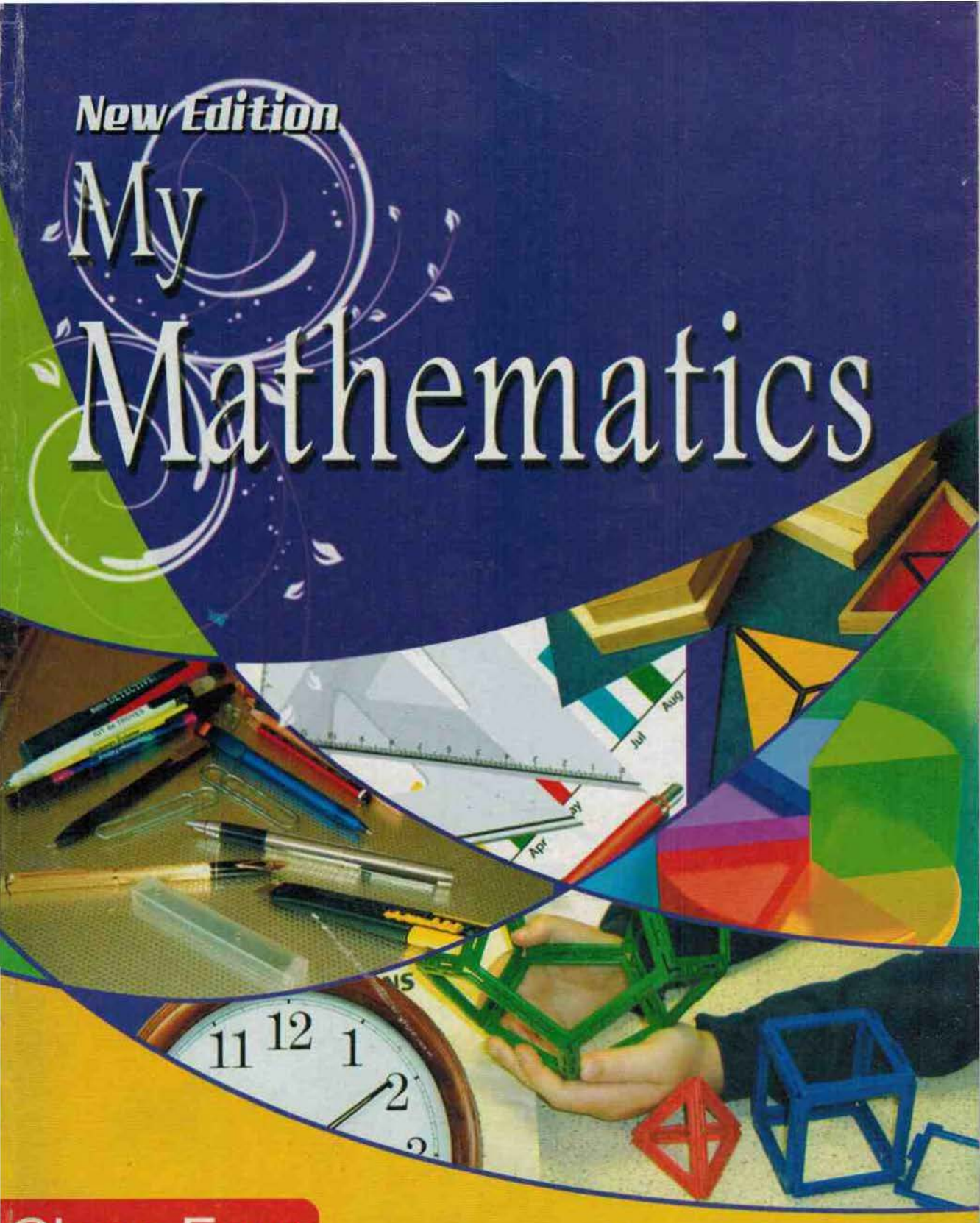
New Edition

My Mathematics

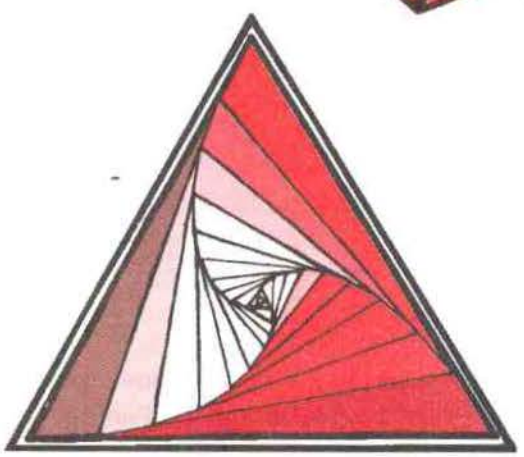


Class Four

MY

MATHEMATICS

Grade 4



Government of Nepal
Ministry of Education
Curriculum Development Centre

Publisher
Government of Nepal
Ministry of Education
Curriculum Development Centre
Sanothimi, Bhaktapur, Nepal

ISBN:

Printing and Distribution
Janak Education Materials Centre
Sanothimi, Bhaktapur

First Edition (Nepali): 2062 BS
Revised Edition (Nepali): 2065 BS
English Edition: 2067 / 2068 BS

Marketed and Distributed by:
Nepal Sahitya Prakashan Kendra
Kathmandu, Nepal Tel: 4435856, 4411652, 4417709
Fax: 977-1-4420990, Email: nspk@mail.com.np

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Publisher

Preface

With the intention of making school level education more purposeful, behavioral and contextual, a process of continuous revision and reform is adopted by the Curriculum Development Centre (CDC). It is obvious that the curriculum is the core part of teaching-learning process, and the textbooks are major means of implementing school curricula at grassroots level. In accordance with the school curricula, the text books keep on changing with a view to addressing societal needs, demands of learners and modern technology in the field of teaching and learning, especially to foster knowledge, skills and positive attitudes in the students so that we can produce skilful, moral, obedient and globally competent citizens. To accomplish this purpose, an attempt is made to bring this book in the present form.

The contents of "My Mathematics" of grade 4 are presented in the two page display system with the clear teaching instructions, pictures and activities. This book (Nepali version) was originally written by Dr. Santosh Man Shakya and Mr. Hari Narayan Upadhyaya in 2049 BS. Likewise, in accordance with the revised curriculum of primary level, it was revised by Mr. Chitra Prasad Devkota, Mr.Barun Prasad Baidhya, Mr. Hari Narayan Upadhyaya, Mr. Dillishwor Pradhan, Mr. Danda Pani Sharma, Ms. Nirmala Gautam, Mr. Shyam Prasad Acharya and Mr. Narayan Wagley. Moreover, Dr. Siddhi Prasad Koirala, Dr. Shiva Ram Nyaupane and Mr. Mukund Raj Sharma have also contributed significantly. Hence, the CDC would like to express its thanks to all of them.

Finally, a textbook is a vital tool of effective teaching learning process in the schools. However, both experienced teachers and inquisitive students can use a number of reference materials and various other resources available in the market to teach and learn a variety of subject matters respectively. Due to lack of different types of reference materials in all schools throughout the country, most of the teaching-learning activities highly depend on the textbooks. In this context, it is expected that the experienced teachers are capable enough to design additional activities as per the demands that usually emerge in the classroom. Moreover, an attempt is made to make this book child friendly by including several motivating teaching-learning activities. Despite our sincere efforts, there may be some mistakes and errors in terms of subject matter, language, presentation style and graphics. In this regard, we definitely expect the constructive suggestions from the teachers, students, parents, readers and other concerned stakeholders to improve the book in its future editions.

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About the English version

The Curriculum Development Centre (CDC), from the very beginning of its inception, has been involved in developing school curricula and textbooks of school education. Moreover, it revises school curricula and textbooks at different time intervals as mandated by the government of Nepal with a view of making school education more purposeful, practical and employment oriented. In the present era, creating a sense of national integrity and democratic culture on students is increasingly becoming a need of Nepalese society. Equally important is to developing linguistic and mathematical skills, and providing fundamental knowledge relating to the fields of Technology, Environment and Health.

In Nepal, English language as a medium of instruction is growing its popularity after Nepali. The public schools are gradually progressing in using English as a medium of instruction. Keeping this fact in view, the Executive Director of CDC Mr. Hari Bole Khanal initiated all the school text books from Nepali into English mainly to meet the needs of learners, parents and teachers. This is one of the steps towards the goal.

We are hopeful that this text book in English version will contribute in meeting the needs of both public and private schools of the country. Besides, we look forward to reducing the dependency of private schools on text books written by foreign writers.

The subject experts involved in translating the textbook "My Mathematics" were Mr. Dinesh Kumar Shrestha, Mr. Danda Pani Sharma and Mr. Shyam Singh Dhami. The CDC would like to express its gratitude to them for bringing the book in the present form. At the end, Mr. Madan Nath also deserves a lot of thanks for his painstaking efforts in editing the language of the textbook.

A textbook is not all in all. It is only a means of executing the curriculum. An experienced and well trained teacher can use a variety of instructional resources for effective teaching-learning transaction in the classroom. Last but not the least; the CDC would be glad to express its hearty thanks to all experts who directly or indirectly made meaningful contributions to the translation of this book. The book could have some mistakes and errors despite the CDC's endeavors in making it child friendly and interesting. So, the CDC welcomes all the constructive suggestions for its further improvement in the forthcoming editions.

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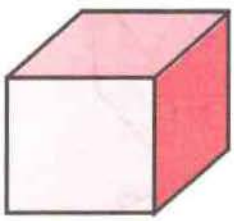
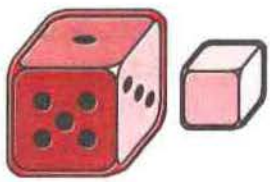
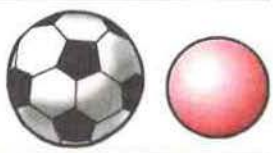
Table of Content

Lesson 1 Geometry

1.1 Solid shapes

Some solid shapes, their mathematical names and physical models are given in the following table. Could you add two more examples in each row as given in the table?

Solid shapes	Mathematical names	Physical models
	Cuboid (all surfaces are rectangular)	
	Cube (all surfaces are square)	
	Cylinder (Bases are circular and base is surrounded by curved surface)	
	Sphere (Round solid shape)	

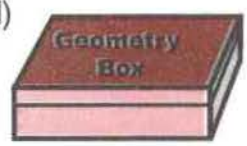
Exercise 1.1

1. Write the mathematical names for each of the following solid objects:

(a) 

(b) 

(c) 

(d) 

(e) 

(f) 

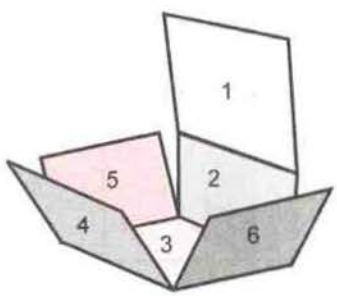
(g) 

(h) 

1.2 Face, edge and corner of solid

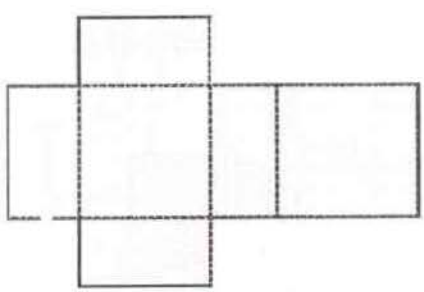
Take a chalk box. Could you tell, the chalk box is the model of which geometrical shape? Yes, it is example of cuboid. Cut the chalk box with scissors along the edges and open it as shown in the figure. What do you find?

A cuboid has six rectangular faces. For example: Chalk box



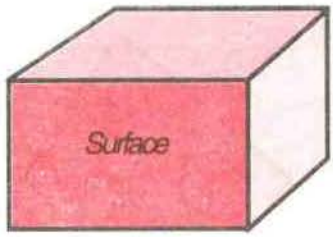
All faces of a cuboid are rectangular. A cuboid has six rectangular faces.

A drawing which shows all faces of a solid and folds into the solid is called the net of the solid. We can make solid objects by folding nets.



Net

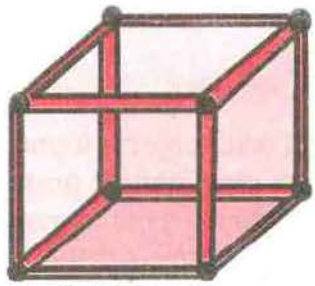
We can make a chalk box again by folding the previous six faces which is cut above. Let's try yourself.



Solid object

Skeletal models of solids can be made by using straws of wheat, pipes of cold drinks and sticks etc.

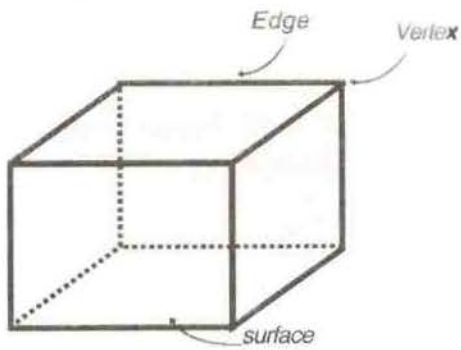
In the adjoining figures, figure of a cuboid and skeletal model of that cuboid are given. The skeletal model is made by pipes. Such models made by pipes, straws and sticks are called the skeletal models.


Skeletal model

How many pieces of pipes are used in the above skeletal model? Each piece of pipe represents the edge of the solid.

In the above figure, three edges of the skeletal model are meeting at a point. Such points are called vertices of the solid.

In the above cuboid, how many faces, edges and vertices are there? Above activities help us to draw the following conclusion:

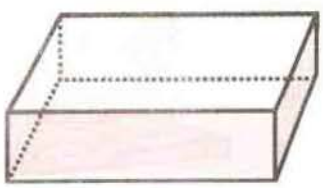


There are 6 faces, 12 edges and 8 vertices in a cuboid.

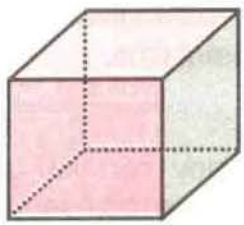
Exercise 1.2

1. Write the number of faces, edges and vertices of the following solids:

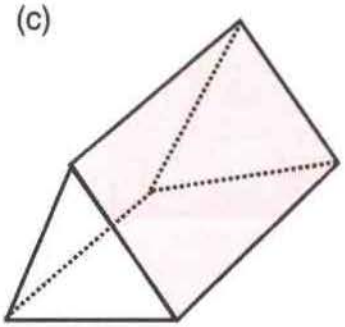
(a)



(b)



(c)



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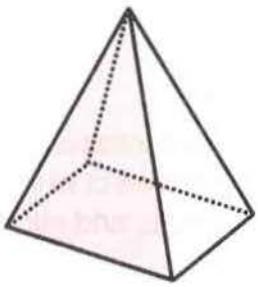


Teaching Instructions:

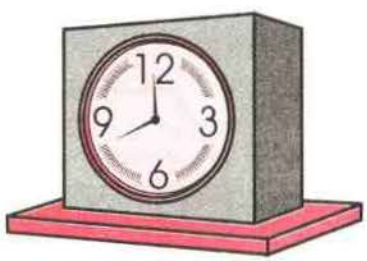
Collect solid objects found in your surrounding. Show each objects and tell their local names and mathematical names. Draw a table and write local names and mathematical names. Ask students to collect solid objects and identify their mathematical names and classify. Use practical method to teach faces, edges and vertices.

1.3 Angle

When we lift any things with hand, arms of hand makes an angle.

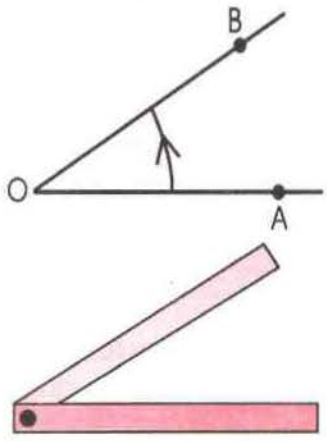
Our legs make angles while walking.

Hands of a clock make different angles at different time.

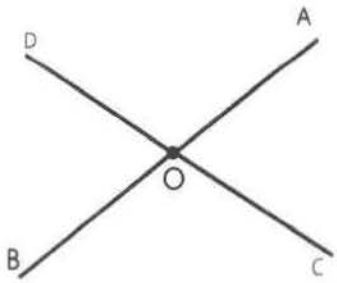


Similarly, can you give some more examples representing angles?

When an end of a line segment keep fixed and other end rotated an angle is formed. In the adjoining figure, point O of line segment OA is kept fixed and point A is rotated, when it reaches B, it makes an angle AOB. It is written as ∠AOB. The angle can be written as ∠BOA. But it cannot be written as ∠OBA or ∠OAB. Why? A model of angle can be made by using two long strips of card board as shown in the adjoining figure.

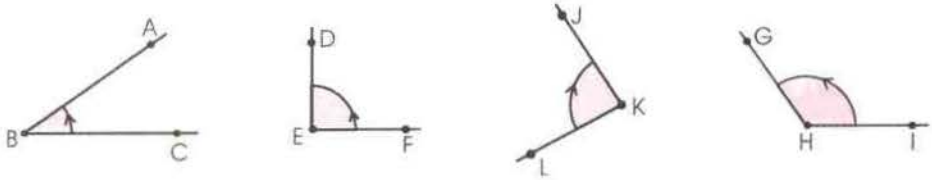


When two line segments cross each other, The angles are formed. In the adjoining figure, line segment AB and CD cross at point O, and ∠AOC is formed. There are some more angles in the figure, can you write names of angles?



