



Mathematics

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Sindh Textbook Board

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Reviewed by

The Provincial Committee for Review of Textbooks
Bureau of Curriculum and Extension Wing Sindh, Jamshoro

Patron in chief

Abdul Aleem Lashari

Chairman Sindh Textbook Board

Written by

- Mr. Arjan Lal S. Sudhria
- Prof. Aijaz Ali Subehpoto
- Ms. Attia Tabassum Bhutto
- Mr. Muhammad Sayem Hanif
- Mrs. Sadia Sayem
- Ms. Asma Bhatti

Provincial Review Committee (PRC)

- Mr. Muhammad Sagheer Shaikh
- Mr. Aftab Ali
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- Mr. Syed Afaq Ahmed
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- Ms. Majida Soomro
- Mr. Nazir Ahmed Memon
- Ms. Attia Tabassum Bhutto
- Mr. Nazir Ahmed Shaikh

Editors

- Arjan Lal S. Sudhria
- Ms. Attia Tabassum Bhutto

Consultants

- Kamran Latif Laghari; A.S.S
- Mir Sarfarz Khalil Saand; J.S.S

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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.

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NUMBERS AND ARITHMETIC OPERATIONS

1.1 NUMBERS

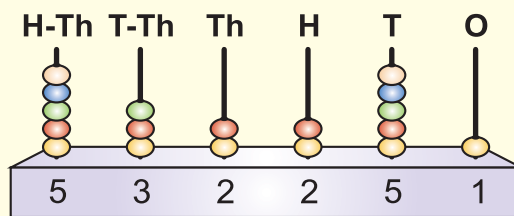
In class III, we have learnt counting objects and writing of numbers up to hundred thousand on the basis of place value of numbers.

Let us revise

Example 1: Number “Five hundred thirty two thousand two hundred fifty one” is written in figures as:

H-Th	T-Th	Th	H	T	O
5	3	2	2	5	1

In abacus, it is represented.



$$500,000 + 30,000 + 2,000 + 200 + 50 + 1 = \boxed{532,251}$$

EXERCISE 1.1

1 Write the following numbers in figures.

- (i) Four thousand six hundred and ninety two.
- (ii) Sixty nine thousand four hundred and seven.
- (iii) Four hundred fifty six thousand and nine hundred twenty six.
- (iv) Seven hundred thousand.
- (v) Nine hundred two thousand and forty two.
- (vi) Seven hundred twenty nine thousand and six.

2 Write the following numbers in words.

- | | | |
|-------------|-------------|--------------|
| (i) 2,561 | (ii) 34,561 | (iii) 56,081 |
| (iv) 92,000 | (v) 245,612 | (vi) 349,650 |

Identify place values of digits up to one hundred million

Place value chart for one million

The smallest seven digit number is called one million,

i.e. $1,000,000$

Place value chart for $1,000,000$

Millions	Hundred Thousands	Ten Thousands	Thousands	Hundreds	Tens	Ones
M	H-Th	T-Th	Th	H	T	O
1	0	0	0	0	0	0

Place value chart for ten million

Greatest seven digit number is $9,999,999$

“Nine million nine hundred and ninety nine thousand nine hundred and ninety nine”

When we add 1 to $9,999,999$, we get $10,000,000$. Thus the number after $9,999,999$ is $10,000,000$ Read as “Ten Million”
i.e. $9,999,999 + 1 = 10,000,000$

Place Value Chart for $10,000,000$

Ten Millions	Millions	Hundred Thousands	Ten Thousands	Thousands	Hundreds	Tens	Ones
1	0	0	0	0	0	0	0

Place value chart for one hundred million

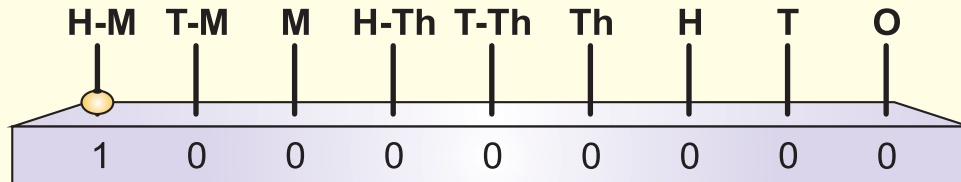
Greatest eight digit number is $99,999,999$, we read it as “Ninety nine million nine hundred ninety and nine thousand nine hundred and ninety nine”.

When we add 1 to $99,999,999$, we get $100,000,000$
Read as “One Hundred Million”
i.e. $99,999,999 + 1 = 100,000,000$

The place value chart for 100,000,000

Hundred Millions	Ten Millions	Millions	Hundred Thousands	Ten Thousands	Thousands	Hundreds	Tens	Ones
1	0	0	0	0	0	0	0	0

Representation on the abacus will be



Example 1:

Identify the place value and value of coloured digit in 2,546,789

M	H-Th	T-Th	Th	H	T	O
2	5	4	6	7	8	9

Digit 2 is million place; its place value is 2,000,000.

Example 2:

Write place value and value of each digit in 37,219,854

T-M	M	H-Th	T-Th	Th	H	T	O
3	7	2	1	9	8	5	4

Digit	Place Value	Value
3	Ten million	30,000,000
7	Million	7,000,000
2	Hundred thousand	200,000
1	Ten thousand	10,000
9	Thousand	9,000
8	Hundred	800
5	Ten	50
4	ones	4

Teacher's Note

Teacher should teach the concept of place value by using abacus on the blackboard.

EXERCISE 1.2

1 Identify the place value and value of the coloured digit.

- (i) 1 **2**,345,678 (ii) 5 **8**,923,107
 (iii) **1**00,000,000 (iv) 23, **9**64,579
 (v) 2 **5**,960, **2**38 (vi) **9**,62 **1**,382
 (vii) 8, **9**9 **8**,776 (viii) **7** **6**,905,851

2 Write down the value of every digit in the following numbers.

- (i) 9,234,513 (ii) 50,120,306
 (iii) 3,567,899 (iv) 36,564, 396

Read and write numbers up to one hundred million

In international system of units a number is split up into groups or periods. Each period consists of three digits.

The chart of periods and place values.

Millions			Thousands			Ones		
Hundred Millions	Ten Millions	Millions	Hundred Thousands	Ten Thousands	Thousands	Hundreds	Tens	Ones

Note: In reading a number, all the digits in the same period are read together along with its period (except the ones).

Commas are placed to separate the periods.

Reading and writing of a number “24,567,189”

Millions	Thousands	Ones
24	567	189
24	567	189

In words:



Twenty four **Million**, Fi ve Hundred
 Sixty Seven **Thousand** and
 one hundred eighty nine

Example 1: Read and then write the given numbers in words.

- (i) 3,671,289 (ii) 45,612,378 (iii) 10,202,000

Solution:

(i) 3,671,289	Three million, six hundred seventy one thousand and two hundred eighty nine.
(ii) 45,612,378	Forty five million, six hundred twelve thousand and three hundred seventy eight.
(iii) 102,002,000	One hundred two million and two thousand.

Example 2: Write numbers from “one million and one” to “one million and fifteen” in figures.

Solution:

1,000,001, 1,000,002, 1,000,003, 1,000,004, 1,000,005,
1,000,006, 1,000,007, 1,000,008, 1,000,009, 1,000,010,
1,000,011, 1,000,012, 1,000,013, 1,000,014, 1,000,015.

Recognize numbers in words up to one hundred million

Nine digit numbers represent hundred millions such as 700,000,000, 850,000,000 and 710,999,999 read as “seven hundred million”, “eight hundred and fifty million” and “seven hundred ten million, nine hundred ninety nine thousand and nine hundred ninety nine” respectively.

100,000,000 is read as (One Hundred Million), it is the smallest 9-digit number.

Example 1: Write 53816432 in expanded form.

$$50,000,000 + 3,000,000 + 800,000 + 10,000 + 6000 + 400 + 30 + 2$$

or 50 millions + 3 millions + 8 hundred thousands
+ 10 thousands + 6 thousands + 4 hundreds + 3 tens + 2 ones

We read it as fifty three million, eight hundred sixteen thousand and four hundred thirty two.

Example 2: Separate numbers in millions, ten millions, and hundred millions from the following.

21,045,678, 100,000,000, 4,234,566, 2,005,127
and 55,566,677

Solution:

Millions	Ten Millions	Hundred Millions
4,234,566	21,045,678	100,000,000
2,005,127	55,566,677	—

EXERCISE 1.3

1 Read and then write the following numbers in words.

- (i) 241,935 (ii) 4,312,687 (iii) 5,000,000
(iv) 25,134,564 (v) 100,000,000 (vi) 9,264,387
(vii) 50,001,000 (viii) 4,109,200 (ix) 99,990,090

2 Write the following numbers in figures.

- (i) Two million, ninety thousand and sixty eight.
(ii) Thirty million, six hundred thousand and forty five.
(iii) One hundred million.
(iv) Twenty million and twenty.
(v) Ninety million and sixty seven thousand.

3 Write numbers from two million to two million twenty in figures.

4 Write the missing numbers.

- (i) 2,450,761, 2,451,761, 2,452,761, _____, _____, _____,
(ii) 7,000,300, 7,000,400, 7,000,500, _____, _____, _____,
(iii) 67,213,415, 67,223,415, 67,233,415, _____, _____, _____,

5 Separate numbers in millions, ten millions and hundred millions from the following.

2,456,178, 22,233,341, 1,000,000, 10,000,000,
100,000,000, 2,561,000 and 20,001,010

Compare and order numbers up to 8-digits.

We already know the rules of comparing numbers.
Let us recall them

Rule 1: When we compare two numbers, the number with less number of digits is always less and a number with more digits is always greater.

Example: Compare the following numbers.

- (i) 3,456,712 and 92,315,612
(ii) 60,123,000 and 9,999,999

Solution:

- (i) $3,456,712 < 92,315,612$ because 3,456,712 has less number of digits than 92, 315, 612
(ii) $60,123,000 > 9,999,999$ because 60,123,000 has more number of digits than 9, 999, 999

Rule 2: Two numbers having same number of digits are equal if digits at corresponding positions are same.

Example: Compare 2,456,127 and 2,456,127

Solution: $2,456,127 = 2,456,127$

- Both numbers have same number of digits.
- Write each number as the corresponding place value.
- We find digits at each position are same.

So, $2,456,127 = 2,456,127$

Rule 3: If two numbers have same number of digits then we compare the different digits of the higher place values.

Example: Compare 24,513,105 and 24,367,999

Solution: Both are 8-digits numbers.

Process as given in the above example:

- First we compare digits of higher place value.

Teacher's Note

Teacher should ensure enough practice by using the rules of comparison of numbers.

- Here the number have same digit 24 at million place.
- So, we compare next digit at hundred thousand place.
- Here $5 > 3$ (Hundred thousands)

So, $24,513,105 > 24,367,999$

Arranging numbers in orders:

Example: Arrange 5,671,231 , 341,267 , 90,000,000 , 5,767,237.
in ascending and descending orders.

Solution: Using the rules of comparison of numbers.

Ascending Order

341,267 , 5,671,231 , 5,767,237 , 90,000,000

Descending Order

90,000,000 , 5,767,237 , 5,671,231 , 341,267

EXERCISE 1.4

1 Compare the following numbers using symbols $<$, $>$ and $=$ respectively.

- (i) 52,001,000 and 345,912
- (ii) 2,456,123 and 24,345,611
- (iii) 7,123,400 and 8,567,001
- (iv) 92,333,444 and 92,315,617
- (v) 24,000,008 and 24,000,005

2 Write the following numbers in ascending and descending orders.

- (i) 3,174,215 , 3,741,512 , 3,076,005
- (ii) 95,123,415 , 95,312,415 , 95,113,417
- (iii) 59,178,215 , 59,296,712 , 52,111,222 , 58,110,176
- (iv) 14,111,920 , 14,160,000 , 13,200,415 , 13,100,219

1.2 ADDITION

Add numbers up to 6-digits

We have learnt in class III to add numbers up to 4 digits.

Example: Add **8420** and **3910** | **Example:** Add **45093** and **3421**.

Solution:

$$\begin{array}{r} \textcircled{1} \\ 8420 \\ + 3910 \\ \hline \text{Sum} \quad 12330 \end{array}$$

So, **8420 + 3910 = 12,330**

Solution:

$$\begin{array}{r} \textcircled{1} \\ 45093 \\ + 3421 \\ \hline \text{Sum} \quad 48514 \end{array}$$

So, **45,093 + 3421 = 48,514**

Let us apply the addition rules to add numbers up to 6 digits.

Example 1: Add **85765** and **37071**

Solution:

T-Th	Th	H	T	O	
8	5	7	6	5	
3	7	0	7	1	
12	2	8	3	6	→ Step1: Add ones 5 + 1 = 6 ones
			3		→ Step2: Add tens 6 + 7 = 13 tens Write 3 below tens and Carry 1 to hundred column
		1			→ Step3: Add hundreds 1 + 7 + 0 = 8 hundreds
	10				→ Step4: Add thousands 5 + 7 = 12 thousand, Write 2 below thousand and regroup 10 thousand to one ten thousand
1					→ Step5: Add ten thousands 1 + 8 + 3 = 12T-Th Write 2 below T-Th and regroup 10 thousands to 1 hundred thousand

Hence **85,765 + 37,071 = 122,836**

Teacher's Note

Teacher should give some more examples to the students for practice by changing digits at place values.

Example 2: Add 348,754 and 343,445

Solution:

$$\begin{array}{r} \textcircled{1}\textcircled{2} \\ 348754 \\ + 343445 \\ \hline 692199 \end{array}$$

So, $348,754 + 343,445 = 692,199$

EXERCISE 1.5

1. Solve the following.

(i)
$$\begin{array}{r} 25431 \\ + 41245 \\ \hline \\ \hline \end{array}$$

(ii)
$$\begin{array}{r} 92345 \\ + 50178 \\ \hline \\ \hline \end{array}$$

(iii)
$$\begin{array}{r} 107236 \\ + 298017 \\ \hline \\ \hline \end{array}$$

(iv)
$$\begin{array}{r} 349629 \\ + 201548 \\ \hline \\ \hline \end{array}$$

(v)
$$\begin{array}{r} 964328 \\ + 428961 \\ \hline \\ \hline \end{array}$$

(vi)
$$\begin{array}{r} 999555 \\ + 312016 \\ \hline \\ \hline \end{array}$$

2. Add the following.

(i) 24,317 and 90,235 (ii) 67,999 and 249,982

(iii) 392,612 and 722,334 (iv) 591,023 and 942,589

(v) 217,640 and 921,079 (vi) 555,566 and 778,896

(vii) 500,983 and 645,008 (viii) 910,052 and 881,223

Solve real life problems involving addition of numbers up to 6-digits

We do the addition of numbers up to 6-digits in our daily life in routine.

Example: There are **321,876** female and **313,589** male in a town. What is the total number of people in the town.

Solution: Number of female = **321876**
Number of male = **313589**

Total number of male and female in the town = **635,465**

	321876
	+ 313589
Sum	<u>635465</u>

EXERCISE 1.6

1. Government of Sindh spent Rs 581,034 on construction of one road and Rs 347,083 on another. Find the total amount spent in construction of both roads?
2. In an examination, 27,514 girls students and 20,328 boys students were appeared. What is the total number of students appeared in the examination?
3. Bismah purchased computers for Rs 857,600 and Aleesha purchased for Rs 641,200. What is the total amount they spent for purchasing computers?
4. In a two cricket match series Pakistan vs India, 55,384 people came to watch the first match at National Stadium Karachi and 43,298 people came for the second match in the Qaddafi Stadium Lahore. How many people came to watch the series in total?
5. A company manufactures 865,271 bicycles and another company manufactures 725,059 bicycles in a year. What is the total production of both companies in a year?
6. Pakistan Railways carried 347,180 kg of mangoes in first week and 449,130 kg mangoes in next week. How many kilograms of mangoes were carried altogether?

1.3 SUBTRACTION

Subtract numbers up to 6-digits

We have learnt in class III to subtract numbers up to 4 digits.

Example 1: Subtract 1,374 from 2,481

$$\begin{array}{r} \text{Solution:} \quad 2481 \\ - 1374 \\ \hline \text{Difference} \quad 1107 \end{array}$$

Hence,

$$2,481 - 1,374 = 1,107$$

Example 2: Solve $51,432 - 40,028$

$$\begin{array}{r} \text{Solution:} \quad 51432 \\ - 40028 \\ \hline \text{Difference} \quad 11404 \end{array}$$

Hence,

$$51,432 - 40,028 = 11,404$$

Example 3: Subtract 45,912 from 85,145

Solution:

T-Th	Th	H	T	O
7	14	11		
8	5	1	4	5
-	4	5	9	1 2
3	9	2	3	3

Step 1: Subtract ones

$$5 - 2 = 3 \text{ ones}$$

Step 2: Subtract tens

$$4 - 1 = 3 \text{ tens}$$

Step 3: Subtract Hundreds

1 - 9 H is not possible
make 1 H to 11 H borrowing 1
from thousands. Now $11 - 9 = 2$ H.

Step 4: Subtract Thousands.

After giving 1Th, 5Th becomes 4Th
So, 4Th - 5Th is not possible. Make
4Th to 14Th by borrowing 1 from Ten
Thousands. Now $14\text{Th} - 5\text{Th} = 9\text{Th}$.

Step 5: Subtract Ten Thousands

$$7 \text{ TTh} - 4 \text{ TTh} = 3 \text{ TTh}$$

$$\text{Hence } 85,145 - 45,912 = 39,233$$

Teacher's Note

Teacher should solve some more examples using regrouping in order to clear the concept of subtraction.

Example 4: Subtract 438,905 from 557,942

$$\begin{array}{r} \text{Solution: } \overset{\textcircled{4}}{5} \overset{\textcircled{7}}{5} \overset{\textcircled{3}}{7} \overset{\textcircled{2}}{9} \overset{\textcircled{1}}{4} \overset{\textcircled{2}}{2} \\ - 438905 \\ \hline 119037 \end{array}$$

$$557,942 - 438,905 = 119,037$$

EXERCISE 1.7

1 Solve the following.

$$\begin{array}{r} \text{(i)} \quad 32164 \\ - 20053 \\ \hline \end{array}$$

$$\begin{array}{r} \text{(ii)} \quad 583729 \\ - 21678 \\ \hline \end{array}$$

$$\begin{array}{r} \text{(iii)} \quad 627948 \\ - 16328 \\ \hline \end{array}$$

$$\begin{array}{r} \text{(iv)} \quad 793854 \\ - 185035 \\ \hline \end{array}$$

$$\begin{array}{r} \text{(v)} \quad 790000 \\ - 628453 \\ \hline \end{array}$$

$$\begin{array}{r} \text{(vi)} \quad 894093 \\ - 847141 \\ \hline \end{array}$$

2 Subtract the following:

(i) 43,210 from 98,765

(ii) 39,072 from 273,194

(iii) 99,999 from 100,000

(iv) 537,864 from 700,000

(v) 685,439 from 874,189

(vi) 721,059 from 751,342

(vii) 781,500 from 871,600

(viii) 894,354 from 994,354

(ix) 990,001 from 991,000

(x) 184,019 from 765,129

(xi) 853,492 from 89,1400

(xii) 493,994 from 943,002

Solve real life problems involving subtraction of numbers up to 6-digits

We use subtraction of numbers in our daily life in routine. Let us understand the process by following example.

Example: There are **847,385** chicken in a farm. From them **312,793** were sold. Find the number of chicken remain in the farm.

Solution: Number of chicken = 847385
Number of chicken sold = 312793

So, there are **534,592** chicken in the farm.

Difference

$$\begin{array}{r} 847385 \\ - 312793 \\ \hline 534592 \end{array}$$

EXERCISE 1.8

- 1 Government spent Rs 985,000 on renovation of two schools. If Rs 539,450 spent on one school, find the amount spent on the other school.
- 2 In an annual examination of grade IV 57,986 students appeared, from which 43,985 students passed. How many students did not pass the examination?
- 3 Aslam and Atif invested Rs 658,700 in establishing cattle farm. Share of Aslam is Rs 385,780. What is the share of Atif?
- 4 Profit of a trading of Cotton Company in two months is Rs 320,000. If Rs 139,998 is profit in one month, find the profit in the other month?
- 5 On the first day of eid 3,955 people visited the zoo and on the second day 3,843 people visited. How many more people visited the zoo on first day of Eid?
- 6 A poultry farm had 89,534 hens from which 43,294 hens died due to bird flu. Find the number of hens left in the poultry farm.

1.4 MULTIPLICATION

Multiply numbers up to 5-digits by numbers up to 3-digits

We have learnt in class III to multiply 2-digit numbers by 1-digit number. As we know that the process of multiplication is repeated Addition.

Let us learn the process by following examples.

Example 1: Multiply 24 by 3.

Solution:

$$\begin{array}{r} 24 \\ \times 3 \\ \hline 72 \end{array}$$

Product = $\underline{72}$ Hence $24 \times 3 = 72$

Example 2: Multiply 34251 by 32.

$$\begin{array}{r} \textcircled{1} \quad \textcircled{1} \\ 34251 \\ \times 32 \\ \hline 68502 \\ + 102753x \\ \hline 1096032 \end{array}$$

Steps 1:

Multiply by 2 and write the numbers as their place value.

Steps 2:

Put a cross on the ones place which indicate that we multiply the number with 3-tens.

Steps 3:

(By Adding)

So, $34251 \times 32 = 1,096,032$

Example 3:

Multiply 40,329 by 123

$$\begin{array}{r} \textcircled{1} \\ \textcircled{2} \\ 40329 \\ \times 123 \\ \hline \textcircled{1} \textcircled{2} \textcircled{1} \\ 120987 \\ 80658x \\ + 40329xx \\ \hline 4960467 \end{array}$$

So, $40329 \times 123 = 4960467$

Example 4:

Multiply 23,415 by 382

$$\begin{array}{r} \textcircled{1} \\ \textcircled{2} \textcircled{3} \textcircled{1} \textcircled{4} \\ 23415 \\ \times 382 \\ \hline \textcircled{1} \textcircled{1} \textcircled{1} \\ 46830 \\ 187320x \\ + 70245xx \\ \hline 8944530 \end{array}$$

So, $23415 \times 382 = 8944530$

EXERCISE 1.9

1 Solve the following:

(i) 1632×23

(ii) 2341×70

(iii) 6314×52

(iv) 2109×84

(v) 51389×562

(vi) 43851×725

(vii) 65123×316

(viii) 74156×163

2 Multiply:

(i) $11689 \text{ by } 100$

(ii) $21499 \text{ by } 120$

(iii) $25701 \text{ by } 553$

(iv) $32145 \text{ by } 152$

(v) $41078 \text{ by } 203$

(vi) $12345 \text{ by } 123$

(vii) $54321 \text{ by } 321$

(viii) $89713 \text{ by } 401$

Solve real life problems involving multiplication

We do the multiplication of numbers in our daily life in routine. Let us understand the process by following example.

Example: A factory produce **28543** toffees in one shift. Find the number of toffees in **132** such shifts.

Solution:

$$\begin{array}{r} \textcircled{2} \textcircled{1} \\ \textcircled{1} \textcircled{1} \textcircled{1} \\ 28543 \\ \times 132 \\ \hline \end{array}$$

Toffees produced in one shift
Number of shifts

$$\begin{array}{r} \textcircled{1} \textcircled{1} \\ \textcircled{1} \textcircled{1} \\ \textcircled{1} \\ + 28543 \times \times \\ \hline 3767676 \end{array}$$

So,
Total number of toffees are **3,767,676**

EXERCISE 1.10

- 1 There were 5,324 bottles of cold drinks loaded in a truck. How many bottles will be loaded in 132 trucks?
- 2 There are 630 students in a school. Each student pays Rs 1,200 as monthly fees. How much fee is collected by the school in a month?
- 3 Price of a motorcycle is Rs 35,800. Find the price of such 325 motorcycles.
- 4 A poultry farm produced 43,290 eggs in a day. How many eggs will be produced in 400 days?
- 5 A town uses 45,038 liters of water in a week. How much water will be used in 890 weeks?
- 6 A family spent Rs 15,980 to purchase food items for a month. What amount will be spent by 580 such families?

1.5 DIVISION

Divide numbers up to 4-digits by numbers up to 2-digits

We have learnt in class III to divide 2-digit numbers by 1-digit numbers. We use division in daily life. It is repeated subtraction.

Example 1:

Divide 56 by 8

$$\begin{array}{r}
 \text{Quotient} \\
 \boxed{8} \overline{) 56} \\
 \underline{- 56} \\
 \text{Remainder} \quad 0
 \end{array}$$

Hence, $56 \div 8 = 7$

Example 2:

Divide 561 by 11

$$\begin{array}{r}
 \text{Quotient} \\
 11 \overline{) 561} \\
 \underline{- 55} \\
 11 \\
 \underline{- 11} \\
 0
 \end{array}$$

Hence, $561 \div 11 = 51$

Teacher's Note

Teacher should teach the division of numbers by the concept of repeated subtraction.

Example 3: Divide 975 by 15

Solution:

$$\begin{array}{r}
 65 \\
 15 \overline{) 975} \\
 \underline{- 90} \\
 75 \\
 \underline{- 75} \\
 00
 \end{array}$$

Hence,

$$975 \div 15 = 65$$

Explanations

- We start division from the highest value digit.
- If it is less than the divisor, we join the next digit.
- So we get 97.
- We have to divide 97 by 15, so we count maximum of multiples of 15 which can be subtracted from 97 which is 6 because $15 \times 6 = 90$. If we take 7 multiples then it will be $15 \times 7 = 105$, which is greater than 97. Write 90 below 97. Subtract 90 from 97 as shown.
- We write 6 as quotient.
- Take down the next digit which is 5 and we get 75. Now again repeat the process.

EXERCISE 1.11

1 Solve the following:

(i) $6744 \div 12$

(ii) $3795 \div 15$

(iii) $7293 \div 13$

(iv) $9384 \div 12$

(v) $2214 \div 18$

(vi) $9944 \div 22$

2 Divide the following numbers and find quotient.

(i) 4368 by 28

(ii) 8890 by 35

(iii) 5056 by 32

(iv) 6300 by 25

(v) 3920 by 16

(vi) 6642 by 18

3 Find the quotient and remainder when divisor is 35 and dividend is 5,075.

4 What will be the quotient and remainder for 5,696 as dividend and 16 as divisor.

5 If the divisor is 12 and dividend is 31,035. Find the quotient and remainder.

6 Find the quotient and remainder if 9,267 is divided by 15.

Solve real life problems involving division

We use the division of numbers in our daily life. Let us understand the process by the following example.

Example: 12 boxes of equal size contain **6816** toffees.
How many toffees are there in each box?

Solution:

Number of toffees = **6816**

Number of boxes = **12**

Number of toffees in each box = ?

Hence there are **568** toffees in each box.

Division:

$$\begin{array}{r}
 568 \\
 12 \overline{) 6816} \\
 \underline{-60} \\
 81 \\
 \underline{-72} \\
 96 \\
 \underline{-96} \\
 00
 \end{array}$$

EXERCISE 1.12

- 1 A cloth is 6,272 metres long. If one suit takes 7 metres of cloth. How many suits can be made?
- 2 Monthly salary of 12 workers is Rs 7,032. What will be the salary of one worker if they are taking same salary?
- 3 Asif spent Rs 2,925 to buy 13 shirts of same price. What is the price of each shirt?
- 4 The weight of 16 sacks of flour is 4,496 kg. What is the weight of each sack?
- 5 Price of 25 cricket bats is Rs 3,075. What is the price of one bat?
- 6 One crate of bottles has capacity to put 36 bottles. How many crates required for 5,616 bottle.

1.6 USE MIXED OPERATIONS OF ADDITION & SUBTRACTION AND MULTIPLICATION & DIVISION

Apply fundamental operations of addition, subtraction, multiplication and division

Combined Operations must be done in this order

1. Deal with brackets
2. If +/- and \times/\div are not combined, then perform the operations from left to right in expression/equation
3. When +/- and \times/\div are combined, then first perform division and multiplication before addition and subtraction in expression/equation

Example 1: Solve: $86 - 34 + 62$

Solution: As both addition and subtraction operations are involved in the question, we have to perform both operations one by one or simply work from left to right

$$\begin{aligned} & 86 - 34 + 62 \\ = & \boxed{86 - 34} + 62 \\ = & \boxed{52 + 62} = 114 \end{aligned}$$

Example 2: Solve: $4 + 6 \div 2 \times 3$

Solution:

$$\begin{aligned} & = 4 + \boxed{6 \div 2} \times 3 \quad (\text{Perform division first}) \\ & = 4 + \boxed{3 \times 3} \quad (\text{Perform multiplication}) \\ & = 4 + 9 = 13 \end{aligned}$$

Example 3: Solve: $3 \times 4 + 2$

Solution: As multiplication and addition both are involved in question, we have to perform multiplication first then addition.

$$\begin{aligned} 3 \times 4 + 2 & = \boxed{3 \times 4} + 2 \\ & = 12 + 2 \\ & = 14 \end{aligned}$$

Example 4: Solve: $81 \div 9 + 34$

Solution: As division and addition both are involved in question, we have to solve the division first then addition.

$$\begin{aligned} 81 \div 9 + 34 &= \boxed{81 \div 9} + 34 \\ &= 9 + 34 = 43 \end{aligned}$$

EXERCISE 1.13

Solve the following:

- | | |
|-----------------------------------|------------------------------------|
| (1) $46 - 23 + 17$ | (2) $99 - 77 + 33$ |
| (3) $98 - 46 + 24$ | (4) $48 - 21 + 31$ |
| (5) $324 - 152 + 182$ | (6) $582 - 325 + 154$ |
| (7) $682 + 329 - 159$ | (8) $489 \div 5 + 393$ |
| (9) $253 \div 11 \times 5$ | (10) $540 \div 15 \times 8$ |
| (11) $992 \div 16 \times 4$ | (12) $7 \times 375 \div 15$ |
| (13) $12 \times 114 \div 19 + 10$ | (14) $23 + 800 \div 20 \times 2$ |
| (15) $32 \times 400 \div 16 + 23$ | (16) $451 \times 690 \div 30 - 15$ |

Solve real life problems (using Pakistani currency as well) involving addition, subtraction, multiplication and division.

Addition, Subtraction, Multiplication and Division:

Example 1: Sara spent Rs **486,935** to buy a car and Rs **439,870** to buy Jewellery. How much money she spent altogether?

Solution: To buy a car	= Rs	$\begin{array}{r} \textcircled{1} \textcircled{1} \textcircled{1} \textcircled{1} \\ 486935 \end{array}$
To buy Jewellery	= Rs	$\begin{array}{r} + 439870 \\ \hline \end{array}$
Total amount spent by Sara.	= Rs	$\begin{array}{r} 926805 \\ \hline \end{array}$

EXERCISE 1.14

- 1 Cost of a car is Rs 748,630 and the cost of another car is Rs 630,010. What is the total cost of both cars?
- 2 Shagufta had Rs 389,000 in her bank account. She spent Rs 183,499 for repair of her house. How much amount is left with her?
- 3 A poultry farm sold 143,860 chicken in a month and 354,180 in next month. Find the difference in its sale.
- 4 The cost of a TV is Rs 95,400. Find the cost of such 150 Tvs.
- 5 A farm contains 56,321 trees of dates. How many date trees will be in 835 farms?
- 6 A school spent Rs 4,375 on a picnic party. Only 35 students went to a picnic. What is the amount to be paid by each student?
- 7 Najeeb is distributing 3,290 food packs among 235 families. How many food packs will each family get?

REVIEW EXERCISE – 1

1. **Tick the correct options.**
 - (i) The place value of 8 in 2,485,612 is _____
(a) 800 (b) 8,000 (c) 80,000
(d) 800,000
 - (ii) Seven digit numbers represent _____
(a) thousand (b) millions (c) ten millions
(d) hundred millions
 - (iii) $20 + 8 \div 4 =$ _____
(a) 4 (b) 7 (c) 8 (d) 22
2. **Write the following numbers in words.**
(i) 2,412,316 (ii) 36,123,101 (iii) 600,216
3. **Write the following numbers in figures.**
(i) Twenty million (ii) One hundred million
4. **Add.**
(i) 416,712 and 712,145 (ii) 900,102 and 812,156
5. **Subtract.**
(i) 218,822 from 967,829 (ii) 100,512 from 200,603
(iii) 555,666 from 723,444
6. **Solve the following.**
(i) 61243×261 (ii) 21588×120
(iii) $3810 \div 15$ (iv) $5088 \div 32$
(v) $555 \div 15 \times 2$
7. The annual saving of Raheel is Rs 89,560. Out of which he purchases a T.V of Rs 35,000. How much amount is left with him?

FACTORS AND MULTIPLES

2.1 DIVISIBILITY TESTS

Identify divisibility rules for 2, 3, 5 and 10

A divisibility test is a quick way of testing if a given number is divisible by another number without doing the division.



Activity

Find the factors of the numbers

2, 4, 5, 7, 9, 12, 18, 24, 32 and 48.

Every number is divisible by 1

Let us examine the numbers.

Example 1: Which of the following numbers is divisible by 2?

(i) 1,456

Digit at units place is 6, which is even.

So, 1,456 is divisible by 2

Verification:

$$\begin{array}{r}
 728 \\
 2 \overline{) 1456} \\
 \underline{-14} \\
 5 \\
 \underline{-4} \\
 16 \\
 \underline{-16} \\
 00
 \end{array}$$

(ii) 92,357

Digit at units place is 7, which is odd.

So, 92,357 is not divisible by 2

Verification:

$$\begin{array}{r}
 46268 \\
 2 \overline{) 92537} \\
 \underline{-8} \\
 12 \\
 \underline{-12} \\
 5 \\
 \underline{-4} \\
 13 \\
 \underline{-12} \\
 17 \\
 \underline{-16} \\
 1
 \end{array}$$

Note: Remainder is not 0

So, 92537 is not exactly divisible by 2.

A number is divisible by 2, if ones digit is 0, 2, 4, 6 or 8

Example 2: Which of the following numbers is divisible by 3?

- (i) 1,452 (ii) 62,345

Solution:

(i) **1,452**

Sum of digit is $1 + 4 + 5 + 2 = 12$

and **12** is divisible by **3**

So, **1,452** is also divisible by **3**

Verification:

$$\begin{array}{r} 3 \overline{) 1452} \quad (484 \\ \underline{-12} \\ 25 \\ \underline{-24} \\ 12 \\ \underline{-12} \\ 00 \end{array}$$

(ii) **62,345**

Sum of digits $6 + 2 + 3 + 4 + 5 = 20$

and **20** is not divisible by **3**

So, **62,345** is not divisible by **3**

Verification:

$$\begin{array}{r} 3 \overline{) 62345} \quad (20748 \\ \underline{-6} \\ 23 \\ \underline{-21} \\ 14 \\ \underline{-12} \\ 25 \\ \underline{-24} \\ 1 \end{array}$$

Note: Remainder is not **0**

So, **62,345** is not divisible by **3**.

Add the digits. If the result is divisible by **3**, then the original number is also divisible by **3**.

Example 3: Which of the following numbers is divisible by 5?

(i) **14673**

14673 is not divisible by **5** because digit at unit place is not **0** or **5**

Verification:

$$\begin{array}{r} 2934 \\ 5 \overline{) 14673} \\ \underline{-10} \\ 46 \\ \underline{-45} \\ 17 \\ \underline{-15} \\ 23 \\ \underline{-20} \\ 3 \end{array}$$

Note: Remainder is not **0**

So, **14,673** is not divisible by **5**.

(ii) **31360**

31360 is divisible by **5** because digit at ones place is **0**

Verification:

$$\begin{array}{r} 6272 \\ 5 \overline{) 31360} \\ \underline{-30} \\ 13 \\ \underline{-10} \\ 36 \\ \underline{-35} \\ 10 \\ \underline{-10} \\ 0 \end{array}$$

A number is divisible by **5**, if the last digit is **0** or **5**.

Example 4: Which of the following number is divisible by 10?

- (i) 24,563 (ii) 16,230

Solution:

(i) 24,563

24,563 is not divisible by 10 because digit at ones place is not zero

Verification:	
10) 24563	(2456
- 20	
45	
- 40	
56	
- 50	
63	
- 60	
3	

Note: Remainder is not 0

So, 24,563 is not divisible by 10.

(ii) 16,230

16,230 is divisible by 10 because digit at ones place is zero.

Verification:	
10) 16230	(1623
- 10	
62	
- 60	
23	
- 20	
30	
- 30	
00	

A number is divisible by 10, if last digit is 0.

