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# Elementary Mathematics

## Book Five

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## Preface

For improving the existing quality of Primary Education in Bangladesh, National Curriculum and Textbook Board (NCTB) in collaboration with PEDP-II initiated an extensive program for development of curriculum and teaching learning materials in 2002. In the light of this program the curriculum, textbooks and other teaching learning materials of Primary levels have been prepared, revised and evaluated.

The textbook entitled, '**Elementary Mathematics**' has been prepared on the basis of attainable competencies for the students of Class Five. The subject matter of the textbook is derived from the basic elements of mathematics following the attainable learning outcomes as depicted in the curriculum. This will facilitate our young learners to know how they can make best use of this knowledge.

The contents of the book are analyzed and explained in such a manner with practical examples, illustrations and system of planned activities, that students are inspired to study the subject with a keen interest.

This book is originally published in Bangla. From this year NCTB is publishing the English version of the textbook. English is the language of choice in today's globalized world. To facilitate the verbal and written communication skills of our future citizens and suitably prepare them for international competition, we decided to translate the original Bangla textbooks into English. It's pleasant to note that the number of English medium schools in Bangladesh is increasing very fast. In this context NCTB decided to publish all the textbooks of Primary level in English. This was a big endeavour for us. Despite our all efforts the first edition may not be totally error free. However, in the future editions we shall try to remove all errors and discrepancies.

Finally, I would like to express my heartfelt thanks and gratitude to those who have made their valuable contributions in writing, editing, evaluating and translating this book. I sincerely hope that the book will be useful to those for whom it has been prepared.

**Prof. Md. Mostafa Kamaluddin**

Chairman

National Curriculum and Textbook Board

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## Chapter - 1

### Addition and Subtraction

**Example 1.** Add : 23041, 10532, 31210, 22000, 2104 and 102.

<b>Solution :</b>		<b>Ajuts</b>	<b>Thousands</b>	<b>Hundreds</b>	<b>Tens</b>	<b>Ones</b>
23041						
10532		2	3	0	4	1
31210		1	0	5	3	2
22000		3	1	2	1	0
2104		2	2	0	0	0
102			2	1	0	4
<u>88989</u>				1	0	2
		8	8	9	8	9

Answer : 88989.

**Example 2.** Add : 312024, 103001, 150310, 201200, 131141 and 102203.

<b>Solution :</b>		<b>L</b>	<b>Aj</b>	<b>Th</b>	<b>H</b>	<b>T</b>	<b>O</b>
312024							
103001		3	1	2	0	2	4
150310		1	0	3	0	0	1
201200		1	5	0	3	1	0
131141		2	0	1	2	0	0
102203		1	3	1	1	4	1
<u>999879</u>		1	0	2	2	0	3
		9	9	9	8	7	9

Answer : 999879.

- ☐ The numbers are placed as ones under ones, tens under tens, hundreds under hundreds.
- ☐ Addition is started from the place of ones.
- ☐ The sum of each place is written below in absence of carrying number.

**Example 3.** Add : 572104, 650489, 948531, 886350, 95448 and 749065.

**Solution :**

$$\begin{array}{r}
 572104 \\
 650489 \\
 948531 \\
 886350 \\
 95448 \\
 749065 \\
 \hline
 3901987
 \end{array}$$

Ni	L	Aj	Th	H	T	O
③	④	③	①	②	②	
	5	7	2	1	0	4
	6	5	0	4	8	9
	9	4	8	5	3	1
	8	8	6	3	5	0
		9	5	4	4	8
	7	4	9	0	6	5
3	9	0	1	9	8	7

Answer : 3901987.

- ☐ The numbers are arranged in the table.
- ☐ The sum of the digits of ones is 27. 27 is 2 tens and 7 ones, so 7 of 27 is placed under the line in the ones place and 2 of 27 is written within a circle on the top of tens place.
- ☐ In the same way, adding the digits of tens place, the carrying number 2 is written on the top of the hundreds place.
- ☐ Similarly, the digits of the hundreds place, thousands place, ajuts place and lacs place are added.
- ☐ Adding the digits of lacs place, the carrying number is written on the top of nijuts place within a circle.
- ☐ As there is no other digit in the nijuts place, the digit is written as sum in nijuts place, within the circle.

**Example 4.** Add the numbers writing them side by side.

- (a) 31420, 50261, 47523, 9431, 23084 and 62100.
- (b) 425731, 653802, 749243, 86010, 72301 and 930211.

**n :**    *//////*    *//////*    *//////*    *////*    *//////*    *//////*  
 (a)    31420 + 50261 + 47523 + 9431 + 23084 + 62100  
        = 223819

(b)  $\begin{array}{cccccc} \text{4} & \text{2} & \text{5} & \text{7} & \text{3} & \text{1} \\ \text{6} & \text{5} & \text{3} & \text{8} & \text{0} & \text{2} \\ \text{7} & \text{4} & \text{9} & \text{2} & \text{4} & \text{3} \\ \text{8} & \text{6} & \text{0} & \text{1} & \text{0} & \text{0} \\ \text{7} & \text{2} & \text{3} & \text{0} & \text{1} & \text{0} \\ \text{9} & \text{3} & \text{0} & \text{2} & \text{1} & \text{1} \\ \hline \text{2} & \text{9} & \text{1} & \text{7} & \text{2} & \text{9} & \text{8} \end{array}$

- ☐ The numbers are written side by side putting plus sign (+) in between them.
- ☐ The result of the addition is written on the line below putting equal sign (=).
- ☐ Before adding the digits of ones, tens, hundreds, thousands, .....places successively the digits are marked with (/).
- ☐ The carrying digits are added to the digit on the left side.

**Add** (One is worked out) :

$$\begin{array}{r}
 \text{(a)} \quad 632054 \\
 284718 \\
 405653 \\
 520890 \\
 741506 \\
 813232 \\
 \hline
 3398053
 \end{array}
 \quad
 \begin{array}{r}
 \text{(b)} \quad 46853 \\
 72041 \\
 53905 \\
 20714 \\
 16300 \\
 81467 \\
 \hline
 200000
 \end{array}
 \quad
 \begin{array}{r}
 \text{(c)} \quad 532861 \\
 704105 \\
 295031 \\
 320524 \\
 813016 \\
 \hline
 2661137
 \end{array}
 \quad
 \begin{array}{r}
 \text{(d)} \quad 732846 \\
 85392 \\
 908705 \\
 624157 \\
 570234 \\
 9063 \\
 \hline
 2661137
 \end{array}$$

(a)  $645317 + 8297 + 53086 + 264309 + 708321 =$

(b)  $526394 + 230087 + 630801 + 319500 + 460009$   
 $+ 809625 =$

**Example 5.** Mr. Mizan sold rice from three pieces of land for Tk. 25087, Tk. 16920 and Tk. 30725 respectively and gram from another piece of land for Tk. 9872. What is the total price of the crops that Mr. Mizan sold ?

**Solution :** Mr. Mizan sold rice from three pieces of land :

$$\begin{array}{r}
 \text{Tk. } 25087 \\
 \text{Tk. } 16920 \\
 \text{Tk. } 30725 \\
 \text{He sold gram : } \text{Tk. } 9872 \\
 \hline
 \text{Total Tk. } 82604 \text{ (Adding)}
 \end{array}$$

Answer : Mr. Mizan sold crops worth Tk. 82604.

**Example 6.** Subtract 713241 from 839642.

$$\begin{array}{r}
 839642 \\
 - 713241 \\
 \hline
 126401
 \end{array}$$

L	Aj	Th	H	T	O	
8	3	9	6	4	2	← minuend
- 7	1	3	2	4	1	← subtrahend
1	2	6	4	0	1	← difference

Answer : 126401.

**Example 7.** Subtract 94273 from 758346.

$$\begin{array}{r}
 758346 \\
 - 94273 \\
 \hline
 664073
 \end{array}$$

Answer : 664073.

L	Aj	Th	H	T	O
7	$5^{+10}$	8	3	$4^{+10}$	6
- $7^{+1}$	9	4	$2^{+1}$	7	3
6	6	4	0	7	3

**Example 8.** Subtract 784906 from 960752.

$$\begin{array}{r}
 960752 \\
 - 784906 \\
 \hline
 175846
 \end{array}$$

Answer : 175846.

L	Aj	Th	H	T	O
9	$6^{+10}$	$0^{+10}$	$7^{+10}$	5	$2^{+10}$
- $7^{+1}$	$8^{+1}$	$4^{+1}$	9	$0^{+1}$	6
1	7	5	8	4	6

**Example 9.** Subtract by writing the digits side by side

(a) 95742 from 650263

(b) 579406 from 836041



**Solution :**

$$(a) \overset{'}{\overset{'}}{\overset{'}}{\overset{'}}{\overset{'}}{\overset{'}}}650263 - \overset{'}{\overset{'}}{\overset{'}}{\overset{'}}{\overset{'}}}95742 = 554521$$

Here, 650263 is minuend, 95742 is subtrahend and the difference is 554521.

Answer : 554521.

$$(b) \overset{'}{\overset{'}}{\overset{'}}{\overset{'}}{\overset{'}}{\overset{'}}}836041 - \overset{'}{\overset{'}}{\overset{'}}{\overset{'}}{\overset{'}}}579406 = 256635$$

Here, 836041 is minuend, 579406 is subtrahend and the difference is 256635.

Answer : 256635.

- ☐ Minus sign (–) is placed in between subtrahend and minuend and equal sign (=) is in front of difference.
- ☐ To subtract conveniently, the digits of ones, tens, hundreds, thousands places are marked with (').

**Subtract (one is worked out) :**

$$\begin{array}{r}
 (a) \quad 853204 \\
 \underline{478526} \\
 374678
 \end{array}
 \quad
 \begin{array}{r}
 (b) \quad 650487 \\
 \underline{73295}
 \end{array}
 \quad
 \begin{array}{r}
 (c) \quad 728513 \\
 \underline{543279}
 \end{array}
 \quad
 \begin{array}{r}
 (d) \quad 860521 \\
 \underline{394076}
 \end{array}$$

**Fill in the boxes (one is worked out) :**

$$\begin{array}{lcl}
 (a) & 628713 - 372946 & = \boxed{255767} \\
 (b) & 462051 - 94608 & = \boxed{\phantom{000000}} \\
 (c) & 750432 - 364853 & = \boxed{\phantom{000000}} \\
 (d) & 804706 - 525376 & = \boxed{\phantom{000000}}
 \end{array}$$

**Example 10** 12804 litchies were plucked from Mina's litchi trees. From these her father sold 7925 litchies. How many litchies are left?

**Solution :** Number of litchies plucked : 1 2 8 0 4  
 Number of litchies sold :  $(-)$  7 9 2 5  
 The number of litchies left : 4 8 7 9

Answer : 4879 litchies are left.

**Example 11.** The sum of three numbers is 845076. Of them two numbers are 321674 and 286539. What is the third number?

**Solution :** The two numbers 3 2 1 6 7 4  
 2 8 6 5 3 9  
 The sum of two numbers 6 0 8 2 1 3  
 The sum of three numbers 8 4 5 0 7 6  
 and the sum of two numbers 6 0 8 2 1 3  
 $\therefore$  The other number is 2 3 6 8 6 3 (by subtraction)

Answer : The third number is 236863.

**Example 12.** Abdul Latif had Tk. 621345. From that money he gave his elder daughter Tk. 85924, Tk. 84790 to younger daughter and to his son he gave Tk. 9830 more than his elder daughter. He gave the rest of the money to his wife. How much will his wife get?

**Solution:** Elder daughter got Tk. 8 5 9 2 4  
 Younger daughter got Tk. 8 4 7 9 0  
 Two daughters got Tk. 1 7 0 7 1 4 (by addition)  
 The son got Tk. 9830 more than elder daughter  
 Tk. 8 5 9 2 4  
 (+) Tk. 9 8 3 0  
 $\therefore$  The son got Tk. 9 5 7 5 4  
 Three persons got Tk. 1 7 0 7 1 4  
 (+) Tk. 9 5 7 5 4  
 Tk. 2 6 6 4 6 8  
 Total amount was Tk. 6 2 1 3 4 5  
 Three persons together got Tk. 2 6 6 4 6 8  
 The rest amount Tk. 3 5 4 8 7 7 (by subtraction)  
 Answer : Abdul Latif's wife got Tk. 354877.

## Exercise - 1

### 1. Add :

(a) $\begin{array}{r} 83572 \\ 40213 \\ 21004 \\ 6532 \\ \hline 8450 \end{array}$	(b) $\begin{array}{r} 230140 \\ 312103 \\ 124315 \\ 200210 \\ \hline 112301 \end{array}$	(c) $\begin{array}{r} 536709 \\ 470985 \\ 325071 \\ 608213 \\ \hline 289050 \end{array}$
(d) $\begin{array}{r} 132023 \\ 210240 \\ 301102 \\ 123012 \\ 120300 \\ \hline 102312 \end{array}$	(e) $\begin{array}{r} 648753 \\ 269107 \\ 853264 \\ 598603 \\ 87562 \\ \hline 69875 \end{array}$	(f) $\begin{array}{r} 872094 \\ 435809 \\ 569275 \\ 325680 \\ 650942 \\ \hline 798056 \end{array}$

### 2. Fill in the boxes:

(a)  $43570 + 26095 + 40591 + 9207 + 8754 =$

(b)  $560829 + 427108 + 82075 + 6429$   
 $+ 325790 + 53008 =$

(c)  $325708 + 246805 + 508362 + 730096$   
 $+ 92346 + 64008 =$

(d)  $410527 + 356807 + 512934 + 239006$   
 $+ 614500 + 800357 =$

### 3. Subtract :

- (a) 53205 from 865497
- (b) 462136 from 798546
- (c) 96837 from 875320
- (d) 479568 from 962053
- (e) 658379 from 927405.

**4. Fill in the boxes :**

(a)  $763569 - 51407 =$

(b)  $972403 - 48705 =$

(c)  $860523 - 285306 =$

(d)  $732645 - 428759 =$

**5. Fill in the boxes :**

$$\begin{array}{r}
 536\boxed{\phantom{0}}14 \\
 2\boxed{\phantom{0}}7985 \\
 6954\boxed{\phantom{0}}6 \\
 76\boxed{\phantom{0}}893 \\
 \hline
 228264\boxed{\phantom{0}}
 \end{array}$$

$$\begin{array}{r}
 82\boxed{\phantom{0}}753 \\
 698\boxed{\phantom{0}}67 \\
 54798\boxed{\phantom{0}} \\
 7\boxed{\phantom{0}}56\boxed{\phantom{0}}9 \\
 \hline
 2\boxed{\phantom{0}}97150
 \end{array}$$

$$\begin{array}{r}
 87\boxed{\phantom{0}}506 \\
 - 9678\boxed{\phantom{0}} \\
 \hline
 778\boxed{\phantom{0}}24
 \end{array}$$

$$\begin{array}{r}
 964\boxed{\phantom{0}}25 \\
 - 5\boxed{\phantom{0}}7468 \\
 \hline
 39\boxed{\phantom{0}}457
 \end{array}$$

6. 240851 mangoes are plucked from a tree of Raju's mango garden. From another tree 92105 mangoes are plucked and from another tree 55008 mangoes are plucked. How many mangoes are plucked from that garden ?
7. Minued is 985214 and subtrahend is 97465. What is the difference?
8. If 68975 is subtracted from a number, the difference is 794768. What is the number?
9. Subtract the greatest number of five digits from the least number of six digits.
10. To get the sum 9 lacs, what is the number that should be added to the greatest number of 4 digits?
11. Find the difference of the greatest and least number of 6 digits that are formed using the digits 6, 8, 9, 5, 0, 4 once.

12. Raju's grandfather sold paddy for Tk. 25830, wheat for Tk. 30645 and gram for Tk. 9786. He bought jute for Tk. 45927. How much money does he have left ?
13. There were 6785 students in a school. At the beginning of the year 542 students left the school and 950 new students got admitted. How many students are there at present in that school?
14. Mr. Farid sold wheat for Tk. 8604 and mustard for Tk. 5798. From that money he gave Tk. 4250 to his son and paid Tk. 5000 against loan. He deposited the rest of the money in the bank. How much money did he deposit in the bank?
15. Mina has Tk. 45987. Raju has Tk. 8250 less than that of Mina. Rani has Tk. 985 more than that of Raju. How much money do the three persons have altogether?
16. The sum of four numbers is 468520. Two of them are 73584 and 64209. The third number is 9485 less than the first one. What is the fourth number?
17. Rahela Begum has Tk. 985320 in a bank. She drew Tk. 172500, Tk. 150430 and Tk. 286250 respectively in three instalments. From the rest of the money she bought saving certificates for Tk. 2 lacs. How much money does she have left in the bank.
18. Sima's uncle sold fish from his pond for Tk. 29850 and eggs for Tk. 20678. From that money he gave Tk. 15600 to his son and Tk. 10890 to his daughter. From the rest of money he bought a cow for Tk. 15000. How much money does he have left?

## Chapter-2

### Multiplication and Division

**Example 1. Multiply :**  $538$   
 $\times 125$

**Solution :**

$538$	← multiplicand
$\times 125$	← multiplier
$2690$	← $538 \times 5$
$10760$	← $538 \times 2 \text{ ten}$
$53800$	← $538 \times 1 \text{ hundred}$
$67250$	← product

Answer : 67250.

**Example 2. Multiply :** 2465 by 234.

**Solution :**

$2465$	← multiplicand
$\times 234$	← multiplier
$9860$	← $2465 \times 4$
$73950$	← $2465 \times 3 \text{ ten}$
$493000$	← $2465 \times 2 \text{ hundred}$
$576810$	← product

Answer : 576810.

**Example 3. Multiply:** 3271 by 420.

**Solution :**

$3271$	← multiplicand
$\times 420$	← multiplier
$65420$	← $3271 \times 2 \text{ ten}$
$1308400$	← $3271 \times 4 \text{ hundred}$
$1373820$	← product

Answer : 1373820.

Since zero (0) is in the ones place of multiplier, multiplication of ones place is not shown. So in the first step, putting zero in the ones place multiplication of tens place has been written moving one step to the left and in the second step putting zero in the ones and tens places multiplication of hundreds has been written moving two steps to the left.

**Example 4. Multiply :** 6582 by 308.

**Solution :**

$$\begin{array}{r}
 6582 \\
 \times 308 \\
 \hline
 52656 \leftarrow 6582 \times 8 \\
 1974600 \leftarrow 6582 \times 3 \text{ hundred} \\
 \hline
 2027256
 \end{array}$$

Answer : 2027256.

Since zero (0) is in the tens place of multiplier, multiplication of tens place is not shown. So in the second step, putting zero in the ones and tens places, multiplication of hundreds has been written moving two steps to the left.

**Example 5. Multiply:** 7596 by 600.

**Solution :**

$$\begin{array}{r}
 7596 \\
 \times 600 \\
 \hline
 4557600 \leftarrow 7596 \times 6 \text{ hundred}
 \end{array}$$

Answer : 4557600.

Since zero (0) is in the ones and tens places of multiplier, multiplications of ones and tens places are not shown. So putting zero in the ones and tens places, multiplication of hundreds has been written moving two steps to the left.

**Example 6. Multiply:** 769

$$\begin{array}{r}
 769 \\
 \times 248 \\
 \hline
 \end{array}$$

**Solution :**

$$\begin{array}{r}
 769 \\
 \times 248 \\
 \hline
 6152 \\
 30760 \\
 153800 \\
 \hline
 190712
 \end{array}$$

Answer : 190712.

**Example 7. Multiply:** 4586

$$\begin{array}{r}
 4586 \\
 \times 479 \\
 \hline
 \end{array}$$

**Solution :**

$$\begin{array}{r}
 4586 \\
 \times 479 \\
 \hline
 41274 \\
 321020 \\
 1834400 \\
 \hline
 2196694
 \end{array}$$

Answer : 2196694.

**Remarks :** Students will do the sum of multiplication as usual. No explanation will be asked from them.

**Example 8. Multiply :**  $3792$   
 $\times 850$

**Solution :**

$$\begin{array}{r} 3792 \\ \times 850 \\ \hline 189600 \\ 3033600 \\ \hline 3223200 \end{array}$$

Answer : 3223200.

**Example 10. Multiply :**  $4908$   
 $\times 400$

**Solution :**

$$\begin{array}{r} 4908 \\ \times 400 \\ \hline 1963200 \end{array}$$

Answer : 1963200.

**Example 9. Multiply :**  $9207$   
 $\times 645$

**Solution :**

$$\begin{array}{r} 9207 \\ \times 645 \\ \hline 46035 \\ 368280 \\ 5524200 \\ \hline 5938515 \end{array}$$

Answer : 5938515.

**Example 11. Multiply :**  $8075$   
 $\times 700$

**Solution :**

$$\begin{array}{r} 8075 \\ \times 700 \\ \hline 5652500 \end{array}$$

Answer : 5652500.

**Example 12. Multiply by easy method :**

(a)  $9999 \times 425$

(b)  $8254 \times 999$

**Solution :** (a)  $9999 \times 425$

$$= (10000 - 1) \times 425$$

$$= (10000 \times 425) - (1 \times 425)$$

$$= 4250000 - 425$$

$$= 4249575$$

(b)  $8254 \times 999$

$$= 8254 \times (1000 - 1)$$

$$= (8254 \times 1000) - (8254 \times 1)$$

$$= 8254000 - 8254$$

$$= 8245746$$

Answer : 4249575.

Answer : 8245746.



**Example 13.** A person earns Tk. 216 a day. How much money does he earn in a year? [1 year = 365 days]

**Solution :** 1 year = 365 days  
 In 1 day he earns Tk. 216  
 $\therefore$  In 365 days he earns Tk.  $(216 \times 365)$

Here,

$$\begin{array}{r}
 365 \\
 \times 216 \\
 \hline
 2190 \\
 3650 \\
 73000 \\
 \hline
 78840
 \end{array}$$

$\therefore$  In 1 year he earns Tk. 78840

Answer : Tk. 78840.

**Remark :** For the convenience of multiplication, the small number is taken as multiplier.

**Example 14.** There are 2605 betel-nut trees in a garden. How many such betel-nut trees are there in 316 gardens?

**Solution :** In 1 garden there are 2605 betel-nut trees  
 $\therefore$  " 316 " " "  $(2605 \times 316)$  "

Here,

$$\begin{array}{r}
 2605 \\
 \times 316 \\
 \hline
 15630 \\
 26050 \\
 781500 \\
 \hline
 823180
 \end{array}$$

Answer : There are 823180 betel-nut trees.

**Example 15.** A goat costs Tk. 3925. What will be the cost of 250 such goats?

**Solution :** 1 goat costs Tk. 3925  
 $\therefore$  250 goat costs Tk.  $(3925 \times 250)$

$$\begin{array}{r} \text{Here,} \quad 3925 \\ \times 250 \\ \hline 196250 \\ 785000 \\ \hline 981250 \end{array}$$

Answer : Tk. 981250.

### Exercise - 2 (a)

1. **Find the product :**

(a) $\begin{array}{r} 298 \\ \times 169 \\ \hline \end{array}$	(b) $\begin{array}{r} 427 \\ \times 208 \\ \hline \end{array}$	(c) $\begin{array}{r} 805 \\ \times 329 \\ \hline \end{array}$	(d) $\begin{array}{r} 2690 \\ \times 219 \\ \hline \end{array}$
(e) $\begin{array}{r} 3695 \\ \times 387 \\ \hline \end{array}$	(f) $\begin{array}{r} 5046 \\ \times 620 \\ \hline \end{array}$	(g) $\begin{array}{r} 8364 \\ \times 709 \\ \hline \end{array}$	(h) $\begin{array}{r} 7692 \\ \times 800 \\ \hline \end{array}$

2. **Multiply:**

- |                 |                 |                 |
|-----------------|-----------------|-----------------|
| (a) 835 by 570  | (b) 946 by 632  | (c) 2694 by 623 |
| (d) 7091 by 780 | (e) 9246 by 905 | (f) 6953 by 900 |

3. **Multiply by easy method :**

- |                       |                       |
|-----------------------|-----------------------|
| (a) $9999 \times 321$ | (b) $9999 \times 207$ |
| (c) $6258 \times 999$ | (d) $4593 \times 999$ |

- The multiplicand is 6381 and the multiplier is 215. What is the product?
- A bicycle costs Tk. 9825. What will be the cost of 135 such bicycles?
- There are 500 sheets of paper in a rim. How many sheets of paper are there in 198 rims?
- A godown has 8326 kg of rice. How much rice is there in 602 such godowns?
- A person earns Tk. 275 every day. How much money does he earn in a year? [1 year = 365 days]
- A chair costs Tk. 800. What is the cost of 2614 such chairs?
- There are 539 pages in a book. How many pages are there in 4038 such books?
- There are 5834 plants in a nursery. How many plants are there in 486 such nurseries?

## Division

### Example 1. Divide 8304 by 16.

**Solution :**  $16 \overline{) 8304} (519$

$$\begin{array}{r} 80 \\ \hline 30 \\ 16 \\ \hline 144 \\ 144 \\ \hline 0 \end{array}$$

Answer : Quotient is 519.

Here, dividend is 8304, divisor is 16 and quotient is 519.

### Example 3. Divide 79213 by 25.

**Solution :**  $25 \overline{) 79213} (3168$

$$\begin{array}{r} 75 \\ \hline 42 \\ 25 \\ \hline 171 \\ 150 \\ \hline 213 \\ 200 \\ \hline 13 \end{array}$$

Answer : Quotient is 3168,  
remainder is 13.

Here, divisor is 25, dividend is 79213, quotient is 3168 and remainder is 13

### Example 2. Divide 64896 by 48.

**Solution :**  $48 \overline{) 64896} (1352$

$$\begin{array}{r} 48 \\ \hline 168 \\ 144 \\ \hline 249 \\ 240 \\ \hline 96 \\ 96 \\ \hline 0 \end{array}$$

Answer : Quotient is 1352.

Here, divisor is 48, dividend is 64896, quotient is 1352 and remainder is 0.

### Example 4. Divide 89250 by 125.

**Solution :**  $125 \overline{) 89250} (714$

$$\begin{array}{r} 875 \\ \hline 175 \\ 125 \\ \hline 500 \\ 500 \\ \hline 0 \end{array}$$

Answer : Quotient is 714.

**Example 5. Divide 98027 by 132.** **Example 6. Divide 49735 by 245.**

**Solution:** 132) 9 8 0 2 7 (742

$$\begin{array}{r}
 924 \\
 \underline{562} \\
 528 \\
 \underline{347} \\
 264 \\
 \underline{83}
 \end{array}$$

Answer : Quotient is 742,  
remainder is 83.

**Solution:** 245) 4 9 7 3 5 (203

$$\begin{array}{r}
 490 \\
 \underline{735} \\
 735 \\
 \underline{0}
 \end{array}$$

Answer : Quotient is 203.

In example 6, in the second step of division, divisor 245 is greater than the dividend 73. So in the quotient, zero (0) is placed in the tens place. Then 5 of dividend is written on the right side of 73 and 735 is divisible by 245.

## Division by 10 or 100

**Example 7.** Divide 24657 by 10.

**Solution :** 10) 2 4 6 5 7 (2465

$$\begin{array}{r}
 20 \\
 \underline{46} \\
 40 \\
 \underline{65} \\
 60 \\
 \underline{57} \\
 50 \\
 \underline{7}
 \end{array}$$

Answer : Quotient is 2465, remainder is 7.

There is one zero (0) in the ones place of divisor. In the dividend, putting a comma after one place from the right, we get 2465, 7. Here, the number on the left of comma is the quotient and the number on the right is the remainder. So, whenever we need to divide any number by 10, it is easier to find the quotient and the remainder in this way.

**Example 8. Divide 39812 by 10.****Solution :** 3981, 2

Answer : Quotient is 3981 and remainder is 2.

**Example 9. Divide 30845 by 100.****Solution :** 100 ) 3 0 8 4 5 ( 308

$$\begin{array}{r} 300 \\ \underline{845} \\ 800 \\ \underline{45} \end{array}$$

Answer : Quotient is 308, remainder is 45.

There are two zeros in the divisor. In the dividend, putting a comma after 2 digits from the right, we get 308, 45. Here, the number on the left of the comma is the quotient and the number on the right is the remainder. So, whenever we need to divide any number by 100, it is easier to find the quotient and the remainder in this way.

**Example 10. Divide 42578 by 100.****Solution :** Here, 425, 78.

So, quotient is 425 and remainder is 78.

Answer : Quotient is 425, remainder is 78.

**Example 11. Divide 63500 by 100.****Solution :** Here, the divisor is 100. In the dividend putting a comma after two digits from the right we get 635,00.

So, 635 is quotient and 00 is remainder.

Answer : Quotient is 635, remainder is 0.

To divide by 10 or 100 easily, put comma in the dividend counting the digits from the right that equal the zeros in the divisor from the right. Then the number on the left of comma will be the quotient and the number on the right will be the remainder.

**Example 12.** In a sum, the dividend is 37024, the quotient is 89 and the remainder is 0. What is the divisor?

**Solution :**  $89 \overline{) 37024} \text{ (416)}$

$$\begin{array}{r} 356 \\ \underline{142} \\ 89 \\ \underline{534} \\ 534 \\ \underline{\phantom{0}} \\ 0 \end{array}$$

Answer : divisor is 416.

In case of exactly divisible	Dividend $\div$ divisor = quotient
	Dividend $\div$ quotient = divisor
	Divisor $\times$ quotient = dividend
In case of not exactly divisible	Dividend = divisor $\times$ quotient + remainder
	Divisor = (dividend – remainder) $\div$ quotient
	Quotient = (dividend – remainder) $\div$ divisor

**Example 13.** In a sum, the dividend is 28087, the divisor is 264 and the remainder 103. What is the quotient?

**Solution :** We know,

$$\text{Quotient} = (\text{dividend} - \text{remainder}) \div \text{divisor}$$

$$\text{Here, dividend} - \text{remainder} = 28087 - 103 = 27984$$

$$\begin{aligned} \therefore \text{Quotient} &= 27984 \div 264 \\ &= 106 \end{aligned}$$

Answer : Quotient is 106.

**Example 14.** If 325 kg. of rice cost Tk. 5200, what is the cost of 1 kg. of rice?

**Solution :**  $325 \overline{) 5200} \text{ (16)}$

$$\begin{array}{r} 325 \\ \underline{1950} \\ 1950 \\ \underline{\phantom{0}} \\ 0 \end{array}$$

$\therefore$  The cost of 1 kg. of rice is Tk.16.

Answer : Tk. 16.

**Exercise -2 (b)****1. Divide :**

- |                      |                      |                      |
|----------------------|----------------------|----------------------|
| (a) $76695 \div 15$  | (b) $54871 \div 37$  | (c) $25748 \div 98$  |
| (d) $52895 \div 149$ | (e) $42835 \div 197$ | (f) $52185 \div 213$ |
| (g) $75089 \div 325$ | (h) $52889 \div 289$ | (i) $43702 \div 342$ |
| (j) $14970 \div 365$ |                      |                      |

**2. Divide :**

- |                      |                      |                      |
|----------------------|----------------------|----------------------|
| (a) $24135 \div 10$  | (b) $87520 \div 10$  | (c) $43560 \div 100$ |
| (d) $65900 \div 100$ | (e) $67500 \div 100$ | (f) $39768 \div 100$ |
| (g) $83090 \div 100$ | (h) $93500 \div 100$ |                      |

3. (a) Dividend 37920, quotient 12 and remainder 0. What is the divisor?  
(b) Dividend 73635, quotient 152 and remainder 67. What is the divisor?  
(c) Dividend 35792, divisor 47 and remainder 25. What is the quotient?  
(d) Divisor 325, quotient 72 and remainder 9. What is the dividend?
4. How many days are there in 10000 hours?
5. Divide the greatest number of five digits by 87.
6. There are 355 mangoes in a basket. How many such baskets are needed for 25560 mangoes?
7. A shopkeeper buys 246 kg. of lentils for Tk. 11808. What is the cost of 1 kg. of lentils?
8. From the greatest number of 5 digits using the digits 8, 3, 5, 0, 7 once and divide it by the greatest number of 3 digits?
9. Tk. 10500 is required when each person is paid Tk. 140. How many persons can be paid by this amount?
10. The product of two numbers is 43290. One number is 555. What is the other number?
11. Divide by 165 the least number formed by taking 9, 4, 0, 2, 6 once.
12. The product of two numbers is 89262. One number is 342. What is the other number ?

## Chapter - 3

### Problems Involving the First Four Rules

**Example 1.** 8 dozens of khatas cost Tk. 2400. What is the cost of one khata?

**Solution :** 1 dozen = 12 pieces

$$\therefore 8 \text{ dozens} = (8 \times 12) \text{ pieces} = 96 \text{ pieces}$$

Here, 8 dozens i.e., 96 khatas cost Tk. 2400

$$\therefore 1 \text{ khata costs Tk. } (2400 \div 96)$$

Now, 96) 2 4 0 0 (25

$$\begin{array}{r} 192 \\ \underline{480} \\ 480 \\ \underline{\phantom{0}} \\ 0 \end{array}$$

$$\therefore 1 \text{ khata costs Tk. } 25$$

Answer : Tk. 25.

**Example 2.** The combined age of father and daughter is 80 years. The father is 4 times older than the daughter. How old are they?

**Solution :** The age of daughter = 1 times of daughter's age  
Father's age = 4 times of daughter's age

---

$\therefore$  Combined age of the father and the daughter = 5 times of daughter's age

$$5 \text{ times of daughter's age} = 80 \text{ years}$$

$$\therefore \text{ Daughter's age} = 80 \text{ years} \div 5 = 16 \text{ years}$$

$$\therefore \text{ Father's age} = 16 \text{ years} \times 4 = 64 \text{ years.}$$

Answer : Father's age is 64 years and daughter's age is 16 years.



**Example 3.** In a sum, the divisor is 78, the quotient is 25 and the remainder is 63. What is the dividend ?

**Solution :** We know,

$$\begin{aligned}\text{Dividend} &= \text{Divisor} \times \text{quotient} + \text{remainder} \\ &= 78 \times 25 + 63 \\ &= 1950 + 63 \\ &= 2013\end{aligned}$$

Answer : Dividend is 2013.

**Example 4.** The total cost of 6 chairs and 4 tables is Tk. 5570. The price of a chair is Tk. 675. What is the price of a table?

**Solution :**

1 chair costs Tk. 675	
$\therefore$ 6 chairs cost Tk. $(675 \times 6) =$ Tk. 4050	
6 chairs and 4 tables cost	= Tk. 5570
$\therefore$ 6 chairs cost	= Tk. 4050
<hr/>	
$\therefore$ 4 tables cost	= Tk. 1520 (by subtracting)
$\therefore$ 1 table costs	= Tk. $(1520 \div 4)$
	= Tk. 380

Answer : Tk. 380.

**Example 5.** Mina and Rina together have Tk. 7532. Mina has Tk. 560 more than Rina. How much money does each of them have?

**Solution :** Mina has Tk. 560 more. If Tk. 560 is taken away from the total amount, then both of them have the equal amount.

$$\begin{aligned}\text{Tk. } 7532 - \text{Tk. } 560 &= \text{Tk. } 6972 \\ \therefore \text{ Rina has Tk. } (6972 \div 2) \\ &\text{or, Tk. } 3486\end{aligned}$$

Therefore, Mina has Tk.  $(3486 + 560) =$  Tk. 4046

Answer : Mina has Tk. 4046 and Rina has Tk. 3486.

**Example 6.** Mr. Altaf's monthly salary is Tk. 9870. He spends Tk. 3800 for house rent and Tk. 5650 for family expenditure. He keeps the rest of the money in the bank. How much money does he save in a year?

**Solution :** Expenditure for house rent and family affairs  
Tk.  $(3800 + 5650) = \text{Tk. } 9450$   
Deposit in the bank in every month  
Tk.  $(9870 - 9450) = \text{Tk. } 420$   
 $\therefore$  Savings in 1 year Tk.  $(420 \times 12) = \text{Tk. } 5040$

Answer : Tk. 5040.

### Exercise - 3

1. 9 dozens of pencils cost Tk. 1620. What is the price of a pencil?
2. 38 halis of mangoes cost Tk. 1216. What is the price of a mango?
3. 12 dozens of khatas cost Tk. 2304. What is the price of 8 khatas?
4. The age of father and son together is 96 years. If the father's age is 3 times than that of the son's, what is the age of the father and the son?
5. There are 168 mangoes in a basket. From the mangoes that are there in 15 such baskets, 780 were given to Mina and 750 to Rani. The rest were given to Raju. How many mangoes did Raju get?
6. In a sum, the dividend is 8903, divisor is 87 and remainder is 29, what is the quotient?
7. In a sum, the divisor is 12 times greater than the remainder and the dividend is 9896. The remainder is 8. What is the quotient?
8. The product of two numbers is 6272. 4 times of one of these numbers is 256. What is the other number?
9. The price of 2 cows and 3 goats together is Tk. 9924. One goat costs Tk. 1280. What is the price of a cow?

10. The cost of 14 chairs and 6 tables together is Tk. 8890. If one table costs Tk. 350, what is the cost of a chair?
11. Raju and Rani together have 8690 litchies. Rani has 786 litchies less than Raju. How many litchies do Raju and Rani have?
12. Farida's and Fatema's salaries together is Tk. 9905. Fatema's salary is Tk. 489 more than that of Farida. Find the salary of each.
13. Mr. Jalal's monthly salary is Tk. 8765. He spends Tk. 3225 as house rent and Tk. 4850 for other expenses. He deposits the rest of the money in the bank. How much money does he deposit in the bank in 8 months?
14. Rokeya Begum gets Tk. 3500 as house rents and Tk. 5085 as pension per month. She spends Tk. 7948 for the education of her son and other expenses. She saves the rest of the money in the bank. How much does she save in a year?
15. Zahidul Hasan bought 40 kg. of rice from a departmental store, soyabene oil for Tk. 265 and fish for Tk. 588. Each kg. of rice costs Tk. 18. He gave the shopkeeper Tk. 2000. How much money did the shopkeeper return him?

## Chapter - 4

### The Unitary Method

**Example 1.** The cost of 1 khata is Tk. 7. What is the cost of 5 khatas?

**Solution :** 1 Khata costs Tk. 7  
 $\therefore$  5 khatas cost Tk.  $(7 \times 5)$   
 $=$  Tk. 35

Answer : Tk. 35.

#### Let us notice

The price of 5 khatas is obtained by multiplying the price of 1 khata by 5. Multiplying the price of 1 object by a fixed number, the price of that fixed number of objects can be obtained.

#### Tick (✓) the correct answer :

- (1) 1 pencil costs Tk. 3. What is the price of 6 pencils?  
a. Tk. 2    b. Tk. 9    c. Tk. 18    d. Tk. 12
- (2) 1 khata costs Tk. 5. What is the price of 10 khatas?  
a. Tk. 15    b. Tk. 50    c. Tk. 2    d. Tk. 20

**Example 2.** 3 khatas cost Tk. 21. What is the price of 1 khata?

**Solution :** 3 khatas cost Tk. 21  
 $\therefore$  1 " " Tk.  $\frac{21}{3}$   
 $=$  Tk. 7

Answer : Tk. 7

**Let us notice :** The price of 1 khata is obtained by dividing Tk. 21 (which is the price of 3 khatas) by 3.

If the price, weight and length of some objects of the same kind are given, then by dividing them by the number of objects, the price, weight and length of an object can be obtained.

**Tick (✓) the correct answer :**

- (1) The price of 6 pencils is Tk. 12. What is the price of 1 pencil?  
 a. Tk. 72      b. Tk. 3      c. Tk. 2      d. Tk. 24
- (2) The price of 5 mangoes is Tk. 35. What is the price of 1 mango?  
 a. Tk. 7      b. Tk. 175      c. Tk. 15      d. Tk. 3
- (3) 3 kg. of rice cost Tk. 60. What is the cost of 1 kg.?  
 a. Tk. 15      b. Tk. 20      c. Tk. 30      d. Tk. 12

**Example 3.** 10 pieces of pencils cost Tk. 30. What is the cost of 8 pencils ?

**Solution :** Cost of 10 pieces of pencils is Tk. 30

$$\begin{aligned} \therefore 10 \text{ " } & \text{Tk. } (30 \div 10) \\ & = \text{Tk. } 3 \\ \therefore 8 \text{ " } & \text{Tk. } (3 \times 8) \\ & = \text{Tk. } 24 \end{aligned}$$

Answer : Tk. 24.

**Let us notice :**

- (1) First, dividing the price of 10 pencils by 10, the price of 1 pencil is obtained. Then multiplying the price of 1 pencil by 8, the cost of 8 pencils is obtained.
- (2) Here, we need to determine the cost of pencils. That is why, while arranging the numbers the cost of pencil is written at the end.

Since the problem is solved by finding the cost of an object, the method is known as the Unitary Method.

In the Unitary Method at the time of arranging the sum, the expression which is to be determined must be written at the end (right side) of the first line.

**Example 4.** 9 books cost Tk. 108. What is the cost of 12 books?

**Solution :** 9 books cost Tk. 108.

$$\begin{aligned} \therefore 9 \text{ " } & \text{Tk. } (108 \div 9) \\ & = \text{Tk. } 12 \\ \therefore 12 \text{ " } & \text{Tk. } (12 \times 9) \\ & = \text{Tk. } 108 \end{aligned}$$

Answer : Tk. 108.

**Example 5.** 100 litchies cost Tk. 80. What is the cost of 25 litchies?

**Solution :** 100 litchies cost Tk. 80, or 8000 Paisha.

$$\begin{aligned}\therefore 1 \quad " \quad " & \quad (8000 \div 100) \text{ Paisha.} \\ & = 80 \text{ Paisha}\end{aligned}$$

$$\begin{aligned}\therefore 25 \quad " \quad " \quad " & \quad (80 \times 25) \text{ Paisha} \\ & = 2000 \text{ Paisha} \\ & = \text{Tk. 20}\end{aligned}$$

Answer : Tk. 20.

**Example 6.** The weight of 1 dozen of apple each of the same weights is 72 grams. What is the weight of 9 such apples ?

**Solution :** 12 apples weight 72 grams

$$\begin{aligned}\therefore 1 \quad " \quad " & \quad (72 \div 12) \text{ grams} \\ & = 6 \text{ grams}\end{aligned}$$

$$\begin{aligned}\therefore 9 \quad " \quad " & \quad (6 \times 9) \text{ grams} \\ & = 54 \text{ grams.}\end{aligned}$$

Answer : 54 grams.

**Example 7.** A labourer earns Tk. 875 per week. How much taka does he earn in 12 days?

**Solution :** In 7 days he earns Tk. 875

$$\begin{aligned}\therefore 1 \quad " \quad " & \quad \text{Tk. } (875 \div 7) \\ & = \text{Tk. 125}\end{aligned}$$

$$\begin{aligned}\therefore 12 \quad " \quad " & \quad \text{Tk. } (125 \times 12) \\ & = \text{Tk. 1500}\end{aligned}$$

Answer : Tk. 1500.

**Example 8.** A hostel of 40 students has food for 20 days. If 10 new students come to the hostel, how many days will the food last?

**Solution :** After arrival, the total number of students become =  $(40 + 10)$   
= 50

40 students have food for 20 days

$$\therefore 1 \quad " \quad " \quad " \quad (20 \times 40) \text{ days} \\ = 800 \text{ days}$$

$$\therefore 50 \quad " \quad " \quad " \quad (800 \div 50) \text{ days} \\ = 16 \text{ days}$$

Answer : 16 days.

**Let us notice :** In the case of consuming the same quantity of food, if the number of students decreases then the number of days increases. So in the second step, multiplication is done. Again, if the number of students increases, the number of days decreases. So in the third step division is done.

**Example 9.** 6 persons can cut the crops of a land in 21 days. In how many days will 18 persons cut the crops of the same land?

**Solution :** 6 persons can cut crops in 21 days

$$\therefore 1 \text{ person} \quad " \quad " \quad (21 \times 6) \text{ days} \\ = 126 \text{ days}$$

$$\therefore 18 \text{ persons} \quad " \quad " \quad (126 \div 18) \text{ days} \\ = 7 \text{ days}$$

Answer : 7 days.

**Example 10.** 200 men can dig a pond in 15 days. How many more men are to be appointed to dig the pond in 10 days?

**Solution :** In 15 days a pond is dug by 200 men

$$\therefore \text{ " 1 day " } \quad \quad \quad \text{ " } \quad (200 \times 15) \text{ men} \\ = 3000 \text{ men}$$

$$\therefore \text{ " 10 days " } \quad \quad \quad \text{ " } \quad (3000 \div 10) \text{ men} \\ = 300 \text{ men}$$

$(300 - 200) = 100$  men are required in addition.