Exercise 1.3

1. Write the names of the following angles in two ways:

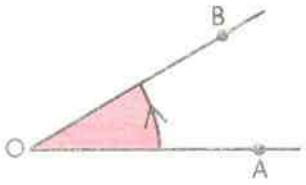


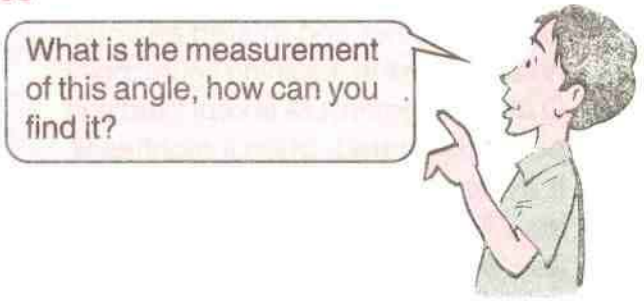
2. The objects used to make figures, and having angles are given below. Write three such figures in your copy.

Teaching Instructions

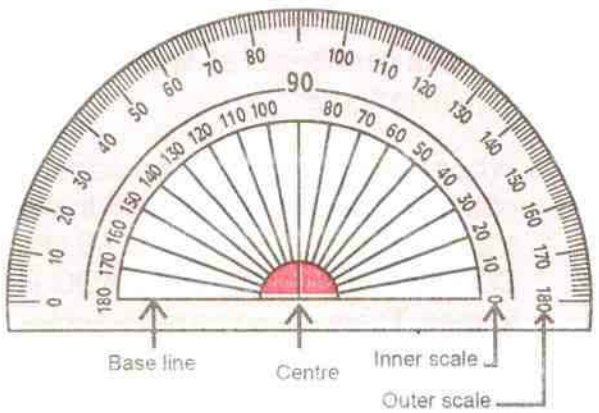
Ask students to give physical objects as the example of angles.

1.4. Measurement of angles





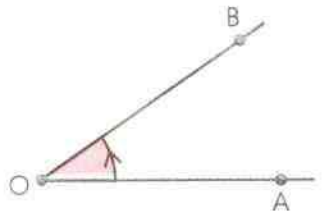
We use protractor to measure angles. The unit of an angle is degree. Look at the protractor carefully given in the figure. There are two scales in the protractor, inner scale and outer scale. There is 0° mark in inner scale and 180° mark in outer scale at the same point. Similarly, there is 180° mark in inner scale and 0° mark in outer scale at the same point. In the inner scale, from right side scale start from 0° and gradually increase up to 180° reaching left side. Likewise, in the outer scale, from left side scale start from 0° and gradually increase up to 180° reaching right side. Two scales are made in the protractor to measure angles conveniently. Let's study how to measure an angle.

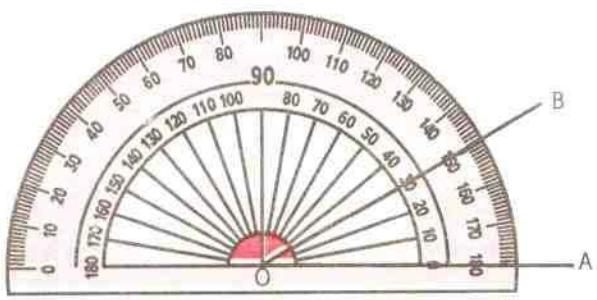


To measure ∠AOB

- Fix the protractor over the angle keeping the point O at the centre of the protractor and OA along the base line of the protractor.

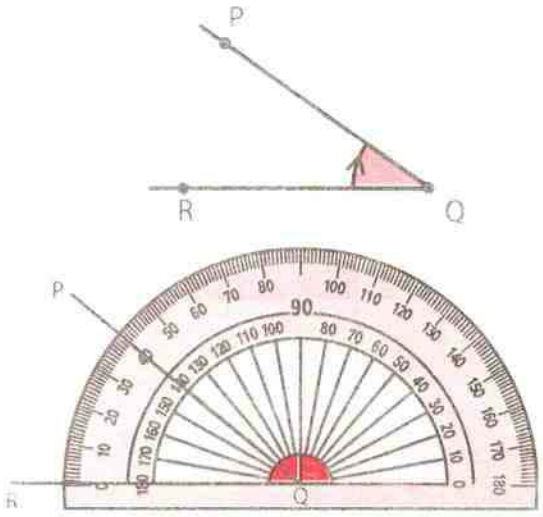
- The line segment OB passes through 30° in the inner scale. Therefore, ∠AOB is 30°.





Similarly, to measure ∠PQR

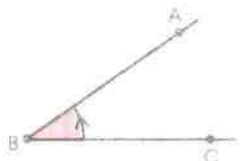
- Fix the protractor over the angle keeping the point Q at the centre of the protractor and QR along the base line of the protractor.
- The line segment OB passes through 40° in the outer scale. Therefore, ∠PQR is 40°.



Exercise 1.4

1. Measure the size of each of the following angles using protractor and write in your exercise book.

(a)



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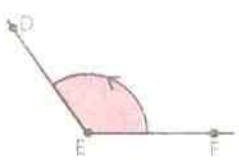

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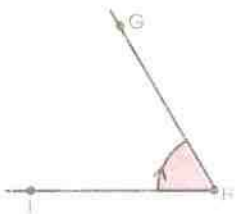

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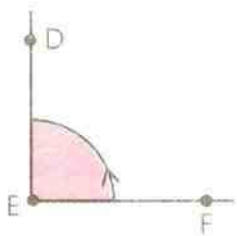

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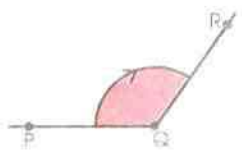
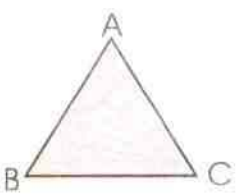


2. Measure the size of internal angles of the following triangles.

(a)



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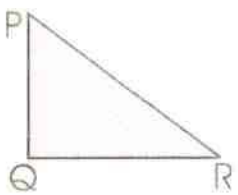

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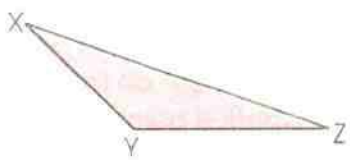
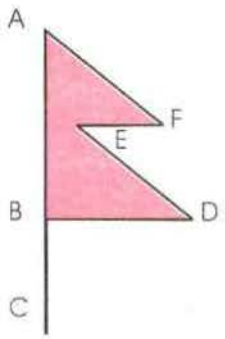


3. Find the size of angles in the following figures.

(a)



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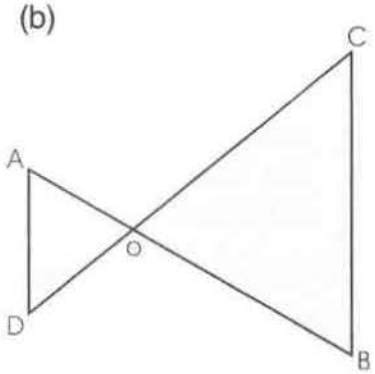
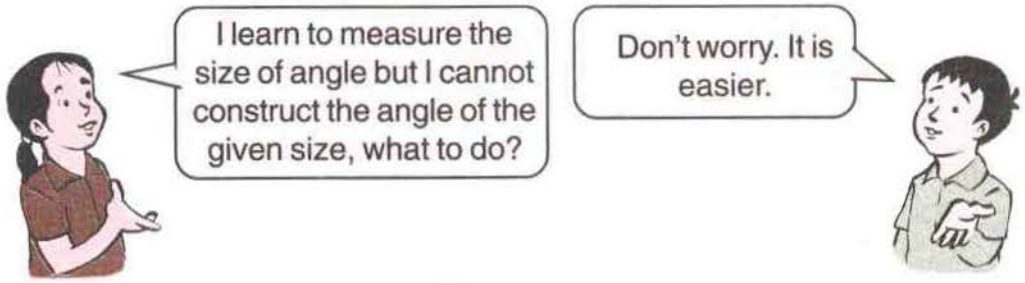


Teaching Instructions:

While teaching to measure size of angles, to boost the self confidence of student, draw the angles of different sizes on the boand and ask to measure the size. Collect the objects which represent angles found in your surrounding, and draw or ask to draw figure of the objects. Then, ask to measure size of the angles.

1.5 Construction of angles in the interval of 10°.



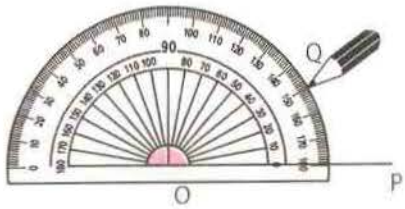
Let us construct an angle of 30°.

- Take a point O in your exercise book.

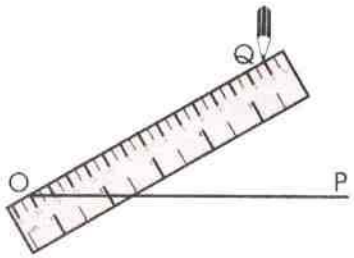
- Draw a straight line segment OP.

- Place the protractor in such a way that its centre is at O and adjust base line of the protractor along OP.

- Read 30° on the inner scale and mark a point Q against it.

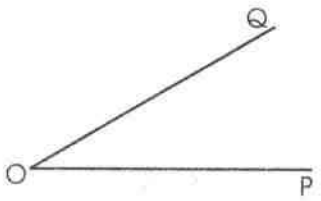


- Remove the protractor and join OQ using ruler.



- The POQ is the required angle of 30°.

- $\angle POQ = 30°$



Exercise 1.5

1. Construct angles of the following sizes by using protractor:

(a) 20° (b) 40° (c) 50° (d) 60° (e) 80°

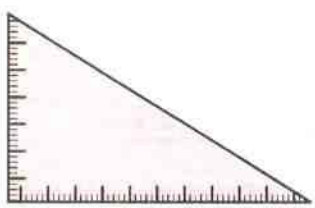
(f) 90° (g) 110° (h) 120° (i) 140° (j) 150°

Teaching Instructions:

While teaching construction of angle, it will be better to demonstrate on the board by using educational materials (Protractor and ruler), and ask students to follow as classwork.

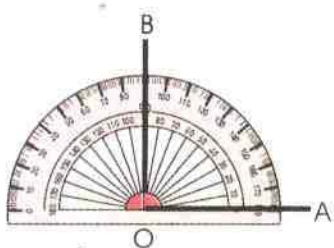
1.6 Angles less than and greater than 90°

The figure alongside is the figure of set square. One of angles of the set square is 90°.



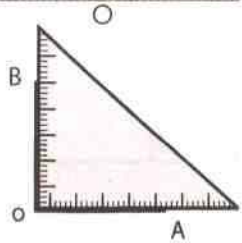
Construct 90° by using protractor.

Place a set square as shown in the figure. Adjust 90° corner of the set square just over point O of $\angle AOB$ and edges of the set square along the side of the arms of the angle.

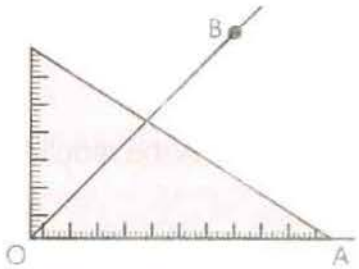


An angle of size 90° is called a right angle.

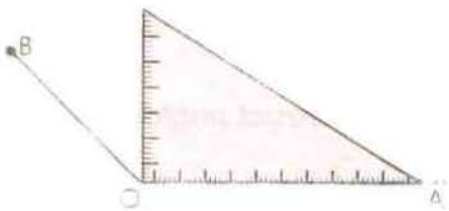
Right angle, angles greater or less than right angle can be recognized by using set square.



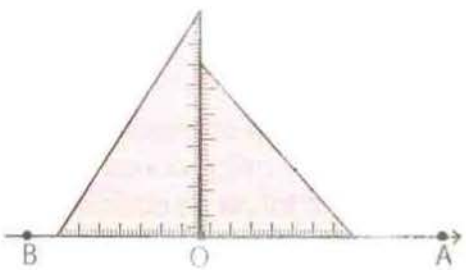
In the adjoining figure, arm OB of ∠AOB lies within the set square as the base line of the set square is adjusted along the arm OA. In such case, ∠AOB is less than 90°. An angle of size less than 90° is called an acute angle.



In the adjoining figure, arm OB of ∠AOB lies outside the set square as the base line of the set square is adjusted along the arm OA. In such case, ∠AOB is greater than 90°. An angle of size greater than 90° is called an obtuse angle.



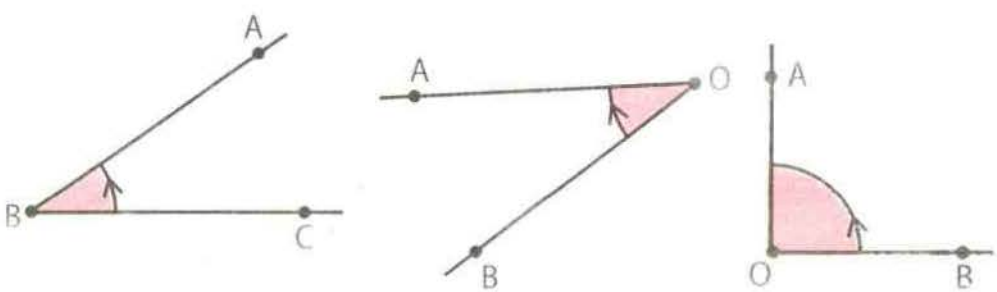
Some angle's size may be two right angles. Such angles are called straight angles. The size of a straight angle is 180°. In the alongside figure, arms OA and OB of ∠AOB lie along the bases of set squares (two set squares). Therefore, ∠AOB = 180°. ∠AOB is a straight angle.



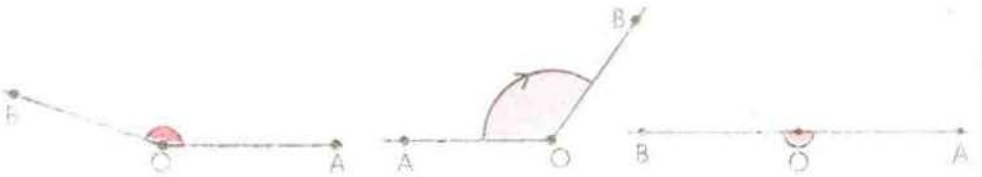
Exercise 1.5

1. **Estimate which of the following angles is acute, right, obtuse and straight angle? Use set square to check your answer.**

(a) (b) (c)

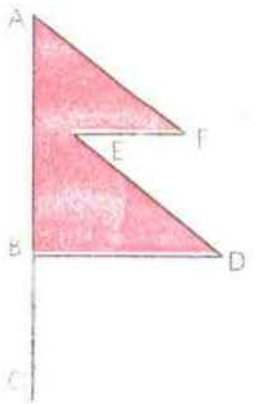


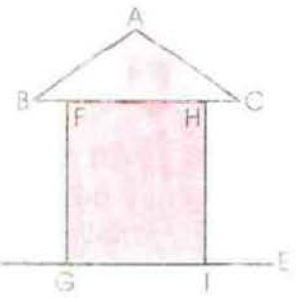
(d) (e) (f)



2. **Name all angles in each figure and classify them into obtuse, acute and right angles.**

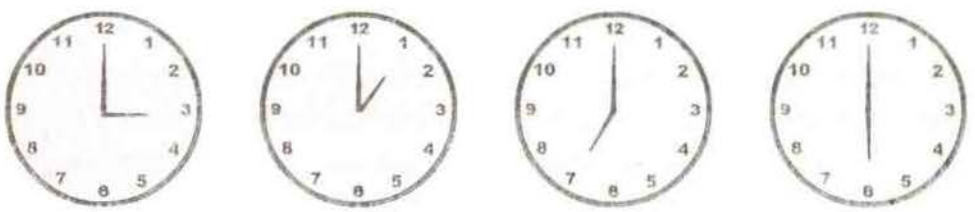
(a) (b)





3. **Classify the angles formed by hands in each of the following clocks into acute, right, obtuse and straight angle.**

(a) (b) (c) (d)



Teaching Instructions:

Here, set squares are used to classify angles. Protractor can be used to classify angles. It will be appropriate to use paper cutting triangles to classify angles into acute, right and obtuse angles. In order to classify angles formed in objects found in the surrounding, ask students to collect objects found in their surrounding.

Concept of numbers

1.1 Origin of numbers

Our forefathers had no numbers as we have today. They had faced difficulty to live in the absence of counting numerals. What problems might they have faced in the absence of counting numerals? At that time people used animal farming to survive. How did they know if any sheep lost from the herd without counting numerals? Look at the adjoining figure, did you know how they used to count at that time?

They put sheep one by one in the pen and used to draw a tally mark for each sheep in the tree or wall. This method continued for a long time. They might have used one pebble for each object for counting because they faced difficulty in drawing tally marks. This is only guess but tally marks are found on the walls of the old caves at many places. After that, it is said that people also used to make knots in the strings as the number of objects they had.