Use divisibility tests for 2, 3, 5 and 10 on numbers up to 5-digits



Activity

Check the divisibility of 15,381 by 2, 3, 5 and 10.

Solution:

- (1) 15,381 since the digit at the unit place is 1, therefore, 15,381 is not divisible by 2.
- (2) The sum of the digits in 15,381 is: $1 + 5 + 3 + 8 + 1 = 18$ as 18 is divisible by 3; therefore 15,381 is divisible by 3.
- (3) In 15,381, the digits at ones place is not 0 or 5; therefore, 15,381 is not divisible by 5.
- (4) Also the digit at ones place is not '0'; therefore, 15,381 is not divisible by 10.

Teacher's Note

Teacher should do enough practice of divisibility rules with the help of examples.

EXERCISE 2.1

1. Which of the following numbers are divisible by 2?

(i) 120 (ii) 1,001 (iii) 1,434 (iv) 2,221 (v) 13,574

2. Test the following numbers for divisibility by 3.

(i) 135 (ii) 1,471 (iii) 2,100 (iv) 3,331 (v) 31,242

3. Which of the following numbers are divisible by 5?

(i) 1,235 (ii) 5,552 (iii) 6,035 (iv) 10,001 (v) 53,550

4. Test the following numbers for divisibility by 10?

(i) 1,350 (ii) 2,225 (iii) 30,500 (iv) 13,575 (v) 20,050

5. Identify the numbers which are divisible by 5 and 10 both.

(i) 12,000 (ii) 2,145 (iii) 4,040 (iv) 12,345 (v) 7,270

6. Check the divisibility of following numbers by 2, 3, 5 and 10.

Numbers	Divisibility by 2	Divisibility by 3	Divisibility by 5	Divisibility by 10
405				
3,354				
2,340				
41,220				
34,329				

2.2 PRIME AND COMPOSITE NUMBERS

Define prime and composite numbers

Over 2000 years ago, a famous Greek Mathematician Eratosthenes, was interested in prime numbers. He arranged the numbers in 10 columns. Follow the steps he did to find out all the prime numbers between 1 and 100.



Activity

- '1' is a very special number, leave it as it is.
- Start with 2, circle it and cross out every 2nd number after it.
- Now move to 3, circle it and cross out every 3rd number after it.
- The next number that has not been circled or crossed out is 5, circle it now and cross out every 5th number.
- What is the next number after 5 that has not circled or crossed out? Circle that number and follow the same steps until you have all the numbers been crossed out or circled except 1.

The chart will look as under:

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

Teacher's Note

After teaching the concept of prime and composite numbers, teacher should ask the students oral questions.

The activity shows that:

All the numbers that have been circled 2, 3, 5, 7, etc. are **Prime numbers**.

All the numbers that have been crossed out 4, 6, 8, 9, 12, 14 etc. are **Composite numbers**.

Note: '1' is neither composite nor prime number.

(a) Prime numbers:

A number which has only two factors 1 and numbers itself is called a prime number.

Like 2, 3, 5 and 41 etc they can not be divided by any other number except 1 and the number itself.

There is only one prime number that is even, all the other prime numbers are odd.
What is that number?

(b) Composite numbers:

Numbers which have more than two factors are called Composite numbers.

Composite numbers can be written as a product of two or more prime numbers
 $10 = 5 \times 2$

For example: 4 can be divided by 1, 2 and 4.

18 can be divided by 1, 2, 3, 6, 9 and 18.

So, 4 and 18 are composite numbers.

Identify prime or composite numbers

Number	Factors	Conclusion
37	1 and 37	Two factors: a prime number
42	1,2,3,6,7,14,21 and 42	More than two factors: a composite number
19	1 and 19	Two factors: a prime number
77	1, 7, 11 and 77	More than two factors: a composite number

- A prime number has exactly two factors 1 and itself.
- A composite number has more than two factors.

EXERCISE 2.2

- Identify the prime numbers from the following.
(i) 22 (ii) 41 (iii) 63 (iv) 51 (v) 81
(vi) 119 (vii) 223 (viii) 1 (ix) 101 (x) 222
- Identify the composite numbers from the following.
(i) 34 (ii) 71 (iii) 163 (iv) 351 (v) 81
(vi) 19 (vii) 23 (viii) 100 (ix) 18 (x) 135
- Separate composite and prime numbers from following.
41, 42, 43, 44, 45, 46, 47, 48, 49, 50,
51, 52, 53, 54, 55, 56, 57, 58, 59, 60.
- Write down all the prime numbers between 1 and 20.
- Write down all the composite numbers between 10 and 30.
- Write down all the prime and composite numbers between 20 and 40.

2.3 FACTORS AND MULTIPLES

List factors of a number up to 50

1. Factors:

A factor divides a number completely with zero remainder.

Example 1:

Factors of 6 are 1, 2, 3 and 6

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

The highest factor of every number is the number itself



1 is a factor of every number

Teacher's Note

Teacher should also perform some activities of factors and multiples in the class.

Example 2: Write down all the factors of

9, 10, 15, 18, 42 and 50

Factors of 10 are 1, 2, 5, and 10

Factors of 15 are 1, 3, 5 and 15

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

Factors of 42 are 1, 2, 3, 6, 7, 14, 21 and 42

Factors of 50 are 1, 2, 5, 10, 25 and 50.



What operation do you think we use to find the factors of a number

2. Multiples:

This biscuit costs Rs 2. For every biscuit you buy, the cost will go up by addition of 2. Costs will be Rs 2, Rs 4, Rs 6 and so on. So 2, 4, 6, 8 are few multiples of 2.



Example:

Cost of 1



$$2 \times 1 = 2$$

Cost of 2



$$2 \times 2 = 4$$

Cost of 3

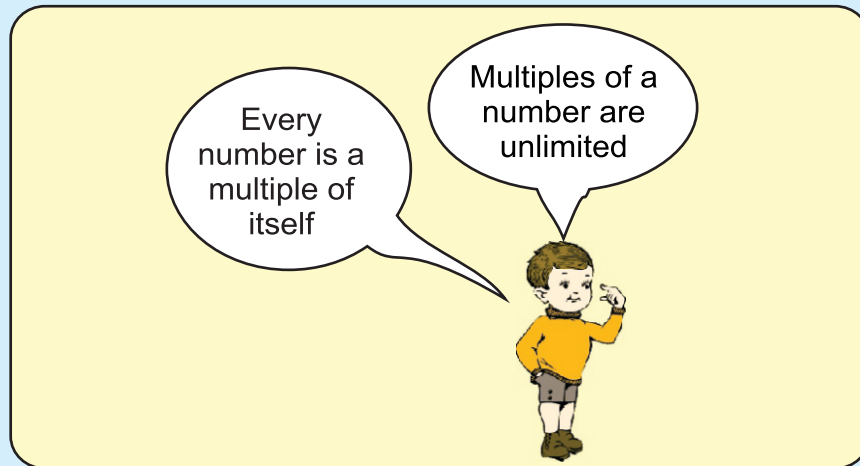


$$2 \times 3 = 6$$

So, 2, 4, 6, 8, . . . are multiples of 2.

The multiplication that you learnt in previous classes, can help to find multiples of a number. The first few multiples of 2, 3, 4 and 5 are given below:

$1 \times 2 = 2$	$1 \times 3 = 3$	$1 \times 4 = 4$	$1 \times 5 = 5$
$2 \times 2 = 4$	$2 \times 3 = 6$	$2 \times 4 = 8$	$2 \times 5 = 10$
$3 \times 2 = 6$	$3 \times 3 = 9$	$3 \times 4 = 12$	$3 \times 5 = 15$
$4 \times 2 = 8$	$4 \times 3 = 12$	$4 \times 4 = 16$	$4 \times 5 = 20$



List the first twelve multiples of a 1-digit number

Example 1: List first twelve multiples of 8 and 6.

Solution:

First twelve multiples of **8** are
8, 16, 24, 32, 40, 48, 56, 64,
72, 80, 88 and 96

First twelve multiples of **6** are
6, 12, 18, 24, 30, 36, 42, 48,
54, 60, 66 and 72

Differentiate between factors and multiples

Factors of 6 are:
1, 2, 3 and 6.
They can be counted.

$$\begin{array}{l} \boxed{1} \times 6 = \boxed{6} \\ \boxed{2} \times 3 = \boxed{6} \end{array}$$

Multiple of 6

$$\begin{array}{l} 6 \times 1 = 6 \\ 6 \times 2 = 12 \\ 6 \times 3 = 18 \\ 6 \times 4 = 24 \\ \dots \end{array}$$

EXERCISE 2.3

- List the first twelve multiples of 4, 7 and 9.
- Write down all the factors of 16, 26 and 45.
- Circle all the multiples of 7 from the following numbers
14, 24, 28, 35, 45, 56, 62, 84, 69
- Write down all the multiples of 8 between 20 and 90.
- Write all the factors of 50 between.

2.4 PRIME FACTORIZATION

Factorize a number by using prime factors

The process of writing numbers as a product of its prime factors is called Prime Factorization.

There are two prime factorization methods:

(1) Factor tree method

(2) Division method

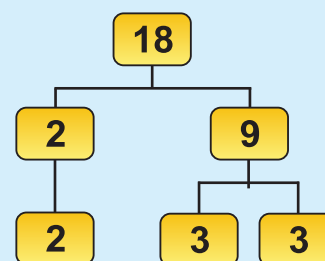
1. Factor tree method

Example 1: Factorize 18 into its prime factors.

Choose any two factors except 1 and 18

Since 9 is a composite number,
so we can write $9 = 3 \times 3$

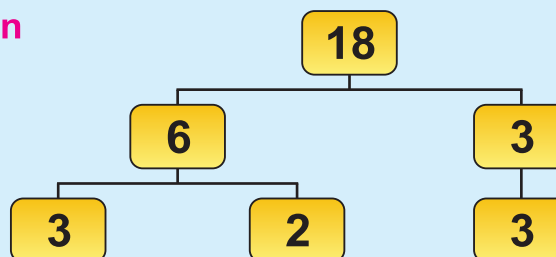
Are 2 and 3 both prime factors?
Yes, **Stop!**



Hence, we can write $18 = 2 \times 3 \times 3$

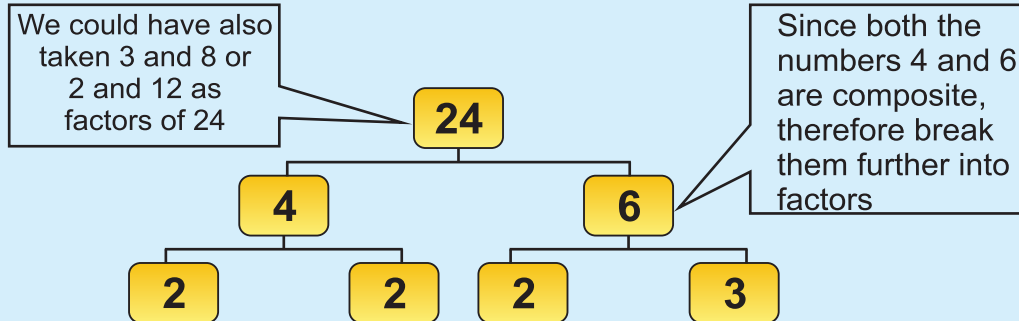
where 2 and 3 are the prime factors of 18.

**We could have also taken
3 and 6 as factors of 18**



Hence we can write
 $3 \times 2 \times 3 = 18$

Example 2: Factorize 24 into its prime factors.



Prime factors of 24 are 2, 2, 2 and 3.

2. Division method:

Example 1:

2	18	
3	9	Since, $2 \times 9 = 18$
3	3	Since, $3 \times 3 = 9$
	1	Since, $3 \times 1 = 3$

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

Example 2:

2	24	
2	12	Since, $2 \times 12 = 24$
2	6	Since, $2 \times 6 = 12$
3	3	Since, $2 \times 3 = 6$
	1	Since, $3 \times 1 = 3$

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

EXERCISE 2.4

- Write down all the factors of the following numbers and underline the prime factors.
 - 12
 - 20
 - 25
 - 44
 - 64
 - 28
- Factorize the following numbers using the factor tree method.
 - 36
 - 54
 - 27
 - 45
 - 32
 - 82
- Factorize the following numbers using the division method.
 - 63
 - 45
 - 72
 - 54
 - 38
 - 90

2.5 HIGHEST COMMON FACTOR (HCF)

Determine common factors of two or more 2-digit numbers

Let us first list down the factors of any two numbers.

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

Factors of 24 are: **1, 2, 3**, 4, **6**, 8, 12 and 24

The common factors of 18 and 24 are 1, 2, 3 and 6 out of which '6' is the highest so, **6** is called the **Highest Common Factor**.

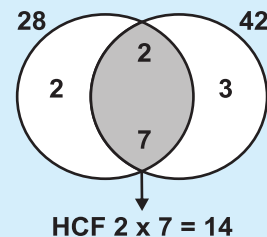
Find HCF of two or more 2-digit numbers using

(i) Venn diagram (ii) Prime factorization

Example 2: Find the Highest Common Factor of 28 and 42 by using Venn diagram and prime factorization method.

1. Venn diagram

Let us find the prime factors of 28 and 42 by using Venn diagram.



2. Prime Factorization

Let us find the prime factors of 28 and 42 by using division method.

$$\begin{array}{r|l} 2 & 28 \\ \hline 2 & 14 \\ \hline 7 & 7 \\ \hline & 1 \end{array}$$

$$\begin{array}{r|l} 2 & 42 \\ \hline 3 & 21 \\ \hline 7 & 7 \\ \hline & 1 \end{array}$$

$$\begin{array}{l} 28 = 2 \times 2 \times 7 \\ 42 = 2 \times 3 \times 7 \end{array} \quad \left. \vphantom{\begin{array}{l} 28 \\ 42 \end{array}} \right\} \longrightarrow \text{Loop the common factors}$$

$$\text{HCF} = 2 \times 7 = 14 \longrightarrow \text{Product of all the common factors}$$

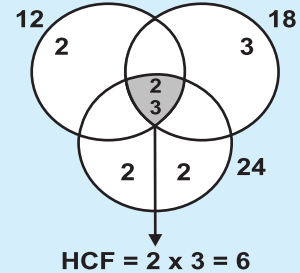
Teacher's Note

Teacher may use other set of numbers and develop the concept of finding HCF of numbers.

Example 3: Find the Highest Common Factor of 12, 18 and 24 by using Venn diagram and prime factorization method.

1. Venn diagram

Let us find the prime factors of 12, 18 and 24 by using Venn diagram.



2. Prime Factorization

Let us find the prime factors of 12, 18 and 24 by using division method.

2	12
2	6
3	3
	1

2	18
3	9
3	3
	1

2	24
2	12
2	6
3	3
	1

$$12 = 2 \times 2 \times 3$$

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

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

Loop the common factors

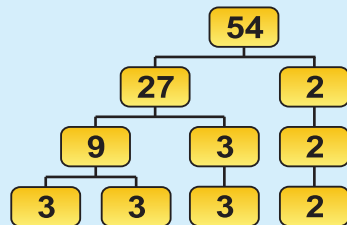
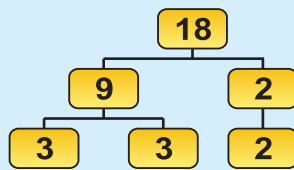
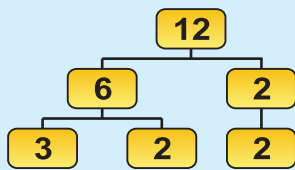
HCF = 2 x 3 = 6

Product of all the common factors

Example 4: Find the Highest Common Factor of 12, 18 and 54 by using prime factorization method and Venn diagram.

By Prime Factorization

Let us find the prime factors of 12, 18 and 54 by using factor tree method.

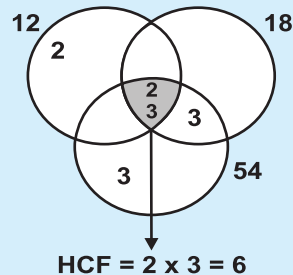


$$12 = 2 \times 2 \times 3$$

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

$$54 = 2 \times 3 \times 3 \times 3$$

HCF = 2 x 3 = 6



By Venn diagram:

Let's find the prime factors of 12, 18 and 54 by using Venn diagram.

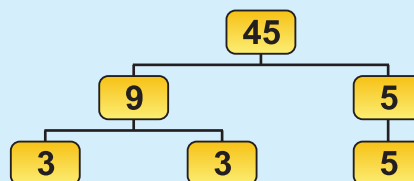
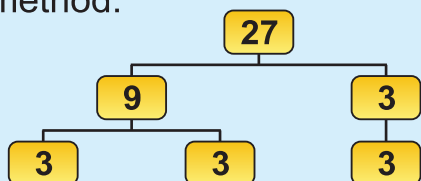
Teacher's Note

Teacher may use other set of numbers and develop the concept of finding HCF of numbers.

Example 5: Find the Highest Common Factor of 27 and 45 by using prime factorization method and Venn diagram.

By Prime Factorization

Let us find the prime factors of 27 and 45 by using factor tree method.



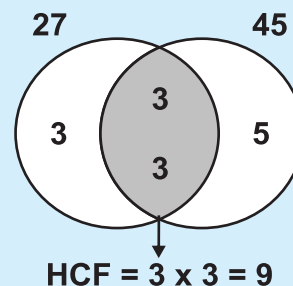
$$27 = 3 \times 3 \times 3$$

$$45 = 3 \times 3 \times 5$$

$$\text{HCF} = 3 \times 3 = 9$$

By Venn diagram:

Let's find the prime factors of 27 and 45 by using Venn diagram.



EXERCISE 2.5

1. Write down all the factors of the following pairs of numbers and loop the common factors.

- (i) 12 and 18 (ii) 10 and 15 (iii) 22 and 44
 (iv) 8 and 32 (v) 24, 30 and 36

2. Find the HCF of the following numbers by Prime Factorization Method.

- (i) 36 and 42 (ii) 28 and 42 (iii) 45 and 75
 (iv) 25 and 75 (v) 18 and 72 (vi) 32 and 64
 (vii) 60 and 90 (viii) 25, 40 and 50

3. Find the HCF of the following numbers by Venn Diagram.

- (i) 24 and 36 (ii) 63 and 54 (iii) 40 and 44
 (iv) 48 and 84 (v) 22 and 24 (vi) 14, 21 and 49

Solve real life problems involving HCF

Example 1: Two wires with lengths of 48 cm and 64 cm are to be cut into pieces of same length. Find the greatest possible length of the pieces.

Solution: We have to find the greatest of length in which each of wire can be divided. In order to find the greatest possible length of the pieces of each wire, we'll have to find the HCF of 48 and 64.

$$\begin{array}{r|l} 2 & 48 \\ \hline 2 & 24 \\ \hline 2 & 12 \\ \hline 2 & 6 \\ \hline 3 & 3 \\ \hline & 1 \end{array}$$

$$\begin{array}{r|l} 2 & 64 \\ \hline 2 & 32 \\ \hline 2 & 16 \\ \hline 2 & 8 \\ \hline 2 & 4 \\ \hline 2 & 2 \\ \hline & 1 \end{array}$$

$$48 = 2 \times 2 \times 2 \times 2 \times 3$$

$$64 = 2 \times 2 \times 2 \times 2 \times 2 \times 2$$

$$\text{So, HCF} = 2 \times 2 \times 2 \times 2 = 16$$

Hence, the greatest possible length of the piece of wire should be 16 cm in which each wire could be cut equally.

Example 2: There are 3 companies of 80, 112 and 144 scouts in a school. Find the highest number of scouts in which each team can be distributed equally.

$$\begin{array}{r|l} 2 & 80 \\ \hline 2 & 40 \\ \hline 2 & 20 \\ \hline 2 & 10 \\ \hline 5 & 5 \\ \hline & 1 \end{array}$$

$$\begin{array}{r|l} 2 & 112 \\ \hline 2 & 56 \\ \hline 2 & 28 \\ \hline 2 & 14 \\ \hline 7 & 7 \\ \hline & 1 \end{array}$$

$$\begin{array}{r|l} 2 & 144 \\ \hline 2 & 72 \\ \hline 2 & 36 \\ \hline 2 & 18 \\ \hline 3 & 9 \\ \hline 3 & 3 \\ \hline & 1 \end{array}$$

$$\text{Therefore, } 80 = 2 \times 2 \times 2 \times 2 \times 5$$

$$112 = 2 \times 2 \times 2 \times 2 \times 7$$

$$144 = 2 \times 2 \times 2 \times 2 \times 3 \times 3$$

$$\text{So, HCF} = 2 \times 2 \times 2 \times 2 = 16$$

Teacher's Note

Teacher may take other examples related to real life i.e number of hours spent in ploughing field, distance covered by the car, cost of crops produced by farmers, things sold by shopkeeper and clear the use of finding HCF.

Example 3: Sheeba has three pieces of cloth. The measure of three pieces are 12, 24 and 30 meters respectively. She needs to cut the pieces into of equal width that are as wide as possible.

we can find width by using HCF, now

$$\begin{aligned} \text{Therefore, } 12 &= 2 \times 2 \times 3 \\ 24 &= 2 \times 2 \times 2 \times 3 \\ 30 &= 2 \times 3 \times 5 \end{aligned}$$

$$\begin{array}{r|l} 2 & 12 \\ \hline 2 & 6 \\ \hline 3 & 3 \\ \hline & 1 \end{array}$$

$$\begin{array}{r|l} 2 & 24 \\ \hline 2 & 12 \\ \hline 2 & 6 \\ \hline 3 & 3 \\ \hline & 1 \end{array}$$

$$\begin{array}{r|l} 2 & 30 \\ \hline 3 & 15 \\ \hline 5 & 5 \\ \hline & 1 \end{array}$$

$$\text{So, HCF} = 2 \times 3 = 6$$

She should cut each piece to be 6 meters.

EXERCISE 2.6

1. What is the maximum number of students among which Haider can distribute 36 sweets and 48 jelly to divide them equally?
2. Find the greatest number of bundles of books in which 18 Science books, 24 Maths books and 36 English books can be arranged equally.
3. Two ribbons with the length of 44 m and 66 m are to be cut into pieces of same length. Find the greatest length of the piece of ribbon?
4. Mona has two pieces of tablecloth, one is 48 cm wide while the other is 90 cm wide. She wants to cut both pieces into strips of equal width. What should be the maximum width of each strip?
5. A class teacher has 32 red balloons, 28 blue balloons and 20 green balloons. She wants to distribute balloons equally among the students. Find the maximum number of balloons which could be distribute between students.
6. Zulfiqar has three containers containing 144, 176 and 256 litres of coconut oil respectively. Find the capacity of the largest tin by which he can measure the oil exactly.

2.6 LOWEST COMMON MULTIPLE (LCM)

Determine common multiples of two or more 2-digit numbers

The multiples of any two numbers which are common in both the numbers are called common multiples.

Example 1:

Let's start with the numbers 4 and 6:

Solution:

Multiples of 4 are: 4, 8, **12**, 16, 20, **24**, 28, 32, **36**, ...

Multiples of 6 are: 6, **12**, 18, **24**, 30, **36**, 42, 48, 54, ...

The common multiples of 4 and 6 are **12, 24, 36**, ...

There is no end to common multiples of any two numbers because multiples are not limited!!!

Example 2:

Determine first 4 common multiples of 8, 12 and 24

Solution:

Multiples of 8 are: 8, 16, **24**, 32, 40, **48**, 56, 64, **72**, 80, 88, **96**, ...

Multiples of 12 are: 12, **24**, 36, **48**, 60, **72**, 84, **96**, 108, ...

Multiples of 24 are: **24, 48, 72, 96**, ...

We can see that that the first four common multiples of 8, 12

And 24 are **24, 48, 72** and **96**

Find Lowest Common Multiple by

(i) Common multiples (ii) Prime factorization

In order to find the lowest common multiple (LCM) of two numbers, consider the above examples:

In example 1, out of the common multiples of 4 and 6, the lowest is **12**, so **12** is the Lowest Common Multiple of 4 and 6.

Will the highest common multiple exist????

Similarly in example 2, out of the common multiples of 8 and 12, the lowest is **24**, so **24** is the Lowest Common Multiple of 8 and 12.

This method of finding LCM is called the **common multiples method**. The other method is **Prime factorization method**.

Example 1: Find the Lowest Common Multiple of 24, 36 and 48 by prime factorization method.

Solution:

2	24
2	12
2	6
3	3
	1

2	36
2	18
3	9
3	3
	1

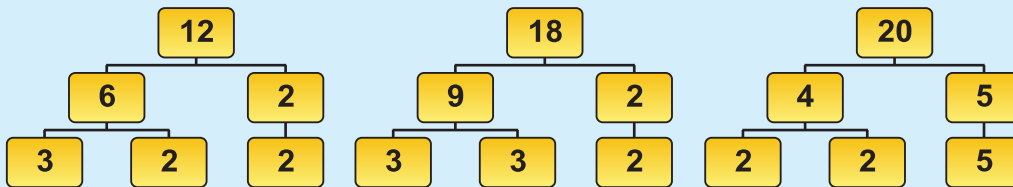
2	48
2	24
2	12
2	6
3	3
	1

$$\begin{aligned}
 24 &= 2 \times 2 \times 2 \times 3 \\
 36 &= 2 \times 2 \times 3 \times 3 \\
 48 &= 2 \times 2 \times 2 \times 2 \times 3
 \end{aligned}$$

LCM must be divisible by all the numbers given

LCM = Product of common factors \times all uncommon factors.
 $= 2 \times 2 \times 2 \times 3 \times 3 \times 2 = 144$

Example 2: Find the LCM of 12, 18 and 20 using the Prime Factorization method.



$$12 = 2 \times 2 \times 3$$

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

$$20 = 2 \times 2 \times 5$$

$$\text{LCM} = 2 \times 2 \times 2 \times 3 \times 3 \times 3 \times 5 = 1080$$

EXERCISE 2.7

1. Find the LCM of the following numbers by common multiples method:

(i) 25 and 15 (ii) 12 and 14 (iii) 10 and 20
(iv) 6 and 9 (v) 7 and 5

2. Find the LCM of the following numbers by prime factorization method:

(i) 42 and 18 (ii) 15 and 36
(iii) 12 and 45 (iv) 35 and 15
(v) 20 and 48 (vi) 27 and 24
(vii) 45 and 63 (viii) 30 and 18
(ix) 11, 22 and 33 (x) 24, 30 and 36

Solve real life problems involving LCM**Example 1:**

Today, both the soccer team and the basketball team had games. The soccer team plays every 3 days and the basketball team plays every 5 days. When will both teams have games on the same day again?

Solution:

Lowest common multiple of 3 and 5 is 15
After 15 days they both will have games on the same day.

Example 2:

A manager at a restaurant can buy buns in packages of 8, Burger in the packages of 10 and shami kababs in packages of 6. What is the least number of packages of each product he should buy to have an equal number of buns and kababs?

Solution:

Lowest common multiple of 8, 10 and 6 is 120
He should buy 120 packages of each product to have equal number of buns and kababs.

Example 3. There are three bells ring at an interval of 7, 10 and 14 minutes respectively. They begin by ringing to gather. Find out how long will they ring to gather again?

Solution: Interval of three bells is 7, 10 and 14 minutes
 LCM of (7, 10, 14) minutes
 LCM = 70 minutes
 Therefore, They will ring to gather after 70 minutes.

2	7, 10, 14
5	7, 5, 7
7	7, 1, 7
	1, 1, 1

$$\text{L.C.M} = 2 \times 5 \times 7 = 70$$

EXERCISE 2.8

1. Ali saves Rs. 9 every day while Maria saves Rs.12. What is the least number of days it will take each person to save the same amount of money?
2. A child smiles at another child every 3 seconds while the other child smiles back every 6 seconds. When will both children smiles at each other at the same time?
3. Boxes that are 12 inches tall are being piled next to boxes that are 10 inches tall. What is the least height in feet at which the two piles will be the same height?
4. Two men running a marathon took a sip of water at the same time 72 minutes after they started the race. If the first man took a sip of water every 9 minutes, how often did the other man take a sip of water?
5. A radio station plays "yesterday" by the Beatles once every 2 days. Another station plays the same song once every 3 days. How many times in 30 days will both radio stations play the same song on the same day?
6. Ali runs every 12 days, Anees every 8 days and Ameen every 6 days. Ali Anees and Ameen boht ran today. How many days will it be until run together again?
7. Ali visits the garden every 15 days and Azhar every 20 days. Ali and Azhar both meet today. After how many days they will meet in garden again?

REVIEW EXERCISE – 2

1. **Choose the correct answer:**
 - (i) **Which of the following number is divisible by 2?**
(a) 567 (b) 484 (c) 257 (d) 193
 - (ii) **Which of the following number is divisible by 3?**
(a) 143 (b) 483 (c) 367 (d) 941
 - (iii) **Which of the following number is divisible by 2 and 10 both?**
(a) 4579 (b) 3921 (c) 4050 (d) 2108
 - (iv) **What is the HCF of 39 and 52?**
(a) 39 (b) 26 (c) 13 (d) 1
 - (v) **What is the LCM of 48 and 66?**
(a) 528 (b) 185 (c) 246 (d) 114
2. Find the HCF and LCM of 48, 69 and 36?
3. What is the HCF and LCM of 37 and 41? Explain how you got your answer?
4. Mrs. Sayem wants to distribute 45 patties, 60 samosas and 75 juices equally. Find the greatest number of students among which these materials can be distributed equally.
5. Rida is arranging her birthday party in cafeteria. She wants to share 15 sandwiches or 30 slices of pizza to be equally distributed in each friend. Find the number of friends could be invited at the party?

3.1 FRACTIONS

Define a fraction

Fraction is the part of a whole which is equally divided.



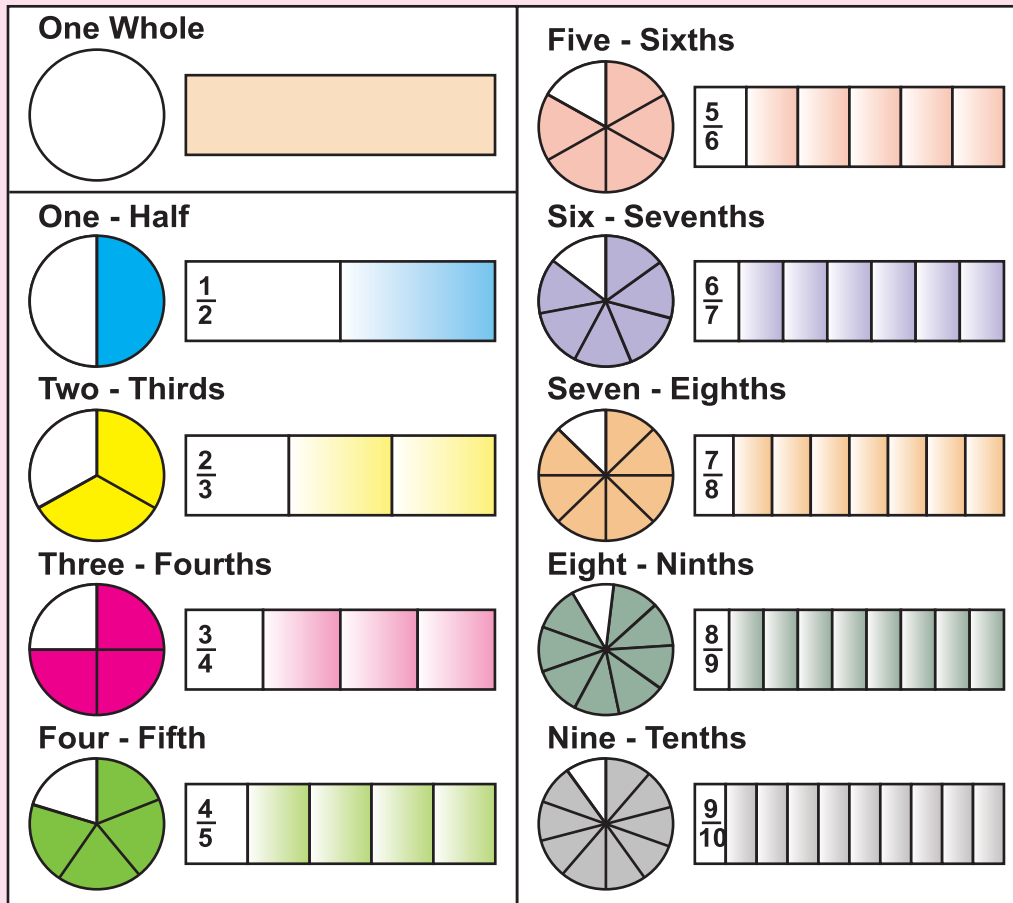
$\frac{3}{4}$ ← Numerator

Number of parts taken

← Denominator

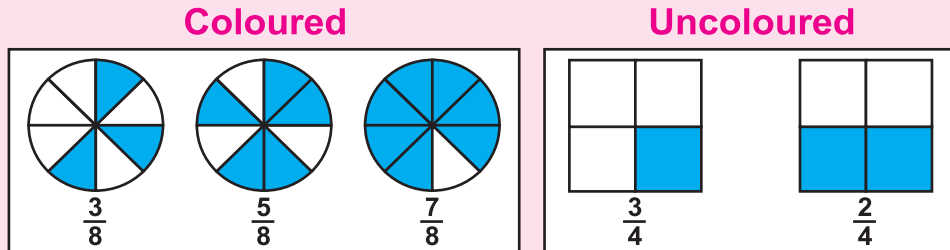
Total number of parts

Examples: Coloured parts of a whole are shown fraction.



Recognize like and unlike fractions

Look at the figures below:



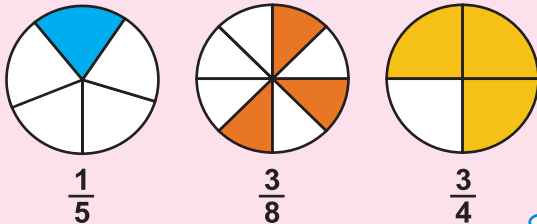
What do you observe?

One figure has been divided into equal parts.

The denominator in each case is the same.

They are called **Like fractions**.Fractions having different denominators are called **Unlike fractions**.

A whole is divided into same number of parts.



A whole is divided into different number of parts.

One-fifth, three-eighths and three-fourths are unlike fractions

Example: Separate the pairs of like and unlike fractions.

(i) $\frac{3}{4}, \frac{5}{7}$ (ii) $\frac{1}{5}, \frac{2}{5}$

Solution:

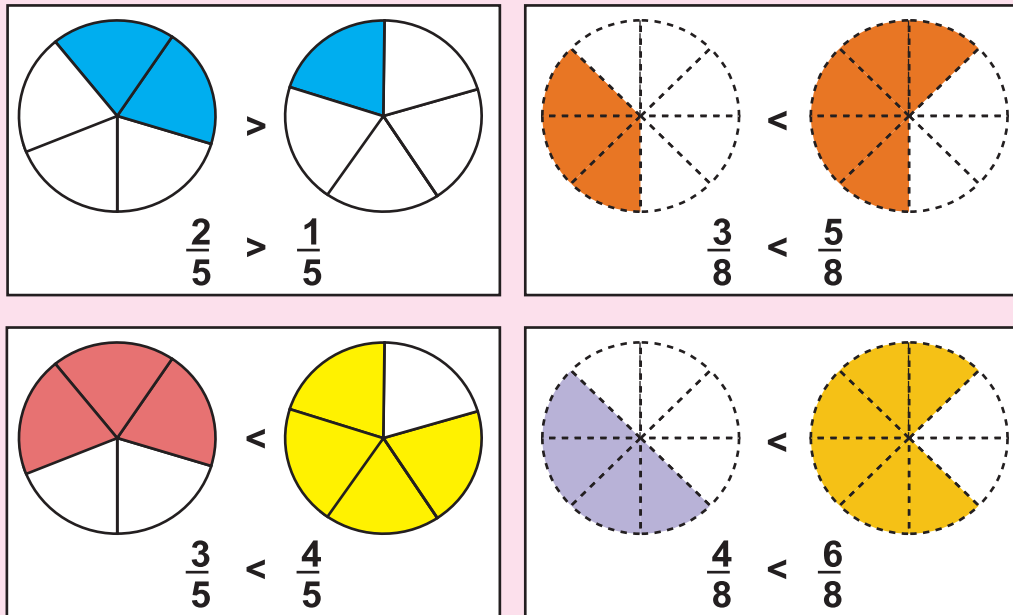
Like fraction pair: $\frac{1}{5}, \frac{2}{5}$

Unlike fraction pair: $\frac{3}{4}, \frac{5}{7}$

Compare two unlike fractions by converting them to equivalent fractions with the same denominator.

