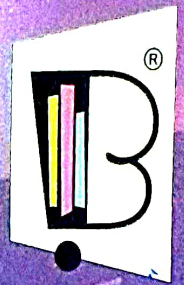


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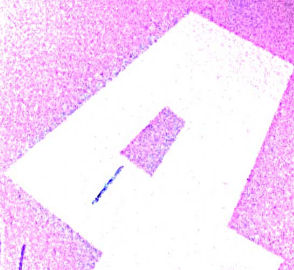
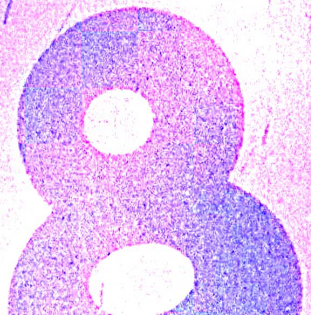
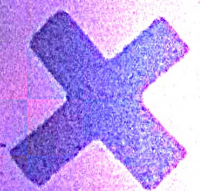
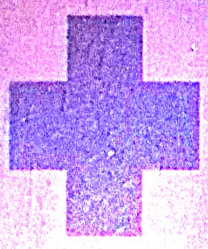


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# MATHS CHALLENGER

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# MATHS CHALLENGER

by  
**Shashank Shekhar**  
*M.A. (Maths)*



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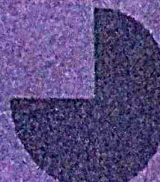
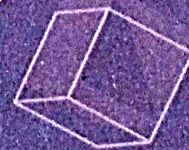
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# Preface

**M**athematics has always been central to a child's education and is a vital tool in dealing with real-life problems. The National Curriculum Framework states that the main goal of mathematics education is mathematisation of students' thinking and ways of solving problems. Therefore at school level the aim should not be just strengthening their numeracy skills but making them recognise mathematics as an important part of the development of their thought process, so that they learn to resolve everyday problems by reasoning mathematically.

Maths Challenger is a complete mathematics course for primary and junior schools which provides a clearly structured progression from classes 1 to 8. The course has been designed and written according to the latest mathematics syllabus. Child-friendly and infused with interest and enjoyment, the series uses a progressive approach to introduce new concepts and reinforce them through all the levels.

## Key features of the series are :

- **Travel Through** to revise the concepts learnt earlier and to be ready to discover the key elements of the topic. (**Readiness Section**)
- **Learning Outcomes** to clearly define the objectives of the chapter.
- Carefully graded in-text exercises for practice to engage the students to explore how the concept is used in everyday life. (**Engagement Section**)
- **Keep in Mind** to provide aid for avoiding mistakes while solving problems.
- **Do and Learn** to further strengthen concept-related knowledge through activities.
- **Pleasure Time** exercises, **Periodic Tests** and **Test Papers** that allow both students and teachers to check learner's progress. (**Mastery Section**)

We hope that this series will have a positive influence on children and encourage them to further explore the world of mathematics. We look forward to your response to the series.

Any suggestions for the improvement of the books are most welcome.

—**Publisher**



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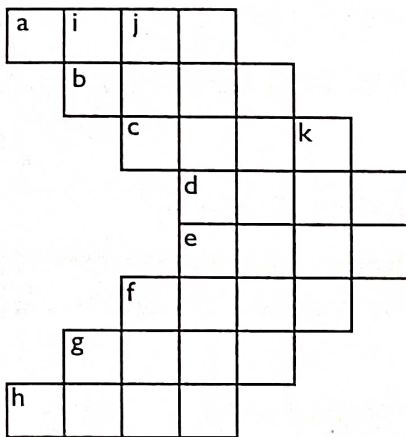
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## Travel Through

**Readiness**

○ Fill in the boxes using the clues given.



- (d) Place value of 5 in 5,364
- (e) Smallest number using digits 9, 1, 2, and 8
- (f) Number before 9310
- (g)  $1000 + 900 + 70$
- (h) The smallest among 3509, 3905 and 3095

Now check using the “Down” clues

- (f) Largest three-digit number
- (g) The value of a digit goes up this many times as it moves to the left of the place value chart
- (i) Number of tens in 480.
- (j) 1000 less than 1167
- (k) Nine thousand eighty-nine.

Across

- (a) Three thousand four hundred eighteen
- (b) 1000 more than 7639
- (c) 7 thousands, 8 hundreds and 9 ones



## Learning Outcomes

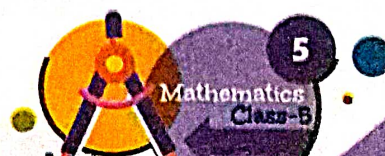
- Numbers Beyond 9999
- The International Place Value Chart
- Ordering of Numbers
- Building Numbers
- The Indian Place Value Chart
- Comparing Numbers
- Successor and Predecessor
- Rounding Numbers

## Numbers Beyond 9999

**Engagement**

In the previous class, we learnt about 3- and 4- digit numbers.

In this class, we will learn larger numbers with 5-, 6-, 7- and 8-digits.



## 5-digit numbers

We know that

- ✿ the digits of a number are placed from right to left according to their place value
- ✿ 5-digit numbers are placed in the place value chart as follows

Ten Thousands
Thousands
Hundreds
Tens
Ones

- ✿ we read numbers from the extreme left
- ✿ numbers can also be represented on a counting frame called an abacus.

We also know that 9999 is the largest 4-digit number and adding 1 to it will give the smallest 5-digit number.

**Table 1.1** Forming smallest numbers up to 5 digits

	1-digit	2-digits	3-digits	4-digits
Largest number	9	99	999	9999
To make smallest number	9 + 1	99 + 1	999 + 1	9999 + 1
Smallest number	10 (2-digits)	100 (3-digits)	1000 (4-digits)	10000 (5-digits)

## Reading 5-digit numbers

Let us consider the number 45250.

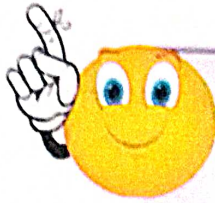
Learn the place value chart well for reading numbers correctly.



TTh	Th	H	T	O
10000	1000	100	10	0
10000	1000	100	10	0
10000	1000	↓	10	0
10000	1000	↓	10	0
↓	1000	↓	10	0
4 ten thousands	5 thousands	2 hundreds	5 tens	0 ones

## Expanded notation of 45250

4	0	0	0	0	TTh
	5	0	0	0	Th
		2	0	0	H
			5	0	T
+				0	O
	4	5	2	5	0



### Keep in Mind

Thousands of years ago, the people of Sumer, a region in modern day Iraq, developed a pictographic writing system. They denoted the numbers by inscribing symbols on baked clay stones.

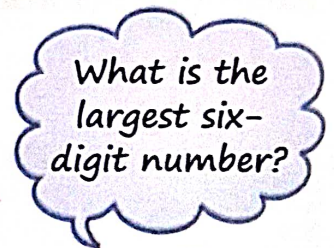
Hence, the number 45250 is read as forty-five thousand two hundred and fifty.

## 6-digit numbers

We know that 9999 is the largest 4-digit number and 99999 is the largest 5-digit number.

So, adding 1 to the largest 5-digit number will give you the smallest 6-digit number.

9	9	9	9	9	Largest 5-digit number
	+			1	
1	0	0	0	0	0
					Smallest 6-digit number



524314 is a 6-digit number which is read as five lakh twenty-four thousand three hundred and fourteen.

The following table gives the list of smallest and largest numbers from 1-digit to 7-digit.

**Table 1.2** Smallest and largest digit numbers

Smallest numbers	Number of Digits	Largest numbers
1	One-digit	9
10	Two-digit	99
100	Three-digit	999

1000

10000

100000

1000000

Four-digit

Five-digit

Six-digit

Seven-digit

9999

99999

999999

9999999

### Reading 6-digit numbers

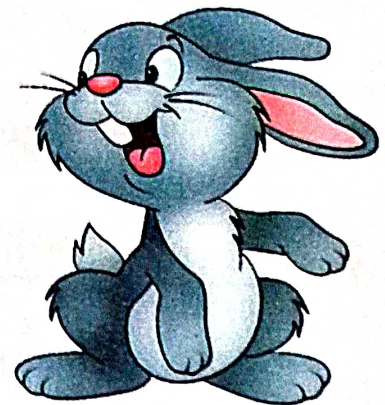
How would you read 543213 as?

Add the numbers in the place value chart.

L	TTh	Th	H	T	O
5	4	3	2	1	3

Expanded notation of 543213

5	0	0	0	0	0	L
	4	0	0	0	0	TTh
		3	0	0	0	Th
			2	0	0	H
				1	0	T
					3	O
+						
5	4	3	2	1	3	



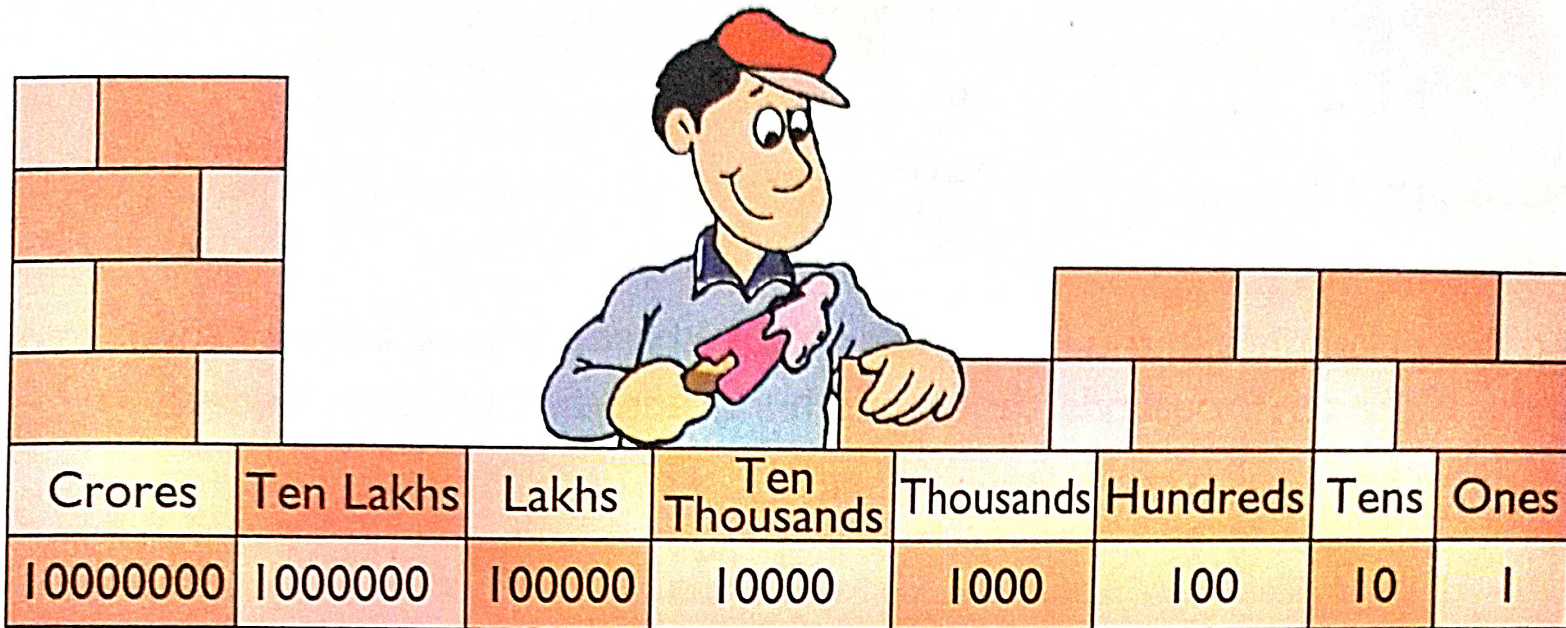
Hence, the number 543213 will be read as five lakh forty-three thousand two hundred and thirteen.

### The Indian Place Value Chart




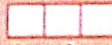
Engagemen

Let us understand the Indian and International systems of representing numbers. We know that 5-digit numbers are placed across ten thousands, thousands, hundreds, tens and ones places from the extreme left to the right respectively. The numbers are read from left to right.

The Indian place value chart is given below.



The blocks used in the Indian place value chart are given below.

Block of crores	Block of Lakhs		Block of thousands		Block of ones		
C	TL	L	TTh	Th	H	T	O
The fourth block  is the block of crores. The block of crores can have 1, 2 or 3-digits.	The third block  is the block of lakhs. It has 2-digits, for lakhs and tenlakhs places.		The second block  is the block of thousands. It has 2-digits, for thousands and ten thousands places.		The first block  is the block of ones. It has 3-digits, for hundreds, tens and ones places.		

In the Indian place value chart, a 6-digit number is placed in lakhs, ten thousands, thousands, hundreds, tens and ones places. In the Indian place value chart, the number 529871 is placed as

L	TTh	Th	H	T	O
5	2	9	8	7	1

The number is read as "five lakh twenty-nine thousand eight hundred and seventy-one".

Also, a 7-digit number in the Indian place value chart is placed across ten lakhs, lakhs, ten thousands, thousands, hundreds, tens and ones place.

In the Indian place value chart, the number 6529871 is placed as

TL	L	TTh	Th	H	T	O
6	5	2	9	8	7	1

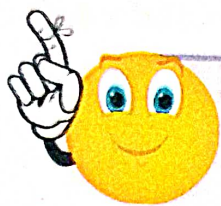
The number is read as "sixty-five lakh twenty-nine thousand eight hundred and seventy-one".

An 8-digit number in the Indian place value chart is placed across crores, ten lakhs, lakhs, ten thousands, thousands, hundreds, tens and ones places.

In Indian place value chart, the number 36529871 is placed as

C	TL	L	TTh	Th	H	T	O
3	6	5	2	9	8	7	1

The number is read as "three crore sixty-five lakh twenty-nine thousand eight hundred and seventy-one".



*Keep in Mind*

You might wonder about the number of people whose lives are related to fish. In all there are about one hundred lakh fish workers—who catch fish, clean and sell them, make and repair nets and boats, etc. We also have a name for this big number—'One hundred lakh' is called a crore.

**Example 1.** Write the numbers in words and arrange them in blocks in figure given below.

- (a) 678936      (b) 1523450      (c) 23247539      (d) 124500761

**Solution:** (a) Six lakh seventy-eight thousand nine hundred and thirty-six

(b) Fifteen lakh twenty-three thousand four hundred and fifty

(c) Two crore thirty-two lakh forty-seven thousand five hundred and thirty-nine

(d) Twelve crore forty-five lakh seven hundred and sixty-one

Crores	Lakhs		Thousands		Ones			
	C	TL	L	TTh	Th	H	T	O
			6	7	8	9	3	6
	1		5	2	3	4	5	0
2	3		2	4	7	5	3	9
12	4		5	0	0	7	6	1

**Example 2.** Write the number names in digits.

- (a) Four lakh five thousand six hundred and eighty-two.
- (b) Thirty-two lakh forty-one thousand six.
- (c) Two crore five lakh eighty-nine thousand four hundred and eighty-two.




*Group the blocks*  
Arrange the numbers in the right block and put zero in the blank blocks.


**Solution :**

Crores Block		Lakhs Block		Thousands Block		Ones Block			
			4	0	5	6	8	2	= 405682

Crores Block		Lakhs Block		Thousands Block		Ones Block			
		3	2	4	1	0	0	6	= 3241006

Crores Block		Lakhs Block		Thousands Block		Ones Block			
	2	0	5	8	9	4	8	2	= 20589482

 **Progress CHECK-UP-1**

 **Pleasure TIME**

**Mastery**

**1. Write the following numbers in words.**

- (a) 324071 .....
- (b) 1745300 .....

**2. Write the following number names in figures.**

- (a) Forty-six lakh twenty-two thousand three hundred and forty-seven  
.....  
.....
- (b) Six lakh four thousand five hundred  
.....  
.....



(c) Nine crore fifty-six lakh fourteen thousand eight hundred and three

(d) Seventy lakh thirty-three thousand and seventy-two

(e) Two crore ninety-three lakh

3. Write the numbers in expanded form.

(a) 324763 = .....

(b) 1456604 = .....

(c) 2399890 = .....

(d) 1754650 = .....

(e) 10776249 = .....

4. Write the numbers.

(a)  $200000 + 0 + 4000 + 300 + 40 + 5 = \dots\dots\dots$

(b)  $80000000 + 7000000 + 900000 + 20000 + 3000 + 900 + 60 + \dots\dots\dots$   
 $= \dots\dots\dots$

(c)  $9000000 + 600000 + 60000 + 4000 + 300 + 70 + 3 = \dots\dots\dots$

(d)  $4000000 + 800000 + 40000 + 2000 + 200 + 70 + 1 = \dots\dots\dots$

(e)  $300000000 + 0 + 4000000 + 500000 + 0 + 0 + 300 + 80 + \dots\dots\dots$   
 $= \dots\dots\dots$

**The International Place Value Chart**

**Engagement**

In the International system of numbers, the place value chart is divided into three blocks, namely, ones, thousands and millions.

Each block is divided into three places, each ones block is divided into ones, tens and hundreds. Each thousands block is divided into thousands, ten thousands and hundred thousands. Each millions block is divided into millions, ten millions and hundred millions.

So, the International place value chart can be represented as follows :

Millions			Thousands			Ones		
Hundred Millions	Ten Millions	Millions	Hundred Thousands	Ten Thousands	Thousands	Hundreds	Tens	Ones
100000000	10000000	1000000	100000	10000	1000	100	10	1

**Example 3.** Write the following in words according to the International place value chart.

- (a) 138,901      (b) 4,392,625      (c) 394,799,813

**Solution :** (a) One hundred and thirty-eight thousand nine hundred and one.

(b) Four million three hundred and ninety-two thousand six hundred and twenty-five.

(c) Three hundred and ninety-four million seven hundred and ninety-nine thousand eight hundred and thirteen.



*Keep in Mind*

- To read a number in International system put commas after every 3-digits starting from the right side.
- Number names of numbers up to 5-digit numbers are the same as the Indian system of numbers.

**Example 4.** Write the following number names in figures.

(a) Three hundred and forty-five thousand one hundred and seventy-six.

(b) Four million one hundred thousand three hundred and sixty-four.

**Solution :** (a) It is written in figures as 345,176.

Millions			Thousands			Ones		
			3	4	5	1	7	6

(b) It is written in figures as 4,100,364.

Millions			Thousands			Ones		
		4	1	0	0	3	6	4

**Example 5.** Using the International place value chart, find the place value of 8 in the following numbers.

- 1,329,418, 1,392,814, 1,398,214,  
1,893,142, 8,193,241.

**Solution.** The place values of 8 in the given numbers are as follows.



*Keep in Mind*

- Arrange the numbers in three blocks divided into three sub-divisions.
- After arranging, put zero in the vacant blocks.

	In figures	In words
1,329,418	8	Eight (ones)
1,392,814	800	Eight hundred (hundreds)
1,398,214	8000	Eight thousand (thousands)
1,893,142	800000	Eight hundred thousand (hundred thousand)
8,193,241	8000000	Eight million (millions)



## Progress CHECK-UP-2



### Pleasure TIME

Mast

1. Write the number names in the International system of numbers.

(a) 4923450 .....

(b) 50200 .....

2. Write the following number names in figures using the International system of numbers.

(a) Three hundred thousand four hundred and fifty-five. ....

(b) Four million two hundred and sixteen thousand four hundred and four. ....

(c) Hundred and six thousand five hundred and eighty. ....

(d) Ninety million six hundred and twenty-four thousand seven hundred and seventy-seven. ....

(e) Two hundred and sixty million four thousand fifty-nine. ....

3. Using the International place value chart write the place value of 6 in the following numbers.

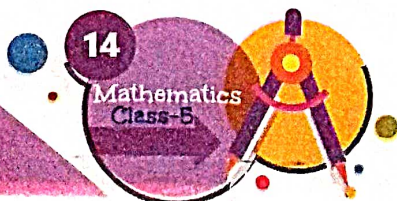
	In figures	In words
(a) 3,457,896	.....	.....

(b) 4,623,512	.....	.....
---------------	-------	-------

(c) 396,002,529	.....	.....
-----------------	-------	-------

(d) 627,840,321	.....	.....
-----------------	-------	-------

(e) 237,951,162	.....	.....
-----------------	-------	-------

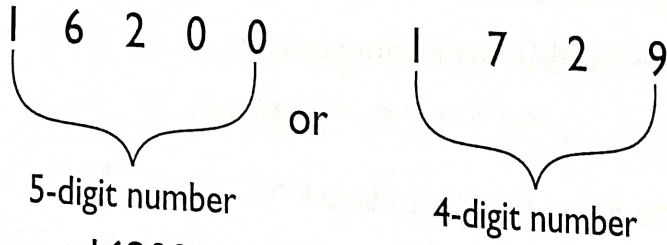


# Comparing Numbers

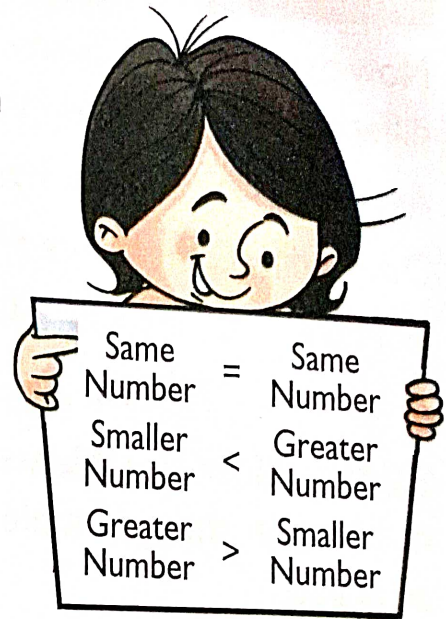
## Different number of digits

When we compare numbers, the number with maximum number of digits will be the greatest.

Which is greater 16200 or 1729?



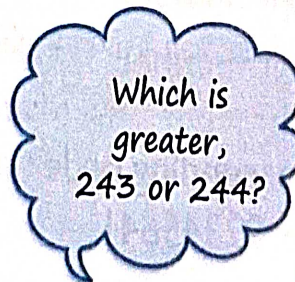
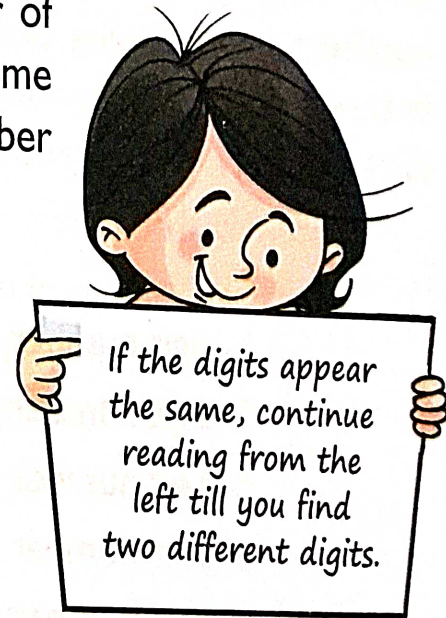
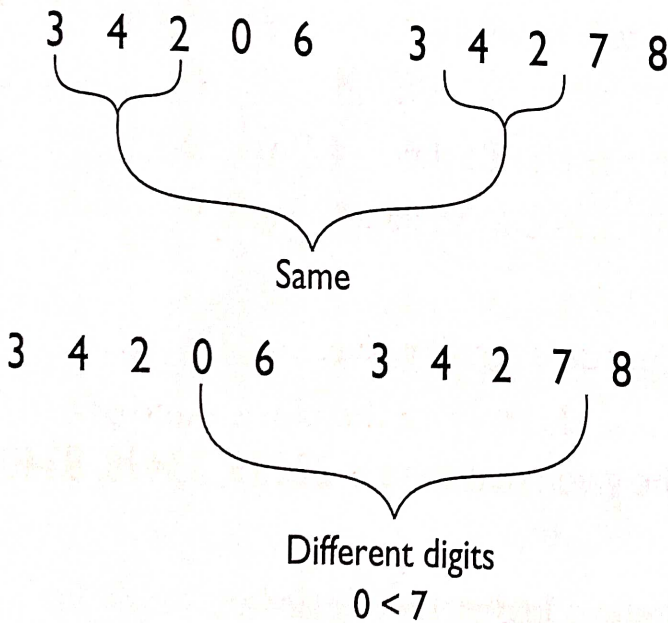
Hence,  $16200 > 1729$ .



## Same number of digits

When we compare numbers with same number of digits we start reading the numbers from the extreme left until we reach two different digits. The number with greater digit is larger.

Compare 34206 and 34278.



Hence,  $34206 < 34278$ .



## Ordering of Numbers

Now that we are familiar with numbers from 1-digit to 9-digits, we will learn a different approach to arrange numbers in an order.

**Ascending Order** is the arrangement of numbers from smallest to largest.

**Descending Order** is the arrangement of numbers from largest to smallest.

**Example 6.** Arrange the following numbers in ascending order.

764576, 22039, 564869, 33498, 83409, 92345641

**Solution :** Make a table with a place value chart as shown below. Write the numbers in the grid table according to the order in which they are to be arranged.

Observe the numbers, we have three 5-digit numbers. We will arrange the 5-digit numbers in ascending order. Then we have 6-digit numbers which can be entered after 5-digit numbers in ascending order. Now we are left with one 9-digit number, which is entered after the 6-digit number.

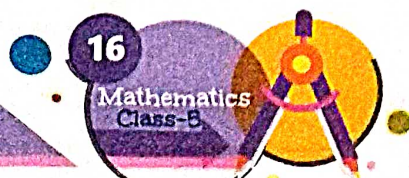
	C	TL	L	TTh	Th	H	T	O
5-digit number				2	2	0	3	9
5-digit number				3	3	4	9	8
5-digit number				8	3	4	0	9
6-digit number			5	6	4	8	6	9
6-digit number			7	6	4	5	7	6
9-digit number	9	2	3	4	5	6	4	1

Therefore, the ascending order of the given numbers is 22039, 33498, 83409, 564869, 764576, 92345641

**Example 7.** Arrange the following numbers in descending order.

49316, 5070892, 4231, 894563, 56432120, 69678450

**Solution :** Observe the numbers. The number with the least number of digits is 4231. Therefore put it in the first row. Then we have 5-, 6-, 7-, 8- and 9-digit numbers, which can be arranged successively.



	C	TL	L	TTh	Th	H	T	O
4-digit number					4	2	3	1
5-digit number				4	9	3	1	6
6-digit number			8	9	4	5	6	3
7-digit number		5	0	7	0	8	9	2
8-digit number	5	6	4	3	2	1	2	0
9-digit number	2	9	6	7	8	4	5	0

Therefore, the descending order of the given numbers is 29678450, 56432120, 5070892, 894563, 49316, 4231.

### Successor and Predecessor

The successor of a number is the number obtained after adding 1 to it.

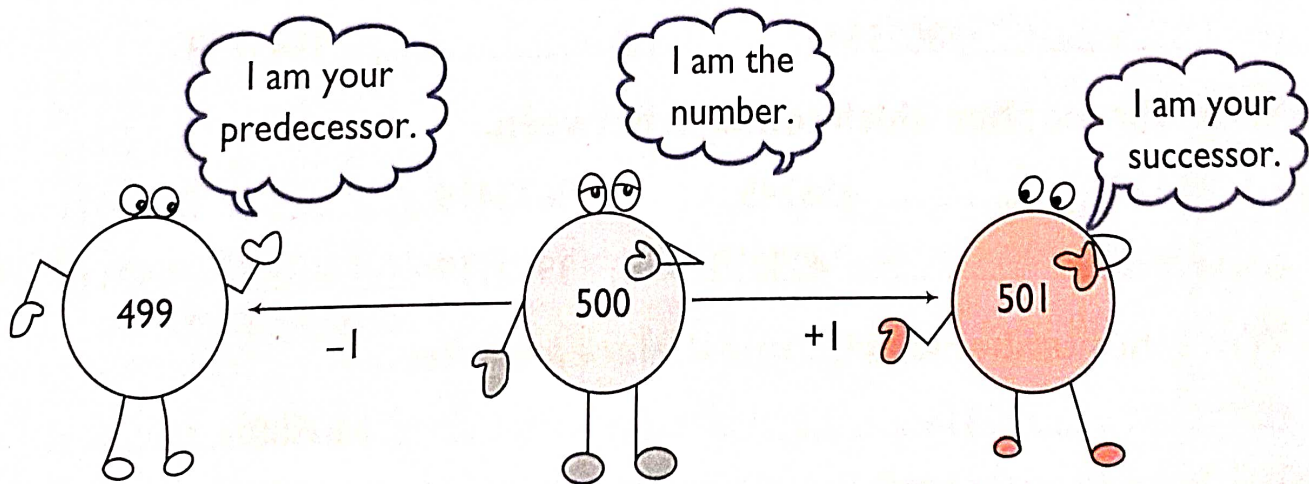
9 is the successor of 8. Since,  $8 + 1 = 9$

12 is the successor of 11. Since,  $11 + 1 = 12$

Predecessor of a number is the number one less than the given number.

8 is the predecessor of 9. Since,  $9 - 1 = 8$

11 is the predecessor of 12. Since,  $12 - 1 = 11$



### Progress CHECK-UP-3



### Pleasure TIME

### Mastery

1. Fill in the blanks:

(a) 100 thousands = ..... lakh

(b) 700 thousands = ..... lakhs

(c) 4 hundred thousands = ..... lakhs

(d) 6 lakhs = ..... hundred thousands

2. Compare the numbers and put  $>$ ,  $<$  or  $=$  in between :

(a) 54321 ..... 5342

(b) 36872 ..... 36872

(c) 86789 ..... 85469

(d) 77452 ..... 79364

(e) 93426 ..... 92138

(f) 62034 ..... 65139

3. Arrange the numbers in ascending and descending order.

(a) 56405, 2326, 492310, 13645980, 23476, 8943722

(b) 1321324, 3131338, 4592670, 23914027, 143256489, 8946786

(c) 494321, 200008, 9241432, 8145647, 6266786, 934994

4. Write the successor.

(a) 384572 .....

(b) 290600 .....

(c) 55673210 .....

(d) 34939999 .....

5. Write the predecessor.

(a) ..... 49251

(b) ..... 32476890

(c) ..... 18025344

(d) ..... 3943758

6. Write the number which comes in between.

(a) 456243 ..... 456245

(b) 8673419 ..... 8673421

(c) 42325222 ..... 42325224

(d) 3952117 ..... 3952119

7. Write the number which comes before and after.

(a) ..... 29316 .....

(b) ..... 340500 .....

(c) ..... 4954655 .....

(d) ..... 11880900 .....

## Building Numbers

## Engagement

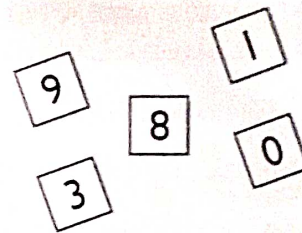
Tarun and Kim are playing a number game. They have been given a few digits and they have to make the greatest and smallest possible number using those digits.



## Building the greatest number

Five different digits are given below.  
The number to be formed should have the highest place value of ten thousand.

Numbers with Kim



**Step 1.** Place the greatest digit in the highest place value box.

TTh	Th	H	T	O
9				

**Step 2.** Place the next greatest digit in the next highest place value box.

TTh	Th	H	T	O
9	8			

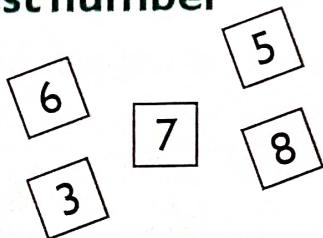
**Step 3.** Now place the third greatest digit and so on.

TTh	Th	H	T	O
9	8	3	1	0

So, the greatest number formed is 98310.

## Building the smallest number

Numbers with Tarun



**Step 1.** Place the smallest digit in the highest place value box.

TTh	Th	H	T	O
3				

**Step 2.** Place the next smallest digit in the next highest place value box and so on.

TTh	Th	H	T	O
3	5	6	7	8

So, the smallest number formed is 35678.

The greatest number can be built in descending order. 9, 8, 3, 1, 0 is in descending order.



The smallest number can be built in ascending order, 3, 5, 6, 7, 8 is in ascending order.



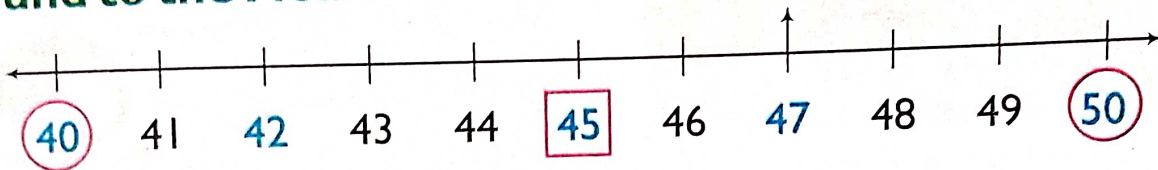
## Rounding Numbers

See the following examples,

- (i) I need about ₹300 to buy vegetables.
- (ii) I won the election by about 20,000 votes!
- (iii) There are about 2,500 stamps in my collection.

The figures mentioned above are not exact. They only tell **about** how many of how much. They are also called **rounded numbers**. We use certain rules to round numbers.

### Round to the Nearest 10



42 is rounded down to 40.

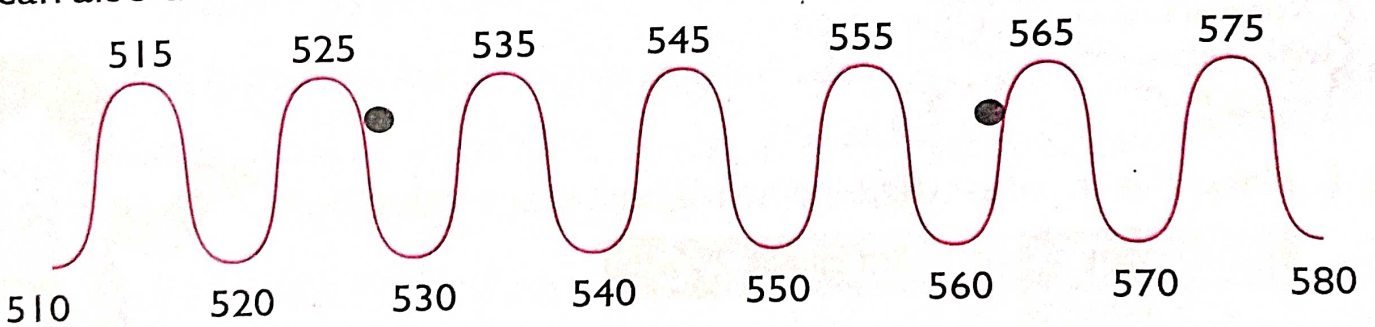
47 is rounded up to 50.

45 is midway so it is rounded up to 50.

#### Steps :

1. Find between which two tens the number lies.
2. Round to the closest ten.
3. A number at the midway point is always rounded up to the next larger number.

You can also think of the number line as a series of hills and valleys.



Imagine a ball at the number 526. It would roll to the number 530.

526 rounded to the nearest 10 is 530.

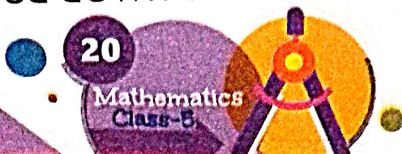
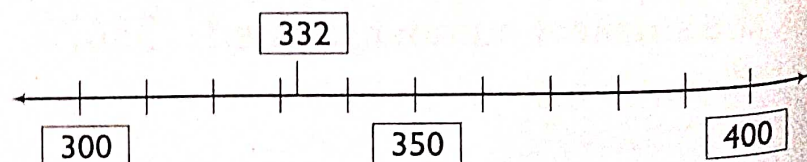
A ball at 564 would roll back to 560. 564 rounded to the nearest 10 is 560.

### Round to the Nearest 100

Round 332 to the nearest 100. 332 is between 300 and 400.

332 is closer to 300.

332 is rounded down to 300.





1. Which of these numbers can you round without it mattering? Put a (✓) next to those which you can and a (X) next to those you cannot.
 

(a) Your shoe size	<input type="checkbox"/>
(b) Your telephone number	<input type="checkbox"/>
(c) Number of children in your city	<input type="checkbox"/>
(d) Your house number	<input type="checkbox"/>
(e) Number of books in a library	<input type="checkbox"/>
  
2. Round to the nearest 10.
 

(a) 65 .....	(b) 91 .....	(c) 78 .....
(d) 115 .....	(e) 488 .....	(f) 225 .....
  
3. Round to the nearest 100.
 

(a) 436 .....	(b) 651 .....	(c) 318 .....
(d) 205 .....	(e) 770 .....	(f) 536 .....
  
4. Write the smallest and greatest number of five digits using the digits 7, 8, 2, 4 and 9. Do not repeat any digit in each number.
5. Use the digits 8, 3, 6 to build a number that rounds up to 370.
6. 87 students of a craft class are to be given one diya each to paint. How many diyas should the craft teacher order to the nearest 10?
7. The school cook prepares lunch for 285 children. For how many children should he prepare, rounded to the nearest 10?
8. 885 people were expected for the school function. How many chairs should be hired, rounded to the nearest 100?
9. Amrit was taking sweets for his friends in school. There are 53 children in his class. How many sweets should he take rounded to the nearest 10? Can Amrit round down the figure or must he round it up?
10. Find the difference between largest number formed by using 3, 2, 5, 9, 1 and smallest number formed by using 9, 8, 6, 7, 7.



### Travel Through

Reading

1. Write each of the following in Roman numerals.

- (a) 9                      (b) 12                      (c) 23                      (d) 28                      (e) 30  
 (f) 18                      (g) 27                      (h) 47                      (i) 61                      (j) 56

2. Write each of the following in Hindu-Arabic numerals.

- (a) VI                      (b) XIII                      (c) XXIV                      (d) XL                      (e) LXI  
 (f) XLI                      (g) LXX                      (h) XIX                      (i) XXXIX                      (j) XXIX

3. Place the correct sign = or  $\neq$  in the boxes.

- (a) XXXVIII  30 + 8                      (b) 30 + 4  XXXVI  
 (f) XXVI  20 + 6                      (g) 50 + 7  LIX



### Learning Outcomes

- Roman Numerals
- Roman Numerals for Hindu-Arabic Numerals

### Roman Numerals

Engagement

Ancient Romans used alphabet symbols for writing numbers. We also use them for writing class names, parts of a question, on clock faces, etc.

The Roman numerals are formed by only 7 symbols – I, V, X, L, C, D and M. The Hindu-Arabic value of each symbol is given below :

<b>Roman symbol</b>	I	V	X	L	C	D	M
<b>Hindu-Arabic value</b>	1	5	10	50	100	500	1000

### Roman Numerals for Hindu-Arabic Numerals

The rules for forming various Roman numerals are common for I, X, C and M. The rules for V, L and D are different from these. But these rules are common for V, L and D.

Rule	Example		
1. Symbols I, X, C and M can be repeated for 3 times only.	III	= 1 + 1 + 1	= 3
	XXX	= 10 + 10 + 10	= 30
2. Symbols V, L and D can never be repeated.	CCC	= 100 + 100 + 100	= 300
	MMM	= 1000 + 1000 + 1000	= 3000
3. Only I, X and C can be used for both addition and subtraction. When the smaller symbol is to the right, it is to be added and when it is to the left, it is subtracted.	XI	= 10 + 1	= 11
	IX	= 10 - 1	= 9
	CX	= 100 + 10	= 110
	XC	= 100 - 10	= 90
	MC	= 1000 + 100	= 1100
	CM	= 1000 - 100	= 900
4. Symbol I can be subtracted from symbol V and X only.	IV	= 5 - 1	= 4
	IX	= 10 - 1	= 9
5. Symbol X can be subtracted from L and C only.	XL	= 50 - 10	= 40
	XC	= 100 - 10	= 90
6. Symbol C can be subtracted from D and M only.	CD	= 500 - 100	= 400
	CM	= 1000 - 100	= 900
7. But the symbols V, L and D can never be subtracted.	VX not possible		
8. When a smaller numeral is placed between two larger numerals, then it is always subtracted from the larger numeral immediately following it.	XIV	= 10 + (5 - 1)	= 14
	XIX	= 10 + (10 - 1)	= 19
	CXIV	= 100 + [10 + (5 - 1)]	= 114
	CXC	= 100 + (100 - 10)	= 190

There is no Roman numeral for zero (0).

To understand and become able to write Roman numerals efficiently, learn the following symmetrical pattern.

M	1000	C	100	X	10	I	1
MM	2000	CC	200	XX	20	II	2

MMM	3000	CCC	300	XXX	30	III	3
		CD	400	XL	40	IV	4
		D	500	L	50	V	5
		DC	600	LX	60	VI	6
		DCC	700	LXX	70	VII	7
		DCCC	800	LXXX	80	VIII	8
		CM	900	XC	90	IX	9
		M	1000	C	100	X	10

You can write any Roman numeral with the help of this table.

**Example 1.** Write following Hindu-Arabic numerals in Roman numerals.

- (a) 89      (b) 93      (c) 139      (d) 395      (e) 589

**Solution:**

(a)  $89 = 80 + 9 = 50 + 30 + (10 - 1) = \text{LXXXIX}$

(b)  $93 = 90 + 3 = (100 - 10) + 3 = \text{XCIII}$

(c)  $139 = 100 + 30 + (10 - 1) = \text{CXXXIX}$

(d)  $395 = 300 + (100 - 10) + 5 = \text{CCCXCV}$

(e)  $589 = 500 + 50 + 30 + (10 - 1) = \text{DLXXXIX}$

**Example 2.** Write following Roman numerals in Hindu-Arabic numerals.

- (a) XLIV      (b) XXIX      (c) LXXXVIII      (d) XCIV      (e) DCCL

**Solution:**

(a)  $\text{XLIV} = \text{XL} + \text{IV} = (50 - 10) + (5 - 1) = 40 + 4 = 44$

(b)  $\text{XXIX} = \text{XX} + \text{IX} = 20 + (10 - 1) = 20 + 9 = 29$

(c)  $\text{LXXXVIII} = \text{L} + \text{XXX} + \text{VIII} = 50 + 30 + 8 = 88$

(d)  $\text{XCIV} = \text{XC} + \text{IV} = (100 - 10) + (5 - 1) = 90 + 4 = 94$

(e)  $\text{DCCLIV} = \text{D} + \text{CC} + \text{L} + \text{IV} = 500 + 200 + 50 + 4 = 754$

**Example 3.** Add:  $\text{XCV} + \text{LX}$

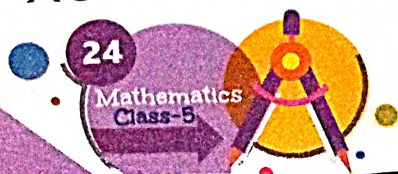
**Solution:**

$\text{XCV} + \text{LX} = 95 + 60 = 155 = \text{CLV}$

**Example 4.** Subtract:  $\text{XC} - \text{XL}$

**Solution:**

$\text{XC} - \text{XL} = 90 - 40 = 50 = \text{L}$





Pleasure TIME

Mastery

1. Write the following Hindu-Arabic numerals in Roman numerals :

- (a) 24
- (b) 78
- (c) 96
- (d) 146
- (e) 328
- (f) 447
- (g) 666
- (h) 979
- (i) 999

2. Write the following Roman numerals in Hindu-Arabic numerals :

- (a) XLVI
- (b) XCIV
- (c) CXXIX
- (d) CCXV
- (e) CDLXVI
- (f) CCCXXIX
- (g) DCLIV
- (h) DCCXVI
- (i) CMLXXIV

3. Add :

- (a) XXXIV + IV
- (b) XXXVIII + VIII
- (c) XL + X
- (d) CXX + XL
- (e) XXIII + XXVI
- (f) XXX + XVII

4. Subtract :

- (a) L - V
- (b) XL - V
- (c) XC - XL
- (d) CD - CC
- (e) XXX - XXIII
- (f) XXXVI - XXVI



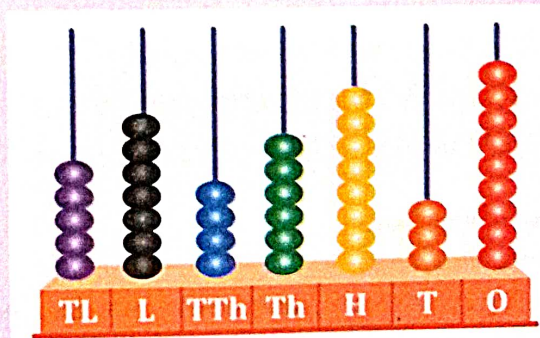
Do and Learn

**Objective** To represent a 7-digit number on an abacus.

**Materials Required** An abacus having 7 spikes, beads of different colours— violet, indigo, blue, green, yellow, orange and red.

**Method** (i) Let us represent a 7-digit number, 5746839 on the abacus.

- (ii) Start from the right most spike, write O, T, H, Th, T-Th, L, T-L on the base of spikes.
- (iii) Put 9 red beads on the spike marked O.
- (iv) Put 3 orange beads on the spike marked T.
- (v) Put 8 yellow beads on the spike marked H.
- (vi) Put 6 green beads on the spike marked Th.
- (vii) Put 4 blue beads on the spike marked T-Th.
- (viii) Put 7 black beads on the spike marked L.
- (ix) Put 5 violet beads on the spike marked T-L.



# 3

# Operation on Large Numbers

Readiness



## Travel Through

1. Add the following.

(a) 7259 and 6925

(b) 9537 and 7892

(c) 8729 and 8538

2. Subtract the following.

(a) 2753 from 4878

(b) 4312 from 6504

(c) 1234 from 5323

3. Multiply the following.

(a)  $297 \times 9$

(b)  $358 \times 18$

(c)  $67 \times 77$

(d)  $256 \times 64$

4. Divide the following.

(a)  $64 \div 8$

(b)  $819 \div 9$

(c)  $2200 \div 10$

(d)  $3000 \div 30$

5. Read the following stories carefully and solve them.

(a) Mr. Sharma purchased a washing machine and a computer costing ₹ 9795 and ₹ 8286, respectively. How much money does he need to pay in all?

(b) 45 oranges are kept in a basket. The oranges are to be distributed to 15 students equally. How many oranges each student will get?



## Learning Outcomes

- Addition ● Properties of Addition ● Subtraction ● Properties of Subtraction
- Word Problems on Addition and subtraction ● Multiplication
- Properties of Multiplication
- Multiplication of a number by 10, 100 and 1000 and their Multiples
- Division ● Properties of Division ● Division of a number by 10, 100 and 1000
- Word Problems and multiplication and division
- BODMAS RULE—Order of operations

## ADDITION

## Engagement

We know that how to add 4-digit and 5-digit numbers. Now let's learn to add 6-digit, 7-digit and 8-digit numbers.



To add two or more large numbers, we follow the same rules, as learned in previous class. Let us recall the steps involved in addition.

**Step 1** Arrange the numbers in columns of place value chart.

**Step 2** Start adding the numbers column-wise, from right to left.

**Step 3** Regroup (carry over) whenever the sum in a column exceeds 9.

Let us learn through examples.

**Example 1 :** Add 2347659 and 3478241.

**Solution :** Arranging the numbers in columns, we get

	TL	L	TTh	Th	H	T	O
		①	①		①	①	
	2	3	4	7	6	5	9
+	3	4	7	8	2	4	1
	5	8	2	5	9	0	0

∴ The required sum is 5825900.

**Example 2 :** Find the sum of 12745, 340508 and 4837965.

**Solution :** Arranging the numbers in columns and then adding :

	TL	L	TTh	Th	H	T	O
	①		①	②	①	①	
			1	2	7	4	5
		3	4	0	5	0	8
+	4	8	3	7	9	6	5
	5	1	9	1	2	1	8

∴ The required sum is 5191218.

### Try This

Complete the magic square.

44		
99		
58		90

## PROPERTIES OF ADDITION

- ✦ The addends can be added in any order. Their sum remains the same.  
For example,  $4,285 + 6,382 = 10,667$  and  $6,382 + 4,285 = 10,667$
- ✦ Even if the grouping of addends is changed, the sum remains the same.  
For example,  $(35,000 + 60,000) + 9,500 = 1,04,500$   
 $35,000 + (60,000 + 9,500) = 1,04,500$   
 $(35,000 + 9,500) + 60,000 = 1,04,500$
- ✦ The sum of zero and the number is the number itself.  
For example,  $5,12,577 + 0 = 5,12,577$  and  $0 + 42,586 = 42,586$
- ✦ When 1 is added to a number, the sum is the successor of that number.  
For example,  $13,685 + 1 = 13,686$



## Progress CHECK-UP-1



### Pleasure TIME

Maste

1. Add the following numbers. Remember to mark the periods.

$$\begin{array}{r} \text{(a)} \quad 1104882 \\ + 7735378 \\ \hline \end{array}$$

$$\begin{array}{r} \text{(b)} \quad 5197722 \\ + 7012393 \\ \hline \end{array}$$

$$\begin{array}{r} \text{(c)} \quad 1114350 \\ + 3879565 \\ \hline \end{array}$$

$$\begin{array}{r} \text{(d)} \quad 1230001 \\ + 7833518 \\ \hline \end{array}$$

$$\begin{array}{r} \text{(e)} \quad 8474032 \\ + 3879565 \\ \hline \end{array}$$

$$\begin{array}{r} \text{(f)} \quad 8445110 \\ + 7145928 \\ \hline \end{array}$$

2. Arrange the following addends in columns and find the sum.

$$\text{(a)} \quad 4,04,296 + 3,87,404 + 1,19,738$$

$$\text{(b)} \quad 10,895 + 29,876 + 4,987$$

$$\text{(c)} \quad 75,84,926 + 3,28,974 + 49,875$$

$$\text{(d)} \quad 2,08,94,578 + 68,72,954 + 8,76,543$$

3. Fill in the missing digits.

$$\begin{array}{r} \text{(a)} \quad 5 \ 6 \ 5 \ 8 \ 7 \ \square \ 2 \\ + 3 \ 8 \ \square \ 2 \ 9 \ 7 \ 5 \\ \hline 9 \ \square \ 0 \ \square \ 7 \ 1 \ \square \end{array}$$

$$\begin{array}{r} \text{(b)} \quad 6 \ \square \ 2 \ 8 \ 0 \ 9 \ 4 \\ + 1 \ 8 \ 6 \ \square \ 9 \ 8 \ \square \\ \hline 8 \ 3 \ \square \ 3 \ 0 \ \square \ 1 \end{array}$$

$$\begin{array}{r} \text{(c)} \quad 2 \ \square \ 4 \ \square \ 6 \ \square \ 8 \ \square \\ + \ \square \ 5 \ \square \ 7 \ 8 \ 9 \ 3 \ 2 \\ \hline 6 \ 9 \ 1 \ 3 \ \square \ 7 \ \square \ 1 \end{array}$$



4. Use the properties of addition to fill in the blanks.

- (a)  $172850 + 93327 = \dots\dots\dots + 172850$   
 (b)  $\dots\dots\dots + 1223185 = 1223185 + 156329$   
 (c)  $284615 + \dots\dots\dots = 284615$   
 (d)  $24867 + (104183 + 90999) = (24867 + 104183) + \dots\dots\dots$

**SUBTRACTION**

**Engagement**

We subtract 6, 7 and 8 digit numbers in the same way as we subtract numbers smaller than them.

To subtract the large numbers, we follow the same rules as learnt in previous class. Let us recall the steps involved in subtraction.

- Step 1** Arrange the numbers in columns of place value chart.  
**Step 2** Start subtracting the numbers column-wise, from right to left.  
**Step 3** Regroup (borrow), if digit of minuend is smaller than that of subtrahend.

Let us learn through examples.

**Example 3 :** Subtract 40,98,938 from 43,69,728.

**Solution :** Arranging the numbers in columns, we get

	TL	L	TTh	Th	H	T	O
					16		
	2	16	8	<del>8</del>	<del>8</del>	12	
	4	<del>3</del>	<del>6</del>	<del>9</del>	<del>7</del>	<del>2</del>	8
-	4	0	9	8	9	3	8
	2	7	0	7	9	0	



**Keep in Mind**  
 The greater number should always be above the smaller number.

∴ The required difference is 270790.

**Example 4 :** Subtract 4,19,53,782 from 8,42,18,956.

**Solution :** Arranging the numbers in columns, we get

	C	TL	L	TTh	Th	H	T	O
			11					
		3	<del>1</del>	11		8	15	
	8	<del>4</del>	<del>2</del>	<del>1</del>	8	<del>9</del>	<del>5</del>	6
-	4	1	9	5	3	7	8	2
	4	2	2	6	5	1	7	4

∴ The required difference is 42265174.



## PROPERTIES OF SUBTRACTION

- ✦ The order of numbers involved in subtraction cannot be changed.  
For example,  $42,237 - 34,899 \neq 34,899 - 42,237$
- ✦ When a number is subtracted from itself, the difference is always '0'.  
For example,  $54,245 - 54,245 = 0$
- ✦ When zero is subtracted from the number, the difference is the number itself.  
For example,  $35,50,628 - 0 = 35,50,628$
- ✦ When 1 is subtracted from a number, the difference is the predecessor of that number.  
For example,  $80,10,324 - 1 = 80,10,323$



## Progress CHECK-UP-2



### Pleasure TIME

Master

1. Subtract the following numbers. Remember to mark the periods.

$$\begin{array}{r} (a) \quad 6083175 \\ - 2294321 \\ \hline \end{array}$$

$$\begin{array}{r} (b) \quad 42806321 \\ - 38170403 \\ \hline \end{array}$$

$$\begin{array}{r} (c) \quad 79809742 \\ - 77009845 \\ \hline \end{array}$$

$$\begin{array}{r} (d) \quad 42785673 \\ - 6893215 \\ \hline \end{array}$$

$$\begin{array}{r} (e) \quad 63508713 \\ - 28434285 \\ \hline \end{array}$$

$$\begin{array}{r} (f) \quad 80103325 \\ - 7010185 \\ \hline \end{array}$$

2. Subtract each of the following and check the answer.

$$(a) \quad 3,28,175 - 2,89,305$$

$$(b) \quad 42,87,603 - 29,65,711$$

$$(c) \quad 98,43,275 - 39,67,908$$

$$(d) \quad 33,43,801 - 28,97,664$$

3. Fill in the missing digits:

$$\begin{array}{r} (a) \quad 182465 \\ - \quad \square\square\square3\square \\ \hline 912\square4 \end{array}$$

$$\begin{array}{r} (b) \quad 7386\square74 \\ - 51306\square\square \\ \hline \square\square\square\square417 \end{array}$$

$$\begin{array}{r} (c) \quad \square7\square563\square1 \\ - 3410\square\square0\square \\ \hline 6\square7\square2520 \end{array}$$

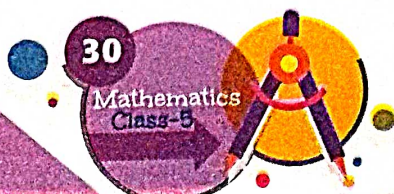
4. Find the difference on subtracting the following.

$$(a) \quad 60,894 \text{ from } 98,789$$

$$(b) \quad 1,63,498 \text{ from } 2,00,057$$

$$(c) \quad 87,99,999 \text{ from } 90,00,000$$

$$(d) \quad 2,76,49,849 \text{ from } 5,00,80,700$$



5. Use the properties of subtraction to fill in the blanks.

(a)  $41,98,332 - 0 = \dots\dots\dots$

(b)  $17,70,800 - \dots\dots\dots = 17,70,799$

(c)  $\dots\dots\dots - 33,609 = 0$

(d)  $54,245 - 1 = \dots\dots\dots$

**WORD PROBLEMS ON ADDITION AND SUBTRACTION**

**Engagement**

**Example 5.** A factory manufactured 63,82,260 toys in 2015, 34,06,281 toys in 2016 and 27,32,058 toys in 2017. How many toys were manufactured in three years?