After many years, people began to use their fingers for counting numerals. They had not faced any difficulty to count twenty objects using their fingers in hands and feet. It is difficult to say exactly when counting was started in the history of human development. It is guessed that counting was started about fifty thousands years ago.

One object

Two objects

Three objects

There were different races in different countries and their development histories were also different. Therefore, different races of the world had developed their own counting system at different times. It took place after thousands of years of origin of human beings.

I II III IV V VI VII VIII IX X

The above numerals which were developed at the time of Roman civilization are still in use. Where have you seen theses numerals used? Can you make a list?

The counting numerals, which we use at present, were developed first by Hindus. We are using the developed form of the numerals ०, १, २, ३, ४, ५, ६, ७, ८, ९. Arabians spread these numerals all over the world. These numerals are called Hindu Arabic numerals. The developed forms of numerals 0, 1, 2, 3, 4, 5, 6, 7, 8, 9 are used all over the world today.

Devanagari numerals and Hindu Arabic numerals have the same counting system. In this lesson, you will learn to read, write and count Hindu Arabic numerals.

Read and understand:

Number made by digit	Number	Number name
The smallest number of one digit	1	One
The smallest number of two digits	10	Ten
The smallest number of three digits	100	Hundred
The smallest number of four digits	1000	Thousand
The smallest number of five digits	10000	Ten Thousand
The smallest number of six digits	100000	Lakh
The smallest number of seven digits	1000000	Ten Lakh
The smallest number of eight digits	10000000	Crore

Example 1

Write the place value of numeral 4 in the number 2345687, and write its expanded form.

Solution,

Here, the given number is written in the place value table as follows:

Ten Lakhs	Lakhs	Ten Thousands	Thousands	Hundreds	Tens	Ones
2	3	4	5	6	8	7

The numeral 4 is in the place of ten thousands in the place value table. Therefore, the expanded form of 4 = 4 X 10,000 = 40,000 (Forty thousands).

Example 2

Write 1258712 in expanded form.

Solution,

1258712 = 1 x 10,00,000 + 2 x 1,00,000 + 5 x 10,000 + 8 x 1,000 + 7 x 100 + 1 x 10 + 2 x 1

= 10,00,000 + 2,00,000 + 50,000 + 8,000 + 700 + 10 +2

Exercise 2.1

1. Write the place of 5 in each of the following numbers.

(a) 1, 53,268 (b) 51, 68,719 (c) 12, 67,815

(d) 65, 78,191 (e) 34, 21,451 (f) 52, 83,639

2. Write each of the following numbers in expanded form.

(a) 3, 25,614 (b) 19, 82,543 (c) 67, 89,123

(d) 67, 30,195 (e) 2, 00,465 (f) 70, 40,053

2.2 Number up to crore

2.2 (a) Read, discuss and write in your copy.

Lakhs	Ten Thousands	Thousands	Hundreds	Tens	Ones
3	6	5	2	4	8

3 is in the place of lakh. Therefore, the place value of 3 = 3 x 1,00,000 = 3,00,000 (three lakhs)

Lakhs	Ten Thousands	Thousands	Hundreds	Tens	Ones
6	9	2	5	2	0

6 is in the place of lakh. Therefore, the place value of 6 = 6 x 1,00,000 = 6,00,000 (six lakhs)

6,92,520 = Six lakhs ninety two thousands five hundreds and twenty.

8,06,888 = Eight lakhs six thousands eight hundreds and eighty eight.

9,72,506 = Nine lakhs seventy two thousands five hundreds and six

Five lakhs thirty six thousands nine hundreds and twelve = 5.36,912.

Seven lakhs thirteen thousands and fifteen = 7, 13, 015.

Teaching Instructions:

Let students remember the number names and use place value table to give the concept of numbers up to nine lakhs.

Exercise 2.2

1. **Write the place value of 4 in each of the following numbers.**

   (a) 3,54,032 (b) 3,45,032 (c) 4,35,032 (d) 3,50,432

2. **Write digits which are in place of lakhs in each of the following numbers.**

   (a) 2,54,321 (b) 5,63, 204 (c) 4,08,452 (d) 9,75,608

3. **Write the number name for each of the following numbers.**

   (a) 2,56,312 (b) 3,35,258 (c) 5,23,907 (d) 6,66,298

4. **Write the number for each of the following number names.**

(a) One lakh sixty one thousands five hundreds and six

(b) Three lakhs twenty six thousands two hundreds and seventeen

(c) Five lakhs twenty seven thousands eight hundreds and twenty

(d) Nine lakhs seventy five thousands four hundreds and twenty two

2.2 (b) Read, discuss and write in your copy.

What comes after lakh in place value table?

Lakhs	Ten Thousands	Thousands	Hundreds	Tens	Ones	
1	0	0	0	0	0	= One lakh
2	0	0	0	0	0	= Two lakhs
5	0	0	0	0	0	= Five lakhs
9	0	0	0	0	0	= Nine lakhs

Ten lakhs comes after nine lakhs.

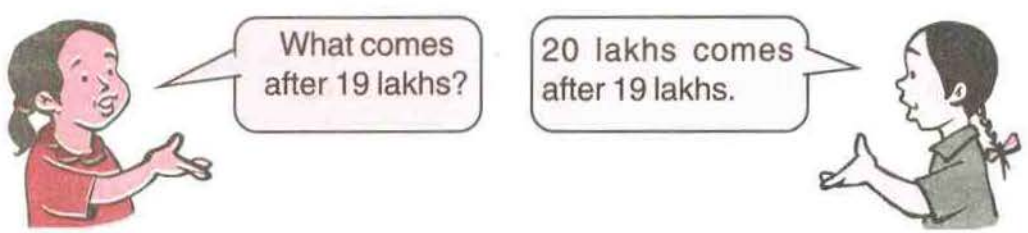
Ten Lakhs	Lakhs	Ten Thousands	Thousands	Hundreds	Tens	Ones	
1	0	0	0	0	0	0	= Ten lakhs

Put 15,63,842 in place value table.

Ten Lakhs	Lakhs	Ten Thousands	Thousands	Hundreds	Tens	Ones
1	5	6	3	8	4	2

One ten lakh and five lakhs = 15 lakhs

Therefore, 15,63,842 = Fifteen lakhs sixty three thousands eight hundreds and forty two.



20,16,857 = Twenty lakhs sixteen thousands eight hundreds and fifty seven.

Twenty five lakhs twenty six thousands six hundreds and fifty six = 25,26,656.

Exercise 2.3

1. **Write which digits are in the place of ten lakhs in each of the following numbers.**

   (a) 12,23,345 (b) 15,25,904 (c) 21,22,608 (d) 29,17,892

2. **Write the number name for each of the following numbers.**

   (a) 15,27, 981 (b) 25,27,003 (c) 26,18,598 (d) 29,82,581

3. **Write the number for each of the following number names.**

   (a) Fifteen lakhs six thousands three hundreds and seventeen

   (b) Twenty one lakhs sixteen thousands five hundreds and twenty seven

   (c) Twenty four lakhs five thousands and fifteen

   (d) Twenty nine lakhs eleven thousands two hundreds and thirty one

Teaching Instructions:

Tell students to write number and number name up to thirty thousands by using place value table.

2.2 (c) Read, discuss and write in your copy.

29,00,000 = Twenty nine lakhs.

If we add 1,00,000 in 29,00,000, the sum is 30,00,000.

Ten Lakhs	Lakhs Ten	Thousands	Thousands	Hundreds	Tens	Ones
3	2	9	3	6	5	7

Three ten lakhs and two lakhs = thirty two lakhs

32,93,657 = Thirty two lakhs ninety three thousands six hundreds and fifty seven.

39,01,500 = Thirty nine lakhs one thousand five hundreds.

45,42,396 = Forty five lakhs forty two thousands three hundreds and ninety six.

Forty eight lakhs thirty four thousands six hundreds and seventy three = 48, 34, 673.

Exercise 2.2

1. **Put the following numbers in place value table and write number names.**

(a) 43,50,432

Ten Lakhs	Lakhs	Ten Thousands	Thousands	Hundreds	Tens	Ones
4	3	5	0	4	3	2

Forty three lakhs fifty thousands four hundreds and thirty two.

(b) 35,78,045 (c) 36,48,810 (d) 39,82,847

(e) 44,87,627 (f) 46,72,345 (g) 48,02,212

2. **Write the number for each of the following number names.**

(a) Thirty six lakhs eighty three thousands five hundreds and nine

(b) Forty seven lakhs seventy five thousands six hundreds and sixty

(c) Forty two lakhs twenty three thousands five hundreds and eighty two

(d) Fifty lakhs sixty seven thousands nine hundreds and six

2.2 Read, Discuss and Write in your copy.

Ten Lakhs	Lakhs	Ten Thousands	Thousands	Hundreds	Tens	Ones	
5	1	0	0	0	0	0	Fifty one lakhs
5	9	0	0	0	0	0	Fifty nine lakhs
6	0	0	0	0	0	0	Sixty lakhs
6	9	0	0	0	0	0	Sixty nine lakhs
7	5	0	0	0	0	0	Seventy five lakhs
8	9	0	0	0	0	0	Eighty nine lakhs
9	9	0	0	0	0	0	Ninety nine lakhs

83,82,653 = Eighty Three Lakhs Eighty Two Thousands and Six Hundreds Fifty Three

97,56,369 = Ninety seven lakhs fifty six thousands three hundreds and sixty nine.

Fifty six lakhs twenty seven thousands nine hundreds and twelve = 56, 27,912.

Eighty two lakhs nine thousands six hundreds and thirty two = 82,09,632.

If we add 1 in 99,99,999, we get 1,00,00,000 (one crore).

Exercise 2.4

1. **Put the following numbers in place value table and write number names.**

   (a) 59,16,713

Ten Lakhs	Lakhs	Ten Thousands	Thousands	Hundreds	Tens	Ones
5	9	1	6	7	1	3

   = Fifty nine lakhs sixteen thousands and seven hundreds thirteen

   (b) 57,26,696 (c) 64,46,931 (d) 66,23,549 (e) 72,39,302

   (f) 89,40,200 (g) 92,51,339 (h) 94,07,737 (i) 97,38,392

2. **Write the number for each of the following number names.**

   (a) Fifty two lakhs six thousands and fifty three = 52, 06, 053

   (b) Sixty three lakhs fifty six thousands and seventeen

   (c) Seventy four lakhs nine thousands seven hundreds and twenty seven

   (d) Eighty seven lakhs fifty five thousands four hundreds and forty four

3. Write in the interval of one lakh from 50,00,000 to 60,00,000.

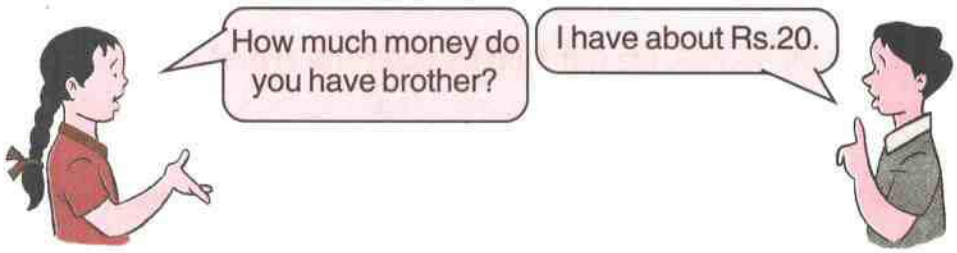
4. Write in the interval of ten lakhs from 30,00,000 to 90,00,000.

Teaching instructions:

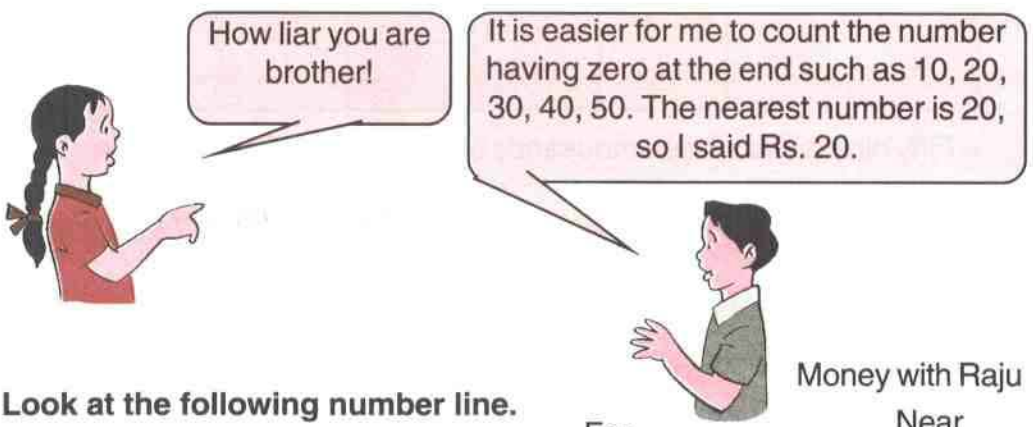
Use place value table to give the concept of numbers up to one crore. Let us practice to write numbers and number names.

2.3 Rounding off numbers

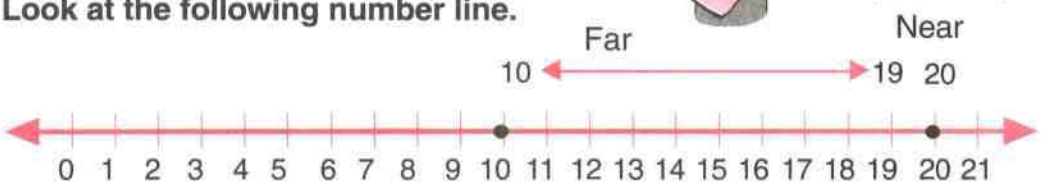
Rounding off three digit numbers to the nearest hundred



Shila counted the money but there was only Rs. 19.



Look at the following number line.



In the number line, 19 is nearer to 20 but farther from 10. Thus, the approach of writing any number in the form of the nearest number having zero in the last digit such as 10, 20, 30, ...,100, 200, 300, ... etc is called Rounding off numbers.

Numbers rounding off to the nearest 10 are: 10, 20, 30,...120, 130,...2350, ...etc.

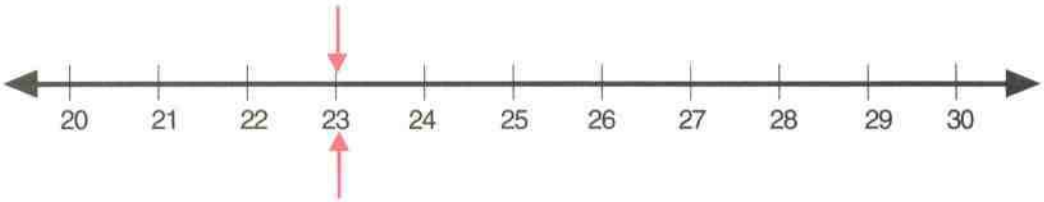
Numbers rounding off to the nearest 100 are: 100, 200,....., 2300,.....etc.

Teaching Instructions:

Let us discuss about the method of rounding off numbers to the nearest ten and hundred by using number line.

Example 1

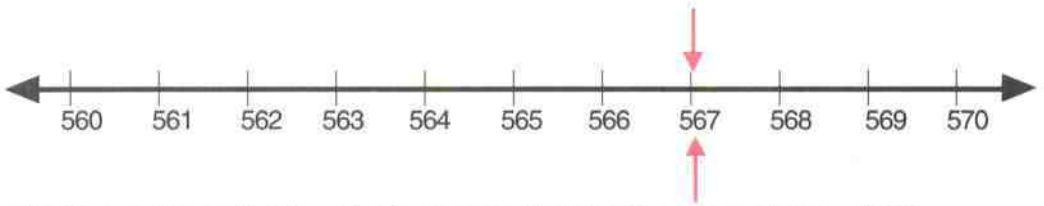
Round off 23 to the nearest ten.



23 is near to 20. So, 23 is rounded off to the nearest ten = 20.

Example 2

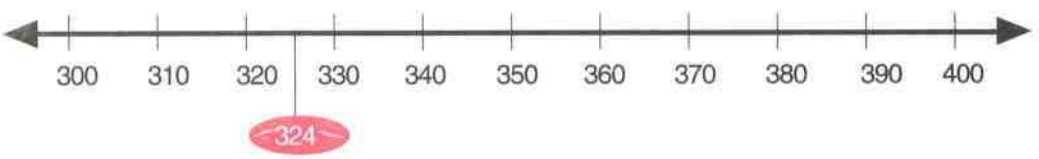
Round off 567 to the nearest ten.



567 is near to 570. So, 567 is rounded off to the nearest ten = 570.

Example 3

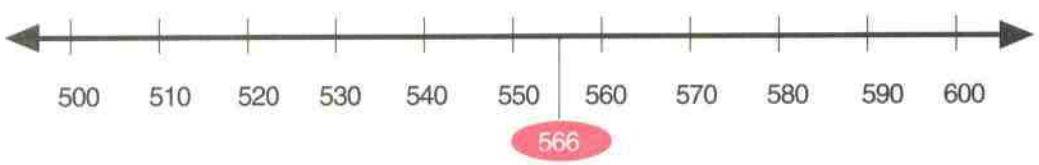
Round off 324 to the nearest hundred.



324 is near to 300. So, 324 is rounded off to the nearest hundred = 300.