In the previous class you have learnt how to compare like fractions. Let us recall how you did that?

Compare fractions represented by coloured portion.



In case of like fractions, just look at the numerator, fraction with greater numerator represents greater value!

Examples:

$$\frac{8}{9} > \frac{5}{9} \quad , \quad \frac{7}{11} > \frac{2}{11} \quad , \quad \frac{1}{16} < \frac{5}{16} \quad , \quad \frac{2}{7} < \frac{5}{7}$$

We can compare unlike fractions as well.

Example:

How would you know whether $\frac{3}{4}$ is less than or greater than $\frac{4}{7}$?

Solution:

Convert these fractions into equivalent fractions having same denominator.

Equivalent fractions are obtained by multiplying the numerator and denominator by same number. It does not change the value of fraction !!!

LCM of 4 and 7 is 28

Now we make denominators same

$$\frac{3}{4} = \frac{3 \times 7}{4 \times 7} = \frac{21}{28}$$

$$\frac{4}{7} = \frac{4 \times 4}{7 \times 4} = \frac{16}{28}$$

Now they are like fractions, so just compare the numerators.

Here,

$$\frac{21}{28} > \frac{16}{28}$$

So, $\frac{3}{4} > \frac{4}{7}$

REMEMBER!

- Take the LCM of denominators
- Multiply the numerator and denominator by the same number to convert the denominator into LCM

Arrange fractions in ascending and descending order

Example 1:

Arrange the following sets of fractions in ascending and descending order.

$$\frac{6}{7}, \frac{2}{7}, \frac{1}{7} \text{ and } \frac{3}{7}$$

Solution: $\frac{6}{7}, \frac{2}{7}, \frac{1}{7}, \frac{3}{7}$

Since they are like fractions, compare the numerators

Ascending order:

$$\frac{1}{7}, \frac{2}{7}, \frac{3}{7}, \frac{6}{7}$$

Descending order:

$$\frac{6}{7}, \frac{3}{7}, \frac{2}{7}, \frac{1}{7}$$

Example 2: Compare $\frac{5}{9}$ and $\frac{4}{5}$

Solution:

LCM of 5 and 9 is 45

So, $\frac{5}{9} = \frac{5 \times 5}{9 \times 5} = \frac{25}{45}$ We make the denominator of both fractions 45

And $\frac{4}{5} = \frac{4 \times 9}{5 \times 9} = \frac{36}{45}$ So, we compare numerators 25 and 36

Because, $25 < 36$

So, $\frac{5}{9} < \frac{4}{5}$

Example 3: Write the following fractions in both ascending and descending order.

$$\frac{2}{9}, \frac{5}{6}, \frac{7}{12} \text{ and } \frac{1}{3}$$

Solution:

Since they are unlike fractions, we will first have to convert them into equivalent fractions.

STEP 1: Take the LCM of denominators
(LCM of 9, 6, 12 and 3 is 36)

STEP 2: Multiply numerator and denominator by the same number to get the LCM in the denominator.

$$\frac{2 \times 4}{9 \times 4} = \frac{8}{36}, \frac{5 \times 6}{6 \times 6} = \frac{30}{36}, \frac{7 \times 3}{12 \times 3} = \frac{21}{36}, \frac{1 \times 12}{3 \times 12} = \frac{12}{36}$$

Or $\frac{8}{36}, \frac{30}{36}, \frac{21}{36}, \frac{12}{36}$

Now it is easier to arrange by looking at the numerators,

Ascending order:

$$\frac{8}{36}, \frac{12}{36}, \frac{21}{36}, \frac{30}{36}$$

Or $\frac{2}{9}, \frac{1}{3}, \frac{7}{12}, \frac{5}{6}$

If the denominators are same, greater the numerator, larger the value of the fraction.

Descending order:

$$\frac{5}{6}, \frac{7}{12}, \frac{1}{3}, \frac{2}{9}$$

Simplify fractions to the lowest form

Fractions can be reduced to lowest form by dividing numerator and denominator by the highest common factor.

Example 1: Simplify: $\frac{30}{45}$

Solution: $\frac{30}{45} \rightarrow$ HCF of 30 and 45 is 15

$$\frac{30 \div 15}{45 \div 15} = \frac{2}{3}$$

So, $\frac{\overset{10}{\cancel{30}}}{\underset{15}{\cancel{45}}} = \frac{\overset{2}{\cancel{10}}}{\underset{3}{\cancel{15}}} = \frac{2}{3}$, where $\frac{2}{3}$ is the lowest form.

Teacher's Note

Teacher should teach the students about the ascending and descending orders of fractions by using LCM.

EXERCISE 3.1

1. From the following pairs of fractions, identify pair of like or unlike fractions.

(i) $\frac{2}{7}$ and $\frac{6}{7}$ (ii) $\frac{2}{9}$ and $\frac{2}{15}$ (iii) $\frac{8}{17}$ and $\frac{7}{17}$

(iv) $\frac{3}{10}$ and $\frac{6}{11}$ (v) $\frac{7}{11}$ and $\frac{7}{10}$ (vi) $\frac{1}{4}$ and $\frac{3}{4}$

(vii) $\frac{4}{13}$ and $\frac{13}{15}$ (viii) $\frac{11}{19}$ and $\frac{16}{19}$ (ix) $\frac{77}{27}$ and $\frac{4}{27}$

2. Fill in the blank boxes with “<” or “>” or “=” by first converting the fractions into like fractions.

(i) $\frac{3}{8}$ $\frac{3}{8}$ (ii) $\frac{5}{6}$ $\frac{4}{9}$ (iii) $\frac{7}{12}$ $\frac{1}{4}$

(iv) $\frac{2}{7}$ $\frac{13}{14}$ (v) $\frac{6}{15}$ $\frac{3}{10}$ (vi) $\frac{9}{11}$ $\frac{16}{22}$

3. Arrange the following fractions in ascending order.

(i) $\frac{6}{7}$, $\frac{9}{7}$, $\frac{5}{7}$ (ii) $\frac{5}{6}$, $\frac{2}{3}$, $\frac{5}{9}$

(iii) $\frac{2}{5}$, $\frac{1}{3}$, $\frac{4}{15}$ (iv) $\frac{5}{12}$, $\frac{4}{8}$, $\frac{3}{4}$, $\frac{1}{6}$

(v) $\frac{9}{8}$, $\frac{7}{2}$, $\frac{13}{6}$, $\frac{5}{4}$ (vi) $\frac{5}{12}$, $\frac{7}{6}$, $\frac{7}{4}$, $\frac{5}{2}$

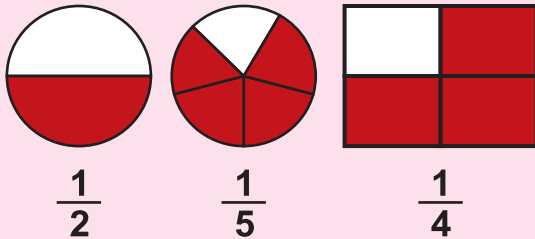
4. Simplify the following fractions to their lowest form.

(i) $\frac{24}{32}$ (ii) $\frac{18}{27}$ (iii) $\frac{30}{50}$ (iv) $\frac{14}{42}$ (v) $\frac{33}{66}$

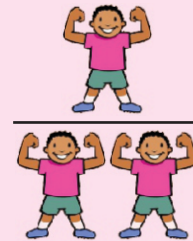
3.2 TYPES OF FRACTION

Unit Fractions: numerator is 1

Example:

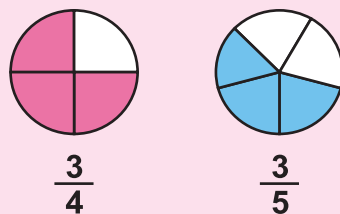


numerator is equal to one.



Non-unit Fractions: numerator is more than 1

Example:

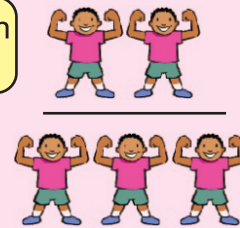
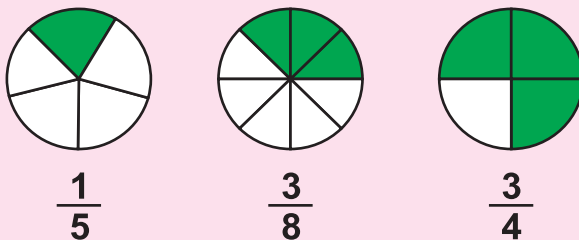


Proper Fractions: numerator is less than denominator

Example:

Proper Fractions

Numerator is less than the Denominator.

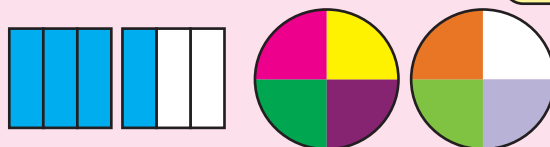


Improper Fractions: numerator is equal or greater than denominator

Example:

Improper Fractions

Numerator is greater than or equal to the Denominator.



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

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

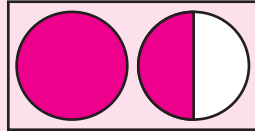
They are greater than or equal to 1

Mixed Numbers: a whole number and a proper fraction together

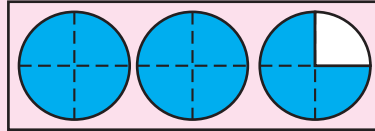
Example:

Mixed Fractions

A whole and a proper fraction

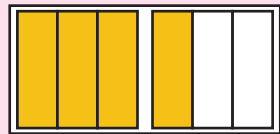


$$1\frac{1}{2}$$



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

They are similar to improper fractions



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

Convert improper fraction to mixed fraction and vice versa

Example 1:

Convert $5\frac{1}{2}$ into an improper fraction

5 wholes = 10 halves

10 halves + 1 half = 11 halves

$10 + 1 = 11$

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

Example 2:

Convert $\frac{13}{4}$ into an mixed number

Four quarters = one whole

13 quarters = 3 wholes and a quarter remaining

$(13 \div 4 = 3 \text{ remainder } 1)$

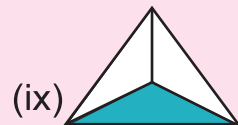
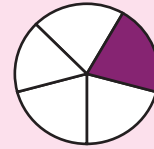
$$\frac{13}{4} = 3\frac{1}{4}$$

EXERCISE 3.2

1. Identify which of the following are unit, proper, improper or mixed fractions?

(i) $\frac{1}{3}$ (ii) $\frac{1}{4}$ (iii) $\frac{19}{4}$ (iv) $\frac{1}{7}$

(v) $\frac{5}{9}$ (vi) $2\frac{1}{8}$ (vii) $\frac{4}{3}$ (viii)



2. Convert the following improper fractions into mixed fractions.

(i) $\frac{43}{7}$ (ii) $\frac{29}{4}$ (iii) $\frac{74}{9}$ (iv) $\frac{14}{6}$

(v) $\frac{28}{5}$ (vi) $\frac{67}{3}$ (vii) $\frac{85}{11}$ (viii) $\frac{86}{5}$

3. Express the following mixed fractions as improper fractions.

(i) $4\frac{3}{10}$ (ii) $5\frac{2}{3}$ (iii) $6\frac{1}{2}$ (iv) $3\frac{2}{7}$

(v) $8\frac{1}{4}$ (vi) $1\frac{11}{13}$ (vii) $7\frac{7}{8}$ (viii) $2\frac{6}{7}$

3.3 ADDITION AND SUBTRACTION OF FRACTIONS

In the previous class, you have learnt how to add and subtract like fractions, let us recall that.

Example 1: Add: $\frac{2}{7} + \frac{3}{7}$

Solution:

$$\frac{2}{7} + \frac{3}{7} = \frac{5}{7}$$

Example 2: Solve: $\frac{7}{11} - \frac{4}{11}$

Solution:

$$\frac{7}{11} - \frac{4}{11} = \frac{3}{11}$$



Activity

Solve.

$$\frac{3}{7} + \frac{5}{7} = \square$$

$$\frac{4}{5} - \frac{2}{5} = \square$$

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

$$\frac{9}{15} - \frac{8}{15} = \square$$

$$\frac{5}{7} + \frac{1}{7} = \square$$

$$\frac{7}{15} - \frac{4}{15} = \square$$

$$\frac{6}{10} + \frac{3}{10} = \square$$

$$\frac{7}{12} - \frac{6}{12} = \square$$

$$\frac{5}{12} + \frac{2}{12} = \square$$

$$\frac{8}{14} - \frac{5}{14} = \square$$

$$\frac{7}{11} + \frac{2}{11} = \square$$

$$\frac{13}{17} - \frac{4}{17} = \square$$

Add fractions with unlike denominators

Example 1: Add $\frac{2}{3} + \frac{5}{6}$

Solution: We will first have to convert these unlike fractions into like fractions by taking the LCM of denominators.

Lowest common multiple of 3 and 6 is 6

$$\frac{2}{3} = \frac{4}{6} \text{ (using equivalent fractions)}$$

$$\text{So, } \frac{2}{3} + \frac{5}{6}$$

$$= \frac{4}{6} + \frac{5}{6} = \frac{4+5}{6} \text{ (add the numerators)}$$

$$= \frac{9}{6} = \frac{3}{2} = 1\frac{1}{2} \text{ (always keep your answer in the lowest form)}$$

Teacher's Note

Teacher should put emphasis on the use of LCM in addition and subtraction of fractions with unlike denominators.

Example 2: Add $1\frac{3}{5} + 2\frac{1}{10}$

Solution:

$$1\frac{3}{5} + 2\frac{1}{10} = \frac{8}{5} + \frac{21}{10}$$

Convert into improper fractions

$$= \frac{8 \times 2}{5 \times 2} + \frac{21 \times 1}{10 \times 1}$$

Make them like fractions (LCM = 10)

$$= \frac{16}{10} + \frac{21}{10} = \frac{16 + 21}{10}$$

Do the addition of numerators

$$= \frac{37}{10}$$

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

Always keep your answer in lowest form

$$\begin{array}{r} 10 \overline{) 37} \quad (3) \\ \underline{- 30} \\ 7 \end{array}$$

Verify commutative property of addition of fraction with same denominator

Example 1: Verify commutative property of addition for $\frac{5}{7}$ and $\frac{6}{7}$.

Commutative property of addition

$$\frac{5}{7} + \frac{6}{7} = \frac{6}{7} + \frac{5}{7}$$

$$\text{L.H.S} = \frac{5}{7} + \frac{6}{7}$$

$$= \frac{5+6}{7} = \frac{11}{7}$$

Now

$$\text{R.H.S} = \frac{6}{7} + \frac{5}{7}$$

$$= \frac{6+5}{7} = \frac{11}{7}$$

$$\text{L.H.S} = \text{R.H.S} \quad \text{verified}$$

Verify associative property of addition of fraction with same denominator

Example 2: Verify associative property of addition for

$$\frac{1}{2}, \frac{5}{2} \text{ and } \frac{9}{2}$$

Associative property of addition

$$\left(\frac{1}{2} + \frac{5}{2}\right) + \frac{9}{2} = \frac{1}{2} + \left(\frac{5}{2} + \frac{9}{2}\right)$$

$$\begin{aligned} \text{L.H.S} &= \left(\frac{1}{2} + \frac{5}{2}\right) + \frac{9}{2} \\ &= \left(\frac{1+5}{2}\right) + \frac{9}{2} \\ &= \frac{6}{2} + \frac{9}{2} \\ \text{L.H.S} &= \frac{6+9}{2} = \frac{15}{2} \\ \text{R.H.S} &= \frac{1}{2} + \left(\frac{5}{2} + \frac{9}{2}\right) \\ &= \frac{1}{2} + \frac{14}{2} \\ \text{R.H.S} &= \frac{1+14}{2} = \frac{15}{2} = \text{L.H.S verified} \end{aligned}$$

Subtract fractions with unlike denominators

We know that while subtraction of fractions with same denominator (like fractions) only numerators are subtracted and denominator of the difference remains the same, as of the given fraction.

Example 1: Subtract $\frac{5}{8} - \frac{1}{4}$

$$\begin{aligned} &\frac{5}{8} - \frac{1}{4} \quad (\text{Making like denominators}) \\ &= \frac{5}{8} - \frac{2}{8} = \frac{5-2}{8} \quad (\text{Take LCM of 8 and 4}) \\ &= \frac{3}{8} \quad (\text{subtract nominators}) \end{aligned}$$

Example 2: Subtract $3\frac{3}{4} - 1\frac{1}{6}$

Convert the mixed fractions into improper fraction

$$3 \frac{3}{4} = \frac{15}{4} \quad \text{and} \quad 1 \frac{1}{6} = \frac{7}{6}$$

$$3 \frac{3}{4} - 1 \frac{1}{6} = \frac{15}{4} - \frac{7}{6} \quad (\text{LCM of 4 and 6 is 12})$$

$$= \frac{15}{4} = \frac{45}{12} \quad \text{and} \quad \frac{7}{6} = \frac{14}{12} \quad (\text{like fraction})$$

$$3 \frac{3}{4} - 1 \frac{1}{6} = \frac{45}{12} - \frac{14}{12} = \frac{31}{12}$$

$$= 2 \frac{7}{12}$$

EXERCISE 3.3

1. Add the following fractions.

(i) $\frac{2}{3} + \frac{11}{9}$

(ii) $\frac{7}{6} + \frac{1}{2}$

(iii) $\frac{8}{10} + \frac{1}{2} + \frac{2}{4}$

(iv) $\frac{3}{4} + \frac{1}{2} + \frac{4}{6}$

(v) $3 \frac{1}{2} + 5 \frac{1}{3}$

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

(vii) $\frac{2}{3} + 1 \frac{1}{5} + \frac{3}{2}$

(viii) $2 \frac{1}{7} + \frac{2}{5} + 1 \frac{1}{7}$

2. Subtract the following fractions.

(i) $\frac{5}{6} - \frac{1}{2}$

(ii) $\frac{7}{8} - \frac{3}{4}$

(iii) $\frac{4}{5} - \frac{1}{3}$

(iv) $3 \frac{3}{10} - 1 \frac{1}{4}$

(v) $9 \frac{1}{2} - 3 \frac{1}{5}$

(vi) $\frac{4}{5} - \frac{1}{10} - \frac{2}{15}$

3. Apply commutative and associative property of addition to fill in the blanks.

(i) $\frac{3}{5} + \frac{7}{4} = \dots + \frac{3}{5}$

(ii) $\frac{2}{9} + \dots = \frac{4}{7} + \dots$

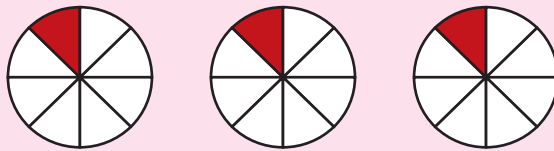
(iii) $\frac{1}{3} + \left(\frac{1}{5} + \frac{1}{4} \right) = \left(\frac{1}{3} + \dots \right) + \frac{1}{4}$

(iv) $\frac{3}{10} + \left(\dots + \frac{4}{5} \right) = \left(\dots + \frac{2}{7} \right) + \frac{4}{5}$

3.4 MULTIPLICATION OF FRACTIONS

Multiply fractions with whole numbers

Consider the diagram



Shaded part in each figure represents $\frac{1}{8}$

$\frac{3}{8}$ Parts are shaded altogether

$$\text{Or } \frac{1}{8} + \frac{1}{8} + \frac{1}{8} = \frac{3}{8}$$

$$\text{Or } 3 \times \frac{1}{8} = \frac{3}{8}$$

In multiplying a whole number with a fraction, multiply the whole number with the numerator

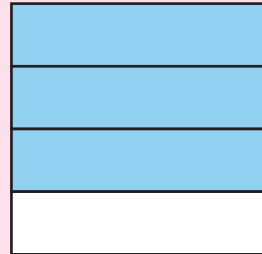
Example 1	Steps Followed	Example 2
$5 \times \frac{3}{4}$ $= \frac{5 \times 3}{4}$ $= \frac{15}{4}$ $= 3 \frac{3}{4}$	<ul style="list-style-type: none"> ▪ Multiply the numerator with the whole number. ▪ Reduce it, if possible. ▪ Convert into mixed number (if improper). <p>Write your answer in simplest form.</p>	$7 \times \frac{3}{14}$ $= \frac{21}{14}$ $= \frac{\overset{3}{\cancel{21}}}{\underset{2}{\cancel{14}}}$ $= \frac{3}{2}$ $= 1 \frac{1}{2}$

Multiply two or more fractions (proper fractions, improper fractions and mixed numbers)

This figure represents $\frac{3}{4}$.

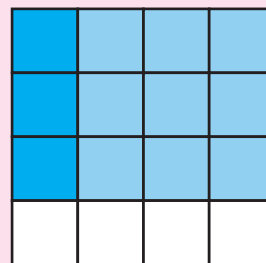
In order to find $\frac{1}{4}$ of $\frac{3}{4}$,

We will further divide $\frac{3}{4}$ into four equal parts and shade one out of four parts.



The figure below represents $\frac{1}{4}$ of $\frac{3}{4}$ which is $\frac{3}{16}$ (the double shaded region).

This was the pictorial representation of $\frac{1}{4}$ of $\frac{3}{4}$



Mathematically, $\frac{1}{4}$ of $\frac{3}{4} = \frac{1}{4} \times \frac{3}{4}$

$$= \frac{1 \times 3}{4 \times 4} \longrightarrow \text{Multiply the numerator and denominator}$$

$$= \frac{3}{16} \longrightarrow \text{Write the product in lowest term}$$

Example : Solve: $\frac{2}{9} \times \frac{3}{5} \times \frac{1}{2}$

Solution: $\frac{2}{9} \times \frac{3}{5} \times \frac{1}{2}$

$$= \frac{2 \times 3 \times 1}{9 \times 5 \times 2} \longrightarrow \text{Multiply the numbers at numerators and denominators}$$

$$= \frac{6}{90} \div \frac{3}{3}$$

$$= \frac{6 \div 3}{90 \div 3} = \frac{\overset{1}{\cancel{2}}}{\underset{15}{\cancel{30}}} = \frac{1}{15}$$

Teacher's Note

Teacher should develop the concept of multiplication of fractions with the help of geometrical figures.

Multiplying mixed numbers:

Multiplying mixed numbers just requires one extra step i.e.

Must Convert Mixed Number into Improper Fractions First,

Rest of the steps are same as multiplying two or more fractions.

Example 1	Steps Followed	Example 2
$1\frac{7}{3} \times 3\frac{1}{9}$		$4\frac{2}{5} \times 3\frac{7}{11}$
$= \frac{10}{3} \times \frac{28}{9}$	Convert mixed numbers into improper fractions and reduce (if possible)	$= \frac{22}{5} \times \frac{40}{11}$
$= \frac{10 \times 28}{3 \times 9}$	Multiply the numerators and denominators	$= \frac{22 \times 40}{5 \times 11}$
$= \frac{280}{27}$		$= \frac{\overset{176}{\cancel{880}}}{\cancel{55}^{11}}$
$= 10\frac{10}{27}$	Convert the product into mixed number (if improper fraction)	$= \frac{\overset{16}{\cancel{176}}}{\cancel{11}^1}$
	Leave your answer in simplest form	$= 16$

EXERCISE 3.4**1. Simplify the following fractions.**

(i) $\frac{5}{6}$ of 9 (ii) $\frac{4}{8}$ of 6 (iii) $\frac{3}{14}$ of 45

2. Find the product of the following fractions.

(i) $\frac{1}{2} \times \frac{4}{10}$ (ii) $\frac{6}{9} \times \frac{8}{6}$ (iii) $\frac{15}{21} \times \frac{6}{9} \times \frac{1}{2}$

(iv) $\frac{12}{24} \times \frac{15}{18}$ (v) $\frac{6}{12} \times \frac{21}{24}$ (vi) $\frac{8}{16} \times \frac{4}{8} \times \frac{3}{2}$

(vii) $4\frac{4}{5} \times 4\frac{3}{3}$ (viii) $8\frac{1}{4} \times 3\frac{2}{6}$ (ix) $8\frac{4}{5} \times 3\frac{6}{8}$

3.5 DIVISION OF FRACTIONS

Divide a fraction by a whole number

In order to understand the division of fractions by a whole number, consider the following example.

Example 1: Solve $\frac{1}{2} \div 4$

Solution: $\frac{1}{2} \div 4$ means one half is divided into 4 more parts.

Thus each part will be called $\frac{1}{4}$ of $\frac{1}{2}$.

$$\begin{aligned} \text{So, } & \frac{1}{4} \times \frac{1}{2} \quad \text{or} \quad \frac{1}{2} \times \frac{1}{4} \\ & = \frac{1 \times 1}{2 \times 4} \\ & = \frac{1}{8} \end{aligned}$$

Division by 4 is the same as multiplication by $\frac{1}{4}$ (reciprocal or multiplicative inverse of 4)

Finding Reciprocal of simple fraction means interchanging the numerator and denominator

Example 2: Solve:

Solution:

$$\frac{3}{7} \div 5 = \frac{3}{7} \div \frac{5}{1} \quad \left(5 \text{ is the same as } \frac{5}{1} \right)$$

$$= \frac{3}{7} \times \frac{1}{5} \longrightarrow \begin{array}{l} \blacksquare \text{ Change division into multiplication} \\ \blacksquare \text{ At the same time reciprocate 5} \end{array}$$

$$= \frac{3 \times 1}{7 \times 5} = \frac{3}{35}$$

Teacher's Note

Teacher should solve some more examples in the class room to strengthen the concept of division of whole number by fraction.

Divide a whole number by a fraction

Example: Solve: $15 \div \frac{2}{3}$

Solution: $15 \div \frac{2}{3} = 15 \times \frac{3}{2} \longrightarrow$
 $= \frac{15 \times 3}{2}$
 $= \frac{45}{2} = 22\frac{1}{2}$

Always the number after the division sign is reciprocated

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

The method remains the same.

Example 1: Solve: $\frac{7}{9} \div \frac{14}{27}$

Solution: $\frac{7}{9} \div \frac{14}{27}$
 $= \frac{\cancel{7}^1}{9_1} \times \frac{\cancel{27}^3}{\cancel{14}_2}$
 $= \frac{1 \times 3}{1 \times 2}$
 $= \frac{3}{2} = 1\frac{1}{2}$

Explanation

- Convert '÷' sign into 'x' sign
- Reciprocates the second fraction
- Multiply the numerators and denominators
- Reduce if possible
- Keep your answer in the simplest form

Example 2: Solve $2\frac{2}{7} \div 1\frac{3}{5}$

Solution: $2\frac{2}{7} \div 1\frac{3}{5} = \frac{16}{7} \div \frac{8}{5}$
 $= \frac{16}{7} \times \frac{5}{8}$
 $= \frac{\cancel{16}^2}{7} \times \frac{5}{\cancel{8}_1}$
 $= \frac{10}{7} = 1\frac{3}{7}$

EXERCISE 3.5

Solve the following.

(i) $\frac{4}{9} \div \frac{16}{9}$

(ii) $\frac{4}{8} \div \frac{2}{12}$

(iii) $\frac{15}{20} \div \frac{3}{12}$

(iv) $\frac{1}{4} \div \frac{7}{16}$

(v) $\frac{9}{10} \div \frac{12}{15}$

(vi) $\frac{9}{30} \div \frac{6}{12}$

(vii) $\frac{12}{21} \div \frac{6}{27}$

(viii) $\frac{5}{25} \div \frac{20}{30}$

(ix) $2\frac{1}{3} \div \frac{2}{5}$

(x) $2\frac{1}{3} \div \frac{2}{4}$

(xi) $2\frac{4}{5} \div \frac{2}{3}$

(xii) $3\frac{6}{83} \div 4\frac{2}{4}$

(xiii) $6 \div \frac{2}{3}$

(xiv) $\frac{2}{3} \div 8$

(xv) $\frac{12}{5} \div 9$

Solve real life problems involving fractions using all four operations

Example 1: One jar contains $\frac{1}{2}$ kg of sugar. Another jar contains $\frac{1}{4}$ kg of sugar. What is the total quantity of the sugar?

Solution: $\frac{1}{2} + \frac{1}{4} = \frac{2+1}{4} = \frac{3}{4}$

Thus, the total quantity of the sugar is $\frac{3}{4}$ kg.

Teacher's Note

Teacher should teach the students how to change real life problems in mathematical form and solve them.

Example 2: Nasima purchased $4\frac{1}{4}$ kg of milk powder. She used $1\frac{3}{8}$ kg of it in a month. How much milk powder is left?

Solution: Quantity of milk powder = $4\frac{1}{4}$ Kg.

Quantity of milk powder used = $1\frac{3}{8}$ Kg.

Subtract milk powder used from total milk powder

$$\begin{aligned} \text{Quantity of milk powder left} &= 4\frac{1}{4} - 1\frac{3}{8} \\ &= \frac{17}{4} - \frac{11}{8} \\ &= \frac{34}{8} - \frac{11}{8} = \frac{34-11}{8} = \frac{23}{8} \\ &= 2\frac{7}{8} \end{aligned}$$

Hence, the remaining milk powder left is $2\frac{7}{8}$

Example 3: What will be the total length of 5 pieces of string, if each piece is $\frac{3}{4}$ metre long.

Solution: Length of 1 piece = $\frac{3}{4}$ m

Length of 5 pieces = $\frac{3}{4} \times 5 = \frac{15}{4} = 3\frac{3}{4}$ m

Thus the total length of 5 pieces of string is $3\frac{3}{4}$ m

EXERCISE 3.6

1. A family used $4\frac{1}{4}$ litres of milk and another family used $7\frac{1}{2}$ litres of milk in a day. How much quantity of milk was used by both families in the day?
2. My aunty buys a piece of ribbon that was $4\frac{1}{6}$ cm long. She buys another piece of ribbon that was $4\frac{2}{5}$ cm long. How much longer the second piece of ribbon was?
3. I am $8\frac{1}{2}$ years old and my brother is $2\frac{1}{2}$ years younger than me, what is the age of my brother?

4. Nazia has $4\frac{4}{5}$ metres of ribbon. She used $\frac{1}{2}$ of this ribbon to tie a present for her daughter. How many metres of ribbon did she use?
5. A tree is 18 metre tall. How many pieces of wood can be cut from the tree, if each piece is to be $\frac{2}{3}$ metre long?
6. Shopkeeper has 15 kg of peanuts. He places $\frac{2}{5}$ kgs of peanuts in a bag. How many bags will he use?

REVIEW EXERCISE – 3

1. Convert the following into mixed numbers:

(i) $\frac{66}{8}$ (ii) $\frac{17}{3}$ (iii) $\frac{23}{5}$ (iv) $\frac{40}{5}$

2. Convert the following mixed fractions into improper fractions:

(i) $8\frac{4}{5}$ (ii) $3\frac{5}{8}$ (iii) $7\frac{3}{7}$ (iv) $4\frac{3}{2}$

3. Write down the following numbers in ascending order:

(i) $\frac{3}{8}, \frac{9}{8}, \frac{5}{8}$ (ii) $\frac{2}{3}, \frac{1}{4}, \frac{5}{6}$
(iii) $\frac{6}{4}, \frac{8}{3}, \frac{7}{6}, \frac{5}{2}$ (iv) $\frac{2}{7}, \frac{5}{11}, \frac{4}{5}, \frac{3}{11}$

4. Write down the following fractions in descending order:

(i) $\frac{13}{6}, \frac{11}{6}, \frac{7}{6}$ (ii) $\frac{2}{3}, \frac{3}{5}, \frac{5}{6}$
(iii) $\frac{4}{15}, \frac{3}{10}, \frac{9}{20}, \frac{4}{5}$ (iv) $\frac{4}{3}, \frac{3}{5}, \frac{5}{7}, \frac{1}{3}$

5. Reduce the following fractions into lowest terms:

(i) $\frac{30}{42}$ (ii) $\frac{24}{44}$ (iii) $2\frac{4}{8}$ (iv) $3\frac{3}{6}$

6. Simplify:

(i) $\frac{3}{5} + \frac{2}{4}$

(ii) $\frac{7}{9} + \frac{4}{6} + \frac{2}{3}$

(iii) $\frac{4}{5} + \frac{6}{10} + \frac{1}{2}$

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

7. Simplify:

(i) $\frac{3}{4} - \frac{4}{8}$

(ii) $\frac{11}{5} - \frac{9}{5}$

(iii) $5\frac{2}{3} - 4\frac{2}{4}$

(iv) $\frac{13}{15} - \frac{5}{10} - \frac{1}{5}$

8. Multiply the following fractions and give your answer in lowest terms:

(i) $2\frac{2}{5} \times 2\frac{1}{2}$

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

(iii) $\frac{28}{35} \times \frac{12}{21}$

(iv) $1\frac{3}{5} \times 1\frac{5}{10}$

9. Divide the following fractions and give your answer in lowest terms:

(i) $\frac{5}{6} \div 25$

(ii) $\frac{3}{4} \div \frac{5}{8}$

(iii) $5\frac{1}{2} \div 1\frac{1}{4}$

(iv) $7\frac{3}{5} \div 1\frac{7}{12}$

- 10.** Nasir and his friend were jogging on a track. Nasir jogged $7\frac{1}{2}$ km and his friend jogged $4\frac{2}{3}$ km. How much more distance did Nasir cover than his friend?
- 11.** There are 32 balloons in a room, out of which $\frac{1}{4}$ are red. How many balloons in the room are red?
- 12.** Javeria's doll dress requires $\frac{3}{4}$ metre of fabric. How many dresses of doll can be made from $3\frac{3}{4}$ metres of fabric?
- 13.** A factory makes $9\frac{1}{2}$ litres of apple juice each hour. How many litres of apple juice will the factory make in 14 hours?

4.1 DECIMALS

Know a decimal number as an alternate way of writing a fraction

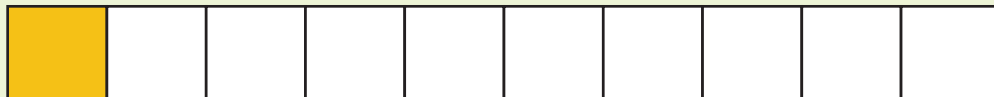
In previous unit, we have learnt about fractions.

There is another way of writing fractions called Decimals.

Define decimal as a fraction whose denominator is 10 or power of 10

A decimal number is a special type of a fraction whose denominator is 10 or a power of 10 which means 10, 100, 1000 etc.

Look at the figure given below.



It represents a whole divided into 10 equal parts of which one is coloured.

In **fraction form** the shaded portion is written as

$\frac{1}{10}$ and read as one tenth.

In **decimal form** the shaded portion is written as 0.1 and read as one-tenth or 'zero point one'.

There will be one digit after the decimal point if the whole is divided into 10 equal parts

Whole number ← **0.1** → Fractional part
 ↓
 Decimal point

Here dot (.) is known as the decimal point.

It separates the whole number part and the fractional part.

In the same way coloured portion of:



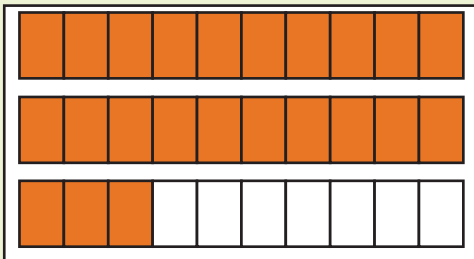
represents $\frac{2}{10}$ or 0.2



represents $\frac{7}{10}$ or 0.7



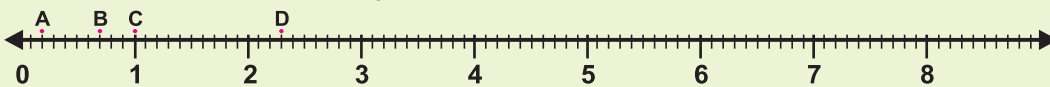
represents $\frac{10}{10} = 1.0$ or (1 whole)



represents $2\frac{3}{10}$ or 2.3

(2 whole and 3 tenths)

All this can also be represented on a number line shown below.



Point A represents $\frac{2}{10}$ or 0.2, point B represents $\frac{7}{10}$ or 0.7,

point C represents $\frac{10}{10}$ or 1.0 and point D represents $2\frac{3}{10}$ or 2.3.