**Answer :** Additional 100 men are to be appointed.

### Exercise - 4

1. **Put tick (✓) on the correct answer :**

- (1) If the cost of a khata is Tk. 8, then to find the cost of 4 khatas, 8 and 4 are to be added / multiplied / divided / subtracted.
- (2) If the cost of a pair of pigeon is Tk. 100, then to find the cost of 3 pairs of pigeon, 100 and 3 are to be multiplied / divided / added / subtracted.
- (3) If the cost of 8 pencils is Tk. 24, then to find out the cost of a pencil, 24 and 8 are to be multiplied / added / subtracted / divided.
- (4) If the cost of 6 khatas is Tk. 24, then to find the cost of 3 khatas, it is necessary first to find the cost of 2 khatas / 5 khatas / 1 khata / 3 khatas from that of 6 khatas.
- (5) If the cost of 6 khatas is Tk. 24, then the cost of 1 khata will be less / equal / more / double.



(6) 3 baskets can contain 48 mangoes. To find out how many mangoes can contain in 9 baskets, we need to find out first the number of mangoes contain in 2 / 1 / 3 / 9 basket's.

(7) 3 baskets contain 48 mangoes. Then to find the number of mangoes contained in 1 basket, 48 is to be divided / added / multiplied / subtracted by 3 .

2. **Fill in the gaps :**

- (1) —— the cost of 1 object by a fixed number, the cost of that fixed number is obtained.
- (2) If the cost of 1 dozen bananas is Tk. 30, then the cost of 3 dozen bananas is Tk. —— .
- (3) If the cost of 10 eggs is Tk. 40, then the cost of an egg is Tk. —— .
- (4) If the cost of 6 pencils is Tk. 24, then the price of 1 pencil is Tk. —— .
- (5) If the cost of 1 pencil is Tk. 4, then the cost of 3 pencils is Tk. —— .
- (6) If 3 baskets contain 48 mangoes, then 1 basket contains —— mangoes.
- (7) 1 basket contains 8 mangoes. 9 baskets contain —— mangoes.
- (8) If the number of basket decreases, the number of mangoes ——.
- (9) If the number of basket increases, the number of mangoes also — .

3. **Tick (✓) the correct answer :**

- (1) If the cost of 5 pencils is Tk. 20, then what is the cost of 1 pencil ?  
(a) Tk. 15 (b) Tk. 4 (c) Tk. 25 (d) Tk. 12
- (2) If the cost of 1 khata is Tk. 8, then what is the cost of 8 khata?  
(a) Tk. 1 (b) Tk. 16 (c) Tk. 64 (d) Tk. 20
- (3) If the cost of 8 pencils is Tk. 24, then what is the cost of 4 pencils?  
(a) Tk. 12 (b) Tk. 32 (c) Tk. 16 (d) Tk. 28
- (4) If the cost of 1 dozen eggs is Tk. 48, then what is the cost of 6 eggs?  
(a) Tk. 24 (b) Tk. 42 (c) Tk. 72 (d) Tk. 64

4. If the cost of 15 kg. of rice is Tk. 300, then what is the cost of 8 kg. rice?
5. If the cost of 12 metre cloth is Tk. 120, then what is the cost of 15 metre cloth.
6. If the cost of 4 khatas is Tk. 28, then what is the cost of 11 khatas?
7. If the cost of 1 dozen bananas is Tk. 60, then what is the cost of 22 bananas?
8. If the cost of 100 litchies is Tk. 90, then what is the cost of 20 litchies?
9. If the cost of 24 kg. pulse is Tk. 1200, then what is the cost of 13 kg.?
10. If the cost of 5 kg. mutton is Tk. 600, then what is the cost of 8 kg. mutton?
11. If the cost of 6 chairs is Tk. 1200, then what is the cost of 9 chairs?
12. 20 persons can do a work in 15 days. In how many days 15 persons can do the work ?
13. 16 persons can do a work in 5 days. In how many days 20 persons can do the work?
14. 8 persons can reap the crops of a land in 21 days. In how many days 14 persons can reap the crops of the land?
15. 200 persons have food for 20 days. How many persons will eat the food in 40 days?
16. A labourer earns Tk. 490 in a week. In how many days will he earn Tk. 1050?
17. 45 men require a quantity of rice for 20 days. How many men will consume that quantity of rice in 25 days?

18. A hostel of 16 students has enough food for 25 days. Some new students came into the hostel and the food was consumed in 20 days. What is the number of new students?
19. 1200 soldiers in a fort have enough food to last for 28 days. 400 soldiers left the fort. How long would the food last?
20. A hostel of 500 students has enough food for 50 days. After 10 days 300 students came into the hostel. How long would the food last?
21. In a family of 8 persons have food for 26 days. After 5 days one person left the house. How long would the remaining food last?
22. 200 persons can dig a pond in 25 days. How many more persons are to be appointed to dig the pond in 20 days?
23. 30 workers can finish a piece of work in 18 days. How many more workers will be required to complete the work in 12 days?
24. 16 men require 56 kg. of rice for a week. How many kg. of rice are required for 24 men for six weeks?
25. A hostel had 15 days food for 400 students. After 5 days a few students left the hostel. The remaining food lasted for 25 more days. How many students left the hostel?

## Chapter - 5

### Simplification

**Example 1.** Simplify :  $48 - 65 + 378 + 39 - 116 - 7 - 147 + 248$

**Solution :**  $48 - 65 + 378 + 39 - 116 - 7 - 147 + 248$   
 $= (48 + 378 + 39 + 248) - (65 + 116 + 7 + 147)$   
 $= 713 - 335$   
 $= 378$

Answer : 378.

**Let us notice :**

- (a) The positive numbers are added together ;  
 $48 + 378 + 39 + 248 = 713$
- (b) The negative numbers are added together ;  
 $65 + 116 + 7 + 147 = 335$
- (c) Then the second added number is subtracted from the first added number ;  $713 - 335 = 378$
- (d) To add the numbers of the same signs brackets ( ) are used.

**Example 2.** Simplify :  $12 + 29 \times 64 \div 8 \times 3 - 52 \div 13 - 8 \times 30 \div 6$

**Solution :**  $12 + 29 \times 64 \div 8 \times 3 - 52 \div 13 - 8 \times 30 \div 6$   
 $= 12 + 29 \times 8 \times 3 - 4 - 8 \times 5$   
 $= 12 + 232 \times 3 - 4 - 40$   
 $= (12 + 696) - (4 + 40)$   
 $= 708 - 44$   
 $= 664$

Answer : 664.

**Let us notice :**

- In the sum there are functions of addition, subtraction, multiplication and division.
- First the division, later the multiplication and at the end the addition and subtraction have been carried out.

**Example 3.** Simplify :  $5 \times 24 \div 8 \times 3 + 5 - 17 + 18 \div 3$

$$\begin{aligned}
 \text{Solution : } & 5 \times 24 \div 8 \times 3 + 5 - 17 + 18 \div 3 \\
 &= 5 \times 3 \times 3 + 5 - 17 + 6 \\
 &= 5 \times 9 + 5 - 17 + 6 \\
 &= 45 + 5 - 17 + 6 \\
 &= (45 + 5 + 6) - 17 \\
 &= 56 - 17 \\
 &= 39
 \end{aligned}$$

Answer : 39.

**Example 4.** Simplify :  $25 \div 5 \times [5 \times \{24 \div (18 - 15)\}]$

$$\begin{aligned}
 \text{Solution : } & 25 \div 5 \times [5 \times \{24 \div (18 - 15)\}] \\
 &= 25 \div 5 \times [5 \times \{24 \div 3\}] \\
 &= 25 \div 5 \times [5 \times 8] \\
 &= 25 \div 5 \times 40 \\
 &= 5 \times 40 \\
 &= 200
 \end{aligned}$$

Answer : 200.

**Let us notice :**

- In the sum there are functions of first brackets ( ), second brackets { }, third brackets [ ], division, multiplication and subtraction.
- The functions inside the first brackets, second brackets and third brackets have been carried out successively.

**Example 5.** Simplify :  $38 - [13 \times (73 - 46 \div 2 \times 3) - \{45 - 3(7 + 21 \div 7)\}]$

$$\begin{aligned}
 \text{Solution : } & 38 - [13 \times (73 - 46 \div 2 \times 3) - \{45 - 3(7 + 21 \div 7)\}] \\
 &= 38 - [13 \times (73 - 23 \times 3) - \{45 - 3(7 + 3)\}] \\
 &= 38 - [13 \times (73 - 69) - \{45 - 3 \times 10\}] \\
 &= 38 - [13 \times 4 - \{45 - 30\}] \\
 &= 38 - [13 \times 4 - 15] \\
 &= 38 - [52 - 15] \\
 &= 38 - 37 \\
 &= 1
 \end{aligned}$$

Answer : 1.

**Example 6.** Simplify :  $78 - [56 + \{165 - (48 \div 6 \times 9) \times 2\}]$

**Solution :**  $78 - [56 + \{165 - (48 \div 6 \times 9) \times 2\}]$   
 $= 78 - [56 + \{165 - (8 \times 9) \times 2\}]$   
 $= 78 - [56 + \{165 - 72 \times 2\}]$   
 $= 78 - [56 + \{165 - 144\}]$   
 $= 78 - [56 + 21]$   
 $= 78 - 77$   
 $= 1$

Answer : 1.

**Example 7.** Simplify :  $48 \div [4 + 28 \div \{4 + 12 \div (7 - 3)\}]$

**Solution :**  $48 \div [4 + 28 \div \{4 + 12 \div (7 - 3)\}]$   
 $= 48 \div [4 + 28 \div \{4 + 12 \div 4\}]$   
 $= 48 \div [4 + 28 \div \{4 + 3\}]$   
 $= 48 \div [4 + 28 \div 7]$   
 $= 48 \div [4 + 4]$   
 $= 48 \div 8$   
 $= 6$

Answer : 6.

## Exercise - 5

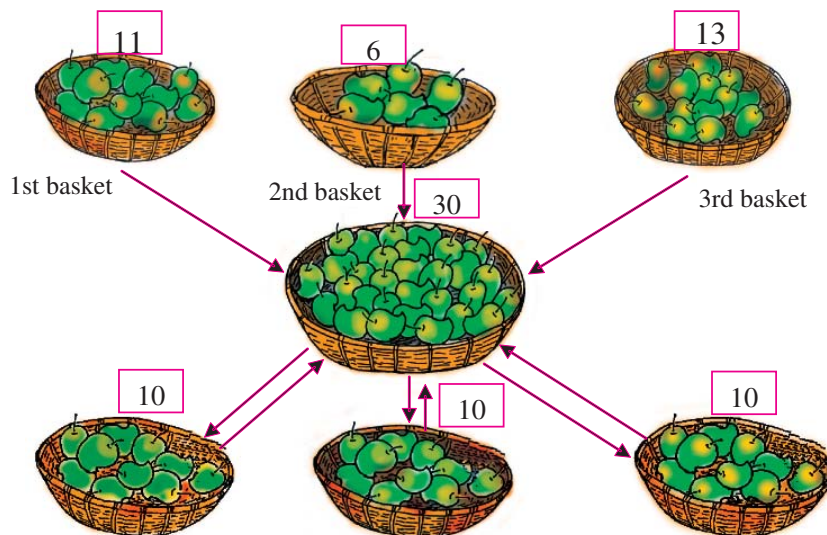
**Simplify :**

1.  $80 + 47 - 43 + 24 - 49$
2.  $688 - 589 + 321 - 301 + 81$
3.  $56 \div 7 - 9 + 121 \div 11$
4.  $2 \times 3 \times 18 \div 6 \times 45 \div 9$
5.  $16 \times 4 + 168 \div 8 - 65 + 48$
6.  $13 \times 4 + 132 \div 12 - 7 \times 52 \div 13 - 12 \div 3 \times 5$
7.  $49 \div 7 - 64 \div 8 + 81 \div 9 - 42 \div 6$
8.  $12 \times 14 + 85 \times 5 - 41 \times 4 - 6 \times 3$

9.  $32 - 2 \times 4 + 12 \times 3 - 6 \times 5 \times 7 + 15 \times 8 \times 3$
10.  $12 \div 6 - 6 \div 2 + 15 \div 5$
11.  $16 \div 4 + 15 \div 3 \times 2$
12.  $9 \times 37 - 6 \times 42 + 4 \times 82 - 3 \times 32 + 8 - 2 \times 3$
13.  $(18 - 9) \times 5 + (20 + 3 - 15)$
14.  $(36 \div 3) \times \{4 \times (5 + 4 - 8 + 1)\}$
15.  $98 - [25 + 3 (11 + 3) - \{36 - 3 (12 - 7)\}]$
16.  $405 - \{146 + (62 \times 4 - 93 + 15 + 3)\}$
17.  $7 - \{502 \div (25 \div 5 \times 5 - 23)\} + 251$
18.  $36 \div 6 \times \{7 \times (15 - 9 - 11 + 7)\}$
19.  $65 - [25 + 2 (13 + 8) - \{25 - 2 (13 - 8)\}]$
20.  $81 \div [6 + 39 \div \{4 + 90 \div (33 - 23)\}]$
21.  $270 - 5 [4 + 81 \div \{93 - (60 \div 5) (35 - 28)\}]$
22.  $107 + 91 \div 13 - \{77 - (85 \div 5 \times 3 + 21)\} - 105$
23.  $82 + [3 \{(99 \div 11) (18 \div 6)\}] - 140$
24.  $49 \div [5 + 24 \div \{5 + 70 \div (33 - 23)\}]$
25.  $67 - [13 \times (73 - 46 \div 2 \times 3) - \{45 - 3 (7 + 21 \div 7)\}]$
26.  $[105 + 91 \div 13 - \{77 - (85 \div 5 \times 3 + 21)\}] - 106$
27.  $65 - 5 [4 + 81 \div \{93 - (60 \div 5) (35 - 28)\}]$
28.  $[36 \div \{2 + 28 \div (4 + 12 \div 4)\}] \div 6$

## Chapter - 6

### Average



It is seen in the above picture that there are 11 mangoes in the first basket, 6 mangoes in the second basket and 13 mangoes in the third basket. If the mangoes of the three baskets are kept in a big basket, then the number of mangoes in the big basket becomes  $(11 + 6 + 13) = 30$ . If there are 10 mangoes in each of the three baskets then the total number of mangoes will be  $10 + 10 + 10 = 30$ . In this case we say, there are 10 mangoes in the three baskets in average.

Here,  $10 = 30 \div 3$

= Total number of mangoes in three baskets  $\div$  number of baskets.

Generally,

Average of more than one expression of the same kind = Sum of the expressions  $\div$  number of the expressions.

In the above example the total number of mangoes in the three baskets was 30 and in average there were 10 mangoes in a basket.

Here,  $10 \times 3 = 30$ .

Generally,

Average  $\times$  number of expressions = sum of the expressions



## Determination of Average

**Example 1.** The ages of Mina, Mithu, Runu, Rani and Nila are 10, 11, 12, 13 and 14 years respectively. What is the average age of them?

**Solution :** Here the sum of expressions =  $(10+11+12+13+14)$  years  
= 60 years

Number of the expressions = 5

$\therefore$  The average of age =  $60 \text{ years} \div 5$   
=  $(60 \div 5) \text{ years} = 12 \text{ years.}$

Answer : The average age is 12 years.

**Example 2.** A cricket player scored 23, 12, 37, 3, 14, 13 runs in six one day matches series. What is his average run in that series?

**Solution :** Total runs =  $23+12+37+3+14+13 = 102$

Number of matches = 6

Therefore, the average of run =  $102 \div 6 = 17$

Answer : He scored 17 runs in average.

**Example 3.** The rainfall in 12 months of a place in Bangladesh in 2004 is as follows :

Month	Quantity of rainfall
January	23 m.m.
February	06 m.m.
March	18 m.m.
April	57 m.m.
May	31 m.m.
June	108 m.m.
July	296 m.m.
August	271 m.m.
September	104 m.m.
October	33 m.m.
November	21 m.m.
December	04 m.m.

What is the average rainfall in a month of 2004 of that place?

**Solution :** Total rainfall

$$= (23 + 06 + 18 + 57 + 31 + 108 + 296 + 271 + 104 + 33 + 21 + 04) \text{ m.m.}$$

$$= 972 \text{ m.m.}$$

Number of months = 12

$$\therefore \text{Monthly average of rainfall} = (972 \text{ m.m.}) \div 12$$

$$= (972 \div 12) \text{ m.m.}$$

$$= 81 \text{ m.m.}$$

Answer : Monthly average of rainfall of that place in 2004 is 81 m.m.

**Example 4.** In a joint business Helen invested Tk. 15,000, Kamal Tk. 20,500, Dalim Tk. 18,000, Titas Tk. 13,500 and Shishir Tk. 17,000. How much did they invest in average?

**Solution :**

15,000
20,500
18,000
13,500
17,000
<hr/>

Total : 84,000

Therefore, total investment = Tk. 84,000

Number of investment = 5

Therefore, average investment = Tk.  $84,000 \div 5$

$$= \text{Tk. } (84,000 \div 5)$$

$$= \text{Tk. } 16,800$$

Answer : Tk. 16,800

**Example 5.** In a test series of five matches, the average run of six batsmen of the visiting team was 76 and the average run of four bowlers was 21. In that series how many runs in average did the players score?

**Solution :** Total runs of the batsmen in 5 games.

$$= 6 \times 76 \times 5 = 76 \times 30 = 2280$$

Total runs of the bowlers in 5 games

$$= 4 \times 21 \times 5 = 21 \times 20 = 420$$

$\therefore$  Grand total of runs =  $2280 + 420 = 2700$

The number of expressions to be considered to determine the average  
$$= \text{Number of players} \times \text{Number of matches.}$$
$$= 10 \times 5 = 50$$

Therefore, average  $= 2700 \div 50 = 54$

Answer : 54 runs.

**Example 6.** The sum of 13 numbers is 1924 and the average of 7 numbers is 172. What is the average of remaining 6 numbers? What is the average of all the numbers?

**Solution :** The sum of 7 numbers  $= 172 \times 7 = 1204$   
So, the sum of remaining 6 numbers  $= 1924 - 1204 = 720$   
Hence the average of 6 numbers  $= 720 \div 6 = 120$   
The average of all numbers i.e. of 13 numbers  
 $= 1924 \div 13 = 148$

Answer : The average of other 6 numbers is 120. The average of all numbers is 148.

**Example 7.** A bus is hired for Tk. 2400 by 60 employees of an industry to go to a picnic on the condition that everybody will bear the expenses equally. But some of the employee did not go to the picnic and thus each employee spent an extra amount of Tk. 8'00. How many employees went to the picnic?

**Solution :** If 60 employees had gone to the picnic then the fare given by each employee would have been  $\text{Tk. } 2400 \div 60 = \text{Tk. } 40$ .

Some employees did not go to the picnic, then fare per employee was  $\text{Tk. } 40 + \text{Tk. } 8 = \text{Tk. } 48$ .

Fare per head  $\times$  Number of the participants in the picnic  
 $= \text{Tk. } 2400$

Therefore, the number of participants in the picnic  $= 2400 \div 48 = 50$

Answer : 50 employees went to the picnic.

## Exercise - 6

1. **Find the average :**  
(a) 23, 37, 47, 61      (b) 22, 46, 60, 72  
(c) Tk. 364, Tk. 541, Tk. 775.  
(d) 47 c.m, 49 c.m, 54 c.m, 52 c.m, 53 c.m.  
(e) 42 kg, 32 kg, 37 kg, 29 kg, 41 kg, 35 kg.  
(f) 90 litre, 92 litre, 89 litre, 86 litre, 93 litre, 85 litre, 95 litre.
2. Lily bought 8 tapes of various prices. The average price of the tapes is Tk. 575. What is the total cost of the tapes Lily bought?
3. In annual examination Molly obtained 68 in Bangla, 96 in Mathematics, 81 in English, 77 in Environmental Studies-Science, 73 in Environmental Studies-Social. What was her average number in each subject ?
4. The heights of Koli, Doli, Poli, Moli and Lily are respectively 123 c.m, 131 c.m, 135 c.m, 126 c.m and 130 c.m. What is their average height ?
5. The average age of Apu and Dipu is 22 years and that of Dipu and Tipu is 23 years. The age of Apu is 21 years. What are the ages of Dipu and Tipu?
6. The sum of 7 numbers is 401. The average of their first 3 numbers is 56 and that of their last 3 numbers is 58. What is the fourth number?
7. Among 11 numbers, the average of first 6 numbers is 87 and the average at last 5 numbers is 131. What is the average of all numbers?
8. In a union, the population of 5 villages are respectively 1327, 1872, 2187, 2516 and 2943. What is the average population of the villages?
9. In annual examination the marks ten students secured in mathematics are as follows: 76, 61, 87, 56, 42, 64, 73, 68, 50, 73. What is their average number?
10. The average age of three children and their father is 17 years. The average age of those three children and their mother is 16. The mother's age is 34 years. What is the age of the father?
11. In Dhaka in the month of Ashar the daily average rainfall in first 10 days is 23 m.m, in second 10 days is 27 m.m, in third 10 days is 29 m.m and in the last day is 16 m.m. What is the average rainfall in that month in Dhaka?

## Chapter - 7

### H.C.F. and L.C.M.

#### Highest Common Factor (H.C.F.)

Let us consider the factors (divisors) of three numbers 18, 24, 30.

**All factors of 18** : ①,②,③,⑥, 9, 18

**All factors of 24** : ①,②,③, 4,⑥, 8, 12, 24

**All factors of 30** : ①,②,③, 5 ,⑥, 10, 15, 30

So, the common factor / divisor of the three numbers are 1, 2, 3, 6. Among them 6 is the greatest. So, 6 is the highest common factor or H.C.F. of 18, 24, 30.

The common prime factors of the three numbers are 2 and 3, whose product is equal to H.C.F.

The greatest common divisor (factor) of more than one number is their Highest Common Factor (H.C.F.)

H.C.F. of more than one number = the product of common prime factors. If the numbers do not have any common prime factor then their H.C.F. is 1.

The other name of divisor is factor.

#### Determination of H.C.F. by prime factorization :

**Example 1.** Find the H.C.F. of 40, 60 and 75.

**Solution :**  $40 = 2 \times 20 = 2 \times 2 \times 10 = 2 \times 2 \times 2 \times 5$

$60 = 3 \times 20 = 3 \times 2 \times 2 \times 5$

$75 = 3 \times 25 = 3 \times 5 \times 5$

It is seen that, 5 is the only prime factor (divisor) of the three numbers 40, 60, 75.

$\therefore$  Their H.C.F. is 5.

Answer : 5.

**Example 2.** Find the H.C.F. of 48, 72, 168.

**Solution :**  $48 = 6 \times 8 = 2 \times 3 \times 2 \times 2 \times 2 = 2 \times 2 \times 2 \times 2 \times 3$

$$72 = 8 \times 9 = 2 \times 2 \times 2 \times 3 \times 3$$

$$168 = 8 \times 21 = 2 \times 2 \times 2 \times 3 \times 7$$

It is seen that, 2, 2, 2, 3 are the prime factors of the three numbers 48, 72, 168.

So, the H.C.F. of the three numbers  $= 2 \times 2 \times 2 \times 3 = 24$

Answer : 24.

**Example 3.** Find the H.C.F. of 24, 30, 77.

**Solution :**  $24 = 3 \times 8 = 3 \times 2 \times 2 \times 2 = 2 \times 2 \times 2 \times 3$

$$30 = 5 \times 6 = 5 \times 2 \times 3 = 2 \times 3 \times 5$$

$$77 = 7 \times 11$$

It is seen that, the three numbers 24, 30, 77 have no common prime factor. So, 1 is the only common prime factor of the given numbers. So 1 is their H.C.F.

Answer : 1.

If more than 1 numbers do not have common prime factor then their H.C.F. is 1

### **Determination of H.C.F. by the method of division**

To determine the H.C.F. of 18 and 84, first, we divide the large number by the smaller number. Here, dividing 84 by 18 we get the remainder 12. In the second step, we divide the smaller number by the remainder 12. Now the remainder is 6. In the third step, we divide the remainder of the previous step by the remainder 6 of that step,  $12 = 6 \times 2$ , thus the remainder becomes zero and the process of division is finished. The last divisor is the H.C.F. of the given numbers.

This is shown below in a normal process :

$$\begin{array}{r}
 18) 84 \text{ (4)} \\
 \underline{72} \\
 12) 18 \text{ (1)} \\
 \underline{12} \\
 6) 12 \text{ (2)} \\
 \underline{12} \\
 0
 \end{array}$$

**Explanation :** Always, dividend = quotient  $\times$  divisor + remainder.  
The above example has three steps :

$$(a) \ 84 = 4 \times 18 + 12 \quad (b) \ 18 = 1 \times 12 + 6 \quad (c) \ 12 = 2 \times 6$$

It is seen from (c) that 6 is the factor of 12. So from (b) it is seen that 6 is one of the factors of 18. Then from (a) it is seen that 6 is a factor of 84. Hence, 6 is the common factor of 18 and 84.

Conversely, it can be understood from (a) that the common factor of 84 and 18 will also be a factor of 12. So it can be observed from (b) that the factor will also be a factor of 6 i.e any common factor of 18 and 84 is also a common factor of 6. Hence, 6 is the highest common factor (or H.C.F.) of 18 and 84.

The method of finding H.C.F. by division is known as **Euclid's Method.**

**Example 4.** Find the H.C.F. of 171 and 561.

**Solution :**

$$\begin{array}{r}
 171) 561 \text{ (3)} \\
 \underline{513} \\
 48) 171 \text{ (3)} \\
 \underline{144} \\
 27) 48 \text{ (1)} \\
 \underline{27} \\
 21) 27 \text{ (1)} \\
 \underline{21} \\
 6) 21 \text{ (3)} \\
 \underline{18} \\
 3) 6 \text{ (2)} \\
 \underline{6} \\
 0
 \end{array}$$

Required H.C.F. = Last divisor = 3  
Answer : 3

In finding the H.C.F. by Euclid's Method, the quotients obtained in different steps have no role; the last remainder is the required H.C.F. In one application of Euclid's Method, the H.C.F. of only two numbers can be determined.

**Example 5.** Find the H.C.F. of 143, 231 and 385.

**Solution :** At first find the H.C.F. of 231 and 385.

$$\begin{array}{r}
 231 \overline{) 385} (1 \\
 \underline{231} \\
 154 \overline{) 231} (1 \\
 \underline{154} \\
 77 \overline{) 154} (2 \\
 \underline{154} \\
 0
 \end{array}$$

Therefore, the H.C.F. of 231 and 385 is 77.

Now we find the H.C.F. of 77 and 143.

$$\begin{array}{r}
 77 \overline{) 143} (1 \\
 \underline{77} \\
 66 \overline{) 77} (1 \\
 \underline{66} \\
 11 \overline{) 66} (6 \\
 \underline{66} \\
 0
 \end{array}$$

Answer : 11.

**Explanation :** Any common factor of 143, 231 and 385 is also factor of 77 and 385. Again, any factor of 77 and 385 is also factor of 143, 231 and 385. So, H.C.F. of 143, 231 and 385 = H.C.F. of 77 and 385.

**Remarks :** Example 5. could be solved by two other methods :

First by finding the H.C.F. of 143 and 231;

or, by finding the H.C.F. of 143 and 385.

As we have at first determined the H.C.F. of two greater numbers, the work has become easier.



**Example 6.** Find the H.C.F. of 231, 304 and 418.

**Solution :** First, we determine the H.C.F. of 304 and 418.

$$\begin{array}{r}
 304 \overline{) 418} \quad (1 \\
 \underline{304} \phantom{0} \\
 114 \phantom{0} \quad 304 \quad (2 \\
 \underline{228} \phantom{0} \\
 76 \phantom{0} \quad 114 \quad (1 \\
 \underline{76} \phantom{0} \\
 38 \phantom{0} \quad 76 \quad (2 \\
 \underline{76} \\
 0
 \end{array}$$

$\therefore$  The H.C.F. of 304 and 418 is 38.

Now, we find the H.C.F. of 38 and 231.

$$\begin{array}{r}
 38 \overline{) 231} \quad (6 \\
 \underline{228} \phantom{0} \\
 3 \phantom{0} \quad 38 \quad (12 \\
 \underline{3} \phantom{0} \\
 8 \phantom{0} \\
 \underline{6} \phantom{0} \\
 2 \phantom{0} \quad 3 \quad (1 \\
 \underline{2} \phantom{0} \\
 1 \phantom{0} \quad 2 \quad (2 \\
 \underline{2} \\
 0
 \end{array}$$

So, the H.C.F. of 38 and 231 is 1. Hence, the H.C.F. of the three given numbers is 1.

Answer : 1.

### Lowest Common Multiple (L.C.M)

Some of multiples of 18, 24 and 27 are written :

**Multiples of 18 :** 18, 36, 54, 72, 90, 108, 126, 144, 162, 180, 198, 216, 234, etc.

**Multiples of 24:** 24, 48, 72, 96, 120, 144, 168, 192, 216, 240, etc.

**Multiples of 27:** 27, 54, 81, 108, 135, 162, 189, 216, 243, etc.

216 is found in every row of the multiples. So, the number 216 is common multiple of 18, 24 and 27. There is no number in any of the three rows which is less than 216. So, 216 is the **Lowest or**

**Least Common Multiple (L.C.M)** of 18, 24 and 27.

### Find the L.C.M. by Prime Factors.

**Example 7.** Find L.C.M. of 18, 24 and 30.

**Solution :**

$$18 = 2 \times 3 \times 3$$

$$24 = 2 \times 2 \times 2 \times 3$$

$$30 = 2 \times 3 \times 5$$

In the prime factors of three numbers 2 occurs in maximum 3 times (as factors of 24) and 3 occurs twice (as factors of 18) and 5 occurs once (as factors of 30). So, the L.C.M. of 18, 24, 30

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

$$= 4 \times 9 \times 5 = 360$$

Answer : 360.

### Determination of L.C.M. by Short Method.

In this method all prime factors of the given numbers are obtained one by one. The product of these prime factors is the L.C.M. of the given numbers.

**Example 8.** Find the L.C.M. of 18, 24 and 40.

**Solution :**

2	18, 24, 40
2	9, 12, 20
2	9, 6, 10
3	9, 3, 5
	3, 1, 5

So the required L.C.M. =  $2 \times 2 \times 2 \times 3 \times 3 \times 5 = 360$

Answer : 360.

**Explanation :** 24 is divided by 2 thrice. The last quotient is 3 which is the prime number. So,  $24 = 2 \times 2 \times 2 \times 3$ .

18 is divided by 2 once and the quotient 9 is divided by 3 twice. The last quotient is 1. So,  $18 = 2 \times 3 \times 3$ .

40 is divided by 2 thrice, the last quotient is 5, which is the prime number. So,  $40 = 2 \times 2 \times 2 \times 5$ .

Here, L.C.M. of 18, 24, 40 =  $2 \times 2 \times 2 \times 3 \times 3 \times 5 = 360$ .

The method of finding L.C.M. by short method is the unified form of finding the prime factor.

In each step at least two of the given numbers are divided by a suitable prime number. The quotients of the numbers exactly divisible by the factors are written below the lines and indivisible numbers are written again. Similar work has been done with the numbers of the next one.

**Example 9.** Find the L.C.M. of 16, 24, 30, 42, 45.

**Solution :**

2	16, 24, 30, 42, 45
2	8, 12, 15, 21, 45
2	4, 6, 15, 21, 45
3	2, 3, 15, 21, 45
5	2, 1, 5, 7, 15
	2, 1, 1, 7, 3

So required L.C.M. =  $2 \times 2 \times 2 \times 3 \times 5 \times 2 \times 7 \times 3 = 5040$

Answer : 5040.

### Easy Problems Concerning H.C.F. and L.C.M.

**Example 10.** What is the greatest number by which dividing 138, 215, 457 leaves remainders of 3, 5, 7 respectively?

**Solution :**  $138 - 3 = 135$ ,  $215 - 5 = 210$ ,  $457 - 7 = 450$ .

135, 210 and 450 will be divisible by the required number.

This number is the H.C.F. of 135, 210, 450.

$\begin{array}{r} 210) 450 \ (2 \\ \underline{420} \\ 30) 210 \ (7 \\ \underline{210} \\ 0 \end{array}$	$\begin{array}{r} 30) 135 \ (4 \\ \underline{120} \\ 15) 30 \ (2 \\ \underline{30} \\ 0 \end{array}$
---	--

So, H.C.F. of 210 and 450 is 30.

$\therefore$  The greatest number is 15.

Again, H.C.F. of 30 and 135 is 15.

Answer : 15.

**Example 11.** Four bells rang together at first and then they started to ring at an interval of 6, 9, 12 and 15 seconds respectively. When will they ring together again?

**Solution :** Minimum time to be determined is equal to the L.C.M. of 6, 9, 12, 15.

$$\begin{array}{r} 3 \overline{) 6, 9, 12, 15} \\ 2 \overline{) 2, 3, 4, 5} \\ 1, 3, 2, 5 \end{array}$$

So, the L.C.M. of the four numbers =  $3 \times 2 \times 3 \times 2 \times 5 = 18 \times 10 = 180$ .  
Hence, four bells will ring after minimum 180 seconds = 3 minutes.  
Answer : 3 minutes.

**Example 12.** Find the least number which when divided by 6, 10, 15 and 21 will leave remainders 4 in each case.

**Solution :** The least number to be determined will be 4 more than the L.C.M. of 6, 10, 15 and 21.

$$\begin{array}{r} 3 \overline{) 6, 10, 15, 21} \\ 2 \overline{) 2, 10, 5, 7} \\ 5 \overline{) 1, 5, 5, 7} \\ 1, 1, 1, 7 \end{array}$$

So, the L.C.M. of the numbers =  $3 \times 2 \times 5 \times 7 = 21 \times 10 = 210$ .  
Hence, the required least number =  $210 + 4 = 214$ .  
Answer : 214.

**Example 13 :** Find the least number which when divided by 4, 6, 10, 16 will leave remainders 2, 4, 8, 14 respectively.

**Solution :**  $4 - 2 = 2$ ,  $6 - 4 = 2$ ,  $10 - 8 = 2$ ,  $16 - 14 = 2$   
i.e. in each case, divisor – remainder = 2; so the required least number of 4, 6, 10 and 16 will be 2 less than the L.C.M.

$$\begin{array}{r} 2 \overline{) 4, 6, 10, 16} \\ 2 \overline{) 2, 3, 5, 8} \\ 1, 3, 5, 4 \end{array}$$

So, the L.C.M. of the numbers =  $2 \times 2 \times 3 \times 5 \times 4 = 12 \times 20 = 240$ .  
Hence, the required least number =  $240 - 2 = 238$ .  
Answer : 238

**Example 14.** A rectangular room is of 7·20 metres in length and 4·40 metres in breadth. What is the biggest size of marble slab that can be used to cover the floor without breaking any part of it?

**Solution :** The length of the room = 7·20 m. = 72 d.m., breadth = 4·40 m. = 44 d.m. As the stone is square and nonbreakable, the length of its side should be common factor of length and breadth . So the length of the greatest square size stone in d.m. will be equal to the H.C.F. of 72 and 44.

$$72 = 8 \times 9 = 2 \times 2 \times 2 \times 3 \times 3$$

$$44 = 4 \times 11 = 2 \times 2 \times 11$$

$$\therefore \text{H.C.F. of 72 and 44} = 2 \times 2 = 4$$

$$4 \text{ d.m.} = 40 \text{ c.m.}$$

Answer : The length of the side of the greatest square size stone is 40 c.m.

### Exercise - 7

1. Find the H.C.F. by prime factor :  
(a) 144, 192                      (b) 160, 275                      (c) 112, 343  
(d) 24, 60, 72                      (e) 45, 75, 120                      (f) 22, 77, 110  
(g) 48, 72, 160, 240                      (h) 35, 56, 84, 119                      (i) 30, 50, 90, 140  
(j) 36, 48, 84, 156
2. Find the H.C.F. by Euclid's Method :  
(a) 90, 325                      (b) 76, 361                      (c) 115, 810  
(d) 154, 484                      (e) 336, 730                      (f) 1769, 2378  
(g) 77, 231, 352                      (h) 117, 183, 303                      (i) 56, 147, 357  
(j) 75, 225, 390
3. Find the L.C.M. by prime factor :  
(a) 51, 85                      (b) 76, 95                      (c) 42, 112  
(d) 32, 48, 80                      (e) 35, 55, 75                      (f) 28, 42, 70

4. Find the L.C.M. by short method :  
(a) 24, 36, 40      (b) 15, 33, 45      (c) 25, 45, 85  
(d) 21, 35, 49, 56      (e) 24, 36, 48, 72      (f) 18, 27, 45, 54  
(g) 26, 44, 77, 99      (h) 12, 18, 24, 30, 42      (i) 15, 25, 35, 45, 55
5. What is the greatest number which if divided by 76, 114 and 228 will leave no remainder?
6. What is the highest number of boys and girls among whom 60 mangoes and 150 litchies may be distributed equally. How many mangoes and litchies will each get?
7. Two drums have the capacity to contain 228 litres and 348 litres of liquid. What should be the highest capacity of a pitcher that can be used in full number of times to fill both the drums. How many pitchers of water each drums can contain?
8. What is the greatest number which if divided by 137, 212 and 452 will leave 2 in each case?
9. What is the greatest number which if divided by 129, 236 and 364 will leave remainder of 3, 5 and 7 respectively.
10. A rectangular hall room is 12.25 metres in length and 7.75 metres in breadth. What is the biggest square size tile that can be used to cover the floor of the room without breaking any of them?
11. What is the least number which if divided by 18, 24, 30, 36 will leave no remainder?
12. What is the least number which when divided by 16, 24, 32, 40 gives the same remainder 6?
13. What is the least number which when divided by 12, 18, 30 gives the remainders 6, 12, 24 respectively ?
14. Four bells rang at the same time and then in an interval of 5, 7, 12 and 15 seconds respectively. After what interval of time will they again ring together?
15. Some plants are planted in rows each contains 3, 5, 6, 8, 10 and 15 numbers, in each case two remains left. What is the least number of the plants?
16. What is least number which is exactly divisible by 15, 18, 20, 24 and 32 after adding 7 to it ?

## Chapter - 8

# Mathematical Symbols and Sentences

Various types of symbols are used in mathematics. e.g.

### Numeral symbols

0	1	2	3	4	5	6	7	8	9
Zero	One	Two	Three	Four	Five	Six	Seven	Eight	Nine

all numbers can be written by these ten symbols. The numeral symbols used in writing number are known as digits. As for examples, 786 is the number of 3 digits whose ones digit is 6, tens digit is 8 and hundreds digit is 7.

**It is noticed :** 1, 2, 3, 4, 5, 6, 7, 8, 9 each of these numbers is a number of one digit.

### Procedural Symbols :

+	-	×	÷
Plus sign	Minus sign	Multiplication sign	Division sign

### Relation Symbols :

=	>	<	≠	⋈	⋈
Equal	Greater	Less	Not equal	Not greater	Not less

### Bracket Symbols :

( )	{ }	[ ]
First bracket	Second bracket	Third bracket

**Special Symbols :** e.g.  $\square$

**Letter Symbols :** e.g., **x, y, z.**

To indicate unknown quantity, the special symbol or letter symbol is used.

**Example 1.** Express the problem by symbol and find out the unknown number.

- If we add a number with 19 the sum is 72. What is that number?
- If we divide a number by 7, the quotient is 15. What is that number?

**Solution :** (a) Choosing the symbol  $\square$  for the unknown number the problem becomes :

$$\square + 19 = 72 \text{ then, } \square = \text{what ?}$$

Subtraction is the reverse process of addition.

So, the number  $\square$  will be the difference of 19 from 72.

$$\therefore \square = 72 - 19 = 53$$

Answer : 53.

(b) Choosing the letter symbol X for the unknown number the problem becomes :

$$X \div 7 = 15 \text{ then, } X = \text{what ?}$$

Multiplication is the reverse process of division, so the number X will be the product of 15 and 7.

$$\therefore X = 15 \times 7 = 105$$

Answer : 105.

### **Numeral Expression :**

Combining various numbers by procedural symbol and necessary brackets a numeral expression is formed e.g.,

$$(36 \div 4) \times 5 - 7$$

Mathematical sentence containing special symbols or letter symbols is known as **Open Sentence**.

**Example 2.** Form mathematical open sentence from the following sentences using letter symbols . “33 litchies are distributed among a few boys and girls. Everyone has got 6 litchies and 3 remained undistributed”.

**Solution:** Here, the number of boys and girls is unknown.

Let us suppose that X is the number of boys and girls.

Every one has got 6 litchies;

So X persons have got  $6 \times X$  litchies.

According to the question  $6 \times X + 3 = 33$

If the 3 undistributed litchies are left then the number of litchies is  $= 33 - 3 = 30$ .  $\therefore 6 \times X = 30$

30 is the 6 times of X. So X is one sixth of 30. i.e.

$$X = 30 \div 6 = 5$$

Answer : Required open sentence :  $6 \times X + 3 = 33$

The value of X (number of boys and girls) = 5.



**Example 3.** Form Mathematical open sentence from the following sentences using symbol  $\leq$  (small and equal) the same symbol as  $\neq$  and letter symbols. Determine whether the sentence is true in terms of the different values of the letter symbol.

“21 lozenges are equally distributed among 5 children.”

**Solution :** Let us suppose that  $x$  number of lozenges is distributed to each child. Here, the value of  $x$  may be 1, 2, 3... .... So 5 children got  $5 \times x$  lozenges. According to the question this number is either less than 21 or equal to 21. i.e.  $5 \times x \leq 21$   
 Now  $5 \times 1 = 5$ ,  $5 \times 2 = 10$ ,  $5 \times 3 = 15$  and  $5 \times 4 = 20$ . Every one of these multiples is less than 21. But  $5 \times 5 = 25$ ,  $5 \times 6 = 30$ ,...; So, other multiples of 5 are greater than 21. So the open sentence is true for  $x$ . when its values are only 1, 2, 3, 4.

Answer : Required open sentence  $5 \times x \leq 21$ .

This is true if and only if  $x = 1, 2, 3$  or  $4$

**Example 4.** Form the indicated numeral expression using bracket and find the expression .

- (a) Dividing 72 by 8, the quotient is multiplied by 3.
- (b) 72 is divided by the product of 8 and 3.

**Solution :** (a) Required numeral expression  $(72 \div 8) \times 3$ .

Determination of value :  $72 \div 8 = 9$  and  $9 \times 3 = 27$  (Answer)

(b) Required numeral expression  $72 \div (8 \times 3)$ .

Determination of value :  $8 \times 3 = 24$  and  $72 \div 24 = 3$  (Answer)

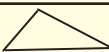
### Mathematical Sentence and Open Sentence

Mathematical sentence is such a statement containing, numbers, symbols, expressions or mathematical conception which can be easily ascertained true or false. e.g.,  $(72 \div 8) \times 3 = 72 \div (8 \times 3)$

From example 4 we see that this mathematical sentence is false.

The example of true mathematical sentence is “Every triangle has three sides and three angles”

The statement concerning mathematical affairs which can be ascertained easily as false or true is known as mathematical statement, e.g.,

Statement	True / False
• 87 is a prime number.	False
• The triangle in the picture  is a right angle triangle.	False
• 81 is a square number.	True

The mathematical statement containing letter symbol or unknown number or expression is known as open sentence. e.g.,

$$72 \div (8 \times 3) = (x \div 8) \times 3$$

**Example 5.** What is the value of the letter symbol for which the open sentence  $(x \div 8) \times 3 = 72 \div (8 \times 3)$  is true ?

**Solution :**  $72 \div (8 \times 3) = 72 \div 24 = 3.$

$$\therefore (x \div 8) \times 3 = 3 \text{ (This should be)}$$

$$\text{As } 1 \times 3 = 3, \text{ so } x \div 8 = 1$$

$$\therefore 8 \div 8 = 1. \text{ Hence, } x = 8$$

Answer : 8

### Successive addition

**Example 6.**  $1 + 3 + 5 + 7 + 9 + 11 + 13 + 15 =$  How much ?

**Solution :** Let us take the required summation as  $= x$

$$\text{On one side, } x = 1 + 3 + 5 + 7 + 9 + 11 + 13 + 15$$

$$\text{On the other side, } x = 15 + 13 + 11 + 9 + 7 + 5 + 3 + 1$$

Adding two expressions of right side termwise we get

$$x + x = 16 + 16 + 16 + 16 + 16 + 16 + 16 + 16$$

$$\text{or, } 2 \times x = 16 \times 8 = 128$$

$$\therefore x = 128 \div 2 = 64$$

Answer : 64.

