



# MATHEMATICS 5



**Sindh Textbook Board**

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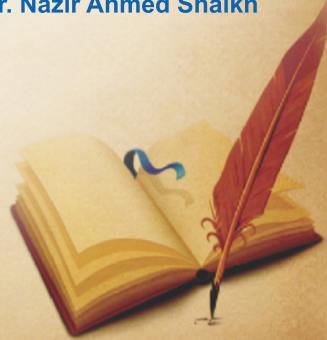
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# PREFACE

The Sindh Textbook Board is an organization charged with the preparation and publication of textbooks in the province of Sindh. Its prime objective is to develop and produce textbooks which are conducive to equip the new generation with the knowledge and acumen to prepare them to face the challenges of the rapidly changing environment. In this age of knowledge explosion and development of technology not witnessed in the human history, efforts have to be made to ensure that our children do not lag behind. The Board also strives to ensure that Universal Islamic Ideology, culture and traditions are not compromised in developing the textbooks.

To accomplish this noble task, a team of educationists, experts, working teachers and friends endeavor tirelessly to develop, text and improve contents, layout and design of the textbooks.

An attempt has made in this textbook to provide horizontal and vertical integration. The efforts of our experts and production personnel can bring about the desired results only if these textbooks are used effectively by teachers and students. Their suggestions will help us in further improving the qualitative contents of textbooks.

Chairman  
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## NUMBERS AND ARITHMETIC OPERATIONS

### 1.1 NUMBERS UP TO ONE BILLION

Read numbers up to one billion in numerals and in words

#### Concept of One Billion

We have learnt in class IV that the smallest number of nine digits is **10000000** (One hundred million)

Look at the number “**34,768,172**”

Millions	Thousands	Ones
34	768	172



- How many millions are in **34,768,172**?
  - How many thousands are in **34,768,172**?
  - How many ones are in **34,768,172**?
  - Write, **34,768,172** in words.
- 
- 

The greatest number of nine digits is 999,999,999 read as “Nine hundred ninety nine million, nine hundred ninety nine thousand and nine hundred ninety nine”. When we add one more to it, then

$$999,999,999 + 1 = 1,000,000,000$$

#### Teacher’s Note

After revision of numbers in millions, teacher should help students to develop the concept of one billion by counting numbers of digits by using flash cards or other related material.

The number after **999,999,999** is **1,000,000,000**. It is read as One thousand million or 1 billion..

One Billion = One thousand million

According to the place value chart of numbers, there are the following four periods for representing numbers upto billions.

**4<sup>th</sup> period**

**3<sup>rd</sup> period**

**2<sup>nd</sup> period**

**1<sup>st</sup> period**

**Billions** , 
 **Millions** , 
 **Thousands** , 
 **Ones**

### Representation of one billion in Place Value Chart

Billions	Millions			Thousands			Ones		
B	H-M	T-M	M	H-Th	T-Th	Th	H	T	O
1	0	0	0	0	0	0	0	0	0

Here **H-M** means Hundred Million.

To read a number, we put commas to after every three digits from the right to separate the periods

**Example.** Read the following numbers:

(i) **245612384**

(ii) **100000000**

**Solution:** (i) **245612384**

We first separate the digits of numbers in periods.

**2 4 5 , 6 1 2 , 3 8 4**

Millions	Thousands	Ones
<b>2 4 5</b>	<b>6 1 2</b>	<b>3 8 4</b>

We read it as “Two hundred forty five million, six hundred twelve thousand and three hundred eighty four” and write it as: 245,612,384.

**Solution:** (ii) 1000000000

We first separate the digits of numbers in periods:

Billions	Millions			Thousands			Ones		
1	0	0	0	0	0	0	0	0	0

We can read it as: “One Billion”

**1.1.2 Write numbers up to 1,000,000,000 (one billion) in numerals and in words.**

**Example 1.** Write 234,567,812 in words.

**Solution.** We first write the digit of the numbers in place value chart.

Millions			Thousands			Ones		
H-M	T-M	M	H-th	T-th	Th	H	T	O
2	3	4	5	6	7	8	1	2

Hence the given number is 234,567,812 and written in words as Two hundred thirty four million, five hundred sixty seven thousand and eight hundred twelve.

**Example 2.** Write “Three hundred fifty six million, two hundred sixty seven thousand and nine hundred two” in numerals.

**Solution:** We first write the number in the place value chart:

Millions			Thousands			Ones		
H-M	T-M	M	H-Th	T-Th	Th	H	T	O
3	5	6	2	6	7	9	0	2

So, the required number is **356,267,902**.

**EXERCISE 1.1**

**A. Write the digit under their correct place value and also write the number in words.**

- 3 thousand
- 6 hundred
- 7 ten million
- 8 ten thousand
- 1 million
- 0 ones
- 1 hundred million
- 8 tens
- 2 hundred thousand

**B. Separate by periods and read the following numbers.**

- (1) 45672                      (2) 2670273                      (3) 34296127  
(4) 100000000

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

- (1) 66,655,522              (2) 96,340,529              (3) 245,672,316  
(4) 100,000,000

**D. Write the following numbers in numerals.**

- (1) One million, two thousand and six hundred.  
(2) Nine million, ninety nine thousand and seventy seven.  
(3) Fifty eight million, eight hundred sixty two thousand and forty five.  
(4) One billion  
(5) Three hundred forty five million, six hundred seventy one thousand and eight hundred six.

## 1.2 ADDITION AND SUBTRACTION

### 1.2.1 Add numbers of complexity and of arbitrary size

We have learnt to add and subtract numbers up to 6 digits. Let us revise.

We always start addition or subtraction from ones.

#### Example 1.

Add 638,941 and 347,036

Write numbers according to place values and then add.

**Solution:**

H-Th	T-Th	Th	H	T	O
6	3	8	9	4	1
+ 3	4	7	0	3	6
<hr/>					
9	8	5	9	7	7

#### Example 2.

Add 359,990 and 406,780

Write numbers according to place values and then add.

**Solution:**

H-Th	T-Th	Th	H	T	O
3	5	9	9	9	0
+ 4	0	6	7	8	0
<hr/>					
7	6	6	7	7	0

While adding numbers we should write the digits according to their place value and then add them accordingly.

**Example 3.**
**Add: 5,389,624 and 930,157**
**Solution:**

M	H-Th	T-Th	Th	H	T	O
5	3	8	9	6	2	4
<hr/>						
6	3	1	9	7	8	1

**Example 4.**
**Fill the missing digits of the following.**

6	4	5	1	○	3
<hr/>					
+	3	○	3	○	1 2
<hr/>					
9	8	8	6	3	5

**EXERCISE 1.2**
**A. Solve.**

**(1)** 
$$\begin{array}{r} 713492 \\ + 268310 \\ \hline \end{array}$$

**(2)** 
$$\begin{array}{r} 4318114 \\ + 313934 \\ \hline \end{array}$$

**(3)** 
$$\begin{array}{r} 8193860 \\ + 429177 \\ \hline \end{array}$$

**(4)** 
$$\begin{array}{r} 6216921 \\ + 834538 \\ \hline \end{array}$$

**(5)** 
$$\begin{array}{r} 3941234 \\ + 590543 \\ \hline \end{array}$$

**(6)** 
$$\begin{array}{r} 5491869 \\ + 605304 \\ \hline \end{array}$$

**(7)** 
$$\begin{array}{r} 7390443 \\ + 1538006 \\ \hline \end{array}$$

**(8)** 
$$\begin{array}{r} 2555312 \\ + 1084881 \\ \hline \end{array}$$

**(9)** 
$$\begin{array}{r} 5319432 \\ + 4181518 \\ \hline \end{array}$$

**(10)** 
$$\begin{array}{r} 34653635 \\ + 2660477 \\ \hline \end{array}$$

**(11)** 
$$\begin{array}{r} 56018987 \\ + 23594431 \\ \hline \end{array}$$

**(12)** 
$$\begin{array}{r} 438394568 \\ + 351056939 \\ \hline \end{array}$$

**B. Add.**

**(1)** 680,563 and 563,168

**(2)** 3,541,371 and 232,164

**(3)** 34,399,188 and 6,412,508

**(4)** 65,943,022 and 22,913,924

**(5)** 840,233,419 and 65,113,846

**(6)** 733,050,195 and 188,439,919

**C. Fill the missing digits in the following.**

$$\begin{array}{r}
 (1) \quad 5 \quad 3 \quad 6 \quad 2 \quad \bigcirc \quad 4 \\
 + \quad 3 \quad \bigcirc \quad 3 \quad \bigcirc \quad 2 \quad 2 \\
 \hline
 \end{array}$$

**8 8 9 6 3 6**

$$\begin{array}{r}
 (2) \quad 3 \quad 4 \quad 7 \quad 8 \quad 4 \quad 5 \\
 + \quad 4 \quad \bigcirc \quad 2 \quad \bigcirc \quad 1 \quad \bigcirc \\
 \hline
 \end{array}$$

**7 6 0 1 5 9**

$$\begin{array}{r}
 (3) \quad 5 \quad 6 \quad 0 \quad 1 \quad 8 \quad 9 \quad 7 \\
 + \quad 2 \quad \bigcirc \quad 5 \quad \bigcirc \quad 4 \quad \bigcirc \quad 1 \\
 \hline
 \end{array}$$

**8 1 5 5 3 1 8**

$$\begin{array}{r}
 (4) \quad 3 \quad 4 \quad \bigcirc \quad 5 \quad \bigcirc \quad 3 \quad 7 \\
 + \quad 2 \quad \bigcirc \quad 4 \quad 2 \quad 0 \quad \bigcirc \quad 2 \\
 \hline
 \end{array}$$

**6 0 6 7 1 4 9**

- D.** Faisal's father was admitted to the hospital for 1 day for an operation. His operation charges were Rs. 350,000, the room charges were Rs. 1200 and his medicine charges were Rs. 125,500. How much was the total bill?

**1.2.2 Subtract numbers of complexity and of arbitrary size**
**Example 1.**

Subtract 430,912 from 871,032

Write numbers according to place values and then subtract.

**Solution:**

H-Th	T-Th	Th	H	T	O
8	7	<sup>0</sup> 0	<sup>10</sup> 0	3	2
-	4	3	0	9	1
<hr/>					
<b>4</b>	<b>4</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>0</b>

**Example 2.**

Subtract 273,587 from 307,843.

Write numbers according to place values and then subtract.

**Solution:**

H-Th	T-Th	Th	H	T	O
3	<sup>10</sup> 0	<sup>7</sup> 7	<sup>13</sup> 8	<sup>13</sup> 4	3
-	2	7	3	5	8
<hr/>					
<b>0</b>	<b>3</b>	<b>4</b>	<b>2</b>	<b>5</b>	<b>6</b>

Numbers of more than 6-digits can be subtracted in the same way.

**Example 3.** Subtract 6,134,248 from 8,206,884

**Solution:**

M	H-Th	T-Th	Th	H	T	O
	1	10			7	10
8	<del>2</del>	0	6	8	<del>8</del>	4
- 6	1	3	4	2	4	8
2 0 7 2 6 3 6						

**Explanation:**

- (i) Borrow 1-ten from 8 tens, add 4 ones to get 14 ones; where 7 tens are left. Now complete the process of subtraction up to thousands.
- (ii) Again borrow 1 hundred-thousand from 2 hundred-thousands and add to ten-thousands to get 10 ten-thousands, where 1 hundred thousand is left. In this way complete the process of subtraction.



### Activity 1

Fill the missing digits in the following.

5	8	5	4	6	3
- 3	○	1	○	1	2
2 3 4 2 5 1					



### Activity 2

Fill the missing digits in the following.

7	4	○	8	6	○
- 3	○	1	○	1	2
4 4 2 4 5 3					

## EXERCISE 1.3

**A. Solve:**

(1) 
$$\begin{array}{r} 2863132 \\ - 164350 \\ \hline \end{array}$$

(2) 
$$\begin{array}{r} 5634153 \\ - 393844 \\ \hline \end{array}$$

(3) 
$$\begin{array}{r} 4194312 \\ - 994208 \\ \hline \end{array}$$

(4) 
$$\begin{array}{r} 4395684 \\ - 2348736 \\ \hline \end{array}$$

(5) 
$$\begin{array}{r} 50862131 \\ - 944029 \\ \hline \end{array}$$

(6) 
$$\begin{array}{r} 65309949 \\ - 8214309 \\ \hline \end{array}$$

**B. Subtract.**

(1) 214,379 from 600,500

(2) 856,394 from 3,767,595

(3) 4,930,109 from 5,851,036

(4) 5,396,138 from 43,547,967

(5) 35,180,962 from 89,086,371

(6) 134,258,369 from 656,148,154

C. Fill the missing digits in the following.

$$\begin{array}{r} (1) \quad 8 \ 7 \ 3 \ 2 \ 4 \ 6 \\ - \quad 4 \ 3 \ \bigcirc \ \bigcirc \ 2 \ \bigcirc \\ \hline \end{array}$$

**4 4 2 1 2 3**

$$\begin{array}{r} (2) \quad 6 \ 9 \ 4 \ 7 \ \bigcirc \ 2 \\ - \quad 3 \ \bigcirc \ 3 \ \bigcirc \ 2 \ 4 \\ \hline \end{array}$$

**3 8 1 6 3 8**

$$\begin{array}{r} (3) \quad 5 \ \bigcirc \ 3 \ 4 \ \bigcirc \ 9 \ 8 \\ - \quad 3 \ 2 \ \bigcirc \ 2 \ 7 \ 4 \ \bigcirc \\ \hline \end{array}$$

**2 7 2 1 5 5 4**

$$\begin{array}{r} (4) \quad 6 \ 8 \ 1 \ 4 \ \bigcirc \ 3 \ 9 \\ - \ \bigcirc \ \bigcirc \ 0 \ 2 \ 5 \ 2 \ \bigcirc \\ \hline \end{array}$$

**3 4 1 2 2 1 5**

D. Pakistan imported 107,857 kg dry grapes in 2014, and 154,792 kg dry grapes in 2015. How many more dry grapes were imported in 2015 than in 2014?

## 1.3 MULTIPLICATION AND DIVISION

### 1.3.1 Multiply numbers, up to 6-digits, by 10, 100 and 1000

We have learnt in class IV to multiply numbers. Let us revise. Remember that multiplication is the process of continuous addition of the same number many times.

**Example 1.** Multiply: (i) 2,658 by 10 (ii) 38,524 by 10

(iii) 451,392 by 10

**Solution:**

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From the examples, it is clear that in the multiplication of a natural number with 10, we put a zero in the given number at right and rest of the number remains same. This rule can also be applied in the multiplication of numbers with 100 and 1000.

**Example 2. Multiply****(i) 4,353 by 100****Solution:**

Th	H	T	O		
4	3	5	3		
x	1	0	0		
				0	0
0	0	0	0	x	
+	4	3	5	x	x
				4	3
				0	0

**(ii) 58,351 by 1,000****Solution:**

T-Th	Th	H	T	O			
5	8	3	5	1			
x	1	0	0	0			
					0	0	0
0	0	0	0	0	x		
0	0	0	0	0	x	x	
+	5	8	3	5	x	x	
					5	8	
					3	5	
					1	0	
					0	0	

**Example 3. Multiply 536,847 by 10, 100 and 1,000.****Solution:**

H-Th	T-Th	Th	H	T	O		
5	3	6	8	4	7	x	10
=							
5	3	6	8	4	7	0	
5	3	6	8	4	7	x	100
=							
5	3	6	8	4	7	0	0
5	3	6	8	4	7	x	1000
=							
5	3	6	8	4	7	0	0
5	3	6	8	4	7	0	0

**Remember:** To multiply a number by 10 (100), (1000); we write one zero, (two zeroes), (three zeroes) at the right of the given number. The rest of the digits remain the same.

**Teacher's Note**

Teacher should ensure enough practice of multiplication by 10, 100 and 1000 by asking questions orally.

**1.3.2 Multiply numbers, up to 6-digits, by a 2-digits and 3-digits numbers**
**Example 1. Multiply: (i) 754,863 by 40 (ii) 754,863 by 400**
**Solution:**

$$\begin{aligned}
 \text{(i)} \quad & 754863 \times 40 \\
 & = 754863 \times 4 \times 10 \\
 & = (754863 \times 4) \times 10 \\
 & = 3019452 \times 10 = 30194520 \\
 & = 30,194,520
 \end{aligned}$$

In case of multiplication of a number with 40, we have to multiply it with 4 and 10. So, multiply the given number by 4 and put one zero in the right of the product for multiplying by 10.

$$\begin{aligned}
 \text{(ii)} \quad & 754863 \times 400 \\
 & = 754863 \times 4 \times 100 \\
 & = (754863 \times 4) \times 100 \\
 & = 3019452 \times 100 = 301945200 \\
 & = 301,945,200
 \end{aligned}$$

Similarly in case of multiplication of number with 400, we have multiplied the given number by 4 and put two zeroes in the right of the product for multiplying by 100.

**Example 2. Multiply 323,114 by 32**
**Solution:**

$$\begin{array}{r}
 323114 \\
 \times 32 \\
 \hline
 646228 \quad \text{---} \text{ Multiplication by 2 ones (1)} \\
 + 969342 \times \quad \text{---} \text{ Multiplication by 3 tens (10)} \\
 \hline
 \mathbf{10,339,648}
 \end{array}$$

 Thus,  $323114 \times 32 = 10,339,648$



**Example 3.** Find the product of 230214 and 103

**Solution:**

$$\begin{array}{r}
 230214 \\
 \times 103 \\
 \hline
 690642 \\
 000000 \\
 + 230214 \\
 \hline
 23712042
 \end{array}$$

Thus,  $230214 \times 103 = 23,712,042$

### EXERCISE 1.4

**A. Solve.**

- |                          |                           |
|--------------------------|---------------------------|
| (1) $4,136 \times 10$    | (2) $34,569 \times 10$    |
| (3) $21,034 \times 10$   | (4) $15,347 \times 100$   |
| (5) $27,796 \times 100$  | (6) $155,430 \times 100$  |
| (7) $41,357 \times 1000$ | (8) $386,975 \times 1000$ |

**B. Solve.**

- |                        |                          |
|------------------------|--------------------------|
| (1) $1,942 \times 50$  | (2) $63,578 \times 80$   |
| (3) $25,608 \times 70$ | (4) $326,985 \times 90$  |
| (5) $8,540 \times 300$ | (6) $280,915 \times 600$ |

**C. Multiply.**

- |                           |                           |
|---------------------------|---------------------------|
| (1) $25,839 \times 33$    | (2) $243,419 \times 86$   |
| (3) $65,204 \times 75$    | (4) $467808 \times 92$    |
| (5) $76,391 \times 22$    | (6) $298,543 \times 44$   |
| (7) $349,776 \times 53$   | (8) $531,062 \times 68$   |
| (9) $12,873 \times 425$   | (10) $859,046 \times 710$ |
| (11) $357,904 \times 486$ | (12) $809,507 \times 572$ |
| (13) $598,722 \times 235$ | (14) $914,076 \times 572$ |
| (15) $743,158 \times 377$ | (16) $865,432 \times 444$ |

**D.** The school library ordered 45 books. The cost of each book was Rs. 325. What is the cost of 45 library books?

### 1.3.3 Divide numbers, up to 6-digits, by a 2-digit and 3-digit numbers

Let us consider the following examples.

**Example 1.** Divide 643185 by 24 and find quotient and remainder.

	<b>26799</b>	→ Quotient
Divisor ← 24	6 4 3 1 8 5	→ Dividend
	$\begin{array}{r} - 48 \\ \hline 163 \\ - 144 \\ \hline 0191 \\ - 168 \\ \hline 0238 \\ - 216 \\ \hline 0225 \\ - 216 \\ \hline 009 \end{array}$	
Remainder should be less than the divisor	<b>009</b>	← Remainder

**Step 1:** Since digit of highest place value 6 is less than divisor 24. So, we take 64 multiply 24 by 2. Write 2 as quotient and subtract ( $64 - 48 = 16$ )  
**Step 2:** 16 is the remainder so after bringing down 3 we get 163. Multiply 24 by 6 and get 144. Write 6 as quotient and subtract ( $163 - 144 = 19$ )  
**Step 3:** The next digit in dividend is 1. So, we place it after 19, we get 191. Multiply 24 by 7. Write 7 as quotient and subtract ( $191 - 168 = 23$ ).  
**Step 4:** Next digit in dividend is 8, we place it after remainder 23. We get 238. Multiply 24 by 9, we get 216. Write 9 as quotient and subtract ( $238 - 216 = 22$ ).  
**Step 5:** Next digit in dividend is 5, so we put it after remainder 22 and get 225. Multiply 24 by 9, we get 216. Write 9 as quotient and subtract ( $225 - 216 = 9$ ).

Hence quotient is **26,799** and remainder is **9**.

**Example 2.** Divide 837576 by 123

**Solution:**

	<b>6809</b>
123	837576
	$\begin{array}{r} - 738 \\ \hline 0995 \\ - 984 \\ \hline 01176 \\ - 1107 \\ \hline 69 \end{array}$
	<b>69</b>

Hence quotient is **6809** and remainder is **69**.

## EXERCISE 1.5

## A. Divide:

- (1) 295,845 by 33                      (2) 569,551 by 89  
 (3) 639,133 by 97                      (4) 576,480 by 60  
 (5) 269,760 by 480                      (6) 135,095 by 205  
 (7) 444,771 by 321                      (8) 466,896 by 822

## B. Find the remainder and quotient of the following.

- (1)  $5,678 \div 10$                       (2)  $396,785 \div 10$   
 (3)  $473,405 \div 100$                       (4)  $843,216 \div 100$   
 (5)  $5,230,106 \div 100$                       (6)  $8,256,879 \div 1000$   
 (7)  $6,456,782 \div 1000$                       (8)  $9,650,000 \div 1000$

- C. Mr. Anwar cooks 61500 *naans* in 500 days. How many *naans* must he cook every day if he cooks equal number of *naans* daily?

## 1.3.4 Solve real life problems involving mixed operations of addition, subtraction, multiplication and division

**Example 1.** Najeeb spends Rs 438900 on buying a house and Rs 358400 on buying a car. How much did he spend in all?

**Solution:** This problem involves addition.

Amount spent on house	4	<sup>①</sup> 3	<sup>①</sup> 8	,	9	0	0
Amount spent on car	+ 3	5	8	,	4	0	0
Total amount	7 9 7, 3 0 0						

Hence Najeeb spent **Rs797,300**

**Example 2.** According to census report 1998, there were 2,380,463 females and 1,511,021 males in Hyderabad. How many females are more than males?

**Solution:** This problem involves subtraction.

Number of females	<del>2</del>	<del>3</del>	<del>8</del>	<del>0</del>	4	6	3
Number of males	- 1	5	1	1	0	2	1
Difference	0 8 6 9 4 4 2						

Hence the difference is **869,442**.



- (4) A factory produced **235,806** floor marble tiles in a day . How many marbles will be produced in **32** days?
- (5) Government spent **Rs 5,380,100** on gas supply in one town. What is the total amount spent on gas supply of **25** such towns?
- (6) A container holds **9,475** litres of milk. How many litres of milk will **354** such containers hold?
- (7) Find the number of roll required to pack **531,675** metre cloths. One roll contains 45 metres.
- (8) A construction company wanted to purchase a land for housing scheme of **Rs 52,890,500**. It had **Rs 50,456,128** and borrowed the rest from the Bank. How much money did the company borrow from the Bank?

## 1.4 ORDER OF OPERATIONS BODMAS RULE

### 1.4.1 Recognize BODMAS rule, using only parentheses ( ) and carry out combined operations using BODMAS rule.

The rule of BODMAS is formed to help us in remembering the order of sloving mathematical operations. The following order must be followed by solving any mathematical problem.

<b>B</b>	<b>Brackets</b>	Solve within brackets ( )	
<b>O</b>	<b>of</b>	To multiply	
<b>D</b>	<b>Divide</b>	$\div$	
<b>M</b>	<b>Multiply</b>	$\times$	
<b>A</b>	<b>Add</b>	$+$	Add and Subtract in order from left to right
<b>S</b>	<b>Subtract</b>	$-$	

### Teacher's Note

Teacher should show students that answer will be wrong if BODMAS rule is not followed

Round Brackets ( ) are also known as parentheses.  
Let us understand BODMAS rule with the following examples.

**Example 1.** Solve by using BODMAS rule  $135 \div 15 + 6 - 5 \times 2$

**Solution:**

$135 \div 15 + 6 - 5 \times 2$  (By applying DMAS rule we first perform **Division**). ( $135 \div 15 = 9$ )

$= 9 + 6 - 5 \times 2$  Then perform **multiplication**. ( $5 \times 2 = 10$ )  
 $= 9 + 6 - 5 \times 10$  Then perform **addition** and **subtraction**  
 in order from left to right.

**Example 2.** Solve by using BODMAS  $64 - (6 \text{ of } 2) \times 3$

**Solution:**

$= 64 - (6 \times 2) \times 3$  First perform operation inside the bracket

$= 64 - 12 \times 3$  Then **multiply**

$= 64 - 36$  and then **Subtract**

$= 28$

**Example 3.** Solve:  $82 - 32 \text{ of } 2 + (8 + 20 \div 4)$

**Solution:**

$82 - 32 \text{ of } 2 + (8 + 20 \div 4)$  (First solve inside the **bracket**. Do **division** first.)

$= 82 - 32 \text{ of } (8 +)$  (Solve **addition** to remove the **bracket**)

$= 82 - 32 \times 2 + (1 + 3)$  (Replace **of** with **multiply** and solve)

$= 82 - 64 + 13$  (In the last perform addition and subtraction in **order** from left to right))

$= 18 + 13$

$= 31$

## EXERCISE 1.7

- A. Salman solved the following question using BODMAS  
 $(213 - 123) + 60 \times 5 - (64 \div 8)$

**Solution:**  $= (213 - 123) + 60 \times 5 - 64 \div 8$   
 $= 90 + 60 \times 5 - 64 \div 8$   
 $= 90 + 60 \times 5 - 8$   
 $= 90 + 300 - 8$   
 $= 390 - 8$   
 $= 382$

Can you write down the steps that Salman followed?

**Step 1:** Solve \_\_\_\_\_

**Step 2:** Solve \_\_\_\_\_

**Step 3:** Solve \_\_\_\_\_

**Step 4:** Solve \_\_\_\_\_

**Step 5:** Solve \_\_\_\_\_

- B. Solve:

(1)  $(9 - 8) \times 18$

(2)  $(5 \times 9) \div 15$

(3)  $16 \div 2 + 5 \times 4 - 2$

(4)  $32 \times 21 - 42 \div 7$

(5)  $50 \times 5 + (15 + 23)$

(6)  $7 + (15 \div 3 + 5) \times 4 - 20$

(7) 4 of  $195 \div 13 - 54$

(8)  $(3 \times 18) \div 3$  of  $2 + 105$

(9)  $(28 \div 4 + 5) \times 4 - 11$  of 3

(10)  $5 + (42 + 7$  of  $2 - 2) \times 8$

(11) 100 of  $(3 \times 150 \div 10)$

(12)  $60 + (72 \div 7$  of  $3 + 5) \times 2$

- C. Add brackets to these mathematical statements so that the statements become correct.

(1)  $24 \div 4 \times 3 = 18$

(2)  $6 \times 2 + 8 \div 4 = 15$

**1.4.2 Verify distributive laws.**

There are two types of distributive laws:

- (i) Distributive law of multiplication over addition with respect to multiplication.
- (ii) Distributive law of multiplication over subtraction with respect to multiplication.

According to distributive law, addition or subtraction of any two numbers within brackets and its multiplication by the number outside the bracket gives the same result of the multiplication of the outer number with both the numbers and addition or subtraction of the results. Let us understand the process of verification of distributive laws with the help of examples.

For example,  $4 \times (2 + 5)$  will be equal to  $(4 \times 2) + (4 \times 5)$

**Example 1. Verify distributive laws.**

- (i)  $8 \times (3 + 2) = (8 \times 3) + (8 \times 2)$
- (ii)  $(12 - 10) \times 4 = (12 \times 4) - (10 \times 4)$

**Solution: (i)  $8 \times (3 + 2) = (8 \times 3) + (8 \times 2)$** 

Left Hand Side (LHS)	Right Hand Side(RHS)
$= 8 \times (3 + 2)$	$= (8 \times 3) + (8 \times 2)$
$= 8 \times 5$	$= 24 + 16$
$= 40$	$= 40$

LHS = RHS  
Hence verified

**(ii)  $(12 - 10) \times 4 = (12 \times 4) - (10 \times 4)$** 

LHS = $(12 - 10) \times 4$	RHS = $(12 \times 4) - (10 \times 4)$
$= 2 \times 4$	$= 48 - 40$
$= 8$	$= 8$

LHS = RHS  
Hence verified

**Example 2.** Fill in the blanks.

$$(1) \quad 18 \times (6 + 3) = (18 \times \square) + (18 \times \square)$$

$$(2) \quad (\square + \square) \times 5 = (20 \times \square) + (10 \times \square)$$

$$(3) \quad 2 \times (5 - \square) = (2 \times \square) - (\square \times 7)$$

**Solution:**

$$(1) \quad 18 \times (6 + 3) = (18 \times \boxed{6}) + (18 \times \boxed{3})$$

$$(2) \quad (\boxed{20} + \boxed{10}) \times 5 = (20 \times \boxed{5}) + (10 \times \boxed{5})$$

$$(3) \quad 2 \times (5 - \boxed{7}) = (2 \times \boxed{5}) - (\boxed{2} \times 7)$$

### EXERCISE 1.8

**A.** Fill in the blanks.

$$(1) \quad 15 \times (5 + 3) = (15 \times \square) + (15 \times \square)$$

$$(2) \quad (25 - 18) \times 32 = (25 \times \square) - (18 \times \square)$$

$$(3) \quad (\square + \square) \times 10 = (30 \times 10) + (40 \times 10)$$

$$(4) \quad (3 \square 5) \times 14 = (3 \square 14) + (5 \times 14)$$

$$(5) \quad \square \times (26 + 74) = (5 \times 26) \square (5 \times 74)$$

$$(6) \quad 9 \times (13 - \square) = (9 \times \square) - (9 \times 5)$$

$$(7) \quad 10 \times (20 - \square) = (10 \times \square) - (\square \times 30)$$

$$(8) \quad (\square + \square) \times 4 = (12 \times \square) + (8 \times \square)$$

**B.** Verify distributive laws.

$$(1) \quad 5 \times (3 + 2) = (5 \times 3) + (5 \times 2)$$

$$(2) \quad 4 \times (9 - 5) = (4 \times 9) - (4 \times 5)$$

$$(3) \quad (18 + 2) \times 10 = (18 \times 10) + (2 \times 10)$$

$$(4) \quad 10 \times (12 - 3) = (10 \times 12) - (10 \times 3)$$

## REVIEW EXERCISE 1

1. **Write the following numbers in words:**
  - (i) 246,416,279
  - (ii) 905,407,608
2. **Write the following numbers in numerals:**
  - (i) Seventy five million, twenty six thousand four hundred twenty.
  - (ii) Four hundred five million, seven hundred forty five thousand eight hundred six.
3. **Add the following:**
  - (i) 205, 617,291 and 5,412,306
  - (ii) 4,000,405 and 20136,999
  - (iii) 214,308,196 and 523,410,018
4. **Subtract the following:**
  - (i) 412,326,917 from 624,005,123
  - (ii) 96,105,892 from 712,342,445
  - (iii) 234,596,501 from 641,884,962
5. **Solve:**
  - (i)  $1,243 \times 10$
  - (ii)  $962,345 \times 45$
  - (iii)  $56,729 \times 40$
  - (iv)  $612,378 \times 962$
  - (v)  $405,617 \times 1000$
6. **Divide:**
  - (i) 753400 by 30
  - (ii) 269817 by 356
7. **Solve:**
  - (i)  $180 \div 10 \times (50 \text{ of } 2 \div 4)$
  - (ii)  $48 - (5 \text{ of } 2 + 12)$

8. **Verify:**

(i)  $2 \times (4 + 7) = (2 \times 4) + (2 \times 7)$

(ii)  $5 \times (96 - 34) = (5 \times 96) - (5 \times 34)$

9. A water tanker holds **24,541** litres of water. How much will be in **35** such tankers?

10. A box contains **30** chalks. How many such boxes are required to pack **24,660** chalks?

# HCF AND LCM

(Highest Common Factor and Least Common Multiple)

## 2.1 HCF

### 2.1.1 Find HCF of three numbers, up to 2-digits

In the previous class, we learned about HCF by using Venn diagram and prime factorization method, LCM by using common multiples and prime factorization. Now we will learn HCF and LCM in more detail.

HCF means Highest Common Factor. It is of two or more natural numbers. It is the greatest common factor (divisor) of the given natural numbers. HCF is also called Greatest Common Divisor (GCD).

Methods for finding the HCF or GCD are given below.

(1) **Prime Factorization method**

(2) **Division method**

#### 1. Prime Factorization method

**Procedure:**

- (i) Write prime factors of all the given numbers.
- (ii) Find common factors from all the prime factors.
- (iii) Write the product of all common factors.
- (iv) The product of common factors is the required HCF.

Consider the following examples:

#### Example 1.

Find HCF of **40** and **50** by using prime factors method.

**Solution:**

Prime factors of 40 =  $2 \times 2 \times 2 \times 5$

Prime factors of 50 =  $2 \times 5 \times 5$

Common prime factors are 2 and 5

Product of common factors =  $2 \times 5 = 10$

So, HCF of **40** and **50** is **10**.

2	40	2	50
2	20	5	25
2	10	5	5
5	5		1
	1		

**Example 2.** Find HCF of 18, 30 and 36.

**Solution:**

Prime factors of 18 =  $2 \times 3 \times 3$

Prime factors of 30 =  $2 \times 3 \times 5$

Prime factors of 36 =  $2 \times 2 \times 3 \times 3$

Common factors of all the prime factors are 2 and 3.

Product of common factors =  $2 \times 3 = 6$

So, HCF of 18, 30 and 36 is 6.

2	18
3	9
3	3
	1

2	30
3	15
5	5
	1

2	36
2	18
3	9
3	3
	1

## 2. By Division Method

We have learnt to find the HCF by prime factors method. Now we will learn to find HCF of two or more numbers by division method.

Let us consider the following examples.

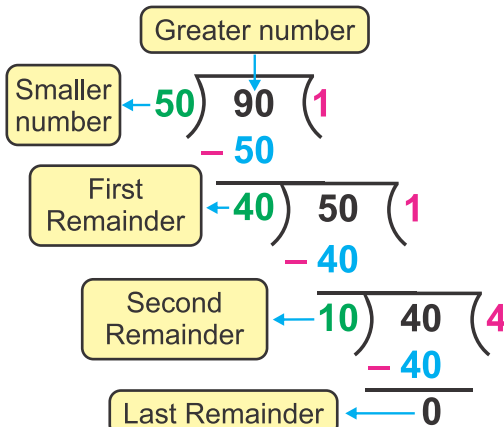
**Example 1:** Find HCF of 50 and 90 by division method.

**Solution:**

Given two numbers are 50 and 90.

Larger number is 90 and smaller number is 50.

First we divide greater number 90 by smaller number 50.



**Step 1:**  $90 \div 50 = 1$ ,  
remainder 40

First remainder is 40.

**Step 2:** Again we divide 50 by 40.

We get  $50 \div 40 = 1$ ,  
remainder 10

**Step 3:** Lastly  $40 \div 10 = 4$ ,  
remainder 0

Hence, HCF of 50 and 90 = 10

### Teacher's Note

Teacher should revise the methods of finding HCF learnt in previous class. Teacher should also help to understand the procedure of prime factorization method.

**Example 2.** Find HCF of 30, 50 and 80.

**Solution:**

First find HCF of any two given numbers; say 30 and 50.

(i) Divide greater number 50 by smaller number 30.

Greater number		
Smaller number	$\begin{array}{r} 30 \overline{) 50} \quad (1 \\ -30 \\ \hline \end{array}$	So, $50 \div 30 = 1$ , remainder 20
First Remainder	$\begin{array}{r} 20 \overline{) 30} \quad (1 \\ -20 \\ \hline \end{array}$	Again $30 \div 20 = 1$ , remainder 10
Second Remainder	$\begin{array}{r} 10 \overline{) 20} \quad (2 \\ -20 \\ \hline \end{array}$	Lastly $20 \div 10 = 2$ , remainder 0
	$\begin{array}{r} 0 \end{array}$	Last Remainder

Hence, HCF of 30 and 50 = 10

Now we have to find HCF of 10 and the remaining number 80 by division method.

Divide the greater number 80 by smaller number 10.

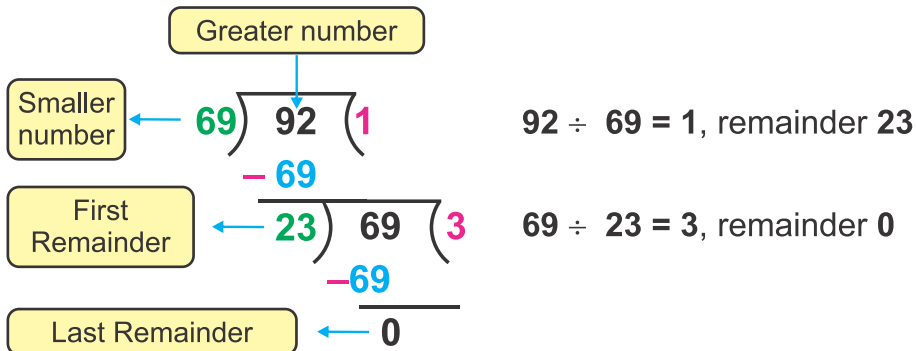
$\begin{array}{r} 10 \overline{) 80} \quad (8 \\ -80 \\ \hline \end{array}$	80 is exactly divided by 10. $80 \div 10 = 8$ , remainder 0.
Last Remainder $\frac{0}{0}$	So, 10 is HCF of 10 and 80.

Hence, HCF of 30, 50 and 80 = 10

**Example 3.** Find HCF of 46, 69 and 92.

**Solution:**

- (i) Find HCF of any two given numbers, say 69 and 92.
- (ii) Divide greater number 92 by smaller number 69.



So, HCF of 69 and 92 = 23

Again find HCF of 23 and the third number 46 by division method.

Divide the greater number 46 by smaller number 23.

$\begin{array}{r} 23 \overline{) 46} \quad (2 \\ \underline{-46} \\ 0 \end{array}$	<p>46 is exactly divided by 23</p> <p><math>46 \div 23 = 2</math>, remainder 0.</p> <p>So, HCF of 46 and 23 = 23</p>
--	--

Hence, 23 is HCF of 46, 69 and 92.

### EXERCISE 2.1

**A. Find HCF of the following by Prime Factorization method.**

- |                    |                    |                    |
|--------------------|--------------------|--------------------|
| (1) 16 and 28      | (2) 27 and 36      | (3) 24 and 56      |
| (4) 28 and 42      | (5) 44 and 66      | (6) 52 and 78      |
| (7) 20, 60 and 80  | (8) 32, 48 and 96  | (9) 35, 49 and 63  |
| (10) 26, 39 and 65 | (11) 45, 75 and 90 | (12) 21, 35 and 63 |

**B. Find HCF of the following by using division method.**

- |                    |                    |                    |
|--------------------|--------------------|--------------------|
| (1) 28 and 70      | (2) 66 and 88      | (3) 57 and 95      |
| (4) 51 and 85      | (5) 48 and 80      | (6) 54 and 90      |
| (7) 40, 60 and 80  | (8) 36, 60 and 96  | (9) 32, 48 and 80  |
| (10) 60, 75 and 90 | (11) 42, 70 and 84 | (12) 63, 72 and 81 |

## 2.2 LCM

### 2.2.1 Find LCM of four numbers up to 2-digits.

LCM means Least Common Multiple. Least Common Multiple is of two or more natural numbers.

LCM is the smallest natural number which is a multiple of the given numbers.

There are two methods to find the LCM of two or more numbers.

- (a) Prime factorization method
- (b) Division method

#### (a) LCM by using prime factorization method.

##### Steps:

- Write all prime factors of each number.
- Write all common and non-common prime factors out of these prime factors.
- The product of all common and uncommon prime factors is the required LCM of the given numbers.