Each of the following figure is divided into 100 equal parts. The coloured portion of these figures represents:

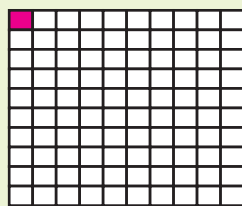


Figure 1

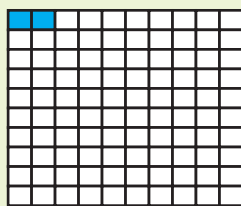


Figure 2

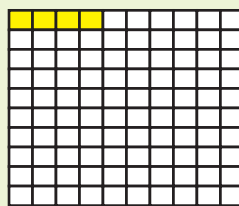


Figure 3

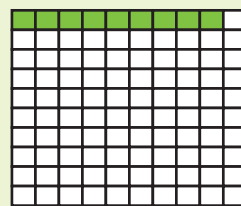


Figure 4

Figure 1: One-hundredth = $\frac{1}{100} = 0.01$ (Read as zero point zero one.)

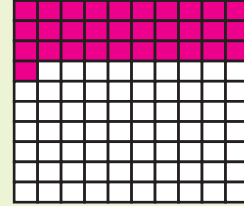
Figure 2: Two-hundredth = $\frac{2}{100} = 0.02$ (Read as zero point zero two.)

Figure 3: Four-hundredth = $\frac{4}{100} = 0.04$ (Read as zero point zero four.)

Figure 4: Nine-hundredth = $\frac{9}{100} = 0.09$ (Read as zero point zero nine.)

Example 1: The whole is divided into 100 equal parts, and 31 of them are shaded. Write in decimal fraction.

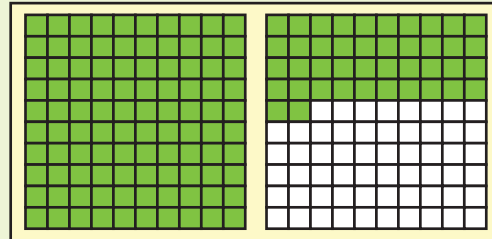
In fraction form it is written as $\frac{31}{100}$ and read as thirty one hundredths. Where as, in decimal form it is written as 0.31



Note that there are 2-digits after the decimal point, if the whole is divided into 100 equal parts.

0.31
and read as
“zero point
three one”

Similarly, in the given figure
coloured portion $1\frac{42}{100}$
represents or 1.42
Read as one point four two.



Activity

Write the fractions as well as the decimal fractions represented by the coloured portions of the figures:



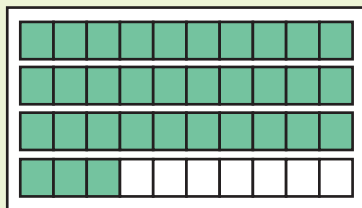
$$\text{Fraction} = \frac{4}{10}$$

$$\text{Decimal fraction} = 0.4$$



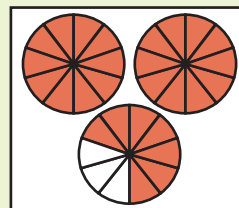
$$\text{Fraction} =$$

$$\text{Decimal fraction} =$$



$$\text{Fraction} = \underline{\hspace{2cm}}$$

$$\text{Decimal fraction} = \underline{\hspace{2cm}}$$



$$\text{Fraction} = \underline{\hspace{2cm}}$$

$$\text{Decimal fraction} = \underline{\hspace{2cm}}$$

Recognize the places occupied by the digits, after the decimal point, as decimal places

The number of digits after the decimal point are called the **Decimal Places**.

Look at the following examples.

- (1) 3.2 represents decimal fraction up to **one decimal place** as it has only one digit after the decimal point.

Fractional part has a denominator of 10.

- (2) 1.43 represents decimal fraction up to **two decimal places** as it has two digits after the decimal point.

Fractional part has a denominator of 100.

- (3) 1.324 represent decimal fraction up to **three decimal places** as it has three digits after the decimal point.

Fractional part has a denominator of 1000.



Activity

Fill the given table with the denominator and the decimal places for the decimal numbers given below:

Decimals	Denominator	No. of decimal places
0.3	10	One
13.5		
0.84		
732.52		
0.324		
583.123		

Identify the place value of a digit in decimals

In decimal fraction, the value of the digit after the decimal point decreases by 10 times.

Look at the following table to understand the place values in decimal fraction.

Fractions	H T O	.	t tenth	h hundredth	th thousandth
$\frac{1}{10}$	0	.	1		
$\frac{1}{100}$	0	.	0	1	
$\frac{1}{1000}$	0	.	0	0	1

- The first digit after the decimal point has a place value of 'tenths' and it is the first decimal place.
- The second digit after the decimal point has a place value equal to 'hundredths' and it is the second decimal place.
- The third digit after the decimal point has a place value equal to 'thousandths' and it is the third decimal place.

Example 1: Write the place values and value of bold digits in the following numbers:

Number	Place Value	Value
53. 5 79	Tenths	5 tenths or 0.5 or $\frac{5}{10}$
1.0 3 2	Hundredths	3 hundredths or 0.03 or $\frac{3}{100}$
123.87 3	Thousandths	3 thousandths or 0.003 or $\frac{3}{1000}$

Example 2: Identify the place value and value of each digit in 23.416.

Let's first write the given number under the place value chart.

T	O	.	T	H	TH
2	3	.	4	1	6

2 tens or 20 3 ones or 3 4 tenths or 0.4 1 hundredths or 0.01 6 thousandths or 0.006

Place value of 2 = 2 tens = $2 \times 10 = 20$

Place value of 3 = 3 ones = $3 \times 1 = 3$

Place value of 4 = 4 tenths = $\frac{4}{10} = 0.4$

Place value of 1 = 1 hundredths = $\frac{1}{100} = 0.01$

Place value of 6 = 6 thousandths = $\frac{6}{1000} = 0.006$

EXERCISE 4.1

1. Draw the figures for the following decimal fractions.

(i) 0.3

(ii) 0.8

(iii) 1.3

(iv) 1.7

(v) 0.34

(vi) 1.5

2. Write down the number of decimal places in each.

(i) 123.1

(ii) 57.322

(iii) 0.87

(iv) 139.45

(v) 59.552

(vi) 735.9

3. Write down the place value and value of encircled digit.

(i) 725.0 (4)

(ii) 135. (8) 5

(iii) 5.09 (2)

(iv) (1) 24.3 (2)

(v) (4) 3.5 (9)

(vi) (3) 4.6 (7)

4. Write down the place value and value of each digit.

(i) 575.1

(ii) 0.534

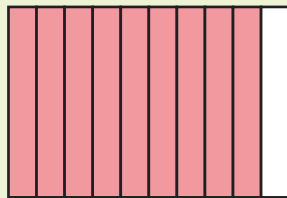
(iii) 18.97

(iv) 9.02

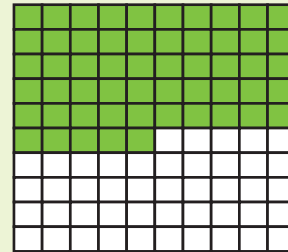
(v) 75.84

(vi) 51.15

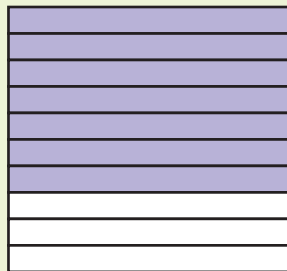
5. Match the coloured part of figures with the correct decimal fractions.



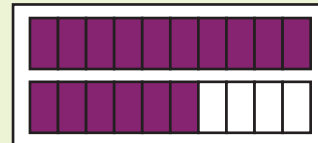
1.4



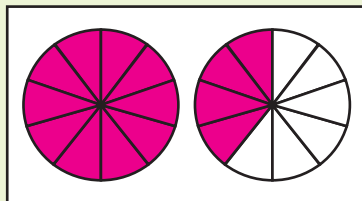
0.23



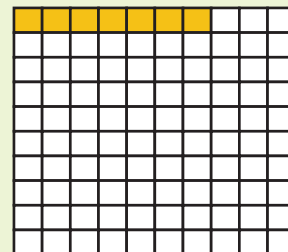
0.07



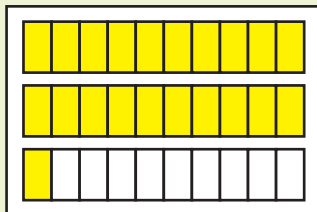
2.1



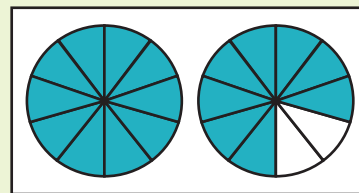
1.8



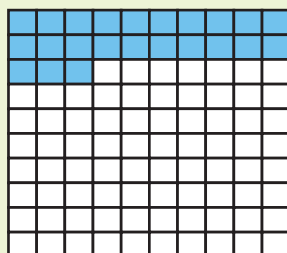
2.2



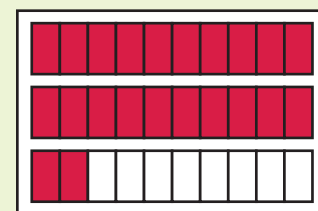
0.9



0.55



1.6



0.7

4.2 CONVERSION BETWEEN FRACTIONS AND DECIMALS

Convert a given fraction to a decimal if,
(i) denominator of the fraction is 10 or a power of 10.

In order to understand how to convert the fraction into decimal when the denominator is 10, 100 or 1000. Consider the following examples.

Example 1: Convert $\frac{3}{10}$ into decimal.

Solution: $\frac{3}{10} = 3$ tenths.

So, $\frac{3}{10} = 0.3$

Example 2: Convert $\frac{3}{100}$ into decimal.

Solution: Here, $\frac{3}{100} = 3$ hundredths.

So, $\frac{3}{100} = 0.03$ because there are no tenths.

But, if we have to convert $\frac{13}{100}$ into decimal, it will be 0.13

Example 3: Convert $\frac{23}{10}$ into decimal.

Solution: Since, it is an improper fraction, it is easier to first convert it into mixed fraction.

$$\frac{23}{10} = 2 \frac{3}{10}$$

Now $2 \frac{3}{10}$ means 2 wholes and 3 tenths, i.e. 2.3

So, $\frac{23}{10} = 2.3 \rightarrow$ fraction

whole number

So, in 2.3, 2 is whole number and .3 or $\frac{3}{10}$ is fraction.

Example 4: Convert $\frac{32}{1000}$ into decimal.

Solution: $\frac{32}{1000}$ means 32 thousandths.

$$\text{So, } \frac{32}{1000} = 0.032$$

(ii) Conversion of fractions into decimals when the denominator is not 10, 100 or 1000

Example 1: Convert $\frac{1}{2}$ into decimal.

Solution: Here, the denominator is not 10 or a power of 10 but it can be converted into 10 or powers of 10.

$$\text{Now } \frac{1}{2} = \frac{1}{2} \times \frac{5}{5}$$

▪ **Making denominator multiple of 10 or power of 10**

$$= \frac{5}{10} \text{ is equivalent to } \frac{1}{2}$$

$$= 5 \text{ tenths} = 0.5, \text{ this means } \frac{1}{2} = 0.5$$

Example 2: Convert $\frac{13}{4}$ into decimal.

$$\text{Solution: } \frac{13}{4} = 3\frac{1}{4} \quad [\text{mixed number}]$$

$$= 3 + \frac{1}{4} \quad [3 \text{ wholes and one fourth}]$$

$$= 3 + \frac{1}{4} \times \frac{25}{25} \quad \text{▪ } \frac{1}{4} \text{ can be converted into its equivalent fraction with denominator 100}$$

$$= 3 + \frac{25}{100}$$

$$= 3 + \frac{25}{100} \quad \text{▪ } 3 \text{ wholes and 25 hundredths}$$

$$= 3.25$$

Example 3: Convert $\frac{11}{25}$ into decimal.

Solution:

$$\begin{aligned}\frac{11}{25} &= \frac{11}{25} \times \frac{4}{4} \\ &= \frac{44}{100} = 0.44\end{aligned}$$

Convert decimals (up to three decimal places) to fractions

Let's consider the following examples.

Example 1: Convert 0.4 into fraction.

Solution: 0.4 = 4 tenths

$$\begin{aligned}&= \frac{4}{10} && \blacksquare \text{ 1}^{\text{st}} \text{ decimal place is tenths;} \\ & && \text{so, denominator will be 10} \\ &= \frac{\cancel{4}^2}{\cancel{10}_5} = \frac{2}{5}\end{aligned}$$

Example 2: Convert 0.32 into fraction.

Solution: 0.32 = 32 hundredths

$$\begin{aligned}&= \frac{32}{100} && \blacksquare \text{ 2}^{\text{nd}} \text{ decimal place hundredth;} \\ & && \text{So, denominator will be 100} \\ &= \frac{\cancel{32}^{16}}{\cancel{100}_{50}} && \blacksquare \text{ Simplifying dividing by 4} \\ &= \frac{\cancel{16}^8}{\cancel{50}_{25}} \\ &= \frac{8}{25}\end{aligned}$$

Example 3: Convert 1.24 into fraction.

Solution: 1.24 = 1 whole and 24 hundredths

$$1.24 = 1 \frac{24}{100}$$

$$= 1 \frac{\overset{6}{\cancel{24}}}{\underset{25}{\cancel{100}}} = 1 \frac{6}{25} \quad \text{▪ Dividing by 4}$$

Example 4: Convert 0.135 into fraction.

Solution: 0.135 = 135 thousandths

$$0.135 = \frac{135}{1000}$$

$$= \frac{\overset{27}{\cancel{135}}}{\underset{200}{\cancel{1000}}} = \frac{27}{200} \quad \text{▪ Dividing by 5}$$

EXERCISE 4.2

1. Convert the following fractions into decimals.

(i) $\frac{1}{100}$	(ii) $\frac{5}{10}$	(iii) $\frac{23}{100}$	(iv) $\frac{431}{1000}$
(v) $\frac{231}{100}$	(vi) $\frac{17}{10}$	(vii) $\frac{29}{1000}$	(viii) $\frac{11}{100}$

2. Convert the following fractions into decimals.

(i) $\frac{7}{25}$	(ii) $\frac{42}{4}$	(iii) $\frac{9}{2}$	(iv) $\frac{3}{4}$
(v) $\frac{13}{50}$	(vi) $\frac{3}{8}$	(vii) $\frac{19}{25}$	(viii) $\frac{30}{50}$

3. Convert the following decimals into fractions and give your answer in simplest form.

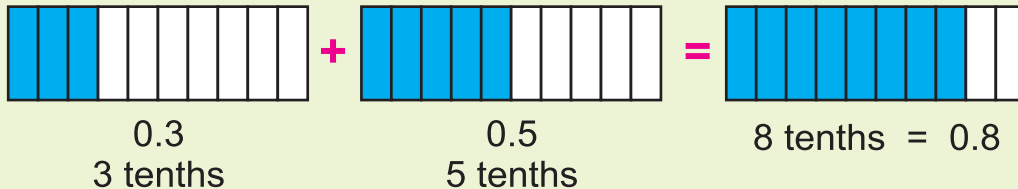
(i) 0.3	(ii) 1.35	(iii) 12.37	(iv) 0.432
(v) 25.5	(vi) 2.32	(vii) 0.45	(viii) 135.2

4.3 BASIC OPERATION ON DECIMALS

Add and subtract decimals (up to three decimal places)

Look at the following pictorial example to understand addition of decimals

Example 1:



We can write it as:

$$\begin{array}{r} 0.3 \\ + 0.5 \\ \hline 0.8 \end{array}$$

- Align the decimal point, i.e. put decimal point just one below the other.
- Start from the digit at the lowest place value.
- Do the usual addition.
- Decimal point in the answer also should be aligned.

Example 2: Subtract.



$$0.6 - 0.2 = 0.4$$

6 tenths – 2 tenths = 4 tenths

$$\begin{array}{r} 0.6 \\ - 0.2 \\ \hline 0.4 \end{array}$$

Example 3: Subtract the following.

(i) $3.57 - 2.43$

$$\begin{array}{r} 3.57 \\ - 2.43 \\ \hline 1.14 \end{array}$$

(ii) $7.84 - 1.75$

$$\begin{array}{r} 7.84 \\ - 1.75 \\ \hline 6.09 \end{array}$$

EXERCISE 4.3

1. Add the following.

(i) $0.35 + 0.42$

(ii) $0.21 + 0.35 + 0.11$

(iii) $1.27 + 3.49$

(iv) $13.5 + 14.2 + 7.9$

(v) $1.34 + 0.43$

(vi) $25.32 + 15.75$

(vii) $0.3 + 0.9 + 0.4$

(viii) $1.5 + 3.9 + 17.2$

(ix) $68.378 + 12.633$

(x) $42.243 + 81.483$

2. Subtract the following.

(i) $0.9 - 0.3$

(ii) $0.84 - 0.61$

(iii) $10.59 - 3.27$

(iv) $13.54 - 12.87$

(v) $15.39 - 12.41$

(vi) $87.34 - 85.56$

(vii) $19.31 - 10.32$

(viii) $54.79 - 39.84$

(ix) $49.243 - 17.157$

(x) $76.919 - 64.883$

Multiply decimal by 10, 100 and 1000

Multiplication of decimals by 10, 100 or 1,000 just invites moving the decimal point to the right depending upon the power of 10 we are multiplying with.

Example 1: Multiply 3.24×10

Solution: 3.24×10

$= 32.4$

Here decimal number 3.24 has multiplied by 10.
The number has moved one column / place to left.

3.24	(We multiply
$\times 10$	numbers where
$\hline 0000$	decimal fraction is
$324x$	of two place value.
$\hline 32.40$	Count digits from
	right to left. Put
	decimal after two
	numbers)

Here the decimal point moves one place to the right.

Example 2:**Multiply 0.325 by 100**

$$\begin{array}{r} 0.325 \\ \times 100 \\ \hline 32.5 \end{array}$$

Decimal point moves two places to the right.

Example 3:**Multiply 1.834 x 1000**

$$\begin{array}{r} 1.834 \\ \times 1000 \\ \hline 1834.0 \\ \text{Or } 1834 \end{array}$$

Decimal point in the end has no value, no fractional part.

Decimal point moves three places to the right.

Multiply a decimal by a 2-digit number

Look at the following examples.

Example 1: Multiply 13.5 x 15**Solution:**

$$\begin{array}{r} 1 \quad 3.5 \\ \times 15 \\ \hline 675 \\ 1350 \\ \hline 202.5 \end{array}$$

- Do the multiplication just as in the case of whole numbers, ignoring the decimal point for a while.
- Multiply the units or ones
- Multiply the tens
- Now look at the total number of decimal places in the numbers being multiplied. There is only one decimal place so, the product should also have one decimal place. Put decimal at one decimal place from right.
- One decimal place In the product

Hence, $13.5 \times 15 = 202.5$

EXERCISE 4.4

Do the following multiplications.

(1) 6.3×10

(2) 0.25×10

(3) 1.732×100

(4) 0.327×100

(5) 22.3542×100

(6) 1.265×1000

(7) 1.872×1000

(8) 6.3×3

(9) 0.85×25

(10) 7.9×13

(11) 7.21×33

(12) 1.834×11

(13) 5.42×24

(14) 0.49×71

(15) 3.52×45

Divide a decimal by a 1-digit number (quotient being a decimal up to two decimal places)

To divide a decimal number by a one digit number (whole number), follow the usual method of dividing whole numbers, just remember to place the decimal point in the quotient when it comes in the dividend.

Look at the following examples to understand this concept.

Example : Divide **27.5** by **5**

Solution:

$$\begin{array}{r}
 5 \overline{) 27.5} \\
 \underline{25} \\
 25 \\
 \underline{25} \\
 00
 \end{array}$$

[$5 \times 5 = 25$]

[$5 \times 5 = 25$ again]

Steps:

- Start from whole numbers we have 27. Divide 27 by 5.
- Because $5 \times 5 = 25$
- Now 2 is smaller than the divisor 5, so bring next 5 down, but before that there is a decimal point so shift it to the quotient.

Hence, $27.5 \div 5 = 5.5$

Teacher's Note

Teacher should teach the students to divide decimal by 1-digit numbers and give them more examples to solve for sufficient practice.

EXERCISE 4.5

Divide the following.

- | | | |
|---------------------|---------------------|---------------------|
| (1) $17.1 \div 6$ | (2) $1.8 \div 5$ | (3) $9.36 \div 4$ |
| (4) $9.66 \div 3$ | (5) $4.68 \div 9$ | (6) $17.85 \div 7$ |
| (7) $6.28 \div 4$ | (8) $0.72 \div 2$ | (9) $5.62 \div 2$ |
| (10) $34.23 \div 3$ | (11) $67.25 \div 5$ | (12) $32.34 \div 6$ |
| (13) $96.20 \div 2$ | (14) $10.11 \div 3$ | (15) $40.05 \div 5$ |

Solve real life problems involving decimals up to two decimal places.

Example 1: Sana bought **0.25 kg** of cadbury chocolates, **10.50 kg** of flour and **2.50 kg** of sugar. What is the total mass of ingredients she bought?

Solution:

Cadbury chocolate	¹ 0.25	Kg
Flour	10.50	Kg
Sugar	+ 2.50	Kg
	<hr/>	
	13.25	Kg

She bought a total mass of **13.25 kg**.

Example 2: Ali's height is **1.75 m** and Azhar's height is **1.27 m**. How tall is Ali than Azhar?

Solution:

Ali's height	1 . ⁶ 7 ¹ 5
Azhar's height	-1 . 27
Difference	<hr/> 0 . 48

Hence Ali is **0.48 m** taller than Azhar.

Example 3:

The cost of one kilogram of flour is **Rs 32.50**, what will be the total cost of **15 kg** of flour?

Solution:

One kg of flour cost = **Rs 32.50**,
the cost of **15 kg** will be = **32.50 x 15**

$$\begin{array}{r} \text{So, } 32.50 \\ \times 15 \\ \hline 16250 \\ +32500 \\ \hline 487.50 \end{array}$$

The total cost of 15 kg of flour will be **Rs 487.50**

Example 4:

Mrs. Aslam wants to divide **3.36kg** of sweets equally among **4** relatives. How much will each relative get?

Solution:

$$\begin{array}{r} 0.84 \\ 4 \overline{) 3.36} \\ \underline{- 32} \\ 16 \\ \underline{- 16} \\ 00 \end{array} \quad \begin{array}{l} \text{[before taking 33, shift the} \\ \text{decimal point to the} \\ \text{quotient]} \end{array}$$

$$3.36 \div 4 = 0.84$$

Hence, each relative will get **0.84** kg of sweets.

EXERCISE 4.6

1. Ahmed purchased a shirt for **Rs 325.80** and a jeans for **Rs 525.25**. Find the amount spent.
2. Javeria's weight is **10.24 kg** and her sister's weight is **11.28 kg**. What is the total weight of both the sisters?
3. Ansa paid a total cost of **Rs 97.5** to the shopkeeper for a pencil case and a colour box. If the pencil case costs **Rs 30.25**, find the cost of the colour box.
4. Haroon and Shafique spent **Rs 95.82**. Haroon spent **Rs 89.75**. What amount was spent by Shafique?
5. Ali has Rs 50.29 as pocket money. He gave **Rs 15.45** to his sister Nida and spent **Rs 13.84** on coffee. How much money has left with him?
6. Aslam brought **65** hens for his farm. The weight of each hen is **2.72 kg**. What is the weight all have?
7. One set of books weigh **3.75 kg**. What will be the weight of **32** such sets?
8. Yusra cuts a ribbon **13.75 m** long into **5** equal pieces. Find the length of each piece.
9. The total weight of **5** sacks of flour is **58.75 kg**. Find the weight of one sack of flour.

REVIEW EXERCISE – 4

1. Write down the place value and value of circled digits in the following.

(i) 2.32 (5)

(ii) (1)7.(9)53

(iii) 37.8 (7)

2. Convert the following fractions into decimals.

(i) $\frac{321}{100}$

(ii) $\frac{175}{1000}$

(iii) $\frac{19}{4}$

(iv) $\frac{27}{8}$

3. Convert the following decimals into fractions.

(i) 1.54

(ii) 0.35

(iii) 13.7

(iv) 0.345

4. Solve the following.

(i) 1.57 + 3.42

(ii) 0.37 – 0.18

(iii) 17.55 + 23.42

(iv) 1.94 – 0.89

5. Multiply the following.

(i) 0.325 × 100

(ii) 17.55 × 10

(iii) 3.5252 × 1000

(iv) 2.57 × 32

6. Divide the following.

(i) 9.42 ÷ 6

(ii) 2.52 ÷ 7

(iii) 8.61 ÷ 3

7. Anas ran a distance of **110.25m** and Asman ran **97.75m**.

a. What is the total distance that they both ran altogether?

b. How much more distance did Anas run than Asma?

8. Abdullah drinks **0.45** litre of juice every day.

How many litres of juice does he drink in **30** days?

5.1 LENGTH

We have learnt that the small lengths are measured in metres (m) and centimetres (cm) and long distances are measured in kilometres (km).

1. Conversion of units of length:

Convert kilometres to metres, metres to centimetres and centimetres to millimetres.

(i) Convert kilometres to metres.

There are 1000 metres in a kilometre.

$$1 \text{ kilometre (km)} = 1000 \text{ metre (m)}$$

So, we multiply the numbers of kilometres by 1000 to change them into meters.

Example 1: Convert 2 kilometres into metres

Solution: $2 \text{ km} = 2 \times 1000 = 2000 \text{ m}$

Example 2: Convert 8 kilometres into metres

Solution: $8 \text{ km} = 8 \times 1000 = 8000 \text{ m}$



Activity 1 Convert to meters.

1	6 km = <u>6 x 1000</u> = <u>6000</u> m
2	9 km = _____ = _____ m
3	12 km = _____ = _____ m
4	25 km = _____ = _____ m
5	50 km = _____ = _____ m
6	75 km = _____ = _____ m
7	80 km = _____ = _____ m

Teacher's Note

Teacher should explain the students to convert the different units of length through multiplication by 1000, 100 and 10.

(ii) Convert metres to centimetres

There are 100 centimetres in a metre.

$$\boxed{1 \text{ metre (m)} = 100 \text{ centimetres (cm)}}$$

So, we multiply metres by 100 to change into centimetres.

Example 1: Convert 6 metres into centimetres

Solution: $6 \times 100 = 600 \text{ cm}$

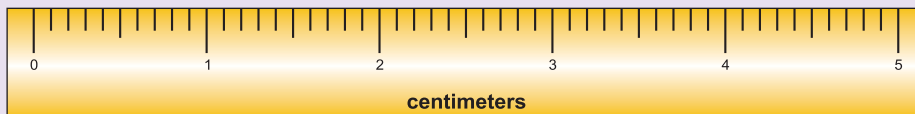
Example 2: Convert 20 metres into centimetres

Solution: $20 \text{ m} = 20 \times 100 = 2000 \text{ cm}$

**Activity 2**

Convert metres into centimetres.

1	5 m = <u>5 x 100</u> = <u>500</u> cm
2	9 m = _____ = _____ cm
3	18 m = _____ = _____ cm
4	45 m = _____ = _____ cm
5	60 m = _____ = _____ cm
6	87 m = _____ = _____ cm

(iii) Convert centimetres to millimetres.

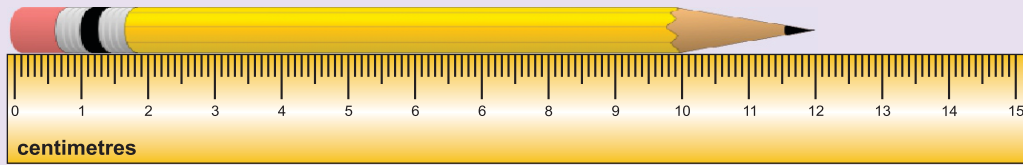
Each centimetre unit is divided into 10 smaller units.

Each smaller unit is called a **millimetre (mm)**.

There are 10 mm in a cm.

$$\boxed{1 \text{ centimetre (cm)} = 10 \text{ millimetres (mm)}}$$

Example 1: Measure the length of this pencil in centimetres and convert it into millimetres.



Solution: The length of this pencil is 12 cm.

To find the length in millimetres, we multiply centimetres by 10.

So,

$$12 \text{ cm} = 12 \times 10 = 120 \text{ mm}$$

The length of pencil is 120 mm.

Example 2: Convert 85 cm to millimetres

Solution: $85 \text{ cm} = 85 \times 10 = 850 \text{ mm}$



Activity

Convert the following into millimetres.

1	$7 \text{ cm} = \underline{7 \times 10} = \underline{70} \text{ mm}$
2	$10 \text{ cm} = \underline{\hspace{2cm}} = \underline{\hspace{1cm}} \text{ mm}$
3	$11 \text{ cm} = \underline{\hspace{2cm}} = \underline{\hspace{1cm}} \text{ mm}$
4	$31 \text{ cm} = \underline{\hspace{2cm}} = \underline{\hspace{1cm}} \text{ mm}$
5	$49 \text{ cm} = \underline{\hspace{2cm}} = \underline{\hspace{1cm}} \text{ mm}$

Following is the table showing relationship among units of length.

10 millimetres = 1 centimetre

100 centimetres = 1 metre

1000 metres = 1 kilometres

1 metre = 1000 millimetres

Example 3: A boy purchased a rope 2 metre long. Convert it into centimetres and millimetres.



Solution: $2 \text{ m} = 2 \times 100 \text{ cm} = 200 \text{ cm}$

Again: $2 \text{ m} = 2 \times 1000 \text{ mm} = 2000 \text{ mm}$

EXERCISE 5.1

1 Convert into metres.

(i) 5 km (ii) 14 km (iii) 20 km

2 Convert into centimetres.

(i) 17 m (ii) 32 m (iii) 54 m

3 Convert into millimetres?

(i) 15 cm (ii) 19 cm (iii) 30 cm

4 Change into centimetres and millimetres?

(i) 4 m (ii) 10 m (iii) 35 m

(iv) 64 m (v) 83 m (vi) 98 m

2. Addition and Subtraction of units of length:
 Add and subtract expressions involving similar units of length.

As metres are added to metres and kilometres are added to kilometres, so like units are to be added and subtracted from each other.

Example 1: Add 24 km 233 m and 20 km 446 m

Solution:

km	m	
24	233	
+ 20	446	
44	679	Thus, sum is 44 km 679 m

Example 2: Add 42 m 75 cm and 28 m 90 cm

Solution:

m	cm	
42	75	
+ 28	90	
71	65	Thus, sum is 71 m 65 cm

Example 3: Subtract 34 km 23 m from 78 km 86 m

Solution:

km	m	
78	86	
- 34	23	
44	63	Thus, difference is 44 km 63 m

Example 4: Subtract 25 m 56 cm from 47 m 23 cm

Solution:

m	cm	
47 ⁶	23 ¹	
- 25	56	
21	67	Thus, difference is 21 m 67 cm

EXERCISE 5.2

(1) Add:

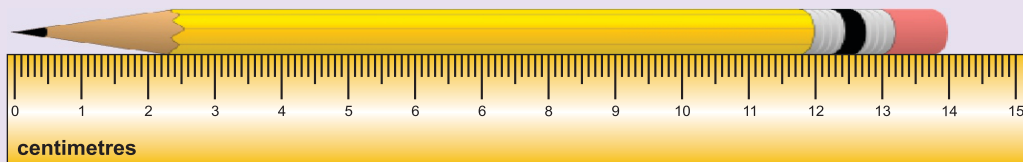
- (i) 4200 m and 9600 m
- (ii) 25 km 520 m and 12 km 840 m
- (iii) 49 km 719 m and 32 km 103 m
- (iv) 30 km 60 m and 29 km 29 m
- (v) 69 m 17 cm and 99 m 32 cm
- (vi) 42 cm 3 mm and 68 cm 5 mm
- (vii) 13 m 25 cm, 40 m and 65 m 5 cm
- (viii) 90 km 820 m, 75 km 500 m and 110 km 175 m
- (ix) 45 km 340 m, 82 km 399 m and 230 km 180 m

(2) Subtract:

- (i) 5050 m from 7000 m
- (ii) 2 m 76 cm from 6 m 35 cm
- (iii) 34 m 20 cm from 36 m 80 cm
- (iv) 305 m 20 cm from 862 m 60 cm
- (v) 36 km 500 m from 87 km 250 m
- (vi) 18 km 352 m from 70 km 100 m
- (vii) 106 m 18 cm from 300 m 29 cm
- (viii) 27 cm 8 mm from 74 cm 7 mm
- (ix) 37 cm 5 mm from 64 cm 3 mm

Use appropriate units to measure the length of different objects

We measure the length of pencil in centimetres.



The length of pencil is 14 cm.

We measure the length of book in centimetres.

We measure the length of table, room or play ground in metres.

We measure the distance between two cities in kilometres.



Activity

Use the correct unit of cm, m and km to fill the each box.

We measure:

- | | | |
|---|---|---------------------------------|
| ① | The length of pen in | <input type="text" value="cm"/> |
| ② | The length of bed in | <input type="text"/> |
| ③ | The length of hockey ground in | <input type="text"/> |
| ④ | The width of your geometry box in | <input type="text"/> |
| ⑤ | The distance from Karachi to Larkana in | <input type="text"/> |

Example: Tick (✓) the best unit of length for measuring the length of sides of table

- (a) 45 mm (b) 45 cm ✓
 (c) 45 m (d) 45 km



Solve real life problems involving conversion, addition and subtraction of units of length

Example 1: Farhan is 1 m 30 cm tall. He stands on a stool 70 cm high. How high is the top of his head from the ground?

Solution:

Farhan's height	① 1 m	30 cm	[Sum of (30 + 70) cm = 100 cm 100 cm = 1 m carry 1 m to metre column]
Height of stool	+	70 cm	
		<u>2 m</u>	
		<u>00 cm</u>	

The top of his head is 2 m high from the ground.

Example 2: There are 2 pieces of wood. The first piece measures 5 m 28 cm and the second piece is 3 m 55 cm long. What is the difference between the two?

Solution:

Length of the first piece of the wood	5 m	28 cm
Length of the second piece of the wood	- 3 m	55 cm
	<u>1 m</u>	<u>73 cm</u>

The difference between the two pieces of wood is 1 m 73 cm.

EXERCISE 5.3

1 Choose the best unit of length for the following objects:

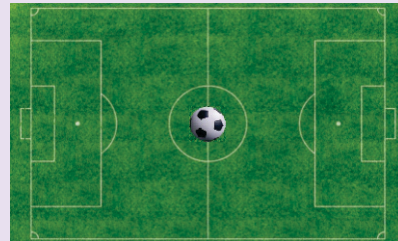
(i) The thickness of eraser is:

- (a) 2 mm (b) 2 cm
(c) 2 m (d) 2 km



(ii) The length of football ground:

- (a) 30 mm
(b) 30 cm
(c) 30 m
(d) 30 km



(iii) The distance between Karachi and Hyderabad by road is:

- (a) 165 mm
(b) 165 cm
(c) 165 m
(d) 165 km



Hyderabad



Karachi

- 2 The length of an iron rod is 2 m 86 cm. How much iron rod is left if 1m 38 cm has been cut off?
- 3 Ali covered a distance of 789 m from his house to Jamia Masjid and then 368 m from Jamia Masjid to School. Find the total distance covered by him ?
- 4 A car is 1m 62 cm wide. A garage is 2 m 41cm wide. How much space is left when the car is in the garage?
- 5 The red part of a colour pencil is 65 mm long. The blue part is 52 mm long. What is the length of full pencil in millimetres and centimetres?
- 6 In a walking race, in specified time Tariq ran 9 km 200 m, Sajjad ran only 8 km 850 m. How far ahead of Sajjad was Tariq?

- 7 In a 10 kilometre race, a horse fall down at a distance of 245 m from the winning point. What distance had the horse run before it fall down?
- 8 Nasir is 142 cm tall. His friend is 8 cm taller than Nasir. How tall is his friend?
- 9 Saba's house is at a distance of 375 m from school and 505 m from railway station. What is the difference between distances of school and railway station from Saba's home?



5.2 MASS / WEIGHT

The unit of mass is kilogram (kg). Kilograms (kg) are used to weigh heavy objects and grams are used to weigh light objects.



Convert kilograms to grams.

There are 1000 grams in a kilogram.

$$\boxed{1 \text{ kilogram (kg)} = 1000 \text{ gram (g)}}$$

So, we multiply the numbers of kilograms by 1000 to convert into grams.

Example 1: Convert 15 kg to grams

Solution: $15 \text{ kg} = 15 \times 1000 \text{ g} = 15000 \text{ g}$

Example 2: Convert 2 kg 250 g into grams

Solution: $2 \text{ kg } 250 \text{ g} = 2 \times 1000 \text{ g} + 250 \text{ g}$
 $= 2000 \text{ g} + 250 \text{ g} = 2250 \text{ g}$

Teacher's Note

Teacher should explain students to convert the different units of kilograms to gram by multiplication.