**Solution :** Number of toys manufactured in 2015 = 6382260

Number of toys manufactured in 2016 = 3406281

Number of toys manufactured in 2017 = + 2732058

Total number of toys manufactured = 12520599

Thus, 1,25,20,599 toys were manufactured in three years.

**Example 6.** The sum of two numbers is 4,14,82,308. If one number is 39,18,695, find the other number.

**Solution :** Sum of two numbers = 41482308

One of the number = - 3918695

Other number = 37563613

Thus, the other number is 3,75,63,613.



**Progress CHECK-UP-3**



**Pleasure TIME**

**Mastery**

1. A dam pumped 1,42,39,053 gallons of water in May. It pumped 80,46,190 gallons in June. How much water is pumped in all?
2. For the famine and disease campaign, three schools collected ₹ 15,35,984, ₹ 6,82,703 and ₹ 59,86,345. How much did they collect altogether?
3. In 2018, a factory produced 73,76,248 bikes. Next year, the number of bikes produced was 10,53,489 more than those produced in 2018. How many bikes were produced during these two years?

4. Mr. Bajaj paid ₹ 94,24,176 as income tax in 2004, ₹ 13,75,324 in 2005 and ₹ 1,74,10,240 in 2006. He got a refund of ₹ 20,15,400. How much income tax did he pay altogether?
5. There are 9,24,09,540 women, 7,65,85,372 men and 3,78,49,075 children in a city. What is the total population of the city? How many more women are there than men?
6. The sum of two numbers is 8,47,51,923. If one number is 3,84,60,025, find the other number.
7. What should be subtracted from 2,59,84,327 to get 52,10,015?
8. Find the difference between the largest number and the smallest number that can be formed using the digits 6, 2, 8, 0, 9, 4 and 5.

## MULTIPLICATION

## Engagement

Large numbers are multiplied in a similar way like small numbers. Rules remain the same. Let us recall the steps involved in multiplication.

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

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

**Step 3** If the multiplier has more than one digit, then multiply the multiplicand first by ones digit of the multiplier, then tens, hundreds and so on.

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

**Step 5** Add all the products.

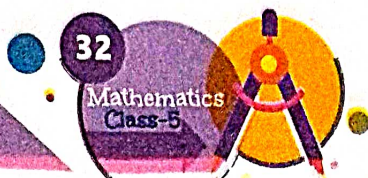
Let us learn through examples.

**Example 7.** Find  $23450 \times 125$ .

**Solution :**

$$\begin{array}{r}
 23450 \\
 \times 125 \longrightarrow (100 + 20 + 5) \\
 \hline
 117250 \longleftarrow (23450 \times 5) \\
 469000 \longleftarrow (23450 \times 20) \\
 2345000 \longleftarrow (23450 \times 100) \\
 \hline
 2931250
 \end{array}$$

$\therefore$  The required product is 2931250.



**Example 8.** Multiply 39786 by 317.

**Solution :**

$$\begin{array}{r} 39786 \\ \times 317 \longrightarrow (300 + 10 + 7) \\ \hline 278502 \longleftarrow (39786 \times 7) \\ 397860 \longleftarrow (39786 \times 10) \\ 11935800 \longleftarrow (39786 \times 300) \\ \hline \underline{12612162} \end{array}$$

## PROPERTIES OF MULTIPLICATION

❖ The product of two numbers remains the same, when the order of the numbers is changed.

For example,  $131 \times 28 = 3668$  and  $28 \times 131 = 3668$

❖ The product of three numbers does not change when the grouping of numbers is changed.

For example,  $413 \times (21 \times 5) = 413 \times 105 = 43365$

$$(413 \times 21) \times 5 = 8673 \times 5 = 43365$$

❖ When a number is multiplied by 1, the product is the number itself.

For example,  $23150 \times 1 = 23150$

❖ When a number is multiplied by 0, the product is 0.

For example,  $3462 \times 0 = 0$

❖ The product of a number and a sum is equal to the sum of the individual products of the addends and the number.

For example,  $8290 \times (584 + 96) = (8290 \times 584) + (8290 \times 96)$

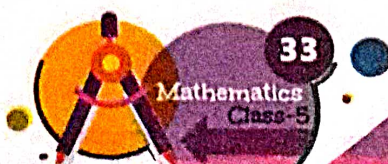
## MULTIPLICATION OF A NUMBER BY 10, 100, 1000 AND THEIR MULTIPLES

1. To multiply a number by 10, 20, 30, ... 90, we multiply the number by 1, 2, 3, ... 9 respectively and add one zero to the right of the number.

For example,  $287 \times 10 = 2870$

$$3287 \times 30 = (3287 \times 3) \times 10 = 9861 \times 10 = 98610$$

2. To multiply a number by 100, 200, 300, ... 900, we multiply the number by 1, 2, 3, ... 9 respectively and add two zeros to the right of the number.



For example,  $175 \times 100 = 17500$

$829 \times 800 = (829 \times 8) \times 100 = 6632 \times 100 = 663200$

3. To multiply a number by 1000, 2000, 3000, ... 9000, we multiply a number by 1, 2, 3, ... 9 respectively and add three zeros to the right of the number.

For example,  $128 \times 1000 = 128000$

$3557 \times 4000 = (3557 \times 4) \times 1000 = 14228 \times 1000 = 14228000$

**Example 9.** Multiply : (a) 637 by 30 (b) 2436 by 500 (c) 5308 × 4000

**Solution :** (a) **Step 1** Carry out the multiplication with the non-zero part of the multiplier.

$$637 \times 3 = 1911$$

**Step 2** Count the zero(s) of the multiplier. Put the same number of zeros to the extreme right of the product.

So,  $637 \times 30 = 19,110$

Similarly, (b)  $2436 \times 500 = 1218000$

[∵  $2436 \times 5 = 12180$ ]

(c)  $5308 \times 4000 = 21232000$

[∵  $5308 \times 4 = 21232$ ]



## Progress CHECK-UP-4



### Pleasure TIME

Ma

1. Find the products.

(a) 
$$\begin{array}{r} 382 \\ \times 563 \\ \hline \end{array}$$

(b) 
$$\begin{array}{r} 935 \\ \times 748 \\ \hline \end{array}$$

(c) 
$$\begin{array}{r} 735 \\ \times 239 \\ \hline \end{array}$$

(d) 
$$\begin{array}{r} 6834 \\ \times 923 \\ \hline \end{array}$$

2. Arrange in columns and multiply the following.

(a)  $826 \times 109$

(b)  $1325 \times 63$

(c)  $2104 \times 189$

(d)  $845 \times 683$

(e)  $65 \times 3014$

(f)  $989 \times 122$

3. Fill in the blanks.

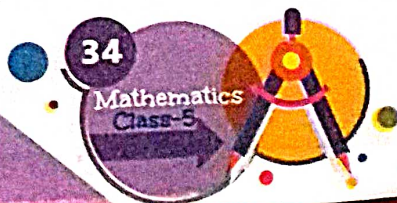
(a)  $4285 \times \dots = 4285$

(b)  $3105 \times \dots = 0$

(c)  $1185 \times 2105 = 2105 \times \dots$

(d)  $27 \times (121 \times 23) = (27 \times \dots) \times 23$

(e)  $119 \times (100 + 17) = (\dots \times 100) + (119 \times \dots)$



#### 4. Find the product without actual multiplying.

- (a)  $6323 \times 10 = \dots\dots\dots$  (b)  $2799 \times 10 = \dots\dots\dots$   
 (c)  $4215 \times 100 = \dots\dots\dots$  (d)  $3612 \times 100 = \dots\dots\dots$   
 (e)  $2560 \times 1000 = \dots\dots\dots$  (f)  $4795 \times 1000 = \dots\dots\dots$

#### 5. Find the product of the following.

- (a)  $122 \times 50$  (b)  $225 \times 300$  (c)  $301 \times 5000$   
 (d)  $81 \times 6000$  (e)  $278 \times 200$  (f)  $3269 \times 60$

### DIVISION

### Engagement

For the division of large numbers, we follow the same method as we have followed to divide small numbers. Keep in mind the following tips of division.

- ✦ Start division from the extreme left.
- ✦ If the first digit of the dividend is less than the divisor, then take the first two digit together.
- ✦ If the number formed by these digits is less than, the divisor then take three digits together and so on.

Let us learn through examples.

**Example 10.** Divide 68,457 by 32 and check your answer.

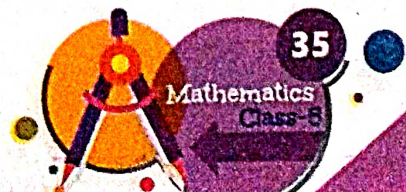
**Solution :**

$$\begin{array}{r}
 2139 \\
 32 \overline{) 68457} \\
 \underline{-64} \phantom{00} \\
 44 \phantom{00} \\
 \underline{32} \phantom{00} \\
 125 \phantom{00} \\
 \underline{-96} \phantom{00} \\
 297 \phantom{00} \\
 \underline{-288} \phantom{00} \\
 9
 \end{array}$$

- ✦ The divisor is a 2-digit number, so consider the number formed by two digits from the left that is 68.
- ✦ Now, divide 68 by 32.
- ✦ Since  $32 \times 2 = 64$ , so write 2 as quotient. Write 64 under 68 and subtract,  $68 - 64 = 4$ .
- ✦ Bring down the next digit 4 from the dividend.
- ✦ Now, divide 44 by 32.
- ✦ Since  $32 \times 1 = 32$ , so write 1 as quotient with 2. Write 32 under 44 and subtract,  $44 - 32 = 12$ .
- ✦ Bring down 5 and then divide 125 by 32.
- ✦  $32 \times 3 = 96$ . Write 3 as quotient with 21. Write 96 under 125 and subtract,  $125 - 96 = 29$ .
- ✦ Bring 7 down.
- ✦ Divide 297 by 32.

#### Keep in Mind

Remainder cannot be greater than the divisor.



❖ Since  $32 \times 9 = 288$  so, write 9 as quotient with 213. Write 288 under and subtract,  $297 - 288 = 9$ .

$\therefore 68,457 \div 32$  gives 2139 as quotient and 9 as remainder.

**Check:** (Quotient  $\times$  Divisor) + Remainder  
 $= (2139 \times 32) + 9 = 68,448 + 9 = 68,457 = \text{Dividend}$

**Example 11.** Divide 68,10,359 by 1,324.

**Solution:**

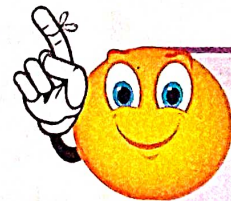
$$\begin{array}{r}
 5143 \\
 1324 \overline{) 6810359} \\
 \underline{-6620} \phantom{00} \\
 1903 \phantom{00} \\
 \underline{-1324} \phantom{00} \\
 5795 \phantom{00} \\
 \underline{-5296} \phantom{00} \\
 4999 \phantom{00} \\
 \underline{-3972} \phantom{00} \\
 1027
 \end{array}$$

**Example 12.** Find the dividend when :

Divisor = 216, Quotient = 31 and Remainder = 65

**Solution:** Dividend = Divisor  $\times$  Quotient + Remainder  
 $= 216 \times 31 + 65$   
 $= 6696 + 65 = 6761$

Thus, Dividend = 6761.



*Keep in Mind*  
 We cannot divide  
 number by 0. So, w  
 any number (say 4  
 $\div 0 = \text{undefined}$ .

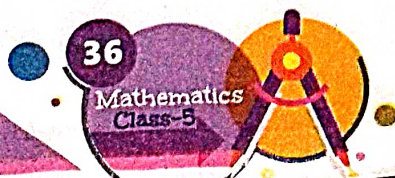
## PROPERTIES OF DIVISION

- ❖ When a number is divided by itself, the quotient is 1.  
 For example,  $98374 \div 98374 = 1$
- ❖ When a number is divided by 1, the quotient is the number itself.  
 For example,  $37745 \div 1 = 37745$
- ❖ When 0 is divided by a non-zero number, the quotient is always zero.  
 For example,  $0 \div 28694 = 0$

## DIVISION OF A NUMBER BY 10, 100 AND 1000

To divide a number by 10, 100, 1000 etc.

- ❖ Count the number of zeros in the divisor.



- Count the same number of digits from the extreme right of the number.
- The number formed by those digits is the remainder.
- The rest of the digits form the quotient.

For example,  $2837 \div 10 \Rightarrow Q = 283; R = 7$

$5296 \div 100 \Rightarrow Q = 52; R = 96$

$9968 \div 1000 \Rightarrow Q = 9; R = 968$  and so on.



## Progress CHECK-UP-5



### Pleasure TIME

### Mastery

1. Solve the following in your notebook.

(a)  $92 \overline{)80647}$

(b)  $98 \overline{)5068732}$

(c)  $214 \overline{)371265}$

(d)  $305 \overline{)2871697}$

(e)  $342 \overline{)864921}$

(f)  $34 \overline{)9979684}$

2. Find the quotient and remainder, then check your answer.

(a)  $3697 \div 27$

(b)  $204995 \div 19$

(c)  $46238 \div 26$

(d)  $7230113 \div 673$

(e)  $496753 \div 306$

(f)  $525798 \div 124$

(g)  $624505 \div 368$

(h)  $589727 \div 285$

(i)  $11849600 \div 9050$

3. Find the dividend when :

(a) Divisor = 235, Quotient = 2503, Remainder = 85

(b) Divisor = 992, Quotient = 3267, Remainder = 532

4. Fill in the blanks.

(a)  $42,817 \div \dots = 1$

(b)  $\dots \div 60,301 = 0$

(c)  $12,000 \div 1 = \dots$

(d)  $90,815 \div \dots = 90,815$

(e)  $42,815 \div 0 = \dots$

5. Complete the given table without actual division.

Number	Divided by 10		Divided by 100		Divided by 1000		Divided by 10000	
	Q	R	Q	R	Q	R	Q	R
(a) 30,488								
(b) 42,825								
(c) 57,199								
(d) 30,528								
(e) 6,31,083								

## WORD PROBLEMS ON MULTIPLICATION AND DIVISION

**Example 13.** The air ticket from Delhi to Dubai is ₹ 8678. In a flight, 135 passengers travelled from Delhi to Dubai. What was total fare paid by the passengers?

**Solution:** Cost of 1 ticket = ₹ 8678  
Cost of 135 tickets = ₹  $(8678 \times 135)$

Thus, the total fare paid by the passengers was ₹ 11,71,530.

**Example 14.** 59,668 tiles are to be sent to a different city. Only 7 similar loading vehicles are available. How many tiles should be loaded on each vehicle?

**Solution:** Number of tiles to be loaded = 59,668  
Number of vehicles = 7  
 $\therefore$  Number of tiles that can be loaded in each vehicle  
 $= 59,668 \div 7 = 8524$

Thus, 8524 tiles should be loaded in each vehicle.



*Keep in Mind*

*When we are given for 1 and have to find for more, we multiply.*

*When we are given for more and have to find for 1, we divide.*



## Progress CHECK-UP-6



### Pleasure TIME

1. If a truck can carry 6,745 kg of rice, how much rice can 185 similar trucks carry?
2. How many toys will be there in 1,085 boxes if one box of toys contain 721 toys?
3. If 2,600 bulbs were manufactured every day, how many bulbs were manufactured in the month of March?
4. A newspaper contains 185 columns. Each column contains 120 lines. Each line has 25 letters. How many letters are there in the newspaper?
5. 275 trees can grow in one orchard. If the total number of trees are 17,47,350, how many similar orchards will they grow in?



- 182 water tanks of the same capacity can hold 16,33,450 litres of water. What is the capacity of each tank?
- The cost of a cap is ₹ 65. How many caps can Mr. Choudhary buy for ₹ 2,500? How much money will be left with him?
- By what number should 17,30,40,062 be divided to get 4,082?

## BODMAS RULE – ORDER OF OPERATIONS

### Engagement

When a calculation involves more operations, the order of the operations is important.

The order of these operations is given by a rule called **BODMAS**.

BODMAS stands for:

- B – Brackets  $[ \{ ( - ) \} ]$  (Step-1)  
 O – Of (of) (Step-2)  
 D – Division ( $\div$ ) (Step-3)  
 M – Multiplication ( $\times$ ) (Step-4)  
 A – Addition (+) (Step-5)  
 S – Subtraction ( $-$ ) (Step-6)

See the following examples:

**Example 15.** Simplify :  $11 + 2 \times 4 - 6 \div 2$ .

**Solution :**

$$\begin{aligned}
 & 11 + 2 \times 4 - 6 \div 2 \quad (\text{Step 3. Division}) \\
 & = 11 + \underline{2 \times 4} - 3 \quad (\text{Step 4. Multiplication}) \\
 & = \underline{11 + 8} - 3 \quad (\text{Step 5. Addition}) \\
 & = 19 - 3 \quad (\text{Step 6. Subtraction}) \\
 & = 16 \quad \text{Final answer}
 \end{aligned}$$

**Example 16.** Simplify :  $264 \div 3 + 132 - 108 \times 2 + 100 \div 20$ .

**Solution :**

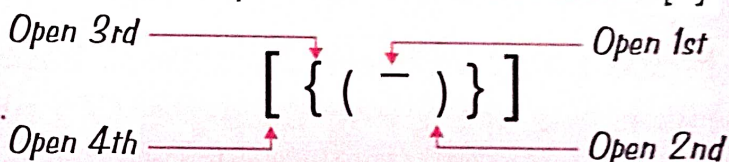
$$\begin{aligned}
 & \underline{264 \div 3} + 132 - 108 \times 2 + \underline{100 \div 20} \quad (\text{Step 3. Division}) \\
 & = 88 + 132 - \underline{108 \times 2} + 5 \quad (\text{Step 4. Multiplication}) \\
 & = \underline{88 + 132} - 216 + 5 \quad (\text{Step 5. Addition}) \\
 & = \underline{225 - 216} \quad (\text{Step 6. Subtraction}) \\
 & = 9 \quad \text{Final answer}
 \end{aligned}$$



### Keep in Mind

Types of brackets :

1. Bar brackets —
2. Parentheses or common bracket ( )
3. Braces or curly brackets { }
4. Brackets or square brackets or box brackets. [ ]



**Example 17.** Simplify the expression :  $8 - [6 - \{4 - (8 - \overline{4 + 3})\}]$ .

**Solution :** This is an example where brackets are given. Brackets are solved after Bar. The order of solving the brackets is  $()$ ,  $\{\}$  and  $[\ ]$  respectively.

So, the solution of above examples is as follows :

$$\begin{aligned}
 &= 8 + [6 - \{4 + (8 - \overline{4 + 3})\}] && \text{(Step I (a). Solve Bar)} \\
 &= 8 + [6 - \{4 + (8 - 7)\}] \\
 &= 8 + [6 - \{4 + (8 - 7)\}] && \text{(Step I (b). Solve Parentheses)} \\
 &= 8 + [6 - \{4 + 1\}] \\
 &= 8 + [6 - \{4 + 1\}] && \text{(Step I (c). Solve Braces)} \\
 &= 8 + [6 - 5] \\
 &= 8 + [6 - 5] && \text{(Step I (d). Solve Square Brackets)} \\
 &= 8 + 1 \\
 &= 9
 \end{aligned}$$

**Note :** You will learn questions based on BODMAS rule in next class. Here, we are giving example 17 only for basic knowledge of removing brackets. In this class mostly you will learn about DMAS rule (basically a part of BODMAS rule).



## Progress CHECK-UP-7



### Pleasure TIME

Simplify the following problems.

(a)  $100 - 50 \times 4 \div 2 + 3$

(c)  $28 + 18 \div 3 - 4 \times 8$

(e)  $(10146 \div 19) \div 2 + 15 \times 48 - 440 + 100$

(g)  $91634 + (3625 \times 4) \div 10 - (825 \div 5)$

(b)  $(6 + 9) - (4 + 5) \div 0$

(d)  $9210 + 648 \div 8 \times (2015 - 999)$

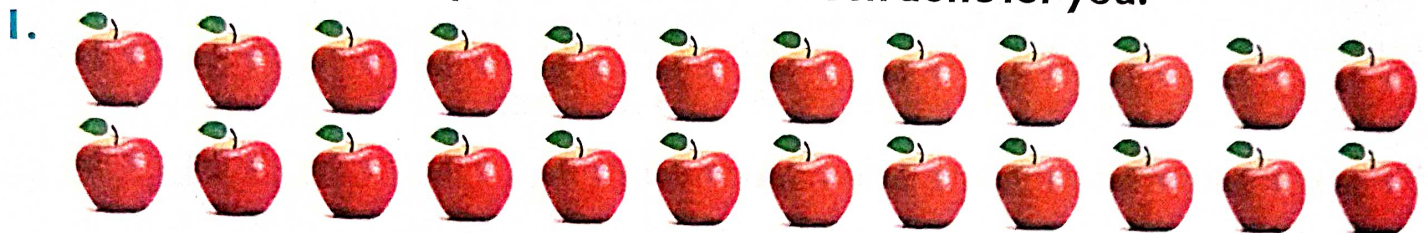
(f)  $684 \div 12 \times 132 - 32 + 520 \div 10$

(h)  $12 - [15 - \{13 - (2 + \overline{1 + 3})\}]$

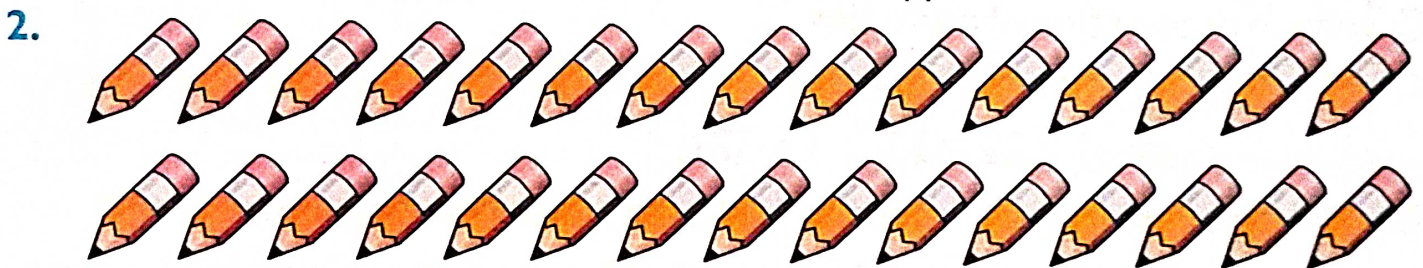
## Travel Through

Readiness

Help Heena distribute these items equally among her friends. Make as many combinations as possible. One has been done for you.



24 apples = 1 apple each for 24 friends, 2 apples each for 12 friends, 12 apples each for 2 friends, 8 apples each for 3 friends, 3 apples each for 8 friends, 4 apples each for 6 friends, 6 apples each for 4 friends, 24 apples for 1 friend



30 pencils = .....

.....



18 mugs = .....

.....



## Learning Outcomes

- Multiples
- Tests of Divisibility
- Prime Factorisation
- Highest Common Factor
- Factors
- Prime and Composite Numbers
- Lowest Common Multiple
- Relationship between HCF and LCM

## Multiples

## Engagement

A multiple is the product of a number and a whole number. For example, first ten multiples of 5 are 5, 10, 15, 20, 25, 30, 35, 40, 45 and 50.

Multiple of a number = Number  $\times$  Whole number

For example, consider multiples of 8 and 12.

Multiples of 8 = 8, 16, 24, 32, 40, 48, 56, 64

Multiples of 12 = 12, 24, 36, 48, 60, 72, 84, 96

In the given sets, common multiples of 8 and 12 are 24 and 48.

### Common properties of multiples

1. Every number is a multiple of 1.

For example,  $1 \times 32 = 32$ ,  $1 \times 57 = 57$

2. The smallest (or the first) multiple of a number is the number itself.

For example, Multiples of 11 = 11, 22, 33 and so on.

3. A number has infinite number of multiples.

For example, Multiples of 3 are 3, 6, 9, 12, 15, 18, 21, 24, 27 and so on.

4. Zero is a multiple of every number.

For example,  $7 \times 0 = 0$ ,  $13 \times 0 = 0$ ,  $101 \times 0 = 0$

5. In case of product of two numbers, the product is a multiple of the multiplier as well as the multiplicand.

For example,  $56 = 7 \times 8$

Multiples of 7 = 7, 14, 21, 28, 35, 42, 49, 56

Multiples of 8 = 8, 16, 24, 32, 40, 48, 56

6. In a continued product, the product is a multiple of every given number.  
For example,  $2 \times 3 \times 4 = 24$   
So, 24 is a multiple of 2, 3 and 4.

## Factors

## Engagement

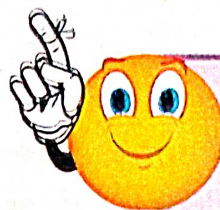
Factors are numbers that are multiplied to form a number. In other words, factors are the numbers multiplied to get a multiple.

Multiplier  $\times$  Multiplicand = Product

For example,

Factors of 18 are 1, 2, 3, 6, 9 and 18.

Factors of 7 are 1 and 7.



*Keep in Mind*

*Both the multiplier and the multiplicand are factors of the product.*

## Common properties of factors

1. 1 is the smallest factor of every number.

For example,  $1 \times 5 = 5$ ,  $1 \times 12 = 12$

2. Every number except 1 has at least two factors, that is, 1 and the number itself.

For example, factors of 13 = 1 and 13

3. Factors of a number always lie between 1 and the number itself. This means that, a number is the biggest factor of itself.

For example, factors of 16 = 1, 2, 4, 8 and 16

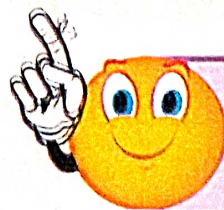
4. Factors of a number divide the number completely and leave 0 as the remainder.

5. Each factor of a number is always less than or equal to the number.

For example, factors of 28 are 1, 2, 4, 7, 14 and 28.

6. Every number has finite number of factors.

For example, factors of 36 are 1, 2, 3, 4, 6, 9, 12, 18 and 36.



*Keep in Mind*

*2 is a factor of every even number.*

## TESTS OF DIVISIBILITY

We have already learnt about tests of divisibility by 2, 3, 5, 9 and 10. Let us recollect them and also learn divisibility rules of 4, 6, 8, 11.

Number	Divisibility Rule	Examples
2	The number is an even number. That is, it has 0, 2, 4, 6 or 8 in the ones place.	48, 1002, 576, 892, 9998 are all divisible by 2.
3	The sum of digits in the number is divisible by 3.	In 8925, the sum of digits is $8 + 9 + 2 + 5 = 24$ , which is a multiple of 3. Thus, 8925 is divisible by 3.
4	The number represented by the last two digits is divisible by 4 or both the digits are zero if the number having more than two digits.	In 14728, the number represented by the last two digits is 28, which is divisible by 4, so the number is divisible by 4. In 2500, the last two digits are zero so the number is divisible by 4.
5	The number has either 0 or 5 in the ones place.	213 <u>25</u> and 478 <u>90</u> are divisible by 5.
6	The number is divisible by both 2 and 3.	49506 is divisible by 2 and the sum of digits is $4 + 9 + 5 + 0 + 6 = 24$ which is divisible by 3. Thus, 49506 is divisible by 6.
8	The number represented by the last three digits of the given number is divisible by 8.	In 256784, the number represented by the last three digits is 784 which is divisible by 8. Thus, 256784 is divisible by 8.
9	The sum of digits in the number is divisible by 9.	In 789345, sum of the digits is $7 + 8 + 9 + 3 + 4 + 5 = 36$ which is divisible by 9. Thus, 789345 is divisible by 9.
10	The number has zero in the ones place.	8950, 10000 and 378200 are all divisible by 10.
11	The difference between the sum of digits in odd places of the number and the sum of digits in even places of the number, is zero or a multiple of 11.	In 709346, Sum of digits in odd places = $7 + 9 + 4 = 20$ Sum of digits in even places = $0 + 3 + 6 = 9$ Difference = $20 - 9 = 11$ Thus, 709346 is divisible by 11.



Pleasure TIME

Mastery

Fill in the blanks.

- (a) Every number is a multiple of .....
- (b) ..... is a multiple of 15 lying between 86 and 100.
- (c) The first common multiple of 4 and 7 is .....
- (d) The continued product of three numbers other than 1 is 30, then 30 is a multiple of ....., ..... and .....
- (e) The smallest multiple of 15 is .....
- (f) A number can have at least ..... factors.
- (g) The factors of 12 are ....., ....., ....., ....., ..... and .....
- (h) ..... and ..... are the factors of 91 other than 1 and the number itself.
- (i) A number is a factor as well as a multiple of .....
- (j) 2 is a factor of all ..... numbers.

Write the factors of the numbers given below :

- (a) 15                      (b) 75                      (c) 88                      (d) 33                      (e) 40
- (f) 51                      (g) 72                      (h) 96                      (i) 66                      (j) 56

Answer the following :

- (a) First five multiples of 4
- (b) All multiples of 2 between 9 and 27
- (c) Fifth multiple of 14
- (d) First five multiples of 3 which are not multiples of 2
- (e) Multiples of 7 greater than 28 but less than 84
- (f) All numbers which have 36 as their multiple
- (g) First two common multiples of 6 and 4
- (h) First four common multiples of 3 and 4.
- (i) First multiple of 5 and 6 that is exactly divisible by 20
- (j) Five common multiples of 2, 3 and 5


4. Write the highest common factor of these pairs of numbers.

(a) 2 and 7

(b) 3 and 10

(c) 12 and 16

(d) 4 and 8

(e) 30 and 6

(f) 3 and 11

(g) 64 and 16

(h) 2 and 13

(i) 12 and 9

5. Circle the numbers that are factors of the given number. One has been done for you.

(a) 1060 — ②, 3, ④, ⑤

(b) 2310 — 2, 4, 10, 11

(c) 1232 — 4, 8, 9, 11

(d) 2365 — 3, 5, 9, 11

(e) 2880 — 8, 9, 10, 11

(f) 3088 — 3, 4, 6, 8

6. Without actual division, underline the numbers that are divisible by the number given inside the circle in each of these cases.

(a) 892, 4123, 95670, 1805, 178, 396, 680507

②

(b) 96261, 189, 39124, 54321, 43917, 23934, 784

③

(c) 1968, 4508, 2914, 1464, 3141, 8900, 6136

④

(d) 1375, 2642, 38150, 92637, 894505, 11111, 41200

⑤

(e) 89364, 35436, 21472, 1821, 96424, 70044, 4266

⑥

(f) 40560, 61256, 78934, 834648, 2935216, 53134, 1296

⑧

(g) 31455, 14531, 600003, 8345, 70479, 256214, 53910

⑨

(h) 2154625, 36247, 194359, 146257, 300404, 921986, 414623

⑪

7. Write the smallest digit other than 0 in the blank spaces such that the given number is divisible by the number indicated.

(a) 3923 ..... by 3

(b) 334 ..... 40 by 8

(c) 542 ..... 4 by 4

(d) 4321 ..... 3 by 3

(e) 1234 ..... by 9

(f) 151 ..... by 5

## PRIME AND COMPOSITE NUMBERS

Engagem

We already know about even and odd numbers. Numbers with 0, 2, 4, 6 or 8 in the ones place are called even numbers.

For example, 184, 250, 9826 and 145322 are even numbers.

Multiples of even numbers are even numbers.  
Multiples of odd numbers are odd or even numbers.

Numbers with 1, 3, 5, 7 or 9 in the ones place are called odd numbers.

For example, 125, 1157, 399 and 400073 are all odd numbers.

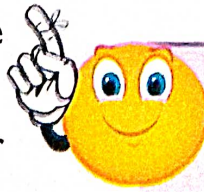
Numbers can also be classified as prime or composite.

Numbers having only two factors that is, 1 and the number itself are called prime numbers.

For example, 2, 3, 5, 7, 11, 13, 17, 19 and 23 are all prime numbers.

Numbers having more than two factors are called composite numbers.

For example, 4, 6, 8, 9, 10 and 12 are all composite numbers.



### Keep in Mind

- 1 is neither a prime nor a composite number as it only has one factor, that is, itself.
- All even numbers except 2 are composite numbers.



### Keep in Mind

- 2 is the smallest prime number.
- 2 is the only even prime number.
- 2 and 3 are consecutive prime numbers.
- 2, 3, 5 and 7 are single-digit prime numbers.



If 1 would have been considered a prime number then all the other numbers would be composite since 1 is a factor of all the numbers.

## Co-prime numbers

Two numbers that have only 1 as the common factor are called co-prime numbers.

For example, (4, 15), (3, 5) and (7, 24) are examples of co-prime numbers.

## Twin primes

Two prime numbers whose difference is 2 are called twin primes.

For example, (5, 7), (11, 13) and (17, 19) are examples of twin prime numbers.



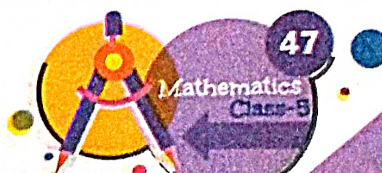
### Keep in Mind

The numbers need not be prime numbers for them to be co-prime.

## PRIME FACTORISATION

### Engagement

The method of expressing a number as a product of prime numbers is called prime factorisation.



Prime factorisation of a number can be done in two different ways, namely

1. Long division method
2. Factor tree method.

Long division method

**Example 1.** Factorise 56

**Solution:** Follow these steps.

**Step 1.** Divide by the least prime number.  
Continue this process till you get a prime number or 1 as the factor.

**Step 2.** Thus, prime factorisation of  $56 = 2 \times 2 \times 2 \times 7$ .

2	56
2	28
2	14
7	7

Factor Tree Method

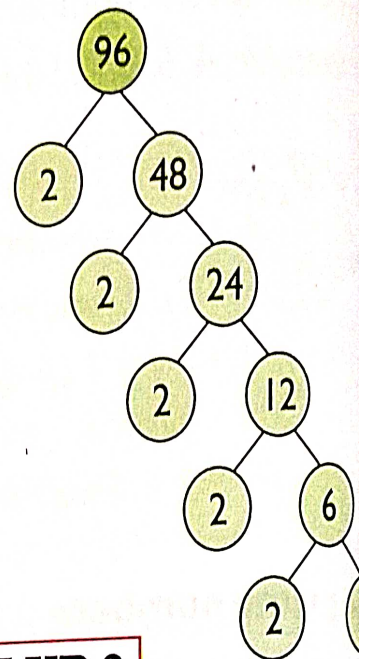
**Example 2.** Factorise 96

**Solution:** Follow these steps.

**Step 1.** Express the number as a multiple of a prime number.  
Write the numbers inside the circles.

**Step 2.** The number can then be finally written as a product of its prime factors.

$$96 = 2 \times 2 \times 2 \times 2 \times 2 \times 3$$



## Progress CHECK-UP-2



### Pleasure TIME

I. Answer these questions.

- (a) First ten prime numbers
- (b) First ten composite numbers
- (c) Five odd composite numbers
- (d) Five even composite numbers
- (e) All prime numbers from 2 to 50
- (f) Any four sets of co-prime numbers

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2. Factorise the numbers using the factor tree method.

- (a) 455      (b) 57      (c) 68      (d) 110      (e) 248  
(f) 126      (g) 750      (h) 605      (i) 375      (j) 824

3. Factorise the numbers using the long division method.

- (a) 216      (b) 435      (c) 820      (d) 175      (e) 324  
(f) 92      (g) 576      (h) 99      (i) 729      (j) 500

4. Circle the sets of numbers that are co-prime.

- (a) 40,39      (b) 18,16      (c) 26,45      (d) 15,90      (e) 23,69  
(f) 27,48      (g) 115,92      (h) 108,117      (i) 49,54      (j) 135,180  
(k) 200,201      (l) 56,75      (m) 76,82      (n) 319,151      (o) 872,171

5. Match the twin primes in column A and column B.

**Column A**

- (a) 17  
(b) 13  
(c) 101  
(d) 41  
(e) 29

**Column B**

- (i) 11  
(ii) 43  
(iii) 19  
(iv) 31  
(v) 103

**LOWEST COMMON MULTIPLE**

**Engagement**

Two or more numbers can have a set of common multiples. The smallest number among these multiples is called the lowest common multiple or LCM.

**Properties of LCM**

- ❖ The LCM of two or more numbers cannot be lesser than any of the numbers.
- ❖ If one number is a factor of the other number, then the bigger number is the LCM.
- ❖ The LCM of co-prime numbers is the product of the numbers. For example, LCM of 9 and 11 is 99.



**Example 3.** Find the LCM of 6 and 9.

**Solution:** We know that,

Multiples of 6 = 6, 12, 18, 24, 30, 36, 42, 48, 54, 60, 66, 72

Multiples of 9 = 9, 18, 27, 36, 45, 54, 63, 72, 81

Common multiples are 18, 36, 54, 72 and so on.

The least common multiple of 6 and 9 = 18

Therefore, LCM of 6 and 9 = 18

However, in case of larger numbers it is difficult to find the multiples.

We can therefore use these methods to find the LCM of two or more numbers.

1. By prime factorisation
2. By long division method

### By prime factorisation

**Example 4.** Find the LCM of the sets of numbers.

(a) 24 and 84

(b) 8, 26 and 14

(c) 18 and 54

**Solution:**

(a) Prime factorisation of 24 =  $2 \times 2 \times 2 \times 3$

Prime factorisation of 84 =  $2 \times 2 \times 3 \times 7$

$$= 2 \times 2 \times 3 \times 2 \times 7$$

$$= 168$$

2	24	2
2	12	2
2	6	3
3	3	7
	1	

(b) Prime factorisation of 8 =  $2 \times 2 \times 2$

Prime factorisation of 26 =  $2 \times 13$

Prime factorisation of 14 =  $2 \times 7$

2	8
2	4
2	2
	1

2	26
13	13
	1

2	14
7	7
	1

**Keep in Mind**  
While finding the LCM, take the common factors only once and then the remaining factors.

Therefore, LCM of 8, 26 and 14 =  $2 \times 2 \times 2 \times 7 \times 13$

$$= 728$$

(c) Prime factorisation of 18 =  $2 \times 3 \times 3$   
 Prime factorisation of 54 =  $2 \times 3 \times 3 \times 3$   
 Therefore, LCM of 18 and 54 =  $2 \times 3 \times 3 \times 3$   
 = 54

2	18
3	9
3	3
	1

2	54
3	27
3	9
3	3
	1

In this case, 18 is a factor of 54 so 54 is found to be the LCM of the two numbers.

By long division method

Example 5. Find the LCM of these sets of numbers.

- (a) 24 and 32
- (b) 15, 10 and 45
- (c) 72 and 60

Solution :

(a) Follow these steps.

- Step 1.** Write all the numbers together.
- Step 2.** Divide the numbers continuously and simultaneously by prime numbers.
- Step 3.** If a number cannot be divided exactly, copy the number and then divide it by its factors.
- Step 4.** Continue division till there is no common prime factor or if 1 is obtained as the remaining number.

2	24,	32
2	12,	16
2	6,	8
2	3,	4
2	3,	2
3	3,	1
	1,	1

LCM of 24 and 32 =  $2 \times 2 \times 2 \times 2 \times 2 \times 3 = 96$

b)

2	15,	10,	45
3	15,	5,	45
3	5,	5,	15
5	5,	5,	5
	1,	1,	1

Therefore, LCM of 15, 10 and 45  
 =  $2 \times 3 \times 3 \times 5$   
 = 90

LCM = Product of common prime factors × remaining factors

c)

2	72,	60
2	36,	30
2	18,	15
3	9,	15
3	3,	5
5	1,	5
	1,	1

Therefore, LCM of 72 and 60  
 =  $2 \times 2 \times 2 \times 3 \times 3 \times 5$   
 = 360



1. Write the multiple, common multiple and LCM for the following:  
(a) 6, 14 (b) 3, 8 (c) 25, 45  
(d) 10, 15 (e) 12, 18
2. Find the LCM of these sets of numbers by using prime factorisation.  
(a) 27, 18 (b) 30, 48 (c) 24, 18  
(d) 48, 51 (e) 9, 12, 15 (f) 22, 36, 48
3. Find the LCM of these sets of numbers by using the long division method.  
(a) 39, 91 (b) 96, 66 (c) 120, 108  
(d) 25, 60, 40 (e) 33, 44, 55 (f) 32, 72  
(g) 87, 129 (h) 88, 40 (i) 117, 81, 39

### HIGHEST COMMON FACTOR

### Engagement

Two or more numbers can have some common factors. The largest common factor among these factors is called the highest common factor or HCF.

For example, consider the numbers 12 and 18.

Factors of 12 are 1, 2, 3, 4, 6 and 12.

Factors of 18 are 1, 2, 3, 6, 9 and 18.

We can see that, common factors of 12 and 18 are 1, 2, 3 and 6. The highest number among these common factors is 6.

Therefore, we can conclude that the HCF of 12 and 18 = 6

We know that the factor of a number divides the number completely. Therefore, HCF is also known as the **Greatest Common Divisor** or GCD.

#### Properties of HCF

- ❖ HCF of two or more numbers is always smaller than or equal to the smallest of the given numbers.
- ❖ If one number is a factor of another number, then the smaller number is the HCF of the two numbers. For example, the HCF of 7 and 14 is 7.

❖ If the HCF of two or more numbers is 1, they are known as co-prime numbers. For example, the HCF of 9 and 16 is 1 so the two numbers are called co-prime numbers.

❖ The HCF of two consecutive numbers is 1.

❖ The HCF of two consecutive even numbers is 2.

We can find the HCF of two numbers by finding their common factors. However, it is a little difficult and time consuming to find the factors of large numbers.

Therefore, in such a case we can use two more methods for finding the HCF.

1. By prime factorisation

2. By long division method

### By prime factorisation

**Example 6.** Find the HCF of the sets of numbers.

(a) 24 and 36

(b) 210, 150 and 120

**Solution:** Factorise the numbers into products of prime factors.

(a) Prime factorisation of 24 =  $2 \times 2 \times 2 \times 3$   
 Prime factorisation of 36 =  $2 \times 2 \times 3 \times 3$

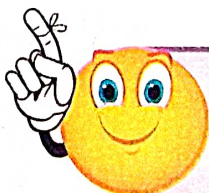
2	24
2	12
2	6
3	3
	1

2	36
2	18
3	9
3	3
	1

Among the factors of 24 and 36, the common factors are 2, 2 and 3.

Therefore,

HCF of 24 and 36  
 $= 2 \times 2 \times 3 = 12$



*Keep in Mind*

*In case of the prime factorisation method, HCF = Product of common prime factors*

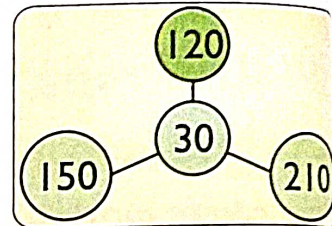
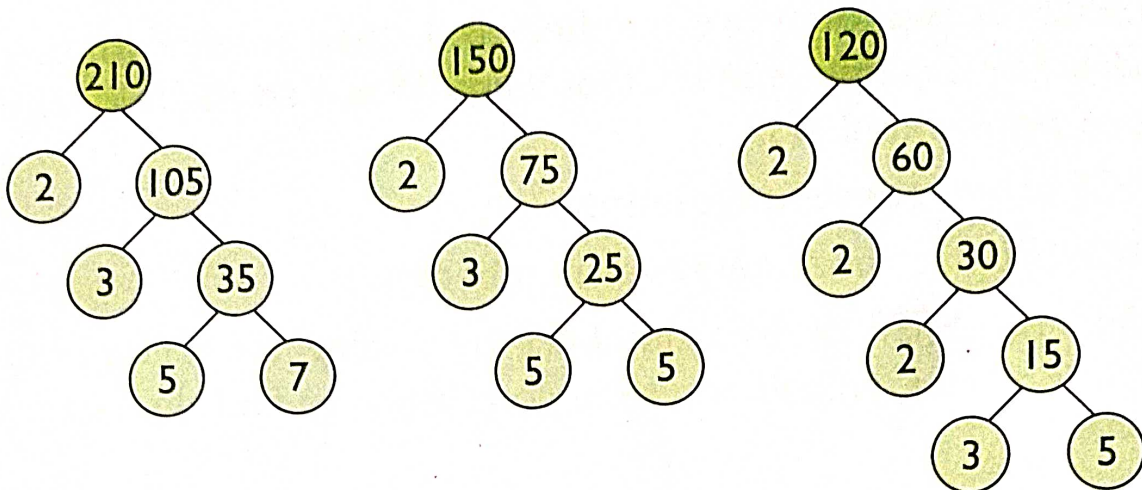
(b) 210, 150 and 120

Prime factorisation of 210 =  $2 \times 3 \times 5 \times 7$   
 Prime factorisation of 150 =  $2 \times 3 \times 5 \times 5$   
 Prime factorisation of 120 =  $2 \times 3 \times 5 \times 2 \times 2$



*Keep in Mind*

*Prime factorisation can be done using either the long division method or the factor tree method.*



Common Factors of 210, 150 and 120 are 2, 3 and 5.  
Therefore, HCF of 210, 150 and 120 =  $2 \times 3 \times 5 = 30$

### By long division method

**Example 7.** Find the HCF of the pairs of numbers.

(a) 675 and 1125

(b) 506 and 657

**Solution:** Follow these steps.

**Step 1.** Divide the larger of two numbers by the smaller one. That is, the larger number is the dividend and the smaller number is the divisor.

**Step 2.** The remainder then becomes the new divisor and the last divisor is the new dividend.

**Step 3.** Continue dividing till zero is obtained as the remainder.

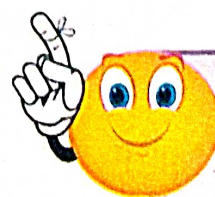
**Step 4.** The last divisor is the HCF of the given numbers.  
Therefore, HCF of 675 and 1125 = 225

$$\begin{array}{r} 675 \overline{)1125} \quad (1 \\ - 675 \\ \hline 450 \end{array}$$

$$\begin{array}{r} 450 \overline{)675} \quad (1 \\ - 450 \\ \hline 225 \end{array}$$

$$\begin{array}{r} 225 \overline{)450} \quad (2 \\ - 450 \\ \hline 000 \end{array}$$

(b) 506 and 657



*Keep in Mind*  
Continue the process of division till 0 is obtained as the remainder.

$$\begin{array}{r}
 506 \overline{)657} \quad 1 \\
 \underline{-506} \\
 151 \overline{)506} \quad 3 \\
 \underline{-453} \\
 53 \overline{)151} \quad 2 \\
 \underline{-106} \\
 45 \overline{)53} \quad 1 \\
 \underline{-45} \\
 8 \overline{)45} \quad 5 \\
 \underline{-40} \\
 5 \overline{)8} \quad 1 \\
 \underline{-5} \\
 3 \overline{)5} \quad 1 \\
 \underline{-3} \\
 2 \overline{)3} \quad 1 \\
 \underline{-2} \\
 1 \overline{)2} \quad 2 \\
 \underline{-2} \\
 0
 \end{array}$$

Therefore, the HCF of 506 and 657 = 1

This means that, 506 and 565 are co-prime numbers.



## Progress CHECK-UP-4

### Pleasure TIME

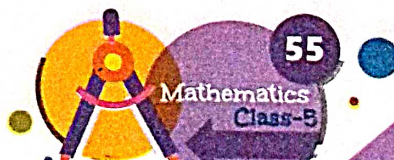
### Mastery

- Write the factors, common factors and HCF for the following :
  - 18, 24
  - 12, 15
  - 48, 72
  - 21, 39
  - 54, 96
- Find the HCF of the sets of numbers using the prime factorisation method.
  - 48, 64
  - 112, 1176, 408
  - 40, 50, 75
  - 1000, 625, 375
  - 256, 182
  - 132, 220, 726
- Find the HCF of the sets of numbers using the long division method.
  - 60, 84
  - 51, 93
  - 104, 240
  - 228, 180
  - 119, 136
  - 256, 78
- There are 28 *laddoos* in box 1 and 32 *gulab jamuns* in box 2. What is the largest number of *laddoos* and *gulab jamuns* that can be packed together such that equal numbers of both are there in each box?

## RELATIONSHIP BETWEEN HCF AND LCM

### Engagement

The relation between HCF, LCM and two numbers can be understood as given here. The product of the two numbers is equal to the product of their HCF and LCM.



Mathematically it can be expressed as,

$$\text{HCF} \times \text{LCM} = \text{First Number} \times \text{Second Number}$$

If any three values are known, we can calculate the fourth value using the formulae.

$$\text{First Number} = \frac{\text{HCF} \times \text{LCM}}{\text{Second Number}}, \quad \text{Second Number} = \frac{\text{HCF} \times \text{LCM}}{\text{First Number}}$$

$$\text{HCF} = \frac{\text{First Number} \times \text{Second Number}}{\text{LCM}}$$

$$\text{LCM} = \frac{\text{First Number} \times \text{Second Number}}{\text{HCF}}$$

**Example 8.** Use the numbers 25 and 150 to check if the given formula is true.  $\text{HCF} \times \text{LCM} = \text{First Number} \times \text{Second Number}$

**Solution :** We know that,

First number = 25, Second number = 150

Product of 25 and 150 =  $25 \times 150 = 3750$

HCF of 25 and 150

5	25	2	150
5	5	3	75
	1	5	25
		5	5
			1

LCM of 25 and 150

2	25,	150
3	25,	75
5	25,	25
5	5,	5
	1	1

Factors of 25 =  $5 \times 5$

Factors of 150 =  $5 \times 5 \times 2 \times 3$

HCF of 25 and 150 =  $5 \times 5 = 25$

Product of HCF and LCM =  $25 \times 150 = 3750$

$\text{HCF} \times \text{LCM} = \text{First Number} \times \text{Second Number}$

$25 \times 150 = 25 \times 150$

$3750 = 3750$

LCM of 25 and 150

=  $2 \times 3 \times 5 \times 5$

= 150

Thus, the formula holds true.

**Example 9.** The HCF and LCM of two numbers are 12 and 72 respectively. One of the numbers is 24, find the other number.



**Solution:** We already know that,

$$\text{HCF} \times \text{LCM} = \text{Product of the numbers}$$

$$\text{Second Number} = \frac{\text{HCF} \times \text{LCM}}{\text{First Number}} = \frac{12 \times 72}{24} = \frac{864}{24} = 36$$

Therefore, the other number is 36.

**Example 10.** The HCF of two numbers 17 and 5 is 1. Find their LCM.

**Solution:** We know that,

$$\begin{aligned} \text{LCM} &= \frac{\text{Product of two numbers}}{\text{HCF}} \\ &= \frac{17 \times 5}{1} = 85 \end{aligned}$$

Since the HCF of 17 and 5 is 1, it also means they are co-prime numbers.



## Progress CHECK-UP-5



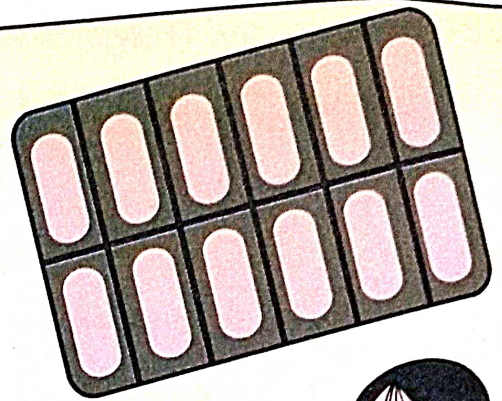
### Pleasure TIME

### Mastery

1. The HCF and LCM of two numbers are 2 and 234 respectively. If the first number is 26, find the second number.
2. The HCF and LCM of two numbers are 28 and 336 respectively. Find the product of the two numbers.
3. Find the LCM of 208 and 186 by finding their HCF.
4. Find the HCF of 54 and 144 by finding their LCM.
5. What is the least number of flowers required to make bunches of 9, 12 and 18?
6. There is a garden in Anu's house. In the middle of the garden there is a path. They decided to tile the path using tiles of length 2 feet, 3 feet and 5 feet. The mason tiled the first row with 2 feet tiles, the second row with 3 feet tiles and the third row with 5 feet tiles. The mason has not cut any of the tiles. Then what is the shortest length of the path?
7. Manoj has made a new house. He wants to lay tiles on the floor. The size of the room is 9 feet  $\times$  12 feet. In the market, there are three kinds of square tiles : 1 foot  $\times$  1 foot, 2 feet  $\times$  2 feet and 3 feet  $\times$  3 feet. Which size of tile should he buy for his room, so that he can lay it without cutting?



1. Manju had a chocolate. She gave one-fourth of it to Raji, one-third to Sugatha and one-sixth to Sheela. She ate the remaining part. How many pieces of chocolate did each get? Write here.