Example 4

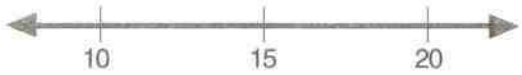
Round off 566 to the nearest hundred.



566 is near to 600. So, 566 is rounded off to the nearest hundred = 600.

Example 5

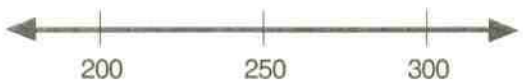
Round off 15 to the nearest ten.



15 is exactly in the middle of 10 and 20. In practice, while rounding off 15 to the nearest ten, it is rounded off to 20.

Example 6

Round off 250 to the nearest hundred.

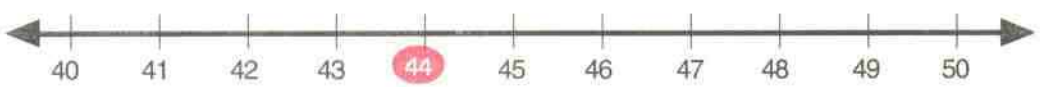


250 is exactly in the middle of 200 and 300. In practice, while rounding off 250 to the nearest hundred, it is rounded off to 300.

Exercise 2.5

1. **Round off the given numbers to the nearest ten.**

   (a) 44



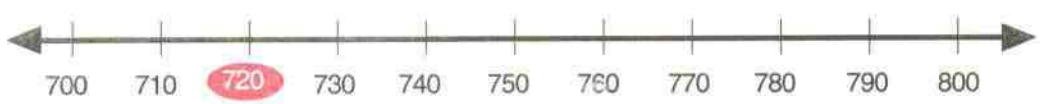
   44 is round off to 40 in the nearest ten.

   (b) 16 (c) 12 (d) 125 (e) 276

   (f) 561 (g) 672

2. **Round off the given numbers to the nearest hundred.**

   (a) 720



720 is round off to 720 in the nearest hundred.

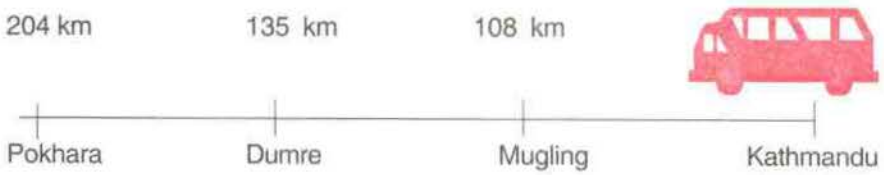
   (b) 390 (c) 550 (d) 450 (e) 1691

(f) 6621 (g) 505 (h) 360 km (i) 570 m.

(j) 145 cm.

3. **The given figure shows the distance from Kathmandu to Pokhara. Round off the distance from Kathmandu to Pokhara, Mugling and Dumre in km respectively to the nearest ten.**

Figure



2.4 Prime and composite numbers

Write the numbers from 1 to 20 in rows in order.

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

- Encircle the number 1.
- Cross out the numbers, which are divisible by 2, except 2. (For example: 4, 6)
- Cross out the numbers which are divisible by 3, except 3.
- All the numbers, which are not crossed out in the above are prime numbers. Which numbers are they ? Find which numbers exactly divide the prime numbers. Let us try.

The number which is exactly divisible by 1 and itself is called a prime number. For example: 2,3,5,7,1,13, etc

The number which is exactly divisible by 1, itself and another numbers is called a composite number. For example: 4,6,8,10,12, etc

Exercise 2.6

1. **How many prime and composite numbers are there from 1 to 25?**

2. **Write numbers from 1 to 50 in row in order.**

   As in above encircled the number 1, cross out the numbers exactly divisible by 2 except 2, cross out the numbers exactly divisible by 3 except 3.

   Similarly, cross out the numbers divisible by 5, 7, 11 except 5, 7, 11.

   - How many prime numbers are there? Write all prime numbers.
   - How many composite numbers are there? Write all composite numbers.
   - How many prime numbers are there, which are greater than 30 and lesser than 50?
   - Add any two prime numbers between 1 and 50 except 2. Is the sum is even?

3. Which is prime and composite number in 27 and 37? Why?

Teaching Instructions:

Practice the exercise of finding prime and composite numbers from 1 to 20 using chart. 1 is neither prime nor composite number.

2.5 Prime Factors

Factors from 1 to 50

Example 1

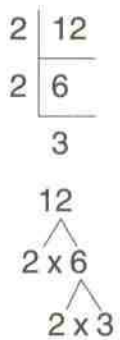
What are the factors of 12?

If 12 is divided by 2, quotient is 6.

If 6 is divided by 2, quotient is 3.

Therefore, 12 = 2 x 2 x 3

2, 2 and 3 are the factors of 12.



Example 2

What are the factors of 36?

If 36 is divided by 2, quotient is 18.

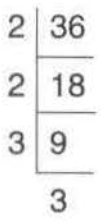
If 18 is divided by 2, quotient is 9.

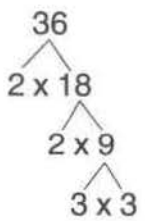
9 is not divisible by 2. 3 is greater prime number than 2.

If 9 is divided by 3, quotient is 3.

Therefore, $36 = 2 \times 2 \times 3 \times 3$

2, 2, 3 and 3 are the factors of 36.





Exercise 2.7

1. Find the factors of the following:

(a) 18 (b) 24 (c) 32 (d) 48

(e) 72 (f) 91 (g) 95 (h) 64

Teaching Instructions:

Divide numbers by prime numbers such as 2, 3, 5, 7, 11 and 13 to make students find the prime factors. Practice more exercises for factorization.

Lesson 3 Basic operation in mathematics

3.1 Subtraction

Study, discuss and learn:

Total exercise books of Rs.65, 325

Sold exercise books of Rs. 36, 476

left exercise books

A copy factory manufactured copies of amount Rs. 65, 325 in a day, and sold copies of amount Rs. 36, 476. How much Rs. copies are left?

Ten thousand	Thousand	Hundred	Ten	One
6	5	3	$\not{2}^{1}$	$\not{5}^{15}$
- 3	6	4	7	6
				9

At first, subtract the numbers of ones place. We cannot subtract 6 from 5. So, we borrow 1 ten from 2 tens. 1 ten means 10 ones. 10 ones and 5 ones make 15 ones. Now subtract 6 ones from 15 ones, we get 9 ones.

1 ten is borrowed from 2 tens. So, only 1 ten is remained in ten's place. 7 tens cannot be subtracted from 1 ten. So, borrow 1 hundred from hundred's place. 1 hundred means 10 tens. 10 tens and 1 ten makes 11 tens. Now, subtract 7 tens from 11 tens, we get 4 tens.

		2	1	
6	5	$\not{3}$	$\not{2}$	$\not{5}$
- 3	6	4	7	6
			4	9

There is only 2 hundreds remain in hundred's place. Borrow 1 thousand from 5 thousands because 4 hundreds cannot be subtracted from 2 hundreds. 1 thousand means 10 hundreds. 10 hundreds and 2 hundreds make 12 hundreds. Subtract 4 hundreds from 12 hundreds, we get 8 hundreds.

There is only 4 thousands remaining in thousad's place. 6 thousands cannot be subtracted from 4 thousands. So, borrow 1 ten thousand from 6 ten thousands. 1 ten thousand means 10 thousands. 10 thousands and 4 thousands makes 14 thousands. Subtract 6 thousands from 14 thousands, we get 8 thousands.

There is 5 ten thousands remaining in ten thousand's place. 2 ten thousands remains as 3 ten thousands is subtracted from 5 ten thousands.

		12	11	15
	4	2	1	
6	5	3	2	5
-3	6	4	7	6
		8	4	9

	14	12	11	15
5	4	2	1	
6	5	3	2	5
-3	6	4	7	6
	8	8	4	9

	14	12	11	15
5	4	2	1	
6	5	3	2	5
-3	6	4	7	6
2	8	8	4	9

Example 1

Subtract:

372568 — 284789

First, subtract the numbers in vertical form as the above and write the answer horizontally.

372568 — 284789 = 87779

372568
-284789
87779

Method for checking answer.

When 284789 is subtracted from 372568, answer is 87779. Now, add 87779 and 284789.

```
  87779
+284789
--------
 372568
```

We get 372568, adding the answer and the subtracted number. So, the above subtraction is correct. Thus, we can check the answer.

Exercise 3.1

1.

Ten thousand	Thousand	Hundred	Ten	One
9	2	3	1	5
−7	4	5	7	6

2.

Ten thousand	Thousand	Hundred	Ten	One
8	3	5	7	6
−4	5	3	9	6

3. 572897
   −352890

4. 372954
   −172868

5. 875436
   −229758

6. 637546
   −299679

Teaching Instructions:
Make subtraction problems up to six digit numbers and practise.

3.2 Daily life problems related to subtraction

Read and learn subtraction

Example 1

Pema had Rs. 28, 538. She bought a television for Rs. 25, 283. How much Rs. will remain with her?

Here,

Total amount = Rs. 28, 538
Spent amount = Rs. 25, 283
Remaining amount = ?

```
 28538
−25283
------
  3255
```

Rs. 3,255 will remain with Pema.

Example 2

Shivani thinks to start a cottage industry. She requires Rs. 1, 68, 539 for that but she has only Rs. 1, 59, 847. How much money will she require?

Here,

Required money = Rs. 1, 68, 539

Available money = Rs. 1, 59, 847

Required money = ?

$$\begin{array}{r} 1,68,539 \\ -\ 1,59,847 \\ \hline 8,692 \end{array}$$

Hence, required money = Rs. 8, 692

Exercise 3.2

1. Kajol Khatoon had Rs. 1, 75, 000. If she bought a motorcycle for Rs. 1, 20, 775, how much money will remain with her?
2. Population of a municipality was 3, 58, 238. If there were 1, 90, 789 male, how many females were there?
3. Barsha's family annual income is Rs. 2, 10, 000 and annual expense is Rs. 1, 92, 832. How much will be the annual saving?
4. A village development committee's expenditure was only Rs. 7, 89, 569 out of total annual budget of Rs. 9, 00, 000. How much budget was left?
5. Krishna wrote number 6, 54, 321 and Srijana wrote number 9, 85, 738. Find the difference between the above two numbers.
6. Make two problems related to subtraction of six digit numbers as given above. Exchange the problems among your friends and solve.

Teaching Instructions:

Make and ask to make simple and daily life related subtraction problems, and ask to solve.

3.3 Multiplication

Multiplication of three or more than three digit numbers by three digit number

Read, discuss and learn:




256 oranges	256 oranges	256 oranges	256 oranges

How many oranges will be there if four basket's oranges are put together?

Total oranges = 256 + 256 + 256 + 256 = 1024 oranges

Now, let us multiply 256 by 4.

256
x 4
1024

Any number adding four times and that number multiply by 4 is the same.

Example 1

Multiply:

2 6 8
x 2 3

- At first multiply by the digit of ones place

2 6 8
x 3
804

- Then multiply by the digit of tens place. There is 2 in ten's place. 2 ten means 20 ones. So, multiply by 20.

2 6 8
x 2 0
5 3 6 0

–Then, add the two products.

2 6 8
x 2 3
8 0 4
+ 5 3 6 0
6 1 6 4

Example 2

Multiply:

3728
x 125

At first, multiply by the digit of ones place

```
  3728
    x5
 18640
```

Then, multiply by the digit of tens place. There is 2 in ten's place. 2 ten means 20 ones.

So, multiply by 20.

```
  3728
   x20
 74560
```

There is 1 in hundred's place. So, multiply by 100.

```
  3728
  x100
372800
```

Then, add the three products.

```
 18640
 74560
+372800
466000
```

In short method

```
  3728
  x125
 18640
 74560
+372800
466000
```

Note: Add one, two and three zeros in the number as multiply any number by 10, 100 and 1000 respectively. For example, to multiply 20 by 8, multiply 2 by 8 and add one zero in the product.

Exercise 3.3

Multiply:

1. 105 x 80
2. 370 x 27
3. 989 x 17
4. 3255 x 120
5. 4760 x 256
6. 3926 x 376
7. 7904 x 832
8. 9743 x 984

Teaching Instructions:

In the beginning, practice the multiplication by long method giving additional exercise as the above. Then, teach short method. Use multiplication table to teach multiplication.

3.4 Daily life problems related to multiplication

Read, discuss and learn:

Example 1

If a match box contains 56 sticks, how many sticks will be there in 312 such match boxes?

Here,

Sticks in one match box = 56

Number of match boxes = 312

Total number of sticks = ?

Adding 312, repeated 56 times means multiplying 312 by 56.

$$\begin{array}{r} 312 \\ \times 56 \\ \hline 1872 \\ 15600 \\ \hline 17472 \end{array}$$

Hence, there are 17, 472 sticks in the match boxes.

Exercise 3.4

1. A book has184 pages. How many pages will be there in 35 such books?
2. If a television costs Rs. 25, 500, how much will 120 such televisions cost?
3. A box contains 105 sticks chalk. How many sticks will there in 503 such boxes?
4. Make 2 word problems as given above, exchange within your friends and solve.

Teaching Instructions:

Tell students to make daily life related problems as the above, which include multiplication of three or more than three digit numbers by up to three digit numbers. Ask to solve them.

3.5 Division

Read, discuss and learn:

If 768 oranges are divided equally among 96 persons, how many oranges will each person get?

Repeated subtraction		Division method
768 −96	1st time	96) 768 | 1 −96
672 −96	2nd time	672 | 1 −96
576 −96	3rd time	576 | 1 −96
480 −96	4th time	480 | 1 −96
384 −96	5th time	384 | 1 −96
288 −96	6th time	288 | 1 −96
192 −96	7th time	192 | 1 −96
96 −96	8th time	96 | 1 −96
0		0 |

Thus, subtracting 96 from 768 repeatedly eight times means dividing 768 into 96 equal parts results 8 in each part. In other words, 768 divided by 96 gives quotient 8.

So, 96)768(8
−768
0

Therefore, division is a short form of repeatedly subtraction.

Division of five digit number by two digit number (without remainder)

Read, discuss and learn:

17028 ÷ 36

The divisor consists of two digits. The first two digit of dividend is 17. 17 is smaller than the divisor. So, divide the first three digit 170 of dividend.

```
   473
36)17028
 - 144
   262
 - 252
   108
 - 108
     0
```

The rounded off value of divisor 36 to the nearest ten is 40.

40 x 4 = 160, it is near to 170. So, let us multiply 36 by 4.

Method of guessing division times

Think, how many times 17 of 170 is divisible by 3 of 36. Five times. 170 is divisible by 36 five times or less one time (four times).

Let us check. 36 x 5 = 180 not divisible.
36 x 4 = 144 Divisible.

To check whether the answer is correct or not, multiply the quotient by divisor.

```
  473
  x36
 2838  →  multiplying by 6.
+14190  →  multiplying by 30.
17028  →  adding to products.
```

473 x 36 = 17028

Thus, Quotient x Divisor = Dividend. So, the answer is correct.

Teaching Instructions:

Teach division through discussion as given in the example 1, and tell students to write in short form in exercise book.

Exercise

Divide and check answer.

1. **540 ÷ 18**
2. **1020 ÷ 15**
3. **12805 ÷ 65**
4. **10530 ÷ 78**
5. **14790 ÷ 85**
6. **44426 ÷97**

Teaching instructions:

Make more exercises of division of five digit number by two digit number (without remainder) as in the above, and let students solve and check the answer.

Division of five digit number by two digit number (with remainder)

Read, discuss and learn:

Let us divide 98194 by 74.

The divisor consists of two digits. The first two digit of dividend is 98, which is greater than the divisor. So, divide 98 by 74. Let's guess by writing 74 to the nearest ten i.e. 70.

Now, 70 x ? = near to 98

70 x 1 = 70

Therefore, 74 x 1 = 74

70 x ? = 241

70 x 3 = 210

Therefore, 74 x 3 = 222

70 x ? = 199 near to 199

74 x 2 = 148

Therefore, 70 x ? = 514 near to 514

70 x 7 = 490

74 x 7 = 518 which is greater.

Therefore, 74 x 6 = 444

Now, remainder = 70

$$
\begin{array}{r}
1326 \\
74\overline{)\,98194} \\
-74 \\
\hline
241 \\
-222 \\
\hline
199 \\
-148 \\
\hline
514 \\
-444 \\
\hline
70
\end{array}
$$

In such cases, to check the answer, multiply the quotient and the divisor and add the remainder.

1326 x 74 + 70 = 98194

Quotient x Divisor + Remainder = Dividend

If a dividend is not exactly divisible by the divisor,

Quotient x Divisor + Remainder = Dividend

Example 1

Divide and check division:

8367 ÷ 96

Division

$$
\begin{array}{r}
87 \\
96\overline{)\,8367} \\
-\ 768 \\
\hline
687 \\
-\ 672 \\
\hline
15 \text{ Remainder}
\end{array}
$$

Checking

87 x 96 + 15

$$
\begin{array}{r}
87 \\
\times 96 \\
\hline
522 \\
+7830 \\
\hline
8352 \\
+15 \\
\hline
8367
\end{array}
$$

Quotient x Divisor + Remainder = Dividend, so the division is correct.