**Explanation :** The expression of the example is a series. The terms of the original series are written in reverse order. Then adding them term wise we have got the same number 16 in each term. In that case the number of terms of the series = Number of terms of the original series = 8.

$$\text{So, } 2 \times x = 16 \times 8.$$

It can be noticed that every term of the given series has 2 in excess from the previous term i.e. the difference of a term from previous term is a fixed number. Such a series is known as **arithmetic progression**. The sum of terms of any arithmetic progression may be obtained by the method shown below :

**Example 7.**  $1 + 3 + 9 + 27 + 81 =$  How much?

**Solution :** This series, each term is three times of the previous term.

Let the required summation = x, then

$$x = 1 + 3 + 9 + 27 + 81$$

Therefore,  $3 \times x = 3 + 9 + 27 + 81 + 243$

$$\text{Again, } 1 \times x = 1 + 3 + 9 + 27 + 81$$

Subtracting two expressions to the right side

$$3 \times x - 1 \times x = -1 + 243 \text{ [ Equal term is deleted ]}$$

$$\text{or, } 2 \times x = 242$$

$$\therefore x = 242 \div 2 = 121$$

Answer : 121.

**Explanation :** In this example, each term is three times of the previous term. For this reason,  $3 \times x$  series is formed and from this series  $x = 1 \times x$  series is subtracted. Eventually from the last term of  $3 \times x$  series first term of  $x$  series is subtracted as the other terms of the two series are arranged as indicated. This type of series is called **geometric progression**. The summation of the terms of any geometric progression may be obtained by the shown method.

**Exercise - 8**

1. Express by symbol :
  - (a) Three lac thirty.
  - (b) Five crore fifty two lac seventy thousand seven hundred seven.
  - (c) Dividing three hundred forty three by seven and subtraction of twenty nine from the quotient.
  - (d) Division of eight times of forty by the difference of fifty one and twenty six.
  - (e) Subtracting seven thousand nine hundred seventy two from eight thousand five hundred eighty seven, multiplication of that difference by sum of one hundred twenty seven and eighty two.
2. Express by using procedural symbol and relation symbol:
  - (a) The difference of sum of three hundred forty seven and four hundred twenty three from eight hundred eighteen is equal to difference of three hundred forty seven and then that of four hundred twenty three from eight hundred eighteen.
  - (b) The product obtained by multiplying one hundred twenty seven by sum of forty three and sixteen is equal to sum of the products of one hundred twenty seven with forty three and one hundred twenty seven with sixteen.
  - (c) The number obtained by multiplying the quotient of seventy five and five with three is not equal to the number obtained by dividing seventy five by the product of five and three.
3. Find out whether the following statements are true and write True / False at the end of each statement :
  - (a)  $347 - (189 - 65) = 347 - 189 + 65$
  - (b)  $(285 \div 5) \times 3 = 285 \div (5 \times 3)$
  - (c)  $(134 + 78 + 49) \times 7 = 134 \times 7 + 78 \times 7 + 49 \times 7$

4. What are the values of letter symbol for the open sentences below are true ?
- (a)  $(x + 15) \times 3 = 90$
  - (b)  $7 \times x < 50$
  - (c)  $(x \div 6) + 5 = 12$
5. Form open sentence putting letter symbol in the place of unknown number and find the unknown number :
- (a) Montu had a few marbles. He gave four marbles to Pintu. Thus Montu had eight marbles left.
  - (b) Piya has some money. Her mother gave her taka fifty in addition. The money she has now is ten taka more than the double of the first amount of money.
  - (c) Tushar's father gave him some money for shopping. His mother gave him Tk. 50 in addition. Tushar bought fish for Taka one hundred sixty, chicken for Taka seventy five and vegetables for Taka thirty eight. After shopping he had Taka twenty seven left.
6. Find the successive sum :
- (a)  $1 + 4 + 7 + 10 + 13 + 16 + 19$
  - (b)  $2 + 6 + 10 + 14 + 18 + 22 + 26 + 30$
  - (c)  $3 + 8 + 13 + 18 + 23 + 28$
  - (d)  $1 + 2 + 4 + 8 + 16 + 32 + 64$
  - (e)  $2 + 6 + 18 + 54 + 162$

## Chapter - 9

# Common Fractions

### Fractions with the Same Denominator

$\frac{3}{5}$  is a fraction having 3 as numerator and 5 as denominator.

$\frac{2}{5}$  is a fraction having 2 as numerator and 5 as denominator.

The two fractions have the same denominator 5. These are fractions with the same denominator.

The denominators of the two fractions  $\frac{3}{5}$  and  $\frac{1}{6}$  are different.

These fractions may be expressed with the same denominator.

$$\frac{3}{5} = \frac{3 \times 6}{5 \times 6} = \frac{18}{30}$$

$$\frac{1}{6} = \frac{1 \times 5}{6 \times 5} = \frac{5}{30}$$

The two fractions have been reduced to fractions with the same denominator 30.

**Example 1.** Reduce  $\frac{3}{4}$ ,  $\frac{7}{8}$  and  $\frac{11}{12}$  to fractions with denominator 48.

$$\begin{array}{ll} \text{Solution : } 48 \div 4 = 12 & \therefore \frac{3}{4} = \frac{3 \times 12}{4 \times 12} = \frac{36}{48} \\ 48 \div 8 = 6 & \therefore \frac{7}{8} = \frac{7 \times 6}{8 \times 6} = \frac{42}{48} \\ 48 \div 12 = 4 & \therefore \frac{11}{12} = \frac{11 \times 4}{12 \times 4} = \frac{44}{48} \end{array}$$

$$\text{Answer : } \frac{3}{4} = \frac{36}{48}, \frac{7}{8} = \frac{42}{48}, \frac{11}{12} = \frac{44}{48}.$$

Here 48 is a common multiple of the denominators of the given fractions.

### Fractions with the Same Numerator

$\frac{6}{7}$  is a fraction having 6 as numerator and 7 as denominator.

$\frac{6}{13}$  is a fraction having 6 as numerator and 13 as denominator.

The numerators of the two fractions are 6. These are fractions with the same numerator.

$\frac{5}{7}$  and  $\frac{3}{8}$  have different numerators. They can be expressed as fractions with the same numerator.

$$\frac{5}{7} = \frac{5 \times 3}{7 \times 3} = \frac{15}{21}$$

$$\frac{3}{8} = \frac{3 \times 5}{8 \times 5} = \frac{15}{40}$$

The two fractions are reduced to fractions with the same numerator 15.

**Example 2.**  $\frac{2}{9}$ ,  $\frac{3}{10}$ ,  $\frac{4}{17}$  as fractions with numerator 12.

**Solution :**  $12 \div 2 = 6 \quad \therefore \frac{2}{9} = \frac{2 \times 6}{9 \times 6} = \frac{12}{54}$

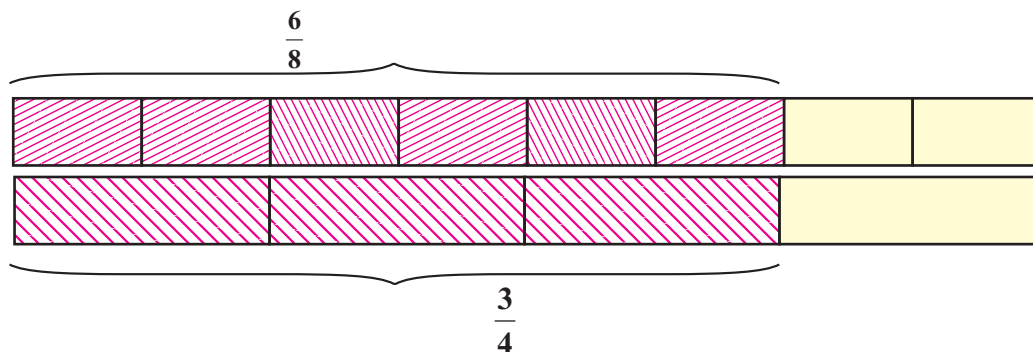
$$12 \div 3 = 4 \quad \therefore \frac{3}{10} = \frac{3 \times 4}{10 \times 4} = \frac{12}{40}$$

$$12 \div 4 = 3 \quad \therefore \frac{4}{17} = \frac{4 \times 3}{17 \times 3} = \frac{12}{51}$$

Answer :  $\frac{2}{9} = \frac{12}{54}$ ,  $\frac{3}{10} = \frac{12}{40}$ ,  $\frac{4}{17} = \frac{12}{51}$

Here 12 is a common multiple of the numerators of the given fractions.

## Lowest Form of Fractions



It is seen that,  $\frac{6}{8} = \frac{3}{4}$   
 i.e.,  $\frac{6}{8}$  and  $\frac{3}{4}$  are equivalent fractions.

Omitting the common factors of numerator and denominator of  $\frac{6}{8}$  we get,

$$\frac{6}{8} = \frac{1 \times \cancel{2} \times 3}{1 \times \cancel{2} \times 2 \times 2} = \frac{3}{2 \times 2} = \frac{3}{4}$$

The lowest form of  $\frac{6}{8}$  is  $\frac{3}{4}$

The lowest form of a fraction is obtained by omitting the common factors of the numerator and the denominator of the fraction.

**Example 3.** Express  $\frac{48}{72}$  into lowest form.

**Solution :** 
$$\frac{48}{72} = \frac{\cancel{2} \times \cancel{2} \times \cancel{2} \times 2 \times \cancel{3}}{\cancel{2} \times \cancel{2} \times \cancel{2} \times 3 \times \cancel{3}}$$

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

Answer :  $\frac{2}{3}$ .



**Example 4.** Express  $\frac{2}{3}$ ,  $\frac{5}{6}$ ,  $\frac{4}{9}$  and  $\frac{7}{12}$  into lowest form of fraction with the same denominator.

**Solution :** Here, the denominators of the fractions are 3, 6, 9 and 12.

$$\begin{array}{r} \text{Now, } 2 \overline{) 3, 6, 9, 12} \\ 3 \overline{) 3, 3, 9, 6} \\ 1, 1, 3, 2 \end{array}$$

$\therefore$  The L.C.M. of 3, 6, 9 and 12 =  $2 \times 3 \times 3 \times 2 = 36$

$$36 \div 3 = 12 \quad \therefore \frac{2}{3} = \frac{2 \times 12}{3 \times 12} = \frac{24}{36}$$

$$36 \div 6 = 6 \quad \therefore \frac{5}{6} = \frac{5 \times 6}{6 \times 6} = \frac{30}{36}$$

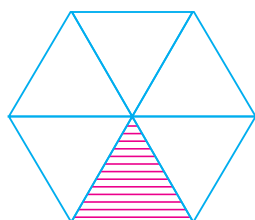
$$36 \div 9 = 4 \quad \therefore \frac{4}{9} = \frac{4 \times 4}{9 \times 4} = \frac{16}{36}$$

$$36 \div 12 = 3 \quad \therefore \frac{7}{12} = \frac{7 \times 3}{12 \times 3} = \frac{21}{36}$$

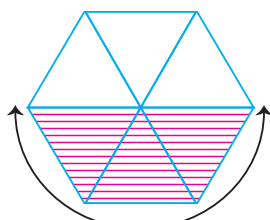
$$\text{Answer : } \frac{2}{3} = \frac{24}{36}, \frac{5}{6} = \frac{30}{36}, \frac{4}{9} = \frac{16}{36}, \frac{7}{12} = \frac{21}{36}.$$

The least denominator of more than one fractions is the common multiple of their denominators. So at first L.C.M. of the denominators is obtained then considering this L.C.M. as common denominator the fractions are expressed as fractions with the same denominator.

### Comparison of Fractions



$$\frac{1}{6}$$



$$\frac{3}{6}$$

$$\frac{3}{6} > \frac{1}{6}$$

$\frac{1}{6}$  and  $\frac{3}{6}$  both have the same denominator 6; but numerator  $3 > 1$ .

Among fractions with the same denominator the fraction with greater numerator is the greater fraction.

**Example 5.** Using symbol, show which one of the two fractions  $\frac{5}{24}$  and  $\frac{11}{24}$  is greater.

**Solution :** Here the denominators of the two fractions are the same. Their numerators are 5 and 11.

Since  $11 > 5$  So,  $\frac{11}{24} > \frac{5}{24}$

**Example 6.** Using symbol, show which one of the fractions  $\frac{7}{12}$  and  $\frac{3}{4}$  is greater.

**Solution :** Here the denominators of the two fractions are 12 and 4.

Now, 
$$\begin{array}{r} 2 \overline{) 12, 4} \\ 2 \overline{) 6, 2} \\ \quad 3, 1 \end{array} \quad \therefore \text{L.C.M. of 12 and 4} = 2 \times 2 \times 3 = 12$$

$$12 \div 12 = 1 \quad \therefore \frac{7}{12} = \frac{7 \times 1}{12 \times 1} = \frac{7}{12}; \quad 12 \div 4 = 3 \quad \therefore \frac{3}{4} = \frac{3 \times 3}{4 \times 3} = \frac{9}{12}$$

Since  $9 > 7$ . So,  $\frac{9}{12} > \frac{7}{12}$  i.e.,  $\frac{3}{4} > \frac{7}{12}$

Answer :  $\frac{3}{4} > \frac{7}{12}$ .

Expressing the two fractions as fractions with same denominator, their numerators are compared. The fraction with greater numerator is greater.

**Example 7.** Arrange the fractions  $\frac{7}{9}$ ,  $\frac{5}{12}$ ,  $\frac{11}{18}$  in ascending order of the values.

**Solution :** The denominators of the given fractions are 9, 12 and 18.

$$\begin{array}{r} \text{Now, } 2 \overline{) 9, 12, 18} \\ 3 \overline{) 9, 6, 9} \\ 3 \overline{) 3, 2, 3} \\ 1, 2, 1 \end{array}$$

$$\therefore \text{L.C.M. of } 9, 12, 18 = 2 \times 3 \times 3 \times 2 = 36$$

$$36 \div 9 = 4 \quad \therefore \frac{7}{9} = \frac{7 \times 4}{9 \times 4} = \frac{28}{36}$$

$$36 \div 12 = 3 \quad \therefore \frac{5}{12} = \frac{5 \times 3}{12 \times 3} = \frac{15}{36}$$

$$36 \div 18 = 2 \quad \therefore \frac{11}{18} = \frac{11 \times 2}{18 \times 2} = \frac{22}{36}$$

$$\text{Since } 15 < 22 < 28 \quad \text{So, } \frac{15}{36} < \frac{22}{36} < \frac{28}{36} \quad \text{or, } \frac{5}{12} < \frac{11}{18} < \frac{7}{9}$$

$\therefore$  Arranging the fractions in ascending order of values,  
we get,  $\frac{5}{12}$ ,  $\frac{11}{18}$ ,  $\frac{7}{9}$ .

Answer :  $\frac{5}{12}$ ,  $\frac{11}{18}$ ,  $\frac{7}{9}$ .

**Remarks :** Arrangement of the fractions after writing them from smaller to greater successively is called “ascending order”

**Example 8.** Arrange the fractions  $\frac{3}{7}$ ,  $\frac{9}{14}$ ,  $\frac{5}{21}$  in descending order of the values.

**Solution :** The denominators of the given fractions are 7, 14, 21.

$$\begin{array}{r} \text{Now, } 7 \overline{) 7, 14, 21} \\ 1, 2, 3 \end{array}$$

$$\therefore \text{L.C.M. of } 7, 14, 21 = 7 \times 2 \times 3 = 42$$

$$42 \div 7 = 6 \quad \therefore \frac{3}{7} = \frac{3 \times 6}{7 \times 6} = \frac{18}{42}$$

$$42 \div 14 = 3 \quad \therefore \frac{9}{14} = \frac{9 \times 3}{14 \times 3} = \frac{27}{42}$$

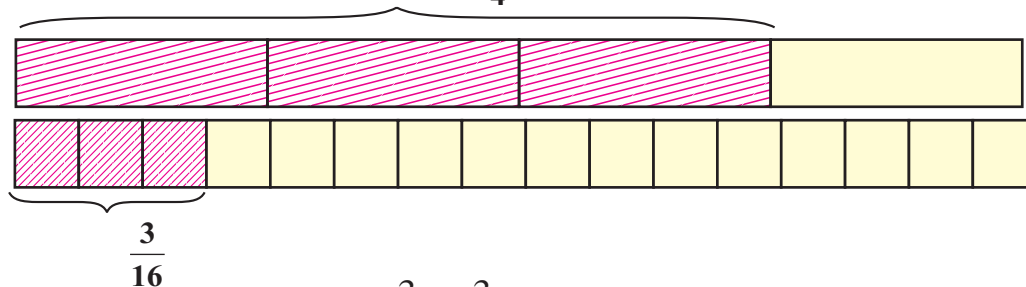
$$42 \div 21 = 2 \quad \therefore \frac{5}{21} = \frac{5 \times 2}{21 \times 2} = \frac{10}{42}$$

Since,  $27 > 18 > 10$  So,  $\frac{27}{42} > \frac{18}{42} > \frac{10}{42}$  or,  $\frac{9}{14} > \frac{3}{7} > \frac{5}{21}$

Arranging the fractions in descending order of values,

we get,  $\frac{9}{14}, \frac{3}{7}, \frac{5}{21}$ .

Answer :  $\frac{9}{14}, \frac{3}{7}, \frac{5}{21}$ .



Let us notice the picture :  $\frac{3}{4} > \frac{3}{16}$ .

$\frac{3}{4}$  and  $\frac{3}{16}$  have the same numerator i.e. numerator 3.

4 is the denominator of  $\frac{3}{4}$ , 16 is the denominator of  $\frac{3}{16}$  and  $4 < 16$ .

Among fractions with the same numerator the fraction with the smaller denominator is the greater fraction.

**Example 9.** Using symbol, show which one of the fractions  $\frac{4}{13}, \frac{4}{29}$  is greater.

**Solution :** The numerators of the fractions are the same i.e. numerator 4 and denominators are 13 and 29.

Since  $13 < 29$ . So,  $\frac{4}{13} > \frac{4}{29}$ .

Answer :  $\frac{4}{13} > \frac{4}{29}$ .

**Example 10.** Arrange the fractions  $\frac{8}{9}, \frac{8}{33}, \frac{8}{15}, \frac{8}{19}$  in ascending order of the values.

**Solution :** The numerators of the fractions is 8 and denominator are 9, 33, 15 and 19.

Since,  $9 < 15 < 19 < 33$ . So,  $\frac{8}{33} < \frac{8}{19} < \frac{8}{15} < \frac{8}{9}$ .

So, arranging the fractions in ascending order, we get,  $\frac{8}{33}, \frac{8}{19}, \frac{8}{15}, \frac{8}{9}$ .

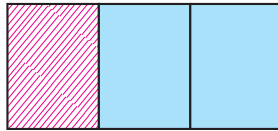
Answer :  $\frac{8}{33}, \frac{8}{19}, \frac{8}{15}, \frac{8}{9}$ .

### Exercise - 9 (a)

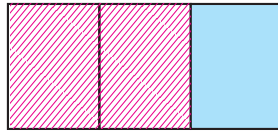
- Expressing the fraction in its lowest term insert the correct number in the box  :  
 a)  $\frac{12}{24} = \square$     b)  $\frac{26}{65} = \square$     c)  $\frac{22}{88} = \square$   
 d)  $\frac{66}{99} = \square$     e)  $\frac{55}{75} = \square$     f)  $\frac{42}{72} = \square$
- Express the fractions as the lowest form of some denominator :  
 a)  $\frac{5}{8}, \frac{1}{12}$     b)  $\frac{7}{9}, \frac{3}{4}$     c)  $\frac{11}{15}, \frac{9}{25}$     d)  $\frac{1}{6}, \frac{3}{7}, \frac{19}{21}$   
 e)  $\frac{3}{5}, \frac{7}{20}, \frac{13}{15}$     f)  $\frac{11}{16}, \frac{1}{2}, \frac{7}{24}, \frac{2}{3}, \frac{3}{8}$
- Which one is the greatest and lowest fraction :  
 a)  $\frac{1}{3}, \frac{7}{12}, \frac{13}{18}$     b)  $\frac{2}{7}, \frac{5}{14}, \frac{22}{35}, \frac{51}{70}$   
 c)  $\frac{3}{8}, \frac{9}{16}, \frac{17}{24}, \frac{1}{3}, \frac{21}{32}$     d)  $\frac{7}{10}, \frac{8}{15}, \frac{23}{50}, \frac{11}{25}, \frac{16}{75}$
- Arrange the fractions in ascending order of values :  
 a)  $\frac{1}{2}, \frac{7}{15}, \frac{19}{20}$     b)  $\frac{2}{5}, \frac{21}{25}, \frac{49}{50}$     c)  $\frac{1}{13}, \frac{3}{29}, \frac{2}{37}, \frac{6}{43}$   
 d)  $\frac{3}{4}, \frac{4}{5}, \frac{5}{6}, \frac{59}{60}$     e)  $\frac{3}{5}, \frac{11}{24}, \frac{33}{71}, \frac{66}{79}, \frac{22}{31}$

5. Arrange the fractions in descending order of values :
- a)  $\frac{4}{5}$ ,  $\frac{13}{15}$ ,  $\frac{21}{25}$ ,  $\frac{49}{75}$       b)  $\frac{9}{13}$ ,  $\frac{25}{39}$ ,  $\frac{15}{26}$ ,  $\frac{61}{78}$
- c)  $\frac{1}{10}$ ,  $\frac{7}{23}$ ,  $\frac{2}{41}$ ,  $\frac{14}{93}$ ,  $\frac{2}{17}$       d)  $\frac{4}{9}$ ,  $\frac{2}{11}$ ,  $\frac{12}{23}$ ,  $\frac{20}{39}$ ,  $\frac{3}{14}$
6. Drawing a circular area Apu coloured  $\frac{1}{5}$  of it with blue,  $\frac{1}{4}$  of it with yellow and  $\frac{11}{20}$  of it with red. Which one is the greater coloured area?
7. Mr. Belal left his residence in the morning with some money. He takes lunch with  $\frac{3}{8}$  of his money, gave a beggar  $\frac{1}{24}$  and gave to rickshaw puller  $\frac{1}{3}$ . He had some money left. On which work did he spend more?
8. Mr. Jamir Ali cultivated tomatoes in  $\frac{1}{4}$  portion of his land, potatoes in  $\frac{5}{12}$  portion and radish in  $\frac{1}{3}$  portion. Which is the vegetable cultivated in the least portion of land?
9. The numbers of white ducks in farms No. 1, No. 2 and No. 3 are respectively  $\frac{1}{16}$ ,  $\frac{3}{32}$  and  $\frac{6}{71}$  portions of the total ducks. What is the farm that contains the least number of ducks?
10. In a village among the total number of people capable of earning,  $\frac{3}{5}$  are cultivators,  $\frac{1}{10}$  are service holders,  $\frac{3}{50}$  are engaged in other professions and  $\frac{6}{25}$  are unemployed. Which is the profession taken by the largest number of people?

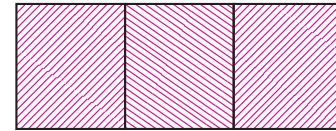
## Proper, Improper and Mixed Fractions



one third or  $\frac{1}{3}$

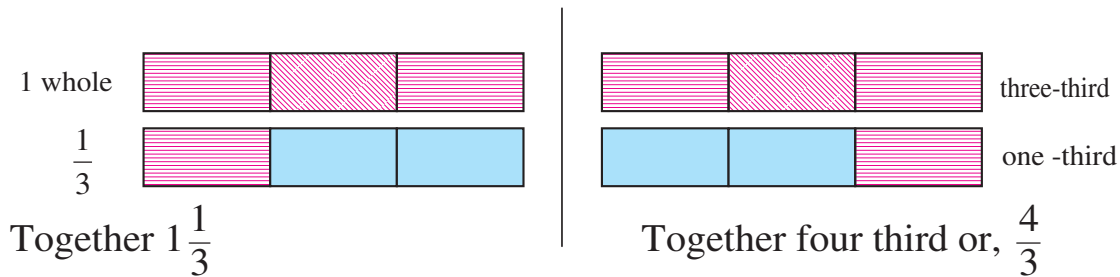


two third or  $\frac{2}{3}$



three third or  $\frac{3}{3}$  or whole

$\frac{1}{3}$ ,  $\frac{2}{3}$  are proper fractions. The numerator is less than the denominator in these fractions.



It is seen that,  $1\frac{1}{3}$

This is a **mixed fraction**  
which has an integer portion.  
The integer of the fraction is 1.

=

$\frac{4}{3}$

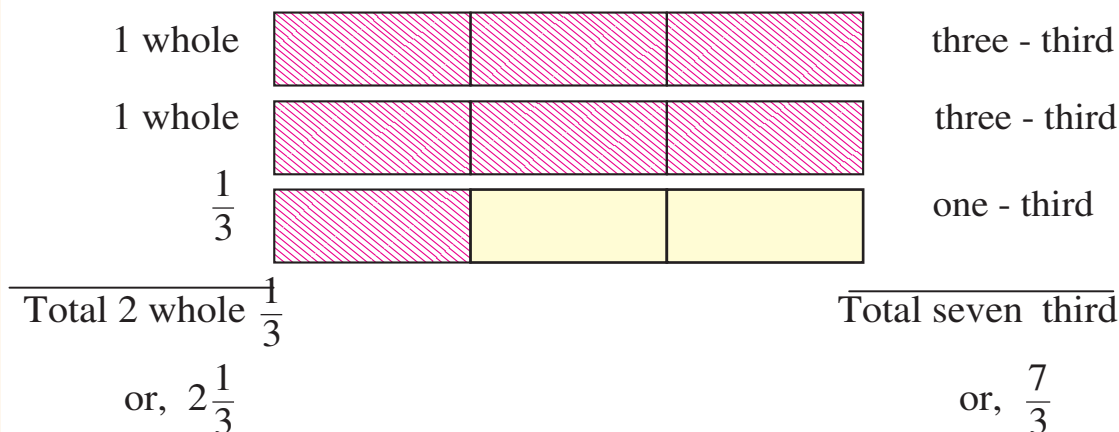
This is an **improper fraction**  
whose numerator is greater  
than the denominator.

$3\frac{3}{4}$ ,  $5\frac{2}{7}$ ,  $2\frac{4}{9}$  are mixed fractions. In these fractions, proper fractions are attached with integers.  $3\frac{4}{7}$  is a mixed fraction. This is read as “3 whole four seventh.”

$\frac{11}{5}$ ,  $\frac{7}{3}$ ,  $\frac{19}{8}$  etc. are improper fractions. In these fractions the numerator is greater than the denominator.

- The fraction in which the numerator is smaller than the denominator is a proper fraction.
- The fraction in which the numerator is greater than the denominator is an improper fraction.
- The fraction with integer and proper fraction is mixed fraction.
- Generally the integer of the mixed fraction is read as “whole”.

## Mutual Conversion of Mixed and Improper Fractions



It is seen that,

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

**We observe that :**  $\frac{7}{3}$   $3 \overline{) 7} ( 2 \rightarrow 2 \text{ whole}$   $\therefore \frac{7}{3} = 2\frac{1}{3}$   
 $\quad \quad \quad \underline{6}$   
 $\quad \quad \quad 1 \rightarrow 1 \text{ third}$

The denominator of the proper fraction which is related with the improper and mixed fractions is the same. The quotient which we get after dividing the numerator of the improper fraction with this denominator is the whole part of the converted mixed fraction. And the remainder is the numerator of the proper fraction which is related to the converted mixed fraction.

**Example 1.** Express the following improper fractions into mixed fractions:

a)  $\frac{83}{9}$

b)  $\frac{79}{15}$

c)  $\frac{91}{19}$

d)  $\frac{92}{27}$

e)  $\frac{97}{32}$

**Solution :** a) 
$$\begin{array}{r} 9 \overline{) 83} ( 9 \\ \underline{81} \\ 2 \end{array}$$

$$\therefore \frac{83}{9} = 9\frac{2}{9}$$

b) 
$$\begin{array}{r} 15 \overline{) 79} ( 5 \\ \underline{75} \\ 4 \end{array}$$

$$\therefore \frac{79}{15} = 5\frac{4}{15}$$



$$\begin{array}{r} \text{c) } 19 \overline{) 91} \text{ (4} \\ \underline{76} \\ 15 \end{array} \quad \therefore \frac{91}{19} = 4 \frac{15}{19}$$

$$\begin{array}{r} \text{d) } 27 \overline{) 92} \text{ (3} \\ \underline{81} \\ 11 \end{array} \quad \therefore \frac{92}{27} = 3 \frac{11}{27}$$

$$\begin{array}{r} \text{e) } 32 \overline{) 97} \text{ (3} \\ \underline{96} \\ 1 \end{array} \quad \therefore \frac{97}{32} = 3 \frac{1}{32}$$

Answer : (a)  $9 \frac{2}{9}$  (b)  $5 \frac{4}{15}$  (c)  $4 \frac{15}{19}$  (d)  $3 \frac{11}{27}$  (e)  $3 \frac{1}{32}$ .

$$7 = \frac{7}{1}, 4 = \frac{4}{1}, 11 = \frac{11}{1} \text{ etc.}$$

Any integer (whole number) can be written as denominator with 1.

**We observe that :**

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

$$2 \frac{1}{5} = 2 + \frac{1}{5} = \frac{2}{1} + \frac{1}{5} = \frac{2 \times 5}{1 \times 5} + \frac{1}{5} = \frac{2 \times 5}{5} + \frac{1}{5} = \frac{2 \times 5 + 1}{5} = \frac{11}{5}$$

$$7 \frac{3}{4} = 7 + \frac{3}{4} = \frac{7}{1} + \frac{3}{4} = \frac{7 \times 4}{1 \times 4} + \frac{3}{4} = \frac{7 \times 4}{4} + \frac{3}{4} = \frac{7 \times 4 + 3}{4} = \frac{31}{4}$$

$$\text{Shortly, } 1 \frac{1}{2} = \frac{1 \times 2 + 1}{2} = \frac{3}{2}; 2 \frac{1}{5} = \frac{2 \times 5 + 1}{5} = \frac{11}{5}; 7 \frac{3}{4} = \frac{7 \times 4 + 3}{4} = \frac{31}{4}$$

$$\text{Mixed fraction} = \frac{\text{whole portion} \times \text{denominator} + \text{numerator}}{\text{denominator}} = \text{Improper fraction}$$

**Example 2.** Express the following mixed fractions into improper fractions :

$$\text{a) } 4 \frac{1}{6} \quad \text{b) } 8 \frac{7}{11} \quad \text{c) } 5 \frac{4}{13} \quad \text{d) } 6 \frac{3}{10} \quad \text{e) } 5 \frac{11}{17}$$

**Solution :** a)  $4\frac{1}{6} = \frac{4 \times 6 + 1}{6} = \frac{25}{6}$   
 b)  $8\frac{7}{11} = \frac{8 \times 11 + 7}{11} = \frac{95}{11}$   
 c)  $5\frac{4}{13} = \frac{5 \times 13 + 4}{13} = \frac{69}{13}$   
 d)  $6\frac{3}{10} = \frac{6 \times 10 + 3}{10} = \frac{63}{10}$   
 e)  $5\frac{11}{17} = \frac{5 \times 17 + 11}{17} = \frac{96}{17}$

Answer : a)  $\frac{25}{6}$  b)  $\frac{95}{11}$  c)  $\frac{69}{13}$  d)  $\frac{63}{10}$  e)  $\frac{96}{17}$ .

### Exercise - 9 (b)

1. Choose proper, improper and mixed fractions from the following fractions :

$$\frac{27}{4}, \frac{14}{15}, \frac{13}{23}, 17\frac{2}{3}, \frac{60}{7}, \frac{42}{41}, 8\frac{3}{12}, \frac{1}{71}, 9\frac{7}{25}.$$

2. Express the following improper fractions into mixed fractions :

a)  $\frac{29}{5}$  b)  $\frac{85}{9}$  c)  $\frac{78}{11}$  d)  $\frac{89}{37}$  e)  $\frac{23}{15}$

f)  $\frac{73}{51}$  g)  $\frac{147}{59}$  h)  $\frac{103}{25}$  i)  $\frac{521}{43}$  j)  $\frac{1416}{203}$

3. Express the following mixed fractions into improper fractions:

a)  $3\frac{3}{16}$  b)  $2\frac{5}{44}$  c)  $1\frac{7}{48}$  d)  $10\frac{3}{16}$

e)  $88\frac{3}{7}$  f)  $112\frac{7}{11}$  g)  $27\frac{11}{23}$  h)  $98\frac{29}{33}$

i)  $100\frac{1}{49}$  j)  $103\frac{18}{19}$

4. Insert the correct number in the box  given :

a)  $\frac{85}{9} = 9\frac{4}{\text{  }}$

b)  $11\frac{9}{20} = \frac{\text{  }}{20}$

c)  $\frac{115}{13} = \text{  }\frac{11}{13}$

d)  $\frac{267}{25} = 10\frac{\text{  }}{25}$

e)  $12\frac{38}{71} = \frac{\text{  }}{71}$

f)  $291\frac{10}{11} = \frac{\text{  }}{11}$

g)  $\frac{4670}{351} = \text{  }\frac{107}{351}$

5. Robin had 25 marbles. From these he lost 7 marbles. What is the portion of the total marbles he lost ?

6. Helal Mia has 5 bighas of land. He planted rice in 4 bighas and in half of another bigha. In the rest portion he planted sugercane. In how many bighas did he plant sugercane?

7. Kamal had Tk. 300. From this money he bought a shirt for Tk. 75. What portion of total money did he spend to buy the shirt ?

## Addition and Subtraction of Fractions

### Addition of Fractions

**Example 1.**  $\frac{1}{75} + \frac{4}{75} + \frac{13}{75} + \frac{23}{75} =$  What ?

**Solution :** 
$$\frac{1}{75} + \frac{4}{75} + \frac{13}{75} + \frac{23}{75}$$

$$= \frac{1+4+13+23}{75} = \frac{41}{75}$$

Answer :  $\frac{41}{75}$

The denominator of the summation of some fractions with the same denominator is the common denominator of the fractions. The numerator of this summation is the summation of the numerators of the given fractions.

**Example 2.**  $\frac{2}{5} + \frac{7}{15} + \frac{11}{25} =$  What?

**Solution :** The denominators of the fractions are 5, 15, 25.

Now,  $5 \begin{array}{l} 5, 15, 25 \\ 1, 3, 5 \end{array}$

$\therefore \text{L.C.M. of } 5, 15, 25 = 5 \times 3 \times 5 = 75$

$75 \div 5 = 15 \quad \therefore \quad \frac{2}{5} = \frac{2 \times 15}{5 \times 15} = \frac{30}{75}$

$75 \div 15 = 5 \quad \therefore \quad \frac{7}{15} = \frac{7 \times 5}{15 \times 5} = \frac{35}{75}$

$75 \div 25 = 3 \quad \therefore \quad \frac{11}{25} = \frac{11 \times 3}{25 \times 3} = \frac{33}{75}$

$\therefore \quad \frac{2}{5} + \frac{7}{15} + \frac{11}{25} = \frac{30}{75} + \frac{35}{75} + \frac{33}{75} = \frac{30+35+33}{75} = \frac{98}{75} = 1 \frac{23}{75}$

Answer :  $1 \frac{23}{75}$

Before addition the fractions are to be expressed as fractions with the same denominator.

**Example 3.**  $\frac{11}{9} + \frac{13}{9} + \frac{10}{9} = \text{What ?}$

**Solution :** 
$$\begin{aligned} & \frac{11}{9} + \frac{13}{9} + \frac{10}{9} \\ &= \frac{11+13+10}{9} \\ &= \frac{34}{9} \\ &= 3\frac{7}{9} \end{aligned}$$

Answer :  $3\frac{7}{9}$ .

If the summation is an improper fraction, then generally this is to be expressed as mixed fraction.

**Example 4.**  $3\frac{1}{11} + 4\frac{2}{11} + 2\frac{5}{11} = \text{What ?}$

**Solution :** 
$$\begin{aligned} & 3\frac{1}{11} + 4\frac{2}{11} + 2\frac{5}{11} \\ &= \frac{34}{11} + \frac{46}{11} + \frac{27}{11} \\ &= \frac{34 + 46 + 27}{11} \\ &= \frac{107}{11} \\ &= 9\frac{8}{11} \end{aligned}$$

Answer :  $9\frac{8}{11}$

Addition is done after expressing the mixed fractions into improper fractions.

**Example 5.**  $5\frac{1}{4} + 3\frac{2}{3} + 1\frac{5}{9} = \text{What ?}$

**Solution :**

$$\begin{aligned}
 & 5\frac{1}{4} + 3\frac{2}{3} + 1\frac{5}{9} \\
 &= \frac{21}{4} + \frac{11}{3} + \frac{14}{9} \\
 &= \frac{21 \times 9 + 11 \times 12 + 14 \times 4}{36} \\
 &= \frac{189 + 132 + 56}{36} \\
 &= \frac{377}{36} \\
 &= 10\frac{17}{36}
 \end{aligned}$$

Answer :  $10\frac{17}{36}$ .

**Example 6.**  $2\frac{1}{4} + 5\frac{1}{2} + 2\frac{3}{8} = \text{What?}$

**Solution :**

$$\begin{aligned}
 & 2\frac{1}{4} + 5\frac{1}{2} + 2\frac{3}{8} \\
 &= \frac{9}{4} + \frac{11}{2} + \frac{19}{8} \\
 &= \frac{9 \times 2 + 11 \times 4 + 19 \times 1}{8} \\
 &= \frac{18 + 44 + 19}{8} \\
 &= \frac{81}{8} \\
 &= 10\frac{1}{8}
 \end{aligned}$$

Answer :  $10\frac{1}{8}$ .

**Explanation :**

Here denominators are 4, 3, 9.

Now,  $3 \overline{) 4, 3, 9}$   
                     4, 1, 3

L.C.M. of 4, 3, 9 =  $3 \times 4 \times 3 = 36$

$36 \div 4 = 9$

$36 \div 3 = 12$

$36 \div 9 = 4$

**Explanation :**

Here donominators are 4, 2, 8.

Now,  $2 \overline{) 4, 2, 8}$   
                     2  $\overline{) 2, 1, 4}$   
                                     1, 1, 2

L.C.M. of 4, 2, 8 =  $2 \times 2 \times 2 = 8$

$\therefore 8 \div 4 = 2$

$8 \div 2 = 4$

$8 \div 8 = 1$

**Example 7.** Bijoy Babu went to market and bought rice with  $\frac{1}{2}$  portion of his money, vegetables with  $\frac{3}{10}$  portion and salt with  $\frac{1}{20}$  portion. What portion of his total money did he spend?

**Solution :**  $\frac{1}{2} + \frac{3}{10} + \frac{1}{20}$   
 $= \frac{10+6+1}{20} = \frac{17}{20}$

$\therefore$  Bijoy Babu spent  $\frac{17}{20}$  portion of his money.

Answer :  $\frac{17}{20}$  portion.

### Subtraction of Fractions

**Example 8.**  $\frac{19}{28} - \frac{11}{28} =$  What ?

**Solution :**  $\frac{19}{28} - \frac{11}{28}$   
 $= \frac{19-11}{28}$   
 $= \frac{8}{28} = \frac{2}{7}$

Answer :  $\frac{2}{7}$

### Let us notice:

- The denominator of the difference of two fractions with the same denominator is the common denominator of the given fractions. The numerator of their difference is the difference of the numerators of the given fractions.
- Summation or difference of fractions is to be always reduced into least form.

**Example 9.**  $\frac{7}{9} - \frac{3}{4} =$  What ?

**Solution :**

$$\begin{aligned} & \frac{7}{9} - \frac{3}{4} \\ &= \frac{7 \times 4}{9 \times 4} - \frac{3 \times 9}{4 \times 9} \\ &= \frac{28}{36} - \frac{27}{36} \\ &= \frac{28 - 27}{36} = \frac{1}{36} \end{aligned}$$

Answer :  $\frac{1}{36}$ .

**Example 10.**  $\frac{61}{7} - \frac{23}{7} =$  What ?

**Solution :**

$$\begin{aligned} & \frac{61}{7} - \frac{23}{7} = \frac{61 - 23}{7} \\ &= \frac{38}{7} = 5\frac{3}{7} \end{aligned}$$

Answer  $5\frac{3}{7}$ .

**Example 11.**  $4\frac{1}{8} - 2\frac{3}{5} =$  What ?

**Solution :**

$$\begin{aligned} & 4\frac{1}{8} - 2\frac{3}{5} \\ &= \frac{33}{8} - \frac{13}{5} \\ &= \frac{33 \times 5 - 13 \times 8}{40} \\ &= \frac{165 - 104}{40} \\ &= \frac{61}{40} = 1\frac{21}{40} \end{aligned}$$

Answer :  $1\frac{21}{40}$ .

**Explanation :**

The two fractions do not have the same denominator. They are expressed with the same denominator. Their denominators are 9 and 4.

The L.C.M. of 9 and 4

$$= 9 \times 4 = 36$$

$$\therefore 36 \div 9 = 4$$

$$36 \div 4 = 9$$

**Explanation :**

Here, denominators of the two fractions are 8 and 5.

The L.C.M. of 8 and 5 =  $8 \times 5 = 40$

$$\therefore 40 \div 8 = 5$$

$$40 \div 5 = 8$$



**Example 12.** Sharif Mia cultivated jute in  $\frac{1}{4}$  portion of his land and paddy in  $\frac{1}{3}$  portion and wheat in the rest of the land. In what portion of his total land did he cultivate wheat ?

**Solution :**  $\frac{1}{4} + \frac{1}{3} = \frac{3+4}{12}$   
 $= \frac{7}{12}$

Sharif Mia cultivated jute and paddy in  $\frac{7}{12}$  portion of his land.

The rest of the land (1 land  $- \frac{7}{12}$  portion of the land).

That is, total portion of the land (  $1 - \frac{7}{12}$  )  
 $= \frac{12-7}{12}$  portion  
 $= \frac{5}{12}$  portion

$\therefore$  He cultivated wheat in  $\frac{5}{12}$  portion of his land.

Answer :  $\frac{5}{12}$  portion.

### Exercise - 9 (c)

1. **Find the summation ;**

a)  $\frac{1}{25} + \frac{7}{25} + \frac{12}{25}$

b)  $\frac{1}{18} + \frac{5}{18} + \frac{11}{18}$

c)  $\frac{1}{2} + \frac{1}{3} + \frac{1}{4}$

d)  $\frac{1}{5} + \frac{3}{4} + \frac{7}{10}$

e)  $\frac{1}{4} + \frac{4}{7} + \frac{9}{14}$

f)  $\frac{10}{9} + \frac{19}{9} + \frac{23}{9}$

$$\text{g) } \frac{23}{22} + \frac{45}{22} + \frac{81}{22} \quad \text{h) } 4\frac{1}{8} + 2\frac{3}{8} + 6\frac{5}{8}$$

$$\text{i) } 7\frac{7}{8} + 10\frac{7}{12} + 3\frac{5}{16} + \frac{13}{16} + \frac{2}{3}$$

$$\text{j) } 1\frac{1}{4} + 2\frac{3}{4} + \frac{4}{5} + 2\frac{1}{10} + 3$$

$$\text{k) } 1 + 3\frac{2}{9} + 7\frac{1}{2} + 1\frac{5}{18} + \frac{13}{36}$$

2. Find the difference :

$$\text{a) } \frac{9}{17} - \frac{6}{17} \quad \text{b) } \frac{19}{45} - \frac{14}{45} \quad \text{c) } \frac{3}{4} - \frac{15}{32} \quad \text{d) } \frac{13}{20} - \frac{11}{40}$$

$$\text{e) } \frac{9}{14} - \frac{19}{42} \quad \text{f) } \frac{41}{6} - \frac{13}{6} \quad \text{g) } \frac{103}{10} - \frac{79}{10} \quad \text{h) } 5\frac{7}{12} - 4\frac{5}{12}$$

$$\text{i) } 6\frac{1}{9} - 4\frac{7}{9} \quad \text{j) } 4\frac{9}{10} - 3\frac{1}{5} \quad \text{k) } 5\frac{3}{4} - 2\frac{2}{5} \quad \text{l) } 1 - \frac{7}{15}$$

$$\text{m) } 6 - 2\frac{9}{13}$$

3. Simplify :

$$\text{a) } \frac{1}{2} + \frac{5}{6} - \frac{7}{12} \quad \text{b) } 6\frac{3}{4} - 1\frac{2}{5} + \frac{1}{2}$$

$$\text{c) } 5\frac{1}{5} - \frac{1}{8} - 1\frac{1}{4} \quad \text{d) } 7\frac{3}{4} - 4\frac{1}{6} - 1\frac{11}{24}$$

$$\text{e) } 8\frac{3}{5} - 4\frac{7}{10} + 2\frac{4}{15}$$

4. Mina started to read a book. On the first day she read  $\frac{2}{5}$  portion of the book and the next day she read  $\frac{8}{15}$  portion. What portion of the book did she read in two days?