Sheela



Manju



Raji



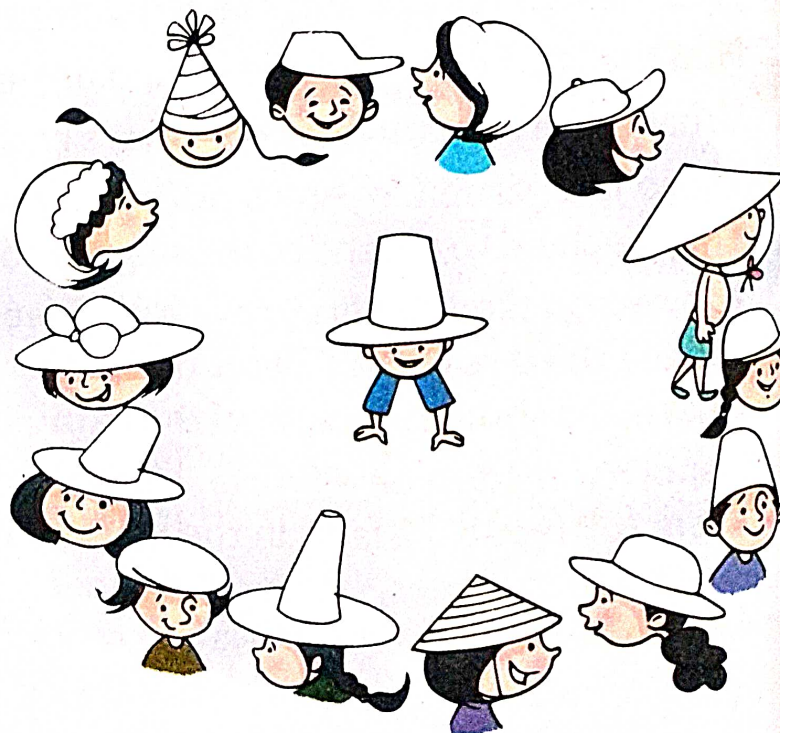
Sugatha



What part of the chocolate did Manju eat?

2. Colour  $\frac{1}{3}$  of the hats red.  
Colour three-fifth hats blue.

- How many hats did you colour red?
- How many hats did you colour blue?
- What part of the hats are not coloured?




# Learning Outcomes

- Fractions
- Like and Unlike Fractions
- To Find the Fraction of a Number
- Mixed Numbers and Improper Fractions
- Equivalent Fractions
- Addition and Subtraction of Like fractions
- Proper and Improper Fractions

## FRACTIONS

## Engagement

A fraction shows part of a whole.  
The whole can be a region or a collection.

  $\frac{2}{5}$  of the star is red.

  $\frac{2}{5}$  of the stars are red.

$$\frac{2}{5} = \frac{\text{Parts being referred to}}{\text{Total number of equal parts}} = \frac{\text{Numerator}}{\text{Denominator}}$$

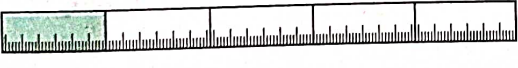
## Progress CHECK-UP-1

### Pleasure TIME

### Mastery

1. Name the fraction for the coloured part.

(a)  ..... of a cup.

(b)  ..... of a metre

(c)  ..... of a kilogram

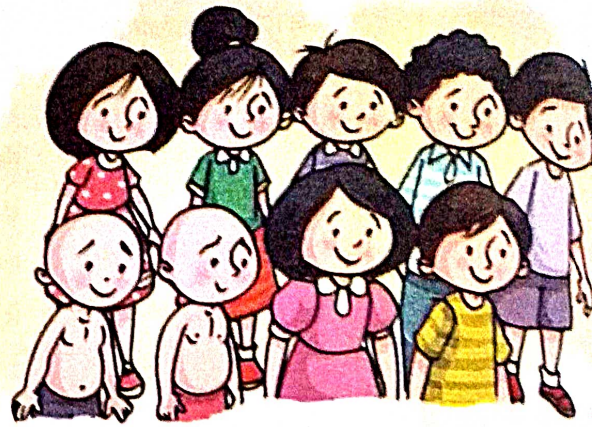
(d)  ..... of a rupee

2. What fraction of children in the photo are :

(a) Girls? .....

(b) Boys? .....

- (c) Babies? .....
- (d) Not girls? .....
- (e) Not boys? .....
- (f) Not babies? .....



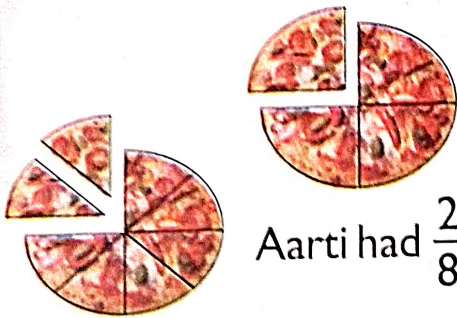
**3. What is**

- (a)  $\frac{1}{2}$  of ₹50?
- (b)  $\frac{1}{4}$  of a dozen?
- (c)  $\frac{1}{3}$  of one hour (in minutes)?
- (d)  $\frac{1}{2}$  of one day (in hours)?
- (e)  $\frac{1}{4}$  of a year (in months)?

**EQUIVALENT FRACTIONS**

**Engage**

(a) Arun and Aarti were having a pizza.



Arun had  $\frac{1}{4}$  of the pizza.

Aarti had  $\frac{2}{8}$  of the pizza.

We can see that both had the same amount of pizza.

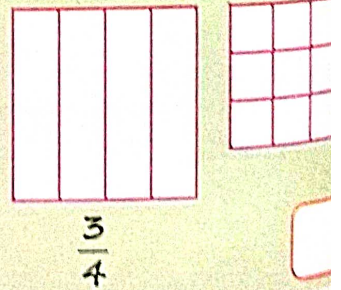
$\frac{1}{4}$  and  $\frac{2}{8}$  mean the same amount.

We say  $\frac{1}{4}$  and  $\frac{2}{8}$  are equivalent fractions.

That is  $\frac{1}{4} = \frac{2}{8}$ .

**Try This**

Colour to show the equivalent fraction



*Fractions that name the same part are called equivalent fractions.*

(b) Look at these socks. We can say that there are 10 socks or 5 pairs of socks.



$\frac{6}{10}$  of these socks are yellow. Or  $\frac{3}{5}$  of the pairs of socks are yellow.

$\frac{6}{10}$  and  $\frac{3}{5}$  are both referring to the same number of socks. They are equivalent fractions.

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



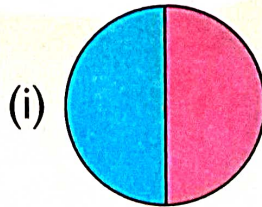
## Progress CHECK-UP-2

### Pleasure TIME

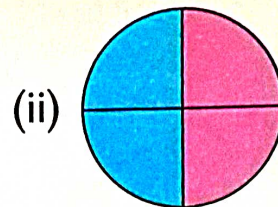
### Mastery

#### 1. Coloured parts

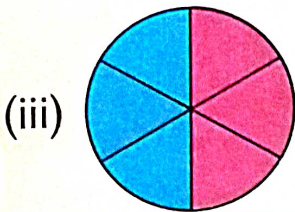
Complete these



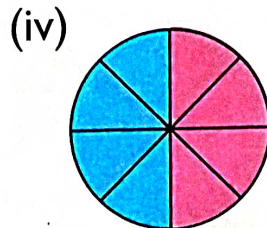
This circle is divided into two equal parts. Out of ..... equal parts one part is coloured blue.



Here the circle is divided into ..... equal parts. Out of ..... equal parts, ..... parts are coloured blue.

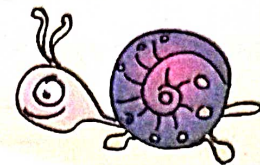


Here the circle is .....  
 .....  
 .....  
 .....

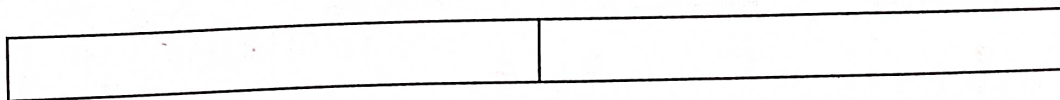


Here the circle is .....  
 .....  
 .....  
 .....

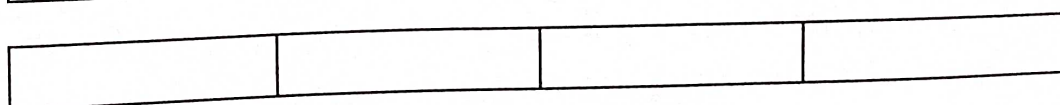
So, we can say that  $\frac{1}{2} = \frac{2}{\dots} = \frac{\dots}{6} = \frac{\dots}{8}$



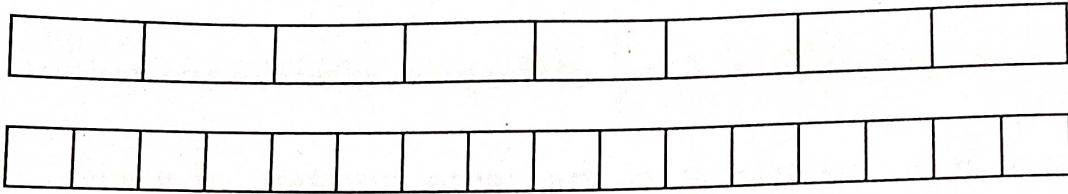
#### 2. Colour the following as directed.



Colour  $\frac{1}{2}$



Colour  $\frac{2}{4}$



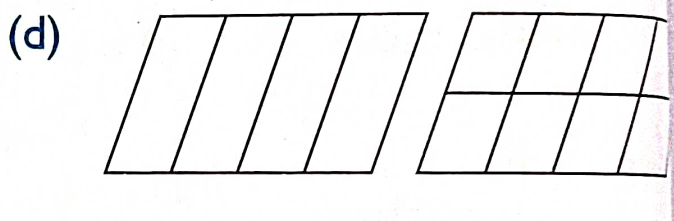
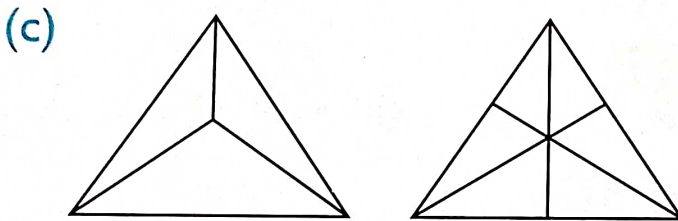
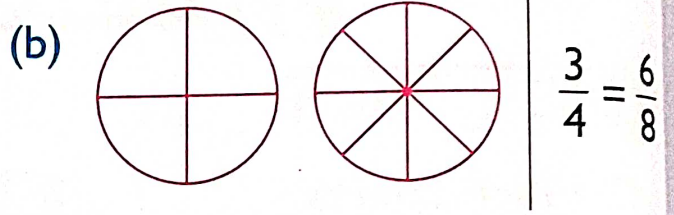
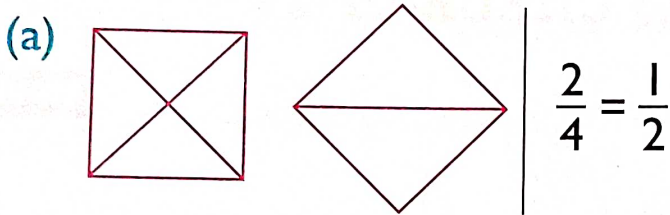
Colour

Colour

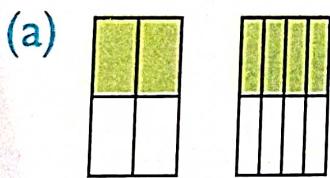
Now fill up the boxes using  $<$ ,  $>$  or  $=$ .

$$\frac{1}{2} \square \frac{2}{4} \square \frac{4}{8} \square \frac{8}{16}$$

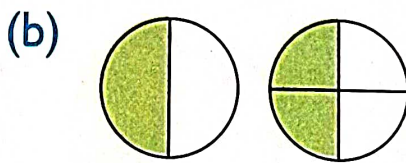
3. Colour the following to show equivalent fractions.



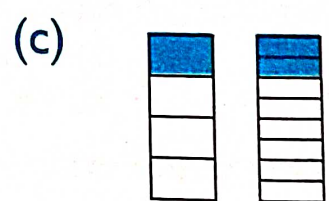
4. Study the shaded regions and fill in the blanks.



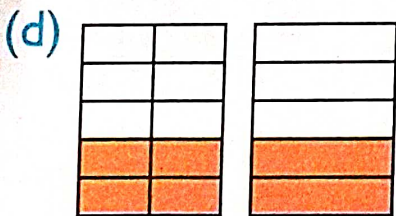
$$\frac{2}{4} = \frac{\square}{8}$$



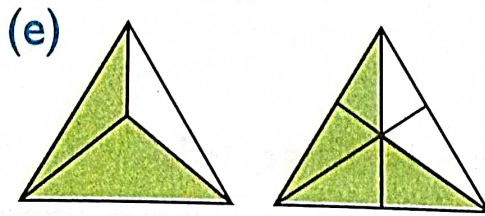
$$\frac{1}{2} = \frac{\square}{4}$$



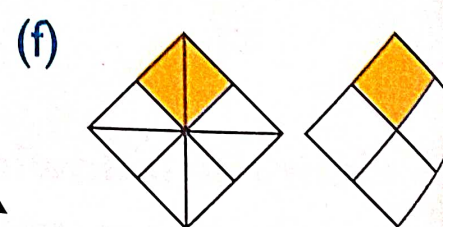
$$\frac{1}{4} = \frac{\square}{8}$$



$$\frac{4}{10} = \frac{2}{\square}$$

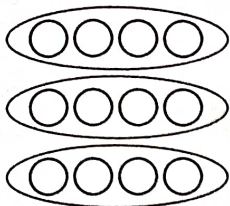


$$\frac{2}{3} = \frac{4}{\square}$$

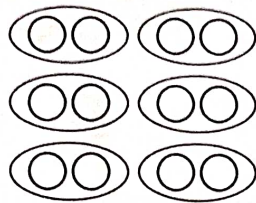


$$\frac{2}{8} = \frac{1}{\square}$$

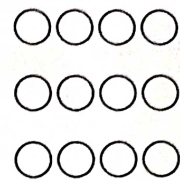
5. Colour the following as directed.



Colour  $\frac{1}{3}$



Colour  $\frac{2}{6}$

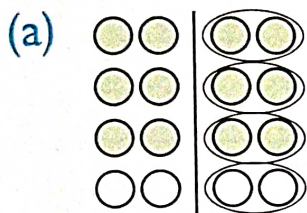


Colour  $\frac{4}{12}$

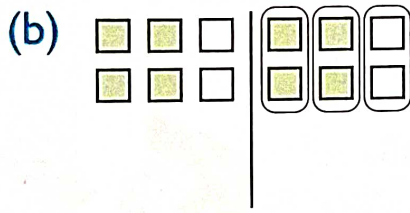
Put the sign (<, >, or =) in the boxes to show what you observe.

$$\frac{1}{3} \square \frac{2}{6} \square \frac{4}{12}$$

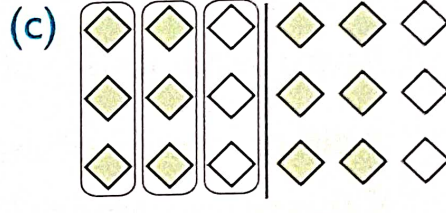
6. Observe the grouping and fill in the blanks.



$$\frac{6}{8} = \frac{\square}{4}$$



$$\frac{4}{6} = \frac{2}{\square}$$



$$\frac{2}{3} = \frac{\square}{9}$$

## LIKE AND UNLIKE FRACTIONS

### Engagement

### Like Fractions

Fractions that have the same denominator are called like fractions.

(a) Aneesh and John are colouring flags for sports day.

Aneesh coloured his flags like this.

John coloured his flags like this.



$\frac{2}{3}$  is coloured.



$\frac{1}{3}$  is coloured.

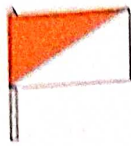
$\frac{2}{3}$  and  $\frac{1}{3}$  are like fractions because both have the denominator 3.

(b)  $\frac{2}{7}$ ,  $\frac{3}{7}$  and  $\frac{5}{7}$  are all like fractions.

### Unlike Fractions

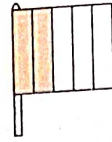
Fractions that have different denominators are called unlike fractions.

(a) Shilpa coloured her flag like this.



$\frac{1}{2}$  is coloured.

Surinder coloured her flag like this



$\frac{2}{5}$  is coloured.

$\frac{1}{2}$  and  $\frac{2}{5}$  are unlike fractions because the denominators are not the same.

(b)  $\frac{3}{8}$ ,  $\frac{3}{7}$  and  $\frac{7}{9}$  are all unlike fractions.

### Comparing Like Fractions

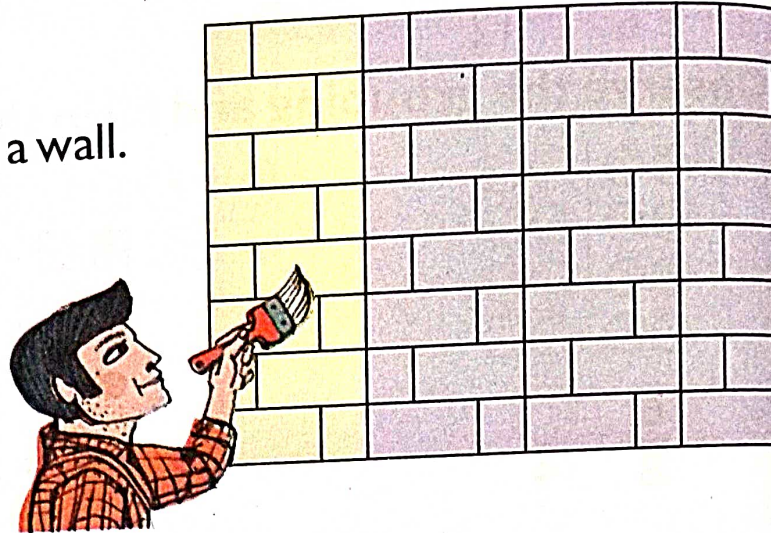
(a) Amresh and Aditi were painting a wall.

Amresh painted  $\frac{3}{4}$  of the wall.

Aditi painted  $\frac{1}{4}$  of the wall.

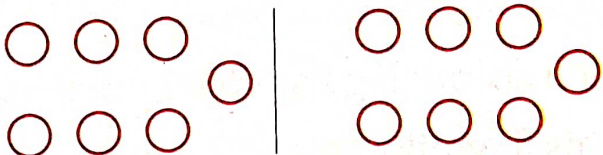
Who painted more?

$$\frac{3}{4} > \frac{1}{4} \quad \text{or} \quad \frac{1}{4} < \frac{3}{4}$$



**Answer:** Amresh painted more.

To compare like fractions, compare the numerators. The fraction with greater numerator is the greater fraction.

(b) Compare  $\frac{4}{7}$  and  $\frac{6}{7}$    $\frac{4}{7} < \frac{6}{7}$ .

(c) Arrange  $\frac{5}{8}$ ,  $\frac{3}{8}$ ,  $\frac{7}{8}$ ,  $\frac{1}{8}$  and  $\frac{6}{8}$  in ascending order.

$$\frac{1}{8}, \frac{3}{8}, \frac{5}{8}, \frac{6}{8}, \frac{7}{8} \quad [\text{Since } 1 < 3 < 5 < 6 < 7]$$

(d) Arrange  $\frac{2}{9}$ ,  $\frac{5}{9}$ ,  $\frac{6}{9}$ ,  $\frac{7}{9}$  and  $\frac{1}{9}$  in descending order.

$$\frac{7}{9}, \frac{6}{9}, \frac{5}{9}, \frac{2}{9}, \frac{1}{9} \quad [\text{Since } 7 > 6 > 5 > 2 > 1]$$





1. Identify these as like and unlike fractions.

- (a)  $\frac{4}{5}, \frac{3}{5}$     (b)  $\frac{6}{8}, \frac{3}{8}, \frac{4}{8}$     (c)  $\frac{2}{7}, \frac{2}{6}$   
 (d)  $\frac{1}{9}, \frac{1}{6}, \frac{1}{2}$     (e)  $\frac{5}{9}, \frac{3}{9}, \frac{1}{9}, \frac{7}{9}$     (f)  $\frac{4}{7}, \frac{3}{7}, \frac{5}{8}, \frac{3}{6}$

*Common Mistake*

$\frac{3}{5}$  and  $\frac{3}{6}$  are like fractions.  $\times$

$\frac{3}{5}$  and  $\frac{3}{6}$  are unlike fractions.  $\checkmark$

2. Colour to compare. Put  $<$  or  $>$ .

(a) (b)   
 $\frac{2}{7} \square \frac{3}{7}$                        $\frac{2}{3} \square \frac{1}{3}$

(c) (d)   
 $\frac{4}{9} \square \frac{7}{9}$                        $\frac{5}{6} \square \frac{1}{6}$

3. Compare the fractions and fill in the blanks.

- (a)  $\frac{3}{7} \square \frac{6}{7}$     (b)  $\frac{7}{9} \square \frac{4}{9}$     (c)  $\frac{2}{4} \square \frac{3}{4}$     (d)  $\frac{8}{13} \square \frac{2}{13}$   
 (e)  $\frac{5}{7} \square \frac{2}{7}$     (f)  $\frac{5}{6} \square \frac{4}{6}$     (g)  $\frac{1}{3} \square \frac{2}{3}$     (h)  $\frac{6}{11} \square \frac{2}{11}$   
 (i)  $\frac{5}{11} \square \frac{7}{11}$     (j)  $\frac{1}{5} \square \frac{2}{5}$     (k)  $\frac{3}{7} \square \frac{4}{7}$     (l)  $\frac{7}{10} \square \frac{8}{10}$

4. Arrange the following in ascending order.

- (a)  $\frac{2}{9}, \frac{5}{9}, \frac{3}{9}, \frac{4}{9}$     (b)  $\frac{3}{5}, \frac{2}{5}, \frac{1}{5}, \frac{4}{5}$     (c)  $\frac{6}{11}, \frac{8}{11}, \frac{7}{11}, \frac{9}{11}$   
 (d)  $\frac{4}{7}, \frac{2}{7}, \frac{3}{7}, \frac{6}{7}$     (e)  $\frac{10}{15}, \frac{12}{15}, \frac{11}{15}, \frac{15}{15}$     (f)  $\frac{5}{10}, \frac{8}{10}, \frac{6}{10}, \frac{9}{10}$

5. Arrange the following in descending order.

(a)  $\frac{4}{8}, \frac{1}{8}, \frac{5}{8}, \frac{8}{8}$

(b)  $\frac{4}{4}, \frac{2}{4}, \frac{1}{4}, \frac{3}{4}$

(c)  $\frac{7}{12}, \frac{3}{12}, \frac{8}{12}, \frac{9}{12}$

(d)  $\frac{14}{17}, \frac{10}{17}, \frac{12}{17}, \frac{9}{17}$

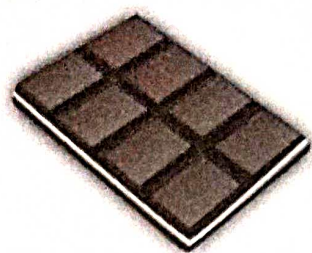
(e)  $\frac{16}{20}, \frac{14}{20}, \frac{2}{20}, \frac{11}{20}$

(f)  $\frac{19}{19}, \frac{16}{19}, \frac{9}{19}, \frac{17}{19}$

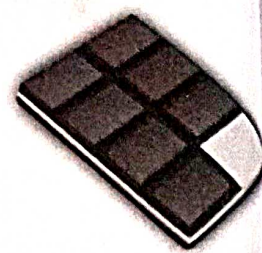
## ADDITION AND SUBTRACTION OF LIKE FRACTIONS

Engagement

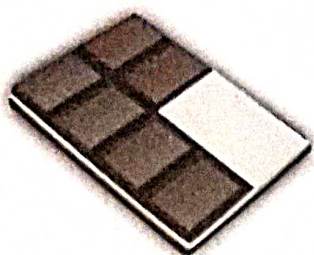
### Addition



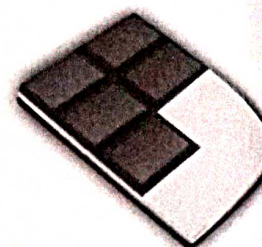
(a) Ashutosh has a slab of chocolate which is divided into 8 pieces.



He ate one piece in the morning, which means he ate  $\frac{1}{8}$  of the chocolate in the morning.



He ate two pieces in the evening, which means he ate  $\frac{2}{8}$  of the chocolate in the evening.



What fraction of the whole chocolate did he eat altogether?

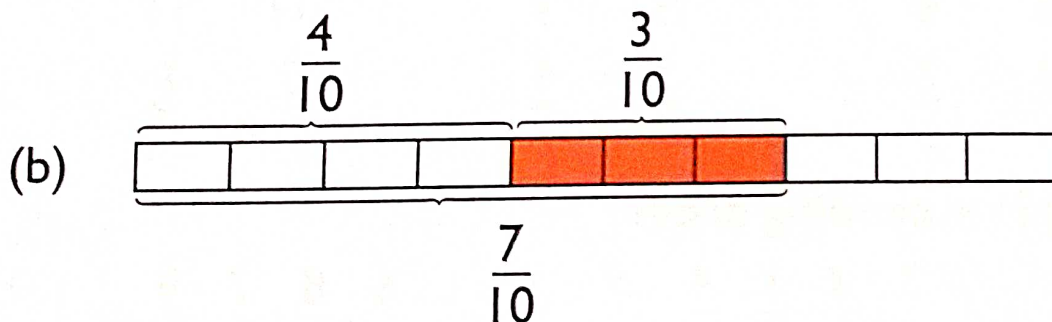
$$\frac{1}{8} + \frac{2}{8} = ?$$

**Step 1.** Add the numerators. **Step 2.** Write the sum over the denominator.

$$\frac{1}{8} + \frac{2}{8} = 1 + 2 = 3$$

$$\frac{1}{8} + \frac{2}{8} = \frac{3}{8}$$

**Answer.** Ashutosh ate  $\frac{3}{8}$  of the whole chocolate.



$$\frac{4}{10} + \frac{3}{10} = \frac{4+3}{10} = \frac{7}{10}$$

(c)  $\frac{2}{7} + \frac{4}{7} = \frac{2+4}{7} = \frac{6}{7}$

(d)  $\frac{3}{4} + \frac{1}{4} = \frac{3+1}{4} = \frac{4}{4} = 1$

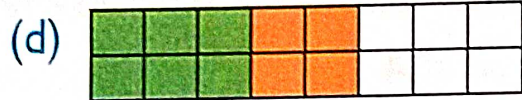
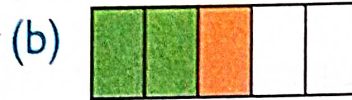
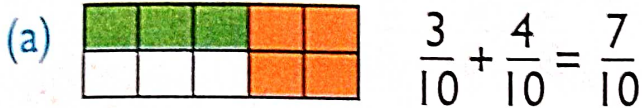


**Pleasure TIME**

**Mastery**

1. (a) Add  $\frac{5}{12}$  hour and  $\frac{3}{12}$  hour. (b) Add  $\frac{1}{7}$  week to  $\frac{4}{7}$  week.

2. Write a fraction for each shaded part and add. The first one has been done for you.



3. Add.

- (a)  $\frac{2}{6} + \frac{3}{6}$  (b)  $\frac{1}{8} + \frac{3}{8}$  (c)  $\frac{1}{4} + \frac{1}{4}$  (d)  $\frac{3}{7} + \frac{3}{7}$  (e)  $\frac{3}{10} + \frac{7}{10}$  (f)  $\frac{1}{5} + \frac{0}{5}$   
 (g)  $\frac{1}{4} + \frac{2}{4}$  (h)  $\frac{4}{9} + \frac{1}{9}$  (i)  $\frac{3}{8} + \frac{4}{8}$  (j)  $\frac{1}{5} + \frac{1}{5}$  (k)  $\frac{6}{8} + \frac{1}{8}$  (l)  $\frac{6}{9} + \frac{2}{9}$

4. Suraj travels  $\frac{1}{3}$  of an hour by train and  $\frac{1}{3}$  of an hour by bus every day to work. What fraction of an hour does he take to travel to work every day?

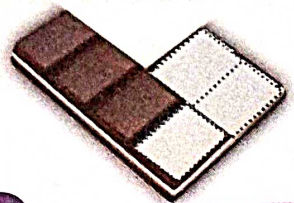
5. I read  $\frac{5}{8}$  of my story book yesterday and  $\frac{5}{8}$  today. How much of my story book have I read in all?

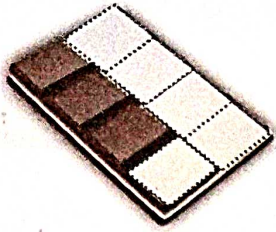
6. Sushmita bought  $\frac{5}{10}$  metre of black cloth and  $\frac{2}{10}$  metre of white cloth. How much cloth did she buy in all?

**Subtraction**



(a) Ashutosh had 5 pieces of his 8-piece chocolate left with him. He had  $\frac{5}{8}$  of a chocolate.





Then he gave two pieces to his friend.

He gave his friend  $\frac{2}{8}$  of the chocolate.

How much is he left with?  $\frac{5}{8} - \frac{2}{8} = ?$

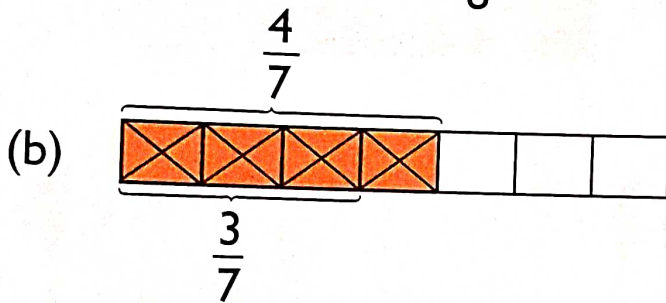
**Step 1.** Subtract the numerators.

$$\frac{5}{8} - \frac{2}{8} = 5 - 2 = 3$$

**Step 2.** Write the difference over the denominator.

$$\frac{5}{8} - \frac{2}{8} = \frac{3}{8}$$

**Answer:** Ashutosh had  $\frac{3}{8}$  of the whole chocolate left with him.



(c)  $\frac{2}{3} - \frac{1}{3} = \frac{2-1}{3} = \frac{1}{3}$

(d)  $\frac{5}{6} - \frac{5}{6} = \frac{5-5}{6} = \frac{0}{6} = 0$

**Common Mistake**

$\frac{9}{11} - \frac{3}{11} = \frac{6}{0} \times$        $\frac{9}{11} - \frac{3}{11} = \frac{6}{11}$



## Progress CHECK-UP-5



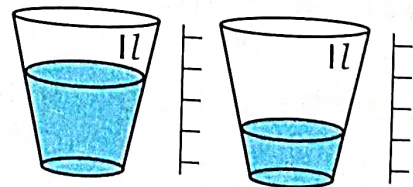
### Pleasure TIME

1. (a) How much longer is Papa's belt?



$$\frac{8}{10} \text{ m} - \frac{6}{10} \text{ m} = \square$$

(b) How much more orange juice than lime juice?



$$\frac{3}{4} \text{ l} - \frac{1}{4} \text{ l} =$$

2. Find the difference. The first one has been done for you.

(a)  $\frac{4}{9} - \frac{1}{9} = \frac{3}{9}$

(b)  $\frac{4}{9} - \frac{2}{9} = \frac{2}{9}$

### 3. Subtract.

- (a)  $\frac{7}{9} - \frac{1}{9}$  (b)  $\frac{8}{9} - \frac{6}{9}$  (c)  $\frac{6}{8} - \frac{1}{8}$  (d)  $\frac{3}{4} - \frac{2}{4}$  (e)  $\frac{5}{6} - \frac{1}{6}$  (f)  $\frac{5}{7} - \frac{2}{7}$   
(g)  $\frac{2}{5} - \frac{2}{5}$  (h)  $\frac{4}{6} - \frac{3}{6}$  (i)  $\frac{3}{8} - \frac{2}{8}$  (j)  $\frac{4}{8} - \frac{3}{8}$  (k)  $\frac{4}{5} - \frac{1}{5}$  (l)  $\frac{6}{10} - \frac{1}{10}$

4. Hari drank  $\frac{8}{11}$  of a glass of *lassi* and Sunder drank  $\frac{9}{11}$  of a glass of *lassi*. Who drank more and how much more did he drink?
5. Kabir drank  $\frac{5}{6}$  of a glass of milk in the morning and  $\frac{3}{6}$  of a glass of milk in the evening. How much more did he drink in the morning?
6. The fruit salad recipe needs  $\frac{1}{5}$  kg apples and  $\frac{3}{5}$  kg grapes. Which fruit is required in greater amount and by how much?

### TO FIND THE FRACTION OF A NUMBER

### Engagement

- (a) What is  $\frac{3}{4}$  of 20?

**Step 1.** Divide the number by the denominator.

$$20 \div 4 = 5$$

**Step 2.** Multiply the **quotient** you get by the numerator.

$$5 \times 3 = 15$$

**Answer:**  $\frac{3}{4}$  of 20 = 15

- (b) How many minutes are there in  $\frac{5}{6}$  of an hour? An hour has 60 minutes.

To find  $\frac{5}{6}$  of 60, divide 60 by 6 and multiply by 5.

$$60 \div 6 = 10$$

$$10 \times 5 = 50$$

**Answer:**  $\frac{5}{6}$  of an hour has 50 minutes.



Pleasure TIME

Mast

1. What is:

(a)  $\frac{2}{3}$  of 27?

(b)  $\frac{2}{5}$  of 20?

(c)  $\frac{5}{6}$  of 48?

(d)  $\frac{3}{4}$  of 32?

(e)  $\frac{3}{7}$  of 56?

(f)  $\frac{2}{9}$  of 63?

(g)  $\frac{3}{4}$  of 132?

(h)  $\frac{5}{8}$  of 384?

2. What is:

(a)  $\frac{2}{3}$  of a day (in hours)?

(b)  $\frac{7}{12}$  of an hour (in minutes)?

(c)  $\frac{5}{6}$  of a dozen?

(d)  $\frac{1}{2}$  of 1 kilogram (in grams)?

(e)  $\frac{2}{5}$  of an hour (in minutes)?

(f)  $\frac{2}{7}$  of a week (in days)?

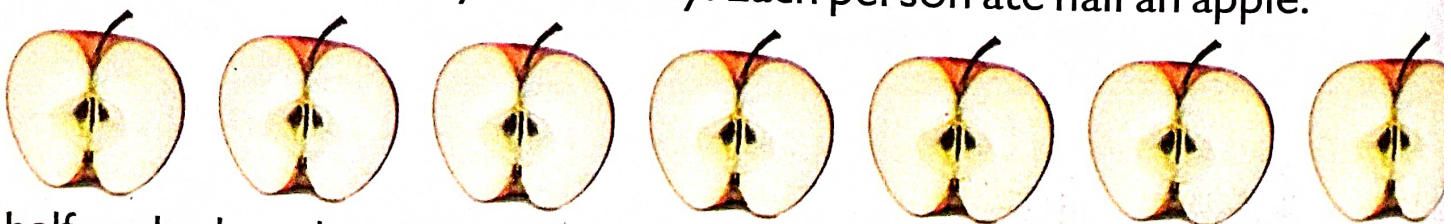
- An auditorium has 600 seats.  $\frac{2}{3}$  of the seats are empty. How many seats are empty?
- A packet has 75 sheets of paper. Simran uses  $\frac{3}{5}$  of the sheets. How many sheets has she used?
- During the class election, Pritam got  $\frac{1}{7}$  of the 42 votes polled. How many votes did Pritam get?
- In a group of 116 tourists who went to see the Qutub Minar,  $\frac{1}{4}$  were foreigners. How many were foreign tourists?

PROPER AND IMPROPER FRACTIONS

Engagem

Improper Fractions

There are 7 people in Gayatri's family. Each person ate half an apple.



7 half apples have been eaten.

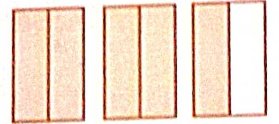


To show seven halves, we would write

$$\frac{7}{2} \rightarrow \frac{\text{Number of parts eaten}}{\text{Number of equal parts in each apple}} \cdot \frac{7}{2} \text{ is an improper fraction.}$$

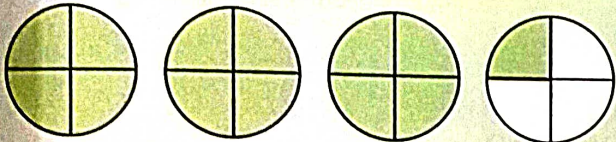
A fraction that has the numerator greater than or equal to the denominator is called an improper fraction.

$$\frac{5}{2} \text{ is an improper fraction. } \frac{5}{2} \rightarrow \frac{\text{number of coloured parts}}{\text{number of equal parts in all}}$$



### Try This

Name the improper fraction.



$$= \frac{\text{number of coloured parts}}{\text{number of equal parts in each}} = \frac{\square}{\square}$$

### Try This

Shade the boxes with proper fractions.

$\frac{7}{3}$	$\frac{4}{7}$	$\frac{7}{11}$	$\frac{3}{4}$	$\frac{2}{3}$
$\frac{9}{8}$	$\frac{11}{19}$	$\frac{12}{7}$	$\frac{13}{9}$	$\frac{8}{13}$
$\frac{4}{3}$	$\frac{1}{2}$	$\frac{6}{15}$	$\frac{2}{9}$	$\frac{9}{20}$
$\frac{9}{5}$	$\frac{3}{10}$	$\frac{7}{4}$	$\frac{8}{3}$	$\frac{13}{7}$
$\frac{11}{10}$	$\frac{4}{5}$	$\frac{16}{13}$	$\frac{14}{9}$	$\frac{11}{2}$
$\frac{8}{7}$	$\frac{5}{8}$	$\frac{19}{13}$	$\frac{23}{16}$	$\frac{9}{5}$

### Proper Fractions

A fraction with the numerator less than the denominator is a proper fraction.

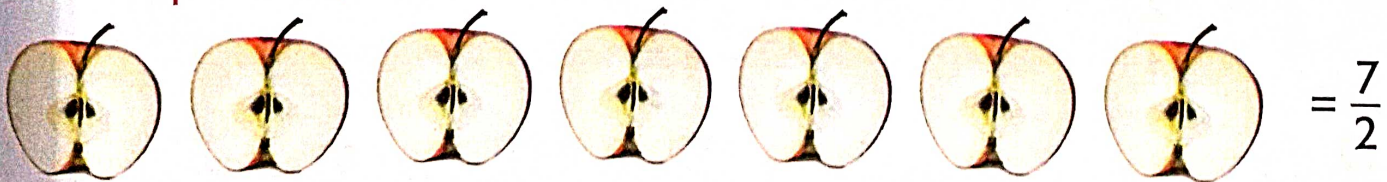
$$\frac{3}{5} \text{ is a proper fraction. } \square \square \square \square \square$$

Proper fractions that have 1 as the numerator are called unit fractions. So,  $\frac{1}{3}$  is a proper fraction and a unit fraction.

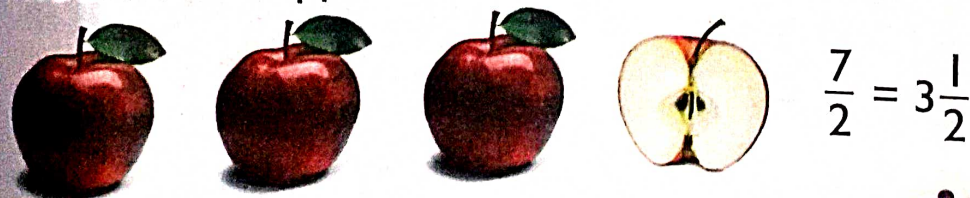
### MIXED NUMBERS AND IMPROPER FRACTIONS

### Engagement

We can express improper fractions as mixed numbers.



The seven half apples that Gayatri's family ate were cut from  $3\frac{1}{2}$  apples.

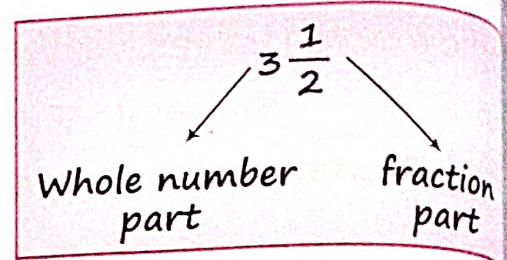


$$\frac{7}{2}$$

↑  
improper fraction (fraction greater than 1)

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

↑  
mixed number (whole number and fraction)



$3\frac{1}{2}$  also means  
 $3 + \frac{1}{2}$



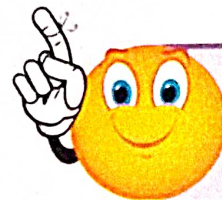
When we combine a whole number with a fraction, we get a mixed number.

## Converting an Improper Fraction to a Mixed Number

(a)  $\frac{14}{3} = ?$

**Step 1.** Divide the numerator by the denominator.

$$\begin{array}{r} 4 \rightarrow \text{Quotient} \\ 3 \overline{)14} \\ \underline{-12} \\ 2 \rightarrow \text{Remainder} \end{array}$$



*Keep in Mind*

Quotient       $\frac{\text{Remainder}}{\text{Divisor}}$

**Step 2.** Write the quotient as the whole number part.

$$4 \frac{\square}{\square}$$

**Try This**

$$\frac{9}{2} = \square$$

$$\frac{18}{3} = \square$$

**Step 3.** Write the remainder over the divisor to form the fraction.

$$4 \frac{\boxed{2}}{\boxed{3}}$$

$$\frac{14}{3} = 4\frac{2}{3}$$

(b)  $\frac{12}{6} = ?$

$$\frac{12}{6} = 2$$

$$\begin{array}{r} 2 \\ 6 \overline{)12} \\ \underline{-12} \\ 0 \end{array}$$

There is no remainder here so it is a whole number.

### Converting a Mixed Number into an Improper Fraction

We can express mixed numbers as improper fractions.

$1\frac{1}{2}$  sandwiches is the same as  $\frac{3}{2}$  sandwiches.



Mixed number

Improper fraction

(a)  $2\frac{1}{3} = ?$

**Step 1.** Multiply the whole number and the denominator.

$$2 \times 3 = 6$$

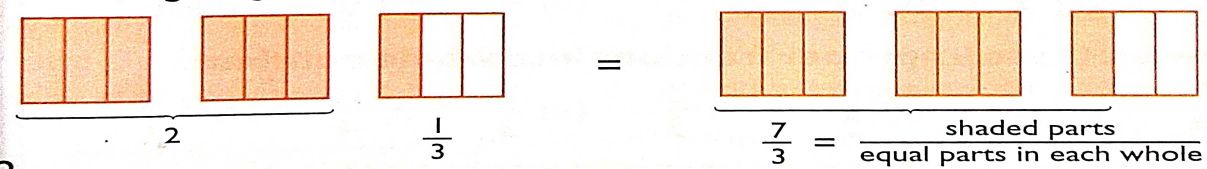
**Step 2.** Add the numerator to the product.

$$6 + 1 = 7$$

**Step 3.** Write the sum over the same denominator.

$$\frac{7}{3}$$

Answer:  $2\frac{1}{3} = \frac{7}{3}$



(b)  $3\frac{2}{5} = ?$

**Step 1.**

$$3 \times 5 = 15$$

**Step 2.**

$$15 + 2 = 17$$

**Step 3.**

$$\frac{17}{5}$$

Answer:  $3\frac{2}{5} = \frac{17}{5}$



Pleasure TIME

1. Use a mixed number to answer.

(a) How many pizzas?



(b) How many biscuits?



2. Use the pictures to write the improper fractions and then convert them into mixed numbers.

	Shapes	Improper fractions	Mixed numbers
(a)		$\frac{3}{2}$	$1\frac{1}{2}$
(b)		$\frac{\square}{4}$	
(c)			

3. Convert these improper fractions into mixed numbers.

- (a)  $\frac{7}{2}$    (b)  $\frac{8}{3}$    (c)  $\frac{8}{5}$    (d)  $\frac{7}{4}$    (e)  $\frac{7}{3}$    (f)  $\frac{12}{5}$    (g)  $\frac{5}{2}$    (h)  $\frac{15}{6}$

4. Convert these improper fractions into whole numbers.

- (a)  $\frac{8}{4}$    (b)  $\frac{12}{3}$    (c)  $\frac{6}{2}$    (d)  $\frac{3}{3}$    (e)  $\frac{9}{3}$    (f)  $\frac{16}{4}$    (g)  $\frac{21}{7}$    (h)  $\frac{36}{6}$

5. Convert these mixed numbers into improper fractions.

- (a)  $4\frac{2}{3}$    (b)  $3\frac{1}{7}$    (c)  $2\frac{1}{10}$    (d)  $1\frac{3}{4}$    (e)  $6\frac{3}{10}$    (f)  $4\frac{3}{8}$    (g)  $3\frac{1}{6}$    (h)  $5\frac{6}{7}$

6. Raheem has to travel  $1\frac{1}{4}$  km to reach school. What distance does he travel to go to school and come back home?

7. Latha bought a pencil and a pen for seven and a half rupees. She gave ₹ 10. The shopkeeper gave back the money in half and quarter rupees. What are the coins she got?

## Travel Through

### Readiness

- Write each of the following in Roman numerals.
  - $0 + \frac{2}{10} + \frac{6}{100} + \frac{4}{1000} = \dots\dots\dots$
  - $400 + 60 + 8 + \frac{3}{10} + \frac{0}{100} + \frac{5}{1000} = \dots\dots\dots$
  - $5000 + 40 + 3 + 0.2 + 0.05 + 0.007 = \dots\dots\dots$
  - 7 tens 0 ones 5 tenths 7 hundredths =  $\dots\dots\dots$
- State whether the following group of decimal fractions is like or unlike :
  - 0.69; 7.123; 61.345
  - 300.91; 44.04; 52.99
  - 64.430; 123.123; 345.008
  - 8.431; 13.99; 14.0
- Put  $>$  or  $<$  between the decimal fractions :
  - 18.7  18.68
  - 65.087  65.805
  - 11.358  11.36
  - 12.23  12.227
- Arrange in descending order :
  - 64.2; 74.25; 64.015; 74.245
  - 2.001; 2.02; 2.0004; 2.003
- Arrange in ascending order :
  - 4.5; 4.053; 4.03; 4.005
  - 30.7; 30.009; 30.17; 30.71



## Learning Outcomes

- Concept of Decimal
- Mixed decimals
- Decimal conversions
- Decimal place value chart
- Form of decimals
- Like and unlike decimals and their Conversion
- Comparing and ordering of decimals
- Addition and Subtraction of decimals
- Multiplication and Division of decimals
- Multiplication and Division of decimals by 10 and 100

## CONCEPT OF DECIMAL

The fractions in which the denominators are 10, 100, 1000, ..., are called decimal fractions. For example,  $\frac{3}{10}, \frac{15}{100}, \frac{3}{1000}$ ..... We may write decimal fractions in a special way removing the denominators and using a decimal point at proper places to show the denominators.

	One tenth	One hundredth	One thousandth
Decimal fractions :	$\frac{1}{10}$	$\frac{1}{100}$	$\frac{1}{1000}$
Decimals :	0.1	0.01	0.001
Right to left : (Place of the decimal)	One place from the right most	Two places from the right most	Three places from the right most

(We add zero/zeros to complete the number of places.)

Similarly,			
Complete fractions	$\frac{123}{10}$	$\frac{123}{100}$	$\frac{123}{1000}$
Decimal fractions	12.3	1.23	0.123

## Decimal Fractions and Decimals

$$\frac{1}{10} = 0.1, \frac{2}{10} = 0.2, \frac{3}{10} = 0.3, \dots, \frac{9}{10} = 0.9, \frac{10}{10} = 1.0$$

$$\frac{1}{100} = 0.01, \frac{2}{100} = 0.02, \frac{3}{100} = 0.03, \dots, \frac{9}{100} = 0.09$$

$$\frac{10}{100} = 0.10, \frac{11}{100} = 0.11, \frac{12}{100} = 0.12, \dots, \frac{99}{100} = 0.99, \frac{100}{100} = 1.00$$

$$\frac{1}{1000} = 0.001, \frac{2}{1000} = 0.002, \frac{3}{1000} = 0.003, \dots, \frac{9}{1000} = 0.009$$

$$\frac{10}{1000} = 0.010, \frac{11}{1000} = 0.011, \frac{12}{1000} = 0.012, \dots, \frac{99}{1000} = 0.099$$

$$\frac{100}{1000} = 0.100, \frac{101}{1000} = 0.101, \frac{102}{1000} = 0.102, \dots, \frac{999}{1000} = 0.999, \frac{1000}{1000} = 1.000$$

## MIXED DECIMALS

So far we have read about decimal fractions like 0.1, 0.01, 0.05, 0.001, 0.98 etc. There is no digits to the left of the decimal point.

The numbers 1, 2, 3, 4, ..... etc., are called whole numbers. When there is a **whole number** to the left of the decimal point, it is called a **mixed decimal**.  
For example,

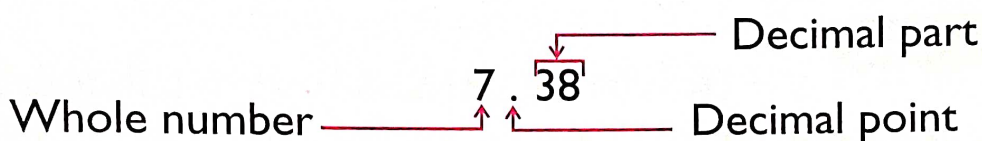
1.2 is read as one point two.

3.56 is read as three point five six.

9.001 is read as nine point zero-zero one.

A decimal has a whole number part and a decimal part. The decimal point separates the whole number part and the decimal part.

For example, in 7.38, the whole number part is 7 and the decimal part is 38.



The absence of any of the parts is shown by zero.

For example,

0.3 may be written as 0.3.

12 may be written as 12.0.

The number of digits after the decimal point is known as the number of decimal places.

## DECIMAL CONVERSIONS

### To Convert a Decimal Number into a Decimal Fraction

Make the number without decimal point as the numerator of the common fraction. Count the number of decimal places. Write the denominator with as many zeroes after 1 as the number of decimal places.

$$3.9 = \frac{39}{10}$$

$$3.73 = \frac{373}{100}$$

$$0.004 = \frac{4}{1000}$$

### To Convert a Decimal Fraction into a Decimal Number

Count the number of zeroes coming after 1 in the denominator. Count an equal number of digits from the right most in the numerator and place the decimal point to the left of the digit reached.

$$\frac{46}{10} = 4.6$$

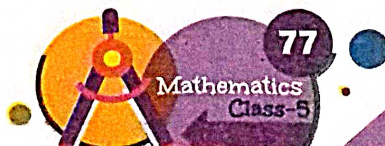
$$\frac{375}{10} = 37.5$$

$$\frac{3812}{10} = 381.2$$

$$\frac{3807}{100} = 38.07$$

$$\frac{386}{100} = 3.86$$

$$\frac{4807}{100} = 48.07$$



$$\frac{8}{10} = 0.8$$

$$\frac{47}{100} = 0.47$$

$$\frac{35}{1000} = 0.035$$

If the number of digits in the numerator is less than the number of zeroes in the denominator, then add zeroes to the left of the numerator to equal the number of zeroes.

For example,  $\frac{7}{100} = 0.07$

$$\frac{7}{1000} = 0.007$$



## Progress CHECK-UP-1



### Pleasure TIME

Mast

1. Write each of the following as a fraction :

(a) 0.7

(b) 0.9

(c) 0.08

(d) 0.03

(e) 0.05

(f) 0.10

(g) 0.26

(h) 0.99

(i) 2.15

(j) 3.01

(k) 5.92

(l) 8.63

(m) 90.3

(n) 84.75

(o) 94.87

2. Write each of the following as a decimal :

(a)  $\frac{2}{10}$

(b)  $\frac{4}{10}$

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

(d)  $\frac{11}{10}$

(e)  $\frac{54}{10}$

(f)  $\frac{5}{100}$

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

(h)  $\frac{17}{100}$

(i)  $\frac{23}{100}$

(j)  $\frac{10}{100}$

(k)  $\frac{58}{100}$

(l)  $\frac{99}{100}$

(m)  $\frac{195}{100}$

(n)  $\frac{199}{100}$

(o)  $\frac{738}{100}$

## DECIMAL PLACE VALUE CHART

Engagem

A decimal has two parts: integer (whole number) part and decimal number part. Both of these parts are separated by a dot (•) called decimal point. The decimal place value chart is shown below :

Places	Thousands	Hundreds	Tens	Ones	Decimal point	Tenths	Hundredths	Thousandths
Place Values	1000	100	10	1	.	$\frac{1}{10}$	$\frac{1}{100}$	$\frac{1}{1000}$

## FORM OF DECIMALS

### Expanded Form of Decimals

The expanded form of a number represents that number as the sum of the place values of all its digits. For expansion of any number, we must be aware of places and place values.

**Example 1.** Expand 782.182.

**Solution :** On writing the given numbers in words, we have,

7 hundreds + 8 tens + 2 ones + 1 tenths + 8 hundredths + 2 thousandths

$$= 700 + 80 + 2 + \frac{1}{10} + \frac{8}{100} + \frac{2}{1000}$$

Thus, the expanded form of 782.182 is  $700 + 80 + 2 + \frac{1}{10} + \frac{8}{100} + \frac{2}{1000}$

### Standard Form or Short Form of Decimals

The standard form of a decimal can be written with the help of its expanded form. It is the way in which we write a number normally.

**Example 2.** Write the standard form of  $7000 + 70 + 9 + \frac{3}{10} + \frac{8}{100} + \frac{5}{1000}$ .

**Solution :** We have,  $7000 + 70 + 9 + \frac{3}{10} + \frac{8}{100} + \frac{5}{1000}$

$$= 7000 + 70 + 9 + 0.3 + 0.08 + 0.005 = 7079.385$$

## LIKE AND UNLIKE DECIMALS AND THEIR CONVERSION

**Like Decimals :** Two decimal fractions are said to be like if they have equal number of decimal places.

For example, 7.03, 193.05, 29.16, etc.

**Unlike Decimals :** Two decimal fractions are said to be unlike if they have unequal number of decimal places.

For example, .013, 1.61, 17.1, etc.

### Conversion of Unlike Decimals into Like Decimals

Consider the decimal 0.3.

$$0.3 = \frac{3}{10} = \frac{3 \times 10}{10 \times 10} = \frac{30}{100} = 0.30$$

$$0.30 = \frac{30}{100} = \frac{30 \times 10}{100 \times 10} = \frac{300}{1000} = 0.300$$



What do we observe?

We see that  $0.3 = 0.30 = 0.300$ , etc.

Thus, we conclude that on putting any number of zeroes to the extreme right side of the decimal part, the value of the decimal does not change.

Using the above fact, we can convert a set of unlike decimals into a set of like decimals.

**Example 3.** Which of the following are like decimals?  
(a) 1.21, 0.35, 25.469 (b) 4.256, 125.001, 0.005

**Solution:** (a) These are unlike decimals because they don't have the same number of decimal places.

(b) These are like decimals because they have the same number of decimal places.