Exercise 3.5

Divide and check division:

1. **6370 ÷ 65**
2. **5765 ÷ 69**
3. **24050 ÷ 98**
4. **33504 ÷ 73**
5. **43200 ÷ 68**
6. **62950 ÷ 92**
7. **67012 ÷ 55**
8. **93216 ÷ 98**

Teaching Instructions:

Tell students to make more problems as given above and solve.

Division of five digit number by three digit number

Read, discuss and learn:

What will be the quotient, if 12850 is divided by 225?

```
      57
   _______
225 ) 12850
    - 1125
    ------
      1600
     -1575
     -----
        25 Remainder
```

- The divisor consists of three digits.
- The first three digit of dividend is 128 which is lesser than the divisor. So, divide the first four digit of dividend 1285 by 225

Therefore, quotient = 57

Remainder = 25

Let's guess.

225 x 4 = 900 which is lesser than 1285.

225 x 5 = 1125

225 x 6 = 1350 which is greater than 1285.

Again,

225 x ? = 1600

225 x 7 = 1575

Checking division

Quotient x Divisor + Remainder

57 x 225 + 25

= 12850

= Dividend

```
   225
  x 57
 ------
  1575
+11250
 ------
 12825
  +25
 ------
 12850
```

Example 1

Divide and check

38590 ÷ 454

On division

$$\begin{array}{r} 85 \\ 454\overline{)38590} \\ -3632 \\ \hline 2270 \\ -2270 \\ \hline 0 \end{array}$$

Therefore, Quotient = 85

Checking

$$\begin{array}{r} 454 \\ \times\ 85 \\ \hline 2270 \\ +\ 36320 \\ \hline 38590 \end{array}$$

85 x 454 = 38590, so it is correct

Exercise 3.6

Divide and check

1. 1947÷205
2. 3583÷527
3. 24888 ÷ 366
4. 80835 ÷ 951
5. 61835 ÷ 305
6. 93108 ÷ 472

3.6 Common problem related to division

Example

A bag factory can produce 125 bags in a day. How many days will it take to produce 29375 bags?

Here,

29375 need to divide into 125 parts.

$$\begin{array}{r} 235 \\ 125\overline{)29375} \\ -250 \\ \hline 437 \\ -375 \\ \hline 625 \\ -625 \\ \hline 0 \end{array}$$

Thus, it will take 235 days to produce 29375 bags.

Exercise 3.7

1. 5, 625 oranges are divided equally among 45 persons. How many oranges will each person get?

2. 250 hens can put in a cage. How many cages will require to put 4,750 hens?

3. An aircraft flies 380 km per hour. How many hours will it take to fly 15,200 km?

4. A school collects Rs. 5,830 donation from 265 students. If all students donate equal amount, how much money will be donated by each student?

5. A typist can type 65 words in a minute. How many minutes will she take to type 31,200 words?

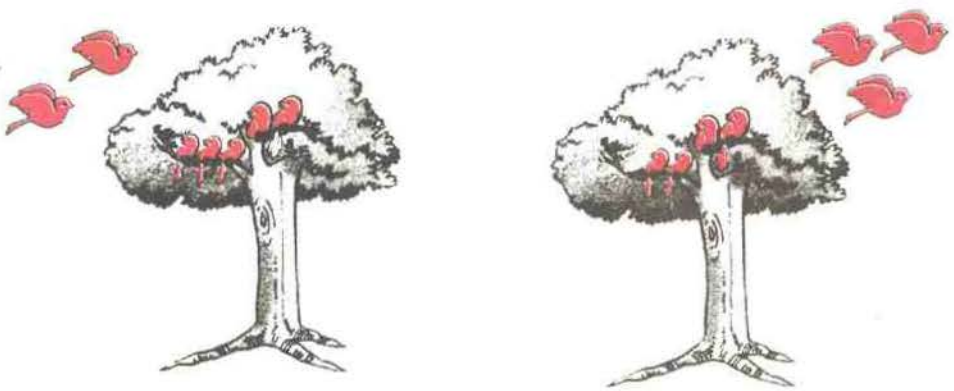
Teaching Instructions:

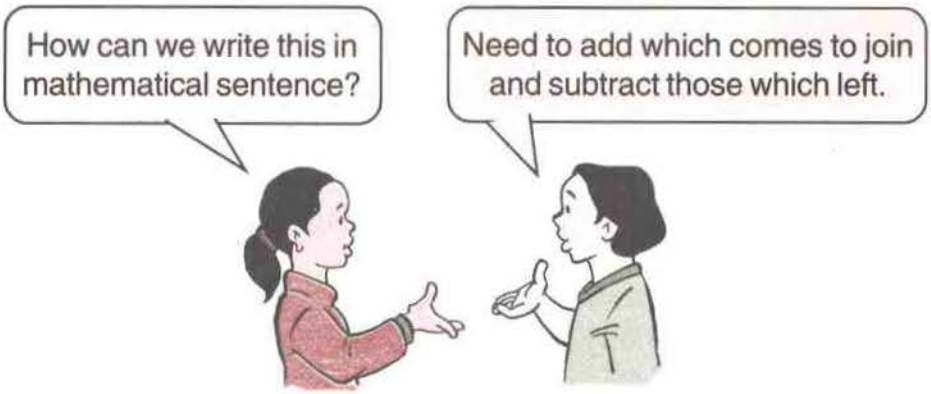
Tell students to make more word problems themselves related to division as given above, and solve.

3.7 Simplification

Read, discuss and learn

There were 5 birds in a tree. After a while, 2 birds came in the tree. Then, 3 birds flew away. How many birds will remain there in the tree?





So,

$5 + 2 - 3$

$= 7 - 3$ Addition sign is in front, so addition is done first.

$= 4$ Subtraction is done later.

Hence, 4 birds are left in the tree.

Example 1

Simplify:

$65 - 25 + 17$

$= 40 + 17$

$= 57$

There is minus in front, so subtraction is done first and added as plus sign is there behind.

Example 2

Subtract product of 10 and 5 from 60. What is the sum?

$60 - 10 \times 5$

$= 60 - 50$

$= 10$

If there is addition, subtraction and multiplication sign, we carry out operation of multiplication, addition and subtraction in order.

Example 3

Add 7 in 3 times of 15. What is the sum?

Here,

$15 \times 3 + 7$

$= 45 + 7$ (First, carry out operation of multiplication. Then, carry out operation of addition.)

$= 52$

Example 4

Simplify:

$(18+22) - 20$

$= 40 - 20$ (First, simplify the numbers in side the brackets. Then, subtract.)

$= 20$

Example 5

Simplify:

$70 + (8-2)$

$= 70 + 6$ (First, simplify the numbers in side the brackets. Then, add.)

$= 76$

Thus, to simplify the problems we carry out the following operations in order:

- **Simplify the numbers inside the bracket**
- **Multiplication**
- **Addition or subtraction**

Exercise 3.8

1. **Simplify :**

   (i) **15 – 4 + 5**

   (ii) **36 + 45 – 55**

   (iii) **54 x 6 – 48**

   (iv) **7 x 15 + 15**

   (v) **15 + (16 – 6)**

   (vi) **30 – (7+4)**

   (vii) **40 – (7-2)**

   (vii) **73 + (4+3)**

2. From 45 subtract the product of 9 and 5. What is the remainder ?

3. Rima had Rs. 5. Her mother gave her three times of the money which she had. How much money did she have altogether ?

4. Saugat had Rs. 10, 000. He bought a goat for Rs. 1, 200 and a cow for 7, 300. How much money is left with him?

Teaching Instructions:

Make yourself or tell students to make more problems as given above, and solve.

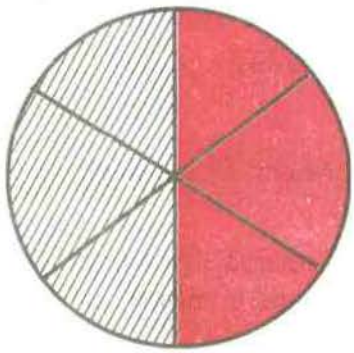
Lesson 4

Fraction, decimal, percentage and unitary method

4.1 Fraction

Equivalent Fractions

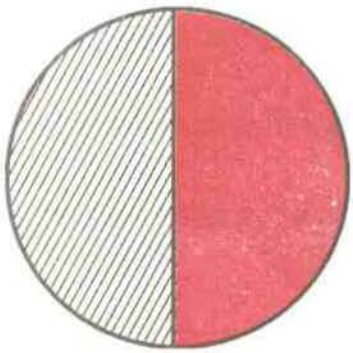
Mother gave Shila and Raju two equal pieces of bread. Shila divided them into six equal parts and ate 3 of them.



Raju divided his bread into two equal parts and ate one of them. Now, say who ate more?

See the figure at the right side. In which figure,coloured part is more?

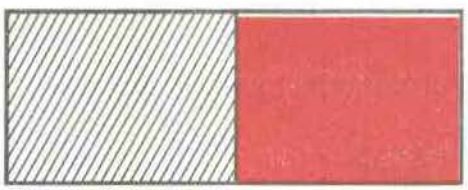
Trace the coloured part on the transparent paper and overlap the coloured part of another figure. What have you found out?



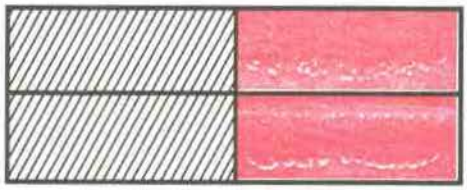
In this way a part of an object can be presented with different types of fraction.

In the figure above $\frac{3}{6}$ and $\frac{1}{2}$ are equal fractions.

Look at the figure below. Which fraction does the coloured part denote?

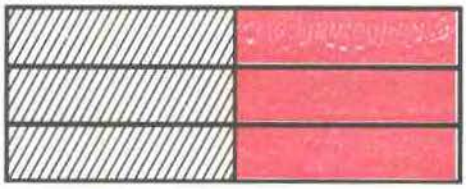


Divide the same figure in 4 equal parts and look at it.



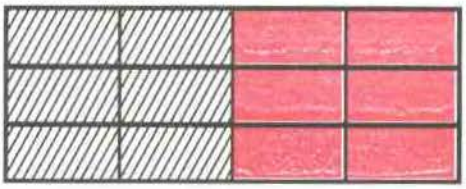
Which fraction does the colored part denote? Is it bigger or smaller than $\frac{1}{2}$?

What happens if the same figure is divided into six equal parts, look!



Now, which fraction does the colored part denote?

Is it greater, lesser or equal to $\frac{1}{2}$?



Again, divide the same figure into 12 equal parts and look.

Now, which fraction is denoted by coloured part? Is it greater or lesser than $\frac{1}{2}$. In all the above four figures, the coloured parts are equal so $\frac{1}{2}, \frac{2}{4}, \frac{3}{6}, \frac{6}{12}$ all denote the same fraction $\frac{1}{2}$.

Therefore, $\frac{1}{2} = \frac{2}{4} = \frac{3}{6} = \frac{6}{12}$

In this way, fractions which are equal are called equivalent fractions.

Similarly, can you say other two fractions, which are equal to $\frac{1}{2}$?

In the above examples, we make three different fractions which are equal to $\frac{1}{2}$. Now, let us try to make them by another method.

(a) Multiplying both numerator and denominator by 2

$$\frac{1}{2}=\frac{1\times2}{2\times2}=\frac{2}{4}$$

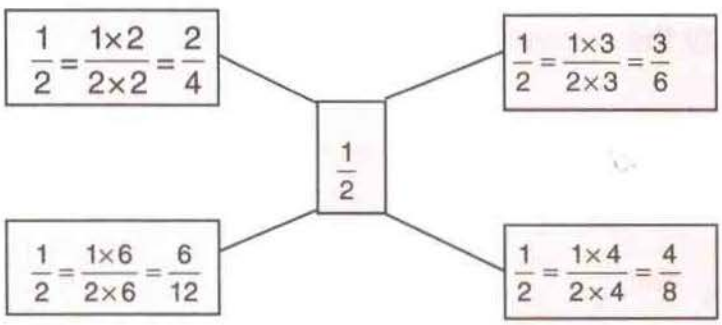
(b) Multiplying both numerator and denominator by 3

$$\frac{1}{2}=\frac{1\times3}{2\times3}=\frac{3}{6}$$

(c) Multiplying both numerator and denominator by 6

$$\frac{1}{2}=\frac{1\times6}{2\times6}=\frac{6}{12}$$

So, the fraction derived by multiplying the numerator and denominator by the same number is equivalent to the given fraction.

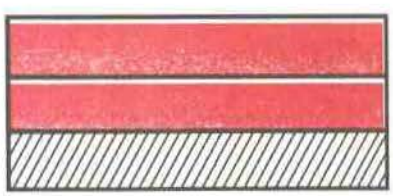


- In this figure, can you add other branches of equivalent fraction?

- If you can, how many such branches can you add at most?

Exercise 4.1

1. Write down the equivalent fraction of the given figure after dividing it into two equal parts.



2. **Which fraction do we need to write in the following blanks?**

(a) $\frac{2}{3}=\frac{2\times2}{3\times2}=\frac{\square}{\square}$ (b) $\frac{3}{4}=\frac{3\times4}{4\times4}=\frac{\square}{\square}$

(c) $\frac{2}{5}=\frac{2\times3}{5\times3}=\frac{\square}{\square}$ (d) $\frac{3}{8}=\frac{3\times5}{8\times5}=\frac{\square}{\square}$

3. **Write two equivalent fractions of each fractions:**

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

4. **Write equivalent fraction of each having 12 in denominator.**

(a) $\frac{1}{2}$ (b) $\frac{2}{3}$ (c) $\frac{1}{4}$ (d) $\frac{5}{6}$ (e) $\frac{3}{4}$

5. **Which number should be written in the boxes?**

(a) $\frac{7}{8}=\frac{\square}{64}$ (b) $\frac{3}{11}=\frac{\square}{77}$ (c) $\frac{7}{9}=\frac{21}{\square}$ (d) $\frac{3}{8}=\frac{24}{\square}$

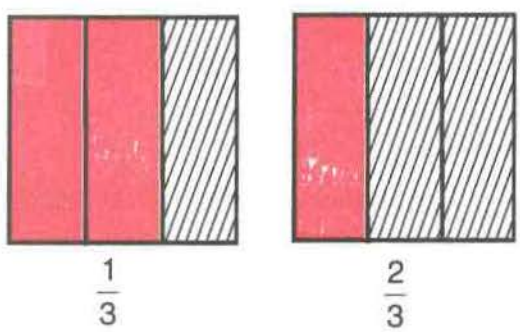
6. **Identify the equivalent fraction:**

(a) $\frac{1}{4}$ and $\frac{6}{24}$ (b) $\frac{2}{3}$ and $\frac{10}{5}$ (c) $\frac{3}{4}$ and $\frac{18}{24}$

(d) $\frac{5}{26}$ and $\frac{1}{5}$ (e) $\frac{3}{8}$ and $\frac{12}{32}$ (f) $\frac{15}{27}$ and $\frac{10}{18}$

Comparison of Fractions

Which figure is more shaded?The figure represented by $\frac{2}{3}$ is shaded more than the figure represented by $\frac{1}{3}$. If so, which fraction is greater?

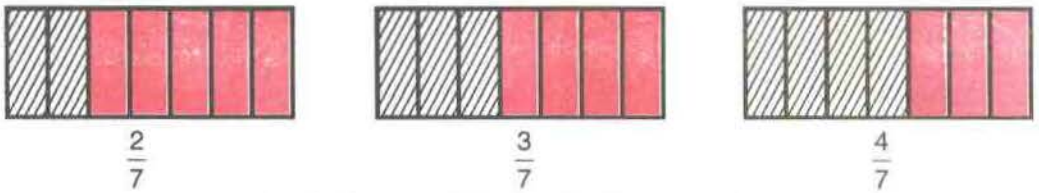


$\frac{1}{3}$ $\frac{2}{3}$

If the denominators are equal, the fraction having great numerator is greater. In the fractions $\frac{1}{3}$ and $\frac{2}{3}$ numerator 2 is greater than 1. So, the fraction $\frac{2}{3}$ is greater. Here $\frac{1}{3}$ is smaller and 2/3 is greater.

Example 1

In order to find out smallest fraction among $\frac{2}{7}, \frac{3}{7}$ and $\frac{4}{7}$ we should draw the figures to represent them. The smallest fraction can be found on the basis of the shaded part. Fractions having the same denominator, the fraction whose numerator is smaller is smaller fraction.



$\frac{2}{7}$ $\frac{3}{7}$ $\frac{4}{7}$

Here, the smallest fraction is $\frac{2}{7}$.

The greatest fraction is $\frac{4}{7}$.

The fractions $\frac{2}{7}, \frac{3}{7}$ and $\frac{4}{7}$ should be written in descending order as $\frac{4}{7}, \frac{3}{7}$ and $\frac{2}{7}$. It is also clear from the shaded part.

Look at the following figures and find out the small and great fractions having the same numerator but different denominators:

$\frac{1}{1}$ $\frac{1}{2}$ $\frac{1}{3}$ $\frac{1}{4}$ $\frac{1}{5}$

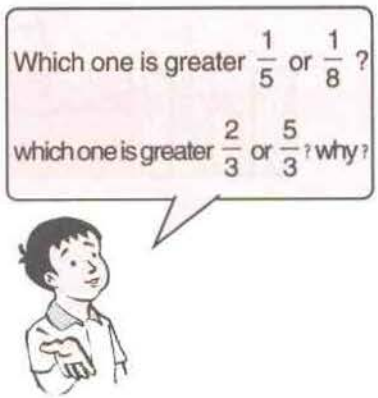
Which fraction representing figure is more shaded?

