[illegible]

Verification

$$\text{Dividend} = (\text{Divisor} \times \text{Quotient}) + \text{Remainder}$$

$$56,083 = (11 \times 5,098) + 5$$

$$56,083 = 56,078 + 5$$

$$56,083 = 56,083$$

Example 11

Divide 10,005 by 2

[illegible]

Verification

$$\text{Dividend} = (\text{Divisor} \times \text{Quotient}) + \text{Remainder}$$

$$10,005 = (2 \times 5,002) + 1$$

$$10,005 = 10,004 + 1$$

$$10,005 = 10,005$$

Exercise 2.1

I. Find the quotient and the remainder.

1) $48 \div 6$

2) $36 \div 3$

3) $55 \div 4$

4) $72 \div 7$

II. Find the quotient and the remainder.

1) $232 \div 4$

2) $474 \div 6$

3) $255 \div 11$

4) $527 \div 12$

III. Find the quotient and the remainder.

1) $1,653 \div 8$

2) $1,325 \div 2$

3) $1,435 \div 15$

4) $2,647 \div 13$

IV. Find the quotient and the remainder.

1) $24,658 \div 2$

2) $14,005 \div 7$

3) $32,745 \div 10$

4) $12,056 \div 12$

V. Solve the following problems.

- 1) A tailor has 18 metres of cloth. He can stitch 9 shirts from this cloth. Find the length of cloth required to stitch one shirt.

- 2) A bike can cover 240 km with 5 litres of petrol. Find how many kilometres does it cover with 1 litre of petrol.
- 3) Mr. Sridhar purchased 11 toys of same price for ₹ 946 from a toy shop. Find the cost of each toy.
- 4) The annual income of a person is ₹ 90,912. Find his monthly income.
- 5) A car manufacturing company manufactures 14,820 cars in 13 months. Find the number of cars manufactured in one month.

Problems involving both multiplication and division operations.

Example 1

A charitable trust collected ₹ 125 each from 175 donors. If the trust decides to distribute this amount to 7 schools equally, how much amount does each school get ?

Number of donors = 175.

Amount collected from each donor = ₹ 125.

∴ Total amount collected = 175×125
 = ₹ 21,875

Number of schools to which the amount is distributed = 7

Amount that each school gets = $21,875 \div 7$

∴ Each school gets = ₹ 3,125

∴ If ₹ 21,875 is distributed to 7 schools, each school gets = ₹ 3,125

Example 2

The Forest department plants trees in 96 rows and 80 columns in government land near a village. If 12 villagers are willing to take care of these trees, find the number of trees that each of them has to take care.

$$\begin{aligned}\text{The number of trees planted in government land} &= 96 \times 80 \\ &= 7,680 \text{ trees}\end{aligned}$$

$$\begin{aligned}\text{The number of trees that each villager has to take care} &= 7,680 \div 12 \\ &= 640 \text{ trees.}\end{aligned}$$

$\therefore$ The number of trees that each villager has to take care = 640 trees

Exercise 2.2

I. Solve :

- 1) An orange garden has 82 orange plants. A farmer plucks 60 oranges from each plant and packs 12 oranges in each box. Calculate the number of boxes required to pack all oranges.
- 2) 15 school children hire a cab for a day's excursion at ₹ 9 per km. If they travel a distance of 325 km, find the amount to be shared by each one of them.
- 3) Anita has a cow which yields 8 litres of milk in a day. The selling price of one litre of milk is ₹ 18. She wants to divide the amount earned in one month (30 days) among her 4 sons. What amount does each one get ?





After studying this Chapter you can,

- explain the process of estimation,
- explain the process of approximation,
- estimate the sum of two 5 digit numbers to nearest ten thousands place,
- estimate the difference of two 5 digit numbers to nearest ten thousands place,
- estimate the product of two numbers to the nearest ten thousands place,
- estimate the quotient of two numbers.

ESTIMATION AND APPROXIMATION

Two newspaper clippings are given below. Read them.

1. *4,700 students visited the science exhibition held in a higher primary school.*

2. *3,500 people were killed, more than 20,000 people were missing and more than 80,000 people have become homeless as floods hit Karnataka.*

Can we say that there were exactly as many people as the numbers quoted in these news items ? In example 1, did exactly 4,700 children visit the exhibition ?

In example 2, were exactly 80,000 people homeless ?

It may not be exactly that number. The exact number of children may be 4,687 or 4,742. The number of people who became homeless may be 76,839 or 84,372.

In these examples, 4,700 , 20,000 and 80,000 are almost the same as the exact numbers, but not exact numbers. These are **approximated numbers**. The approximate number is roughly calculated. This approximate calculation is known as **estimation**.

Activity

Think about the situations where we need to have the exact numbers and situations where only an approximately estimated number is sufficient. List them.

While performing fundamental operations on numbers, we estimate the sums, differences, products and quotients. For example the sum of 458 and 540 is approximately estimated as 1,000.

Now let us learn how to do estimation and verify the answer.

Estimating the given number to the nearest tens place.

Mukund and Gowri found the sum of 43 and 48 as follows.

Mukund calculated the digits of unit place as $3 + 8$ nearly equal to 1 tens.

Then he added digits in ten place as,

$$1 \text{ ten} + 4 \text{ ten} + 4 \text{ ten} = 9 \text{ ten i.e., } 90.$$

Gowri answered as $4 \text{ ten} + 5 \text{ ten}$

$$= 40 + 50$$

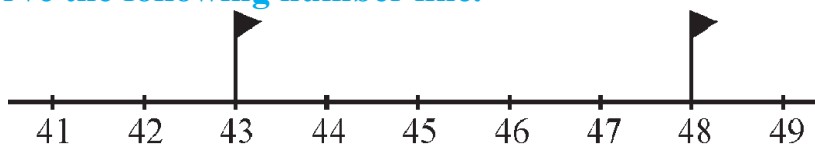
$$= 90$$

Both the answers are right. Gowri calculated the answer in one step. Let us know how Gowri calculated.

Between which multiples of 10 does 43 and 48 lie ?

43 lies between 40 and 50. 48 also lies between 40 and 50.

Observe the following number line.



Compare the position of 43 with 40 and 50

43 is nearer to 40 by 3 units and to 50 by 7 units. Therefore 43 is considered to be **approximately same as 40**. So 43 when rounded off to nearest tens place gives 40.

Compare the position of 48 with 40 and 50 ?

48 is nearer to 50 by 2 units and to 40 by 8 units. Therefore 48 is considered to be **approximately equal to 50**. So 48 when rounded off to nearest tens place gives 50.

So, Gowri added 40 and 50 to get the approximated sum.

Mukund approximated 11 ones to one ten and then added the tens. He too got the sum as 90.

How to round off a number to nearest tens place ?

If the digit at ones place is 1, 2, 3 or 4, replace unit digit by 0. If the digit at ones place is 5, 6, 7, 8 or 9, replace unit digit by 0 and add 1 to the tens place.

Example 1

Round off 583 to the nearest tens place.

Replace by zero



Rounded off to nearest tens

→ 580

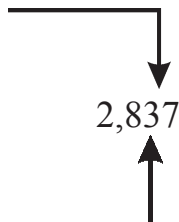
Leave tens place unchanged

∴ 583 rounded off to nearest tens place it is 580.

Example 2

Round off 2,837 to the nearest tens place.

Replace by zero



Rounded off to nearest tens

2,840

Add 1 to tens place

$\therefore$ when 2,837 is rounded off to nearest tens place it is 2,840.

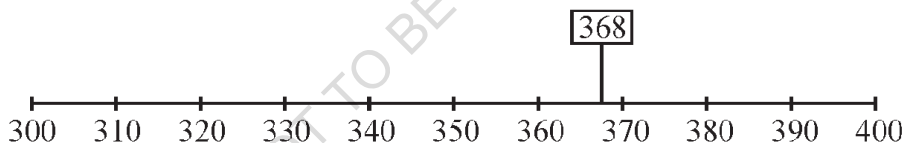
Estimating the given number to the nearest hundreds place.

Pradeep wants to round off 368 to nearest hundreds place.

Between which multiples of 100 does 368 lie ?

368 lies between 300 and 400.

Observe the following number line.



Compare the position of 368 with 300 and 400 ?

368 is nearer to 400 by 32 units and to 300 by 68 units. Therefore 368 is considered to be **approximately same as 400**. So, when 368 is rounded off to nearest hundreds place, gives 400.

How to round off a number to nearest 100 ?

If the digit at tens place is 1, 2, 3 or 4, replace tens and units place digit by 0. If the digit at tens place is 5, 6, 7, 8, or 9, replace tens, unit digit by 0 and add 1 to the hundreds place.

Example 3

Round off 3,548 to the nearest hundreds place.

Replace by zero

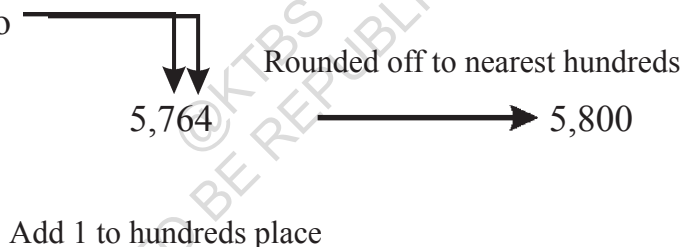


$\therefore$ when 3,548 is rounded off to nearest hundreds place, it is 3,500.

Example 4

Round off 5,764 to the nearest hundreds place.

Replace by zero



$\therefore$ when 5,764 is rounded off to nearest hundreds place, it is 5,800.

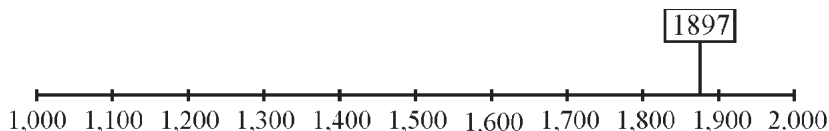
Estimating the given number to the nearest thousands place.

Nafeesa wants to round off 1,897 to nearest thousands place.

Between which multiples of 1,000 does 1,897 lie ?

1,897 lie between 1,000 and 2,000.

Observe the following number line.



Compare the position of 1,897 with 1,000 and 2,000 ?

1,897 is nearer to 2,000 by 103 units and to 1,000 by 897 units. Therefore 1,897 is considered to be **approximately same as 2,000**. Therefore when 1,897 is rounded off to nearest thousands place, it is 2,000.

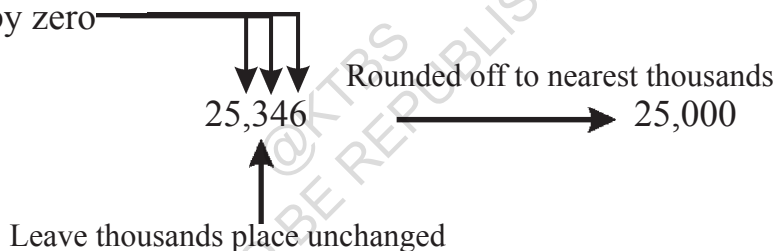
How to round off a number to nearest thousands place?

If the digit at hundreds place is 1, 2, 3 or 4, replace hundreds, tens and units place digit by 0. If the digit at hundreds place is 5, 6, 7, 8 or 9, replace hundreds, tens, units place digit by 0 and add 1 to the thousands place.

Example 5

Round off 25,346 to the nearest thousands place.

Replace by zero

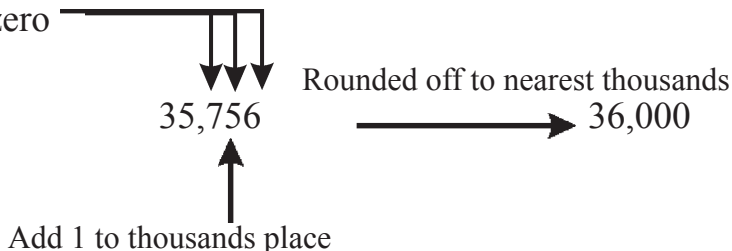


$\therefore$ when 25,346 is rounded off to nearest thousands place, it is 25,000.

Example 6

Round off 35,756 to the nearest thousands place.

Replace by zero



$\therefore$ when 35,756 is rounded off to nearest thousands place, it is 36,000.

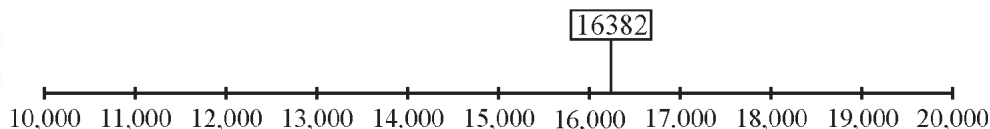
Estimating the given number to the nearest ten thousands place.

Reena wants to round off 16,382 to nearest ten thousands place.

Between which multiples of 10,000 does 16,382 lie ?

16,382 lies between 10,000 and 20,000.

Observe the following number line.



Compare the position of 16,382 with 10,000 and 20,000 ?

16,382 is nearer to 20,000 by 3,618 units and to 10,000 by 6,382 units. Therefore 16,382 is considered to be **approximately same as 20,000**. So, when 16,382 is rounded off to nearest ten thousands place, it is 20,000.

How to round off a number to nearest ten thousands place ?

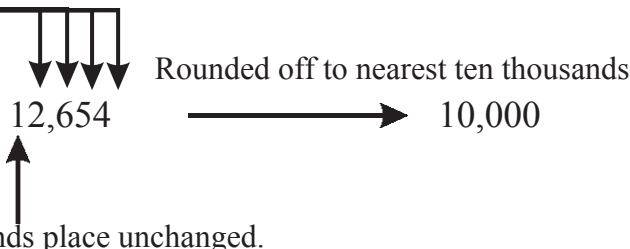
If the digit at thousands place is 1, 2, 3 or 4, replace digits of thousands, hundreds, tens and units place by 0.

If the digit at thousands place is 5, 6, 7, 8 or 9, replace digits of thousands, hundreds, tens, units place by 0 and add 1 to the digit of ten thousands place.

Example 7

Round off 12,654 to the nearest ten thousands place.

Replace by zero

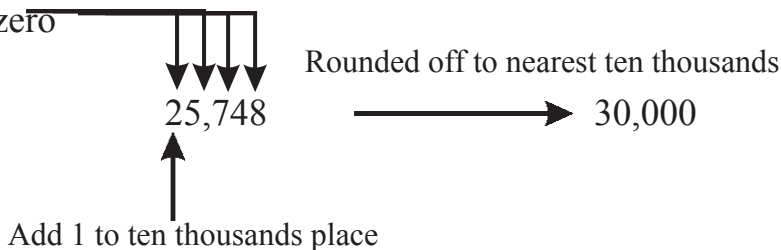


∴ when 12,654 rounded off to nearest thousands place, it is 10,000.

Example 8

Round off 25,748 to the nearest ten thousands place.

Replace by zero



∴ when 25,748 rounded off to nearest thousands place, it is 30,000.

Remember :

While rounding off a number to the required place, observe the digit to the right of it and then,

- if it is **less than 5**, retain the same digit in the required place to be rounded off and write 0 in the following places.
- if it is **equal to 5 or more than 5**, increase the digit in the required place to the next higher digit and write 0 in the following places.

Estimating the sum and the difference.

Example 1

Estimate the sum of 2,462 and 3,487 to nearest tens place.

2,462 is rounded off to nearest tens place as	2,460
3,487 is rounded off to nearest tens place as	+ 3,490
Estimated sum is	<u>5,950</u>

Verification by actual addition	2,462
	+ 3,487
	<u>5,949</u>

∴ estimated sum is nearly equal to actual sum.

Example 2

Estimate the sum of 8,743 and 7,275 to nearest hundreds place.

$$\begin{array}{rcl} 8,743 \text{ is rounded off to nearest hundreds as} & & 8,700 \\ 7,275 \text{ is rounded off to nearest hundreds as} & + & 7,300 \\ \text{Estimated sum is} & & \underline{16,000} \end{array}$$

$$\begin{array}{rcl} \text{Verification by actual addition} & & 8,743 \\ & + & 7,275 \\ & & \underline{16,018} \end{array}$$

$\therefore$ estimated sum is nearly equal to actual sum.

Example 3

Estimate the sum of 24,316 and 34,861 to nearest thousands place.

$$\begin{array}{rcl} 24,316 \text{ is rounded off to nearest thousands as} & & 24,000 \\ 34,861 \text{ is rounded off to nearest thousands as} & + & 35,000 \\ \text{Estimated sum is} & & \underline{59,000} \end{array}$$

$$\begin{array}{rcl} \text{Verification by actual addition} & & 24,316 \\ & + & 34,861 \\ & & \underline{59,177} \end{array}$$

$\therefore$ estimated sum is nearly equal to actual sum.

Example 4

Estimate the sum of 38,527 and 32,596 to nearest ten thousands.

$$\begin{array}{rcl} 38,527 \text{ is rounded off to nearest ten thousands as} & & 40,000 \\ 32,596 \text{ is rounded off to nearest ten thousands as} & + & 30,000 \\ \text{Estimated sum is} & & \underline{70,000} \end{array}$$

Verification by actual addition	38,527
	+ 32,596
	71,123

∴ estimated sum is nearly equal to actual sum.

Estimating products

Example 1

Estimate the product of 1,249 and 48 to its highest place.

1,249 is rounded off to nearest thousands as		1,000
48 is rounded off to nearest tens as	×	50
Estimated product is		50,000
Verification by actual multiplication		1,249
	×	48
		59,952

∴ estimated product is lesser than the actual product.

Example 2

Estimate the product of 19,426 and 4 to its highest place.

19,426 is rounded off to nearest ten thousands as		20,000
	×	4
Estimated product is		80,000
Verification by actual multiplication		19,426
	×	4
		77,704

∴ estimated product is greater than the actual product.

Example 3

The owner of a theatre decided to sell tickets for a theatre performance. The theatre has 198 rows of 88 seats in each row. Estimate the tickets that can be sold for each show ?

198 is rounded off to nearest hundreds as 200

88 is rounded off to nearest tens as $\times 90$

Estimated tickets needed for each show is $\underline{18,000}$

Verification by actual multiplication 198

$\times 88$

$\underline{17,424}$

$\therefore$ estimated product is greater than the actual product.

Estimating quotients

Example 1

Estimate the quotient of $44,238 \div 95$

44,238 is rounded off to nearest ten thousands as 40,000

95 is rounded off to nearest tens as 100

Estimated quotient = $40,000 \div 100 = 400$

Example 2

8 Chocolate packets contain 768 chocolates. Estimate the number of chocolates in each packet.

768 chocolates are rounded off to nearest hundreds as = 800

Number of chocolate packets = 8

Estimated number of chocolates in each packet = $800 \div 8$
= 100

∴ estimated chocolates in each packet = 100.