**Example 4.** Convert each of the following into groups of like decimals :

(a) 21.2, 17.97, 208.3, 536.025 (b) 5.1, 12.62, 129.9, 56.015

**Solution:** The maximum number of decimal places contained in the given group of decimal numbers is three. So, we convert each of the given decimals into an equivalent decimal having three decimal places, by putting zero or zeroes to the extreme right of the decimal part.

(a)  $21.2 = 21.200$ ,  $17.97 = 17.970$ ,  $208.3 = 208.300$

Clearly, 21.200, 17.970, 208.300 and 536.025 are like decimals.

(b)  $5.1 = 5.100$ ,  $12.62 = 12.620$ ,  $129.9 = 129.900$

Clearly, 5.100, 12.620, 129.900 and 56.015 are like decimals.



## Progress CHECK-UP-2



### Pleasure TIME

I. Write the following decimals in the place-value chart :

(a) 0.07

(b) 34.18

(c) 57.02

(d) 2.753

(e) 9.256

(f) 946.2

(g) 3846.9

(h) 1057.18



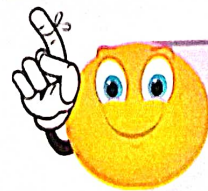
2. Expand the following decimals :
- (a) 53.489                      (b) 109.872                      (c) 348.61                      (d) 94.367  
 (e) 752.69                      (f) 89.350                      (g) 5.349                      (h) 209.103
3. Write the place values of each underline digits :
- (a) 512.356                      (b) 26.006                      (c) 39.075  
 (d) 135.609                      (e) 26.692                      (f) 129.089
4. Write the short form of :
- (a)  $3 + \frac{5}{10} + \frac{4}{100}$                       (b)  $60 + 3 + \frac{7}{10} + \frac{3}{100}$   
 (c)  $500 + \frac{6}{10} + \frac{9}{1000}$                       (d)  $200 + 40 + 1 + \frac{5}{10} + \frac{7}{100}$
5. Which of the following are groups of like decimals?
- (a) 15.2, 181.7, 0.3, 18.9                      (b) 98.5, 3.12, 14.37, 1.003  
 (c) 2.75, 18.03, 125.74, 0.56                      (d) 6.856, 2.084, 7.38, 125.4
6. Convert each of the following into a group of like decimals :
- (a) 0.87, 2.574, 6.3, 105.73                      (b) 6.5, 2.8, 12.53, 17.437  
 (c) 125.652, 7.4, 0.06, 15.089                      (d) 125.51, 246.8, 19.001, 0.25

## COMPARING AND ORDERING OF DECIMALS

### Engagement

Like we compare whole numbers, we can also compare decimals. To compare decimal numbers, we first convert unlike decimals into like decimals.

Then, we compare their whole parts and decimal parts with the help of the following rules.



*Keep in Mind*  
 Before starting the comparison of decimals, convert them into like decimals.

- Rules:**
1. Of the given decimals, the decimal with the greater whole number part is greater.
  2. If the whole part is the same in both the decimals, we compare the decimals by comparing their digits in the tenths places. If they are equal, then digits in the hundredths places are compared; and so on.

**Example 5.** Compare the following.

- (a) 23.45 and 29.67    (b) 12.4 and 12.04    (c) 0.97 and 0.975

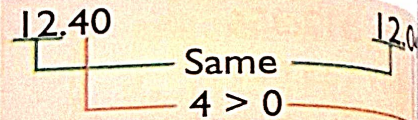
**Solution:** (a) We have to compare 23.45 and 29.67.  
Comparing the whole parts, we have

$$29 > 23.$$

So,  $29.67 > 23.45.$

(b) Converting the decimals into like decimals, we get 12.40 and 12.04.

So  $12.40 > 12.04$  or  $12.4 > 12.04.$



(c) Converting these decimals into like decimals, we get 0.970 and 0.975.  
Here, the whole parts, tenths digits, and the hundredths digits are the same. So, we compare their thousandths digits.

So  $0.970 < 0.975$  or  $0.97 < 0.975.$

**Example 6.** Arrange the following decimals in ascending order.

0.5, 0.45, 0.005, 0.036

**Solution:** Converting into like decimals, we have

0.500, 0.450, 0.005, 0.036.

The decimals in ascending order are 0.005, 0.036, 0.45, 0.5.



### Progress CHECK-UP-3



### Pleasure TIME

Maste

1. Fill in the boxes with the  $>$ ,  $<$  or  $=$  signs.

(a)  $0.42$    $0.24$

(b)  $0.08$    $0.8$

(c)  $3.01$    $3.001$

(d)  $2.067$    $2.67$

(e)  $8.56$    $8.567$

(f)  $0.020$    $0.002$

2. Arrange the following decimals in ascending order.

(a) 11.1, 11.21, 11.001

(b) 0.42, 0.5, 0.382

(c) 20.3, 30.2, 23.25

3. Arrange the following decimals in descending order.

(a) 11.42, 10.4, 11.526

(b) 9.82, 9.9, 9.795

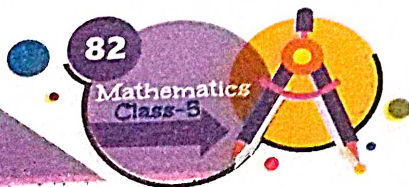
(c) 8.86, 8.094, 8.9

### ADDITION AND SUBTRACTION OF DECIMALS

Engage 2

❖ In order to add two or more decimals, we proceed as follows :

1. If the given decimals are not like decimals, change them to like decimals



- Write the decimals in columns, keeping the decimal points in the same column. The digits having same place value should be in same column.
- Add as in the case of ordinary numbers.
- In the sum, put the decimal point in the column of the decimal points.

**Example 7.** Add: (a) 4.38 and 15.76 (b) 26.437, 125.07 and 36.8

**Solution:** (a)

$$\begin{array}{r} 4.38 \\ + 15.76 \\ \hline 20.14 \end{array}$$

(b)

$$\begin{array}{r} 26.437 \\ 125.070 \\ + 36.800 \\ \hline 188.307 \end{array}$$

❖ To subtract decimals, we proceed as follows :

- Change the given decimals into like decimals.
- Write the greater number on top and the smaller below, so that the decimal points of both the numbers are in the same column.
- Subtract as in the case of ordinary numbers.
- In the difference, put the decimal point in the column of the decimal points.

**Example 8:** Subtract: (a) 26.32 from 57.16 (b) 8.007 from 18.3

**Solution:** (a)

$$\begin{array}{r} 57.16 \\ - 26.32 \\ \hline 30.84 \end{array}$$

(b) Converting the given decimals into like decimals, we get

8.007, 18.300

$$\begin{array}{r} 18.300 \\ - 8.007 \\ \hline 10.293 \end{array}$$



## Progress CHECK-UP-4

### Pleasure TIME

### Mastery

1. Add:

(a) 6.32 and 8.75

(b) 15.07 and 9.15

(c) 16.5 and 12.32

(d) 26.407 and 18.35

(e) 37.54, 12.06 and 26.13

(f) 13.5, 27.436 and 8.56

2. Subtract :

(a) 5.29 from 20.16

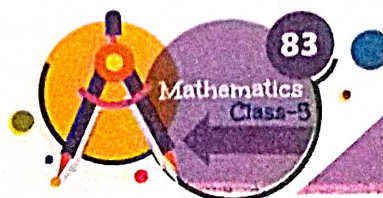
(b) 12.47 from 35.5

(c) 13.3 from 38.45

(d) 17.39 from 56.003

(e) 48 from 68.25

(f) 73.56 from 100.005



## MULTIPLICATION AND DIVISION OF DECIMALS

### ❖ Multiplying a Decimal Number by a Whole Number

Let us multiply 0.708 by 16.

**Step 1 :** We first multiply the numbers as if we are multiplying whole numbers by ignoring the decimal point.

**Step 2 :** Now, we put the decimal point in the product in such a way that there are as many decimal places in the product as in the given decimal (multiplicand). We start counting from the extreme right of the number.

Since, 0.708 has 3 places of decimal. So, in the product, decimal will be placed after 3 digits from the right.

So,  $0.708 \times 16 = 11.328$

### ❖ Dividing a Decimal Number by a Whole Number

Let us divide 16.62 by 3.

**Step 1 :** We divide the decimal number as we divide the whole number.

**Step 2 :** We put the decimal point in the quotient right above the decimal point of the dividend, because as we reach the decimal point in the dividend, we put it simultaneously in the quotient and only then we continue to divide.

**Step 3 :** We continue the division in the same way as whole numbers by bringing down the digits in the decimal part.

If the last remainder is not zero, we may insert as many zeroes as are needed. This does not change the value of the dividend.

So,  $16.62 \div 3 = 5.54$

Let us divide 129.36 by 15.

So,  $129.36 \div 15 = 8.624$

$$\begin{array}{r} 708 \\ \times 16 \\ \hline 4248 \\ 7080 \\ \hline 11328 \end{array}$$

$$\begin{array}{r} 5.54 \\ 3 \overline{) 16.62} \\ \underline{- 15} \phantom{0} \\ 16 \\ \underline{- 15} \\ 12 \\ \underline{- 12} \\ 0 \end{array}$$

$$\begin{array}{r} 8.624 \\ 15 \overline{) 129.360} \\ \underline{- 120} \phantom{0} \\ 93 \\ \underline{- 90} \\ 36 \\ \underline{- 30} \\ 60 \\ \underline{- 60} \\ 0 \end{array}$$

## MULTIPLICATION AND DIVISION OF DECIMALS BY 10 AND 100

❖ Move the decimal point to the right as many places as the number of zeroes in the multiplier.

For examples ,

$$3.024 \times 10 = 30.24 \text{ (one zero in 10, move the point one place to the right)}$$

$$3.024 \times 100 = 302.4 \text{ (two zeroes in 100, move the point two places to the right)}$$

✦ Move the decimal point to the left by the number of places equal to the number of zeroes in the divisor.

For example,  $324.6 \div 10 = 32.46$  (Divisor has one zero, move the decimal point 1 place to the left in the dividend)

$324.6 \div 100 = 3.246$  (Divisor has two zeroes, move the decimal point 2 places to the left in the dividend)



## Progress CHECK-UP-5



### Pleasure TIME

### Mastery

#### 1. Multiply :

(a)  $4.8 \times 6$

(b)  $12.3 \times 7$

(c)  $10.36 \times 9$

(d)  $15.32 \times 9$

(e)  $0.356 \times 7$

(f)  $0.736 \times 12$

(g)  $27.08 \times 26$

(h)  $3.214 \times 24$

#### 2. Divide :

(a)  $16.8 \div 6$

(b)  $119.2 \div 8$

(c)  $306.72 \div 9$

(d)  $114.28 \div 4$

(e)  $88.34 \div 12$

(f)  $572.4 \div 18$

(g)  $77.136 \div 24$

(h)  $100.5 \div 25$

#### 3. Find the product :

(a)  $0.45 \times 10$

(b)  $5.04 \times 100$

(c)  $8.8 \times 100$

(d)  $0.07 \times 10$

(e)  $0.01 \times 10$

(f)  $0.38 \times 1000$

(g)  $0.01 \times 100$

(h)  $0.75 \times 100$

#### 4. Find the quotient :

(a)  $0.6 \div 10$

(b)  $5.8 \div 10$

(c)  $27.5 \div 10$

(d)  $93.4 \div 10$

(e)  $0.5 \div 100$

(f)  $0.8 \div 100$

(g)  $2.19 \div 100$

(h)  $4.73 \div 100$



## Travel Through

Reading

1. Complete the patterns.

(a)

			.....	
--	--	--	-------	--

(b)

			.....	
--	--	--	-------	--

2. Circle the picture that represents the incorrect turn. Draw the correct picture.

(a)

					.....
--	--	--	--	--	-------

(b)

					.....
--	--	--	--	--	-------



## Learning Outcomes

- Patterns
- Palindromes
- Turns and Patterns
- Calendar Magic
- Magic Squares
- Smart Adding

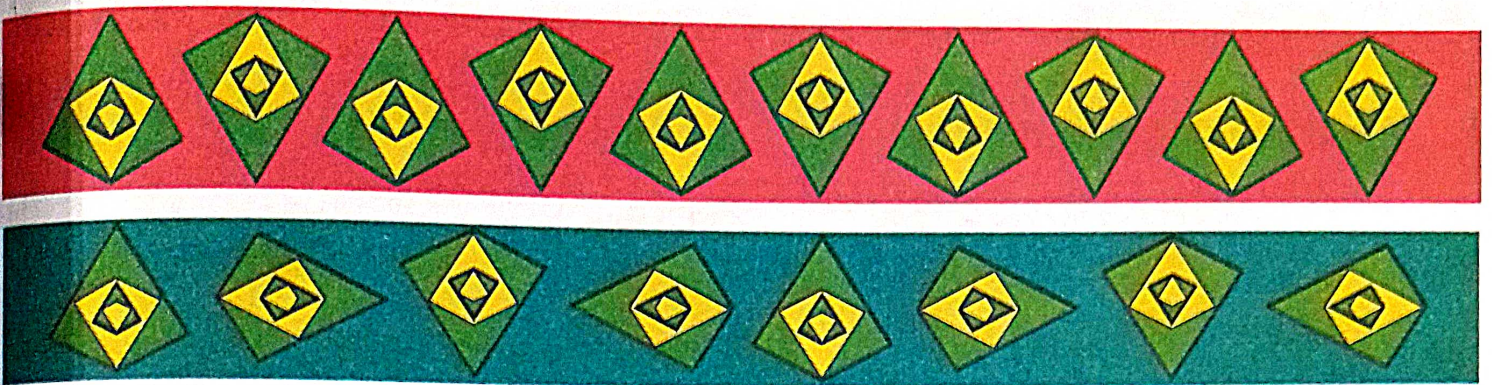
## PATTERNS

A group or arrangement of numbers, shapes, letters, designs, etc., that repeats more than one time is called a **pattern**.

Engagement




We see patterns in our daily life on objects like sarees, carpets, floor, sheets, etc. For example,

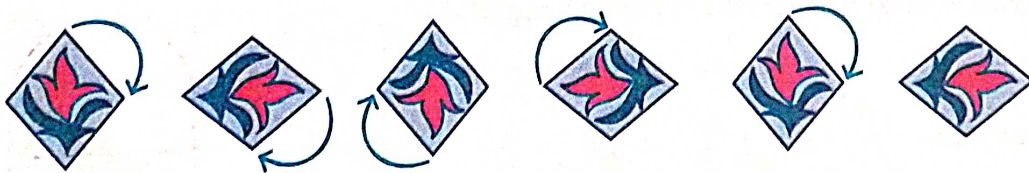


Now you use these two rules to make patterns with this  block. Also make your own rule.

## URNS AND PATTERNS

Look at this block . We make three different rules to turn it clockwise and see the patterns.

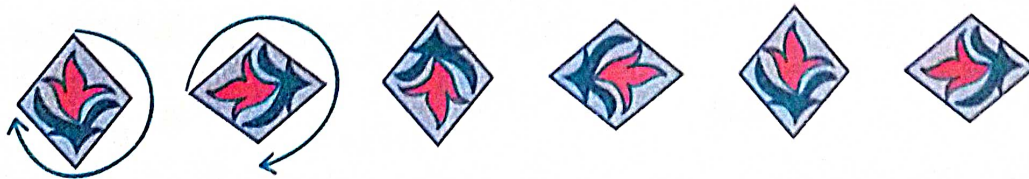
**Rule 1:** Repeat it with a one-fourth turn.



**Rule 2:** Repeat it with a half turn.




**Rule 3:** Repeat it with a three-fourth turn.

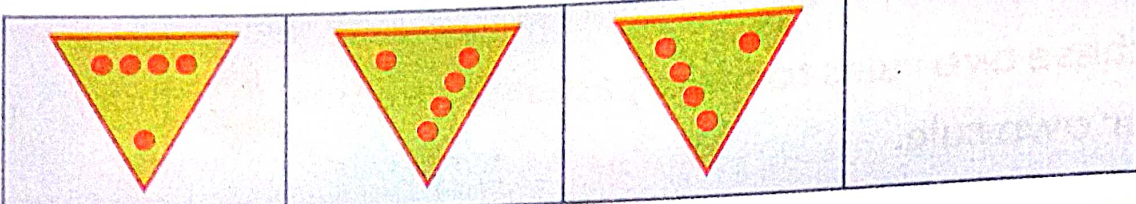


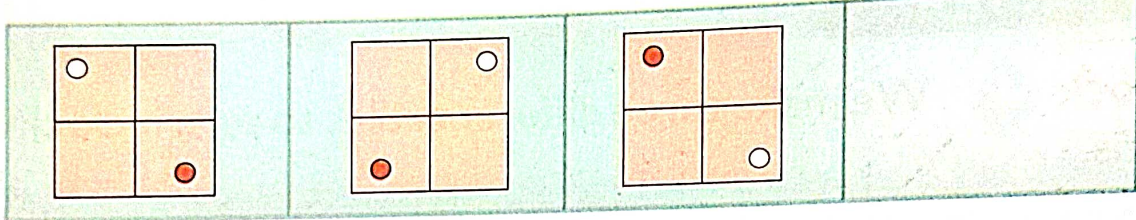


Pleasure TIME

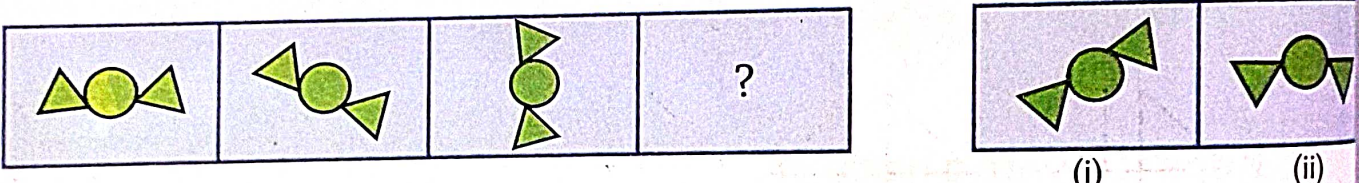
1. What should come next?

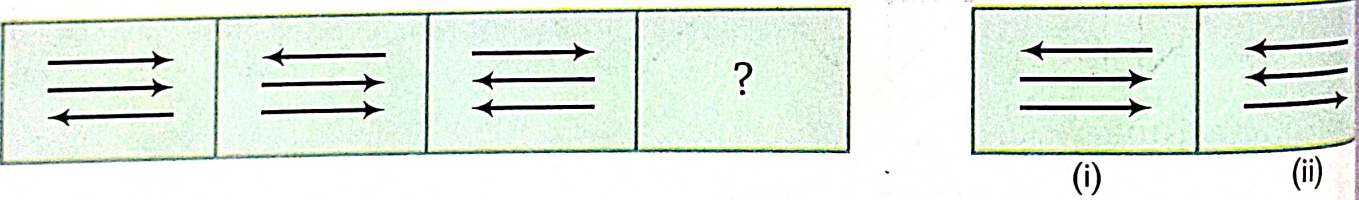
(a) 

(b) 

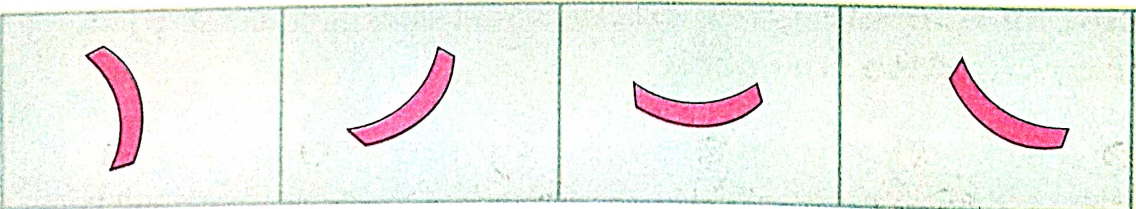
(c) 

2. Find the rule and choose the next figure :

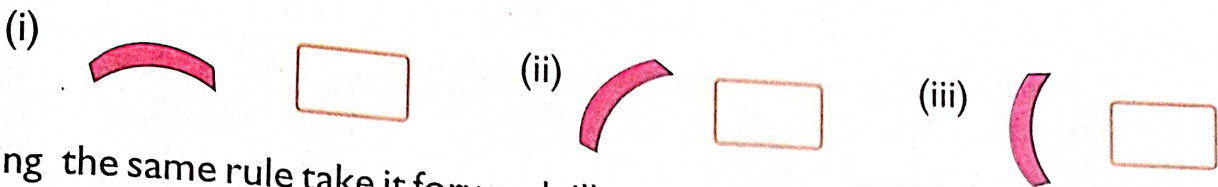
(a) 

(b) 

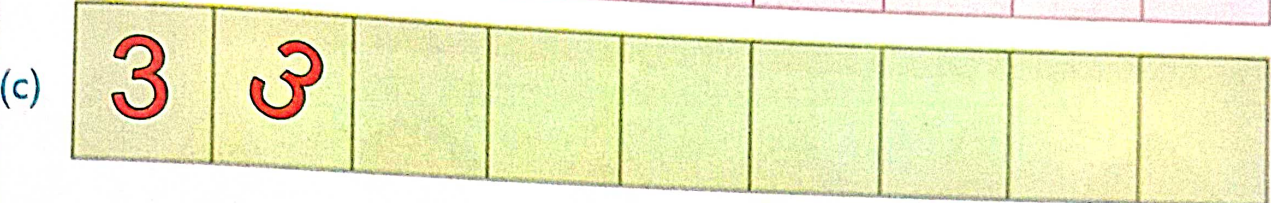
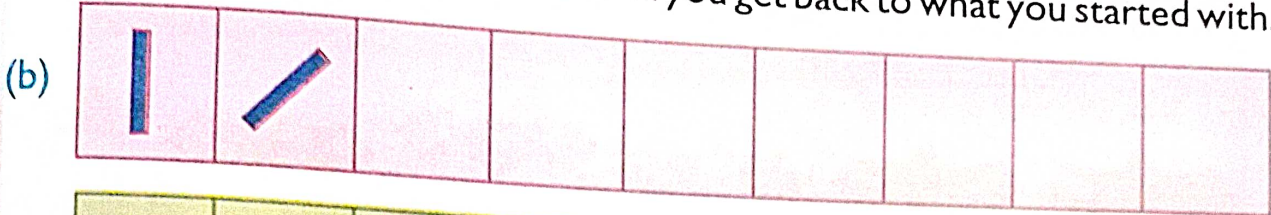
3. See this pattern :

(a) 

The rule of the pattern is — turning by  $45^\circ$  each time. Which will be the next? Tick (✓) the right one.



Using the same rule take it forward till you get back to what you started with.



4. Some patterns are given below on the left side of the red line. For each pattern, write the rule. Then choose what comes next from the right side of the line and tick (✓) it.

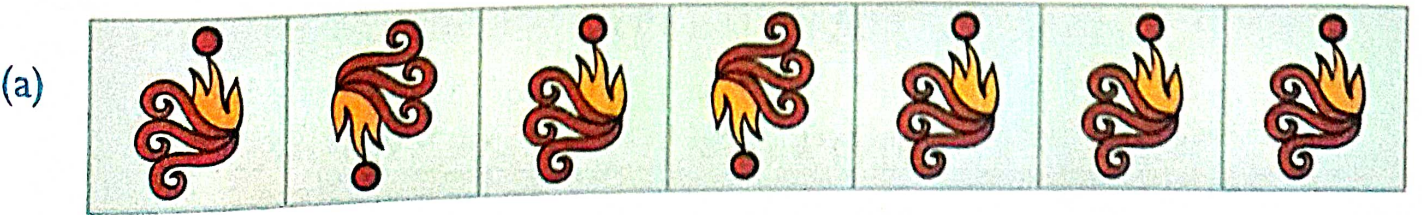
(a) (i) ( ) (ii) ( )

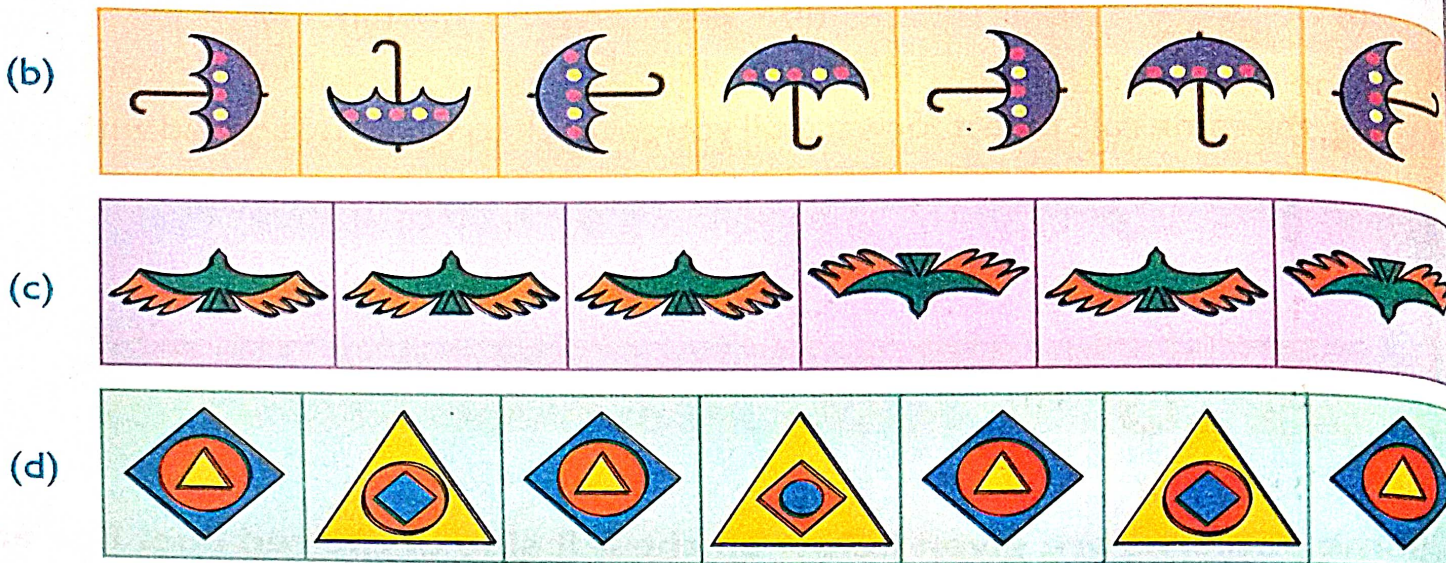
Rule : .....

(b) (i) ( ) (ii) ( )

Rule : .....

5. Observe the rule in the given patterns and mark that picture which is breaking the rule. Also correct it.



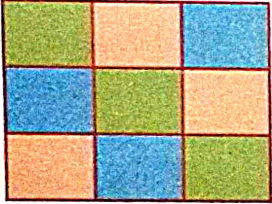


**MAGIC SQUARES**

**Engagement**

Do you remember magic triangles? Come now, let's make some magic squares. Fill this square using all the numbers from 46 to 54.

Rule : The total of each line is 150.



✿ Fill this square using all the numbers from 21 to 29.

Rule : The total of each side is 75.

		49
46		
	52	47

**PALINDROMES**

**Engagement**

Special words/numbers which read the same both ways are called palindromes. For example, eye, pop, level, radar and madam read the same forwards and backwards.

Some operations produce palindromes. Study the pattern and write the missing numbers.

$$\begin{aligned}
 I \times II &= II \\
 II \times II &= 121 \\
 III \times II &= 1221 \\
 IIII \times II &= \dots\dots\dots \\
 IIIII \times II &= \dots\dots\dots
 \end{aligned}$$

# CALENDAR MAGIC

Look at the calendar below.

Let us mark a  $3 \times 3$  box (9 dates) on the calendar and see some magic.

S	M	T	W	TH	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

I can quickly find the total of these numbers in the box.



Won't that take some time?

The total is 99.



Hey! Just take the middle number and multiply it by 9. See you can get the answer even faster.

Take the smallest number	3
Add 8 to it	+8
=	11
Multiply it by 9	$\times 9$
Total	99

Now you choose any  $3 \times 3$  box from a calendar and find the total in the same way. Play this game with your family.

# SMART ADDING

See the following carefully:

1	+	2	+	3	+	4	+	5	+	6	+	7	+	8	+	9	+	10	=	55
11	+	12	+		+		+		+		+		+		+		+	20	=	155
21	+		+		+		+		+		+		+		+		+	30	=	
31	+		+		+		+		+		+		+		+		+	40	=	
41	+		+		+		+		+		+		+		+		+	50	=	
51	+		+		+		+		+		+		+		+		+	60	=	555
61	+		+		+		+		+		+		+		+		+	70	=	

Did you notice some pattern in the answers?



1. Magic squares.

Fill in the boxes below as per the instructions given.

(a)

		8
	7	
6		4

Use numbers 3 to 11.

Rule: The total of each line is 21.

(b)

13		11
	10	
		7

Use numbers 6 to 14.

Rule: The total of each line is 30.

2. Study the pattern and fill in the blanks. One has been done for you.

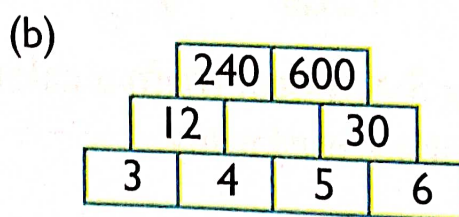
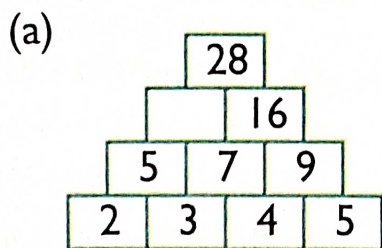
(a)  $24 + 37 + 19 = 37 + 24 + 19$

(c)  $400 + \text{○} + \text{○} = 300 + \text{○} + 600$

(b)  $34 + \text{□} + 10 = 26 + 10 + \text{□}$

(d)  $600 + \text{△} + 120 = \text{□} + \text{○} + 145$

3. See the pattern and fill in the blanks.



4. Follow the pattern given below and fill in the boxes.

$(3 \times 3) - (2 \times 2) = 5$      $(5 \times 5) - (4 \times 4) = 9$      $(6 \times 6) - (5 \times 5) = 11$

(a)  $(8 \times 8) - (7 \times 7) = \text{□}$

(b)  $(13 \times 13) - (12 \times 12) = \text{□}$

(c)  $(15 \times 15) - (14 \times 14) = \text{□}$

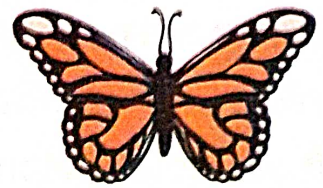
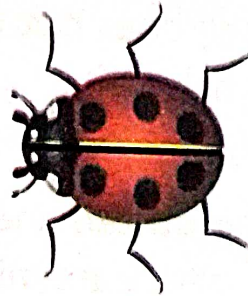
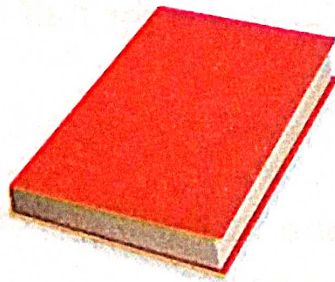
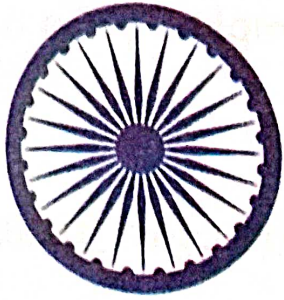
(d)  $(25 \times 25) - (24 \times 24) = \text{□}$



## Travel Through

Readiness

1. (a) Cross (X) the shapes that do not have symmetry.



(b) Draw the lines of symmetry for each.

2. Complete the pattern.

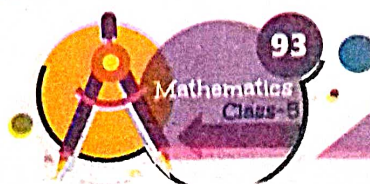


## Learning Outcomes

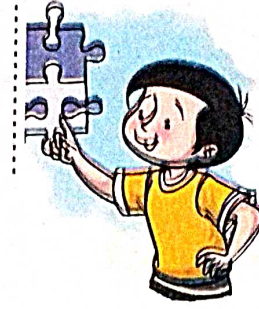
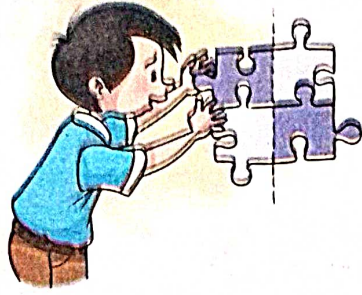
- Mirror Halves

- Symmetry

- Patterns and Turns



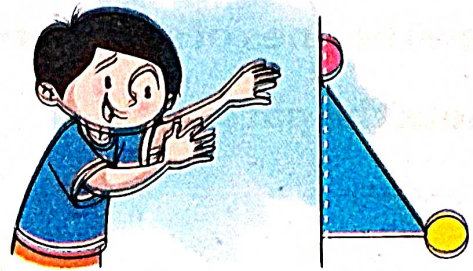
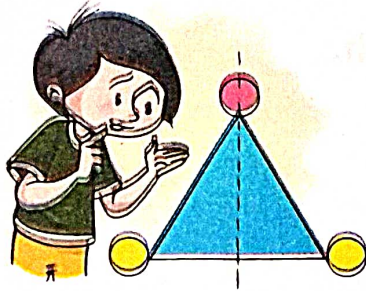
Look at this pattern.



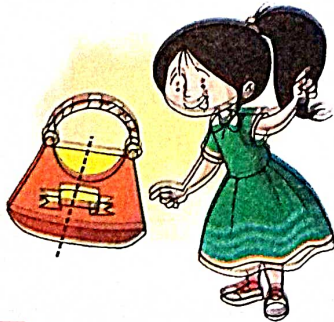
The dotted line divides the shape into two halves. But if you fold it along the dotted line, the left half does not cover the right half completely. So the two halves are not mirror halves.

Now look at another shape.

If you fold it along the dotted line, one half will cover the other similar half completely. So the two here are mirror halves.



Now imagine the same for these pictures.

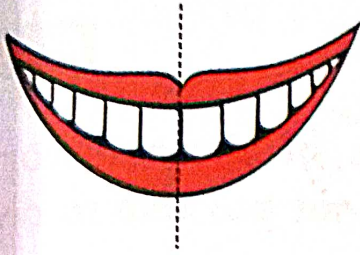


## SYMMETRY

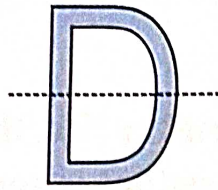
Figures that can be divided exactly into identical halves are known as **symmetrical figures**. Such images are the mirror images of each other. It means that, the two parts of the divided figure are identical about the line of division. When the figures are folded along this line, one half will exactly fit over the other half. The line drawn to divide an image into two equal halves is known as the **line of symmetry**.



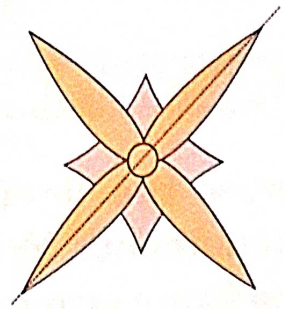
Figures can be divided equally by drawing the line of symmetry vertically, horizontally or diagonally.



Vertical line of symmetry



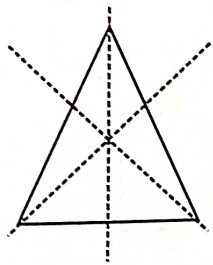
Horizontal line of symmetry



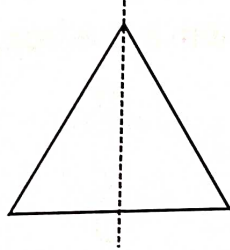
Diagonal line of symmetry

Figures that cannot be divided into equal parts are called **asymmetrical** or **non-symmetrical figures**. Some figures can have more than one line of symmetry and some are asymmetrical.

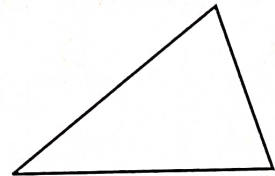
Different types of triangles have different number of lines of symmetry.



Three lines of symmetry  
(All sides of the triangle are equal.)

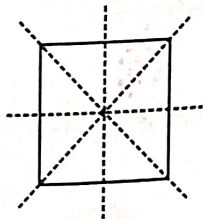


One line of symmetry  
(Two sides of the triangle are equal.)

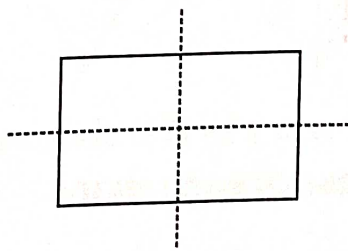


No line of symmetry  
(No sides of the triangle are equal.)

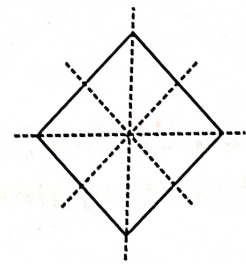
Similarly, a square, rectangle, rhombus, trapezium, parallelogram and circle have different number of lines of symmetry.



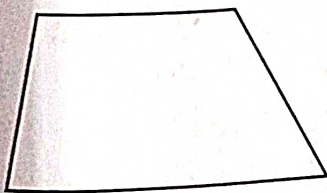
A square has four lines of symmetry.



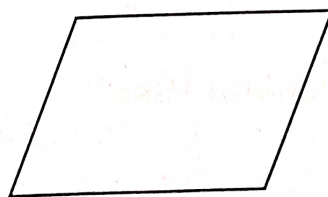
A rectangle has two lines of symmetry.



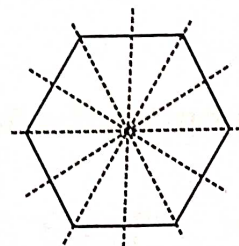
A rhombus has four lines of symmetry.



A trapezium has no line of symmetry.



A parallelogram has no line of symmetry.

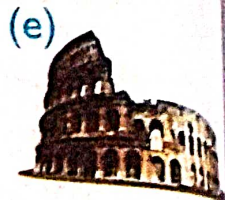
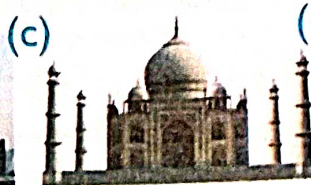
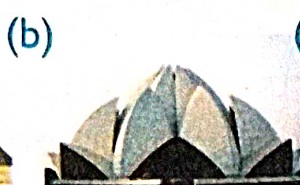


A hexagon has six lines of symmetry.



Pleasure TIME

1. Draw the line(s) of symmetry in the images of these historic monuments. Write 'Not Possible' wherever it is not possible to divide the figure symmetrically.



2. Write 'A' for asymmetrical, 'H' for horizontal line of symmetry, 'V' for vertical line of symmetry and 'D' for diagonal line of symmetry. In case, a letter has more than one line of symmetry, mention all of them in the box.

A

D

F

H

I

K

M

P

Q

S

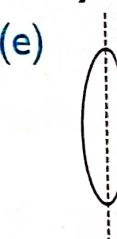
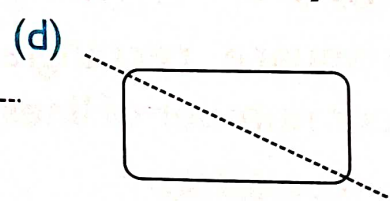
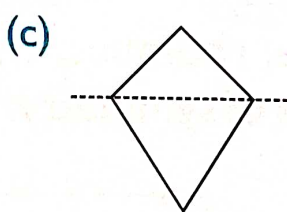
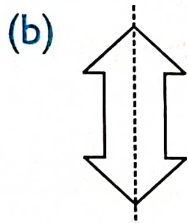
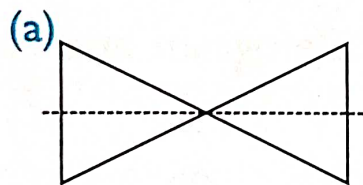
U

V

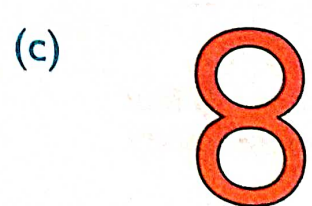
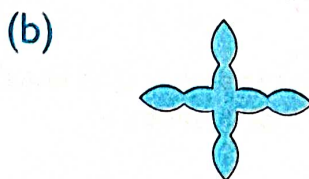
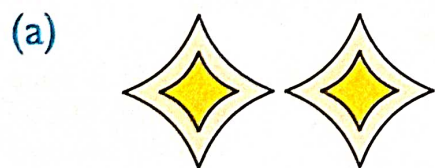
X

Z

3. Circle the figures that do not represent the correct line of symmetry.



4. Draw the line(s) of symmetry in the shapes and write down the number of lines of symmetry in case of each shape.

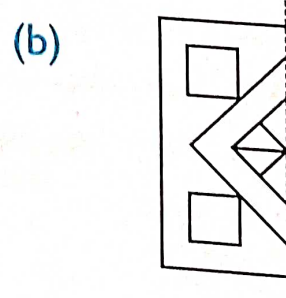
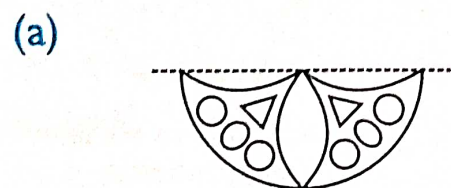


.....

.....

.....

5. Complete the designs and colour them.

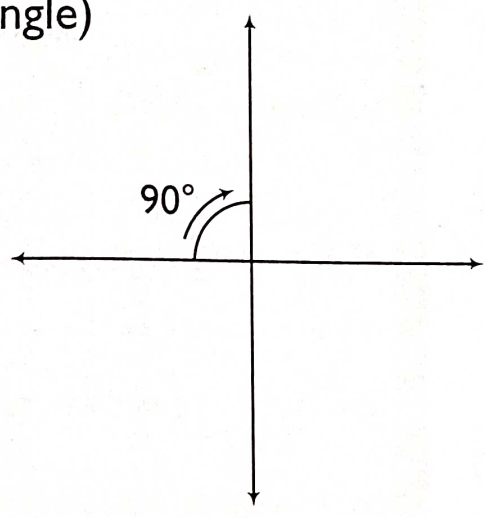


# PATTERNS AND TURNS

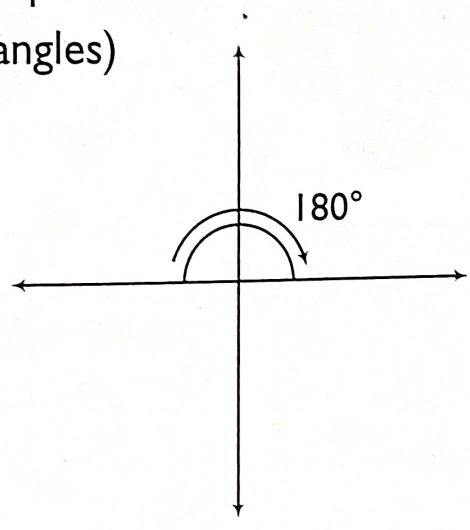
## Engagement

If a shape is turned at specific angles, a new pattern can be formed.

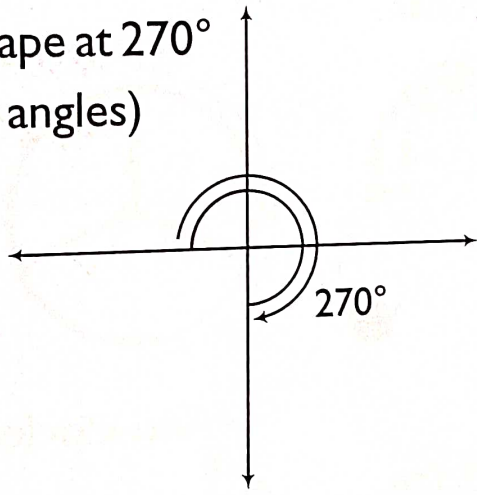
Turning a shape at  $90^\circ$   
(One right angle)



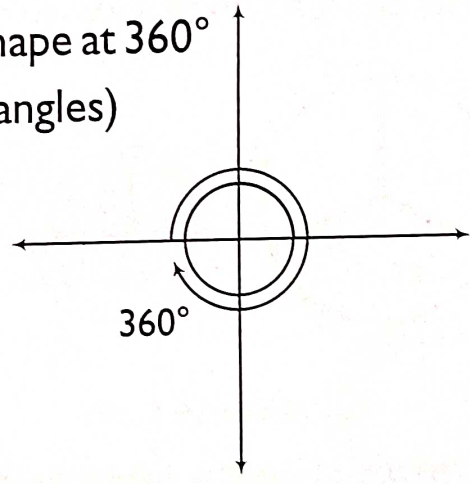
Turning a shape at  $180^\circ$   
(Two right angles)



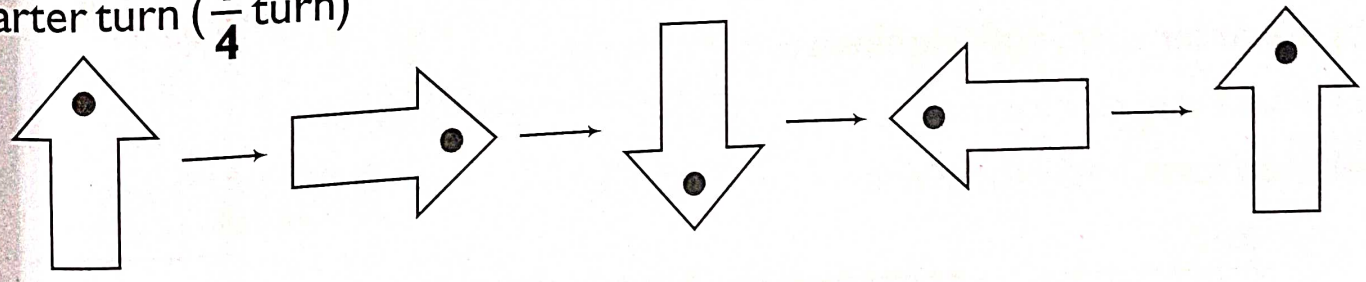
Turning a shape at  $270^\circ$   
(Three right angles)



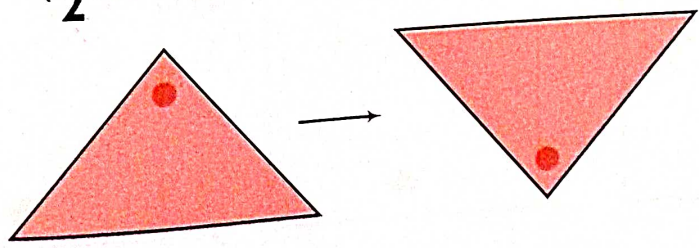
Turning a shape at  $360^\circ$   
(Four right angles)



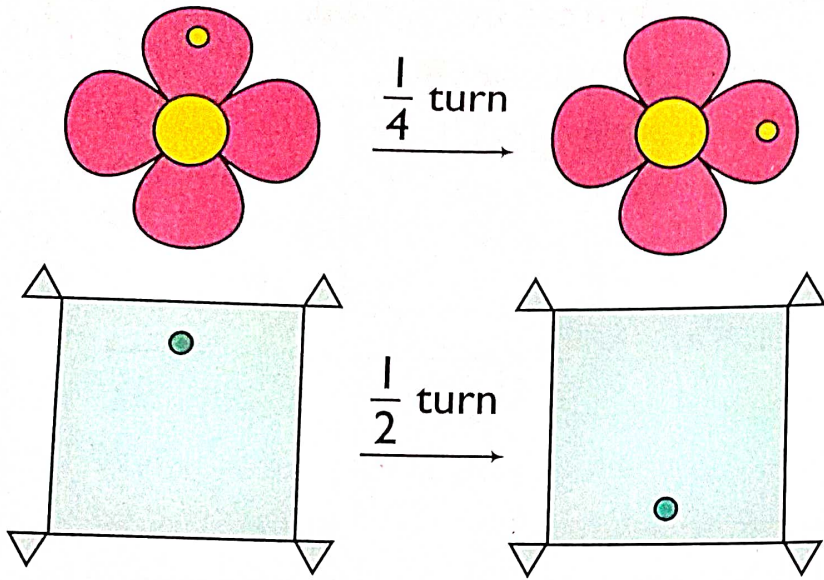
Quarter turn ( $\frac{1}{4}$  turn)



Half turn ( $\frac{1}{2}$  turn)



Some shapes look the same even after taking turns.



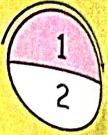
*Note*

$90^\circ$  turn =  $\frac{1}{4}$  turn

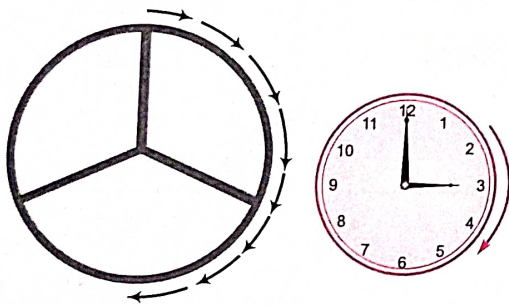
$180^\circ$  turn =  $\frac{1}{2}$  turn

$270^\circ$  turn =  $\frac{3}{4}$  turn

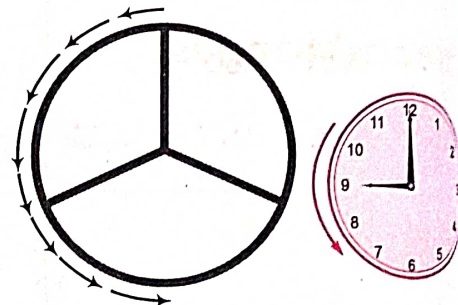
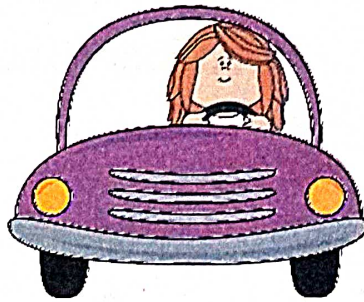
$360^\circ$  turn = 1 complete turn



Turns can also be clockwise or anti-clockwise.



Clockwise turn

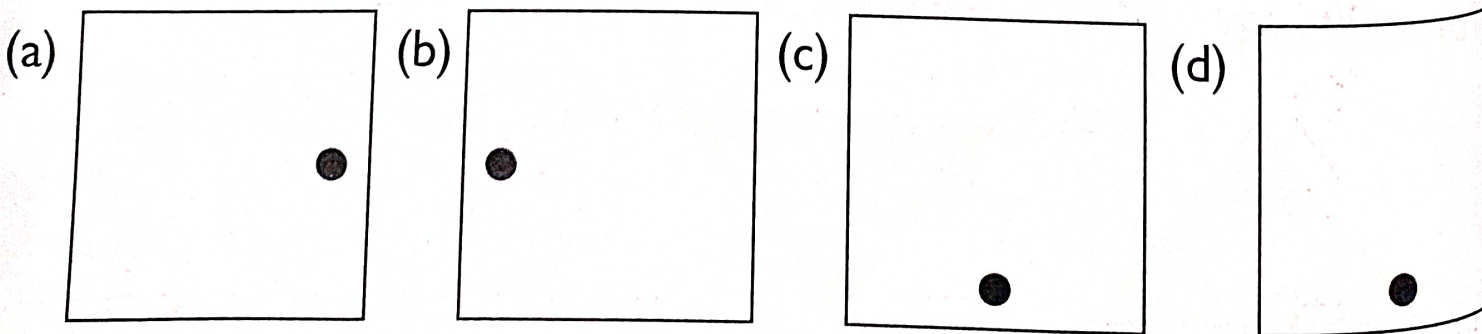


Anti-clockwise turn

**Example :** Give the figure the turns as instructed.

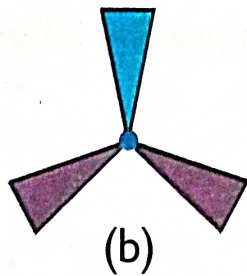
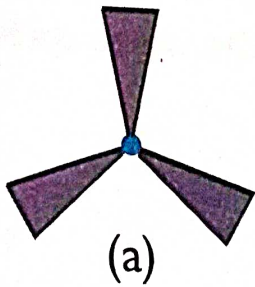
- (a) Quarter turn, clockwise
- (b) Quarter turn, anti-clockwise
- (c) Half turn, clockwise
- (d) Half turn, anti-clockwise

**Solution :**

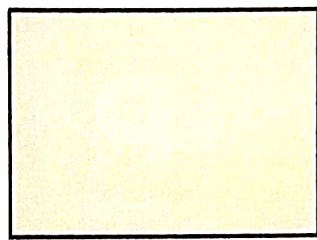
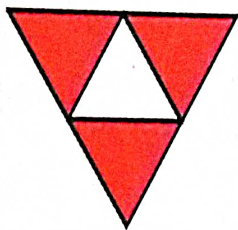


# One-third Turn

❖ Which fan will look the same on a  $\frac{1}{3}$  turn?



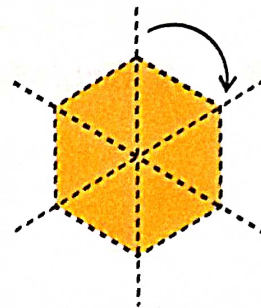
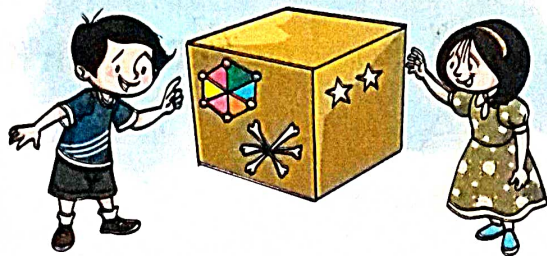
❖ Draw this shape after  $\frac{1}{3}$  turn.



Shape after  $\frac{1}{3}$  turn

# One-sixth Turn

Can you see that this shape looks the same on  $\frac{1}{6}$  turn?