#### Example 1.

Find LCM of **32** and **40** by Prime Factorization method.

**Solution:** Given two numbers are 32 and 40

Prime factorization of 32 =  $2 \times 2 \times 2 \times 2 \times 2$

Prime factorization of 40 =  $2 \times 2 \times 2 \times 5$

Common factors of both prime factorizations are 2, 2, 2

Non-common factors of both prime factorizations are 2, 2, 5.

Product of common factors =  $2 \times 2 \times 2 = 8$

Product of non-common factors =  $2 \times 2 \times 5 = 20$

LCM is product of common and non-common factors  
=  $8 \times 20 = 160$

So, the required LCM is 160.

2	32
2	16
2	8
2	4
2	2
	1
2	40
2	20
2	10
5	5
	1

#### Teacher's Note

Teacher should revise the methods of LCM with concept. And help the students to understand the procedure of prime factorization of four numbers.

**Example 2.**

Find LCM of **18**, **24**, **36** and **60**.

**Solution:**

Prime factors of 18 =  $2 \times 3 \times 3$

Prime factors of 24 =  $2 \times 2 \times 2 \times 3$

Prime factors of 36 =  $2 \times 2 \times 3 \times 3$

Prime factors of 60 =  $2 \times 2 \times 3 \times 5$

Common prime factors are 2, 3

Common prime factors of in 2 or 3 numbers and uncommon prime factors are 2, 2, 3, 5

LCM is product of all these factors

$$= (2 \times 3) \times (2 \times 2 \times 3 \times 5) = (6) \times (60) = 360$$

So, the required LCM is **360**.

2	18
3	9
3	3
	1

2	24
2	12
2	6
3	3
	1

2	36
2	18
3	9
3	3
	1

2	60
2	30
3	15
5	5
	1

**(b) LCM by using division method**

We have learnt to find the LCM by prime factorization method. Now we will learn to find LCM of four numbers by division method. Let us consider the following examples.

**Example 1:** Find LCM of **16** and **20** by division method.

**Solution:**

$$\text{LCM} = 2 \times 2 \times 2 \times 2 \times 5 = 80$$

Therefore LCM of **16** and **20** = **80**

**Steps:**

- (i) Write the numbers as shown above.
- (ii) Divide both numbers by the smallest prime number which exactly divides at least one of the number.
- (iii) Write the quotient in each case below the number.
- (iv) If a number cannot be divided exactly, write the number as it is in the next row.
- (v) Keep on dividing until the last row has only 1 under each number.
- (vi) Product of all divisors gives the LCM.

2	16, 20
2	8, 10
2	4, 5
2	2, 5
5	1, 5
	1, 1

**Example 2.** Find the LCM of 12, 36 and 60 by division method.

**Solution:**

2	12, 36, 60
2	6, 18, 30
3	3, 9, 15
3	1, 3, 5
5	1, 1, 5
	1, 1, 1

Thus,  $LCM = 2 \times 2 \times 3 \times 3 \times 5 = 180$

**Example 3:** Find LCM of 50, 60, 75 and 90 by division method.

**Solution:**

2	50, 60, 75, 90
2	25, 30, 75, 45
3	25, 15, 75, 45
3	25, 5, 25, 15
5	25, 5, 25, 5
5	5, 1, 5, 1
	1, 1, 1, 1

$LCM = 2 \times 2 \times 3 \times 3 \times 5 \times 5 = 900$

Hence the required LCM of the given numbers is **900**.

## EXERCISE 2.2

**A. Find LCM of the following by Prime factorization method.**

- |                        |                        |                        |
|------------------------|------------------------|------------------------|
| (1) 36 and 54          | (2) 33 and 55          | (3) 52 and 78          |
| (4) 16, 24 and 40      | (5) 27, 48 and 72      | (6) 50, 80 and 90      |
| (7) 56, 84 and 98      | (8) 44, 66 and 99      | (9) 25, 50 and 75      |
| (10) 15, 25, 30 and 45 | (11) 10, 20, 32 and 40 | (12) 12, 24, 48 and 54 |

**B. Find LCM of the following by division method.**

- |                       |                        |                        |
|-----------------------|------------------------|------------------------|
| (1) 16 and 24         | (2) 20 and 25          | (3) 36 and 48          |
| (4) 27, 36 and 45     | (5) 28, 35 and 63      | (6) 48, 64 and 96      |
| (7) 54, 72 and 90     | (8) 55, 88 and 99      | (9) 60, 70 and 80      |
| (10) 8, 12, 32 and 48 | (11) 18, 27, 36 and 45 | (12) 20, 40, 60 and 80 |

**2.2.1 Solve the real life problems involving HCF and LCM.**

To solve real life problems with HCF or LCM it is important to read the question carefully and identify what needs to be found out.

Let us consider the following examples:

**Example 1.** Find the least number of toffees which can be equally distributed among 15, 30 or 60 friends.

**Solution:** For equal distribution of least number of toffees, we have to find the LCM of 15, 30 or 60.

2	15, 30, 60
2	15, 15, 30
3	15, 15, 15
5	5, 5, 5
	1, 1, 1

So,  $LCM = 3 \times 5 \times 2 \times 2 = 60$

Thus, the required number of toffees are **60**.

**Example 2:** Four containers have 32, 40, 56 and 72 litres capacity. Find the capacity of the largest utensil by which these containers can be filled exactly.

**Solution:**

2	32, 40, 56, 72
2	16, 20, 28, 36
2	8, 10, 14, 18
	4, 5, 7, 9

Highest Common Factor (HCF) =  $2 \times 2 \times 2 = 8$

Therefore each container will be filled **8** litres.

**EXERCISE 2.3**

1. The lowest number, which is divisible by **15, 25, 40** and **75**.
2. Find the greatest number that will divide **42, 66** and **78**.

3. Salam exercises after every **10** days and Nadeem every **6** days. Salam and Nadeem both exercised today. After how many days will they be unite and exercise together again?
4. Hooria is thinking of a number that is divisible by both **15** and **21**. What is the smallest possible number that Hooria could be thinking of?
5. Four vans leave Sukkur at the same time. The first van is seen after 3 hours, the second after 4 hours, the third after 5 hours and the fourth after 6 hours. After how many hour from the starting time, will all of them come together.
6. Boxes that are **12** cm tall are being stacked next to boxes that are **18** cm tall. What is the shortest height at which the two stacks will be of the same height?
7. Samina has two peices of cloth. One piece is **64** cm wide and the other piece is **80** cm wide. She wants to cut both pieces into strips of equal width that are as wide as possible. How wide should she cut the strips?
8. Three milk container hold 30 litres, 40 litres and 50 litres respectively. Find the capacity of a measuring utensils which can hold the milk in each container an exact number of times.
9. Find the greatest length of a measure of stick which can be used to measure exactly **30 cm**, **60 cm** or **90 cm**.
10. Pencils are in packages of **10**. Erasers are in packages of **12**. A shopkeeper wants to purchase the smallest number of pencils and erasers so that he will have exactly **1** eraser per pencil. How many packages of pencils and erasers should shopkeeper buy?

## REVIEW EXERCISE 2

1. Tick (✓) the correct answer.

(i) HCF of 2, 4, 10 is:

- (a) 2                      (b) 4                      (c) 10                      (d) 1

(ii) LCM of 3, 6, 9 is:

- (a) 3                      (b) 6                      (c) 9                      (d) 18

(iii) HCF of 3, 5, 7 is:

- (a) 3                      (b) 1                      (c) 7                      (d) 5

(iv) LCM of 2, 3 and 5 is:

- (a) 6                      (b) 10                      (c) 30                      (d) 15

(v) To find HCF by division method we divide greater number by \_\_\_\_\_.

- (a) same number                      (b) twice the number  
(c) smaller number                      (d) greater number

2. Find the least number which is exactly divisible by 6, 8 and 12.

3. Find the greatest number which divides 12 and 18 exactly.

4. What is the least number of apples which can be distribute equally among 10, 15 or 20 children.

5. Two pieces of cloth 15 metres and 20 metres long respectively are to be cut into small pieces of equal lengths. What will be the greatest length of each piece?

6. What will be capacity of smallest drum which can be filled completely using each of the utensils that can fill exactly 15l, 25l, 40l or 75l.

### 3.1 ADDITION AND SUBTRACTION

#### 3.1.1 Add and subtract two and more fractions with different denominators.

##### (a) Addition of fractions

We have learnt in previous class about the addition and subtraction of two fractions. When we add two fractions with different denominators, first we will make the denominators equal to each other by finding the equivalent fractions.

Let us see the following examples:

**Example 1.** Add  $\frac{2}{5}$  and  $\frac{1}{4}$

**Method 1.** By making equivalent fractions

**Solution:**

First we find the equivalent fractions of  $\frac{2}{5}$  and  $\frac{1}{4}$

Finding equal multiples of 5 and 4.

$$\text{So, } \frac{2}{5} = \frac{2 \times 4}{5 \times 4} = \frac{8}{20} \text{ and } \frac{1}{4} = \frac{1 \times 5}{4 \times 5} = \frac{5}{20}$$

Now, we have a common denominator of both the fractions.

$$\text{So, } \frac{2}{5} + \frac{1}{4} = \frac{8}{20} + \frac{5}{20} = \frac{8+5}{20} = \frac{13}{20}$$

Sum of fractions = Sum of their equivalent fractions

#### Teacher's Note

Teacher should revise addition and subtraction of two fractions with different denominators and learn them with more fractions also.

**Method 2.** By finding LCM of denominators

$$\frac{2}{5} + \frac{1}{4}$$

Find LCM of the denominators

$$\begin{aligned} \frac{2}{5} + \frac{1}{4} &= \frac{(2 \times 4) + (1 \times 5)}{20} \\ &= \frac{8 + 5}{20} \\ &= \frac{13}{20} \end{aligned}$$

2	5, 4
2	5, 2
5	5, 1
	1, 1

$$\text{LCM} = 2 \times 2 \times 5 = 20$$

$$20 \div 5 = 4, 20 \div 4 = 5$$

So, dividing LCM 20 by denominator of  $\frac{2}{5}$ ,  $20 \div 5 = 4$   
Dividing 20 by denominator of  $\frac{1}{4}$ ,  $20 \div 4 = 5$

**Example 1. Solve:**  $\frac{1}{4} + \frac{1}{6} + \frac{3}{8}$

**Solution:**  $\frac{1}{4} + \frac{1}{6} + \frac{3}{8}$

First find LCM of the denominators.

The LCM of 4, 6, 8 is 24

$$\text{LCM} = 2 \times 2 \times 2 \times 3 = 24$$

$$\frac{1}{4} + \frac{1}{6} + \frac{3}{8} = \frac{(1 \times 6) + (1 \times 4) + (3 \times 3)}{24}$$

$$= \frac{6 + 4 + 9}{24}$$

$$= \frac{19}{24}$$

Hence,  $\frac{1}{4} + \frac{1}{6} + \frac{3}{8}$   
 $= \frac{19}{24}$

2	4, 6, 8
2	2, 3, 4
2	1, 3, 2
3	1, 3, 1
	1, 1, 1

$$\begin{aligned} 24 \div 4 &= 6 \\ 24 \div 6 &= 4 \\ 24 \div 8 &= 3 \end{aligned}$$

So, dividing LCM 24 by denominator of  $\frac{1}{4}$ ,  $24 \div 4 = 6$   
Dividing 24 by denominator of  $\frac{1}{6}$ ,  $24 \div 6 = 4$   
Dividing 24 by denominator of  $\frac{3}{8}$ ,  $24 \div 8 = 3$

**(b) Subtraction of two fractions.****Example 1: Subtract  $\frac{2}{7}$  from  $\frac{1}{3}$** **Solution:** To subtract  $\frac{2}{7}$  from  $\frac{1}{3}$  means to solve  $\frac{1}{3} - \frac{2}{7}$ **Method 1.** By making equivalent fractions:First we find the equivalent fractions of  $\frac{1}{3}$  and  $\frac{2}{7}$ 

$$\frac{1}{3} = \frac{1}{3} \times \frac{7}{7} = \frac{1 \times 7}{3 \times 7} = \frac{7}{21}$$

$$\text{and } \frac{2}{7} = \frac{2}{7} \times \frac{3}{3} = \frac{2 \times 3}{7 \times 3} = \frac{6}{21}$$

Now we have a common denominator of both the fractions.

$$\begin{aligned} \text{So, } \frac{1}{3} - \frac{2}{7} &= \frac{7}{21} - \frac{6}{21} \\ &= \frac{7-6}{21} = \frac{1}{21} \end{aligned}$$

Difference of two fractions = Difference of their equivalent fractions.

**Method 2.** Finding LCM of denominators:**Solution:** First find LCM of the denominators 3 and 7.

Now,

$$\frac{1}{3} - \frac{2}{7} = \frac{(1 \times 7) - (2 \times 3)}{21}$$

$$= \frac{7-6}{21}$$

$$= \frac{1}{21}$$

$$\text{Thus, } \frac{1}{3} - \frac{2}{7} = \frac{1}{21}$$

3	3, 7
7	1, 7
	1, 1

$$\text{LCM} = 3 \times 7 = 21$$

So, divide 21 by denominator of  $\frac{1}{3}$ ,  $21 \div 3 = 7$ 

Divide 21 by denominator of

$$\frac{2}{7}, 21 \div 7 = 3$$

**Example 2.** Solve:  $\frac{14}{5} - 2\frac{3}{4}$

**Solution:**

First we change the mixed fraction into an improper fraction.

$$\begin{aligned} \text{Now, } & \frac{14}{5} - 2\frac{3}{4} \\ & = \frac{14}{5} - \frac{11}{4} \end{aligned}$$

Then find the LCM

$$\begin{aligned} \frac{14}{5} - 2\frac{3}{4} & = \frac{(14 \times 4) - (11 \times 5)}{20} \\ & = \frac{56 - 55}{20} = \frac{1}{20} \end{aligned}$$

$$\text{Thus, } \frac{14}{5} - 2\frac{3}{4} = \frac{1}{20}$$

2	5, 4
2	5, 2
5	5, 1
	1, 1

$$\text{LCM} = 2 \times 2 \times 5 = 20$$

**Example 3.** Solve:  $\frac{4}{3} + \frac{1}{2} - \frac{1}{8}$

**Solution:**

$$\frac{4}{3} + \frac{1}{2} - \frac{1}{8}$$

First we find the LCM of 2, 3 and 8

$$\text{LCM} = 2 \times 2 \times 2 \times 3 = 24$$

Therefore,

$$\begin{aligned} & = \frac{(4 \times 8) + (1 \times 12) - (1 \times 3)}{24} \\ & = \frac{32 + 12 - 3}{24} = \frac{41}{24} \\ & = \frac{41}{24} = 1\frac{17}{24} \end{aligned}$$

$$\text{Thus, } \frac{4}{3} + \frac{1}{2} - \frac{1}{8} = 1\frac{17}{24}$$

2	3, 2, 8
2	3, 1, 4
2	3, 1, 2
3	3, 1, 1
	1, 1, 1

$$\text{LCM} = 2 \times 2 \times 2 \times 3 = 24$$

## EXERCISE 3.1

A. Add the following:

$$(1) \frac{1}{3} + \frac{1}{2} \quad (2) \frac{3}{4} + \frac{1}{8} \quad (3) \frac{2}{5} + \frac{1}{3}$$

$$(4) \frac{3}{8} + \frac{1}{3} \quad (5) \frac{2}{9} + \frac{3}{4} \quad (6) \frac{2}{5} + \frac{3}{7}$$

B. Solve:

$$(1) \frac{1}{3} + \frac{1}{5} + \frac{1}{9} \quad (2) \frac{1}{6} + \frac{1}{15} + \frac{1}{18} \quad (3) \frac{1}{8} + \frac{1}{12} + \frac{1}{16}$$

$$(4) 1\frac{1}{10} + 1\frac{1}{5} + \frac{2}{20} \quad (5) 2\frac{1}{3} + 1\frac{1}{15} + 1\frac{1}{20} \quad (6) 1\frac{1}{24} + \frac{1}{32} + 1\frac{1}{4}$$

C. Subtract the following:

$$(1) \frac{3}{4} - \frac{3}{8} \quad (2) \frac{2}{3} - \frac{1}{4} \quad (3) \frac{3}{4} - \frac{1}{2}$$

$$(4) \frac{5}{6} - \frac{1}{2} \quad (5) 4\frac{2}{5} - 1\frac{1}{4} \quad (6) 3\frac{3}{5} - 2\frac{9}{10}$$

D. Solve:

$$(1) \frac{7}{8} - \frac{1}{3} - \frac{1}{4} \quad (2) \frac{3}{4} - \frac{1}{6} - \frac{1}{3} \quad (3) \frac{6}{7} - \frac{1}{14} - \frac{1}{2}$$

$$(4) 2\frac{5}{6} - 2\frac{1}{3} - \frac{1}{4} \quad (5) 2\frac{11}{12} - 2\frac{1}{6} - 1\frac{1}{4} \quad (6) 2\frac{9}{10} - 3\frac{1}{2} - 2\frac{1}{5}$$

$$(7) 4\frac{8}{9} - 3\frac{1}{6} - 4\frac{1}{3} \quad (8) 3\frac{1}{12} - 3\frac{1}{4} - 2\frac{1}{6} \quad (9) 2\frac{3}{15} - 1\frac{2}{5} - 1\frac{3}{10}$$

E. Add:

$$(1) \frac{2}{5} \text{ and } \frac{3}{10} \quad (2) \frac{1}{3} \text{ and } \frac{1}{6} \quad (3) \frac{1}{7}, \frac{1}{14} \text{ and } \frac{1}{21}$$

F. Subtract:

$$(1) \frac{2}{3} \text{ from } \frac{3}{4} \quad (2) \frac{1}{3} \text{ from } \frac{4}{5} \quad (3) \frac{3}{4} \text{ from } \frac{4}{5}$$

## 3.2 MULTIPLICATION

## 3.2.1 Multiply a fraction by a number and demonstrate with the help of diagram

Let us see the following example:

**Example 1.** Multiply  $\frac{2}{3}$  by 3 using diagram.

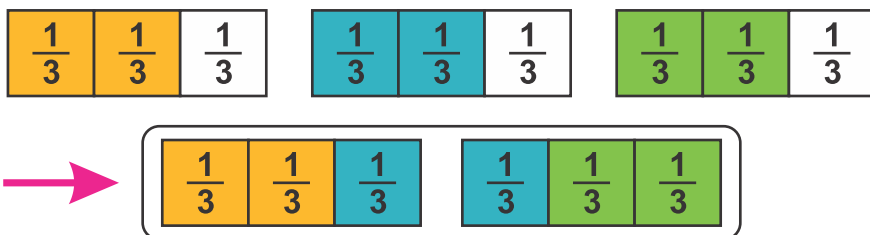
**Solution:**

As we know that multiply  $\frac{2}{3}$  by 3 is expressed in symbol as  $\frac{2}{3} \times 3$

We can express the multiplication as a repeated addition.

$$\frac{2}{3} \times 3 = 3 \times \frac{2}{3} = \frac{2}{3} + \frac{2}{3} + \frac{2}{3} = \frac{2+2+2}{3} = \frac{6}{3}$$

With the help of diagram, we can show as follows:

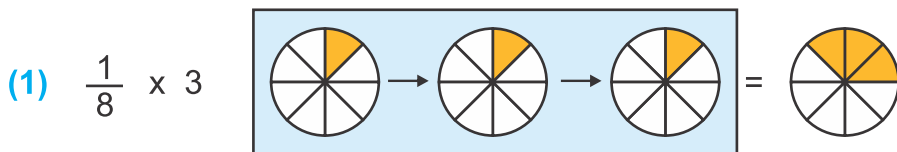


The coloured parts are  $\frac{6}{3}$  or 2 whole.



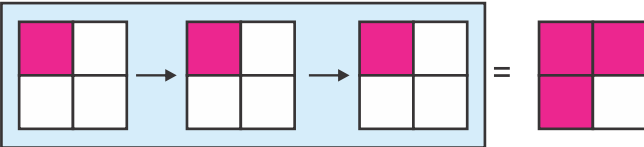
## Activity

Use the diagrams to solve the following:



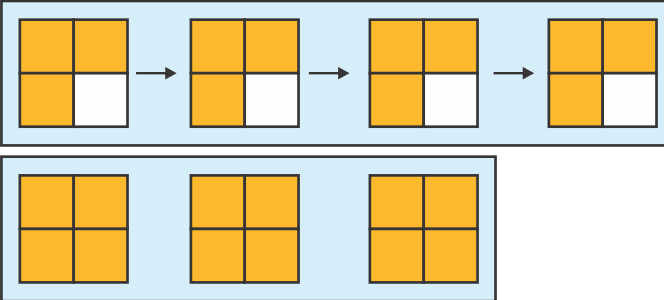
$$\text{So, } \frac{1}{8} \times 3 = \boxed{\frac{1}{8}} + \boxed{\frac{1}{8}} + \boxed{\frac{1}{8}} = \boxed{\frac{3}{8}}$$

(2)  $\frac{1}{4} \times 3$



So,  $\frac{1}{4} \times 3 = \square + \square + \square = \square$

(3)  $\frac{3}{4} \times 4$



So,  $\frac{3}{4} \times 4 = \square + \square + \square + \square = \square$

To multiply a fraction by a whole number means to multiply numerator by the whole number and keep the denominator same.

### 3.2.2 Multiply a fraction by another fraction

Consider the following examples:

**Example 1.** Multiply  $\frac{1}{2}$  by  $\frac{4}{5}$ .

**Solution:**

We know that,  $\frac{1}{2}$  by  $\frac{4}{5}$  means  $\frac{1}{2} \times \frac{4}{5}$

$$\begin{aligned} \text{So, } & \frac{1}{2} \times \frac{4}{5} \\ & = \frac{1 \times 4}{2 \times 5} = \frac{2}{5} \end{aligned}$$

To multiply one fraction by another fraction, we multiply the numerator with numerator and the denominator with denominator. We can simplify a product by cancelling the common factors. Here 2 is a common factor of denominator 2 and numerator 4 so it is cancelled out.

**Example 2.** Multiply  $\frac{1}{7}$  by  $\frac{5}{6}$ .

**Solution:**  $\frac{1}{7}$  by  $\frac{5}{6}$  means  $\frac{1}{7} \times \frac{5}{6}$

$$\frac{1}{7} \times \frac{5}{6} = \frac{1 \times 5}{7 \times 6} = \frac{5}{42}$$

**Example 3.** Simplify.

(a)  $2 \frac{2}{3} \times \frac{9}{4}$

**Solution:**

$$\begin{aligned} 2 \frac{2}{3} \times \frac{9}{4} &= \frac{8}{3} \times \frac{9}{4} \\ &= \frac{\overset{2}{\cancel{8}} \times \overset{3}{\cancel{9}}}{\underset{1}{\cancel{3}} \times \underset{1}{\cancel{4}}} \\ &= \frac{2 \times 3}{1 \times 1} \\ &= \frac{6}{1} = 6 \end{aligned}$$

(b)  $\frac{6}{5} \times \frac{25}{8} \times \frac{1}{3}$

**Solution:**

$$\begin{aligned} \frac{6}{5} \times \frac{25}{8} \times \frac{1}{3} &= \frac{\overset{2}{\cancel{6}} \times \overset{5}{\cancel{25}} \times 1}{\underset{1}{\cancel{5}} \times \underset{4}{\cancel{8}} \times \underset{1}{\cancel{3}}} \\ &= \frac{1 \times 5 \times 1}{1 \times 4 \times 1} \\ &= \frac{5}{4} = 1 \frac{1}{4} \end{aligned}$$

### EXERCISE 3.2

**A.** Multiply the fraction by the given whole number. Also demonstrate with the help of diagram.

(1)  $\frac{3}{4} \times 4$

(2)  $\frac{1}{3} \times 3$

(3)  $\frac{3}{5} \times 5$

(4)  $\frac{1}{2} \times 2$

(5)  $\frac{1}{4} \times 8$

(6)  $\frac{1}{3} \times 6$

(7)  $\frac{3}{2} \times 4$

(8)  $\frac{2}{3} \times 6$

(9)  $\frac{3}{5} \times 11$

**B. Multiply the given fraction by another fraction.**

(1)  $\frac{1}{2}$  by  $\frac{1}{5}$       (2)  $\frac{1}{4}$  by  $\frac{3}{5}$       (3)  $\frac{1}{3}$  by  $\frac{2}{3}$

(4)  $1\frac{1}{4}$  by  $\frac{3}{4}$       (5)  $2\frac{1}{3}$  by  $\frac{4}{5}$       (6)  $3\frac{1}{2}$  by  $1\frac{1}{2}$

**C. Simplify.**

(1)  $\frac{3}{4} \times \frac{8}{9}$       (2)  $\frac{2}{5} \times \frac{25}{4}$       (3)  $\frac{7}{3} \times \frac{9}{14}$

(4)  $1\frac{5}{18} \times 2\frac{1}{10} \times \frac{8}{7}$       (5)  $1\frac{6}{7} \times \frac{14}{15} \times 3\frac{1}{8}$       (6)  $2\frac{1}{3} \times 1\frac{2}{3} \times \frac{20}{7}$

**Multiply two or more fractions involving brackets (proper, improper and mixed fractions)**

Let us see the following examples:

**Example 1.** Multiply  $\frac{6}{8}$  by  $\frac{19}{6}$ .

**Solution:**  $\frac{6}{8} \times \frac{19}{6} = \frac{\overset{1}{\cancel{6}} \times 19}{8 \times \underset{1}{\cancel{6}}} = \frac{19}{8} = 2\frac{3}{8}$

**Example 2.** Solve:  $1\frac{1}{4} \times \left(\frac{5}{10} \times \frac{4}{5}\right)$ 

**Solution:**  $1\frac{1}{4} \times \left(\frac{5}{10} \times \frac{4}{5}\right) = \frac{5}{4} \times \left(\frac{5}{10} \times \frac{4}{5}\right)$

Remember to solve the brackets first!

$$\begin{aligned}
 &= \frac{5}{4} \times \left(\frac{\overset{1}{\cancel{5}} \times \underset{1}{\cancel{4}}}{\underset{5}{\cancel{10}} \times \underset{1}{\cancel{5}}}\right) \\
 &= \frac{5}{4} \times \left(\frac{1 \times 2}{5 \times 1}\right) = \frac{5}{4} \times \frac{2}{5} \\
 &= \frac{\overset{1}{\cancel{5}} \times \underset{1}{\cancel{2}}}{\underset{2}{\cancel{4}} \times \underset{1}{\cancel{5}}} = \frac{1}{2}
 \end{aligned}$$

Thus,  $1\frac{1}{4} \times \left(\frac{5}{10} \times \frac{4}{5}\right) = \frac{1}{2}$

**Example 3.** Solve:  $1\frac{1}{2} \times \left(2\frac{1}{4} \times 3\frac{1}{3}\right)$

**Solution:**  $1\frac{1}{2} \times \left(2\frac{1}{4} \times 3\frac{1}{3}\right)$

First convert mixed fractions into improper fractions

$$\begin{aligned} 1\frac{1}{2} \times \left(2\frac{1}{4} \times 3\frac{1}{3}\right) &= \frac{3}{2} \times \frac{9}{4} \times \frac{10}{3} \\ &= \frac{3}{2} \times \left(\frac{\overset{3}{\cancel{9}} \times \overset{5}{\cancel{10}}}{\underset{2}{\cancel{4}} \times \underset{1}{\cancel{3}}}\right) \\ &= \frac{3}{2} \times \left(\frac{3 \times 5}{2 \times 1}\right) \\ &= \frac{3}{2} \times \frac{15}{2} \\ &= \frac{3 \times 15}{2 \times 2} = \frac{45}{4} = 11\frac{1}{4} \end{aligned}$$

Thus,  $1\frac{1}{2} \times \left(2\frac{1}{4} \times 3\frac{1}{3}\right) = 11\frac{1}{4}$

**Example 4.** Simplify  $\left(\frac{5}{9} \times \frac{6}{11}\right) \times \frac{21}{10}$

**Solution:**  $\left(\frac{5}{9} \times \frac{6}{11}\right) \times \frac{21}{10} = \left(\frac{\overset{2}{\cancel{5}} \times \overset{2}{\cancel{6}}}{\underset{3}{\cancel{9}} \times 11}\right) \times \frac{21}{10}$

$$\begin{aligned} &= \left(\frac{5 \times 2}{3 \times 11}\right) \times \frac{21}{10} = \frac{10}{33} \times \frac{21}{10} \\ &= \frac{\overset{1}{\cancel{10}} \times \overset{7}{\cancel{21}}}{\underset{11}{\cancel{33}} \times \underset{1}{\cancel{10}}} = \frac{1 \times 7}{11 \times 1} \\ &= \frac{7}{11} \end{aligned}$$

Thus,  $\left(\frac{5}{9} \times \frac{6}{11}\right) \times \frac{21}{10} = \frac{7}{11}$

## EXERCISE 3.3

Solve.

(1)  $\frac{5}{6} \times 2\frac{1}{4} \times \frac{16}{5}$

(2)  $\frac{7}{9} \times \left(2\frac{1}{4} \times \frac{8}{7}\right)$

(3)  $\left(\frac{4}{5} \times \frac{10}{3}\right) \times \frac{9}{8}$

(4)  $\left(\frac{3}{4} \times \frac{16}{5}\right) \times 1\frac{2}{3}$

(5)  $\left(1\frac{3}{5} \times 10\frac{1}{2}\right) \times \frac{5}{21}$

(6)  $\left(1\frac{1}{6} \times \frac{5}{6}\right) \times 5\frac{1}{7}$

(7)  $1\frac{5}{16} \times \left(12\frac{1}{2} \times 1\frac{11}{21}\right)$

(8)  $2\frac{5}{6} \times \left(1\frac{3}{17} \times 2\frac{1}{10}\right)$

(9)  $\left(3\frac{9}{10} \times \frac{20}{36}\right) \times 1\frac{11}{13}$

(10)  $\left(2\frac{4}{5} \times 1\frac{5}{7}\right) \times 2\frac{1}{12}$

(11)  $4\frac{2}{7} \times \left(2\frac{5}{8} \times 1\frac{1}{9}\right)$

(12)  $8\frac{1}{3} \times \left(2\frac{1}{10} \times \frac{1}{7}\right)$

## 3.2.4 Verify Distributive Laws:

There are two laws of distributive multiplication.

- (1) Distributive law of multiplication over addition
- (2) Distributive law of multiplication over subtraction

## 1. Distributive law of multiplication over addition

If  $\frac{1}{2}$ ,  $\frac{2}{3}$  and  $\frac{1}{4}$  are any three fractions, thenConsider  $\frac{1}{2} \times \left(\frac{2}{3} + \frac{1}{4}\right)$  and  $\frac{1}{2} \times \frac{2}{3} + \frac{1}{2} \times \frac{1}{4}$ 

Let us verify it:

$$\frac{1}{2} \times \left(\frac{2}{3} + \frac{1}{4}\right) = \left(\frac{1}{2} \times \frac{2}{3}\right) + \left(\frac{1}{2} \times \frac{1}{4}\right)$$

$$\frac{1}{2} \times \left(\frac{8+3}{12}\right) = \frac{2}{6} + \frac{1}{8}$$

$$\frac{1}{2} \times \frac{11}{12} = \frac{8+3}{24}$$

$$\frac{11}{24} = \frac{11}{24}$$

So, LHS = RHS

$$\text{Therefore, } \frac{1}{2} \times \left( \frac{2}{3} + \frac{1}{4} \right) = \left( \frac{1}{2} \times \frac{2}{3} \right) + \left( \frac{1}{2} \times \frac{1}{4} \right)$$

This indicates distributive law of multiplication over addition.

$$\text{Now verify it: } \left( \frac{2}{3} + \frac{1}{4} \right) \times \frac{1}{2} = \left( \frac{2}{3} \times \frac{1}{2} \right) + \left( \frac{1}{4} \times \frac{1}{2} \right)$$

## 2. Distributive law of multiplication over subtraction

If  $\frac{1}{2}$ ,  $\frac{1}{3}$  and  $\frac{1}{4}$  are any three fractions, then the distributive law says that the two expressions below will be equal.

$$\frac{1}{2} \times \left( \frac{1}{3} - \frac{1}{4} \right) \text{ and } \left( \frac{1}{2} \times \frac{1}{3} \right) - \left( \frac{1}{2} \times \frac{1}{4} \right)$$

$$\text{Let us verify it: } \frac{1}{2} \times \left( \frac{1}{3} - \frac{1}{4} \right) = \left( \frac{1}{2} \times \frac{1}{3} \right) - \left( \frac{1}{2} \times \frac{1}{4} \right)$$

$$\frac{1}{2} \times \left( \frac{4-3}{12} \right) = \frac{1}{6} - \frac{1}{8}$$

$$\frac{1}{2} \times \frac{1}{12} = \frac{4-3}{24}$$

$$\frac{1}{24} = \frac{1}{24}$$

So, LHS = RHS

$$\text{Therefore, } \frac{1}{2} \times \left( \frac{1}{3} - \frac{1}{4} \right) = \left( \frac{1}{2} \times \frac{1}{3} \right) - \left( \frac{1}{2} \times \frac{1}{4} \right)$$

This indicates distributive law of multiplication over subtraction.

$$\text{Now verify it: } \left( \frac{1}{3} - \frac{1}{4} \right) \times \frac{1}{2} = \left( \frac{1}{3} \times \frac{1}{2} \right) - \left( \frac{1}{4} \times \frac{1}{2} \right)$$

## EXERCISE 3.4

A. Verify the distributive law of multiplication over addition in the following.

$$(1) \quad \frac{2}{5} \times \left( \frac{3}{7} + \frac{4}{5} \right) = \left( \frac{2}{5} \times \frac{3}{7} \right) + \left( \frac{2}{5} \times \frac{4}{5} \right)$$

$$(2) \quad \frac{7}{9} \times \left( \frac{1}{4} + \frac{1}{3} \right) = \left( \frac{7}{9} \times \frac{1}{4} \right) + \left( \frac{7}{9} \times \frac{1}{3} \right)$$

$$(3) \quad \frac{2}{7} \times \left( \frac{3}{8} + \frac{1}{5} \right) = \left( \frac{2}{7} \times \frac{3}{8} \right) + \left( \frac{2}{7} \times \frac{1}{5} \right)$$

$$(4) \quad \left( \frac{1}{9} + \frac{4}{9} \right) \times \frac{3}{4} = \left( \frac{1}{9} \times \frac{3}{4} \right) + \left( \frac{4}{9} \times \frac{3}{4} \right)$$

B. Verify the distributive law of multiplication over subtraction in the following.

$$(1) \quad \frac{1}{2} \times \left( \frac{3}{4} - \frac{2}{3} \right) = \left( \frac{1}{2} \times \frac{3}{4} \right) - \left( \frac{1}{2} \times \frac{2}{3} \right)$$

$$(2) \quad \frac{1}{5} \times \left( \frac{1}{2} - \frac{1}{3} \right) = \left( \frac{1}{5} \times \frac{1}{2} \right) - \left( \frac{1}{5} \times \frac{1}{3} \right)$$

$$(3) \quad \left( \frac{4}{5} - \frac{3}{4} \right) \times \frac{2}{3} = \left( \frac{4}{5} \times \frac{2}{3} \right) - \left( \frac{3}{4} \times \frac{2}{3} \right)$$

$$(4) \quad \frac{5}{6} \times \left( \frac{4}{7} - \frac{1}{2} \right) = \left( \frac{5}{6} \times \frac{4}{7} \right) - \left( \frac{5}{6} \times \frac{1}{2} \right)$$

Solve real life problems involving multiplication of fractions

**Example 1.** There were 56 students in class five. On a rainy day  $\frac{1}{8}$  of them were absent. How many were present?

**Solution:** Total number of students = 56

Number of students absent on rainy day =  $\frac{1}{8}$  of 56 =  $\frac{1}{8} \times 56$

$$= \frac{1}{8} \times \frac{56}{1} = \frac{1 \times 56}{8 \times 1} = \frac{1 \times 7}{1 \times 1} = 7$$

Total number of students	-	Number of students absent	=	Number of students present
56	-	7	=	49

Hence 49 students were present on rainy day.

**Example 2.**

The engineers drilled  $\frac{5}{6}$  km of a tunnel in January and drilled only  $\frac{1}{6}$  of the previously drilled in February. What fraction of the tunnel did they drill in February?

**Solution:**

Engineer drilled in January =  $\frac{5}{6}$  km of a tunnel

They drilled in February  $\frac{1}{6}$  of the  $\frac{5}{6}$  km in January

$$= \frac{1}{6} \times \frac{5}{6} \text{ km} = \frac{5}{36} \text{ km}$$

Thus they drilled  $\frac{5}{36}$  km in February

**EXERCISE 3.5**

1. The height of a door is  $2\frac{2}{3}$  metres. Out of which  $\frac{1}{8}$  the part was trimmed off. How much part was trimmed off?
2. On Monday one-tenth of the total number of students were on leave. If the total number of the students are enrolled 550. How many students were present?
3. A surgeon advised an operating room technician to arrange 12 drips of dextrose solution. The hospital has only  $\frac{2}{3}$  of the required dextrose. How many drips are available in the hospital?

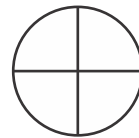
4. A lady used  $\frac{1}{5}$  of 50 kg of wheat for making bread. If she makes bread twice a day, then how much wheat will be used?
5. Find the price of 13 dozen of eggs; if the price of one egg is Rs  $9\frac{1}{2}$
6. A lady bought  $5\frac{2}{5}$  metres of cloth. She used  $\frac{1}{3}$  of the cloth in making a TV cover. How much cloth she used?
7. A cooler holds 8 bottles of water. If one bottle is holding  $2\frac{1}{2}$  litre water, find the capacity of full cooler.
8. What is the total length of the cloth? If it consists of 12 pieces of cloth and each piece is of length  $1\frac{1}{2}$  metres.
9. The cost of 1 kg potatoes is Rs 45. Find the cost of  $15\frac{2}{4}$  kg of that potatoes.
10. A piece of wire is  $8\frac{1}{3}$  metre long. Find the total length of wire, if there are  $13\frac{1}{5}$  such small pieces.

### 3.3 DIVISION

#### 3.3.1 Divide a fraction by a number

If we divide a circle into four equal parts.  
How many quarters are in one whole?

That is  $\frac{1}{1} \div \frac{1}{4} = \boxed{4}$



Or  $\frac{1}{1} \times \frac{4}{1} = \frac{1 \times 4}{1 \times 1} = 4$  quarters.

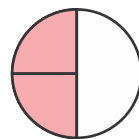
Here,  $\frac{4}{1}$  is reciprocal of  $\frac{1}{4}$

Again how many quarters in one half?

#### Teacher's Note

Teacher should explain the students to divide a fraction by a whole number we need to multiply by the reciprocal of the numbers.

$$\begin{aligned} \text{That is } \frac{1}{2} \div \frac{1}{4} &= \frac{1}{2} \times \frac{4}{1} \\ &= \frac{1 \times 4^2}{2 \times 1} = 2 \text{ quarters} \end{aligned}$$



Let us consider the following examples:

**Example 1.** Simplify:  $\frac{1}{5} \div 3$

$$\begin{aligned} \text{Solution: } \frac{1}{5} \div 3 &= \frac{1}{5} \div \frac{3}{1} && \left( \frac{1}{5} \div \frac{3}{1} \text{ means } \frac{1}{5} \times \frac{1}{3} \right) \\ &= \frac{1}{5} \times \frac{1}{3} && \left( \frac{1}{3} \text{ is reciprocal of } 3 \right) \\ &= \frac{1 \times 1}{5 \times 3} = \frac{1}{15} \end{aligned}$$

Similarly, simplifying  $\frac{1}{3} \div 5$

$$\begin{aligned} \frac{1}{3} \div 5 &= \frac{1}{3} \times \frac{1}{5} && \left( \frac{1}{5} \text{ is reciprocal of } 5 \right) \\ &= \frac{1 \times 1}{5 \times 3} = \frac{1}{15} \end{aligned}$$

**Example 2.** Divide  $1\frac{5}{9}$  by 7

**Solution:**

First we change the mixed fraction into an improper fraction.

$$\begin{aligned} \frac{14}{9} \div 7 & \\ &= \frac{14}{9} \times \frac{1}{7} && \left( \frac{1}{7} \text{ is reciprocal of } 7 \right) \\ &= \frac{14 \times 1}{9 \times 7} = \frac{14 \times 1}{9 \times 7_1} = \frac{2}{9} \end{aligned}$$

$$\text{Thus, } 1\frac{5}{9} \div 7 = \frac{2}{9}$$

To divide a fraction by a non-zero whole number, we multiply the fraction by the reciprocal of the whole number.