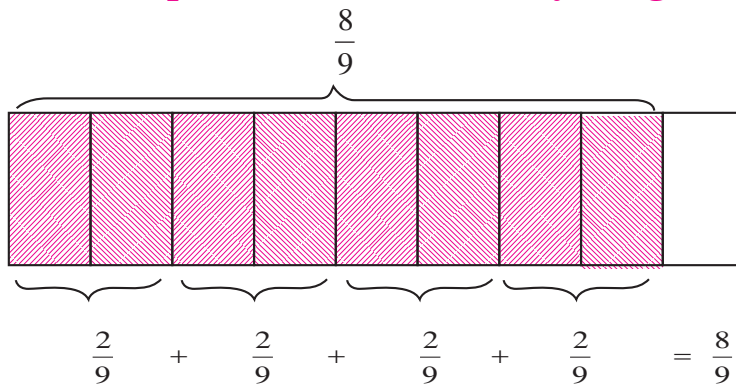
5.  $\frac{1}{5}$  portion of a bamboo is coloured black,  $\frac{1}{6}$  portion is red and  $\frac{3}{10}$  portion green. What portion of the bamboo is coloured?

6. After buying a basket of 240 mangoes it is seen that  $\frac{1}{16}$  portion of the total mangoes was rotten. How many fresh mangoes are there in the basket?

7. From a land a farmer used  $\frac{3}{8}$  portion to construct a house,  $\frac{2}{5}$  portion for garden and dug a pond in the remaining land. What portion of the land did he use to dig the pond?
8. A gardener planted rose in  $\frac{2}{5}$  portion of his garden, in  $\frac{1}{15}$  portion he planted tube rose and in  $\frac{3}{25}$  portion china rose. What portion of land did he use in total to plant the flowers?
9. Jalil Mia had Tk. 200. He gave Kamal  $\frac{2}{5}$  portion of it and  $\frac{1}{4}$  portion to Mukul. How much money did he have left?

## Multiplication of Fractions

**The multiplication of fractions by integer.**



**Let us observe that :**

$$\begin{aligned} \frac{2}{9} + \frac{2}{9} + \frac{2}{9} + \frac{2}{9} &= \frac{2+2+2+2}{9} \\ &= \frac{2 \times 4}{9} \\ &= \frac{8}{9} \end{aligned}$$

$\text{Fraction} \times \text{Integer} = \frac{\text{Numerator of fraction} \times \text{Integer}}{\text{Denominator of fraction}}$
---

**Example 1.**  $\frac{7}{8} \times 5 =$  What ?

**Solution :** 
$$\begin{aligned}\frac{7}{8} \times 5 &= \frac{7 \times 5}{8} \\ &= \frac{35}{8} \\ &= 4\frac{3}{8}\end{aligned}$$

Answer :  $4\frac{3}{8}$ .

**Example 2.**  $\frac{13}{6} \times 7 =$  What ?

**Solution :** 
$$\begin{aligned}\frac{13}{6} \times 7 &= \frac{13 \times 7}{6} \\ &= \frac{91}{6} = 15\frac{1}{6}\end{aligned}$$

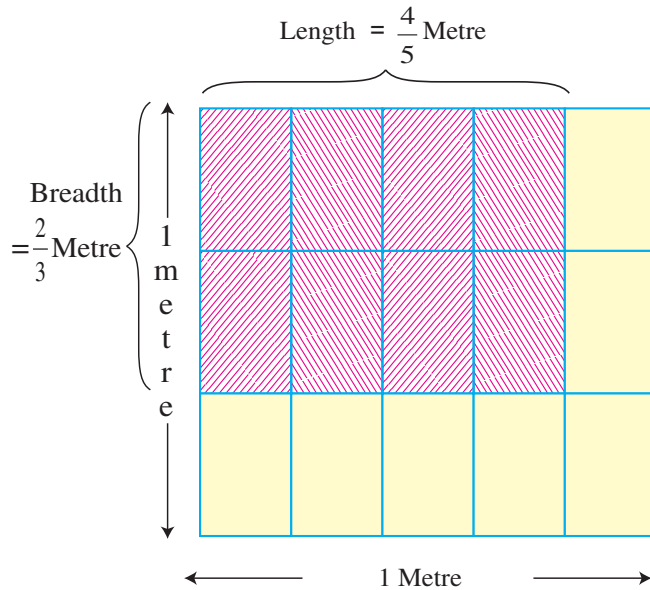
Answer :  $15\frac{1}{6}$ .

**Example 3.**  $6\frac{1}{10} \times 8 =$  What ?

**Solution :** 
$$\begin{aligned}6\frac{1}{10} \times 8 &= \frac{61}{10} \times 8 \\ &= \frac{61 \times 8}{10} \\ &= \frac{244}{\cancel{10}^5} \\ &= \frac{244}{5} \\ &= 48\frac{4}{5}\end{aligned}$$

Answer :  $48\frac{4}{5}$ .

## Multiplication of fraction by fraction :



- \* Area of the square = 1 sq. metre
- \* The square is divided into 15 small rectangles.  
Area of each rectangle =  $\frac{1}{15}$  sq. metre
- \* The area of the deep coloured portion  $\frac{4}{5} \times \frac{2}{3}$  sq. metre
- \* There are 8 small rectangles in deep coloured portion
- \* The area of deep coloured portion =  $\frac{1}{15} \times 8$  sq. metre  

$$= \frac{8}{15} \text{ sq. metre}$$

$$\therefore \frac{4}{5} \times \frac{2}{3} = \frac{8}{15}$$

**Let us observe that :**  $\frac{4}{5} \times \frac{2}{3} = \frac{8}{15}$  or,  $\frac{4}{5} \times \frac{2}{3} = \frac{4 \times 2}{5 \times 3}$

The product of two fractions =  $\frac{\text{The product of the numerators of the fractions}}{\text{The product of the denominators of the fractions}}$

**Example 4.**  $\frac{5}{6} \times \frac{3}{8} =$  What ?

**Solution :**  $\frac{5}{6} \times \frac{3}{8} = \frac{5 \times \overset{1}{\cancel{3}}}{\cancel{6}_2 \times 8} = \frac{5}{16}$

Answer :  $\frac{5}{16}$ .

**Example 5.**  $\frac{11}{7} \times \frac{4}{9} =$  What ?

**Solution :**  $\frac{11}{7} \times \frac{4}{9} = \frac{11 \times 4}{7 \times 9} = \frac{44}{63}$

Answer :  $\frac{44}{63}$ .

**Example 6.**  $\frac{13}{10} \times \frac{25}{17} =$  What ?

**Solution :**  $\frac{13}{10} \times \frac{25}{17} = \frac{13 \times \cancel{25}^5}{\cancel{10}_2 \times 17}$   
 $= \frac{65}{34} = 1 \frac{31}{34}$

Answer :  $1 \frac{31}{34}$

**Example 7.**  $4\frac{1}{12} \times \frac{3}{7} =$  What ?

**Solution :**  $4\frac{1}{12} \times \frac{3}{7}$  (Expressing into improper fractions)

$$= \frac{49}{12} \times \frac{3}{7}$$

$$= \frac{\cancel{49}^7 \times \cancel{3}^1}{\cancel{12}_4 \times \cancel{7}_1}$$

$$= \frac{7}{4}$$

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

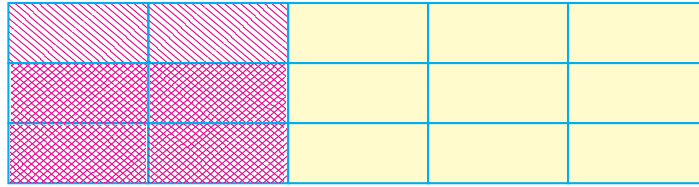
Answer :  $1 \frac{3}{4}$ .

**Example 8.**  $6\frac{3}{8} \times 2\frac{2}{17} =$  What ?

**Solution :**  $6\frac{3}{8} \times 2\frac{2}{17} = \frac{\cancel{51}^3}{\cancel{8}_2} \times \frac{\cancel{36}^9}{\cancel{17}_1} = \frac{27}{2} = 13 \frac{1}{2}$

Answer :  $13 \frac{1}{2}$ .

## The meaning of “of”



- Let us observe that :**
- \* The area is divided into 15 small equal areas.
  - \* Coloured portion =  $\frac{2}{5}$  portion of the whole area.
  - \* Deep coloured portion =  $\frac{2}{3}$  of coloured portion  
 $= \frac{2}{3}$  portion of  $\frac{2}{5}$  of the whole area.

But deep coloured portion =  $\frac{4}{15}$  portion of the whole area

$$\therefore \frac{2}{3} \text{ of } \frac{2}{5} \text{ portion} = \frac{4}{15}$$

Briefly,  $\frac{2}{3} \text{ of } \frac{2}{5} = \frac{4}{15}$

$$\text{But } \frac{4}{15} = \frac{2 \times 2}{5 \times 3} \therefore \frac{2}{3} \text{ of } \frac{2}{5} = \frac{2 \times 2}{5 \times 3}$$

**Example 9.**  $\frac{8}{9}$  portion of the mathematics book of class V is Arithmetic.  $\frac{5}{16}$  portion of Arithmetic is a fraction. What portion of mathematics book is a fraction?

**Solution :**  $\frac{5}{16} \text{ of } \frac{8}{9} = \frac{\cancel{8}^1 \times 5}{9 \times \cancel{16}_2}$

$$= \frac{1 \times 5}{9 \times 2} = \frac{5}{18}$$

$\therefore \frac{5}{18}$  portion of mathematics book is a fraction.

Answer :  $\frac{5}{18}$  portion.

**Example 10.**  $\frac{3}{4}$  portion of one metre cloth is red. A handkerchief is made with  $\frac{1}{2}$  of the red portion of the cloth. What portion of one metre cloth was used to make the handkerchief ?

**Solution :** To make handkerchief ( $\frac{1}{2}$  of  $\frac{3}{4}$ ) portion of one metre cloth is used.

$$\text{Now, } \frac{1}{2} \text{ of } \frac{3}{4} = \frac{3 \times 1}{4 \times 2} = \frac{3}{8}$$

To make handkerchief  $\frac{3}{8}$  portion of one metre cloth is used.

Answer :  $\frac{3}{8}$  portion.

## Reciprocal fraction

Every fraction has numerator and denominator. A reciprocal fraction is obtained by changing the denominator of a fraction to numerator and numerator to denominator.

$\frac{3}{4}$  is a fraction whose denominator is 4 and numerator is 3.

Interchanging the places of 3 and 4 we get  $\frac{4}{3}$ .

$\frac{4}{3}$  is the reciprocal fraction of  $\frac{3}{4}$ .

or,  $\frac{3}{4}$  is the reciprocal fraction of  $\frac{4}{3}$ .

**Let us observe that :**  $\frac{4}{3} \times \frac{3}{4} = 1$

Any fraction  $\times$  its reciprocal fraction = 1

**Example 11.** Write down the reciprocal fractions of

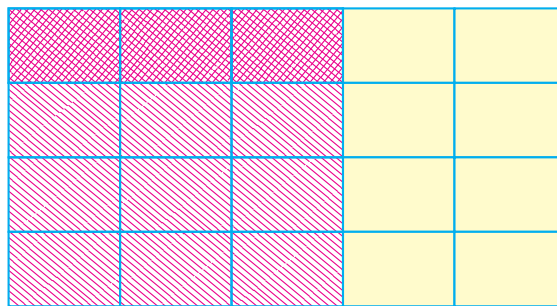
$$\frac{5}{9}, \frac{1}{6}, \frac{11}{10}, 7, \frac{9}{5}.$$



**Solution :** The reciprocal fraction of  $\frac{5}{9}$  is  $\frac{9}{5}$   
 ” ” ”  $\frac{1}{6}$  is  $\frac{6}{1}$  or 6  
 ” ” ”  $\frac{11}{10}$  is  $\frac{10}{11}$   
 ” ” ” 7 is  $\frac{1}{7}$   
 ” ” ”  $\frac{9}{5}$  is  $\frac{5}{9}$

Answer :  $\frac{9}{5}$ , 6,  $\frac{10}{11}$ ,  $\frac{1}{7}$ ,  $\frac{5}{9}$ .

### Division of fraction :



- The area is divided into 20 equal small areas.
- Among 20 small areas 12 areas are coloured.

i.e., coloured portion =  $\frac{12}{20}$  or,  $\frac{3}{5}$  portion of the area.

Deep coloured portion is 3 portions of 20 portion of the area.

i.e., Deep coloured portion =  $\frac{3}{20}$  portion of the area.

Again, Deep coloured portion is 1 portion of 4 coloured portions.

i.e., Deep coloured portion = coloured portion  $\div$  4

=  $\frac{3}{5}$  portions of the area  $\div$  4

=  $(\frac{3}{5} \div 4)$  portions of the area.

Again, deep coloured portion

$$= \frac{1}{4} \text{ portion of coloured portion}$$

$$= \frac{1}{4} \text{ portion of } \frac{3}{5} \text{ portion of the area.}$$

$$= \left( \frac{3}{5} \times \frac{1}{4} \right) \text{ portion of the area.}$$

$$\square \quad \frac{3}{5} \div 4 = \frac{3}{5} \times \frac{1}{4}$$

It is seen that, dividing  $\frac{3}{5}$  by 4 is the same as multiplying by  $\frac{1}{4}$ .

So, to divide  $\frac{3}{5}$  by 4, it is multiplied by  $\frac{1}{4}$ .

To divide a fraction by a fraction, we need to multiply the first fraction by the reciprocal fraction of the second fraction.

**Example 12.**  $\frac{3}{25} \div 4 = \text{What ?}$

$$\begin{aligned} \text{Solution : } \frac{3}{25} \div 4 &= \frac{3}{25} \div \frac{4}{1} \\ &= \frac{3}{25} \times (\text{reciprocal fraction of } \frac{4}{1}) \\ &= \frac{3}{25} \times \frac{1}{4} \\ &= \frac{3 \times 1}{25 \times 4} \\ &= \frac{3}{100} \end{aligned}$$

Answer :  $\frac{3}{100}$ .

**Example 13.**  $\frac{8}{7} \div 9 =$  What ?

$$\begin{aligned}
 \text{Solution : } \frac{8}{7} \div 9 &= \frac{8}{7} \div \frac{9}{1} \\
 &= \frac{8}{7} \times (\text{reciprocal fraction of } \frac{9}{1}) \\
 &= \frac{8}{7} \times \frac{1}{9} \\
 &= \frac{8 \times 1}{7 \times 9} \\
 &= \frac{8}{63}
 \end{aligned}$$

Answer :  $\frac{8}{63}$ .

**Example 14.**  $3\frac{3}{5} \div 15 =$  What ?

$$\begin{aligned}
 \text{Solution : } 3\frac{3}{5} \div 15 &= \frac{18}{5} \times (\text{reciprocal fraction of } \frac{15}{1}) \\
 &= \frac{18}{5} \times \frac{1}{15} = \frac{6 \times 1}{5 \times 5} \\
 &= \frac{6}{25}
 \end{aligned}$$

Answer :  $\frac{6}{25}$ .

**Example 15.**  $13 \div 2\frac{1}{4} =$  What?

$$\begin{aligned}
 \text{Solution : } 13 \div 2\frac{1}{4} &= \frac{13}{1} \div \frac{9}{4} \\
 &= \frac{13}{1} \times \frac{4}{9} \\
 &= \frac{52}{9} = 5\frac{7}{9}
 \end{aligned}$$

Answer :  $5\frac{7}{9}$ .

**Example 16.**  $\frac{7}{\frac{4}{\frac{11}{11}}} = \text{What ?}$

**Solution :**  $\frac{7}{\frac{4}{\frac{11}{11}}} = 7 \div \frac{4}{\frac{11}{11}}$

$$= \frac{7}{1} \times \frac{11}{4}$$

$$= \frac{77}{4}$$

$$= 19\frac{1}{4}$$

Answer :  $19\frac{1}{4}$ .

**Example 17.**  $\frac{\frac{13}{\frac{18}{7}}}{\frac{20}{20}} = \text{What ?}$

**Solution :**  $\frac{\frac{13}{\frac{18}{7}}}{\frac{20}{20}} = \frac{13}{18} \div \frac{7}{20}$

$$= \frac{13}{\cancel{18}_9} \times \frac{10}{\cancel{20}^2}$$

$$= \frac{130}{63}$$

$$= 2\frac{4}{63}$$

Answer :  $2\frac{4}{63}$ .

**Example 18.**  $\frac{11}{6\frac{3}{5}} = \text{What ?}$

**Solution :**

$$\begin{aligned}\frac{11}{6\frac{3}{5}} &= \frac{11}{\frac{33}{5}} \\ &= \frac{11}{15} \div \frac{33}{5} = \frac{11}{15} \times \frac{5}{33} \\ &= \frac{1}{3 \times 3} = \frac{1}{9}\end{aligned}$$

Answer :  $\frac{1}{9}$ .

**Example 19.** The age of a sister is  $\frac{3}{4}$  portion of her brother .  
If the brother's age is 16 years, what is the age of the sister?

**Solution :** Brother's age is 16 years

Sister's age =  $\frac{3}{4}$  portion of the age of brother.

$$\begin{aligned}&= 16 \times \frac{3}{4} \text{ years} \\ &= 12 \text{ years}\end{aligned}$$

Answer : 12 years.

### Exercise – 9 (D)

1. Find the product of :

a)  $\frac{5}{8} \times 12$

b)  $\frac{7}{13} \times 6$

c)  $\frac{5}{6} \times \frac{3}{8}$

d)  $\frac{11}{24} \times \frac{12}{17}$

e)  $\frac{16}{5} \times \frac{9}{14}$

f)  $\frac{8}{15} \times \frac{55}{16} \times \frac{3}{22}$

g)  $3\frac{3}{14} \times 4\frac{1}{5}$

h)  $8\frac{3}{14} \times 3\frac{1}{35}$

i)  $7\frac{13}{18} \times 7\frac{1}{23}$

2. Find the quotient of :

a)  $\frac{3}{4} \div 6$

b)  $25 \div \frac{15}{13}$

c)  $1\frac{1}{20} \div 7$

d)  $3\frac{3}{4} \div 5$

e)  $12 \div 2\frac{1}{3}$

f)  $\frac{13}{25} \div \frac{39}{10}$

g)  $\frac{23}{75} \div \frac{46}{35}$

h)  $5\frac{3}{5} \div 1\frac{1}{7}$

i)  $11\frac{3}{7} \div 3\frac{3}{14}$

3. Find the value of :

a)  $\frac{11}{15}$  of  $\frac{4}{3}$

b)  $\frac{9}{8}$  of  $\frac{5}{12}$

c)  $\frac{25}{32}$  of  $\frac{3}{5}$

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

e)  $\frac{17}{4}$

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

g)  $5\frac{1}{4}$

4. The cost of  $1\frac{1}{2}$  dozens of egg is Tk. 21. What is the cost of  $5\frac{1}{2}$  dozens of eggs?

5. A car runs 45 kilometres per hour. How many kilometres will the car go in  $4\frac{1}{3}$  hours ?

6. The price of  $\frac{8}{15}$  portion of a property is Tk. 48,000. What is the price of  $\frac{1}{3}$  portion of that property?

7.  $\frac{1}{8}$  portion of a pillar is under the earth and the rest is above the earth. How many metres are above the earth if 1 metre is under the earth?

8.  $\frac{1}{6}$  portion of a pole is under mud,  $\frac{1}{2}$  portion under water and the rest is above water. What is the length of the pole under water if the length of the pole above water is 2 metres?
9. If a number is divided by  $5\frac{1}{2}$ , then the quotient comes to  $20\frac{1}{2}$ . What is the number?
10.  $\frac{2}{3}$  portion of a tape is red and the rest is green. If the length of green portion is 3 metres, what is the length of the tape?
11. The product of two numbers is  $54\frac{1}{6}$ . If one of the numbers is  $6\frac{1}{4}$ , what is the other?

### Simplification of fractions

**Example 1.** Simplify :  $4\frac{2}{3} \times 1\frac{1}{7} - 2\frac{2}{5} + 1\frac{3}{5}$

**Solution :**  $4\frac{2}{3} \times 1\frac{1}{7} - 2\frac{2}{5} + 1\frac{3}{5}$

$$\begin{aligned}
 &= \frac{14}{3} \times \frac{8}{7} - \frac{12}{5} + \frac{8}{5} = \frac{16}{3} - \frac{12}{5} + \frac{8}{5} \\
 &= \frac{80 - 36 + 24}{15} \\
 &= \frac{104 - 36}{15} = \frac{68}{15}
 \end{aligned}$$

Answer :  $4\frac{8}{15}$ .

- \* In the first step mixed fraction is expressed as improper fractions and then multiplied.
- \* In the second step addition and subtraction are done simultaneously.

**Example 2.** Simplify :  $1\frac{2}{7} \div \frac{3}{14} - 1\frac{1}{4} \div 3\frac{1}{8}$  of  $9\frac{3}{5} + \frac{1}{2} \times 3\frac{1}{2} - \frac{2}{3}$

**Solution :**  $1\frac{2}{7} \div \frac{3}{14} - 1\frac{1}{4} \div 3\frac{1}{8}$  of  $9\frac{3}{5} + \frac{1}{2} \times 3\frac{1}{2} - \frac{2}{3}$

$$= \frac{9}{7} \div \frac{3}{14} - \frac{5}{4} \div \frac{25}{8} \text{ of } \frac{48}{5} + \frac{1}{2} \times \frac{7}{2} - \frac{2}{3}$$

$$= \frac{9}{7} \div \frac{3}{14} - \frac{5}{4} \div 30 + \frac{1}{2} \times \frac{7}{2} - \frac{2}{3}$$

$$= \frac{39}{7} \times \frac{14^2}{3} - \frac{15}{4} \times \frac{1}{30} + \frac{1}{2} \times \frac{7}{2} - \frac{2}{3}$$

$$= 6 - \frac{1}{24} + \frac{7}{4} - \frac{2}{3}$$

$$= \frac{144 - 1 + 42 - 16}{24}$$

$$= \frac{186 - 17}{24}$$

$$= \frac{169}{24}$$

$$= 7\frac{1}{24}$$

Answer :  $7\frac{1}{24}$  .

- \* The function of “of” is done first. Then the function of division and multiplication are done.
- \* At last function of addition and subtraction are done at the same time.



**Example 3.** Simplify :  $1\frac{3}{4}-\frac{1}{3}$  of  $\frac{3}{4}\div\frac{5}{8}-3\frac{1}{2}+2\frac{1}{4}$

**Solution :**  $1\frac{3}{4}-\frac{1}{3}$  of  $\frac{3}{4}\div\frac{5}{8}-3\frac{1}{2}+2\frac{1}{4}$

$$= \frac{7}{4} - \frac{1}{\cancel{3}_1} \text{ of } \frac{\cancel{3}^1}{4} \div \frac{5}{8} - \frac{7}{2} + \frac{9}{4}$$

$$= \frac{7}{4} - \frac{1}{4} \div \frac{5}{8} - \frac{7}{2} + \frac{9}{4}$$

$$= \frac{7}{4} - \frac{1}{\cancel{4}_1} \times \frac{8^2}{5} - \frac{7}{2} + \frac{9}{4}$$

$$= \frac{7}{4} - \frac{2}{5} - \frac{7}{2} + \frac{9}{4}$$

$$= \frac{35 - 8 - 70 + 45}{20}$$

$$= \frac{35 + 45 - 70 - 8}{20}$$

$$= \frac{80 - 78}{20}$$

$$= \frac{\cancel{2}^1}{\cancel{20}_{10}}$$

$$= \frac{1}{10}$$

Answer :  $\frac{1}{10}$ .

**Example 4.** Simplify :  $4\frac{4}{5} \times 3\frac{3}{4} \div 1\frac{1}{2}$  of  $1\frac{1}{3} \times (\frac{1}{3} - \frac{1}{4}) \div 1\frac{2}{3}$

**Solution :**

$$\begin{aligned}
 & 4\frac{4}{5} \times 3\frac{3}{4} \div 1\frac{1}{2} \text{ of } 1\frac{1}{3} \times (\frac{1}{3} - \frac{1}{4}) \div 1\frac{2}{3} \\
 &= \frac{24}{5} \times \frac{15}{4} \div \frac{3}{2} \text{ of } \frac{4}{3} \times (\frac{4-3}{12}) \div \frac{5}{3} \\
 &= \frac{24}{5} \times \frac{15}{4} \div \frac{\cancel{3}}{\cancel{2}_1} \text{ of } \frac{\cancel{4}^2}{\cancel{3}_1} \times \frac{1}{12} \div \frac{5}{3} \\
 &= \frac{24}{5} \times \frac{15}{4} \div 2 \times \frac{1}{12} \div \frac{5}{3} \\
 &= \frac{\cancel{2}^1 \cancel{24}^3}{\cancel{5}_1} \times \frac{\cancel{15}^3}{4} \times \frac{1}{\cancel{2}_1} \times \frac{1}{\cancel{12}_1} \times \frac{3}{5} \\
 &= \frac{9}{20}
 \end{aligned}$$

Answer :  $\frac{9}{20}$ .

- \* First the function of first bracket ( ) is done. Then the function of “of” is done.
- \* After that the function of division is done first and then function of multiplication is done.
- \* As there are five signs of multiplication in the last step, the functions of multiplication are done at the same time.

**Remarks :** If the functions of multiplication and division occur simultaneously, then the function of division is to be done first, then the function of multiplication.

**Example 5.** Simplify :  $5\frac{1}{4} \div \frac{13}{29}$  of  $3\frac{1}{2} - (2 + 2\frac{9}{13} \div 2)$

$$\begin{aligned}
 \text{Solution : } & 5\frac{1}{4} \div \frac{13}{29} \text{ of } 3\frac{1}{2} - (2 + 2\frac{9}{13} \div 2) \\
 &= \frac{21}{4} \div \frac{13}{29} \text{ of } \frac{7}{2} - (2 + \frac{35}{13} \div 2) \\
 &= \frac{21}{4} \div \frac{13}{29} \text{ of } \frac{7}{2} - (2 + \frac{35}{13} \times \frac{1}{2}) \\
 &= \frac{21}{4} \div \frac{13}{29} \text{ of } \frac{7}{2} - (2 + \frac{35}{26}) \\
 &= \frac{21}{4} \div \frac{13}{29} \text{ of } \frac{7}{2} - (\frac{52 + 35}{26}) \\
 &= \frac{21}{4} \div \frac{13}{29} \text{ of } \frac{7}{2} - \frac{87}{26} \\
 &= \frac{21}{4} \div \frac{91}{58} - \frac{87}{26} \\
 &= \frac{\cancel{21}_2 \times \cancel{29}_{13}}{\cancel{4}_2 \times \cancel{91}_{13}} - \frac{87}{26} \\
 &= \frac{87}{26} - \frac{87}{26} \\
 &= \frac{87 - 87}{26} \\
 &= \frac{0}{26} \\
 &= 0
 \end{aligned}$$

Answer : 0.

**Example 6.** Simplify :  $\frac{5\frac{7}{8}}{6\frac{5}{7}} + \frac{7\frac{2}{9}}{8\frac{1}{8}} - 2\frac{2}{3}$  of  $1\frac{1}{3} \times (\frac{3}{26}$  of  $2\frac{1}{6} + \frac{1}{8})$

**Solution :**

$$\begin{aligned}
 & \frac{5\frac{7}{8}}{6\frac{5}{7}} + \frac{7\frac{2}{9}}{8\frac{1}{8}} - 2\frac{2}{3} \text{ of } 1\frac{1}{3} \times (\frac{3}{26} \text{ of } 2\frac{1}{6} + \frac{1}{8}) \\
 &= \frac{\frac{47}{8}}{\frac{47}{7}} + \frac{\frac{65}{9}}{\frac{65}{8}} - \frac{8}{3} \text{ of } \frac{4}{3} \times (\frac{\cancel{1}^1}{\cancel{26}_2} \text{ of } \frac{\cancel{13}^1}{\cancel{6}_2} + \frac{1}{8}) \\
 &= \frac{47}{8} \div \frac{47}{7} + \frac{65}{9} \div \frac{65}{8} - \frac{8}{3} \text{ of } \frac{4}{3} \times (\frac{1}{4} + \frac{1}{8}) \\
 &= \frac{47}{8} \div \frac{47}{7} + \frac{65}{9} \div \frac{65}{8} - \frac{8}{3} \text{ of } \frac{4}{3} \times (\frac{2+1}{8}) \\
 &= \frac{47}{8} \div \frac{47}{7} + \frac{65}{9} \div \frac{65}{8} - \frac{8}{3} \text{ of } \frac{4}{3} \times \frac{3}{8} \\
 &= \frac{47}{8} \div \frac{47}{7} + \frac{65}{9} \div \frac{65}{8} - \frac{32}{9} \times \frac{3}{8} \\
 &= \frac{\cancel{1}^1}{\cancel{47}_1} \times \frac{7}{\cancel{47}_1} + \frac{\cancel{1}^1}{\cancel{65}_1} \times \frac{8}{\cancel{65}_1} - \frac{\cancel{4}^1}{\cancel{32}_3} \times \frac{\cancel{3}^1}{\cancel{8}_1} \\
 &= \frac{7}{8} + \frac{8}{9} - \frac{4}{3} = \frac{63+64-96}{72} \\
 &= \frac{127-96}{72} = \frac{31}{72}
 \end{aligned}$$

Answer :  $\frac{31}{72}$ .

**Exercise - 9 (e)**

Simplify :

1.  $\frac{1}{3} + \frac{1}{4} - \frac{1}{12} + \frac{1}{6} - \frac{1}{24}$

2.  $\frac{1}{2} \div \frac{3}{4} + \frac{3}{5} \div \frac{5}{3} \times 2\frac{16}{27}$

3.  $\frac{3}{8} + \frac{1}{7} \times 4\frac{1}{5} \div 2\frac{1}{7} \times \frac{25}{63}$

4.  $75 \div 6\frac{3}{7} \times \frac{8}{21}$  of  $\frac{3}{5} \times \frac{1}{2}$

5.  $\frac{4}{5}$  of  $\frac{7}{8} \div \frac{9}{10}$  of  $\frac{3}{4} - \frac{1}{2} \times \frac{5}{9}$

6.  $3\frac{3}{4} \div 1\frac{2}{3}$  of  $2\frac{1}{2} + \frac{1}{9} \times 1\frac{4}{5} \div \frac{3}{10} - 1$

7.  $5\frac{1}{2} \times 1\frac{31}{33}$  of  $1\frac{1}{8} \div 5\frac{1}{3} + 2$

8.  $6\frac{1}{4}$  of  $2\frac{1}{3} \div 4\frac{2}{3} + \frac{2}{3} - 2\frac{1}{12}$

9.  $13\frac{1}{2} \div 11\frac{1}{4} \times 2\frac{1}{2} + \frac{9}{44}$  of  $7\frac{1}{3} \times \frac{3}{8}$

10.  $\frac{13}{25} + 2\frac{2}{5} \times (\frac{1}{3} - \frac{1}{6}) \div 1\frac{1}{9}$

11.  $(3\frac{1}{2} \div 2\frac{1}{2} \times 1\frac{1}{2}) \div (3\frac{1}{2} \div 1\frac{1}{2}$  of  $2\frac{1}{2})$

12.  $\frac{1}{15}$  of  $20 \times \{ (4\frac{1}{3} + \frac{2}{3}) \times \frac{3}{5} \div 1\frac{4}{5} \} - 1$

13.  $1\frac{20}{23} \times [4\frac{5}{16} \div \{ 5\frac{1}{2}$  of  $1\frac{3}{8} + (\frac{5}{7} - \frac{3}{14}) \} ]$

14.  $7\frac{1}{3} - [1\frac{3}{4} + \{ 3\frac{2}{3} - (5\frac{1}{2} - 1\frac{1}{2}$  of  $2\frac{1}{3} + \frac{3}{4}) \} ]$

15.  $[10 - \{3\frac{1}{10} \times 11\frac{1}{9} \div 20\frac{2}{3} + (2\frac{6}{17} \text{ of } 1\frac{1}{50} \times \frac{1}{2})\}]$
16.  $\frac{5}{7} \times [14\frac{7}{15} - \{4\frac{1}{5} \div 8\frac{3}{4} \text{ of } 7\frac{1}{5} + (7\frac{1}{15} + 5\frac{3}{5} + \frac{1}{3})\}]$
17.  $\frac{2}{5} \times [\frac{5}{32} \times \{(3\frac{1}{3} + 8\frac{4}{9}) \div (6\frac{1}{12} - 3\frac{7}{8})\} + 3\frac{1}{7} \div 4\frac{2}{5} \times 4\frac{2}{3}]$

### Problems relating divisions

**Example 1.**  $8\frac{3}{4}$  dozens of bananas are distributed among 21 persons. How many bananas will each person get?

**Solution :**  $8\frac{3}{4}$  dozens =  $\frac{35}{4}$  dozens.

$$1 \text{ dozen} = 12$$

$$\therefore \frac{35}{4} \text{ dozens} = \frac{35 \times \cancel{12}^3}{\cancel{4}_1} = 105$$

The total number of bananas are 105.

21 persons will get 105 bananas

$$\therefore 1 \text{ person " } \frac{\cancel{105}^5}{\cancel{21}_1} \text{ "}$$

$$= 5 \text{ bananas}$$

Each person will get 5 bananas

Answer : 5 bananas

**Example 2.** Mr. Sajjad had Tk. 24000 from which he gave  $\frac{5}{12}$  portions to an orphanage and  $\frac{3}{8}$  portions to an educational institution. How much money did he have left ?

**Solution :** He donated to orphanage and educational institution  
 $(\frac{5}{12} + \frac{3}{8})$  of total money.

$$\text{or, } (\frac{10+9}{24}) \text{ portion} \quad \text{or, } \frac{19}{24} \text{ portion}$$

The rest is  $(1 - \frac{19}{24})$  portion of total money.

$$\text{or, } \frac{24-19}{24} \text{ portion} \quad \text{or, } \frac{5}{24} \text{ portion}$$

Mr. Sajjad had total Tk. 24000.

$$\begin{aligned} \therefore \frac{5}{24} \text{ portion of total money} &= (\cancel{24000} \times \frac{5}{\cancel{24}}) \\ &= \text{Tk. } 5000 \end{aligned}$$

Now, he has Tk. 5000.

Answer : Tk. 5000

### Exercise - 9 (f)

1. Babul Mia, Badal Mia and Lipi Begum got respectively  $\frac{1}{6}$  portion,  $\frac{1}{3}$  portion and  $\frac{1}{4}$  portion of the yearly income of a fishery. What portion of the total income did they get?
2.  $\frac{2}{5}$  portion of a bamboo is coloured red,  $\frac{1}{10}$  portion green and  $\frac{1}{5}$  portion yellow and 3 metres of the bamboo is not coloured. What is the length of the whole bamboo?
3. Molly bought paper with  $\frac{1}{5}$  portion of her money, pen with  $\frac{1}{3}$  portion and khata with  $\frac{1}{4}$  portion. She had Tk. 26 left . How much money did she have first?
4. Nogen Babu kept  $\frac{1}{8}$  portion of his property for himself and gave  $\frac{1}{8}$  portion to his wife. He distributed the rest of the property equally among his 4 sons and each son got Tk. 15000. What is the price of the total property?

5. Kamal Babu spent  $\frac{1}{5}$  portion of his monthly income for house rent,  $\frac{3}{8}$  portion for education expenses of his sons and daughters and  $\frac{3}{10}$  portions for other expenses. He keeps the rest of the money in a bank. What is his monthly income if he saves Tk. 14400 at the end of the year?
6. Rony and Panna got respectively  $\frac{3}{4}$  portion and  $\frac{2}{3}$  portion of the total marks secured in the annual examination. Rony got 50 marks more than Panna. What was the total marks and what mark did each of them get?
7. The divisor is  $12\frac{1}{2}$  times the quotient. The quotient is  $4\frac{1}{5}$ . What is the dividend ?
8. The product of two fractions is  $74\frac{1}{6}$ . One fraction is  $28\frac{1}{8}$ . What is the other ?
9. In Hatirdiya Primary School there are 800 students.  $\frac{13}{20}$  portion of them are boys and the rest are girls.  $\frac{13}{14}$  portion of the girls passed in the annual examination. How many girls failed in the examination?
10. Mr. Motin had some money. He bought a cycle with  $\frac{1}{2}$  portion of his money. He bought a radio with  $\frac{4}{5}$  portion of the cost of the cycle and distributed the rest of the money among his two daughters. Each daughter got Tk. 300. How much money did Mr. Motin have?
11. There was 260 kg. of rice in a rice shop. The shopkeeper sold  $\frac{3}{5}$  portion of his rice and kept the rest equally in 4 sacks. How many kilograms of rice did he keep in each sack?



## Chapter-10

# The Decimal Fraction

## The Summation of Decimal Fraction

**Example 1.** Add :  $5\cdot03$  and  $8\cdot64$ .

**Solution :**

$$\begin{array}{r} 5\cdot03 \\ 8\cdot64 \\ \hline 13\cdot67 \end{array}$$

Answer :  $13\cdot67$ .

**Explanation**

Tens	Ones	Tenths	Hundredths
	5	0	3
	8	6	4
1	3	6	7

One number is placed below the other in such a way that the decimal points remain in the same line vertically. After the summation has been carried out normally, the decimal point has been placed in the gap of decimal point.

**Example 2.** Add :  $7\cdot89$  and  $9\cdot48$ .

**Solution :**

$$\begin{array}{r} 7\cdot89 \\ 9\cdot48 \\ \hline 17\cdot37 \end{array}$$

Answer :  $17\cdot37$ .

**Explanation**

Tens	Ones	Tenths	Hundredths
	$7^{+1}$	$8^{+1}$	9
	9	4	8
1	7	3	7

**Example 3.** Add :  $12\cdot04$ ,  $0\cdot5$ ,  $0\cdot03$ ,  $0\cdot009$ .

**Solution :**

$$\begin{array}{r} 12\cdot040 \\ 0\cdot500 \\ 0\cdot030 \\ 0\cdot009 \\ \hline 12\cdot579 \end{array}$$

Answer :  $12\cdot579$ .

The numbers have been arranged in such a way that the decimal points remain vertically in the same line. For the convenience of the summation, to the extreme right of the digits, extra zeros have been added where necessary to equalize the number of digits after the decimal points. In other words, the digits have been made three. Arranging the numbers in this way, the summation has been carried out simply and right below the line of the decimal points, a point has been given.

- \* The value of fraction does not change if zeros are added to the right of the last digit of the decimal point.
- \* If there is no digit on the left of the decimal point, sometimes a zero is added to write the number.

### Subtraction of Decimal Fraction

**Example 4.** Subtract : 2·69 from 8·15.

**Solution :**

$$\begin{array}{r} 8\cdot15 \\ - 2\cdot69 \\ \hline 5\cdot46 \end{array}$$

Answer : 5·46.

#### Explanation

Tens	Ones	Tenths	Hundredths
	8	1 <sup>+10</sup>	5 <sup>+10</sup>
	2 <sup>+1</sup>	6 <sup>+1</sup>	9
	5	4	6

The digits to be subtracted have been arranged below the subtraction in such a way that the one decimal points remain just below the others. It is not possible to deduct 9 hundredth from 5 hundredth. That is why 10 hundredth has been added to 5 hundredth to make it 15 hundredth and then it has been added to 6 as 1 tenth. Similarly, 10 tenth has been added to 1 and 1 ones has been added to 2.

**Example 5.** Subtract : 0·001 from 5.

**Solution :**

$$\begin{array}{r} 5\cdot000 \\ - 0\cdot001 \\ \hline 4\cdot999 \end{array}$$

Answer : 4·999.

The subtraction 5 does not have any decimal fraction. In the number to be subtracted, there are three digits on the right of the decimal point. For this reason, three digits have been added after placing a decimal point on the right of the digit 5. Finally, they have been subtracted normally.

**Example 6.** Simplify :  $1\cdot1 + 0\cdot1 - 0\cdot001 + 0\cdot101 - 0\cdot01$

**Solution :**

$$\begin{aligned} & 1\cdot1 + 0\cdot1 - 0\cdot001 + 0\cdot101 - 0\cdot01 \\ &= (1\cdot1 + 0\cdot1 + 0\cdot101) - (0\cdot001 + 0\cdot01) \\ &= (1\cdot100 + 0\cdot100 + 0\cdot101) - (0\cdot001 + 0\cdot010) \\ &= 1\cdot301 - 0\cdot011 \\ &= 1\cdot290 \\ &= 1\cdot29 \end{aligned}$$

Answer :  $1\cdot29$ .

**Example 7.** Simplify :  $2002 - 0\cdot101 + 77\cdot077 - 33\cdot003$

**Solution :**

$$\begin{aligned} & 2002 - 0\cdot101 + 77\cdot077 - 33\cdot003 \\ &= (2002 + 77\cdot077) - (0\cdot101 + 33\cdot003) \\ &= 2079\cdot077 - 33\cdot104 \\ &= 2045\cdot973 \end{aligned}$$

Answer :  $2045\cdot973$ .

**Observe that :**

- The digits with plus sign have been put within brackets before carrying out the summation.
- The digits with minus sign have been put within brackets before carrying out the summation.
- The summation of the numbers with minus sign has been subtracted from the summation of the numbers with plus sign.

**Example 8.** Mina had Tk. 50. She bought a pencil for Tk. 5.50, biscuits for Tk. 12.75 and chocolates for Tk. 2.60. How much money did she have left?

<b>Solution :</b>	The price of pencil	=	Tk. 5.50
	The price of biscuit	=	Tk. 12.75
	The price of chocolates	=	Tk. 2.60
	Total amount of money spent	=	Tk. 20.85
	The amount Mina had	=	Tk. 50.00
	The amount spent	=	Tk. 20.85
	The amount left	=	Tk. 29.15

Answer : Tk. 29.15.

### Exercise - 10 (a)

#### Add : (Questions 1-9)

1. 1.02, 2.002, 3.0003
2. 0.09, 9.009, 99.0009
3. 3.081, 0.1042, 0.5, 7.002
4. 8.005, 200.09, 1.234, 0.003
5. 4.379, 25.257, 9.123, 1.999
6. Tk. 5.05, Tk. 8.07, Tk. 29.90.
7.  $60.75^\circ$ ,  $30.25^\circ$ ,  $25.20^\circ$ ,  $63.80^\circ$
8. Tk. 9.20, Tk. 17.50, Tk. 23.75, Tk. 0.05.
9. 5.125 metre, 2.005 metre, 3 metre, 22.02 metre.

#### Subtract : (Questions 10 -15)

10. 0.0003 from 0.03
11. 1.11 from 100.01

12.  $0\cdot0003$  from  $0\cdot0007$
13. Tk.  $2\cdot92$  from Tk.  $4\cdot01$ .
14.  $29\cdot0008$  seconds from  $30\cdot256$  seconds.
15.  $14\cdot895$  km from  $17\cdot575$  km.

**Simplify (Questions 16 -20) :**

16.  $80\cdot0018 - 17\cdot999 + 2\cdot005 - 4\cdot001$
17.  $200 - 0\cdot291 - 9\cdot6 + 5\cdot0005$
18.  $28\cdot30$  minutes  $- 3\cdot135$  minutes  $+ 9\cdot0105$  minutes  $- 17\cdot92$  minutes.
19. Tk.  $303\cdot05 - \text{Tk. } 125\cdot28 - \text{Tk. } 0\cdot96 - \text{Tk. } 29\cdot75$ .
20.  $500\cdot003$  metres  $+ 125\cdot625$  metres  $- 130\cdot202$  metres  $- 25$  metres.
21. Badal's school is 2 km. away from his home. After starting from his home he reached his school walking  $0\cdot25$  km. on foot and the rest of the way riding on a rickshaw. How much distance did he go by rickshaw?
22. Mr. Hakim went to market and bought fish for Tk.  $50\cdot50$ , vegetables for Tk.  $10\cdot25$  and oil for Tk.  $7\cdot20$ . How much money did he spend buying those things?
23. Toma had Tk. 50. She gave Tk.  $15\cdot50$  to her younger brother and Tk.  $12\cdot75$  to her friend. How much money did she have left?
24. Monu Mia had Tk. 200. He spent Tk.  $110\cdot50$  to buy a shirt and Tk.  $40\cdot75$  for an undergarment. How much money did he have left?
25. Parul Begum has a land of 10 kathas. She cultivates paddy in  $4\cdot5$  kathas, chilli in  $2\cdot2$  kathas, potatoes in  $1\cdot75$  kathas and eggplants in the rest of the land. In how much land did she cultivate eggplants?