Activity

Convert the following into grams.

- (1) 18 kg = $\frac{18 \times 1000}{\quad}$ = $\frac{18000}{\quad}$ g
- (2) 25 kg = $\frac{\quad}{\quad}$ = $\frac{\quad}{\quad}$ g
- (3) 4 kg 80 g = $\frac{\quad}{\quad}$ = $\frac{\quad}{\quad}$ g
- (4) 5 kg 125 g = $\frac{\quad}{\quad}$ = $\frac{\quad}{\quad}$ g

3. Addition and subtraction of unit of Mass/Weight

Add and subtract expressions involving similar units of mass/weight.

Example 1:

Add 3 kg 65 g and 5 kg 30 g.

Solution:

	kg	g
3	3	65
+ 5	5	30
	<hr/>	<hr/>
	8	95

Total weight = 8 kg 95 g

Example 2: Subtract 7 kg 650 g from 9 kg 500 g.

Solution:

	kg	g
9	9	500
- 7	7	650
	<hr/>	<hr/>
	1	850

Total weight = 1 kg 850 g

EXERCISE 5.4

1 Add.

- (i) 3705 g, 8536 g and 4000 g
- (ii) 4 kg 485 g, 2 kg 390 g and 4 kg 425 g
- (iii) 8 kg 75 g and 9 kg 46 g
- (iv) 4 kg 32 g and 3 kg 85 g
- (v) 16 kg 860 g, 23 kg 545 g and 49 kg 360 g

2 Subtract.

- (i) 1 kg 250 g from 5 kg (ii) 3 kg 33 g from 6 kg 86 g
- (iii) 4505 g from 9007 g (iv) 36 kg 740 g from 59 kg 960 g
- (v) 14 kg 72 g from 20 kg 40 g

Use appropriate units to measure the mass/weight of different objects.

- To weigh heavy objects we use kilogram.
- To weigh lighter objects we use gram.

For example:

We know the vegetable seller is weighing potatoes in kilogram (kg). The goldsmith is weighing a ring in grams (g). The wheat bags are weighing in kilogram (kg).



Activity

Use appropriate unit in the blanks 'kg' or 'g'.

- The mass of a silver ring is measured in g
- The mass of bags of flour are measured in _____
- The mass of sugar bag is measured in _____
- The mass of one soap is measured in _____
- The mass of potatoes and onions are measured in _____
- The mass of salt bag is measured in _____

Solve real life problems involving conversion, addition and subtraction of units of mass/weight.

Example 1: A rice merchant sold 168 kg 750 g of rice and had 57 kg 650 g left. Find the quantity of rice in the beginning?

<i>Solution:</i>	Weight of rice sold	kg g
		168 750
	Weight of rice left	+ 57 650
		226 400

He had 226 kg 400 g rice in the beginning.

Example 2: A hen weighs 2 kg 720 g and a duck weighs 4 kg 240 g. How much duck is heavier than the hen?

<i>Solution:</i>	Weight of the duck	kg	g
		4	240
	Weight of the hen	– 2	720
		1	520

The duck is 1 kg 520 g heavier than the hen.

EXERCISE 5.5

- 1** Choose the answer in best unit of mass/weight for following objects:
 - (i) The mass of a paper clip.
(a) 1 g (b) 1 kg (c) 100 g (d) 100 kg
 - (ii) The mass of a 13 years old boy.
(a) 4 g (b) 4 kg (c) 40 kg (d) 400 g
 - (iii) The mass of a box of tea.
(a) 40 g (b) 400 g (c) 4 g (d) 4 kg
 - (iv) The weight of a watermelon.
(a) 5 kg (b) 50 g (c) 50 kg (d) 500 g
- 2** A bale of rubber weighs 75 kg 700 g. Another weighs 86 kg 400 g. Find their total weight.
- 3** Hussain weighs 28 kg 750 g and his father weighs 63 kg 500 g. How much lighter is Hussain than his father?
- 4** Fozia bought 21 kg 350 g of sweet from one shop. She purchased 1 kg 200 g of sweet from another shop. Find the total weight of sweet she purchased in all?
- 5** A grain merchant had 3000 kg of peas. He sold 1856 kg 750 g of it. What weight of peas had he left?

EXERCISE 5.6

(1) Add.

- (i) $7\text{ l } 420\text{ ml}$ and $10\text{ l } 500\text{ ml}$
- (ii) 2100 ml , 4960 ml and 3755 ml
- (iii) $7\text{ l } 25\text{ ml}$, $16\text{ l } 400\text{ ml}$ and $31\text{ l } 251\text{ ml}$
- (iv) 705 ml , 820 ml and 695 ml
- (v) $14\text{ l } 782\text{ ml}$, $17\text{ l } 300\text{ ml}$ and $26\text{ l } 450\text{ ml}$

(2) Subtract.

- (i) 719 l from 825 l
- (ii) $16\text{ l } 415\text{ ml}$ from $60\text{ l } 600$
- (iii) 640 ml from 905 ml
- (iv) $8\text{ l } 205\text{ ml}$ from $11\text{ l } 150\text{ ml}$
- (v) $76\text{ l } 223\text{ ml}$ from $97\text{ l } 660\text{ ml}$

Use appropriate units to measure the capacity/volume of different objects (utensils etc).

★ The capacity of milk pack is $\frac{1}{2}\text{ l}$
or 500 ml .

★ The capacity of 2nd milk pack is 1 l
or 1000 ml .

★ The capacity of mineral water bottle is 1 litre .

★ The capacity of bucket is 5 l
or 5000 ml .

★ The capacity or volume of bowls are
 250 ml , 500 ml and 750 ml





Activity

Choose the appropriate measure of given objects.



25 ml
 250 ml ✓
 2500 ml



36 ml
 360 ml
 3600 ml



1 l
 10 l
 100 l

Solve real life problems involving conversion, addition and subtraction of units of capacity/volume.

Example 1: A plastic tank contains 18 l of water. Ali pours 16 l of water into it, how much water will it contain now?

Solution:

Water in the tank	18 l
Ali pours	+ 16 l
Total	<u>34 l</u>

It will contain 34 l of water in total.

Example 2: Two bottles together contain 200 ml of juice. If one of them holds 98 ml, how much juice does the other hold?

Solution:

Two bottles contain	200 ml of juice
One of them holds	- 98 ml of juice
	<u>102 ml</u>

The other bottle holds 102 ml of juice.

EXERCISE 5.7

- (1) Choose answer in the best unit of volume for the following objects:



4 l, 40 l, 400 l



1 l, 1 ml, 2 ml



500 l, 500 ml, 800 ml



4 l, 4 ml



140 l, 140 ml



5 l, 5 ml

- 2 How much water is left if 19 ml are taken from a cup holding 28 ml.
- 3 The bath tub in Sara's house requires 850 l of water to fill. It now holds 552 l. How many more litres are needed to fill the bath tub?
- 4 A container contains 98 l 300 ml of oil. If 51 l 700 ml more of oil is added to it. How much oil will there be in the tank altogether?
- 5 A milk van carried 272 l of milk. 35 l 875 ml of the milk were spilt in an accident. How much milk was left?
- 6 A water drum contains 500 l of water. After watering the flowers, 260 ml of water is left. How much quantity of water has been used for watering the flowers?
- 7 There is 1 l 10 ml of syrup in a bottle and in another bottle contains 2 l 75 ml. Find the total quantity of syrup in both bottles.
- 8 There is 80 l 750 ml of diesel in the tank of a bus. How much diesel must be added to make it 100 l?

5.4 TIME

An analogue clock has three hands.

The shorter hand is called **hour hand**.

The longer hand is called **minute hand**.

The thinnest hand is called **second hand**.

The hour hand goes round the clock twice a day.

The minute hand goes round the clock 24 times a day.

The second hand takes 60 little jerks to go round the clock in a minute. We already know that:



TIME MEASUREMENT

- 1 hour = 60 minutes
- 1 day = 24 hours
- 1 week = 7 days
- 52 weeks = 1 year
- 1 year = 12 months

MAY 2014						
Mon	Tue	Wed	Thu	Fri	Sat	Sun
*	*	*	1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	*

Conversion of units of time

Read time in hours, minutes and seconds

We have learnt each day has 24 hours .

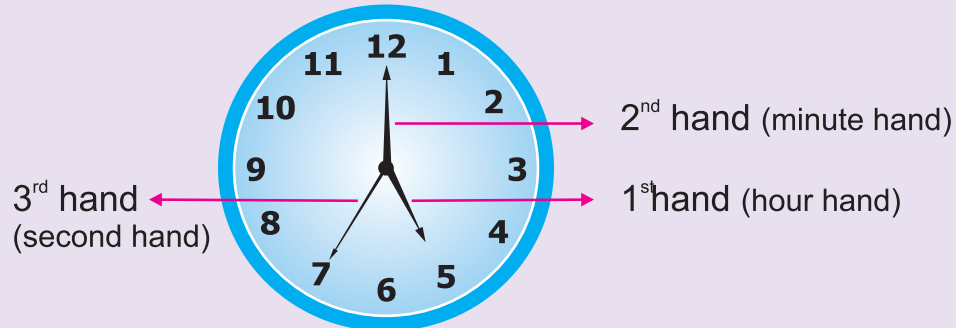
A day ends at 12 midnight and a new day begins at same time after 12 midnight .

- The time between 12 midnight and 12 noon is called a.m. It means in the late night and morning.
- The time between 12 noon and 12 midnight is called p.m. means in the afternoon, evening and night.

Teacher's Note

Teacher should revise different time measurements to the students.

Look at this clock. It has 3 hands.



The third hand is long and thin. It moves faster than other two hands. It moves in short jerks. Each jerk made by this hand marks the passing of one second.

The second is the smallest unit of time.

1 minute contains 60 seconds.

$$1 \text{ minute} = 60 \text{ seconds}$$

The 3rd hand takes 60 little jerks to go clock wise round the clock, when 60 seconds are complete a minute has passed.

How many jerks will the second hand make in one hour?

$$\begin{aligned} 1 \text{ hour} &= 60 \text{ minutes} \\ \text{or } 1 \text{ hour} &= 60 \times 60 \text{ seconds} \\ \text{or } 1 \text{ hour} &= 3600 \text{ seconds} \end{aligned}$$



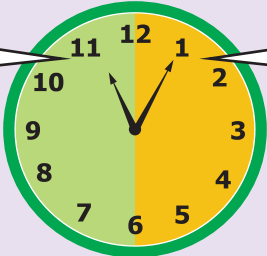
Activity 1 Use a.m. or p.m.

- 1 8'o clock in the morning 8 a.m
- 2 5'o clock in the evening _____
- 3 1'o clock in the morning _____
- 4 9'o clock at night _____
- 5 2 hours before midnight _____

a.m stands for ante meridien p.m stands for post meridien

Look at the dial of the clock. We divide it in two parts.

If the minute hand is on left side, we say to the hour.



If the minute hand is on right side, we say past the hour



quarter to 12

11:45



quarter past 12

12:15



5 minutes to 4

3:55



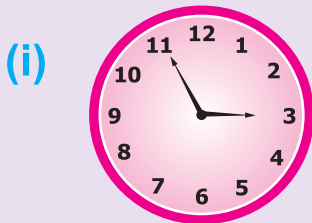
10 minutes past 6

6:10



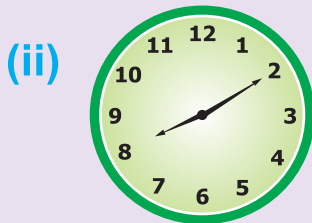
Activity 2

Write time in words and in numbers.



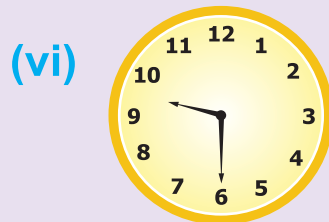
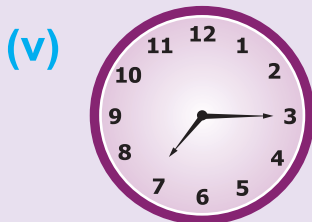
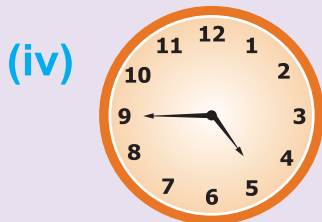
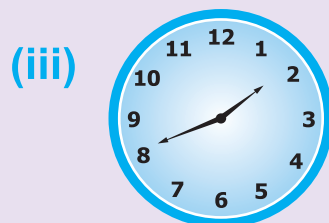
5 minutes to 3

2:55



10 minutes past 8

8:10



Convert hours to minutes and minutes to seconds.**(a) Convert hours into minutes:**

We multiply the number of hours by 60 to convert hours into minutes.

Example 1: Convert 3 hours 15 minutes into minutes

Solution: $3 \text{ h } 15 \text{ m} = 3 \times 60 + 15$
 $= 180 + 15 = 195 \text{ min.}$

**Activity 1 Convert the following into minutes.**

- (1) $2 \text{ h } 10 \text{ min} = \underline{2 \times 60 + 10} = \underline{130}$ minutes.
 (2) $3 \text{ h } 32 \text{ min} = \underline{\hspace{2cm}} = \underline{\hspace{2cm}}$ minutes.
 (3) $1 \text{ h } 45 \text{ min} = \underline{\hspace{2cm}} = \underline{\hspace{2cm}}$ minutes.
 (4) $5 \text{ hours} = \underline{\hspace{2cm}} = \underline{\hspace{2cm}}$ minutes.

(b) Conversion of minutes to seconds.

We multiply the minutes by 60 to convert into seconds.

Example 1: Convert 4 minutes into seconds.

Solution: $4 \text{ min} = 4 \times 60 \text{ sec} = 240 \text{ seconds}$

Example 2: Convert 3 minutes 20 seconds

Solution: $3 \text{ minutes } 20 \text{ seconds} = 3 \times 60 \text{ sec.} + 20 \text{ sec.}$
 $= 180 + 20 \text{ sec} = 200 \text{ seconds}$

**Activity 2 Convert the following into seconds.**

- (1) $47 \text{ min} = \underline{47 \times 60} = \underline{2820}$ seconds.
 (2) $1 \text{ min } 5 \text{ sec} = \underline{\hspace{2cm}} = \underline{\hspace{2cm}}$ seconds.
 (3) $12 \text{ min } 15 \text{ sec} = \underline{\hspace{2cm}} = \underline{\hspace{2cm}}$ seconds.
 (4) $45 \text{ min } 10 \text{ sec} = \underline{\hspace{2cm}} = \underline{\hspace{2cm}}$ seconds.
 (5) $59 \text{ min} = \underline{\hspace{2cm}} = \underline{\hspace{2cm}}$ seconds.

Teacher's Note

Teacher should explain the students to convert the hour into minutes and minutes into seconds through multiplication by 60.

Convert years to months, months to days and weeks to days

(a) Conversion of years to months:

We multiply the number of years by 12 to convert it into months.

Example 1: Convert 3 years to months

Solution: There are twelve months in a year.

$$\text{So, } 3 \text{ years} = 3 \times 12 \text{ months} = 36 \text{ months}$$

Example 2: Convert 4 years 8 months to months

Solution: 4 years 8 months = $4 \times 12 \text{ months} + 8 \text{ months}$
 $= 48 \text{ months} + 8 \text{ months} = 56 \text{ months}$

**Activity**

Convert the following into months.

- (1) 2 years = $\frac{2 \times 12}{}$ = 24 months.
 (2) 5 years 2 months = $\frac{}$ = $\frac{}$ months.
 (3) 10 years 8 months = $\frac{}$ = $\frac{}$ months.
 (4) 7 years 6 months = $\frac{}$ = $\frac{}$ months.

(b) Conversion of months to days.

We multiply the months by 30 to convert them into days.

Example 1: Convert 5 months to days

Solution: 5 months = $5 \times 30 \text{ days} = 150 \text{ days}$

Example 2: Convert 2 months 20 days into days.

Solution: 2 months 20 days = $2 \times 30 \text{ days} + 20$
 $= 60 + 20 \text{ days} = 80 \text{ days}$

**Activity**

Convert the following into days.

- (1) 4 months 10 days = $\frac{4 \times 30 + 10}{}$ = 130 days.
 (2) 6 months 4 days = $\frac{}$ = $\frac{}$ days.
 (3) 9 months 20 days = $\frac{}$ = $\frac{}$ days.
 (4) 18 months 15 days = $\frac{}$ = $\frac{}$ days.

(c) Conversion of weeks to days.

We multiply weeks by 7 to convert into days.

Example 1: Convert 5 weeks into days.

Solution: 5 weeks = 5×7 days = 35 days

Example 2: Convert 2 weeks 4 days into days.

Solution: 2 weeks 4 days = 2×7 days + 4 days = 18 days

EXERCISE 5.8**(1) Convert the following into months.**

- | | |
|------------------------|-------------------------|
| (i) 5 years | (ii) 8 years 6 months |
| (iii) 4 years 9 months | (iv) 10 years 2 months |
| (v) 15 years 8 months | (vi) 20 years 10 months |

(2) Convert the following into days.

- | | |
|------------------------|-----------------------|
| (i) 3 months | (ii) 3 months 12 days |
| (iii) 8 months 20 days | (iv) 4 months 25 days |
| (v) 10 months 28 days | (vi) 2 months 15 days |

(3) Convert the following into days.

- | | |
|-----------------------|----------------------|
| (i) 8 weeks | (ii) 25 weeks 3 days |
| (iii) 17 weeks 6 days | (iv) 30 weeks |
| (v) 35 weeks 5 days | (vi) 41 weeks 2 days |

Addition and subtraction of units of time

Example 1: Add 15 minutes 35 seconds and 30 minutes 20 seconds.

Solution:

Minutes	Seconds
15	35
+ 30	20
45	55

Therefore, sum is 45 min 55 sec.

Example 2: Subtract 25 minutes 32 seconds from 46 minutes 48 seconds.

Solution:

Minutes	Seconds
46	48
– 25	32
21	16

Therefore, difference is 21 min 16 sec.

EXERCISE 5.9

(1) Add:

- i 45 minutes 38 seconds and 30 minutes 40 seconds.
- ii 48 minutes 39 seconds and 37 minutes 20 seconds.
- iii 28 hours 10 minutes and 31 hours 20 minutes.
- iv 25 hours 20 minutes and 34 hours 15 minutes.

(2) Subtract:

- i 48 minutes 39 seconds from 59 minutes 49 seconds.
- ii 35 minutes 25 seconds from 55 minutes 35 seconds.
- iii 32 hours 12 minutes from 45 hours 46 minutes.
- iv 23 hours 10 minutes from 54 hours 30 minutes.

Solve simple real life problems involving conversion, addition and subtraction of units of time

Example 1: Nazia takes 1 hour 15 minutes to complete her Maths home work and 1 hour to complete her English home work. How much time she takes to complete both home works?

Solution:

	Hours	Minutes
Time taken to complete Maths homework:	1	15
Time taken to complete English homework:	+ 1	00
Total time taken:	2	15

Total time taken = 2 hours 15 minutes.

Example 2: Hamdan takes 1 hour 30 minutes to play cricket, while his brother Hammad takes 1 hour 15 minutes to play cricket. How much more time Hamdan takes to play cricket than his brother Hammad?

Solution:

	Hours	Minutes
Time taken by Hamdan	1	30
Time taken by Hammad	- 1	15
Difference	0	15

Hamdan takes 15 minutes more to play cricket.

EXERCISE 5.10

- 1 Rafique took 25 minutes 30 seconds to reach his school while 23 minutes 25 seconds to come back from school. How much total time he takes to go and come back from school?
- 2 Pakistani cricket team took 4 hours 25 minutes to complete their innings, while Indian cricket team took 3 hours 20 minutes to complete their innings. How much total time both the teams took to complete their innings?
- 3 Ahsan takes 42 minutes 54 seconds to complete a job, while his friend takes 32 minutes 12 seconds to complete the same job. How much more time does Ahsan take to complete the job?
- 4 A train takes 19 hours 48 minutes to reach from Lahore to Karachi, while another train takes 17 hours 23 minutes. Find the difference between the times taken by the two trains.
- 5 Momal spent 53 minutes 47 seconds to watch television while Zahid spent 39 minutes 23 seconds to watch the television. Find the difference in their time.

REVIEW EXERCISE – 5

- 1 Tick (✓) the correct answer.
- (i) 1 centimetre is equal to
(a) 100 mm (b) 10 mm (c) 1000 mm
- (ii) 1 kilometre is equal to
(a) 1000 m (b) 100 m (c) 10 m
- (iii) 1 litre is equal to
(a) 100 ml (b) 10 ml (c) 1000 ml
- (iv) The number of hours in a day is
(a) 12 (b) 24 (c) 30
- 2 List any four lengths from your surrounding that would be measured by using km.
Example:
Distance between my home and school is 2 km
- (i) _____ (ii) _____
(iii) _____ (iv) _____
- 3 Convert these lengths into kilometres.
- (i) 6000 m = _____ (ii) 3500 m = _____
- 4 Convert these lengths into metres.
- (i) 15 km = _____ (ii) 3 km = _____
- 5 Add:
- (i) 30 km 43 m and 18 km 84 m
(ii) 48 m 65 cm and 38 m 76 cm
(iii) 13 l 800 ml and 12 l 700 ml
(iv) 44 kg 380 g and 38 kg 960 g
- 6 Subtract:
- (i) 40 km 65 m from 76 km 72 m
(ii) 43 m 81 cm from 72 m 34 cm
(iii) 4 l from 12 l 250 ml
(iv) 45 kg 325 g from 86 kg 638 g

6.1 GEOMETRY BOX

Geometry Box contains different types of instruments which are used for measurement and drawing geometrical figures.



Know instruments of a Geometry Box. i.e., pencil, straight edge/ ruler, compasses, dividers, set squares and protractor.

A geometry box contains the following instruments:

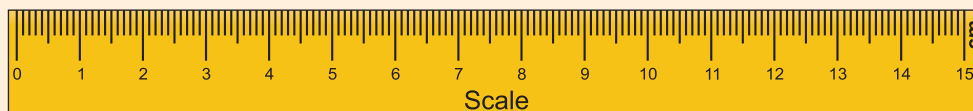
(1) Pencil and Eraser

Pencil is used for drawing figures and other lines, arcs, angles etc. and eraser is used to delete or correct the figures.



(2) Ruler (straight edge)

It is used to measure the length of a given line segment. It is also used in drawing line segment of given or required length.



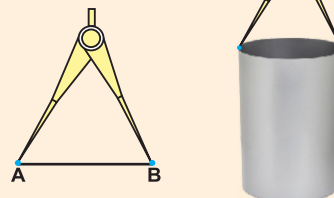
(3) Compasses (a pair of compasses)

Compasses are used to draw arcs, circles and marking distance.



(4) Dividers (a pair of dividers)

A pair of dividers is used to measure the length of a line segment and the diameter of hollow cylinder.

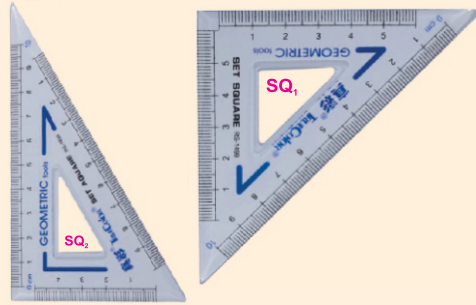


Teacher's Note

Teacher should show the geometry box and instruments to the students in the class room.

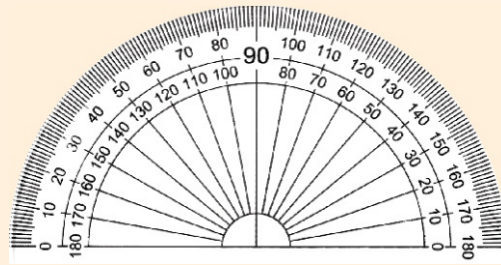
(5) **Set squares**

Set squares are used to draw a line parallel or perpendicular to a given line. It is also used to draw angles of 30° , 45° , 60° and 90° .



(6) **Protractor**

Protractor is used to measure an angle or to draw an angle of a given measure.



Recognize the use of pencils of grade H and HB

Pencils are characterized in two grades.

(i) Pencil of grade H
H stands for hardness



H grade pencil

The line drawn with pencil H grade is very thin. In this pencil the lead leaves light black colour impression.

(ii) Pencil of grade HB.
HB stands for blackness



HB grade pencil

The line drawn with HB grade is bold. In this pencil the lead leaves dark black colour impression.

Demonstrate the use of H and HB pencils by drawing different lines

Look at these pencils



The line drawn with pencil of grade H is very thin.



The line drawn with pencil of grade HB is bold.

**Activity 1**

Draw the following diagrams with *H* and *HB* grade pencils.

- (i) Line segment (ii) Square (iii) Circle

**Activity 2**

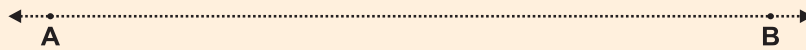
Take a point A. From point A draw \overline{AB} with the help of any straight edge. Draw another \overline{AC} from point A. How many lines can be drawn from point?

**Activity 3**

Take a pair of dividers. Penetrate the pointed ends on a paper. Name the two marks as A and B. Now draw lines with the help of straightedge; so that they may pass through both the points A and B.

6.2 LINE

In previous class, we learnt that a line consists of a set of infinite points. A line has no end point.



It is a line which shows infinite number of points.

Measure the length of a line in centimetres and millimetres using straightedge/ruler and dividers

**Activity 1**

To draw a line segment using straightedge / ruler.

Step 1. Take two points (say A and B).

Step 2. Join A and B, using your ruler and pencil.



Step 3. Thus we get a part of a line which has two end points called the line segment.

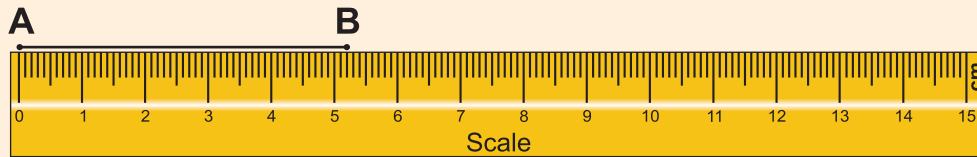
Teacher's Note

Teacher may organise activities and engage the students to draw and measure line segment in their own copies.



Activity 2

Measuring the length of a line segment with ruler.

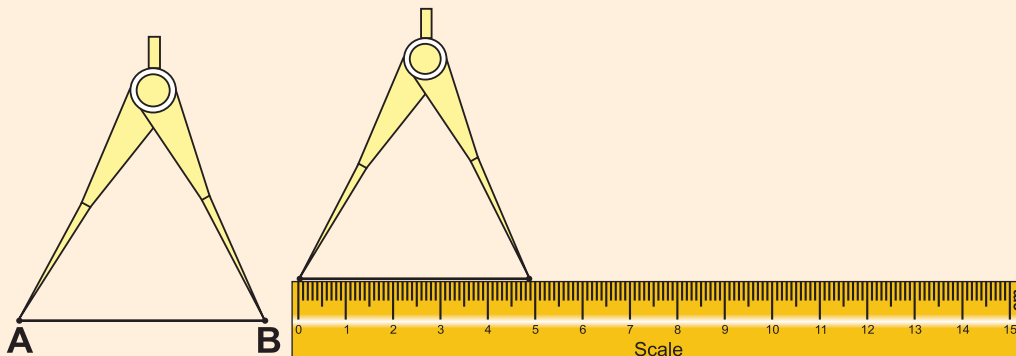


- Step 1.** Place a ruler with its edge along \overline{AB} such that zero (0) mark of the ruler faces the point A.
- Step 2.** Read the mark on the ruler which faces the point B.
- Step 3.** This gives us the length of AB. Thus the length of \overline{AB} is 5 cm 2 mm i.e. 5.2 cm. Symbolically, we write $m\overline{AB} = 5.2$ cm.



Activity 3

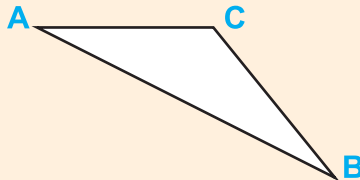
Measuring the length of line segment with divider.

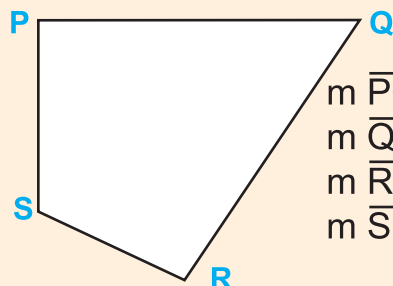


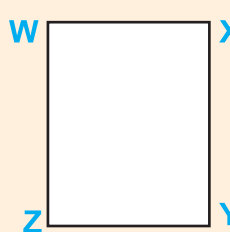
- Step 1.** Open the divider so that the end point of one of its arms is at A and the point of the second arm is at B.
- Step 2.** Lift the divider without disturbing it and place it on the ruler so that the end point of one arm is at zero (0) mark.
- Step 3.** Read the mark against the end point of the second arm of the divider.
- Step 4.** We find the length of \overline{AB} to be 4.9 cm or we write $m\overline{AB} = 4.9$ cm

EXERCISE 6.1

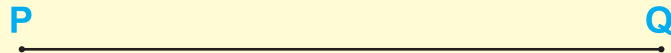
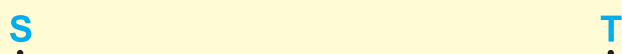
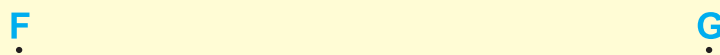
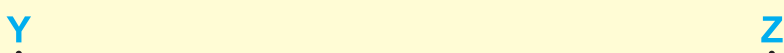

1. Measure the sides of the following figures with ruler and write their lengths:

(i)  $m \overline{AC} = \underline{\hspace{2cm}} \text{ cm}$
 $m \overline{AB} = \underline{\hspace{2cm}} \text{ cm}$
 $m \overline{CB} = \underline{\hspace{2cm}} \text{ cm}$
 $m \overline{BC} = \underline{\hspace{2cm}} \text{ cm}$

(ii)  $m \overline{PQ} = \underline{\hspace{2cm}} \text{ cm}$
 $m \overline{QR} = \underline{\hspace{2cm}} \text{ cm}$
 $m \overline{RS} = \underline{\hspace{2cm}} \text{ cm}$
 $m \overline{SP} = \underline{\hspace{2cm}} \text{ cm}$

(iii)  $m \overline{WX} = \underline{\hspace{1cm}} = m \overline{YZ} = \underline{\hspace{1cm}}$
 $m \overline{XY} = \underline{\hspace{1cm}} = m \overline{ZW} = \underline{\hspace{1cm}}$

2. Join the pair of points given below, to draw line segments, then measure the length of each of the line segments with the ruler and write its length. Verify the length by divider.

(i)	
	Length of \overline{PQ} is 8.5 cm
(ii)	
	Length of \overline{ST} is <u> </u> cm
(iii)	
	Length of \overline{FG} is <u> </u> cm
(iv)	
	Length of \overline{YZ} is <u> </u> cm
(v)	
	Length of \overline{MN} is <u> </u> cm

Draw a straight line of given length using a straightedge/ruler and dividers

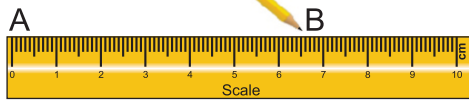


Activity 1

Let's draw a line segment 6.5 cm long using ruler.

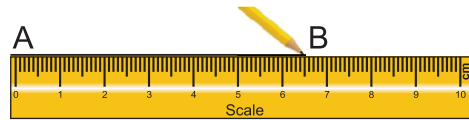
1st Step

- (i) Take any point A.
- (ii) Place the 0 (zero) of the ruler against point A.
- (iii) Put another point B with pencil against 6.5 cm of the ruler.



2nd Step

- (i) Join points A and B using the ruler or any straight edge.



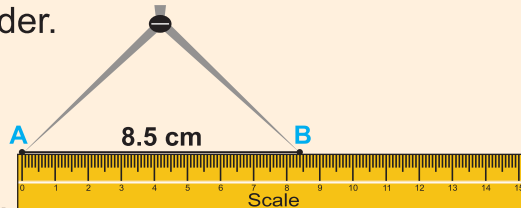
Thus a straight line AB is drawn whose length is 6.5 cm



Activity 2

To draw a straight line of 8.5 cm using dividers.

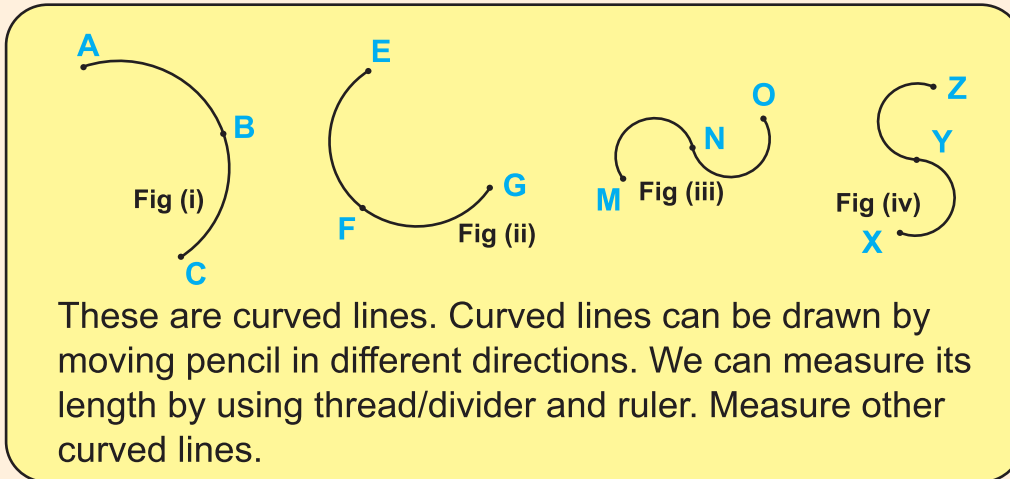
- Step 1.** Take a point A on a sheet of paper.
- Step 2.** Place one end of the divider at zero mark on ruler.
- Step 3.** Open the divider so that the other end of the divider is on the mark of 8.5 cm on the ruler.
- Step 4.** Without changing the openings of dividers, place one end at A and put a point B with another end of the divider.
- Step 5.** Join A and B.
- Step 6.** Thus, we obtain a straight line AB of required length 8.5 cm.



Teacher's Note

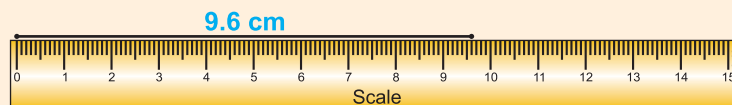
Help the students to draw lines of different measure in their own copy.

Draw a curved line and measure its length using thread/dividers and straightedge / ruler.



Activity 1 Measure curved line of Fig (i) with thread and ruler.

- Step 1.** Take a piece of thread.
- Step 2.** Place one end of the thread at point A.
- Step 3.** Spread the thread along the path from A to B and then from B to C.
- Step 4.** Put a mark on the thread or cut it with a pair of scissors.



- Step 5.** Measure the length of the thread with the help of ruler which is **9 cm 6 mm** or **9.6 cm**.
- Step 6.** In this way the length of the said curved line **ABC** is **9.6 cm**.

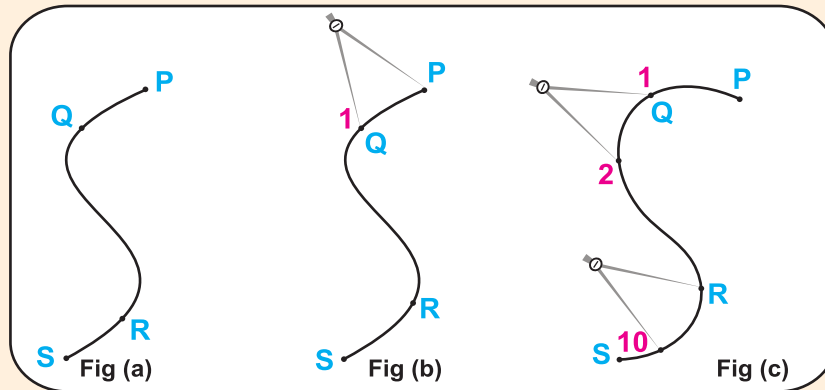
Teacher's Note

Teacher may help the students to draw some curved lines in their copies and measure their lengths with thread or scale.



Activity 2

Measure curved line PQRS fig. (a) with dividers and ruler.