## EXERCISE 3.6

A. Write the reciprocals of each of the following.

(1) 2      (2) 4      (3)  $\frac{1}{3}$       (4)  $\frac{1}{5}$       (5)  $\frac{1}{10}$

(6)  $\frac{3}{4}$       (7)  $2\frac{6}{7}$       (8)  $1\frac{8}{5}$       (9)  $2\frac{1}{3}$       (10)  $4\frac{2}{3}$

B. Solve.

(1)  $\frac{1}{2} \div \frac{5}{6}$       (2)  $\frac{2}{3} \div 4$       (3)  $\frac{3}{4} \div 6$       (4)  $\frac{4}{5} \div 8$

(5)  $\frac{5}{6} \div 10$       (6)  $\frac{4}{5} \div 12$       (7)  $\frac{7}{8} \div 14$       (8)  $\frac{8}{9} \div 24$

(9)  $2\frac{2}{5} \div 36$       (10)  $1\frac{1}{9} \div 20$       (11)  $2\frac{1}{5} \div 55$       (12)  $3\frac{1}{3} \div 5$

### 3.3.2 Divide a fraction by another fraction (proper, improper and mixed)

To divide a fraction by another fraction is to multiply the first fraction by the reciprocal of another given fraction. Consider the following examples.

**Example 1.** Divide  $\frac{9}{16}$  by  $\frac{3}{4}$

**Solution:**  $\frac{9}{16} \div \frac{3}{4} = \frac{9}{16} \times \frac{4}{3}$  ( $\frac{4}{3}$  is reciprocal of  $\frac{3}{4}$ )

$$= \frac{9 \times 4}{16 \times 3} = \frac{\overset{3}{\cancel{9}} \times \overset{4}{\cancel{4}} \overset{1}{}}{\underset{4}{\cancel{16}} \times \underset{1}{\cancel{3}} \overset{1}{}}$$

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

**Example 2.** Divide  $\frac{7}{4}$  by  $\frac{5}{4}$

$$\begin{aligned} \text{Solution: } \frac{7}{4} \div \frac{5}{4} &= \frac{7}{4} \times \frac{4}{5} \\ &= \frac{7 \times 4}{4 \times 5} = \frac{7 \times \cancel{4}^1}{\cancel{4}_1 \times 5} = \frac{7}{5} = 1\frac{2}{5} \end{aligned}$$

Hence,  $\frac{7}{4} \div \frac{5}{4} = 1\frac{2}{5}$

**Example 3.** Divide  $2\frac{5}{8}$  by  $2\frac{1}{3}$

**Solution:** First we change mixed fraction into improper fraction.

$$\begin{aligned} 2\frac{5}{8} \div 2\frac{1}{3} &= \frac{2 \times 8 + 5}{8} \div \frac{2 \times 3 + 1}{3} \\ &= \frac{16 + 5}{8} \div \frac{6 + 1}{3} = \frac{21}{8} \div \frac{7}{3} = \frac{21}{8} \times \frac{3}{7} \\ &= \frac{\overset{3}{21} \times 3}{8 \times \cancel{7}_1} = \frac{3 \times 3}{8 \times 1} = \frac{9}{8} = 1\frac{1}{8} \end{aligned}$$

Thus,  $2\frac{5}{8} \div 2\frac{1}{3} = 1\frac{1}{8}$

### EXERCISE 3.7

Solve the following.

- |                                       |  |  |
|---------------------------------------|--|--|
| (1) $\frac{1}{2} \div \frac{3}{4}$    | (2) $\frac{7}{6} \div \frac{4}{9}$     | (3) $\frac{3}{4} \div \frac{15}{16}$   |
| (4) $\frac{9}{7} \div \frac{81}{14}$  | (5) $\frac{1}{6} \div \frac{1}{12}$    | (6) $\frac{11}{22} \div \frac{11}{22}$ |
| (7) $\frac{16}{9} \div \frac{4}{3}$   | (8) $\frac{20}{30} \div \frac{40}{30}$ | (9) $1\frac{1}{4} \div \frac{1}{4}$    |
| (10) $\frac{2}{3} \div 4\frac{3}{4}$  | (11) $8\frac{1}{2} \div 3\frac{1}{2}$  | (12) $2\frac{1}{5} \div 1\frac{1}{6}$  |
| (13) $9\frac{3}{5} \div 2\frac{1}{4}$ | (14) $3\frac{8}{9} \div 1\frac{1}{9}$  | (15) $10\frac{1}{9} \div 4\frac{3}{4}$ |

## Solve real life problems involving division of fractions

**Example 1.** How many half metre pieces can be cut from a stick which is  $12\frac{1}{2}$  metres long?

**Solution:** Length of stick =  $12\frac{1}{2}$  m (Dividend  $12\frac{1}{2}$  a mixed fraction)

Length of one of the required piece =  $\frac{1}{2}$  m (Divisor  $\frac{1}{2}$  is proper fraction)

Total numbers of pieces =  $12\frac{1}{2} \div \frac{1}{2} = \frac{25}{2} \div \frac{1}{2}$

(Reciprocal of  $\frac{1}{2}$  is  $\frac{2}{1}$ )

$$= \frac{25}{2} \times \frac{2}{1} = \frac{25 \times \cancel{2}^1}{\cancel{2}_1 \times 1} = \boxed{25}$$

Thus, we get **25** pieces.

## EXERCISE 3.8

1. Talib buys  $10\frac{1}{2}$  kg tomatoes for Rs 210. What is the price of 1 kg of tomatoes?
2. One-fifth of the 35 cars in the parking area are blue. How many blue cars are there in the parking area?
3. Naila buys  $\frac{7}{3}$  m piece of a lace. She wants to make its small pieces at length  $\frac{1}{12}$  m. How many pieces can be made?
4. The camp cook made  $1\frac{3}{4}$  kg of baked beans. Each serving of beans is  $\frac{1}{4}$  kg. How many servings of beans did the cook make?

5. A road is  $50\frac{1}{2}$  metre long. Half of it was damaged in rain. How much road is safe?
6. Rehan bought  $82\frac{1}{2}$  metre cloth. He used this cloth for making uniform of 15 children of equal size. How much is cloth used in each dress?
7. A plastic drum holds  $49\frac{1}{2}$  litres drinking water. How many bottles holding  $1\frac{1}{2}$  litres of drinking water can be filled from it?
8. A boy completes  $8\frac{3}{4}$  km in  $2\frac{1}{2}$  hours on bicycle in a race. How much distance does he complete in 1 hour?

### 3.4 SIMPLIFY EXPRESSIONS INVOLVING FRACTIONS USING BODMAS RULE

We know that in BODMAS, B stands for Brackets, O stands for Of, D stands for Division, M stands for Multiplication, A stands for Addition and S stands for Subtraction.

**Example 1:** Simplify by using BODMAS rule:

$$\frac{5}{3} \times \left(1\frac{1}{3} - \frac{1}{2}\right) \div \frac{5}{2}$$

**Solution:**

Solve operations within 'brackets'.

$$\frac{5}{3} \times \left(1\frac{1}{3} - \frac{1}{2}\right) \div \frac{5}{2} = \frac{5}{3} \times \left(\frac{4}{3} - \frac{1}{2}\right) \div \frac{5}{2}$$

By following the order of BODMAS, we first simplify brackets then of, and then arithmetic operations. In arithmetic operations first Division next Multiplication, and in last Addition and Subtraction.

$$= \frac{5}{3} \times \left(\frac{8-3}{6}\right) \div \frac{5}{2} \quad (\text{By taking LCM})$$

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

$$= \frac{5}{3} \times \frac{5}{6} \times \frac{2}{5} \left( \frac{2}{5} \text{ is reciprocal of } \frac{5}{2} \right)$$

$$= \frac{5 \times \overset{1}{\cancel{5}} \times \overset{1}{\cancel{2}}}{3 \times \underset{3}{\cancel{6}} \times \underset{1}{\cancel{5}}} = \frac{5 \times 1 \times 1}{3 \times 3 \times 1} = \frac{5}{9}$$

**Example 2.** Simplify  $\frac{1}{2}$  of  $\frac{4}{5} + \left( 2\frac{1}{3} - 1\frac{1}{4} \right)$

**Solution:** First solve within bracket.

$$\frac{1}{2} \text{ of } \frac{4}{5} + \left( 2\frac{1}{3} - 1\frac{1}{4} \right) = \frac{1}{2} \text{ of } \frac{4}{5} + \left( 2\frac{1}{3} - 1\frac{1}{4} \right)$$

$$= \frac{1}{2} \times \frac{4}{5} + \left( \frac{3 \times 2 + 1}{3} - \frac{4 \times 1 + 1}{4} \right)$$

By simplifying

$$= \frac{1 \times \overset{2}{\cancel{4}}}{\underset{1}{\cancel{2}} \times 5} + \left( \frac{7}{3} - \frac{5}{4} \right)$$

$$= \frac{1 \times 2}{1 \times 5} + \left( \frac{28 - 15}{12} \right)$$

$$= \frac{2}{5} + \frac{13}{12} \quad \text{By taking LCM of 5 and 12}$$

$$= \frac{24 + 65}{60}$$

$$= \frac{89}{60}$$

$$= 1\frac{29}{60}$$

## EXERCISE 3.9

Simplify the followings by using BODMAS rule.

- (1)  $\frac{3}{4} + \frac{2}{9} \times 4\frac{1}{3} \div 3\frac{1}{4}$       (2)  $\frac{1}{4} \times \left(\frac{8}{3} + \frac{2}{7}\right)$
- (3)  $\frac{1}{2} + \left(\frac{3}{4} \times 1\frac{7}{33} - \frac{1}{3}\right)$       (4)  $\left(3\frac{1}{6} - 1\frac{1}{4}\right) \times 2$
- (5)  $\left(\frac{4}{5} - \frac{3}{10}\right) \times \left(\frac{1}{2} + \frac{3}{4}\right)$
- (6)  $\left(2\frac{1}{2} \div \frac{3}{4}\right) \times \frac{3}{7} - \left(\frac{1}{4} + \frac{1}{8}\right)$
- (7)  $1\frac{3}{5} \times \left(\frac{4}{3} - \frac{3}{4} + 2\frac{1}{3}\right) \div 1\frac{2}{7}$
- (8)  $1\frac{1}{6} + \left(2\frac{3}{4} \times 3\frac{1}{3} \div 2\frac{1}{4}\right) - 7\frac{1}{2}$
- (9)  $\left(1\frac{3}{5} \text{ of } \frac{5}{6}\right) - \left(2\frac{3}{7} + 1\frac{1}{5}\right)$
- (10)  $\left(\frac{5}{4} + \frac{8}{3}\right) \times \left(\frac{10}{3} + \frac{5}{2}\right)$
- (11)  $20 + 5 \text{ of } 9 - \left(1\frac{2}{3} \times \frac{1}{5}\right)$
- (12)  $4\frac{1}{2} + \left(5\frac{1}{3} \text{ of } 3\right) - 2\frac{2}{3}$

## REVIEW EXERCISE 3

(1) Write 'T' for true and 'F' for false.

- (i)  $4\frac{2}{3}$  is an example of an improper fraction.
- (ii)  $\frac{1}{3} \div \frac{3}{1} = \frac{1}{9}$
- (iii) The lowest form of  $\frac{12}{4} = \frac{1}{3}$

(iv)  $\frac{3}{4} - \frac{1}{2} = \frac{1}{4}$

(v)  $\frac{1}{3}, \frac{2}{6}, \frac{3}{9}$  are equivalent fractions.

(vi) The reciprocal of  $2\frac{1}{2}$  is  $\frac{2}{5}$ .

(vii)  $\frac{3}{4}$  of a dozen is 9.

(viii)  $1\frac{1}{2}$  m equal to 150 cm.

**(2) Solve the following.**(i) Five ball points are bought for Rs 50  $\frac{3}{4}$ . Find the price of one ball point.(ii) Afzal and Fazila bought a chocolate bar. Afzal got  $\frac{2}{5}$  and Fazila got  $\frac{3}{10}$ . Who got more and by how much?(iii) Find the price of 2 dozen packets of biscuit, if the price of one packet is Rs  $12\frac{1}{2}$ .(iv) Shumaila buys  $2\frac{1}{4}$  m ribbon. She used  $1\frac{7}{8}$  m of it. How much ribbon is left?(v)  $75\frac{3}{4}$  kg of tea is packed into packets. Each packet contains  $\frac{3}{8}$  kg of tea. How many packets are needed to fill the tea?(vi) At a charity show each student in a school purchases a ticket costing Rs 30. If  $\frac{3}{4}$  the amount collected is Rs 24600. Find the number of tickets sold.(vii) Simplify: (a)  $2\frac{1}{3} - \left(\frac{16}{5} \div 1\frac{7}{8} \text{ of } 2\frac{2}{15}\right) + 1\frac{1}{8}$ (b)  $\frac{3}{4} + \frac{3}{4} \text{ of } \frac{3}{4} \div \frac{3}{4} - \left(\frac{3}{4} \times \frac{3}{4}\right)$

## DECIMALS AND PERCENTAGES

## 4.1 DECIMALS

Decimal is a number that contains fractional part, such as: 0.4, 6.5, 17.23 are all decimals. We also know that the number of digits at the right hand side of a decimal point determines the number of decimal places. For example 7.6, 4.8, 0.2, 0.9 are all decimal fractions up to one decimal place.

6.37, 4.95, 0.12, 9.08 are all decimal fractions up to two decimal places.

Similarly a fraction which has three digits after decimal point is called a decimal fraction up to three decimal places. 1.002, 4.036, 5.123 are all decimal fractions up to three decimal places.

In decimal fraction, the place values of the digits increase 10 times on moving from right to left. Conversely reduce to  $\frac{1}{10}$  th on proceeding from left to right.

Place value of 111.111, 222.222, 333.333 and 888.888 are given below:

Number	Hundreds	Tens	Ones	Tenths	Hundredths	Thousandths
111.111	100	10	1	$\frac{1}{10} = 0.1$	$\frac{1}{100} = 0.01$	$\frac{1}{1000} = 0.001$
222.222	200	20	2	$\frac{2}{10} = 0.2$	$\frac{2}{100} = 0.02$	$\frac{2}{1000} = 0.002$
333.333	300	30	3	$\frac{3}{10} = 0.3$	$\frac{3}{100} = 0.03$	$\frac{3}{1000} = 0.003$
888.888	800	80	8	$\frac{8}{10} = 0.8$	$\frac{8}{100} = 0.08$	$\frac{8}{1000} = 0.008$

## Teacher's Note

Teacher should explain the students, when the digit moves one step to the right, the place value becomes  $\frac{1}{10}$  (one-tenth).

Let us consider the place value of the position of each digit in 765.984

Hundreds	Tens	Ones	Decimal	Tenths	Hundredths	Thousandths
7	6	5	.	9	8	4

The decimal point separates the whole number part from the fractional part. If a number consists of only a decimal part, then we take zero as whole number.

**For Example:**

$$.45 = 0.45, .06 = 0.06 \text{ and } .007 = 0.007$$

Again if a number consists of only a whole number part and we want to describe it in decimals, we take zero as decimal. For example  $36 = 36.0$  upto one decimal place or  $36.00$  upto two decimal places.

#### 4.1.1 Add and subtract decimals

In previous class we have learnt about decimals, conversion between fractions and decimals and basic operations on decimals.

Now we learn addition and subtraction of decimals.

Let us consider the following examples:

**Example 1. Add the following:**

(i)  $20.25 + 7.52$

(ii)  $234.452 + 23.23$

(iii)  $109.25 + 7.589$

(iv)  $608.56 + 23.068$

**Solution:** (i)  $20.25 + 7.52$

For adding these decimal fractions, write the given fractions in vertical form in such a way, that decimal points of both addends will be placed right below each other. Then add by using rules as we have already learned.

**Teacher's Note**

Teacher should help the students to put the decimal point in the correct place.

$$\begin{array}{r} \text{(i)} \quad 20.25 \\ + 7.52 \text{ means} \\ \hline 27.77 \end{array}$$

Write zero (0) where there is no digit like in the given example.

	Tens	Ones	Decimal	Tenths	Hundredths
	2	0	.	2	5
+	0	7	.	5	2
	2	7	.	7	7

$$\begin{array}{r} \text{(ii)} \quad 234.452 \\ + 23.230 \\ \hline 257.682 \end{array}$$

$$\begin{array}{r} \text{(iii)} \quad 109.250 \\ + 7.589 \\ \hline 116.839 \end{array}$$

$$\begin{array}{r} \text{(iv)} \quad 608.560 \\ + 23.068 \\ \hline 631.628 \end{array}$$

### Example 2. Subtract the following:

$$\text{(i)} \quad 58.75 - 17.50$$

$$\text{(ii)} \quad 782.65 - 293.562$$

$$\text{(iii)} \quad 422.785 - 206.5$$

$$\text{(iv)} \quad 845.506 - 458.068$$

**Solution:** (i)  $58.75 - 17.50$

For subtracting these decimal fractions, write the given fractions in vertical form in such a way that decimal points of both the numbers will be right below each other. Then subtract by using rules as we have already learned.

$$\begin{array}{r} \text{(i)} \quad 58.75 \\ - 17.50 \text{ means} \\ \hline 41.25 \end{array}$$

	Tens	Ones	Decimal	Tenths	Hundredths
	5	8	.	7	5
-	1	7	.	5	0
	4	1	.	2	5

Write zero (0) where there is no digit like in the given example.

$$\begin{array}{r} \text{(ii)} \quad 782.650 \\ - 293.562 \\ \hline 489.088 \end{array}$$

$$\begin{array}{r} \text{(iii)} \quad 422.785 \\ - 206.500 \\ \hline 216.285 \end{array}$$

$$\begin{array}{r} \text{(iv)} \quad 845.506 \\ - 458.068 \\ \hline 387.438 \end{array}$$

## EXERCISE 4.1

## A. Add the following:

- (1)  $22.32 + 6.46$       (2)  $4.567 + 36.4$       (3)  $75.05 + 24.62$   
(4)  $257.003 + 0.25$       (5)  $40.123 + 7.32$       (6)  $45.005 + 52.47$   
(7)  $345.38 + 786.46$       (8)  $674.567 + 36.48$   
(9)  $45.75 + 54.69$       (10)  $287.099 + 8.258$   
(11)  $45.468 + 277.358$       (12)  $35.69 + 875.875$

## B. Subtract the following:

- (1)  $25.52 - 6.3$       (2)  $74.567 - 33.402$   
(3)  $75.75 - 24.62$       (4)  $257.003 - 0.25$   
(5)  $49.123 - 7.02$       (6)  $757.785 - 152.005$   
(7)  $786.46 - 345.38$       (8)  $674.567 - 36.48$   
(9)  $85.75 - 54.65$       (10)  $287.099 - 174.055$   
(11)  $845.468 - 234.358$       (12)  $935.69 - 805.365$

## 4.1.2 Recognize like and unlike decimals

In previous class we have learnt fractions with same denominators. For example,  $\frac{2}{7}$ ,  $\frac{3}{7}$ ,  $\frac{4}{7}$ ,  $\frac{5}{7}$ . Such fractions which have same denominators are known as like fractions. Similarly fractions with different denominators are known as unlike fractions for example  $\frac{3}{5}$ ,  $\frac{2}{7}$  and  $\frac{1}{2}$  etc.

Decimal fractions with same number of decimal places like 4.5, 6.3, 56.7 are some examples of **like decimals**.

The decimals like 34.0, 567.24, 234.7802 are some **unlike decimals**.

**Example 1:** Recognize decimals of the 2-decimal places of the following:

- (i) 6.3, 0.25, 25.52, 643.2, 342.81, 14.025, 67.9 and 8.01

**Solution:**

0.25, 25.52, 342.81 and 8.01 are decimals with two decimal places.

### 4.1.3 Multiply decimals by 10, 100 and 1000

Consider the following examples.

**Example 1. Find the product.**

- (i)  $2.23 \times 10$       (ii)  $2.23 \times 100$       (iii)  $2.23 \times 1000$

**Solution:**

$$(i) \quad 2.23 \times 10 = 2.230 = 22.30 = \mathbf{22.3}$$

What happen to value of 2.23

Multiply a decimal by 10, then the value of the decimals increases ten times or the decimal point moves one place to the right.

$$(ii) \quad 2.23 \times 100 = 2.2300 = 223.00 = \mathbf{223.}$$

Multiply a decimal by 100 then the value of the decimals increases hundred times or the decimal point moves two places to the right.

$$(iii) \quad 2.23 \times 1000 = 2.23000 = 2230.00 = \mathbf{2230.}$$

Multiply a decimal by 1000, then the value of the decimals increases one thousand times or the decimal point moves three places to the right.

## EXERCISE 4.2

- A. Separate the decimals of one, two and three decimal places from the following.**

0.08, 2.123, 34.25, 0.6, 3.36, 52.302, 38.66 and 62.1.

- B. Find the product of the following by using the rules of multiplication:**

- (1)  $0.175 \times 10$       (2)  $0.175 \times 100$       (3)  $0.175 \times 1000$   
 (4)  $35.058 \times 10$       (5)  $35.058 \times 100$       (6)  $35.058 \times 1000$   
 (7)  $8.15 \times 10$       (8)  $8.15 \times 100$       (9)  $8.15 \times 1000$   
 (10)  $324.423 \times 10$       (11)  $324.423 \times 100$       (12)  $324.423 \times 1000$   
 (13)  $0.0067 \times 10$       (14)  $0.0067 \times 100$       (15)  $0.0067 \times 1000$

## 4.1.4 Divide decimals by 10, 100 and 1000

**Rules:**

1. Divide a decimals by 10, then the value of the decimals decreases ten times or the decimal point moves one place to the left

$$15.34 \div 10 = 1.534$$

(What happened to value of 15.35?)

2. Divide a decimals by 100, then the value of the decimals decreases hundred times or the decimal point moves two places to the left.

$$15.34 \div 100 = 0.1534$$

3. Divide a decimals by 1000, then the value of the decimals decreases one thousand times or the decimal point moves three places to the left.

$$15.34 \div 1000 = 0.01534$$

**Example 1:** Solve by using the above stated rules:

(1)  $0.0175 \div 10$

(2)  $0.0175 \div 100$

(3)  $0.0175 \div 1000$

**Solution:**

The value of decimals decreases accordingly 10, 100 and 1000

(1)  $0.0175 \div 10$

(2)  $0.0175 \div 100$

(3)  $0.0175 \div 1000$

$$\begin{array}{l} \curvearrowleft 0.0175 \div 10 \\ = \mathbf{0.00175} \end{array}$$

$$\begin{array}{l} \curvearrowleft 00.0175 \div 100 \\ = \mathbf{0.000175} \end{array}$$

$$\begin{array}{l} \curvearrowleft 000.0175 \div 1000 \\ = \mathbf{0.000175} \end{array}$$

### EXERCISE 4.3

**A. Solve the following by using the rules of division.**

(1)  $6.675 \div 10$

(2)  $6.675 \div 100$

(3)  $6.675 \div 1000$

(4)  $35.89 \div 10$

(5)  $35.89 \div 100$

(6)  $35.89 \div 1000$

(7)  $815.4 \div 10$

(8)  $815.4 \div 100$

(9)  $815.4 \div 1000$

(10)  $0.085 \div 10$

(11)  $0.085 \div 100$

(12)  $0.085 \div 1000$

#### 4.1.5 Multiply a decimal with a whole number

We consider the following examples.

**Example 1.** Find the product:

(i)  $0.231 \times 2$

(ii)  $4.4 \times 4$

(iii)  $2.3 \times 24$

**Solution:**

(i)  $0.231 \times 2 = \mathbf{0.231}$

$$\begin{array}{r} \phantom{0.} \mathbf{x 2} \\ \hline \mathbf{0.462} \\ \hline \end{array}$$

(ii)  $4.4 \times 4 = \mathbf{4.4}$

$$\begin{array}{r} \phantom{4.} \mathbf{x 4} \\ \hline \mathbf{17.6} \\ \hline \end{array}$$

(iii)  $2.3 \times 24$

**Solution:**

$$\begin{array}{r} 2.3 \\ \times 24 \\ \hline 92 \\ 460 \\ \hline 55.2 \end{array}$$

**Step 1:** Neglect the decimal point. Multiply 3 by 4. We get 12, write 2 at first place and carry 1. Multiply 2 by 4, we get 8, add 1 in 8, we get 9, write in second place, we get 92.

**Step 2:** Write 0 in ones place. Multiply 3 by 2, we get 6, write 6 after zero. Now multiply 2 by 2, we get 4.

**Step 3:** Add all the digits of ones and tens, we get 55.2.

**Step 4:** Count decimal places in given numbers to be multiplied.

**Step 5:** Put a decimal point after one digit, count from right digit. We get 55.2

## EXERCISE 4.4

**Find the product:**

(1)  $6.5 \times 5$

(2)  $3.5 \times 6$

(3)  $0.65 \times 5$

(4)  $0.65 \times 6$

(5)  $0.35 \times 8$

(6)  $4.25 \times 7$

(7)  $4.25 \times 8$

(8)  $4.25 \times 9$

(9)  $0.382 \times 5$

(10)  $0.394 \times 8$

(11)  $24.58 \times 7$

(12)  $53.69 \times 9$

(13)  $4.25 \times 27$

(14)  $0.265 \times 36$

(15)  $2.785 \times 435$

(16)  $4.25 \times 162$

(17)  $47.326 \times 348$

(18)  $58.967 \times 564$

**4.1.6 Divide a decimal with a whole number.**

Consider the following examples:

**Example 1. Solve:  $0.9 \div 3$** **Solution:**  $0.9 \div 3 = 9 \text{ Tenths} \div 3$ 

$$\begin{aligned} &= (9 \div 3) \text{ Tenths} = 3 \text{ Tenths} \\ &= 0.3 \end{aligned}$$

$$\begin{array}{r} 3 \overline{) 0.9} \quad (0.3) \\ \underline{-9} \\ 0 \end{array}$$

**Example 2. Solve:  $0.84 \div 4$** **Solution:**  $0.84 \div 4 = (0.80 + 0.04) \div 4$ 

$$\begin{aligned} &= (8 \text{ tenths} \div 4) + (4 \text{ hundredths} \div 4) \\ &= 2 \text{ tenths} + 1 \text{ hundredth} \\ &= 20 \text{ hundredths} + 1 \text{ hundredth} = 21 \text{ hundredths} \\ &= 0.21 \end{aligned}$$

$$\begin{array}{r} 4 \overline{) 0.84} \quad (0.21) \\ \underline{-8} \\ 4 \\ \underline{-4} \\ 0 \end{array}$$

**Teacher's Note**

Teacher may ask students to see and note how the decimals are lined up in the original number and in the answer (quotient).

**Example 3.** Solve:  $25.85 \div 5$

**Solution:**  $(25 + 0.8 + 0.05) \div 5$

$25.85 \div 5 = (25 \div 5) + (8 \text{ Tenths} \div 5) + (5 \text{ Hundredths} \div 5)$

$$= (5) + (0.8 \div 5) + (0.05 \div 5)$$

$$= 5 + 0.16 + 0.01$$

$$= 5.17$$

Verify

5.17	Quotient
x 5	Divisor
25.85	Dividend

OR

$$\begin{array}{r} 5 \overline{) 25.85} \quad (5.17) \\ \underline{- 25} \phantom{00} \\ 8 \phantom{00} \\ \underline{- 5} \phantom{00} \\ 35 \phantom{00} \\ \underline{- 35} \phantom{00} \\ 0 \phantom{00} \end{array}$$

So,  $25.85 \div 5 = 5.17$

### EXERCISE 4.5

**A. Solve:**

(1)  $0.65 \div 5$

(2)  $6.5 \div 5$

(3)  $.065 \div 5$

(4)  $3.6 \div 6$

(5)  $0.64 \div 8$

(6)  $4.27 \div 7$

(7)  $9.6 \div 8$

(8)  $44.1 \div 9$

(9)  $0.385 \div 5$

(10)  $8.394 \div 6$

(11)  $39.851 \div 7$

(12)  $87.03 \div 9$

**B. Solve up to 3-decimal places:**

(1)  $40.25 \div 4$

(2)  $89.64 \div 6$

(3)  $98.58 \div 3$

(4)  $24.25 \div 10$

(5)  $0.265 \div 20$

(6)  $2.785 \div 25$

(7)  $3.16 \div 2.31$

(8)  $0.555 \div 5.5$

(9)  $14.04 \div 12.4$

## 4.1.7 Multiply a decimal by tenths and hundredths only

We have already learnt:

$$\text{One-Tenth} = 0.1 \text{ and One-Hundredth} = 0.01$$

Now consider the following examples.

**Example 1.** Find the product:

$$(i) \quad 2.23 \times 0.1 \qquad (ii) \quad 2.23 \times 0.01$$

$$(iii) \quad 2.23 \times 0.5 \qquad (iv) \quad 2.23 \times 0.07$$

**Solution:**

$$(i) \quad \begin{array}{r} 2.23 \\ \times 0.1 \\ \hline 0.223 \end{array}$$

$$(ii) \quad \begin{array}{r} 2.23 \\ \times 0.01 \\ \hline 0.0223 \end{array}$$

$$(iii) \quad \begin{array}{r} 2.23 \\ \times 0.5 \\ \hline 1.115 \end{array}$$

$$(iv) \quad \begin{array}{r} 2.23 \\ \times 0.07 \\ \hline 0.1561 \end{array}$$

**Example 2.** Find the product of:  $0.04 \times 0.2$

**Solution:**

$$0.04 \times 0.2 = 0.008 \rightarrow \begin{array}{ccc} \boxed{0.04} & \times & \boxed{0.2} & = & \boxed{0.008} & \text{(product)} \\ \downarrow & & \downarrow & & \downarrow & \\ 2 \text{ decimal} & & 1 \text{ decimal} & & 3 \text{ decimal} & \\ \text{places} & & \text{place} & & \text{places} & \end{array}$$

in 0.04 we have 2 decimal places and in 0.2 we have one decimal place. When we write their product then add decimals and get 3 decimal places. Count from right up to 3 decimal places and if digits are less than 3 places, write zeros as we need, as shown in the example, we write 2 zeros.

Thus, we get 0.008

## EXERCISE 4.6

Find the product of the following:

- (1)  $2.6 \times 0.1$       (2)  $3.87 \times 0.2$       (3)  $42.5 \times 0.3$   
 (4)  $59.95 \times 0.4$     (5)  $0.3 \times 0.5$       (6)  $0.01 \times 0.6$   
 (7)  $1.1 \times 0.4$       (8)  $1.05 \times 0.2$     (9)  $2.6 \times 0.03$   
 (10)  $0.3 \times 0.01$     (11)  $0.01 \times 0.01$    (12)  $1.1 \times 0.08$   
 (13)  $3.87 \times 0.06$    (14)  $42.5 \times 0.05$     (15)  $59.95 \times 0.07$

#### 4.1.8 Multiply a decimal by a decimal (with three decimal places)

Consider the following examples:

**Example 1.** Find the product of:  $0.25 \times 0.056$

**Solution:**

$$0.25 \times 0.056 = \begin{array}{r} 0.056 \longrightarrow 3 \text{ decimal places} \\ \times 0.25 \longrightarrow 2 \text{ decimal places} \\ \hline 280 \\ 112 \times \\ \hline 1400 \end{array}$$

So, we get the product ( $3 + 2 = 5$  decimals)  $0.01400 = 0.014$

Or

$$\begin{array}{ccc} \boxed{0.25} & \times & \boxed{0.056} & = & \boxed{0.01400} & = & 0.014 \\ \downarrow & & \downarrow & & \downarrow & & \\ 2 \text{ decimal} & & 3 \text{ decimal} & & 5 \text{ decimal} & & \\ \text{place} & & \text{places} & & \text{places} & & \end{array}$$

#### Teacher's Note

Teacher should ask students to write the given number and the product in place value chart, then compare the values of both.

**Example 2.** Solve  $0.045 \times 0.68$

**Solution:**

$$\underbrace{0.045}_{\substack{\downarrow \\ \text{3 decimal} \\ \text{places}}} \times \underbrace{0.68}_{\substack{\downarrow \\ \text{2 decimal} \\ \text{places}}} = \underbrace{0.03060}_{\substack{\downarrow \\ \text{5 decimal} \\ \text{places}}} = 0.0306$$

$$\begin{array}{r} 0.045 \\ \times 0.68 \\ \hline 360 \\ 270 \times \\ \hline 3060 \end{array}$$

Thus,  $0.045 \times 0.68 = 0.03060 = \mathbf{0.0306}$

#### 4.1.9 Multiply a decimal by a decimal (in the same way as for whole numbers and then in the decimal point accordingly)

To multiply a decimal by a decimal in the same way as for whole numbers. Let us consider the following examples.

**Example:**

**Find the product:**

- (i)  $1.9 \times 2.7$       (ii)  $28.5 \times 1.25$

**Solutions:**

- (i) Number of decimal places in 1.9 is one.

Number of decimal places in 2.7 is one .

Number of decimal places in the product will be

$$1 + 1 = 2 .$$

Therefore,  $1.9 \times 2.7 = \mathbf{5.13}$

$$\begin{array}{r} 1.9 \\ \times 2.7 \\ \hline 133 \\ 38 \times \\ \hline 5.13 \end{array}$$

- (ii) Number of decimal places in

28.5 is one and in 1.25 is two.

Number of decimal places in the product

$$\text{will be } 1 + 2 = 3.$$

Therefore,  $28.5 \times 1.25 = \mathbf{35.625}$

$$\begin{array}{r} 28.5 \\ \times 1.25 \\ \hline 1425 \\ 570 \times \\ 285 \times \times \\ \hline 35.625 \end{array}$$

## EXERCISE 4.7

A. Put the decimal point at the appropriate place in each answer.

$$\begin{array}{r} (1) \quad 46.7 \\ \times 1.2 \\ \hline \end{array}$$

5604

$$\begin{array}{r} (2) \quad 0.754 \\ \times 1.2 \\ \hline \end{array}$$

09048

$$\begin{array}{r} (3) \quad 3.57 \\ \times 1.2 \\ \hline \end{array}$$

4284

$$\begin{array}{r} (4) \quad 68.2 \\ \times 1.2 \\ \hline \end{array}$$

8184

$$\begin{array}{r} (5) \quad 0.402 \\ \times 1.2 \\ \hline \end{array}$$

04824

$$\begin{array}{r} (6) \quad 14.839 \\ \times 1.2 \\ \hline \end{array}$$

178068

$$\begin{array}{r} (7) \quad 361.4 \\ \times 3.54 \\ \hline \end{array}$$

1279356

$$\begin{array}{r} (8) \quad 219.241 \\ \times 2.5 \\ \hline \end{array}$$

5481025

$$\begin{array}{r} (9) \quad 402.58 \\ \times 2.3 \\ \hline \end{array}$$

925934

B. Solve:

(1)  $0.28 \times 0.4$

(2)  $0.45 \times 0.5$

(3)  $0.2 \times 0.023$

(4)  $0.28 \times 0.05$

(5)  $0.065 \times 0.25$

(6)  $0.005 \times 0.12$

(7)  $0.002 \times 0.08$

(8)  $0.105 \times 0.09$

(9)  $0.31 \times 0.052$

(10)  $0.22 \times 0.057$

(11)  $0.25 \times 0.05$

(12)  $0.755 \times 0.14$

C. Find the product:

(1)  $1.4 \times 2.5$

(2)  $1.05 \times 2.6$

(3)  $3.8 \times 0.7$

(4)  $0.3 \times 2.01$

(5)  $4.45 \times 1.8$

(6)  $8.84 \times 1.5$

(7)  $6.24 \times 7.1$

(8)  $5.25 \times 4.4$

(9)  $7.05 \times 2.6$

(10)  $9.06 \times 5.5$

(11)  $25.08 \times 8.5$

(12)  $9.2 \times 7.85$

## 4.1.10 Divide a decimal by a decimal (by converting decimals to fractions)

Let us consider the following examples:

**Example 1. Solve:  $2.48 \div 1.24$**

**Solution:**

$$\begin{aligned}
 2.48 \div 1.24 &= \frac{248}{100} \div \frac{124}{100} \\
 &= \frac{248}{100} \times \frac{100}{124} \\
 &= \frac{248 \times \overset{1}{\cancel{100}}}{\underset{1}{\cancel{100}} \times 124} = \frac{248}{124} \\
 &= \frac{\overset{2}{\cancel{62}} \overset{2}{\cancel{124}}}{\overset{2}{\cancel{62}} \overset{1}{\cancel{31}}} = 2
 \end{aligned}$$

Thus,  $2.48 \div 1.24 = 2$

**Example 2: Solve:  $1.84 \div 2.3$**

**Solution:**

$$\begin{aligned}
 1.84 \div 2.3 &= \frac{184}{100} \div \frac{23}{10} \\
 &= \frac{184}{100} \times \frac{10}{23} \\
 &= \frac{\overset{8}{\cancel{184}} \times \overset{1}{\cancel{10}}}{\underset{10}{\cancel{100}} \times \underset{1}{\cancel{23}}} \\
 &= \frac{8}{10} = 0.8
 \end{aligned}$$

Thus,  $1.84 \div 2.3 = 0.8$

**Example 3: Solve:  $6.25 \div 0.25$**

$$\begin{aligned}
 \text{Solution: } 6.25 \div 0.25 &= \frac{625}{100} \div \frac{25}{100} \\
 &= \frac{625}{100} \times \frac{100}{25} = \frac{625 \times \cancel{100}^1}{\cancel{100}_1 \times 25} \\
 &= \frac{625}{25} = \frac{\cancel{625}^{25}}{\cancel{25}_1} = 25
 \end{aligned}$$

Thus  $6.25 \div 0.25 = 25$

#### 4.1.11 Divide a decimal by a decimal using direct division by moving decimal positions.

Consider the following examples:

**Example:**

Solve the following decimals using direct division method by moving decimal positions:

(i)  $0.55 \div 0.05$       (ii)  $0.125 \div 0.5$       (iii)  $2.25 \div 0.3$

**Solutions:**

(i)  $0.55 \div 0.05 = 55 \div 5 = 11$

(Both the decimals are with two decimal places).