Verification by actual division

$$\begin{array}{r} 96 \\ 8 \overline{) 768} \\ \underline{72} \\ 048 \\ \underline{48} \\ 00 \end{array}$$

∴ actual number of chocolates in each packet = 96.

estimated quotients is near to actual quotient.

Note : While estimating the quotients, round off the divisor and dividend to the given place and then do the division.

Exercise 3.1

I. Round off each of the following numbers to nearest thousands place.

- | | |
|-----------|-----------|
| 1) 7,547 | 2) 3,469 |
| 3) 15,238 | 4) 32,658 |

II. Round off each of the following numbers to nearest ten thousands place.

- | | |
|-----------|-----------|
| 1) 26,674 | 2) 32,464 |
| 3) 46,379 | 4) 53,668 |

III. Estimate sum of the following by rounding off to nearest thousands place.

- | | |
|--------------------|--------------------|
| 1) 42,125 + 35,637 | 2) 54,837 + 41,354 |
| 3) 33,231 + 20,097 | 4) 47,463 + 41,541 |

IV. Estimate the sum of the following by rounding off to nearest ten thousands place.

- 1) $56,256 + 24,872$
- 2) $47,671 + 28,745$
- 3) $32,184 + 45,138$
- 4) $15,025 + 40,165$

V. Estimate the difference of the following by rounding off to nearest thousands place.

- 1) $65,487 - 46,502$
- 2) $45,630 - 32,148$
- 3) $57,146 - 25,472$
- 4) $60,046 - 15,247$

VI. Estimate the difference of the following by rounding off to nearest ten thousands place.

- 1) $51,689 - 34,685$
- 2) $86,853 - 47,829$
- 3) $80,808 - 55,055$
- 4) $77,777 - 44,444$

VII. Estimate the product of each of the following by rounding off to its highest place.

- 1) 428×54
- 2) 878×46
- 3) $5,476 \times 11$
- 4) $2,645 \times 18$

VIII. Estimate the quotient of each of the following by rounding off to its highest place.

- 1) $398 \div 82$
- 2) $786 \div 22$
- 3) $3,265 \div 58$
- 4) $7,687 \div 43$

IX. Solve the following problems.

- 1) A garment company stitched 16,783 shirts and 12,438 pants in a month. Estimate the total number of dresses stitched to the nearest ten thousands place.
- 2) A news paper agent sells 36,721 papers in first month and 24,172 papers in second month. Estimate the decrease in sale of the newspaper in second month to the nearest ten thousands place.
- 3) A train can cover 225 km in one hour. Estimate the distance covered in a day to the highest place.
- 4) A carpenter earned ₹ 18,634 during the month of November and ₹ 32,645 in December. Estimate how much more he earned in December to the nearest ten thousands place.



DECIMAL FRACTIONS



After studying this Chapter you can,

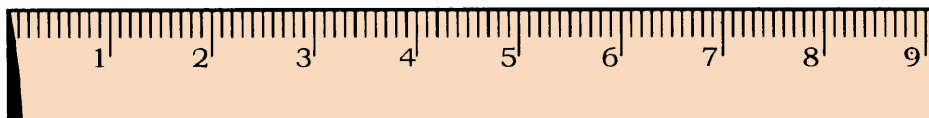
- express the length of an object in decimal fraction form,
- use decimal fraction to express the length in centimetre
- use decimal fraction to express the length in metre,
- use decimal fraction to express the cost in rupees,
- express a given fraction in decimal notation,
- express a decimal notation in fraction form.

In the previous standard you have studied about decimal fractions like 0.1, 0.2.....etc. Now let us study how to use these decimal fractions to express the length and cost of objects.

Example 1

Observe the figure given below.

The length of the pencil is measured using a scale.



What is the length of the pencil ?

It is more than 3 centimetre but less than 4 centimetre.

Read the measurement.....

Let us learn how to read such measurements, which are not whole numbers.

Observe your scale.

- In that 1 centimetre has **10 equal parts**
So each part is **one tenth** of a centimetre.
- We also write **one-tenth** of a centimetre as 0.1 centimetre.
- We read it as “**point one centimetre**”
or “**zero point one centimetre**”.

Now tell the correct length of the pencil.

It is 3 centimetre and eight-tenths of a centimetre.

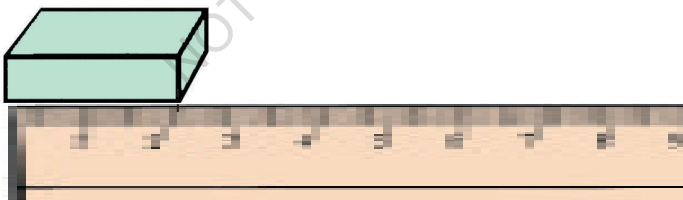
It is 3.8 centimetre or 3.8 cm.

Centimetres = cm

We read it as ‘**Three point eight centimetre**’.

Example 2

Measure the length of the eraser.



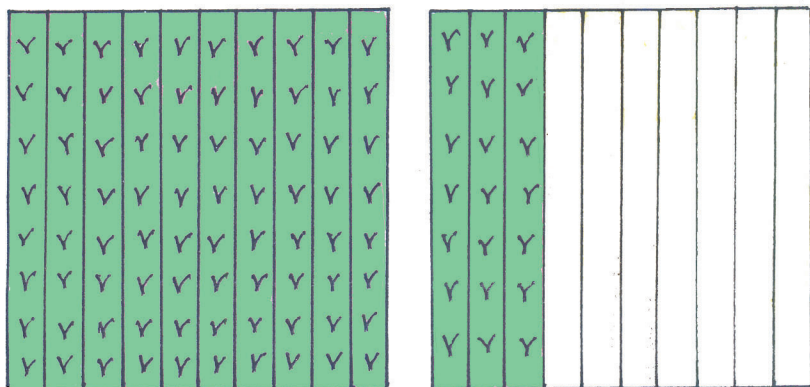
What is the length of the eraser ?

It is 2 centimetre and three-tenths of a centimetre.

We can also write it as 2.3 cm

2.3 is a decimal fraction or a decimal number.

Example 3



Krishna has planted saplings in two of his fields as shown above. We can say he has planted one whole field and three-tenths of another.

Using fractions, we write this as $1\frac{3}{10}$

Using decimals, we write this as 1.3

Let us observe how tenths are written as a decimal.

One-tenth = $\frac{1}{10} = 0.1$ read as zero point one.

Two-tenth = $\frac{2}{10} = 0.2$ read as zero point two.

Two and six-tenths = $2\frac{6}{10} = 2.6$ Two point six.

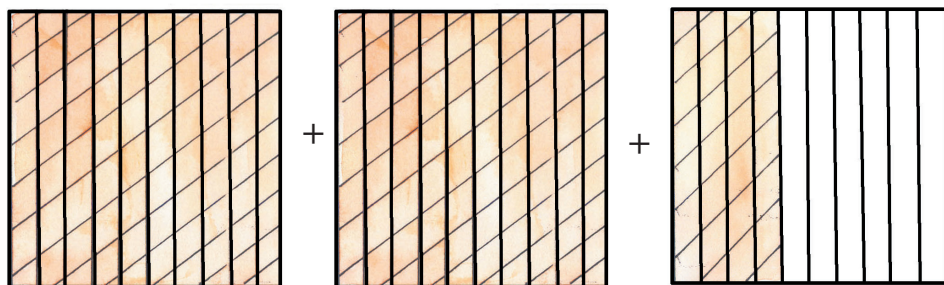
From the above examples we conclude that,

- The digits to the left of the point are the integral part or whole part.
- The digits to the right of the point are the decimal part or fraction part.
- The decimal part is less than one whole.

In 8.6 ; 8 is the integral part, 6 is the decimal part.

In 13.7; 13 is the integral part, 7 is the decimal part.

Example 4



The shaded part is represented as 2.4

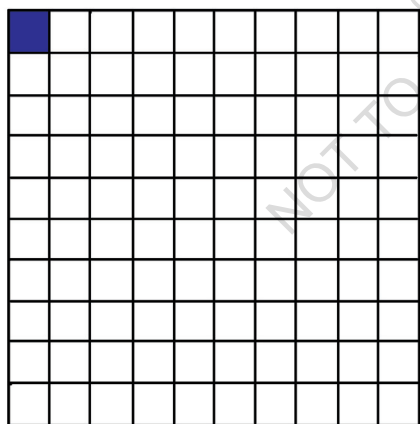
Integral part $\leftarrow 2$. 4 $\rightarrow$ Decimal part



Decimal Point

Each part in the above figure is one-tenth, $\frac{1}{10}$ or 0.1

Now let us see what happens if one-tenth is further divided into ten equal parts.



There are 100 equal parts. One part out of these 100 equal parts is shaded.

Here, each part is called one-hundredth or $\frac{1}{100}$ or 0.01

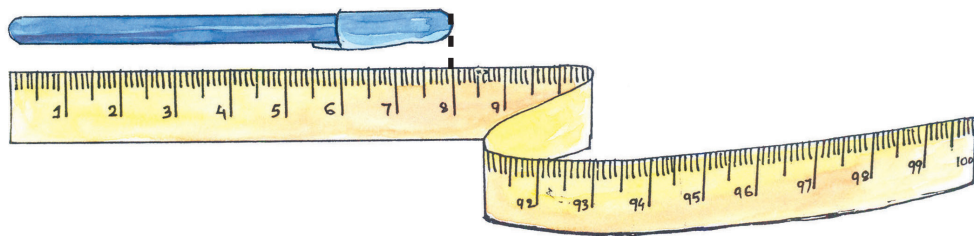
The decimal form of one-hundredth is 0.01

Example 5

Observe the one metre measuring tape which is given below.

Into how many equal parts is it divided ?

100 equal parts.



So each part is one-hundredth of a metre.

$\frac{1}{100}$ m, We write it as 0.01 m.

Will you now tell the length of the pen in metres ?

It is 0.08 m i.e, eight hundredth of a metre.

Observe the following examples and read.

Fraction	Decimal fraction	Read as
$\frac{5}{100}$	0.05	Zero point zero five.
$\frac{13}{100}$	0.13	Zero point one three.
$35 \frac{46}{100}$	35.46	Thirty five point four six.

In the decimal number system, the place value of a digit increases 10 times, as it moves from right to the left by one place. Its place value increases 100 times as it moves from the right to the left by two places and so on.

Observe in the table how the value of 4 changes.

Ten Th	Th	H	T	U	Place value of the digit.
8	3	6	5	4	The place value of 4 is 4 ones = 4.
6	8	5	4	3	The place value of 4 is 4 tens = $4 \times 10 = 40$.
3	6	4	8	5	The place value of 4 is 4 hundreds = $4 \times 100 = 400$.
8	4	5	3	6	The place value of 4 is 4 thousands = $4 \times 1,000 = 4,000$.
4	5	8	6	3	The place value of 4 is 4 ten thousands = $4 \times 10,000 = 40,000$.

Let us observe the following place value chart and see what happens when a digit moves from left to the right.

Ten Th	Th	H	T	U	Place value of the digit.
4	5	3	2	9	The place value of 4 is $4 \times 10,000 = 40,000$.
9	4	5	3	2	The place value of 4 is 4,000 = $40,000 \div 10$.
2	3	4	5	9	The place value of 4 is 400 = $4,000 \div 10$.
3	5	2	4	9	The place value of 4 is 40 = $400 \div 10$.
2	3	5	9	4	The place value of 4 is 4 = $40 \div 10$.

Thus, we see that the place value of a digit decreases by 10 times as the digit moves from the left to the right by one place.

What happens to the place value of the digit 4 when it moves further from left to the right of units place ?

It becomes $4 \div 10 = \frac{4}{10}$ read as four-tenths.

Thus the place value of the digit 4 becomes **one-tenth**.

∴ When the digit moves to its right by one place, the value of the digit becomes one-tenth of its previous value.

In the same way the place value of a digit becomes one-hundredth when the digit moves two places to its right.

So the place value of a digit becomes one-tenth,

one hundredth, ...

These can be written as $\frac{1}{10}, \frac{1}{100}$

or 0.1, 0.01, ...

Observe the following place value table.

Thousands	Hundreds	Tens	Ones		Tenths	Hundredths
1000	100	10	1	•	0.1	0.01



Integral Part ← **Decimal** → **Decimal fractions**
point

A point placed between units place and one-tenths place is called the decimal point. It separates the integral part from the fractional part of a decimal number.

- A number written with a decimal point is known as decimal fraction or decimal number.
- Decimal number is the other way of writing fraction.
- A decimal fraction is a fraction whose denominator is 10, 100, 1000, ...

Use of decimals in measures of length

1. We know $10\text{mm} = 1\text{cm}$.

So, $1\text{ mm} = \text{one-tenth } \left(\frac{1}{10}\right) \text{ of a cm.}$

$$1\text{ mm} = \frac{1}{10}\text{ cm} = 0.1\text{ cm}$$

$$7\text{ mm} = \frac{7}{10}\text{ cm} = 0.7\text{ cm}$$

$$17\text{ mm} = 1\frac{7}{10}\text{ cm} = 1.7\text{ cm}$$

Millimetre = mm

Centimetre = cm

Metre = m

2. We know $100\text{ cm} = 1\text{m}$

So, 1 cm is one-hundredth of a metre.

$$1\text{ cm} = \frac{1}{100}\text{ m} = 0.01\text{m.}$$

$$\text{Similarly, } 5\text{ cm} = \frac{5}{100}\text{ m} = 0.05\text{m}$$

$$89\text{cm} = \frac{89}{100}\text{ m} = 0.89\text{ m}$$

$$\text{Thus we write, } 7\text{ m } 3\text{ cm as } 7\text{ m } \frac{3}{100}\text{ m} = 7\frac{3}{100}\text{ m} = 7.03\text{ m}$$

$$\text{and } 18\text{ m } 27\text{ cm as } 18.27\text{ m}$$

Use of Decimals in Money

We know that 100 paise = 1 rupee.

Symbol of Rupee = ₹

So one paise is one-hundredth of a rupee.

$$1 \text{ paise} = ₹ \frac{1}{100} = ₹ 0.01$$

$$\text{Similarly, } 25 \text{ paise} = ₹ \frac{25}{100} = ₹ 0.25.$$

Thus we write,

2 rupees 15 paise as ₹ 2.15.

18 rupees 60 paise as ₹ 18.60.

9 rupees 5 paise as ₹ 9.05.

640 paise as ₹ 6.40.

850 rupees 50 paise as ₹ 850.50.

Exercise 4.1

I. Read the following decimals and write them in words.

- 1) 0.5 2) 0.13 3) 1.7 4) 5.21

II. Write the numeral representing each of the following.

- 1) Zero point one-two. 4) Four point zero two.
2) Six point eight. 5) Six point eight four.
3) Ten point five. 6) One hundred eight point zero six.

III. Fill in the blanks.

- 1) 8 mm = ... cm
2) 75 mm = ... cm
3) 8cm 5mm = ... cm
4) 525 mm = ... cm

IV. Fill in the blanks.

- 1) 8 cm = ... m
- 2) 72 cm = ... m
- 3) 375 cm = ... m
- 4) 4m 80 cm = ... m
- 5) 15 m 6 cm = ... m

V. Write in decimal fractions.

- 1) 75 paise = ₹
- 2) 10 rupees and 25 paise = ₹
- 3) 870 paise = ₹
- 4) 782 rupees and ten paise = ₹
- 5) 2050 paise = ₹

Conversion of fractions to decimal notation

You are familiar with fractional numbers and decimal numbers.

Raju has scored 41 marks out of 50 marks.

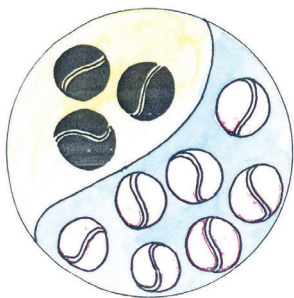
This can be written in fractional form as $\frac{41}{50}$

Suppose this fractional number has to be expressed in decimal form, how to convert it ?

Now let us learn how to convert the fractional number into decimal number.

Example 1

Observe this figure



Write the fraction for the shaded collection of balls.

It is $\frac{3}{10}$

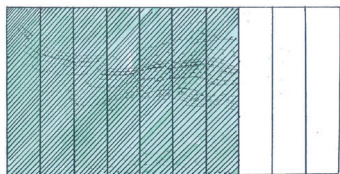
Write the shaded collection in decimal fraction

It is three-tenths or 0.3.

So we understand that $\frac{3}{10} = 0.3$.

Example 2

Observe the figure given below.



Write the fraction for the shaded portion.

It is $\frac{7}{10}$.

Write the shaded portion in decimal fraction.

It is seven-tenths or 0.7.

So $\frac{7}{10} = 0.7$.

Observe the following table.

Fraction	Denominator	No. of zeroes in the denominator	Decimal form
a) $\frac{4}{10}$	10	1	0.4
b) $\frac{17}{10}$	10	1	1.7
c) $\frac{523}{10}$	10	1	52.3

We can conclude if the denominator of a fraction is 10, put a decimal point in the number of the numerator after one digit from the right.

Observe the fractions given below.

$$\frac{2}{5}, \frac{3}{5}, \frac{1}{2}$$

Here the denominator is not 10 but it can be easily converted to 10.

Convert $\frac{2}{5}$ to the fraction having 10 as denominator.

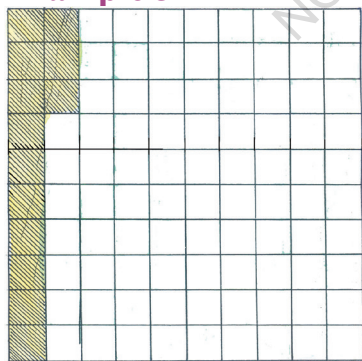
$$\frac{2}{5} = \frac{2 \times 2}{5 \times 2} = \frac{4}{10} = 0.4 \therefore \frac{2}{5} = 0.4$$

Similarly $\frac{3}{5} = \frac{3 \times 2}{5 \times 2} = \frac{6}{10} = 0.6 \therefore \frac{3}{5} = 0.6$

$$\frac{1}{2} = \frac{1 \times 5}{2 \times 5} = \frac{5}{10} = 0.5 \therefore \frac{1}{2} = 0.5$$

Observe the figure given below.

Example 3



Write the fraction for the shaded portion.

It is $\frac{13}{100}$.

Write the shaded portion in decimal fraction.

It is thirteen-hundredths or 0.13

So $\frac{13}{100} = 0.13$

Now, observe the following table :

Fraction	Denominator	No. of zeroes in the denominator	Decimal form
a) $\frac{24}{100}$	100	2	0.24
b) $\frac{8}{100}$	100	2	0.08
c) $\frac{153}{100}$	100	2	1.53

We can conclude that, if the denominator of the fraction is 100, put a decimal point in the number in the numerator after two digits from the right.