- Step 1:** Open the arms of divider 1 cm apart.
- Step 2:** Place one arm at **P** so that the other arm reaches at **1** see fig (b).
- Step 3:** Hold firm arm at No. **1**, rotate the line arm to fall at No. **2** see fig (c).
- Step 4:** Repeat the above process again and again to reach at No. **10** see fig. (c).
- Step 5:** Remaining part of the curved line is not a complete unit. Open divider touching points **S** and No. **10**. Place it on the ruler so that one arm is at **0** (zero). Read the other point. Suppose the second arm falls at **5 mm**. Hence the required length of the curved line **PQRS** is **10.5 cm**.

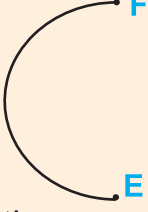
EXERCISE 6.2

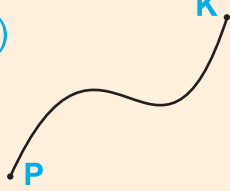
1. Draw line segments of following lengths.
Using (a) ruler (b) ruler and dividers.

- (i) $m\overline{AB} = 7.4 \text{ cm}$ (ii) $m\overline{BC} = 6.6 \text{ cm}$ (iii) $m\overline{CD} = 5.7 \text{ cm}$
 (iv) $m\overline{DE} = 3.8 \text{ cm}$ (v) $m\overline{EF} = 4.9 \text{ cm}$ (vi) $m\overline{PQ} = 6.0 \text{ cm}$

2. Measure these curved lines with thread, ruler and dividers and write their lengths.

(i)  Length _____ cm

(ii)  Length _____ cm

(iii)  Length _____ cm

Recognize horizontal and vertical lines

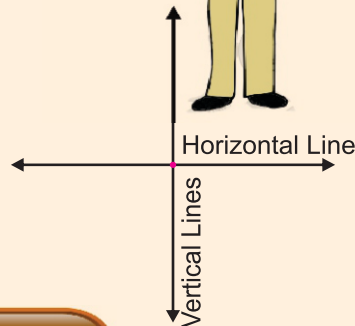
Look at stretched arms of the body.



Arms represent a line **horizontal** to the ground. Body is **vertical** to the ground and also to arms.

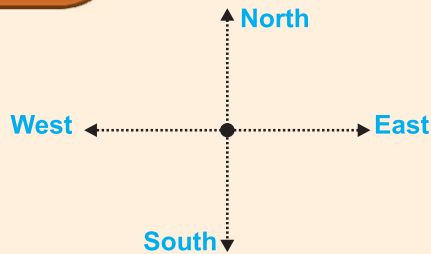
Thus we get a horizontal line \longleftrightarrow and a vertical line \updownarrow which intersect each other at a point.

Note: Horizontal and vertical lines have arrow marks, which represent direction.



EXERCISE 6.3

Look at the directions North, South, East and West shown on Horizontal and Vertical lines and fill in the blanks.



- (1) Horizontal line shows _____ directions.
- (2) Vertical line shows _____ directions.
- (3) North to South direction represents _____ line.
- (4) West to East direction represents _____ line.

Teacher's Note

Teacher may show the students horizontal and vertical lines with back of chair, window pan, sides of table, blackboard and corner of book with both hands of a clock at the time 6 o'clock and 15 minutes past.

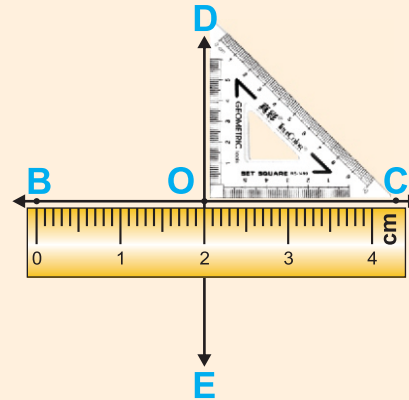
Draw a vertical line on a given horizontal line using set squares



Activity

Draw a vertical line \overleftrightarrow{DE} on a given horizontal line \overleftrightarrow{BC} .

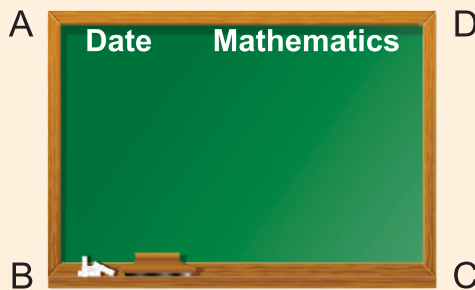
- Step 1. Draw a horizontal line \overleftrightarrow{BC} .
- Step 2. Place ruler edge along \overleftrightarrow{BC} .
- Step 3. Along the side of the ruler edge, place a set square. Now slide it until its square corner meet the point O at which the vertical line is to be drawn.



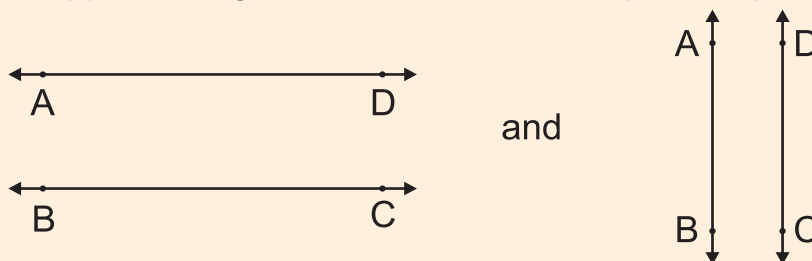
- Step 4. Draw \overrightarrow{DO} as shown in the figure. Then extend \overrightarrow{DO} to E. Thus we get a vertical line \overleftrightarrow{DE} on a given horizontal line \overleftrightarrow{BC} .

Recognize parallel and non-parallel lines

Look at these pictures:

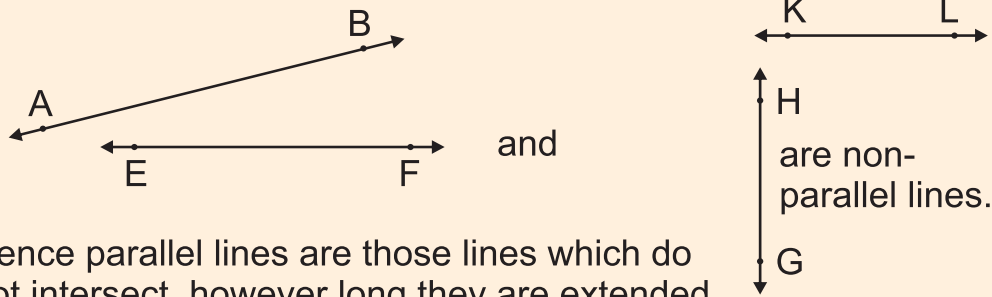


The opposite edges of the black board represent parallel lines;



\longleftrightarrow \longleftrightarrow \longleftrightarrow \longleftrightarrow
 AD is parallel to BC and AB is parallel to DC. Similarly the two lines of the railway track are parallel.

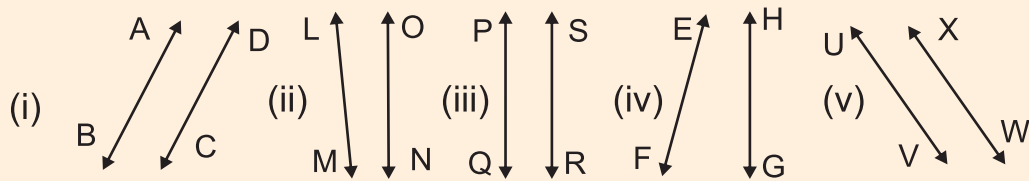
On the contrary, the following pair of lines are non-parallel lines because they will meet or intersect if extended.



Hence parallel lines are those lines which do not intersect, however long they are extended.

Identify parallel and non-parallel lines from a given set of lines

Example: Identify parallel and non-parallel lines.

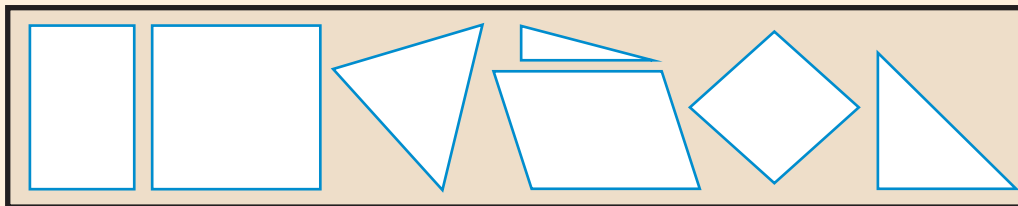


Here (i), (iii) and (v) are all pair of parallel lines.
 But (ii) and (iv) are pair of non-parallel lines.



Activity 1

Cross (X) the shapes which represent parallel lines and (✓) the shapes which represent non-parallel lines.



Teacher's Note

Teacher should give examples from real life situation to recognized the parallel and non-parallel lines.



Activity 2 Write down some pairs of:

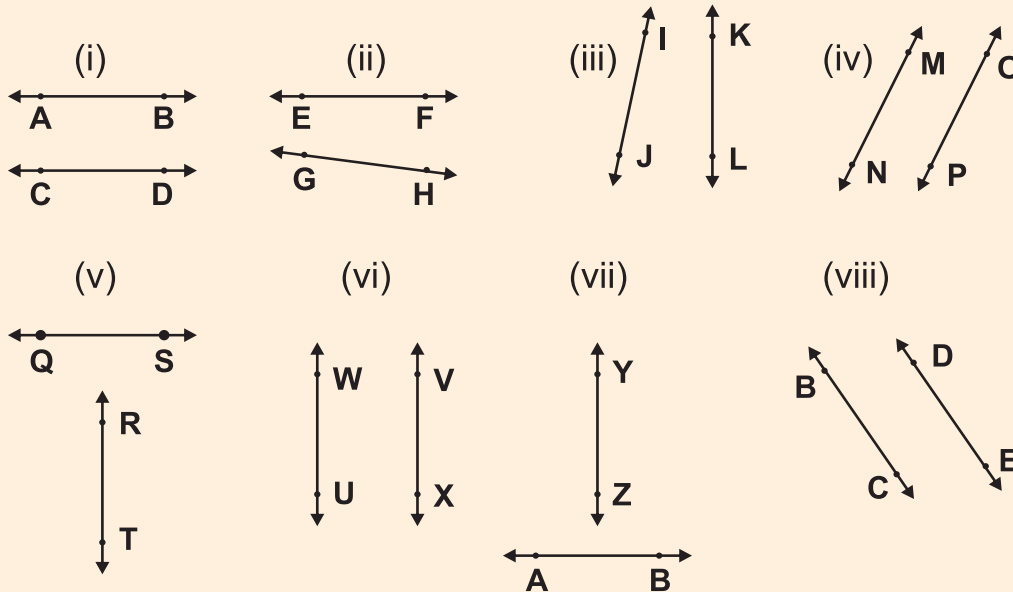
Parallel lines	Non-Parallel lines
1. Edges of the black board	1. Sides of triangle
2.	2.
3.	3.
4.	4.
5.	5.

Observations:

- (1) Pair of parallel lines never meet; how far they are extended.
- (2) Pair of non-parallel lines will meet and intersect each other.

EXERCISE 6.4

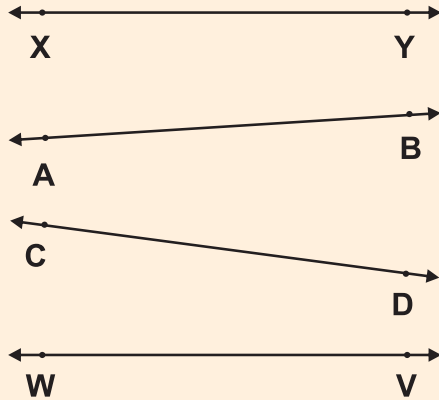
1. Identify parallel and non-parallel lines from the following set of lines.



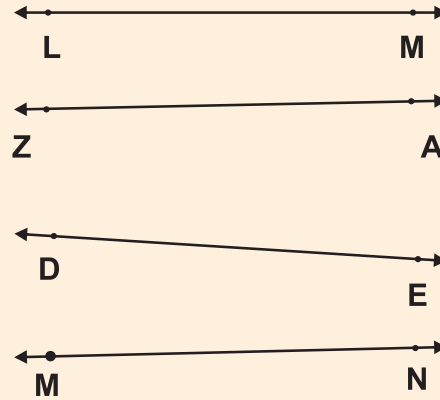
Teacher's Note

Teacher may ask the students to verify the above mentioned observations in their copies.

2. Tick (✓) the lines which are parallel to \overleftrightarrow{XY} ?



3. Cross (✗) the lines which are non-parallel to \overleftrightarrow{LM} ?



Draw a parallel line to a given straight line using set squares



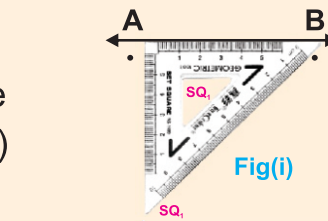
Activity

Draw a line (or lines) parallel to \overleftrightarrow{AB} .

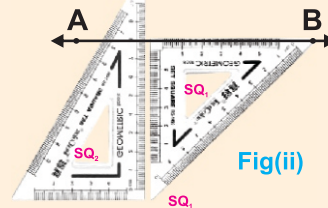


Step 1. Draw given lines \overleftrightarrow{AB} .

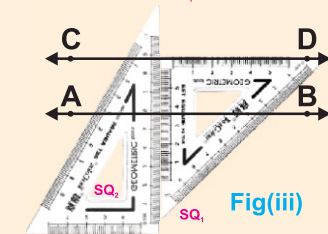
Step 2. Place the edge of one set square (SQ_1) along \overleftrightarrow{AB} as shown in fig. (i)



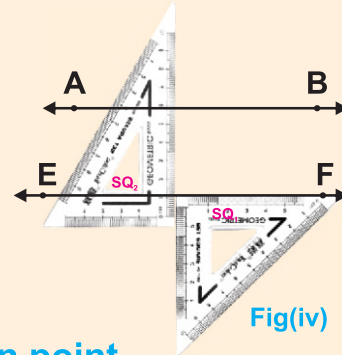
Step 3. Place another set square (SQ_2) adjacent to the previous one (fig ii). Now SQ_1 is ready to slide up and down along SQ_2



Step 4. Holding firm SQ_2 slide up SQ_1 and draw \overleftrightarrow{CD} as shown in fig (iii) Therefore \overleftrightarrow{AB} is parallel to \overleftrightarrow{CD} .



Step 5. Holding firm SQ_2 slide down SQ_1 and draw \overleftrightarrow{EF} as shown in fig (iv)
Therefore \overleftrightarrow{AB} is parallel to line \overleftrightarrow{EF} .



Draw a line which passes through a given point and is parallel to a given line (using set - squares)

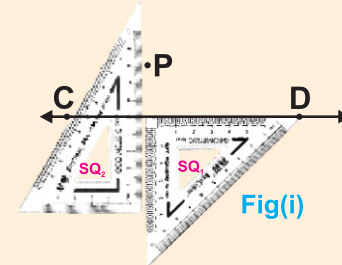


Activity

Draw a line \overleftrightarrow{RS} parallel to a given line \overleftrightarrow{CD} and passing through a given point P.

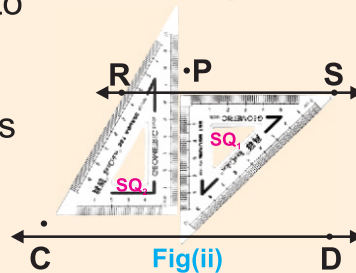
Step 1. Draw given \overleftrightarrow{CD} and take point P out side it.

Step 2. Place the set squares as explained previously and shown in figure (i).



Step 3. Holding fast SQ_2 slide up SQ_1 to reach at point P.

Step 4. Draw \overleftrightarrow{RS} passing through P as shown in figure (ii).



Therefore \overleftrightarrow{CD} is parallel to \overleftrightarrow{RS} which is passing through the point P.

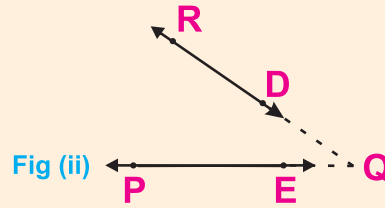
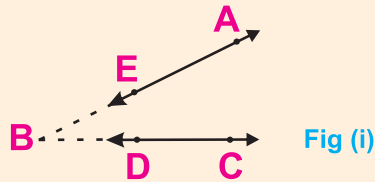
EXERCISE 6.5

1. Draw a vertical line \overleftrightarrow{PQ} on a given horizontal line \overleftrightarrow{XY} ; using set squares.
2. Draw a parallel line \overleftrightarrow{YZ} to a given line \overleftrightarrow{PQ} using set squares.
3. Draw \overleftrightarrow{AB} which passes through a given point E and is parallel to a given \overleftrightarrow{CD} (using set squares)

6.3 ANGLE

Recognize an angle through non-parallel lines

Look at the two non-parallel lines \overleftrightarrow{AE} and \overleftrightarrow{CD} fig (i)



These lines are produced to meet at point B and make an angle ABC. Thus two non-parallel lines have a common end point. Here the common end point is B.

Again look at the two non-parallel lines \overleftrightarrow{PE} and \overleftrightarrow{RD} fig (ii). These lines are produced to meet at point Q and make an angle PQR. Here Q is the common end point of line \overleftrightarrow{RQ} and \overleftrightarrow{PQ}

Draw an angle AOB with vertex (O) and arms (\overrightarrow{OA} , \overrightarrow{OB}) to recognize the notation $\angle AOB$ for an angle AOB

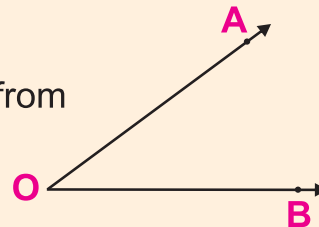


Activity

Draw an angle.

Step 1: Draw \overrightarrow{OB} .

Step 2: Draw another \overrightarrow{OA} (not along \overrightarrow{OB}) from point O. This is an angle AOB (or angle BOA)



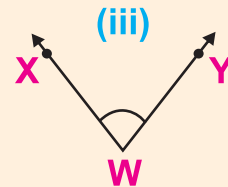
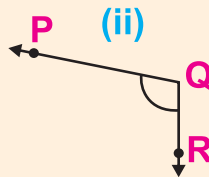
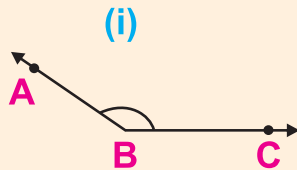
The common end point O is the vertex of angle AOB. \overrightarrow{OA} and \overrightarrow{OB} are arms of angle AOB.

The symbol for angle is \angle

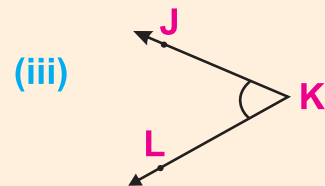
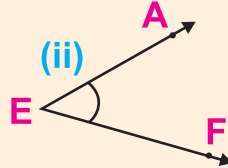
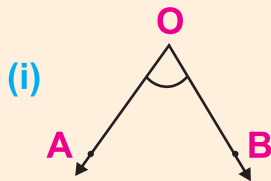
So angle AOB is written as $\angle AOB$ or $\angle BOA$

EXERCISE 6.6

1. Write the names of vertex and arms each of the following angles.



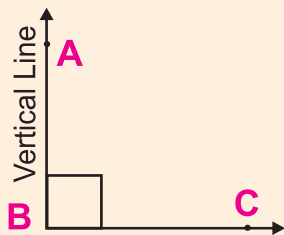
2. Write the following angles in symbols:



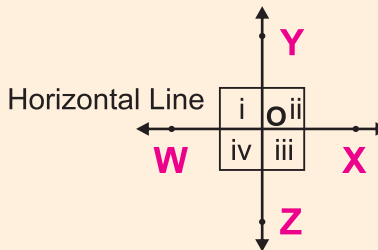
Recognize right angle through horizontal and vertical lines

Look at the following pairs of horizontal and vertical lines.

When vertical and horizontal lines meet at a point they form a right angle. In figure (i) $\angle ABC$ is a right angle.



Horizontal Line
Fig (i)



Vertical Line
Fig (ii)

In figure (ii), the pairs of horizontal and vertical lines intersect each other at a point O and form four right angles. Hence

- (i) $\angle WOY$ is a right \angle (ii) $\angle XOY$ is a right \angle
 (iii) $\angle XOZ$ is a right \angle (iv) $\angle ZOW$ is a right \angle

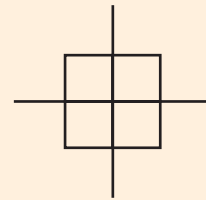


Activity 1

To make four right angles by folding a paper sheet.



- Step 1.** Take a piece of paper. Fold it into two halves and then into four quarters.
 - Step 2.** Draw lines on the creases of the paper.
 - Step 3.** Name horizontal line as \overleftrightarrow{CD} and vertical line as \overleftrightarrow{AB} . They intersect each other at point O.
 - Step 4.** They form four right angles.
 - Step 5.** We can write their names symbolically. $\angle AOC$, $\angle COB$, $\angle BOD$ and $\angle DOA$.
- Note:** We can draw square in each right angle at its vertex.



EXERCISE 6.7

1. Look at the following angles and tick (✓) all those that are right angles.

(i)

(ii)

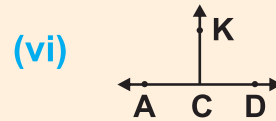
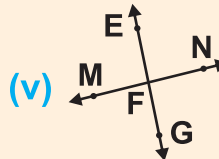
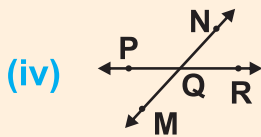
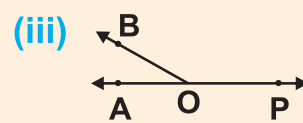
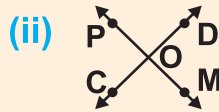
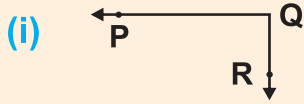
(iii)

(iv)

(v)

(vi)

2. Which of the following figures show right angles?



Demonstrate acute and obtuse angles via the right angle

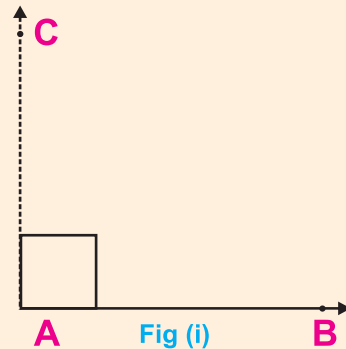


Activity 1 Draw a right angle.

Step 1. Draw a horizontal line \overrightarrow{AB} .

Step 2. At point A, draw a dotted vertical line \overrightarrow{AC} .

Step 3. So $\angle BAC$ is a right angle. See fig (i)



Activity 2 Draw an acute angle.

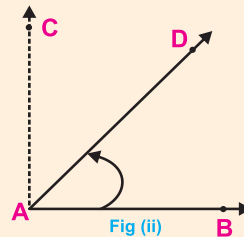
Step 1. Draw a third line \overrightarrow{AD} between \overrightarrow{AC} and \overrightarrow{AB} as shown in fig (ii).

Step 2. We have another angle $\angle BAD$ (or $\angle DAB$).

Step 3. $\angle BAD$ is smaller than $\angle BAC$ because the curved arrow (↪) is stopped by arm \overrightarrow{AD} before reaching the arm \overrightarrow{AC} .

Step 4. Thus $\angle BAD$ is less than a right angle $\angle BAC$.

Step 5. Hence $\angle BAD$ is the required acute angle.



An angle which is less than a right angle is called an acute angle.

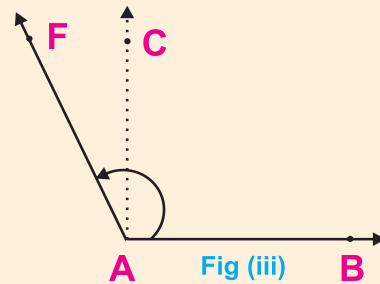

Activity 3 Draw an obtuse angle.

Step 1. Draw a line \overrightarrow{AF} outside the right angle BAC to get another angle BAF , as shown in figure (iii).

Step 2. $\angle BAF$ is greater than $\angle BAC$ because the curved arrow goes beyond arm \overrightarrow{AC} to reach the arm \overrightarrow{AF} .

Step 3. Thus $\angle BAF$ is greater than a right angle.

Step 4. Hence $\angle BAF$ is an obtuse angle.



An angle which is greater than 90° but less than 180° , is called an obtuse angle.

EXERCISE 6.8

1. Look at the previous figures (i), (ii) and (iii) and complete the following sentences.

- (i) $\angle BAC$ is _____ angle. (ii) $\angle BAD$ is _____ angle.
 (iii) $\angle BAF$ is _____ angle. (iv) $\angle DAB$ is _____ angle.
 (v) $\angle FAB$ is _____ angle. (vi) $\angle CAB$ is _____ angle.

2. Draw the following angles.

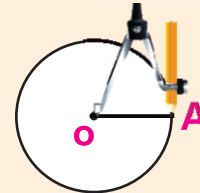
- (i) $\angle ABC$ (obtuse angle)
 (ii) $\angle PQR$ (acute angle) (iii) $\angle ABC$ (right angle)
 (iv) $\angle DEF$ (obtuse angle) (v) $\angle WXY$ (right angle)

Recognize the standard unit for measuring angles as one degree (1°) which is defined as $\frac{1}{360}$ of a complete revolution

**Activity**

Define standard unit for measuring angle.

Step 1. Take O as centre and radius \overline{OA} , with a pair of compasses. Draw a complete revolution, it describes a circle.



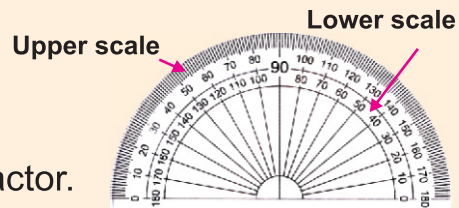
Step 2. Divide this circle in 360 equal parts. Each equal part is called a degree. It is denoted by " 1° ".

Step 3. The number of degrees in a complete turn are 360° .

Step 4. A "degree" is $\frac{1}{360}$ th part of a complete revolution.

Measure angles using protractor

Protractor is used to measure angle from 0° to 180° . There are two scales of number marked on protractor.



The upper scale of protractor reads the measure of angle from left to right. The lower scale of protractor reads the measure of angle from right to left.

**Activity 1**

Measure the given acute angle $\angle PQR$

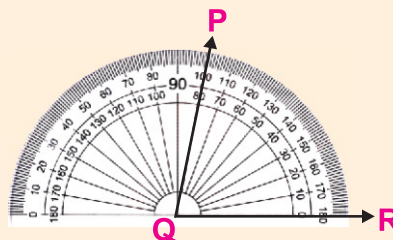
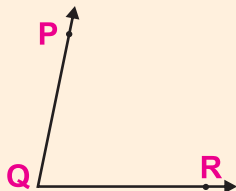
Step 1. Put the centre of the protractor on the vertex Q of $\angle PQR$.

Step 2. Base line coincides with one arm \overrightarrow{QR} .

Step 3. Start reading from 0° in lower scale from right to left.

Step 4. Mark at a point on which arm \overrightarrow{QP} lies.

Step 5. Thus $m \angle PQR = 80^\circ$





Activity 2 Measure the given obtuse angle $\angle DEF$.

Step 1. Put the centre of the protractor on the vertex E of $\angle DEF$.

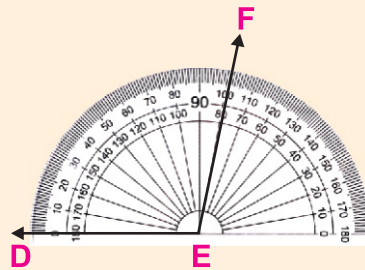
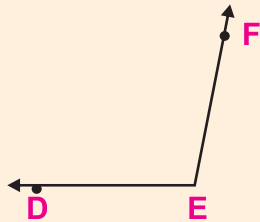
Step 2. The base line coincides with one arm \overrightarrow{ED} .

Step 3. Start reading from 0 in upper row from left to right.

Step 4. Mark at a point on which arm \overrightarrow{EF} lies.

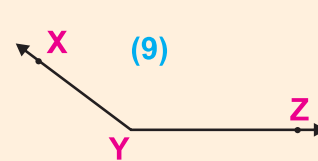
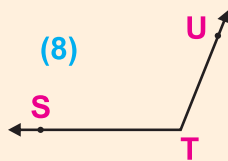
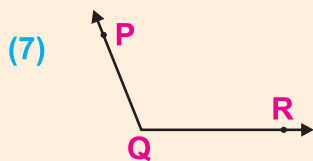
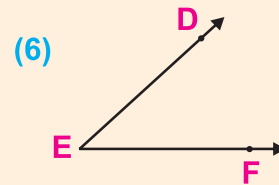
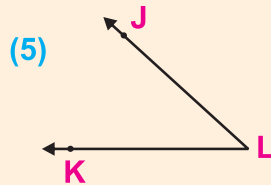
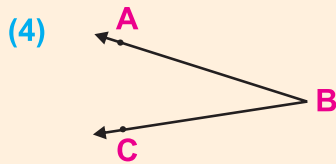
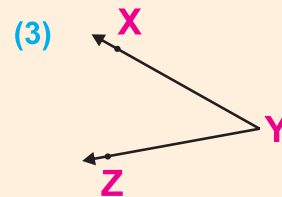
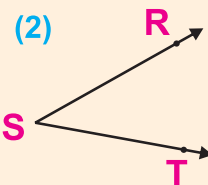
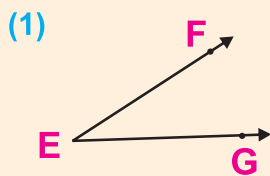
Step 5. The point F crosses the number 100.

Thus $m \angle DEF = 100^\circ$



EXERCISE 6.9

Using the protractor, measure the following angles.



Draw a right angle using protractor



Activity Draw an angle BAC of 90°

Step 1. Draw \overrightarrow{AB} horizontally.

Step 2. Place protractor on \overrightarrow{AB} such that the middle of its bottom line is exactly on A.

Step 3. Find the 90° mark on the protractor. Take a point against it, and name it C, fig (i).

Step 4. Join C to A.

Step 5. We get $\angle BAC$ as shown in fig (ii).

Step 6. It is the required angle of 90° known as right angle.

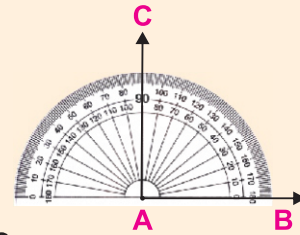


Fig (i)

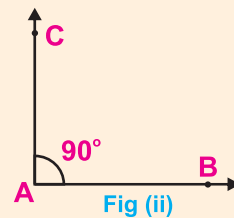


Fig (ii)

Draw acute and obtuse angles of different measures using protractor



Activity 1 Draw an acute angle of 60°

Step 1. Draw \overrightarrow{OB} .

Step 2. Place the centre of the protractor at point O, one end of \overrightarrow{OB} .

Step 3. Adjust the protractor so that the line of the 0 (zero) mark on the right side coincides with \overrightarrow{OB} .

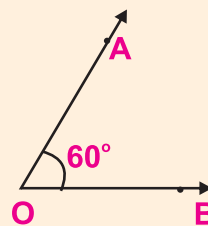
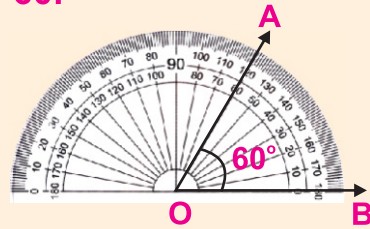
Step 4. Extend \overrightarrow{OB} if necessary.

Step 5. Make a fine point mark against the 60° mark on the protractor.

Step 6. Name this point A.

Step 7. Draw \overrightarrow{OA} and extend it.

Step 8. AOB is the required acute angle measuring 60°



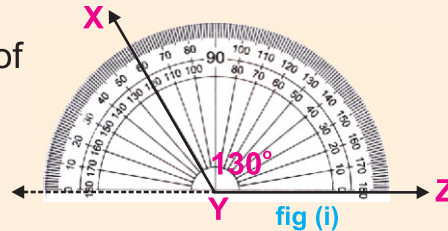


Activity 2 Draw an obtuse angle of 130°

Step 1. Draw a \vec{YZ} .

Step 2. We have to draw an angle of 130° at point Y.

Step 3. Place the centre of the protractor on the point Y.

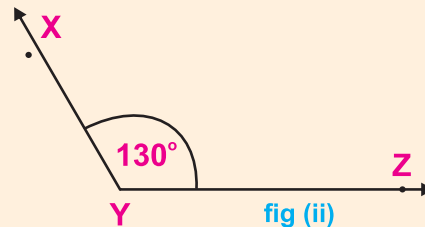


Step 4. Let 0 (zero) mark on the right side of the protractor be exactly on \vec{YZ} . (Extend \vec{YZ} if necessary).

Step 5. Find 130° mark on the protractor. Take a point against it and call it X; see fig (i).

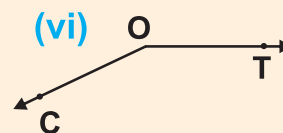
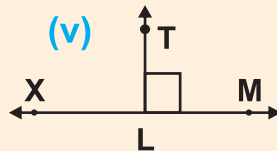
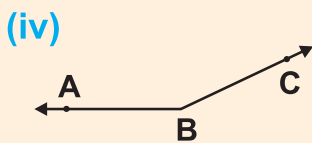
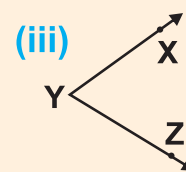
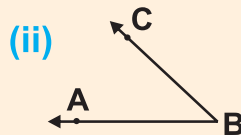
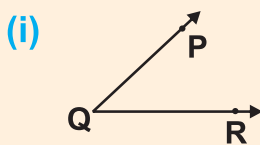
Step 6. Draw \vec{YX} and extend it.

Thus $\angle XYZ$ is the required angle of 130° ; see fig (ii).



EXERCISE 6.10

(1) Measure each of the following angles and then tell the type of the angle.



(2) Draw the following angles with the help of protractor.

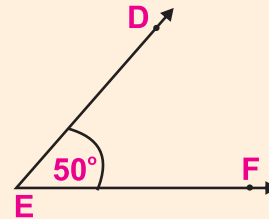
- | | | | | |
|-----------------|------------------|--------------------|------------------|----------------|
| (i) 10° | (ii) 40° | (iii) 20° | (iv) 60° | (v) 30° |
| (vi) 80° | (vii) 90° | (viii) 120° | (ix) 145° | (x) 45° |

Draw an angle (using protractor)

We have already learnt to draw an angle of any measure with the help of protractor. Also we have learnt to measure any given angle with the help of protractor.

(a) Draw an angle equal in measure to a given angle.**Steps of construction:**

Step 1. Measure the given $\angle DEF$ with the help of protractor. It is found that $m\angle DEF = 50^\circ$

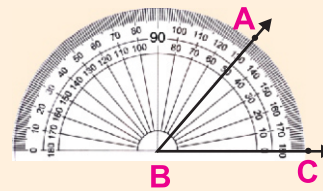


Step 2. We have to draw another angle say $\angle ABC$ such that

$$m\angle ABC = m\angle DEF = 50^\circ$$

Step 3. Draw \overrightarrow{BC} with initial point B.

Step 4. Place the centre of the protractor on B and adjust the base line of protractor to coincide with \overrightarrow{BC} .

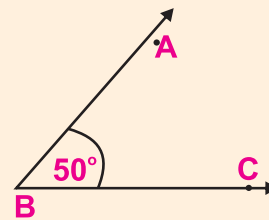


Step 5. Start from zero and read the lower scale of the protractor up to 50° .

Step 6. Mark a point A against 50° mark.

Step 7. Remove the protractor and draw \overrightarrow{BA} .

Thus $m\angle ABC = 50^\circ$. It is equal in measure to given $\angle DEF$.

**(b) Draw an angle twice the measure of a given angle.**

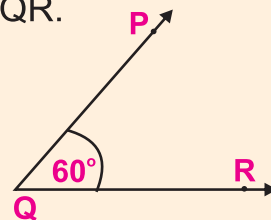
First of all we have to measure the given $\angle PQR$.

Let the measure of given angle is 60° .