So we get whole number.

$$\begin{array}{r}
 11 \\
 \hline
 0.55 \\
 -0.05 \\
 \hline
 1
 \end{array} = 11$$

$$\begin{array}{r}
 11 \\
 5 \overline{) 55} \\
 \underline{-55} \\
 0
 \end{array}$$

(ii)  $0.125 \div 0.5 = 1.25 \div 5$

3 decimal places – 1 decimal place

= 2 decimal places

= **0.25**

$$\begin{array}{r}
 25 \\
 \hline
 1.25 \\
 -0.5 \\
 \hline
 1
 \end{array} = 0.25$$

$$\begin{array}{r}
 0.25 \\
 5 \overline{) 1.25} \\
 \underline{-10} \\
 25 \\
 \underline{-25} \\
 0
 \end{array}$$

(iii)  $2.25 \div 0.3 = 22.5 \div 3 = 7.5$

4 decimal places – 1 decimal place

= 3 decimal places

$$\frac{2.25}{0.3} = \frac{22.5}{3}$$

= 7.5

## EXERCISE 4.8

## A. Solve by converting decimals to fractions:

- (1)  $2.16 \div 0.6$       (2)  $5.76 \div 0.24$       (3)  $4.41 \div 0.3$   
 (4)  $7.84 \div 0.07$       (5)  $0.6017 \div 1.1$       (6)  $4.905 \div 4.5$   
 (7)  $7.84 \div 0.14$       (8)  $78.4 \div 0.7$       (9)  $10.24 \div 0.08$   
 (10)  $3.5308 \div 0.13$       (11)  $97.578 \div 0.039$       (12)  $10.26 \div 0.18$

## B. Solve the following decimals using direct division method by moving decimal positions:

- (1)  $0.016 \div 0.2$       (2)  $0.18 \div 0.3$       (3)  $0.36 \div 0.6$   
 (4)  $0.072 \div 0.8$       (5)  $0.121 \div 1.1$       (6)  $0.0169 \div 1.3$   
 (7)  $0.96 \div 0.4$       (8)  $9.018 \div 0.9$       (9)  $0.036 \div 1.2$   
 (10)  $0.0289 \div 1.7$       (11)  $0.0144 \div 1.2$       (12)  $0.072 \div 0.12$   
 (13)  $4.096 \div 0.16$       (14)  $0.325 \div 0.25$       (15)  $0.0196 \div 1.4$

## 4.1.12 Use division to change fractions into decimals

Consider the following examples:

**Examples:** Change the following fractions into decimals:

(i)  $\frac{2}{5}$       (ii)  $\frac{10}{6}$

**Solution:** (i)  $\frac{2}{5} = 2 \div 5$

$$\begin{array}{r} 0.4 \\ 5 \overline{) 20} \\ \underline{- 20} \\ 0 \end{array}$$

So,  $\frac{2}{5} = 0.4$

(ii)  $\frac{10}{6} = 10 \div 6$

$$\begin{array}{r} 1.66 \\ 6 \overline{) 10.00} \\ \underline{- 6} \\ 40 \\ \underline{- 36} \\ 40 \\ \underline{- 36} \\ 4 \end{array}$$

Remainder  $\rightarrow 04$

So,  $\frac{10}{6} = 1.66$

## EXERCISE 4.9

Change the following fractions into decimals:

$$(1) \frac{5}{4} \quad (2) \frac{5}{3} \quad (3) \frac{4}{5} \quad (4) \frac{7}{10} \quad (5) \frac{15}{7}$$

$$(6) \frac{14}{9} \quad (7) \frac{5}{8} \quad (8) \frac{23}{9} \quad (9) \frac{32}{7} \quad (10) \frac{45}{13}$$

$$(11) \frac{50}{15} \quad (12) \frac{9}{14} \quad (13) \frac{11}{16} \quad (14) \frac{5}{12} \quad (15) \frac{17}{20}$$

$$(16) \frac{125}{60} \quad (17) \frac{245}{26} \quad (18) \frac{250}{8} \quad (19) \frac{300}{250} \quad (20) \frac{23}{25}$$

#### 4.1.13 Simplify decimal expressions involving brackets (applying one or more basic operations)

Simplifying decimals is a common activity. Just need some care of positions of decimals. Decimal expressions involving multiple operations and brackets are simplified using the rules of BODMAS.

**Example 1: Simplify:**  $24.24 - (5.6 + 20.25 - 4.45)$

**Solution:** First solve the expressions in the bracket.

$$\begin{aligned} & 24.24 - (5.6 + 20.25 - 4.45) \\ &= 24.24 - (25.85 - 4.45) && \text{(Operations of addition are performed,} \\ &= 24.24 - 21.40 && \text{then subtraction in operations are} \\ &= 2.84 && \text{performed)} \end{aligned}$$

**Example 2. Simplify:**  $52.05 + (28.22 - 22.6) + (13.15 - 6.56)$

**Solution:**

$$\begin{aligned} 52.05 + (28.22 - 22.6) + (13.15 - 6.56) &= 52.05 + 5.62 + 6.59 \\ &= 52.05 + 12.21 \\ &= 64.26 \end{aligned}$$

## EXERCISE 4.10

**Simplify:**

- (1)  $5.6 + 7.22 - (2.24 + 4.68)$
- (2)  $(20.14 \times 5.6) + 10.9335$
- (3)  $4.6 + 6.07 + (23.35 - 8.30 + 8.34)$
- (4)  $14.3 - 2.8 + (1.84 + 3.29)$
- (5)  $(5.24 + 2.02) - 0.96 - 7.45 + (9.405 - 2.24)$
- (6)  $5.6 \times (25.5 - 12.2) + (2.3 + 2.6)$
- (7)  $45.234 + (18.024 - 6.66) - (0.457 + 9.945)$
- (8)  $3.45 \times 8.56 - 4.23 + (2.2 - 1.12)$
- (9)  $(6.6 \times 3.59) - (1.12 + 0.1) - 1.02$
- (10)  $(230.24 + 23.028) - 72.72 \div (6.42 + (14.045 - 6.3))$

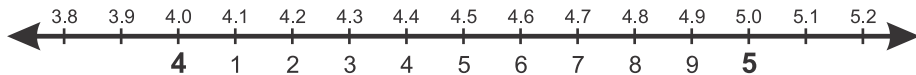
**4.1.14 Round off decimals up to specific number of decimal places**

Consider the following examples.

**Example 1.**

Round off the following decimals to the nearest whole number:

- (i) 4.2                      (ii) 4.5                      (iii) 4.7



This is a number line, 3.8, 3.9, 4.0, 4.1, 4.2, 4.3, 4.4, 4.5, 4.6, 4.7, 4.8, 4.9, 5.0, 5.1 and 5.2 are represented on it.

**Solutions:**

- (i) 4.2**

Look at the number line.

4.2 is closer to 4 than to 5; and 4.2 is nearest to 4.

So,  $4.2 = 4$ .

**(ii) 4.5**

Look at the number line.

4.5 is equally closer to 4 and 5.

If it is = or  $> 5$ , round of the numbers accordingly.

So, 4.5 becomes 5 after rounded off.

**(iii) 4.7**

Look at the number line.

4.7 is closer to 5 than to 4; and 4.6 is nearest to 5.

So,  $4.7 = 5$ .

**Rule:** In order to round off a decimal nearest to the whole number. (i) Check the first decimal place or tenths digit to see if it is less or greater than 5. (ii) If it is  $< 5$ , it will remain unchanged. (iii) If it is = or  $> 5$ , rounded off the numbers accordingly.

**Example 2.**

Round off the following decimal numbers up to the one decimal places:

- (i) 24.33      (ii) 50.67      (iii) 50.94

**Solutions:****(i) 24.33**

24.33 is closer to 24.3 than to 24.4; and 24.33 is nearest to 24.3

So, 24.33 after rounded of up to one decimal place = 24.3

**(ii) 50.67**

50.67 is closer to 50.7 than to 50.6; and 50.67 is nearest to 50.7

So, 50.67 after rounded off up to one decimal place = 50.7

**(iii) 50.94**

50.94 is closer to 50.9 than to 51 and 50.94 is nearest to 50.9

So, 50.94 after rounded off up to one decimal place = 50.9

**Example 3.**

Round off the following decimal numbers up to the two decimal places:

(i) 9.354

(ii) 58.687

**Solutions:****(i) 9.354**

9.354 is closer to 9.35 than to 9.36; and 9.354 is nearest to 9.35

So, 9.354 after rounded off up to two decimal places = 9.35

**(ii) 58.687**

58.687 is closer to 58.69 than to 58.68; and 58.687 is nearest to 58.69

So, 58.687 after rounded off up to two decimal places = 58.69

**EXERCISE 4.11****1. Round off the following decimals as whole numbers.**

(1) 2.3

(2) 5.6

(3) 7.7

(4) 6.6

(5) 9.9

(6) 8.3

(7) 7.8

(8) 50.2

(9) 58.6

(10) 78.2

(11) 81.7

(12) 99.9

**2. Round off the following decimals up to one decimal place.**

(1) 32.38

(2) 25.156

(3) 6.17

(4) 6.42

(5) 76.798

(6) 95.24

(7) 12.86

(8) 5.95

(9) 3.432

(10) 11.7681

(11) 50.4752

(12) 60.1536

**3. Round off the following decimals up to two decimal places.**

(1) 32.386

(2) 25.056

(3) 6.775

(4) 6.422

(5) 76.798

(6) 8.4832

(7) 0.9627

(8) 58.1905

(9) 4.0098

(10) 40.9807

(11) 70.4908

(12) 19.0185

## 4.1.15 Convert fractions to decimals and vice versa

Consider the following examples:

**Example 1.** Convert the fraction  $\frac{6}{10}$  into decimals.

**Solution:**  $\frac{6}{10} = 6 \text{ tenths} = 0.6$

**Example 2.** Convert the fraction  $\frac{2}{5}$  into decimals.

**Solution:**

$$\begin{aligned} \frac{2}{5} &= \frac{2 \times 2}{5 \times 2} = \frac{4}{10} && \text{(Multiply 2 by 2 and 5 by 2,} \\ & && \text{we get the new fraction).} \\ &= 4 \text{ tenths} = 0.4 \end{aligned}$$

**Example 3.** Convert the fraction  $\frac{45}{1000}$  into decimals.

**Solution:**  $\frac{45}{1000} = 45 \text{ Thousandths} = 0.045$

Let us convert the decimals 0.68 to a fraction

$$0.68 = \frac{0.68}{100} = \frac{68}{100} = \frac{\overset{17}{\cancel{68}}}{\underset{25}{\cancel{100}}} = \frac{17}{25}$$

**Remember:** For the numerator, we write the given number without the decimal point. For the denominator, we write 1 for the decimal point and put zeros after 1 according to the decimal places. Then simplify if possible.

**Example 4:** Convert following decimals into fractions in their lowest form.

(i) 0.8

(ii) 0.625

**Solution:**

$$(i) \quad 0.8 = \frac{0.8 \times 10}{10} = \frac{8}{10}$$

$$= \frac{\overset{4}{\cancel{8}}}{\underset{5}{\cancel{10}}} = \frac{4}{5}$$

$$\text{Thus } 0.8 = \frac{4}{5}$$

$$(ii) \quad 0.625 = \frac{0.625 \times 1000}{1000}$$

$$= \frac{\overset{5}{\cancel{625}}}{\underset{8}{\cancel{1000}}} = \frac{5}{8}$$

$$\text{Thus } 0.625 = \frac{5}{8}$$

### EXERCISE 4.12

**A. Convert the following fractions into decimals:**

$$(1) \frac{7}{8} \quad (2) \frac{9}{10} \quad (3) \frac{2}{5} \quad (4) \frac{17}{25} \quad (5) \frac{61}{50}$$

$$(6) \frac{19}{20} \quad (7) \frac{49}{40} \quad (8) \frac{71}{80} \quad (9) \frac{451}{500} \quad (10) \frac{79}{250}$$

$$(11) \frac{83}{100} \quad (12) \frac{111}{400} \quad (13) \frac{777}{800} \quad (14) \frac{551}{1000} \quad (15) \frac{999}{10000}$$

**B. Convert the following decimals into fractions:**

$$(1) 0.5 \quad (2) 1.05 \quad (3) 3.56 \quad (4) 0.565$$

$$(5) 0.023 \quad (6) 0.25 \quad (7) 0.345 \quad (8) 35.506$$

$$(9) 0.064 \quad (10) 0.945 \quad (11) 41.625 \quad (12) 46.1024$$

### 4.1.16 Solve real life problems involving decimals

We have already learnt four operations on decimals. Now we will learn real life problems based on operations.

**Example 1.** Ahmed and Ali are two brothers, they saved Rs 1245.50 and Rs 1050.50 respectively. How much amount they saved altogether?

**Solution:**

Ahmed saved money = Rs 1245.50

Ali saved money = Rs 1050.50

Both brothers saved = Rs 1245.50 + Rs 1050.50

= Rs 2296.00

$$\begin{array}{r} 1245.50 \\ + 1050.50 \\ \hline 2296.00 \end{array}$$

**Example 2.** Price of 15 pencils is Rs 97.50. Find the price of one pencil.

**Solution:**

The price of 15 pencils is Rs 97.50

Therefore, the price of 1 pencil =  $97.50 \div 15$

$$= \frac{9750}{100} \div 15$$

$$= \frac{9750}{100} \times \frac{1}{15}$$

$$= \frac{\overset{65}{\cancel{975}}}{10 \times \underset{1}{\cancel{15}}} = \frac{65}{10}$$

$$= 6.50$$

Thus, price of one pencil is Rs 6.50

## EXERCISE 4.13

- (1) Sahir bought two chickens of weight 1.450 kg and other of 1.685 kg respectively. Find the total weight of both chicken.
- (2) A general store sold 200.750 kg of flour and 98.500 kg of sugar. How much more flour was sold than sugar?
- (3) Saira bought a necklace of gold of mass 2.565 g and bangles of mass 8.875 g. What is the total mass of these two items?
- (4) Aftab saved Rs 3206.75 from monthly salary of Rs 35200. Find his monthly expenditure.
- (5) Noor communications earn Rs 2345.75 in a day by selling easy loading balance. How much amount he will earn in one month?
- (6) A bundle contains 119.5 m of wire. If one piece of wire measuring 29.92 m is sold. Find the length of remaining piece of wire.
- (7) The height of a pole is 18.75 m. We have ladder of  $\frac{1}{3}$  of pole. How much length is left out?
- (8) A school uniform is made from 4.5 m cloth. How many uniforms can be made from 31.5 m cloth?
- (9) A lady used 3.60 kg of salt in preparing different kinds of food for her family in the month of April. How much salt is used per day?
- (10) The price of 2.5 kg ghee is Rs 391.25. Find the price of 1 kg.

## 4.2 PERCENTAGES

### 4.2.1 Recognize percentage as a special kind of fraction

The word “Percent” is formed of two words, “Per” and “Cent”. “Per” means out of and “Cent” means hundred. Therefore, the word PERCENT is used to mean one hundred, and it is represented by the symbol%.

1% makes  $\frac{1}{100}$  means 1 out of 100 = 0.01

10 % makes  $\frac{10}{100}$  means 10 out of 100 = 0.1

and 100% makes  $\frac{100}{100}$  means 100 out of 100 = 1

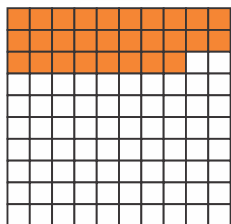
Thus, percentage is a special kind of fraction.



### Activity

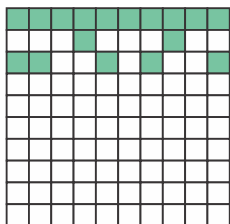
Express the shaded parts as percentages.

(i)

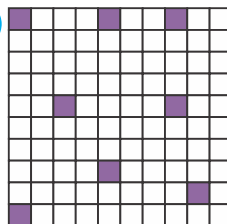


$$\frac{28}{100} = 28\%$$

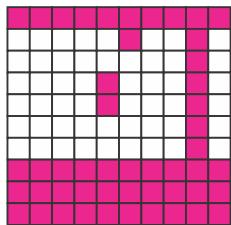
(ii)



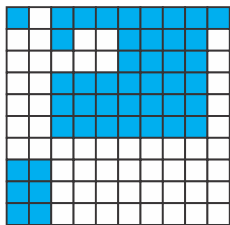

(iii)



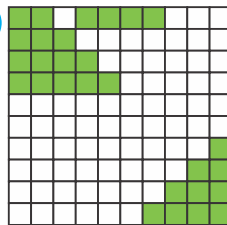

(iv)




(v)




(vi)




### Teacher's Note

Teacher should explain the concept of percentage as a kind of fraction.

## 4.2.2 Convert percentage to fraction and to decimal and vice versa.

Consider the following examples:

**Example 1.** Convert the given percentages into fraction and then into decimal.

(i) 15%                      (ii) 75%

**Solution:**

$$(i) \quad 15\% = \frac{15}{100} = \frac{\overset{3}{\cancel{15}}}{\underset{20}{\cancel{100}}} = \frac{3}{20}, \text{ it is fractional form.}$$

$$\text{and } 15\% = \frac{15}{100} = 0.15, \text{ it is decimal form.}$$

$$(ii) \quad 75\% = \frac{75}{100} = \frac{3 \times \overset{1}{\cancel{25}}}{4 \times \underset{1}{\cancel{25}}} = \frac{3}{4}, \text{ it is fractional form.}$$

$$\text{and } 75\% = \frac{75}{100} = 0.75, \text{ it is decimal form.}$$

**Example 2.** Convert the given decimals into fraction and then convert into percentage:

(i) 0.50                      (ii) 2.45

**Solution:**

$$(i) \quad 0.50 = \frac{50}{100} = \frac{\overset{1}{\cancel{50}}}{\underset{2}{\cancel{100}}} = \frac{1}{2}$$

$$\text{Now, } 0.50 = \frac{50}{100} = 50\%$$

$$\text{Thus } 0.50 = \frac{1}{2} \text{ is in fractional form and } 0.50 = 50\%$$

$$(ii) \quad 2.45 = \frac{245}{100} = \frac{49 \times \overset{1}{\cancel{5}}}{20 \times \underset{1}{\cancel{5}}} = \frac{49}{20} = 2 \frac{9}{20} \text{ (fractional form)}$$

$$\text{Now, } 2.45 = \frac{245}{100} = 245\%$$

**Example 3.** Express the fraction  $\frac{3}{5}$  as percentage.

**Solution:** For making denominator 100 multiply 3 and 5 by 20, we get the equivalent fraction.

$$\frac{3 \times 20}{5 \times 20} = \frac{60}{100}$$

This means 60%. Hence,  $\frac{3}{5} = 60\%$

### EXERCISE 4.14

**A. Convert the given percentages into fraction and then into decimal.**

- (1) 25%      (2) 30%      (3) 35%      (4) 40%  
(5) 65%      (6) 70%      (7) 80%      (8) 85%  
(9) 95%      (10) 99%      (11) 105%      (12) 115%

**B. Convert the given decimals into fractions and then convert into percentage.**

- (1) 0.8      (2) 0.34      (3) 0.56      (4) 0.63  
(5) 0.55      (6) 0.66      (7) 3.45      (8) 3.60  
(9) 5.50      (10) 2.05      (11) 25.5      (12) 55.25

**C. Express the following fractions as percentages, giving your answer correct to 1 decimal place where necessary.**

- (1)  $\frac{4}{5}$       (2)  $\frac{6}{25}$       (3)  $\frac{11}{20}$       (4)  $\frac{5}{8}$       (5)  $\frac{17}{40}$   
(6)  $\frac{6}{12}$       (7)  $\frac{18}{60}$       (8)  $\frac{18}{30}$       (9)  $\frac{71}{50}$       (10)  $1\frac{4}{5}$

**4.2.3 Solve real life problems involving percentages**

Consider the following examples.

**Example.** There are 825 students studying in a school. 40 percent are girls. How many number of girls are studying in the school?

**Solution:**

Number of girls studying in the school = 40% of 825

$$= \frac{40}{100} \times 825 = 0.40 \times 825$$

$$= 330 \text{ girls}$$

Thus **330 girls** studying in the school.

**EXERCISE 4.15**

- (1) 480 students visited a book fair. Out of them 45 percent are boys. How many boys visited the book fair?
- (2) 825 students are studying in a school. 60 percent students were regular for whole of the session. How many students were regular in the school?
- (3) 900 employees are in a company. 70 percent employees were using English frequently. How many employees are using English frequently?
- (4) 65 percent of the houses in the colony have computers. There are 2450 houses in all. How many houses have computers?
- (5) In a school total number of students are 1200. In class V have 20% of the students. How many students in class V?
- (6) There are 450 cars are in a car parking and 20% of these are white in colour. What is the number of white cars?
- (7) The original price of a dress is Rs 1650. During a sale, it is sold at 9% discount. What is the price of a dress?

## REVIEW EXERCISE 4

## A. Fill in the blanks.

- (1)  $42.0 \div \underline{\hspace{2cm}} = 0.42$
- (2)  $12.04 \times \underline{\hspace{2cm}} = 1204.$
- (3) In decimals  $65\% = \underline{\hspace{2cm}}.$
- (4)  $4 + 0.4 + 0.04 + 0.004 = \underline{\hspace{2cm}}.$
- (5) When we round off 4.956 to two decimal places, we get  $\underline{\hspace{2cm}}.$

## B. Solve:

- (1) Arrange 0.016, 2.087, 1.995, 0.463 in ascending order.
- (2) Solve:  $9.123 - 5.865 + 2.403$
- (3) Height of an electric pole is 14.95 m and height of mobile tower is 25.04 m. How much higher is the mobile tower than electric pole?
- (4) Verify:  $4.5 \times 3.2 = 45 \times 0.32$
- (5) Divide 0.72 by 1.2

## C. Solve the problems.

- (1) 3.6 m cloth is required to make a dress. How many such dresses can be prepared from 14.4 m of cloth?
- (2) Aftab gets 84% marks in all subjects of computer science. If the total marks are 2000. Find the marks he obtained.
- (3) Find the value of:
  - (a) 3.5% of 450
  - (b) 0.45% of 760
  - (c) 110% of 220
  - (c) 1.1% of 1000

# DISTANCE, TIME AND TEMPERATURE

## 5.1 DISTANCE

### 5.1.1 Convert kilometres to metres and metres to kilometres

We know the units of measuring length. Following is the table showing relationship among units of length.

$$10 \text{ millimetres (mm)} = 1 \text{ centimetre (cm)}$$

$$100 \text{ centimetres (cm)} = 1 \text{ metre (m)}$$

$$1000 \text{ metres (m)} = 1 \text{ kilometre (km)}$$

Units of length can be converted.

It should be noted that when the bigger unit of lengths are converted into smaller units, we multiply the bigger units with their equivalent smaller units.

Similarly, when the smaller units are converted into bigger units, we divide the smaller units by the equivalent bigger units.

We already learnt to convert kilometres to metres, we multiply the number of kilometres by 1000.

#### Examples:

- (1) Convert 5 km to metres      (2) Convert 8 km 150 m to metres

#### Solution:

$$\begin{aligned} \text{Distance} &= 5 \text{ km} \\ &= (5 \times 1000) \text{ m} \\ &= 5000 \text{ m} \end{aligned}$$

#### Solution:

$$\begin{aligned} \text{Distance} &= 8 \text{ km } 150 \text{ m} \\ &= (8 \times 1000) \text{ m} + 150 \text{ m} \\ &= 8000 \text{ m} + 150 \text{ m} \\ &= 8150 \text{ m} \end{aligned}$$

To convert metres to kilometres, we divide the number of metres by 1000.

#### Teacher's Note

Teacher should explain the units of length and time. He/she should also revise the procedure of conversion into different units.

**Examples.****(1) Convert 12000 m to km****Solution:**

$$\begin{aligned}
 12000 \text{ m} &= (12000 \div 1000) \text{ km} \\
 &= \frac{12000}{1000} \text{ km} = \frac{12}{1} \text{ km} = 12 \text{ km}
 \end{aligned}$$

**(2) Convert 18450 m to km and m****Solution:**

$$\begin{aligned}
 18450 \text{ m} &= 18000 \text{ m} + 450 \text{ m} \\
 &= \frac{18000}{1000} \text{ km} + 450 \text{ m} \\
 &= 18 \text{ km } 450 \text{ m}
 \end{aligned}$$

	<b>18 km</b>
1000	18450
	- 1000
	-----
	8450
	8000
	-----
	450 m

**5.1.2 Convert metres to centimetres and centimetres to metres**

We already learnt to convert metres to centimetres in previous class. We multiply the numbers of metres by 100.

**Examples:****(1) Convert 11 m to cm****Solution:**

$$\begin{aligned}
 11 \text{ m} &= (11 \times 100) \text{ cm} \\
 &= 1100 \text{ cm}
 \end{aligned}$$

**(2) Convert 15 m 30 cm to cm****Solution:**

$$\begin{aligned}
 &15 \text{ m } 30 \text{ cm} \\
 &= (15 \times 100) \text{ cm} + 30 \text{ cm} \\
 &= 1500 \text{ cm} + 30 \text{ cm} \\
 &= 1530 \text{ cm}
 \end{aligned}$$

To convert centimetres to metres, we divide the number of centimetres by 100.

**Examples:****(1) Convert 1400 cm to m****Solution:**

$$\begin{aligned}
 1400 \text{ cm} &= (1400 \div 100) \text{ m} \\
 &= \overset{14}{\cancel{1400}} \times \frac{1}{\underset{1}{\cancel{100}}} \text{ m} = 14 \text{ m}
 \end{aligned}$$

**(2) Convert 2436 cm to m and cm****Solution:**

$$\begin{aligned}
 2436 \text{ cm} &= 2400 \text{ cm} + 36 \text{ cm} \\
 &= (2400 \div 100) \text{ m} + 36 \text{ cm} \\
 &= \left( \overset{24}{\cancel{2400}} \times \frac{1}{\underset{1}{\cancel{100}}} \right) \text{ m} + 36 \text{ cm} = 24 \text{ m } 36 \text{ cm}
 \end{aligned}$$

**5.1.3 Convert centimetres to millimetres and millimetres to centimetres**

We have already learnt about conversion of centimetres to millimetres, we multiply the number of centimetres by 10.

**Examples.****(1) Convert 16 cm to mm****Solution:**

$$\begin{aligned}
 16 \text{ cm} &= (16 \times 10) \text{ mm} \\
 &= 160 \text{ mm}
 \end{aligned}$$

**(2) Convert 25 cm 4 mm to mm****Solution:**

$$\begin{aligned}
 25 \text{ cm } 4 \text{ mm} \\
 &= 25 \text{ cm} + 4 \text{ mm} \\
 &= (25 \times 10) \text{ mm} + 4 \text{ mm} \\
 &= 250 \text{ mm} + 4 \text{ mm} = 254 \text{ mm}
 \end{aligned}$$

To convert millimetres to centimetres, we divide the number of millimetres by 10.

## Examples.

(3) Convert 350 mm to cm

## Solution:

$$350 \text{ mm} = (350 \div 10) \text{ cm}$$

$$\left( \cancel{350} \times \frac{1}{\cancel{10}} \right) \text{ cm} = 35 \text{ cm}$$

(4) Convert 145 mm to cm and mm

## Solution:

$$145 \text{ mm}$$

$$= (145 \div 10) \text{ cm}$$

$$= 14.5 \text{ cm}$$

$$= 14 \text{ cm } 5 \text{ mm}$$



## Activity

## Convert the following:

(1)  $9 \text{ km} = 9 \times 1000 = 9000 \text{ m}$

(2)  $2500 \text{ m} = \frac{2500}{1000} = 2.5 \text{ km}$

(3)  $3784 \text{ m} = \underline{\hspace{2cm}} \text{ km}$

(4)  $3000 \text{ m} = \underline{\hspace{2cm}} \text{ km}$

(5)  $24 \text{ m} = \underline{\hspace{2cm}} \text{ cm}$

(6)  $350 \text{ cm} = \underline{\hspace{2cm}} \text{ m}$

(7)  $200 \text{ cm} = \underline{\hspace{2cm}} \text{ m}$

(8)  $4 \text{ m } 58 \text{ cm} = \underline{\hspace{2cm}} \text{ m}$

(9)  $3 \text{ km } 400 \text{ m} = \underline{\hspace{2cm}} \text{ m}$

(10)  $1320 \text{ cm} = \underline{\hspace{2cm}} \text{ m}$

(11)  $425 \text{ cm} = \underline{\hspace{2cm}} \text{ m}$

(12)  $250 \text{ mm} = \underline{\hspace{2cm}} \text{ cm}$

(13)  $500 \text{ mm} = \underline{\hspace{2cm}} \text{ m}$

(14)  $10 \text{ mm} = \underline{\hspace{2cm}} \text{ cm}$

(15)  $28 \text{ cm } 5 \text{ mm} = \underline{\hspace{2cm}} \text{ mm}$

## EXERCISE 5.1

**A. How many kilometres and metres?**

- (1) 1600 m    (2) 2483 m    (3) 1386 m  
(4) 6034 m    (5) 8324 m    (6) 7945 m

**B. Convert the lengths in metres and centimetres.**

- (1) 400 cm    (2) 750 cm    (3) 385 cm    (4) 810 cm  
(5) 205 cm    (6) 567 cm    (7) 684 cm    (8) 998 cm

**C. Convert into centimetres and millimetres.**

- (1) 35 mm    (2) 634 mm    (3) 593 mm    (4) 400 mm  
(5) 295 mm    (6) 447 mm    (7) 609 mm    (8) 899 mm

**D. Convert the following:**

- (1) 8 km to m    (2) 20 km 340 m to m  
(3) 15 m to cm    (4) 25 m 45 cm to m  
(5) 35 cm to mm    (6) 1200 m to km and m  
(7) 3785 m to km and m    (8) 1520 cm to m and cm  
(9) 850 mm to cm    (10) 4725 mm to cm and mm

**E. How many metres?**

- (1) 7000 mm    (2) 8000 mm    (3) 9000 mm  
(4) 4000 cm    (5) 1000 cm    (6) 5000 cm  
(7) 6000 mm    (8) 10000 cm

## 5.1.4 Add and subtract measure of distances

**Example 1.** Add 3 m 35 cm distance to 8 m 75 cm.**Solution:**

m	cm
① 3	① 35
+ 8	75
12	10

Therefore addition of distances:  
 $3 \text{ m } 35 \text{ cm} + 8 \text{ m } 75 \text{ cm} = 12 \text{ m } 10 \text{ cm}$

**Example 2:** Subtract 4 km 80 m from 11 km 15 m distances**Solution:**

km	m
<sup>10</sup> 11	① 15
- 4	80
6	935

Therefore difference of distances:  
 $11 \text{ km } 15 \text{ m} - 4 \text{ km } 80 \text{ m} = 6 \text{ km } 935 \text{ m}$

**EXERCISE 5.2****A. Solve.**

1. 43 km 15 m + 66 km 57 m      2. 428 m 15 cm + 257 m 29 cm
3. 5 km 860 m + 2 km 220 m      4. 8 m 70 cm + 5 m 60 cm
5. 3 km 918 m + 1 km 324 m      6. 45 cm 8 mm + 65 cm 7 mm
7. 8 km 750 m + 7 km 430 m      8. 9 m 58 cm + 4 m 64 cm

**B. Subtract.**

1. 12 km 75 m - 3 km 84 m      2. 143 m 62 cm - 87 m 59 cm
3. 8 km 546 m - 6 km 804 m      4. 51 cm 3 mm - 27 cm 8 mm
5. 5 km 150 m - 2 km 730 m      6. 71 m 22 cm - 48 m 85 cm
7. 7 km 505 m - 4 km 700 m      8. 23 cm 2 mm - 17 cm 9 mm

## 5.1.5 Solve real life problems involving conversion, addition and subtraction of units of distance

**Example 1.**

A carpenter needs 2 pieces of wood of 2 m 30 cm long and 70 cm long. What is the total length of the pieces they need?

**Solution:**

	m	cm	
	① 2	30	
	+ 0	70	
Total length	3	00	(Would required is 3 m)

**Example 2.**

The length of an iron rod is 9 m 80 cm. A piece of 5 m 85 cm has been cut off from it. How much length of the rod is left?

**Solution:** Subtract 5 m 85 cm from 9 m 80 cm means  
9 m 80 cm – 5 m 85 cm.

	m	cm
Length of iron rod	9	80
Piece used	– 5	85
	3	95

Length of iron rod left is **3 m 95 cm**

**EXERCISE 5.3**

**Solve.**

- (1) The length of a ribbon is 6 m 80 cm. How much ribbon is left, if 2m 88 cm has been cut off?
- (2) Jameel covered a distance of 589 m from his house to Jamia Masjid and then 868 m from Jamia Masjid to School. Find the total distance covered by him.
- (3) A car is 1 m 62 cm wide. A garage is 2m 41 cm wide. How much space is left when the car is in the garage?

- (4) Maria's home is distance as 375 m to the school. Railway station is 504 m far from her home. Which is farther from her home and how much?
- (5) The red part of a colour pencil is 65 mm long. The blue part is 57 mm long. What is the length of pencil? What is the answer in millimetres and centimetres?
- (6) In a walking race, in an specified time Hamid walked 2 km 102 m, Hussain walked only 1 km 985 m. How far ahead of Hussain was Hamid?
- (7) In a 250 kilometre car race, a car get accident at a distance of 134 km from the winning point. What distance had the car drive before accident?
- (8) Naeem is 142 cm tall. His friend is 8 cm taller than Naeem. How tall is his friend? Give the answer in metres.

## 5.2 TIME

### 5.2.1 Convert hours to minutes, minutes to seconds and vice versa

We already know the following relationship among various units of time.

$$60 \text{ seconds} = 1 \text{ minute}$$

$$60 \text{ minutes} = 1 \text{ hour}$$



To convert hours to minutes, we multiply the number of hours by 60.

**Example:** Convert 3 hours 20 minutes to minutes.

**Solution:** 3 hours 20 minutes

$$= 3 \text{ hours} + 20 \text{ minutes} = (3 \times 60) \text{ minutes} + 20 \text{ minutes}$$

$$180 \text{ minutes} + 20 \text{ minutes}$$

$$= 200 \text{ minutes}$$

To convert minutes into hours we divide the number of minutes by 60.

**Examples:****(1) Convert 600 minutes to hours****Solution:**

$$\begin{aligned} & 600 \text{ minutes} \\ & 600 \div 60 \text{ hours} \\ & = 10 \text{ hours} \end{aligned}$$

**(2) Convert 400 minutes to hours and minutes****Solution:**

$$\begin{aligned} & 400 \text{ minutes} \\ & = (400 \div 60) \text{ hours} \\ & = 6 \text{ hours } 40 \text{ minutes} \end{aligned}$$

$$\begin{array}{r} 6 \\ 60 \overline{) 400} \\ \underline{- 360} \\ 40 \end{array}$$

To convert minutes to seconds, we multiply the number of minutes by 60.

**Examples:****(1) Convert 5 minutes 30 seconds to seconds****Solution:** Given:

$$\begin{aligned} & 5 \text{ minutes } 30 \text{ seconds} \\ & = 5 \text{ minutes} + 30 \text{ seconds} \\ & = 5 \times 60 \text{ seconds} + 30 \text{ seconds} \\ & = 300 \text{ seconds} + 30 \text{ seconds} \\ & = 330 \text{ seconds} \end{aligned}$$

**(2) Convert 12 minutes 45 seconds to seconds****Solution:** Given:

$$\begin{aligned} & 12 \text{ minutes } 45 \text{ seconds} \\ & = 12 \text{ minutes} + 45 \text{ seconds} \\ & = 12 \times 60 \text{ seconds} + 45 \text{ seconds} \\ & = 720 \text{ seconds} + 45 \text{ seconds} \\ & = 765 \text{ seconds} \end{aligned}$$

To convert seconds to minutes, we divide the number of seconds by 60.

**Example. Convert 660 seconds into minutes****Solution:** Given 660 seconds

$$\begin{aligned} & = (660 \div 60) \text{ minutes.} \\ & = 11 \text{ minutes} \end{aligned}$$

**Activity****Convert 2 days into hours, minutes and seconds.**

$$2 \text{ days} = (2 \times 24) \text{ hours} = \underline{\hspace{2cm}} \text{ hours}$$

$$48 \text{ hour} = 48 \times 60 \text{ minutes} = \underline{\hspace{2cm}} \text{ minutes}$$

$$2880 \text{ minutes} = 2880 \times 60 \text{ seconds} = \underline{\hspace{2cm}} \text{ seconds}$$

## EXERCISE 5.4

**A. Convert into minutes.**

- |                   |                    |
|-------------------|--------------------|
| (1) 2 hours       | (2) 8 hours        |
| (3) 12 hours      | (4) 1 day 3 hours  |
| (5) 1 day 6 hours | (6) 1 day 10 hours |

**B. Convert into seconds.**

- |                       |                       |
|-----------------------|-----------------------|
| (1) 5 minutes         | (2) 10 minutes        |
| (3) 20 minutes        | (4) 45 minutes        |
| (5) 55 minutes        | (6) 1 hour            |
| (7) 1 hour 15 minutes | (8) 1 hour 25 minutes |

**C. Convert into hours and minutes.**

- |                   |                   |
|-------------------|-------------------|
| (1) 1,180 minutes | (2) 1,250 minutes |
| (3) 1,490 minutes | (4) 2,225 minutes |
| (5) 1,815 minutes | (6) 2,375 minutes |

**D. Convert into minutes and seconds.**

- |                   |                   |
|-------------------|-------------------|
| (1) 2,185 seconds | (2) 275 seconds   |
| (3) 350 seconds   | (4) 710 seconds   |
| (5) 990 seconds   | (6) 1,395 seconds |

**E. Convert into hours, minutes and seconds.**

- |                   |                   |
|-------------------|-------------------|
| (1) 3,800 seconds | (2) 4,100 seconds |
| (3) 4,360 seconds | (4) 4,595 seconds |
| (5) 4,725 seconds | (6) 4,915 seconds |

## 5.2.2 Addition and subtraction of units of time with carrying/borrowing

**Example 1.** Add 3 hours 55 minutes and 5 hours 40 minutes.

**Solution:** We add 3 hours 55 minutes and 5 hours 40 minutes.

h	m	
3	55	55 minute + 40 minute = 95 minutes = 1 hour 35 minute
+ 5	40	Write 35 minutes under minutes column and carry 1 to hours column.
<hr/>		
9	35	Thus, 9 hours 35 minutes

**Example 2.** Subtract 58 minutes 15 seconds from 72 minutes 30 seconds

**Solution:** We subtract 58 minutes 15 seconds from 72 minutes 30 seconds.

m	s	
72	15	15 seconds – 30 seconds We borrow 1 minute = 60 seconds
– 58	30	So, 60 + 15 = 75 seconds 75 – 30 = 45 seconds
<hr/>		
13	45	Thus, 13 minutes 45 seconds

## EXERCISE 5.5

**A. Add.**

- (1) 30 minutes 38 seconds and 20 minutes 42 seconds.
- (2) 47 minutes 25 seconds and 19 minutes 49 seconds.
- (3) 4 hours 40 minutes and 3 hours 57 minutes.
- (4) 3 hours 35 minutes 26 seconds and 2 hours 40 minutes 50 seconds.
- (5) 2 hours 55 minutes 45 seconds and 3 hours 48 minutes 44 seconds.

**B. Subtract.**

- (1) 38 minutes 39 seconds from 62 minutes 20 seconds.
- (2) 44 minutes 25 seconds from 50 minutes.
- (3) 2 hours 58 minutes from 3 hours 5 minutes
- (4) 4 hours 32 minutes from 7 hours.
- (5) 3 hours 45 minutes 50 seconds from 5 hours 30 minutes 40 seconds.

**5.2.3 Convert years to months, months to days, weeks to days and vice versa**

We already know that:

$$\begin{aligned} 24 \text{ hours} &= 1 \text{ day} \\ 7 \text{ days} &= 1 \text{ week} \\ 1 \text{ month} &= 30 \text{ days} \\ 12 \text{ months} &= 1 \text{ year} \\ 365 \text{ days} &= 1 \text{ year} \end{aligned}$$

**A. Convert years to month and months to year**

To convert years into months, we multiply the number of years by 12.

**Example.**

- (a) Convert 11 years to months
- (b) Convert 5 years 10 months to months

**Solution:**

- (a) 11 years =  $(11 \times 12)$  months = 132 months
- (b) 5 years 10 months = 5 years + 10 months  
 $= (5 \times 12)$  months + 10 months  
 $= 60$  months + 10 months  
 $= 70$  months

**Teacher's Note**

Teacher should explain the students method of conversion of years to months, months to days, week to days and vice versa and give them more task.

**B. Convert months to years**

To convert months to years, we divide the number of months by 12.

**Example.**

- (a) Convert 48 months to years
- (b) Convert 81 months to years and months

**Solution:**

- (a) 48 months =  $(48 \div 12)$  years = 4 years
- (b) 81 months =  $(81 \div 12)$  years =  $(72 \div 12)$  years + 9 months  
= 6 years 9 months

**C. Convert months to days**

To convert months to days, we multiply the number of months by 30.

**Example .**

- (a) Convert 18 months to days
- (b) Convert 13 months 25 days to days

**Solution:**

- (a) 18 months =  $18 \times 30$  days = 540 days
- (b) 13 months 25 days = 13 months + 25 days  
=  $(13 \times 30)$  days + 25 days  
= 390 days + 25 days = 415 days

**D. Convert days to months**

To convert days to months, we divide the number of days by 30.