Observe these fractions.

$$\frac{3}{4}, \frac{7}{20}, \frac{6}{25}, \frac{41}{50}$$

Here the denominators are not equal to 100.

But, the denominators can easily be converted to 100 by multiplying the numerator and denominator by a common number.

$$\frac{3}{4} = \frac{3 \times 25}{4 \times 25} = \frac{75}{100} = 0.75 \quad \therefore \frac{3}{4} = 0.75$$

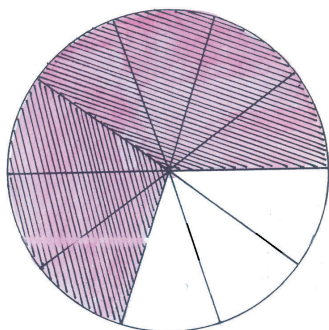
$$\frac{7}{20} = \frac{7 \times 5}{20 \times 5} = \frac{35}{100} = 0.35 \quad \therefore \frac{7}{20} = 0.35$$

$$\frac{6}{25} = \frac{6 \times 4}{25 \times 4} = \frac{24}{100} = 0.24 \quad \therefore \frac{6}{25} = 0.24$$

$$\frac{41}{50} = \frac{41 \times 2}{50 \times 2} = \frac{82}{100} = 0.82 \quad \therefore \frac{41}{50} = 0.82$$

Converting Decimal fractions to fractions

Example 1



Observe the figure.

Write the decimal fraction for the shaded portion.

It is 0.7 (seven-tenths)

Write it in fraction.

It is $\frac{7}{10}$

$\therefore 0.7 = \frac{7}{10}$

Example 2

Write the decimal fraction for forty three-hundredths. It is 0.43

In fraction form it is $\frac{43}{100}$

$\therefore 0.43 = \frac{43}{100}$

Study the examples given in the following table.

Decimal Fraction	The number without decimal Point	The number of decimal places	Denominator	Fraction
0.4	04 = 4	1	10	$\frac{4}{10}$
0.9	09 = 9	1	10	$\frac{9}{10}$
1.8	18 = 18	1	10	$\frac{18}{10}$
0.04	004 = 4	2	100	$\frac{4}{100}$
0.78	078 = 78	2	100	$\frac{78}{100}$
1.67	167 = 167	2	100	$\frac{167}{100}$

From the table, we can conclude the steps to be followed for converting a given decimal number into fractional form are :

1. Write the digits of the given decimal without the decimal point that forms the numerator.
2. Count the decimal places in the given decimal number.
3. Write 1 followed by as many zeroes as the number of decimal places that forms the denominator.

Example 3

To write the decimal fraction 1.42 in the form of fraction.

- 1) Write the number without decimal point that forms the numerator $\rightarrow 142$
- 2) Count the decimal places in the decimal fraction i.e, 2
- 3) Write 1 followed by two zeroes in denominator $\rightarrow 100$

$$\text{So } 1.42 = \frac{142}{100}$$

Exercise 4.2

I. Write the following fractions as decimal fractions.

1) $\frac{8}{10}$

2) $\frac{7}{10}$

3) $\frac{6}{10}$

4) $\frac{16}{10}$

5) $\frac{42}{10}$

6) $\frac{83}{10}$

7) $\frac{7}{100}$

8) $\frac{72}{100}$

9) $\frac{861}{100}$

10) $\frac{162}{10}$

11) $\frac{141}{100}$

12) $\frac{1461}{100}$

13) $\frac{1}{2}$

14) $\frac{3}{4}$

15) $\frac{2}{5}$

16) $\frac{7}{20}$

17) $\frac{38}{50}$

18) $\frac{17}{25}$

19) $\frac{13}{20}$

20) $\frac{8}{25}$

II. Write the following decimal fractions as fractions

1) 0.7

2) 0.02

3) 3.8

4) 14.5

5) 0.56

6) 8.03

7) 14.57

8) 85.4

9) 147.5

10) 8.5

11) 85.61

12) 6.84





After studying this Chapter you can,

- write rupees and paise in decimal form,
- solve problems on money involving all the mathematical fundamental operations,
- understand the importance of earning, saving and spending money and its wise usage,
- check the list of the items purchased while shopping,
- know the prices prevalent in the market and thus do the shopping accordingly,
- know the need for a bill,
- prepare a bill.
- Reading the bill and understand the information given in the bill.

Problems on Money

In your previous class you have learnt how to add and subtract amount in rupees and paise. You have also learnt to use operations to find totals, multiple costs, unit cost and also to describe rate charts and bills.

Let us study a few examples.

Example 1

Ragini buys a book for ₹ 12.50, a pen for ₹ 28.75 and a pencil for ₹ 3.25, what is the total cost of all the articles ?



Cost of the articles are as follows:

Book	₹ 12.50
Pen	₹ 28.75
Pencil	+ ₹ 3.25
∴ Total cost of all the articles	₹ <u>44.50</u>

Note : We see rupees and paise arranged in an order with dots coming one below the other.

Example 2

Mohan went to buy a ball which costs ₹ 38.75. But he had only ₹ 25 with him. How much more money does he need to buy the ball ?

Cost of the ball = ₹ 38.75

Amount Mohan had = - ₹ 25.00

∴ Amount he still needed = ₹ 13.75

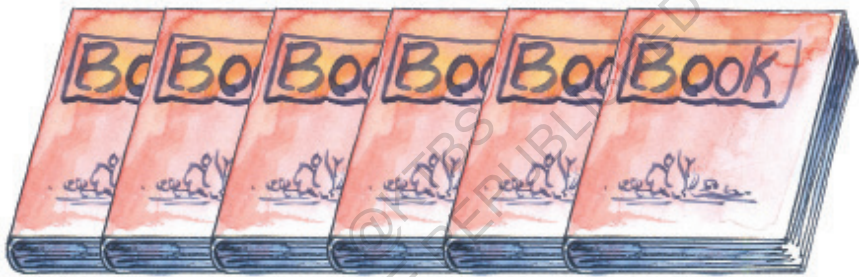
∴ Mohan still needs an amount of ₹ 13.75 to buy the ball.

Note : Here also, we find rupees arranged in an order with dots coming one below the other.

Now let us study the examples on use of fundamental operations in money system.

Example 3

What is the cost of 6 books , if the cost of one book is ₹ 24.75?



What do you think will be the cost of six books ?

Will the cost be more or less as compared to that of one book ?

What operation should we use to find the total cost ?

The cost of 6 books will be more. You have to multiply the cost of 1 book by the number of books to get the total cost of 6 books.

$$\text{Cost of 1 book} = ₹ 24.75$$

$$\therefore \text{Cost of 6 books} = ₹ 24.75 \times 6$$

$$= ₹ 148.50$$

Example 4

Cost of 8 dolls is ₹ 128. What is the cost of each doll ?



Will the cost of one doll be more or less as compared to that of eight dolls ? What operation should we use to find it out ?

The cost of 1 doll will be less. Therefore, you have to divide the total cost of the dolls by the number of dolls.

That is, ₹ $128 \div 8$

$$\begin{array}{r} 8 \overline{) 128} \end{array} \quad (16)$$

$$\begin{array}{r} - 8 \downarrow \\ \hline \end{array}$$

$$\begin{array}{r} 48 \\ \hline \end{array}$$

$$\begin{array}{r} - 48 \\ \hline \end{array}$$

$$\begin{array}{r} 00 \\ \hline \hline \end{array}$$

$\therefore$ Cost of each doll = ₹ 16

Exercise 5.1

I. Find the following :

- 1) Sum of ₹ 13.25, ₹ 6.30, ₹ 10.40 =
- 2) Difference of ₹ 78.45 and ₹ 69.70 =
- 3) Product of ₹ 147.25 and ₹ 17 =
- 4) Quotient of ₹ 4960 ÷ ₹ 8 =

II. Solve the following :

- 1) Subtract ₹ 95.80 from the sum of ₹ 279.05 and ₹ 103.25
- 2) Express ₹ 32 in paise.
- 3) Express ₹ 19.75 in paise.
- 4) Express 4,705 paise in rupees.

Problems involving addition in Money system.

III. Solve :

- 1) I had ₹ 625 with me. My father gave ₹ 450.75 as pocket money. What is the total amount with me now ?
- 2) Mahesh buys a pen for ₹ 18.5, a book for ₹ 10.75 and a bag for ₹ 125. What is the total cost of all the things bought ?
- 3) Girija buys 2 kg of beans for ₹ 36.50, 1 kg of tomatoes for ₹ 12.25 and 1 kg of potatoes for ₹ 14.75. Find the total amount that Girija should pay to the shopkeeper.

Problems involving subtraction in Money system.

IV. Solve :

- 1) Subtract ₹ 348.25 from ₹ 500.
- 2) Varun bought sweets for ₹ 475.5. He paid ₹ 500 to the shop keeper. What change should he get back from the shopkeeper?
- 3) Razia had ₹ 345 with her. She bought a dress for ₹ 245.75. What is the amount left with her ?
- 4) Poornima had ₹ 3,425 with her. She gave ₹ 2,745.75 to her friend to buy a saree. What is the amount left with her ?
- 5) Joseph had ₹ 2,500 in his account in a bank. He withdrew ₹ 1,800.75 for his expenses. What is the amount left in his account in the bank ?

Problems involving Multiplication in Money system

V. Solve :

- 1) The cost of an egg is ₹ 4. What is the cost of a dozen eggs?
- 2) Swathi buys 8 metres of cloth at ₹ 75 per metre. What is the amount to be paid to the shopkeeper ?
- 3) The cost of an umbrella is ₹ 225 What is the cost of 15 umbrellas ?
- 4) A labourer earns ₹ 525 a day. How much will he earn in a week?
- 5) The cost of a table is ₹ 4,320. What is the cost of 16 tables?

Problems involving division in Money System

IV. Solve :

- 1) The Government higher primary school sanctioned a scholarship amount of ₹ 4,000 for 10 students, How much amount did each one get ?
- 2) Mohan paid ₹ 1,422 for 9 shirts. What is the cost of each shirt ?
- 3) Distribute ₹ 4,425 among Amar, Akbar and Anthony equally. What is the amount of share that each one gets ?
- 4) If the cost of a dozen apples is ₹ 96, what is the cost of one apple?
- 5) Vinod, a carpenter earns ₹ 9,666 in 6 days. What is the amount that he earns in a day?

Rate charts and bills

In your previous class you have learnt how to describe rate charts and bills.

Let us study a few examples.

Example 1

Ayesha goes to Ambika textiles to purchase a few dresses. She buys a pant and a shirt, skirt and a blouse and salwar suit. The person at the packing centre packs the dresses and asks her to collect the packet after paying cash.

At the cash counter, Ayesha is given a slip giving the details of her purchase. The slip looked in this form.

Ambika Textiles

No. 909

Date : 14-4-2011

Customer's Name : Ayesha

Sl. No.	Particulars	Quantity	Rate (₹)	Amount (₹)
1.	Pant	1	375.00	375.00
2.	Shirt	1	143.00	143.00
3.	Skirt	1	195.00	195.00
4.	Blouse	1	100.00	100.00
5.	Salwar Suit	1	280.00	280.00
		Total		1,093.00

In words : ₹ One thousand ninety three only.

Signature

Example 2

John buys 4 books at ₹ 12 each, 6 pens at ₹ 15 each, 6 pencils at ₹ 3 each and a geometrical instrument box at ₹ 45 from “Vision Stationaries”.

The slip given to John to pay the amount is given below.

Observe the details of the purchase written by the shopkeeper.

Vision Stationaries				
No. 840		Jayanagar		Date : 22-6-2011
Customer's Name : John		Bengaluru		
Sl No	Particulars	Quantity	Rate (₹)	Amount (₹)
1.	Books	4	12.00	48.00
2.	Pens	6	15.00	90.00
3.	Pencils	6	3.00	18.00
4.	Instrument box	1	45.00	45.00
		Total	=	201.00
In words : ₹ Two hundred one only.				
Signature				

Compare the calculations in the two examples.

In the first example we find different items but quantity is one.

In the second example, the rate of each item is multiplied by the quantity purchased as it is more than one quantity.

The slip given to the customers by the shopkeeper with all the details is called a “Bill”.

From the above two examples we notice the following points present in a bill.

- Name of the shop and address.
- Date of purchase.
- Customer's name.

- Items purchased
- Quantity of each item purchased
- Cost of each item
- Total amount to be paid by the customer
- Signature of the shopkeeper.

Note : The bill serves as an evidence of purchase. The customer can exchange the product or claim for refund by showing the bill. Hence, the customer should demand for the bill and take it from the shopkeeper.

Let us study few more bills. In each example answer the questions given below the bill.

Example 3

1. Chandregowda purchased the following items from Venkat Provision stores, on 24/11/2011.

Sugar 3 kg at ₹ 37 per kg

Rice 5 kg at ₹ 25 per kg

Wheat 4 kg at ₹ 18 per kg

Toordal 2 kg at ₹ 72 per kg

Groundnut Oil 2 kg at ₹ 92 per kg

A bill is prepared for the above items.

No. 17 Venkat Provision Stores				
Customer's Name : Chandre Gowda			Date:24/11/11	
Sl No	Particulars	Quantity (kg)	Rate (₹)	Amount (₹)
1.	Sugar	3	37.00	111.00
2.	Rice	5	25.00	125.00
3.	Wheat	4	18.00	72.00
4.	Toordal	2	72.00	144.00
5.	Ground nut oil	2	92.00	184.00
			Total =	636.00
In words : ₹ Six hundred thirty six only. Signature				

Answer the following.

- Cost of 3 kg of sugar _____ .
- Cost of 2 kg of groundnut oil _____ .
- Cost of 4 kg of wheat _____ .
- Cost of 5 kg of rice _____ .
- Cost of 2 kg of Toordal _____ .
- What is the name of the provision stores?
- Who is the customer ?
- How many items have been purchased ?
- The total value of the bill ₹

Example 4

Gayathri purchases fruits from Ayub fruit stall on 25/11/2011.

Apples $2\frac{1}{2}$ kg at ₹ 35 per kg

Oranges $1\frac{1}{2}$ kg at ₹ 28 per kg

Mangoes 3 kg at ₹ 40 per kg

Bananas $1\frac{1}{4}$ kg at ₹ 17 per kg

No. 24		Ayub Fruit Stall		
Name : Gayathri			Date : 25/11/11	
Sl No	Particulars	Quantity (kg)	Rate (₹)	Amount (₹)
1.	Apples	$2\frac{1}{2}$	35.00	87.50
2.	Oranges	$1\frac{1}{2}$	28.00	42.00
3.	Mangoes	3	40.00	120.00
4.	Bananas	$1\frac{1}{4}$	17.00	21.25
			Total	270.75
In words : ₹ Two hundred seventy seven five paise only.				
Signature				

Answer the following.

- Name of the fruit stall _____
- Name of the customer _____
- Date of purchase of fruits _____

- Number of items purchased _____
- Cost of 3 kg of mangoes _____
- Cost of $1\frac{1}{4}$ kg of bananas _____
- Cost of $2\frac{1}{2}$ kg of apples _____
- Cost of $1\frac{1}{2}$ kg of oranges _____.
- Total cost of fruits purchased _____.

Example 5

Let us check the bill and correct if required :

Mahima Readymade Garments M.G. Road, Mysuru Bill No 246 Name: Mrs Usha Date:26/11/11				
Sl No	Particulars	Quantity	Rate (₹)	Amount (₹)
1.	Baniyans	10	53.00	153.00
2.	Napkins	08	12.50	100.00
3.	Socks	12 pairs	25.00	300.00
4.	Sweater	02	285.00	285.00
			Total	838.00

In words : ₹ Eight hundred thirty eight only.

Signature

Verification :

Cost of 1 baniyan	= ₹ 53	
∴ Cost of 10 banyans	= 53 × 10	= ₹ 530.00
Cost of 1 napkin	= ₹ 12.50	
∴ Cost of 8 napkins	= 12.50 × 8	= ₹ 100.00
Cost of 1 pair of socks	= ₹ 25	
∴ Cost of 12 pair of socks	= 25 × 12	= ₹ 300.00
Cost of 1 sweater	= ₹ 285	
∴ Cost of 2 sweaters	= 285 × 2	= ₹ 570.00
Total	=	<u>₹ 1500.00</u>

The following mistakes are to be corrected. _____

- Cost of banyans should be ₹ 530
- Cost of 2 sweaters should be ₹ 570
- The total bill amount should be ₹ 1500

Exercise 5.2

I. Check and correct the bills given below :

1)

Amar Cake Palace				
Bill No. 350		Name: Miss Sudha		Date: 26/11/11
Sl No	Particulars	Quantity	Rate (₹)	Amount (₹)
1	Jam bottle	8	65.00	520.00
2.	Cake	15	8.00	115.00
3.	Chocolate	12	15.00	156.00
4.	Buns	10	5.00	52.00
			Total	853.00
In words : ₹ Eight hundred fifty three only.				
Signature				

2)

Rosy Fancy Stores :

217 / B - 2, Bengaluru

No. 178

Name: Smt. Gangamma

Date: 26/11/11

Sl No	Particulars	Quantity	Rate (₹)	Amount (₹)
1.	Bangles	12	4.00	48.00
2.	Earrings	18	9.00	175.00
3.	Hairpin	24	3.00	70.00
4.	Rings	10	16.00	150.00
			Total	350.00

In words : ₹ Three hundred fifty only

Signature

II. Prepare bills for the particulars given the below. Find the total cost in each case and total cost of all items.

- Miss Rita bought the following items for the school Annual Day from Meghan Stationaries.
 25 sheets of colour paper at ₹ 9 each.
 18 sheets of gold colour paper at ₹ 19 each.
 12 sheets of silver colour paper at ₹ 18 each.
 2 tubes of glue stick at ₹ 30 each.
- Ranbir Singh bought the following articles from Hanuman Hardware shop.
 2 hammers at ₹ 85 each.
 6 boxes of nails at ₹ 25 each.
 8 boxes of screws at ₹ 30 each box.
 2 spanners at ₹ 175 each.



WEIGHT AND VOLUME



Weight :

After studying this Chapter you can,

- know the units to weight heavy and light objects used in daily life,
- compare the units of heavy and light weight and state their relationship,
- analyse and solve problems involving weight using mathematical operations.

Mamata, Roopa, Julie and Razia go to a wholesale dealer and buy 1 bag of rice. They paid equal amount of money.

This is to be divided equally among 4 of them as they have contributed equal amount of money.

To divide the bag of rice equally among themselves, first they should know the weight of the rice bag.

The standard unit of measurement of weight is 'gram'.

To measure heavier objects the standard units are decagram, hectogram, kilogram, quintal and ton.

To measure objects of light weight the units used are decigram, centigram and milligram.

Let us learn more about the standard units.