Therefore we have to draw an angle of

measure $2 \times 60^\circ = 120^\circ$

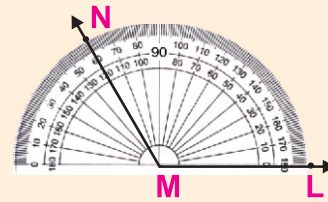
Say $m\angle LMN = 120^\circ$



Steps of construction:

Step 1. Draw \overrightarrow{ML} with M as initial point.

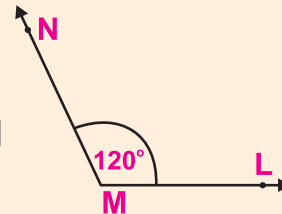
Step 2. Place the centre of the protractor on M and adjust the base line of protractor to coincide with \overrightarrow{ML} .



Step 3. Start from zero and read the lower scale on the protractor up to 120° .

Step 4. Mark a point N against 120° mark.

Step 5. Remove the protractor and draw \overrightarrow{MN} .
Thus we get $\angle LMN$ such that
 $m\angle LMN = 2 \times (m\angle PQR) = 120^\circ$

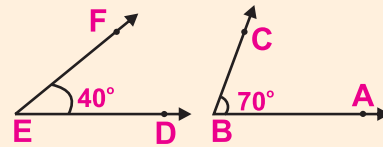
**(c) Draw an angle equal in measure the sum of two angles.**

First of all we have to measure the given angles, $\angle ABC$ and $\angle DEF$ with the help of protractor.

Let $m\angle DEF = 40^\circ$ and $m\angle ABC = 70^\circ$

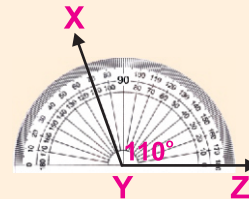
The sum of two given angles is $40^\circ + 70^\circ = 110^\circ$

Now we have to draw $\angle XYZ$ such that $m\angle XYZ = 110^\circ$

**Steps of construction:**

Step 1. Take an initial point Y and draw \overrightarrow{YZ} .

Step 2. Place the centre of the protractor on Y and adjust the base line of protractor to coincide with \overrightarrow{YZ} .

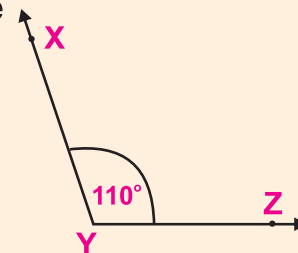


Step 3. Start from zero, read the lower scale of protractor up to 110° .

Step 4. Mark a point X against 110° .

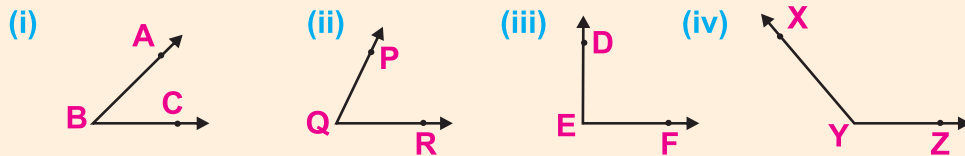
Step 5. Remove protractor and draw \overrightarrow{YX} .

Thus we get $\angle XYZ$ such that
 $m\angle XYZ = m\angle DEF + m\angle ABC = 110^\circ$

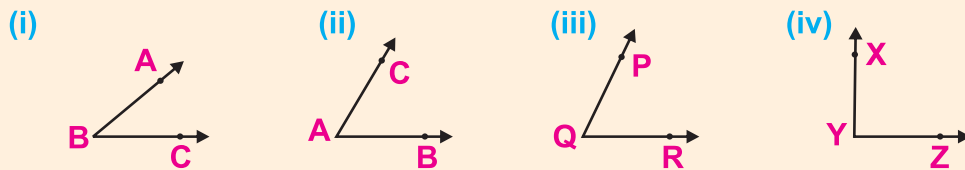


EXERCISE 6.11

- (1) Draw angles with the help of protractor equal in measure to the given angle.



- (2) Draw angles with the help of protractor twice the measure of the given angle.



- (3) Draw angles equal in measure to the sum of two angles. (with the help of protractor).



6.4 CIRCLE

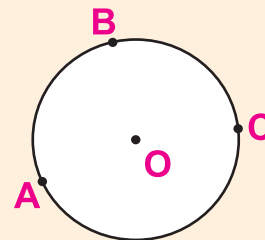
Look at the picture. It is the picture of a circle. There are three points A, B and C on the circle. Its centre is O. Points A, B and C are at the same distance from O.

Identify centre, radius, diameter and circumference of a circle

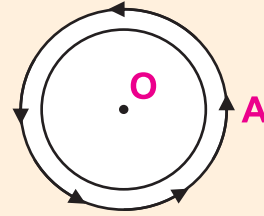
- (i) **Centre:** All the points of a circle are at the same distance from a fixed point O, called its centre.

Example:

Point A, B and C are at the same distance from centre O.

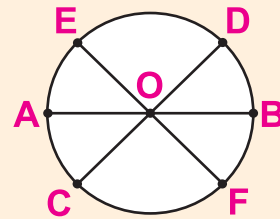


- (ii) **Circumference:** The length of the circle is called the **circumference** of the circle. It is the distance that we cover by taking exactly one complete round of the circle.

**Example:**

Lets start at point A and again reach the same point A after completing one revolution. This distance is the circumference of circle.

- (iii) **Diameter:** The line segment passing through the centre of the circle and joining the circle at two different points is called the **diameter**.

**Example:**

\overline{AB} , \overline{CD} , \overline{EF} etc are the diameters.

- (iv) **Radius:** Radius is half of the length of the diameter of a circle.

Remember:
$$\text{Radius} = \frac{\text{length of the diameter}}{2}$$

Draw a circle of given radius using compasses and straightedge/ruler

**Activity 1**

Draw a circle using compass whose radius is 2 cm.

Step 1. Draw \overline{OA} , 2 cm long.

Step 2. Take O as centre and radius \overline{OA} , draw arc of one complete revolution. [it is shown in the fig (i)]

Step 3. This is the required circle of radius 2 cm. [fig(ii)]

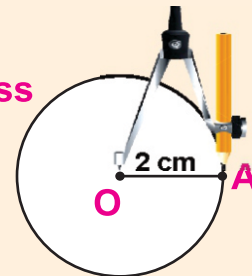


Fig (i)

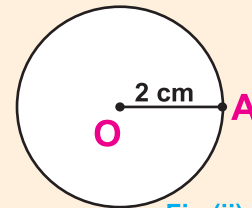


Fig (ii)

Teacher's Note

Teacher may draw circle on black board and explain all these terms involving with students.

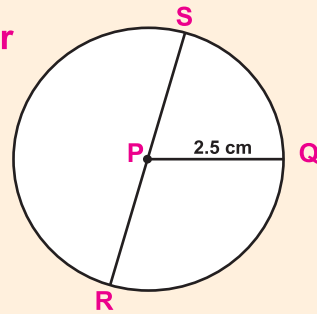
**Activity 2**

Draw a circle using ruler whose radius is 2.5 cm.

$$m \overline{PQ} = \text{radius} = 2.5 \text{ cm}$$

$$m \overline{PQ} = 2.5 \text{ cm}$$

$$\begin{aligned} m \overline{SR} &= \text{diameter} = \text{twice the radius} \\ &= 2 \times 2.5 = 5.0 \text{ cm} = 5 \text{ cm} \end{aligned}$$

**EXERCISE 6.12**

By using compass and ruler draw the following circles if their radii are:

(1) 3.2 cm

(2) 4.1 cm

(3) 4.4 cm

(4) 5.5 cm

(5) 6 cm

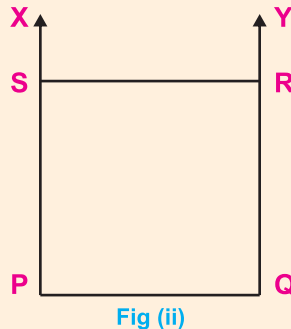
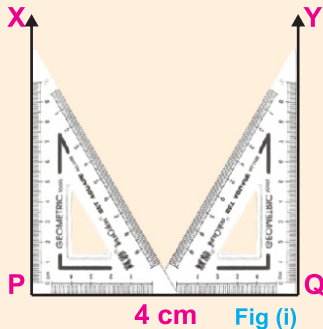
(6) 4.8 cm

6.5 QUADRILATERALS

Construct squares and rectangles with sides of given measure using protractor, set squares and straightedge/ruler.

**Activity 1**

Draw a square with side 4 cm using set square.



Steps of construction:

Step 1. Draw \overline{PQ} , 4 cm long.

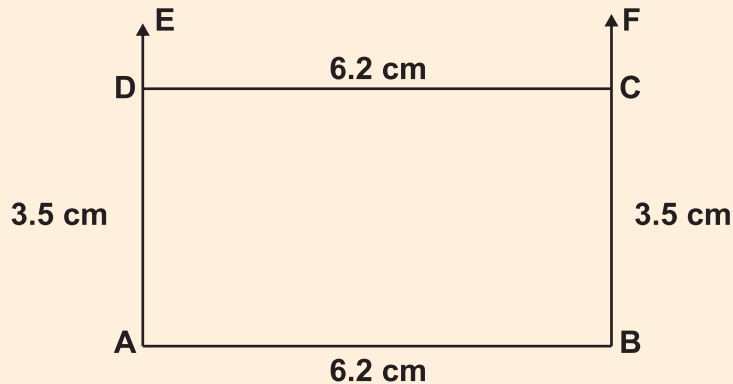
Step 2. At points P and Q, draw right angles $\angle QPX$ and $\angle PQY$ using set square. [see fig (i)]

Step 3. From \overrightarrow{PX} , measure $\overline{PS} = 4 \text{ cm}$ and from \overrightarrow{QY} , measure $\overline{QR} = 4 \text{ cm}$. Join R and S. So, PQRS is the required square [see fig (ii)].



Activity 2

To draw a rectangle with sides 6.2 cm and 3.5 cm using protractor and ruler.



Step 1. Draw \overline{AB} , 6.2 cm long.

Step 2. At points A and B draw right angles $\angle BAE$ and $\angle ABF$ using protractor.

Step 3. From \overrightarrow{AE} , measure $\overline{AD} = 3.5$ cm and from \overrightarrow{BF} , measure $\overline{BC} = 3.5$ cm.

Step 4. Join C and D. So, ABCD is the required rectangle.

EXERCISE 6.13

1. Draw squares with sides of the following lengths. Using protractor or set square.

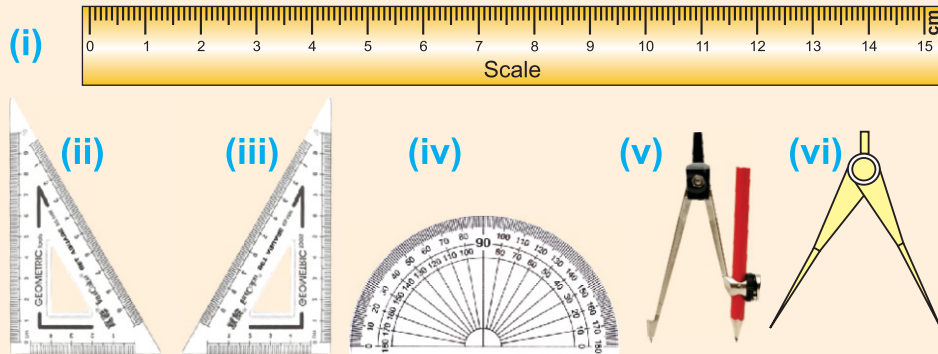
- | | | | |
|------------|-------------|--------------|---------------|
| (i) 6.5 cm | (ii) 4.9 cm | (iii) 5.8 cm | (iv) 6.3 cm |
| (v) 7.3 cm | (vi) 4.1 cm | (vii) 8.7 cm | (viii) 8.5 cm |

2. Draw rectangle with sides of the following lengths using protractor or set square.

- | | |
|--------------------------|------------------------|
| (i) 8 cm and 7 cm | (ii) 9.5 cm and 4.7 cm |
| (iii) 12.3 cm and 5.2 cm | (iv) 9.6 cm and 3.7 cm |
| (v) 6.1 cm and 2.9 cm | (vi) 2.9 cm and 7.6 cm |

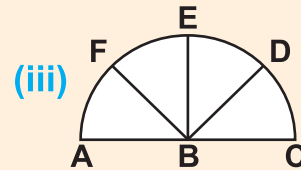
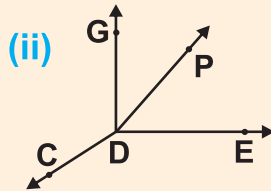
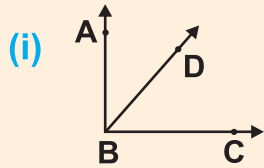
REVIEW EXERCISE – 6

1. Write down the names of the following instruments.

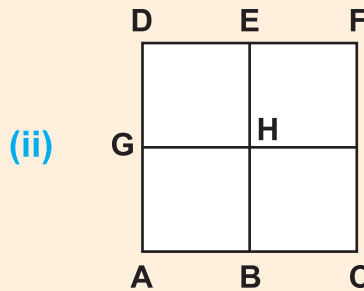
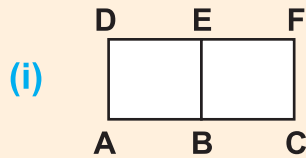


2. If you have to draw a thin line segment, which grade of pencil you will use.
3. Measure the length and width of the following objects with ruler in millimetres.
- (i) A post card (ii) Cover of Maths-book
(iii) Geometry Box
4. Draw a pair of :
- (a) Parallel and non-parallel lines.
(b) Horizontal and vertical lines.
5. Draw a curved line and measure its length by using thread and ruler.
6. Draw line which passes through a given point and is parallel to a given line using set square.
7. Draw the figure to go with each sentence:
- (i) \overleftrightarrow{PQ} is parallel to \overleftrightarrow{RS} .
- (ii) \overleftrightarrow{UV} intersects \overleftrightarrow{PQ} at point A.
- (iii) \overleftrightarrow{UV} intersects \overleftrightarrow{RS} at point B.

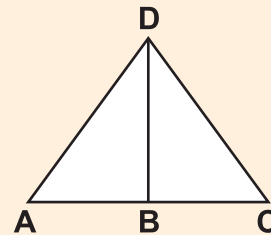
8. List some objects in your class room that represent right angles.
9. How many angles can you find in the figure?
Name and mention the type of the angle.



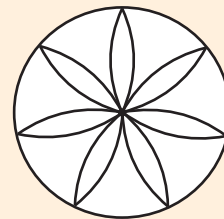
10. Count the number of squares in the figure. Also name them.



11. How many triangles in the figure?



12. Get a compass and practice drawing same circles. Make Some designs of your own.



13. (i) Draw a circle with 25 mm radius.
(ii) Name its centre, radius, diameter and circumference.
(iii) Measure its circumference with thread and ruler.

7.1 BAR GRAPH.

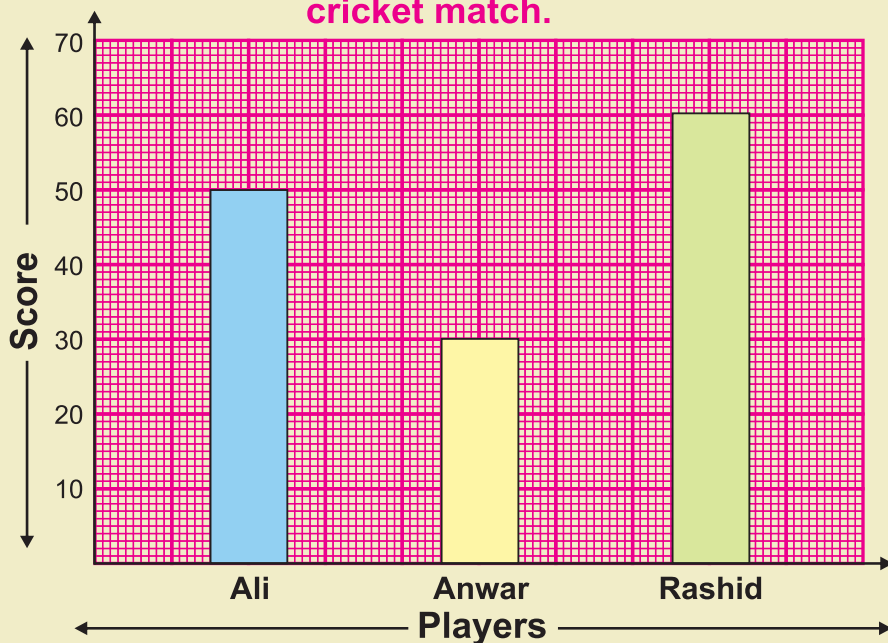
Read and interpret simple bar graphs given in horizontal and vertical form.

In bar graph we draw rectangular strips, horizontally or vertically with equal spacing between them. Each bar represents only one quantity.



Activity

Following is the picture of a bar graph showing the score of three players in a cricket match.



From the above bar graph. We can understand the following.

The number of runs made by Ali are **50**.

The number of runs made by Anwar are _____.

The number of runs made by Rashid _____.

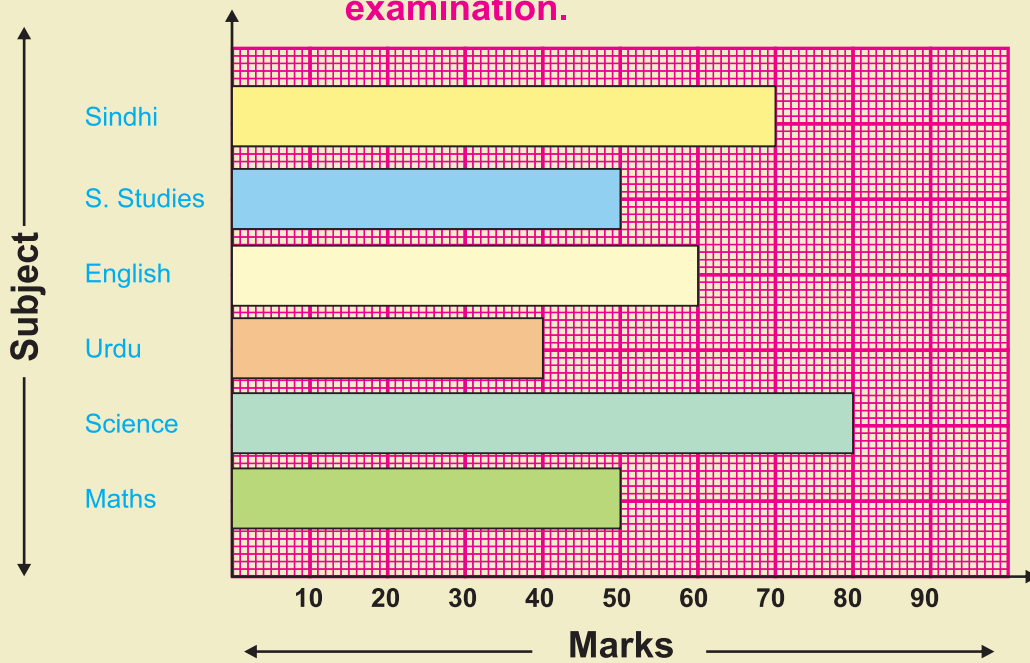
Whose runs are the highest _____?

Whose runs are the least _____?



Activity

Read the bar graph showing the marks secured by Saima in her final examination.



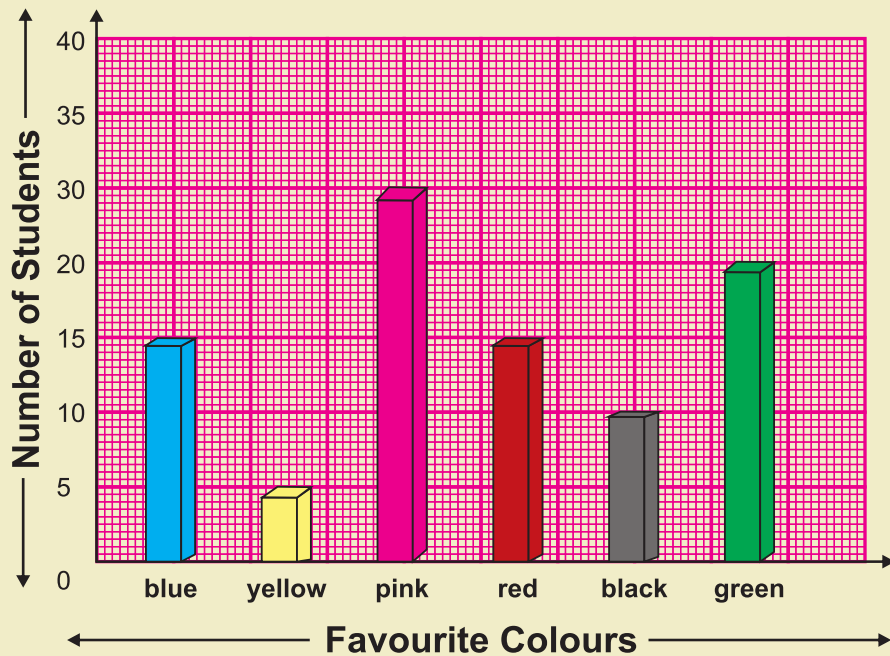
Fill in the following boxes:

- 1 She secured highest marks in:
- 2 She secured lowest marks in:
- 3 In how many subjects she appeared?
- 4 In how many subjects she secured equal marks?
- 5 In which subject she secured more than 60 marks?
- 6 What was the total marks of Saima?

EXERCISE 7.1

1 Look at this Bar graph.

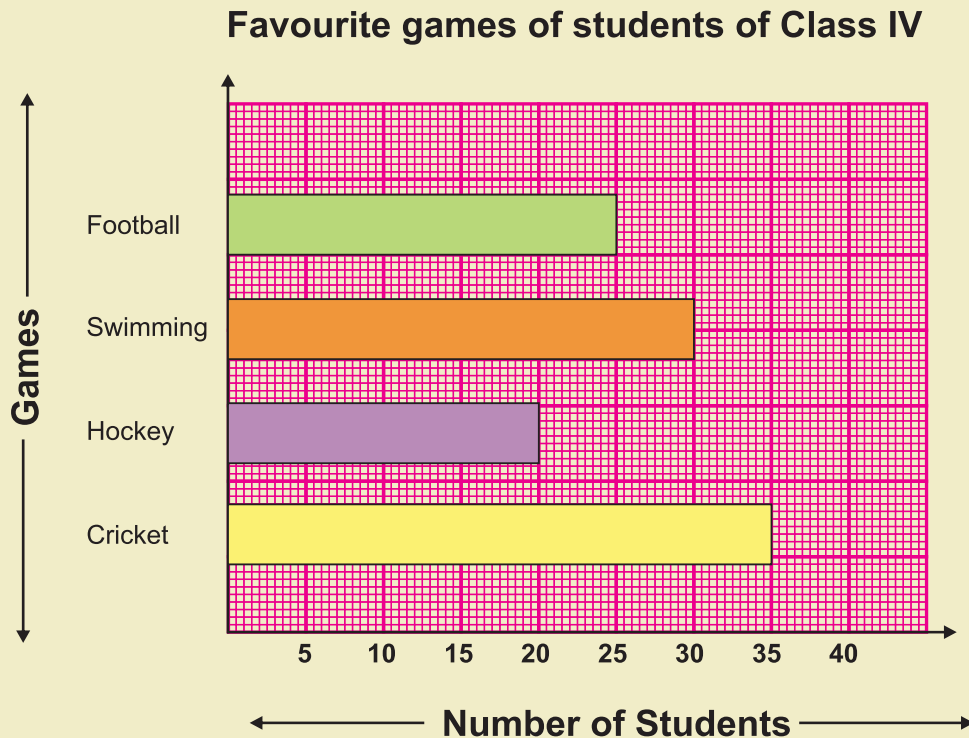
Survey of favourite colours of students of class IV



Answer the following questions:

- (i) How many students like yellow colour?
- (ii) Which colour is liked most?
- (iii) Which colour is liked least?
- (iv) How many students like green colour?
- (v) How many students like red colour?
- (vi) How many colours are included in this survey?
- (vii) How many students are included in this survey?

- 2 Read the following bar graph and answer the questions.



- (i) How many students like Hockey?
- (ii) Which game is liked most?
- (iii) How many students like Football?
- (iv) How many games liked by students?
- (v) Which game is liked least?
- (vi) How many students like cricket?
- (vii) How many total students involved in games?

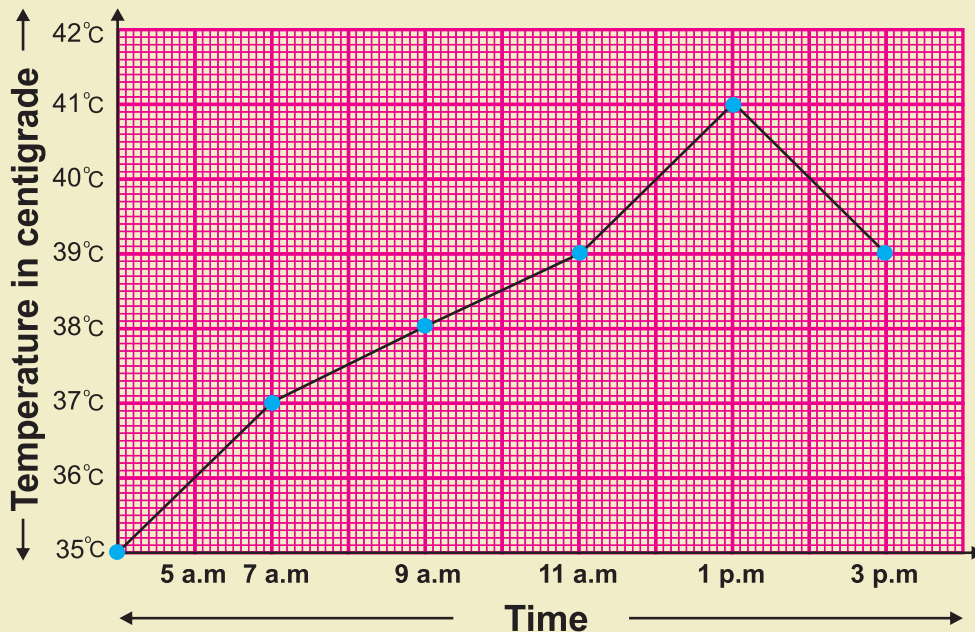
7.2 LINE GRAPH:

Read and interpret line graph

In line graph the information is represented in the form of points. These points are joined together by line segments.



Activity Following is a line graph representing temperature of Jacobabad town at various time of the day. (Time is on horizontal axis and temperature is shown on vertical axis).



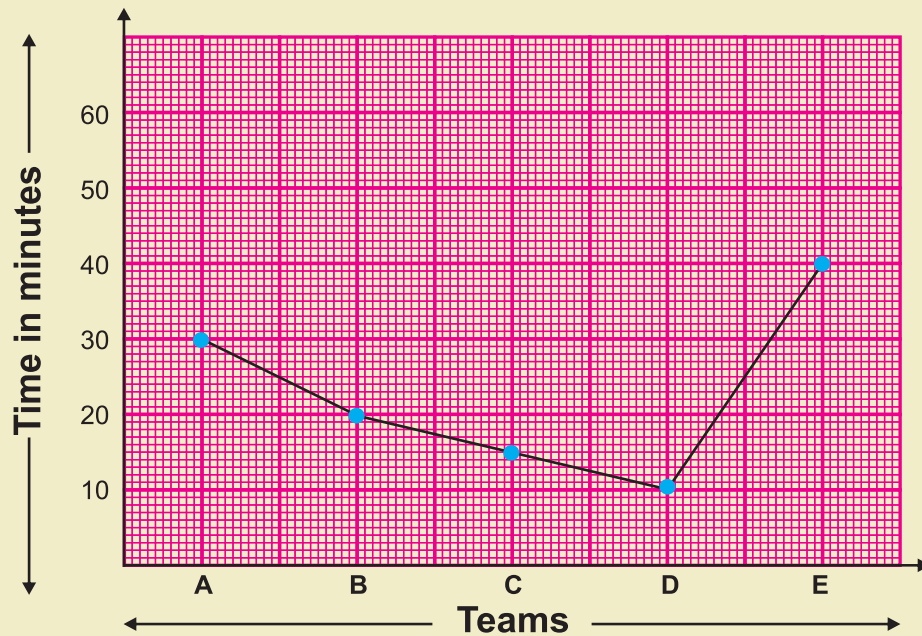
Look at the graph and answer the following questions.

- 1 What was the temperature at 9 a.m.?
- 2 At what time the temperature was the lowest?
- 3 Were the temperatures same at 7 a.m. and 3 p.m.?
- 4 What was the temperature at 1 p.m.?
- 5 What was the lowest temperature?

EXERCISE 7.2

- 1 This line graph shows the time in minutes taken by each of the five teams to complete a task.

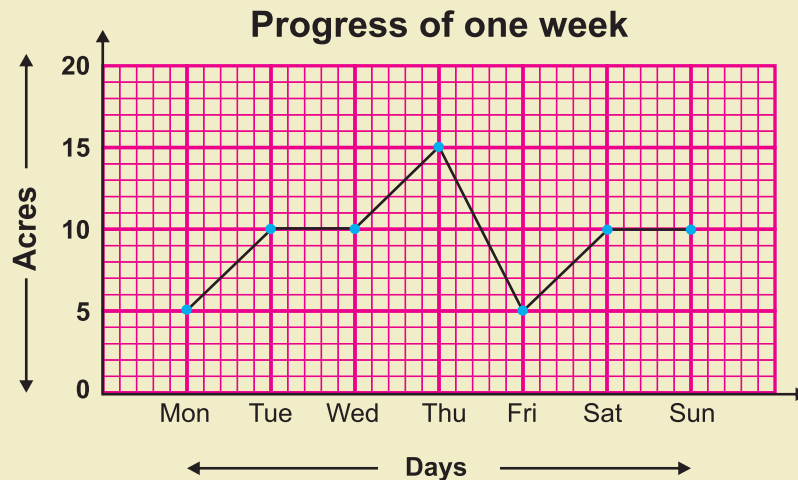
Time Table by Teams to complete the task



Now answer these questions.

- (i) Which team completed the work in the shortest time?
- (ii) Which team took the longest time?
- (iii) Which teams took the same length of time?
- (iv) What was the shortest time?
- (v) What was the longest time?
- (vi) How long did team C take to complete the task?

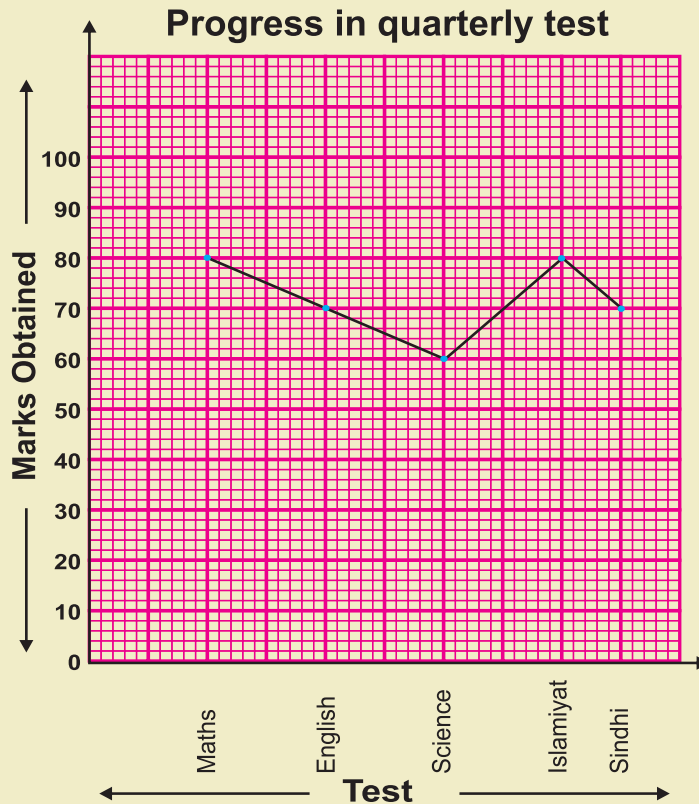
- 2 A farmer took a tractor on rent to plough his fields. The progress of one week is shown by the following graph. Names of days are shown on horizontal axis and acres on vertical axis.



Look at the graph and answer the following questions:

- (i) On which day the tractor ploughed the maximum number of acres?
- (ii) How many acres of land were ploughed on Wednesday?
- (iii) For how many days the land was ploughed?
- (iv) What was his progress on Tuesday?
- (v) On which days the progress was minimum?
- (vi) How many acres of fields were ploughed during the whole week?
- (vii) Give the separate output for Thursday, Friday and Saturday? ,
- (viii) On which days the output was same?

- 3 Samina's progress in quarterly tests is shown in the graph. The names of subjects are shown on horizontal axis. The number of marks are shown on vertical axis.

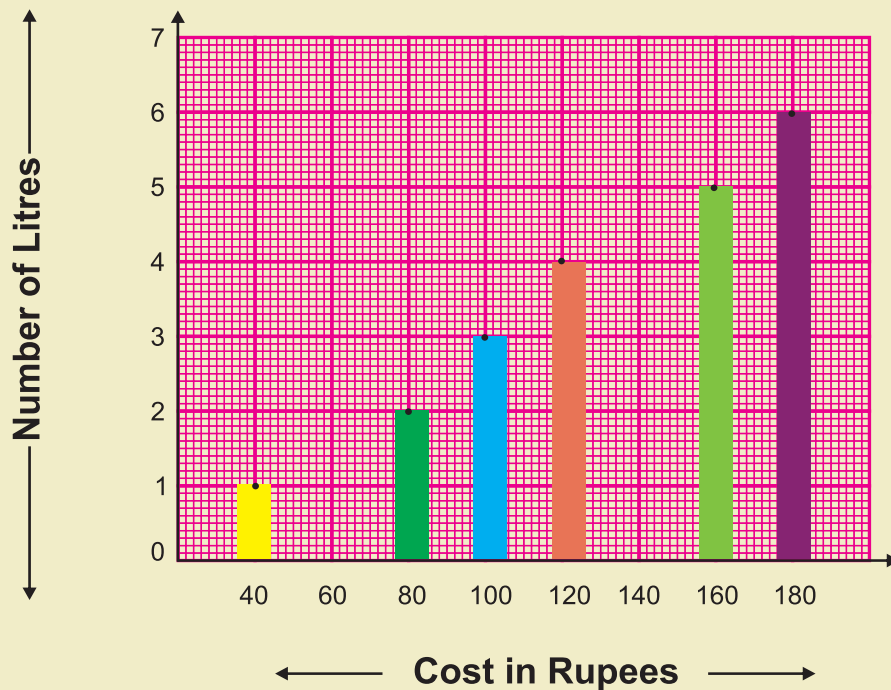


Look at the graph and answer the following questions:

- (i) In which subject(s) Samina secured the highest marks?
- (ii) What were her total marks obtained?
- (iii) How many marks did she get in English?
- (iv) How many marks did she get in Maths?
- (v) In which subject did she get the lowest marks?
- (vi) How many marks did she get in Sindhi?

REVIEW EXERCISE – 7

(1) The given bar graph shows the cost of mango squash.



Study the graph and answer these questions.

(i) What is the cost of 2 litres of mango squash?

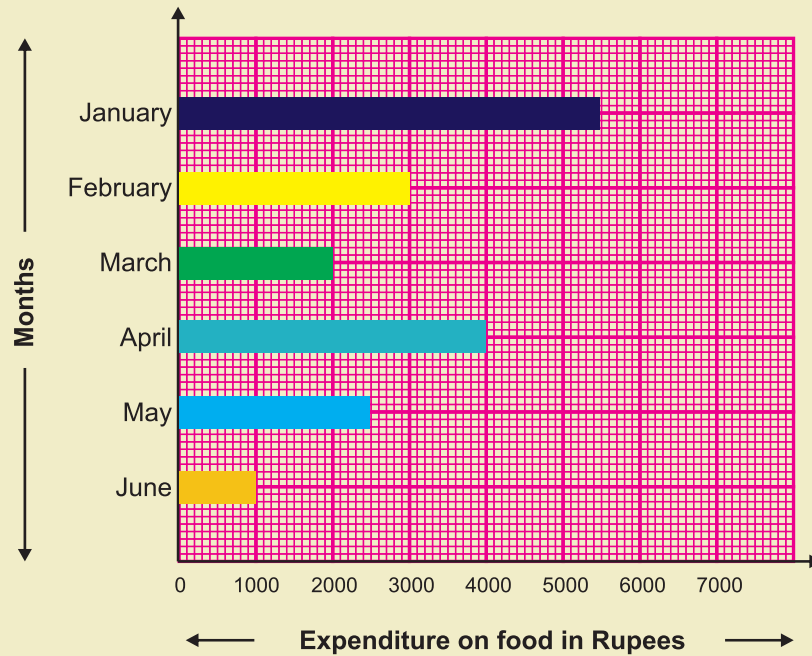
(ii) What is the cost of 4 litres of mango squash?