**Example.**

- (a) Convert 150 days to months
- (b) Convert 244 days to months and days

**Solution:**

- (a) 150 days =  $(150 \text{ days} \div 30)$  months = 5 months
- (b) 244 days =  $(244 \div 30)$  months  
=  $(240 \div 30)$  months + 4 days  
= 8 months 4 days

**E. Convert weeks to days**

To convert weeks to days, we multiply the number of weeks by 7.

**Example.**

- (a) Convert 4 weeks to days  
 (b) Convert 14 weeks 2 days to days

**Solution:**

- (a) 4 weeks =  $4 \times 7$  days = 28 days  
 (b) 14 weeks 2 days = 14 weeks + 2 days  
                           =  $(14 \times 7)$  days + 2 days  
                           = 98 days + 2 days = 100 days

**F. Convert days to weeks**

To convert days into weeks, we divide the number of days by 7.

**Example.**

- (a) Convert 98 days to weeks  
 (b) Convert 125 days to weeks and days

**Solution:**

- (a) 98 days =  $(98 \div 7)$  weeks = 14 week  
 (b) 125 days =  $(125 \div 7)$  weeks  
                   (Divide  $125 \div 7$ , we get 17 weeks  
                   and remainder 6 days)  
                   = 17 weeks 6 days

$$\begin{array}{r} 17 \\ 7 \overline{) 125} \\ \underline{- 7} \phantom{0} \\ 55 \\ \underline{- 49} \\ 6 \end{array}$$

**EXERCISE 5.6****Convert:**

- (1) 46 days into weeks and days.
- (2) 80 days into weeks and days.
- (3) 213 days into weeks and days.
- (4) 2343 days into weeks and days.
- (5) 450 days into months and days.

- (6) 800 days into months and days.
- (7) 710 days into months and days.
- (8) 650 days into months and days.
- (9) 66 months into years and months.
- (10) 82 months into years and months.
- (11) 49 months into years and months.
- (12) 244 months into years and months.

**5.2.4 Solve real life problems involving conversion, addition and subtraction of units of time.**

**Example 1.** Sana is 12 years 8 months old and her sister Saba is 6 years 10 months old. How much older is Sana than her sister?

**Solution:** We have to subtract the ages of Saba and Sana.

	Years	Months
Sana's age	<del>12</del> <sup>11</sup>	8 <sup>12</sup>
Saba's age	- 6	10
	5	10

First we borrow 1 year = 12 months by adding 12 months + 8 months = 20 months  
Now 20 - 10 months  
Write 10 below months column.

Sana is 5 years and 10 months older than her sister Saba.

**Example 2.** The school opens at 7:30 a.m and closes at 1:15 p.m. How much time does the school remain open?

**Solution:**

Duration from 7:30 a.m to 12:00 noon = 4 hours 30 minutes

Duration from 12:00 noon to 1:15 p.m = 1 hour 15 minutes

Now,

	Hours	Minutes
	4	30
	+ 1	15
	5	45

School duration is 5 Hours and 45 minutes.

## EXERCISE 5.7

1. Umair plays for 1 hour 15 minutes and Ali plays for 55 minutes. Who plays for shorter period and how much?
2. Fatima takes 1 hour 20 minutes to complete her Mathematics homework and 50 minutes to complete her English homework. How much total time she takes to complete the homework of both subjects?
3. School closes for summer vacations for a period of 2 months and 5 days, while the other holidays are for 27 days. How many days school will remain closed?
4. At a library Hassan reads a newspaper for 36 minutes and then reads a magazine for 1 hour 50 minutes. How long does he spend in reading?
5. Adil takes 2 hours 9 minutes to complete a video game, while Ali takes 55 minutes to complete the same game. How much more time Adil takes as compared to Ali?

## 5.3 TEMPERATURE

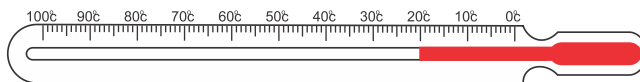
## 5.3.1 Recognize scales of temperature in Fahrenheit and Celsius

The instrument used to measure temperature is called thermometer.

There are two types of scales used in thermometers.

1. Celsius scale
2. Fahrenheit scale

## Celsius scale



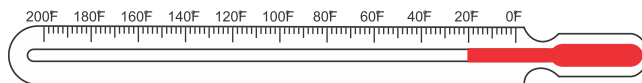
## Celsius scale

The freezing point of water is zero degrees Celsius ( $0^{\circ}\text{C}$ ) and the boiling point of water is  $100^{\circ}\text{C}$  on the Celsius scale. The scale is divided into 100 equal parts. This scale is named after the Swedish Astronomer Celsius scale and is used in most parts of the world.

## Teacher's Note

Teacher should explain the concept of temperature and give knowledge about different scales of temperature.

## Fahrenheit scale

**Fahrenheit scale**

The freezing point of water is 32 degrees Fahrenheit (32°F) and the boiling point of water is 212 °F on the Fahrenheit scale, the scale is divided into 180 equal parts. This scale is named after the German scientist G. Fahrenheit.

**(i) Converting temperature from Fahrenheit scale to Celsius scale**

To convert temperature from Fahrenheit to Celsius scale, we subtract 32 and then multiply the difference by  $\frac{5}{9}$ .

**Example:** Change 59°F to the Celsius scale.

**Solution:**

**Step 1:** Subtraction of 32 from 59 gives

$$59 - 32 = 27$$

**Step 2:** Multiplication of 27 by  $\frac{5}{9}$  gives

$$\overset{3}{\cancel{27}} \times \frac{5}{\cancel{9}} = 3 \times 5 = 15$$

Thus, 59°F = 15°C.

**(ii) Converting from Celsius scale to Fahrenheit scale**

To convert the temperature from Celsius scale to the Fahrenheit scale, we multiply given temperature by  $\frac{9}{5}$  and add 32 to the product.

**Example:** Change 35°C to the Fahrenheit scale.

**Solution:**

**Step 1:** Multiplication of given temperature by  $\frac{9}{5}$  gives

$$35 \times \frac{9}{5} = 7 \times 9 = 63$$

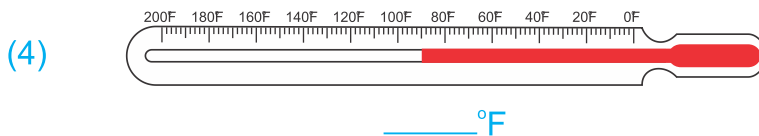
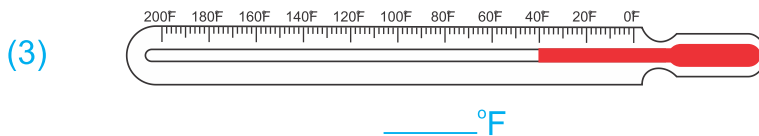
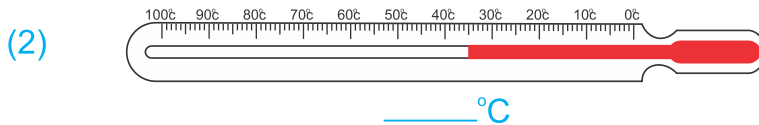
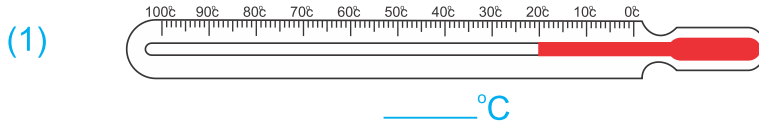
**Step 2:** Addition of 32 and 63 gives

$$63 + 32 = 95$$

Thus, 35°C = 95°F.

### EXERCISE 5.8

**A. Write the readings from following thermometer.**



**B. Change to the Celsius scale:**

- |           |            |            |            |
|-----------|------------|------------|------------|
| (1) 41°F  | (2) 77°F   | (3) 95°F   | (4) 68°F   |
| (5) 203°F | (6) 230°F  | (7) 257°F  | (8) 275°F  |
| (9) 122°F | (10) 167°F | (11) 230°F | (12) 248°F |

**C. Change to the Fahrenheit scale:**

- (1) 30°C (2) 45°C (3) 85°C (4) 55°C (5) 90°C  
 (6) 10°C (7) 20°C (8) 60°C (9) 80°C (10) 110°C

**5.3.2 Solve real life problems involving conversion, addition and subtraction of units of temperature****Example:**

In the month of May on one day the maximum temperature in Larkana was 113°F. What was the temperature in degree Celsius?

**Solution:** Temperature in Larkana was 113°F

Subtracting 32 from 113 gives:  $113 - 32 = 81$

Multiplication of 81 by  $\frac{5}{9}$  gives:  $81 \times \frac{5}{9} = \frac{\overset{9}{\cancel{81}} \times 5}{\underset{9}{\cancel{9}}} = 45$

Thus, temperature in Celsius was 45°C

**EXERCISE 5.9**

- (1) Day the maximum temperature on a day in Hyderabad was 35°C. What was the temperature in degree Fahrenheit?
- (2) During summer on one day the temperature in Jacobabad was 113°F where as the temperature in Hyderabad was 40°C. Which city had more temperature and how much?
- (3) Ali was suffering from fever. His temperature at noon was 102°F. Convert the said temperature into degree Celsius.
- (4) In summer on one day the maximum temperature in Sukkur was 104°F, where as in Karachi it was 35°C. What was the difference in the temperatures of both the cities in degree Fahrenheit?
- (5) Day the maximum temperature on a day in Sehwan Sharif was 86°F. The minimum temperature on that day was 20°C. What was the difference in the both temperatures in degree Fahrenheit?

## REVIEW EXERCISE 5

## 1. Convert:

- (i) 28km 648m to m      (ii) 48m 97cm to cm  
(iii) 76cm 9mm to mm      (iv) 6m 75cm 8mm to mm

## 2. Add:

- (i) 38 minutes 42 seconds and 25 minutes 55 seconds  
(ii) 20 hours 30 minutes and 16 hours 43 minutes  
(iii) 4m 70cm 9mm and 3m 80cm 5mm

## 3. Subtract:

- (i) 22km 895m from 67km 472m  
(ii) 2m 85cm 8mm from 4m 13cm 2mm  
(iii) 39 hours 49 minutes from 76 hours 32 minutes

## 4. Choose the correct answer:

- (i) 5 km =  
(a) 500 m      (b) 5000 m      (c) 50 m      (d) 555 m
- (ii) 3 metres =  
(a) 30 cm      (b) 300 cm      (c) 3000 cm      (d) 30000 cm
- (iii) 6 weeks =  
(a) 40 days      (b) 35 days      (c) 30 days      (d) 42 days
- (iv)  $59^{\circ}\text{F} = \text{_____}^{\circ}\text{C}$   
(a) 15      (b) 25      (c) 30      (d) 35

## 5. What will be the time?

- (i) 50 minutes earlier than 13 : 25  
(ii) 45 minutes later than 9 : 45

## 6. How much time?

- (i) 5 : 30 to 6 : 15      (ii) 2 : 20 to 3 : 25

## 6.1 UNITARY METHOD

### 6.1.1 Describe the concept of unitary method

We use mathematics in our daily life problems, in which the price of a number of articles is given. We are required to find the price of some other number of articles of same kind. We solve such problems by finding the price of one article.

The method in which the value of a number of articles as unit is determined by finding a value of an article is called unitary method.

### 6.1.2 Calculate the value of many objects of the same kind when the value of one of these objects is given

#### Case I:

To find the value of many objects we just multiply the value of one object with required number of objects.

#### Example 1.

The price of a book is **Rs 30**. Find the price of **4** such books.

#### Solution:

The price of one book = 30 rupees  
 The price of 4 such books =  $(30 \times 4)$  rupees  
 = **120 rupees**

**Example 2.** The price of one pencil is **Rs 4.50**. What is the price of **5** such pencils?

#### Solution:

The price of 1 pencil = 4.50 rupees  
 The price of 5 such pencils =  $(4.50 \times 5)$  rupees  
 = 22.50 rupees

#### Case II:

To find the value of one object when the value of many objects is given, we divide the given value of the objects by the number of objects.

#### Teacher's Note

Teacher should explain the concept and gives the daily life problems regarding unitary method.

**Example 3.**

The price of **6 kg** apples is **Rs 240**. What is the price of **1 kg** apples?

**Solution:**

The price of 6 kg apples = 240 rupees

$$\begin{aligned} \text{The price of 1 kg apples} &= \frac{240}{6} \text{ rupees} = \frac{\overset{40}{\cancel{240}}}{\underset{1}{\cancel{6}}} \text{ rupees} \\ &= \mathbf{40 \text{ rupees}} \end{aligned}$$

**EXERCISE 6.1**

1. The price of a pen is **Rs 30**. Find the price of **6** such pens.
2. One litre of petrol price is **Rs 105.70**. What is the price of **5 litres** of petrol?
3. The price of 1 kg rice is **Rs 110**. What is the price of **7 kg** rice?
4. The rent of a house for one month is **Rs 5000**. What is the rent for one year?
5. The price of a dozen bananas is **Rs 66**. What is the price of 1 banana?
6. If **12** books price **Rs 480**. What is the price of one book?
7. The price of **8** chocolates is **Rs 36**. What is the price of one chocolate?
8. The price of ten balls is **Rs 205**. What is the price of one ball?
9. The price of three mobile phones is **Rs 38400**. What is the price of one?
10. The price of **16** pairs of socks is **Rs 1004.80**. What is the price of one pair of socks?

### 6.1.3 Solving to word problems when the same type of objects are given (unitary method).

If value of many things is given. First we find the value of one thing (by division) and then find the value of the required number of things. (by multiplication).

#### Example 1.

Rafay purchased **5** copies for **Rs 100**. How much will he pay for **12** such copies?

#### Solution:

The price of 5 copies = Rs 100

The price of 1 copy = Rs  $\frac{100}{5}$

The price of 12 copies = Rs  $\left(\frac{100}{5} \times 12\right)$   
 $= \text{Rs } (20 \times 12)$   
 $= \text{Rs } 240$

Hence Rafay will pay Rs 240 for purchasing 12 such copies.

#### Example 2.

Bismah reads **50** pages of a book in **3** hours. In how many hours can she read the book of **250** pages?

#### Solution:

For reading 50 pages, she takes = 3 hours

For reading of 1 page, she will take =  $\frac{3}{50}$  hours

For 250 pages, she takes =  $\left(\frac{3}{50} \times 250\right)$  hours  
 $= (3 \times 5) \text{ hours} = 15 \text{ hours}$

So, Bismah can read the book in **15 hours**.

## EXERCISE 6.2

1. The price of **6** balls is **240** rupees. Find the price of **10** such balls.
2. The cost of **10** books is **Rs 240**. What will be the cost of such **15** books?
3. The price of **2** dozen pencils is **Rs 60**. What is the price of  $3\frac{1}{2}$  dozen pencils?
4. **6** farmers plough a field in **10** hours. How many hours will it take for **8** farmers to plough the same field?
5. Rent of a house for **3** months is **Rs 18000**. What is the rent for **8** months?
6. A car travels **45 km** in  $3\frac{1}{2}$  **litres** of petrol. How far would it travel with **364 litres** of petrol?
7. **6** metres of cloth is required for **2** shirts. How many same shirts can be made from **42** metre?
8. **12** coaches of passengers carry **624** persons. How many passengers will be carried by **18** such coaches?
9. The weight of **16** bags of rice is **775.60** kg. What will be the weight of **24** such bags?
10. The bus fare of **10** persons from Karachi to Larkana is **Rs 8300**. What is the fare for 36 persons?

## 6.2 DIRECT AND INVERSE PROPORTION

### 6.2.1 Define ratio of two numbers

#### Ratio:

A ratio is a relationship between two numbers. The numbers represent quantities of same kind. Ratio of two numbers 3 and 2 is expressed as  $3 : 2$  or  $\frac{3}{2}$ . We read  $3 : 2$  as (3 is to 2)

**Note:** Ratio compares two quantities of same kind.

**For example:** The ratio of ages of Danish and Rafay is  $3 : 1$  then it shows that

- Danish is older than Rafay
- Danish is thrice as old as Rafay

The ratio of two quantities **a** and **b** is written as **a : b**. We read this as “**a** is to **b**” **a : b** is also written as  $\frac{a}{b}$ , where  $b \neq 0$ .

#### Proportion:

Equality of two ratios is called proportion. The symbol for proportions is “=” or “::”

If **a:b** and **c:d** are two ratios then the proportion between these two ratios is written as:

$$a:b = c:d \text{ or } a:b :: c:d.$$

It is read as “Ratio **a** is to **b** is same as **c** is to **d**”. Here **a**, **b**, **c** and **d** are respectively called as first term, second term, third term and fourth term of the proportion.

**Example.**  $2 : 3 = 4 : 6$  is a proportion.

We can write it as  $2 : 3 :: 4 : 6$

### 6.2.2 Define and identify direct and inverse proportion

#### Types of proportion:

There are two types of proportion.

- (i) Direct proportion
- (ii) Inverse proportion

#### Teacher's Note

Teacher should explain the concept of ratio also describe the types of proportion with daily life examples.

**(i) Direct Proportion:** If two quantities are related in such a way that if one quantity increases in a given ratio, the other also increases in the same ratio or if one decreases in a given ratio, the other also decreases in the same ratio. Then the given quantities are said to be in direct proportion.

**Examples:**

- (1) More money and more shopping; less money and less shopping.
- (2) Faster the speed of machine and more production is produced.

**(ii) Inverse Proportion:** If two quantities are related in such a way that if one quantity increases in a given ratio, the other decreases in the same ratio. Then the given quantities are said to be inverse proportion.

**Examples:**

- (1) Faster the speed, lesser the time taken
- (2) More workers, less number of days for completing a work.



**Activity**

**Identify and write direct or inverse proportion.**

- (i) Larger crowd, more noise. (Direct proportion)
- (ii) More books, more money needed. (.....)
- (iii) Less labourers, more time to build a house. (.....)
- (iv) Less money, less toffees purchased. (.....)

**6.2.2 Solve real life problems involving direct and inverse proportion (by unitary method)**

**Example 1.** A man buys **3kg** of apples for **Rs 150**. How much will he pay for **7kg** of apples?

**Solution:**

Kg	Rs	Kg	Rs
3	:	150	::
		7	:
			<input style="width: 30px; height: 20px; border: 1px solid black;" type="text"/>

For 3kg of apples he spends Rs 150

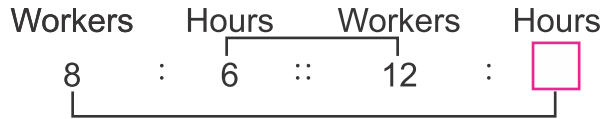
For 1kg of apples he spends Rs  $\frac{150}{3}$

For 7kg of apples he spends Rs  $\frac{150}{3} \times 7 = \text{Rs } 350$

**Example 2.**

8 workers can do a work in 6 hours. How much time will 12 workers take to do the same work?

**Solution:**



8 workers can do the work in = 6 hours

1 worker can do the work in = 6 x 8 hours (Less workers more time)

12 workers can do the work in  $\frac{\overset{1}{6} \times \overset{4}{8}}{\underset{-2}{12}} \text{ hours} = \frac{4}{1}$

(More workers less time) = **4 hours**

So, **12 workers** will do the same work in **4 hours**.

**EXERCISE 6.3**

1. **The ratio of pocket money of Bismah and Omaima is 3 : 5. Write true or False.**
  - (i) Omaima has less pocket money than Bismah. (     )
  - (ii) Bismah has less pocket money than Umaima. (     )
2. **Express the following as ratio.**
  - (i) 3 boys to 6 girls                      (ii) 25 minutes to 80 minutes
  - (iii) 5 days to 3 weeks                  (iv) 250 kg to  $1\frac{1}{2}$  kg
3. **Identify and write direct or inverse proportion.**
  - (i) More laboures, more work. (     )
  - (ii) More laboures, less days needed for work. (     )
  - (iii) Less speed of a car, more time taken. (     )
  - (iv) More farmers, more work done in the field. (     )

4. If 2 packs of juice cost **Rs 24**. what is the cost of **4** packs of juice?
5. Aslam can walk **10.5 km** in **2** hours. Find the distance he can travel in **5** hours.
6. If **9** workers can complete a work in **6** days. How many workers are required to complete the same work in **3** days?
7. A motorcycle covers **100 km** in  $2\frac{1}{2}$  litres of petrol. How many litres of petrol will it use to cover **300 km**?
8. **180** soldiers have food stock for **6** days. How many soldiers can eat the same food for **9** days?
9. **44** farmers could reap a field in **15** days. How many farmers can reap the same field in **10** days?

### REVIEW EXERCISE 6

1. The cost of a sharpener is Rs. 4.50. Find the cost of a dozen sharpeners.
2. From Karachi to Nawabshah the fare of 10 persons in a bus is 6500 rupees. What is the fare of each person?
3. The cost of 2 dozen eggs is 220 rupees. What is the cost of 3 dozen eggs?
4. If 10 persons can do a work in 6 days. In how many days can 15 persons do the same work?
5. The price of 6 packets of chalk is Rs. 90. What is the price of 8 packets of chalk?
6. A printer prints 7620 papers in 1 hour. Find how many papers will be printed by the same printer in 40 minutes?
7. A train travels 800 km in 6 hours. How much distance will be traveled in 15 hours with same speed?

## 7.1 ANGLES

### 7.1.1 Recall an angle and recognize acute, right, obtuse, straight and reflex angle.

We know when two rays  $\vec{AB}$  and  $\vec{AC}$  meet at common end point, they form an angle.

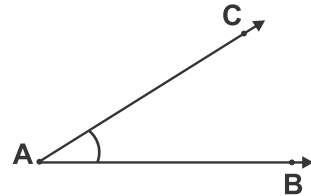
Point A is called its vertex.  $\vec{AB}$  and  $\vec{AC}$  are called its arms or sides.

The angle at point A is named as angle BAC or angle CAB.

“ $\angle$ ” is the symbol for an angle.

It is written as  $\angle BAC$  or  $\angle CAB$ .

It is read as angle BAC or angle CAB.



#### 7.1.1 Kinds of an Angle

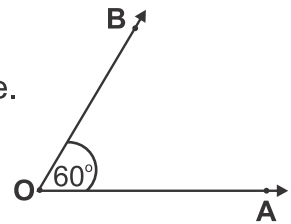
##### (i) Acute angle:

An angle whose measure is greater than  $0^\circ$  but less than  $90^\circ$  is called an acute angle.

Here  $m \angle AOB = 60^\circ$

( $m$  stands for measure)

Therefore  $\angle AOB$  is an acute angle.



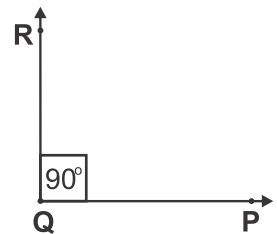
##### (ii) Right angle:

An angle whose measure is  $90^\circ$  is called right angle.

It makes a perfect 'L' shape.

Here  $m \angle PQR = 90^\circ$

Therefore  $\angle PQR$  is a right angle.



#### Teacher's Note

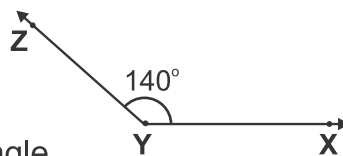
Teacher should revise and recall the students acute, right, obtuse, straight and reflex angle through making with paper or rope.

(iii) **Obtuse angle:**

An angle whose measure is greater than  $90^\circ$  but less than  $180^\circ$  is called an obtuse angle.

Here  $m \angle XYZ = 140^\circ$

Therefore  $\angle XYZ$  is an obtuse angle.

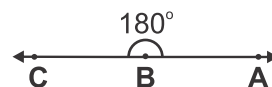


(iv) **Straight angle:**

An angle whose measure is  $180^\circ$  is called a straight angle.

Here  $m \angle ABC = 180^\circ$

Therefore  $\angle ABC$  is a straight angle.

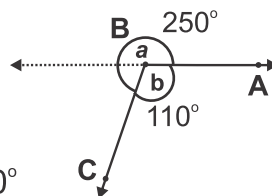


(v) **Reflex angle:**

An angle whose measure is greater than  $180^\circ$  but less than  $360^\circ$  is called a reflex angle.

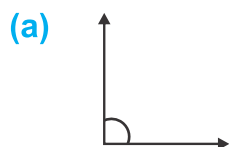
In the given figure  $m \angle ABC = a = 250^\circ$

Therefore  $\angle ABC$  is a reflex angle.

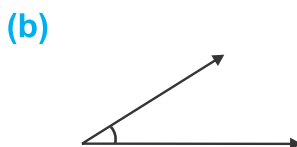


**EXERCISE 7.1**

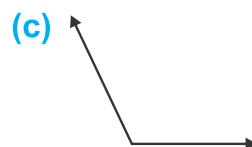
1. Name the angles then write their measurements.



.....

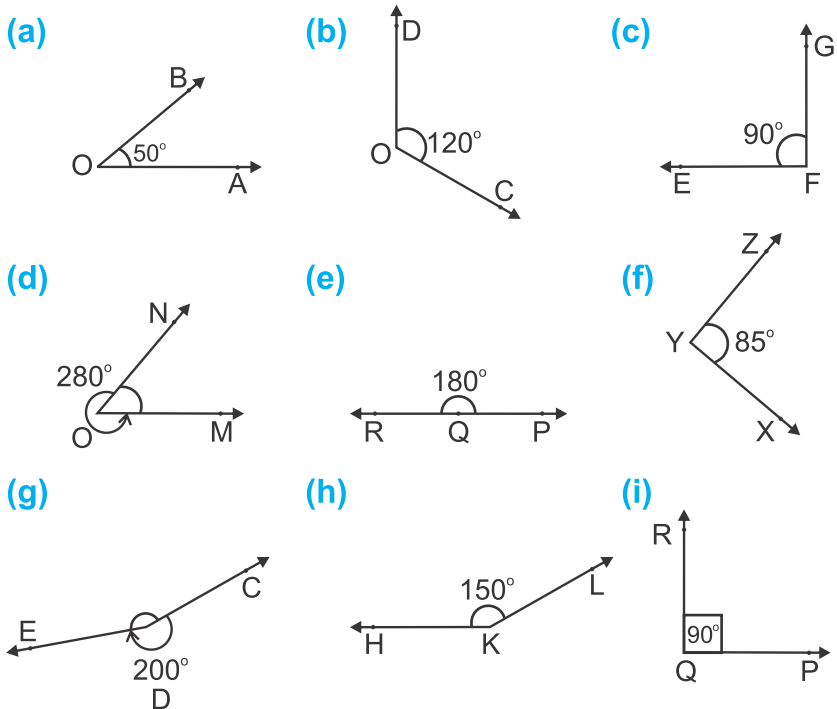


.....



.....

2. Identify the angles as acute, right, obtuse, straight or reflex angle.

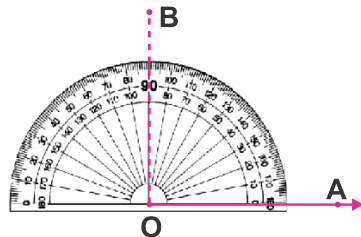


7.1.2 Use protractor to construct a right angle, a straight angle and reflex angles of different measure.

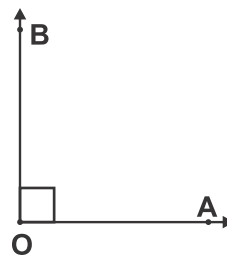
1. To construct a right angle with the help of protractor.

Steps of construction:

- (i) Draw ray  $\vec{OA}$ .
- (ii) Place the centre point of the protractor at point O along  $\vec{OA}$ .
- (iii) Read the measurement at the protractor from the side where its zero mark lies on  $\vec{OA}$ . Mark the point B at  $90^\circ$ .



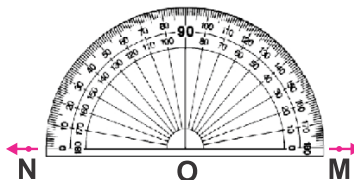
- (iv) Draw  $\overrightarrow{OB}$  as shown in the picture.  
Thus  $m \angle AOB = 90^\circ$  and it is a right angle.



## 2. To construct a straight angle with the help of protractor.

### Steps of construction:

- (i) Draw a ray  $\overrightarrow{OM}$ .
- (ii) Place the centre point of the protractor on point O along  $\overrightarrow{OM}$ .
- (iii) Read the protractor from the side where its zero mark lies on  $\overrightarrow{OM}$ . Mark a point N at  $180^\circ$ .
- (iv) Now draw  $\overrightarrow{ON}$  as shown in the picture.  
Thus  $m \angle MON = 180^\circ$  which is the required straight angle.



## 3. Using the protractor to construct reflex angle of different measures.

### Steps of construction:

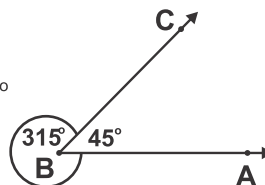
Let us draw and measure a reflex angle of  $315^\circ$  using a protractor. We know that one complete turn =  $360^\circ$ .

Therefore the measure of the acute angle  $\angle ABC = 45^\circ$ .

The reflex angle  $\angle ABC = 360^\circ - 45^\circ = 315^\circ$ .

We first draw and measure the acute  $\angle ABC = 45^\circ$ .

Then we draw an arc around the outside of



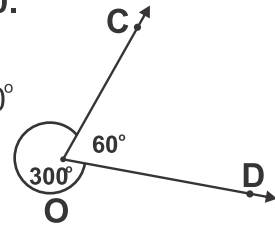
**Example.** Construct a reflex angle of  $300^\circ$

**Steps of construction:**

We subtract the given measure of  $300^\circ$  from  $360^\circ$  i.e.  $360^\circ - 300^\circ = 60^\circ$

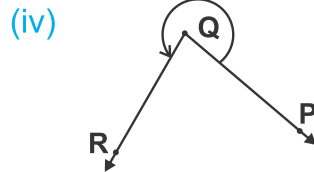
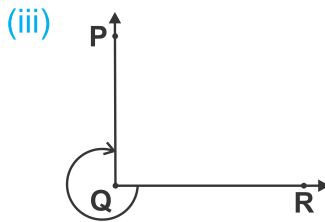
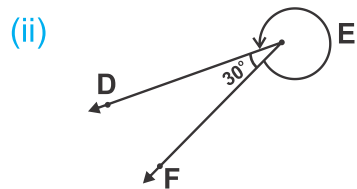
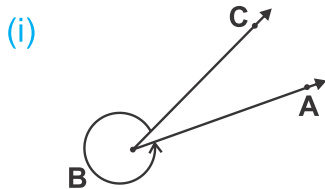
Now we draw an acute angle of  $60^\circ$  as to get the required reflex angle of  $300^\circ$ .  $\angle COD$  is the required reflex angle.

In this way we can draw a reflex angle of different measure.



## EXERCISE 7.2

1. Measure the reflex angles by using protractor.



2. Draw and label the following angles:

- |                                   |                                    |
|-----------------------------------|------------------------------------|
| (i) $\angle ABC$ (reflex angle)   | (ii) $\angle DEF$ (straight angle) |
| (iii) $\angle GHI$ (reflex angle) | (iv) $\angle PQR$ (right angle)    |
| (v) $\angle STU$ (straight angle) | (vi) $\angle XYZ$ (reflex angle)   |

3. Using protractor, draw the following:

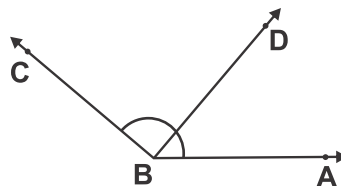
- |  |   |
|--|---|
| (i) Reflex $\angle ABC$ of $310^\circ$   | (ii) Reflex $\angle DEF$ of $280^\circ$ |
| (iii) Reflex $\angle LMN$ of $340^\circ$ | (iv) Reflex $\angle OPQ$ of $290^\circ$ |

### 7.1.3 Describe Adjacent, Complementary and Supplementary angles

We often come across pairs of angles that have some special properties. Some of them are given below:

#### (i) Adjacent Angles

Look at the figure. We have two angles: (i)  $\angle ABD$  and (ii)  $\angle DBC$ . There is a common vertex at point B and a common arm  $\overrightarrow{BD}$ . The other two arms  $\overrightarrow{BA}$  and  $\overrightarrow{BC}$  of the angles are on the opposite sides of the common arm  $\overrightarrow{BD}$ .

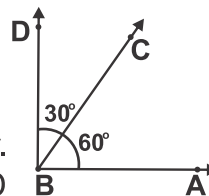


Two such angles:  $\angle ABD$  and  $\angle DBC$  are called adjacent angles.

Thus two angles are said to be adjacent angles, if they have a common vertex and, a common arm.

#### (ii) Complementary Angles

Two angles whose measures have a sum of  $90^\circ$  are called complementary angles. In figure  $60^\circ$  and  $30^\circ$  are two complementary angles because  $m\angle ABC + m\angle CBD = 60^\circ + 30^\circ = 90^\circ$ . Each angle is called a complement of the other. So,  $\angle ABC$  is complement of  $\angle CBD$  and  $\angle CBD$  is complement of  $\angle ABC$ .

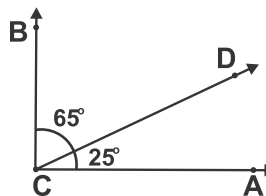


**Example:** Find the complement of  $65^\circ$ .

**Solution:**

$m\angle BCD$  is  $65^\circ$ , then measure of its complementary angle  $\angle ACD$  will be  $90^\circ - 65^\circ = 25^\circ$ . Because  $\angle BCD$  and  $\angle ACD$  are two complementary angles.

$$m\angle BCD + m\angle ACD = 65^\circ + 25^\circ = 90^\circ$$



#### Teacher's Note

Teacher should explain the concept of adjacent, complementary and supplementary angles.



**Activity**

Find complement of  $m \angle DEF = 44^\circ$  in the following figure.

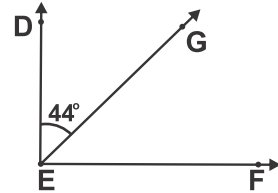
In figure,  $\angle DEF$  and  $\angle FEG$  are two complementary angles.

Therefore,  $m \angle DEF + m \angle FEG =$

$m \angle DEF = 44^\circ$  (given)

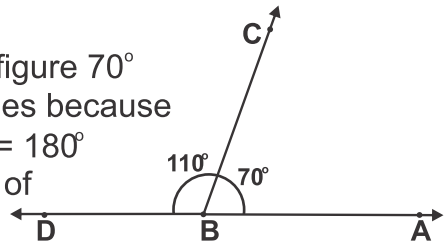
Hence,  $m \angle FEG = 90^\circ - 44^\circ =$

Thus, the complement of  $\angle DEF$  is



**(iii) Supplementary Angles**

Two angles whose measure have a sum of  $180^\circ$  are called supplementary angles. In figure  $70^\circ$  and  $110^\circ$  are supplementary angles because  $m \angle ABC + m \angle CBD = 110^\circ + 70^\circ = 180^\circ$ . Each angle is called supplement of the other.



Then  $\angle ABC$  is supplement of  $\angle CBD$ , or  $\angle CBD$  is supplement of  $\angle ABC$ .

**Example:** Find supplement of the given angle of  $120^\circ$

**Solution:**

Supplement of  $120^\circ = 180^\circ - 120^\circ = 60^\circ$



**Activity**

Find supplement of the given angle of  $110^\circ$ .

In figure  $\angle CEF$  and  $\angle DEF$  are two supplementary angles.

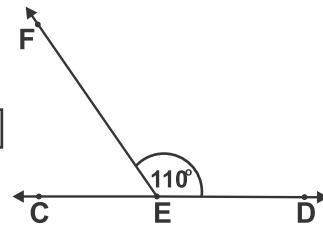
Therefore  $m \angle CEF + m \angle DEF =$

$m \angle DEF = 110^\circ$  (given)

Hence  $m \angle CEF = 180^\circ - 110^\circ =$

Thus the supplement of  $\angle DEF$  is

or supplement of  $110^\circ$  is .



## EXERCISE 7.3

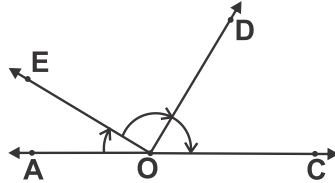
1. Look at the figure and answer the following:

(i) Is  $\angle AOE$  adjacent to  $\angle DOE$ ?

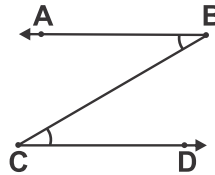
(ii) Is  $\angle AOD$  adjacent to  $\angle COD$ ?

(iii) Is  $\angle AOE$  adjacent to  $\angle AOD$ ?

(iv) Is  $\angle DOE$  adjacent to  $\angle EOC$ ?



2. Is  $\angle ABC$  adjacent to  $\angle BCD$ ?  
Why or why not?



3. Find the complement of each of the following angles:

(i)  $60^\circ$     (ii)  $76^\circ$     (iii)  $45^\circ$     (iv)  $38^\circ$     (v)  $15^\circ$

4. Find the supplement of each of the following angles:

(i)  $25^\circ$     (ii)  $45^\circ$     (iii)  $70^\circ$     (iv)  $98^\circ$     (v)  $143^\circ$

5. Identify the complementary and supplementary pair of angles:

(i)  $49^\circ, 41^\circ$     (ii)  $154^\circ, 26^\circ$     (iii)  $95^\circ, 85^\circ$

(iv)  $32^\circ, 58^\circ$     (v)  $111^\circ, 69^\circ$     (vi)  $14^\circ, 76^\circ$

6. (i) Find the angle which is equal to its complement.  
(ii) Find the angle which is equal to its supplement.

7. Can two angles be supplementary, if both of them are:

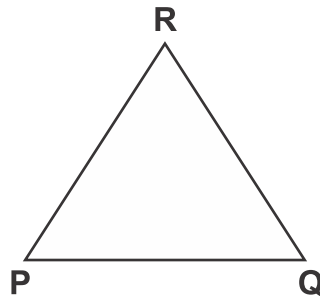
(i) Obtuse    (ii) Acute    (iii) Right

8. Are complementary angles also adjacent angles? Are supplementary angles also adjacent angles? Explain your answers.

## 7.2 TRIANGLES

**Definition of a triangle:**

Triangle is a plane closed figure with three sides. The symbol of triangle is  $\Delta$ . Given figure is  $\Delta PQR$ . Points  $P$ ,  $Q$  and  $R$  are three vertices.  $\overline{PQ}$ ,  $\overline{QR}$  and  $\overline{RP}$  are three sides.  $\angle PQR$ ,  $\angle QRP$  and  $\angle RPQ$  are three angles.



Sum of all three angles of a triangle is equal to  $180^\circ$ .

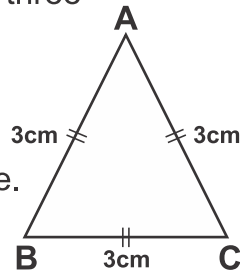
**Types of Triangles with respect to their sides**

According to the sides of a triangle, there are three types of a triangle.

**(i) Equilateral Triangle**

It is a triangle having three sides equal in length.  $\Delta ABC$  is an equilateral triangle.

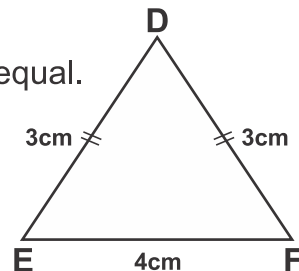
$$\therefore m \overline{AB} = m \overline{BC} = m \overline{CA}$$

**(ii) Isosceles Triangle**

It is a triangle having any two sides equal.

$\Delta DEF$  is an isosceles triangle.

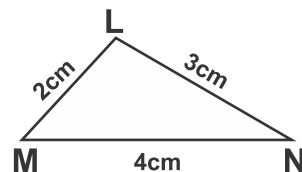
$$\therefore m \overline{DE} = m \overline{DF}$$

**(iii) Scalene Triangle**

It is a triangle where all sides are different in length.

$\Delta LMN$  is scalene triangle.

because  $m \overline{LM} \neq m \overline{MN} \neq m \overline{LN}$ .

**Teacher's Note**

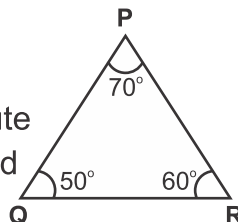
Teacher should explain the types of triangles with respect to their sides and angles.

## Types of Triangles with respect of their angles

According to the angles of a triangle, there are three types of a triangle.