The words deca, hecto, kilo, deci, centi and milli are prefixed before the word 'gram'.

Let us see what part of a gram they are and try to know the meaning of these words.

Higher standard units	Lower standard units
1 gram ↓	1 gram ↓
deca = 10 times	deci = $\frac{1}{10}$ part
hecto = 100 times	centi = $\frac{1}{100}$ part
kilo = 1,000 times	milli = $\frac{1}{1,000}$ part.

Comparison of greater standard units of weight with one gram.

10 times 1 gram	=	10 gram	=	1 decagram
100 times 1 gram	=	100 gram	=	1 hectogram
1,000 times 1 gram	=	1,000 gram	=	1 kilogram

Comparison of smaller standard units of weight with one gram

$\frac{1}{10}$ of 1 gram	=	$\frac{1}{10}$ gram	=	1 decigram
$\frac{1}{100}$ of 1 gram	=	$\frac{1}{100}$ gram	=	1 centigram
$\frac{1}{1,000}$ of 1 gram	=	$\frac{1}{1,000}$ gram	=	1 milligram

The common standard units of weight used in daily life.

1 ton	=	1,000 kg	1 quintal	=	100 kg
1 kg	=	1,000 gram	$\frac{3}{4}$ kg	=	750 gram
$\frac{1}{2}$ kg	=	500 gram	$\frac{1}{4}$ kg	=	250 gram

Conversion of units of weight

To convert greater units of weight to smaller units

Rule :

To convert kg into gram multiply by 1,000

To convert hectogram into gram multiply by 100

To convert decagram into gram multiply by 10

Note : To convert greater units of weight to smaller units, we should multiply.

Now, let us learn how to convert the units of weight.

Example 1 : How many gram make 3 kg ?

$$1 \text{ kg} = 1,000 \text{ gram}$$

$$\therefore 3 \text{ kg} = 1,000 \times 3 = 3,000 \text{ gram}$$

Example 2 : How many gram make 4 hectogram ?

$$1 \text{ hectogram} = 100 \text{ gram}$$

$$\therefore 4 \text{ hectogram} = 100 \times 4 = 400 \text{ gram}$$

Example 3 : How many gram make 15 decagram ?

$$1 \text{ decagram} = 10 \text{ gram}$$

$$\therefore 15 \text{ decagram} = 10 \times 15 = 150 \text{ gram}$$

Example 4 : How many kg make 5 quintals ?

$$1 \text{ quintal} = 100 \text{ kg}$$

$$\therefore 5 \text{ quintals} = 100 \times 5 = 500 \text{ kg}$$

To convert smaller units of weight into greater units

Rule :

- To convert gram into kg divide by 1,000.
- To convert milligram into gram divide by 1,000.
- To convert kg into quintal divide by 100.

Note : To convert smaller units of weight into greater units, we should divide.

Let us study the given examples.

Example 5 : How many gram make 500 milligram ?

$$1,000 \text{ mg} = 1 \text{ gram}$$

$$\therefore 500 \text{ mg} = 500 \div 1,000 = \frac{1}{2} \text{ gram}$$

Example 6 : How many gram make 1,600 centigram ?

$$100 \text{ centigram} = 1 \text{ gram}$$

$$\therefore 1,600 \text{ centigram} = 1,600 \div 100 = 16 \text{ gram}$$

Example 7 : How many gram make 280 decigram ?

$$10 \text{ decigram} = 1 \text{ gram}$$

$$\therefore 280 \text{ decigram} = 280 \div 10 = 28 \text{ gram}$$

Example 8 : How many kg make 750 gram ?

$$1,000 \text{ gram} = 1 \text{ kg}$$

$$\therefore 750 \text{ gram} = 750 \div 1,000 = \frac{3}{4} \text{ kg}$$

Example 9 : How many quintal make 850 kg ?

$$100 \text{ kg} = 1 \text{ quintal}$$

$$\therefore 850 \text{ kg} = 850 \div 100 = 8\frac{1}{2} \text{ Quintal.}$$

Activity 1 :

Find your body weight using a weighing machine in your school.

Activity 2 :

Go to a nearby shop and observe the weights used to measure 50 g, 100 g, 200 g, 500 g, 1 kg, 2 kg, 5 kg and 10 kg and get familiarised.

Activity 3 :

Visit a jewellery shop and observe the weights used to weigh 50 milligram, 100 milligram, 200 milligram, 500 milligram, 1 gram, 2 gram, 5 gram and 10 gram.

Problems involving measurement of Weight

Add the following.

Example 1

15 kg, 750 g, 13 kg and 227 g

Kg	g	
15	000	
00	750	
13	000	
00	227	
28	977	28 kg 977 g

Example 2

A shopkeeper has 100 kg of rice flour in his shop. If he sells 45 kg of it, find the quantity of rice flour left in his shop.

Quantity of rice flour the shopkeeper has = 100 kg

Quantity of rice flour he sold = 45 kg

Quantity of rice flour left = 55 kg

∴ Total quantity of rice flour left in the shop = 55 kg

Example 3

There are 4 members in Ramaiah's family. The ration shop gives 12 kg of rice to each member. What is the total quantity of rice the family gets ?

Quantity of rice given to each member = 12 kg

∴ Total quantity of rice given to 4 members = $12 \text{ kg} \times 4$
= 48 kg

Example 4

Four farmers Chenna, Kaala, Thimma and Bomma together purchased 50 kg of Sunflower seeds by contributing equal amount of money. They divide the seeds equally among themselves. What is the weight of seeds that each one gets ?

Weight of 1 bag of sunflower seeds = 50 kg

Number of persons to whom it is divided equally = 4

∴ Weight of seeds each person gets = $50 \div 4$ = 12.5 kg
= 12 kg 500 g

Exercise 6.1

I. Answer orally

- 1) Albert buys 16 kg of jaggery and 15 kg of rice from a shop. He puts both the packets into one bag. What is the total weight of the bag ?
- 2) 62 kg of rice was supplied to a school under 'Aksharadasoha Scheme'. If 15 kg of rice was used, find the quantity of rice remaining.

- 3) A bag can hold 20 kg of soji. If 140 kg of soji is to be filled equally, how many such bags are required ?
- 4) A merchant has 5 packets of sugar, each packet weighing 15 kg of sugar. What is the total weight of 5 packets of sugar ?

II. Convert the following.

- 1) 7 kg = ... gram.
- 2) 16 gram = ... milligram.
- 3) 6,000 gram = ... kg.
- 4) 750 milligram = ... gram.
- 5) 12 quintals = ... kg.
- 6) 1,500 kg = ... quintals.

III. Add the following.

- 1) 4 kg, 250 g, 12 kg and 355 g.
- 2) 23 kg, 432 g, 37 kg and 350 g.
- 3) 12 kg, 450 g, 15 kg and 550 g.
- 4) 17 kg, 370 g, 18 kg and 630 g.
- 5) 6 kg 250 g, 8 kg 430 g, 7 kg 220 g and 430 g.

IV. Subtract the following.

- 1) 13 kg 250 g from 28 kg 550 g
- 2) 35 kg 550 g from 70 kg 675 g
- 3) 55 kg 335 g from 85 kg 730 g
- 4) 28 kg 650 g from 63 kg 350 g
- 5) 34 kg 585 g from 75 kg 475 g

V. Solve the following.

- 1) Radha buys 2 kg 500 g of carrot, 2 kg 500 g of brinjal and 3 kg 250 g of tomatoes from a vegetable shop. Find the total weight of vegetables bought by her.
- 2) A merchant has 68 kg 250 g of wheat with him. He sells 15 kg 250 g of wheat to one customer and 13 kg 500 g to another customer. What is the weight of wheat remaining with him?
- 3) The yield of paddy per acre is 29 quintals and 50 kg. Rachappa has 30 acres of field. What is the total yield of paddy ?
- 4) 18 kg 400 g of sugar is to be packed in 4 bags equally. What is the weight of each bag ?
- 5) A farmer gets 60 kg 400 g of onion from one field and 56 kg 800 g from another field. If he sells 98 kg 200 g of onion, find the weight of onions left with him.

VOLUME

After studying this unit you can,

- know the units of measuring objects having greater and lesser volume,
- compare the units of greater volume with units of lesser volume and find their relationship,
- analyse and solve problems involving volume.

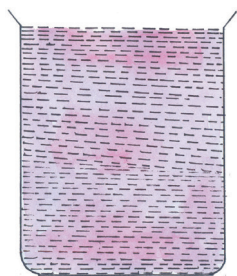


Fig. (1)

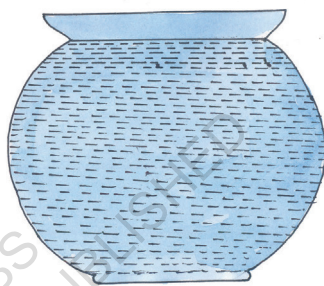


Fig. (2)

Figure (1) and figure (2) are the two containers filled with milk.

Can you tell which container contains more quantity of milk ?

Can you tell the approximate quantity of milk contained in each container ?

It is not possible. Isn't it ?

To know the quantity of milk contained in each vessel, we should measure the volume of milk.

The total quantity of liquid contained in a vessel is called its 'Volume'.

The measurement of volume is expressed in cubic units.

The standard unit of volume is '**litre**'.

Decalitre, hectolitre and kilolitre are the standard units to measure liquids with greater volume.

Decilitre, centilitre and millilitre are the standard units to measure liquids with lesser volume.

Let us try to know more about these standard units.

The words deca, hecto, kilo, deci, centi, and milli are prefixed before the word 'litre'.

These units show the number of times it is contained in a litre. Hence, let us first learn the meaning of these words.

Units of greater volume	Units of lesser volume
1 litre ↓	1 litre ↓
deca = 10 times	deci = $\frac{1}{10}$ part
hecto = 100 times	centi = $\frac{1}{100}$ part
kilo = 1,000 times	milli = $\frac{1}{1,000}$ part

Comparison of greater standard units of volume with one litre.

10 times 1 litre = 10 litre = 1 decalitre.
 100 times 1 litre = 100 litre = 1 hecto litre.
 1,000 times 1 litre = 1,000 litre = 1 kilolitre.

Comparison of smaller standard units of volume with one litre.

$\frac{1}{10}$ of 1 litre = $\frac{1}{10}$ litre = 1 decilitre.
 $\frac{1}{100}$ of 1 litre = $\frac{1}{100}$ litre = 1 centilitre.
 $\frac{1}{1,000}$ of 1 litre = $\frac{1}{1,000}$ litre = 1 millilitre.

The standard units of volume used in daily life are :

1 litre = 1000 ml.

$\frac{1}{2}$ litre = 500 ml.

$\frac{1}{4}$ litre = 250 ml.

1 kilolitre = 1,000 litre.

The word 'litre' is written as 'l', millilitre as 'ml' and kilolitre as 'kl'.

Conversion of units of volume.

To convert greater units of volume into smaller units.

Rule :

To convert kilolitre into litre multiply by 1,000

To convert hectolitre into litre multiply by 100

To convert decilitre into litre multiply by 10

Note : To convert greater units of volume into smaller units, we should multiply.

Example 1 : How many litres make 4 kilolitre ?

1 Kilolitre = 1,000 l

$\therefore$ 4 Kilolitre = $1,000 \times 4 = 4,000$ l.

Example 2 : How many litres make 5 hecto litre ?

1 hectolitre = 100 l

$\therefore$ 5 hectolitre = $100 \times 5 = 500$ l.

Example 3 : How many litres make 17 decalitre ?

1 decalitre = 10 litres

$\therefore$ 17 decalitre = $10 \times 17 = 170$ l.

To convert smaller units of volume into greater units.

Rule :

To convert litre into kilolitre divide by 1,000.

To convert litre into hectolitre divide by 100.

To convert litre into decalitre divide by 10.

To convert millilitre into litre divide by 1,000.

Note : To convert smaller units of volume into greater units, we should divide.

Observe the following examples.

Example 4 : How many kilolitre make 7,000 litres ?

$$1,000 \text{ litre} = 1 \text{ Kilolitre}$$

$$\therefore 7,000 \text{ litre} = 7,000 \div 1,000 = 7 \text{ kL.}$$

Example 5 : How many hectolitres make 1,200 litres ?

$$100 \text{ litre} = 1 \text{ hectolitre}$$

$$\therefore 1,200 \text{ litre} = 1,200 \div 100 = 12 \text{ hectolitre.}$$

Example 6 : How many decalitres make 900 litre ?

$$10 \text{ litre} = 1 \text{ decalitre}$$

$$\therefore 900 \text{ litre} = 900 \div 10 = 90 \text{ decalitre.}$$

Example 7 : How many litres make 15,000 ml ?

$$1,000 \text{ ml} = 1 \text{ litre}$$

$$\therefore 15,000 \text{ ml} = 15,000 \div 1,000 = 15 \text{ litre.}$$

Activity 1

Visit a milk booth or an oil depot and observe the containers of the measure 50 ml, 100 ml, 200 ml, 500 ml, 1 l, 2 l, 5 l and 10 l.

Activity 2

Take a vessel which can hold 5 litres of water. Pour water into the vessel 2 times from a vessel having the capacity of 2 litre. Then again pour 1 litre of water, see whether the vessel is fully filled ?

Activity 3

We should drink 2 to 3 litres of water on an average per day.

To know whether you are drinking sufficient quantity of water, keep a bottle of known capacity.

For example :

If you have a bottle of 500 ml, fill water in it completely each time and drink.

Count how many times you have emptied the bottle.

If you have consumed 6 bottles of water, then you have consumed the required quantity of water.

To solve problems involving volume

Example 1

Add the following :

12 l 500 ml, 8 l 300 ml, 9 l 600 ml.

<i>l</i>	<i>ml</i>
12	500
8	300
9	600
30 <i>l</i>	400 <i>ml</i>

Example 2

Subtract 6 litre 750 ml from 18 litre 500 ml.

$$\begin{array}{r} \text{l} \quad \text{ml} \\ 18 \quad 500 \\ - 6 \quad 750 \\ \hline 11 \text{ l} \quad 750 \text{ ml} \end{array}$$

Example 3

A person drinks 2 l 300 ml of water per day. What is the quantity of water he drinks in 10 days ?

1 litre = 1000 millilitres

$$2 \text{ l } 300 \text{ ml} \times 10 = 23 \text{ litre}$$

$$2 \text{ l} \times 10 = 20 \text{ l}$$

$$300 \text{ ml} \times 10 = 3,000 \text{ ml} = 3 \text{ l}$$

$$\therefore 20 \text{ l} + 3 \text{ l} = 23 \text{ l}$$

$\therefore$ the person drinks 23 litre of water in 10 days.

Example 4

8 glasses of equal volume are used to fill a vessel with water. If the vessel can hold 5 l 600 ml of water, find the capacity of each glass.

$$1 \text{ litre} = 1,000 \text{ ml}$$

$$5 \text{ l } 600 \text{ ml} = 5 \times 1,000 + 600$$

$$= 5,600 \text{ ml}$$

$$\text{Capacity of 8 glasses} = 5,600 \text{ ml}$$

$$\therefore \text{Capacity of 1 glass} = 5,600 \div 8 = 700 \text{ ml}$$

Exercise 6.2

I. Answer orally

- 1) A glass contains 300 ml of water and another glass contains 250 ml of water. If water from both the glasses are poured into a jug, what is the quantity of water in the jug ?
- 2) A milkman has 5 l 700 ml of milk. Out of this he sells 1 l 350 ml of milk to one person and 2 l 250 ml to another person. Find the quantity of milk left with the milkman.
- 3) A bottle contains 200 ml of milk. What is the total quantity of milk contained in 5 such bottles ?
- 4) 100 ml of sugarcane juice is distributed among 4 friends equally. What quantity of sugarcane juice does each one get?

II. Convert the following.

- 1) 5 l = ... ml
- 2) 6 kilolitre = ... l
- 3) 500 ml = ... l
- 4) 8,000 l = ... kilolitre

III. Add

- 1) 3 l 250 ml, 750 ml and 6 l 500 ml
- 2) 15 l 450 ml, 5 l 350 ml and 2 l 750 ml
- 3) 12 l 550 ml, 14 l 450 ml and 12 l 650 ml
- 4) 8 kl 250 l, 3 kl 350 l and 4 kl 550 l

IV. Subtract

- 1) $15\text{ l } 750\text{ ml}$ from $25\text{ l } 350\text{ ml}$
- 2) $24\text{ l } 550\text{ ml}$ from $64\text{ l } 450\text{ ml}$
- 3) $45\text{ l } 800\text{ ml}$ from $75\text{ l } 750\text{ ml}$
- 4) $34\text{ kilolitre } 750\text{ l}$ from 55 kilolitre

V. Solve the following.

- 1) Veena buys $3\text{ l } 250\text{ ml}$ of groundnut oil while returning from her office. Her mother also bought $1\text{ l } 500\text{ ml}$ of groundnut oil on the same day. What is the total quantity of groundnut oil bought by them ?
- 2) A milkman has 25 litres of milk. He sells $16\text{ l } 750\text{ ml}$ of it. Find the quantity of milk left with him.
- 3) A bottle contains $1\text{ l } 500\text{ ml}$ of sandal oil. It has to be filled into bottles of 250 ml each. How many bottles are required?
- 4) An oil can contains 15 l of Sunpure oil. Out of this Rani uses $3\text{ l } 600\text{ ml}$ in the first month and $5\text{ l } 300\text{ ml}$ in the second month. Find the quantity of oil left in the oil can.
- 5) A vessel contains 1 litre 800 ml of tea. It is poured into 12 glasses of the same size equally. What is the quantity of tea contained in each glass ?



Chapter - 7

TIME



After studying this Chapter you can,

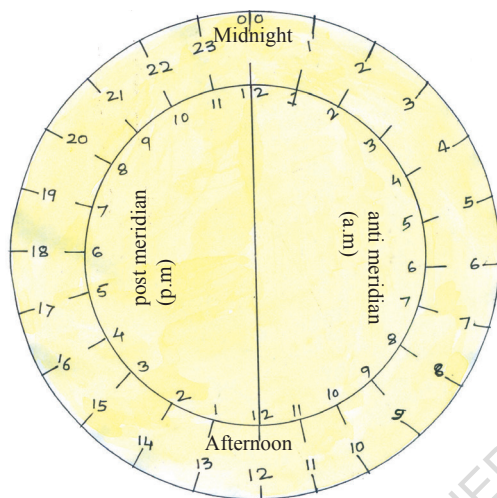
- convert 24 hour clock time into 12 hour clock time,
- solve the problems related to time with respect to daily problems involving addition and subtraction,
- calculate the time required to complete a work or an event.

To convert 24 hour clock time into 12 hour clock time.