(iii) If we have six notes of Rs 20, can we buy 6 litres of mango squash?

(iv) How much change, we will have from Rs 100, when we buy 2 litres of mango squash?

(v) How much litres of squash can we buy from Rs 180

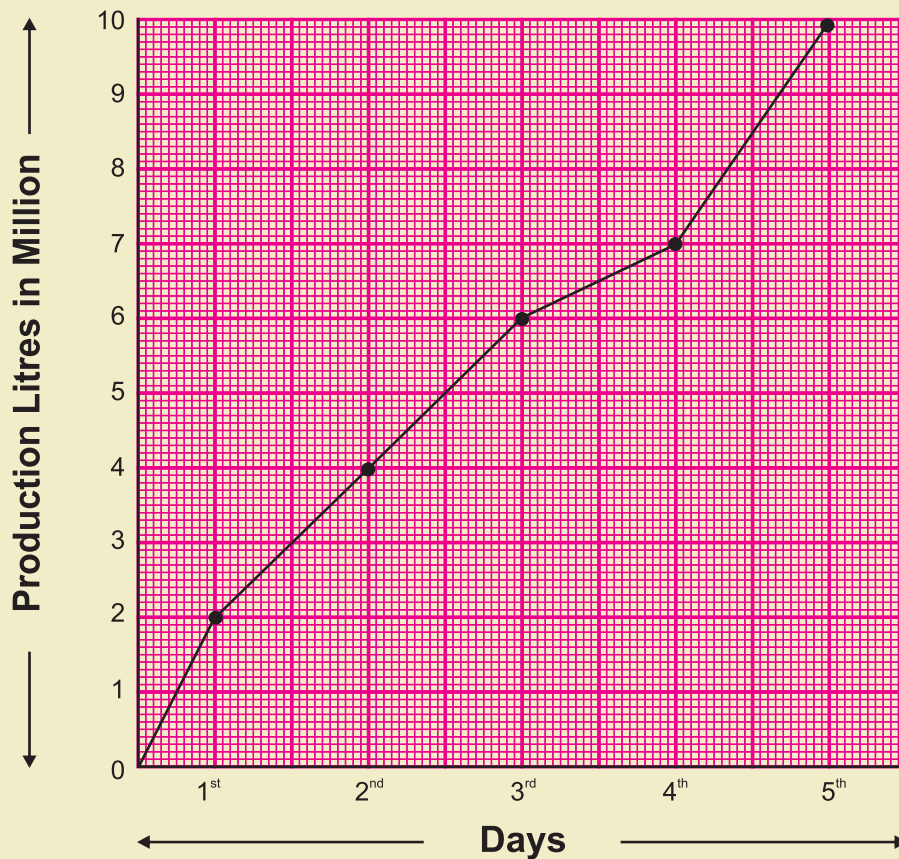
- (2) Read the following bar graph of Rashid's family about the expenditure on food for six months.



Look at the graph and answer the following questions.

- (i) How much amount is spent on food during the month of February?
- (ii) How much amount is spent on food during month of April?
- (iii) In which month the expenditure spent was the lowest?
- (iv) In which month the expenditure spent was the highest?
- (v) What are the total expenditures spent from January to June?
- (vi) What was the difference in expenditure spent for April and May.

- (3) The line graph shows the production of a oil plant over a period of 5 days.



Look at the line graph and answer these questions.

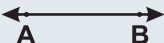
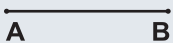
- (i) What was the production of the plant on the 1st day?
- (ii) What was its production on the 3rd day?
- (iii) What production was made between the 2nd and 3rd day?
- (iv) How much production was made between the 2nd and 5th days?
- (v) On which day the plant growth production was the highest?
- (vi) How many times the plant production was measured?

GLOSSARY

Addition:	Symbol +; the process of finding sum of two numbers/quantities.
Associative property of addition:	When any three numbers or fractions added in any order, their sum is always the same.
Associative property of multiplication:	When any three numbers or fractions are multiplied in any order, their product is always the same.
Angle:	The amount of turning between two arms about a common point.
Arc:	A part of the circumference of a circle.
Acute angle:	An angle of measure greater than 0° and less than 90° .
Acute angle triangle:	A triangle which has three acute angles.
Capacity:	The amount of liquid a container can hold.
Centimetre:	A unit of length, 100 centimetres (cm) = 1 metre (m)
Circle:	The set of all the points which are equidistant from a fixed point.
Commutative property of Multiplication:	Any two numbers or fractions when multiplied to each other in any order, their product is always same.
Commutative property of addition:	The property that when any two numbers (fractions) are added in any order their sum is always same.
Common multiples:	The numbers which are common in multiples of two or more numbers.
Composite number:	A natural number which has more than two factors.
Division:	Process of finding the quotient of two numbers/quantities. (The repeated subtraction).
Denominator:	Lower part of the fraction.
Diametre:	A line segment that divides the circle into two equal halves



GLOSSARY

Divisibility:	When a number is divided exactly by another number, (the remainder is zero).
Dividend:	A number is to be divided by another number.
Divisor:	A number by which another number is to be divided.
Decimal fraction:	A fraction whose denominator is a power of ten and whose numerator is expressed by figures placed to the right of a decimal point.
Even numbers:	A number that can be divided into two equal groups. Even numbers end in 2,4,6,8 and 0 regardless of how many digits they have.
Edge:	The outside limit of an object, area, or surface.
Equivalent fraction:	Fractions with different numerators and denominators that represent the same value.
Fraction:	Part of a whole.
Factors:	Factors are whole numbers that are multiplied together to produce another number.
Factorization:	a method of writing numbers as the product of their factors or divisors.
Gram:	a metric unit of mass equal to one thousandth of a kilogram.
Graph:	A pictorial representation of data.
GCD:	Greatest Common Divisor.
Hours:	A unit of time 1 hour = 60 minutes
HCF:	Highest Common Factor.
Improper fraction:	A fraction whose numerator is greater than or equal to denominator.
Kilogram:	A unit of mass. 1 kilogram (kg) = 1000 grams (g)
Litre:	Unit of volume/capacity 1 litre (l) = 1000 millilitres (ml)
Line:	A line of points that extends infinitely in two directions 
Line segment:	A line with two definite end points 

GLOSSARY

Lunar Calendar:	(Hijrah Qamri Calendar) Islamic Calendar in a solar year.
L.C.M	Lowest Common Multiple.
Like fractions:	Fractions having same denominator.
Multiplication:	The process of finding product of two numbers/quantities (Repeated Addition).
Mass:	Mass is commonly measured by how much something weighs.
Millilitre:	Thousandth part of a litre.
Millimetre:	Thousandths part of a metre.
Minute:	A unit of time. 1 minute = 60 seconds
Month:	A unit of time. 1 month = 30 days
Million:	The smallest seven digit number i.e. 1,000,000
Mixed number:	a number consisting of a whole number and a proper fraction.
Numerator:	Upper part of a fraction.
Obtuse angle:	An angle of measure greater than 90° and less than 180° .
Obtuse angled triangle:	A triangle with one obtuse angle and two acute angles.
Place value:	Value of a digit according to its position in a number
Proper fraction:	a fraction that is less than one, with the numerator is less than the denominator.
Paisa:	Unit of Pakistani currency.
Point:	A point is a location. It has no size i.e. no width, no length and no depth. It is shown by a dot.
Prime factorisation	A factorization in which every factor is a prime number
Protector:	An instrument for measuring angles.
Quadrilateral:	A four sided closed figure.
Quotient:	A result obtained by dividing one quantity by another. The number shows how many times the divisor has been repeatedly subtracted.

GLOSSARY

Remainder:	The number left over when one integer is divided by another.
Ray:	An arrow mark on one end point of a line segment  \overrightarrow{AB}
Rectangle:	A quadrilateral whose opposite sides are equal and have four right angles.
Radius:	The distance from centre to any point on the circumference of circle.
Rupee:	Unit of Pakistani currency.
Ruler:	A straight edge instrument used to measure distances.
Right angle:	An angle of measure 90° .
Right triangle:	A triangle in which one angle is of right angle.
Symbol:	A sign used to represent an operation, element or relation.
Square:	A quadrilateral with four equal sides and four right angles.
Subtraction:	The process of taking one number or amount away from another
Second:	Unit of time, $1 \text{ second} = \frac{1}{60} \text{ minute}$.
Solar Calendar:	In this calendar, the dates indicates the position of earth around the sun (365 days in a year).
Scalene triangle:	A triangle whose all sides and angles are of different measure.
Triangle:	A three sided closed geometrical figure.
Unlike fractions:	The fractions with different denominators.
Unit fraction:	A proper fraction whose numerator is equal to 1.
Vertex:	An angular point of any shape.
Week:	A unit of time. 1 week = 7 days
Year:	A unit of time. 1 year = 365 days

ANSWERS

EXERCISE 1.1

- (1) (i) 4,692 (ii) 69,407 (iii) 456,926 (iv) 700,000
(v) 902,042 (vi) 729,006 (vii) 902,042 (viii) 729,006
- (2) (i) Two thousand five hundred sixty one
(ii) Thirty four thousand five hundred sixty one
(iii) Fifty six thousand eighty one (iv) Ninety two thousand
(v) Two hundred forty five thousand six hundred twelve
(vi) Three hundred forty nine thousand six hundred fifty only

EXERCISE 1.2

- (1) (i) The place value of 2 is 2 million = 2,000,000
(ii) The place value of 8 is 8 million = 8,000,000
(iii) The place value of 1 is 1 hundred million = 100,000,000
(iv) The place value of 9 is 9 hundred thousand = 900,000
(v) 5 million = 5,000,000, (vi) 9 million = 9,000,000,
2 hundred = 200 1 thousand = 1000
(vii) 9 hundred thousand = 900,000, (viii) 7 ten million = 70,000,000,
8 thousand = 8000 6 million = 6,000,000
- (2) (i) 9 millions = 9,000,000
2 hundred thousands = 200,000
3 ten thousands = 30,000
4 thousands = 4,000
5 hundreds = 500
1 ten = 10
3 ones = 3
- (ii) 5 ten millions = 50,000,000
0 millions = 0,000,000
1 hundred thousands = 100,000
2 ten thousands = 20,000
0 thousand = 0,000
3 hundreds = 300
0 tens = 00
6 ones = 6
- (iii) 3 millions = 3,000,000
5 hundred thousands = 500,000
6 ten thousands = 60,000
7 thousands = 7,000
8 hundreds = 800
9 tens = 90
9 ones = 9
- (iv) 3 ten millions = 30,000,000
6 millions = 6,000,000
5 hundred thousands = 500,000
6 ten thousands = 60,000
4 thousands = 4000
3 hundreds = 300
9 tens = 90
6 ones = 6

A N S W E R S

EXERCISE 1.3

1.
 - (i) Two hundred forty one thousand and nine hundred thirty five.
 - (ii) Four million, three hundred twelve thousand and six hundred eighty seven.
 - (iii) Five million.
 - (iv) Twenty five million, one hundred thirty four thousand and five hundred sixty four.
 - (v) One hundred million.
 - (vi) Nine million, two hundred sixty four thousand and three hundred eighty seven.
 - (vii) Fifty millions one thousand.
 - (viii) Four million, one hundred nine thousand and two hundred.
 - (ix) Ninety nine million, nine hundred ninety thousand and ninety.
2.

(i) 2,900,068	(ii) 30,600,045	(iii) 100,000,000
(iv) 20,000,020	(v) 90,067,000	
4.

(i) 2,453,761,	2,454,761,	2,455,761
(ii) 7,000,600,	7,000,700,	7,000,800
(iii) 67,243,415,	67,253,415,	67,263,415

5.

Millions	Ten Millions	Hundred Millions
2,456,178	22,233,341	100,000,000
1,000,000	10,000,000	
2,561,000	20,001,010	

EXERCISE 1.4

1.

(i) >	(ii) <	(iii) <	(iv) >	(v) >
-------	--------	---------	--------	-------
2.
 - (i) **Ascending Order:**
3,076,005, 3,174,215, 3,741,512
Descending Order:
3,741,512, 3,174,215, 3,076,005
 - (ii) **Ascending Order:**
95,113,417, 95,123,415, 95,312,415
Descending Order:
95,312,415, 95,123,415, 95,113,417
 - (iii) **Ascending Order:**
52,111,222, 58,110,176, 59,178,215, 59,296,712
Descending Order:
59,296,712, 59,178,215, 58,110,176, 52,111,222

ANSWERS

(iv) **Ascending Order:**

13,100,219, 13,200,415, 14,111,920, 14,160,000

Descending Order:

14,160,000, 14,111,920, 13,200,415, 13,100,219

EXERCISE 1.5

1. (i) 66676 (ii) 142523 (iii) 405253 (iv) 551177
(v) 1393289 (vi) 1311571
2. (i) 114552 (ii) 317981 (iii) 1114946 (iv) 1533612
(v) 1138719 (vi) 1334462 (vii) 1145991 (viii) 1791275

EXERCISE 1.6

1. Rs 928117 2. 47842 students 3. Rs 1498800
4. 98682 people 5. 1590330 bicycles 6. 796310 Mangoes

EXERCISE 1.7

1. (i) 12111 (ii) 562051 (iii) 611620 (iv) 608819
(v) 161547 (vi) 46952
2. (i) 55555 (ii) 234122 (iii) 1 (iv) 162136
(v) 188750 (vi) 30283 (vii) 90100 (viii) 100000
(ix) 999 (x) 581110 (xi) 37908 (xii) 449008

EXERCISE 1.8

1. Rs 445550 2. 14001 students 3. Rs 272920
4. Rs 180002 5. 112 people 6. 46240 hens

EXERCISE 1.9

1. (i) 37536 (ii) 163870 (iii) 328328 (iv) 177156
(v) 28880618 (vi) 31791975 (vii) 20578868 (viii) 12087428
2. (i) 1168900 (ii) 2579880 (iii) 14212653 (iv) 4886040
(v) 8338834 (vi) 1518435 (vii) 17437041 (viii) 35974913

ANSWERS

EXERCISE 1.10

1. 702768 bottles 2. Rs 756000 3. Rs 11635000
4. 17316000 eggs 5. 40083820 litres 6. Rs 9268400

EXERCISE 1.11

- (1) (i) 562 (ii) 253 (iii) 561 (iv) 782
(v) 123 (vi) 452
- (2) (i) Quotient = 156 (ii) Quotient = 254 (iii) Quotient = 158
(iv) Quotient = 252 (v) Quotient = 245 (vi) Quotient = 369
- (3) Quotient = 145, Remainder = 0 (4) Quotient = 356, Remainder = 0
(5) Quotient = 2586, Remainder = 3 (6) Quotient = 617, Remainder = 12

EXERCISE 1.12

- (1) 896 suits (2) Rs. 586 (3) Rs. 225
(4) 281 kg (5) Rs. 123 (6) 156 crates

EXERCISE 1.13

- (1) 40 (2) 55 (3) 76 (4) 58
(5) 354 (6) 411 (7) 852 (8) 490
(9) 115 (10) 288 (11) 248 (12) 175
(13) 82 (14) 103 (15) 823 (16) 10358

EXERCISE 1.14

- (1) Rs 1378640 (2) Rs 205501 (3) 210320 chicken
(4) Rs 14310000 (5) 47028035 trees (6) Rs 125 (7) 14 food packs

REVIEW EXERCISE 1

- (1) (i) c (ii) b (iii) d
- (2) (i) Two million, four hundred twelve thousand and three hundred sixteen
(ii) Thirty six million, one hundred twenty three thousand and one hundred one
(iii) Six hundred thousand and two hundred sixteen
- (3) (i) 20,000,000 (ii) 100,000,000

ANSWERS

- (4) (i) 1128857 (ii) 1712258
(5) (i) 749007 (ii) 100091 (iii) 167778
(6) (i) 15984423 (ii) 2590560 (iii) 254 (iv) 159 (v) 74
(7) The amount left with Raheel = Rs 54560

EXERCISE 2.1

- (1) (i), (iii) and (v) (2) (i), (iii) and (v) (3) (i), (iii) and (v)
(4) (i), (iii) and (v) (5) (i), (iii) and (v)

EXERCISE 2.2

- (1) (ii), (vii) and (ix) (2) (i), (iv), (v), (viii), (ix) and (x)
(3) **Prime Numbers:** 41, 43, 47, 53, 59. Remaining are composite.
(4) 2, 3, 5, 7, 11, 13, 17, 19
(5) 12, 14, 15, 16, 18, 20, 21, 22, 24, 25, 26, 27, 28
(6) **Prime Numbers:** 23, 29, 31, 37

Composite numbers: 21, 22, 24, 25, 26, 27, 28, 30, 32, 33, 34, 35, 36, 38, 39.

EXERCISE 2.3

- (1) **Multiples of 4 are:** 4, 8, 12, 16, 20, 24, 28, 32, 36, 40, 44, 48
Multiples of 7 are: 7, 14, 21, 28, 35, 42, 49, 56, 63, 70, 77, 84
Multiples of 9 are: 9, 18, 27, 36, 45, 54, 63, 72, 81, 90, 99, 108
(2) **Factors of 16 are:** 1, 2, 4, 8, 16 **Factors of 26 are:** 1, 2, 13, 26
Factors of 45 are: 1, 3, 5, 9, 15, 45
(3) 14, 28, 35, 56, 84 (4) 24, 32, 40, 48, 56, 64, 72, 80, 88
(5) Factors of 50 are: 1, 2, 5, 10, 25, 50

EXERCISE 2.4

- (1) (i) 1, 2, 3, 4, 6, 12 (ii) 1, 2, 4, 5, 10, 20 (iii) 1, 5, 25
(iv) 1, 2, 4, 11, 22, 44 (v) 1, 2, 4, 8, 16, 32, 64 (vi) 1, 2, 4, 7, 14, 28
(2) (i) $2 \times 2 \times 3 \times 3$ (ii) $2 \times 3 \times 3 \times 3$ (iii) $3 \times 3 \times 3$
(iv) $5 \times 3 \times 3$ (v) $2 \times 2 \times 2 \times 2 \times 2$ (vi) 2×41
(3) (i) $3 \times 3 \times 7$ (ii) $3 \times 3 \times 5$ (iii) $2 \times 2 \times 2 \times 3 \times 3$
(iv) $2 \times 3 \times 3 \times 3$ (v) 2×19 (vi) $2 \times 3 \times 3 \times 5$

ANSWERS

EXERCISE 2.5

- (1) (i) $12 = 1, 2, 3, 4, 6, 12$ (ii) $10 = 1, 2, 5, 10$
 $18 = 1, 2, 3, 6, 9, 18$ $15 = 1, 3, 5, 15$
- (iii) $22 = 1, 2, 11, 22$ (iv) $8 = 1, 2, 4, 8$
 $44 = 1, 2, 4, 11, 22, 44$ $32 = 1, 2, 4, 8, 16, 32$
- (v) $24 = 1, 2, 3, 4, 6, 8, 12, 24$
 $36 = 1, 2, 3, 4, 6, 9, 12, 18, 36$
 $30 = 1, 2, 3, 5, 6, 10, 15, 30$
- (2) (i) 6 (ii) 14 (iii) 15 (iv) 25 (v) 18
(vi) 32 (vii) 30 (viii) 5
- (3) (i) 12 (ii) 9 (iii) 4 (iv) 12 (v) 2 (vi) 7

EXERCISE 2.6

- (1) 12 students (2) 6 books (3) 22 cm
(4) 6 cm (5) 4 balloons (6) 16 litres (7) 5 days

EXERCISE 2.7

- (1) (i) 75 (ii) 84 (iii) 20 (iv) 18 (v) 35
(2) (i) 126 (ii) 180 (iii) 180 (iv) 105 (v) 240
(vi) 216 (vii) 315 (viii) 90 (ix) 66 (x) 360

EXERCISE 2.8

- (1) Ali will take 4 days and Mari will take 3 days (2) 6 seconds time
(3) 60 inches (4) 8 (5) 5 days (6) 24 days

REVIEW EXERCISE 2

- (1) (i) b (ii) b (iii) c (iv) c (v) a
(2) HCF = 3, LCM = 3312 (3) HCF = 1, LCM = 1517
(4) 15 students (5) 30 friends

ANSWERS

EXERCISE 3.1

(1) **Like Fractions** (i), (iii), (vi), (viii) and (ix) **Unlike Fractions** (ii), (iv), (v) and (vii)

- (2) (i) = (ii) > (iii) > (iv) < (v) > (vi) >
- (3) (i) $\frac{5}{7}$, $\frac{6}{7}$, $\frac{9}{7}$ (ii) $\frac{5}{9}$, $\frac{2}{3}$, $\frac{5}{6}$ (iii) $\frac{4}{15}$, $\frac{1}{3}$, $\frac{2}{5}$
- (iv) $\frac{1}{6}$, $\frac{5}{12}$, $\frac{1}{2}$, $\frac{3}{4}$ (v) $\frac{9}{8}$, $\frac{5}{4}$, $\frac{13}{6}$, $\frac{7}{2}$ (vi) $\frac{5}{12}$, $\frac{7}{6}$, $\frac{7}{4}$, $\frac{5}{2}$
- (4) (i) $\frac{3}{4}$ (ii) $\frac{2}{3}$ (iii) $\frac{3}{5}$ (iv) $\frac{1}{3}$ (v) $\frac{1}{2}$

EXERCISE 3.2

(1) **Unit Fractions** (i), (ii), (iv), (viii) and (ix), **Proper Fractions** (i), (ii), (iv), (v), (viii) and (ix) **Improper Fractions** (iii) and (vii), **Mixed Fractions** (vi) and (x)

- (2) (i) $6\frac{1}{7}$ (iii) $7\frac{1}{4}$ (viii) $8\frac{2}{9}$ (iv) $2\frac{2}{6}$
- (v) $5\frac{3}{5}$ (vi) $22\frac{1}{3}$ (vii) $7\frac{8}{11}$ (viii) $17\frac{1}{5}$
- (3) (i) $\frac{43}{10}$ (ii) $\frac{17}{3}$ (iii) $\frac{13}{2}$ (iv) $\frac{23}{7}$
- (v) $\frac{33}{4}$ (vi) $\frac{24}{13}$ (vii) $\frac{63}{8}$ (viii) $\frac{20}{7}$

EXERCISE 3.3

- (1) (i) $1\frac{8}{9}$ (ii) $1\frac{2}{3}$ (iii) $1\frac{4}{5}$ (iv) $1\frac{11}{12}$ (v) $8\frac{5}{6}$
- (vi) $8\frac{1}{12}$ (vii) $3\frac{11}{30}$ (viii) $3\frac{24}{35}$
- (2) (i) $\frac{1}{3}$ (ii) $\frac{1}{8}$ (iii) $\frac{7}{15}$ (iv) $2\frac{1}{20}$ (v) $6\frac{3}{10}$
- (vi) $\frac{17}{30}$
- (3) (i) $\frac{7}{4}$ (ii) $\frac{4}{7}$, $\frac{2}{9}$ (iii) $\frac{1}{5}$ (iv) $\frac{2}{7}$, $\frac{3}{10}$

ANSWERS

EXERCISE 3.4

- (1) (i) $7\frac{1}{2}$ (ii) 3 (iii) $9\frac{9}{14}$
(2) (i) $\frac{1}{5}$ (ii) $\frac{8}{9}$ (iii) $\frac{5}{21}$ (iv) $\frac{5}{12}$
(v) $\frac{7}{16}$ (vi) $\frac{3}{8}$ (vii) 24 (viii) $27\frac{1}{2}$ (ix) 33

EXERCISE 3.5

- (i) $\frac{1}{4}$ (ii) 3 (iii) 3 (iv) $\frac{4}{7}$ (v) $1\frac{1}{8}$
(vi) $\frac{3}{5}$ (vii) $2\frac{4}{7}$ (viii) $\frac{3}{10}$ (ix) $5\frac{5}{6}$ (x) $4\frac{2}{3}$
(xi) $4\frac{1}{5}$ (xii) $\frac{170}{249}$ (xiii) 9 (xiv) $\frac{1}{12}$ (xv) $\frac{4}{15}$

EXERCISE 3.6

- (1) $11\frac{3}{4}$ litres of milk (2) $\frac{7}{30}$ cm long (3) 6 years old
(4) $2\frac{2}{5}$ metres (5) 27 pieces (6) $37\frac{1}{2}$ bags

REVIEW EXERCISE 3

- (1) (i) $8\frac{2}{8}$ (ii) $5\frac{2}{3}$ (iii) $4\frac{3}{5}$ (iv) 8
(2) (i) $\frac{44}{5}$ (ii) $\frac{29}{8}$ (iii) $\frac{52}{7}$ (iv) $\frac{11}{2}$
(3) (i) $\frac{3}{8}, \frac{5}{8}, \frac{9}{8}$ (ii) $\frac{1}{4}, \frac{2}{3}, \frac{5}{6}$ (iii) $\frac{7}{6}, \frac{6}{4}, \frac{5}{2}, \frac{8}{3}$
(iv) $\frac{3}{11}, \frac{2}{7}, \frac{5}{11}, \frac{4}{5}$
(4) (i) $\frac{13}{6}, \frac{11}{6}, \frac{7}{6}$ (ii) $\frac{5}{6}, \frac{2}{3}, \frac{3}{5}$ (iii) $\frac{4}{15}, \frac{3}{10}, \frac{9}{20}, \frac{4}{5}$
(iv) $\frac{4}{3}, \frac{5}{7}, \frac{3}{5}, \frac{1}{3}$
(5) (i) $\frac{5}{7}$ (ii) $\frac{6}{11}$ (iii) $\frac{5}{2}$ (iv) $\frac{7}{2}$

ANSWERS

- (2) (i) 0.28 (ii) 10.5 (iii) 4.5 (iv) 0.75 (v) 0.26
(vi) 0.375 (vii) 0.76 (viii) 0.6

- (3) (i) $\frac{3}{10}$ (ii) $1\frac{7}{20}$ (iii) $12\frac{37}{100}$ (iv) $\frac{54}{125}$ (v) $25\frac{1}{2}$
(vi) $2\frac{8}{25}$ (vii) $\frac{9}{20}$ (viii) $135\frac{1}{5}$

EXERCISE 4.3

- (1) (i) 0.77 (ii) 0.67 (iii) 4.76 (iv) 35.6 (v) 1.77
(vi) 41.07 (vii) 1.6 (viii) 22.6 (ix) 81.011 (x) 123.726
- (2) (i) 0.6 (ii) 0.23 (iii) 7.32 (iv) 0.67 (v) 2.98
(vi) 1.78 (vii) 8.99 (viii) 14.95 (ix) 32.086 (x) 12.036

EXERCISE 4.4

- (1) 63 (2) 2.5 (3) 173.2 (4) 32.7 (5) 2235.42
(6) 1265 (7) 1872 (8) 18.9 (9) 21.25 (10) 102.7
(11) 237.93 (12) 20.174 (13) 130.08 (14) 34.79 (15) 158.4

EXERCISE 4.5

- (1) 2.85 (2) 0.36 (3) 2.34 (4) 3.22 (5) 0.52
(6) 2.55 (7) 1.57 (8) 0.36 (9) 2.81 (10) 11.41
(11) 13.45 (12) 5.39 (13) 48.1 (14) 3.37 (15) 8.01

EXERCISE 4.6

- (1) Rs 851.05 (2) 21.52 kg (3) Rs 67.25
(4) Rs. 6.07 (5) Rs. 21.3 (6) 176.8 kg
(7) 120 kg (8) 2.75 m (9) 11.75 kg

REVIEW EXERCISE 4

- (1) (i) 5 thousandths = $\frac{5}{1000} = 0.005$ (ii) 1 tens = 10
9 tenths = $\frac{9}{10} = 0.9$
(iii) 7 hundredths = $\frac{7}{100} = 0.07$

ANSWERS

- (2) (i) 3.21 (ii) 0.175 (iii) 4.75 (iv) 3.375
 (3) (i) $1\frac{27}{50}$ (ii) $\frac{7}{20}$ (iii) $13\frac{7}{10}$ (iv) $\frac{69}{200}$
 (4) (i) 4.99 (ii) 0.19 (iii) 40.97 (iv) 1.05
 (5) (i) 32.5 (ii) 175.5 (iii) 3525.2 (iv) 82.24
 (6) (i) 1.57 (ii) 0.36 (iii) 2.87
 (7) 208 m and 12.5 m (8) 13.5 litres

EXERCISE 5.1

- (1) (i) 5000 m (ii) 14000 m (iii) 20000 m
 (2) (i) 1700 cm (ii) 3200 cm (iii) 5400 cm
 (3) (i) 150 mm (ii) 190 mm (iii) 300 mm
 (4) (i) 400 cm, 4000 mm (ii) 1000 cm, 10000 mm
 (iii) 3500 cm, 35000 mm (iv) 6400 cm, 64000 mm
 (v) 8300 cm, 83000 mm (vi) 9800 cm, 98000 mm

EXERCISE 5.2

- (1) (i) 13800 m (ii) 38 km 360 m (iii) 81 km 822 m
 (iv) 59 km 89 m (v) 168 m 49 cm (vi) 110 cm 8 mm
 (vii) 118 m 30 cm (viii) 276 km 495 m (ix) 357 km 919 m
 (2) (i) 1950 m (ii) 3m 59 cm (iii) 2 m 60 cm
 (iv) 557 m 40 cm (v) 50 km 750 m (vi) 51 km 748 m
 (vii) 194 m 11 cm (viii) 46 cm 9 mm (ix) 26 cm 8 mm

EXERCISE 5.3

- (1) (i) 2cm (b) (ii) 30 m (c) (iii) 165 km (d)
 (2) 1 m 48 cm (3) 1157 m (4) 79 cm (5) 1 cm 17 mm
 (6) 350 m (7) 9km 755m (8) 150 cm (9) 130 m

EXERCISE 5.4

- (1) (i) 16241 g (ii) 11 kg 300 g (iii) 17kg 121g
 (iv) 7kg 117g (v) 89 kg 765 g
 (2) (i) 3 kg 750 g (ii) 3kg 53g (iii) 4502 g
 (iv) 23kg 220g (v) 5kg 968g

A N S W E R S

EXERCISE 5.5

- (1) (i) (a) (ii) (c) (iii) (b) (iv) 5 kg (a)
(2) 162 kg 100 gm (3) 34 kg 750 g (4) 22 kg 550 g (5) 1143 kg 250 g

EXERCISE 5.6

- (1) (i) 17 l 920 ml (ii) 10815 ml (iii) 54 l 676 ml
(iv) 2220 ml (v) 58 l 532 ml
(2) (i) 106 l (ii) 44 l 185 ml (iii) 265 ml
(iv) 2 l 945 ml (v) 21 l 437 ml

EXERCISE 5.7

- (1) (i) 4 l (ii) 1 l (iii) 500 ml
(iv) 4 l (v) 140 ml (vi) 5 ml
(2) 9 ml (3) 298 l water needed (4) 150 l
(5) 236 l 125 ml (6) 499 l 740 ml (7) 3 l 85 ml (8) 19 l 250 ml

EXERCISE 5.8

- (1) (i) 60 months (ii) 102 months (iii) 57 months
(iv) 122 months (v) 188 months (vi) 250 months
(2) (i) 90 days (ii) 102 days (iii) 260 days
(iv) 145 days (v) 328 days (vi) 75 days
(3) (i) 56 days (ii) 178 days (iii) 125 days
(iv) 210 days (v) 250 days (vi) 289 days

EXERCISE 5.9

- (1) (i) 76 minutes 18 seconds (ii) 85 minutes 59 seconds
(iii) 59 hours 30 minutes (iv) 59 hours 35 minutes
(2) (i) 11 minutes 10 seconds (ii) 20 minutes 10 seconds
(iii) 13 hours 34 minutes (iv) 31 hours 20 minutes

EXERCISE 5.10

- (1) 48 minutes 55 seconds (2) 7 hours 45 minutes
(3) 10 minutes 42 seconds (4) 2 hours 25 minutes
(5) 14 minutes 24 seconds

ANSWERS

REVIEW EXERCISE 5

- (1) (i) (b) (ii) (a) (iii) (c) (iv) (b)
(3) (i) 6 km (ii) 3.5 km (4) (i) 15000 m (ii) 3000 m
(5) (i) 48km 127m (ii) 87 m 41 cm (iii) 26 l 500 ml (iv) 83 kg 340 g
(6) (i) 36 km 7 m (ii) 28 m 53 cm (iii) 8 l 250 ml (iv) 41 kg 313 g

EXERCISE 6.1

- (1) (i) 3 cm, 5.6 cm, 3.5 cm, 3.5 cm (ii) 5.4 cm, 5.4 cm, 2.6 cm, 3.3 cm
(iii) 2.7 cm, 2.7 cm, 3.5 cm, 3.5 cm
(2) (ii) 7.9 cm (iii) 9.1 cm (iv) 10 cm (v) 10.6 cm

EXERCISE 6.2

- (2) (i) 4.2 cm (ii) 4.7 cm (iii) 4.3 cm

EXERCISE 6.3

- (1) West and East (2) North and South (3) Vertical (4) Horizontal

EXERCISE 6.4

- (1) (i), (iv), (vi) and (viii) are parallel lines
(ii), (iii), (v) and (vii) are non-parallel lines

EXERCISE 6.6

- (1) (i) Vertex B, Arms \overrightarrow{BA} and \overrightarrow{BC} (ii) Vertex Q, Arms \overrightarrow{QP} and \overrightarrow{QR}
(iii) Vertex W, Arms \overrightarrow{WX} and \overrightarrow{WY}
(2) (i) $\angle AOB$ (ii) $\angle AEF$ (iii) $\angle JKL$

EXERCISE 6.7

- (1) (iii), (iv) and (v) are right angles (2) (i), (ii), (v) and (vi) are right angles

EXERCISE 6.8

- (1) (i) right (ii) acute (iii) obtuse (iv) acute (v) obtuse (vi) right

EXERCISE 6.9

- (1) 30° (2) 40° (3) 40° (4) 28° (5) 43°
(6) 43° (7) 110° (8) 110° (9) 142°

ANSWERS

EXERCISE 6.10

- (1) (i) 43° acute angle (ii) 43° acute angle (iii) 70° acute angle
(iv) 155° obtuse angle (v) 90° right angle (vi) 155° obtuse angle

REVIEW EXERCISE 6

- (1) (i) Ruler (ii) Set square (iii) Set square
(iv) Protractor (v) Compasses (vi) Dividers
- (9) (i) 3 angles, $\angle ABD$ acute angle
 $\angle CBD$ acute angle
 $\angle ABC$ right angle
(ii) 6 angles, $\angle GDP$ acute angle, $\angle PDE$ acute angle,
 $\angle GDE$ right angle, $\angle CDE$ obtuse angle,
 $\angle CDG$ obtuse angle, $\angle CDP$ obtuse angle
- (10) (i) 2 Squares, ABED and BCFE
(ii) 5 squares, ABHG, BCIH, HIFE, GHED, ACFD (11) (i) 3 triangles

EXERCISE 7.1

- (1) (i) 5 students (ii) Pink (iii) Yellow
(iv) 20 students (v) 15 students (vi) 6 colours (vii) 95 students
- (2) (i) 20 students (ii) Cricket (iii) 25 students
(iv) 4 games (v) Hockey (vi) 35 students (vii) 110 students

EXERCISE 7.2

- (1) (i) Team D (ii) Team E (iii) No team
(iv) 10 minutes (v) 40 minutes (vi) 15 minutes
- (2) (i) Thursday (ii) 10 acres (iii) 7 days (iv) 10 acres
(v) Monday and Friday (vi) 65 acres
(vii) 15 acres, 5 acres, 10 acres (viii) Monday, Friday; Tuesday, Wednesday, Saturday, Sunday.
- (3) (i) Math and Islamiyat (ii) 360 marks (iii) 70 marks
(iv) 80 marks (v) Science (vi) 70 marks

REVIEW EXERCISE 7

- (1) (i) 80 rupees (ii) 120 rupees (iii) No (iv) 20 rupees (v) 6 litres
- (2) (i) 3000 rupees (ii) 4000 rupees (iii) June
(iv) January (v) 18000 rupees (vi) 1500 rupees
- (3) (i) 2 cm (ii) 6 cm (iii) 2 cm (iv) 6 cm (v) 4th and 5th days (vi) 5 times