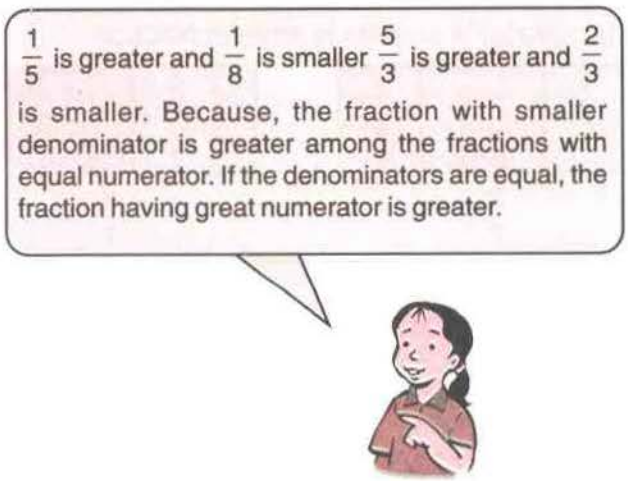
Which fraction representing figure is least shaded?

It can be said from the above figures that the fraction having small denominator is greater among the fractions with equal numerator. When an object is divided into various parts, it becomes smaller respectively.

If we write the above fractions in descending order, We will get $\frac{1}{1}, \frac{1}{2}, \frac{1}{3}, \frac{1}{4}$ and $\frac{1}{5}$

Similarly, in ascending order. $\frac{1}{5}, \frac{1}{4}, \frac{1}{3}, \frac{1}{2}$ and $\frac{1}{1}$





Exercise 4.2

1. Find out the greater fraction in the following fractions:

(a) $\frac{6}{7}, \frac{3}{7}$ (b) $\frac{5}{9}, \frac{7}{9}$ (c) $\frac{3}{8}, \frac{2}{8}, \frac{7}{8}$

(d) $\frac{3}{5}, \frac{4}{5}, \frac{2}{5}$ (e) $\frac{2}{5}, \frac{2}{7}, \frac{2}{3}$ (f) $\frac{3}{8}, \frac{3}{5}, \frac{3}{7}$

2. Write the following fractions in descending order:

(a) $\frac{5}{7}, \frac{4}{7}$ (b) $\frac{3}{11}, \frac{8}{11}, \frac{5}{11}$ (c) $\frac{5}{8}, \frac{7}{8}, \frac{6}{8}$

(d) $\frac{13}{14}, \frac{11}{14}, \frac{12}{14}$ (e) $\frac{5}{6}, \frac{5}{9}, \frac{5}{8}$ (f) $\frac{9}{10}, \frac{9}{13}, \frac{9}{15}$

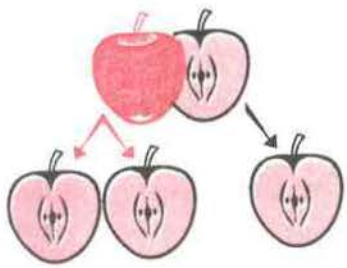
3. Write the following fractions in ascending order:

(a) $\frac{7}{9}, \frac{6}{9}, \frac{8}{9}$ (b) $\frac{5}{7}, \frac{4}{7}, \frac{6}{7}$ (c) $\frac{4}{6}, \frac{3}{6}, \frac{5}{6}$ (d) $\frac{19}{21}, \frac{16}{21}, \frac{20}{21}$

(e) $\frac{2}{7}, \frac{2}{9}, \frac{2}{3}$ (f) $\frac{5}{9}, \frac{5}{7}, \frac{5}{6}$

Mixed Numbers

Sheela said to Raju, "I have one and half apple". How can I write this in a single number?



Raju said, 'Divide that single apple into two parts and look. Now, how many halves are there?

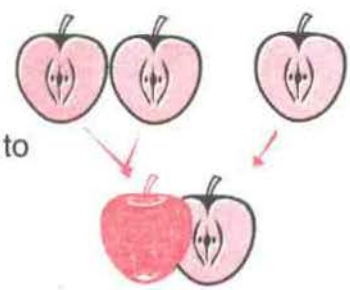
Sheela said, "Three halves. She has written in this way; 3 halves $= 3 \times \frac{1}{2} = \frac{3}{2}$

"It's a new kind of fraction; It has greater numerator than the denominator."

Raju said, "Fraction having greater numerator than the denominator is called improper fraction'

Let's write 5 improper fractions.

Now, we can make an apple joining two halves among three halves and remain a half.



In the adjoining figure, 2 halves apples are equal to 1 apple and remains a half.

thus $\frac{3}{2}$ = an apple and half apple

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

Thus, if a whole number and fraction is combined together that is called mixed number.

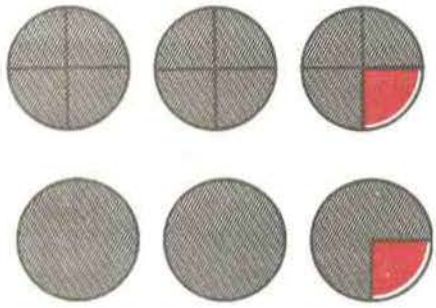
Similarly, how many whole and half in $3\frac{1}{2}$

Think for a while and write 5/5 examples of mixed number. We can convert the mixed number into improper fraction and improper fraction into mixed number.

Example 1

(a) Convert $\frac{11}{4}$ into mixed number:

In the given figure $\frac{11}{4}$ denotes 11 pieces of $\frac{1}{4}$ part. Here, 8 pieces of $\frac{1}{4}=2$ 2 whole and 3 pieces of $\frac{1}{4}$ $=\frac{3}{4}$



so $\frac{11}{4}$ = 2 whole + $\frac{3}{4}=2\frac{3}{4}$

Short Method

In $\frac{11}{4}$, divide 11 by 4

$$4\overline{)\,11}\quad 2$$

$$\underline{8}$$

3 remainder

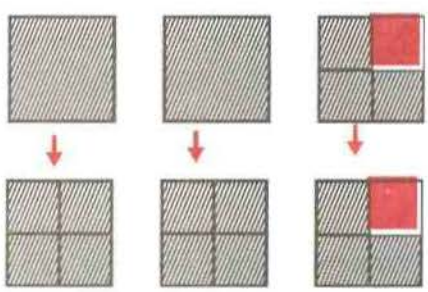
So $\frac{11}{4}$ = 2 whole + $\frac{3}{4}$ = $2\frac{3}{4}$ (2 whole and 3 by 4)

(b) Convert $2\frac{3}{4}$ into improper fraction:

Here, $\frac{3}{4}$ means 3 parts among 4.

So, if we divide 2 whole into 4/4 parts, we get 8 parts, in total. If we add remaining 3 parts,

it becomes 11 parts of $\frac{1}{4}$.



So, $2\frac{3}{4}=\frac{11}{4}$

In short -

$$2\frac{3}{4} = \frac{2\times4+3}{4}$$

$$= \frac{8+3}{4}$$

$$= \frac{11}{4}$$

Multiply whole number and denominator of fraction and add numerator with the product. Then, write down the denominator of the given fraction.

Exercise 4.3

1. Convert the following improper fractions into mixed number.

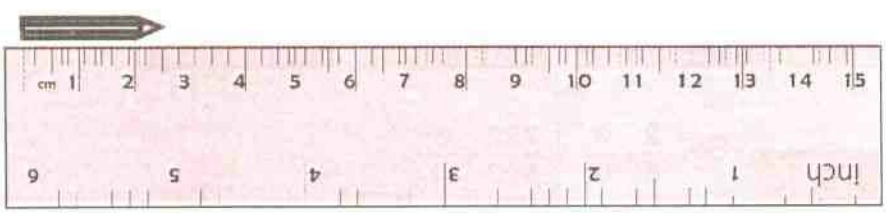
(a) $\frac{15}{4}$ (b) $\frac{13}{3}$ (c) $\frac{11}{5}$ (d) $\frac{16}{3}$ (e) $\frac{21}{8}$

2. Convert the following mixed numbers into improper fractions:

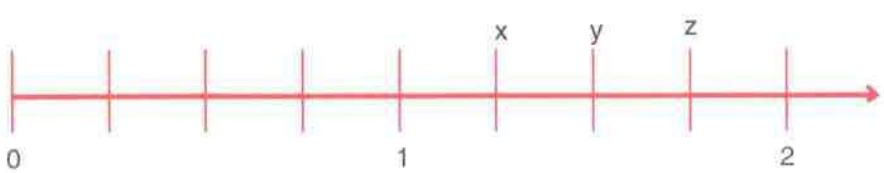
(a) $12\frac{1}{2}$ (b) $33\frac{1}{3}$ (c) $15\frac{1}{4}$ (d) $16\frac{3}{5}$ (e) $9\frac{7}{6}$

3. In the figure, 1 cm is divided into 10 equal parts. Find the length of pencil.

(a) in mixed number and (b) in improper fraction



4. What is the value of x, y and z in the number line? Find out mixed numbers improper fractions.

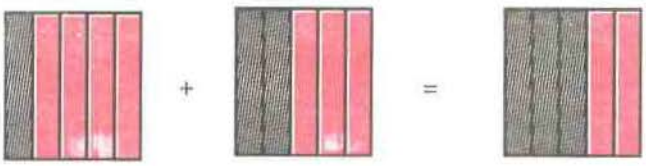


Fundamental Operations on Fraction

We can do operation in fraction similar as in the whole number.

Addition of like Fractions.

Look at the following figure. The figures show $\frac{3}{5}$ is sum of fractions $\frac{1}{5}$ and $\frac{2}{5}$.



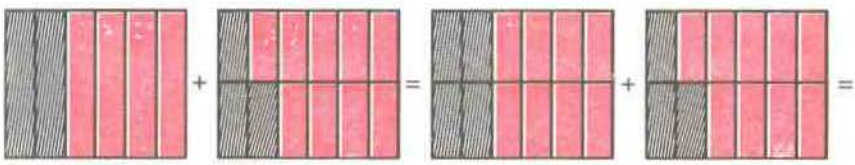
$\frac{1}{5}$ + $\frac{2}{5}$ = $\frac{3}{5}$

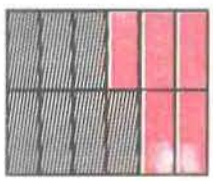
So,

$$\frac{1}{5}+\frac{2}{5}=\frac{1+2}{5}=\frac{3}{5}$$

While adding like fraction, we have to add the numerator only. Denominator remains the same.

Addition of unlike Fractions.





So, $\frac{2}{6}+\frac{3}{12}=\frac{2\times2}{6\times2}+\frac{3}{12}$

$=\frac{4}{12}+\frac{3}{12}$

$=\frac{4+3}{12}$

$=\frac{7}{12}$

To make denominator 12, we have multiplied numerator and denominator by 2.

Teaching Instructions:

While adding unlike fraction, first, make the denominator equal (make equivalent fraction). Then, add numerator. Discuss more about it.

Example 1

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

$=\frac{3\times3}{4\times3}+\frac{1\times2}{6\times2}$

$=\frac{9}{12}+\frac{2}{12}$

$=\frac{11}{12}$

Multiples of 4 are 4, 8, 12, 16, 20, 24

Multiples of 6 are 6, 12, 18, 24, 30, ...

Here, 12 is the least number, which can be made equal from 4 and 6.

So, we have to multiply the denominator and numerator of $\frac{3}{4}$ by 3 and $\frac{1}{6}$ by 2

(b) $\frac{6}{7}+\frac{5}{8}$

$=\frac{6\times8}{7\times8}+\frac{5\times7}{8\times7}$

$=\frac{48}{56}+\frac{35}{56}$

$=\frac{83}{56}$

$=1\frac{27}{56}$

Multiples of 7 are 7, 14, 21, 28, 35, 42, 49, 56, 63, . . .

Multiples of 8 are 8, 16, 24, 32, 40, 48, 56, 64, . . .

Here, 56 is the least number which can be made equal from 7 and 8.

So, we should multiply the denominator and numerator of $\frac{6}{7}$ by 8 and $\frac{5}{8}$ by 7.

To change unlike fractions into like fractions, we can multiply the denominator and numerator of the first fraction by the denominator of the second fraction, and the denominator and numerator of the second fraction by the denominator of the first fraction.

Example 2

Subtract:

(a) $\frac{7}{8}-\frac{5}{8}$

$=\frac{7-5}{8}$

$=\frac{2}{8}$

$=\frac{1}{4}$ (keeping in the smallest term)

Similar to the addition of the fraction, while subtracting of like fraction, we should subtract numerator only. If the fraction is unlike, first, we should make the denominator same. Then, only we can subtract the numerator.

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

$= \frac{3\times5}{4\times5} - \frac{2\times4}{5\times4}$ Making equivalent fraction having the same denominator.

$= \frac{15}{20} - \frac{8}{20}$

$= \frac{15-8}{20}$

$= \frac{7}{20}$

Example 3

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

$= \frac{4\times2+1}{2} + \frac{3\times4+3}{4}$ —— Changing mixed number into improper fraction.

$= \frac{9}{2} + \frac{15}{4}$

$= \frac{9\times4}{2\times4} + \frac{15\times2}{4\times2}$ —— Making the equivalents having the same denominator.

$= \frac{36}{8} + \frac{30}{8}$

$= \frac{36+30}{8}$

$= \frac{66}{8}$

$= \frac{33}{4}$ —— Changing into the smallest term

$$4\overline{)33}\ 8$$
$$-32$$
$$1$$

$= 8\frac{1}{4}$ —— Changing improper fraction into mixed number.

Example 4

$7\frac{2}{3} - 5\frac{5}{6}$

$= \frac{7\times3+2}{3} - \frac{5\times6+5}{6}$ ——— Changing mixed number into improper fraction.

$= \frac{23}{3} - \frac{35}{6}$

$= \frac{23\times6}{3\times6} - \frac{35\times3}{6\times3}$ ——— Making equivalent fractions having same denominator.

$= \frac{138}{18} - \frac{105}{18}$

$= \frac{138-105}{18}$

$= \frac{33}{18}$ ——— Subtracting numbers

$= \frac{11}{6}$ ——— Changing into least term.

$= 1\frac{5}{6}$ ——— Changing improper fraction into mixed number.

Exercise 4.4

1. Make the same denominator of the following pair of fractions.

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

2. Add:

(a) $\frac{1}{4}+\frac{3}{8}$ (b) $\frac{4}{5}+\frac{2}{15}$ (c) $\frac{5}{9}+\frac{7}{18}$ (d) $\frac{5}{6}+\frac{3}{8}$

(e) $\frac{1}{6}+\frac{2}{7}$ (f) $\frac{3}{10}+\frac{3}{4}$ (g) $\frac{5}{9}+\frac{2}{7}$ (h) $\frac{7}{11}+\frac{7}{12}$

3. Subtract:

(a) $\frac{7}{9}-\frac{5}{9}$ (b) $\frac{1}{5}-\frac{1}{10}$ (c) $\frac{5}{6}-\frac{7}{12}$ (d) $\frac{5}{6}-\frac{2}{5}$

(e) $\frac{8}{15}-\frac{2}{5}$ (f) $\frac{5}{8}-\frac{2}{6}$ (g) $\frac{13}{18}-\frac{5}{12}$ (h) $\frac{11}{15}-\frac{3}{10}$

4. Simplify:

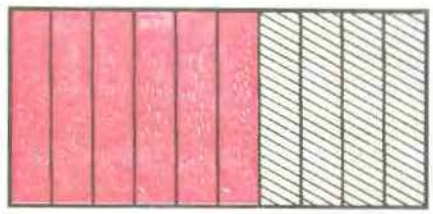
(a) $5\frac{2}{3}+8\frac{1}{6}$ (b) $3\frac{2}{5}+5\frac{4}{10}$ (c) $6\frac{1}{9}+7\frac{1}{2}$ (d) $4\frac{1}{2}+3\frac{1}{3}$

5. Simplify:

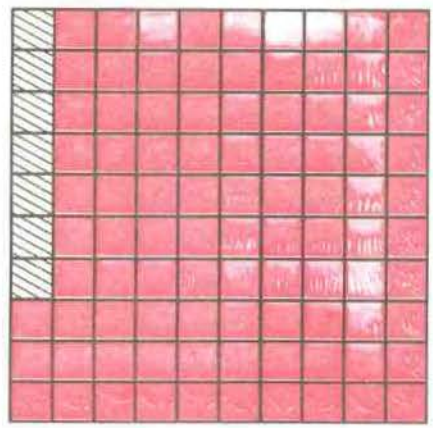
(a) $3\frac{3}{5}-2\frac{1}{10}$ (b) $8\frac{1}{2}-6\frac{3}{4}$ (c) $10\frac{1}{3}-2\frac{1}{6}$ (d) $8\frac{1}{4}-3\frac{2}{9}$

4.2 Decimal Number

Here, a rectangular figure is divided into ten equal parts. Its $\frac{4}{10}$ part is coloured. Which is called 4 tenths. It can be written $\frac{4}{10}$ in fraction and 0.4 in decimal.