### Multiplication of an integer by a decimal fraction and a decimal fraction by an integer.

**Example 9.** Multiply  $5\cdot304$  by  $25$ .

**Solution :**

$$\begin{array}{r} 5\ 3\ 0\ 4 \\ \times 2\ 5 \\ \hline 2\ 6\ 5\ 2\ 0 \\ 1\ 0\ 6\ 0\ 8\ 0 \\ \hline 1\ 3\ 2\ 6\ 0\ 0 \end{array}$$

In the multiplicand there are 3 digits on the right of the decimal point.

$$\begin{aligned} \therefore 5\cdot304 \times 25 &= 132\cdot600 \\ &= 132\cdot6 \end{aligned}$$

Answer :  $132\cdot6$ .

**Explanation :**

$$\begin{array}{r} 5\cdot304 = 5\ 3\ 0\ 4 \text{ thousandth} \\ \times 2\ 5 \\ \hline 1\ 3\ 2\ 6\ 0\ 0 \text{ thousandth} \end{array}$$

$$\begin{aligned} \therefore 5\cdot304 \times 25 &= 132\cdot600 \\ &= 132\cdot6 \end{aligned}$$

The decimal point of the given number has been omitted and multiplied normally as an integer. The number to be multiplicand has three digits on the right of the decimal point. The product of the multiplication has been obtained after placing a decimal point before the last three digits. As the product has 2 zeros on the extreme right of the decimal point, they have been omitted. This however, makes no change in the product.

**Example 10.** Multiply  $35$  by  $2\cdot215$ .

**Solution :**  $35 \times 2\cdot215 = 2\cdot215 \times 35$

$$\begin{array}{r} 2\ 2\ 1\ 5 \\ \times 3\ 5 \\ \hline 1\ 1\ 0\ 7\ 5 \\ 6\ 6\ 4\ 5\ 0 \\ \hline 7\ 7\ 5\ 2\ 5 \end{array}$$

The multiplicand has 3 digits on the right of the decimal point.

$$\therefore 35 \times 2\cdot215 = 77\cdot525$$

Answer :  $77\cdot525$ .

**Explanation :**

$$2\cdot215 = 2\ 2\ 1\ 5 \text{ thousandth}$$

$$\begin{array}{r} 3\ 5 \\ \times 2\ 2\ 1\ 5 \\ \hline 7\ 7\ 5\ 2\ 5 \text{ thousandth} \end{array}$$

$$\therefore 35 \times 2\cdot215 = 77\cdot525$$

It is convenient to multiply a decimal fraction by an integer.

**The multiplication of decimal fractions by 10, 100****Example 11.** Multiply  $6\cdot123$  by 10.**Solution :**

$$\begin{aligned}6\cdot123 \times 10 \\ = 61\cdot23\end{aligned}$$

Answer :  $61\cdot23$ **Explanation :**

$$\begin{aligned}6\cdot123 &= 6123 \text{ thousandth} \\ &\quad \times 10 \\ \hline &61230 \text{ thousandth} \\ &= 6123 \text{ hundredth} \\ &= 61\cdot23\end{aligned}$$

There is one zero on the right of the multiplier 1. The product can be obtained if the decimal point of the multiplicand is moved one place to the right.

**Example 11.** Multiply  $8\cdot947$  by 100.**Solution :**

$$\begin{aligned}8\cdot947 \times 100 \\ = 894\cdot7\end{aligned}$$

Answer :  $894\cdot7$ .**Explanation :**

$$\begin{aligned}8\cdot947 \times 100 \\ = \frac{8947}{1000} \times 100 \\ = \frac{8947}{10} \\ = 894\cdot7\end{aligned}$$

The multiplier 1 has two zeros on its right. The product can be obtained if the decimal point of the multiplicand is moved two places to the right.

### The multiplication of a decimal fraction by a decimal fraction.

**Example 13.** Multiply 0·67 by 0·29.

**Solution :**

$$\begin{array}{r} 67 \\ \times 29 \\ \hline 603 \\ 1340 \\ \hline 1943 \end{array}$$

The multiplicand has 2 and the multiplier has 2 total 4 digits on the right of the decimal point.

$$\therefore 0\cdot67 \times 0\cdot29 = 0\cdot1943$$

Answer : 0·1943.

**Explanation :**

$$\begin{aligned} &0\cdot67 \times 0\cdot29 \\ &= \frac{67}{100} \times \frac{29}{100} \\ &= \frac{67 \times 29}{10000} \\ &= \frac{1943}{10000} \\ &= 0\cdot1943 \end{aligned}$$

First, the decimal point has been omitted and the numbers have been multiplied normally as integers. The number of digits after the decimal points of both the multiplier and the multiplicand has been added. Finally, the decimal point has been placed by the same total of digits from the right of the product, i.e. four digits from the right of the result.

**Example 14.** Multiply 0·37 by 0·172.

**Solution :**

$$\begin{array}{r} 37 \\ \times 172 \\ \hline 74 \\ 2590 \\ 3700 \\ \hline 6364 \end{array}$$

To the right of the decimal point, there are 2 digits in the multiplicand and 3 in the multiplier (5 digits in total)

$$\therefore 0\cdot37 \times 0\cdot172 = 0\cdot06364$$

Answer : 0·06364.

There are 2 digits after the decimal point of the multiplicand and 3 after that of the multiplier. Therefore, in the product there must be 5 digits on the right of the decimal point. As the product has four digits, one zero has been added on the left before placing the decimal point so that there remains 5 digits on the right of the decimal point.



**Example 15.** An orange costs Tk. 4.75. How much does a dozen cost ?

**Solution :**

The cost of 1 dozen oranges = Tk.  $(4.75 \times 12)$ .

The multiplicand has 2 digits on the right of the decimal point.

$$\therefore 4.75 \times 12 = 57.00 \\ = 57$$

$\therefore$  The price of one dozen oranges is Tk. 57.

Answer : Tk. 57.

1 dozen = 12

$$\begin{array}{r} 475 \\ \times 12 \\ \hline 950 \\ 4750 \\ \hline 5700 \end{array}$$

### Exercise - 10 (b)

1. **Find out the product :**

a)  $4.34 \times 14$

b)  $9.789 \times 15$

c)  $29 \times 2.0303$

d)  $35 \times 6.1001$

e)  $32.48 \times 10$

f)  $2.007 \times 100$

g)  $0.0008 \times 100$

h)  $18.251 \times 4.6$

i)  $26.51 \times 3.2$

j)  $0.2 \times 2.2 \times 2.22$

k)  $0.1 \times 0.01 \times 0.001$

l)  $0.04 \times 0.004 \times 25$

2. One pen costs Tk. 20.25. What is the cost of 8 pens ?

3. The cost of one litre of soyabean oil is Tk. 49.75. What is the cost of 5 litres?

4. A man walks 2.25 km. everyday during his morning walk. He walked the same distance everyday all through the month of April. How much distance did he walk in the month of April?

5. A car goes 45.5 km. in an hour. How far will it go in 12.2 hours ?

6. If one inch is equal to 2.45 cm. (centimetres), how many centimetres are equal to 8.5 inches ?

## The division of a decimal fraction by an integer

**Example 16.** Divide  $50\cdot4$  by 8.

**Solution :**

$$\begin{array}{r} 8) 50\cdot4 ( 6\cdot3 \\ \underline{48} \phantom{00} \\ 24 \phantom{00} \\ \underline{24} \phantom{00} \\ 0 \end{array}$$

Answer :  $6\cdot3$

The placemet of decimal point in quotient.

$$\begin{array}{r} 8) 50\cdot4 ( 6\cdot3 \\ \boxed{48} \phantom{00} \\ \boxed{24} \phantom{00} \\ \underline{\boxed{24}} \phantom{00} \\ 0 \end{array}$$

While dividing whenever the digit after the decimal point is taken, a decimal point is placed in the quotient.

**Explanation :**  $50\cdot4 = 504$  tenth

$$8) 504 \text{ tenth } ( 63 \text{ tenth}$$

$$\begin{array}{r} 48 \\ \underline{24} \\ 24 \\ \underline{0} \end{array}$$

$$\therefore \text{Quotient} = 63 \text{ tenth}$$

$$= 6\cdot3$$

**Example 17.** Divide  $29\cdot5$  by 16.

**Solution :**  $16) 29\cdot5 ( 1\cdot84375$

$$\begin{array}{r}
 16 \\
 \hline
 135 \\
 128 \\
 \hline
 70 \\
 64 \\
 \hline
 60 \\
 48 \\
 \hline
 120 \\
 112 \\
 \hline
 80 \\
 80 \\
 \hline
 0
 \end{array}$$

Answer :  $1\cdot84375$ .

- \* During division a zero has been added on the right of the remainder till the part on the right of the decimal point becomes completely divisible.
- \*  $29\cdot5 = 29\cdot50000$   
Therefore,  $29\cdot5 \div 16 = 29\cdot50000 \div 16$

### The division of an integer by a decimal fraction

**Example 18.** Divide 28 by  $2\cdot5$ .

**Solution :** In  $28 \div 2\cdot5$ , the divisor is  $2\cdot5$  and by removing its decimal point once to the right we get 25.

By adding a zero on the right of the divisible 28, we get 280.

$$\begin{array}{r}
 25) 280 (11\cdot2 \\
 25 \\
 \hline
 30 \\
 25 \\
 \hline
 50 \\
 50 \\
 \hline
 0
 \end{array}$$

$$\therefore 28 \div 2\cdot5 = 11\cdot2$$

Answer :  $11\cdot2$ .

**Explanation :**  $28 \div 2.5 = \frac{28}{2.5} = \frac{28 \times 10}{2.5 \times 10} = \frac{280}{25} = 280 \div 25$

The decimal point of the divisor has been removed in such a way that the divisor becomes an integer. On the right of the divisible, a zero is added as many times as the decimal point is shifted in the divisor. The quotient has been obtained by dividing this changed divisible with the changed divisor.

### The division of a decimal fraction by 10, 100

**Example 19.** Divide  $29.32$  by  $10$ .

**Solution :**

$$29.32 \div 10 = 2.932$$

Answer :  $2.932$

**Explanation :**

$$\begin{aligned} 29.32 \div 10 &= 2932 \text{ hundredth} \times \frac{1}{10} \\ &= 2932 \text{ thousandth} \\ &= 2.932 \end{aligned}$$

The divisor has one zero (0) on its right. The quotient has been obtained by shifting the decimal point to the left side once on the right side. The divisible and the quotient have the same digits. Only the place of the decimal points has been shifted.

**Example 20.** Divide  $154.9$  by  $100$ .

**Solution :**  $154.9 \div 100 = 1.549$ .

Answer :  $1.549$ .

**Explanation :**  $154.9 \div 100 = 1549 \text{ tenth} \times \frac{1}{100} = 1549 \times \frac{1}{10} \times \frac{1}{100}$

$$= 1549 \times \frac{1}{1000}$$

$$= 1549 \text{ thousandth} = 1.549.$$

- In the divisor on the right of 1 there are 2 zeros. The quotient has been obtained by shifting the decimal point of the divisible twice to the left.
- In the divisor 1 if there are 3 zeros on the right, the quotient can be obtained by shifting the decimal point of the divisible thrice to the left.
- We need to add zero (0) if needed.

## The division of a decimal fraction by a decimal fraction.

**Example 21.** Divide  $85\cdot1$  by  $4\cdot6$ .

**Solution :** In  $85\cdot1 \div 4\cdot6$  the divisor is  $4\cdot6$  and by shifting the decimal point once to the right, we get 46 and by shifting the decimal point of the divisible  $85\cdot1$  once on the right, we get 851 i.e.  $851\cdot00$ .

$$\begin{array}{r} 46 \overline{) 851\cdot00} \quad (18\cdot5 \\ \underline{391} \phantom{00} \\ 368 \phantom{00} \\ \underline{230} \phantom{00} \\ 230 \phantom{00} \\ \underline{\phantom{230}0} \phantom{00} \\ \phantom{230}0 \phantom{00} \end{array}$$

$$\therefore 85\cdot1 \div 4\cdot6 = 18\cdot5$$

Answer :  $18\cdot5$ .

### Explanation :

- To remove the decimal point of the divisor it has been multiplied by 10. In other words, the decimal point has been shifted once to the right. To keep the value of the number, the decimal point of the divisible is also shifted once to the right.
- While dividing the number on the right of the decimal point, a zero needs to be added to the right of the remainder until it becomes exactly divisible.

**Example 22.** Divide  $8\cdot51$  by  $4\cdot6$ .

**Solution :**  $8\cdot51 \div 4\cdot6$  by shifting the decimal point of the divisor  $4\cdot6$  once to the right, we get 46 and by shifting that of the divisible  $8\cdot51$  once to the right, we get  $85\cdot1$ .

$$\begin{array}{r} 46 \overline{) 85\cdot1} \quad (1\cdot85 \\ \underline{391} \phantom{00} \\ 368 \phantom{00} \\ \underline{230} \phantom{00} \\ 230 \phantom{00} \\ \underline{\phantom{230}0} \phantom{00} \\ \phantom{230}0 \phantom{00} \end{array}$$

$$\therefore 8\cdot51 \div 4\cdot6 = 1\cdot85$$

Answer :  $1\cdot85$ .

**Example 23.** The cost of 5 kg. potatoes is Tk. 63.75. What is the cost of 1 kg. potatoes?

**Solution :** The cost of 5 kg. potatoes is Tk. 63.75.

$$\therefore \quad " \quad " \quad 1 \quad " \quad " \quad \text{Tk. } \frac{63.75}{5}$$

Here,  $5) 63.75$  (12.75

$$\begin{array}{r} 5 \\ \hline 13 \\ 10 \\ \hline 37 \\ 35 \\ \hline 25 \\ 25 \\ \hline 0 \end{array}$$

$\therefore$  The cost of one kg. potatoes is Tk. 12.75.

Answer : Tk. 12.75.

**Example 24.** Amena bought 5 notebooks for Tk. 12.50 and 4 ballpen for Tk. 6.50. She gave a Tk. 100 note to the shopkeeper. How much money will he give her back?

**Solution :** The cost of 5 notebooks is  $(12.50 \times 5) =$  Tk. 62.50

The cost of 4 ballpen is  $(6.50 \times 4) =$  Tk. 26.00

---

Total cost = Tk. 88.50

Amena gave the shopkeeper Tk. 100.00

The total cost of 5 notebooks and

4 ballpen Tk. 88.50

---

The shopkeeper will return Tk. 11.50 (by subtracting)

Answer : Tk. 11.50.

**Exercise - 10 (c)**

1. Find out the quotient :

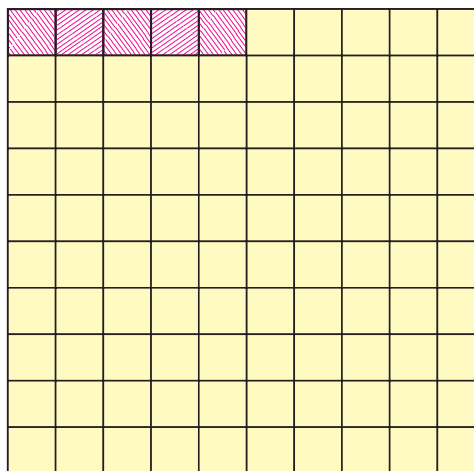
- |                              |                              |                           |                        |
|------------------------------|------------------------------|---------------------------|------------------------|
| a) $6\cdot45 \div 5$         | b) $18\cdot56 \div 4$        | c) $56\cdot25 \div 12$    | d) $\cdot85 \div 17$   |
| e) $24\cdot6 \div 8$         | f) $\cdot005 \div 25$        | g) $15 \div \cdot04$      | h) $48 \div 7\cdot5$   |
| i) $2 \div 1\cdot25$         | j) $7\cdot89 \div 10$        | k) $14\cdot3 \div 10$     | l) $86\cdot1 \div 100$ |
| m) $72\cdot35 \div 100$      | n) $56\cdot25 \div 1\cdot25$ | o) $6\cdot4 \div \cdot25$ | p) $\cdot027 \div 18$  |
| q) $\cdot0075 \div 12\cdot5$ | r) $3\cdot25 \div \cdot04$   |                           |                        |

2. 11 ballpens cost Tk. 27·50. How much does one ballpen cost?
3. The cost of 4 oranges is Tk. 12·80. How much does one cost?
4. A worker earns Tk. 492·50 in 5 days. How much does he earn per day?
5. The product of two numbers is 8·8. One number is 2·75. What is the other?
6. The product of two numbers is 19·845. One number is 0·9. What is the other?
7. The divisor is 0·008; divisible is 0·204; what is the quotient?
8. By what number 0·006 should be divided to get the quotient 0·12?
9. If 6·5 metres equals to 255·905 inches, how many inches equals to one metre?
10. The bill of 28 telephone calls is Tk. 48·16. What is the bill of one call?
11. 25 litres of fuel cost Tk. 393·75. How much does 1 litre cost?
12. A car goes 45·6 km. per hour. How many hours will it take to go 319·2 km.?
13. The cost of 24·5 kg wheat is Tk. 367·50. How much does 1 kg. cost?
14. The amount of money which was collected after each of 10 students donated Tk. 15·50 was distributed equally among 4 poor people. How much did one poor person get?
15. A teacher bought oranges for Tk. 722·15 at the rate of 60·60 and distributed them equally among 13 students. How many oranges will one student get?
16. The sum of two numbers is 70·60. The greater number is 4·50 more than the smaller one. What are these numbers?

## Chapter - 11

# Percentage

The big area at the right has been divided into 100 small areas. Among these 100 small areas 5 are deep coloured. It can be seen that the deep coloured areas cover  $\frac{5}{100}$  of the total area. The fraction  $\frac{5}{100}$  is called 5 per hundred or, 5 percent. It is written as 5%.



### The marks obtained in mathematics in the last annual examination

Subject	Total marks	Mithu	Rina	Raju	Rani	Rita
Math	100	85	80	82	65	60

Mithu obtained 85 in 100. In other words, he obtained the marks “85 per hundred” or '85 percent' or 85%.

$$85\% = \frac{85}{100} = 85 \times \frac{1}{100}$$

Rina obtained the marks 80% and Raju 82%. Similarly, Rani obtained 65% and Rita 60%.

Mizan bought some raw materials for Tk. 100 and sold them for Tk. 115. He made a profit of (Tk. 115 – Tk. 100) = Tk. 15 in Tk. 100. His profit was Tk. 15 percent. It means, his profit is 15%.

- The word percentage is briefly expressed with the symbol %.
- The percentage is a fraction which has the denominator 100 in each case.



$$\begin{aligned}\frac{1}{2}\% &= \frac{\frac{1}{2}}{100} = \frac{1}{2} \times \frac{1}{100} \\ 1\% &= \frac{1}{100} = 1 \times \frac{1}{100} \\ 10\% &= \frac{10}{100} = 10 \times \frac{1}{100} \\ 20\% &= \frac{20}{100} = 20 \times \frac{1}{100} \\ 30\% &= \frac{30}{100} = 30 \times \frac{1}{100} \\ 40\% &= \frac{40}{100} = 40 \times \frac{1}{100}\end{aligned}$$

$$\begin{aligned}50\% &= \frac{50}{100} = 50 \times \frac{1}{100} \\ 60\% &= \frac{60}{100} = 60 \times \frac{1}{100} \\ 70\% &= \frac{70}{100} = 70 \times \frac{1}{100} \\ 80\% &= \frac{80}{100} = 80 \times \frac{1}{100} \\ 90\% &= \frac{90}{100} = 90 \times \frac{1}{100} \\ 100\% &= \frac{100}{100} = 100 \times \frac{1}{100}\end{aligned}$$

**Example 1.** Express 35% as a common fraction.

$$\begin{aligned}\text{Solution : } 35\% &= \frac{35}{100} \times \frac{1}{100} \\ &= \frac{7}{20}\end{aligned}$$

Answer :  $\frac{7}{20}$  .

**Example 2.** Express  $\frac{3}{4}$  in percentage.

$$\begin{aligned}\text{Solution : } \frac{3}{4} &= \frac{3 \times 100}{4 \times 100} = \frac{3 \times 100}{4} \times \frac{1}{100} \\ &= 75 \times \frac{1}{100} \\ &= 75\%\end{aligned}$$

Answer : 75%.

**Example 3.** Express  $\frac{15}{10}$  in percentage.

**Solution :**

$$\begin{aligned}\frac{15}{10} &= \frac{15 \times 100}{10 \times 100} = \frac{15 \times 100}{10} \times \frac{1}{100} \\ &= 150 \times \frac{1}{100} \\ &= 150\%\end{aligned}$$

Answer : 150%

$\frac{15}{10}$  is an improper fraction. Since it has been expressed in percentage, it exceeded 100%

**Example 4.** Express in percentage how much is Tk. 10 of Tk. 25 in portion.

**Solution :** Tk. 10 is  $\frac{10}{25}$  portion of Tk. 25.

Now,

$$\begin{aligned}\frac{10}{25} &= \frac{10 \times 100}{25 \times 100} \\ &= \frac{10 \times 100}{25} \times \frac{1}{100} \\ &= 40 \times \frac{1}{100} \\ &= 40\%\end{aligned}$$

Answer : 40%.

**Example 5.** 75% of 4 = how much ?

**Solution :**

$$\begin{aligned}75\% \text{ of } 4 &= 75 \times \frac{1}{100} \text{ of } 4 \\ &= \frac{75}{100} \text{ of } 4 \\ &= \frac{75}{100} \times 4 = 3\end{aligned}$$

Answer : 3.

**Example 6.** A government employee gets 45% of his salary as house rent. What portion of his salary does he get as house rent?

**Solution :**  $45\% = \frac{45}{100}$   
 $= \frac{9}{20}$

Answer :  $\frac{9}{20}$  portion of salary.

**Example 7.** Mr. Anisul Islam deposits 5% of his salary in a bank. In one month he deposited Tk. 400. What is his monthly salary?

**Solution :** If Tk. 5 is deposited the monthly salary is Tk. 100  
 $\therefore$  " 1 " " " " Tk.  $\frac{100}{5}$   
 $\therefore$  " 400 " " " " Tk.  $\frac{100 \times 400}{5}$   
 $= \text{Tk. } 8000$

$\therefore$  The monthly salary of Mr. Anisul Islam is Tk. 8000.

Answer : Tk. 8000.

**Example 8.** The population of Ibrahimpur village increased by 4% and became 1872. What was the number of people before?

**Solution :** The population has increased by 4%. In other words, if the population was 100 earlier, now it has become (100 + 4) or 104.

If the present population is 1872 previously it was 100  
 $\therefore$  " " " 1 "  $\frac{100}{104}$   
 $\therefore$  " " " 1872 "  $\frac{100 \times 1872}{104}$   
 $= 1800 \text{ people}$

$\therefore$  Earlier the population of the village was 1800.

Answer : 1800 people .

**Example 9.** A pen is bought for Tk. 50 and sold for Tk. 56. What is the percentage of profit?

**Solution :** Selling price = Tk. 56

Cost price = Tk. 50

$$\therefore \text{Profit} = \text{Tk. } 56 - \text{Tk. } 50 = \text{Tk. } 6$$

Now, in Tk. 50 the profit is Tk. 6

$$\therefore \quad \quad \quad 1 \quad \quad \quad \text{Tk. } \frac{6}{50}$$

$$\therefore \quad \quad \quad 100 \quad \quad \quad \text{Tk. } \frac{6 \times 100}{50} = \text{Tk. } 12$$

$\therefore$  The profit is 12 percent.

Answer : 12%.

- Profit is made if the selling price is greater than the cost price.
- Profit = selling price – cost price.
- Profit is calculated on the cost price.

**Alternate method :**

Selling price = Tk. 56

Cost price = Tk. 50

$$\therefore \text{Profit} = \frac{6}{50} \text{ portion of the cost price}$$

$$\text{Here, } \frac{6}{50} = \frac{6 \times 100}{50 \times 100} = \frac{600}{50} \times \frac{1}{100} = 12\%$$

Answer : 12%.

**Example 10.** A pen is bought for Tk. 50. What is the percentage of loss if it is sold for Tk. 45?

**Solution :** Cost price = Tk. 50  
 Selling price = Tk. 45  
 $\therefore$  Loss = Tk. 50 – Tk. 45 = Tk. 5

Now, for Tk. 50 the loss is Tk. 5

$$\therefore \frac{5}{50} = \frac{1}{10}$$

$$\therefore \frac{1}{10} \times 100 = 10\%$$

$\therefore$  The loss is 10 percent.

Answer : 10%.

- If the selling price is lower than the cost price a loss is made.
- Loss = cost price – selling price.
- Loss is calculated on the cost price.

**Example 11.** The cost price of a pants is Tk. 280. What will be the selling price if a profit of 25% is to be made?

**Solution :** If the cost price is Tk. 100 and the target profit is 25%, the selling price of the pants will be Tk. (100 + 25) = Tk. 125

Now, if Tk. 100 is the cost price, the selling price will be Tk. 125

$$\therefore \frac{125}{100} = \frac{5}{4}$$

$$\therefore \frac{5}{4} \times 280 = 350$$

$\therefore$  The selling price of the pants is Tk. 350

Answer : Tk. 350.

**Example 12.** A goat is sold at a loss of 6%. If the selling price of the goat is Tk. 2256, what is the cost price?

**Solution :** If the cost price is Tk. 100, then with 6% loss the selling price will be Tk. (100 – 6) or, Tk. 94.

Now, if the selling price is Tk. 94, the cost price is Tk. 100

$$\begin{array}{rcl} \therefore & " & " & " & 1 & " & " & \text{Tk. } \frac{100}{94} \\ & & & & & & & \begin{array}{r} 24 \\ 1128 \end{array} \\ \therefore & " & " & " & 2256 & " & " & \text{Tk. } \frac{100 \times 2256}{94} \\ & & & & & & & \begin{array}{r} 2256 \\ 94 \overline{) 2256} \\ \underline{94} \phantom{00} \\ 1128 \\ \underline{1128} \\ 0 \end{array} \\ & & & & & & & = \text{Tk. } 2400 \end{array}$$

$\therefore$  The cost price of the goat is Tk. 2400

Answer : Tk. 2400.

**Example 13.** Mr. Habib received Tk. 96 as interest of in 4 years by depositing Tk. 800 in a bank. What is the rate of interest in percentage per annum?

**Solution :** The interest on Tk. 800 in 4 years is Tk. 96

$$\begin{array}{rcl} \therefore & " & " & " & 1 & 1 & " & \text{Tk. } \frac{96}{4 \times 800} \\ & & & & & & & \begin{array}{r} 96 \\ 4 \times 800 \end{array} \\ \therefore & " & " & " & 100 & 1 & " & \text{Tk. } \frac{96 \times 100}{4 \times 800} \\ & & & & & & & \begin{array}{r} 96 \times 100 \\ 4 \times 800 \end{array} \\ & & & & & & & = \text{Tk. } 3 \end{array}$$

$\therefore$  The rate of interest in percentage per annum Tk. 3

Answer : Rate of interest 3%.

$$\text{The rate of interest in percentage} = \frac{\text{Interest} \times 100}{\text{Time} \times \text{Principal}}$$

- The money deposited in a bank is called the principal.
- The money in addition to the principal given by the bank is called the interest.
- The interest, which is considered per Tk. 100 in 1 year, is called the rate of interest.

**Example 14.** The rate of annual interest in percentage is Tk. 6. What is the interest on Tk. 600 in 3 years ?

**Solution :** The interest on Tk. 100 in 1 year is Tk. 6

$$\therefore \quad " \quad " \quad 1 \quad 1 \quad " \quad \text{Tk.} \quad \frac{6}{100}$$

$$\therefore \quad " \quad " \quad 600 \quad 1 \quad " \quad \text{Tk.} \quad \frac{6 \times 600}{100}$$

$$\therefore \quad " \quad " \quad 600 \quad 3 \quad " \quad \text{Tk.} \quad \frac{6 \times 600 \times 3}{100} \\ = \text{Tk.} \quad 108$$

Answer : Tk. 108.

$$\text{Interest} = \frac{\text{Principal} \times \text{Rate} \times \text{Time}}{100}$$

**Example 15.** What is the principal which will yield an interest of Tk. 180 in 4 years at 5% interest?

**Solution :** The interest is Tk. 5 in 1 year on the principal Tk. 100

$$\therefore \quad " \quad " \quad 1 \quad " \quad 1 \quad " \quad " \quad \text{Tk.} \quad \frac{100}{5}$$

$$\therefore \quad " \quad " \quad 180 \quad " \quad 1 \quad " \quad " \quad \text{Tk.} \quad \frac{100 \times 180}{5}$$

$$\therefore \quad " \quad " \quad 180 \quad " \quad 4 \quad " \quad " \quad \text{Tk.} \quad \frac{100 \times 180}{5 \times 4}$$

$$= \text{Tk.} \quad 900$$

Answer : The principal is Tk. 900.

$$\text{Principal} = \frac{\text{Interest} \times 100}{\text{Rate of interest} \times \text{Time}}$$

**Let us notice :** If the number of year increases, the amount of principal will decrease for the same amount of interest. So, it is divided by 4.

**Example 16.** In how many years the interest on Tk. 850 at 6%, interest rate will be Tk. 255?

**Solution :** The interest on Tk. 100 for 1 year is Tk. 6

$$\begin{array}{rcl} \therefore & " & " & " & 1 & 1 & " & \text{Tk. } \frac{6}{100} \\ & & & & & & & \text{34 17} \\ \therefore & " & " & " & 850 & 1 & " & \text{Tk. } \frac{6 \times 850}{100} \\ & & & & & & & \text{204 21} \\ & & & & & & & = \text{Tk. 51} \end{array}$$

Now, the interest amounts to Tk. 51 in 1 year.

$$\begin{array}{rcl} \therefore & " & " & " & 1 & " & \frac{1}{51} \\ & & & & & & \text{5} \\ \therefore & " & " & " & 255 & " & \frac{1 \times 255}{51} \\ & & & & & & \text{5 1} \\ & & & & & & = 5 \text{ years.} \end{array}$$

Answer : 5 years.

$\text{Time} = \frac{\text{Interest} \times 100}{\text{Principal} \times \text{Rate}}$
--

### Exercise - 11

1. Express in common fractions :

- (a) 5%      (b) 15%      (c) 25%      (d) 35%      (e) 60%  
 (f) 50%      (g) 75%      (h) 85%      (i)  $8\frac{1}{3}\%$       (j)  $16\frac{2}{3}\%$

2. Express as percentages :

- (a)  $\frac{1}{4}$       (b)  $\frac{2}{5}$       (c)  $\frac{5}{8}$       (d)  $\frac{1}{10}$       (e)  $\frac{5}{12}$       (f)  $\frac{1}{20}$   
 (g)  $\frac{2}{15}$       (h)  $\frac{3}{7}$       (i)  $\frac{18}{15}$       (j)  $\frac{25}{20}$       (k)  $\frac{65}{50}$       (l)  $\frac{88}{65}$



3. Find the values of :
- (1) 4% of Tk. 75      (2) 15% of Tk. 90      (3) 4% of Tk. 3·20  
(4) 20% of 20 kg.      (5) 30% of 50 gm.      (6)  $8\frac{1}{3}\%$  of 80 km.  
(7) 20% of Tk. 550      (8) 15% of Tk. 300      (9) 40% of Tk. 60
4. Express the first numbers as percentage of the second :
- (a) Tk. 5, Tk. 20      (b) Tk. 16, Tk. 25  
(c) 21 kg, 35 kg      (d) 15 m., 45 m.  
(e) 45 kg, 72 kg      (f) Tk. 70 , Tk. 80
5. In the annual examination Jasim secured 420 marks out of 700 marks. What percentage of marks did he get?
6. In your class among 60 students 30% are female students. How many are female students?
7. At present the monthly income of Mr. Hanif is Tk. 1550. Earlier his income was Tk. 1500. What is the percentage of his increased income?
8. In a school among 560 students 224 are females. What is the percentage of female students in that school?
9. In a class among 150 students 6 are absent. What is the percentage of absent students?
10. 8% of the total population of Narayanpur die every year. If the number of population of that village is 6250, how many people die each year?
11. Rahima's monthly income is Tk. 420 and expenditure is Tk. 336. What is the percentage of expenditure relating to her income?
12. In your area  $\frac{18}{25}$  portion people are educated. What is the percentage of educated people in the area?
13. Last year from Ekhlashpur High School 64 students appeared in the S.S.C. examination. 56 among them passed. What percentage of students passed?

14. 45% of people in Alenia village are educated. The total population of that village is 900. What is the number of educated people in that village?
15. Among 450 soldiers 63 were martyr. What is the percentage of martyred soldiers?
16. Mr. Proshanto spends 40% of his salary on house rent. His monthly income is Tk 6550. How much does he spend on house rent?
17. A fisherman caught 150 fish from a pond. Among these 30 were Ruhi. What was the percentage of Ruhi fish?
18. 250 Fazli mangoes were sent from Chapai Nawabgonj. Among these 25 were rotten. What is the percentage of fresh mangoes?
19. Anwara Begum gets Tk. 1000 as her monthly salary. She saves 10% of her salary in providend fund. How much does she save every month?
20. Mr. Monower gets Tk. 2000 as his monthly salary. 40% of his salary covers his house rent. What is the amount of money he gets as house rent?
21. In Bangladesh 50 babies are born per thousand each year and 20 of them die. What is the percentage of population increase in Bangladesh?
22. In Santoshpur village with 3% increase the number of population turned 1236. What was the number of population earlier?
23. Of Bangladesh in the year 1981 the population was 9 crores and in year 1982 it became 9 crores and 27 lacs. What is the percentage of population increase in 1982?
24. A trader named Halim purchased rice for Tk. 250·00 and sold it for Tk. 275·00. What is the percentage of his profit?
25. The cost price of a chair is Tk. 175 and the selling price is Tk. 140. What is the percentage of profit or loss?

26. The cost price of a commodity is Tk. 150. What will be its selling price if a profit of 25% is to be made?
27. A pen has been bought for Tk. 60 and sold at a profit of 25%. What is the selling price?
28. A pants was sold for Tk. 588 at a loss of 2%. What is the cost of the pants?
29. A shopkeeper bought a shirt for Tk. 240 and sold it for Tk. 210. What is the percentage of profit or loss?
30. Apples worth Tk. 1000 were sold at a loss of 2%. What is the total amount of loss?
31. Monowara deposited an amount of Tk. 900 in a bank and got Tk. 216 as interest in 3 years. What is the percentage of interest in that bank?
32. Mithu deposited an amount of Tk. 1200 in a bank. He got Tk. 432 as interest after 4 years. What is the percentage of interest in that bank?
33. The interest of Tk. 600 in 3 years is Tk. 144. Find out the rate of interest.
34. How much will Tk. 350 yield in 4 years at a rate of 5% simple interest per annum?
35. How much will Tk. 1200 yield in 3 years at the rate of 7 percent interest ?
36. In how many years will Tk. 425 become Tk. 510 as principal including interest, if the rate of interest is 5%?
37. In how many years Tk. 350 will yield an interest of Tk. 168 if the rate of interest is 8%?
38. An amount yields Tk. 360 in 5 years at the rate of interest 6%. Find out the principal.

## Chapter - 12

# Measurement

## Measurement of Length

The basic unit of measurement of length : Metre

The following table shows the relation between metre and the other units of measuring length in Metric System.

↑	1 Kilometre (k.m.)	=	1000	metre
	1 Hectometre (h.m.)	=	100	metre
	1 Decametre (decam.)	=	10	metre
	1 Metre (m.)	=	1	metre
	1 Decimetre (decim.)	=	$\frac{1}{10}$	m. or, 0.1 metre
	1 Centimetre (c.m.)	=	$\frac{1}{100}$	m. or, 0.01 metre
↓	1 Millimetre (m.m.)	=	$\frac{1}{1000}$	m. or, 0.001 metre

In case of transforming to greater unit from basic unit of metre, each preceding unit is to be multiplied by 10. Again in case of transforming to smaller unit from basic unit of metre, each preceding unit is to be multiplied by  $\frac{1}{10}$

Kilo	is	thousand times	$(10 \times 10 \times 10)$
Hecto	is	hundred times	$(10 \times 10)$
Deca	is	ten times	$(10)$
Deci	is	tenth	$(\frac{1}{10} \text{ or, } 0.1)$
Centi	is	hundredth	$(\frac{1}{100} \text{ or, } 0.01)$
Milli	is	thousandth	$(\frac{1}{1000} \text{ or, } 0.001)$

**Example 1.** Express 5 kilometre 215 metre 95 centimetre in millimetres.

$$\begin{array}{rclcl}
 \text{Solution : } 5 \text{ k.m.} & = & 5 \times 1000 \text{ m.} & = & 5000 \text{ m.} \\
 \therefore 5000 \text{ m.} & = & 5000 \times 1000 \text{ m.m.} & = & 5000000 \text{ m.m.} \\
 215 \text{ m.} & = & 215 \times 1000 \text{ m.m.} & = & 215000 \text{ m.m.} \\
 95 \text{ c.m.} & = & 95 \times 10 \text{ m.m.} & = & 950 \text{ m.m.} \\
 & & \text{Summation} & = & 5215950 \text{ m.m.}
 \end{array}$$

Answer : 5215950 m.m.

**Example 2.** Express 27 metre 36 centimetre 9 millimetre in metres.

$$\begin{array}{rclcl}
 \text{Solution : } 27 \text{ metre} & = & 27 \times 1 \text{ m.} & = & 27 \text{ metre} \\
 36 \text{ centimetre} & = & \frac{36}{100} \text{ m.} & = & 0.36 \text{ metre} \\
 9 \text{ millimetre} & = & \frac{9}{1000} \text{ m.} & = & 0.009 \text{ metre} \\
 & & \text{Summation} & = & 27.369 \text{ metre}
 \end{array}$$

Answer : 27.369 metre.

**Alternative Method :**

$$\begin{array}{rclcl}
 27 \text{ metre} & = & 27 \times 1 \text{ m.} & = & 27 \text{ metre} \\
 36 \text{ centimetre} & = & 36 \times 0.01 \text{ m.} & = & 0.36 \text{ metre} \\
 9 \text{ millimetre} & = & 9 \times 0.001 \text{ m.} & = & 0.009 \text{ metre} \\
 & & \text{Summation} & = & 27.369 \text{ metre}
 \end{array}$$

Answer : 27.369 metre.

**Example 3.** Express 25 kilometre 49 metre 28 centimetre 7 millimetre in kilometres.

**Solution :**

$$\begin{array}{rclcl}
 25 \text{ k.m.} & = & 25 \times 1 \text{ k.m.} & = & 25 \text{ k.m.} \\
 49 \text{ m.} & = & \frac{49}{1000} \text{ k.m.} & = & 0.049 \text{ k.m.} \\
 28 \text{ c.m.} & = & \frac{28}{100} \text{ m.} & & \\
 & = & 0.28 \text{ m.} = \frac{0.28}{1000} \text{ k.m.} & = & 0.00028 \text{ k.m.} \\
 7 \text{ millimetre} & = & \frac{7}{1000} \text{ m.} = 0.007 \text{ m.} & & \\
 & = & \frac{0.007}{1000} \text{ k.m.} & = & 0.000007 \text{ k.m.} \\
 \hline
 \text{Summation} & = & & & 25.049287 \text{ k.m.}
 \end{array}$$

Answer : 25.049287 kilometre.

**Alternative Method :**

$$\begin{array}{rclcl}
 25 \text{ kilometre} & = & 25 \times 1 \text{ k.m.} & = & 25 \text{ k.m.} \\
 49 \text{ metre} & = & 49 \times 0.001 \text{ k.m.} & = & 0.049 \text{ k.m.} \\
 28 \text{ centimetre} & = & 28 \times 0.01 \text{ m.} & & \\
 & = & 0.28 \times 0.001 \text{ k.m.} & = & 0.00028 \text{ k.m.} \\
 7 \text{ millimetre} & = & 7 \times 0.001 \text{ m.} & & \\
 & = & 0.007 \times 0.001 \text{ k.m.} & = & 0.000007 \text{ k.m.} \\
 \hline
 \text{Summation} & = & & & 25.049287 \text{ k.m.}
 \end{array}$$

Answer : 25.049287 kilometer.

## Measurement of Weight

### The basic unit of measurement of weight : Gram

#### Metric Units of Measurement of Weight :

The table of metric units for measuring weight is found by writing 'gram' instead of 'metre' in the table of metric units for measuring length.

Two more units which are used for measuring weight in metric system:

$$\begin{aligned} 100 \text{ kilogram (k.g.)} &= 1 \text{ quintal} \\ 10 \text{ quintal or } 1000 \text{ kilogram} &= 1 \text{ metric ton} \end{aligned}$$

**Example 4.** Express 6 kilogram 25 gram 59 centigram 5 milligram in milligrams.

$$\begin{aligned} \text{Solution : } 6 \text{ kilogram} &= 6 \times 1000 \text{ gram} \\ &= 6000 \times 1000 \text{ m.g.} = 6000000 \text{ m.g.} \\ 25 \text{ gram} &= 25 \times 1000 \text{ m.g.} = 25000 \text{ m.g.} \\ 59 \text{ centigram} &= 59 \times 10 \text{ m.g.} = 590 \text{ m.g.} \\ 5 \text{ milligram} &= 5 \times 1 \text{ m.g.} = 5 \text{ m.g.} \\ \hline \text{Summation} &= 6025595 \text{ m.g.} \end{aligned}$$

Answer : 6025595 milligram.

**Example 5.** Express 29 kilogram 206 gram 129 milligram in kilograms.

$$\begin{aligned} \text{Solution : } 29 \text{ kilogram} &= 29 \times 1 \text{ k.g.} = 29 \text{ k.g.} \\ 206 \text{ gram} &= 206 \times 0.001 \text{ k.g.} = 0.206 \text{ k.g.} \\ 129 \text{ milligram} &= 129 \times 0.001 \text{ gram} \\ &= 0.129 \times 0.001 \text{ k.g.} = 0.000129 \text{ k.g.} \\ \hline \text{Summation} &= 29.206129 \text{ k.g.} \end{aligned}$$

Answer : 29.206129 k.g.

**Example 6.** 795000 grams equal how many quintals? How many metric tons?

**Solution :** 795000 gram  
 $= 795000 \times \frac{1}{1000} \text{ k.g.}$   
 $= 795 \text{ k.g.}$   
 $= 795 \times \frac{1}{100} \text{ quintal}$   
 $= 7.95 \text{ quintal}$

Again, 795000 gram = 795 k.g.  
 $= 795 \times \frac{1}{1000} \text{ metric ton}$   
 $= 0.795 \text{ metric ton.}$

Answr : 7.95 quintal, 0.795 metric ton.

### National Units for measuring weight :

5 tola	= 1 chhotak
4 chhotak	= 1 powa
4 powas or	
16 chhotak	= 1 seer
40 seer	= 1 maund

### Relationship between Metric and National Systems for measuring weight :

1 tola	= 11.63 gram (approx.)
1 kilogram	= 1 seer 6 tola (approx.)
	= 1.07 seer (approx.)
1 seer	= 0.93 kilogram (approx.)
1 maund	= 37.32 kilogram (approx.)
1 ton	= 27 maund 9 seer (approx.)
1 ton	= 1 metric ton 16 kilogram (approx.)
1 quintal	= 2 maund 27 seer



**Example 7.** Express 14 chhotak in maund.

$$\begin{aligned}\text{Solution : } 14 \text{ chhotak} &= \frac{14}{16} \text{ seer} = \frac{14}{16 \times 40} \text{ maund} \\ &= \frac{7}{8 \times 40} \text{ maund} = 0.021875 \text{ maund}\end{aligned}$$

Answer: 0.021875 maund.

**Example 8.** 5 maund 16 seer equal how many kilogram?

$$\begin{aligned}\text{Solution : } 5 \text{ maund} &= 5 \times 37.32 \text{ kilogram} = 186.6 \text{ k.g.} \\ 16 \text{ seer} &= 16 \times 0.93 \text{ kilogram} = 14.88 \text{ k.g.} \\ \hline \text{Summation} &= 201.48 \text{ k.g.}\end{aligned}$$

Answer : 201.48 kilogram.