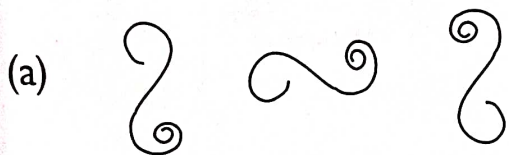
**Progress CHECK-UP-2**



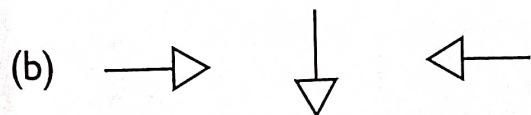
**Pleasure TIME**

**Mastery**

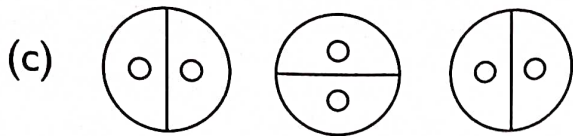
I. Complete the patterns given below :



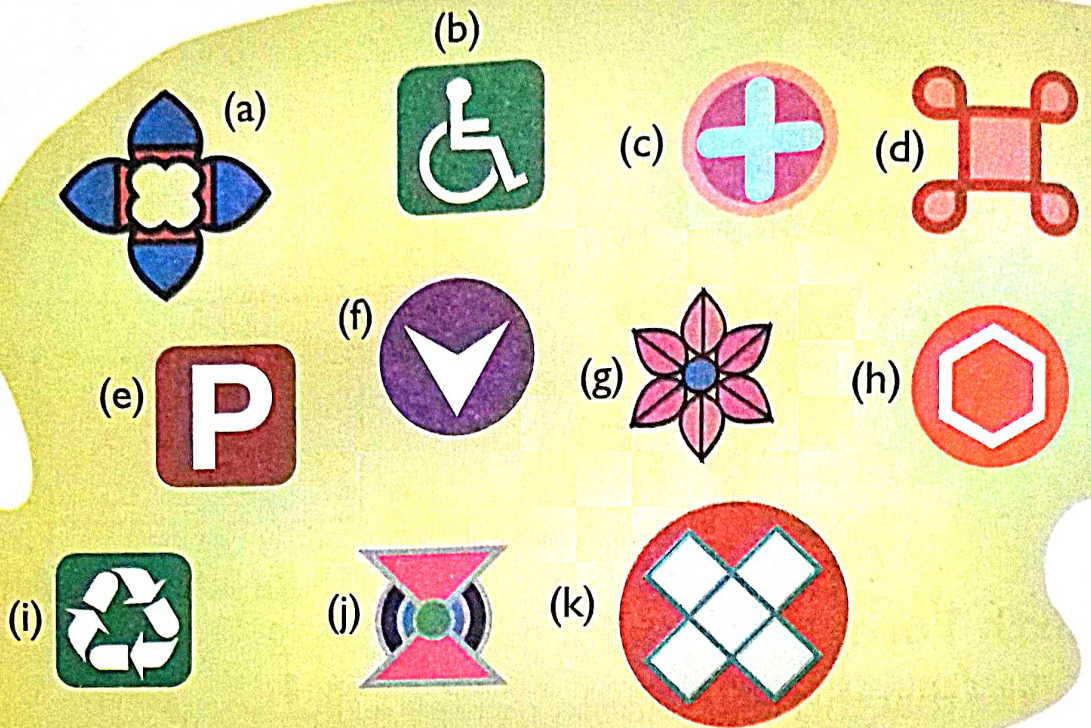
.....



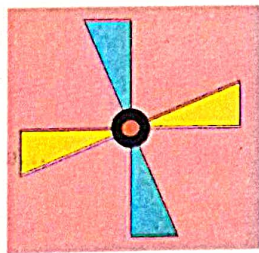
.....



2. Which among the following pictures will look the same on half a turn?



3. Will this fan also look the same after  $\frac{1}{4}$  turn? Draw in the yellow box.

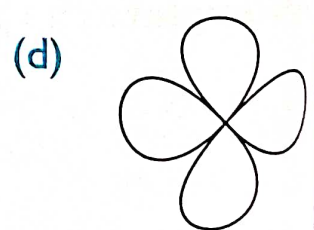
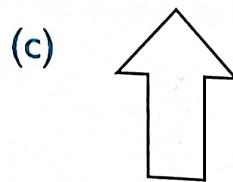
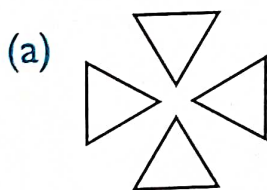


Before turning it


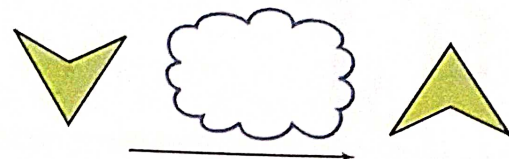


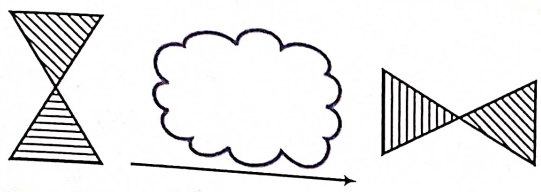
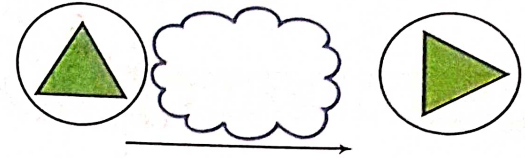
After  $\frac{1}{4}$  turn

4. Which of these shapes will look the same after quarter turn.

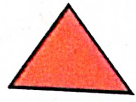
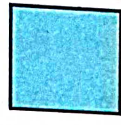
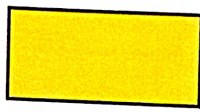


5. Identify the type of turn in the shapes.

(a)  (b) 


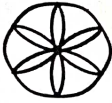


(c)  (d) 

6. Draw what the following shapes would look like on  $\frac{1}{4}$  turn and half a turn.

(a)  (b)  (c) 

Which of the above shapes do not look the same on  $\frac{1}{4}$  turn? Which shapes do not look the same on  $\frac{1}{2}$  a turn?

7. Look at the following shapes. Draw how they will look on  $\frac{1}{3}$  and  $\frac{1}{6}$  turn.

(a)  (b)  (c)  (d) 

8. Look at the following shapes:

- (a) Find out which of these figures look the same on  $\frac{1}{3}$  turn. Mark them with (✓).  
 (b) Which are the ones that will not look the same after  $\frac{1}{3}$  turn? Mark them with (X).

9. Draw some shapes which will look the same after  $\frac{1}{3}$  turn.

10. Draw some shapes which will look the same after  $\frac{1}{6}$  turn.



### Travel Through

1. Write the correct surface for each of the following. Choose your answer from curved surface or plain surface.

(a) Mango .....

(b) Table .....

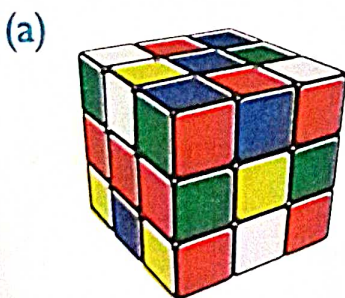
(c) Ball .....

(d) Book .....

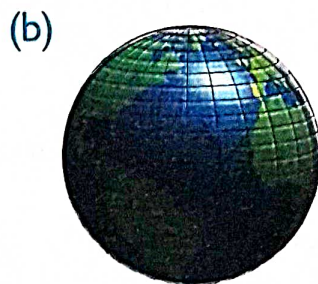
(e) Apple .....

(f) Bottle .....

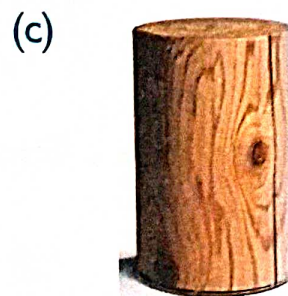
2. Write the number of faces, edges and vertices for each figure.



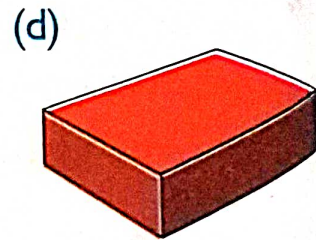
Cube



Sphere



Cylinder



Cuboid



### Learning Outcomes

- Some Geometric Terms
- Construction of Lines and Angles
- Angle
- Triangles
- Measuring Angles
- Quadrilaterals

### SOME GEOMETRIC TERMS

### Engagement

**Point** : A point is the smallest space imagined. But practically a point has no length, width or thickness. A point has a certain position. We mark a dot (.) to show the point and name it with a capital letter A. This is a point A.

**Line segment** : If we join two points with a ruler, we get a line segment. It is a part of a line. It has two end points. A line segment is named as  $\overline{AB}$ .

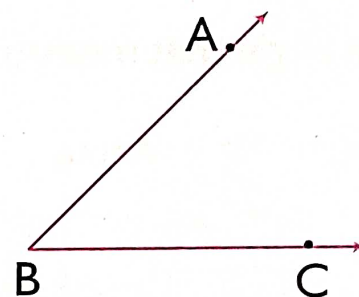
**Line:** If a line segment is extended in both the directions endlessly, it is called a line  $\overleftrightarrow{AB}$ . A line cannot be drawn on a piece of paper.

**Ray:** A ray has one end point and extends endlessly in the other direction. A ray is named as  $\overrightarrow{AB}$ .

## ANGLE

A figure formed by two rays beginning from a common point is called an angle. For example,  $\overrightarrow{BA}$  and  $\overrightarrow{BC}$  are two rays beginning from a common point B.

The common beginning point of these two rays is called the **vertex** of the angle. The two rays making the angle are called the **sides** or **arms** of the angle. The symbol for an angle is  $\angle$ .



## Measure of an Angle

The unit for measuring the size of angles is the **degree**. For example, if an angle measures 30 degrees, we write  $30^\circ$ .

## Type of Angles

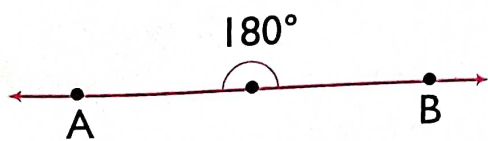
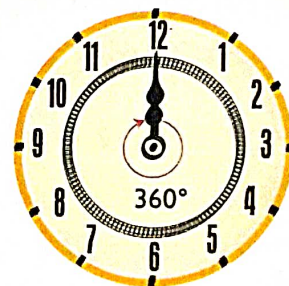
Angles have names depending on their measurements.

A full turn is called a **complete angle**.

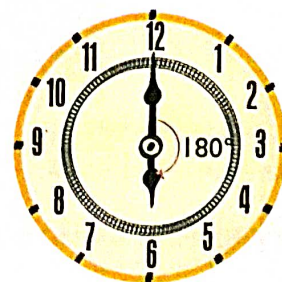
A complete angle =  $360^\circ$ .

The minute hand makes a complete angle in 60 minutes.

Two rays pointing in opposite directions along a straight line make a **straight angle**. A straight angle =  $180^\circ$ .



straight angle =  $\frac{1}{2}$  of complete angle



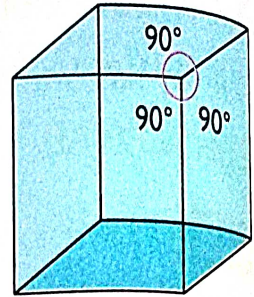
At 6 o'clock, the hands of a clock make a straight angle.

A right angle measures  $90^\circ$ .



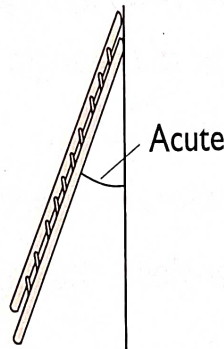
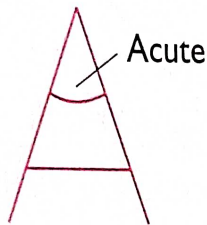
At 3 o'clock, the hands of a clock make a right angle.

right angle =  $\frac{1}{4}$  of complete angle  
=  $\frac{1}{2}$  of straight angle



The edges of a cube meet right angles at the corners.

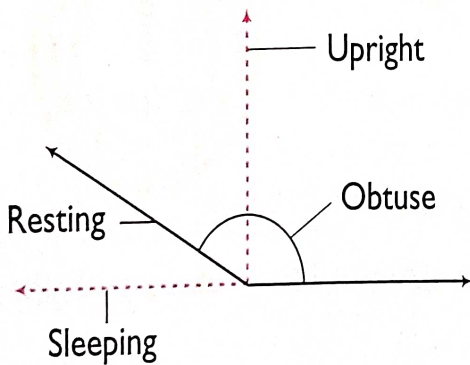
An angle that measures less than a right angle is an **acute angle**.



Remember :  
'A' for acute



An angle that is greater than a right angle but less than a straight angle is **obtuse angle**.



Obtuse angles are resting angles



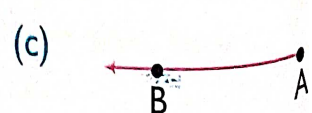
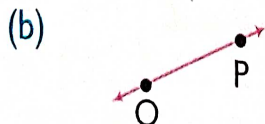
### Progress CHECK-UP-1

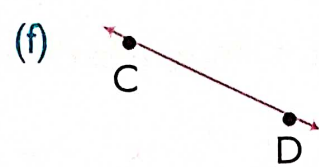
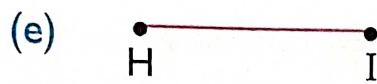
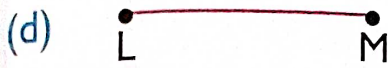


#### Pleasure TIME

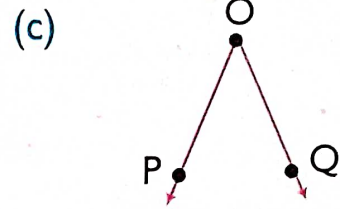
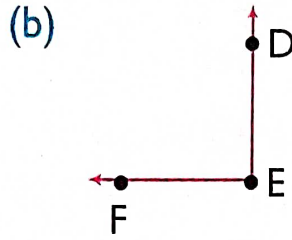
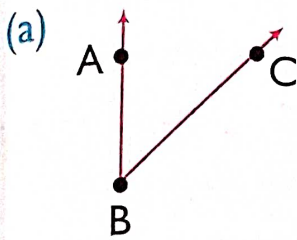
Mas

1. Classify these as lines, line segments and rays.



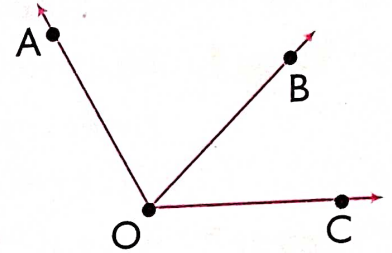


2. Name the angle and its type.

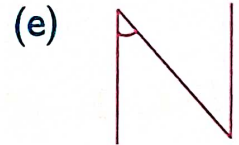
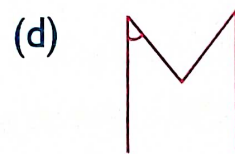
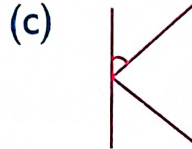
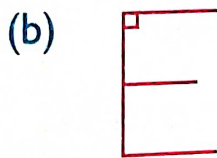
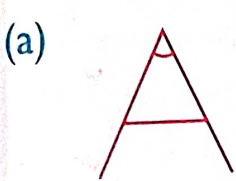


3. Study the figure and answer these questions.

- (a) How many vertices are there in the figure?
- (b) How many angles are there in the figure?
- (c) Name the angles and their types.



4. Identify and write the type of angles marked in the given letters.

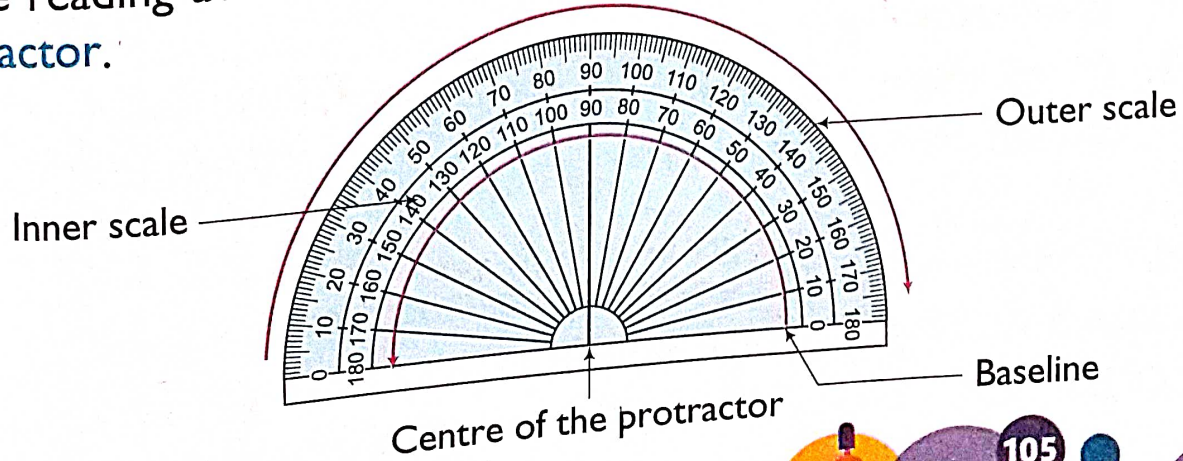


### Engagement

## MEASURING ANGLES

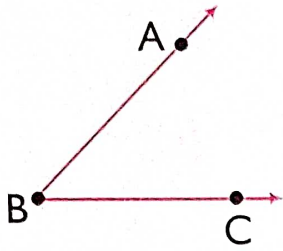
Angles are measured using a protractor. A protractor is in the shape of a semi-circle with two sets of grading from 0 to 180. One set of reading is from 0 to 180 in the clockwise direction and is called the **outer scale**. Another set of reading is from 180 to 0 in the anti-clockwise direction and is called the **inner scale**.

A protractor has a baseline. The point on the baseline where the vertical line of the reading across 90 and the baseline meet, is called the **centre of the protractor**.

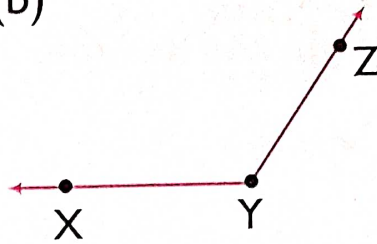


## Example 1. Measure these angles.

(a)



(b)



**Solution:**

(a) Follow these steps to measure the angle.

**Step 1.** Place the baseline of the protractor on the arm BC of the angle.

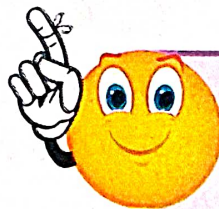
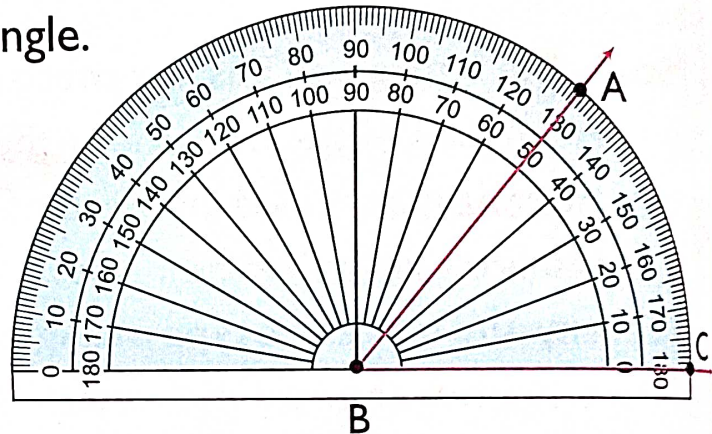
**Step 2.** Vertex B of the angle should be on the centre of the protractor.

**Step 3.**  $0^\circ$  of the inner scale should be on the arm BC.

**Step 4.** Check where the arm AB crosses the inner scale of the protractor.

Here, arm AB crosses 50 on the inner scale.

So,  $\angle ABC = 50^\circ$



*Keep in Mind*

*Choose the scale where the arm of the angle is pointing to  $0^\circ$  on the baseline.*

(b) Follow these steps to measure the angle.

**Step 1.** Place baseline of the protractor on the arm XY of the angle.

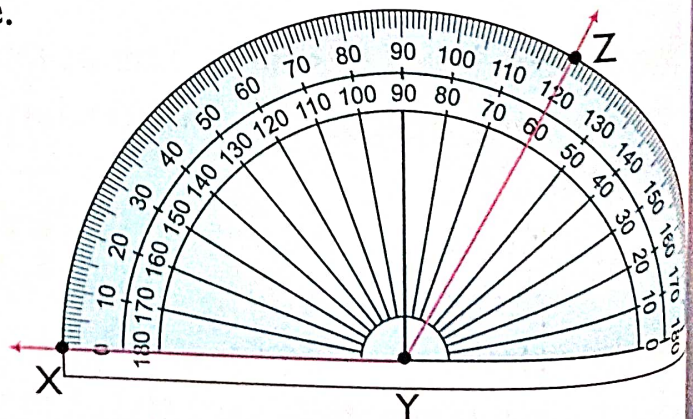
**Step 2.** Vertex Y should be on the centre of the protractor.

**Step 3.**  $0^\circ$  of the outer scale should be on the arm XY.

**Step 4.** Check where arm YZ crosses the protractor.

In this case, YZ crosses 120 on the outer scale.

So,  $\angle XYZ = 120^\circ$



# CONSTRUCTION OF LINES AND ANGLES

**To draw a line segment of given length**

**Example 2.** Draw a line segment of length 4 cm.

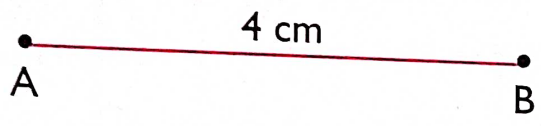
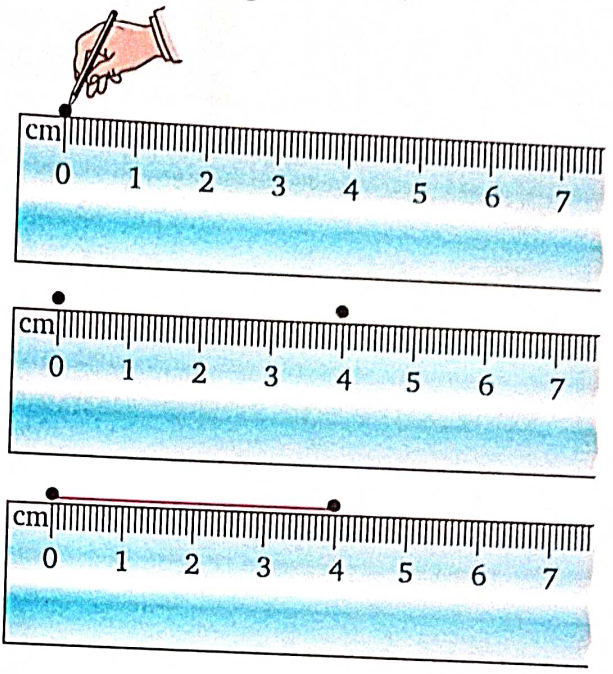
**Solution:** Follow these steps to draw a line segment of length 4 cm.

**Step 1.** Place the scale in horizontal position on the plane and hold it firmly.

**Step 2.** Mark the two endpoints 0 and 4 with respect to the scale on the plane.

**Step 3.** Join the endpoints keeping the scale in position.

**Step 4.** Name the points using capital letters and write the length measured.



**To draw an angle of given measurement using a protractor**

**Example 3.** Make an angle of  $30^\circ$  using a protractor.

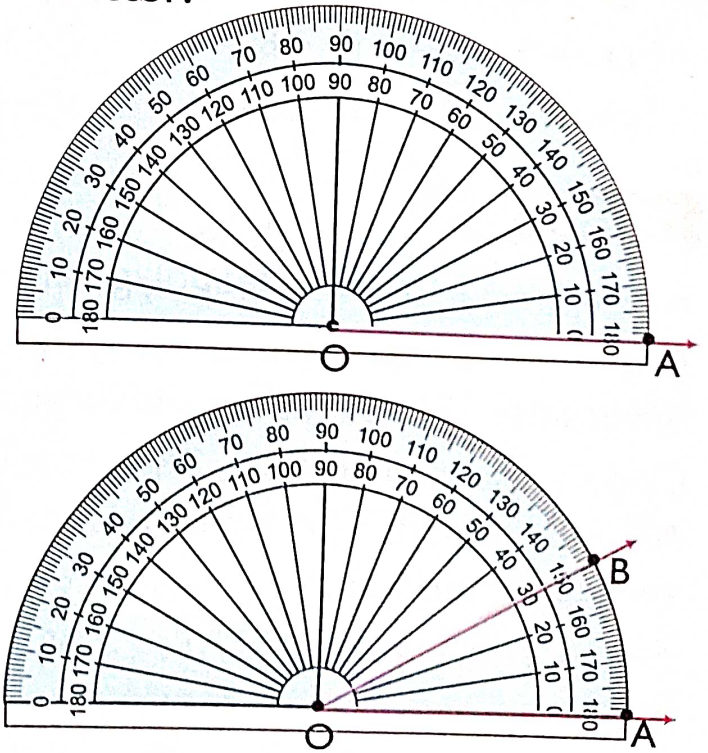
**Solution:** Follow these steps to draw an angle of  $30^\circ$ .

**Step 1.** Draw a ray OA.



**Step 2.** Keep the baseline of the protractor on ray OA such that the centre of the protractor is on the end point O.

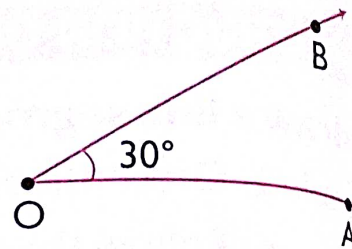
**Step 3.** Use the scale where OA coincides with  $0^\circ$ . In this



case, use the inner scale and mark a point at  $30^\circ$ , name it as point B.

**Step 4.**

Lift the protractor and join point O and the marked point B using a scale.



**Progress CHECK-UP-2**



**Pleasure TIME**

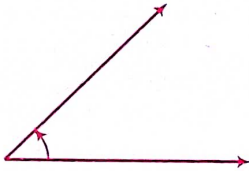
**Mast**

1. Draw line segments of the given lengths using a scale and a pencil.

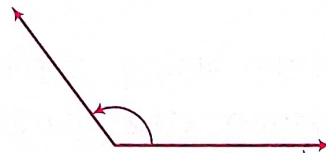
- (a) 5 cm    (b) 3.5 cm    (c) 4.8 cm    (d) 6 cm    (e) 7.2 cm    (f) 6.1 cm

2. Measure the angles using a protractor.

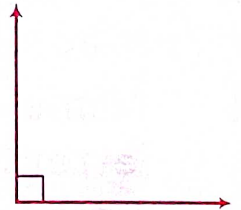
(a)



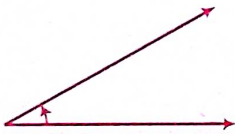
(b)



(c)



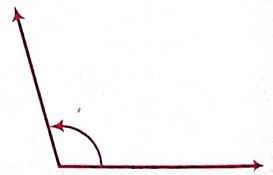
(d)



(e)



(f)



3. Draw these angles using a protractor.

- (a)  $145^\circ$     (b)  $180^\circ$     (c)  $105^\circ$     (d)  $75^\circ$     (e)  $90^\circ$   
 (f)  $62^\circ$     (g)  $38^\circ$     (h)  $180^\circ$     (i)  $118^\circ$     (j)  $59^\circ$

**TRIANGLES**

**Engager**

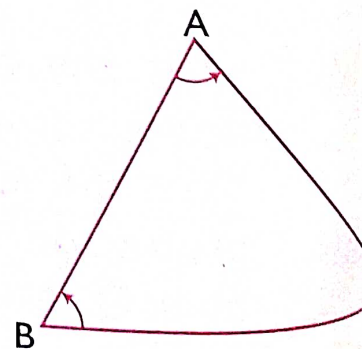
A triangle is a three-sided polygon. It is the simplest polygon.

A triangle is represented using the symbol  $\Delta$ . It has three sides, three vertices and three angles.

Consider a triangle ABC. The triangle has three sides AB, BC and CA. The points A, B and C are the three vertices of the triangle.

The three angles are  $\angle CAB$ ,  $\angle ABC$  and  $\angle BCA$ .

These three angles can also be named by the vertex as  $\angle A$ ,  $\angle B$  and  $\angle C$ .



## Types of triangles

Triangles are classified depending on the lengths of the sides and the nature of the angles.

On the basis of lengths of sides, triangles are classified as follows.

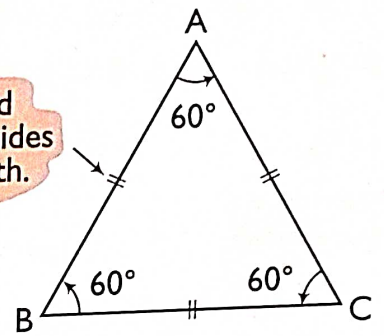
### Equilateral triangle

A triangle where the length of all three sides is equal is called an equilateral triangle.

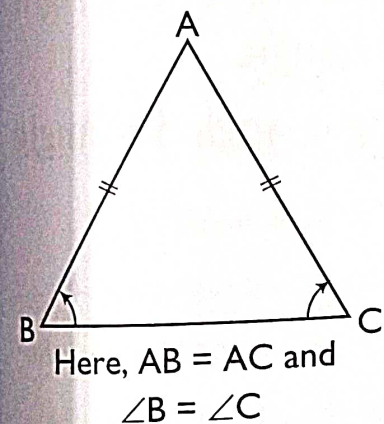
In an equilateral triangle, all the three angles are also equal.

Each angle of an equilateral triangle measures  $60^\circ$ .

This sign is used to show that the sides are equal in length.



Here,  $AB = BC = CA$   
and  $\angle A = \angle B = \angle C = 60^\circ$



### Isosceles Triangle

A triangle where the length of two sides is equal is called an isosceles triangle.

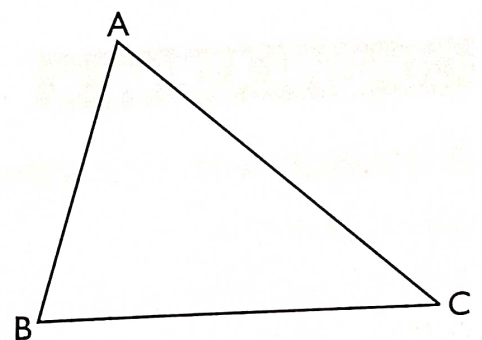
In an isosceles triangle, the angles opposite to equal sides are also equal.

### Scalene triangle

A triangle where the lengths of all the sides are unequal is called a scalene triangle.

In a scalene triangle, all the angles are also unequal.

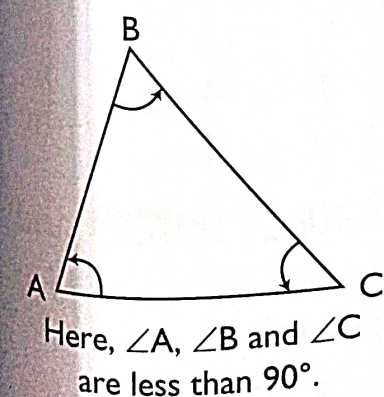
Triangles are classified on the basis of angles as follows.



### Acute-angled triangle

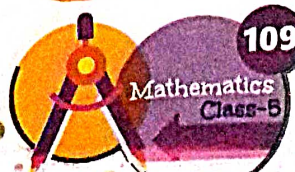
A triangle where all the angles are acute angles is called an acute-angled triangle.

An acute angle measures more than  $0^\circ$  but less than  $90^\circ$ .



*Keep in Mind*

An equilateral triangle is an acute-angled triangle.



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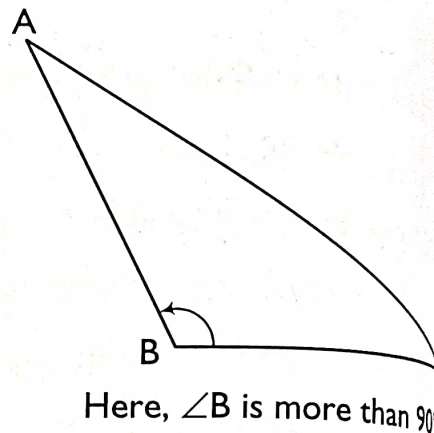
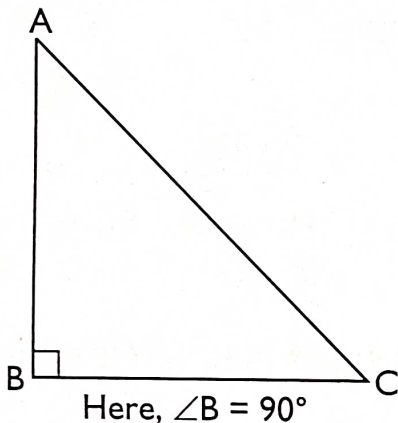
Mathematics  
Class-5

## Obtuse-angled triangle

A triangle where one angle out of the three angles is an obtuse angle is called an obtuse-angled triangle.

An angle that measures more than  $90^\circ$  and less than  $180^\circ$  is called an obtuse angle.

The remaining two angles of an obtuse-angled triangle are always acute angles.



## Right-angled triangle

A triangle where one of the three angles is a right angle is known as a right-angled triangle.

The remaining two angles of a right-angled triangle are acute angles.



### Keep in Mind

- A triangle can have only one obtuse angle.
- A triangle can have only one right angle.

## QUADRILATERALS

A polygon with four sides is called a quadrilateral. Squares and rectangles are quadrilaterals.

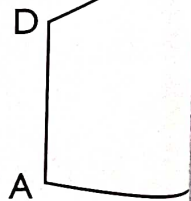
We know that, a quadrilateral has four vertices, four sides and four angles.

Consider a quadrilateral ABCD.

The four vertices are A, B, C and D.

The four sides are AB, BC, CD and DA.

The four angles are  $\angle A$ ,  $\angle B$ ,  $\angle C$  and  $\angle D$  or  $\angle DAB$ ,  $\angle ABC$ ,  $\angle BCD$  and  $\angle CDA$ .

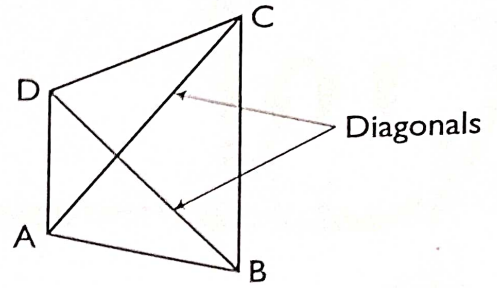


Engage

The line segment joining the opposite vertices of a closed plane figure is called the **diagonal** of the plane figure.

Diagonals of quadrilateral ABCD are AC and BD.

On drawing one diagonal of the quadrilateral ABCD, two triangles are formed.



## Progress CHECK-UP-3

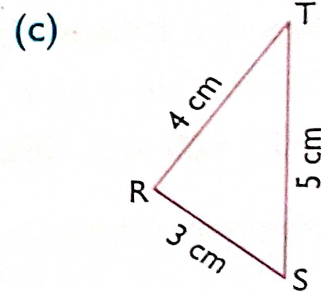
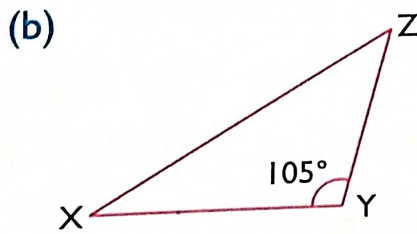
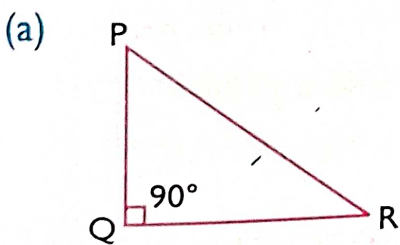
### Pleasure TIME

### Mastery

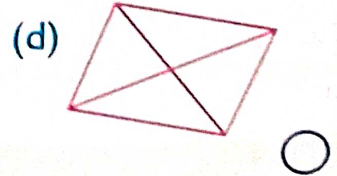
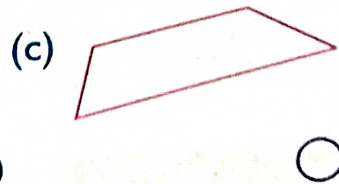
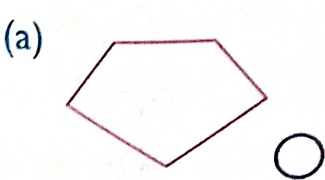

1. Write true or false.

- (a) A triangle has three angles and three sides.
- (b) In an equilateral triangle, only two angles are equal.
- (c) A triangle can have two obtuse angles.
- (d) An isosceles triangle has two equal sides.
- (e) An equilateral triangle is an obtuse-angled triangle.

2. Identify the type of triangles based on the measurement(s) given.



3. Tick (✓) the quadrilaterals.



4. Fill in the blanks.

- (a) A quadrilateral has ..... diagonals.
- (b) Each angle of a square is equal to .....
- (c) A polygon having ..... sides is a quadrilateral.
- (d) A diagonal of a square divides the square into two .....



### Travel Through

Readings

#### 1. Fill in the blanks.

- |                       |                       |
|-----------------------|-----------------------|
| (a) 300 cm = ..... m  | (b) 3 cm = ..... mm   |
| (c) 8000 g = ..... kg | (d) 4 kg = ..... g    |
| (e) 9 L = ..... mL    | (f) 2000 mL = ..... L |

#### 2. Write the correct unit for the following.

- A jug can hold 1 ..... (L/mL) of milk.
- The height of a tree is about 10 ..... (m/cm).
- The distance between Delhi and Haridwar is about 200 ..... (km/m).
- A bag of rice weighs 25 ..... (kg/g).
- A cup has 180 ..... (L/mL) of milk.

#### 3. Solve the following.

- |                               |                              |
|-------------------------------|------------------------------|
| (a) 6 km 56 m + 7 km          | (b) 21 kg 352 g + 45 kg 27 g |
| (c) 92 L 600 mL - 58 L 272 mL | (d) 29 m 56 cm - 18 m 81 cm  |



### Learning Outcomes

- Measurement of Length
- Measurement of Mass
- Measurement of Capacity
- Conversion of Units
- Basic Operations on Metric Measures

## MEASUREMENT OF LENGTH

Engagement

The basic unit of measure of length is **metre** (m).

The higher units are obtained by adding the prefixes **deca** (meaning **ten**), **hecto** (meaning **hundred**) and **kilo** (meaning **thousand**). The lower units are obtained by adding the prefixes **deci** (meaning **tenth**), **centi** (meaning **hundredth**), and **milli** (meaning **thousandth**).



Symbol	Units
Kilometre (km)	(1 km = 1000 m)
Hectometre (hm)	(1 hm = 100 m)
Decametre (dam)	(1 dam = 10 m)
Metre (m)	(= 1 m)
Decimetre (dm)	(1 dm = $\frac{1}{10}$ m or 0.1 m)
Centimetre (cm)	(1 cm = $\frac{1}{100}$ m or 0.01 m)
Millimetre (mm)	(1 mm = $\frac{1}{1000}$ m or 0.001 m)

From the above table, we have the following relationships among various units of length.

$$1 \text{ kilometre (km)} = 10 \text{ hectometres (hm)}$$

$$1 \text{ hectometre (hm)} = 10 \text{ decametres (dam)}$$

$$1 \text{ decametre (dam)} = 10 \text{ metres (m)}$$

$$1 \text{ metre (m)} = 10 \text{ decimetres (dm)}$$

$$1 \text{ decimetre (dm)} = 10 \text{ centimetres (cm)}$$

$$1 \text{ centimetre (cm)} = 10 \text{ millimetres (mm)}$$

Also,  $1 \text{ m} = 100 \text{ cm}$       $1 \text{ km} = 1000 \text{ m}$

## MEASUREMENT OF MASS

The basic unit of measure of mass is **gram (g)**. The higher units are obtained by adding the prefixes **deca**, **hecto** and **kilo**. The lower units are obtained by adding the prefixes **deci**, **centi**, and **milli**.

Symbol	Units
Kilogram (kg)	(1 kg = 1000 g)
Hectogram (hg)	(1 hg = 100 g)
Decagram (dag)	(1 dag = 10 g)
Gram (g)	(= 1 g)

Decigram (dg)	$(1 \text{ dg} = \frac{1}{10} \text{ g or } 0.1 \text{ g})$
Centigram (cg)	$(1 \text{ cg} = \frac{1}{100} \text{ g or } 0.01 \text{ g})$
Milligram (mg)	$(1 \text{ mg} = \frac{1}{1000} \text{ g or } 0.001 \text{ g})$

From the above table, we have the following relationships among various units of mass.

$$1 \text{ kilogram (kg)} = 10 \text{ hectograms (hg)}$$

$$1 \text{ hectogram (hg)} = 10 \text{ decagrams (dag)}$$

$$1 \text{ decagram (dag)} = 10 \text{ grams (g)}$$

$$1 \text{ gram (g)} = 10 \text{ decigrams (dg)}$$

$$1 \text{ decigram (dg)} = 10 \text{ centigrams (cg)}$$

$$1 \text{ centigram (cg)} = 10 \text{ milligrams (mg)}$$

$$\text{Also, } 1 \text{ g} = 100 \text{ cg} \quad 1 \text{ kg} = 1000 \text{ g.}$$

## MEASUREMENT OF CAPACITY

The basic unit of measure of capacity is **litre**. The higher units are obtained adding the prefixes **deca**, **hecto** and **kilo**. The lower units are obtained adding the prefixes **deci**, **centi**, and **milli**.

Symbol	Units
Kilolitre (kL)	$(1 \text{ kL} = 1000 \text{ L})$
Hectolitre (hL)	$(1 \text{ hL} = 100 \text{ L})$
Decalitre (daL)	$(1 \text{ daL} = 10 \text{ L})$
Litre (L)	$(= 1 \text{ L})$
Decilitre (dL)	$(1 \text{ dL} = \frac{1}{10} \text{ L or } 0.1 \text{ L})$
Centilitre (cL)	$(1 \text{ cL} = \frac{1}{100} \text{ L or } 0.01 \text{ L})$
Millilitre (mL)	$(1 \text{ mL} = \frac{1}{1000} \text{ L or } 0.001 \text{ L})$

From the above table, we have the following relationships among various units of capacity.

1 kilolitre (kL) = 10 hectolitres (hL)

1 hectolitre (hL) = 10 decalitres (daL)

1 decalitre (daL) = 10 litres (L)

1 decilitre (dL) = 10 centilitres (cL)

1 centilitre (cL) = 10 millilitres (mL)

Also, 1 L = 100 cL

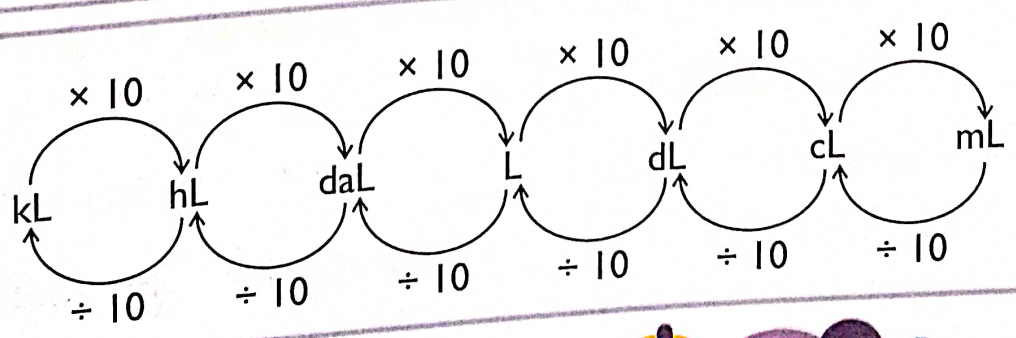
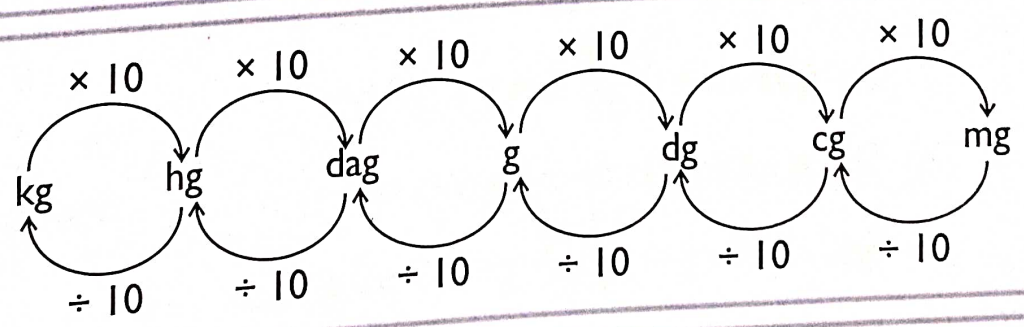
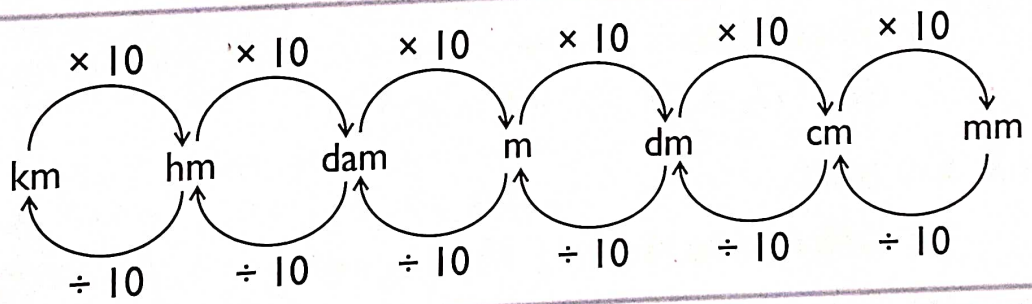
1 L = 1000 mL.

**Engagement**

**CONVERSION OF UNITS**

**Rule 1:** To convert a higher unit into a lower unit, multiply by 10 for each move to the right.

**Rule 2:** To convert a lower unit into a higher unit, divide by 10 for each move to the left.



**Example 1.** Convert:

- (a) 5 km into m      (b) 13 kg into g      (c) 9 l into mL

**Solution:** (a) Since km to m is three moves to the right, we multiply by 1000

So,  $5 \text{ km} = 5 \times 1000 \text{ m} = 5000 \text{ m}$

(b) Since kg to g is three moves to the right, we multiply by 1000

So,  $13 \text{ kg} = 13 \times 1000 \text{ g} = 13000 \text{ g}$

(c) Since L to mL is three moves to the right, we multiply by 1000

So,  $9 \text{ L} = 9 \times 1000 \text{ mL} = 9000 \text{ mL}$

**Example 2.** Convert:

- (a) 6 hm into m      (b) 16 dag to dg      (c) 7 dL into mL

**Solution:** (a) Since hm to m is two moves to the right, we multiply by 100.

So,  $6 \text{ hm} = 6 \times 100 \text{ m} = 600 \text{ m}$

(b) Since dag to dg is two moves to the right, we multiply by 100.

So,  $16 \text{ dag} = 16 \times 100 \text{ dg} = 1600 \text{ dg}$

(c) Since dL to mL is two moves to the right, we multiply by 100.

So,  $7 \text{ dL} = 7 \times 100 \text{ mL} = 700 \text{ mL}$

**Example 3.** Convert:

- (a) 638 m into hm      (b) 1540 cg into g      (c) 1700 dL into daL

**Solution:** (a) Since m to hm is two moves to the left, we divide by 100.

So,  $638 \text{ m} = \frac{638}{100} \text{ hm} = 6.38 \text{ hm}$

(b) Since cg to g is two moves to the left, we divide by 100.

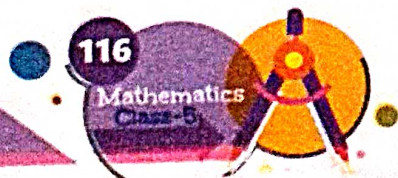
So,  $1540 \text{ cg} = \frac{1540}{100} \text{ g} = 15.40 \text{ g}$

(c) Since dL to daL is two moves to the left, we divide by 100.

So,  $1700 \text{ dL} = \frac{1700}{100} \text{ daL} = 17 \text{ daL}$

**Example 4.** Convert:

- (a) 57000 dm to hm      (b) 6000 mg to g      (c) 7360 L to kL



**Solution:** (a) Since dm to hm is three moves to the left, we divide by 1000.  
So,  $57000 \text{ dm} = \frac{57000}{1000} \text{ hm} = 57 \text{ hm}$

(b) Since mg to g is three moves to the left, we divide by 1000.  
So,  $6000 \text{ mg} = \frac{6000}{1000} \text{ g} = 6 \text{ g}$

(c) Since L to kL is three moves to the left, we divide by 1000.  
So,  $7360 \text{ L} = \frac{7360}{1000} \text{ kL} = 7.360 \text{ kL}$

**Example 5.** Convert:

(a) 50 cm into dm

(b) 9 hg into dag

(c) 17 dL into cL

**Solution:** (a) Since cm to dm is one move to the left, we divide by 10.

$$\text{So, } 50 \text{ cm} = \frac{50}{10} \text{ dm} = 5 \text{ dm}$$

(b) Since hg to dag is one move to the right, we multiply by 10.

$$\text{So, } 9 \text{ hg} = 9 \times 10 \text{ dag} = 90 \text{ dag}$$

(c) Since dL to cL is one move to the right, we multiply by 10.

$$\text{So, } 17 \text{ dL} = 17 \times 10 \text{ cL} = 170 \text{ cL}$$

**Example 6.** Convert:

(a) 3 L 450 mL into L

(b) 12 g 75 cg into g

**Solution:** (a)  $3 \text{ L } 450 \text{ mL} = 3 \text{ L} + 450 \text{ mL}$

$$= 3 \text{ L} + \frac{450}{1000} \text{ L} = 3 \text{ L} + 0.450 \text{ L} = 3.450 \text{ L}$$

(b)  $12 \text{ g } 75 \text{ cg} = 12 \text{ g} + 75 \text{ cg}$

$$= 12 \text{ g} + \frac{75}{100} \text{ g} = 12 \text{ g} + 0.75 \text{ g} = 12.75 \text{ g}$$



*Keep in Mind*

*When you convert big unit to small, you multiply.*

*When you convert small unit to big, you divide.*



1. Convert:

- |                   |                   |                   |
|-------------------|-------------------|-------------------|
| (a) 4 km into dam | (b) 10 hm into dm | (c) 15 dam into m |
| (d) 16 km into m  | (e) 18 dm into mm | (f) 24 m into mm  |

2. Convert:

- |                    |                     |                      |
|--------------------|---------------------|----------------------|
| (a) 16 cm into m   | (b) 90 m into dam   | (c) 453 hm into km   |
| (d) 5240 m into hm | (e) 8000 dm into mm | (f) 8500 cm into dam |

3. Convert:

- |                    |                    |                   |
|--------------------|--------------------|-------------------|
| (a) 12 dg into mg  | (b) 25 kg into g   | (c) 32 dg into cg |
| (d) 40 dag into cg | (e) 5 l dag into g | (f) 73 g into mg  |

4. Convert:

- |                    |                      |                      |
|--------------------|----------------------|----------------------|
| (a) 49 mg into cg  | (b) 250 dg into g    | (c) 2567 dg into hg  |
| (d) 4650 g into kg | (e) 6214 cg into dag | (f) 6500 dg into dag |

5. Convert:

- |                     |                   |                    |
|---------------------|-------------------|--------------------|
| (a) 7 hL into L     | (b) 12 L into dL  | (c) 15 cL into mL  |
| (d) 2 l daL into cL | (e) 25 hL into dL | (f) 46 daL into dL |

6. Convert:

- |                      |                    |                    |
|----------------------|--------------------|--------------------|
| (a) 63 mL into dL    | (b) 90 cL into dL  | (c) 53 daL into hL |
| (d) 6520 cL into daL | (e) 5000 L into hL | (f) 9300 L into kL |

7. Express:

- |                    |                      |                        |
|--------------------|----------------------|------------------------|
| (a) 7 hm 83 m as m | (b) 7 L 65 mL as L   | (c) 8 m 5 dm as m      |
| (d) 9 g 65 cg as g | (e) 12 kg 240 g as g | (f) 12 hL 350 dL as hL |

BASIC OPERATIONS ON METRIC MEASURES

Example 7. Add:

- 20 km 525 m and 15 km 895 m
- 52 g 925 mg and 36 g 125 mg
- 36 kL 256 L and 27 kL 903 L

Solution:

$$\begin{array}{r} \text{(a)} \quad 20 \text{ km} \quad 525 \text{ m} \\ + \quad 15 \text{ km} \quad 895 \text{ m} \end{array}$$

$$\underline{\quad 35 \text{ km} \quad 1420 \text{ m} \quad}$$

$$\begin{aligned} &= 35 \text{ km} + 1000 \text{ m} + 420 \text{ m} \\ &= 35 \text{ km} + 1 \text{ km} + 420 \text{ m} \\ &= 36 \text{ km } 420 \text{ m} \end{aligned}$$

$$\begin{array}{r} \text{(b)} \quad 52 \text{ g} \quad 925 \text{ mg} \\ + \quad 36 \text{ g} \quad 125 \text{ mg} \end{array}$$

$$\underline{\quad 88 \text{ g} \quad 1050 \text{ mg} \quad}$$

$$\begin{aligned} &= 88 \text{ g} + 1000 \text{ mg} + 50 \text{ mg} \\ &= 88 \text{ g} + 1 \text{ g} + 50 \text{ mg} \\ &= 89 \text{ g } 50 \text{ mg} \end{aligned}$$

$$\begin{array}{r} \text{(c)} \quad 36 \text{ kL} \quad 256 \text{ L} \\ + \quad 27 \text{ kL} \quad 903 \text{ L} \end{array}$$

$$\underline{\quad 63 \text{ kL} \quad 1159 \text{ L} \quad}$$

$$\begin{aligned} &= 63 \text{ kL} + 1000 \text{ L} + 159 \text{ L} \\ &= 63 \text{ kL} + 1 \text{ kL} + 159 \text{ L} = 64 \text{ kL } 159 \text{ L} \end{aligned}$$

Example 8. Subtract:

(a) 7 km 207 m from 16 km 112 m

(b) 26 kg 432 g from 51 kg 307 g

(c) 11 L 853 mL from 44 L 92 mL

$$\begin{array}{r} \text{(a)} \quad \begin{array}{r} 15 \\ 16 \end{array} \text{ km} \quad \begin{array}{r} 1112 \\ 112 \end{array} \text{ m} \\ - \quad 7 \text{ km} \quad 207 \text{ m} \end{array}$$

$$\underline{\quad 8 \text{ km} \quad 905 \text{ m} \quad}$$

Solution:

In decimal notation

$$\begin{array}{r} 20.525 \text{ km} \\ + 15.895 \text{ km} \\ \hline 36.420 \text{ km} \\ \hline = 36 \text{ km } 420 \text{ m} \end{array}$$

In decimal notation

$$\begin{array}{r} 52.925 \text{ g} \\ + 36.125 \text{ g} \\ \hline 89.050 \text{ g} \\ \hline = 89 \text{ g } 50 \text{ mg} \end{array}$$

In decimal notation

$$\begin{array}{r} 36.256 \text{ kL} \\ + 27.903 \text{ kL} \\ \hline 64.159 \text{ kL} \\ \hline = 64 \text{ kL } 159 \text{ L} \end{array}$$

In decimal notation

$$\begin{array}{r} 16.112 \text{ km} \\ - 7.207 \text{ km} \\ \hline 8.905 \text{ km} \\ \hline = 8 \text{ km } 905 \text{ m} \end{array}$$

$$\begin{array}{r}
 \begin{array}{r} 50 \\ 51 \end{array} \text{ kg} \\
 - \begin{array}{r} 26 \\ 26 \end{array} \text{ kg} \\
 \hline
 \begin{array}{r} 1307 \\ 307 \end{array} \text{ g} \\
 - \begin{array}{r} 432 \\ 432 \end{array} \text{ g} \\
 \hline
 \begin{array}{r} 24 \text{ kg} \\ 875 \text{ g} \end{array}
 \end{array}$$

In decimal notation

$$\begin{array}{r}
 51.307 \text{ kg} \\
 - 26.432 \text{ kg} \\
 \hline
 24.875 \text{ kg} \\
 = 24 \text{ kg } 875 \text{ g}
 \end{array}$$

$$\begin{array}{r}
 \begin{array}{r} 43 \\ 44 \end{array} \text{ L} \\
 - \begin{array}{r} 11 \\ 11 \end{array} \text{ L} \\
 \hline
 \begin{array}{r} 1092 \\ 92 \end{array} \text{ mL} \\
 - \begin{array}{r} 853 \\ 853 \end{array} \text{ mL} \\
 \hline
 \begin{array}{r} 32 \text{ L} \\ 239 \text{ mL} \end{array}
 \end{array}$$

In decimal notation

$$\begin{array}{r}
 44.092 \text{ L} \\
 - 11.853 \text{ L} \\
 \hline
 32.239 \text{ L} \\
 = 32 \text{ L } 239 \text{ mL}
 \end{array}$$

**Example 9.** A man gets 46 L 55 mL of milk from his four cows. Assuming that he gets the same quantity of milk everyday, find the quantity of milk he would get in 30 days?

$$\begin{array}{r}
 46.055 \\
 \times 30 \\
 \hline
 1381.650
 \end{array}$$

**1381.650**

**Solution:** Quantity of milk the man gets in 1 day = 46 L 55 mL  
= 46.055 L

Quantity of milk the man gets in 30 days = 46.055 L  $\times$  30  
= 1381.650 L

**Example 10.** 648 L 24 mL of medicine is filled in 124 bottles equally. Find out how much medicine is filled in each bottle?

$$\begin{array}{r}
 5.226 \\
 124 \overline{) 648.024} \\
 \underline{- 620} \phantom{0} \\
 280 \\
 \underline{- 248} \\
 322 \\
 \underline{- 248} \\
 744 \\
 \underline{- 744} \\
 0
 \end{array}$$

**Solution:** Quantity of medicine in 124 bottles  
= 648 L 24 mL = 648.024 L

Quantity of medicine in 1 bottle  
= 648.024  $\div$  124 = 5.226

So, 648 L 24 mL  $\div$  124 = 5 L 226 mL.