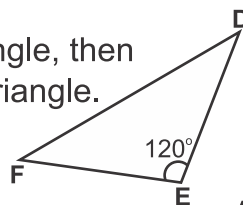
## (1) Acute-angled Triangle

If all three angles of a triangle are acute angles, then the triangle is called an acute angled triangle.  $\triangle PQR$  is an acute angled triangle, in which  $\angle P$ ,  $\angle Q$  and  $\angle R$  are acute angles.



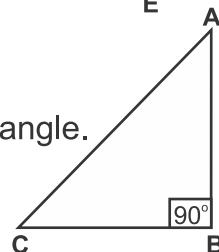
## (2) Obtuse-angled Triangle

If one angle of a triangle is an obtuse angle, then the triangle is called an obtuse angled triangle.  $\triangle DEF$  is an obtuse angled triangle, in which  $\angle DEF$  is an obtuse angle.



## (3) Right-angled Triangle

If one angle of a triangle is a right angle, then the triangle is called a right angled triangle.  $\triangle ABC$  is a right-angled triangle, in which  $m \angle ABC = 90^\circ$



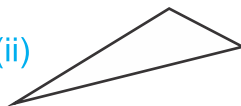
## EXERCISE 7.4

1. Measure the sides of the following triangles and then write their names with respect to their sides.

(i)



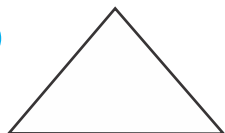
(ii)



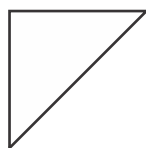
(iii)



(iv)



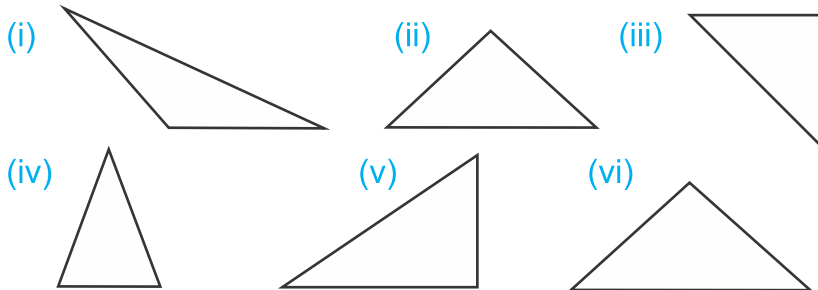
(v)



(vi)



2. Use protractor to measure the angles of the following triangles and write their names with respect to their angles.



### 7.2.1 Use compasses and straight edge to construct equilateral, isosceles and scalene triangles when three sides are given.

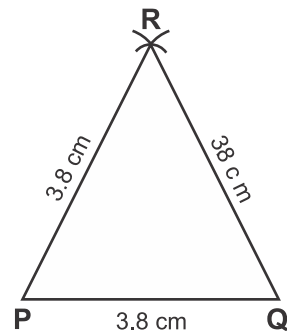
- A. Using pair of compasses and ruler to construct an equilateral triangle when the measure of each side is given.

**Example 1.** Construct a equilateral triangle PQR such that its each side is 3.8 cm.

**Given:** Each side of triangle is 3.8 cm.  
Since it is equilateral triangle hence measure of each angles will be  $60^\circ$ .

**Steps of construction:**

**Step 1:** Draw a line segment 3.8 cm length with the help of ruler. Name it as  $\overline{PQ}$ .



**Step 2:** Take P and Q as centres, open pair of compass to measure 3.8 cm. Draw an arc of radius 3.8 cm from point P and another from point Q. Such as to intersect each other. Mark the point where two arcs meet as R.

**Step 3:** Draw  $\overline{PR}$  and  $\overline{QR}$ .

Thus  $\triangle PQR$  is the required equilateral triangle.

- B. Using pair of compasses and ruler to construct an isosceles triangle when measure of sides are given.

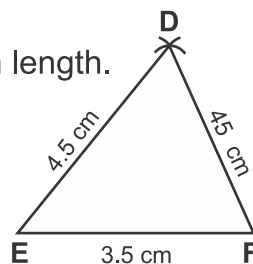
**Example 2:**

Construct a triangle DEF when  $m \overline{DE} = m \overline{DF} = 4.5$  cm and  $m \overline{EF} = 3.5$  cm

**Steps of construction:**

**Step I:** Use a ruler and draw  $\overline{EF}$  of 3.5 cm length.

**Step II:** Open the pair of compasses to measure 4.5 cm. Take E and F as centre. Draw two arcs each of 4.5 cm for E and F, such as to intersect other.



**Step III:** Mark the point where two arcs intersect as D.

**Step IV:** Draw  $\overline{DE}$  and  $\overline{DF}$ .

Thus  $\triangle DEF$  is the required isosceles triangle.

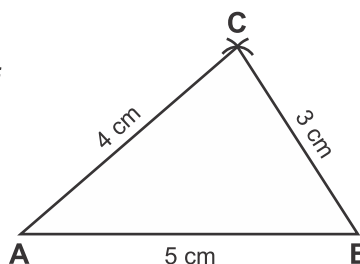
- C. To construct a scalene triangle, the measures of all three sides are given. We use the following steps which are given in the example.

**Example 3:** Construct a triangle ABC when  $m \overline{AB} = 5$  cm,  $m \overline{AC} = 4$  cm and  $m \overline{BC} = 3$  cm

**Steps of construction:**

**Step I:** Use a ruler and draw  $\overline{AB}$  of 5 cm in length.

**Step II:** Open pair of compasses to measure 4 cm. Take A as centre and draw an arc.



**Step III:** Again open pair of compasses to measure 3 cm. Take B as centre and draw another arc to meet previous arc.

**Step IV:** Mark the point where two arcs meet; mark as C. Draw  $\overline{AC}$  and  $\overline{BC}$ .

Thus  $\triangle ABC$  is the required scalene triangle.

**7.2.2 Use a protractor and ruler to construct equilateral, isosceles and scalene triangles, when two angles and included side are given. Measure the length of the remaining two sides and one angle of the triangle.**

We use the following steps given in the examples.

**Example 1:** Construct an equilateral triangle when

$$m\angle PQR = 60^\circ = m\angle QPR \text{ and } m\overline{PQ} = 4\text{cm}$$

**Steps of construction:**

**Step I:** Draw a line segment PQ measuring 4 cm.

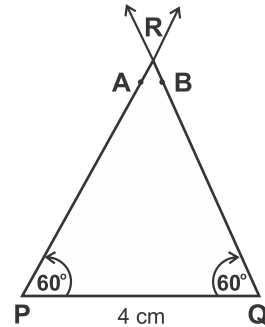
**Step II:** Place the central point of the protractor at point P. Read from Q and mark point A at  $60^\circ$ .

**Step III:** Place the central point of the protractor at point Q read from P and mark point B at  $60^\circ$ .

**Step IV:** From point P and Q segment draw the ray  $\overrightarrow{PA}$  and  $\overrightarrow{QB}$ , so that the rays intersect each other at point R. Now  $\triangle PQR$  is the required triangle.

**Step V:** Measure the sides  $\overline{PR}$  and  $\overline{QR}$  and  $\angle PQR$ .

Thus  $m\overline{PR} = 4\text{cm}$ ,  $m\overline{QR} = 4\text{cm}$  and  $m\angle PRQ = 60^\circ$   
Hence  $\triangle PQR$  is the required equilateral  $\triangle$ .



**Example 2:** Construct an isosceles  $\triangle ABC$ , where  $m\overline{AB} = 4.5\text{ cm}$ ,  
 $m\angle ABC = m\angle CAB = 40^\circ$

**Given:** Two angles of equal measured and one side is given.

**Steps of construction:**

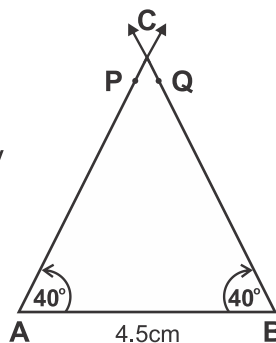
**Step I:** Draw  $\overline{AB}$  of measure 4.5 cm.

**Step II:** Place the central point of the protractor at point A in such a way that  $\overline{AB}$  coincides the base line of the protractor. Read it upto  $40^\circ$  and mark at point P.

**Step III:** Place the central point of the protractor at point B in such a way that  $\overline{AB}$  coincides the base line of the protractor. Read it upto  $40^\circ$  and mark it point Q.

**Step IV:** From points A and B, draw  $\overrightarrow{AP}$  and  $\overrightarrow{BQ}$  to intersect each other at a point.

**Step V:** Mark the point as C. In this way, we get an isosceles triangle ABC. Now measure the remaining two sides  $\overline{AC}$  and  $\overline{BC}$  with the help of ruler. Also measure third angle ACB with the help of protractor.



**Example 3:** Construct a scalene  $\triangle XYZ$ , when  $m\angle XYZ = 65^\circ$   
 $m\angle XZY = 45^\circ$  and  $mYZ = 5.4$ cm.

**Steps of construction:**

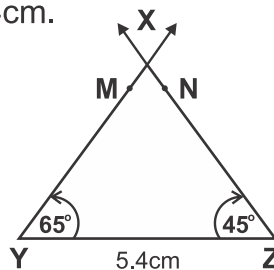
**Step I:** With the help of ruler and pencil draw  $\overline{YZ}$  of 5.4cm in the length.

**Step II:** Place protractor at point Y. Read it and mark point upto  $65^\circ$  and mark it as M.

**Step III:** From point Z, read the protractor up to  $45^\circ$  and mark at a point N.

**Step IV:** Through points Y and Z, draw  $\overrightarrow{YM}$  and  $\overrightarrow{ZN}$  to intersect each other at point X.

**Step V:** Measure  $\overline{XY}$ ,  $\overline{XZ}$  and  $\angle YXZ$   
 $m\overline{XY} = \underline{\hspace{2cm}}$  cm,  $m\overline{XZ} = \underline{\hspace{2cm}}$  cm and  $m\angle YXZ = 70^\circ$   
 Thus  $\triangle XYZ$  is the required scalene triangle.

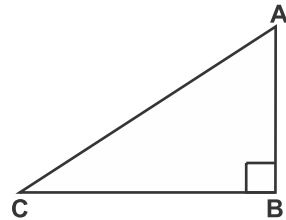


### 7.2.3 Define Hypotenuse of a right angled triangle.

In a right triangle, the side opposite to the right angle is called hypotenuse.

**Note:** Hypotenuse is the longest side in a right angled triangle.

In figure,  $\triangle ABC$  is a right triangle, where  $\angle B$  is a right angle.  $\overline{AC}$  or  $\overline{CA}$  is hypotenuse, as it is opposite to right angle B.



### 7.2.4 Use protractor and straightedge/ruler to construct a triangle when two angles and included side are given

#### Example:

Construct a right angled  $\triangle ABC$ , where  $m \angle BAC = 50^\circ$ ,  $m \angle ABC = 40^\circ$  and  $m \overline{AB} = 3.5$  cm

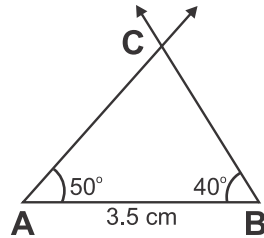
#### Steps of construction:

**Step I:** Draw  $\overline{AB}$  of measure 3.5 cm.

**Step II:** Take point A as centre, draw  $\angle BAC$  of measure  $50^\circ$ .

**Step III:** Take point B as centre, draw  $\angle ABC$  of measure  $40^\circ$ .

**Step IV:** The point where arms of both the angles meet at point C, form right angle.



Thus, ABC is the required right angled triangle.

### 7.2.5 Use protractor and straightedge/ruler to construct acute angled, obtuse angled and right angled triangles when one angle and adjacent sides are given

**Example 1:** Construct an acute angled  $\triangle ABC$ , where  $m \angle ABC = 75^\circ$ ,  $m \overline{AB} = 4.2$  cm and  $m \overline{BC} = 3.8$  cm.

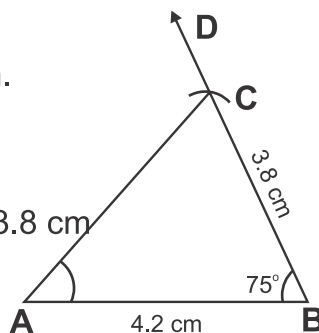
**Steps of construction:**

**Step I:** Draw  $\overline{AB}$  of measuring 4.2 cm.

**Step II:** Using protractor make  $\angle ABD$  measuring  $75^\circ$ .

**Step III:** From point B, draw an arc of 3.8 cm to cut the arm  $\overrightarrow{BD}$  at point C.

**Step IV:** Draw  $\overline{AC}$ . We get the required acute angled  $\triangle ABC$ .



**Example 2:** Construct an obtuse angled  $\triangle DEF$ , when  $m\angle DEF = 110^\circ$ ,  $m\overline{DE} = 4.5$  cm and  $m\overline{EF} = 4$  cm.

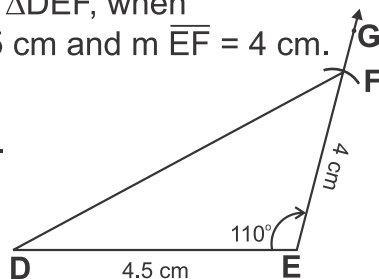
**Steps of construction:**

**Step I:** Draw  $\overline{DE}$  of measuring 4.5 cm.

**Step II:** Using protractor make  $\angle DEG$  measuring  $110^\circ$ .

**Step III:** Use pair of compass, select E as centre and draw arc of 4 cm radius  $\overline{EF}$  to cut the arc  $\overrightarrow{EG}$  at point F. Use scale and draw  $\overline{DF}$ , which is the third side of the  $\triangle DEF$ .

**Step IV:** Thus, we get the required obtuse angled  $\triangle DEF$ .



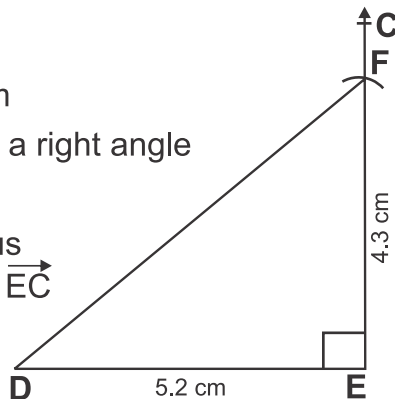
**Example 3:** Construct a right angled triangle with sides  $m\overline{DE} = 5.2$  cm,  $m\overline{EF} = 4.3$  cm and  $m\angle DEF = 90^\circ$ .

**Steps of construction:**

**Step I:** Draw  $\overline{DE}$  measuring 5.2 cm

**Step II:** From point E, draw  $\angle DEC$  a right angle with the help of protractor.

**Step III:** With E as centre and radius 4.3 cm, draw an arc to cut  $\overrightarrow{EC}$  at point F, the third vertex of  $\triangle DEF$ .



**Step IV:** Draw  $\overline{DF}$  by joining the points D and F.  
Thus  $\triangle DEF$  is the required right angled triangle.

### EXERCISE 7.5

**1. Using a ruler and a pair of compasses, construct the following equilateral triangles.**

- (i)  $\triangle ABC$  where  $m\overline{AB} = m\overline{BC} = m\overline{CA} = 4$  cm.
- (ii)  $\triangle DEF$  where  $m\overline{DE} = m\overline{EF} = m\overline{DF} = 3.5$  cm.
- (iii)  $\triangle PQR$  where  $m\overline{PQ} = m\overline{QR} = m\overline{PR} = 5.2$  cm.

**2. Using a ruler and a pair of compasses, construct the following isosceles triangles.**

- (i)  $\triangle ABC$  where  $m\overline{AB} = m\overline{BC} = 6$  cm;  $m\overline{AC} = 4$  cm.
- (ii)  $\triangle DEF$  where  $m\overline{DE} = 2.5$  cm,  $m\overline{EF} = m\overline{DF} = 4$  cm.
- (iii)  $\triangle PQR$  where  $m\overline{PQ} = 4$  cm,  $m\overline{QR} = m\overline{PR} = 3.5$  cm.

**3. Using a ruler and a pair of compasses, construct the following scalene triangles.**

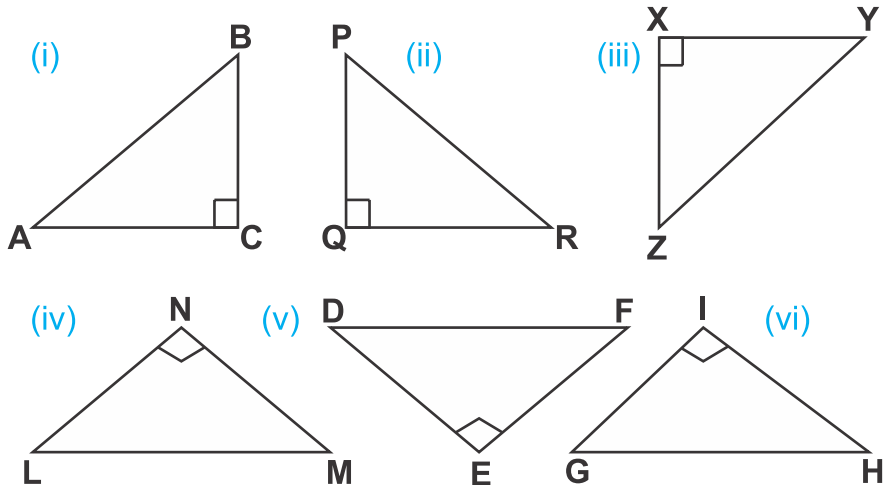
- (i)  $\triangle ABC$  where  $m\overline{AB} = 4.8$  cm,  $m\overline{BC} = 3$  cm and  $m\overline{AC} = 5$  cm.
- (ii)  $\triangle PQR$  where  $m\overline{PQ} = 4.5$  cm,  $m\overline{QR} = 5$  cm and  $m\overline{PR} = 3.5$  cm.
- (iii)  $\triangle EFG$  where  $m\overline{EF} = 5.2$  cm,  $m\overline{FG} = 4.4$  cm and  $m\overline{GE} = 3$  cm.

**4. Using ruler, protractor and a pencil to construct the following equilateral, isosceles and scalene triangles. Also measure the remaining two sides and one angle in each triangle.**

- (i) An equilateral  $\triangle ABC$  where  $m\overline{AB} = 5.7$  cm,  
 $m\angle ABC = m\angle BAC = 60^\circ$ .

- (ii) An isosceles  $\triangle LMN$  where  $m\overline{LM} = 5$  cm,  
 $m\angle LMN = m\angle MLN = 70^\circ$
- (iii) A scalene  $\triangle XYZ$  where  $m\overline{XY} = 6$  cm,  
 $m\angle XYZ = 60^\circ$ ;  $m\angle YXZ = 50^\circ$
- (iv) An equilateral  $\triangle RST$  where  $m\overline{RS} = 4.8$  cm  
and  $m\angle RST = m\angle TRS = 60^\circ$
- (v) A scalene  $\triangle EFG$  where  $m\overline{EF} = 5.5$  cm,  
 $m\angle EFG = 75^\circ$  and  $m\angle GEF = 65^\circ$
- (vi) An isosceles  $\triangle JKL$  where  $m\angle JLK = 45^\circ$ ,  $m\overline{JL} = 4.6$  cm  
and  $m\angle KJL = 45^\circ$

5. Look at the following right angled triangles. Name and measure the hypotenuse in each triangle.



6. Using a ruler and protractor to construct the following triangles. Measure the length of remaining two sides and one angle of the triangle.

- (i)  $\triangle ABC$  where  
 $m\overline{AB} = 5$  cm,  
 $m\angle BAC = 55^\circ$ ,  
 $m\angle ABC = 35^\circ$

- (ii)  $\triangle JKL$  where  
 $m\angle KJL = 65^\circ$ ,  
 $m\angle JKL = 25^\circ$ ,  
 $m\overline{JK} = 4.8$  cm

(iii)  $\triangle PQR$  where  
 $m \angle QPR = 30^\circ$   
 $m \angle PQR = 60^\circ$ ;  
 $m \overline{QP} = 4 \text{ cm}$

(iv)  $\triangle STU$  where  
 $m \overline{ST} = 5.3 \text{ cm}$ ,  
 $m \angle STU = 75^\circ$   
 $m \angle TSU = 15^\circ$

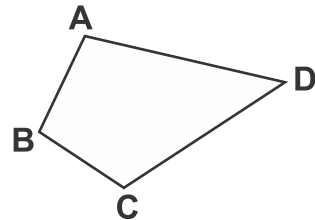
**7. Use protractor, a pair of compasses and ruler to construct the following triangles:**

- (i) Acute angled  $\triangle ABC$ , when  $m \angle BAC = 65^\circ$ ,  
 $m \overline{AB} = 3.6 \text{ cm}$  and  $m \overline{AC} = 4.4 \text{ cm}$ .
- (ii) Right angled  $\triangle DEF$ , when  $m \angle DEF = 90^\circ$ ,  
 $m \overline{DF} = 3 \text{ cm}$  and  $m \overline{EF} = 4 \text{ cm}$ .
- (iii) Obtuse angled  $\triangle LMN$ ,  $m \angle NML = 110^\circ$ ,  
 $m \overline{MN} = m \overline{ML} = 5 \text{ cm}$ .
- (iv) Acute angled  $\triangle PQR$ ,  $m \angle PQR = 60^\circ$ ,  
 $m \overline{PQ} = m \overline{QR} = 4 \text{ cm}$ .
- (v) Right angled  $\triangle XYZ$ , when  $m \angle XYZ = 90^\circ$ ,  
 $m \overline{XY} = 4.2 \text{ cm} = m \overline{YZ}$
- (vi) Obtuse angled  $\triangle STU$ , when  $m \angle STU = 120^\circ$ ,  
 $m \overline{ST} = 3.6 \text{ cm}$  and  $m \overline{TU} = 4.2 \text{ cm}$ .

### 7.3 QUADRILATERALS

A closed figure with four sides is called a quadrilateral


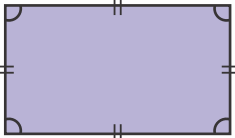
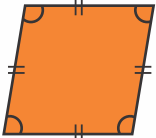
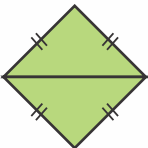
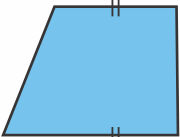
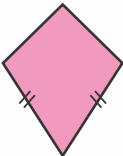
In the figure, quadrilateral ABCD has four sides  $\overline{AB}$ ,  $\overline{BC}$ ,  $\overline{CD}$  and  $\overline{AD}$ . It has four angles  $\angle A$ ,  $\angle B$ ,  $\angle C$  and  $\angle D$ .



The sum of measure all four angles of quadrilateral is equal to  $360^\circ$ .

### 7.3.1 Recognize the kinds of quadrilateral (square, rectangle, parallelogram, rhombus, trapezium and kite).

The kinds of a quadrilateral are:

Quadrilateral	Figure	Properties
Square		<ul style="list-style-type: none"> <li>All four sides are equal</li> <li>Opposite sides parallel</li> <li>Each angle is of <math>90^\circ</math></li> </ul>
Rectangle		<ul style="list-style-type: none"> <li>Opposite sides equal</li> <li>Opposite sides are parallel</li> <li>Each angle is of <math>90^\circ</math></li> </ul>
Parallelogram		<ul style="list-style-type: none"> <li>Opposite sides equal</li> <li>Opposite sides are parallel</li> <li>Opposite angles are equal.</li> <li>None of angle measure <math>90^\circ</math></li> </ul>
Rhombus		<ul style="list-style-type: none"> <li>Four equal sides</li> <li>Opposite sides are parallel</li> <li>Opposite angles are equal.</li> <li>None of angle measure <math>90^\circ</math></li> </ul>
Trapezium		<ul style="list-style-type: none"> <li>Only one pair of opposite parallel sides</li> </ul>
Kite		<ul style="list-style-type: none"> <li>Two pairs of adjacent equal sides</li> <li>Here one pair of equal angles</li> </ul>

#### Teacher's Note

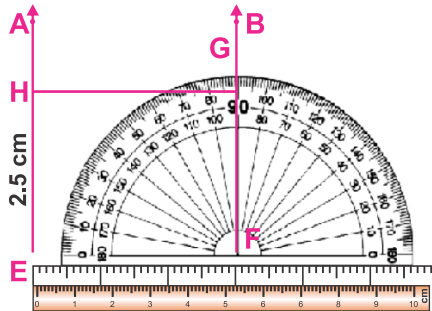
Teacher should help students to recognize the kinds of quadrilateral.

### 7.3.2 Use protractor, set squares and ruler to construct square and rectangle with given sides.

**Example 1:** With the help of ruler and protractor construct a rectangle of sides 4.5 cm and 2.5 cm.

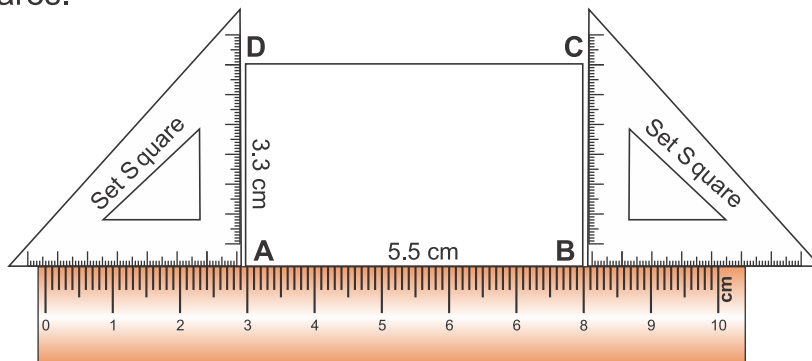
#### Steps of construction:

- Step I:** Use ruler, draw  $\overline{EF}$  of 4.5 cm.
- Step II:** At point F, draw  $\angle EFB = 90^\circ$  with the help of protractor.
- Step III:** Using ruler cut  $\overrightarrow{FB}$  such that  $\overline{FG}$  of 2.5 cm
- Step IV:** At point E, draw  $\angle FEA = 90^\circ$  with the help of protractor.
- Step V:** Using ruler, cut  $\overrightarrow{EA}$  such that  $\overline{EH}$  of 2.5 cm.
- Step VI:** Draw  $\overline{GH}$  by joining the points G and H i.e. draw  $\overline{GH}$  of 4.5 cm.



Hence quadrilateral EFGH is the required rectangle.

**Example 2:** To construct a rectangle of which the length is 5.5 cm and breadth is 3.3 cm with the help of ruler and a set squares.



#### Teacher's Note

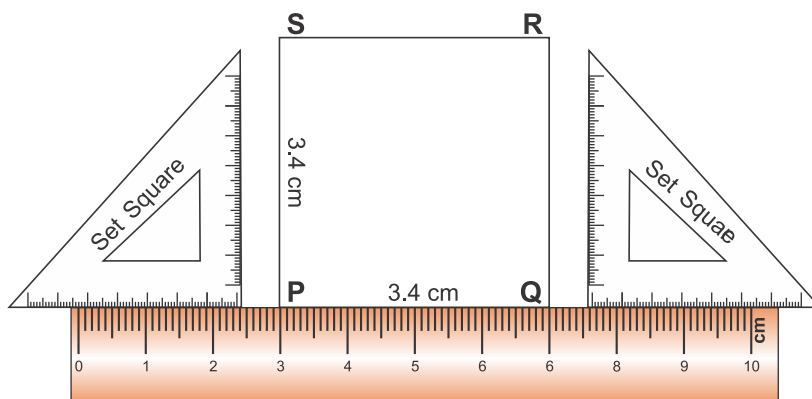
Teacher should help the students how to use protractor, set square and ruler for construction of rectangle.

**Steps of construction:**

- Step I:** Use ruler, draw  $\overline{AB}$  of 5.5 cm length.
- Step II:** Place both set squares on  $\overline{AB}$ , such that their right angled perpendicular sides are parallel to each other.
- Step III:** With the help of set squares, construct a perpendicular at point A. Cut it 3.3 cm and mark it point D.
- Step IV:** Construct perpendicular with the help of set squares at point B. Draw another perpendicular  $\overline{BC}$  and cut it 3.3 cm length and mark it point C.
- Step V** Join point C and D with the help of ruler and draw  $\overline{CD}$ .

Thus quadrilateral ABCD is the required rectangle.

**Example 3:** Construct a square of which the length of a side is 3.4 cm with the help of ruler and a set square.

**Steps of construction:**

- Step I:** Use ruler, draw  $\overline{PQ} = 3.4$  cm long.
- Step II:** Place both set squares on  $\overline{PQ}$ , such that their right angled perpendicular sides are parallel to each other.
- Step III:** With the help of set square, draw a perpendicular on point P. Measure it 3.4 cm and mark it as point S.

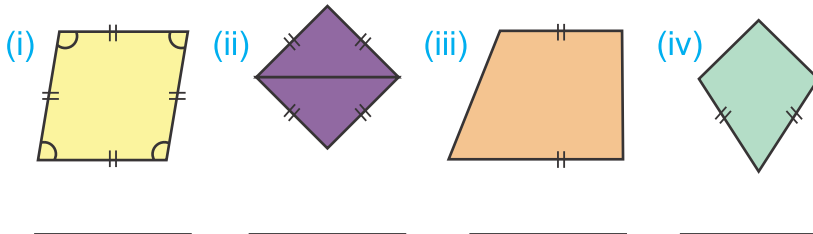
**Step IV:** Construct another perpendicular at point Q. Cut it 3.4 cm and mark it point R.

**Step V:** Use ruler, Join point R and S then draw  $\overline{RS} = 3.4$  cm long.

Thus quadrilateral PQRS is the required square.

### EXERCISE 7.7

1. Recognize the names and give the answers of the following for each quadrilateral.



**How many?**

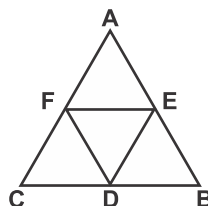
- (i) Sides \_\_\_\_\_ names \_\_\_\_\_
- (ii) Angles \_\_\_\_\_ names \_\_\_\_\_
- (iii) Vertex \_\_\_\_\_
- (iv) Measurement of each angle \_\_\_\_\_
2. Construct rectangle with sides given below with the help of a ruler and a protractor.
- (i) 4 cm, 3 cm      (ii) 6 cm, 3.5 cm      (iii) 5.5 cm, 2.8 cm
3. Construct a square with a side given below with the help of a ruler and a protractor.
- (i) 3 cm      (ii) 4 cm      (iii) 5.4 cm
4. Construct rectangles with sides given below with the help of a ruler and set squares.
- (i) 5 cm, 4 cm      (ii) 6 cm, 3 cm      (iii) 4.6 cm, 3.5 cm

5. Construct a square with a side given below with the help of a ruler and a set squares.

(i) 4 cm                      (ii) 5 cm                      (iii) 4.4 cm

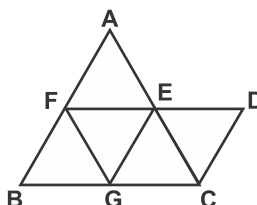
### REVIEW EXERCISE 7

- Marium and Sakina start from a point A. Marium moves towards east up to E and Sakina moves towards south up to S. Draw their paths and name the kind of angle which will be formed between them.
- State the kinds of angle that is formed between the following directions:
  - East and West
  - East and North
  - From North to West through East
- Is it possible to have a triangle, in which:
  - Two of the angles are right angles?
  - Two of the angles are acute?
  - Two of the angles are obtuse?
  - Each angle is less than  $60^\circ$ .



- How many quadrilaterals are formed in the adjoining figure? Name them.

- Write the names of the triangles and quadrilaterals formed in the figure. Also mention their kinds.



- Prove that a square is a rectangle but a rectangle is not a square. Give reasons in your own words.
- Two angles of a triangle are of measure  $65^\circ$  and  $45^\circ$ . Find the measure of the third angle.


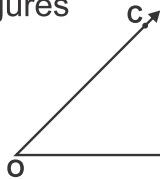
## 8.1 PERIMETER AND AREA

### 8.1.1 Recognize region of a closed figure.

There are two types of figures in geometry.

- (a) Open figures      (b) Closed figures

#### (a) Open figures:

A line  and an angle  are examples of open figures.

Here are some more examples of open figures.

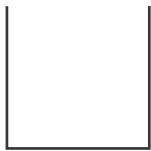


Fig. 1

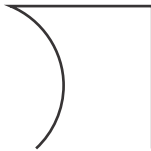


Fig. 2

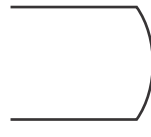


Fig. 3

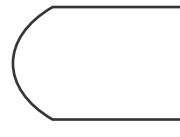


Fig. 4

We can not determine the region enclosed by the open figures because it is open on at least one side.

#### (b) Closed figures

Consider an other figure (i). It is closed figure represented by the triangle XYZ.

It shows the triangular region which is marked by dots.  $\overline{XY}$ ,  $\overline{YZ}$ , and  $\overline{ZX}$  form the boundary of the triangular region XYZ. The sides  $\overline{XY}$ ,  $\overline{YZ}$ , and  $\overline{ZX}$  are the parts of triangular region.

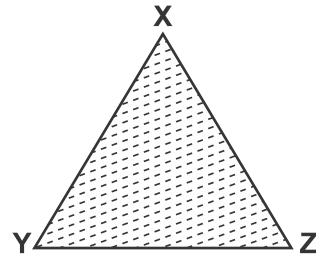


Fig. (i)

We can also show the closed figure in the form of the circular region figure (ii). The boundary of this circular region is the circle itself.

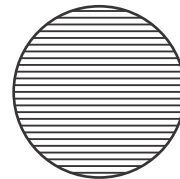


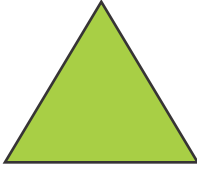
Fig. (ii)

#### Teacher's Note

Teacher should demonstrate the open and closed geometrical figures through thread/rope.

## 8.1.2 Differentiate between perimeter and area of a region.

Look at the following figures.



A triangular region



A square region



A rectangular region

Here we see that these regions are bounded of line segments. This means that we find the distance around the figure or the length of the boundary which is known as the **perimeter** of the figure.

“**Perimeter**” is the measure of the total length of the sides, or of any closed figure. It is the length of the sides, or the boundary of the region.

“**Area**” is the measure of the region within a closed figure. We can find the area of a closed figure by fitting unit squares in the region.

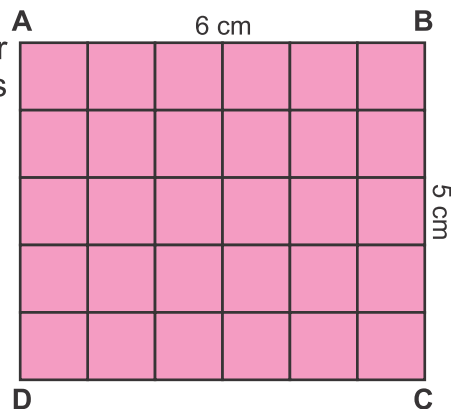
**Example:** Find the perimeter and area of rectangle with sides of 5cm and 6cm.

**Solution:**

$$\text{Length} = 6 \text{ cm}$$

$$\text{Breadth} = 5 \text{ cm}$$

$$\begin{aligned} \text{Perimeter} &= B + L + B + L \\ &= 5 + 6 + 5 + 6 \\ &= 22 \text{ cm} \end{aligned}$$



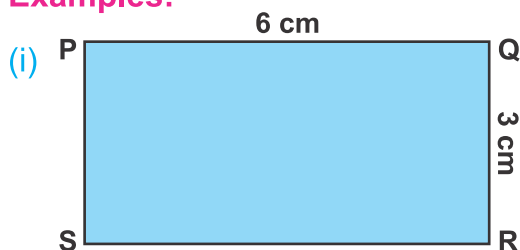
In given rectangle there are total 30 unit squares. So, the area of ABCD = 30 squares cm.

## 8.1.3 Identify units for measurement of perimeter and area.

## (a) Units for the perimeter

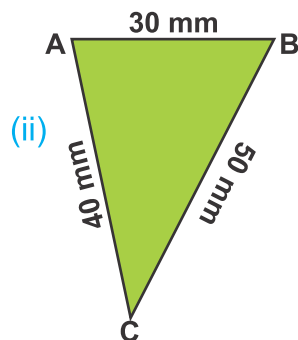
Look at the following figures:

## Examples:



Here PQRS is a rectangle.

$$\begin{aligned} m\overline{PQ} &= 6 \text{ cm} \\ m\overline{QR} &= 3 \text{ cm} \\ m\overline{SR} &= 6 \text{ cm} \\ m\overline{PS} &= + 3 \text{ cm} \\ \text{Perimeter} &= \underline{\underline{18 \text{ cm}}} \end{aligned}$$



Here ABC is a triangle.

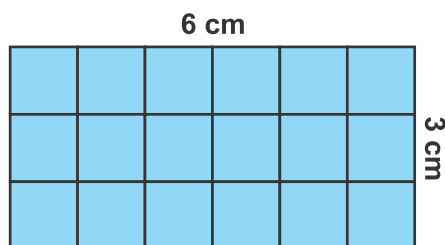
Remember 10 mm = 1 cm

$$\begin{aligned} m\overline{AB} &= 30 \text{ mm} = 3 \text{ cm} \\ m\overline{BC} &= 50 \text{ mm} = 5 \text{ cm} \\ m\overline{AC} &= 40 \text{ mm} = + 4 \text{ cm} \\ \text{Perimeter} &= \underline{\underline{12 \text{ cm}}} \\ &= (30 + 50 + 40) \text{ mm} \\ &= 120 \text{ mm} = 12 \text{ cm} \end{aligned}$$

The unit for the perimeter is the same as the length used, i.e we can use mm, cm, m and km as the units for measurement of the perimeter.

## (b) Units of the area

In the figure the length of rectangle is 6 cm and its breadth is 3 cm. We can find its area by fitting each unit squares with one side of 1 cm. There are total 18 unit squares in the rectangle.



So its area is 18 squares with side of 1 cm each.

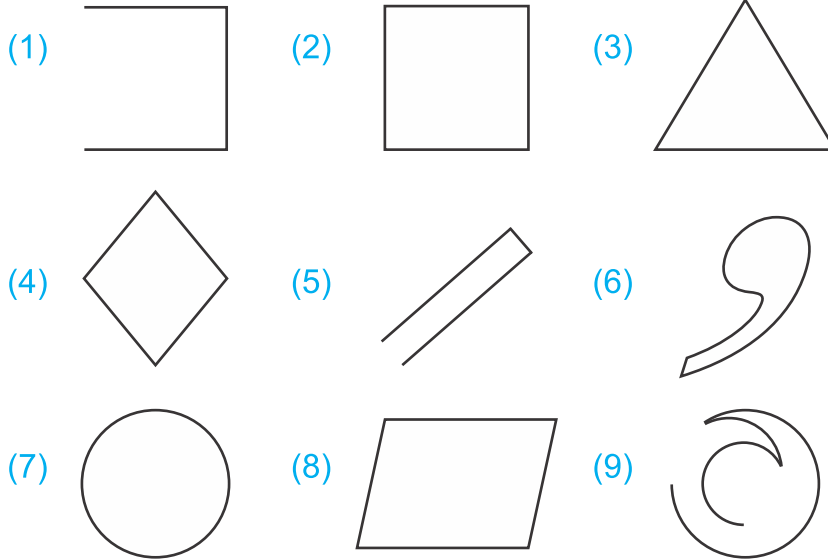
i.e Area = 18 sq. cm

Here the unit of area is sq. cm

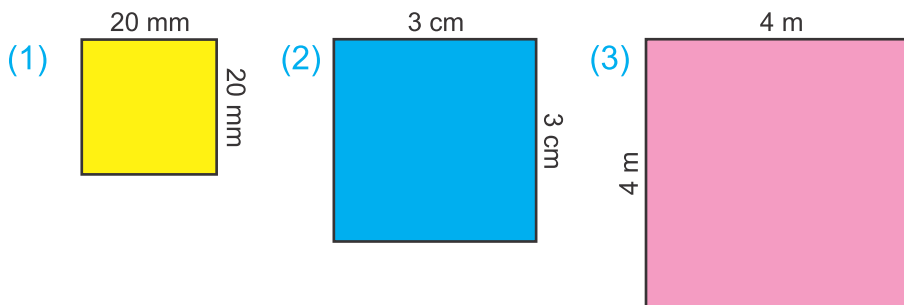
Similarly sq. m, sq. km, sq. mm are also the units of area.