**Example 9.** Express 25 kilogram in seers.

$$\begin{aligned}\text{Solution : } 1 \text{ kilogram} &= 1.07 \text{ seer (approximately)} \\ \therefore 25 \text{ kilogram} &= 25 \times 1.07 \text{ seer (approximately)} \\ &= 26.75 \text{ seer (approximately)}\end{aligned}$$

Answer : 26.75 seer (approximately)

**Example 10.** Add :

(a) k.m.	h.m.	deca m.	metre	(b) k.g.	h. g.	deca g.	gram
14	8	7	4	10	7	9	2
22	6	0	8	18	5	8	6
9	0	9	6	8	6	3	0
35	9	5	3	29	9	7	8

**Solution :**

(a) k.m.	h.m.	deca m.	metre
14	8	7	4
22	6	0	8
9	0	9	6
35	9	5	3
82	5	3	1

**Answer :** 82 k.m. 5 h.m.  
3 decam. 1 metre.

(b) k.g.	h. g.	decag.	gram
10	7	9	2
18	5	8	6
8	6	3	0
29	9	7	8
67	9	8	6

**Answer :** 67 k.g. 9 h.g.  
8 decag. 6 gram.

**Example 11.** Subtract :

(a) k.m.	h.m.	deca m.	metre
25	4	8	2
16	9	6	7

(b) k.g.	h. g.	decag.	gram
30	7	9	8
21	7	5	9

**Solution :**

(a) k.m.	h.m.	deca m.	metre
25	4 <sup>+10</sup>	8	2 <sup>+10</sup>
16 <sup>+1</sup>	9	6 <sup>+1</sup>	7
8	5	1	5

**Answer :** 8 k.m. 5 h.m.  
1 decam. 5 metre.

(b) k.g.	h. g.	deca g.	gram
30	7	9	8 <sup>+10</sup>
21	7	5 <sup>+1</sup>	9
9	0	3	9

**Answer :** 9 k.g. 0 h.g.  
3 decag. 9 grams.

**Example 12.** Multiply 7 k.m. 5 h.m. 8 metres by 9

**Solution :** 7 k.m. 5 h.m. 8 metre

$$\begin{array}{r} \times 9 \\ \hline 67 \text{ k.m. } 5 \text{ h.m. } 7 \text{ deca m. } 2 \text{ metre} \end{array}$$

$$\begin{aligned} [\because 72 \text{ metre} &= 7 \text{ decam. } 2 \text{ metre} \\ 45 \text{ h.m.} &= 4 \text{ k.m. } 5 \text{ h.m.}] \end{aligned}$$

**Answer :** 67 k.m. 5 h.m. 7 deca m. 2 metre.

**Example 13.** Multiply 9 k.g. 6 h. g. 5 deca g. 7 gram by 8.

**Solution :** 9 k.g. 6 h.m. 5 deca g. 7 gram

$$\begin{array}{r} \phantom{77 \text{ k.g. } 2 \text{ h.g. } 5 \text{ deca g. } 6 \text{ gram}} \times 8 \\ \hline 77 \text{ k.g. } 2 \text{ h.g. } 5 \text{ deca g. } 6 \text{ gram} \end{array}$$

Answer : 77 k.g. 2 h.g. 5 deca g. 6 gram.

**Example 14.** Divide 30 k.m. 8 h.m. 5 deca m. 6 metre by 8.

**Solution :** 8) 30 k.m. 8 h.m. 5 deca m. 6 metre (3 k.m. 8 h.m.  
24 " 5 deca m. 7 m.

$$\begin{array}{r} 68 \text{ h.m.} \\ 64 \text{ " } \\ \hline 45 \text{ deca m.} \\ 40 \text{ " } \\ \hline 56 \text{ metre} \\ 56 \text{ " } \\ \hline 0 \end{array}$$

**Explanation :**

6 k.m. 8 h.m. = 68 h.m.

4 h.m. 5 deca m. = 45 decam.

5 deca m. 6 m. = 56 metre

Answer : 3 k.m. 8 h.m. 5 deca m. 7 metre.

**Example 15.** Divide 42 k.g. 7 h.g. 8 deca g. 6 gram by 9.

**Solution :** 9) 42 k.g. 7 h.g. 8 deca g. 6 gram ( 4 k.g. 7 h.g. 5 deca g.  
36 " 4 gram.

$$\begin{array}{r} 36 \text{ " } \\ \hline 67 \text{ h.g.} \\ 63 \text{ " } \\ \hline 48 \text{ decag.} \\ 45 \text{ " } \\ \hline 36 \text{ gram} \\ 36 \text{ " } \\ \hline 0 \end{array}$$

Answer : 4 k.g. 7 h.g. 5 deca g. 4 gram.

**Example 16.** Mr. Aziz sold 28 k.g. 425 gram of potatoes from 45 k.g. of potatoes he had. How much potatoes does he have left?

**Solution :** The potatoes of Mr. Aziz had : 45 k.g.

he sold : 28 k.g. 425 g.

The potatoes left : 16 k.g. 575 gram

∴ Mr. Aziz has 16 k.g. 575 gram of potatoes left.

Answer : 16 k.g. 575 gram.

## Measurement of the volume of liquid

**The basic unit for measurement of the volume of liquid: Litre**

### Metric units for measuring the volume of liquids :

The table of metric units for measuring the volume of liquid is found by writing 'litre' instead of 'metre' in the table of metric units for measuring length.

### International unit of measurement for liquids.

1000 millilitre

or

= 1 litre

1000 cubic centimetre

1000 litre

= 1 cubic metre (Cubic metre is the  
international unit or S.I. Unit)

## Exercise - 12 (a)

1. Express in millimetres:

- (a) 36 centimetre 8 millimetre;
- (b) 99 metre 30 centimetre 5 millimetre;
- (c) 8 kilometre 95 centimetre 2 millimetre;
- (d) 8 kilometre 245 metre 96 millimetre;
- (e) 7 kilometre 250 metre 85 centimetre.

2. Express in metre :
  - (a) 58 centimetre 8 millimetre ;
  - (b) 43 metre 25 centimetre 7 millimetre ;
  - (c) 90 metre 36 centimetre 6 millimetre ;
  - (d) 8 kilometre 9 metre 125 centimetre ;
  - (e) 6 kilometre 237 centimetre.
3. Express in kilometre :
  - (a) 22 kilometre 35 metre 27 centimetre ;
  - (b) 19 kilometre 87 metre 90 millimetre ;
  - (c) 125 kilometre 75 metre 250 millimetre ;
  - (d) 78 kilometre 40 metre 15 centimetre 4 millimetre ;
  - (e) 308 metres 96 millimetre.
4. Express in milligram :
  - (a) 18 gram 15 centigram 6 milligram;
  - (b) 4 kilogram 27 gram 45 centigram 2 milligram;
  - (c) 9 kilogram 38 gram 10 centigram;
  - (d) 5 kilogram 65 gram 37 centigram;
  - (e) 4 kilogram 236 centigram.
5. Express in gram :
  - (a) 29 kilogram 515 gram;      (b) 60 kilogram 182 gram;
  - (c) 82 kilogram 98 gram 45 centigram;
  - (d) 9 kilogram 65 gram 54 centigram 9 milligram.
6. Express in kilogram :
  - (a) 45 kilogram 25 gram 59 centigram ;
  - (b) 12 kilogram 98 gram 145 milligram;
  - (c) 9 kilogram 427 gram 505 milligram;
  - (d) 27 kilogram 306 gram 97 centigram.
7. 385000 gram equal how many quintal ? How many metric ton?
8. 85321 kilogram equal how many metric ton?
9. 4 maund 22 seer equal how many kilogram?
10. Express 37 kilogram in seer.

11. 80 kilogram equal how many seer ?

12. Add :

(a) k.m.	h.m.	deca m.	metre	(b) k.g.	h.g.	deca g.	gram
21	7	2	8	28	6	0	9
9	0	6	5	34	8	9	2
28	9	0	7	20	0	5	0
10	2	8	1	8	2	8	7

13. Subtract :

(a) k.m.	h.m.	deca m.	metre	(b) k.g.	h.g.	deca g.	gram
98	4	3	5	54	6	2	3
28	8	5	7	39	5	7	9

14. Multiply :

- (a) 6 k.m. 8 h.m. 5 metre by 8 ;
- (b) 8 k.m. 11 deca m. 6 metre by 7;
- (c) 9 k.g. 5 hectogram 17 gram by 8;
- (d) 5 k.g. 4 h.gram 8 deca g. 9 gram by 8.

15. Divide :

- (a) 28 kilometre 9 hectometre 6 decametre 2 metre by 9;
- (b) 49 kilometre 7 decametre 7 metre by 9;
- (c) 69 k.g. 9 hectogram 6 decagram 8 gram by 8.

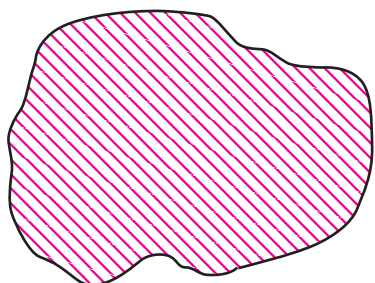
16. Sumi's weighs 32 k.g. 8 h.g. 9 deca g. 5 gram, Mitu's weighs 29 k.g. 7 h.g. 9 gram. Raju's weighs 35 k.g. 7 deca g. 8 gram and Saju's weighs 30 k.g. 7 gram. What is their total weight?

17. Hashem Mian has sold 37 k.g. 500 grams of rice from 98 k.g. of rice. How much rice does he have left?

18. A drum can contain 35 k.g. 3 hectogram, 7 decagram 9 gram of flour. How much can 9 similar drums contain?

19. Babul can go 78 kilometre riding on a bicycle for 5 hours. How much distance will he go per hour?

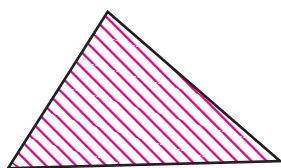
## Measurement of Areas



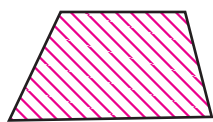
Here, the deep space the borderline is an area. This area has a particular measurement. This measurement is called its area.

The amount of surface with a particular measure enclosed by a borderline is called its area.

**The area of some particular shapes is shown below :**



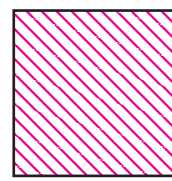
**Triangular  
area**



**Quadrilateral  
area**



**Rectangular  
area**



**Square  
area**

In each figure the deep coloured space is an area.

In the figure of the triangle, the deep space inside is the triangular area.  
In the figure of the quadrilateral, the deep space inside is the quadrilateral area.

In the figure of the rectangle, the deep space inside is the rectangular area.

In the figure of the square, the deep space inside is the square area.

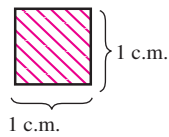
Each of these is an enclosed area with a particular borderline having a particular measure. These measurement are the areas of the figures.

A particular unit is used to measure an area. An area with a particular unit of length and breadth is considered as a square unit.

### The Metric Units of Land Measurement :

1 square metre	= 100 square decimetres	= 10,000 square c.m.
1 square decametre	= 100 square metres	= 1 acre
1 square hectometre	= 100 square decametre	= 10,000 square metres
1 hectre	= 10,000 square metres	= 1 square hectometre

### The Area of the Square

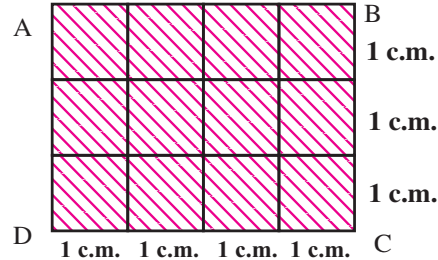
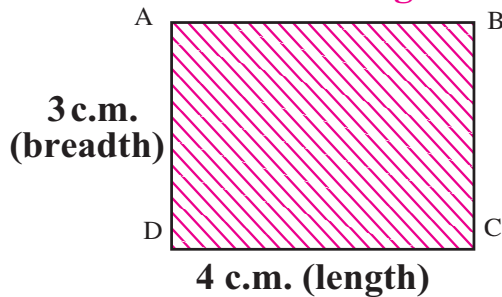


This is a square. The length of its each side is 1 centimetre.

The area of this square =  $1 \text{ c.m.} \times 1 \text{ c.m.}$   
 $= 1 \text{ square centimetre.}$

That means,  $\text{Area} = \text{Length} \times \text{Breadth}$

### The Area of the Rectangle :



A B C D is a rectangle. Its length is 4 c.m. and breadth is 3 c.m. Along with its length and breadth in every 1 c.m. lines have been drawn to divide up the rectangle. By this, the rectangle has been divided into  $(4 \times 3) = 12$  smaller areas. Each small area has the length 1 c.m. and breadth 1 c.m. All these small areas are squares and each of them has the area = 1 square c.m.

Therefore, the area of the rectangle = The area of 12 small squares  
 $= (12 \times 1) \text{ square c.m.}$   
 $= (4 \times 3 \times 1) \text{ square c.m.}$   
 $= (4 \times 3) \text{ square c.m.}$   
 $= 12 \text{ square c.m.}$

Therefore, the area of the rectangle = 12 square c.m.



**Let us notice :** To find the area, we multiply the length of the rectangle by its breadth.

The measurement of the area of rectangle = The measurement of length  $\times$  measurement of breadth  
In short, the area of rectangle = length  $\times$  breadth

**Example 1.** The length of a rectangle is 35 c.m. and breadth 25 c.m. What is its area?

**Solution :** We know,

The area of a rectangle = length  $\times$  breadth

$$\begin{aligned}\therefore \text{The area} &= 35 \text{ c.m.} \times 25 \text{ c.m.} \\ &= (35 \times 25) \text{ square c.m.} \\ &= 875 \text{ square c.m.}\end{aligned}$$

Answer : 875 square c.m.

**Example 2.** What is the area of a rectangle of 5 c.m. length and 2 c.m. 5.m.m. breadth?

**Solution :** Length = 5 c.m. =  $5 \times 10$  m.m. = 50 m.m.

Breadth = 2 c.m. 5 m.m. = 25 m.m.

$$\begin{aligned}\therefore \text{The area of the rectangle} &= \text{length} \times \text{breadth} \\ &= 50 \text{ m.m.} \times 25 \text{ m.m.} \\ &= 1250 \text{ square m.m.} \\ &= 12.50 \text{ square c.m.} \quad [\because 100 \text{ sq. m.m.} = 1 \text{ sq. c.m.}]\end{aligned}$$

Answer : 12.50 square c.m.

When measuring an area, if the length and breadth are in different units, then to transform them in the same unit.

### **The Area of Triangle :**

A B C D is a rectangle. The diagonal line AC has divided it into two triangles of equal measure. The area of each of these triangle is the half of that of the rectangle.

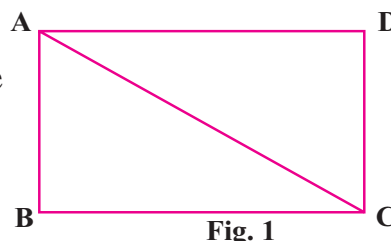


Fig. 1

Since A B C D is a rectangle, the side AB is perpendicular to side BC.

That means, the side AB is the height of the triangle A B C.

Therefore, in Fig. 1, the area of the triangle A B C

$$= \frac{1}{2} \text{ (the area of rectangle A B C D)}$$

$$= \frac{1}{2} (BC \times AB) \text{ [} \because \text{The area of rectangle ABCD = length} \times \text{breadth} = BC \times AB \text{]}$$

$$= \frac{1}{2} \text{ (the base of the triangle} \times \text{the height of the triangle)}$$

$$= \frac{1}{2} \text{ (base} \times \text{height)}$$

$$\therefore \text{ The area of the triangle ABC} = \frac{1}{2} \text{ (base} \times \text{height)}$$

In Fig. 2, the area of the triangle ABC

$$= \text{The area of triangle ABD} \\ + \text{the area of triangle ACD.}$$

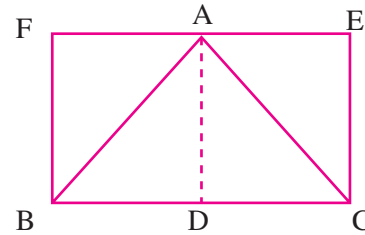


Fig. 2

$$= \frac{1}{2} \text{ (the area of rectangle AFBD)} + \frac{1}{2} \text{ (the area of rectangle AECD)}$$

$$= \frac{1}{2} (BD \times AD) + \frac{1}{2} (DC \times AD)$$

$$= \frac{1}{2} (BD + DC) \times AD$$

$$= \frac{1}{2} (BC \times AD \text{ [} \because BD + DC = BC \text{]})$$

$$= \frac{1}{2} \text{ (the base of the triangle} \times \text{the height of the triangle)}$$

$$= \frac{1}{2} \text{ (base} \times \text{height)}$$

$$\therefore \text{ The area of the triangle ABC} = \frac{1}{2} \text{ (base} \times \text{height)}$$

In Fig. 3, The area of the triangle ABC  
 = the area of triangle ABD  
 – the area of triangle ACD

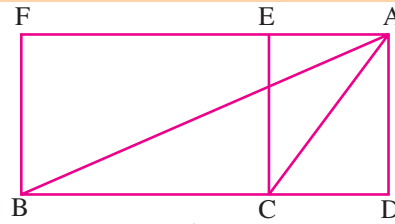


Fig. 3

$$\begin{aligned}
 &= \frac{1}{2} (\text{the area of rectangle ADBF}) - \frac{1}{2} (\text{the area of rectangle ADCE}) \\
 &= \frac{1}{2} (BD \times AD) - \frac{1}{2} (CD \times AD) \\
 &= \frac{1}{2} (BD - CD) \times AD \\
 &= \frac{1}{2} (BC \times AD) [\because BD - CD = BC] \\
 &= \frac{1}{2} (\text{the base of the triangle} \times \text{the height of the triangle}) \\
 &= \frac{1}{2} (\text{base} \times \text{height})
 \end{aligned}$$

$\therefore$  The area of the triangle ABC =  $\frac{1}{2}$  (base  $\times$  height)

Generally, the area of triangle =  $\frac{1}{2}$  (base  $\times$  height)

**Example 3.** The length of the land of a triangle is 8 c.m. and height 5 c.m. What is the area of the triangle?

**Solution :** We know, the area of triangle =  $\frac{1}{2}$  (base  $\times$  height)

$$= \frac{1}{2} (8 \text{ c.m.} \times 5 \text{ c.m.})$$

$$= \frac{1}{2} (8 \times 5) \text{ square c.m.}$$

$$= \frac{1}{2} \times 40 \text{ square c.m.}$$

$$= 20 \text{ square c.m.}$$

$\therefore$  The area of the triangle = 20 square c.m .

Answer : 20 square c.m.

**Example 4.** A rectangle formed by two triangles has the length 12 metre and breadth 8 metre. What is the area of the rectangle? What is the area of one triangle?

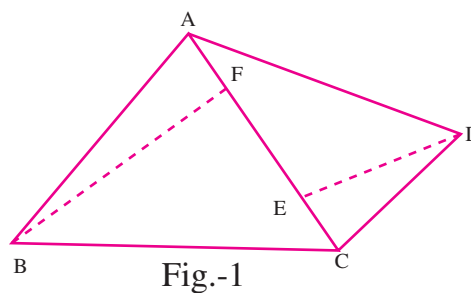
**Solution :** We know, the area of rectangle = length  $\times$  breadth  
 $\therefore$  the area of rectangle = 12 metre  $\times$  8 metre  
 = (12  $\times$  8) square metre  
 = 96 square metre

We know, the area of triangle =  $\frac{1}{2}$  (the area of rectangle)  
 =  $\frac{1}{2} \times 96$  square metre  
 = 48 square metre

Answer : The area of rectangle = 96 square metre.  
 and the area of triangle = 48 square metre.

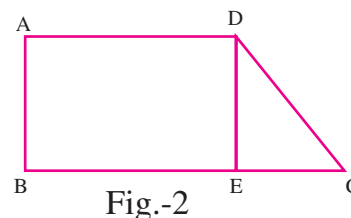
### Area of quadrilateral :

In Fig. 1, ABCD is a quadrilateral. AC is the diagonal line which divides the quadrilateral into two triangles ABC and ACD.



Therefore, the area of the quadrilateral ABCD  
 = the area of triangle ABC + the area of triangle ACD.

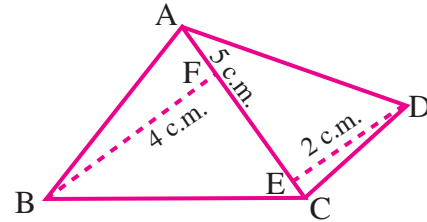
In Fig. 2, ABCD is a quadrilateral. Let us draw the line DE from the point D which is equal and parallel to AB. The line DE divides the quadrilateral into two areas. One is the rectangle ABED and the other is the triangle DEC.



$\therefore$  The area of the quadrilateral ABCD  
 = the area of the rectangle ABED + the area of the triangle DEC.

**Example 5.** In a quadrilateral, a diagonal line is 5 c.m. long. The perpendicular distances of the vertex opposite to the diagonal line are 4 c.m. and 2 c.m. Find out the area of the quadrilateral.

**Solution :** The area of the quadrilateral ABCD = the area of the triangle ABC + the area of the triangle ACD.



Here, in the triangle ABC the base is AC and height BF.

$$\begin{aligned}
 \therefore \text{The area of the triangle ABC} &= \frac{1}{2} (\text{base} \times \text{height}) \\
 &= \frac{1}{2} (AC \times BF) \\
 &= \frac{1}{2} (5 \times 4) \text{ sq. c.m.} \\
 &= \frac{1}{2} \times 20 \text{ sq. c.m.} = 10 \text{ sq. c.m.}
 \end{aligned}$$

Again, in the triangle ACD the base is AC and height DE .

$$\begin{aligned}
 \therefore \text{The area of the triangle ACD} &= \frac{1}{2} (\text{base} \times \text{height}) \\
 &= \frac{1}{2} (AC \times DE) \\
 &= \frac{1}{2} (5 \times 2) \text{ sq. c.m.} \\
 &= \frac{1}{2} \times 10 \text{ sq. c.m.} \\
 &= 5 \text{ sq. c.m.}
 \end{aligned}$$

$$\begin{aligned}
 \therefore \text{The area of the quadrilateral ABCD} \\
 &= \text{the area of the triangle ABC} + \text{the area of the triangle ACD} \\
 &= 10 \text{ square c.m.} + 5 \text{ square c.m.} \\
 &= 15 \text{ square c.m.}
 \end{aligned}$$

Answer: 15 square c.m.

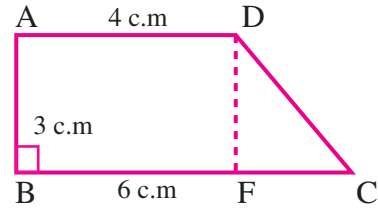
**Example 6.** In a quadrilateral the lengths of both parallel sides are 6 c.m. and 4 c.m. and one angle is right angle respectively. If the distance between the sides is 3 c.m., what is the area of the quadrilateral?

**Solution:** ABCD is a quadrilateral.

Here, the side  $BC = 6$  c.m.

side  $AD = 4$  c.m.  $\angle ABC = 90^\circ$

Then height  $AB = 3$  c.m.



Let us draw a perpendicular line  $DF$  on  $BC$  from point  $D$  so that,  $AD = BF$ .

Now,  $ABFD$  is a rectangle and  $DFC$  is a triangle.

$$\therefore AB = DF = 3 \text{ c.m.}$$

$$\text{and } AD = BF = 4 \text{ c.m.}$$

$$\text{it is given, } BC = 6 \text{ c.m.}$$

$$\therefore FC = BC - BF$$

$$= (6 - 4) \text{ c.m.} = 2 \text{ c.m.}$$

$$\therefore \text{the area of quadrilateral } ABCD$$

$$= \text{The area of rectangle } ABFD + \text{the area of triangle } DCF.$$

$$= (BF \times AB) + \frac{1}{2} (FC \times DF)$$

$$= (4 \text{ c.m.} \times 3 \text{ c.m.}) + \frac{1}{2} (2 \text{ c.m.} \times 3 \text{ c.m.})$$

$$= 12 \text{ square c.m.} + \frac{1}{2} \times 6 \text{ square c.m.}$$

$$= 12 \text{ square c.m.} + 3 \text{ square c.m.}$$

$$= 15 \text{ square c.m.}$$

$$\therefore \text{The area of the quadrilateral} = 15 \text{ square c.m.}$$

Answer : 15 square c.m.

**Exercise -12 (B)**

1. Find out the area of the following rectangles :
  - (a) Length 36 c.m. and breadth 30 c.m.
  - (b) Length 2 m. and breadth 65 c.m.
  - (c) Length 45 m. and breadth 37 m.
  - (d) Length 82 m. and breadth 63.25 m.
2. The lengths of one side of several squares are given below. Find out their area :
  - (a) 27 metre      (b) 76 metre      (c) 6 metre 44 c.m.
3. The base and height of several triangles are given below. Find out their area :
  - (a) base 10 metre and height 15 metre.
  - (b) base 25 metre and height 18 metre.
  - (c) base 7 metre 35 centimetre and height 2 metre.
4. The area of a rectangle is 5400 square metre and breadth 20 metre. What is its length?
5. The area of a rectangular garden is 3392 square c.m. Its length is 64 c.m. What is its breadth?
6. The area of a rectangular land is 1092 square metre. If its length is 39 metre, what is its breadth?
7. The length of one side of a square is 45 metre. What is its area?
8. In a triangle the base is 28 metre and the height is 12 metre. What is its area?

9. The area of a triangular land is 8544 square metre. Its base measures 100 metre. What is its height?
10. The area of a triangle is 189 square metre and height 14 metre. What is the measure of its base ?
11. The base of a triangular land is 280 metre and height 150 metre. Find out its area in hector.
12. The length of a diagonal line of a quadrilateral is 9 c.m. The perpendicular distances of the vertex opposite the diagonal line are 6 c.m. and 8 c.m. Find out the area of the quadrilateral?
13. The lengths of two parallel sides of a quadrilateral are 8 c.m. and 6 c.m. respectively and the distance between the sides is 5 c.m. What is the area of the quadrilateral?
14. The lengths of two parallel sides of a quadrilateral land are 40 metre and 50 metre respectively and the distance between the sides is 25 metre. What is the area of the land?



## Chapter- 13

### Time

**The names of twelve Bengali months and the number of days :**

Months	Number of days	Months	Number of days
Baishak	31	Kartik	30
Jaistha	31	Agrahayan	30
Ashar	31	Poush	30
Shravan	31	Magh	30
Bhadra	31	Falgun	30
Ashwin	30	Chaitra	30

- According to Bengali practice the day and date starts when the sun rises.

**The names of twelve English months and the number of days :**

Months	Number of days	Months	Number of days
January	31	July	31
February	28	August	31
March	31	September	30
April	30	October	31
May	31	November	30
June	30	December	31

- According to international or English practice the day and date starts after 12 pm.

**The names of twelve Hijri months :**

1. Muharram	5. Jamadiul Awal	9. Ramjan
2. Safar	6. Jamadius Sani	10. Shawal
3. Rabiul Awal	7. Rajab	11. Jilkadh
4. Rabius Sani	8. Shaban	12. Jilhajj

- On the 20 September, 622 A.D. Hazrat Muhammad (Sm) migrated from Macca to Madina. Since then the Hijri year has been counted.

- Depending on the duration of the moon, the days in Hijri month can be 29 or 30.
- The Hijri year is counted on a lunar month. A Hijri year has 11 days less than a solar year.
- The first month of the Hijri year is Muharram and the last one is Jilhajj.
- A Hijri day and date is counted after the sunset.

### Leap year

February						2004
Saturday	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday
	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					

- In the year 2004 the month of February had 29 days. The year was a leap year.
- Normally a year has 365 days. However, the earth takes approximately 365·2422 days to move around the sun once. As a result, in a normal year 0·2422 days or  $\frac{1}{4}$  of a day is not counted. To solve this problem after each 4 years a day is added and it is considered as an extra day in the month of February. The year in which 29 days instead of 28 days are counted in the month of February is called a leap year.

If an extra day is added in every four years then in four years  $(1 - 0·2422 \times 4) = 0·0312$  or in four hundred years 3·12 or 3 days (approx.) are added in addition. For this reason, in every four hundred years 3 leap years are dropped.

From the year 8 A.D. the leap years are regularly counted based on the reformed calender. According to it,

- ◆ The year in which the last two digits are not 00, can be a leap year if its last two digits make a number that is divisible by 4.
- ◆ The year in which the last two digits are 00, can be a leap year if its first two digits make a number that is divisible by 4. Otherwise, it is not considered a leap year.

**Observe that :** If the number formed by the last two digits of a number is divisible by 4, the number itself is divisible by 4. Therefore, each leap year is divisible by 4.

However, the years 1500, 1700, 1800, 1900, 2100 are not leap years, although they are divisible by 4. The first two digits of these numbers are not divisible by 4. In other words, they are not divisible by 400. The years 1600, 2000, 2400 are leap year, since they are divisible by 400.

**Example 1.** What is the number of days in the month of February of 1996?

**Solution :**  $4 \overline{) 96} (24$

$$\begin{array}{r} 8 \\ \hline 16 \\ 16 \\ \hline 0 \end{array}$$

In the number 1996, the number formed with the digits in ones and tens places i.e. the number 96 is divisible by 4. So, the given number is also divisible by 4. Therefore, the year is a leap year.

Therefore, in 1996 there are 29 days in the month of February.

Answer : 29 days.

**Example 2.** Is 1998 a leap year?

**Solution :** In the number 1998, the number formed with the digits in ones and tens places, i.e. the number 98 is not divisible by 4. So, the given number is not divisible by 4.

Therefore, 1998 is not a leap year.

Answer : It is not a leap year.

Example 3. Is 2000 a leap year?

**Solution :** In the number 2000 the digits in ones and tens places are 0 and the first two digits form 20 which is divisible by 4. So, the number 2000 is divisible by 400.

Therefore, 2000 is a leap year.

Answer : It is a leap year.

## Decade, Era, Century

- The period of successive 10 years is considered as a decade. For example, the period from the year 1991 to 2000 is considered a decade.
- The period of successive 12 years is considered as an era. For example, the period from the year 1991 to 2002 is considered an era.
- The period of successive 100 years is considered as a century. For example, the period from the year 1901 to 2000 is considered a century and it is called the twentieth century.
- According to English calendar, the period from year 1 to year 100 is considered as the first century. The period from the year 1801 to 1900 is called the nineteenth century.

According to Bengali calendar, the period from the year 1101 to year 1200 is considered as the twelfth century and the period from the year 1301 to year 1400 is considered as the fourteenth century.

## Units of measuring time :

60 seconds = 1 minute	12 months = 1 year
60 minutes = 1 hour	365 days = 1 year
24 hours = 1 day	12 years = 1 era
7 days = 1 week	100 years = 1 century
30 days (generally) = 1 month	

## The Addition and Subtraction of Numbers Related with Time.

**Example 4.** Add : 4 years 5 months 15 days 12 hours and 7 years 8 months 20 days 16 hours.

**Solution :**

Years	Months	Days	Hours
4	5	15	12
7	8	20	16
12	2	6	4

Answer : 12 years 2 months 6 days 4 hours.

**Let us notice that :**

- 12 hours + 16 hours = 28 hours = 1 day 4 hours  
[ $\because$  24 hours = 1 day]
- 15 days + 20 days + (in hand) 1 day = 36 days = 1 month 6 days  
[ $\because$  30 days = 1 month]
- 5 months + 8 months + (in hand) 1 month = 14 months  
= 1 year 2 months.  
[ $\because$  12 months = 1 year]

**Example 5.** Add :

Months	Days	Hours	Minutes
5	12	20	25
8	6	8	10
6	5	14	30

**Solution :**

Years	Months	Days	Hours	Minutes
	5	12	20	25
	8	6	8	10
	6	5	14	30
1	7	24	19	5

[ $\because$  60 minutes = 1 hour  
24 hours = 1 day  
12 months = 1 year]

Answer : 1 year 7 months 24 days 19 hours 5 minutes.

**Example 6.** Add : Years Months Days Hours Minutes Seconds

7	6	12	15	20	10
4	2	10	20	15	30
10	8	6	12	25	40

**Solution :**

Years	Months	Days	Hours	Minutes	Seconds	
7	6	12	15	20	10	[ ∴ 60 seconds = 1 minute 60 minutes = 1 hour 24 hours = 1 day 30 days = 1 month 12 months = 1 year ]
4	2	10	20	15	30	
10	8	6	12	25	40	
22	5	0	0	1	20	

Answer : 22 years 5 months 0 day 0 hour 1 minute 20 seconds.

**Example 7.** Subtract : Years Months Days Hours

18	6	15	12
11	9	10	5

**Solution :** Years Months Days Hours

18	6	15	12
11	9	10	5
6	9	5	7

Answer : 6 years 9 months 5 days 7 hours.

**Explanation :** It is not possible to subtract 9 months from 6 months. For this reason, from the place of years, 1 year = 12 months is taken and added with 6 months. The result is 18 months. Now by subtracting 9 months from 18 months we get 9 months. Again, we added 1 year in hand with 11 years which came to 12 years. Again, by subtracting 12 years from 18 years we get 6 years.

**Example 8.** Subtract : Hours Minutes Seconds

16	20	15
12	30	40

**Solution :**

Hours	Minutes	Seconds
16	20	15
12	30	40
3	49	35

Answer : 3 hours 49 minutes 35 seconds.

**[Explanation :** By adding 15 seconds with 1 minute = 60 seconds we get 75 seconds and by subtracting 40 seconds from 75 seconds we get 35 seconds. Again, by adding 1 hour = 60 minutes with 20 minutes we get 80 minutes and by adding 1 minute in hand with 30 minutes we get 31 minutes. Now, we get 49 minutes by subtracting 31 minutes from 80 minutes. Again, 1 hour in hand has been added with 12 hours and then it has been subtracted from 16 hours.]

### The Multiplication and Division of Numbers Related with Time

**Example 9 :** Multiply 4 years 6 months 11 days by 4.

**Solution :**

4	years	6	months	11	days
					× 4
18		1		14	

Answer : 18 years 1 month 14 days.

**Explanation :** 11 days × 4 = 44 days = 1 month 14 days.

In the place of days 14 has been written while 1 month in hand.

6 months × 4 = 24 months, with it if 1 month is added the result becomes 25 months or 2 years 1 month. In the place of month 1 has been written and 2 years in hand.

4 years × 4 = 16 years, with it if 2 years is added, the result becomes 18 years.

**Example 10.** Multiply 8 days 7 hours 30 minutes 18 seconds by 5.

**Solution :**

Days	Hours	Minutes	Second
8	7	30	18
			× 5
1 month	11 days	13 hours	31 minutes 30 seconds

Answer : 1 month 11 days 13 hours 31 minutes 30 seconds.

**Example 11.** Transform 2 years 3 months 15 days into hours.

**Solution:**

$$\begin{array}{rcll} 2 \text{ years} & = 2 \times 365 \text{ days} & = 730 & \text{days} \quad [\because 1 \text{ year} = 365 \text{ days}] \\ 3 \text{ months} & = 3 \times 30 \text{ days} & = 90 & \text{days} \quad [\because 1 \text{ month} = 30 \text{ days}] \\ 15 \text{ days} & = 15 \text{ days} & = 15 & \text{days} \end{array}$$

---


$$\text{Summation} = 835 \text{ days}$$

Now,  $835 \text{ days}$

$$\begin{array}{r} \times 24 \\ \hline 3340 \\ 16700 \\ \hline 20040 \end{array} \quad [\because 24 \text{ hours} = 1 \text{ day}]$$

$20040 \text{ hours.}$

Answer : 20040 hours.

**Example 12** Transform 2 years 6 months 12 days into minutes.

**Solution:**

$$\begin{array}{rcll} 2 \text{ years} & = 2 \times 365 \text{ days} & = 730 & \text{days} \\ 6 \text{ months} & = 6 \times 30 \text{ days} & = 180 & \text{days} \\ 12 \text{ days} & & = 12 & \text{days} \end{array}$$


---


$$\text{Summation} = 922 \text{ days}$$

Now,  $922 \text{ days}$

$$\begin{array}{r} \times 24 \\ \hline 3688 \\ 18440 \\ \hline 22128 \end{array} \quad [\because 1 \text{ day} = 24 \text{ hours}]$$

$22128 \text{ hours}$

$$\begin{array}{r} \times 60 \\ \hline 1327680 \end{array} \quad [\because 1 \text{ hour} = 60 \text{ minutes}]$$

$1327680 \text{ minutes}$

Answer : 1327680 minutes.



**Example 13.** Transform 69835 hours into years, months and days.

**Solution :** 24) 69835 hours ( 2909 days.

$$\begin{array}{r}
 48 \\
 \hline
 218 \\
 216 \\
 \hline
 235 \\
 216 \\
 \hline
 19 \text{ hours}
 \end{array}$$

365) 2909 days (7 years

$$\begin{array}{r}
 2555 \\
 \hline
 354 \text{ days}
 \end{array}$$

30) 354 days (11 months

$$\begin{array}{r}
 30 \\
 \hline
 54 \text{ days} \\
 30 \\
 \hline
 24 \text{ days}
 \end{array}$$

Answer : 7 years 11 months 24 days 19 hours.

**Let us notice that:** One year is determined on the basis of 365 days to find out years from days.

[**N.B.** If the days exceeds 365, then we have to divide it by 365. The remaining days exceeding 30 have to be divided by 30 to turn into months.]

**Example 14.** Transform 97860 seconds into days, hours and minutes.

**Solution :** 60) 97860 seconds ( 1631 minutes

$$\begin{array}{r}
 60 \\
 \hline
 378 \\
 360 \\
 \hline
 186 \\
 180 \\
 \hline
 60 \\
 60 \\
 \hline
 0
 \end{array}$$

60) 1631 minutes ( 27 hours.

$$\begin{array}{r}
 120 \\
 \hline
 431 \\
 420 \\
 \hline
 11 \text{ minutes}
 \end{array}$$

24) 27 hours ( 1 day

$$\begin{array}{r}
 24 \\
 \hline
 3 \text{ hours}
 \end{array}$$

Answer : 1 day 3 hours 11 minutes.

**Example 15.** Divide 24 years 8 months 6 days 12 hours by 16.

**Solution :** 16 ) 24 years 8 months 6 days 12 hours ( 1 year

$$\begin{array}{r} 16 \\ \hline \end{array}$$

8 years

$$\times 12 \quad [\because 1 \text{ year} = 12 \text{ months}]$$

$$\begin{array}{r} 96 \text{ months} \\ \hline \end{array}$$

$$+ 8 \text{ months}$$

$$16 ) 104 \text{ months ( 6 months}$$

$$\begin{array}{r} 96 \\ \hline \end{array}$$

8 months

$$\times 30 \quad [\because 1 \text{ month} = 30 \text{ days.}]$$

$$\begin{array}{r} 240 \text{ days} \\ \hline \end{array}$$

$$+ 6 \text{ days}$$

$$16 ) 246 \text{ days ( 15 days}$$

$$\begin{array}{r} 16 \\ \hline \end{array}$$

$$\begin{array}{r} 86 \\ \hline \end{array}$$

$$\begin{array}{r} 80 \\ \hline \end{array}$$

6 days

$$\times 24 \quad [\because 1 \text{ day} = 24 \text{ hours}]$$

$$\begin{array}{r} 144 \text{ hours} \\ \hline \end{array}$$

$$+ 12 \text{ hours}$$

$$16 ) 156 \text{ hours ( 9 hours}$$

$$\begin{array}{r} 144 \\ \hline \end{array}$$

12 hours

$$\times 60 \quad [\because 1 \text{ hour} = 60 \text{ minutes}]$$

$$16 ) 720 \text{ minutes ( 45 minutes}$$

$$\begin{array}{r} 64 \\ \hline \end{array}$$

$$\begin{array}{r} 80 \\ \hline \end{array}$$

$$\begin{array}{r} 80 \\ \hline \end{array}$$

$$\begin{array}{r} 0 \\ \hline \end{array}$$

Answer : 1 year 6 months 15 days 9 hours 45 minutes.

## International Time Table

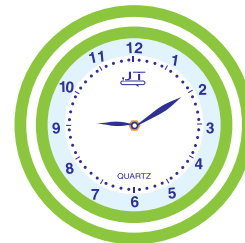
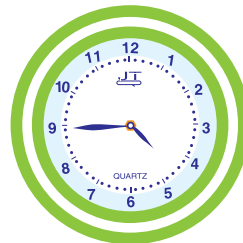
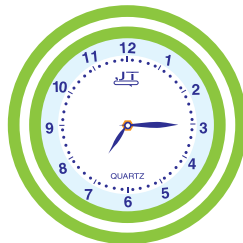
According to International time table a day is counted as 24 hours from midnight i.e. after 12:00 p.m. to 12:00 p.m. of the next midnight.

However, when it is 2:15 at night in our country, in International time it is also 2:15. Again, when it is 2:15 in the afternoon in our country, it is 14:15 in the International time.

**International time table is expressed below :**

**The time table of our country**

12:25 at night | 7:15 in the morning | 4:45 in the afternoon | 9:10 at night

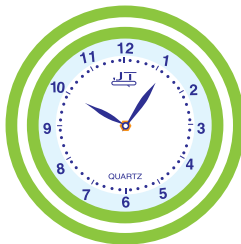


**International time table**

0 : 25 | 7 : 15 | 16 : 45 | 21 : 10

In International time we do not call the time as morning, noon, afternoon, evening, night, etc.

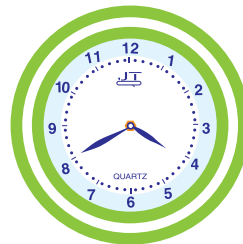
Express the times shown in the clocks in International time (one is done) :



**night**



**noon**



**morning**



**night**

22 : 05 hours.

## Time table (Railway)

### Dhaka - Chittagong

Station	Distance from Dhaka k.m.	704 Moha-nagar Provati	4 Karna-phuli Express	722 Moha-nagar Godhuli	702 Suborno Express	2 Chitta-gong Mail	742 Turna Express
Dhaka Dep.	00	0740	0530	1515	1630	2230	2300
Dhaka Airport Dep.	19	0821	0625	1558	1705	2315	2338
Tongi Dep.	23		0747			2330	
Ghorashal Flag Dep.	47		0828			0003	
Norshindi Dep.	58		0850			0028	
Bhairab Bazar Dep.	87	1017	1045	1735		0115	
Ashugonj Dep.	91		1100			0142	
Brahmonbaria Dep.	104	1050	1129	1805		0210	0150
Akhaura Dep.	120		1215			0300	
Comilla Dep.	168	1211	1350	1928		0400	0335
Laksam Dep.	192		1445			0435	0410
Hasanpur Dep.	210		1523				
Feni Dep.	232	1322	1606	2039		0527	0458
Chittagong Arrival	321	1515	1840	2255	2235	0755	0705

Let us notice the time table of railway above :

The Karnaphuli Express Train leaves the Dhaka Station at 5:30 a.m. and reaches the Chittagong Station at 6:40 p.m.

Fill in the blanks following the time table above:

- The Suborno Express Train leaves the Dhaka Station at  and reaches the Chittagong Station at
- The Mohanagar Provati Train leaves the Bhairab Bazar Station at
- The Chittagong Mail Train leaves the Comilla Station at  and reaches the Chittagong Station at
- The Turna Express Train leaves the Dhaka at  and reaches the Chittagong Station at
- The Mohanagar Godhuli Train reaches the Chittagong Station at

**Example 16.** Raju was born on 26 March in 1991. What will be his age on 5 June 1997?

**Solution :**

Years	Months	Days
1997	06	05
(-) 1991	03	26
<hr/>		
06	02	10
		+ 1
<hr/>		
06	02	11

As the month he was born in March (31 days)  
 $\therefore (31+5) \text{ days} = 36 \text{ days}$   
 $\quad \quad \quad - 26 \text{ days}$   


---

 10 days  
 [To find out the age the day of birth is added]

$\therefore$  Raju will be 6 years 2 months 11 days old.

Answer : 6 years 2 months 11 days.