Sarojini came to the railway station with her brother. In the railway time table the departure time was mentioned as 22 : 05. She sat in the train. When the train started moving, Sarojini observed the time in her brother's watch. It was showing 10 : 05. How is it ? In the railway time table the departure time was 22 : 05. In her brother's watch it is 10 : 05. In the clock there are only 1 to 12 hour. So how to calculate 22 : 05 hour ? Such questions raised in her mind.

One day has 24 hour. So, the time table of the train and the aeroplane has been framed from 00 to 24 hour. We can show this 00 to 24 hour in a clock.

Observe the 24 - hour clock.



In this clock, 24 hours of the day is shown. Here 24 hours of the day has been equally divided. From 00 hour to 12 hour in the afternoon, it is the first part. From 12 hour in the afternoon to 00 (24) hour in the midnight, it is the second part. The time interval between 00 hour in the midnight to 12 hour in the afternoon is called 'ante meridian'. This is represented as a.m.

The time interval from afternoon 12 hour to midnight 00 (24) hour is called 'post meridian'. This is represented as p.m.

How to convert 24 hour clock time to 12 hour clock time ?

Example 1 : In the railway time table, the departure time of the train is denoted as 22 : 05 hour. What will be the departure time of this train in 12 hour clock ?

$$\begin{aligned}\text{Departure time of the train} &= 22:05 - 12:00 \\ &= 10:05 \text{ p.m. (night 10:05)}\end{aligned}$$

Note :

- When the time is above 12 hours, 12 should be subtracted from it and the remaining time is written as p.m.
- When the time is below 12 hours, it is written as a.m.

Example 2 : The arrival time of an aeroplane is 13:50 hour. Convert this into 12 hour clock time.

$$\begin{aligned}\text{Arrival time of an aeroplane} &= 13:50 - 12:00 \\ &= 1:50 \text{ p.m. (afternoon 1:50)}\end{aligned}$$

Example 3 :

Denote the following timings in a.m. and p.m.

(i) 20 : 20 (ii) 10 : 45

i) 20 : 20. This is more than 12 hour.

$$20 : 20 - 12 : 00 = 8 : 20 \text{ p.m.}$$

ii) 10 : 45. This is less than 12 hour

$$\therefore 10 : 45 = 10 : 45 \text{ a.m.}$$

Activity 1 : Using your pencil, compass and protractor, draw the figure of 24 hour clock.

Activity 2 : Using your pencil, scale, compass and protractor, draw the figure of 12 hour clock. Draw hour, minute and second needles.

Activity 3 : 02 : 36 : 15

This is the time in a digital clock. This clock shows hour, minute and second. In this way prepare different timings and make different strips. These different strips are exhibited through a window. In this way prepare a model for a digital clock.

Study the following table. You can clearly learn about anti meridian (a.m) and post meridian (p.m)

24 hour clock time	12 hour clock time
00 : 00 hour to 24 hour	00 : 00 hour to 12 hour
01 : 00 hour	1 a.m.
02 : 00 hour	2 a.m.
11 : 00 hour	11 a.m.
12 : 00 hour	12 hour (afternoon)
13 : 00 hour	1 p.m.
14 : 00 hour	2 p.m.
23 : 00 hour	11 p.m.
00 : 00 hour or 24 hour	12 hour (midnight)

Exercise 7.1

I. Answer orally

- 1) At what time do you get up in the morning ?
- 2) At what time do you go to school ?
- 3) At what time do you go out to play ?
- 4) From what time to what time do you study during night ?
- 5) At what time you will have your dinner ?
- 6) At what time do you go to bed at night ?

II. Denote the following timings in a.m and p.m.

- 1) 10:15 morning 2) 8 : 10 night
- 3) 1:45 afternoon 4) 4 : 30 morning
- 5) 9 : 45 night 6) 5:35 evening

III. Convert the following timings to 12 hour clock timing. Also write in a.m. and p.m.

- 1) 23 : 25 hour 2) 12 : 35 hour
- 3) 14 : 45 hour 4) 18 : 40 hour
- 5) 08 : 30 hour 6) 11 : 55 hour

We know that second, minute and hour are the three fundamental units of time. Let us now learn the relationship between them.

60 seconds = 1 minute (1 min)

60 minutes = 1 hour (1 hr)

24 hours = 1 day

7 days = 1 week

30 or 31 days = 1 month (excluding February month)

12 months = 1 year

365 days = 1 year

In the month of February there are 28 days. After every 4 years, in February there are 29 days. The year in which there are 29 days is called "leap year".

Problems on time involving addition

Example 1 : Add 2 hour 20 minutes to 3 hour 30 minutes.

$$\begin{array}{r} 2 \text{ hr } 20 \text{ min} \\ + 3 \text{ hr } 30 \text{ min} \\ \hline 5 \text{ hr } 50 \text{ min} \end{array}$$

Note : While adding time, we add second to second, minute to minute and hour to hour.

Example 2 : Add 3 hour 50 minutes 30 seconds to 2 hour 15 minutes 50 seconds.

$$\begin{array}{r} 3 \text{ hr } 50 \text{ min } 30 \text{ s} \\ + 2 \text{ hr } 15 \text{ min } 50 \text{ s} \\ \hline 6 \text{ hr } 06 \text{ min } 20 \text{ s} \end{array}$$

[**Note :** $30\text{s} + 50\text{s} = 80\text{s}$ - $60\text{s} = 20\text{s}$. 20 seconds is written in seconds place. $60\text{s} = 1\text{min}$. This 1 minute is added to minutes. So $1\text{min} + 50\text{min} + 15\text{min} = 66\text{min}$. $66\text{min} - 60\text{min} = 06\text{min}$. This 6 minutes is written in minutes place.

$60\text{min} = 1\text{hr}$. This 1 hour is added to hours.

So, $1\text{hr} + 3\text{hr} + 2\text{hr} = 6\text{hours}$]

Example 3 : Add 3 years 8 months to 2 years 7 months

$$\begin{array}{r} 3\text{yr } 8 \text{ months} \\ 2\text{yr } 7 \text{ months} \\ \hline 6\text{yr } 3 \text{ months} \end{array}$$

[Note : $8 \text{ months} + 7 \text{ months} = 15 \text{ months} - 12 \text{ months} = 3 \text{ months}$

$12 \text{ months} = 1 \text{ year}$

This one year is added to years.

$\therefore 1 \text{ year} + 3 \text{ years} + 2 \text{ years} = 6 \text{ years}$]

Activity 1 : From Monday to Saturday everyday you have a period of 40 minutes of mathematics subject. For how many periods is mathematics taught in a week ? Express this in hours.

Activity 2 : As in activity 1, find out the number of periods and hours of teaching for different subjects.

Exercise 7.2

I. Answer orally

- 1) How many seconds make 1 minute ?
- 2) How many minutes make 1 hour ?
- 3) How many hours are there in a day ?
- 4) How many days are there in a week ?
- 5) How many months are there in a year ?
- 6) How many days are there in a year ?
- 7) How many days are there in a month ?
- 8) How many days are there in February ?
- 9) What do you mean by leap year ?
- 10) What is the sum of 3hr 20min and 4hr 30min ?

II. Add the following.

- 1) 4hr 40min and 6hr 10min
- 2) 3hr 30min and 2hr 20min
- 3) 2hr 50min and 3hr 40min
- 4) 5hr 30min and 2hr 50min
- 5) 3hr 15min 18s and 1hr 19min 17s
- 6) 2hr 30min 40s and 4hr 50min 30s
- 7) 5hr 45min 30s and 3hr 25min 40s
- 8) 3yr 8 months and 2yr 7 months
- 9) 5yr 6 months and 4yr 9 months

Problems on time involving subtraction

Example 1 : Subtract 2hr 20min from 5hr 30min.

$$\begin{array}{r} 5\text{hr } 30\text{min} \\ - 2\text{hr } 20\text{min} \\ \hline 3\text{hr } 10\text{min} \end{array}$$

Note : In problems involving time, seconds should be subtracted from seconds, minutes from minutes and hours from hours.

Example 2 : Subtract 3hr 45min from 6hr 15min

$$\begin{array}{r} 6\text{hr } 15\text{min} \\ - 3\text{hr } 45\text{min} \\ \hline 2\text{hr } 30\text{min} \end{array}$$

[**Note** : It is not possible to subtract 45 min from 15min. So we borrow 1hr from 6hr.

Now 1 hour = 60 minutes

$$\therefore 60 + 15 = 75\text{min}$$

$$75 - 45 = 30\text{min}$$

In the place of hours, $5\text{hr} - 3\text{hr} = 2\text{hr}$]

Example 3 : Subtract 4years 9months from 7years 7months

$$\begin{array}{r} 7\text{yr} \quad 7 \text{ months} \\ - 4\text{yr} \quad 9 \text{ months} \\ \hline 2\text{yr} \quad 10 \text{ months} \end{array}$$

(**Note** : It is not possible to subtract 9months from 7months. So we borrow 1year from 7 years.

$$1 \text{ year} = 12 \text{ months}$$

$$12 \text{ months} + 7\text{months} = 19 \text{ months}$$

$$19 \text{ months} - 9 \text{ months} = 10\text{months}$$

In the place of years, $6\text{yr} - 4\text{yr} = 2 \text{ years}$)

Activity 1

Note the starting and closing time of your school. Find out the time interval. From this subtract the time for lunch break and find how many hours your school works.

Activity 2

Watch on your television how the needles of hour, minute and seconds change at the time of telecasting the news.

List the timings of the news telecasted in 'Doordarshan - 1' in one day.

Exercise 7.3

I. Answer orally :

- 1) How many seconds make 5 minutes ?
- 2) How many minutes are there in 10 hours ?
- 3) How many seconds make 1 hour ?
- 4) What is the time interval between 9:30 a.m. and 12:00 noon?
- 5) Find out the railway clock time for 5:30 p.m.

II. Subtract the following

- 1) 5hr 10min from 7hr 30min
- 2) 3hr 20min 25s from 4hr 40min 50s
- 3) 2hr 50min from 5hr 30min
- 4) 5hr 40min from 6hr 10min
- 5) 3yr 8months from 6yr 4months
- 6) 2yr 9months from 5yr 6months
- 7) 4yr 11months from 7yr 5months

How to calculate the time taken to complete a work or an Incident?

Example 1 : Shalini leaves her home at 7:30 a.m. and reaches her school at 9:00 a.m. How much time does Shalini take to reach her school?

Starting time of Shalini = 7 : 30 a.m.

The time she reaches her school = 9 : 00 a.m.

Now we have to subtract 7:30 a.m. from 9:00 a.m.

hr : min	[Note : we have to borrow 1 hr from 9hrs,
9 : 00	1 hr = 60min
- 7 : 30	60min - 30min = 30min
	8hr - 7hr = 1hr]
1 : 30	

∴ Shalini takes 1 hr and 30min to reach her

Example 2 : The school closed for summer vacation on April 11 and reopened on May 31. For how many days the school was closed for summer vacation ?

No. of days the school was closed from
April 11 to April 30 = 20 days

No. of days the school was closed from
May 1 to May 30 = 30 days.

Total number of days the school was closed for
summer vacation = 50 days.

Exercise 7.4

Solve the following problems.

- 1) A worker enters the factory at 6 : 15 a.m. He finishes his work and leaves the factory at 2 : 15 p.m. For how many hours has he worked in the factory ?
- 2) A school closes for mid-term vacation on October 3rd and reopens on October 31st. How many days has the school closed for mid term vacation?

- 3) A school starts at 8 : 00 a.m on Saturday and closes at 12 : 30 p.m. How many hours did the school work on that day ?
- 4) Shyam comes to his office at 9 : 00 a.m. He works 8 hours in his office. What time does he leave his office in the evening?
- 5) Fathima studies for 5hr. 10min in her school. At home, she studies 2hr . 50min. What is the total number of hours she studie on that day ?
- 6) Mahesh spends his 15 days holidays in his uncle's place from 3 - 10 - 2011. On which date does he leave his uncle's place ?



SYMMETRICAL FIGURES

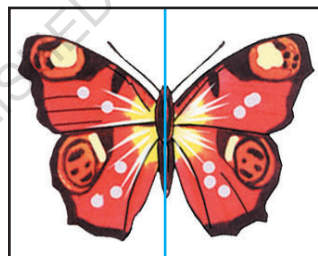


After studying this Chapter you can,

- cut and fold the papers, use ink blots to identify the images of figures,
- identify the images of simple geometrical figures,
- identify symmetry in two and three dimensional figures,
- identify the figures obtained when 2D figures such as circle, right angled triangle and rectangle are rotated.

Symmetrical figures

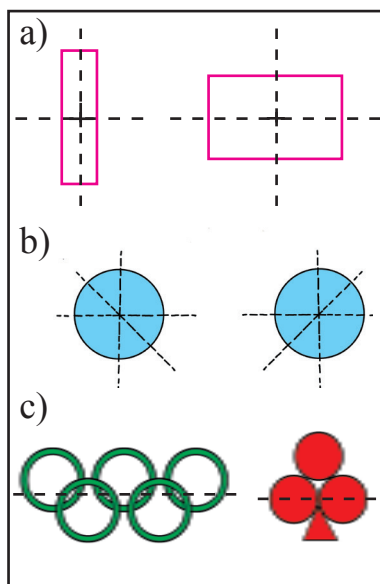
Observe the figure of a butterfly. A straight line is drawn on this figure. When the paper is folded along this straight line, one part will exactly coincide with the other part. This is a **symmetrical figure**. This straight line is called **axis of symmetry**.



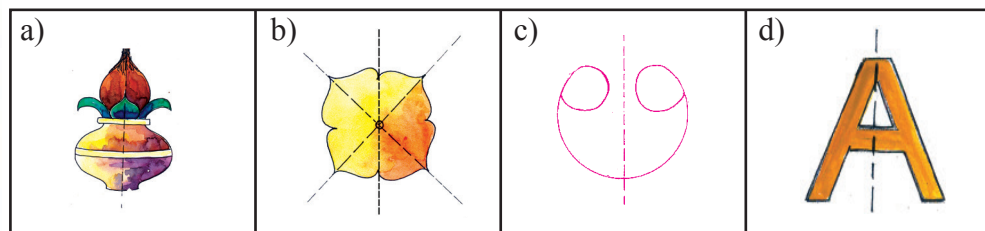
Observe these symmetrical figures. In figure (a), the figures have two axes of symmetry.

In figure (b), the symmetrical figures have many axes of symmetry. Only a few axes are drawn.

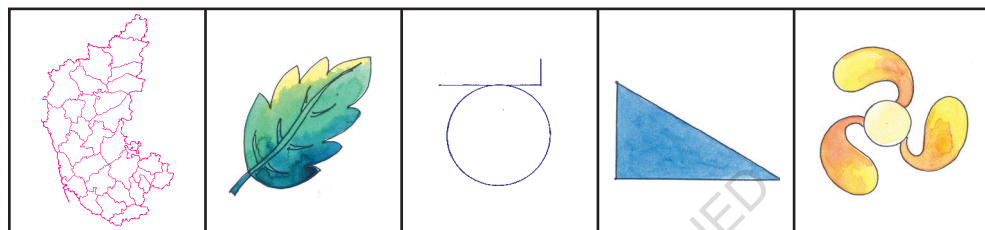
In figure (c), they are not symmetrical figures. When we fold the paper on the straight line drawn, they do not coincide with one another. They are not symmetrical figures.



Examples for symmetrical figures

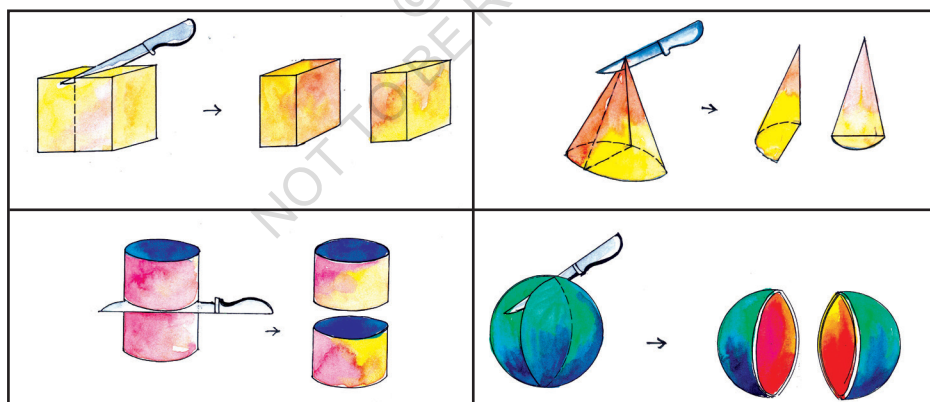


Examples for non - symmetrical figures.

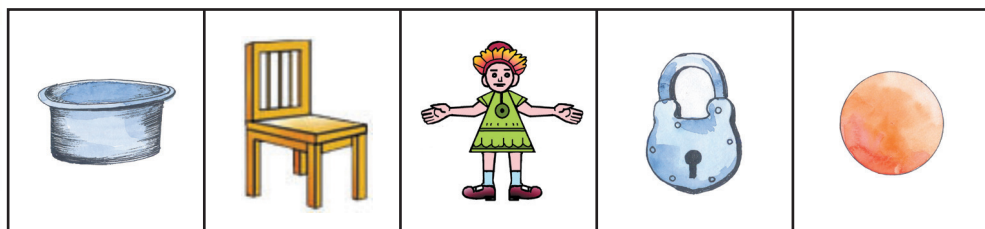


Symmetrical cubical figures

Anu and Manu have bought cakes of different shapes. They cut the cake into two equal parts as shown. Observe the two parts in each case.



Examples for symmetrical cubical figures.

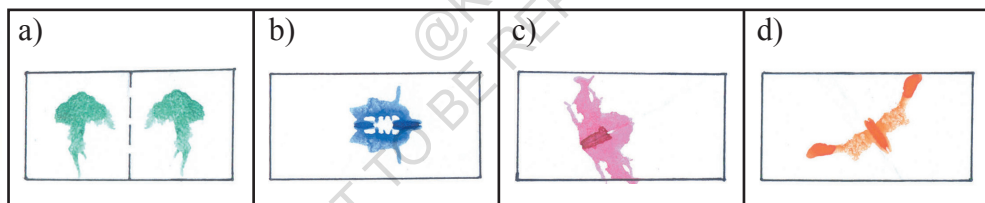
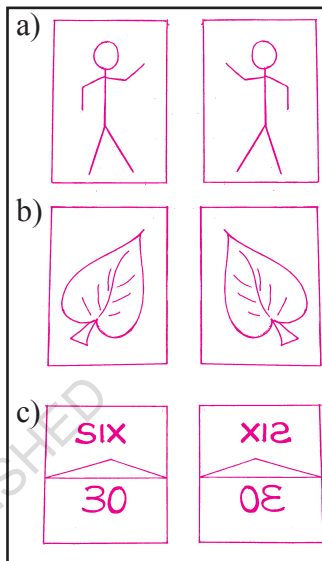


Think : Car, planes, mobile, computer, human being are all symmetrical cubical figures. Why ?