EXERCISE 8.1

A. Look at the following figures carefully. (✓) the shapes which are closed figures and (✗) the open figures.

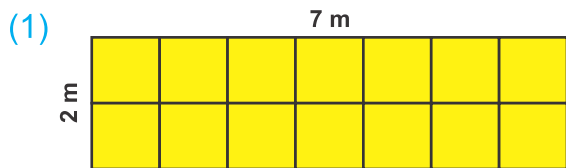


B. Find the perimeter and write the unit of perimeter for each of the following:

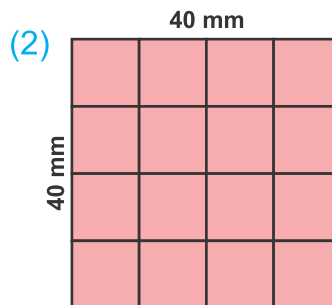


- (a) Here perimeter \_\_\_\_\_. (a) Here perimeter \_\_\_\_\_. (a) Here perimeter \_\_\_\_\_.  
 (b) Unit of perimeter \_\_\_\_\_. (b) Unit of perimeter \_\_\_\_\_. (b) Unit of perimeter \_\_\_\_\_.

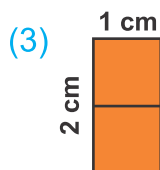
C. Find the area by counting small unit squares and write the unit of area for each of the following:



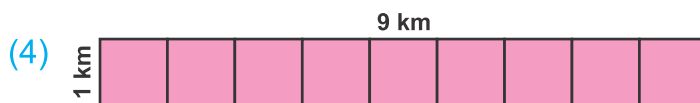
- (a) Area \_\_\_\_\_ squares.  
 (b) Unit of area \_\_\_\_\_.



- (a) Area \_\_\_\_\_ squares.  
 (b) Unit of area \_\_\_\_\_.



- (a) Area \_\_\_\_\_ squares.  
 (b) Unit of area \_\_\_\_\_.



- (a) Area \_\_\_\_\_ squares.  
 (b) Unit of area \_\_\_\_\_.

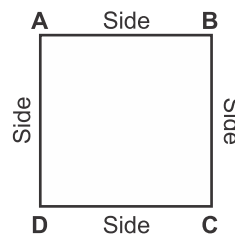
Write and apply the formulas for the perimeter and area of a square and rectangle

(a) Formulas for perimeter of a square and rectangle

(i) We know that a square is a quadrilateral shape in which all its four sides are equal.

Perimeter of the square

$$\begin{aligned} \text{ABCD} &= m\overline{AB} + m\overline{BC} + m\overline{CD} + m\overline{DA} \\ &= \text{side} + \text{side} + \text{side} + \text{side} \\ &= 4 \times \text{side} \\ &= 4 \times (\text{length of a side of square}) \end{aligned}$$



Thus, formula for perimeter of a square figure = 4 x length of side

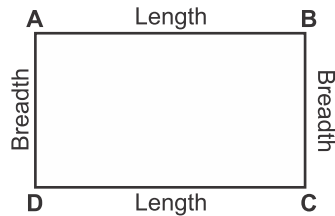
- (ii) Draw a rectangle ABCD.  
Measure its sides.

Then find its perimeter as follows:

Perimeter of the rectangle ABCD

$$\begin{aligned}
 &= m\overline{AB} + m\overline{BC} + m\overline{CD} + m\overline{DA} \\
 &= \text{length} + \text{breadth} + \text{length} + \text{breadth} \\
 &= 2 \times \text{length} + 2 \times \text{breadth} \\
 &= 2 \times (\text{length} + \text{breadth})
 \end{aligned}$$

Thus, formula for perimeter of a rectangle  
=  $2 \times (\text{length} + \text{breadth})$



(b) **Formulas for area of a square and rectangle**

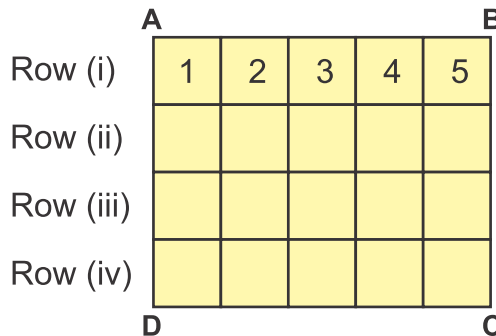


**Activity 1**

Look at the rectangle ABCD with the length of 5 cm and breadth 4 cm.

Length \_\_\_\_\_

Breadth \_\_\_\_\_



- (i) What is the length of rectangle ABCD?
- (ii) What is the breadth of rectangle ABCD?
- (iii) How many rows in the figure?
- (iv) How many unit squares in one row?
- (v) How many unit squares altogether?

Thus, the area of given rectangle ABCD =  $20 \text{ cm}^2$

So, area of rectangle = Length x Breadth

Thus the formula for finding the area A of a rectangle is:

$$\text{Area of a rectangle} = \text{Length} \times \text{Breadth}$$

$$\text{or } A = L \times B$$

**Example.** Find area of a rectangle whose length is 5 cm and breadth is 2 cm.

**Solution:**

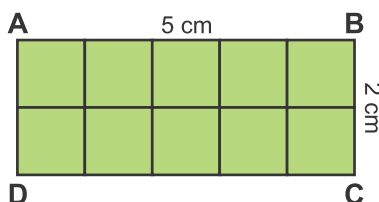
Here length = 5 cm

breadth = 2 cm

Area of a rectangle ABCD

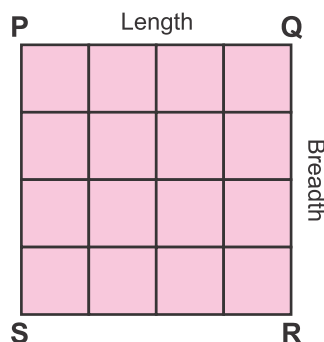
$$= \text{Length} \times \text{Breadth.}$$

$$= 5 \times 2 = 10 \text{ sq. cm}$$



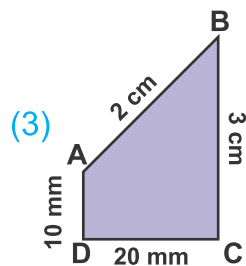
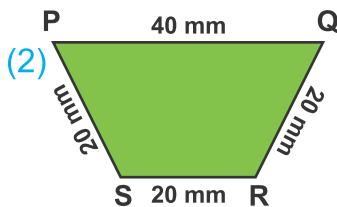
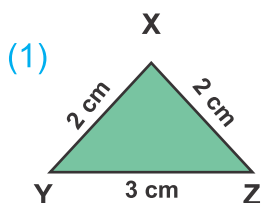
Using formula, find area of the given square shape.

Since the length and breadth of a square are equal, the area of a square PQRS = Side x Side

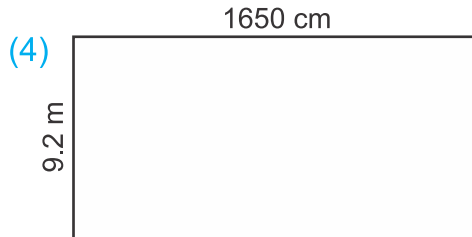
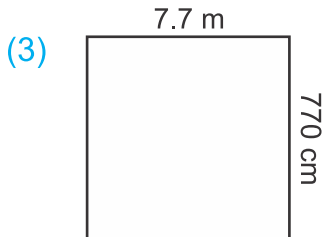
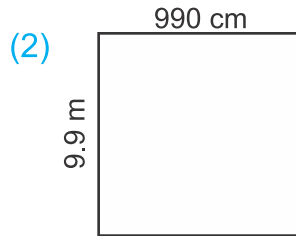
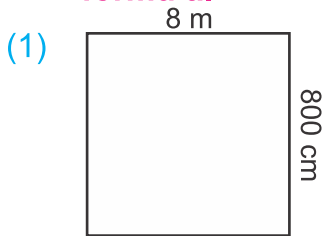


### EXERCISE 8.2

**A. Find the perimeter of each of the following figures:**



**B. Find the area of the following shapes by using formula.**



**C. Find the area and perimeter of each of the following rectangles.**

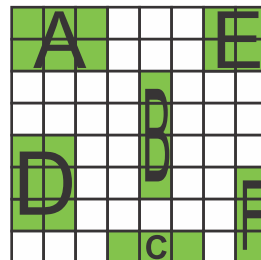
- |                          |                          |
|--------------------------|--------------------------|
| (1) L = 3 cm, B = 2 cm   | (2) L = 5 cm, B = 1 cm   |
| (3) L = 4 cm, B = 3 cm   | (4) L = 8 cm, B = 2 cm   |
| (5) L = 9 cm, B = 5 cm   | (6) L = 7 cm, B = 4 cm   |
| (7) L = 4.5 cm, B = 2 cm | (8) L = 8 cm, B = 3.5 cm |

**D. Find area and perimeter of a square whose sides are given below:**

- |            |               |               |
|------------|---------------|---------------|
| (1) 4 cm   | (2) 6 cm      | (3) 7.5 cm    |
| (4) 8.2 cm | (5) 5 cm 6 mm | (6) 9 cm 2 mm |

**E. Answer the questions.**

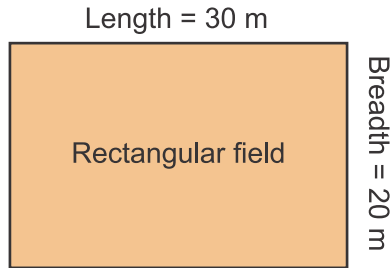
- (1) Which shape has the same area as shape B?
- (2) Which shape has the same area as shape C?
- (3) Which rectangle shapes are equal in area as rectangle A?
- (4) Which rectangle shapes are equal in area as square E?
- (5) Which shapes have the same area?



Solve appropriate problems of perimeter and area.

**Example 1.** Length of a rectangular field is 30 m and its breadth is 20 m. Find the perimeter of the rectangular field.

**Solution:**



Length of the given rectangular field = 30 m

Breadth of the given rectangular field = 20 m

**Formula:** Perimeter of the given rectangular field is

$2 \times (\text{Length} + \text{Breadth})$

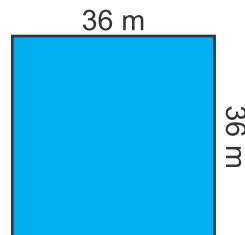
$$= 2 \times (30 \text{ m} + 20 \text{ m})$$

$$= 2 \times 50 \text{ m} = 100 \text{ m}$$

**Example 2.** A square ground has each side 36 m. What distance will a boy cover by cycling around the ground three times?

**Solution:** The side of the square ground is 36 m each. Therefore perimeter of the ground is:

$$\begin{aligned} 4 \times \text{side} &= 4 \times 36 \text{ m} \\ &= 144 \text{ m} \end{aligned}$$



144
$\times 3$
<hr style="border: none; border-top: 1px solid black;"/>
432

In one time boy will cover 144 m distance.

In three times the boy will cover  $144 \times 3 = 432 \text{ m}$

**Example 3.** The perimeter of a rectangular park is 320m. Its length is 70m. Find the breadth.

**Solution:**

$$\text{Perimeter} = 320\text{m}$$

$$\text{Length} = 70\text{m}$$

$$\text{Perimeter} = 2 \times (\text{length} + \text{breadth})$$

$$\text{Breadth} = \frac{\text{Perimeter}}{2} - \text{Length}$$

$$= \left( \frac{160}{2} \right) - 70 = \frac{160}{1} - 70$$

$$= 160 - 70 = 90\text{m}$$

**Example 4.** The perimeter of a square shape is 280 cm. Find the length of each side.

**Solution:**

$$\text{Perimeter} = 280 \text{ cm}$$

$$\text{Length of each side} = \frac{\text{Perimeter}}{4}$$

$$= \frac{70}{1} = 70 \text{ cm}$$

**Example 5.** A rectangular field is 80m long and 60m wide. Find the cost of laying green grass in it; at a rate of Rs 2.50 per sq. Metre.

(Remember wide = width = breadth).

**Solution:**

Rectangular field has length = 80m, width = 60m

Area of rectangular field = Length x Width

$$= 80\text{m} \times 60\text{m}$$

$$= 4800 \text{ sq. m}$$

Now let us find the cost of laying green grass in the field.

One sq. metre costs Rs 2.50

4800 sq. metres will cost Rs (4800 x 2.50)

$$= \text{Rs } 12000$$

## EXERCISE 8.3

1. A rectangular park is 84 m long and 56 m broad. Find the perimeter of the park.
2. A square room is 7 m wide. Find the area of the room.
3. A square picture is 60 cm wide. How long wooden frame will be required to reap it from all sides?
4. The length and breadth of a rectangular agriculture field are 190 m and 160 m respectively. Find the area and the perimeter of the field.
5. How much lace is required to fix around a rectangular bed sheet, whose length is 2 m 80 cm and width is 1 m 50 cm?
6. Find the area of both fields; a square of 25 m side and a rectangle 30 m in length and 20 m in breadth.
7. A rectangular agriculture park is 75 m long and 40 m wide. Find the cost of laying green grass in it at the rate of Rs 25 per square metre.
8. Consider a room 15m long and 12m wide. A square carpet 10m x 10m is placed on it.
  - (i) What is the area of the floor of the room?
  - (ii) What is the area of the carpet?
  - (iii) Which is the more in area; the floor or the carpet?  
And by how much?

## REVIEW EXERCISE 8

**A. Choose and tick (✓) the correct answer.**

- The space occupied by the boundary of a shape is called:  
(a) Triangle (b) Square (c) Perimeter (d) Region
- The distance along all the sides of a closed shape is called:  
(a) Triangle (b) Square (c) Perimeter (d) Region
- The perimeter of a square of length of each side 4 cm is:  
(a) 16 m (b)  $16 \text{ m}^2$  (c) 16 cm (d)  $16 \text{ cm}^2$
- The area of a square having each side of 3 cm is:  
(a) 6 cm (b) 9 cm (c)  $9 \text{ cm}^2$  (d) 12 cm
- The area of a rectangle with length 4 cm and breadth 2 cm is:  
(a) 4 cm (b) 8 cm (c)  $8 \text{ cm}^2$  (d) 12 cm
- The perimeter of a rectangle with length 6 cm and breadth 3 cm is:  
(a) 6 cm (b) 18 cm (c) 9 cm (d) 15 cm

**B. Answer the following questions.**

- Write formula of area of a square.
- Write formula of perimeter of a rectangle.
- Find the perimeter and area of a square of side 7 cm.
- Find the perimeter and area of a rectangle with length and breadth 8 cm and 5 cm respectively.

In this chapter we will learn how to use numbers to display different kinds of information

## 9.1 AVERAGE

### 9.1.1 Define an average (arithmetic mean)

Consider the following example.

**Example.** Once Shahid Afridi made 6 runs in the first over, 10 runs in the second over, 8 runs in the third over and 4 runs in the fourth over.

**Now answer the following questions:**

1. What was the number of his total runs?

$$6 + 10 + 8 + 4 = \mathbf{28 \text{ runs}}$$

2. How many overs did he play?

**4 overs**

3. What was his run rate (runs per over)?

To answer this question we find average as under:

$$\begin{aligned} \text{Run rate} &= \frac{\text{Total runs made in all the overs}}{\text{Total numbers of overs played}} \\ &= \frac{\overset{7}{\cancel{28}} \text{ runs}}{\underset{1}{\cancel{4}} \text{ overs}} = 7 \text{ runs per over} \end{aligned}$$

The run rate **7** is the average score. This 7 represents his performance in all the overs.

Or

Average is the, overall representative value of the information. It is also called the **mean** or the **arithmetic mean**.

Average = Sum of the quantities divided by the total number of quantities

### Teacher's Note

Teacher should help the students to understand the concept of average and develop the formula to find the average.

### 9.1.2 Find an average of given numbers.

**Example.** Find the average of 5, 8, 10, 12 and 20.

**Solution:**

Sum of given numbers =  $5 + 8 + 10 + 12 + 20$

$$\text{Average} = \frac{\text{Sum of quantities}}{\text{Total number of quantities}}$$

$$\begin{aligned} \text{Average} &= \frac{5 + 8 + 10 + 12 + 20}{5} = \frac{55}{5} \\ &= \frac{\overset{11}{\cancel{55}}}{\cancel{5}_1} = \frac{11}{1} = 11 \end{aligned}$$

Thus the average of the given numbers is **11**.



#### Activity 1

**Find the average of first five even numbers.**

**Solution:** First five even numbers are: 2, 4, 6, 8 and 10.

$$\text{Average} = \frac{\text{Sum of numbers}}{\text{Total number}}$$

Solve it,

$$= \frac{2 + 4 + 6 + 8 + 10}{5} = \boxed{\quad} = \boxed{\quad}$$



#### Activity 2

**Find the average of first five odd numbers.**

**Solution:** First five odd numbers are: 1, 3, 5, 7 and 9.

$$\text{Average} = \frac{\text{Sum of numbers}}{\text{Total number}}$$

Solve it,

$$= \underline{\hspace{2cm}} = \boxed{\quad} = \boxed{\quad}$$

**Example:** Find the average of given numbers.

4.5, 5.5, 7.5, 6.5, 6.5, 9.5, 7.6

$$\begin{aligned}\text{Solution: Average} &= \frac{\text{Sum of given quantities}}{\text{Numbers of given quantities}} \\ &= \frac{4.5 + 5.5 + 7.5 + 6.5 + 6.5 + 9.5 + 7.6}{7} \\ &= \frac{47.6}{7} = 6.8\end{aligned}$$

### EXERCISE 9.1

Find the average (mean) of the following numbers.

- (1) 12, 14, 16, 18 and 20      (2) 1, 2, 3, 4, 5, 6 and 7  
 (3) 6, 7, 8, 9, 7, 6, 5 and 15      (4) 2, 3, 5, 7, 11, 13, 17 and 19  
 (5)  $\frac{1}{2}$ ,  $\frac{2}{5}$ ,  $\frac{3}{4}$  and  $\frac{4}{5}$       (6)  $\frac{3}{10}$ ,  $\frac{7}{20}$ ,  $\frac{11}{30}$ ,  $\frac{13}{40}$  and  $\frac{17}{50}$   
 (7) 1.1, 2.2, 3.3, 4.4, 5.5 and 6.6      (8) 13.5, 7.5, 6.5, 9.5, 5.5 and 7.5  
 (9)  $1\frac{2}{3}$ ,  $4\frac{5}{6}$ ,  $7\frac{8}{9}$ ,  $10\frac{11}{12}$  and  $13\frac{14}{15}$       (10)  $6\frac{5}{6}$ ,  $7\frac{1}{2}$ ,  $8\frac{1}{3}$  and 5

#### 9.1.3 Solve real life problems involving average.

**Example 1.** The attendance of class V during six days of a week is 44, 40, 37, 42, 35 and 36. Find the average attendance?

**Solution:** Daily attendance = 44, 40, 37, 42, 35, 36.

$$\text{Average} = \frac{\text{Total attendance}}{\text{Number of days}}$$

$$\begin{aligned}\text{Average attendance} &= \frac{44 + 40 + 37 + 42 + 35 + 36}{6} = \frac{234}{6} \\ &= \frac{\overset{39}{\cancel{234}}}{\cancel{6}_1} = \frac{39}{1} = 39\end{aligned}$$

Thus average attendance is 39.

**Example 2.** The business train covers a distance of 450 km in 6 hours. What is its average speed?

**Solution:**

$$\begin{aligned} \text{Average speed} &= \frac{\text{Distance covered}}{\text{Number of hours}} = \frac{450 \text{ km}}{6 \text{ hours}} \\ &= \frac{\overset{75}{\cancel{450}} \text{ km}}{\underset{1}{\cancel{6}} \text{ hours}} = \frac{75 \text{ km}}{1 \text{ hr}} = 75 \text{ km per hr} \end{aligned}$$

Thus average speed of the train will be **75 km/hr**.

### EXERCISE 9.2

- Rabia obtained 65 marks in Maths, 72 marks in Urdu, 60 marks in Science, 75 marks in Sindhi and 70 marks in Islamiyat. Find her average marks.
- Kalsoom saved rupees 13, 15, 12, 20, 25, 30 and 18 during a week. What is her average saving per day?
- The maximum temperature of Sanghar city recorded during the week of June last year was  $36.3\text{C}^\circ$ ,  $42.7\text{C}^\circ$ ,  $41.6\text{C}^\circ$ ,  $38.5\text{C}^\circ$ ,  $40.4\text{C}^\circ$ ,  $41.9\text{C}^\circ$  and  $42.8\text{C}^\circ$ . Find the average temperature during that week.
- A Qari wants to recite the Holy Qura'n in 15 days during the holy month of Ramzan. What will be the average number of Paras he has to recite daily?
- Saleem scored 50, 70, 100, 60 runs in the four one day matches. What was his average score?
- A labour earns Rs 577 on the first day, Rs 600 on the second day and Rs 725 on the third day. Find his average income per day.

7. A train covers a distance of 560 km in 8 hours from Karachi to Rohri. What is its average speed?
8. A car covers a distance of 55 km in the first hour, 60 km in the second hour, 45 km in the third hour and 30 km in the fourth hour. Find the average speed of the car.
9. Akmal gets 8 wickets for 72 runs. Find the average runs he has given for each wicket.
10. Kulsoom's father told her that he would buy her a bicycle if she scored an average of 80 marks in her exams. The scores of all of her exams are below. Did she get the bicycle?  
Urdu: 85, English: 70, Math: 82, Science: 77, Social Studies: 75, Islamiat: 89.

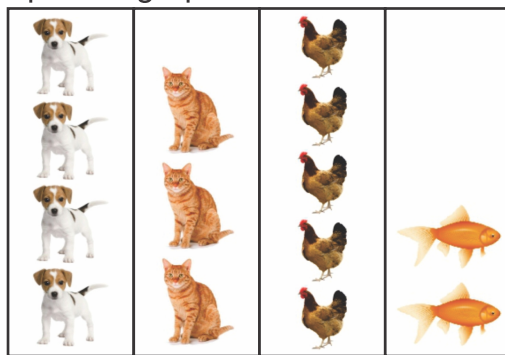
## 9.2 BLOCK, COLUMN AND BAR GRAPH

### Draw block graphs or column graphs

We have learnt picture graph in previous classes.

Let us revise an example.

The number of animals in Ali's farm house has been represented in picture graph.



**Dogs      Cats      Hens      Fish**

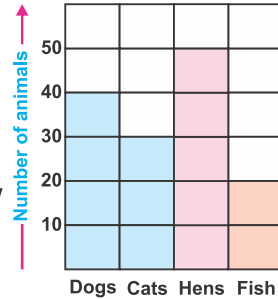
Each  represent 10 dogs.

Each  represent 10 cats.

Each  represent 10 hens.

Each  represent 10 fish.

This diagram is called **picture graph**. Picture graph helps us to see quantity of each thing/item at a glance and help us to compare their differences. We can show these number of animals in blocks as:

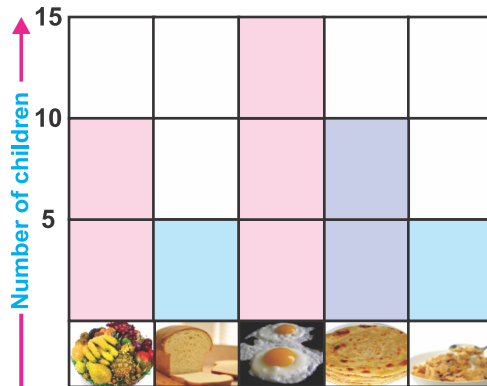


We call this a **block graph** or **column graph**. Column graph is used to represent small objects and quantities.

**Example 1.** Following table shows the result of the favourite breakfast food taken by class V students. Draw a block graph.

Fresh Fruit	Toast/Bread	Eggs	Paratha	Cereal
10	5	15	10	5

**Solution:**



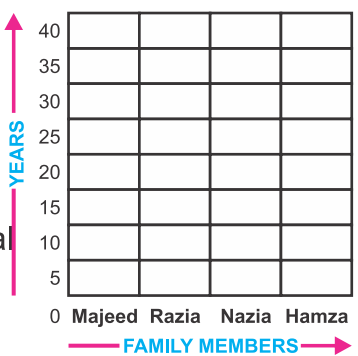
**Read the above graph and answer the following questions:**

- How many students eat Paratha?
- Which breakfast is the most favourite?
- Which breakfast is least favourite?




**Activity** The ages of Nazia's family members are as under. Help her draw the block graph.

Majeed is 30 years old.  
Razia is 25 years old.  
Nazia is 10 years old.  
Hamza is 5 years old.



**Step 1:** Select the ages on vertical side and family members on horizontal side of the graph.

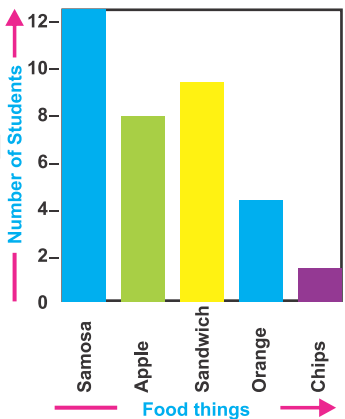
**Step 2:** Colour the columns to show the information.

**9.2.2 Read and interpret a simple bar graphs given in horizontal and vertical form.**



**Activity** Read the vertical bar graph and write the correct answer in the box.

This bar graph represents information about students and what they ate at break time in school. The different food things are shown horizontally and number of students are shown vertically.



**Answer the following questions.**

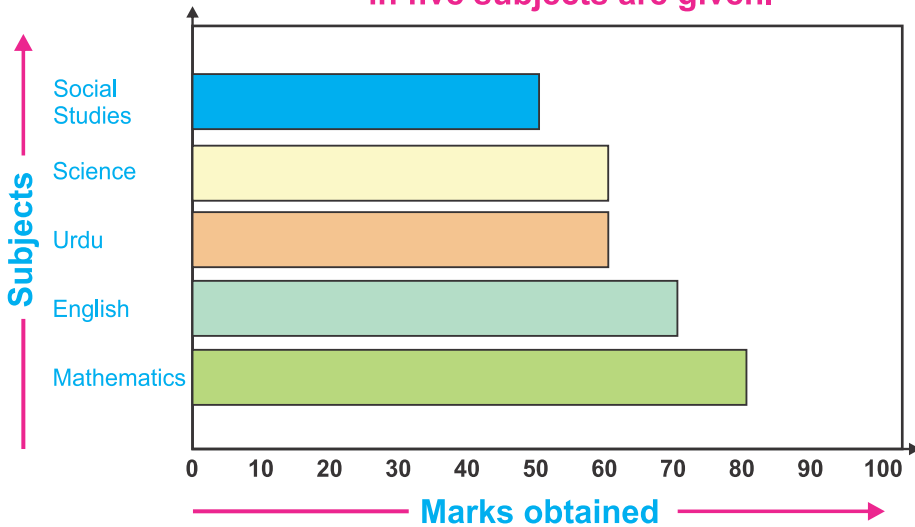
- (1) How many children ate oranges?
- (2) How many children ate apples?
- (3) How many total children were in the school?
- (4) How many children ate samosa?
- (5) How many total ate chips?
- (6) How many children ate sandwich?

12



## Activity

Read the following horizontal bar graph. In this graph, the marks obtained by Yasir of Grade V in five subjects are given.



Read the horizontal bar graph and answer the following questions:

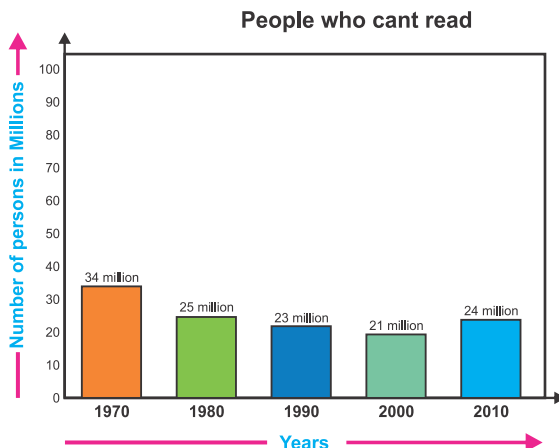
- How many marks did Yasir get in English? 70
- How many marks did he get in Urdu?
- How many marks did he get in Mathematics?
- How many marks did he get in Science?
- How many marks did he get in Social studies?
- In which subjects did he got the least number of mark?
- How many total marks did he get?
- In which subject did he get the highest marks?
- Which subjects he get equal marks?



**Activity**

The following bar graph shows the number of people who cannot read of a country in different years.

Time in years is shown on horizontal axis. The number in millions is shown on vertical axis.



Read the vertical bar graph and answer the following questions:

- (i) How many people could not read in 1990?
- (ii) In which year was number of people who could not read highest?
- (iii) What was the number of people who could not read in 1980?
- (iv) How many people who could not read were in 2010?
- (v) In which year was 2nd highest people who could not read?
- (vi) How many fewer people illiterates in 2000 than in 1990?

## EXERCISE 9.3

1. Draw a block graph or column graph of the following:

(i) Attendance of Faraz's class during a week.

Days	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Children	32	35	30	30	25	20

(ii) Result of examination of class V.

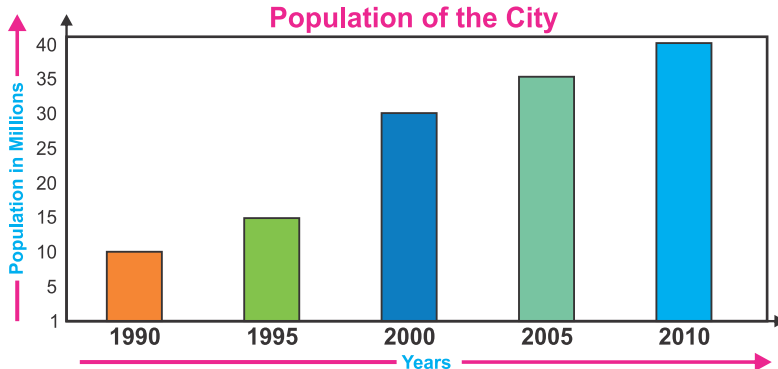
Grade	A1	A	B	C	D
No. of Children	20	25	15	20	5

(iii) The marks obtained by Amjad during annual examination.

Subject	Islamiyat	English	Urdu	Maths	S.Studies	Science
Marks Obtained	80	50	65	90	40	55

2. The population of Dadu city is represented in the following bar graph.

Years are shown on horizontal axis.  
Population in millions is shown on vertical axis.

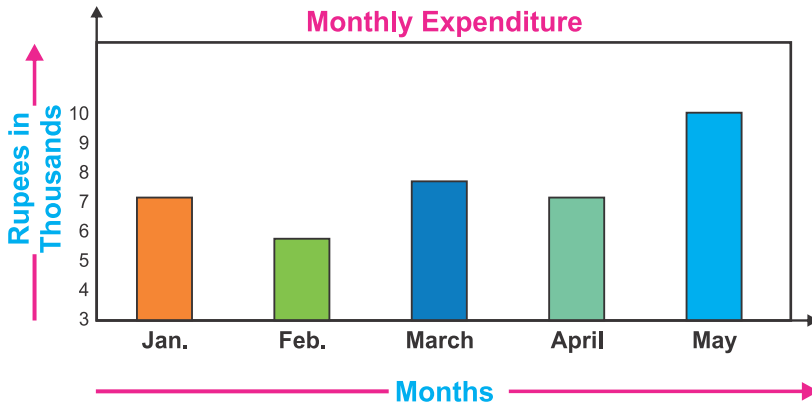


Read the graph and answer the following questions:

- |  |   |
|--|---|
| (i) What was the population of the city in 1995?           | <input style="width: 100%; height: 20px;" type="text"/> |
| (ii) What was the population of the city in 2000?          | <input style="width: 100%; height: 20px;" type="text"/> |
| (iii) What was the population of the city in 2005?         | <input style="width: 100%; height: 20px;" type="text"/> |
| (iv) In which year the population was least?               | <input style="width: 100%; height: 20px;" type="text"/> |
| (v) In which year the population was highest?              | <input style="width: 100%; height: 20px;" type="text"/> |
| (vi) How many more people were there in 2010 than in 2005? | <input style="width: 100%; height: 20px;" type="text"/> |

3. The expenditure of a family for five months is reported by the following bar graph.

Names of months are shown on horizontal axis. Amount of expenditure in thousand rupees is shown on vertical axis.



Look at the graph and answer the following questions:

- (i) In which month expenditure was the least?
- (ii) In which month the expenditure was the greatest?
- (iii) What was the expenditure in the month of February?
- (iv) What was the expenditure in the month of April?
- (v) In which months the expenditure is equal?
- (vi) In which month the expenditure is Rs 8000?
- (vii) What is the highest amount of expenditure?
- (viii) What is the difference of expenditure between months of April and May?

### 9.2.3 Define and organize data.

#### (a) Definition of Data

The information collected from any survey, observation or research is called data. Mostly it is represented in the form of numbers.

**Example:** Favourite colour of class IV students, different age groups in class V, marks obtained by some one in an examination, any office record, match scores; etc.

#### (b) Organizing Data

There are many ways of collecting and organizing data.

Data can be represented through pictures, tables, charts and graphs.

**Example:** The organizer of a market survey wants to know the ages of the customers.

#### Solution:

The ages of customers are:

17, 12, 15, 20, 25, 17, 19, 11, 12,  
15, 20, 20, 12, 20, 22, 20, 19, 15

This way of representing the information does not help the organizer to answer any question.

Now we write the above information in ascending order:

11, 12, 12, 12, 15, 15, 15, 17, 17,  
19, 19, 20, 20, 20, 20, 20, 22, 25

Table (i)

#### Teacher's Note

Teacher should help the students to develop the concept of data and of organizing different data. He/she should give them tasks to collect and represent different data from their surroundings.

Though it is one way but it is time taking. There is possible that some data may be missed. However, it is easier to read data. Now we organize the data in another way through tally method.

Age of customers in years	Tally marks	Number of customers
11		1
12		3
15		3
17		2
19		2
20		5
22		1
25		1

Table (ii)

The organizer now read the ages one by one from Table (i) and draws one small line called tally in the tally column against the age read in table (ii). If a number occurs five times he crosses the four tallies already drawn by a slash like this (||||). Thus (||||) stands for five numbers. Then counts the tallies and write the numbers in the last column shown in table.

**Example:**

The mathematics marks of class V students are as under:

**organize the data**

32, 30, 31, 33, 33, 34, 34, 33, 32, 32, 34, 35,  
35, 32, 33, 32, 31, 33, 32

**Solution:**

Now we write the above information in ascending order:

30, 31, 31, 32, 32, 32, 32, 32, 32, 33,  
33, 33, 33, 33, 34, 34, 34, 35, 35

The data is represented through tally chart.

Marks obtained	Tally	No. of students
30		1
31		2
32		6
33		5
34		3
35		2



### Activity

Organize the following information through tally method. The ages of students of class V in a school are given in the following table:

Ages of students in years	11	12	11	13	10	11	13	12	13	14
	12	13	11	11	14	10	12	12	11	13

**Solution:** Writing the above information in ascending order:

Ages of students in years	10		11						12	
				13					14	

Organize the given data through tally method

Ages of students in years	Tally	No. of same ages of students
10		
11		
14		

## EXERCISE 9.4

Organize the following survey information through tally method.

1. The pocket money of students of Class V is found as: Rs 30, Rs 40, Rs 50, Rs 40, Rs 50, Rs 60, Rs 50, Rs 40, Rs 70, Rs 60, Rs 50, Rs 40, Rs 30, Rs 40 and Rs 50.
2. The heights of students of Class V in a school are noted as: 110 cm, 115 cm, 100 cm, 105 cm, 104 cm, 110 cm, 108 cm, 100 cm, 100 cm, 105 cm, 110 cm, 104 cm, 105 cm, 100 cm, 115 cm, 105 cm, 110 cm, 105 cm, 100 cm and 105 cm.
3. The attendance of 20 days of class V students are: 15, 18, 16, 17, 18, 17, 18, 17, 16, 15, 16, 17, 18, 18, 17, 16, 18, 17, 16 and 17.
4. A gardener planted different numbers of plants in 18 days as under:  
2, 1, 3, 5, 6, 3, 2, 3, 1, 2, 3, 4, 3, 2, 5, 5, 2 and 3.
5. The number of patients daily checked by doctor in 15 days are: 35, 40, 36, 35, 35, 40, 37, 35, 40, 38, 35, 40, 39, 40 and 35.
6. A team played 6 matches. The score was 210, 189, 180, 205, 175 and 165 runs respectively. What is the average score?
7. The enrolment of a school is 460 students. If there are 8 class rooms, what is the average of students in each class room?

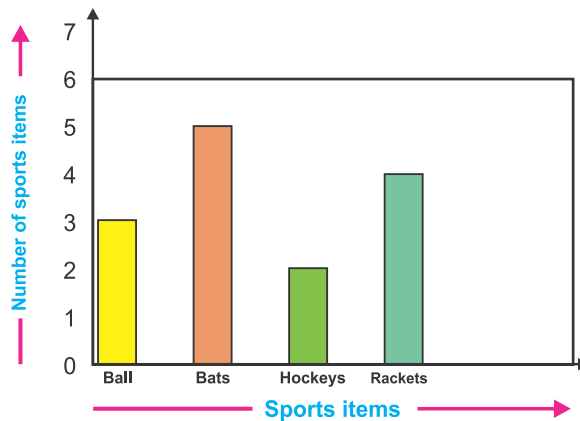
## REVIEW EXERCISE 9

- Find the average of following numbers:
  - 4, 3, 5, 8, 6, 10.
  - 10, 20, 30, 40, 50
- The six hours journey of a person on car is given below.

<b>Hours</b>	1	2	3	4	5	6
<b>Distance in kilometres</b>	20	18	20	22	16	18

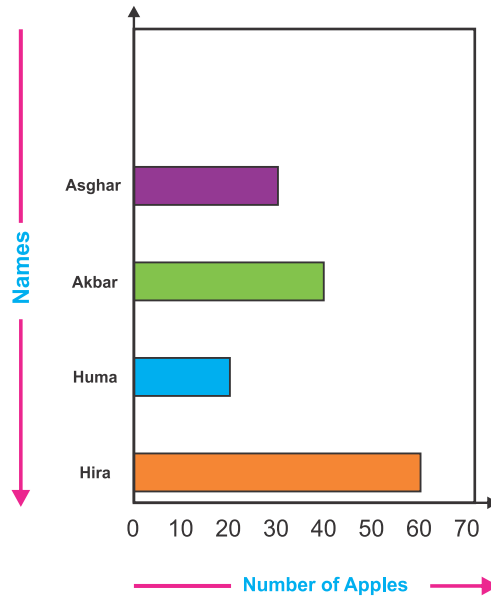
What is the average distance covered per hour?

- A batsman made **160** runs in two innings. Find the average runs he made in each innings.
- Read the graph and answer the following questions.



- How many balls are there?
- How many bats are there?
- How many hockeys and bats are there?
- How many more rackets are there than hockeys?
- How many fewer balls are there than bats?
- How many bats and rackets are there?

5. Interpret the following vertical bar graph.



- (i) How many apples does Asghar have?
- (ii) How many apples does Akbar have?
- (iii) How many apples does Huma have?
- (iv) How many apples does Hira have?
- (v) How many apples do Asghar and Akbar have?
- (vi) How many apples do Huma and Hira have?


6. Fill in the blanks.

- (i) The average of 5, 15, 30, 10 and 20 is \_\_\_\_\_
- (ii) The average of 20, 40, 30 and 35 is \_\_\_\_\_
- (iii) When we choose a suitable symbol to represent each part of information, we will use \_\_\_\_\_ graph.