**Expplanation :**

26 - 31 March in 1991  $\rightarrow$  6 days

From 1 April in 1991 to

31 March in 1997  $\rightarrow$

6 years

From 1 April to 31 May 1997  $\rightarrow$

2 months

From 1 June to 5 June in 1997  $\rightarrow$

5 day

From 26 March in 1991 to 5 June in 1997  $\rightarrow$  6 years 2 months 11 days

**Example 17.** How many days are there from 1 February 1998 to 26 September?

**Solution :** The number formed with the digits in ones and tens places of 1998 year is 98. This is not divisible by 4.

Therefore, 1998 is not divisible by 4.

So, 1998 is not a leap year. That means, in 1998 the month of February has 28 days.

<b>The number of days to be found:</b>	February	28	days
	March	31	days
	April	30	days
	May	31	days
	June	30	days
	July	31	days
	August	31	days
	September	26	days
	<b>Total</b>	<b>238</b>	<b>days</b>

Answer : 238 days.

**Example 18.** Baby's date of birth is 26 February, 1980. On which date her age will be 17 year 2 months 24 days?

**Solution:**

Years	Months	Days	
1980	02	26	(It is assumed that the month February has 29 days)
(+) 17	02	24	$26 + 24 = 50$ days
<hr/>			$1 \text{ month} = 29$ days
1997	05	21	21 days
		(-) 1	[To count age the date of birth is added. So, here 1 is subtracted]
<hr/>			
1997	05	20	

Answer : 20 May, 1997.

**Explanation:** As the month of birth is February and a leap year, the sum has been solved by counting 29 days in the month.

### Exercise - 13

- Find out which of the years below are leap years :  
 (a) 1922    (b) 1930    (c) 1952    (d) 1964    (e) 1978  
 (f) 1984    (g) 1996    (h) 2000    (i) 2006    (j) 2008
- Add :

(a)	Years	Months	Days	Hours	Minutes
	8	6	12	7	30
	9	2	20	8	25
		11	15	10	45

(b)	Years	Months	Days	Hours	Minutes	Seconds
	5	7	16	8	40	20
	12	3	4	15	50	10
	6	9	25	20	9	45
	10	5	1	6	20	55

## 3. Subtract :

(a)	Days	Hours	Minutes	Seconds
	20	8	45	20
	7	9	25	40

(b)	Years	Months	Days	Hours	Minutes	seconds
	25	4	26	12	30	35
	18	9	23	15	55	10

4. Multiply: (a) 4 months 12 days 8 hours 20 minutes by 7  
 (b) 8 months 22 days 25 minutes 40 seconds by 5  
 (c) 5 years 2 months 10 days 6 hours by 9.
5. Divide: (a) 22 years 8 months 10 days by 15  
 (b) 16 years 7 months 15 days 20 hours 12 minutes by 12.
6. Transform 4 days 9 hours 10 minutes into seconds.
7. Transform 3 years 4 months 8 days into hours.
8. Transform 3 years 2 days into minutes.
9. Transform into years, months, days etc.  
 (a) 84735 minutes.  
 (b) 16180 hours  
 (c) 20960 hours  
 (d) 93540 seconds
10. Mithu was born on 25 January, 1985. How old will he be on 20 October in 2005?
11. Rima was born on 10 April, 1976. How old will she be on 6 September in 1998?

12. Shamima's date of birth is 26 February, 1980. What will be her age on 15 May, 2000?
13. How many days are there from 1 January to 25 August in 2004?
14. Tuhin was 8 years 1 month 12 days old on 31 March, 1997. What was his date of birth?
15. Ritu was 15 years 2 months 5 days old on 2 April, 1996. What was her date of birth?
16. Kajol was born on 26 March, 1992. On which date will she be 8 years 2 months 14 days old?
17. Moushumi was born on 30 May, 1986. On which date will she be 20 years old ?
18. Anjana Sarkar was born on 20 February in 1971. On which date will she be 57 years old?
19. Mina studies at 7: 00 p.m. everyday. When in international time does she study?
20. Rani's father returns home from his office at 5:20 p.m. At which hour in international time does he return home?
21. Pintu reached from Dhaka to Chittagong station by Mohanagar Godhuli Train at 2255 international time. At which hour did he reach Chittagong?



## Chapter -14

### Income, Expenditure and Cash Memo

Everybody has to take a profession to earn his/her living. What a man earns by his profession has to be spent to meet the needs of his daily life. We need to keep a record of our income and expenditure. This is the register of income and expenditure. We can understand the proverb “cut your coat according to your cloth” only when we keep a record of our income and expenditure.

On Monday, the 30 May, 2005 Mr. Sukkur Ali had Tk. 835·70 in his funds. On that day he sold chillis for Tk. 445·50, mustard for Tk 315·80 and turmeric for Tk. 225·00 and bought the following things

Rice 5 k.g.	Tk. 110·00
Fish	Tk. 80·50
Meat	Tk. 110·00
Soyabean Oil 1 litre	Tk. 54·00
Sugar $\frac{1}{2}$ k.g.	Tk. 18·00
Salt 1 k.g.	Tk. 9·00
Stationary	Tk. 15·75

**Below is the record of income and expenditure of Mr. Sukkur Ali for that day.**

**Date 30-05-2005**

<b>Income</b>	<b>Tk.</b>	<b>Expenditure</b>	<b>Tk.</b>
Openning balance	835 ·70	Rice 5 k.g.	110 ·00
Chillis sold	445 ·50	Fish	80 ·50
Mustard sold	315 ·80	Meat	110 ·00
Turmeric sold	225 ·00	Soyabean oil 1 litre	54 ·00
Total income	1822 ·00	Sugar $\frac{1}{2}$ k.g.	18 ·00
Total expenditure	397 ·25	Salt 1 k.g.	9 ·00
Closing balance	1424 ·75	Stationary	15 ·75
			397 ·25

On 31 May, 2005 the amount in funds Tk. 1424·75  
(One thousand 4 hundred 24 taka and 75 Paisa).

**Let us notice that :** The income on 30 May 2005 was written on the left and the expenditure on the right. The funds of the next day closing balance can be found by subtracting the expenditure from income.

### Record of income and expenditure

**Example 1.** Rita went to a shop with Tk. 50'00. She bought 2 note books for Tk. 18'00, 1 pencil for Tk. 6'00, 1 book for Tk. 8'00 and 1 eraser for Tk. 2'50. Write down her income and expenditure.

**Solution :**

### Income & Expenditure

#### Expenditure

Income	Tk.	50'00	Notebooks	2 nos.	Tk.	18'00
Expenditure	Tk.	34'50	Pencil	1 nos.	Tk.	6'00
Closing balance	Tk.	15'50	Book	1 nos.	Tk.	8'00
			Eraser	1 nos.	Tk.	2'50
					Tk.	34'50

Answer : Tk. 15'50.

### 3 Days' Sample of Monthly Income and Expenditure

An account for the income and expenditure of Mr. Jasim in the month of May, 2005.

The name of the month and year : May, 2005.

Date and Day	Income	Tk.	Expenditure	Tk.
01-5-2005	Opening balance	224'00	Shopping	305'00
Sunday	Salary	3225'00	Tution fee of son	50'00
	Selling of Chillis	300'00	<u>Rickshaw fare</u>	<u>8'00</u>
	Given by son	1200'00		363'00
	Total	4949'00		
	<u>Expenditure</u>	<u>363'00</u>		
	Closing balance	4586'00		

	<b>Income</b>	<b>Tk.</b>	<b>Expenditure</b>	<b>Tk.</b>
02-5-2005	Openning balance	4586'00	Tax for land	325'00
Monday	Dues		Doctors fee	50'00
	with Swapon	200'00	Medicine	60'00
	Total	4786'00	Clothe for daughter	215'00
	Expenditure	650'00		650'00
	Closing balance	4136'00		

	<b>Income</b>	<b>Tk.</b>	<b>Expenditure</b>	<b>Tk.</b>
03-5-2005	Openning balance	4136'00	Rice	325'00
Tuesday	Selling of pulses	250'00	Oil	50'00
	Total	4386'00	Fish	80'00
	Expenditure	567'00	Other groceries	12'00
	Closing Balance	3819'00	Repayment of loan to Shamsu	100'00
				567'00

**Observe that :** The income and expenditure of the month of May can be found if we write down the account of 31 days following the accounts of the dates above.

### Cash Memo

A cash memo is a receipt which contains quantity, description, rate and price of goods sold. The shopkeeper or the seller gives it to a buyer when something is sold.

**Example 2.** From Manjur Store Al Amin bought 3 notebooks at the rate of Tk. 6, one eraser at Tk. 2'50, one pencil at Tk. 5, a ballpen at Tk. 3'50. The receipt of the sold goods is like the following:

## Cash Memo

### Manjur Store

No. 8

Station Road, Tongi

Date : 10/5/05

Name of the Client : Al Amin  
6 Cherag Ali Road, Tongi.

Description of Items	Quantity	Rate in Taka	Price in Taka
Notebook	3 nos.	6'00	18'00
Eraser	1 nos.	2'50	2'50
Pencil	1 nos.	5'00	5'00
Ballpen	1 nos.	3'50	3'50
		Total =	29'00

In words : Twenty nine taka only.

Signature of the sales person.

**Example 3.** On 12 May 2005 from Hat Bazar store Mithu bought 5 k.g. of rice at the rate of Tk. 22'00 per k.g., 2 k.g. of lentils at the rate of Tk. 44'00 per k.g., 2 k.g. of beans at the rate of Tk. 40'00 per k.g., 1 k.g. of salt at the rate of Tk. 8'00 per k.g., 2 k.g. of sugar at the rate of Tk. 36'00 per k.g. and  $\frac{1}{2}$  litre of milk at the rate of Tk. 24'00 per litre. Prepare a cash memo showing how much money he spent.

**Solution :****Cash Memo****Hat Bazar Store**

No. 135

Sat Masjid Road, Dhaka

Date : 12/5/05

Name of the Client : Mithu

Address : 13/2 Jigatola  
Dhaka- 1209.

Description of Items	Quantity	Rate (Taka)	Price (Taka)
Rice	5 k.g.	22'00	110'00
Lentils	2 k.g.	44'00	88'00
Beans	2 k.g.	40'00	80'00
Salt	1 k.g.	8'00	8'00
Sugar	2 k.g.	36'00	72'00
Milk	$\frac{1}{2}$ litre	24'00	12'00
		Total =	370'00

In words : Three hundred and seventy taka only.

Signature of the sales person.

**Exercise - 14**

1. Answer in brief :
  - (a) In which place do we write the opening balance in the statement of income and expenditure?
  - (b) How do we get the opening balance in the statement of income and expenditure?
  - (c) In which place should we write the amount for buying pulses?
  - (d) In which place should we write the selling price of pulses?
  - (e) Prepare a sample of monthly income and expenditure of your family?
  - (f) What is cash memo?
  - (g) Who prepares the cash memo?
  - (h) On whose name do we write the cash memo?
2. You went to market with Tk. 200'00. You bought 2 books for Tk. 25'50, a quire of paper for Tk. 12'75 and an eraser for Tk. 2'25. Prepare a statement of income and expenditure.
3. Raju went to market with Tk. 250'00. He bought fish for Tk. 25'50, vegetables for Tk. 8'50, green chillies for Tk. 2'00 and betel nut for Tk. 6'25. He also spent Tk. 4'00 as rickshaw fare. Write an account of his income and expenditure for the day.
4. On 18 Baishak, 1412 Bengali year, Monday, Kalu Byapari sold jute for Tk. 570'00, mustard for Tk. 350'00, green chillies for Tk. 150'00 and bought the following things:

Rice	Tk. 132'00
Pulses	Tk. 40'00
Soyabean oil	Tk. 25'00
Flour	Tk. 36'00
Matches	Tk. 2'00

Prepare his record of income and expenditure for that day.

5. On Sunday the 8 May, 2005 Mr. Jasim had Tk. 324·60 as his closing balance for the day before. On that day he sold potatoes for Tk. 200·00, onions for Tk 140·00 and vegetables for Tk. 80·75. He also lend Tk. 50·00 to a worker named Moti. On that day he bought fish for Tk. 50·00, pulses for Tk.16·00, salt for Tk. 4·00, a dress for his daughter for Tk. 200·00, a lungi for himself for Tk. 85·00. He also received Tk. 500·00 sent by his eldest son. Prepare a record of income and expenditure for that day.
6. On 28 April, 2005 Mr. Asgar bought a shirt for himself for Tk. 250·00, a pants for his son for Tk. 325·00, a saree for his wife for Tk. 225·00 and a kameez for his daughter for Tk. 400·00 from Amrit Garments Shop, Narshingdi. Prepare a cash memo of the items he bought.
7. On 25 April, 2005 from 'Boi Bitan' New market, Chittagong, Mina bought a Bengali book for Tk. 17·75, an English book for Tk. 8·75, a book on Mathematics for Tk. 12·50 . a book on Science for Tk. 7·25, a book on Social science for Tk. 8·15, a book on Religion for Tk.8·30 and an Atlas book for Tk. 14·60. Prepare a cash memo showing the total price of the books.
8. Tick (✓) the correct answer :
  - (a) In how many parts do we divide the statement of income and expenditure?  
1 / 2 / 3 / 4
  - (b) On which side of the khata do we write 'Income'?  
above / below / left / right
  - (c) Which is the daily income and expenditure?  
1 day's / 15 day's / 1 week's / 1 month's
  - (d) Which of these will go to income?  
School fee of son / father's salary / shopping expenditure / payment of loan.
  - (e) What is cash memo?  
rate / price / the total price / the list of price.
  - (f) Who writes the cash memo?  
the buyer / seller / teacher / student.

## Chapter - 15

### The Arrangement of Data

#### Arranged and disarranged data

Often we describe different information by number. For example, following are the marks which 20 students obtained in mathematics in their annual examination:

69	62	41	52	45
44	55	32	58	38
65	63	39	48	57
68	49	60	40	47

These numbers represent the data of their achievements in mathematics. These data are not well arranged according to any particular order.

If the data are arranged in order, we can get the necessary information very easily. For example, we can arrange these data of achievements in mathematics according to the order of merit or class.

The data arranged in this way are arranged data.

Among the marks secured 32 is the lowest and 69 is the highest.

The table below is prepared by arranging the marks from 30 to 69 with 10 as intervening number.

The classification of number	The number of students
30 — 39	3
40 — 49	7
50 — 59	4
60 — 69	6
	<b>Total = 20</b>

In this way, with the classification of numbers, the table prepared with the number of students in each class are arranged data.



Starting from 30 a class is formed with 10 as the intervening number. First, the classes are written on the left. The first number is 69 and it belongs to the 60 - 69. Therefore, a tally sign is given.

The class interval of numbers	Tally sign	The number of students / occurring numbers.
30 - 39		3
40 - 49		7
50 - 59		4
60 - 69		6
		Total = 20

The second number is 62; it also belongs to the 60 - 69 class. Now, another tally has been given to that class. In this way when 4 tallies are given the fifth one is not given separately. Rather it is given diagonally  $\diagup$  on the other 4 tallies.

**Example 1.** The daily sales (in taka) of 20 shops are as follows:

2230    2215    2225    2230    2225    2220  
 2230    2225    2220    2225    2220    2225  
 2215    2230    2225    2215    2220    2225  
 2230    2220.

Arrange the data.

**Solution :**

The daily sale (in taka)	Tally	The number of shops
2215		3
2220		5
2225		7
2230		5
		Total = 20

**Example 2.** Below are the weights (k.g.) of 22 people :

60, 30, 50, 20, 40, 30, 40, 30, 60, 20,  
60, 50, 60, 30, 60, 20, 30, 20, 40, 30,  
60, 20.

Arrange the data.

**Solution :**

Weights (k.g.)	Tally	The number of people
20		5
30		6
40		3
50		2
60		6
		Total = 22

### Exercise - 15

- Following are the marks secured in mathematics by 30 students. Arrange the data.

71, 75, 63, 75, 51, 75, 57, 75, 52,  
70, 75, 72, 58, 63, 69, 71, 60, 61,  
69, 53, 52, 72, 72, 72, 52, 63, 54,  
55, 55, 69.

- Following are the weekly income (in taka) of 15 families. Arrange the data.

420, 260, 290, 480, 275, 475,  
325, 280, 480, 330, 375, 430,  
270, 340, 360.

3. Following are the numbers of benches (seat and high) of five classrooms. Express the number of benches with tally signs.

Classes	Number of Benches
Class One	30 Pairs
Class Two	25 Pairs
Class Three	22 Pairs
Class Four	15 Pairs
Class Five	12 Pairs

4. Following are the weights (k.g.) of 20 people. Arrange the data.

60   30   40   50   20   40   30   50   20   30  
40   60   20   40   30   50   20   30   20   30.

5. Following are the wages of 28 labourers. Arrange the data.

154   132   149   138   149   137   144  
138   162   157   140   150   143   148  
145   146   136   150   157   164   156  
132   152   138   144   137   134   150.

## Chapter - 16

# Graph

Graph is a useful means of easily understanding and visualizing any given information or collected data.

**Example 1.** The numbers of students studying in different classes of Joypara Government Primary School are as follows :

Classes	The number of students
Class One	75
Class Two	67
Class Three	58
Class Four	53
Class Five	49

Following the information of the table draw a bar graph.

### Solution :

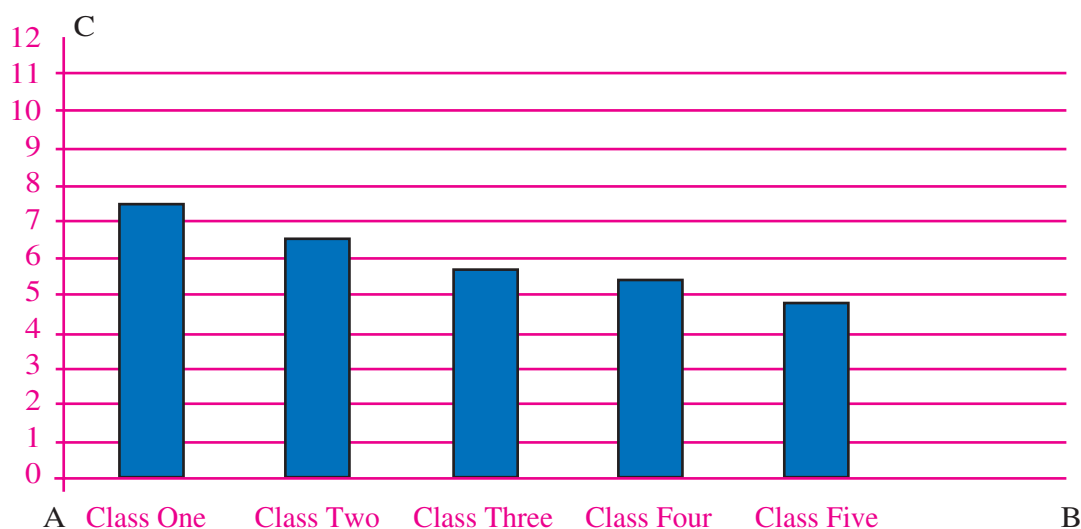
Let us draw a horizontal line AB and a vertical line AC. Keeping equal distance, let us draw the straight line AB several times. Consider each alternative portion as class one, two, three, four and five.

On the line AC let us draw sufficient lines that have 1 c.m. distance from one another. On these lines draw that are parallel to AB.

Let us think, along the uppersides of the line AC each centimetre represents 10 students. Therefore, along the line AC each millimetre represents one student.

On the two marked places for class one along the line AB, let us draw two lines of 75 m.m. = 7.5 c.m. height that remain parallel to line AC and connect their two vertices. The narrow rectangle which has thus been obtained, is the bar graph of 75 students of class one. To make the graph beautiful and clear, let us coloured the column. Similarly, draw 6.7 c.m., 5.8 c.m., 5.3 c.m. and 4.9 c.m. with height of bar graph of students for classes two, three, four and five respectively.

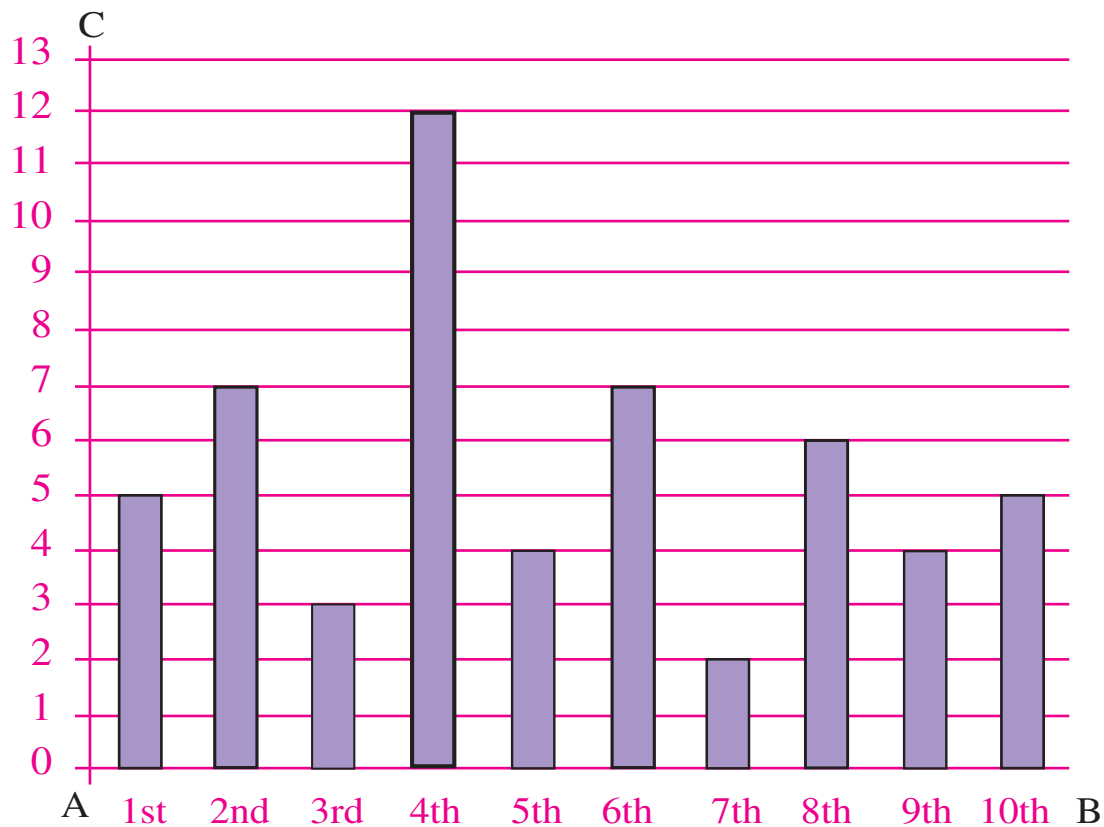
The whole figure obtained in this way is the graph of the given data.



**The class wise number of students in Joypara Government Primary School (Along the vertical line AC, 1 c.m. represents 10 students)**

**Example 2.** In a one day cricket match a bowler bowled 10 overs. The bar graph below shows the number of runs given by him in different overs (i.e. the number of runs scored by the batsmen of the other team). Answer the following questions observing the graph :

- In which over did he give the highest number of runs?
- In which over did he give the lowest number of runs?
- How many total runs did he give in 10 overs and what is the average runs in each over?
- Arrange the number of runs in descending order and write the corresponding overs under the number of runs.



### Solution

- (a) In the 4th over he gave 12 runs which is the highest.
- (b) In the 7th over he gave 2 runs which is the lowest.
- (c) In 10 overs he gave  $5+7+3+12+4+7+2+6+4+5 = 55$  runs in total. The average runs  $= 55 \div 10 = 5.5$   
Therefore, in an average he gave 5.5 runs in each over.
- (d) Runs : 12   7   7   6   5   5   4   4   3   2  
Overs : 4th   2nd   6th   8th   1st   10th   5th   9th   3rd   7th

**Exercise - 16**

1. In Jhawtola Government Primary School, the numbers of students in five classes are as follows :

<b>Classes</b>	<b>Number of students</b>
Class One	98
Class Two	87
Class Three	79
Class Four	66
Class Five	55

Draw a bar graph following the data.

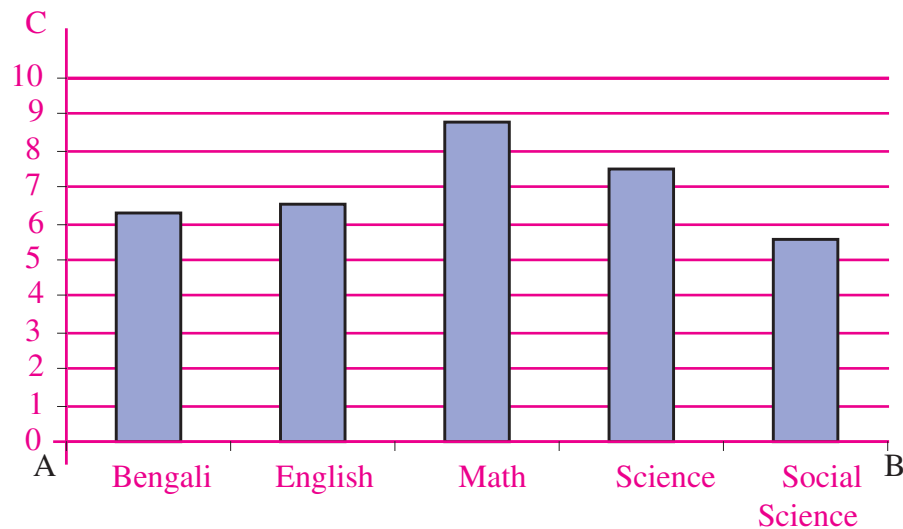
2. Poran Mondol, a cultivator under the terms of lease, harvested 5 kinds of crops last year. The table below shows the quantity of crops. Following the information of the table draw a bar graph.

<b>Crops</b>	<b>Quantity (Quintals)</b>
Paddy	105
Jute	92
Wheat	86
Gram	73
Pulses	58

3. The distances between Dhaka and several other cities (In the nearest multiple of 10 kilometre) are given in the table below. Draw a bar graph following the data.

<b>Places</b>	<b>Distances</b>
Khulna	330 k.m.
Chittagong	290 k.m.
Kushtia	260 k.m.
Rajshahi	310 k.m.
Rangpur	440 k.m.
Sylhet	410 k.m.

4. The following bar graph shows the marks Pamela secured in different subjects in the annual examination. Observing the graph answer the following questions :
- (a) In which subject did she get the highest marks and how much is that?
  - (b) In which subject did she get the lowest marks and how much is that?
  - (c) How much did she get in Bengali?
  - (d) How much total marks did she get and what is the average marks in each subject?



The bar graph of the marks secured by Pamela.

(Along the line AC each space represents 10 marks)

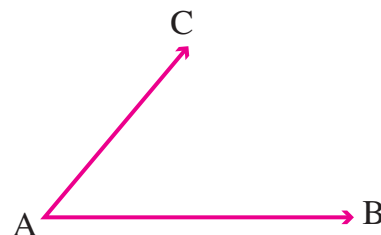


## Chapter - 17

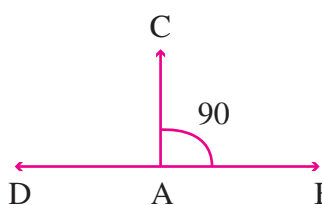
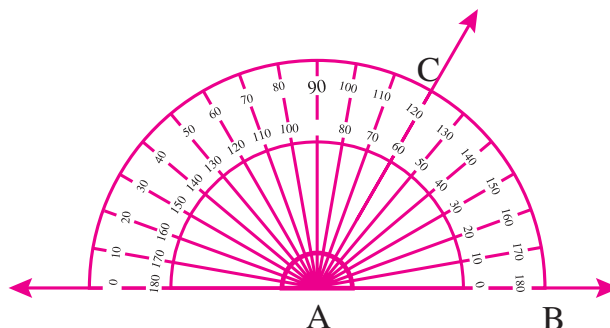
# Geometry

### Angle and Measurement of Angle

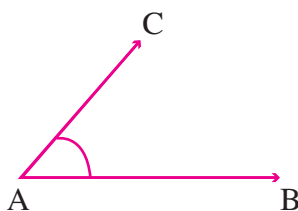
In the adjacent figure, the rays AB and AC formed the angle BAC or CAB in their common end point A. The vertex of the angle is A and the angle is expressed by writing  $\angle BAC$  or,  $\angle CAB$ .



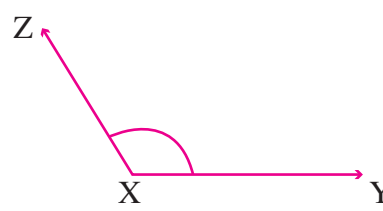
We use the protractor to measure angle in degree as unit. In the figure,  $\angle CAB = 60$  degree or, 60 .



Right Angle



Acute Angle



Obtuse Angle

The angle which is smaller than a right angle is called an acute angle. The angle which is greater than a right angle is called an obtuse angle.

By measuring an angle, it can be determined whether it is right or acute or obtuse angle.

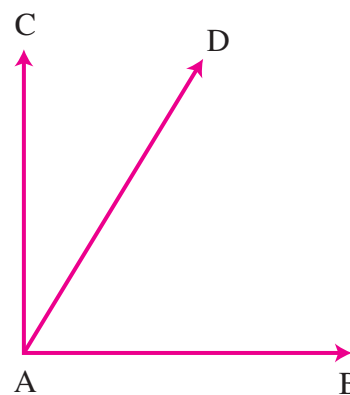
The angle which is less than 90 is an acute angle.

The angle which is 90 is a right angle.

The angle which is greater than 90 is an obtuse angle.

## Complementary Angle

In the figure,  $\angle BAC$  is a right angle. The ray  $AD$  stands between the two arms of the angle. As a result,  $\angle BAD$  and  $\angle DAC$  two angles were formed. Measuring the two angles, it was observed that the total measurement of the two angles is equal to the measurement of  $\angle BAC$  i.e.  $90^\circ$ . We say,  $\angle BAD$  and  $\angle DAC$  are complementary angles to each other; or, they are mutually complementary angles.

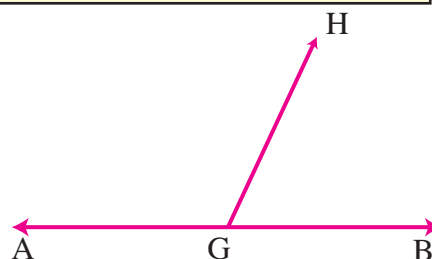


If the sum of the two angles is  $90^\circ$ , then the angles are complementary to each other; or, they are mutually complementary angles.

If the two complementary angles are drawn as adjacent angles, they will produce a right angle.

## Supplementary Angle

$AB$  is a straight line. On this line  $G$  is a point between the points  $A$  and  $B$ .  $H$  is a point which is not on the line  $AGB$ .  $GH$  is a ray which is different from  $GA$  and  $GB$ . Thus, we get two angles  $\angle AGH$  and  $\angle BGH$ . Measuring the angles, we find that the sum of these two angles is equal to  $\angle AGB$  i.e.  $180^\circ$  as  $\angle AGB$  is a straight angle. We say,  $\angle AGH$  and  $\angle BGH$  are supplementary angles to each other; or, they are mutually supplementary angles.

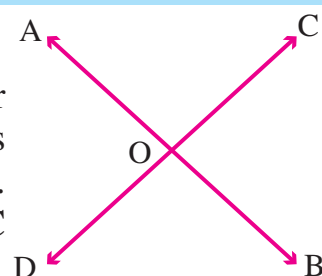


If the sum of the two angles is  $180^\circ$ , then the angles are supplementary to each other; or, they are mutually supplementary angles.

If the two supplementary angles are drawn as adjacent angles, they produce a straight angle.

## Vertically Opposite Angles

Two straight lines AB and CD intersected each other at the point O in the figure. Four angles, such as  $\angle AOD$ ,  $\angle DOB$ ,  $\angle BOC$  and  $\angle COA$  are formed at O. Among these,  $\angle AOD$  is vertically opposite to  $\angle BOC$  or, they are mutually vertically opposite angles.



Again,  $\angle AOC$  and  $\angle BOD$  are vertically opposite angles or they are mutually vertically opposite angles. Again rays OA, OB are opposite to each other as the points A, O, B rest on the same straight line. Again, OC and OD are opposite rays. The sides of any of the four vertically opposite angles at the point O are opposite to the rays of the sides of the main angle.

An angle produced by the two rays opposite to the two sides of an angle is called the vertically opposite angle of the given angle.

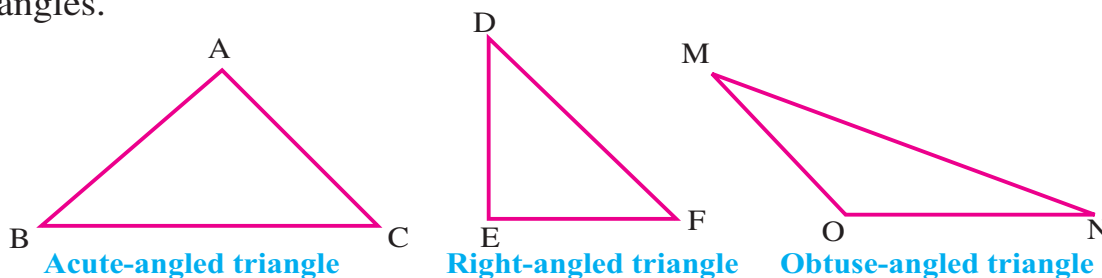
If two straight lines intersect each other at a point, two pairs of vertically opposite angles are obtained at the point.

The sides of a pair of angles vertically opposite to each other produce two straight lines that intersect each other. The meeting point is the common vertex of the pair of angles.

**Observe that :** The measurements of an angle and its vertically opposite angle are equal.

## Triangle : Acute, Right and Obtuse-angled Triangle

The space closed by the three segments is a triangle. These three segments are the three sides of the triangle. Each triangle has three angles.



Here, we have drawn three triangles. If we measure the angles  $\angle BAC$ ,  $\angle CBA$  and  $\angle ACB$  of the triangle with a protractor, we will see that each of these is an acute angle. We call the triangle ABC an acute angled triangle.

If each angle of a triangle is acute, then the triangle is an acute - angled triangle.

In the triangle DEF,  $\angle DEF$  is a right angle and  $\angle EDF$  and  $\angle DFE$  are acute angles. We call DEF a right-angled triangle.

If one angle of a triangle is a right angle, the triangle is called a right-angled triangle.

In the triangle MON,  $\angle MON$  is an obtuse angle and  $\angle OMN$  and  $\angle MNO$  are both acute angles. We call MON an obtuse-angled triangle.

If one angle of a triangle is obtuse, the triangle is called an obtuse-angled triangle.

In an acute-angled triangle, all three angles are acute angles.

In a right-angled triangle, only one angle is a right angle, the other two angles are acute angles.

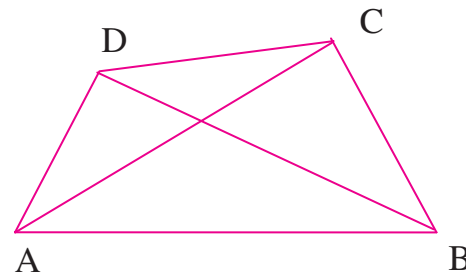
In an obtuse-angled triangle, only one angle is an obtuse angle, the other two angles are acute angles.

### Do Yourself

1. Draw an acute, an obtuse and a right angled triangle.
  - (a) Measure, in each case, the length of the three sides and write them.
  - (b) Measure, in each case, the angles and find out whether the summation of the three angles remain equal every time.

### Quadrilateral

The figure is a quadrilateral formed by four segments of line. AB, BC, CD and DA are the four sides of this figure. AC and BD are two diagonals.



## Parallelogram

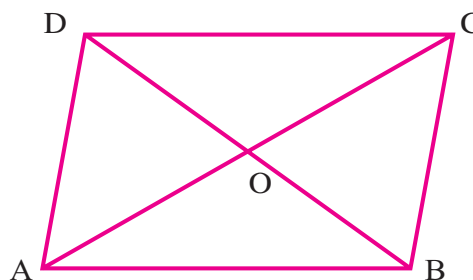
In this figure, the quadrilateral ABCD is a parallelogram. If we measure the length of its sides we will find that the length of any of its two opposite sides are equal;

$AB = CD$  and  $BC = DA$ .

By measuring,  $\angle DAB$ ,  $\angle ABC$ ,  $\angle DCB$ ,  $\angle CDA$  with the help of a protractor, we find,  $\angle DAB = \angle BCD$  and  $\angle ABC = \angle CDA$ .

$\angle DAB$  and  $\angle BCD$  and  $\angle ABC$  and  $\angle CDA$  are two pairs of opposite angles of the parallelogram.

Now, let us draw the two diagonals of the parallelogram which intersect each other at the point O. By measuring the lengths of AO and OC, we find that these two segments are equal; again, the lengths of BO and OD are also equal. Therefore, the diagonal lines intersect each other equally at their meeting point.



The quadrilateral in which the opposite sides are equal and parallel, is a parallelogram.

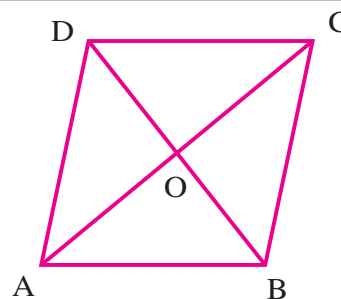
The opposite angles of a parallelogram are equal.

The diagonals of a parallelogram intersect each other equally.

## Rhombus

Rhombus is such a quadrilateral whose sides are equal but none of the angles is a right angle.

In figure, ABCD is a rhombus. Its diagonals intersected at O. After measuring,  $AO = CO$  and  $BO = DO$ . So, AC and BD diagonals intersect each other equally. Now, measuring the four angles,  $\angle AOB$ ,  $\angle BOC$ ,  $\angle COD$ ,  $\angle DOA$  with a protractor, it is found that each angle measures  $90^\circ$ . That means, diagonals intersect each other equally at a right angle. Again, measuring, it is found that  $\angle ADC = \angle ABC$  and  $\angle DAB = \angle BCD$ . That means, the opposite angles are equal.



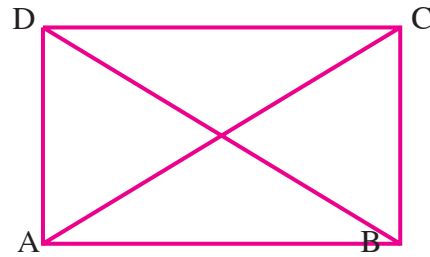
Rhombus is a quadrilateral with equal sides none of whose angle is not a right angle.

In a rhombus the opposite sides are equal each other and opposite angles also are equal.

The diagonals of a rhombus intersect each other equally at a right angle.

## Rectangle

Rectangle is a kind of parallelogram in which each angle is a right angle. In the figure, ABCD is a rectangle. If we measure its two diagonals AC and BD, we will find that their lengths are equal.



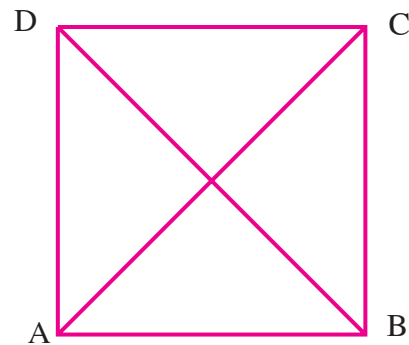
It can be mentioned that, if an angle of a parallelogram is a right angle, the other three angles are also right angles.

The quadrilateral in which the opposite sides are equal and parallel and angles are right angle, it is called a rectangle. In a rectangle each angle is a right-angle and the opposite sides are equal.

In a rectangle the diagonals are equal and they intersect each other equally.

## Square

Square is a rectangle in which the sides are all equal i.e. a square is a rectangle in which each angle is a right angle and the sides are equal. In the figure, ABCD is a square. Since each square is a rectangle, the lengths of both the diagonals are equal. If we measure the four angles obtained at the meeting point, we will find that each of these is a right angle.



Since the opposite sides of a rectangle are equal, so if any two adjacent sides of it are equal, it will be a square.

The quadrilateral in which each sides are equal and parallel and angles are is called a square. right-angle, is called a square.

All the sides of a square are equal and each angle is a right angle. The two diagonals of a square are equal and they intersect each other at a right angle.

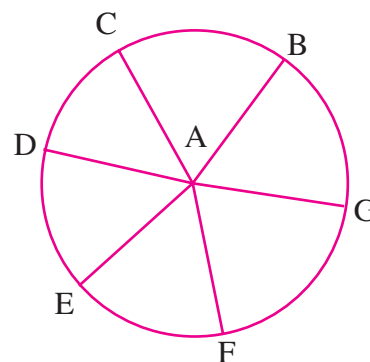
### Do yourself

1. Draw two quadrilaterals with two sides of unequal length.
  - (a) In each case, measure the length of the four sides and two diagonals and note them.
  - (b) Measure the four angles and say whether the summation of the four angles that you have noted are equal in both cases.
2. Draw a parallelogram, a rhombus and a rectangle.
  - (a) In each case find out whether the length of the opposite sides are equal or not.
  - (b) In each case find out whether the opposite angles are equal or not.
  - (c) Find out if the diagonals have intersected themselves equally at the meeting point.
  - (d) In the case of rhombus, measure the angles obtained at the meeting point of the diagonals and find out whether they are perpendicular to each other.
3. Draw a square with each side of 4 c.m. length.
  - (a) Measure the length of each diagonals and note.
  - (b) Mark the middle points of the sides and connect them successively. What kind of quadrilateral has been produced? Measure the lengths of its sides and the angles.

### Circle

Place a one or two taka Bangladeshi coin on a white piece of paper. Use your left index finger to press the coin tightly on the paper. Now using a sharp pencil with your right hand draw a line round the edge of the coin. If you remove the coin, you will see an enclosed round curved line on the paper. This is a circle.

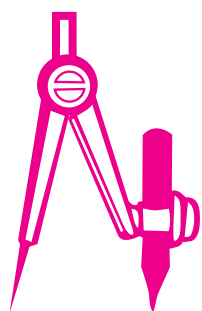
Inside the circle, the point A is placed exactly in the middle of the circle. Place the points B, C, D, E, F, G on the circle and draw the lines AB, AC, AD, AE, AF, AG. If we measure these lines, we will find that all of them are equal in length. The point A is called the centre and the lines AB, AC, AD, etc. are each a radius of the circle. The length of the radius is also called the radius of the circle.



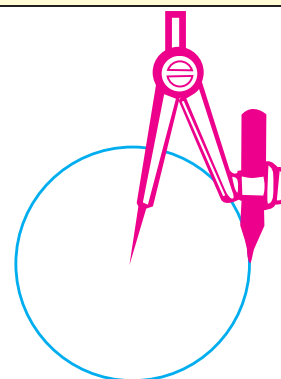
A circle is an enclosed curved line having a point inside, from which every point on the line remains at the same distance. This point is the center of the circle.

The line from the centre of a circle which connects any point on the circle is a radius of the circle. Every radius of the circle is equal in length. This length is also called the radius.

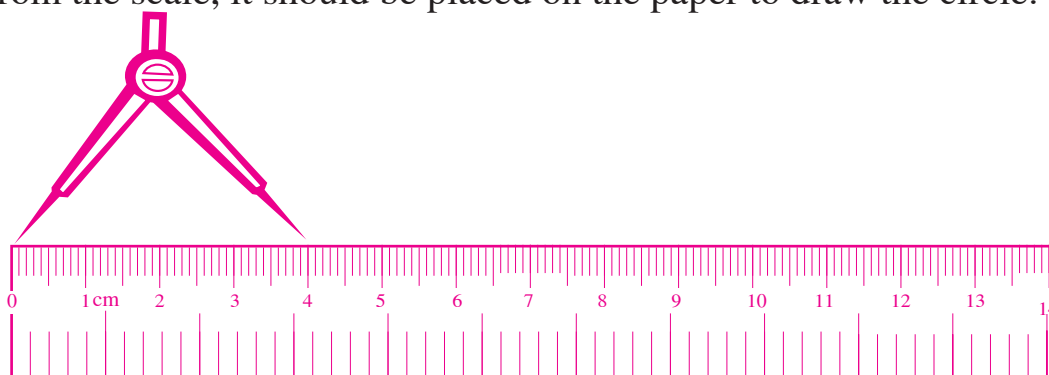
### Drawing a Circle



A pair of pencil compasses is used to draw a perfect circle. The nib/end of one of the metal legs of the compasses is pointed; in the other leg a pencil can be tightly fixed using a screw.