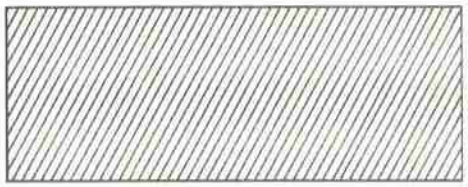
Square of the right is divided into hundred equal parts. Its $\frac{7}{100}$ parts are coloured. It is called 7 hundredths.

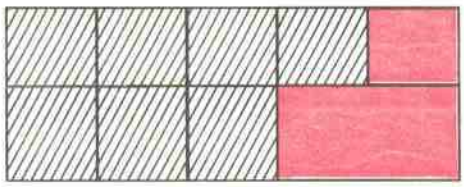


0.07 is written from $\frac{7}{100}$ in decimal,

$\frac{15}{100}$ is written as 0.15.

0.79 is written for $\frac{79}{100}$



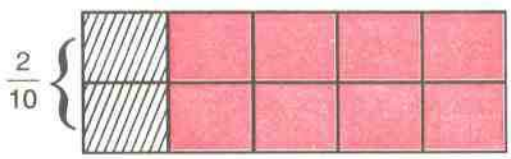


In the above figure, a rectangle and $\frac{7}{10}$ of the second rectangle is coloured.

both of them can be written in fraction as $1\frac{7}{10}$

For the fraction $1\frac{7}{10}$, we write 1.7 in decimal.

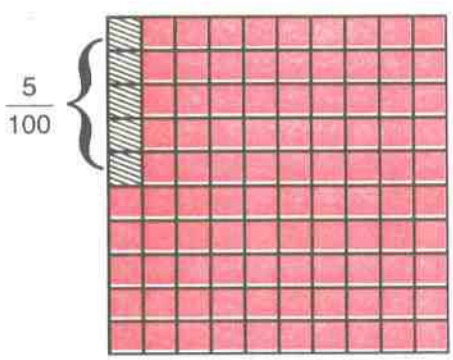
Similarly $= 3\frac{7}{100} = 3.07$ and $= 5\frac{59}{100} = 5.59$



The figure is divided into 10 equal parts. The coloured parts can be written as $\frac{1}{5}$ or $\frac{2}{10}$

So, $\frac{1}{5} = \frac{2}{10} = 0.2$

The figure is divided into hundred equal parts. The coloured parts can be written in the following way:



$\frac{5}{100}$

So, $\frac{5}{100} = 0.05$

Example 1

1. Write in decimal:

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

To make denominator 10, multiply by 2

$\frac{3}{5} = \frac{3\times2}{5\times2}$

$= \frac{6}{10}$

$= 0.6$

(b) $\frac{2}{25}$

Make denominator 100

$\frac{7}{25} = \frac{7\times4}{25\times4}$

$= \frac{28}{100}$

$= 0.28$

Exercise 4.5

1. Write in decimal:

(a) $\frac{8}{10}$ (b) $\frac{5}{10}$ (c) $3\frac{6}{10}$ (d) $9\frac{5}{10}$ (e) $12\frac{7}{10}$

(f) $\frac{89}{100}$ (g) $\frac{45}{100}$ (h) $\frac{9}{100}$ (i) $8\frac{12}{100}$ (j) $30\frac{8}{100}$

2. Write in fraction:

(a) 0.5 (b) 0.9 (c) 3.4 (d) 8.2 (e) 10.8

(f) 0.37 (g) 0.53 (h) 0.77 (i) 12.05 (j) 18.68

3. Write in decimal:

(a) $\frac{2}{5}$ (b) $\frac{4}{5}$ (c) $\frac{1}{2}$ (d) $\frac{7}{50}$ (e) $\frac{13}{20}$

(f) $\frac{1}{4}$ (g) $\frac{4}{25}$ (h) $\frac{3}{4}$ (i) $\frac{9}{25}$ (j) $\frac{15}{20}$

Units, Tenths and Hundredths

10 tenths

The coloured part is a whole (1)

The coloured part is 1 tenth (0.1)

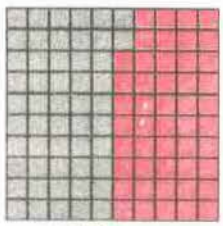
1 whole = 10 tenths

The coloured part is 1 hundredths

1 hundredth = 0.01

Similarly,

0.37



0.52

Example 1

Study the following examples and learn:

(a) 2.3 (b) 0.64

(a) 2.3 = 2 whole and 3 tenths = 20 tenths + 3 tenths = 23 tenths
= 2.0 + 0.3 = 2.3

(b) 0.64 = 64 hundredths = 60 hundredths and 4 hundredths = 0.6 + 0.04
= 0.64

Example 2

Study the following examples and learn:

(a) 35 tenths (b) 26 Hundredths

(a) 35 tenths = 30 tenths and 5 tenths = 3 + 0.5 = 3.5

(b) 26 hundredths = 2 tenths and 6 hundredths = 0.2 + 0.06 = 0.26

Exercise 4.6

1. **Write in tenths:**

   (a) 3 ones (b) 7 ones (c) 4 ones (d) 9 ones

2. **Do as example 1:**

   (a) 1.8 (b) 4.5 (c) 3.7 (d) 8.0 (e) 0.46

   (f) 0.08 (g) 0.67 (h) 1.37 (i) 2.09 (j) 4.84

3. **Do as example 2:**

   (a) 52 tenths (b) 49 tenths (c) 30 tenths (d) 80 tenths

   (e) 45 hundredths (f) 76 hundredths (g) 28 hundredths

4. **25.67 = 2 tens, 5 ones, 6 tenths and 7 hundredths**

   Write the followings like the above:

   (a) 5.69 (b) 89.36 (c) 152.87 (d) 220.95

5. **4 tens, 6 ones, 3 tenths and 8 hundredths = 46.38**

   Write the followings like the above:

   (a) 7 tens, 8 ones, 4 tenths and 9 hundredths

   (b) 5 tens, 3 ones, 5 tenths and 7 hundredths

   (c) 8 tens, 0 one, 3 tenths and 4 hundredths

   (d) 2 hundreds, 0 ten, 6 ones, 0 tenths and 5 hundredths

Addition of Decimal Number

Example 1

Add: (a) $0.4 + 0.3$ (b) $0.9 + 0.8$

(a) $0.4 \rightarrow$ 4 tenths
$+\ 0.3 \rightarrow +$ 3 tenths
$0.7 \rightarrow$ 7 tenths

(b) $0.9 \rightarrow$ 9 tenths
$+\ 0.8 \rightarrow +$ 8 tenths
$1.7 \rightarrow$ 17 tenths

Example 2

Add: (a) $0.43 + 0.35$ (b) $0.48 + 0.29$

(a) $0.43 \rightarrow$ 4 tenths 3 hundredths
$+\ 0.35 \rightarrow +$ 3 tenths 5 hundredths
$0.78 \rightarrow$ 7 tenths 8 hundredths

(b) $0.48 \rightarrow$ 4 tenths 8 hundredths
$+\ 0.29 \rightarrow +$ 2 tenths 9 hundredths
$0.77 \rightarrow$ 7 tenths 7 hundredths

(17 hundredths = 1 tenths and 7 hundredths)

Exercise 4.7

Add:

1. (a) $0.3 + 0.2$ (b) $0.6 + 0.2$ (c) $0.4 + 0.2$ (d) $0.2 + 0.5$

2. (a) 3.9 + 0.5 (b) 0.7 + 0.3 (c) 4.8 + 1.2 (d) 27.9 + 56.7

3. (a) 0.54 + 0.32 (b) 4.63 + 0.54 (c) 5.32 + 12.93 (d) 52.63 + 23.94

(e) 0.23 + 0.42 + 0.31 (f) 15.34 + 6.02 + 7.43 (g) 3.37 + 2.48 + 0.15 (h) 27.58 + 37.43 + 53.63

(i) 0.65 + 0.27 (j) 0.34 + 0.58 (k) 2.29 + 6.16 (l) 9.86 + 5.69

4. Add:

(a) 6.72 + 9.18 + 3.29 (b) 14.1 + 36.08 + 7.96

Subtraction of Decimal Number

Example 1

Subtract:

(a) 0.9 − 0.3 (b) 8.3 − 0.6

(a) 0.9 → 9 tenths
− 0.3 → 3 tenths
0.6 → 6 tenths

(b) 8.3 → 8 whole and 3 tenths → 7 whole and 13 tenths
− 0.6 6 tenths → 0 whole and 6 tenths
7.7 → 7 whole and 7 tenth

Example 2

Subtract:

(a) $0.98 - 0.45$ (b) $0.64 - 0.28$

(a) 0.98 → 9 tenths and 8 hundredths
-0.45 → $-$ 4 tenths and 5 hundredths
0.53 → 5 tenths and 3 hundredths

(b) 0.64 → 6 tenths and 4 hundredths → 5 tenths and 14 hundredths
-0.28 → $-$ 2 tenths and 8 hundredths → $-$2 tenths and 8 hundredths
0.36 → 3 tenths and 6 hundredths

Exercise 4.7

Subtract:

1. (a) $0.9 - 0.4$ (b) $1.6 - 0.4$ (c) $8.6 - 0.6$ (d) $40.8 - 23.6$

   (e) $9.3 - 0.8$ (f) $14.2 - 3.7$ (g) $64.5 - 59.7$ (h) $50.0 - 34.6$

2. (a) $0.96 - 0.32$ (b) $6.98 - 3.76$ (c) $60.83 - 43.83$ (d) $0.54 - 0.28$

   (e) $0.84 - 0.26$ (f) $8.82 - 3.43$ (g) $16.14 - 9.08$ (h) $28.20 - 19.58$

3. By how much 5.28 is greater than 3.06?

4. By how much 60 is greater than 21.69?

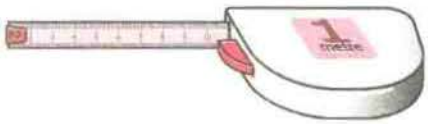
5. **Simplify:**

   (a) $36.08 + 7.8 - 14.1$ (b) $6.72 - 9.18 + 5.29$

Use of Decimal

100 Paisa = 1 Rupee 1 Paisa = $\frac{1}{100}$ Rupee

A metre tape is shown below:



Here, 1 m is divided into 100 cm. Also, you look for a similar tape and observe.

100 cm = 1m

1 cm = hundredths of 1 m

1 cm $\frac{1}{100}$ m

Example 1

Write in rupees: (a) 42 Paisa (b) Rs. 6 and 63 Paisa

(a) 42 Paisa = Rs. $\frac{42}{100}$ = Rs. 0.42

(b) Rs. 6 and 63 Paisa = Rs. $6\frac{63}{100}$ = Rs. 6.63

Exmaple 2

Write in Paisa:

(a) Rs. 0.09 (b) Rs. 0.68

(a) Rs. 0.09 = Rs. 0.09 x 100 Paisa = 9.00 Paisa = 9 Paisa

(b) Rs. 0.68 = Rs. 0.68 x 100 Paisa = 68 Paisa

Exmaple 3

Write in Metre:

(a) 37 cm (b) 7 m and 25 cm

(a) 37 cm $= \frac{37}{100}$ m $= 0.37$ m

(b) 7 m 25 cm $= 7 \text{ m} + \frac{25}{100}$ m $= 7.25$ m

Example 4

(a) Write in cm: 0.53m

(b) Write in metre and cm: 5.63m

Solution

(a) 0.53m $= 0.53 \times 100$ cm $= 53$ cm

(b) 5.63 m $= 5 \text{ m} + 0.63 \text{ m} = 5 \text{ m} + 0.63 \times 100$ cm
$= 5 \text{ m} + 63 \text{ cm} = 5 \text{ m } 63 \text{ cm}$

Exercise 4.8

1. **Write in Rupees:**

   (a) 24 Paisa (b) 93 Paisa (c) 7 Paisa

   (d) Rs 5 and 87 Paisa (e) Rs 8 and 75 Paisa (f) Rs 20 and 80 Paisa

2. **Write in Rupees and Paisa**

   (a) Rs. 0.56 (b) Rs. 0.50 (c) Rs. 0.09 (d) Rs 0.83

   (e) Rs. 8.50 (f) Rs. 12.25 (g) Rs. 3.08 (h) Rs. 35.23

3. **Write in metre:**

   (a) 32 cm (b) 8cm (c) 95 cm

   (d) 8 m 45 cm (e) 25 m 28cm (f) 65 m 29cm

4. **Write in metre and cm.**

(a) 0.87 m (b) 0.6 m (c) 5.50 m (d) 9.73 m

(e) 5.60 m (f) 25.09 m (g) 3.65 m (h) 8.38 m

5. **Write in Rupees and Paisa:**

(a) 62 paisa + Rs. 3.92 + RS. 3.48 + 8 Paisa

(b) Rs. 3.65 + 68 Paisa + Rs. 1.32 + 15 Paisa

(c) Rs. 8.89 + 9 Paisa + Rs. 4.86 + Rs. 7.79

(d) Rs. 0.69 + Rs. 3.69 + 50 Paisa + Rs. 18.36

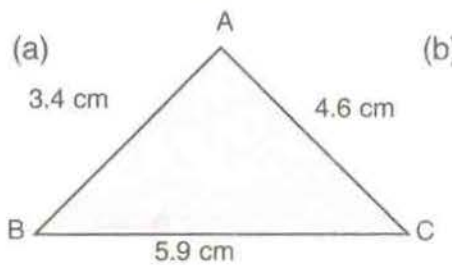
6. **Write in metres and cm.**

(a) 2.41m + 6.0 m + 0.73 m + 22 m

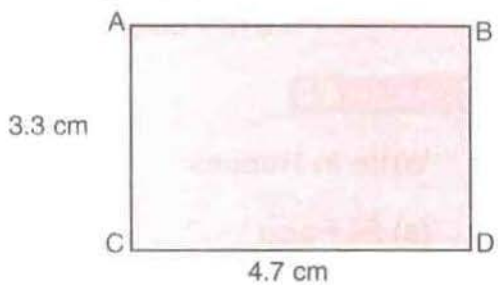
(b) 72 cm + 8 cm + 27.45 m + 26

7. **Find the length of perimeter of each figures:**

(a)



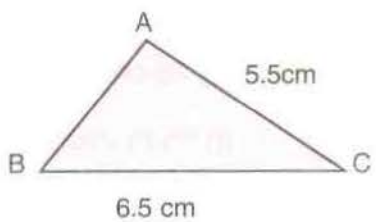
(b)



8 Raju bought a copy of Rs. 3.45 and gave Rs. 5 to shopkeeper. How much will he get return?

9. If a copy is bought of Rs. 5.25 and pencil of Rs. 1.75, how much will he save from Rs. 10?

10. This triangle has the perimeter of 16.5 cm. What is the length of AB?



11. A ——— B
C ——— D

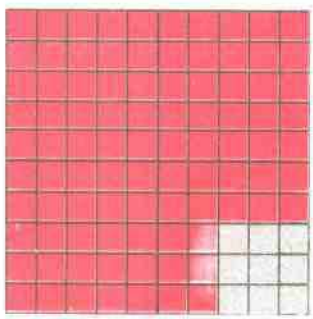
Measure AB and CD in cm. What is the length of the line adding both. How long is CD than AB?

12. P ——— Q
R ——— S

In the figure alongside Rs = 4.7cm PQ is shorter than Rs. by 2.3cm. Find the length of PQ without using a ruler

4.3 Percentage

Among different forms of fraction number, percentage is one. What does the shaded part of the figure alongside denote?



The whole figure has been divided into 100 equal parts, and among which 9 parts have been coloured.

Therefore, the coloured part $= \frac{9}{100} = 0.09$

Here, $\frac{9}{100}$ or 0.09 denotes 9 parts out of 100.

If the denominator of the fraction is 100, what part out of 100 will denote the numerator. The numerator of the fraction with denominator 100 is known as percentage. The sign % indicates percentage.

In the above figure $\frac{9}{100}$ part has been coloured, so it is 9% means 9 out of 100.

When we change a fraction into percentage, we multiply it by 100, and put a sign % For example, $\frac{9}{100} \times 100\% = 90\%$

Exercise 4.9

1. **Write each of the following fractions in percentage.**

   (a) $\frac{5}{100}$ (b) $\frac{17}{100}$ (c) $\frac{38}{100}$ (d) $\frac{65}{100}$

2. **Making each denomination of the following fractions 100, Write in the form of percentage.**

   (a) $\frac{3}{4}$ (b) $\frac{1}{2}$ (c) $1\frac{1}{2}$ (d) $\frac{9}{10}$ (e) $\frac{12}{25}$

3. **5% denotes $\frac{5}{100}$. Likewise, write the following percentage in the form of fraction.**

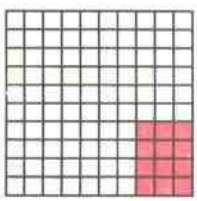
   (a) 3% (b) 13% (c) 55% (d) 115% (e) 63%

4. **Change the following decimals in the form of percentage:**

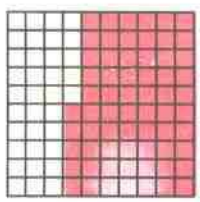
   (a) 0.33 (b) 0.15 (c) 0.10 (d) 0.08 (e) 1.5

5. **For the shaded parts of the following figures, first, write in the fraction, then, in the form of percentage:**

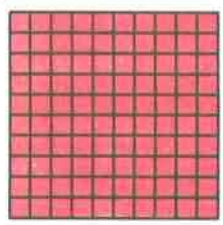
   (a)

   (b)

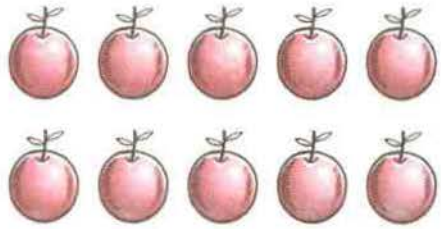
   (c)

6. **In an examination, 10 questions were asked. One question among them was difficult. Write in the fraction from the difficult part of the whole questions. Now, make the denominator 100 and write in the form of percentage.**

4.4 Unitary method

Raju Paid Rs. 2 to buy an orange. How can we find out the price of 10 oranges? To find out the price of 10 oranges using the price of 1 orange, we multiply by 2



10 x Rs 2 = Rs 20

Let's think of the same question in a different method:

Raju bought 10 oranges for Rs 20. What price did he pay for one orange? Lets' divide the total price by the number bought, and see what happens.

$$10 \overline{)\,20} \quad 2$$
$$\underline{20}$$
$$x$$

So it's clear that one orange costs Rs 2.