Therefore, the required quantity  
= 5 L 226 mL.



Pleasure TIME

Mastery

1. Add:

- (a) 8 km 45 m and 15 km 963 m
- (b) 15 kg 816 g and 25 kg 506 g
- (c) 8 kL 570 L and 27 kL 736 L
- (d) 18 cm 2 mm and 25 cm 9 mm
- (e) 12 m 46 cm, 48 m 45 cm and 9 m 72 cm
- (f) 35 g 126 mg, 26 g 426 mg and 15 g 739 mg
- (g) 16 L 752 mL and 25 L 840 mL
- (h) 12 m 26 mm, 38 m 703 mm and 44 m 452 mm

2. Subtract:

- (a) 12 kL 430 L from 38 kL 326 L
- (b) 40 L 895 mL from 126 L 495 mL
- (c) 73 kg 850 g from 106 kg 250 g
- (d) 15 g 276 mg from 56 g 103 mg
- (e) 40 km 703 m from 95 km 576 m
- (f) 76 m 91 cm from 154 m 12 cm
- (g) 42 cm 8 mm from 78 cm 3 mm
- (h) 11 m 705 mm from 65 m 356 mm

3. Multiply:

- (a) 22 m 14 cm by 16
- (b) 3 km 789 m by 23
- (c) 9 kg 8 g by 7
- (d) 516 mL by 4

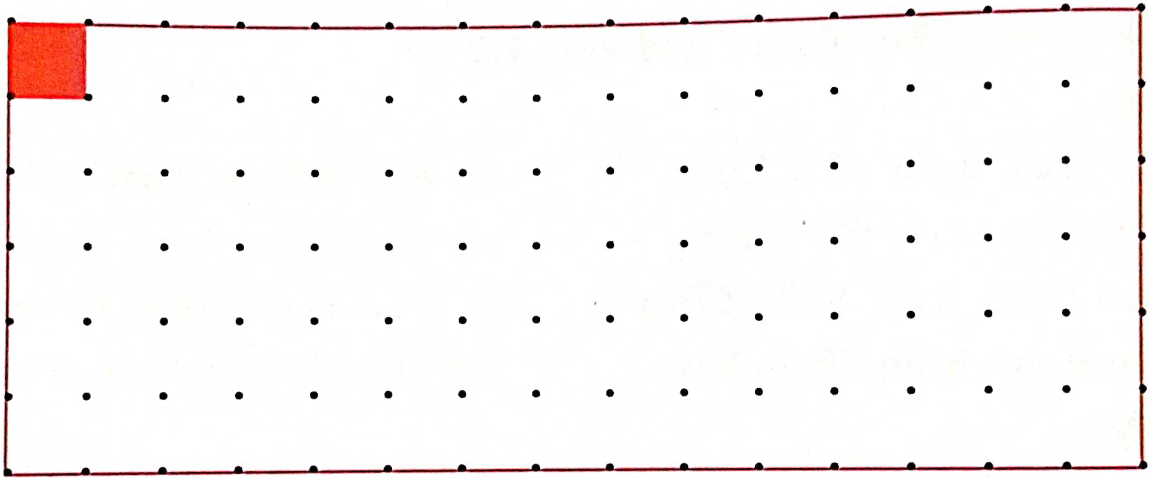
4. Divide:

- (a) 3 km 456 m by 4
- (b) 12 kg 60 g by 7
- (c) 63 L 920 mL by 8
- (d) 178 g 212 mg by 12



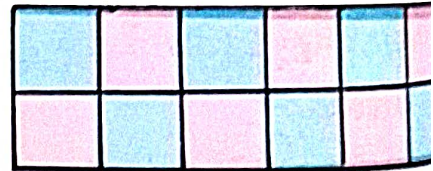
## Travel Through

1. Measure the side of the red square on the dotted sheet. Draw here as many rectangles as possible using 12 such squares. Answers to the questions given below.



- (a) How many rectangles could you make? .....

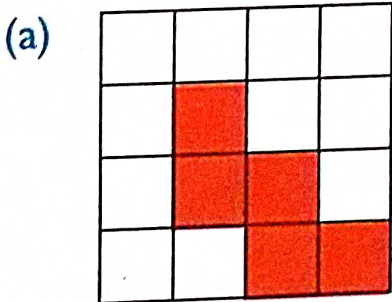
Each rectangle is made out of 12 equal squares, so all have the same area, but the length of the boundary will be different.



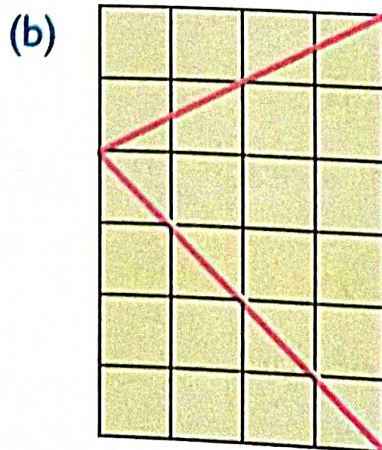
- (b) Which of these rectangles has the longest perimeter?  
 (c) Which of these rectangles has the smallest perimeter?

## 2. Find the area of the given figures.

Assume that each side of the square is 1 cm.



A = ..... sq. cm



A = ..... sq. cm

# Learning Outcomes

- Perimeter
- Relationship Between Perimeter and Area
- Area
- Volume

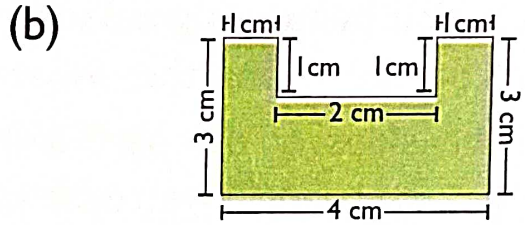
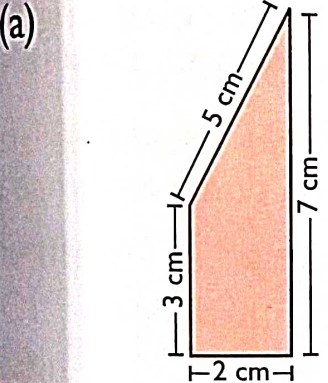
## Perimeter

## Engagement

The word 'perimeter' has originated from two Greek words *peri* which means around and *metron* which means measure.

We also know that, perimeter of a plane figure is the sum of lengths of all the sides. Perimeter is denoted as P.

**Example 1.** Find the perimeter of these figures.



**Solution :**

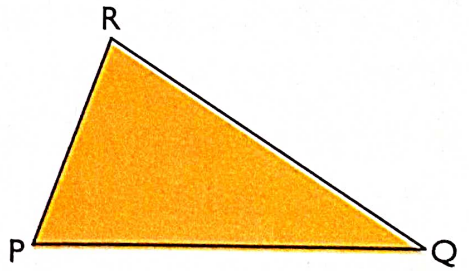
(a)  $P = (2 + 3 + 5 + 7) \text{ cm}$   
 $P = 17 \text{ cm}$

(b)  $P = (4 + 3 + 1 + 1 + 2 + 1 + 1 + 3) \text{ cm}$   
 $P = 16 \text{ cm}$

### Perimeter of a triangle

Perimeter of a triangle is the sum of lengths of all three sides.

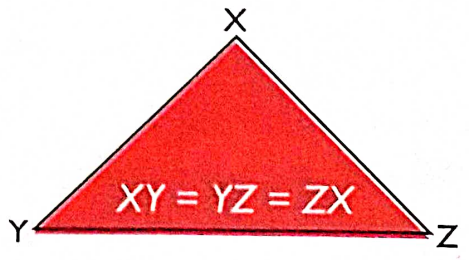
In the given figure, PQ, QR and RP are three sides of a triangle.



Perimeter =  $PQ + QR + RP$

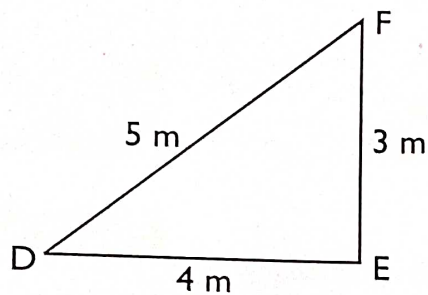
In case of an equilateral triangle where all the three sides are equal,

Perimeter =  $XY + YZ + ZX$   
 $= 3 \times \text{length of side}$

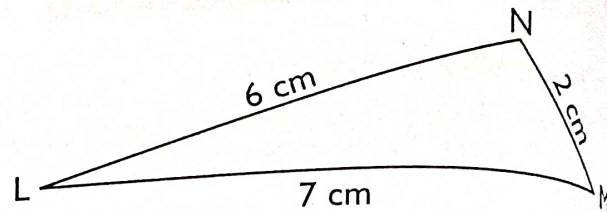


**Example 2.** Find the perimeter of the triangle.

(a)



(b)



**Solution.** Calculate as follows.

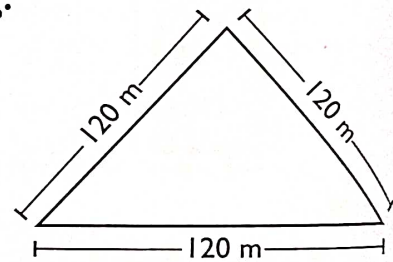
$$\begin{aligned} \text{(a) } P &= DE + EF + FD \\ &= (4 + 3 + 5) \text{ m} \\ &= 12 \text{ m} \end{aligned}$$

$$\begin{aligned} \text{(b) } P &= LM + MN + NL \\ &= (7 + 2 + 6) \text{ cm} \\ &= 15 \text{ cm} \end{aligned}$$

**Example 3.** A park is being designed such that all its sides will be of equal length. If each side will be 120 m long, then what will be the perimeter of the park?

**Solution.** As the sides of the park will be equal in length, so it will be an equilateral triangle with each side 120 m long.

$$\begin{aligned} P &= 3 \times \text{length of side} \\ &= 3 \times 120 \text{ m} \\ &= 360 \text{ m} \end{aligned}$$



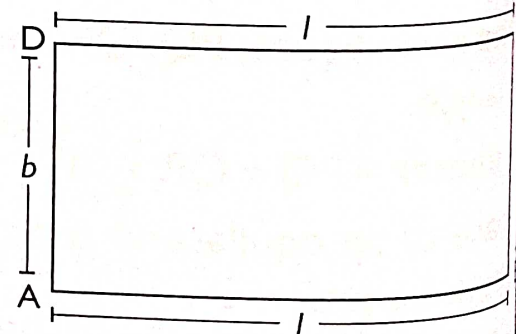
Thus, perimeter of the park will be 360 m.

### Perimeter of a rectangle

Rectangle is a plane shape made up of four line segments. The opposite sides (that is, the sides facing each other) are of equal lengths.

In the given figure AB, BC, CD and DA are four line segments where,  $AB = DC$  and  $BC = AD$

$$\begin{aligned} \text{Perimeter of rectangle} &= AB + BC + CD + DA \\ &= l + b + l + b \\ &= 2 \times l + 2 \times b \\ &= 2 \times (l + b) \end{aligned}$$



Here,  $l$  stands for length and  $b$  stands for breadth of the rectangle.

So,  $P = 2 \times (\text{Length} + \text{Breadth})$

**Example 4.** Mrs. Gupta stitched a table cloth of length 150 cm and breadth 40 cm. How much lace will she need to stitch it around the table cloth?

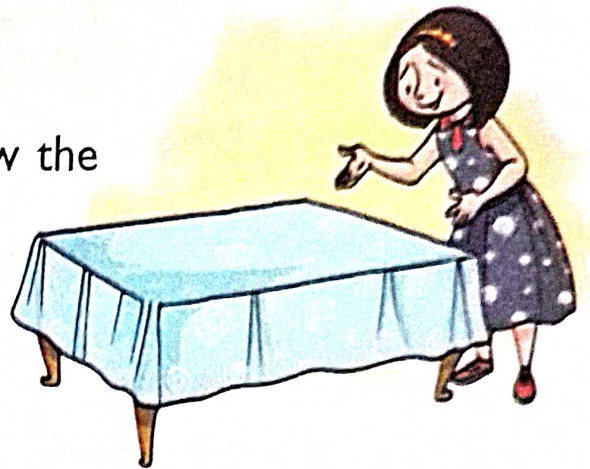
**Solution.** We know that,

Length of table cloth = 150 cm

Breadth of table cloth = 40 cm

Perimeter of the table cloth will help us know the length of lace required to be stitched around.

$$\begin{aligned} \text{Perimeter} &= 2 \times (\text{Length} + \text{Breadth}) \\ &= 2 \times (150 + 40) \\ &= 2 \times 190 = 380 \text{ cm} \end{aligned}$$



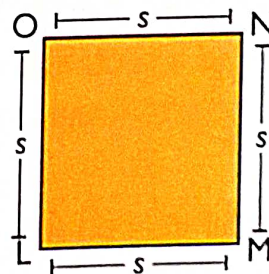
Thus, a 380 cm long lace is needed for the table cloth.

### Perimeter of a square

A square is a plane figure made up of four equal line segments. Each line segment is called a side.

In the given figure, LM, MN, NO and OL are four line segments where,  $LM = MN = NO = OL$ .

$$\begin{aligned} \text{Perimeter} &= LM + MN + NO + OL \\ &= s + s + s + s = 4 \times s \end{aligned}$$



Since all the four sides are equal, we can multiply a side with 4.

Here,  $s$  stands for side of the square.

So,  $P = 4 \times s$

**Example 5.** Each side of a square origami sheet is 12 cm long. What is the perimeter of the sheet?

**Solution.** We know that,

Side of origami sheet = 12 cm

$$\text{Perimeter} = 4 \times s = 4 \times 12 \text{ cm} = 48 \text{ cm}$$

Thus, perimeter of the origami sheet is 48 cm.

**Example 6.** Find the side of the square, if its perimeter is 24 cm.

**Solution.** We know that,  $P = 24 \text{ cm}$  side = ?

We know  $P = 4s \Rightarrow s = \frac{P}{4} = \frac{24}{4} \text{ cm} = 6 \text{ cm}$

Thus, each side of the square is 6 cm long.



## Progress CHECK-UP-1

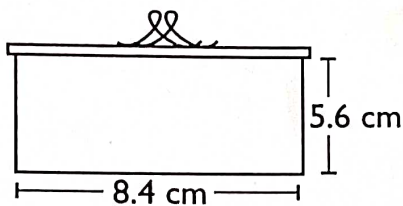


### Pleasure TIME

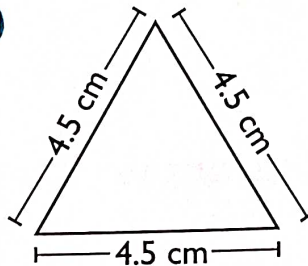
Mastery

1. Find the perimeter of these figures.

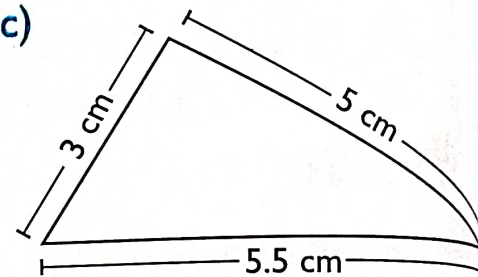
(a)



(b)



(c)



- How long should the side of a square garden be, if its perimeter has to be 70 m?
- A door has to be decorated with ribbons along its boundary. What length of ribbon is required if the door is 2 m long and 75 cm wide?
- Aruna put a rope around a rectangular flower bed 10 m long and 2.5 m wide. Komal put a rope around a square flower bed of side 6.4 m. Who used more rope and how much?
- In order to protect her garden from stray animals Manpreet decided to fence its boundary. The length of the square garden is 50 m. What length of wire is required to fence the garden?
- Find the perimeter of a rectangular park which is 450 m long and 300 m broad.

## AREA

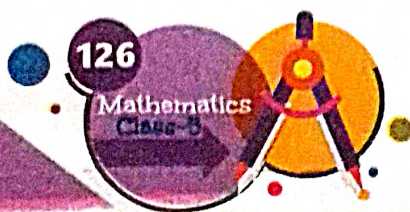
Engagement

The space occupied by a plane shape is called its area. The space is occupied on a flat surface.

### Units of area

Area is expressed as square units being occupied by a given shape.

The unit of area is chosen according to the size of the object being dealt with. So, a unit of area smaller than sq. cm can also be used.

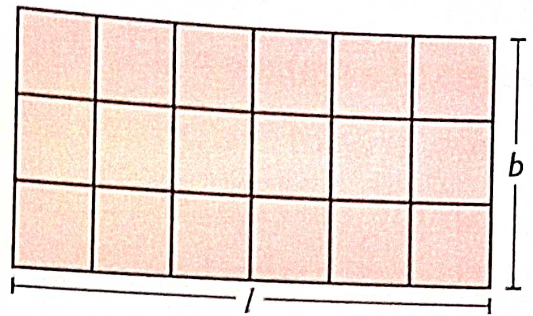


## Area of a Rectangle

Area of a rectangle = Length  $\times$  Breadth or  $A = l \times b$

We can also say,

$$l = \frac{A}{b} \text{ units and } b = \frac{A}{l} \text{ units}$$



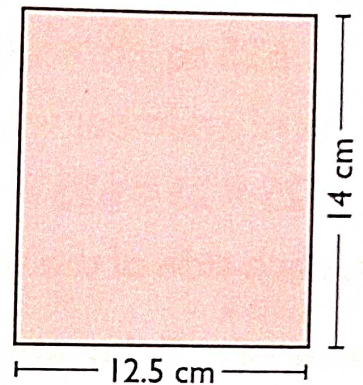
**Example 7.** Find the area of a rectangle whose length is 12.5 cm and breadth is 14 cm.

**Solution.** We know that,

Length of rectangle = 12.5 cm

Breadth of rectangle = 14 cm

$$\begin{aligned} \text{Area} &= \text{Length} \times \text{Breadth} \\ &= 12.5 \text{ cm} \times 14 \text{ cm} = 175 \text{ sq. cm} \end{aligned}$$



Thus, area of the rectangle is 175 sq. cm.

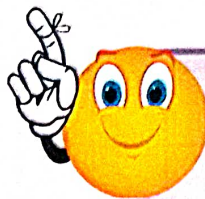
**Example 8.** Find the length of a rectangle with area 400 sq. m and breadth 25 m.

**Solution.** We know that,

Area of rectangle = 400 sq. m

Breadth of rectangle = 25 m

$$\begin{aligned} \text{Length} &= \frac{\text{Area}}{\text{Breadth}} \\ &= \frac{400}{25} = 16 \text{ m} \end{aligned}$$



*Keep in Mind*

$$\text{sq. m} = m \times m$$

$$\text{Length} = \frac{m \times m}{m} = \frac{\text{Area}}{\text{Breadth}}$$

*Removing the common factor from the fraction,*

$$\text{Length} = \frac{m \times m}{m} = m$$

*So, the unit of length is m.*

## Area of a Square

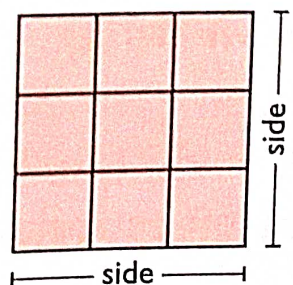
In case of a square, all the sides are equal. That is, length = breadth

We also know,

Area of a rectangle = Length  $\times$  Breadth

Area of a square = Length  $\times$  Length

Area of a square = side  $\times$  side



**Example 9.** Find the area of a square of side 18 cm.

**Solution.** We know that, side of square = 18 cm

Area of a square = side  $\times$  side = 18 cm  $\times$  18 cm = 324 sq. cm

Thus, area of the square is 324 sq. cm.

**Example 10.** The area of a square is 625 sq. cm. What is the length of each side

**Solution.** We know that,

Area of square = 625 sq. cm

Area of a square = side  $\times$  side

625 sq. cm = side  $\times$  side

Think of a number which when multiplied by itself gives 625.

$$25 \times 25 = 625$$

So, each side of the square measures 25 cm.

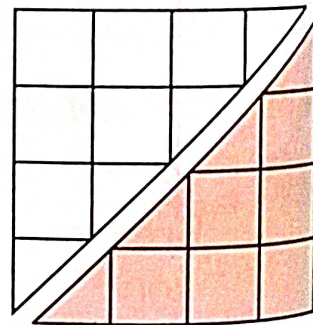
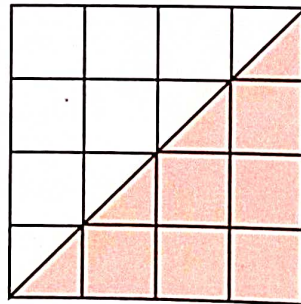
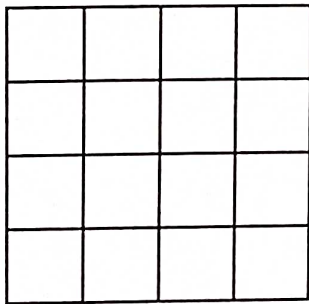


*Keep in Mind*

$$\begin{aligned} \text{Side} &= \frac{\text{Area}}{\text{side}} \\ &= \frac{\text{cm} \times \text{cm}}{\text{cm}} \\ \text{Side} &= \text{cm} \end{aligned}$$

## Area of a Triangle

Look at the given square. Each square of the grid has an area of 1 square unit. Suppose that this square is cut into two equal-sized triangles by cutting along the diagonal.



Area of square = 16 sq. units

Each triangle is half of the square. So, the area of each triangle will be half of the area of the entire square. Here, Area of each triangle = 8 sq. units

Thus, we can say

$$\begin{aligned} \text{Area of triangle} &= \frac{\text{Area of rectangle}}{2} \\ \text{Area of rectangle} &= 2 \times \text{Area of triangle} \end{aligned}$$



*Keep in Mind*

Every square is a rectangle but every rectangle is not a square.

For example, to find the area of the triangle in the given rectangle.

We can see that the rectangle has been divided into two parts and each contains a portion of the triangle.

Area of green rectangle = 9 sq. units

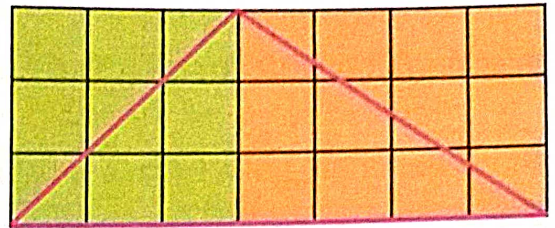
Area of green triangle = 4.5 sq. units

Area of orange rectangle = 12 sq. units

Area of orange triangle = 6 sq. units

So, area of triangle = 4.5 sq. units + 6 sq. units = 10.5 sq. units

Thus, the area of triangle within the given rectangle is 10.5 sq. units.



## Progress CHECK-UP-2

### Mastery

### Pleasure TIME

1. Find the area of rectangle with the given dimensions.

(a)  $l = 10$  cm

$b = 20$  cm

(b)  $l = 15$  cm

$b = 4$  cm

(c)  $l = 1.2$  m

$b = 3$  cm

(d)  $l = 14$  m 8 cm

$b = 40$  cm

2. Find the area of squares with the given sides.

(a) 25 m

(b) 12.5 cm

(c) 1.4 km

(d) 400 mm

(e) 8.9 cm

(f) 3.6 m

3. Find the missing dimension of the rectangle.

(a)  $A = 1800$  sq. cm  $b = 40$  cm

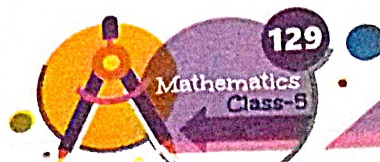
(b)  $A = 2250$  sq. m  $b = 90$  m

(c)  $A = 5000$  sq. cm  $l = 1$  m 25 cm

(d)  $A = 1650$  sq. cm  $l = 1.5$  m

4. Sanya, Aarushi, Manav and Kabir made greeting cards. Complete the table for their cards :

Whose card	Length	Width	Perimeter	Area
Sanya	10 cm	8 cm		
Manav	11 cm		44 cm	
Aarushi		8 cm		80 square cm
Kabir			40 cm	100 square cm



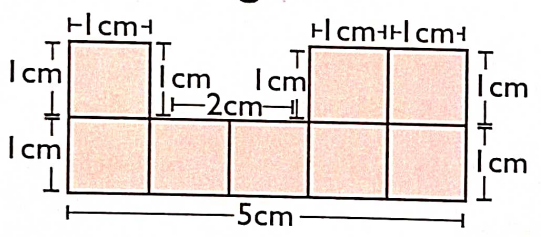
5. Find the area of a square wooden frame whose side is 16 cm long.
6. Mr. Ravindra left a space on the wall of area 21600 sq. cm for a painting. If the length of the painting is to be 180 cm, what should be the breadth of the painting such that it fits the area on the wall?
7. A wall is 530 cm long and 160 cm wide. How many tiles of side 20 cm each will be required to cover the entire wall?
8. The fencing of a square garden is 20 m in length. How long is one side of the garden?
9. A thin wire 20 centimetres long is formed into a rectangle. If the width of the rectangle is 4 centimetres, what is its length?
10. A square carrom board has a perimeter of 320 cm. How much is its area?

## RELATIONSHIP BETWEEN PERIMETER AND AREA

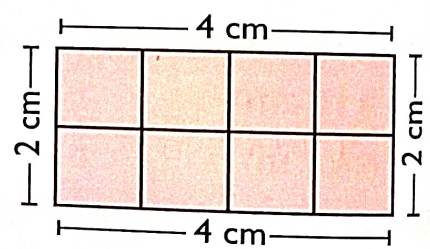
Engagement

**Example 11.** Observe the figures and assume each square to be 1 cm × 1 cm. What is the area and perimeter of each figure?

**Figure A**

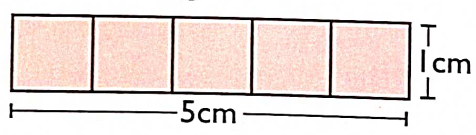


**Figure B**



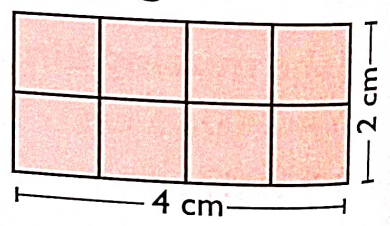
**Solution :**

**Figure A**



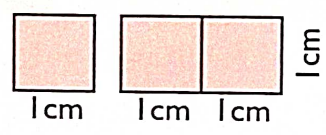
Area =  $5 \times 1 = 5$  sq. cm

**Figure B**



Area =  $4 \times 2 = 8$  sq. cm

Perimeter =  $4 + 2 + 4 + 2 = 12$  cm



Area =  $(1 \times 1) + (2 \times 1)$   
 $= 1 + 2 = 3$  sq. cm

Total area of figure A =  $5 + 3 = 8$  sq. cm

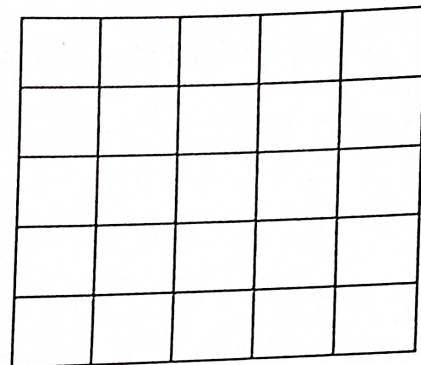
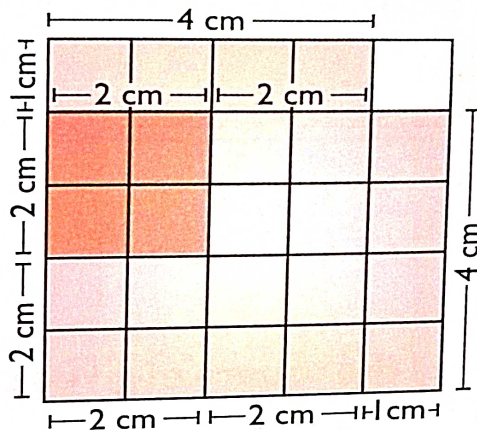
Perimeter of figure A =  $5 + 1 + 1 + 1 + 1 + 2 + 1 + 1 + 1 + 1 + 1 = 16$  cm

We can see that both the figures have an area of 8 sq. cm but the perimeter is different in both the cases.

**Example 12.** How many squares of area 4 sq. cm be cut out of a figure with area 25 sq. cm? (Consider each square to be 1 cm × 1 cm)

**Solution :** Let us shade the regions of squares with area 4 sq. cm.

We observe that we can make 6 squares of area 4 sq. cm each from the given figure.



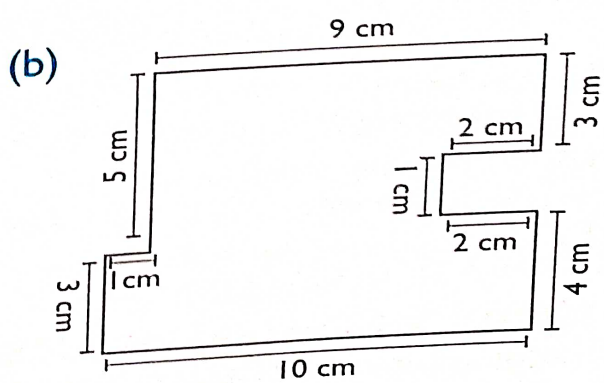
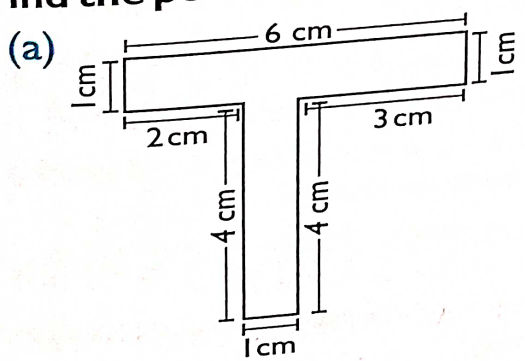
### Progress CHECK-UP-3

### Mastery

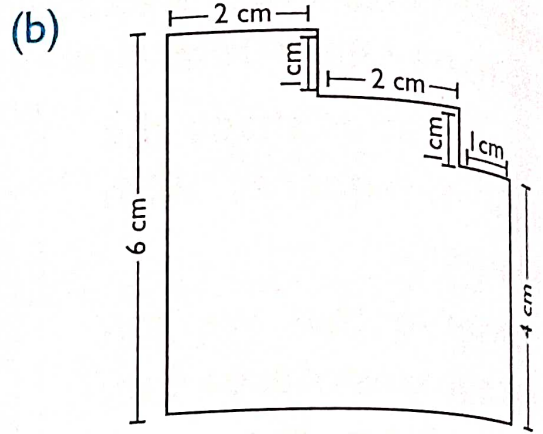
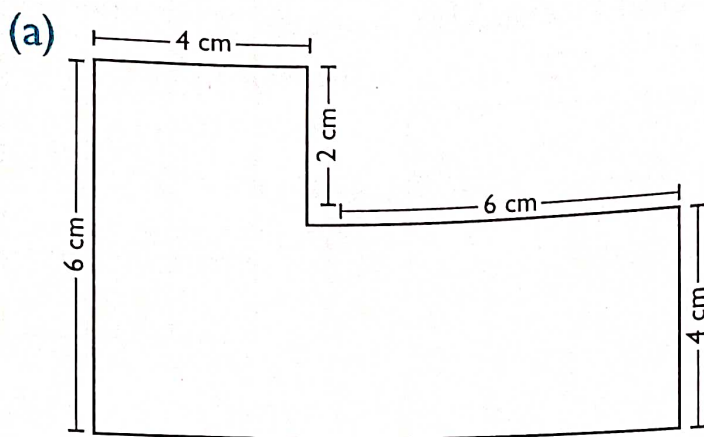
### Pleasure TIME

- Fill in the blanks.
  - A rectangle with area 22 sq. cm is divided into two equal-size triangles. The area of each triangle is ..... sq. cm.
  - The distance around a square field can be calculated using the formula .....
  - The measurement of length and breadth is needed to calculate the area of a .....
  - When the side of a square is doubled, the perimeter increases ..... times and area increases ..... times.

2. (i) Find the perimeter of the figures.



(ii) Find the area of the following figures.



3. Find the perimeter of the square of given side.

(a)  $s = 22 \text{ cm}$

(b)  $s = 12.5 \text{ mm}$

(c)  $s = 7.75 \text{ cm}$

4. Find the length of side of the square whose perimeter is given.

(a)  $P = 60 \text{ cm}$

(b)  $P = 3 \text{ m}$

(c)  $P = 228.8 \text{ cm}$

5. Find the perimeter of the rectangles.

(a)  $l = 6.5 \text{ m}$

$b = 3.2 \text{ m}$

(b)  $l = 720 \text{ cm}$

$b = 640 \text{ cm}$

6. Find the length of the rectangle.

(a)  $\text{Area} = 640 \text{ sq. km}$   $b = 16 \text{ km}$

(b)  $\text{Area} = 1800 \text{ sq. cm}$   $b = 60 \text{ cm}$

7. Find the breadth of the rectangle.

(a)  $\text{Area} = 8500 \text{ sq. m}$   $l = 170 \text{ m}$

(b)  $\text{Area} = 1000 \text{ sq. cm}$   $l = 100 \text{ mm}$

8. Find the perimeter of the figures.

(a)  $\text{Area} = 1575 \text{ sq. m}$

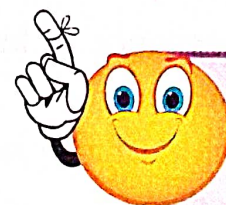
$l = 3500 \text{ cm}$

(b)  $\text{Area} = 504 \text{ sq. cm}$

$b = 21 \text{ cm}$

(c)  $\text{Area} = 5625 \text{ sq. mm}$

$\text{side} = 75 \text{ mm}$



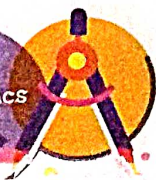
**Keep in Mind**  
The given dimensions of the figure should be in the same unit measurement.

9. Naina walks around a park which is 110 m long and 55 m wide. How far distance will she cover, if she takes 4.5 rounds around the park?

10. Shivam coloured a picture 45 cm long and 25 cm wide. Sohali coloured a picture with side 40 cm. Who coloured more and by how much?

11. A wall is to be 420 cm long and 300 cm wide. How many bricks of length 30 cm and breadth 20 cm are required to construct the wall?

12. The side of a square tile is 30 cm. How many such tiles are required to cover the floor of a room 360 cm long and 330 cm wide?



# VOLUME

## Engagement

The space occupied by something is called its volume. All matter (solid, liquid or gas) occupies space or has volume.

### Units of Volume

In order to find the volume of solids with a regular shape, like a cube or cuboid, we measure volume in terms of small cubes called unit cubes. We can choose one of the three kinds:

- (i) A millimetre cube (mm cube) is about the size of a grain of sugar.
- (ii) A centimetre cube (cm cube) is about the size of a die.
- (iii) A metre cube (m cube) is about the size of a very large TV box.

### Volume of a cuboid

The method of counting and calculating the number of blocks to calculate the volume of the container is time consuming. Also, in case of cuboids of sides 3.6 cm, 4.8 cm, etc. the calculation of volume becomes difficult. Thus, a formula is needed for the calculation of volume.

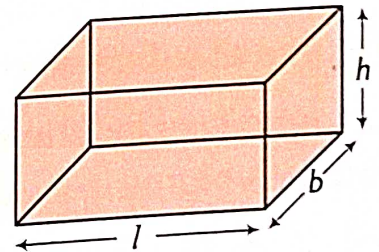
$$\text{Volume of cuboid} = \text{length} \times \text{breadth} \times \text{height}$$

Also,

$$l = \frac{\text{Volume}}{b \times h}$$

$$b = \frac{\text{Volume}}{l \times h}$$

$$h = \frac{\text{Volume}}{l \times b}$$



**Example 13.** Find the volume of a cuboid whose length is 8 cm, breadth is 4 cm and height is 6 cm.

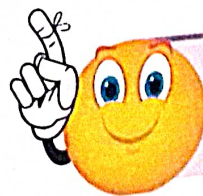
**Solution.** We know that,

$$l = 8 \text{ cm}, b = 4 \text{ cm}, h = 6 \text{ cm}$$

$$\text{Volume} = l \times b \times h$$

$$= 8 \text{ cm} \times 4 \text{ cm} \times 6 \text{ cm} = 192 \text{ cu. cm}$$

**Example 14.** Find the volume of a cuboid whose length is 1 m, breadth is 2 m and height is 80 cm.



*Keep in Mind*

Ensure that all the dimensions are in the same unit of measurement.

**Solution.** We know that,

$$l = 1 \text{ m}, b = 2 \text{ m}, h = 80 \text{ cm} = \frac{80}{100} \text{ m} = 0.8 \text{ m}$$

$$\text{Volume} = l \times b \times h$$

$$= 1 \text{ m} \times 2 \text{ m} \times 0.8 \text{ m} = 1.6 \text{ cu. m}$$

**Example 15.** Find the breadth of a cuboid of length 13 mm, height 6 mm and volume 624 cu. mm.

**Solution.** We know that,  $l = 13 \text{ mm}$ ,  $h = 6 \text{ mm}$

$$\text{Volume} = 624 \text{ cu. mm}$$

$$\text{Volume} = l \times b \times h$$

$$b = \frac{\text{Volume}}{l \times h} = \frac{624 \text{ cu. mm}}{13 \text{ mm} \times 6 \text{ mm}} = 8 \text{ mm}$$

Thus, breadth of the cuboid is 8 mm.

### Volume of a Cube

A cube is a special type of a cuboid where the measure of each side is equal, that is, length = breadth = height.

$$\text{Volume of cube} = \text{side} \times \text{side} \times \text{side}$$

**Example 16.** Find the volume of a cube whose sides are of length 30 mm. Also find the volume in cu. cm.

**Solution.** We know that, side = 30 mm

$$\text{Volume} = \text{side} \times \text{side} \times \text{side}$$

$$= 30 \text{ mm} \times 30 \text{ mm} \times 30 \text{ mm} = 27000 \text{ cu. mm}$$

To calculate the answer in cu. cm we can follow these methods.

$$30 \text{ mm} = \frac{30}{10} = 3 \text{ cm}$$

$$\text{So, volume} = \text{side} \times \text{side} \times \text{side}$$

$$= 3 \text{ cm} \times 3 \text{ cm} \times 3 \text{ cm} \quad \text{Or}$$

$$= 27 \text{ cu. cm}$$

$$\text{Volume} = 27000 \text{ cu. mm}$$

$$= \frac{27000}{10 \times 10 \times 10}$$

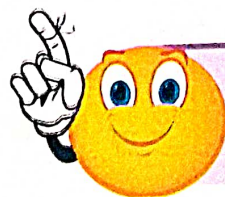
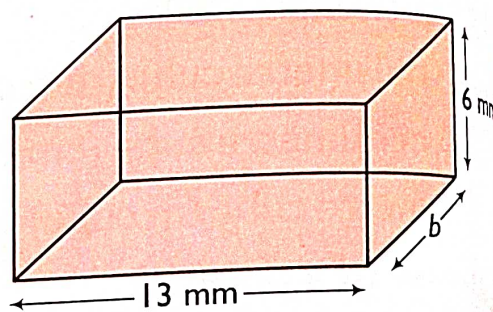
$$= 27 \text{ cu. cm}$$



*Keep in Mind*

$$1 \text{ m} = 100 \text{ cm}$$

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



*Keep in Mind*

*Each dimension of cube is called a side.*



*Keep in Mind*

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

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

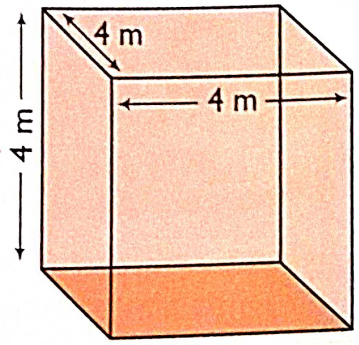
**Example 17.** The inner edges of a cubical tank measure 4 m each. What is its capacity? How much water does it hold when it is three fourths full?

**Solution.**

The inner volume of the tank = edge  $\times$  edge  $\times$  edge  
 $= 4 \text{ m} \times 4 \text{ m} \times 4 \text{ m} = 64 \text{ cu.m}$

So, the capacity of the tank = 64 cu.m.

When it is three fourths full, it holds  $\frac{3}{4} \times 64 \text{ cu.m} = 48 \text{ cu.m}$  of water.

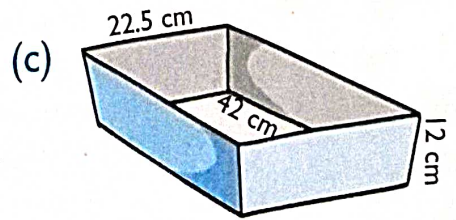
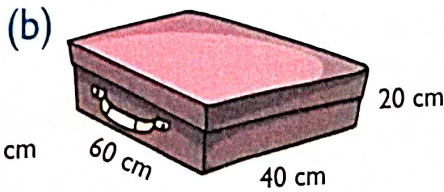
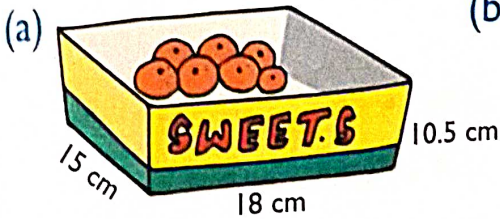


**Progress CHECK-UP-4**

**Mastery**

**Pleasure TIME**

1. Find the volume of each.



2. Complete the table.

	Length	Breadth	Height	Volume
(a)	8 m	3 m	7 m	
(b)	6 cm	4 cm		120 cu.cm
(c)	14 cm		8 cm	448 cu. cm
(d)		11 mm	10 mm	1210 cu. mm

3. A book is 24 cm long, 14 cm wide and 2 cm high. What is the volume of 2 such books piled one on top of the other?

4. The drawer in Kalpana's cupboard is 45 cm long, 10 cm high and 30 cm wide. What is the volume of the drawer?

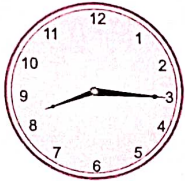
5. A brick has a length of 18 cm, breadth of 6 cm and height of 5 cm. What will be the volume of 10 such bricks?



## Travel Through

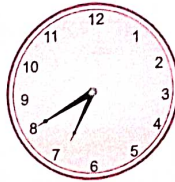
1. Write the exact time as shown on the clocks in two ways.

(a)



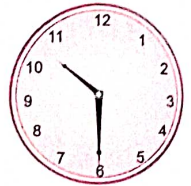
.....  
 .....

(b)



.....  
 .....

(c)



.....  
 .....

2. Fill in the blanks with a.m. or p.m.

(a) Ritika goes to school at 7:30 .....

(b) Deepak had his dinner at 9:00 .....

3. Rewrite the following statements using a.m. or p.m.

(a) Sneha started doing her homework at 5:30 in the evening.

(b) Dr Pathak left for his clinic at 8 o'clock in the morning.

4. What time is it ?

(a) 2 hours after 3:40 p.m. ....

(b) 5 hours before 1:30 p.m. ....



## Learning Outcomes

- 12-hour clock and 24-hour clock
- To convert 12-hour clock time to 24-hour clock time
- Clock with three hands
- Addition of time
- Subtraction of time
- Calendar

## 12-HOUR CLOCK AND 24-HOUR CLOCK

We can convey the measure of time in two ways.

In 12-hour clock, we use numbers 1 to 12 twice to represent the period from midnight to next midnight. In 24-hour clock, the hours from midnight to next midnight are marked 0 to 24 hours.



In 12-hour clock:

Morning, that is midnight to just before noon, is denoted by a.m.

Afternoon, evening and night upto midnight is denoted by p.m.

In 24 hour clock:

❖ The time midnight is expressed as 0000 hours (for the next day) or 2400 hours (for the past day).

❖ The Railways, Shipping Lines, Airways, Defence Forces and Television Networks work continuously day and night which means 24 hours. At such places, the time is measured and / or told in 24 hours. The real clocks are mostly 12-hours clock. But the new digital clocks show time from 0000 to 2400 hours.

❖ Time in the 24-hour clock system is written in 4 digits. The first 2 digits on the left are for the hours and the two digits on the right are for the minutes. There is no dot separating the four digits.

The table given below shows some 12-hour clock and 24-hour clock times.

Time	12-hour clock	24-hour clock
1 o'clock in the morning	1:00 a.m.	0100 hours
10 to 8 in the morning	7:50 a.m.	0750 hours
12 o'clock (day)	12:00 p.m.	1200 hour
half past 3 in the afternoon	3:30 p.m.	1530 hours
quarter past 6 in the evening	6:15 p.m.	1815 hours
midnight	12:00 a.m.	2400/0000 hours

### TO CONVERT 12-HOUR CLOCK TIME TO 24-HOUR CLOCK TIME

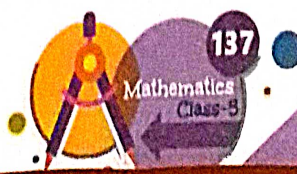
(a) For a.m. timings, write hours and minutes side by side without separating them (writing hours as a two digit number writing 0 before them if required). For example:

3 a.m.  $\longrightarrow$  0300 hours

6:15 a.m.  $\longrightarrow$  0615 hours

3:05 a.m.  $\longrightarrow$  0305 hours

12:00 noon  $\longrightarrow$  1200 hours



(b) For p.m. timings (1 p.m. to 12 p.m.), add 12 to the hours.

1 p.m.  $\longrightarrow$  1300 hours  $(1200 + 0100 = 1300)$

9:30 p.m.  $\longrightarrow$  2130 hours  $(1200 + 0930 = 2130)$

12:00 midnight  $\longrightarrow$  2400 hours/0000 hours

**Note:** 12:01 p.m.  $\longrightarrow$  1201 hours

12:59 p.m.  $\longrightarrow$  1259 hours

**Example 1.** Change to 24-hour clock time :

(a) 3:25 a.m.                      (b) 8:30 p.m.                      (c) 12 noon

(d) 12 midnight                      (e) 12:30 a.m.

**Solution:** (a) 3:25 a.m. is written in 24-hour clock time as 0325 hours.

(b) 8:30 p.m. is written in 24-hour clock time as 2030 hours.

(c) 12 noon is written in 24-hour clock time as 1200 hours.

(d) 12 midnight is written in 24-hour clock time as 2400 hours or 0000 hours.

(e) 12:30 a.m. is written in 24-hour clock time as 0030 hours.

**Example 2.** Change to 12-hour clock time :

(a) 1538 hours                      (b) 0356 hours                      (c) 0045 hours

(d) 0500 hours                      (e) 2140 hours

**Solution:** (a) 1538 hours  $(12:00 + 3:38) = 3:38$  p.m.

(b) 0356 hours = 3:56 a.m.

(c) 0045 hours = 12:45 a.m.

(d) 0500 hours = 5:00 a.m.

(e) 2140 hours  $(12:00 + 9:40) = 9:40$  p.m.



## Progress CHECK-UP-1



### Pleasure TIME

Master

**I. Change to 24-hour clock time :**

(a) 1:10 a.m.

(b) 2:17 p.m.

(c) 12 midnight

(d) 5:45 a.m.

(e) 12:58 p.m.

(f) 1:55 p.m.

(g) 10:00 p.m.

(h) 6:35 p.m.

(i) 8:35 p.m.



## 2. Change to 12-hour clock time :

- (a) 1613 hours                      (b) 0145 hours                      (c) 0020 hours  
(d) 2358 hours                      (e) 0938 hours                      (f) 2400 hours  
(g) 2144 hours                      (h) 2328 hours                      (i) 2355 hours

## CLOCK WITH THREE HANDS

### Engagement

Some clocks have a seconds' hand also, apart from the hour hand and the minute hand. The seconds' hand is the thinnest and moves fastest.

The hour hand completes one round in 12 hours. Minute hand completes one round in 60 minutes and seconds' hand completes one round in 1 minute.

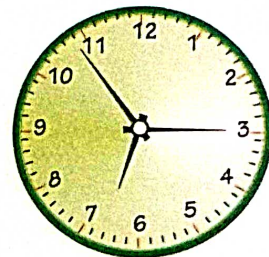
The time which the second's hand takes in moving between two successive small divisions is called 1 second.

Hence, 1 minute = 60 seconds

Let us summarise all the relations :

$$1 \text{ hour} = 60 \text{ minutes}$$

$$1 \text{ minute} = 60 \text{ seconds}$$



**Example 3.** Convert the following into minutes :

- (a) 6 hours                      (b) 15 hours                      (c) 22 hours

**Solution :** We know, 1 hour = 60 minutes

- (a) 6 hours                      =  $60 \times 6$  minutes = 360 minutes  
(b) 15 hours                      =  $60 \times 15$  minutes = 900 minutes  
(c) 22 hours                      =  $60 \times 22$  minutes = 1320 minutes

**Example 4.** Convert the following into seconds :

- (a) 12 minutes                      (b) 25 minutes                      (c) 2 hours

**Solution :** (a) We know, 1 minute = 60 seconds

So, 12 minutes =  $12 \times 60$  seconds = 720 seconds

(b) We know, 1 minute = 60 seconds

So, 25 minutes =  $25 \times 60$  seconds = 1500 seconds

(c) To convert hours into seconds, we shall first convert hours into minutes and then minutes into seconds.

We know, 1 hour = 60 minutes

So, 2 hours =  $2 \times 60$  minutes = 120 minutes

We know, 1 minute = 60 seconds

So, 120 minutes =  $60 \times 120$  seconds = 7200 seconds

Thus, 2 hours = 7200 seconds

**Example 5.** Convert the following into seconds :

(a) 18 minutes 20 seconds      (b) 5 hours 12 minutes 45 seconds

**Solution :**

(a) First, we shall convert minutes into seconds and then add the given number of seconds to it.

We know, 1 minute = 60 seconds

So, 18 minutes =  $18 \times 60$  seconds = 1080 seconds

Hence, 18 minutes 20 seconds

$$= 1080 \text{ seconds} + 20 \text{ seconds}$$

$$= 1100 \text{ seconds}$$

(b) First, we shall convert hours and minutes into seconds ; then add the given number of seconds to it.

We know, 1 hour = 60 minutes

So, 5 hours =  $5 \times 60$  minutes = 300 minutes

We know, 1 minute = 60 seconds

So, 300 minutes =  $300 \times 60$  seconds = 18000 seconds

Also, 12 minutes =  $12 \times 60$  seconds = 720 seconds

Hence, 5 hours 12 minutes 45 seconds

$$= (18000 + 720 + 45) \text{ seconds} = 18765 \text{ seconds}$$

**Example 6.** Convert 230 minutes into hours and minutes.

**Solution :**

To convert minutes into hours and minutes, divide the number of minutes by 60, quotient gives the number of hours and remainder gives the number of minutes.

$$\begin{array}{r} 3 \\ 60 \overline{) 230} \\ \underline{- 180} \\ 50 \end{array}$$

Hence, 230 minutes = 3 hours 50 minutes



**Example 7.** Convert 2548 seconds into minutes and seconds.

**Solution:**

To convert seconds into minutes and seconds, divide the number of seconds by 60, quotient gives the number of minutes and remainder gives the number of seconds.

$$\begin{array}{r}
 42 \\
 60 \overline{) 2548} \\
 \underline{-240} \phantom{0} \\
 148 \\
 \underline{-120} \\
 28
 \end{array}$$

Hence, 2548 seconds = 42 minutes 28 seconds



## Progress CHECK-UP-2

### Mastery

### Pleasure TIME

- Convert the following into minutes :  
 (a) 5 hours      (b) 13 hours      (c) 23 hours      (d) 28 hours
- Convert the following into seconds :  
 (a) 35 minutes      (b) 38 minutes      (c) 3 hours      (d) 5 hours 25 minutes
- Convert the following into hours and minutes :  
 (a) 527 minutes      (b) 418 minutes      (c) 545 minutes      (d) 796 minutes
- Convert the following into minutes and seconds :  
 (a) 1675 seconds      (b) 2764 seconds      (c) 39682 seconds      (d) 42602 seconds

### Engagement

## ADDITION OF TIME

**Rule:** Write hours, minutes and seconds in separate columns and add.

**Example 8.** Add 5 hours 13 minutes and 3 hours 24 minutes.

**Solution:**

Hours	Minutes
5	13
+ 3	24
<b>8</b>	<b>37</b>

Hence, 5 hours 13 minutes + 3 hours 24 minutes  
 = 8 hours 37 minutes



**Example 9.** Add 13 hours 35 minutes and 6 hours 40 minutes.

**Solution:**

Hours	Minutes
13	35
+ 6	40
<b>19</b>	<b>75</b>

Since, 60 minutes = 1 hour

So, 75 minutes = 60 minutes + 15 minutes = 1 hour + 15 minutes

Hence, 19 hours 75 minutes = 19 hours + 1 hour + 15 minutes  
 = (19 + 1) hours + 15 minutes = 20 hours 15 minutes

**Example 10.** A train leaves Delhi at 3:45 a.m. and reaches Dehradun in hours 10 minutes. At what time does it reach Dehradun?