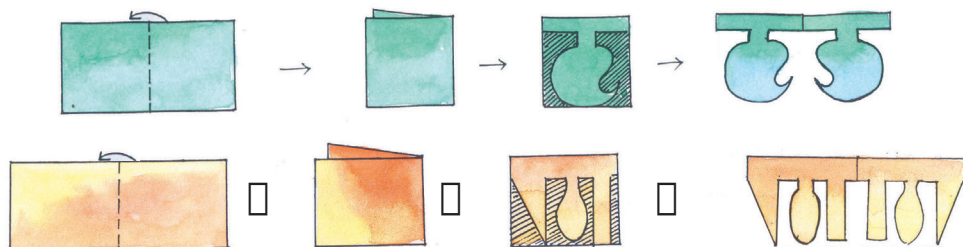
Images :

Activity 1 : Observe the images obtained by placing different pictures in front of a mirror. The left and the right portion of the object has been changed into right and left portion in the image.

Activity 2 : Take a white paper and put one or two drops of ink on it. Fold the paper and gently rub the paper. Open and see the images formed on either side of the paper.



Activity 3 : Take a coloured rectangular paper. Fold it exactly in the middle as shown. In this folded paper, cut any figure of your choice. Open the fold of the paper. Is the left side fold, same as the image of the right side?



In all these activities we got the image of a figure.

Examples :

1) Examine whether the given figures are symmetrical figures. If they are symmetrical figures, how many axes of symmetry can be drawn to them ?

a)



b)



c)



a) This is a symmetrical figure. It has only one axis of symmetry.

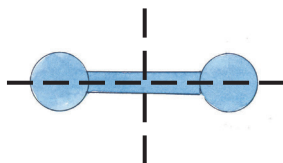
b) This is not a symmetrical figure. So it has no axis of symmetry.

c) This is a symmetrical figure. It has two axes of symmetry.

a)

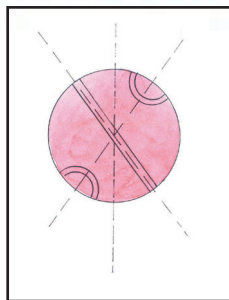


b)



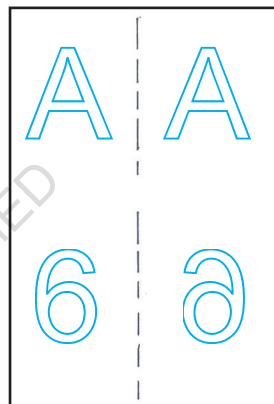
- 2) In the given figure, many straight lines are drawn. Which are the axes of symmetry ?

The straight lines (1) and (2) are the axes of symmetry. But straight line (3) is not the axis of symmetry.



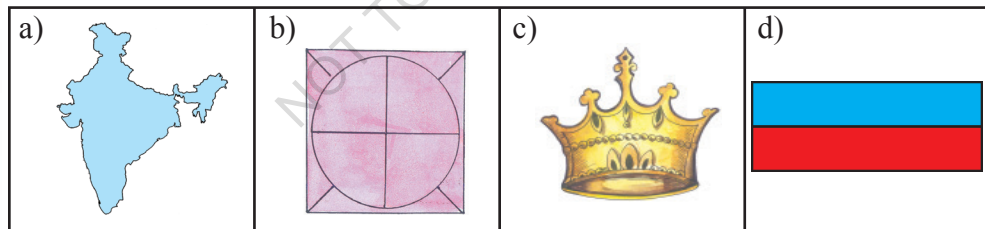
- 3) Examine whether the images of the following letter and numeral are exactly the same as the original letter and numeral.

- The image of 'A' is exactly the same as the original letter.
- The image of '6' is not like the original numeral.

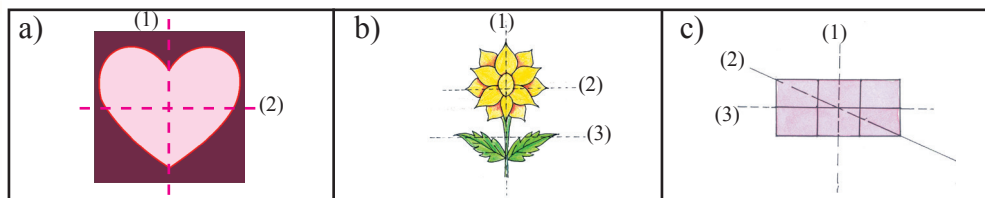


Exercise 8.1

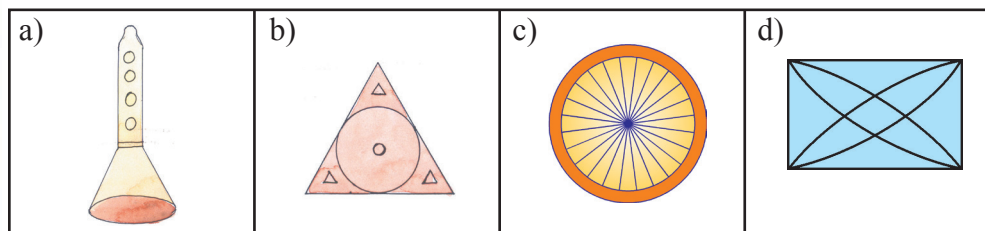
- 1) Mark symmetric figures as 'x' and non symmetric figure as '✓' in the following.



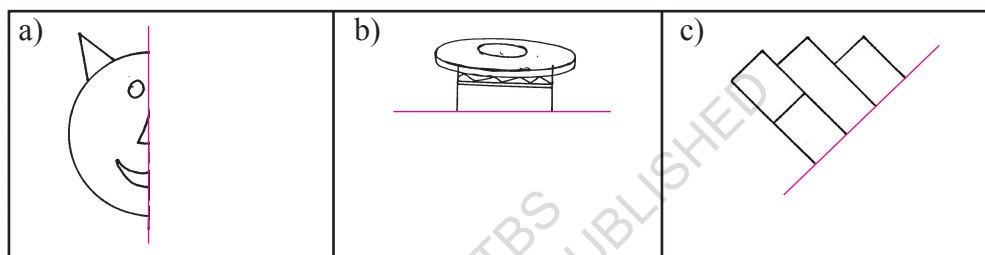
- 2) A few lines have been drawn on the following figures and the lines are denoted by numbers. Identify the axes of symmetry and write its number.



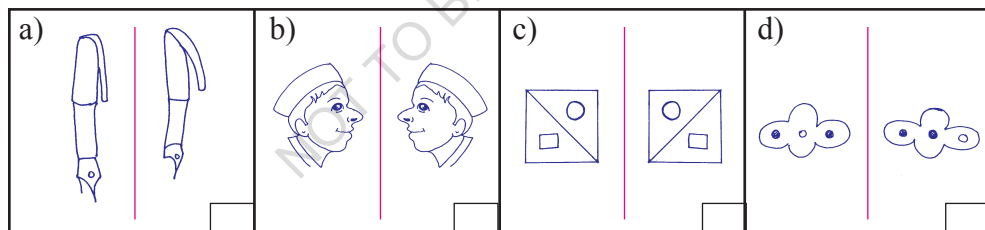
3) Draw axes of symmetry to the following symmetrical figures.



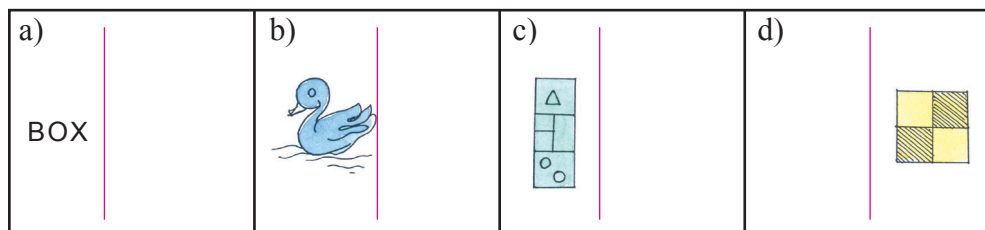
4) A few symmetrical figures with only half part are given below. Complete the remaining half part by drawing.



5) Pairs of figures are given below. If one figure is the image of the other figure put a tick 'x', if not put '✓'



6) Some figures are given below. Draw their images in the given space.



7) A few numerals and words are given below. Among them a few numerals or words are the images of original numerals and words. List them.

a) 818

b) 310

c) 18081

d) 80888

e) DAD

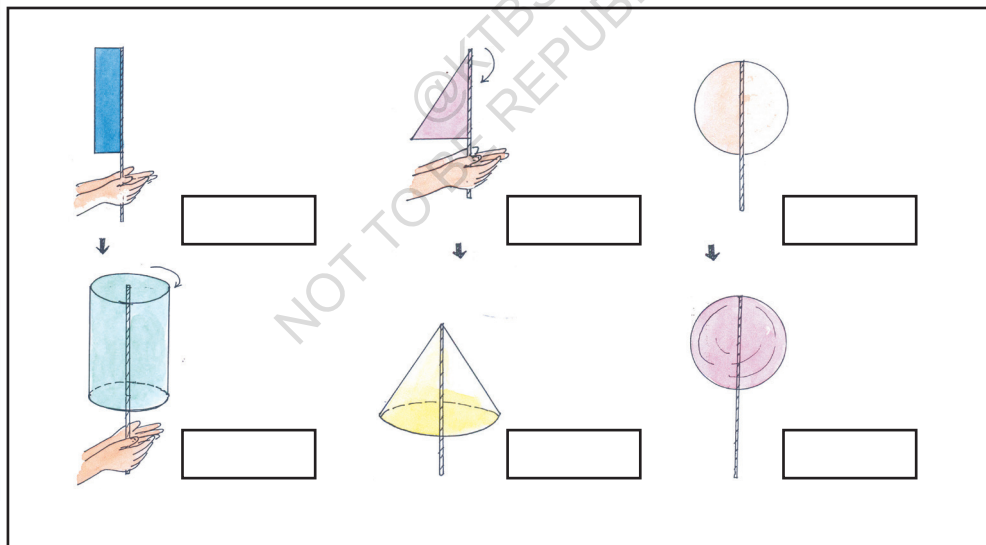
f) MAM

g) EVE

h) THAT

8) List the symmetrical objects you have seen in your surroundings.

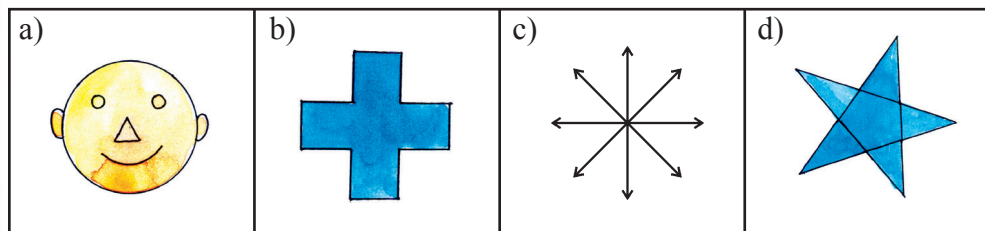
Activity : Cut the cardboard into rectangle, right angled triangle and circular shapes. Paste a stick to each one of them as shown in the figure. Rotate these figures by keeping the sticks in the middle of your two hands. Now observe the cubical figures formed. Write their names in the box provided.



When we rotate rectangle, right angled triangle and circle in definite axis we get cylinder, cone and sphere respectively.

Rotation of figures

Johara hung some figures on the wall :



When she had gone out, her friend turned them upside down (half). When Johara came back, she found that two pictures were upside down and the other two pictures which were also made upside down were found to look alright. Why ?

 When this figure is rotated one turn we get  This is exactly like the original figure.

 When this figure is rotated half turn, we get .

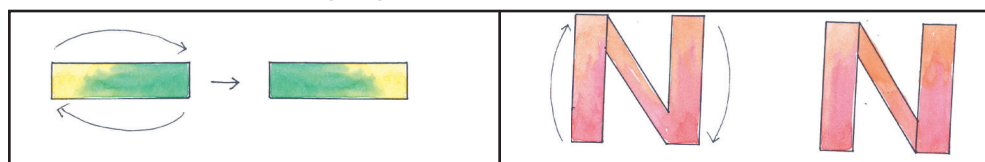
 When this figure is rotated $\frac{1}{4}$ turn, we get .

 When this figure is rotated $\frac{1}{3}$ turn .

 When this figure is rotated $\frac{1}{6}$ turn we get .

So when this figure is rotated $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{3}$, $\frac{1}{6}$ turn, then it looks completely different from the original figure.

Observe the following figures.



When the above figures are rotated $\frac{1}{2}$ turn, they appear exactly like the original figure.

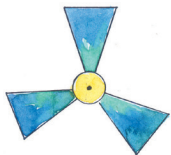
Some more examples are given below. Observe them.

1)



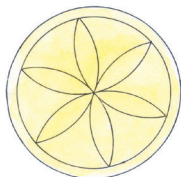
When this figure is rotated $\frac{1}{4}$ th turn (90°), it appears as before.

2)



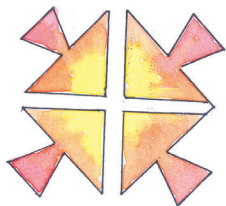
When this figure is rotated $\frac{1}{3}$ rd (120°), it resembles the original figure.

3)



When this figure is rotated $\frac{1}{6}$ th (60°), it resembles the original figure.

4)

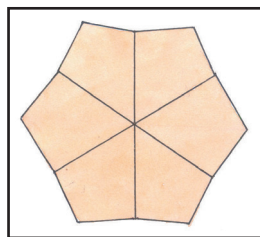


When this figure is turned 1 round, $\frac{1}{2}$ round, $\frac{1}{4}$ round, then it resembles the original figure.

Note :

- If a figure is rotated $\frac{1}{4}$ th round and they resemble the original figure, then with $\frac{1}{2}$ round also they resemble the original figure.
- All figures when rotated one complete round will resemble the original figure.

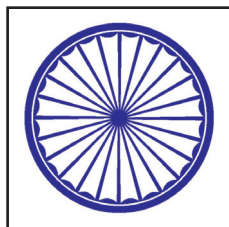
Examine whether the figure given below resemble the original figure or not when it is rotated $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$ and $\frac{1}{6}$ round.



When the figure is rotated $\frac{1}{3}$ round and $\frac{1}{6}$ round, it resembles the original figure. But in $\frac{1}{2}$ round and $\frac{1}{4}$ round, it will not resemble the original figure.

Note : If the figures which are rotated $\frac{1}{6}$ round resemble the original figure, then with $\frac{1}{3}$ round also they resemble the original figure.

Activity : Examine the figure of Ashoka chakra. In which of the following rounds it resembles the original figure ? ($\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$ or $\frac{1}{6}$)



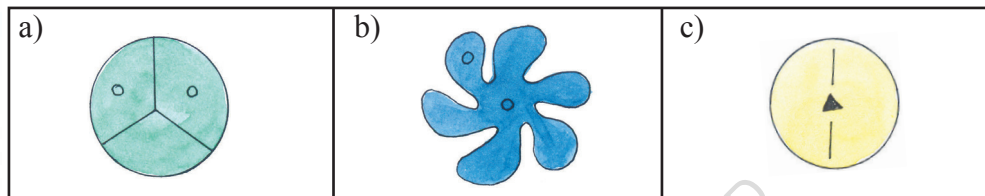
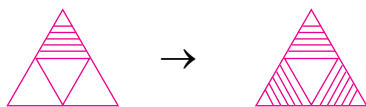
Exercise 8.2

1) Figures are given in the first row of the table given below. In the next rows, the rotations it has to be turned are given. If the figure is turned for given rounds and resembles the original figure, put '✓' in the box and if it does not resemble put '✗' in the box.

Figure Round							W	8				
$\frac{1}{2}$ round	✓											
$\frac{1}{3}$ round	✗											
$\frac{1}{4}$ round	✓											
$\frac{1}{6}$ round	✗											

- 2) The following figures when turned $\frac{1}{3}$ round donot resemble the original figure. Make suitable changes in the figure, to make them resemble the original figure when turned $\frac{1}{3}$ round.

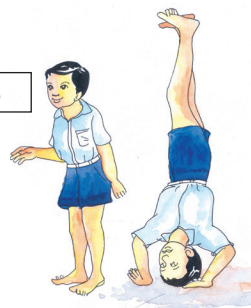
Example :



- 3) a) List the letters from English alphabet, which will not change their shape, when turned $\frac{1}{2}$ rotation. Example : X
- b) Which capital letter from English alphabet when turned $\frac{1}{4}$ round gives another letter ?
- c) Which capital letter from English alphabet when rotated $\frac{1}{2}$ round gives another capital letter ?
- 4) Draw the figures which resemble the original figure when rotated $\frac{1}{4}$ round.
- 5) Draw the figures which resemble the original figure when rotated $\frac{1}{3}$ round.

Discuss : A boy stands straight in front of a board and observes it. Another boy read the board in shirshasana posture. What difference they find in the board ?

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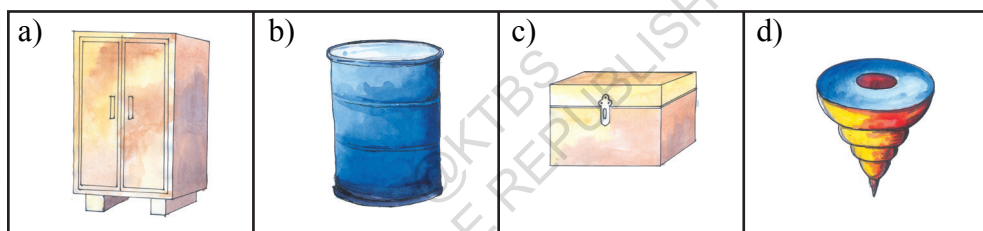
THREE DIMENSIONAL FIGURES



After studying this unit you can,

- represent 3 dimensional figures as 2 dimensional figures,
- draw the elevation, plan and side view of the 3D geometrical figures,
- draw geometrical sketches of cube, cylinder and cone with definite nets.

We observe many three dimensional objects around us. Some of them are given below.



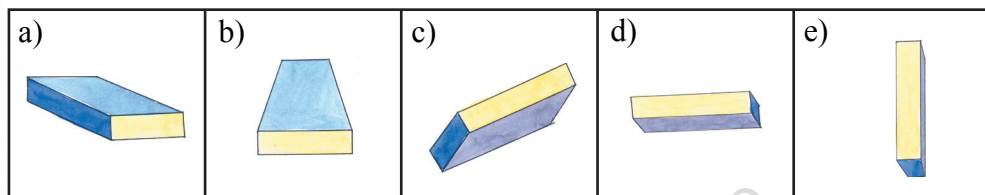
These objects resemble three dimensional geometrical shapes. They are rectangular cube (cuboid), cylinder, cube and cone. You have already learnt about the properties of these figures in your previous classes. Study the following table.