# GLOSSARY

<b>Acute angle:</b>	An angle whose measure lies between $0^\circ$ and $90^\circ$ .
<b>Acute angled triangle:</b>	A triangle in which all angles are acute.
<b>Adjacent angles:</b>	Two angles with a common vertex and a common arm are called adjacent angles.
<b>Angle:</b>	The amount of turning between two arms about a common point.
<b>Arc:</b>	A part of the circumference of a circle.
<b>Area:</b>	The space occupied within the boundary of a shape is called an area.
<b>Associative property of addition:</b>	The property that when any three numbers (fractions) are added in any order, their sum is always the same.
<b>Associative property of multiplication:</b>	The property that when any three numbers (fractions) are multiplied in any order, their sum is always the same.
<b>Average:</b>	Sum of quantities divided by the total number of quantities.
<b>Bar graph:</b>	It represents each part of the information in the form of bars (vertical or horizontal).
<b>Block graph:</b>	The graph in which we choose a suitable symbol to represent each part of the information.
<b>Capacity:</b>	The amount of liquid a container can hold.
<b>Centimetre:</b>	A unit of length, 100 centimetres (cm) = 1 metre (m)
<b>Circle:</b>	The set of all points which are equidistant from the fixed point, is called a circle
<b>Commutative property of Multiplication:</b>	The property in which any two numbers fractions when multiplied to each other in any order, their product is always same
<b>Commutative property of addition:</b>	The property that when any two numbers (fractions) are added in any order their sum is always same.
<b>Complementary angles:</b>	Two angles whose sum of the measures is equal to $90^\circ$ .
<b>Data:</b>	Information presented in the form of numbers.
<b>Decimal:</b>	Any number containing a fractional part indicated by a decimal point is called decimal number or decimal.
<b>Decimal fraction:</b>	A fraction which is expressed in decimal point.


# GLOSSARY

- Denominator:** Lower part of the common fraction.
- Diametre:** A line segment that divides the circle into two equal halves.
- 
- Direct proportion:** The relationship between two ratios in which increase in one quantity causes a proportional increase in the other quantity and decrease in one quantity causes a proportional decrease in the other quantity.
- Dividend:** A number which is to be divided by another number.
- Divisibility:** A division in which when a number is divided by another, the remainder is zero.
- Divisor:** A number which can divide the other number exactly.
- Edge:** A one dimensional line segment joining two vertices.
- Equivalent fractions:** Fractions that have the same lowest form.
- Equilateral triangle:** A triangle in which all the three sides are equal in length.
- Factors:** The divisor of a number.
- Factorization:** A number represented as a product of its factors.
- Fractions:** Part of a whole.
- Gram:** Unit of mass.
- Graph:** A pictorial representation of a data.
- GCD:** Greatest Common Divisor.
- Hours:** 24<sup>th</sup> part of the day, 60 minutes. A unit of time
- 1 hour = 60 minutes**
- HCF:** Highest Common Factor.
- Inverse proportion:** The relationship between the two ratios in which increase in one quantity causes a proportional decrease in the other quantity and a decrease in one quantity causes a proportional increase in the other quantity.
- Isosceles triangle:** A triangle with its two sides equal in length.
- Kilogram:** A unit of mass. 1 kilogram (kg) = 1000 grams (g)
- L.C.M** Least Common Multiple.
- Like decimals:** The decimals having same number of decimal places.

## GLOSSARY

<b>Like fractions:</b>	Fraction having same denominator.
<b>Line:</b>	 This figure represents a line AB.
<b>Line segment:</b>	Shortest distance between two points. 
<b>Litre:</b>	Unit of volume/capacity 1 litre ( $l$ ) = 1000 millilitres ( $ml$ )
<b>Lunar Calendar:</b>	(Hijrah Qamri Calendar) Islamic Calendar in a solar year.
<b>Mass:</b>	Quantity of matter present in a body.
<b>Millilitre:</b>	Thousandth part of a litre.
<b>Millimetre:</b>	Thousandths part of a metre.
<b>Million:</b>	The smallest seven digit number i.e. 1,000,000 (Ten hundred thousand).
<b>Minute:</b>	Sixtieth part of an hour. <b>1 minute = 60 seconds</b>
<b>Mixed fraction:</b>	A fraction contains both a whole number and a proper common fraction.
<b>Month:</b>	A unit of time. <b>1 month = 30 days</b>
<b>Numerator:</b>	Upper number of common fraction.
<b>Obtuse angle:</b>	An angle whose measure lies between $90^\circ$ and $180^\circ$ .
<b>Obtuse angled triangle:</b>	A triangle which has one of its angles obtuse angle.
<b>Percentage:</b>	The word percent is a short form of the Latin word "Percentum". Percent means out of hundred or per hundred.
<b>Perimeter:</b>	The distance along the sides or boundary of a closed shape.
<b>Prime factorization:</b>	A factorization in which every factor is a prime factor.
<b>Proper fraction:</b>	A fraction whose numerator is less than the denominator.
<b>Proportion:</b>	The quality of two ratios.
<b>Quadrilateral:</b>	A four sided closed figure.
<b>Quotient:</b>	The number shows how many times the divisor has been repeatedly subtracted from dividend.
<b>Ratio:</b>	A comparison of two quantities of the same kind.
<b>Radius:</b>	The distance from the centre of the circle to the boundary of the circle.

## GLOSSARY

<b>Ray:</b>	An arrow mark on one end point of a line segment 
<b>Rectangle:</b>	A quadrilateral whose opposite sides are equal and have four right angles.
<b>Reflex angle:</b>	An angle of measure greater than $180^\circ$ but less than $360^\circ$
<b>Remainder:</b>	The number left over when one integer is divided by another.
<b>Right angle:</b>	An angle whose measure is $90^\circ$ .
<b>Right angled triangle:</b>	A triangle which has one of its angle of the measure $90^\circ$ .
<b>Round off decimals:</b>	To round off a decimal nearest to the whole number, check the first decimal place and accordingly round off the number.
<b>Scalene triangle:</b>	A triangle whose all sides are of different measures.
<b>Second:</b>	Unit of time, $\frac{1}{60}$ the part of a minute.
<b>Solar Calendar:</b>	In this calendar, the dates indicates the position around the sun (365 days in a year).
<b>Square:</b>	A quadrilateral whose all four sides are equal and has four right angles.
<b>Straight angle:</b>	An angle whose measure equals to $180^\circ$ .
<b>Subtraction:</b>	Symbol (-). The process of finding the difference between two numbers/quantities.
<b>Supplementary angles:</b>	Two angles whose sum of the measures is equal to $180^\circ$ .
<b>Symbol:</b>	A sign or notation used to represent an operation, element or relation etc
<b>Temperature:</b>	A quantity that measure the hotness or coldness of a body or substance.
<b>Triangle:</b>	A three sided closed geometrical figure.
<b>Unit fraction:</b>	Numerator is equal to the denominator.
<b>Unitary method:</b>	The process of finding the price of one (unit) item, from which we find the price of a number of similar items.
<b>Unlike decimals:</b>	The decimals having different number of decimal places.
<b>Unlike fractions:</b>	Fractions whose denominators are not same.
<b>Vertex:</b>	An angular point of any shape.

# ANSWERS

## EXERCISE 1.1

H-M	T-M	M	H-th	T-th	Th	H	T	O
1	7	1	2	8	3	6	8	0

- A. So, the number in words is**  
One hundred seventy one million, Two hundred eighty three thousands and six hundred eighty
- B.** (1) 45,672      (2) 2,670,273      (3) 34,296,127      (4) 100,000,000
- C.** (1) Sixty six millions, Six hundred fifty five thousands and five hundred twenty two.  
(2) Ninety six millions, three hundred forty thousands and five hundred twenty nine.  
(3) Two hundred forty five millions, six hundred seventy two thousands and three hundred sixteen.  
(4) One hundred millions.
- D.** (1) 1,002,600      (2) 9,099,077      (3) 58,862,045  
(4) 1,000,000,000      (5) 345,671,806

## EXERCISE 1.2

- A.** (1) 981,802      (2) 4,632,048      (3) 8,623,037      (4) 7,051,459  
(5) 4,531,777      (6) 6,097,173      (7) 8,928,449      (8) 3,640,193  
(9) 9,500,950      (10) 37,314,112      (11) 79,613,418      (12) 789,451,507
- B.** (1) 1,243,731      (2) 3,773,535      (3) 40,811,696      (4) 88,856,946  
(5) 905,347,265      (6) 921,490,114
- D.** 475,200

## EXERCISE 1.3

- A.** (1) 2698782      (2) 5240309      (3) 3200104      (4) 2046948  
(5) 49918102      (6) 57095640
- B.** (1) 386121      (2) 2911201      (3) 920927      (4) 38151829  
(5) 53905409      (6) 521889785
- D.** 46,935

# ANSWERS

## EXERCISE 1.4

- A.** (1) 41360 (2) 345690 (3) 210340 (4) 1534700  
(5) 2779600 (6) 15543000 (7) 41357000 (8) 386975000
- B.** (1) 97100 (2) 5086240 (3) 1792560 (4) 29428650  
(5) 2562000 (6) 168549000
- C.** (1) 852687 (2) 20934034 (3) 4890300 (4) 43038336  
(5) 1680602 (6) 13135892 (7) 18538128 (8) 36112216  
(9) 5471025 (10) 609922660 (11) 173941344 (12) 463038004  
(13) 140699670 (14) 522851472 (15) 280170566 (16) 384251808
- D.** 14,625

## EXERCISE 1.5

- A.** (1) 8,965 (2) 5,568 (3) 6,589 (4) 9,608  
(5) 562 (6) 659 (7) 1,377 (8) 568
- B.** (1) remainder = 8, quotient = 567 (2) remainder = 5, quotient = 39678  
(3) remainder = 5, quotient = 4734 (4) remainder = 16, quotient = 8432  
(5) remainder = 6, quotient = 52301 (6) remainder = 879, quotient = 8256  
(7) remainder = 782, quotient = 6456 (8) remainder = 0, quotient = 9650
- C.** 123

## EXERCISE 1.6

- A.** (1) 199624 rupees (2) Rs 2700 (3) Rs 114 by each student  
(4) 7545792 marbles (5) Rs 134502500 (6) 3354150 litres  
(7) 11815 rolls required (8) Rs 2434372

## EXERCISE 1.7

- A.** Step 1: Bracket first Subtract 213 - 123 Step 4: Add 90 + 300  
Step 2: Divide 64 ÷ 8 Step 5: Subtract 390 - 8  
Step 3: Multiply 60 × 5
- B.** (1) 18 (2) 3 (3) 20 (4) 666  
(5) 288 (6) 27 (7) 6 (8) 114  
(9) 288 (10) 27 (11) 10 (12) 1

## EXERCISE 1.8

- B.** (1) 5, 3 (2) 32, 32 (3) 30, 40 (4) +, ×  
(5) 5, + (6) 5, 13 (7) 30, 20, 10 (8) 12, 8, 4, 4

# ANSWERS

## REVIEW EXERCISE 1

1. (i) Two hundred forty six millions, four hundred sixteen thousands and two hundred seventy nine.  
(ii) Nine hundred five millions, four hundred seven thousands and six hundred eight.
2. (i) 75,026,420 (ii) 405,745,806
3. (i) 211,029,597 (ii) 24,137,404 (iii) 737,718,214
4. (i) 211,678,206 (ii) 616,236,553 (iii) 407,288,461
5. (i) 12,430 (ii) 43,305,525 (iii) 2,269,160  
(iv) 589,107,636 (v) 405,617,000
6. (i) remainder = 10, quotient = 25113 (ii) remainder = 325, quotient = 757
7. (i) 450 (ii) 26 9. 858935 litres 10. 800 boxes

## EXERCISE 2.1

- A. (1) 4 (2) 9 (3) 8 (4) 14  
(5) 22 (6) 26 (7) 20 (8) 16  
(9) 7 (10) 13 (11) 15 (12) 7
- B. (1) 14 (2) 22 (3) 19 (4) 17  
(5) 16 (6) 18 (7) 20 (8) 12  
(9) 16 (10) 15 (11) 14 (12) 9

## EXERCISE 2.2

- A. (1) 108 (2) 165 (3) 156 (4) 240  
(5) 432 (6) 3600 (7) 1176 (8) 396  
(9) 150 (10) 450 (11) 160 (12) 432
- B. (1) 48 (2) 100 (3) 144 (4) 540  
(5) 1260 (6) 192 (7) 1080 (8) 3960  
(9) 240 (10) 96 (11) 540 (12) 240

## EXERCISE 2.3

- (1) 600 (2) 6 (3) 30 days (4) 105  
(5) 60 hours (6) 36 cm (7) 16 cm (8) 600 litres  
(9) 180 cm (10) Packets of 6 pencils and 5 erasers

## REVIEW EXERCISE 2

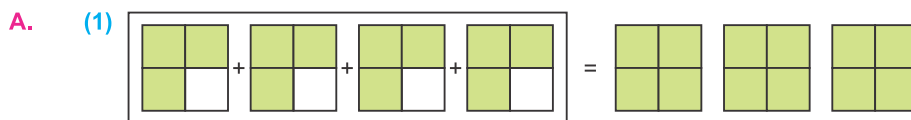
1. (i) a (ii) d (iii) b (iv) c (v) c
2. 24 3. 6 4. 60 apples
5. 5 metres 6. 600 litres

# ANSWERS

## EXERCISE 3.1

- A. (1)  $\frac{5}{6}$  (2)  $\frac{7}{8}$  (3)  $\frac{11}{15}$  (4)  $\frac{17}{24}$  (5)  $\frac{35}{16}$  (6)  $\frac{29}{35}$   
 B. (1)  $\frac{29}{45}$  (2)  $\frac{13}{45}$  (3)  $\frac{13}{48}$  (4)  $2\frac{2}{5}$  (5)  $4\frac{9}{20}$  (6)  $2\frac{31}{96}$   
 C. (1)  $\frac{5}{12}$  (2)  $\frac{1}{4}$  (3)  $\frac{1}{3}$  (4)  $\frac{1}{3}$  (5) 3 (6)  $\frac{7}{10}$   
 D. (1)  $\frac{7}{24}$  (2)  $\frac{1}{4}$  (3)  $\frac{2}{7}$  (4)  $\frac{1}{4}$  (5)  $-\frac{1}{2}$  (6)  $-2\frac{4}{5}$   
 (7)  $-2\frac{11}{18}$  (8)  $-2\frac{1}{3}$  (9)  $\frac{1}{2}$   
 E. (1)  $\frac{7}{10}$  (2)  $\frac{1}{2}$  (3)  $\frac{11}{42}$  F. (1)  $\frac{1}{12}$  (2)  $\frac{7}{15}$  (3)  $\frac{1}{20}$

## EXERCISE 3.2



So,  $\frac{3}{4} \times 4 = 3$

- (2) 1 (3) 3 (4) 1 (5) 2 (6) 2 (7) 2 (8) 4 (9) 6

**Note:** Compare the answer with drawn figures.

- B. (1)  $\frac{1}{10}$  (2)  $\frac{3}{20}$  (3)  $\frac{2}{9}$  (4)  $\frac{15}{16}$  (5)  $1\frac{13}{15}$  (6)  $5\frac{1}{4}$   
 C. (1)  $\frac{2}{3}$  (2)  $2\frac{1}{2}$  (3)  $1\frac{1}{2}$  (4)  $3\frac{1}{15}$  (5)  $5\frac{5}{12}$  (6)  $11\frac{1}{9}$

## EXERCISE 3.3

- (1) 6 (2) 2 (3) 3 (4) 4 (5) 4 (6) 5  
 (7) 25 (8) 14 (9) 4 (10) 10 (11)  $12\frac{1}{2}$  (12)  $2\frac{1}{2}$

## EXERCISE 3.5

- (1)  $\frac{1}{3}$  metres (2) 495 students (3) 8 drips (4) 20 kg  
 (5) Rs 1482 (6)  $1\frac{4}{5}$  metres (7) 20 litres (8) 18 metres  
 (9) Rs 705 (10) 110 metres

# ANSWERS

## EXERCISE 3.6

- A. (1)  $\frac{1}{2}$  (2)  $\frac{1}{4}$  (3) 3 (4) 5 (5) 10  
(6)  $\frac{4}{3}$  (7)  $\frac{7}{20}$  (8)  $\frac{5}{13}$  (9)  $\frac{3}{7}$  (10)  $\frac{3}{14}$
- B. (1)  $\frac{3}{5}$  (2)  $\frac{1}{6}$  (3)  $\frac{1}{8}$  (4)  $\frac{1}{10}$  (5)  $\frac{1}{12}$  (6)  $\frac{1}{15}$   
(7)  $\frac{1}{16}$  (8)  $\frac{1}{27}$  (9)  $\frac{1}{15}$  (10)  $\frac{1}{18}$  (11)  $\frac{1}{25}$  (12)  $\frac{2}{3}$

## EXERCISE 3.7

- (1)  $\frac{2}{3}$  (2)  $2\frac{5}{8}$  (3)  $\frac{4}{5}$  (4)  $\frac{2}{9}$  (5) 2  
(6) 1 (7)  $1\frac{1}{3}$  (8)  $\frac{1}{2}$  (9)  $\frac{5}{9}$  (10)  $\frac{44}{57}$   
(11)  $2\frac{3}{7}$  (12)  $1\frac{31}{35}$  (13)  $4\frac{4}{15}$  (14)  $3\frac{1}{2}$  (15)  $2\frac{22}{171}$

## EXERCISE 3.8

- (1) Rs 20 (2) 7 cars (3) 28 pieces (4) 7 servings  
(5)  $25\frac{1}{4}$  metres (6)  $5\frac{1}{2}$  metres (7) 33 bottles (8)  $3\frac{1}{2}$  km

## EXERCISE 3.9

- (1)  $1\frac{5}{108}$  (2)  $\frac{31}{42}$  (3)  $1\frac{5}{66}$  (4)  $3\frac{5}{6}$  (5)  $\frac{5}{8}$  (6)  $1\frac{13}{56}$   
(7)  $3\frac{17}{27}$  (8)  $-2\frac{7}{27}$  (9)  $-2\frac{31}{105}$  (10)  $22\frac{61}{72}$  (11)  $64\frac{2}{3}$  (12)  $17\frac{5}{6}$

## REVIEW EXERCISE 3

1. (i) F (ii) T (iii) F (iv) T  
(v) T (vi) T (vii) T (viii) T
2. (i) Rs  $10\frac{3}{20}$  (ii) Afzal got  $\frac{1}{10}$  more (iii) Rs 300  
(iv)  $\frac{3}{8}$  m left (v) 202 packets (vi) 800 tickets
3. (a)  $\frac{-1643}{9000}$  (b)  $\frac{15}{16}$

# ANSWERS

## EXERCISE 4.1

- A.** (1) 28.78 (2) 40.967 (3) 99.67 (4) 257.253  
(5) 47.443 (6) 97.475 (7) 1131.84 (8) 711.047  
(9) 100.44 (10) 295.357 (11) 322.826 (12) 911.565
- B.** (1) 19.22 (2) 41.165 (3) 51.13 (4) 256.753  
(5) 42.103 (6) 605.78 (7) 441.08 (8) 638.087  
(9) 31.1 (10) 113.044 (11) 611.11 (12) 130.325

## EXERCISE 4.2

- A.** Decimals having (i) One decimal place= 0.6 and 62.1  
(ii) Two decimal places= 0.08,34.25,3.36 and 38.66  
(iii) Three decimal places= 2.123 and 52.302
- B.** (1) 1.75 (2) 17.5 (3) 175 (4) 350.58  
(5) 3505.8 (6) 35058 (7) 81.5 (8) 815  
(9) 8150 (10) 3244.23 (11) 32442.3 (12) 324423  
(13) 0.067 (14) 0.67 (15) 6.7

## EXERCISE 4.3

- (1) 0.6675 (2) 0.06675 (3) 0.006676 (4) 3.589  
(5) 0.3589 (6) 0.03589 (7) 81.54 (8) 8.154  
(9) 0.8154 (10) 0.0085 (11) 0.00085 (12) 0.000085

## EXERCISE 4.4

- B.** (1) 3.25 (2) 32.5 (3) 3.9 (4) 21  
(5) 2.8 (6) 29.75 (7) 34 (8) 38.25  
(9) 1.91 (10) 3.152 (11) 172.06 (12) 48321  
(13) 114.75 (14) 9.54 (15) 1211.475 (16) 688.5  
(17) 16469.448 (18) 33257.388

## EXERCISE 4.5

- A.** (1) 0.13 (2) 1.3 (3) 0.013 (4) 0.6  
(5) 0.08 (6) 0.61 (7) 1.2 (8) 4.9  
(9) 0.077 (10) 1.399 (11) 5.693 (12) 9.67
- B.** (1) 0.894 (2) 14.94 (3) 32.86 (4) 2.425  
(5) 0.013 (6) 0.111 (7) 1.367 (8) 3.052  
(9) 174.096

# ANSWERS

## EXERCISE 4.6

- |             |            |             |            |
|-------------|------------|-------------|------------|
| (1) 0.26    | (2) 0.774  | (3) 12.75   | (4) 23.98  |
| (5) 0.15    | (6) 0.006  | (7) 0.44    | (8) 0.21   |
| (9) 0.078   | (10) 0.003 | (11) 0.0001 | (12) 0.088 |
| (13) 0.2322 | (14) 2.125 | (15) 4.1965 |            |

## EXERCISE 4.7

- A.** (1) 56.04 (2) 0.9048 (3) 4.284 (4) 81.84 (5) 0.4824  
(6) 17.8068 (7) 1279.356 (8) 548.1025 (9) 925.934
- B.** (1) 0.112 (2) 0.225 (3) 0.0046 (4) 0.014  
(5) 0.01625 (6) 0.0006 (7) 0.0016 (8) 0.945  
(9) 0.01612 (10) 0.01254 (11) 0.0125 (12) 0.1057
- C.** (1) 3.5 (2) 2.73 (3) 2.66 (4) 0.603  
(5) 8.01 (6) 13.26 (7) 44.304 (8) 23.1  
(9) 18.33 (10) 49.83 (11) 213.18 (12) 72.22

## EXERCISE 4.8

- A.** (1) 3.6 (2) 24 (3) 14.7 (4) 112  
(5) 0.547 (6) 1.09 (7) 56 (8) 112  
(9) 128 (10) 27.16 (11) 2502 (12) 57
- B.** (1) 0.08 (2) 0.6 (3) 0.6 (4) 0.09  
(5) 0.11 (6) 0.013 (7) 2.4 (8) 10.02  
(9) 0.03 (10) 0.017 (11) 0.012 (12) 0.6  
(13) 25.6 (14) 1.3 (15) 0.014

## EXERCISE 4.9

- |            |            |            |            |
|------------|------------|------------|------------|
| (1) 1.25   | (2) 1.666  | (3) 0.8    | (4) 0.7    |
| (5) 2.142  | (6) 1.555  | (7) 0.625  | (8) 2.555  |
| (9) 4.571  | (10) 3.461 | (11) 3.333 | (12) 0.642 |
| (13) 0.687 | (14) 0.416 | (15) 0.85  | (16) 2.083 |
| (17) 9.423 | (18) 31.25 | (19) 1.2   | (20) 0.92  |

## EXERCISE 4.10

- |           |              |            |            |              |
|-----------|--------------|------------|------------|--------------|
| (1) 5.9   | (2) 123.7175 | (3) 34.06  | (4) 16.63  | (5) 6.015    |
| (6) 79.38 | (7) 46.196   | (8) 26.382 | (9) 21.454 | (10) 194.711 |

# ANSWERS

## EXERCISE 4.11

- A.** (1) 2 (2) 6 (3) 8 (4) 7 (5) 10 (6) 8  
(7) 8 (8) 50 (9) 59 (10) 78 (11) 82 (12) 100
- B.** (1) 32.4 (2) 25.2 (3) 6.2 (4) 6.4  
(5) 76.8 (6) 95.2 (7) 12.9 (8) 6.0  
(9) 3.4 (10) 11.8 (11) 50.5 (12) 60.2
- C.** (1) 32.39 (2) 25.06 (3) 6.78 (4) 6.42  
(5) 76.80 (6) 8.48 (7) 0.96 (8) 58.19  
(9) 4.01 (10) 40.98 (11) 70.49 (12) 19.02

## EXERCISE 4.12

- A.** (1) 0.875 (2) 0.9 (3) 0.4 (4) 0.68  
(5) 1.22 (6) 0.95 (7) 1.225 (8) 0.8875  
(9) 0.902 (10) 0.316 (11) 0.83 (12) 0.2775  
(13) 0.97125 (14) 0.551 (15) 0.0999
- B.** (1)  $\frac{1}{2}$  (2)  $1\frac{1}{20}$  (3)  $3\frac{14}{25}$  (4)  $\frac{113}{200}$  (5)  $\frac{23}{1000}$  (6)  $\frac{1}{4}$   
(7)  $\frac{69}{200}$  (8)  $35\frac{253}{500}$  (9)  $\frac{8}{125}$  (10)  $\frac{189}{200}$  (11)  $41\frac{5}{8}$  (12)  $46\frac{64}{625}$

## EXERCISE 4.13

- (1) 3.135 kg weight (2) 102.25 kg more (3) 11.44 g total  
(4) Rs 31993.25 (5) Rs 70372.50 (6) 89.58 m wire  
(7) 12.50 m left (8) 7 dresses (9) 0.12 kg per day  
(10) Rs 156.50

## EXERCISE 4.14

- A.** (1) 0.25 (2) 0.3 (3) 0.35 (4) 0.4  
(5) 0.65 (6) 0.7 (7) 0.8 (8) 0.85  
(9) 0.95 (10) 0.99 (11) 1.05 (12) 1.15
- B.** (1)  $\frac{4}{5}$ , 80% (2)  $\frac{17}{50}$ , 34% (3)  $\frac{14}{25}$ , 56% (4)  $\frac{63}{100}$ , 63%  
(5)  $\frac{11}{20}$ , 55% (6)  $\frac{33}{50}$ , 66% (7)  $3\frac{9}{20}$ , 345% (8)  $3\frac{3}{5}$ , 360%  
(9)  $5\frac{1}{2}$ , 550% (10)  $2\frac{1}{20}$ , 205% (11)  $25\frac{1}{2}$ , 2550% (12)  $55\frac{1}{4}$ , 5525%

# ANSWERS

- C.** (1) 80% (2) 24% (3) 55% (4) 62.5%  
(5) 42.5% (6) 50% (7) 30% (8) 60%  
(9) 142% (10) 180%

## EXERCISE 4.15

- (1) 216 boys (2) 495 students (3) 630 employees (4) 1586 houses  
(5) 240 students (6) 90 cars (7) Rs 1501.50

## REVIEW EXERCISE 4

- A.** (1) 100 (2) 100 (3) 0.65 (4) 4.444 (5) 4.95  
**B.** (1) 0.016, 0.463, 1.995, 2.087 (2) 5.661 (3) 10.09 m higher (5) 0.6  
**C.** (1) 4 dresses (2) 1680 marks (3) (i) 15.75 (ii) 3.42 (iii) 242 (iv) 11

## EXERCISE 5.1

- A.** (1) 1 km 600 m (2) 2 km 483 m (3) 1 km 386 m  
(4) 6 km 34 m (5) 8 km 324 m (6) 7 km 945 m  
**B.** (1) 4 m (2) 7 m 50 cm (3) 3 m 85 cm (4) 8 m 10 cm  
(5) 2 m 5 cm (6) 5m 67 cm (7) 6 m 84 cm (8) 9 m 98 cm  
**C.** (1) 3 cm 5 mm (2) 63 cm 4 mm (3) 59 cm 3 mm (4) 40 cm  
(5) 29 cm 5mm (6) 44 cm 7 mm (7) 60 cm 9 mm (8) 89 cm 9 mm  
**D.** (1) 8000 m (2) 20340 m (3) 1500 cm (4) 2545 cm  
(5) 350 mm (6) 1 km 200 m (7) 3 km 785 m (8) 15 m 20 cm  
(9) 85 cm (10) 472 cm 5 mm  
**E.** (1) 7m (2) 8 m (3) 9 m (4) 40 m  
(5) 10 m (6) 50m (7) 6 m (8) 100 m

## EXERCISE 5.2

- A.** (1) 109 km 72 m (2) 685 m 44 cm (3) 8 km 80 m  
(4) 14 m 30 cm (5) 5 km 242 m (6) 111 cm 5 mm  
(7) 16 km 180 m (8) 14 m 22 cm

## ANSWERS

- B.** (1) 8 km 991 m                      (2) 56 m 3 cm                      (3) 1 km 742 m  
(4) 23 cm 5 mm                      (5) 2 km 420 m                      (6) 22 m 37 cm  
(7) 2 km 805 m                      (8) 5 cm 3 mm

### EXERCISE 5.3

- (1) 3 m 92 cm ribbon left                      (2) 1 km 457 m total distance  
(3) 79 cm space left                      (4) Railway station, 129 m  
(5) 12 cm 2 mm length                      (6) 117 m ahead  
(7) 116 km drive                      (8) 1 m 5 cm tall

### EXERCISE 5.4

- A.** (1) 120 minutes                      (2) 480 minutes                      (3) 720 minutes  
(4) 1620 minutes                      (5) 1800 minutes                      (6) 2040 minutes
- B.** (1) 300 seconds                      (2) 600 seconds                      (3) 1200 seconds  
(4) 2700 seconds                      (5) 3300 seconds                      (6) 3600 seconds  
(7) 4500 seconds                      (8) 5100 seconds
- C.** (1) 19 hours 40 minutes                      (2) 20 hours 50 minutes                      (3) 24 hours 50 minutes  
(4) 37 hours 5 minutes                      (5) 30 hours 15 minutes                      (6) 39 hours 35 minutes
- D.** (1) 36 minutes 25 seconds                      (2) 4 minutes 35 seconds  
(3) 5 minutes 50 seconds                      (4) 11 minutes 50 seconds  
(5) 16 minutes 30 seconds                      (6) 23 minutes 15 seconds
- E.** (1) 1 hour 3 minutes 20 seconds                      (2) 1 hour 8 minutes 20 seconds  
(3) 1 hour 12 minutes 40 seconds                      (4) 1 hour 16 minutes 35 seconds  
(5) 1 hour 18 minutes 45 seconds                      (6) 1 hour 21 minutes 55 seconds

### EXERCISE 5.5

- A.** (1) 51 minutes 20 seconds                      (2) 67 minutes 14 seconds  
(3) 8 hours 37 minutes                      (4) 6 hours 16 minutes 16 seconds  
(5) 6 hours 44 minutes 29 seconds
- B.** (1) 23 minutes 41 seconds                      (2) 35 seconds  
(3) 7 minutes                      (4) 2 hours 28 minutes  
(5) 1 hour 44 minutes 50 seconds

# ANSWERS

## EXERCISE 5.6

- |                       |                        |
|-----------------------|------------------------|
| (1) 6 weeks 4 days    | (2) 11 weeks 3 days    |
| (3) 30 weeks 3 days   | (4) 334 weeks 5 days   |
| (5) 15 months         | (6) 26 months 20 days  |
| (7) 23 months 20 days | (8) 21 months 20 days  |
| (9) 5 years 6 months  | (10) 6 years 10 months |
| (11) 4 years 1 month  | (12) 20 years 4 months |

## EXERCISE 5.7

- |                                  |                        |
|----------------------------------|------------------------|
| (1) Ali plays 20 minutes shorter | (2) 2 hours 10 minutes |
| (3) 3 months 20 days             | (4) 2 hours 26 minutes |
| (5) 1 hour 54 minutes            |                        |

## EXERCISE 5.8

- |           |            |            |           |           |            |
|-----------|------------|------------|-----------|-----------|------------|
| <b>A.</b> | (1) 20°C   | (2) 35°C   | (3) 40°F  | (4) 85°F  |            |
| <b>B.</b> | (1) 5°C    | (2) 25°C   | (3) 35°C  | (4) 20°C  | (5) 95°C   |
|           | (6) 110°C  | (7) 125°C  | (8) 135°C | (9) 50°C  | (10) 75°C  |
|           | (11) 110°C | (12) 120°C |           |           |            |
| <b>C.</b> | (1) 86°F   | (2) 113°F  | (3) 185°F | (4) 131°F | (5) 194°F  |
|           | (6) 50°F   | (7) 68°F   | (8) 140°F | (9) 176°F | (10) 230°F |

## EXERCISE 5.9

- |                    |                          |          |
|--------------------|--------------------------|----------|
| (1) 95°F           | (2) Jacobabad 104°F more | (3) 40°C |
| (4) 9°F difference | (5) 18°F difference      |          |

## REVIEW EXERCISE 5

- |           |                                 |                                |              |              |
|-----------|---------------------------------|--------------------------------|--------------|--------------|
| <b>1.</b> | (i) 28648 m                     | (ii) 4897 cm                   | (iii) 769 mm | (iv) 6758 mm |
| <b>2.</b> | (i) 1 hour 4 minutes 37 seconds | (ii) 1 day 13 hours 13 minutes |              |              |
|           | (iii) 8 m 51 cm 4 mm            |                                |              |              |
| <b>3.</b> | (i) 44 km 577 m                 | (ii) 1 m 27 cm 4 mm            |              |              |
|           | (iii) 36 hours 43 minutes       |                                |              |              |
| <b>4.</b> | (i) b                           | (ii) b                         | (iii) d      | (iv) a       |
| <b>5.</b> | (i) 12:35                       | (ii) 10:30                     |              |              |
| <b>6.</b> | (i) 45 minutes                  | (ii) 1 hour 5 minutes          |              |              |

# ANSWERS

## EXERCISE 6.1

- (1) Rs 180      (2) Rs 528.50      (3) Rs 770      (4) Rs 60000  
(5) Rs 5.5      (6) Rs 40      (7) Rs 4.50      (8) Rs 20.50  
(9) Rs 12800      (10) Rs 62.80

## EXERCISE 6.2

- (1) Rs 400      (2) Rs 360      (3) Rs 105      (4)  $7\frac{1}{2}$  hours  
(5) Rs 48000      (6) 4680 km      (7) 14 shirts      (8) 936 passengers  
(9) 1163.4 kg      (10) Rs 29880

## EXERCISE 6.3

1. (i) F      (ii) T  
2. (i) 1:2      (ii) 16:5      (iii) 5:21      (iv) 500:3  
3. (i) Direct      (ii) Inverse      (iii) Inverse      (iv) Direct  
4. Rs 48      5. 26.25 km      6. 18 workers  
7.  $7\frac{1}{2}$  litres      8. 120 soldiers      9. 66 farmers

## REVIEW EXERCISE 6

1. Rs 54      2. Rs 650      3. Rs 90      4. 4 days  
5. Rs 120      6. 5000 papers      7. 2000 km

## EXERCISE 7.1

2. (a) acute angle      (b) obtuse angle      (c) right angle  
(d) reflex angle      (e) straight angle      (f) acute angle  
(g) reflex angle      (h) obtuse angle      (i) right angle

## EXERCISE 7.2

1. (i)  $335^\circ$       (ii)  $330^\circ$       (iii)  $270^\circ$       (iv)  $280^\circ$

# ANSWERS

## EXERCISE 7.3

- (i) Yes    (ii) Yes    (iii) No    (iv) No
- No, because they do not have common vertex
- (i)  $30^\circ$     (ii)  $14^\circ$     (iii)  $45^\circ$     (iv)  $52^\circ$     (v)  $75^\circ$
- (i)  $155^\circ$     (ii)  $135^\circ$     (iii)  $110^\circ$     (iv)  $82^\circ$     (v)  $37^\circ$
- (i) Complementary    (ii) Supplementary    (iii) Supplementary  
(iv) Complementary    (v) Supplementary    (vi) Complementary
- (i)  $45^\circ$     (ii)  $90^\circ$
- (i) No    (ii) No    (iii) Yes

## EXERCISE 7.7

- (i) Rhombus    (ii) Kite    (iii) Trapezium    (iv) Kite

## REVIEW EXERCISE 7

- Right angle
- (i) Straight angle    (ii) Right angle    (iii) Straight angle
- (i) No    (ii) Yes    (iii) No    (iv) Yes
- Three; AEDF, BEFD, DEFC
- Equilateral triangles ABC, FGE, GEC, ECD, AFE, BFG  
Trapeziums FEBC, FDGC, FACG, BAGE  
Parallelogram FDCB  
Rhombus EDGC, FEBG, FAEG
- $70^\circ$

## EXERCISE 8.1

- A. (i) ✗    (ii) ✓    (iii) ✓    (iv) ✓    (v) ✗  
(vi) ✓    (vii) ✓    (viii) ✓    (ix) ✗
- B. (1) (a) cm    (b) sq. cm  
(2) (a) cm    (b) sq. cm  
(3) (a) m    (b) sq. m
- C. (1) (a) cm    (b) sq. cm    (2) (a) cm    (b) sq. cm  
(3) (a) cm    (b) sq. cm    (4) (a) cm    (b) sq. cm

# ANSWERS

## EXERCISE 8.2

- A.** (1) 7 cm      (2) 100 mm      (3) 80 mm
- B.** (1) 640000 sq. cm      (2) 980100 sq. cm  
(3) 592900 sq. cm      (4) 1518000 sq. cm
- C.** (1) area = 6 sq. cm, perimeter = 10 cm  
(2) area = 5 sq. cm, perimeter = 12 cm  
(3) area = 12 sq. cm, perimeter = 14 cm  
(4) area = 16 sq. cm, perimeter = 20 cm  
(5) area = 45 sq. cm, perimeter = 28 cm  
(6) area = 28 sq. cm, perimeter = 22 cm  
(7) area = 9 sq. cm, perimeter = 13 cm  
(8) area = 28 sq. cm, perimeter = 23 cm
- D.** (1) area = 16 sq. cm, perimeter = 16 cm  
(2) area = 36 sq. cm, perimeter = 24 cm  
(3) area = 56.25 sq. cm, perimeter = 30 cm  
(4) area = 67.24 sq. cm, perimeter = 32.8 cm  
(5) area = 3136 sq. mm, perimeter = 224 mm  
(6) area = 8464 sq. mm, perimeter = 368 cm
- E.** (1) E      (2) F      (3) A, B, C, D and F  
(4) E      (5) A and D, B and E, C and F

## EXERCISE 8.3

- (1) 280 m perimeter      (2) 49 sq. m area  
(3) 240 cm long      (4) Area = 5400 sq. m, perimeter = 300 m  
(5) 860 cm lace      (6) Area of square = 625 sq. m  
(7) Area of rectangle = 600 sq. m  
(8) (i) 180 sq. m    (ii) 100 sq. m    (iii) Floor, 80 sq. m

## REVIEW EXERCISE 8

- A.** (1) d      (2) c      (3) c  
(4) c      (5) c      (6) b
- B.** (1) 4 x side      (2) 2 x (length + breadth)  
(3) perimeter = 28 cm, area = 49 sq. cm  
(4) perimeter = 26 cm, area = 40 sq. cm

# ANSWERS

## EXERCISE 9.1

- (1) 16                      (2) 4                      (3) 7.875                      (4) 9.625  
(5)  $\frac{49}{80}$                       (6)  $\frac{1009}{3000}$                       (7) 3.85                      (8) 8.33  
(9)  $7\frac{763}{900}$                       (10)  $6\frac{11}{12}$

## EXERCISE 9.2

- (1) Average marks = 68.4                      (2) Average Expenditure per day = Rs 19  
(3) Average temperature = 40.6°C                      (4) 2 paras  
(5) Average score = 70                      (6) Average income = Rs 634  
(7) Average speed = 70 km                      (8) Average speed = 47.5 km  
(9) Average runs = 9                      (10) Average rain fall = 8 mm

## EXERCISE 9.3

2. (i) 15 millions                      (ii) 30 millions                      (iii) 35 millions  
(iv) 1990                      (v) 2010                      (vi) 5 millions
3. (i) February                      (ii) May                      (iii) Rs. 5500  
(iv) Rs. 7000                      (v) January and April                      (vi) March  
(vii) Rs. 10000                      (viii) Rs. 3000

## REVIEW EXERCISE 9

1. (i) 6    (ii) 30  
2. 19 km  
3. 80 runs  
4. (i) 3                      (ii) 5                      (iii) 7                      (iv) 2                      (v) 2                      (vi) 9  
5. (i) 30                      (ii) 40                      (iii) 20                      (iv) 60                      (v) 70                      (vi) 80  
6. (i) 16                      (ii) 31.25                      (iii) Bar