**Solution:** The train reaches Dehradun 8 hours 10 minutes after 3:45 a.m..

Hours	Minutes
3	45
+ 8	10
<b>11</b>	<b>55</b>

Hence, the train reaches Dehradun at 11:55 a.m.

## SUBTRACTION OF TIME

**Rule:** Arrange hours, minutes and seconds in separate columns and then subtract.

**Example 11.** Find the difference between 6 hours 40 minutes and 11 hours 25 minutes.

**Solution:** **Subtracting minutes:**

Since  $40 > 25$ , so we cannot subtract 40 from 25.

Regroup 11 hours 25 minutes as 10 hours

(60 + 25) minutes, i.e., 10 hours 85 minutes

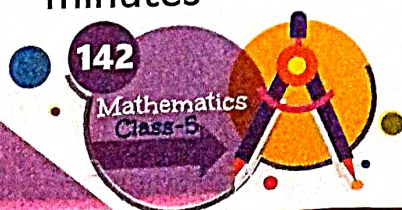
Now, 85 minutes – 40 minutes = 45 minutes

**Subtracting hours:**

10 hours – 6 hours = 4 hours

Hence, 11 hours 25 minutes – 6 hours 40 minutes = 4 hours 45 minutes

Hours	Minutes
10	85
<del>11</del>	<del>25</del>
- 6	40



Example 12.

Find the time 2 hours 30 minutes before 10:15 a.m.

Solution:

**Subtracting minutes:**

Since  $30 > 15$ , so we cannot subtract 30 from 15.

Regroup 10 hours 15 minutes as 9 hours

(60 + 15) minutes, i.e., 9 hours 75 minutes

Now, 75 minutes - 30 minutes = 45 minutes

Hours	Minutes
9	75
<del>10</del>	<del>15</del>
- 2	30
<b>7</b>	<b>45</b>

**Subtracting hours:**

9 hours - 2 hours = 7 hours

Hence, the time 2 hours 30 minutes before 10:15 a.m. is 7:45 a.m.

Example 13.

Subtract 21 minutes 50 seconds from 40 minutes 25 seconds.

Solution:

**Subtracting seconds:**

Since  $25 < 50$ , so we cannot subtract 50 from 25.

Regroup 40 minutes 25 seconds as 39 minutes

(60 + 25) seconds, i.e., 39 minutes 85 seconds.

Now, 85 seconds - 50 seconds = 35 seconds

Hours	Minutes
39	85
<del>40</del>	<del>25</del>
- 21	50
<b>18</b>	<b>35</b>

**Subtracting minutes:**

39 minutes - 21 minutes = 18 minutes

Hence, 40 minutes 25 seconds - 21 minutes 50 seconds = 18 minutes 35 seconds



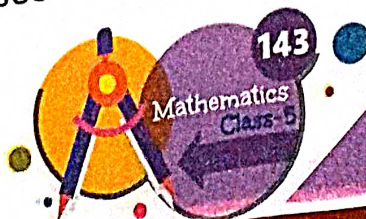
**Progress CHECK-UP-3**

**Mastery**

**Pleasure TIME**

Add:

- (a) 3 hours 30 minutes and 7 hours 25 minutes.
- (b) 5 hours 38 minutes and 13 hours 4 minutes.
- (c) 9 hours 11 minutes and 19 hours 25 minutes.
- (d) 14 hours 15 minutes and 25 hours 50 minutes.
- (e) 15 minutes 20 seconds and 40 minutes 55 seconds.



- (f) 17 hours 2 minutes and 5 hours 53 minutes.
- (g) 20 minutes 18 seconds and 12 minutes 50 seconds.
- (h) 27 hours 30 minutes and 14 hours 40 minutes.
- (i) 35 minutes 40 seconds and 24 minutes 30 seconds.

## 2. Subtract :

- (a) 2 hours 10 minutes from 15 hours.
- (b) 2 hours 5 minutes from 18 hours 17 minutes.
- (c) 5 hours 25 minutes from 17 hours 30 minutes.
- (d) 11 hours 40 minutes from 20 hours 2 minutes.
- (e) 12 minutes 48 seconds from 35 minutes 35 seconds.
- (f) 13 hours 18 minutes from 21 hours 25 minutes.
- (g) 16 minutes 40 seconds from 50 minutes 10 seconds.
- (h) 16 hours 20 minutes from 22 hours 19 minutes.
- (i) 20 minutes 35 seconds and 52 minutes 20 seconds.

## CALENDAR

## Engagement

Calendar is a table of months and days. There are 12 months in a year — January, February, March, April, May, June, July, August, September, October, November and December. There are 7 days in a week — Sunday, Monday, Tuesday, Wednesday, Thursday, Friday and Saturday.

There are 28 days in the month of February. In a leap year it has 29 days.

There are 30 days in April, June, September and November. There are 31 days in January, March, May, July, August, October and December.

## Adding and Subtracting Days

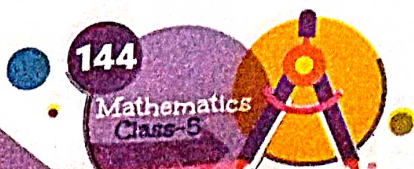
**Example 14.** Riya's school closed for summer vacations on 17 May and reopened on 3 July. For how many days was the school closed?

**Solution :** We count the number of days as follows :

17 May to 31 May =  $(31 - 17)$  days = 14 days;

1 Jun to 30 Jun = 30 days; and 1 July to 2 July = 2 days.

Since the vacation started on 17 May, so the starting day will also be added to the total number of days. Hence, total days of summer vacation =  $14 + 30 + 2 = 46$  days.



Example 15.

Aditya's birthday is on 14 September. His friend Riya's birthday is on 13 October. How many days are there between their birthdays?

Solution :

Number of days in September = 30

14 September to 30 September =  $(30 - 14)$  day = 16 days

1 October to 13 October = 13 days

Hence, there are  $(16 + 13)$  days = 29 days between Aditya's and Riya's birthdays.



### Progress CHECK-UP-4

Mastery

### Pleasure TIME

1. Answer the following questions.

- (a) Which is the last month of a year?
- (b) Do all the months in a year have the same number of days?
- (c) Which month has the least number of days?
- (d) How many months have 31 days?
- (e) How many months have 30 days?

.....  
.....  
.....  
.....  
.....

2. Solve the following.

- (a) The Munsri family went for a holiday on 27 May and returned home on 2 June. For how many days did the family go out?
- (b) Somya started her 35 days computer course on 15 August. When would her course end?
- (c) Tickets for the movie were issued three weeks before the show opened on 28 July. On which date did the sale of tickets begin?
- (d) Radhika started knitting a sweater on March 20 and finished it on the May 3. How many days did she take to knit the sweater?



### Travel Through

1. Convert the following into paise.

- (a) ₹ 0.07                      (b) ₹ 79.79                      (c) ₹ 100.90                      (d) ₹ 2670.70

2. Convert the following into rupees.

- (a) 5 paise                      (b) 568 paise                      (c) 4528 paise                      (d) 5 rupees 15 paise

3. Solve the following.

- (a) ₹ 65.73 + ₹ 80.90 + ₹ 5.75                      (b) ₹ 1000 – ₹ 175.00  
 (c) ₹ 15.50 × 6                      (d) ₹ 266.94 ÷ 9

4. Solve these word problems.

- (a) Amit's father gave him ₹ 500. He buys a cricket bat for ₹ 368 and a ball for ₹ 80. How much money is left with Amit now?  
 (b) Mrs Gupta bought 5 kg apples at ₹ 30.50 per kg and 2 kg oranges at ₹ 22.50 per kg. How much did she spend in all?



### Learning Outcomes

- The Unitary Method
- Profit and Loss
- To Find the Cost Price
- To Find the Selling Price
- Bills

### THE UNITARY METHOD

Sumit went to buy a packet of pens. A packet of 10 pens from Company A cost ₹ 85 and a packet of ₹ 12 pens from Company B costs ₹ 96. The quality of both was the same. Which packet should he buy to get a better deal?

Here, we have to find out which of the two packets will cost less. To do so, we need to find the price of one pen of each company.



### Engagement



Finding the price of one object of a type is called finding the **unit price** and this method is called the **unitary method**.

**Pack of pens from Company A**

Cost of 10 pens = ₹ 85

Cost of 1 pen = ₹  $85 \div 10 = ₹ 8.5$

∴ Cost of 1 pen = ₹ 8.50

**Pack of pens from Company B**

Cost of 8 pens = ₹ 96

Cost of 1 pen = ₹  $96 \div 12 = ₹ 8$

Cost of 1 pen = ₹ 8.00

Here, the cost of 1 pen of Company A is greater than the cost of 1 pen of Company B. Therefore, Sumit should buy the pens of Company B to get a better deal.

**Example 1.** The cost of 5 dozen bananas is ₹ 240. What is the cost of 8 dozen bananas?

**Solution:** Cost of 5 dozen bananas = ₹ 240

Cost of 1 dozen bananas = ₹  $240 \div 5 = ₹ 48$

Cost of 8 dozen bananas = ₹  $48 \times 8 = ₹ 384$



**Progress CHECK-UP-1**



**Pleasure TIME**

**Mastery**

1. Which is the better buy?

(a)



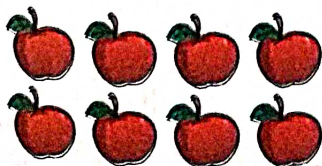
2 balls for ₹ 35

Or



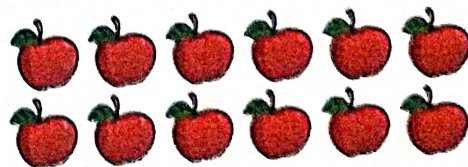
4 balls for ₹ 65

(b)



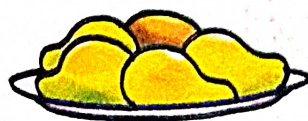
20 kg of apples for ₹ 1120

Or



32 kg of apples for ₹ 1770

(c)



5 for ₹ 125

Or



8 for ₹ 208

## 2. Solve the following problems :

- One dozen eggs costs ₹36. Find the cost of 7 eggs.
- 6 kg of potatoes cost ₹84. Find the cost of 1 kg of potatoes.
- 3 shirts cost ₹420. Find the cost of 5 such shirts.
- The cost of 8 exercise books is ₹144. Find the cost of 1 exercise book.
- A car covers 180 km in 15 litres of petrol. How much distance will it cover in 12 litres of petrol?

Engagemen

## PROFIT AND LOSS

Shopkeepers buy goods in bulk. They sell goods in retail for a price a little higher than the price for which they bought the goods.

**Cost price** is the buying price + transportation + labour, etc.

**Selling price** is the price for which a shopkeeper sells the goods.

When the selling price is more than the cost price, the shopkeeper earns **profit**.

$$\text{Profit} = \text{Selling price (SP)} - \text{Cost price (CP)}$$

When the goods are defective or old, the shopkeeper has to sell the goods at a price less than the cost price. In this case, there is a loss.

$$\text{Loss} = \text{Cost price (CP)} - \text{Selling price (SP)}$$

**Example 2.** Deepak bought a calculator for ₹175 and sold it to Manav for ₹210. Find his profit or loss.

**Solution :**

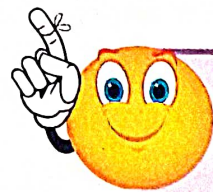
$$\text{CP of the calculator} = ₹175$$

$$\text{SP of the calculator} = ₹210$$

Since  $\text{SP} > \text{CP}$ , so there is a profit.

$$\text{Profit} = \text{SP} - \text{CP} = ₹210 - ₹175 = ₹35$$

Hence, Deepak makes a profit of ₹35.



*Keep in Mind*

If  $\text{CP} = \text{SP}$ , then there is neither gain nor loss.

**Example 3.** Rahul is a TV mechanic. He bought a second hand TV for ₹3430 and spent ₹580 on its repairs. He sold the TV for ₹4380. Find the profit or loss in this transaction.

**Solution :**

$$\text{Cost of the TV} = ₹3430$$

$$\text{Cost of repairs} = ₹580$$

$$\text{Total CP of the TV} = ₹3430 + ₹580 = ₹4010$$

SP of the TV = ₹4380

Since  $SP > CP$ , Rahul made a profit.

Profit =  $SP - CP = ₹4380 - ₹4010 = ₹370$

Hence, Rahul made a profit of ₹370.

### TO FIND THE COST PRICE

#### Engagement

In case of profit, Cost price = Selling price - Profit

In case of loss, Cost price = Selling price + Loss

**Example 4.** A bookseller sold 100 books for ₹990 and earned a profit of ₹99. Find the cost price for 100 books.

**Solution :** Selling price = ₹990

Profit = ₹99

Cost Price = Selling price - Profit = ₹990 - ₹99 = ₹891

**Example 5.** Mellisa sold a refrigerator for ₹6700 and lost ₹400. Find the cost price of the refrigerator.

**Solution :** Selling price = ₹6700 and Loss = ₹400

Cost price = Selling price + Loss = ₹6700 + ₹400 = ₹7100

### TO FIND THE SELLING PRICE

#### Engagement

In case of profit, Selling price = Cost price + Profit

In case of loss, Selling price = Cost price - Loss

**Example 6.** Sharon bought a DVD player for ₹3250. She sold it at a profit of ₹275. For how much did she sell it?

**Solution :** Cost price = ₹3250

Profit = ₹275

Selling price = Cost price + profit = ₹3250 + ₹275 = ₹3525

**Example 7.** Joe suffered a loss of ₹85 while selling a table which she purchased for ₹900. What was the selling price?

**Solution :** Cost price = ₹900

Loss = ₹85

Selling price = Cost price - Loss = ₹900 - ₹85 = ₹815





I. Complete the table :

(i)

	CP (₹)	SP (₹)	Profit / Loss	Amount (₹)
(a)	578	487	Loss	₹ 91
(b)	1503	1592		
(c)	18450	19310		
(d)	21920	20370		

(ii)

	SP (₹)	Profit (₹)	Loss (₹)	CP (₹)
(a)	3540		490	
(b)	5108	910		
(c)	14325		730	
(d)	16190	1840		

(iii)

	CP (₹)	Profit (₹)	Loss (₹)	SP (₹)
(a)	2470		320	
(b)	5108	525		
(c)	15940		805	
(d)	21006	1452		

2. Suraj buys a washing machine for ₹7215. He sells the washing machine for ₹8450. Find his gain or loss.
3. Yuvraj bought a second hand scooter for ₹9200. She spent ₹1400 on its repairs. She sold the scooter for ₹10000. Find her gain or loss.
4. Kamal bought a shirt for ₹215. He sold the shirt at a profit of ₹50. Find the selling price of the shirt.
5. By selling a cycle for ₹2450, a shopkeeper made a profit of ₹310. Find the cost price of the cycle.

Whenever we buy something, the shopkeeper gives us a statement of the total amount due to be paid. This statement is called a bill.

A bill is simply an account statement that lists the details of goods and services bought and the total money which needs to be paid for them.

The bill also serves as a proof or record of purchase. For example, in case a customer wants refund for a damaged product, he shows the bill of purchase to the shopkeeper to prove that the product was brought from his shop.

**Format of a Bill**

Usually the format of a printed bill is as shown below :

Bill No. ....					Date : ...../...../.....	
S.No.	Item	Quantity	Price (in ₹)	Amount		
				₹	P	
			<b>Total</b>			

**Preparing a Bill**

**Example 8.** Kiran purchased 18 boxes of pencils, 15 boxes of pens, 20 erasers and 8 geometry boxes. A box of pencils costs ₹32.50, a box of pens ₹56, 1 eraser ₹1.50 and 1 geometry box ₹46.25. Prepare a bill for Kiran's purchases from Raj Stationery.

*Solution :*

<b>RAJ STATIONERY</b>					
Bill No. 245			Date : 6/6/2018		
S.No.	Item	Quantity	Price (in ₹)	Amount	
				₹	P
1.	Box of pencils	18	32.50	585	00
2.	Box of pens	15	56.00	840	00
3.	Eraser	20	1.50	30	00
4.	Geometry Box	8	46.25	370	00
			<b>Total</b>	1825	00



1. On 12 November 2018, Rama General Store, Dadar sold the following items to Patekar :
- (a) 750 g of sugar at the rate of ₹ 12 per kg.
  - (b) 2 kg 500 g of refined oil at the rate of ₹ 52 per kg.
  - (c) 2 dozen soap bars at the rate of ₹ 45 per dozen.
  - (d) 2 packets of matchbox at the rate of ₹ 3.50 per packet.

Prepare a bill for the purchase. Mr Patekar gave a 500-rupee note to the shopkeeper. How much money will he get back?

2. Find the errors in the following bill and rewrite them correctly.

<b>NERA BAZAR</b>					
Bill No. 2011 .....			Date : 15/6/2018		
S.No.	Item	Quantity	Price (in ₹)	Amount	
				₹	P
1.	Mustard Oil	3 kg	36.00/kg	108	00
2.	Pulses	2.5 kg	12.00/kg	24	00
3.	Sugar	4 kg	14.25/kg	57	00
4.	Incense sticks	1 packet	6.00/packet	6	00
<b>Total</b>				195	00

3. Mrs Agarwal purchased some vegetables and fruits from the market and was given the following bill :

Now answer the following questions.

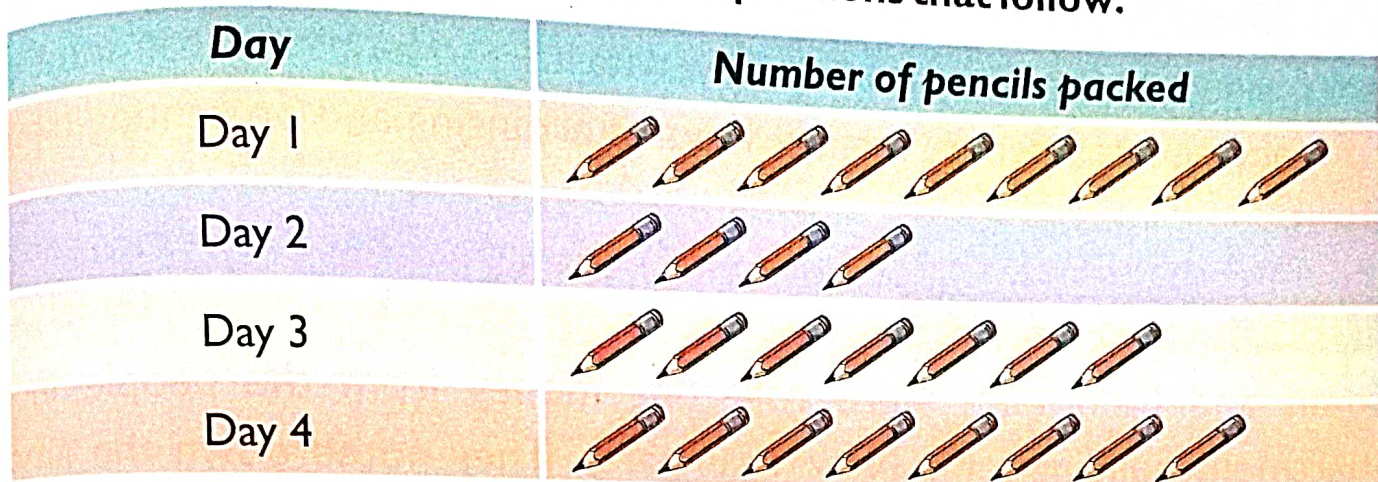
- (a) Fill in the cost of 1 kg of each item in the price column.
- (b) How much would 2 kg of onion cost?
- (c) What is the total amount that Mrs Agarwal needs to pay?


<b>CHINU FRUITS AND VEGETABLES</b>					
Bill No. 25 .....			Date : 30/7/2018		
S.No.	Item	Quantity	Price (in ₹)	Amount	
				₹	P
1.	Mangoes	2 kg		110	00
2.	Peaches	1½ kg		120	75
3.	Tomatoes	2 kg		19	50
4.	Onions	500 g		15	00
5.	Potatoes	3 kg		36	75
<b>Total</b>				.....	.....

## Travel Through

Readiness

Study the pictograph and answer the questions that follow.

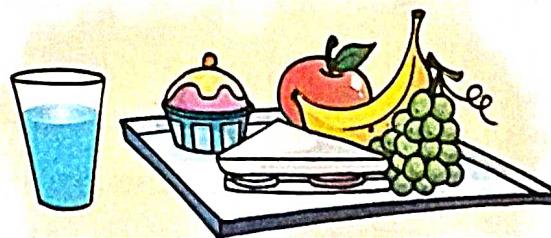


 = 400

- (a) On which day was the maximum number of pencils packed?
- (b) What was the total number of pencils packed in four days?
- (c) What is the difference between the number of pencils packed on Day 2 and Day 3?

The tally chart shows the evening snack choices of students of a class.

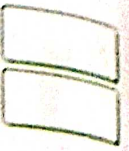
Food item	Number of students
Muffins	
Sandwich	
Milkshake	
Fruit salad	



Based on your understanding of the data answer these questions.

- (a) Which evening snack is preferred most by children?
- (b) Which snack is preferred more by children, sandwiches or muffins and by how much?

- (c) How many students are there in the class?
- (d) How many more students prefer milkshake than fruit salad?



## Learning Outcomes

- Tally Marks Table
- Pie Chart
- Bar Graph
- Line Graph

A collection of facts and figures is called data. Data put together as they are collected are called raw data. Raw data have to be arranged in some order to make sense. There are many ways of arranging and presenting (showing data).

### TALLY MARKS TABLE

### Engagement

Sumit and his friends were collecting money from the people in their apartment building for a New Year party. They noted down the amounts against the flat numbers. The table shows their raw data.

101. ₹300	102. ₹ <del>250</del>	103. ₹ <del>250</del>	104. ₹500	105. ₹300	106. ₹ <del>250</del>
201. ₹500	202. ₹400	203. ₹300	204. ₹500	205. ₹450	206. ₹500
301. ₹400	302. ₹450	303. ₹300	304. ₹ <del>250</del>	305. ₹ <del>250</del>	306. ₹400
401. ₹450	402. ₹400	403. ₹500	404. ₹ <del>250</del>	405. ₹300	406. ₹350
501. ₹500	502. ₹400	503. ₹350	504. ₹ <del>250</del>	505. ₹300	506. ₹450
601. ₹500	602. ₹300	603. ₹ <del>250</del>	604. ₹400	605. ₹500	606. ₹300

Then they arranged the amounts in ascending order.

₹250, ₹300, ₹350, ₹400, ₹450, ₹500

Then they made this table. One person crossed out the amounts from the raw data, while another made tally (/) marks. Remember: Every fifth tally mark against an item is put across the four tally marks, like  $\text{||||}$ . The tally marks  $\text{|||||}$  count 5.

Work in pairs and complete the rest of the table.

Amount (in ₹)	Tally marks	Number of flats
250	//// //	8
300		
350		
400		
450		
500		

From the chart:

- The total amount collected = ₹(250 × 8) + ₹(300 × ..... ) + ₹(350 × ..... ) + ₹(400 × ..... ) + ₹(450 × ..... ) + ₹(500 × ..... ) = .....
- ₹250, ₹..... and ₹..... were collected from an equal number of flats.
- ₹..... was collected from the least number of flats.
- The fraction of flats from which ₹450 was collected = .....
- $\frac{1}{6}$  of the residents paid ₹.....

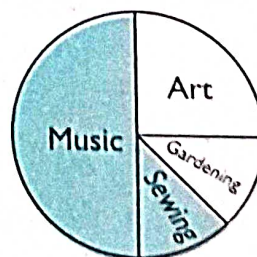
## PIE CHART

## Engagement

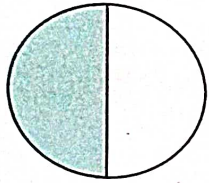
Circle graphs show all the parts of a whole. Here the whole consists of all the 24 students of class V-B.

The table shows the hobby classes that the students chose for the term. The circle graph shows the same information.

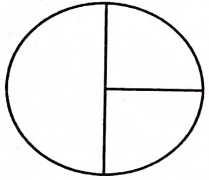
Music	12 students
Art	6 students
Gardening	3 students
Sewing	3 students



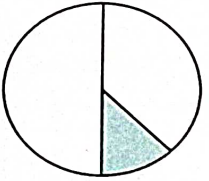
What is the total number of students shown in the graph? .....



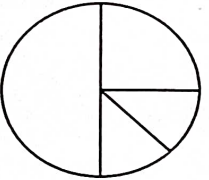
12 out of 24 students have opted for music. That is half the students have opted for music. So  $\frac{1}{2}$  the circle has been coloured to show the information.



6 out of 24 is  $\frac{6}{24}$  or  $\frac{1}{4}$  students have opted for art.



3 out of 24 is  $\frac{3}{24}$  or  $\frac{1}{8}$  students have opted for sewing.



3 out of 24 or  $\frac{1}{8}$  students opted for gardening.

**Example 1.** The data here represents the number of children who attended the swimming class in a week. Represent the data as a circle graph.

Day	Monday	Wednesday	Friday	Saturday
Number of students in swimming class	8	2	10	20

**Solution :** The total number of children who came for the swimming class in the week = 40

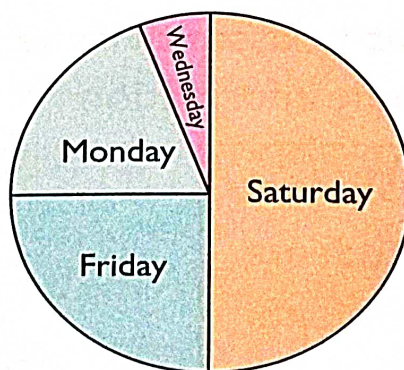
**Step 1.** Find the fraction of children going for the swimming class for the given days of the week.

$$\text{Monday} = \frac{8}{40} = \frac{1}{5}$$

$$\text{Wednesday} = \frac{2}{40} = \frac{1}{20}$$

$$\text{Friday} = \frac{10}{40} = \frac{1}{4}$$

$$\text{Saturday} = \frac{20}{40} = \frac{1}{2}$$



In case slices are of equal sizes, then pie charts do not prove useful.

Step 2. Prepare a pie chart based on the fractions obtained. For this, convert unlike fractions to like fractions. The fraction with the largest numerator will occupy the largest part of the circle graph.



**Progress CHECK-UP-1**

**Pleasure TIME**

**Mastery**

The number of students who were absent from class in the month of August is shown in this chart. Make a table showing the number of times a particular number of students was absent.

1.2	2.5	3.1	6.2	7.3	8.1	9.5
10.3	13.4	14.3	16.1	17.4	20.2	22.3
23.3	24.5	27.1	28.2	29.4	30.2	31.1

Number of absent students	Tally Marks	Number of days

The number of sums (out of 20) done correctly by Farooq in different maths tests is shown in the chart. Arrange the numbers in ascending order. Then make a table showing the number of times he got a particular score (each sum carried 1 mark).

Farooq's scores 18, 17, 20, 18, 15, 17, 19, 18, 17, 16, 19, 18, 17, 18, 16

Ascending order : .....

From the chart :

Score	Number of times

- (a) What score did he get most often?  
.....
- (b) What score did he get least often?  
.....
- (c) Do you think he is good in maths?  
.....

3. Celina wanted to find out the most popular newspaper in her neighbourhood. The data needed was simple : number of readers for each newspaper. So, she made a table for tally marks straightaway. For each reader of a newspaper, she made a tally mark.

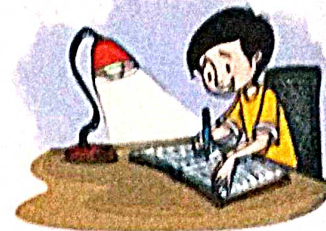
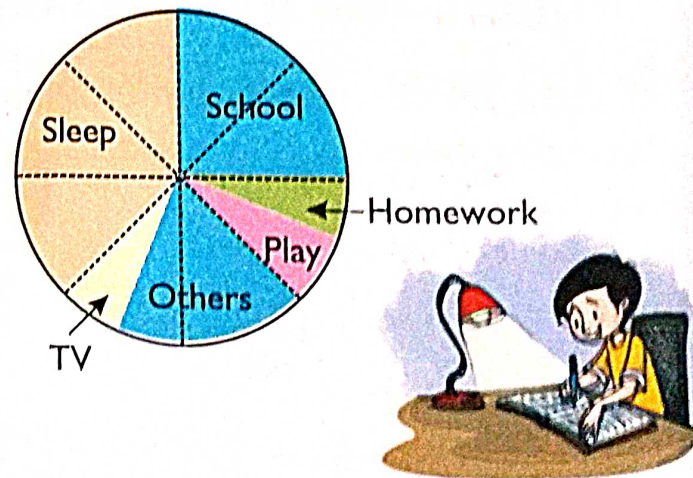
Fill in the numbers in Celina's table.

Newspaper	Tally marks	Numbers
Indian Age		
Pathbreaker		
Overview		
Insight		
People's Times		

From the chart :

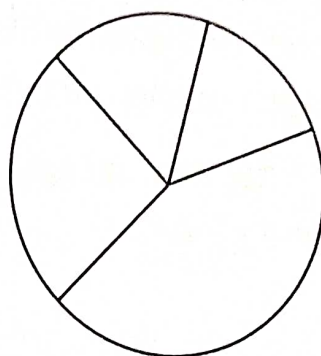
- (a) Which newspaper is the most popular? .....
- (b) Which is the least popular? .....
- (c) How many houses did Celina visit to ask? .....
- (d) What fraction of people read People's Times? .....
- (e) What percentage of people read Overview? .....
4. This circle graph shows how Rishabh spent his day. A day has 24 hours. The circle has been divided into 8 equal parts with dotted lines. So each part represents 3 hours. You can fill in the details on the table with the help of the circle graph.

6 hours	
9 hours	
1.5 hour	Homework
1.5 hours	
4.5 hours	
1.5 hour	

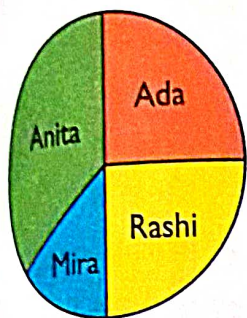


100 people were asked which kind of movies were their favourite. Look at the table that gives their replies and colour, and label the circle graph accordingly.

Adventure	24
Comedy	20
Mystery	20
Drama	36



This circle graph shows the votes for the class election. If there are 40 students in the class, estimate the number of votes each person who stood for the election got.



(a) (i) Ada (**Hint:**  $\frac{1}{4}$  of 40)

(ii) Rashi

(iii) Mira (**Hint:**  $\frac{1}{8}$  of 40)

(iv) Anita

(b) Who won the election?

(c) Which two students got the same number of votes? How many more votes did Rashi get than Mira?



7. Given below is a list of activities 60 students of class 5-B enrolled in during their summer vacation. Prepare a pie chart for the data.

Activity	Reading	Music	Art and Craft	Swimming
Number of students	9	6	15	30

8. Prepare a circle graph for the given data.

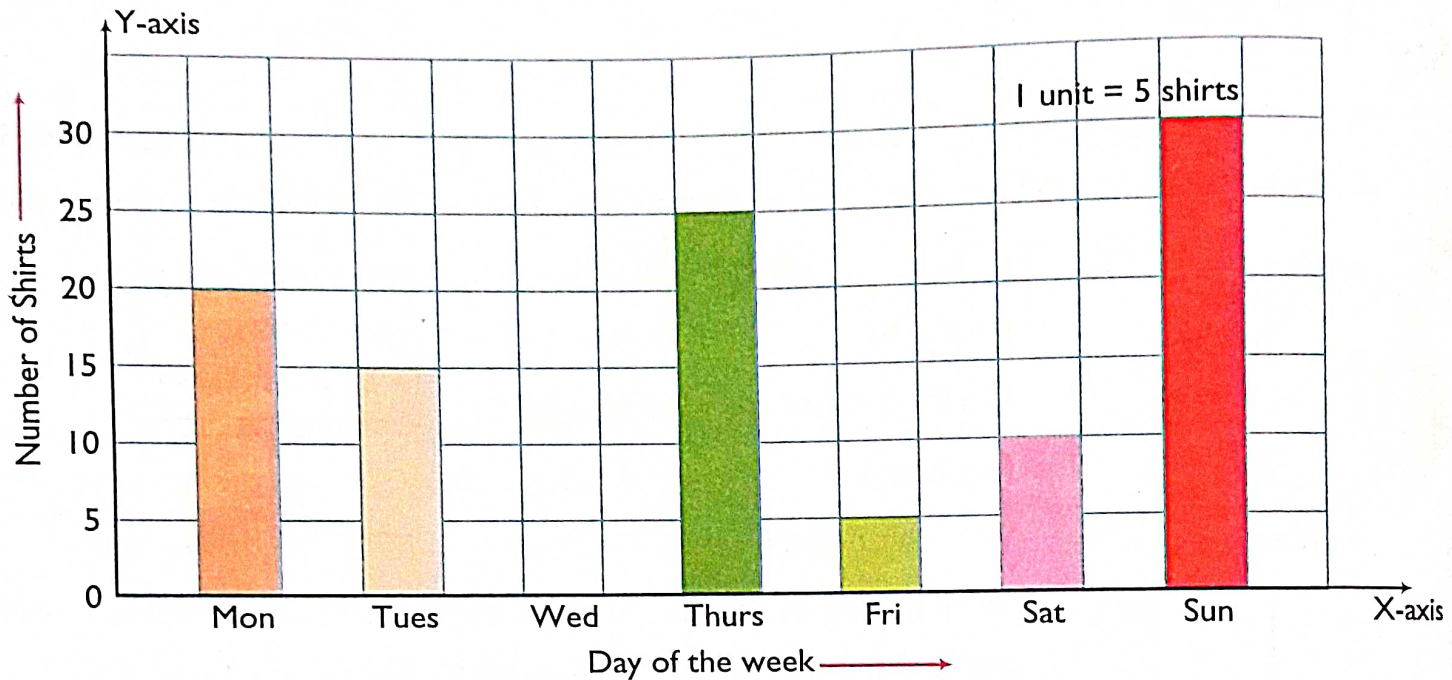
Ice cream flavour	Number of children
Strawberry	10
Mango	25
Chocolate	30
Black Currant	15
Butterscotch	20

## BAR GRAPH

Engagement

A bar graph is an effective way of representing data. The data is represented as rectangular bars of equal widths but different heights with equal space between them. The length of the bars depends on the data represented by them.

**Example 2.** The bar graph represents the number of shirts sold by a shopkeeper in a week.



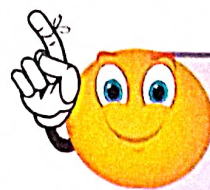
Based on your understanding of the graph, answer these questions.

- On which day was the maximum number of shirts sold?
- On which day was the least number of shirts sold?
- On which day only 10 shirts were sold?
- How many shirts were sold in the entire week?

**Solution.** On reading the graph we can answer the questions.

- The maximum number of shirts were sold on Sunday.
- The least number of shirts were sold on Wednesday.
- On Saturday, only 10 shirts were sold.
- Adding values for the seven days,

$$20 + 15 + 0 + 25 + 5 + 10 + 30 = 105 \text{ shirts}$$



*Keep in Mind*

*It is important to choose an appropriate scale for the graph so that all the values given in the data can be plotted easily.*

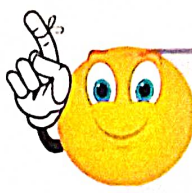
**Example 3.** Prepare a bar graph for the data.

Dry Fruit	Almond	Walnut	Pistachio	Cashew nut
Weight in kg	200	250	150	175

**Solution.** Follow these steps to draw a bar graph for the given data.

**Step 1.** Draw two lines—one vertical and one horizontal. Label the horizontal line as X-axis and the vertical line as Y-axis.

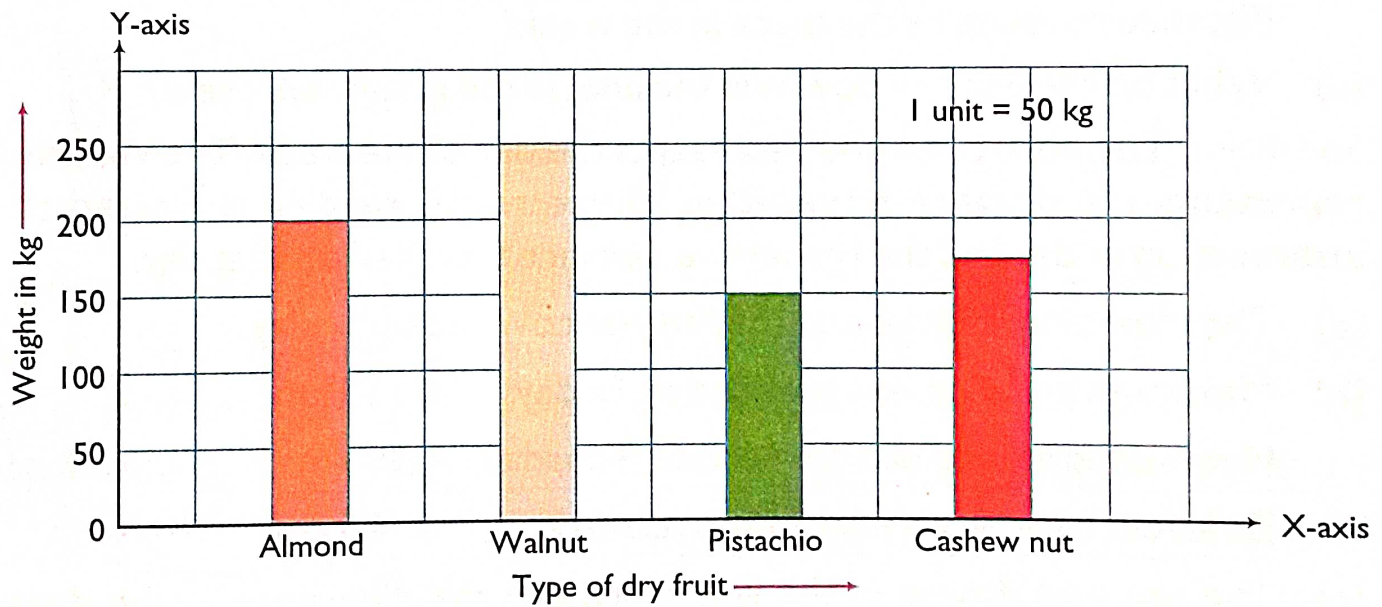
**Step 2.** Along the horizontal line, mark the names of dry fruits and along the vertical line, mark the weights.



*Keep in Mind*  
The value 175 lies halfway between 150 and 200. So, it is marked between the two values on the graph.

**Step 3.** Choose a suitable scale for the vertical line. In this case let, 1 unit = 50 kg.

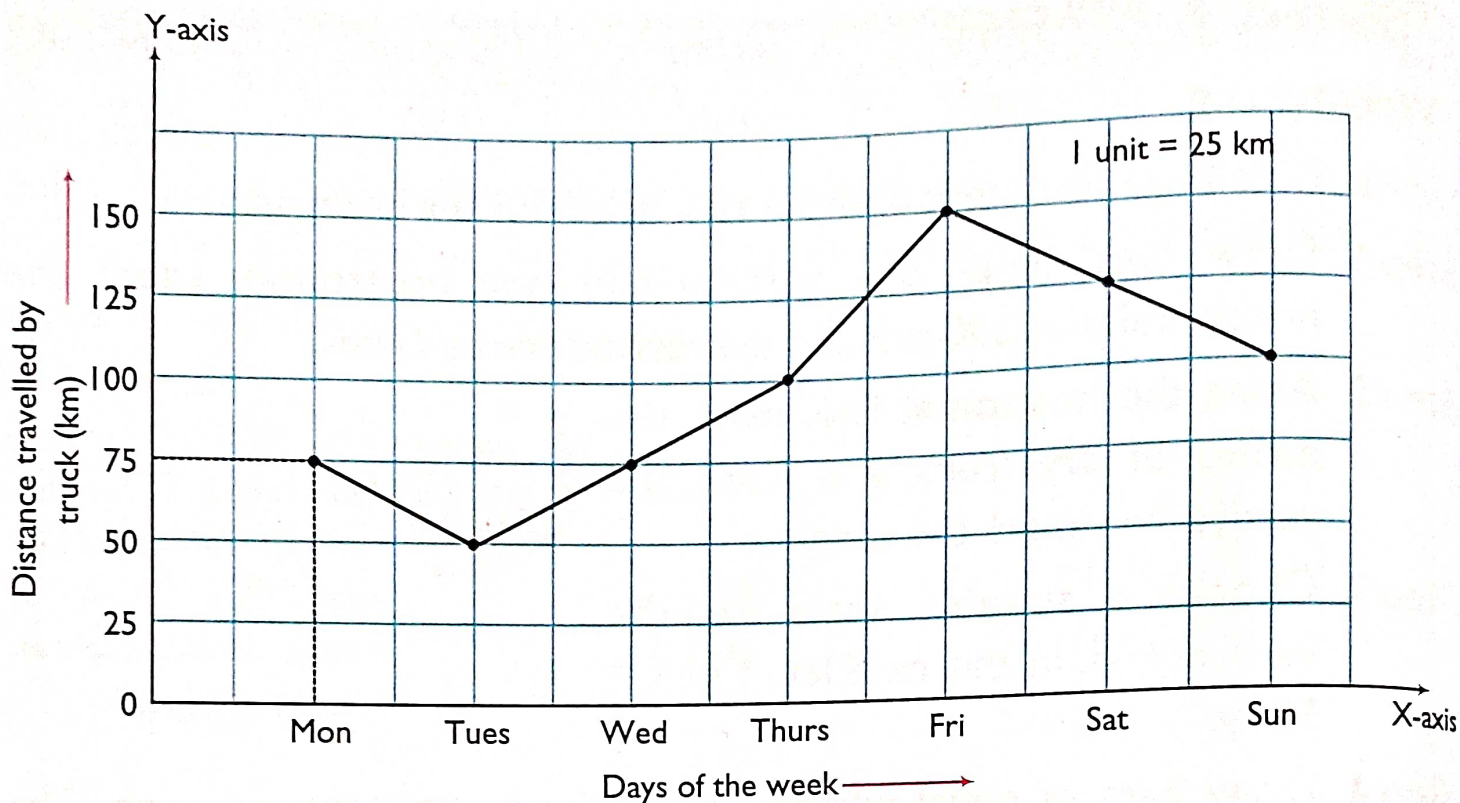
**Step 4.** Draw bars of equal widths with uniform gap between each. The height of the bar should be equal to its corresponding value given in the data.



**LINE GRAPH**

Line graphs are also known as growth charts. They are used to represent the data as points that are joined together to form a line. Generally in line graphs, we tend to study a single variable.

**Example 4.** Read the graph and answer the questions that follow.



- On which day was the maximum distance covered?
- What is the difference between the maximum distance and the minimum distance covered by the truck in the week?
- What do the ups and downs in the line on the graph represent?

**Solution.** The horizontal line represents the day of the week. The vertical line represents the distance travelled in kilometres. A reading is plotted at the intersection of day and the respective distance travelled on that day.

(a) The maximum distance of 150 km was covered on Friday.

(b) Maximum distance was covered on Friday = 150 km

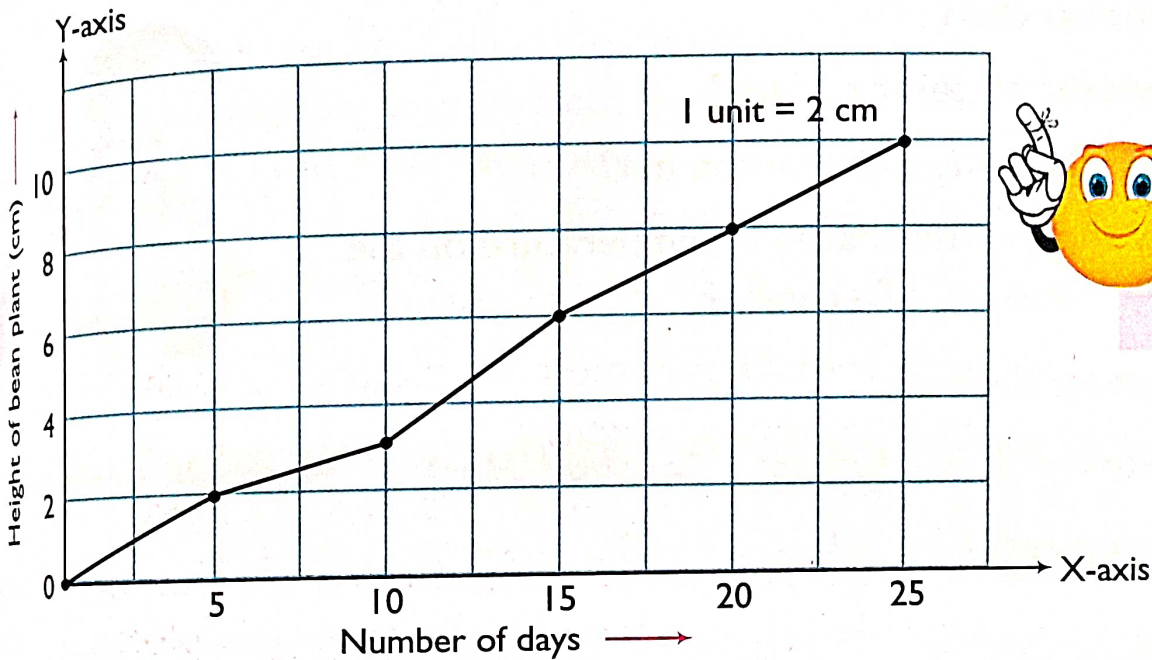
Minimum distance was covered on Tuesday = 50 km

Difference between the distance covered = 100 km

(c) The ups and downs in the line represent the difference in the distance covered by the truck on each day of the week.

**Example 5.** Dr. Shyam recorded the growth of a bean plant for 25 days. Prepare a line graph based on the recorded observations.

Day	Height of plant (cm)
0	0
5	2
10	3
15	6
20	8
25	10



**Keep in Mind**  
In this case the reading starts from 0 for Day 0.

**Solution.** Follow these steps to draw a line graph for the given data.

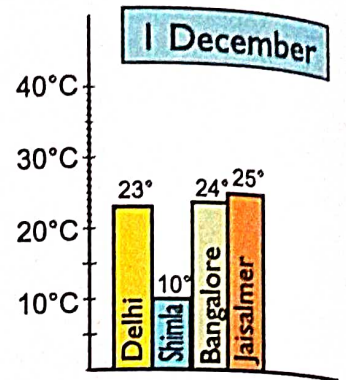
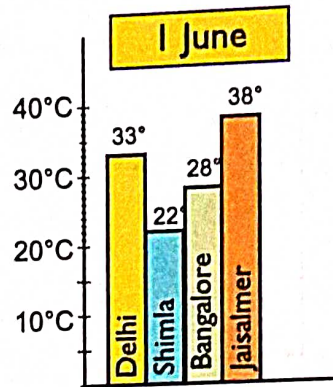
- Step 1.** Draw two lines—one vertical and one horizontal. Mark the horizontal line as X-axis and the vertical line as Y-axis.
- Step 2.** Along the horizontal axis mark the days when height of plant was measured (at equal intervals) and along the vertical axis mark the height of the plant.
- Step 3.** Choose a suitable scale for the vertical line. In this case, 1 unit = 2 cm.
- Step 4.** Plot the respective reading of height of the bean plant and the day when the reading was taken at the intersection of the two on the graph grid. Join the dots to form a line.



## Pleasure TIME

## Mastery

1. Have you seen the weather report on TV or in a newspaper? These are two bar charts. These show the highest temperature (in degrees Celsius) in four cities, on two different days. The cities are Delhi, Shimla, Bangalore and Jaisalmer.



Find out from the bar chart :

- Which city is the hottest on 1 June?
- Which city is the coldest on 1 December?
- Which city shows little change in temperature on the two days — 1 June and 1 December.

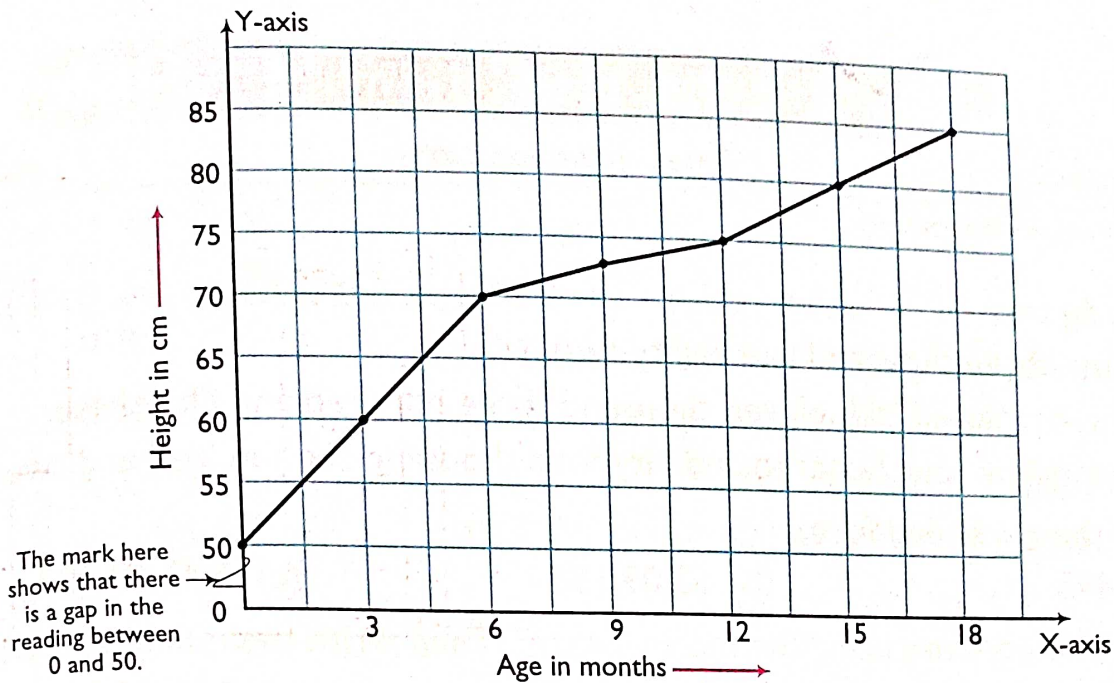


2. Draw a bar graph for the data.

Sport	Cricket	Baseball	Hockey	Football	Basketball
Number of players	11	9	6	11	5

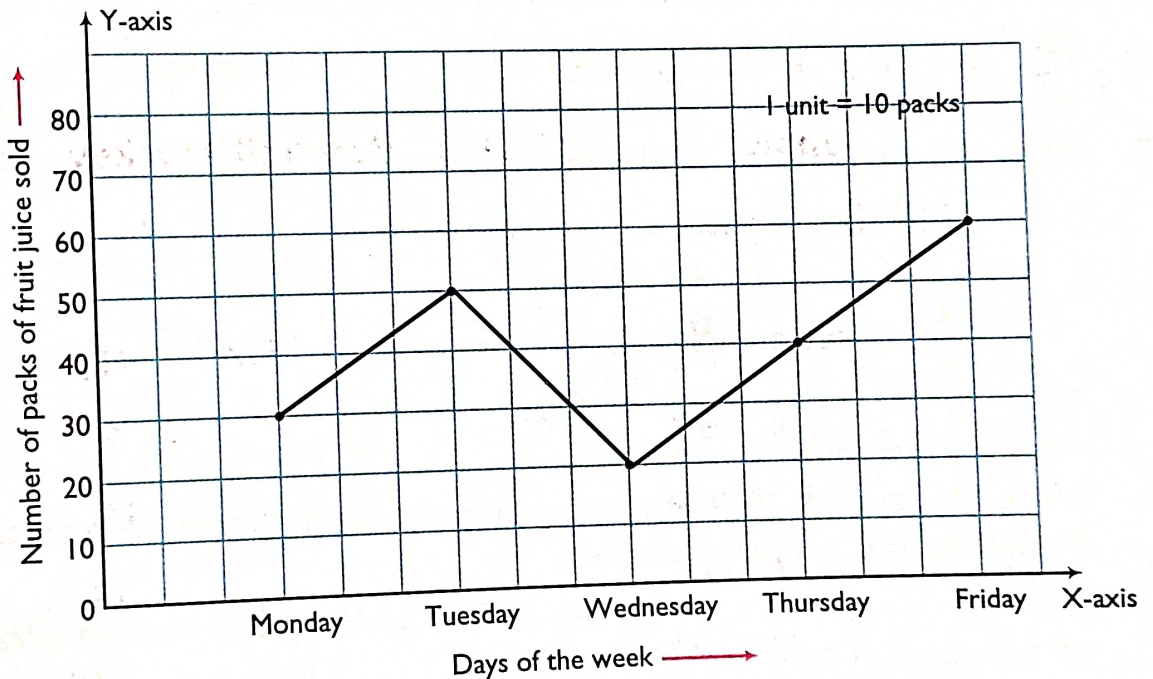
Name of train	Number of passengers
Train A	450
Train B	1500
Train C	750
Train D	1200

3. Arun's doctor kept a record of his height from the day of his birth till he was 18 months old. Read the graph and answer the questions.



- How tall was Arun when he was born?
- How much did he grow from the age of 6 months to 15 months?
- How old was Arun when he was 72.5 cm tall?

Alice recorded the number of packs of fruit juice sold each day in her school canteen for five working days of the week. Analyse the graph and answer the questions.