Name of 3D figures	Figure	No. of faces	Properties	No. of edges	No. of vertices
Cube		6	6 square faces	12	8
Cuboid		6	6 faces (square or rectangular)	12	8
Cylinder		3	1 curved surface 2 circular bases	-	-

Cone		2	1 circular base 1 curved surface	-	1
------	---	---	-------------------------------------	---	---

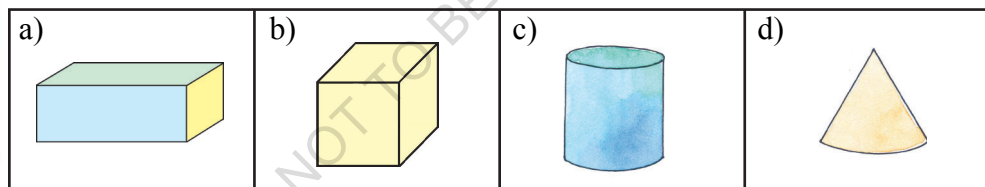
Some students drew the figure of the same object - cuboid.

Here are a few figures drawn.



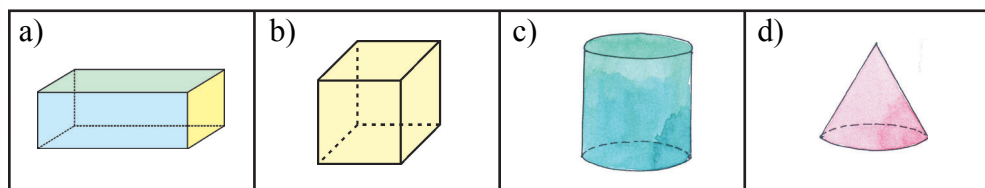
Though students drew the figure of the same object, each figure differs from the another. This is because each one of them have seen the object from different directions.

Observe the figures of some objects with different geometrical shapes.

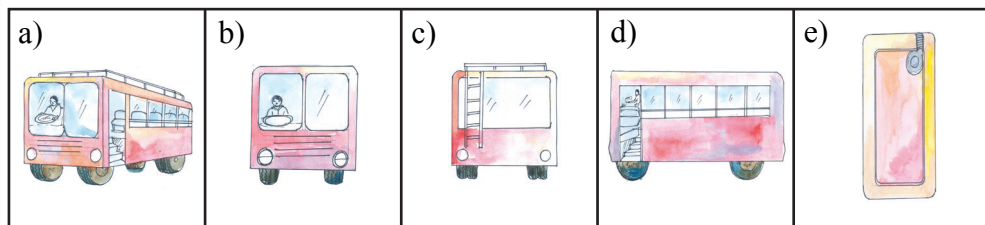


In all these figures, we cannot see all faces and edges at a time. We denote the edge by a straight line (_____) and when we cannot see the edge we denote it by dotted lines (.....)

Observe this in the following figures.



When we see an object or a cubical figure from different directions it appears different. For example : When we see the bus from different sides, we have the following figures.



In these different views, let us know about 3 views.

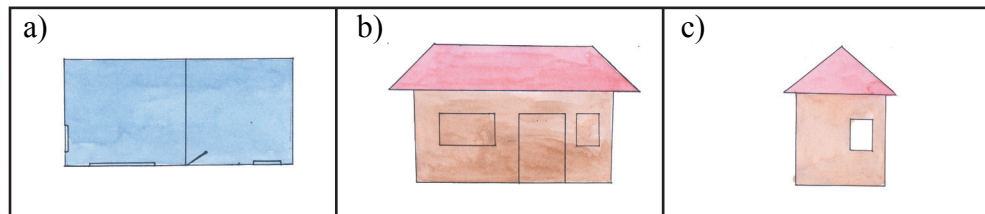
- 1) **Front view (Elevation) :** When we see the object from front.
- 2) **Side view :** When we see the object from left or right
- 3) **Plan (Top view) :** When we see the object from the top.

Observe the figures in the following table.

Name of the shape	Figure of 3D in 2D	Elevation	Side view	Plan
Cube				
Cuboid				
Cylinder				
Cone				

Know this : Before constructing a house or any building, engineers draw the plan, elevation and side view of that house or building. These pictures will give us information about the area of the building, height, structure, number of rooms, number of doors and windows etc.

Example

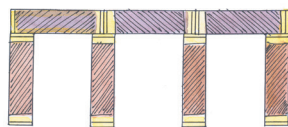


In this house, there are 2 rooms, 1 door and 3 windows. The roof of this house is slanting.

Some more examples are given below.

1) Suman, Peter and Irshad constructed a model bridge from match boxes.

a) Peter drew the **elevation** picture.



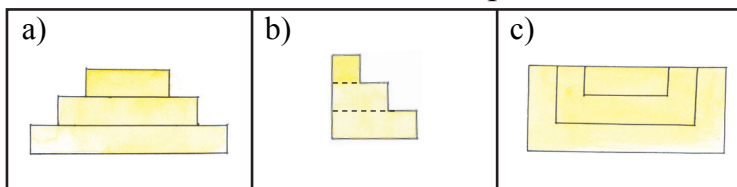
b) Suman drew the picture of **side view**.



c) Irshad drew the picture of **plan**.



2) Observe the different views of the steps.

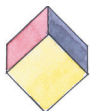
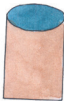
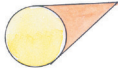
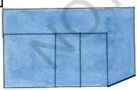
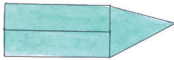


Exercise 9.1

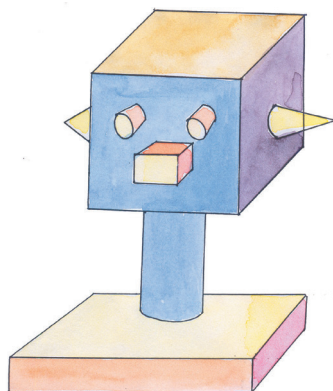
I. Answer orally.

- a) What is the shape of the faces of a cube ?
- b) How many circular faces are there in a cylinder ?
- c) Mention the number of plane surfaces and curved surfaces in a cone.

II. Observe the following table. Against each shape of solid, some pictures are given. Put '✓' against the figure which is an example of that shape and put '×' against the figure which is not an example of that shape.

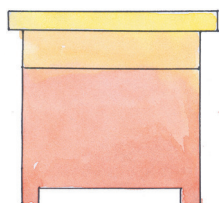
Cube	a) 	b) 	c) 	d) 
Cylinder	e) 	f) 	g) 	h) 
Cone	i) 	j) 	k) 	l) 
Cuboid	m) 	n) 	o) 	p) 

III. A robot is constructed using different solid shapes. Identify the shapes and write the number of times it is used.

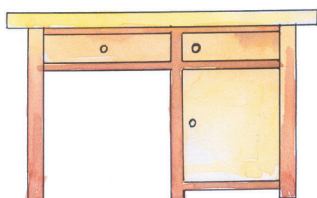


IV. Different views of a table are given below. Name them.

(a)



(b)



(c)



- V.
- 1) Draw diagrams of cube, cylinder and cone with different measurements in 2D.
 - 2) Draw diagrams of your school showing elevation, side view and plan.
 - 3) Draw diagrams of different objects in your house to show elevation, side view and plan.

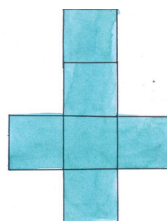
To construct solid figures from Networks :

Take a cubical box and draw coloured lines on its edge and cut them. When you open it, you get a plane figure.

(a)

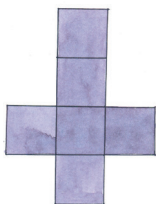


(b)



This plane figure is called the net of the cube. This net when folded on its edges, forms the cube.

(a)



Network of cube

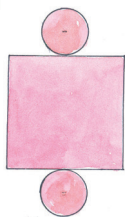


(b)



cube

(a)



Network of cylinder

(b)



cylinder

(a)



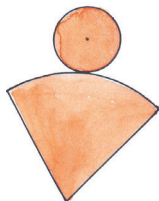
Network of cuboid

(b)



cuboid

(a)



Network of cone

(b)



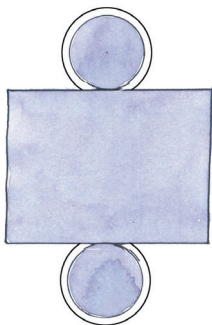
(c)



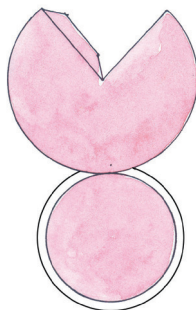
cone

Exercise 9.2

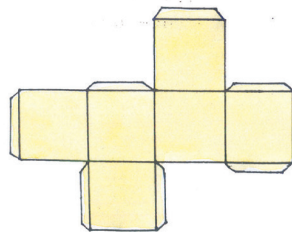
- 1) Trace the following nets on a sheet of paper. Cut them on their edges (including the piece of paper surrounding the edge). Fold these nets, paste the flaps and construct the solid figures.



(a)



(b)



(c)

Chapter 10

PATTERNS



After studying this Chapter you can,

- understand the rule followed in the pattern,
- complete the pattern by following the rule,
- create designs,
- know that numbers can be arranged in patterns,
- identify the number pattern,
- form triangular and square numbers through patterns,
- recognize number pattern and solve the problem,
- relate sequence of odd numbers and consecutive square numbers,
- make border strips and tile patterns,
- know about different kinds of border strips and tiling patterns.

Patterns with Numbers

You have already studied number patterns in the previous class.

Study the following examples.

Example 1

5, 10, 15, 20, 25, 30, 35, 40

These numbers are multiples of 5 and the pattern is

5, 5 + 5, 10 + 5, 15 + 5, 20 + 5

Example 2

2, 3, 6, 7, 10, 11, 14, 15

In this example we see that there is a difference of one between 2 and 3 and a difference of 3 between 3 and 6.

The same pattern is continued.

i.e., : 2, 2+1, 3+3, 6+1, 7+3, 10+1, 11+3

Observe the following number patterns and write the next three numbers.

20, 40, 60, 80, _____, _____, _____.

8, 16, 24, 32, _____, _____, _____.

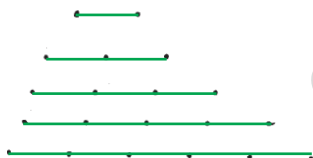
1, 4, 7, 10, _____, _____, _____.

19, 18, 17, 16, _____, _____, _____.

Now let us study about some more interesting number patterns.

Square Numbers

Observe the following figures with dots. Identify the figure formed in each case.



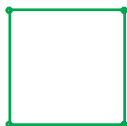
We observe that when a group of dots in the same direction are joined a line segment is obtained.

Now, let us consider the points not lying on a straight line.

Observe the number of points used and the shape of the figure formed.



3 points – triangle.

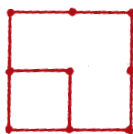


4 points – square

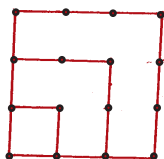
Look at these figures. How many dots are there in each of them?



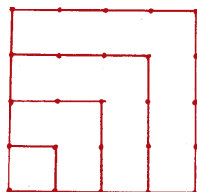
- 4 dots



- 9 dots



- 16 dots



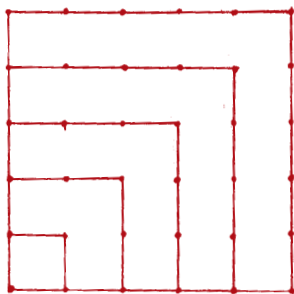
- 25 dots

Each of the figure formed is a 'Square'.

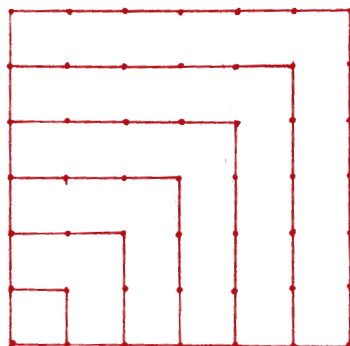
Observe that we get squares when 4, 9, 16, and 25 dots are joined. These are called "Square numbers" as they form the shape of a square.

Look at the dot patterns and identify the square numbers.

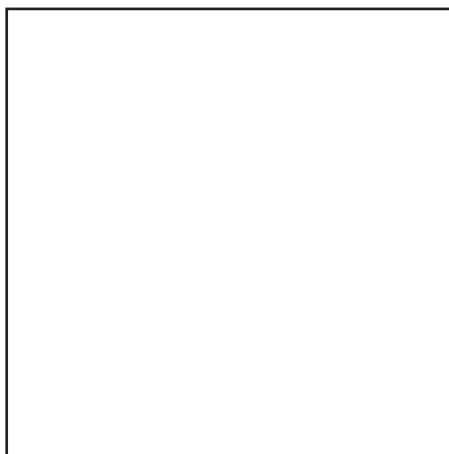
a)



b)



Write the dot diagram for the next square number.



Observe the multiplication table.

Multiplication Table

10									100
9							81		90
8						64	72		80
7					49	56	63		70
6				36	42	48	54		60
5			25	30	35	40	45		50
4		16	20	24	28	32	36		40
3	9	12	15	18	21	24	27		30
2	4	6	8	10	12	14	16	18	20
1	2	3	4	5	6	7	8	9	10

The red coloured numbers which run up and across are multiplied.

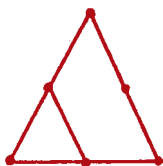
The green coloured numbers on the diagonal are square numbers.

Triangular Numbers

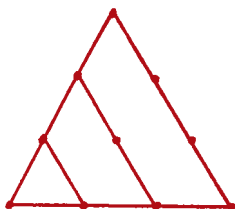
Observe the figures formed by joining the dots as shown.



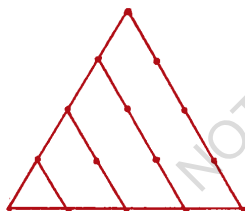
3 dots



6 dots



10 dots



15 dots

The numbers 3, 6, 10, and 15 are called “**Triangular Numbers**” as they form triangles.

Note : All numbers do not form triangular numbers.

The sequence of the triangular numbers can be obtained from the natural numbers as shown below. Study the pattern.

$$1$$

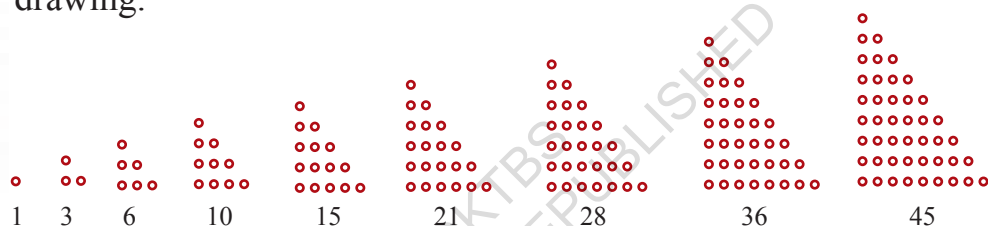
$$1+2 = 3$$

$$(1+2)+3 = 6$$

$$(1+2+3)+4 = 10$$

$$(1+2+3+4)+5 = 15$$

You can illustrate the same triangular numbers by the following drawing.



Observe these dot diagrams. Identify and write the triangular numbers formed in them.

a)

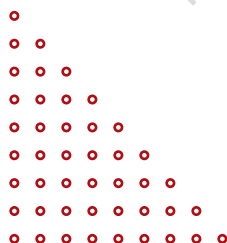


fig (a)

b)

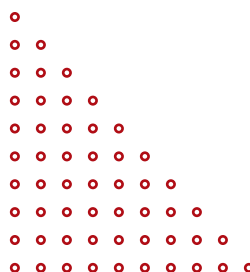


fig (b)

Odd numbers and consecutive square numbers

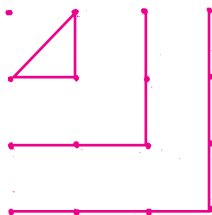
Observe the dot pattern and numbers.



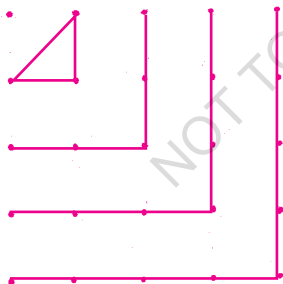
$$1 + 3 = 4$$



$$1 + 3 + 5 = 9$$



$$1 + 3 + 5 + 7 = 16$$



$$1 + 3 + 5 + 7 + 9 = 25$$

When consecutive odd numbers beginning from one are added we get a “**Square Number**”.

Look at these consecutive odd numbers- add them. Observe the type of number formed.

$$1 + 3 + 5 + 7 + 9 + 11 = \boxed{36}$$

$$1 + 3 + 5 + 7 + 9 + 11 + 13 = \boxed{49}$$

$$1 + 3 + 5 + 7 + 9 + 11 + 13 + 15 = \boxed{64}$$

$$1 + 3 + 5 + 7 + 9 + 11 + 13 + 15 + 17 = \boxed{81}$$

$$1 + 3 + 5 + 7 + 9 + 11 + 13 + 15 + 17 + 19 = \boxed{100}$$

36, 49, 64, 81 and 100 are square numbers.

Activity

Pick out consecutive odd numbers from the table and form square numbers.

1	2	3	4	5
6	7	8	9	10
11	12	13	14	15
16	17	18	19	20

Example

$$1 + 3 = 4$$

$$1 + 3 + 5 = 9$$

I. Solve the following problems.

Colour the square numbers in red and triangular numbers in

[illegible]

- List the square numbers.
- List the triangular numbers.
- How many square numbers are there from 1 to 50 ?
- How many triangular numbers are there from 1 to 50 ?

2) Observe the given pattern of numbers and fill in the space provided.

$$1 + 2 + 1 = \boxed{4}$$

$$1 + 2 + 3 + 2 + 1 = \boxed{9}$$

$$1+2+3+4+3+2+1 = \boxed{16}$$

$$\boxed{} = \boxed{}$$

$$\boxed{} = \boxed{}$$

$$\boxed{} = \boxed{}$$

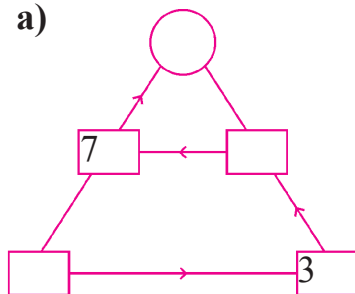
3. Express the following square numbers as the sum of consecutive odd numbers.