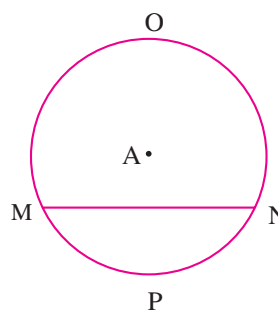
As shown in the above picture, a circle is drawn by placing the pointed leg on the paper and moving round the pencil fixed in the other leg. To draw a circle of a particular radius, the pointed end of the compasses should be placed on the 0 (zero) marked point of the scale and the nib of the pencil fixed in the other leg should be placed on the point marking a particular length. Then, by lifting the compasses carefully (so that the legs remain at the same distance) from the scale, it should be placed on the paper to draw the circle.





## Chord and Arc of a Circle

The circle in the figure has the centre A. Take any two points M, N on the circle and then draw the line MN connecting the two points. MN is a chord of the circle which divides it into two parts.



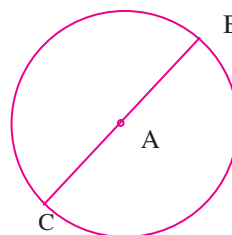
If we take the points O, P on the two opposite parts of the circle, then they can be called the MON and MPN parts. The part of the circle divided by the chord is called the arc of the circle or the arc. In the figure, the chord MN produces the arcs MON and MPN.

The line that connects any two points on the circle is called a chord.

Every chord divides the circle into two arcs.

## Diameter

In the figure, the chord BC is drawn over the centre A. In this case, the chord is called a diameter of the circle.



The two arcs produced by the diameter BC are equal. Each of them is a semi-circle.

Any chord that moves towards the centre is a diameter of the circle.

Every diameter divides the circle into two semi-circles.

The length of the diameter is also called diameter .

Diameter is two times the radius.

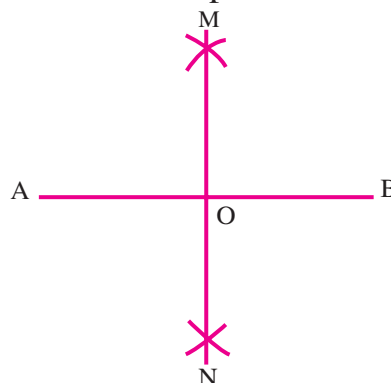
### Do yourself

1. Taking any centre and radius draw a circle with the help of a compasses. Draw a number of radiuses on the circle. Measure them to find out if all the radiuses are equal in length.
2. Draw a circle with the diameter BC. Take a point D on the semi-circle; extend the lines BD and CD and measure  $\angle BDC$  using a protractor. Measure  $\angle BDC$  for different places of the point B. Find, if all of them are equal.
3. Draw a line AB. Take A as the centre and draw an arc whose radius is approximately three-fourth of the length of AB. Take B as the centre and on the same side of the line AB, draw another arc of the same radius. The arcs cross each other at the point M.

Following the process, draw two more arcs on the other side of the line AB. These two arcs cross each other at the point N. Draw the line MN; the lines AB and MN cross each other at the point O.

- (a) Measure, if  $AO = BO$  and  $MO = NO$  or not.

- (b) Measure,  $\angle AOM$ ,  $\angle AON$ ,  $\angle BOM$ ,  $\angle BON$  to find out if all of them are right angles.



4. Using a ruler draw three lines of any length you like. Place the two legs of the compasses on the two ends of the first line and lift them carefully so that the distance between them remains the same. Place the compass on another piece of white paper and mark the two ends of the compasses. Connect the points to draw the line AB which equals the first line. Now, taking A as the centre, on any side of the line AB, draw an arc with the same radius as the second line. Again, taking B as the centre, on the same side of the line AB, draw another arc with the same radius as the third line. If needed, stretch the third line so that the arcs cross each other at the point C. Draw the line AC and BC. ABC becomes a triangle in which the length of three sides equal the length of the three lines drawn earlier.

**Exercise - 17**

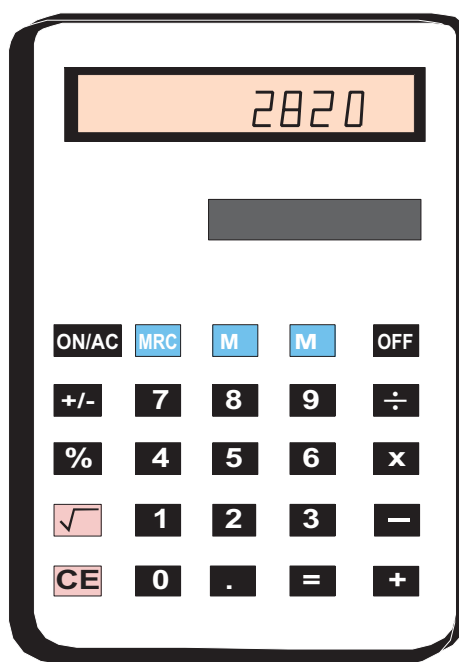
1. Fill in the blanks :
  - (a) The measure of the right angle is \_\_\_\_\_.
  - (b) The measure of an acute angle is \_\_\_\_\_ than the measure of a right angle.
  - (c) The measure of an obtuse angle is \_\_\_\_\_ than the measure of a right angle.
  - (d) One angle of a right angle is \_\_\_\_\_ and the other two angles are \_\_\_\_\_.
  - (e) A \_\_\_\_\_ angle has \_\_\_\_\_ obtuse angle and \_\_\_\_\_ acute angles.
  - (f) A triangle in which each angle is less than \_\_\_\_\_ is an acute angled triangle.
2. Following are the measures of some angles; draw them.  
(a)  $30^\circ$  (b)  $45^\circ$  (c)  $60^\circ$  (d)  $85^\circ$   
(e)  $95^\circ$  (f)  $120^\circ$  (g)  $135^\circ$  (h)  $160^\circ$ .
3. Draw an acute- angled, right- angled and an obtuse angled triangle. In each case, measure the three angles to find out their sum.
4. Following are the measures of some angles. Mention in each case, the measure of the complementary angle and draw the complementary angle.  
(a)  $60^\circ$  (b)  $45^\circ$  (c)  $72^\circ$  (d)  $25^\circ$  (e)  $50^\circ$
5. Following are the measures of some angles. In each case, draw the angle and its supplementary and vertically opposite angles in the same figure mentioning their degrees.  
Mark also the vertically opposite angle of the supplementary angle.  
(a)  $45^\circ$  (b)  $120^\circ$  (c)  $72^\circ$  (d)  $110^\circ$  (e)  $85^\circ$
6. Draw some right- angled triangles. In each case, measure the two angles other than the right angle and find the sum. What is the total measure of the three angles in each case?

7. Draw a quadrilateral. Measure the length of its 4 sides and two diagonals. Measure also its four angles and find out their sum.
8. Draw a parallelogram with a side of 4 c.m. length and another beside it of 3 c.m. length. Measure their two opposite sides and also the pair of opposite angles. Draw the two diagonals of the parallelogram. Measure the four divided parts of the diagonals at their meeting point.
9. Draw a rhombus and a square with a side 3.5 c. m. length. In each case measure the other three sides and the four angles. Draw two diagonals in each case and find out whether the lines intersect themselves in acute angles.
10. Draw a circle of 2 c.m. radius. Draw a chord that is a diameter and not a diameter of the circle. Measure their lengths.

## Chapter - 18

### The Usage of Calculator

**Calculator :** A calculator is a small electronic device to help us calculate numbers. It helps us to do the arithmetical calculations easily. Different models of calculators are available.



A calculator normally has 25 buttons and a display box. The machine has to be activated first by pressing **ON/AC** and after its use it has to be closed by pressing **OFF**.

**Example 1.** Add :  $8 + 7 =$  What ?

**Solution :** The following buttons of the calculator have been pressed one after another.

**ON/AC** **8** **+** **7** **=** **15**

Answer : 15.

$$8 + 7 = 15$$

First, the machine has been activated by pressing **ON/AC**. Afterwards, the necessary buttons have been pressed. After the result had been obtained, the calculator was shut down by pressing **OFF**.

**Example 2.** Add :  $12 + 5 =$  What ?

**Solution :** The following buttons of the calculator have been pressed one after another.

**ON/AC** **1** **2** **+** **5** **=** (17)

$$12 + 5 = 17$$

Answer : 17.

**Example 3.** Add :  $10 + 7 + 13 =$  What ?

**Solution :** The following buttons of the calculator have been pressed one after another.

**ON/AC** **1** **0** **+** **7** **+** **1** **3** **=** (30)

$$10 + 7 + 13 = 30$$

Answer : 30.

**Example 4.** Add :  $9 + 27 + 48 =$  What ?

**Solution :** The following buttons of the calculator have been pressed one after another.

**AC** **9** **+** **2** **7** **+** **4** **8** **=** (84)

$$9 + 27 + 48 = 84$$

Answer : 84.

**Example 5.** Subtract :  $252 - 50 =$  What ?

**Solution :** The following buttons of the calculator have been pressed one after another.

**AC** **2** **5** **2** **-** **5** **0** **=** (202)

$$252 - 50 = 202$$

Answer : 202.

**Example 6.** Subtract :  $490 - 281 =$  What?

**Solution :** The following buttons of the calculator have been pressed one after another.

AC 4 9 0 - 2 8 1 = 209

$$490 - 281 = 209$$

Answer : 209.

**Example 7.** Multiply :  $253 \times 78 =$  What ?

**Solution :** The following buttons of the calculator have been pressed one after another.

AC 2 5 3  $\times$  7 8 = 19,734

$$253 \times 78 = 19,734$$

Answer : 19734.

**Example 8.** Simplify (with the help of a calculator) :

$$92 + 13 - 8 \times 9 = \text{What ?}$$

**Solution :** AC 9 2 + 1 3 = 105

$$92 + 13 = 105$$

AC 8  $\times$  9 = 72

$$8 \times 9 = 72$$

AC 105 - 72 = 33

$$105 - 72 = 33$$

Answer : 33.

**Let us notice that :**

- $92 + 13 - 8 \times 9 =$  What? To solve the problem the calculator has been used in three steps.
- It can also be solved in one step.

AC 9 2 + 1 3 = M<sup>+</sup> C

+/- 8  $\times$  9 - MRC =

**Example 9.** Simplify :  $45 \div 5 \times 8 - 71$  (with the help of a calculator)

**Solution :** The following buttons of the calculator have been pressed in one after another.

$$\boxed{\text{AC}} \quad \boxed{4} \quad \boxed{5} \quad \boxed{\div} \quad \boxed{5} \quad \boxed{\times} \quad \boxed{8} \quad \boxed{-} \quad \boxed{7} \quad \boxed{1} \quad \boxed{=} \quad \boxed{1}$$

$$45 \div 5 \times 8 - 71 = 1$$

Answer : 1.

**Example 9.** Mr. Anwar went to a market and bought fish for Tk. 220, vegetables for Tk. 45 and oil for Tk. 52. He gave Tk. 500 to the shopkeeper. How much will the shopkeeper return him? Find out the result using a calculator.

**Solution :** It is given,

Fish Tk. 220

Vegetables Tk. 45

Oil Tk. 52

The following buttons of the calculator have been pressed one after another.

$$\boxed{\text{ON/AC}} \quad \boxed{2} \quad \boxed{2} \quad \boxed{0} \quad \boxed{+} \quad \boxed{4} \quad \boxed{5} \quad \boxed{+} \quad \boxed{5} \quad \boxed{2} \quad \boxed{=} \quad \boxed{317}$$

$$220 + 45 + 52 = 317$$

The following buttons of the calculator have been pressed one after another.

$$\boxed{\text{AC}} \quad \boxed{5} \quad \boxed{0} \quad \boxed{0} \quad \boxed{-} \quad \boxed{3} \quad \boxed{1} \quad \boxed{7} \quad \boxed{=} \quad \boxed{183}$$

$$500 - 317 = 183$$

Answer : Tk. 183.

## Exercise - 18

1. Add using a calculator :

(a)  $8 + 7 =$  What ?      (b)  $12 + 15 =$  What ?

(c)  $20 + 0 =$  What ?      (d)  $128 + 38 + 44 =$  What ?

(e)  $215 + 15 + 25 + 40 =$  What ?



2. Subtract using a calculator :  
(a)  $18 - 10 = \text{What ?}$  (b)  $52 - 0 = \text{What?}$  (c)  $324 - 124 = \text{What?}$   
(d)  $525 - 425 = \text{What?}$  (e)  $200 - 100 = \text{What ?}$
3. Multiply using a calculator :  
(a)  $8 \times 3 = \text{What ?}$  (b)  $125 \times 25 = \text{What ?}$  (c)  $220 \times 0 = \text{What ?}$   
(d)  $4 \times 444 = \text{What?}$  (e)  $580 \times 8 = \text{What ?}$
4. Simplify using a calculator :  
(a)  $324 - 55 - 62 + 65 + 68 - 10$   
(b)  $2 \times 3 \times 4 + 5 \times 6$   
(c)  $6 \times 4 \div 3$   
(d)  $8 \times 3 - 2 + 2 \times 3$
5. Mr. Shafiq went to a market and bought fish for Tk. 225, vegetables for Tk. 30, onions for Tk. 25 and oil for Tk. 180. He gave Tk. 500 to the shopkeeper. How much will the shopkeeper return him? Find out the result using a calculator.
6. Bakul went to a shop and bought books for Tk. 227, notebooks for Tk. 75 and an eraser for Tk. 8. He gave Tk. 400 to the shopkeeper. Use a calculator to find out how much the shopkeeper will return him.

## Chapter -19

# Population

Bangladesh is our motherland. The total area of this country is 1,47,570 square kilometre. In the year 2001\*\* the population of this country was as follows :

The table of the population in the year 2001	
Total population	123851120
Total number of males	63894740
Total number of females	59956380

According to the calculation in 2001, out of our total population 6 crore 38 lac 94 thousand 7 hundred are males and 5 crore 99 lac 56 thousand 3 hundred 80 are females. The population of males is a bit higher than that of the females. The number of our population was found out by counting. This counting is called census. Census is a process of officially counting a country's population and recording various facts. Generally, census is undertaken after every 10 years.

### The number of Sayeed's family members :

The number of family members	Sayeed's father	Sayeed's mother	Sayeed	Sayeed's sister	Total
	1	1	1	1	4

The number of Sayeed's family members is 4. This is a small family.

### The number of Salma's family members :

The number of family members	Salma's father	Salma's mother	Salma's brother	Salma and her sisters	Total number
	1	1	7	3	12

The number of Salma's family members is 12. This is a large family.

**\*\*Population census-2001. National Report, Bangladesh Bureau of Statistics. Planning Division, Page-15.**

**Find out the number of members of 2 families of your neighbourhood**

The families of 2 neighbours	Grand father	Grand mother	Father	Mother	Brothers	Sisters	Uncles	Aunts	Others	Total number of family members
1.										
2.										

Now, find out which family in the table above is smaller?

**Let us observe the table below :**

The population in the last several years in Bangladesh

Year	Population
1974	7 crores 63 lacs
1981	8 crores 99 lacs
1991	11 crores 14 lacs
2001	12 crores 39 lacs (approximately)

In terms of area Bangladesh holds the 90th position in the world. However, in terms of population it holds the 9th position.

**Exercise - 19 (a)****1. Tick ( ✓ ) the correct answer :**

(1) According to the census of 1991 what was the population of Bangladesh?

- (a) 11'14 crores (b) 12'60 crores  
(c) 12'81 crores (d) 13'00 crores.

(2) What is the total area of Bangladesh?

- (a) 1,47,181 sq. kilometre (b) 1,47,570 sq. kilometre  
(c) 6,78,000 sq. kilometre (d) 32,88,000 sq. kilometre.

(3) How many years does it take to hold a census?

- (a) 10 years (b) 15 years  
(c) 20 years (d) 25 years

**2. In the table below write down the number of family members of three of your classmates.**

Families	Number of members	Which is the largest family	Which is the smallest family

## Population Related Problems

### Density :

The area of Rasulpur village is 4 square kilometre. 3200 people live in that village. How many people live in each square kilometre?

In 4 square kilometre live 3200 people

$$\therefore 1 \text{ " " " } (3200 \div 4) \text{ " } \\ = 800 \text{ people}$$

**Let us notice that :** In Rasulpur village in each square kilometre live 800 people. It means, in that village density of population is 800.

The number of people living in each square kilometre of an area is called the density of population.

**Example 1.** The population in Bhutan is about 9 lacs and its total area is about 47 thousand square kilometre. Find out the density of population of Bhutan.

**Solution:** In 47000 square kilometre live 9,00,000 people.

$$\therefore 1 \text{ " " " } \frac{900000}{47000} = 19.2 \text{ people}$$

$\therefore$  The density of population is 19.2.

Answer : 19.2.

**Example 2.** The population of Narayangonj District is about 21 lacs 70 thousands and its area is 701 square kilometre. Find out the density of population of Narayangonj.

**Solution :** In 701 square kilometre live 21,70,000 people

$$\therefore 1 \text{ " " " } \frac{2170000}{701} \\ = 3095.58 \text{ people}$$

Therefore, the density of population is 3095.58.

Answer : 3095.58.

## Urban Population

**The populations of several cities are given below :**

city year	population					comment
	1961	1974	1981	1991	1998	
Chittagong	3,54,206	8,89,760	13,90,684	20,40,663	64,42,000	
Khulna	1,27,970	4,37,344	6,52,000	8,77,388	24,58,000	
Rajshahi	56,885	90,909	2,53,726	5,17,136	23,18,000	

**Question :** Form the above table, find out how many times the population of Chittagong, Khulna and Rajshahi have increased in the last 37 years.

The following table shows the area, population and density of different divisions in 2001 :

Bangladesh / Division	Area square k.m.	The number of males and females	Males	Females	Density square k.m.
Bangladesh	1,47,570	12,38,51,120	6,38,94,740	5,99,56,380	839
Barisal Division	13,297	81,53,960	41,56,280	39,97,680	
Chittagong Division	33,771	2,41,19,660	1,23,04,540	1,18,15,120	
Dhaka Division	31,120	3,89,87,140	2,03,80,260	1,86,06,880	1,253
Khulna Division	22,273	1,46,04,900	75,32,140	70,72,760	656
Rajshahi Division	34,514	3,00,88,740	1,54,80,300	1,46,08,440	
Sylhet Division	12,596	78,96,720	40,41,220	38,55,500	627

**Question :** Find out the density of population of Barisal, Chittagong and Rajshahi division.

**The density of populations of different divisions in the year 1991 and 2001 are given below :**

Bangladesh / Division	Density	
	1991	2001
Bangladesh	720	839
Barisal Division	561	613
Chittagong Division	608	714
Dhaka Division	1050	1253
Khulna Division	570	656
Rajshahi Division	759	872
Sylhet Division	537	627

**Question :** Find out the increase rate of the density of population of Dhaka and Chittagong Division from 1991 to 2001.

Following are the districts with the highest and lowest density of population :

- (a) Highest : In Dhaka District with 5,887 people per square kilometre.
- (b) Lowest : In Bandarban District with 67 people per square kilometre.

**The density of population per square kilometre of different countries in Asia :**

India	300 people
Pakistan	184 people
Srilanka	189 people
Nepal	165 people
Bhutan	19 people

**Question :** Find out the difference between the density of population of India and Bhutan

### **Exercise – 19 (B)**

**1. Tick (✓) the correct answer :**

**(1) Which district of Bangladesh comes first in terms of density of population ?**

- (a) Khulna
- (b) Rangpur
- (c) Dhaka
- (d) Bogra

**(2) Which district has the lowest density of population ?**

- (a) Bandarban (b) Rajshahi  
(c) Chittagong (d) Noakhali

**(3) The average number of population per square kilometre of a country is called-**

- (a) population (b) total population  
(c) density of population (d) average population

**(4) How do we determine the density of population ?**

- (a) By dividing the total number of adult population by the total area.  
(b) By dividing the total population by the area of total cultivable land.  
(c) By dividing the total population by total area.  
(d) By dividing the total number of population capable of working by total area.

2. The population of Narsingdi District is 19 lacs and its area is 1141 square kilometres. Find out the density of population of this district.  
3. The area of Rangamati District is 6116 square kilometres and its population is 5 lac 25 thousand. Find out the density of population of that district.

**4. Write down in the following table how many students are there in different classes of your school :**

Class	Numbers of male students	Number of female students	Total number of students
One			
Two			
Three			
Four			
Five			
Total			

**Following the table above answer these questions :**

Which class has the highest number of students ?

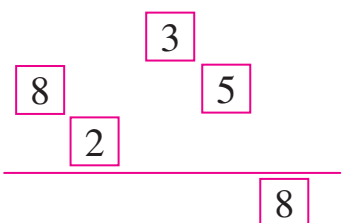
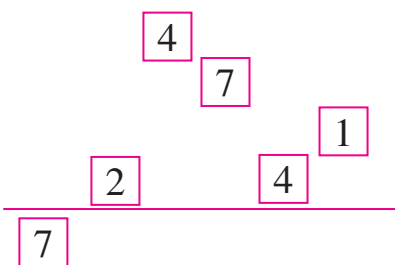
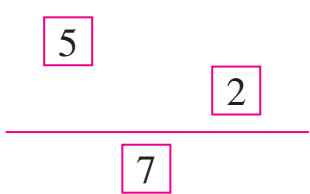
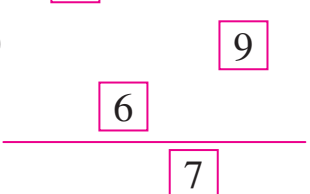
Which class has the lowest number of students ?

5. What is the density of population ? How do we determine it ?  
6. Which district has the highest number of population and how many of them are per kilometre?

## Answer

### Exercise – 1

1. (a) 159771 (b) 979069 (c) 2230028 (d) 988989  
(e) 2527164 (f) 3651856
2. (a) 128217 (b) 1455239 (c) 1967325 (d) 2934131
3. (a) 812292 (b) 336410 (c) 778483 (d) 482485  
(e) 269026
4. (a) 712162 (b) 923698 (c) 575217 (d) 303886

5. (a)  (b) 
- (c)  (d) 

6. 387964, 7. Difference 887749
8. 863743 9. 1
10. 890001 11. 580851 12. Tk. 20334 13. 7193
14. Tk. 5152 15. Tk. 122446 16. 266628
17. Tk. 176140 18. Tk. 9038

### Exercise – 2 (a)

1. (a) 50362 (b) 88816 (c) 264845 (d) 589110  
(e) 1429965 (f) 3128520 (g) 5930076 (h) 6153600
2. (a) 475950 (b) 597872 (c) 1678362 (d) 5530980  
(e) 8367630 (f) 6257700
3. (a) 3209679 (b) 2069793 (c) 6251742 (d) 4588407
4. 1371915 5. Tk. 1326375 6. 99000 sheets



7. 5012252 k.g.      8. Tk. 100375      9. Tk. 2091200  
10. 2176482      11. 2835324

### Exercise – 2 (b)

1. (a) quotient 5113 (b) quotient 1483 (c) quotient 262, remainder 72  
(d) quotient 355 (e) quotient 217, remainder 86 (f) quotient 245  
(g) quotient 231, remainder 14 (h) quotient 183, remainder 2  
(i) quotient 127, remainder 268 (j) quotient 41, remainder 5.
2. (a) quotient 2413, remainder 5 (b) quotient 8752, remainder 0,  
(c) quotient 435, remainder 60 (d) quotient 659, remainder 0,  
(e) quotient 675, remainder 0 (f) quotient 397, remainder 68  
(g) quotient 830, remainder 90 (h) quotient 935, remainder 0.
3. (a) divisor 3160 (b) divisor 484 (c) quotient 761 (d) dividend 23409
4. 416 days 16 hours    5. quotient 1149, remainder 36,
6. 72    7. Tk. 48      8. quotient 87, remainder 617
9. 75 persons      10. Other number is 78
11. quotient 124, remainder 9.    12. Other number is 261.

### Exercise – 3

1. Tk. 15      2. Tk. 8      3. Tk. 128
4. Age of father 72 years, age of son 24 years,    5. 990
6. quotient 102,    7. Quotient 103
8. Other number is 98, 9. Tk. 3042,    10. Tk. 485,
11. Raju 4738, Roni 3952,    12. Farida Tk. 4708, Fatema Tk. 5197
13. Tk. 5520,    14. Tk. 7644,    15. Tk. 427.

**Exercise – 4**

- |              |                  |                |                 |
|--------------|------------------|----------------|-----------------|
| 4. Tk. 160   | 5. Tk. 150       | 6. Tk. 77      | 7. Tk. 110      |
| 8. Tk. 18    | 9. Tk. 650       | 10. Tk. 960    | 11. Tk. 1800    |
| 12. 20 days  | 13. 4 days       | 14. 12 days    | 15. 100 persons |
| 16. 15 days  | 17. 36 person    | 18. 4 persons  | 19. 42 days     |
| 20. 25 days  | 21. 24           | 22. 50 persons | 23. 15          |
| 24. 504 k.g. | 25. 240 persons. |                |                 |

**Exercise – 5**

- |         |        |        |         |
|---------|--------|--------|---------|
| 1. 59   | 2. 200 | 3. 10  | 4. 90   |
| 5. 68   | 6. 15  | 7. 1   | 8. 411  |
| 9. 210  | 10. 2  | 11. 14 | 12. 315 |
| 13. 53  | 14. 96 | 15. 52 | 16. 86  |
| 17. 7   | 18. 84 | 19. 13 | 20. 9   |
| 21. 205 | 22. 4  | 23. 23 | 24. 7   |
| 25. 30  | 26. 1  | 27. 0  | 28. 1   |

**Exercise – 6**

1. (a) 42 (b) 50 (c) Tk. 560 (d) 51 c.m. (e) 36 k.g.  
(f) 90 litres
2. Tk. 46 3. 79 4. 129 c.m.
5. Dipu and Tipu each 23 years old.
6. 59 7. 107 8. 2169 persons
9. 65 10. 38 years 11. 26 m.m.

**Exercise – 7**

1. (a) 48 (b) 5 (c) 7 (d) 12 (e) 15  
(f) 11 (g) 8 (h) 7 (i) 10 (j) 12
2. (a) 5 (b) 19 (c) 5 (d) 22 (e) 2  
(f) 29 (g) 11 (h) 3 (i) 7 (j) 15
3. (a) 255 (b) 380 (c) 336  
(d) 480 (e) 5775 (f) 420
4. (a) 360 (b) 495 (c) 3825  
(d) 5880 (e) 144 (f) 270  
(g) 36036 (h) 2520 (i) 17325
5. 38 6. 30 persons, 2 mangoes, 5 litchies
7. 12 litres; in first drum 19 pitchers, in second drum 29 pitchers.
8. 15 9. 21 10. 25 c.m. square size
11. 360 12. 486 13. 174 14. 7 minutes
15. 122 16. 1433

**Exercise – 8**

1. (a) 300030 (b) 55270707 (c)  $(343 - 7) - 29$   
(d)  $(40 \times 8) - (51 - 26)$  (e)  $(8587 - 7972) \times (127 + 82)$
2. (a)  $818 - (347 + 423) = 818 - 347 - 423$   
(b)  $127 \times (43 + 16) = 127 \times 43 + 127 \times 16$   
(c)  $(75 - 5) \times 3 \neq 75 - (5 \times 3)$
3. (a) true (b) false (c) true
4. (a) 15 (b) 1, 2, 3, 4, 5, 6, 7 (c) 42
5. (a) 12 (b) Tk. 40 (c) Tk. 250
6. (a) 70 (b) 128 (c) 93 (d) 127 (e) 242

**Exercise – 9 (a)**

1. (a)  $\frac{1}{2}$  (b)  $\frac{2}{5}$  (c)  $\frac{1}{4}$  (d)  $\frac{2}{3}$  (e)  $\frac{11}{15}$  (f)  $\frac{7}{12}$
2. (a)  $\frac{5}{8} = \frac{15}{24}$ ,  $\frac{1}{12} = \frac{2}{24}$  (b)  $\frac{7}{9} = \frac{28}{36}$ ,  $\frac{3}{4} = \frac{27}{36}$ .  
 (c)  $\frac{11}{15} = \frac{55}{75}$ ,  $\frac{9}{25} = \frac{27}{75}$  (d)  $\frac{1}{6} = \frac{7}{42}$ ,  $\frac{3}{7} = \frac{18}{42}$ ,  $\frac{19}{21} = \frac{38}{42}$   
 (e)  $\frac{3}{5} = \frac{36}{60}$ ,  $\frac{7}{20} = \frac{21}{60}$ ,  $\frac{13}{15} = \frac{52}{60}$   
 (f)  $\frac{11}{16} = \frac{33}{48}$ ,  $\frac{1}{2} = \frac{24}{48}$ ,  $\frac{7}{24} = \frac{14}{48}$ ,  $\frac{2}{3} = \frac{32}{48}$ ,  $\frac{3}{8} = \frac{18}{48}$ .
3. (a) greatest  $\frac{13}{18}$ , least  $\frac{1}{3}$  (b) greatest  $\frac{51}{70}$ , least  $\frac{2}{7}$   
 (c) greatest  $\frac{17}{24}$ , least  $\frac{1}{3}$  (d) greatest  $\frac{7}{10}$ , least  $\frac{16}{75}$
4. (a)  $\frac{15}{7}$ ,  $\frac{1}{2}$ ,  $\frac{19}{20}$  (b)  $\frac{2}{5}$ ,  $\frac{21}{25}$ ,  $\frac{49}{50}$   
 (c)  $\frac{2}{37}$ ,  $\frac{1}{13}$ ,  $\frac{3}{29}$ ,  $\frac{6}{43}$  (e)  $\frac{3}{4}$ ,  $\frac{4}{5}$ ,  $\frac{5}{6}$ ,  $\frac{59}{60}$   
 (f)  $\frac{11}{24}$ ,  $\frac{33}{71}$ ,  $\frac{3}{5}$ ,  $\frac{22}{31}$ ,  $\frac{66}{79}$ .
5. (a)  $\frac{13}{15}$ ,  $\frac{21}{25}$ ,  $\frac{4}{5}$ ,  $\frac{49}{75}$  (b)  $\frac{61}{78}$ ,  $\frac{9}{13}$ ,  $\frac{25}{39}$ ,  $\frac{15}{26}$   
 (c)  $\frac{7}{23}$ ,  $\frac{14}{93}$ ,  $\frac{2}{17}$ ,  $\frac{1}{10}$ ,  $\frac{2}{41}$  (d)  $\frac{12}{23}$ ,  $\frac{20}{39}$ ,  $\frac{4}{9}$ ,  $\frac{3}{14}$ ,  $\frac{2}{11}$
6. Red colour 7. To eat 8. Tomato
9. In farm no. 1 10. Cultivation

**Exercise – 9 (b)**

1. Proper fractions :  $\frac{14}{15}$ ,  $\frac{13}{23}$ ,  $\frac{1}{71}$ ; Improper fractions :  $\frac{27}{4}$ ,  $\frac{60}{7}$ ,  $\frac{42}{41}$   
 Mixed fractions:  $17\frac{2}{3}$ ,  $8\frac{5}{12}$ ,  $9\frac{7}{25}$

2. (a)  $5\frac{4}{5}$  (b)  $9\frac{4}{9}$  (c)  $7\frac{1}{11}$  (d)  $2\frac{15}{37}$  (e)  $1\frac{8}{15}$   
 (f)  $1\frac{22}{51}$  (g)  $2\frac{29}{59}$  (h)  $4\frac{3}{25}$  (i)  $12\frac{5}{43}$  (j)  $6\frac{198}{203}$ .
3. (a)  $\frac{51}{16}$  (b)  $\frac{93}{44}$  (c)  $\frac{55}{48}$  (d)  $\frac{163}{16}$  (e)  $\frac{619}{7}$   
 (f)  $\frac{1239}{11}$  (g)  $\frac{632}{23}$  (h)  $\frac{3263}{33}$  (i)  $\frac{4901}{49}$  (j)  $\frac{1975}{19}$ .
4. (a)  $9\frac{4}{\boxed{9}}$  (b)  $\frac{\boxed{229}}{20}$  (c)  $\boxed{8}\frac{11}{13}$  (d)  $10\frac{\boxed{17}}{25}$   
 (e)  $\frac{\boxed{890}}{71}$  (f)  $\frac{\boxed{3211}}{11}$  (g)  $\boxed{13}\frac{107}{351}$ .
5.  $\frac{7}{25}$  portion 6.  $\frac{1}{2}$  bigha 7.  $\frac{1}{4}$  portion.

### Exercise – 9 (c)

1. (a)  $\frac{4}{5}$  (b)  $\frac{17}{18}$  (c)  $1\frac{1}{12}$  (d)  $1\frac{13}{20}$  (e)  $1\frac{13}{28}$   
 (f)  $5\frac{7}{9}$  (g)  $6\frac{17}{22}$  (h)  $13\frac{1}{8}$  (i)  $23\frac{1}{4}$  (j)  $9\frac{9}{10}$   
 (k)  $13\frac{13}{36}$
2. (a)  $\frac{3}{17}$  (b)  $\frac{1}{9}$  (c)  $\frac{9}{32}$  (d)  $\frac{3}{8}$  (e)  $\frac{4}{21}$   
 (f)  $4\frac{2}{3}$  (g)  $2\frac{2}{5}$  (h)  $1\frac{1}{6}$  (i)  $1\frac{1}{3}$  (j)  $1\frac{7}{10}$   
 (k)  $3\frac{7}{20}$  (l)  $\frac{8}{15}$  (m)  $3\frac{33}{40}$ .
3. (a)  $\frac{3}{4}$  (b)  $5\frac{17}{20}$  (c)  $4\frac{33}{40}$  (d)  $2\frac{1}{8}$  (e)  $6\frac{1}{6}$
4.  $\frac{14}{15}$  5.  $\frac{2}{3}$  portion 6. 225 7.  $\frac{9}{40}$  portion
8.  $\frac{44}{75}$  portion 9. Tk. 70.

**Exercise – 9 (d)**

1. (a)  $7\frac{1}{2}$  (b)  $3\frac{3}{13}$  (c)  $\frac{5}{16}$  (d)  $\frac{11}{34}$  (e)  $2\frac{2}{35}$   
 (f)  $\frac{1}{4}$  (g)  $13\frac{1}{2}$  (h)  $24\frac{43}{49}$  (i)  $54\frac{9}{23}$ .
2. (a)  $\frac{1}{8}$  (b)  $21\frac{2}{3}$  (c)  $\frac{3}{20}$  (d)  $\frac{3}{4}$  (e)  $5\frac{1}{7}$   
 (f)  $\frac{2}{15}$  (g)  $\frac{7}{30}$  (h)  $4\frac{9}{10}$  (i)  $3\frac{5}{9}$ .
3. (a)  $\frac{44}{45}$  (b)  $\frac{15}{32}$  (c)  $\frac{15}{32}$  (d)  $6\frac{2}{3}$  (e)  $\frac{1}{8}$  (f)  $\frac{2}{3}$
4. Tk. 77 5. 195 kilometre 6. Tk. 30000.
7. 7 metres 8. 3 metre 9.  $112\frac{3}{4}$  10. 9 metre 11.  $8\frac{2}{3}$ .

**Exercise – 9 (e)**

1.  $\frac{5}{8}$  2.  $1\frac{3}{5}$  3.  $\frac{35}{72}$  4.  $1\frac{1}{3}$  5.  $\frac{41}{54}$  6.  $\frac{17}{30}$
7.  $4\frac{1}{4}$  8.  $1\frac{17}{24}$  9.  $3\frac{9}{16}$  10.  $\frac{22}{25}$  11.  $2\frac{1}{4}$  12.  $1\frac{2}{9}$
13. 1 14.  $4\frac{2}{3}$  15.  $7\frac{2}{15}$  16. 1 17.  $1\frac{2}{3}$ .

**Exercise – 9 (f)**

1.  $\frac{3}{4}$  portion 2. 10 metre 3. Tk. 120 4. Tk. 80,000
5. Tk. 9600
6. Total 600 marks, Roni gets 450 marks, Panna gets 400 marks.
7. Dividend  $220\frac{1}{2}$  8.  $2\frac{86}{135}$  9. 20 persons 10. Tk. 6000 11. 26 k.g

**Exercise – 10 (a)**

1. 6.0223      2. 108.0999      3. 10.6872      4. 209.332
5. 40.758      6. Tk. 43.02      7.  $180^0$       8. Tk. 50.50
9. 32.15 metre      10. 0.0297      11. 98.9      12. 0.0004
13. Tk. 1.09      14. 1.2552 seconds      15. 2.68 k.m.
16. 60.0068      17. 195.1095      18. 16.2555 minutes
19. Tk. 147.06      20. 470.426 metre      21. 1.75 k.m.
22. Tk. 67.95      23. Tk. 21.75      24. Tk. 48.75      25. Tk. 1.55

**Exercise – 10 (b)**

1. (a) 60.76      (b) 146.835      (c) 58.8787      (d) 213.5035  
(e) 324.8      (f) 200.7      (g) 0.08      (h) 83.9546  
(i) 84.832      (j) 0.9768      (k) 0.000001      (l) 0.004
2. Tk. 162      3. Tk. 248.75      4. 67.5 kilometre
5. 555.1 kilometre      6. 20.825 centimetre

**Exercise – 10 (c)**

1. (a) 1.29      (b) 4.64      (c) 4.6875      (d) 0.05      (e) 3.075  
(f) 0.0002      (g) 375      (h) 6.4      (i) 1.6      (j) 0.789  
(k) 1.43      (l) 0.861      (m) 0.7235      (n) 45      (o) 25.6  
(p) 0.0015      (q) 0.0006      (r) 81.25 .
2. Tk. 2.50      3. Tk. 3.20      4. Tk. 98.50      5. 3.2
6. 22.05      7. 25.5      8. 0.05      9. 39.37 inches
10. Tk. 1.72      11. Tk. 15.75      12. 7 hours      13. Tk. 15
14. Tk. 38.75      15. 11      16. 37.55, 33.05

### Exercise – 11

1. (a)  $\frac{1}{20}$  (b)  $\frac{3}{20}$  (c)  $\frac{1}{4}$  (d)  $\frac{7}{20}$  (e)  $\frac{3}{5}$   
 (f)  $\frac{1}{2}$  (g)  $\frac{3}{4}$  (h)  $\frac{17}{20}$  (i)  $\frac{1}{12}$  (j)  $\frac{1}{6}$
2. (a) 25% (b) 40% (c) 62.5% (d) 10% (e) 41.67%  
 (f) 5% (g) 13.33% (h) 42.86% (i) 120% (j) 125%  
 (k) 130% (l) 135.38%
3. (1) Tk. 3 (2) Tk.  $13\frac{1}{2}$  (3) Tk.  $\frac{16}{125}$  (4) 4 k.g. (5) 15 g.  
 (6)  $6\frac{2}{3}$  k.m. (7) Tk.110 (8) Tk. 15 (9) Tk. 24
4. (a) 25% (b) 64% (c) 60% (d)  $33\frac{1}{3}\%$  (e)  $62\frac{1}{2}\%$   
 (f)  $87\frac{1}{2}\%$  5. 60 6. 18 persons 7.  $3\frac{1}{3}\%$  8. 40 persons
9. 4% 10. 500 persons 11. 80% 12. 72%
13.  $87\frac{1}{2}\%$  14. 405 persons 15. 14% 16. Tk. 2620
17. 20 Ruhi fish 18. 90% 19. Tk.100 20. Tk.800
21. 3% 22. 1200 persons 23. 3%
24. 10% profit 25. 20% loss 26. Tk.187.50 27. Tk.75.00
28. Tk.600.00 29.  $12\frac{1}{2}\%$  30. Tk.20.00 31. 8%
32. 9% 33. 8% 34. Tk.70 35. Tk.252
36. 4 years 37. 6 years 38. Tk.1200.



**Exercise– 12(a)**

1. (a) 368 m.m. (b) 99305 m.m. (c) 8000952 m.m.  
(d) 8245096 m.m. (e) 7250850 m.m.
2. (a) 0·588 metres (b) 43·257 metre (c) 90·366 metre  
(d) 8010·25 metre (e) 6002·37 metre
3. (a) 22·03527 k.m. (b) 19·087090 k.m. (c) 125·075250 k.m.  
(d) 78·040154 k.m. (e) 0·308096 k.m.
4. (a) 18156 m.g. (b) 4027452 m.g..(c) 9038100 m.g.  
(d) 5065370 m.g. (e) 4002360 m.g.
5. (a) 29515 gram (b) 60182 gram (c) 82098·45 gram  
(d) 9065·549 gram.
6. (a) 45·02559 k.g. (b) 12·098145 k.g. (c) 9·427505 k.g.  
(d) 27·30697 k.g.
7. 3·85 quintals, 0·385 metric ton. 8. 85·321 metric ton
9. 169·74 k.g. 10. 39·59 seer (approx.)
11. 85·60 seer (approx.)
12. (a) 69 k.m. 9 h.m. 8 decametre 1 metre.  
(b) 91 k.g. 8 h.g. 3 decagram 8 gram
13. (a) 69 k.m. 5 h.m. 7 decametre 8 metre  
(b) 15 kg. 0 h.g. 4 decagram 4 gram
14. (a) 54 k.m. 4 h.m. 4 decam. 0 metre  
(b) 56 k.m. 8 h.m. 1 decam. 2 metre  
(c) 76 kg. 1 h.gram 3 decagram 6 gram  
(d) 43 kg. 9 h.gram 1 decagram 2 gram
15. (a) 3 k.m. 2 h.metre 1 decametre 8 metre  
(b) 5 k.m. 4 h. metre 5 decametre 3 metre  
(c) 8 k.g. 7 h.gram 4 decagram 6 gram
16. 127 k.g. 6 h.gram 8 decagram 9 gram
17. 60 k.g. 500 gram
18. 318 k.g. 4 h.gram 1 decagram 1 gram
19. 15·60 k.m.

**Exercise – 12(b)**

1. (a) 1080 square c.m. (b) 1'30 square metre (c) 1665 square metre  
(d) 5186'50 square metre
2. (a) 729 square metre (b) 5776 square metre  
(c) 41'4736 square metre
3. (a) 75 square metre (b) 225 square metre (c) 7'35 square metre
4. 270 metre                      5. 53 c.m.                      6. 28 metre
7. 2025 square metre      8. 168 square metre              9. 170'88 metre
10. 27 metre                      11. 2'1 hector              12. 63 square c.m.
13. 35 square c.m.              14. 1125 square metre

**Exercise –13**

1. (c) 1952                      (d) 1964                      (f) 1984  
(g) 1996                      (h) 2000                      (j) 2008
2. (a) 18 years 8 monthes 18 days 2 hours 40 minutes  
(b) 35 years 1 month 18 days 3 hours 1 minute 10 seconds
3. (a) 12 days 23 hours 19 minutes 40 seconds  
(b) 6 years 7 months 2 days 20 hours 35 minutes 25 seconds
4. (a) 2 years 6 months 26 days 10 hours 20 minutes  
(b) 3 years 7 months 20 days 2 hours 8 minutes 20 seconds  
(c) 46 years 9 months 2 days 6 hours
5. (a) 1 year 6 months 4 days 16 hours  
(b) 1 year 4 months 18 days 19 hours 41 minutes
6. 378600 seconds
7. 29352 hours
8. 1579680 minutes

9. (a) 1 month 28 days 20 hours 15 minutes  
(b) 1 year 10 months 9 days 4 hours  
(c) 2 years 4 months 23 days 8 hours  
(d) 1 day 1 hour 59 minutes
10. 20 years 8 months 27 days      11. 22 years 4 months 27 days
12. 20 years 2 months 19 days      13. 238 days
14. 20 February, 1989      15. 29 January, 1981
16. 8 June, 2000      17. 29 May, 2006
18. 19 February, 2028      19. 19
20. 17 hours 20 minutes      21. 10 : 55 p.m.

### Exercise – 18

1. (a) 15      (b) 27      (c) 20      (d) 210      (e) 295
2. (a) 8      (b) 52      (c) 200      (d) 100      (e) 100
3. (a) 24      (b) 3125      (c) 0      (d) 1776      (e) 4640
4. (a) 330      (b) 54      (c) 8      (d) 28
5. Tk. 40      6. Tk. 90.

### Exercise – 19 (a)

1. (1) (a)      (2) (b)      (3) (a)
2. Do yourself

### Exercise – 19 (b)

1. (1) (c)      (2) (a)      (3) (c)      (4) (c)
2. 1665·2 persons      3. 85·8 persons      4. Do yourself
5. Do yourself      6. In Dhaka district 5887 people

\*\* Population census-2001. National Report, Bangladesh Bureau of Statistics. Planning Division.