- How many juice packs were sold on Wednesday?
- How many more juice packs were sold on Friday than on Thursday?
- On which day were the maximum number of juice packs sold?
- How many packs were sold in the entire week?
- If the cost of each pack of fruit juice is ₹20, what is the total amount of money collected at the end of the week?

Time : .....

(Based on chapters 1 to 4)

**Note :** All questions are compulsory.

- Write in figures :
  - Seventy-three thousand and eighty-two.
  - Four crore seven lakh eleven thousand three hundred and fifty-three.
  - Three million four hundred and fifty-four thousand six hundred and twenty-one.
- Write in the expanded form.
  - 7,83,495
  - 63,09,158
  - 5,42,63,207
- Rewrite with commas using the Indian system. Then write the number names.
  - 72345
  - 249318
  - 3546509
- Write in descending order : 253917; 23948721; 100741; 268000
- Write the greatest and the smallest numbers with the given digits :
  - 7, 9, 2, 5, 8 and 1
  - 8, 0, 6, 2, 6, 4 and 3
- Fill in the blanks :
  - The Roman number for 495 is .....
  - The value of  $4, 82, 761 + 3,00,925$  is .....
  - The LCM of 12 and 18 is .....
- Fill in the missing digits in the boxes :
 

	TL	L	TTh	Th	H	T	O
	3	□	1	□	4	3	0
	□	4	9	2	8	1	□
+	4	7	6	8	□	□	1
	9	4	□	8	6	7	0
- Write the smallest digit other than 0 in the blank spaces such that, the given number is divisible by the number indicated.
  - 9326 ..... by 2
  - 334 ..... 40 by 8
  - 3923 ..... by 3
  - 542 ..... 4 by 4
  - 4321 ..... 3 by 3
  - 151 ..... by 5
- Find the HCF of the sets of numbers using the long division method.
  - 60, 84
  - 51, 93
  - 104, 240
  - 228, 180
  - 256, 78
- 36 chair can be kept in a room. How many rooms will be required to keep 36,03 chair?
  - 12 eggs are kept in a tray. 235 such trays are kept in a carton. How many eggs are there in 40 such carton?

Time .....  
 Note: All questions are compulsory.

1. Write the following numbers in words.

(a) 324071

(b) 1745300

(c) 9121524

2. Round to the nearest 10.

(a) 65

(b) 91

(c) 78

(d) 34

(e) 13

(f) 115

(g) 488

(h) 225

(i) 672

(j) 919

3. Simplify the following :

(a)  $4006 + 3087 - 1349 + 1832 =$

(b)  $5678 - 3560 - 1347 + 4888 =$

4. Fill in the missing digits in the boxes :

	C	TL	L	TTh	Th	H	T	O
8	<input type="text"/>	2	<input type="text"/>	0	<input type="text"/>	4	<input type="text"/>	<input type="text"/>
- <input type="text"/>	9	<input type="text"/>	7	8	2	<input type="text"/>	4	6
4	7	5	2	<input type="text"/>	8	4	7	

5. Find the LCM of these sets of numbers by using prime factorisation.

(a) 27, 18

(b) 30, 48

(c) 24, 18

(d) 9, 12, 15

(e) 24, 36, 48

6. Convert the fractions into decimals.

(a)  $11\frac{19}{100}$

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

(c)  $150\frac{456}{1000}$

(d)  $13\frac{47}{100}$

(e)  $\frac{61}{100}$

(f)  $\frac{923}{1000}$

(g)  $4\frac{9}{100}$

(h)  $85\frac{7}{10}$

7. Identify these as like and unlike fractions.

(a)  $\frac{4}{5}, \frac{3}{5}$

(b)  $\frac{6}{8}, \frac{3}{8}, \frac{4}{8}$

(c)  $\frac{5}{9}, \frac{3}{9}, \frac{1}{9}, \frac{7}{9}$

(d)  $\frac{4}{7}, \frac{3}{7}, \frac{5}{8}, \frac{3}{6}$

8. Convert these mixed numbers into improper fractions.

(a)  $4\frac{2}{3}$

(b)  $3\frac{1}{7}$

(c)  $2\frac{1}{10}$

(d)  $1\frac{3}{4}$

(e)  $3\frac{1}{6}$

9. What is

(a)  $\frac{1}{2}$  of ₹ 50?

(b)  $\frac{1}{4}$  of a dozen?

(c)  $\frac{1}{3}$  of one hour (in minutes)?

(d)  $\frac{1}{2}$  of one day (in hours)?

10. Arrange the following in ascending order :

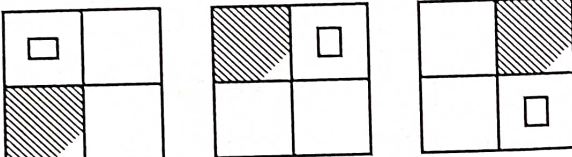
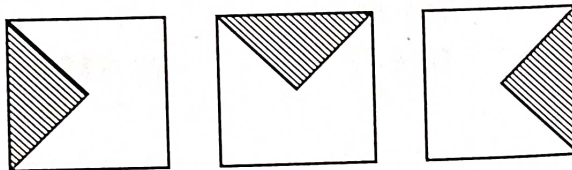
(a)  $\frac{3}{5}, \frac{2}{5}, \frac{1}{5}, \frac{4}{5}$

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

(c)  $\frac{6}{11}, \frac{8}{11}, \frac{7}{11}, \frac{9}{11}$

(d)  $\frac{10}{15}, \frac{12}{15}, \frac{11}{15}, \frac{15}{15}$

11. Complete the patterns.

(a)  .....  
 (b)  .....

12. Fill in the blanks.

- (a) The smallest multiple of 15 is .....
- (b) Every number is a multiple of .....
- (c) The first common multiple of 4 and 7 is .....
- (d) ..... is a multiple of 15 lying between 86 and 100.
- (e) The continued product of three numbers other than 1 is 30, then 30 is a multiple of ..... and .....

13. Solve the following word problems.

- (a) Suraj travels  $\frac{1}{3}$  of an hour by train and  $\frac{1}{3}$  of an hour by bus everyday to work. What fraction of an hour does he take to travel to work every day?
- (b) The fruit salad recipe needs  $\frac{1}{5}$  kg apples and  $\frac{3}{5}$  kg grapes. Which fruit is required greater amount and by how much?
- (c) A packet has 75 sheets of paper. Simran uses  $\frac{3}{5}$  of the sheets. How many sheets has she used?
- (d) Shamu's school is  $6\frac{7}{8}$  km away from his house. Sohan's school is  $5\frac{3}{4}$  km away from his house. Whose school is farther from the school any by how much?
- (e) The different between Kashmir and Kanyakumari is 3582 km and, Gujarat and West Bengal is 2271 km. Convert both the units into dm and find the difference.

All questions are compulsory.

Which is the correct option :

(a)  $CXXIX = 179$

(b)  $XLXXIX = 69$

(c)  $LXXXIX = 71$

Divide the following and check your answer.

(a)  $4368 \div 28$

(b)  $8352 \div 36$

(c)  $138950 \div 12$

(d)  $229607 \div 82$

(e)  $312967 \div 45$

A total of 14190 apples produced in an apple orchard are to be packed in 55 cartons. How many apples will be packed in each carton?

A namkeen mixture contains 250.785 g roasted chana, 225.802 g roasted moong and 300.005 g roasted peanuts. How many grams of roasted cornflakes should be added so that the total weight of the mixture is 1 kg?

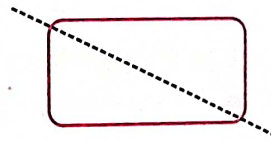
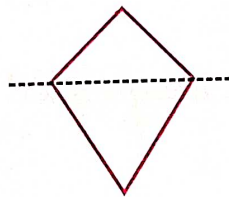
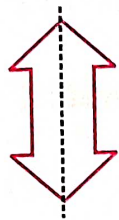
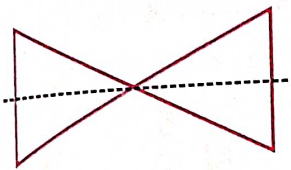
Divide the decimal numbers and check your answer.

(a) 67.2 by 12

(b) 2.89 by 17

(c) 14.49 by 7

Circle the figures that do not represent the correct line of symmetry.



Fill in the blanks :

(a) The line segment AB is written symbolically as .....

(b) A ray has ..... end point(s).

(c) An angle measures  $72^\circ$ . It is a/an ..... angle.

(d) A triangle is called a ..... triangle if no two sides of it are equal.

Draw these angles using a protractor.

(a)  $38^\circ$

(b)  $62^\circ$

(c)  $115^\circ$

(d)  $118^\circ$

(e)  $180^\circ$

Draw and Identify the types of triangles based on the measurement(s) given.

(a)  $\triangle EFG$ ,  $\angle E = 80^\circ$ ,  $\angle F = 60^\circ$ ,  $\angle G = 40^\circ$  (b)  $\triangle RST$ ,  $RS = 3$  cm,  $ST = 5$  cm,  $TR = 4$  cm

1. The Perimeter of a square is 105 m. Find the length of each its of the side.

1. The inner edges of a cubical tank measure 4 m each. What is its capacity? How much water does it hold when it is three fourth full?

2. Find the area of half part of a rectangle having length 4 cm and breadth 3 cm.



Time .....

Marks .....

Note : All questions are compulsory.

- Write the following number names in figures using the International system of numbers.
  - Three hundred thousand four hundred and fifty-five. ....
  - Four million two hundred and sixteen thousand four hundred and four. ....
  - Hundred and six thousand five hundred and eighty. ....
  - Two hundred and sixty million four thousand fifty-nine. ....
- 885 people were expected for the school function. How many chairs should be hired rounded to the nearest 100?
- The HCF and LCM of two numbers are 2 and 234 respectively. If the first number is 26, find the second number.
- What is :
  - $\frac{2}{3}$  of 27?
  - $\frac{2}{5}$  of 20?
  - $\frac{3}{4}$  of 132?
  - $\frac{5}{8}$  of 384?
- Convert these improper fractions in to mixed numbers.
  - $\frac{7}{2}$
  - $\frac{8}{3}$
  - $\frac{8}{5}$
  - $\frac{17}{4}$
  - $\frac{7}{3}$
  - $\frac{12}{5}$
  - $\frac{5}{3}$
  - $\frac{15}{6}$
- Arrange in descending order.
  - 0.6, 0.06, 6.06, 6.006, 0.006
  - 7.21, 7.201, 7.021, 7.002, 7.220
- Arrange in ascending order.
  - 23.46, 43.92, 23.06, 38.97, 46.528
  - 9.812, 9.64, 8.002, 9.644, 8.702
- During a bus journey, the driver covered a distance of 68.75 km in the first hour, 80.63 km in the second hour and 53.952 km in the third hour. What was the total distance covered by the bus in three hours?
- The weight of one cement bag is 50.75 kg. What will be the weight of 15 such bags?
- Complete the table.

	Length	Breadth	Height	Volume
(a)	3 m	8 m	7 m	
(b)	6 cm	4 cm		120 cu. cm
(c)	14 cm		8 cm	448 cu. cm
(d)		11 mm	10 mm	1210 cu. cm



11. Write in metres :
- (a) 3 metre 45 centimetre      (b) 99 centimetre      (c) 1 metre and 5 centimetre
12. A metallic wire of length 53.25 m is cut into 15 equal pieces. What is the length of each piece?
13. Find the perimeter of a rectangular park which is 300 m long and 450 m broad.
14. Arbaz plans to tile his kitchen floor with green square tiles. Each side of the tile is 10 cm. His kitchen is 220 cm in length and 180 cm wide. How many tiles will he need?
15. A train leaves Delhi at 3:45 am and reaches Dehradun in 8 hours 10 minutes. At what time does it reach Dehradun?
16. Deepak bought a calculator for ₹175 and sold it to Manav for ₹210. Find his profit or loss.
17. Mellisa sold a refrigerator for ₹6700 and lost ₹400. Find the cost price of the refrigerator.
18. Surbhi own a jewellery shop. She sells a pair of earring for ₹ 58,500 which actually costed her ₹62,000. Find her loss or gain percent.
19. A newborn baby was vaccinated on May 16. His next vaccination is due after 32 days. On which date will he be vaccinated next.
20. Complete the table below :

	Cost Price	Selling Price	Profit	Loss
(a)	₹ 480		₹ 38	
(b)	₹ 6800	₹ 4880		
(c)		₹ 13450		₹ 2200
(d)	₹ 6880		₹ 1225	

21. Prepare a circle graph for the given data.

Ice cream flavour	Number of children
Strawberry	10
Mango	25
Chocolate	30
Butterscotch	20

22. The temperature recorded for seven days in a city is given below. Represent information using a bar graph.

Day	Mon	Tues	Wed	Thur	Fri	Sat	Sun
Temperature	34° C	32° C	33° C	31° C	32° C	35° C	34° C



# ANSWERSHEET

## I. LARGE NUMBERS

### Progress Check-up-1

1. (a) Three lakh twenty four thousand and seventy-one. (b) Seventeen lakh forty five thousand three hundred; 2. (a) 46,22,347 (b) 6,04,500 (c) 9,56,14,803 (d) 70,33,072 (e) 2,93,00,000; 3. (a)  $300000 + 20000 + 4000 + 700 + 60 + 3$  (b)  $1000000 + 400000 + 50000 + 6000 + 600 + 4$  (c)  $2000000 + 300000 + 90000 + 9000 + 800 + 90$  (d)  $1000000 + 700000 + 50000 + 4000 + 600 + 50$  (e)  $10000000 + 700000 + 70000 + 6000 + 200 + 40 + 9$ ; 4. (a) 204345 (b) 87923969 (c) 9664373 (d) 4842271 (e) 304500386.

### Progress Check-up-2

1. (a) Four million nine hundred and twenty three thousand four hundred and fifty (b) Fifty thousand two hundred; 2. (a) 300,455 (b) 4,216,404 (c) 106,580 (d) 90,624,777 (e) 260,004,059; 3. (a) 6, six (b) 600000 six hundred thousand (c) 6000000, six million (d) 600000000, six hundred million (e) 60 six tens.

### Progress Check-up-3

1. (a) 1 (b) 7 (c) 4 (d) 6; 2. (a)  $54321 > 5342$  (b)  $36872 = 36872$  (c)  $86789 > 85469$  (d)  $77452 < 79364$  (e)  $93426 > 92138$  (f)  $62034 < 65139$ ; 3. (a) Ascending order : 2326, 23476, 56405, 492310, 8943722, 13645980 Descending order : 13645980, 8943722, 492310, 56405, 23476, 2326 (b) Ascending order : 1321324, 3131338, 4592670, 8946786, 23914027, 143256489 Descending order : 143256489, 23914027, 8946786, 4592670, 3131338, 1321324 (c) Ascending order : 200008, 494321, 934994, 6266786, 8145647, 9241432 Descending order : 9241432, 8145647, 6266786, 934994, 494321, 200008; 4. (a) 384573 (b) 290601 (c) 55673211 (d) 34940000; 5. (a) 49250 (b) 32476889 (c) 18025343 (d) 3943757; 6. (a) 456244 (b) 8673420 (c) 42325223 (d) 3952118; 7. (a) 29315, 29317 (b) 340499, 340501 (c) 4954654, 4954656, (d) 11880899, 11880901.

### Progress Check-up-4

1. (a) X (b) X (c) ✓ (d) X (e) ✓; 2. (a) 70 (b) 90 (c) 80 (d) 120 (e) 490 (f) 230; 3. (a) 400 (b) 700 (c) 300 (d) 200 (e) 800 (f) 500; 4. The greatest number = 98742; The smallest number = 24789; 5. 368; 6. 90 diyas; 7. 290 children; 8. 900; 9. The number rounded is 50 but in this case he should round the number up and he should take 60 sweets; 10. 27532

## 2. ROMAN NUMERALS

### Progress Check-up

1. (a) XXIV (b) LXXVIII (c) XCVI (d) CXLVI (e) CCCXXVIII (f) CDXLVII (g) DCLXVI (h) CMLXXIX (i) CMXCIX  
2. (a) 46 (b) 94 (c) 129 (d) 215 (e) 466 (f) 329 (g) 654 (h) 716 (i) 974  
3. (a) XXXVIII (b) XLVI (c) L (d) CLX (e) XLIX (f) XLXVII  
4. (a) XLV (b) XXXV (c) L (d) CC (e) VII (f) X

## 3. OPERATION ON LARGE NUMBERS

### Progress Check-up-1

1. (a) 8840260 (b) 12210115 (c) 4993915 (d) 9063519 (e) 12353597 (f) 15591038 2. (a) 911438 (b) 45758 (c) 7963775 (d) 28644075  
3. (a) 
$$\begin{array}{r} 5658742 \\ + 3842975 \\ \hline 9501717 \end{array}$$
 (b) 
$$\begin{array}{r} 6528094 \\ + 1864987 \\ \hline 8393081 \end{array}$$
 (c) 
$$\begin{array}{r} 23456789 \\ + 45678932 \\ \hline 69135721 \end{array}$$
  
4. (a) 93327 (b) 156329 (c) 0 (d) 90999

### Progress Check-up-2

1. (a) 3788854 (b) 4635918 (c) 2799897 (d) 35892452 (e) 35074422 (f) 73093140 2. (a) 38870 (b) 1321892 (c) 5875367 (d) 446137  
3. (a) 
$$\begin{array}{r} 182465 \\ - 91231 \\ \hline 91234 \end{array}$$
 (b) 
$$\begin{array}{r} 7386074 \\ - 5130657 \\ \hline 2255417 \end{array}$$
 (c) 
$$\begin{array}{r} 97256321 \\ - 3410320 \\ \hline 63752526 \end{array}$$
  
4. (a) 37895 (b) 36559 (c) 200001 (d) 22430851 5. (a) 4192332 (b) 33609 (d) 54244

### Progress Check-up-3

1. 2,22,85,243 gallons 2. ₹ 82,05,032 3. 1,58,05,985 bikes  
4. ₹ 2,61,94,340 5. 20,68,43,987; 1,58,24,168 6. 4,62,91,292  
7. 2,07,74,312 8. 78, 19,731

### Progress Check-up-4

1. (a) 2,15,066 (b) 6,99,380, (c) 1,75,665 (d) 63,07,782 2. (a) 90,034 (b) 83,475 (c) 3,97,656 (d) 5,77,135 (e) 1,95,910 (f) 1,20,652  
3. (a) 1 (b) 0 (c) 1185 (d) 121 (e) 119; 17 4. (a) 63230 (b) 27990 (c) 421500 (d) 361200 (e) 2560000 (f) 4795000 5. (a) 6,100 (b) 67,500 (c) 15,05,5000 (d) 4,86,000 (e) 55,600 (f) 1,96,140

### Progress Check-up-5

1. (a) Q = 876, R = 55 (b) Q = 51,721, R = 74 (c) Q = 1,734, R = 129 (d) Q = 9,415, R = 122 (e) Q = 2,529, R = 3 (f) Q = 2,93,520, R = 4  
2. (a) Q = 136, R = 25 (b) Q = 10,789, R = 4 (c) Q = 1,778, R = 10 (d) Q = 10,743, R = 74 (e) Q = 1,623, R = 115 (f) Q = 4,240, R = 38 (g) Q = 1,697, R = 9 (h) Q = 2,069, R = 62 (i) Q = 1,309, R = 3150  
3. (a) 588290 (b) 3241396  
4. (a) 42,817 (b) 0 (c) 12,000 (d) 1 (e) undefined  
5.

Numbers	Divided by 10		Divided by 100		Divided by 1,000		Divided by 10,000	
	Q	R	Q	R	Q	R	Q	R
(a) 30,488	3048	8	304	88	30	488	3	488
(b) 42,825	4282	5	428	25	42	825	4	2825
(c) 57,199	5719	9	571	99	57	199	5	7199
(d) 30,528	3052	8	305	28	30	528	3	528
(e) 6,31,083	63108	3	6310	83	631	083	63	1083

### Progress Check-up-6

1. 12,47,825 kg 2. 7,82,285 toys 3. 80,600 bulbs 4. 7,10,400 letters  
5. 6,354 orchards 6. 8,975 litres 7. 38 caps; ₹ 30 8. 42,391

### Progress Check-up-7

- (a) 3 (b) undefined (c) 2 (d) 91,506 (e) 647 (f) 7544 (g) 92,919 (h) 4

## 4. MULTIPLES AND FACTORS

### Progress Check-up-1

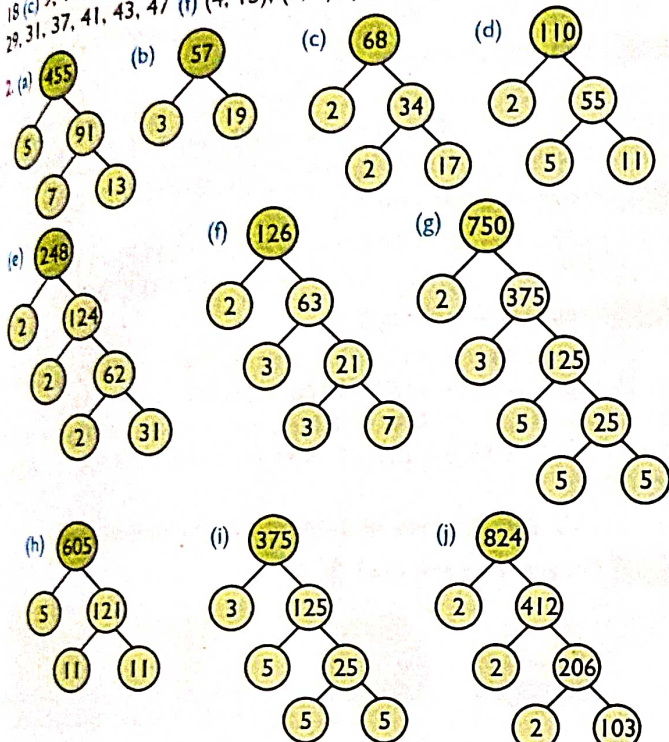
1. (a) 1 (b) 90 (c) 28 (d) 2, 3 and 5 (e) 15 (f) 2 (g) 1, 2, 3, 4, 6 and 12 (h) 7 and 13 (i) itself (j) even. 2. (a) 1, 3, 5, 15 (b) 1, 3, 5, 15, 25, 75 (c) 1, 2, 4, 8, 11, 22, 44, 88 (d) 1, 3, 11, 33 (e) 1, 2, 4, 5, 8, 10, 20, 40 (f) 1, 3, 17, 51 (g) 1, 2, 3, 4, 6, 8, 9, 18, 24, 36, 72 (h) 1, 2, 3, 4, 6, 8, 12, 16, 24, 32, 48, 96 (i) 1, 2, 3, 6, 11, 22, 33, 66 (j) 1, 2, 4, 7, 8, 14, 28, 56 3. (a) 4, 8, 12, 16, 20 (b) 10, 12, 14, 16, 18, 20, 22, 24, 26 (c) 70 (d) 3, 9, 15, 21, 27 (e) 35, 42, 49, 56, 63, 70, 77 (f) 1, 2, 3, 4, 6, 9, 10, 18, 36 (g) 12, 24 (h) 12, 24, 36, 48 (i) 60 (j) 30, 60



90, 120, 150; 4. (a) 1 (b) 1 (c) 4 (d) 4 (e) 6 (f) 1 (g) 16 (h) 1 (i) 3; 5. (b) 2, 10, 11 (c) 4, 8, 11 (d) 5, 11 (e) 8, 9, 10 (f) 4, 8; 6. (a) 892, 956, 70, 178, 396 (b) 962, 61, 189, 543, 21, 439, 17, 239, 34 (c) 1968, 4508, 1464, 8900, 6136 (d) 1375, 38150, 894505, 41200 (e) 89364, 35436, 70044, 4266 (f) 40560, 61256, 834648, 2935216, 1296 (g) 31455, 600003, 70479, 53910 (h) 2154625, 194359, 414623; 7. (a) 1 (b) 2 (c) 2 (d) 2 (e) 8 (f) 5

**Progress Check-up-2**

1. (a) 2, 3, 5, 7, 11, 13, 17, 19, 23, 29 (b) 4, 6, 8, 9, 10, 12, 14, 15, 16, 18 (c) 9, 15, 21, 25, 27 (d) 4, 6, 8, 10, 12 (e) 2, 3, 5, 7, 11, 13, 17, 19, 23, 29, 31, 37, 41, 43, 47 (f) (4, 15), (3, 5), (7, 24), (8, 25);



3. (a)  $216 = 2 \times 2 \times 2 \times 3 \times 3 \times 3$  (b)  $435 = 3 \times 5 \times 29$  (c)  $820 = 2 \times 2 \times 5 \times 41$  (d)  $175 = 5 \times 5 \times 7$  (e)  $324 = 2 \times 2 \times 3 \times 3 \times 3 \times 3$  (f)  $92 = 2 \times 2 \times 23$  (g)  $576 = 2 \times 2 \times 2 \times 2 \times 2 \times 3 \times 3$  (h)  $99 = 3 \times 3 \times 11$  (i)  $729 = 3 \times 3 \times 3 \times 3 \times 3 \times 3$  (j)  $500 = 2 \times 2 \times 5 \times 5 \times 5$  4. (a), (c), (i), (k), (l), (n) and (o); 5. (a) (iii), (b) (i), (c) (v), (d) (ii), (e) (iv).

**Progress Check-up-3**

Number	Multiples	Common Multiples	LCM
(a) 6	6, 12, 18, 24, 30, 36, 42, 48, 54, 60, 66, 72, 78, 84, ...	42, 84	42
14	14, 28, 42, 56, 70, 84, ...		
(b) 3	3, 6, 9, 12, 15, 18, 21, 24, 27, 30, 33, 36, 39, 42, 45, 48, ...	24, 48	24
8	8, 16, 24, 32, 40, 48, ...		
(c) 25	25, 50, 75, 100, 125, 150, 175, 200, 225, 250, 275, 300, 325, ...	225, 450	225
45	45, 90, 135, 180, 225, 270, 315, 360, 405, 450, ...		
(d) 10	10, 20, 30, 40, 50, 60, 70, 80, 90, ...	30, 60, 90	30
15	15, 30, 45, 60, 75, 90, ...		
(e) 12	12, 24, 36, 48, 60, 72, 84, 96, 108, ...	36, 72, 108	36
18	18, 36, 54, 72, 90, 108, ...		

2. (a) 54 (b) 240 (c) 72 (d) 816 (e) 180 (f) 1584; 3. (a) 273 (b) 1056 (c) 1080 (d) 600 (e) 660 (f) 288 (g) 3741 (h) 440 (i) 1053.

**Progress Check-up-4**

Number	Factors	Common Factors	HCF
18 24	1, 2, 3, 6, 9, 18 1, 2, 3, 4, 6, 8, 12, 24	1, 2, 3, 6	6
12 15	1, 2, 3, 4, 6, 12 1, 3, 5, 15	1, 3	3
48 72	1, 2, 3, 4, 6, 8, 12, 24, 48 1, 2, 3, 4, 6, 8, 12, 18, 24, 36, 72	1, 2, 3, 4, 6, 8, 12, 24	24
21 39	1, 3, 7, 21 1, 3, 13, 39	1, 3	3
54 96	1, 2, 3, 6, 9, 27, 54 1, 2, 3, 4, 6, 8, 12, 16, 24, 32, 48, 96	1, 2, 3, 6	6

2. (a) 16 (b) 8 (c) 5 (d) 125 (e) 2 (f) 22; 3. (a) 12 (b) 3 (c) 8 (d) 12 (e) 17 (f) 2; 4. 4.

**Progress Check-up-5**

1. 18; 2. 9408; 3. 19344; 4. 18; 5. 36 flowers; 6. 30 feet; 7. Manoj can buy tiles of 1 foot × 1 foot or 3 feet × 3 feet. These tiles can be laid without cutting.

**5. FRACTIONS**

**Progress Check-up-1**

1. (a)  $\frac{1}{2}$  of a cup or half a cup (b)  $\frac{1}{5}$  of a metre (c)  $\frac{3}{4}$  of a kilogram (d)  $\frac{1}{4}$  of a rupee; 2. (a)  $\frac{4}{9}$  (b)  $\frac{3}{9}$  (c)  $\frac{2}{9}$  (d)  $\frac{5}{9}$  (e)  $\frac{6}{9}$  (f)  $\frac{7}{9}$ ; 3. (a) ₹ 25 (b) 3 (c) 20 minutes (d) 12 hours (e) 3 months;

**Progress Check-up-2**

1. (i) 2 (ii) 4, 4, 2 (iii) divided into six equal parts. Out of 6 equal parts three parts are coloured blue (iv) divided into eight equal parts. Out of 8 equal parts four parts are coloured blue. So, we can say that  $\frac{1}{2} = \frac{2}{4} = \frac{3}{6} = \frac{4}{8}$ ;

2.  $\frac{1}{2} = \frac{2}{4} = \frac{4}{8} = \frac{8}{16}$ ; 3. Do yourself; 4. (a)  $\frac{2}{4} = \frac{4}{8}$  (b)  $\frac{1}{2} = \frac{2}{4}$  (c)  $\frac{1}{4} = \frac{2}{8}$  (d)  $\frac{4}{10} = \frac{2}{5}$  (e)  $\frac{2}{3} = \frac{4}{6}$  (f)  $\frac{2}{8} = \frac{1}{4}$ ; 5.  $\frac{1}{3} = \frac{2}{6} = \frac{4}{12}$ ; 6. (a)  $\frac{3}{4}$  (b)  $\frac{2}{3}$  (c)  $\frac{6}{9}$ ;

**Progress Check-up-3**

1. (a) Like fractions = (a), (b), (e) Unlike fractions = (c), (d), (f);  
 2. (a)  $\frac{2}{7} < \frac{3}{7}$  (b)  $\frac{2}{3} > \frac{1}{3}$  (c)  $\frac{4}{9} < \frac{7}{9}$  (d)  $\frac{5}{6} > \frac{1}{6}$ ; 3. (a)  $\frac{3}{7} < \frac{6}{7}$  (b)  $\frac{7}{9} > \frac{4}{9}$  (c)  $\frac{2}{4} < \frac{3}{4}$  (d)  $\frac{8}{13} > \frac{2}{13}$  (e)  $\frac{5}{7} > \frac{2}{7}$  (f)  $\frac{5}{6} > \frac{4}{6}$  (g)  $\frac{1}{3} < \frac{2}{3}$  (h)  $\frac{6}{11} > \frac{2}{11}$  (i)  $\frac{5}{11} < \frac{7}{11}$  (j)  $\frac{1}{5} < \frac{2}{5}$  (k)  $\frac{3}{7} < \frac{4}{7}$  (l)  $\frac{7}{10} < \frac{8}{10}$ ; 4. (a)  $\frac{2}{9} < \frac{3}{9} < \frac{4}{9}$  (b)  $\frac{1}{5} < \frac{2}{5} < \frac{3}{5} < \frac{4}{5}$  (c)  $\frac{6}{11} < \frac{7}{11} < \frac{8}{11} < \frac{9}{11}$  (d)  $\frac{2}{7} < \frac{3}{7} < \frac{4}{7} < \frac{6}{7}$  (e)  $\frac{10}{15} < \frac{11}{15} < \frac{12}{15} < \frac{15}{15}$  (f)  $\frac{5}{10} < \frac{6}{10} < \frac{8}{10} < \frac{9}{10}$ ; 5. (a)  $\frac{8}{8} > \frac{5}{8} > \frac{4}{8} > \frac{1}{8}$  (b)  $\frac{4}{4} > \frac{3}{4} > \frac{2}{4} > \frac{1}{4}$  (c)  $\frac{9}{12} > \frac{8}{12} > \frac{7}{12} > \frac{3}{12}$  (d)  $\frac{14}{17} > \frac{12}{17} > \frac{10}{17} > \frac{9}{17}$  (e)  $\frac{16}{20} > \frac{14}{20} > \frac{11}{20} > \frac{2}{20}$  (f)  $\frac{19}{19} > \frac{17}{19} > \frac{16}{19} > \frac{9}{19}$

**Progress Check-up-4**

1. (a)  $\frac{8}{12}$  or  $\frac{2}{3}$  hours (b)  $\frac{5}{7}$  week; 2. (b)  $\frac{2}{5} + \frac{1}{5} = \frac{3}{5}$  (c)  $\frac{6}{15} + \frac{5}{15} = \frac{11}{15}$   
 (d)  $\frac{6}{16} + \frac{4}{16} = \frac{10}{16}$ ; 3. (a)  $\frac{5}{6}$  (b)  $\frac{4}{8}$  or  $\frac{1}{2}$  (c)  $\frac{2}{4}$  or  $\frac{1}{2}$  (d)  $\frac{6}{7}$  (e)  $\frac{10}{10}$  or 1 (f)  $\frac{1}{5}$  (g)  $\frac{3}{4}$   
 (h)  $\frac{5}{9}$  (i)  $\frac{7}{8}$  (j)  $\frac{2}{5}$  (k)  $\frac{7}{8}$  (l)  $\frac{8}{9}$ ; 4.  $\frac{2}{3}$  hour; 5.  $\frac{7}{8}$  part; 6.  $\frac{7}{10}$  metre.

**Progress Check-up-5**

1. (a)  $\frac{2}{10}$  m (b)  $\frac{2}{4}$  l or  $\frac{1}{2}$  l; 2. (b)  $\frac{8}{12} - \frac{4}{12} = \frac{4}{12}$  or  $\frac{1}{3}$ ; 3. (a)  $\frac{6}{9}$  or  $\frac{2}{3}$  (b)  $\frac{2}{9}$  (c)  $\frac{5}{8}$   
 (d)  $\frac{1}{4}$  (e)  $\frac{4}{6}$  or  $\frac{2}{3}$  (f)  $\frac{3}{7}$  (g) 0 (h)  $\frac{1}{6}$  (i)  $\frac{1}{8}$  (j)  $\frac{1}{8}$  (k)  $\frac{3}{5}$  (l)  $\frac{5}{10}$  or  $\frac{1}{2}$ ; 4. Sunder  
 drank more by  $\frac{1}{11}$  part; 5. He drank  $\frac{2}{6}$  or  $\frac{1}{3}$  part more in the morning;  
 6. Grapes by  $\frac{2}{5}$  kg.

**Progress Check-up-6**

1. (a) 18 (b) 8 (c) 40 (d) 24 (e) 24 (f) 14 (g) 99 (h) 240; 2. (a) 16 hours  
 (b) 35 minutes (c) 10 (d) 500 grams (e) 24 minutes (f) 2 days; 3. 400  
 seats; 4. 45 sheets; 5. 6 votes; 6. 29.

**Progress Check-up-7**

1. (a)  $1\frac{3}{4}$  pizzas (b)  $3\frac{1}{2}$  biscuits 2. (b)  $\frac{9}{4}$ ,  $2\frac{1}{4}$  (c)  $\frac{5}{3}$ ,  $1\frac{2}{3}$ ; 3. (a)  $3\frac{1}{2}$  (b)  $2\frac{2}{3}$   
 (c)  $1\frac{3}{5}$  (d)  $1\frac{3}{4}$  (e)  $2\frac{1}{3}$  (f)  $2\frac{2}{5}$  (g)  $2\frac{1}{2}$  (h)  $2\frac{3}{6}$  or  $2\frac{1}{2}$ ; 4. (a) 2 (b) 4 (c) 3 (d) 1  
 (e) 3 (f) 4 (g) 3 (h) 6; 5. (a)  $\frac{14}{3}$  (b)  $\frac{22}{7}$  (c)  $\frac{21}{10}$  (d)  $\frac{7}{4}$  (e)  $\frac{63}{10}$  (f)  $\frac{35}{8}$  (g)  $\frac{19}{6}$   
 (h)  $\frac{41}{7}$ ; 6.  $2\frac{1}{2}$  km; 7. She might have got either of (a) One 50-paise coin  
 and eight 25-paise coins (b) Two 50-paise coins and six 25-paise coins  
 (c) Three 50-paise coins and four 25-paise coins (d) Four 50-paise coins  
 and two 25-paise coins;

**6. DECIMAL FRACTIONS**

**Progress Check-up-1**

1. (a)  $\frac{7}{10}$  (b)  $\frac{9}{10}$  (c)  $\frac{8}{100}$  (d)  $\frac{3}{100}$  (e)  $\frac{5}{100}$  (f)  $\frac{1}{10}$  (g)  $\frac{26}{100}$  (h)  $\frac{99}{100}$  (i)  $\frac{215}{100}$  (j)  $\frac{301}{100}$   
 (k)  $\frac{592}{100}$  (l)  $\frac{863}{100}$  (m)  $\frac{903}{10}$  (n)  $\frac{8475}{100}$  (o)  $\frac{9487}{100}$  2. (a) 0.2 (b) 0.4 (c) 0.7  
 (d) 1.1 (e) 5.4 (f) 0.05 (g) 0.07 (h) 0.17 (i) 0.23 (j) 0.01 (k) 0.58 (l) 0.99  
 (m) 1.95 (n) 1.99 (o) 7.38

**Progress Check-up-2**

1.

Place	Th	H	T	O	Decimal Point	T	H	Th
(a)				0	.	0	7	
(b)			3	4	.	1	8	
(c)			5	7	.	0	2	
(d)				2	.	7	5	3
(e)				9	.	2	5	6
(f)		9	4	6	.	2		
(g)	3	8	4	6	.	9		
(h)	1	0	5	7	.	1	8	

2. (a)  $50 + 3 + \frac{4}{10} + \frac{8}{100} + \frac{9}{1000}$  (b)  $100 + 0 + 9 + \frac{8}{10} + \frac{7}{100} + \frac{2}{1000}$   
 (c)  $300 + 40 + 8 + \frac{6}{10} + \frac{1}{100}$  (d)  $90 + 4 + \frac{3}{10} + \frac{6}{100} + \frac{7}{1000}$   
 (e)  $700 + 50 + 2 + \frac{6}{10} + \frac{9}{100}$  (f)  $80 + 9 + \frac{3}{10} + \frac{5}{100} + 0$   
 (g)  $5 + \frac{3}{10} + \frac{4}{100} + \frac{9}{1000}$  (h)  $200 + 0 + 9 + \frac{1}{10} + 0 + \frac{3}{100}$   
 3. (a) 0.05 (b) 0.00 (c) 9 (d) 0.6 (e) 0.002 (f) 0.009  
 4. (a) 3.54 (b) 63.73 (c) 500.609 (d) 241.57 5. (a) and (b)  
 6. (a) 0.870, 2.574, 6.300, 105.730 (b) 6.500, 2.800, 12.530, 17.437  
 (c) 125.652, 7.400, 0.060, 15.089 (d) 125.510, 246.800, 19.001, 0.250

**Progress Check-up-3**

1. (a)  $>$  (b)  $<$  (c)  $>$  (d)  $<$  (e)  $<$  (f)  $>$  2. (a)  $11.001 < 11.1 < 11.21$  (b)  $0.382 < 0.42 < 0.5$  (c)  $20.3 < 23.25 < 30.2$  3. (a)  $11.526 > 11.42 > 10.4$  (b)  $9.9 > 9.82 > 9.795$  (c)  $8.9 > 8.86 > 8.094$

**Progress Check-up-4**

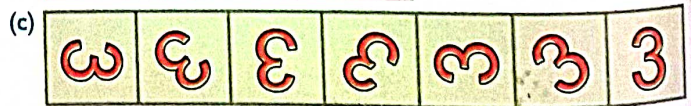
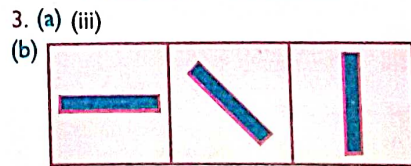
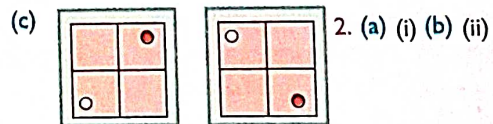
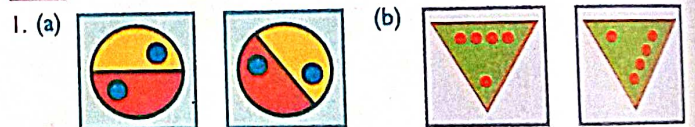
1. (a) 15.07 (b) 24.22 (c) 28.82 (d) 44.757 (e) 75.73 (f) 49.496  
 2. (a) 14.87 (b) 23.03 (c) 25.15 (d) 38.613 (e) 20.25 (f) 26.445

**Progress Check-up-5**

1. (a) 28.8 (b) 86.1 (c) 93.24 (d) 137.88 (e) 2.492 (f) 8.832 (g) 704.08  
 (h) 77.136 2. (a) 2.8 (b) 14.9 (c) 34.08 (d) 28.57 (e) 7.36 (f) 31.8 (g) 3.214  
 (h) 4.02 3. (a) 4.5 (b) 504 (c) 880 (d) 0.7 (e) 0.1 (f) 380 (g) 1 (h) 75  
 4. (a) 0.06 (b) 0.58 (c) 2.75 (d) 9.34 (e) 0.005 (f) 0.008 (g) 0.0219  
 (h) 0.0473

**7. PATTERNS IS SHAPES AND NUMBERS**

**Progress Check-up-1**



4. (a) (ii) (b) (ii) Rule for (a) turning by  $45^\circ$  each time, (b) turning by  $180^\circ$  each time, 5. (a) sixth picture from the left (b) sixth picture from the left  
 (c) second picture from the left (d) fourth picture from the left.

**Progress Check-up-2**

1. Magic Squares

(a) 

10	3	8
5	7	9
6	11	4

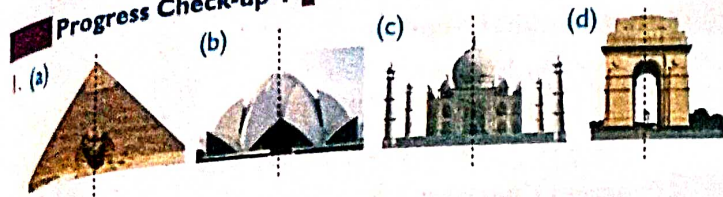
 (b) 

13	6	11
8	10	12
9	14	7

2. (b)  $34 + 26 + 10 = 26 + 10 + 34$  (c)  $400 + 300 + 600 = 300 + 400 + 600$   
 (d)  $600 + 145 + 120 = 120 + 600 + 145$   
 3. (a) 12 (b) 20 4. (a) 15 (b) 25 (c) 29 (d) 49;

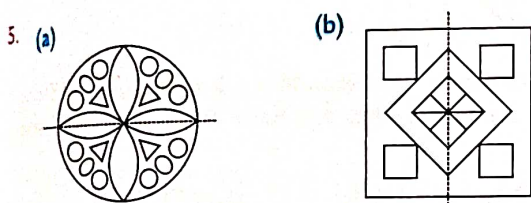
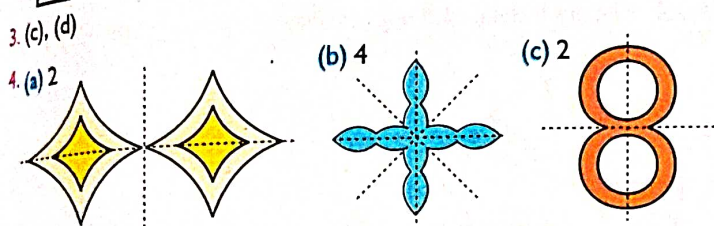
## 8. PATTERNS IS SHAPES AND NUMBERS

### Progress Check-up-1
























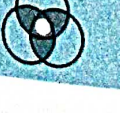

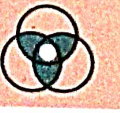
- (e) Not possible;  
 2. 

A	D	F	H	I	K	M
V	H	A	H, V	H, V	H	V
P	Q	S	U	V	X	Z
A	A	A	V	V	H, V, D	A

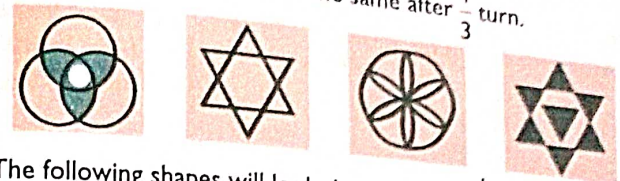


### Progress Check-up-2

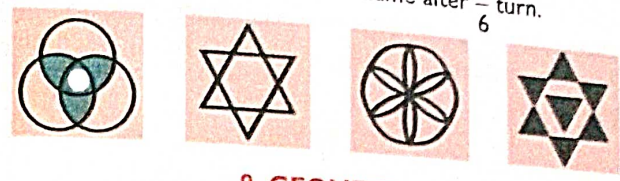
1. (a)   (b)    (c)     
 2. Following pictures will look the same on half a turn : (a), (c), (d), (g), (h), (j), (k); 3. Do yourself 4. (a), (b) and (d) will look the same after quarter turn ; 5. (a)  $\frac{1}{8}$  turn (b)  $\frac{1}{2}$  turn (c)  $\frac{1}{4}$  turn (d)  $\frac{1}{4}$  turn ;  
 6. (a)   (b)  (c)  (d) Shapes (a) and (c) do not look the same on  $\frac{1}{4}$  turn. Shape (a) does not look the same on  $\frac{1}{2}$  a turn.  
 7. The required shapes are drawn as under

	$\frac{1}{3}$ turn	$\frac{1}{6}$ turn
		
		
		
		

8. (a) Row 2<sup>nd</sup>: 1st  $\rightarrow$  ( $\checkmark$ ), 2<sup>nd</sup>  $\rightarrow$  ( $\checkmark$ ), 3<sup>rd</sup>  $\rightarrow$  ( $\checkmark$ ) (b) Row 1<sup>st</sup>: 1st  $\rightarrow$  (X), 2<sup>nd</sup>  $\rightarrow$  (X), 3<sup>rd</sup>  $\rightarrow$  (X)  
 9. The following shapes will look the same after  $\frac{1}{3}$  turn.



10. The following shapes will look the same after  $\frac{1}{6}$  turn.



## 9. GEOMETRY

### Progress Check-up-1

1. Lines = (b), (f); Line segment = (d), (e); Rays = (a), (c); 2. (a) angle ABC, acute angle (b) angle FED, right angle (c) angle POQ, acute angle  
 3. (a) four (b) three (c)  $\angle AOB$  = acute angle,  $\angle BOC$  = acute angle,  $\angle AOC$  = obtuse angle; 4. (a) acute angle (b) right angle (c) acute angle (d) acute angle (e) acute angle.

### Progress Check-up-2

Do it yourself.

### Progress Check-up-3

1. (a) True (b) False (c) False (d) True (e) False; 2. (a) Right-angled triangle (b) Obtuse-angled triangle (c) Scalene triangle 3. (b), (c), (d);  
 4. (a) two (b)  $90^\circ$  (c) four (d) right-angled triangles;

## 10. MEASUREMENT

### Progress Check-up-1

1. (a) 400 (b) 10000 (c) 150 (d) 16000 (e) 1800 (f) 24000 2. (a) 0.16 (b) 9 (c) 45.3 (d) 52.40 (e) 800000 (f) 8.5 3. (a) 1200 (b) 25000 (c) 320 (d) 40000 (e) 510 (f) 73000 4. (a) 4.9 (b) 25 (c) 2.567 (d) 4.650 (e) 6.214 (f) 65 5. (a) 700 (b) 120 (c) 150 (d) 21000 (e) 25000 (f) 4600 6. (a) 0.63 (b) 9 (c) 5.3 (d) 6.520 (e) 50 (f) 9.3 7. (a) 783 (b) 7.065 (c) 8.5 (d) 9.65 (e) 12240 (f) 12.35

### Progress Check-up-2

1. (a) 24 km 8 m (b) 41 km 322 m (c) 36 km 306 m (d) 43 cm 11 mm (e) 70 m 63 cm (f) 77 g 291 mg (g) 42 l 592 ml (h) 95 m 181 mm  
 2. (a) 25 kl 896 l (b) 85 l 600 ml (c) 32 kg 400 g (d) 40 g 827 mg (e) 54 km 875 m (f) 77 m 21 cm (g) 35 cm 5 mm (h) 53 m 651 mm 3. (a) 354 m 24 cm (b) 87 km 147 m (c) 63 kg 0.56 g (d) 2 l 64 ml 4. (a) 0.864 km (b) 1 kg 72 g (c) 7 l 99 ml (d) 14 g 851 mg

## 11. PERIMETER, AREA AND VOLUME

### Progress Check-up-1

1. (a) 28 cm (b) 13.5 cm (c) 13.5 cm 2. 17.5 m; 3. 5.5 m; 4. Komal used more rope by 0.6 m; 5. 7.6 m; 5. 200 m; 6. 1500 m.

### Progress Check-up-2

2. (a) 200 square cm (b) 60 square cm (c) 360 square cm (d) 5.632 square m; 2. (a) 625 square m (b) 156.25 square cm (c) 1.96 square km (d) 1600 square cm (e) 79.21 square cm (f) 12.96 square m; 3. (a) 45 cm (b) 25 m (c) 40 cm (d) 11 4. Sanya's card 36 cm, 80 cm<sup>2</sup>; Manav's card 11 cm, 121 cm<sup>2</sup>; Aarushi's card = 10 cm, 36 cm; Kabir's card 10 cm, 10 cm; 5. 256 square cm; 6. 120 cm; 7. 212 tiles; 8. 5 m; 9. 6 cm; 10. 6400 square cm.

### Progress Check-up-3

1. (a) 11 sq.cm (b) 4 × side (c) rectangle (d) two, four; 2. (i) (a) 22 cm (b) 26 cm (c) 26 cm (d) 40 cm (e) 32 cm (ii) (a) 48 sq.cm (b) 26 sq.cm.  
3. (a) 88 cm (b) 50 mm (c) 31 cm; 4. (a) 15 cm (b) 0.75 m (c) 57.2 cm;  
5. (a) 19.4 m (b) 2720 cm; 6. (a) 40 km (b) 30 cm 7. (a) 50 m (b) 100 cm;  
8. (a) 160 m (b) 90 cm (c) 75 mm; 9. 1485 m; 10. Sohali by 475 sq.cm;  
11. 210 bricks; 12. 132 tiles

### Progress Check-up-4

1. (a) 2835 cubic cm (b) 48000 cubic cm (c) 11340 cubic cm; 2. (a) 168 cu cm (b) 5 cm (c) 4 cm (d) 11 mm; 3. 1344 cubic cm. 4. 13500 cubic cm;  
5. 5400 cubic cm.

## 12. TIME

### Progress Check-up-1

1. (a) 0110 hours (b) 1417 hours (c) 2400 hours (d) 0545 hours (e) 1258 hours (f) 1355 hours (g) 2200 hours (h) 1835 hours (i) 2035 hours  
2. (a) 4:13 p.m. (b) 1:45 a.m. (c) 12:20 a.m. (d) 11:58 p.m. (e) 9:38 a.m.  
(f) 12 midnight (g) 9:44 p.m. (h) 11:28 p.m. (i) 11:55 p.m.

### Progress Check-up-2

1. (a) 300 minutes (b) 780 minutes (c) 1380 minutes (d) 1680 minutes  
2. (a) 2100 sec (b) 2280 sec (c) 10800 sec (d) 19500 sec 3. (a) 8 hr 47 minutes (b) 6 hr 58 minutes (c) 9 hr 5 minutes (d) 13 hr 16 minutes  
4. (a) 27 minutes 55 seconds (b) 46 minutes 4 seconds (c) 661 minutes 22 seconds (d) 710 minutes 2 seconds

### Progress Check-up-3

1. (a) 10 hours 55 minutes (b) 18 hours 42 minutes (c) 28 hours 36 minutes (d) 40 hours 5 minutes (e) 56 hours 15 seconds (f) 22 hours 55 minutes (g) 33 hours 8 seconds (h) 42 hours 10 minutes (i) 1 hours 10 seconds 2. (a) 12 hours 50 minutes (b) 16 hours 12 minutes (c) 12 hours 5 minutes (d) 8 hours 22 minutes (e) 22 minutes 47 seconds (f) 8 hours 7 minutes (g) 33 minutes 30 seconds (h) 5 hours 59 minutes (i) 31 minutes 45 seconds

### Progress Check-up-4

1. (a) December (b) No (c) February (d) 7 (e) 4  
2. (a) 6 days (b) 19 September (c) 7 July (d) 44 days.

## 13. MONEY

### Progress Check-up-1

1. (a) 4 balls for ₹ 65 (b) 32 kg = ₹ 1770 (c) 5 kg = ₹ 125 (d) 10 kg = ₹ 180  
2. (a) ₹ 21 (b) ₹ 14 (c) ₹ 700 (d) ₹ 18 (e) 144 km

### Progress Check-up-2

1. (i) (b) profit, ₹ 89 (c) profit, ₹ 860 (d) Loss, ₹ 1550  
(ii) (a) CP = 4030 (b) CP = 4198 (c) CP = 15055 (d) CP = 14350  
(iii) (a) SP = 2150 (b) SP = 5633 (c) SP = 15135 (d) SP = 22485  
2. Profit = ₹ 1235 3. Loss = ₹ 600 4. Profit = ₹ 265 5. CP = ₹ 2140

### Progress Check-up-3

1. ₹ 24; 2. Amount for pulses = ₹ 30, Total = ₹ 201  
3. (a) ₹ 55, ₹ 80.5, ₹ 9.75, ₹ 30, ₹ 12.25 (b) ₹ 60 (c) ₹ 302

## 14. DATA HANDLING

### Progress Check-up-1

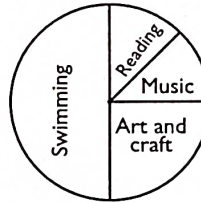
1. Do yourself; 2. Ascending order 15, 16, 16, 17, 17, 17, 17, 18, 18, 18, 18, 18, 19, 19, 20; score 15 = 1 time; score 16 = 2 times; score 17 = 4 times; score 18 = 6 times; score 19 = 2 times; score 20 = 1 time  
(a) score 18 (b) score 15 and 20 (c) Yes; 3. Numbers 24, 12, 20, 14, 30  
(a) People's Times (b) Path breaker (c) 100 (d)  $\frac{3}{10}$  (e) 20%; 4. 6 hours = School; 9 hours = sleep; 1.5 hours = Play; 4.5 hours = Others; 1.5 hour = TV;

5.



6. (a) Ada = 10 votes, Rashi = 10 votes, Mira = 5 votes, Anita = 15 votes  
(b) Anita won the election (c) Ada and Rashi. Rashi get 5 votes more than Mira

7.



8.



### Progress Check-up-2

1. (a) Jaisalmer (b) Shimla (c) Bangalore  
2. Draw yourself  
3. (a) 50 cm (b) 10 cm (c) 9 months;  
4. (a) 20 (b) 20 (c) Friday (d) 200 (e) ₹ 4000;

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