16, 36, 81, 100, 121, 144, 169, 225

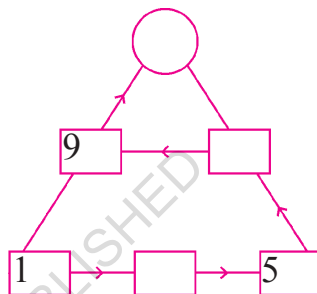
Example : $9 = 1 + 3 + 5$

4. Fill in the missing odd number and write the square number in the circle.

a)



b)



5. List the first four square numbers and triangular numbers. Represent them through dot diagrams.
6. Here is fun with triangular numbers. First complete the list and then write them in the table as shown.

1, 3, 6, 10, _____, _____, _____, 36, 45.

1	3	6	10				36	
	1	3	6	10				36

Now add them together and write the sum in the bottom row.

What can you say about the numbers formed in this row ?

Write your conclusion in the form of a statement.

7. Observe the given table.

Multiplication table of 3	Triangular Numbers	Square Numbers
$3 \times 1 = 3$	3, 6, 15, 21,	9
$3 \times 2 = 6$		
$3 \times 3 = 9$		
$3 \times 4 = 12$		
$3 \times 5 = 15$		
$3 \times 6 = 18$		
$3 \times 7 = 21$		
$3 \times 8 = 24$		
$3 \times 9 = 27$		
$3 \times 10 = 30$		

- Write multiplication tables of 4, 5 and 6. In each table, circle the triangular numbers as shown in the example. Draw a box for square numbers. List them in columns as shown.
- Write numbers from 51 to 100. Identify and list triangular numbers and square numbers.

Border strips and tiling patterns.

In your previous class you have learnt to make geometrical patterns based on symmetry.

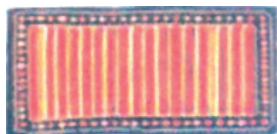
Observe the given patterns.



Think of some geometrical patterns based on symmetry and draw them.

In the same way we can make borders using patterns.

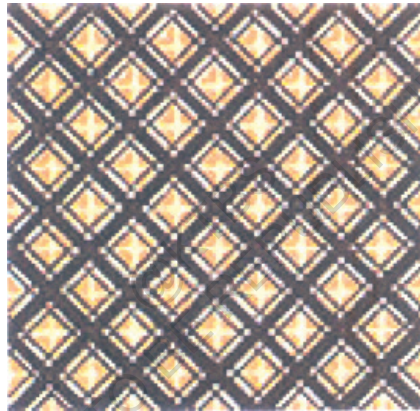
Observe the given borders :





We find that there is uniformity in design and space.

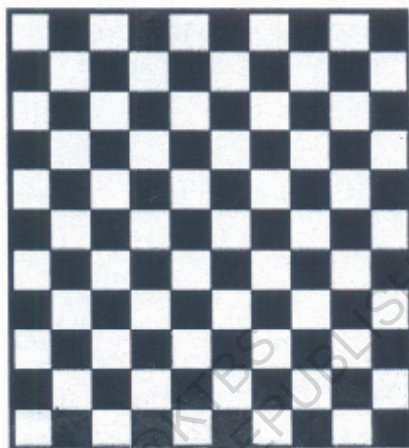
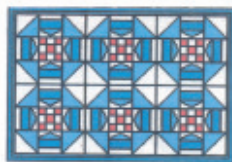
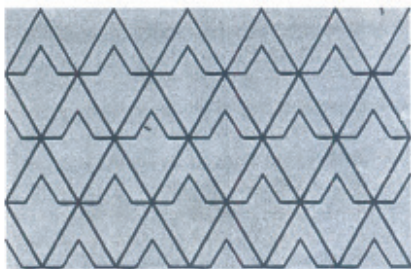
Observe the design of the floor.



Observe that tiles are placed in an uniform pattern without any gap or overlapping.

Observe a few more examples of tile patterns given below.





The floor of our houses, temples, platforms etc; are all tiled in an uniform pattern.

This pattern of laying a collection of individual tiles together without any gaps or overlaps to fill some flat space is called **“Tiling”**.

Exercise 10.2

I. Complete the border design.

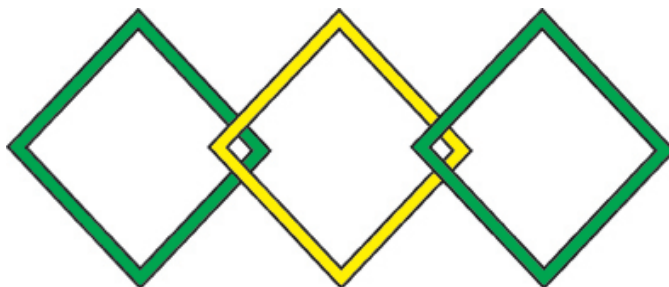
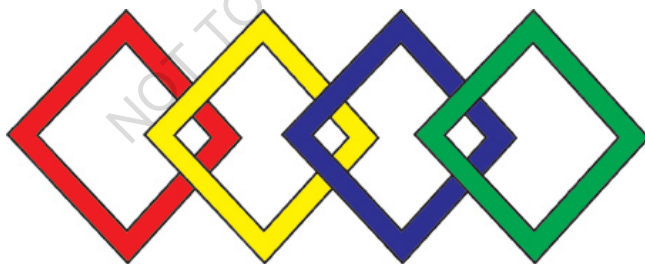
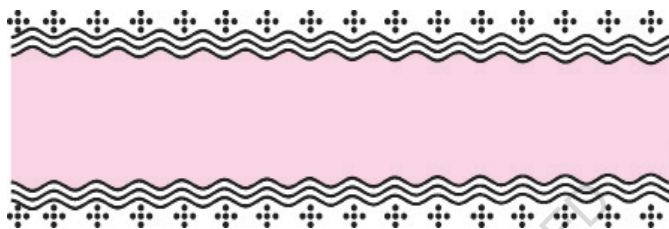
a)

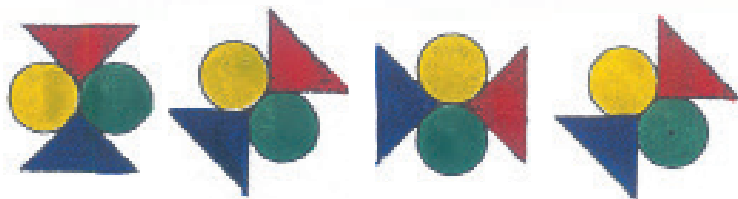


b)



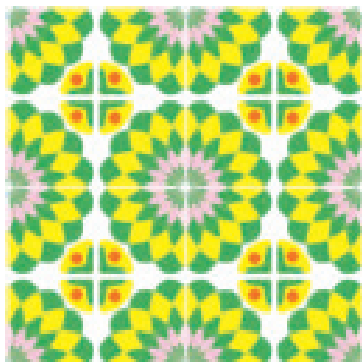
II. Observe the given border patterns and draw a few border patterns of your own.



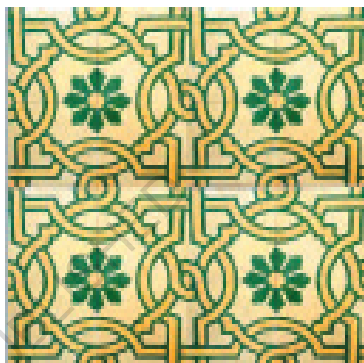


III. Observe a few more tiled designs.

A



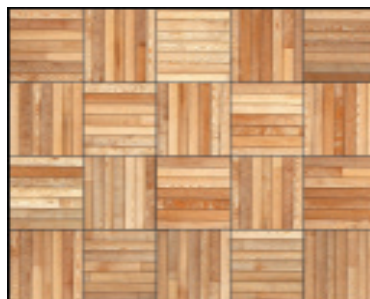
B



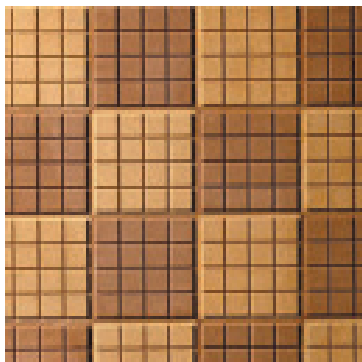
C



D



E

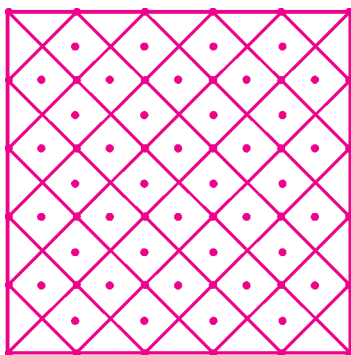


F



Activity

1. Observe the given tile pattern and make a design of your own.
Remember that there must be no gaps between them.

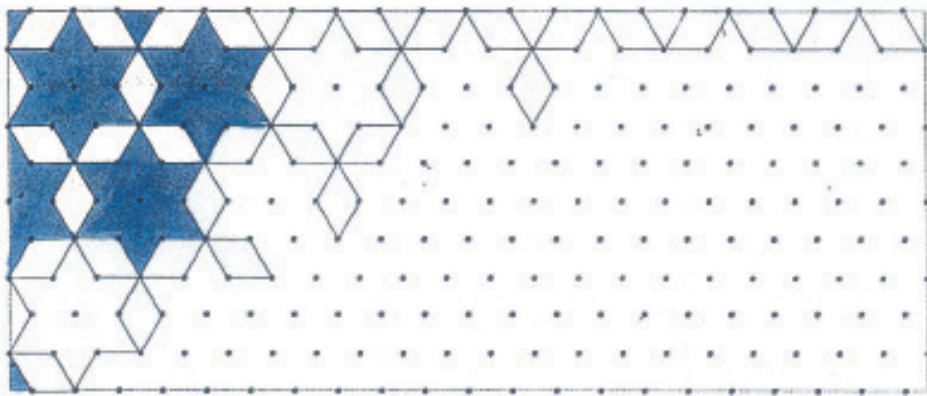


2. Look at the given shapes carefully.



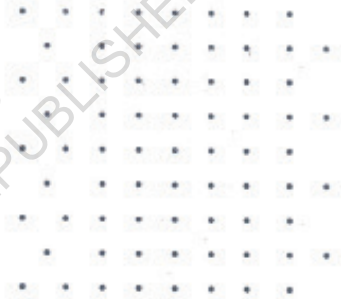
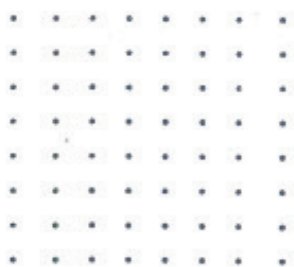
- Which of these shapes will tile a floor (without any gaps).
 - Make designs by using these shapes.
 - Create your own new tile design out of a square. Can you do the same with a triangle ? Try it.
3. Complete the tile design and colour them.





4. Make your own tile designs using the dots.

Colour them.



5. Make tiled designs and border designs using squares and triangles.



Answers

Chapter - 1

Exercise 1.1

- I. 1) 25,258 2) 25,276 3) 21,842 4) 38,064 5) 16,050
6) 52,576 7) 31,600 8) 52,300
- II. 1) 25,749 2) 27,639 3) 43,524 4) 30,205 5) 64,224
6) 39,555
- III. 1) 90250 2) 50,980 3) 86,158 4) 90,364 5) 75,609
6) 16,354 7) 38,036 8) 38,000
- IV. 1) 64,491 2) 78,730 3) 77,336 4) 90,351
- V. 1) 37,296 2) 17,280 3) ₹ 55,809 4) ₹ 44,505

Chapter - 2

Exercise 2.1

- I. 1) Quotient = 8, remainder = 0, 2) Quotient = 12, remainder = 0
3) Quotient = 13, remainder = 3, 4) Quotient = 10, remainder = 2
- II. 1) Quotient = 58, remainder = 0, 2) Quotient = 79, remainder = 0
3) Quotient = 23, remainder = 2, 4) Quotient = 43, remainder = 11
- III. 1) Quotient = 206, remainder = 5, 2) Quotient = 662, remainder = 1
3) Quotient = 95, remainder = 10, 4) Quotient = 203, remainder = 8
- IV. 1) Quotient = 12329, remainder = 0 2) Quotient = 2000, remainder = 5
3) Quotient = 3274, remainder = 5 4) Quotient = 1004, remainder = 8
- V. 1) 2 metres 2) 48 km 3) ₹ 86 4) ₹ 7,576
5) 1,140

Exercise 2.2

- I. 1) 410 2) ₹ 195 3) ₹ 1,080

Chapter - 3

Exercise 3.1

- I. 1) 8,000 2) 3,000 3) 15,000 4) 33,000
- II. 1) 30,000 2) 30,000 3) 50,000 4) 50,000
- III. 1) 78,000 2) 96,000 3) 53,000 4) 89,000

- IV. 1) 80,000 2) 80,000 3) 80,000 4) 60,000
- V. 1) 18,000 2) 14,000 3) 32,000 4) 45,000
- VI. 1) 20,000 2) 40,000 3) 30,000 4) 30,000
- VII. 1) 20,000 2) 45,000 3) 50,000 4) 60,000
- VIII. 1) 5 2) 40 3) 50 4) 200
- IX. 1) 30,000 2) 20,000 3) 4,000 km. 4) ₹ 10,000

Chapter - 4

Exercise 4.1

- II. 1) 0.12 2) 6.8 3) 10.5 4) 4.02 5) 6.84 6) 108.06
- III. 1) 0.8 2) 7.5 3) 8.5 4) 52.5
- IV. 1) 0.08 2) 0.72 3) 3.75 4) 4.80 5) 15.06
- V. 1) 0.75 2) 10.25 3) 8.70 4) 782.10 5) 20.50

Exercise 4.2

- I. 1) 0.8 2) 0.7 3) 0.6 4) 1.6 5) 4.2
- 6) 8.3 7) 0.07 8) 0.72 9) 8.61 10) 16.2
- 11) 1.41 12) 14.61 13) 0.5 14) 0.75 15) 0.4
- 16) 0.35 17) 0.76 18) 0.68 19) 0.65 20) 0.32
- II. 1) $\frac{7}{10}$ 2) $\frac{2}{100}$ 3) $\frac{38}{10}$ 4) $\frac{145}{10}$ 5) $\frac{56}{100}$
- 6) $\frac{803}{100}$ 7) $\frac{1457}{100}$ 8) $\frac{854}{10}$ 9) $\frac{1475}{10}$ 10) $\frac{85}{10}$
- 11) $\frac{8561}{100}$ 12) $\frac{684}{100}$

Chapter - 5

Exercise 5.1

- I. 1) ₹ 29.95 2) ₹ 8.75 3) ₹ 2,503.25 4) ₹ 620
- II. 1) ₹ 286.5 2) 3,200 paise 3) 1,975 paise 4) ₹ 47.05
- III. 1) ₹ 1075.75 2) ₹ 154.25 3) ₹ 63.50
- IV. 1) ₹ 151.75 2) ₹ 24.50 3) ₹ 99.25
4) ₹ 679.25 5) ₹ 699.25
- V. 1) ₹ 48 2) ₹ 600 3) ₹ 3375
4) ₹ 3,675 5) ₹ 69,120
- VI. 1) 400 2) ₹ 158 3) ₹ 1,475
4) ₹ 8 5) ₹ 1,611

Exercise 5.2

- I. 1) ₹ 843 2) ₹ 910

Chapter - 6

Exercise 6.1

- II. 1) 7,000 gram 2) 16,000 mg 3) 6 kg
4) 7.5 gram 5) 1,200 kg 6) 15 quintal
- III. 1) 16 kg 635 gram 2) 60 kg 782 gram 3) 28 kg
4) 36 kg 70 gram 5) 22 kg 330 gram
- IV. 1) 15 kg 30 gram 2) 35 kgs 125 gram 3) 30 kg 395 grma
4) 34 kg 70 gram 5) 40 kg 89 gram

- V. 1) 8 kg 250 gram 2) 39 kgs 500 gram 3) 88,500 kg
 4) 4,600 gram 5) 19 kg

Exercise 6.2

- II. 1) 5000 ml 2) 6,000 litre 3) $\frac{1}{2}$ litre 4) 8 litres
 III. 1) 10 litre 500 ml 2) 42 litres 550 ml
 3) 39 litre 650 ml 4) 16 kilo litre 150 litre
 IV. 1) 9 litre 600 ml 2) 39 litre 900 ml
 3) 29 litre 950 ml 4) 20 kilolitre 250 litre
 V. 1) 4 litre 750 ml 2) 8 litre 250 ml 3) 6 bottles
 4) 6 litres 100 ml 5) 412 litres 500 ml 6) 150 ml

Chapter- 7

Exercise 7.1

- III. 1) 11 : 25 p.m. 2) 12 : 35 p.m. 3) 2 : 45 p.m.
 4) 6 : 40 p.m. 5) 8 : 30 a.m. 6) 11 : 55 a.m.

Exercise 7.2

- II. 1) 10 hr.50 min 2) 5 hr.50 min 3) 6hr.30 min
 4) 8hr.20 min 5) 4 hr. 30 min 35s 6) 7 hr. 21 min 10 s
 7) 9hr. 11 min 10s 8) 2 yr.8m 9) 10 yr. 3m

Exercise 7.3

- II. 1) 2hr.20 min 2) 1hr.20min.25s 3) 2hr.40 min
 4) 30 min 5) 2yr.8 mth 6) 2yr.9 mth
 7) 2yr.6 mth

Exercise 7.4

- 1) 8hr 2) 28 days 3) 4hr.30min
 4) 5hr 5) 8hr 6) 18-10-2011

Chapter - 8

Exercise 8.1

1. a) ✗ b) ✓ c) ✓ d) ✓
2. a) (1) b) (1) c) (1) and (3)
5. a) ✗ b) ✓ c) ✓ d) ✗
7. a) 818 c) 18081 (f) MAM

Figure Round							W	8				
$\frac{1}{2}$ round	✓	✓	✓	✓	✓	✗	✗	✓	✓	✓	✓	✓
$\frac{1}{3}$ round	✗	✗	✓	✓	✓	✗	✗	✗	✗	✗	✓	✓
$\frac{1}{4}$ round	✓	✗	✓	✗	✗	✗	✗	✗	✓	✓	✗	✓
$\frac{1}{6}$ round	✗	✗	✓	✗	✓	✗	✗	✗	✗	✗	✓	✓

Exercise 8.2

- 3) a) H, I, N, O, S, Z b) N c) M

Chapter - 9

Exercise 9.1

- I. a) Square b) Two c) One, One
- II. a) ✗ b) ✗ c) ✓ d) ✓
- e) ✓ f) ✗ g) ✗ h) ✓
- i) ✓ j) ✗ k) ✗ l) ✗
- m) ✗ n) ✓ o) ✗ p) ✓

- III. Cube - 2, Cuboid - 1 Cylinder - 3 Cone - 2