In this way, if we know the price of a certain number of the same thing, we can find out the price of one of them by dividing it by the total number bought. This is known as a unit price. Similarly, if we know the price of one item, and want to find the total price of a certain number of the same thing, we should multiply the total number by the unit price.

Exercise 4.10

1. **If one mango costs Rs 3, what is the price of 15 mangoes?**
2. **If one dozen of exercise books costs Rs. 60, What is the price of 12 dozens?**
3. **If one dozen of pencils costs Rs. 24, What is the price of 1 pencil?**
4. **Ramesh paid Rs 1600 to the shopkeeper in buying 2 sarees. What was the price of 1 saree?**
5. **If the price of 25 books is Rs. 300, what's the price of 1 book?**
6. **5 people ate 15 samosas in equal numbers. How many samosas did one man eat?**

Teaching Instructions:

The teachers should make some more problems like in the exercise, or make the students do the same and then try to solve the problems.

Lesson 5 Time, money and measurement

5.1 Day, week, month and year

Look at the following calendar and discuss the questions that follow:

Kartik						2067 B.S.
Sun	**Mon**	**Tue**	**Wed**	**Thu**	**Fri**	**Sat**
	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				

(a) Which month's calendar is this?

(b) How many days are there in a week? What are they?

(c) How many days are there in this month?

(d) Are there the same days in all months? How many days are there in each month of the year? Find out days by looking calendar?

Teaching Instructions:

Bring a real calendar and disucss on all information available in the calendar.

Relation among day, week, month and year

Look at the following table to learn relation of time:

24 hours = 1 day

7 days = 1 week

30 days = 1 months

12 month = 1 year

Conversion of day and week

Exmaple 1

Convert 25 days into week and day:

There are seven days in a week. So divide the days by 7 to convert the day into week.

Such as:

$$7 \overline{)\,25}\ 3$$

$$-21$$

$$4 \text{ days}$$

Hence, 25 days = 3 weeks & 4 days.

Conversion of day into month

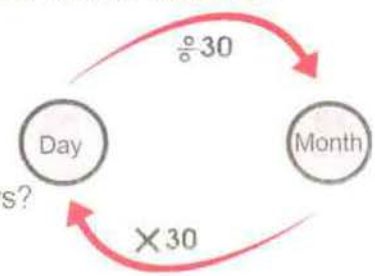
There are not 30 days in all months but calculation is carried out taking 30 days in a month. How many days are there in two months?

1 month = 30 days

2 months = 30 x 2 = 60 days

Now, we can say, how many months are in 60 days?

How do we know?



To convert days into month, we should divide by 30.

Example 2

How many months are there in 250 days?

Divide 250 by 30, then

$$
\begin{array}{r}
8 \\
30 \overline{)\ 250} \\
-\ 240 \\
\hline
10
\end{array}
$$

From the above, we know that 250 days = 8 months and 10 days.

Conversion of Month into Year

There are 12 months in a year. Then, there are 24 months in 2 years. Here, to convert year into month, we multiplied by 12. Then, to convert month into year, what should we do?

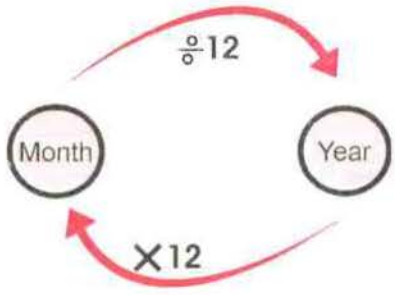
We should divide months by 12 to convert month into year.

Example 1

How many years are there in 124 months?

Dividing 124 months by 12:

$$
\begin{array}{r}
10 \text{ years} \\
12 \overline{)\ 124} \\
-\ 12 \\
\hline
04 \text{ months}
\end{array}
$$



Thus, 124 months means 10 years and 4 month.

Day and Year

Look, observe & Learn

Jestha						2067 B.S.
Sun	**Mon**	**Tue**	**Wed**	**Thu**	**Fri**	**Sat**
30	31					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

Above calendar in related to Jestha month of 2065 BS. How many days are there in the above month? count.

There are 12 month in a year. Generally, there are 30 days in a month. But some of them also have 29, 31, 32 days. What are the days of each year? Find out days of all months of this year by counting days?

Generally, there are 365 days in a year.

Problem related to day and year:

A year has 365 days, write appropriate number in the box in your copy.

1 year = 365 days

in 2 years = 2 x 365 days = ☐ days

in 3 years = 3 x 365 days = ☐ days

in 4 years ☐ x ☐ days = ☐ days

Exercise 5.1

1. **Convert days into months:**

   (a) 30 days (b) 60 days (c) 240 days

   (d) 300 days (e) 210 days (f) 270 days

2. **Convert days into months and days:**

   (a) 40 days (b) 76 days (c) 87 days

   (d) 125 days (e) 166 days (f) 215 days

3. **Convert days into weeks:**

   (a) 14 days (b) 21 days (c) 35 days

   (d) 63 days (e) 273 days (f) 364 days

4. **Convert days into weeks and days:**

   (a) 24 days (b) 47 days (c) 83 days

   (d) 132 days (e) 240 days (f) 320 days

5. **Convert year into days:**

   (a) 2 years (b) 4 years (c) 6 years

   (b) 14 years (e) 20 years (f)50 years

5. **Convert months into years:**

   (a) 48 months (b) 60 months (c) 84 months

   (d) 108 months (e) 120 months (f) 144 months

7. **Convert months into years and months:**

   (a) 50 months (b) 85 months (c) 170 months

   (d) 250 months (e) 1224 months (f) 2436 months

Time: Hour and Minute

If the minute hand rotates one round, it is 60 minutes. There are 60 minutes in an hour. Hour hand crosses as one number in an hour.

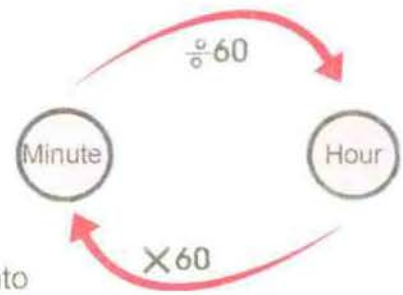
Look at the following clocks.



Look and read times in these clocks. How much difference of time is there in the first and third clocks. Discuss:

Read, discuss and learn:

Look at the right hand side figure, what is written? discuss.



Minute can be converted into hour and hour into minute. To convert hours into minute, multiply by 60, and to convert minute into hour, divide by 60.

Example 1

Convert 5 hour into minutes:

5 hours

= 5 x 60 minutes

= 300 minutes

Example 2

convert 7 hours and 20 minutes into minutes:

7 hrs and 20 minutes

Here, 20 minutes need not to convert. So, convert 7 hrs into minute and add both:

Here, 7 hrs 20 minutes

= 7 × 60 minutes + 20 minutes

= 420 minutes + 20 minutes

= 440 minutes.

Example 3

Convert 250 minutes into hrs and minutes:

To convert minute into hour, we should divide it by 60

$$\begin{array}{r} 4 \\ 60\overline{)\,250} \\ -\,240 \\ \hline 10 \end{array}$$

Here, 250 minute = 4 hrs and 10 minute

Exercise 5.2

1. **Convert hour into minutes:**

   (a) 7 hours (b) 8 hours (c) 24 hours

   (d) 36 hours (e) 100 hours (f) 340 hours

2. **Convert minutes into hour:**

   (a) 120 minutes (b) 180 minutes (c) 240 minutes

3. **Express minutes into hour and minutes:**

   (a) 110 minutes (b) 170 minutes (c) 250 minutes

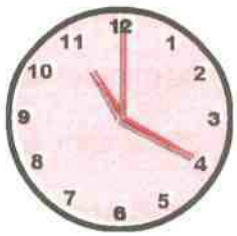
   (d) 340 minutes (e) 420 minutes (f) 570 minutes

Time: Second and minute

Rina and Sita are playing skipping. To skip 15 times, how much time do you take? Such little time is lesser than a minute. Second is used to measure such small time. It takes 15 seconds to skip 15 times. Second is a unit of time.

There are 60 seconds in a minute.

Thin hand in clock shows time in second.
It moves one round in one minute.
Hence, 60 seconds is equal to one minute.

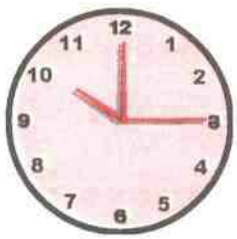


Activity 1

It is 15 second past 10 in o'clock where will second hand reaches after 20 seconds?

Activity 2

Where do you reach in 30 second by running.
Find out with the help of your teacher and friends by using stop watch.



Problems related to second.

Example 1

If 60 seconds are equal to 1 minute, how many seconds will be there in 3 minutes?

1 minute = 60 seconds

3 minute = 3 × 60 second = 180 seconds

Example 2

Convert time into seconds.

2 minutes 15 seconds

= 2 minutes + 15 seconds

= 2×60 seconds + 15 seconds = 120 seconds + 15 seconds = 135 seconds

Exercise 5.3

Convert in seconds:

(a) 12 minutes

(b) 15 minutes and 20 seconds

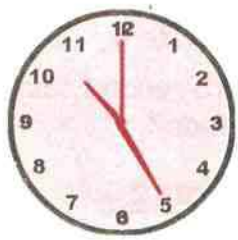
(c) 30 minutes and 45 seconds

(d) 32 minutes and 10 seconds

(e) 35 minutes and 40 seconds

Read, Discuss and Learn:

In the given clock, time is 25 minute past 10 o'clock. Where should hands of clock reach after 1 hr and 30 minutes? Discuss.



Addition of Time

Example 1

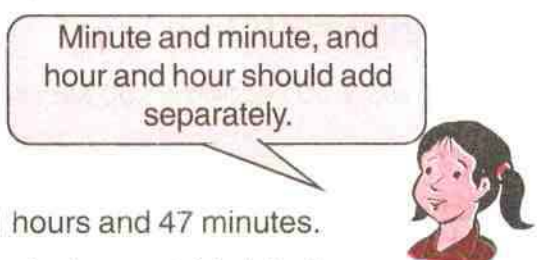
Hari went to the hospital at 10:30. He reached hospital in 1 hr and 17 minutes, at what time will he reach hospital?

Hari departed to hospital from home=10:30

Time to reach hospital in = 1:17

Can we find out time took to reach hospital? Let's see:

$$\begin{array}{rl} & 10 \text{ hrs } 30 \text{ minutes} \\ + & 1 \text{ hrs } 17 \text{ minutes} \\ \hline & 11 \text{ hrs } 47 \text{ minutes} \end{array}$$



Now, time Hari reached hospital at 11 hours and 47 minutes.

47 minutes past 11 o'clock.

Subtraction of time

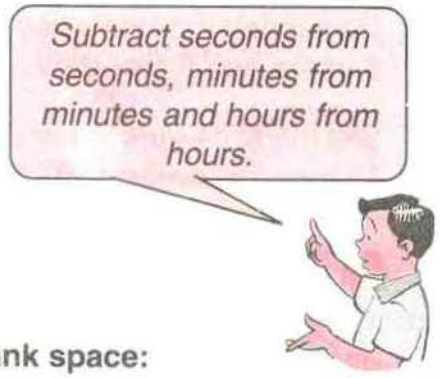
Example 2

Subtract 8 hours 15 minutes 10 seconds from 12 hours 30 minutes and 15 seconds.

12 hours 30 minutes 15 seconds

- 8 hours 15 minutes 10 seconds

4 hours 15 minutes 5 seconds



Exercise 5.4

1. **Write an appropriate number in blank space:**

   (a) 60 second = ☐ minute (b) ☐ minutes = 1 hour

   (c) ☐ days = 1 year (d) ☐ hours = 1 day

   (e) 7 days = ☐ weeks (f) ☐ days = 1 month

   (g) 1 minute 20 seconds = ☐ second

   (h) 1 day 5 hours = ☐ hour

   (i) One year 4 months = ☐ months.

2. **Look at the watch. What will be time after 40 minutes? Calculate.**

3. **What will be the time in the given clock after 2 hours 15 minutes?**

4. **Phurwa went to the market at 2:30 o'clock Phurwa returned home in 1 hour 43 minutes time of departure from home, at what time phurwa will come home?**

5. **Teacher entered into class at 12:15 o'clock. If he returned from class after 50 minutes, at what time will he return from class?**

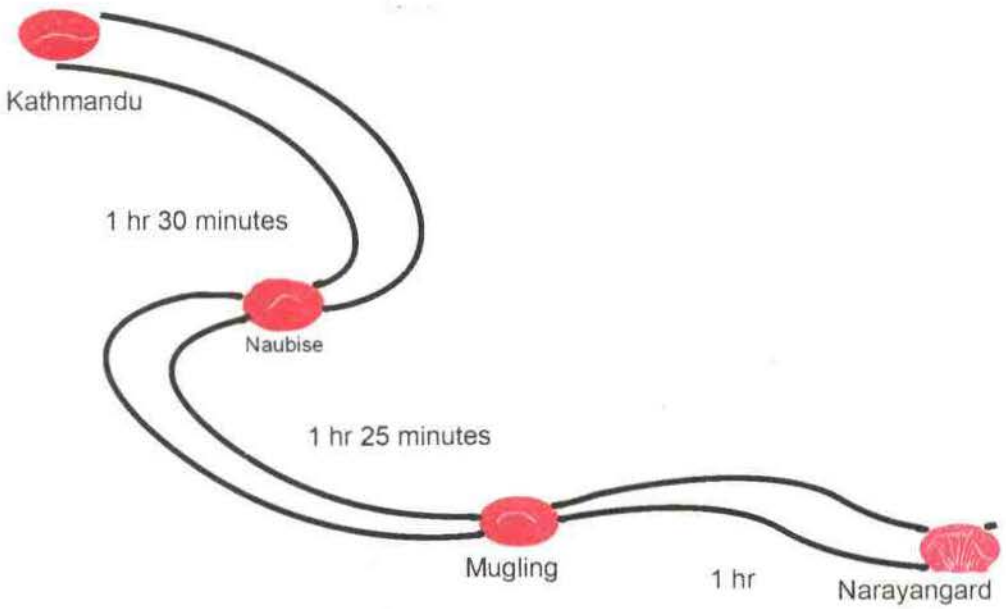
6. **Kailash went home for two months in winter vacation but he returned after 20 days, how many days ahead will he return?**

7. **There is a three days travelling. After travelling 52 hours, how many hours were left to travel?**

8. **How many months will you add in 5 years and 7 months to make 8 years and 9 months?**

9. **Sita made a figure in her drawing paper in 3 days. She spends 1 hr. 15 minutes on Sunday, 3 hrs 20 minutes on Monday and 2 hrs 5 minutes on Tuesday. How much time will she use in drawing the figure?**

10. **Time taken by a bus to reach Narayangarh from Kathmandu is given below. What time will the bus take to reach Narayangarh from Kathmndu?**



11. **A worker has worked for 3 months 25 days. If he gets wages for only 2 months 3 days, how many day's wages are left to get?**

5.2 Money

Look and Recognize:

Re. 1

Rs. 2

Rs. 5

Rs. 10

Rs. 20

Rs. 25

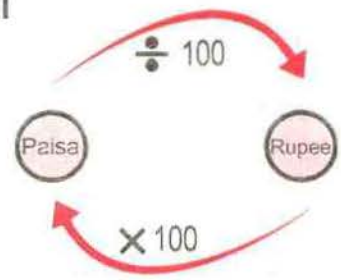
Rs. 50

Rs. 100

Rs. 500

Rs. 1000

Money is in the form of coins and notes. Small unit of money is paisa. There are 100 paisa in one Rupee. Can you tell, how many rupees will be in 200 paisa?



How do you know? discuss it.

What is given in the figure? Paisa is divided by 100 to convert into rupee.

Similarly, rupee is multiplied by 100 to change into paisa.

Conversion of money

Example 1

How much paisa are there in 3 rupees and 25 paisa?

Here, 3 Rupees 25 paisa = 3×100 paisa + 25 paisa = 325 paisa.

Example 2

How much rupee and paisa are there in 365 paisa?

Re. 1 = 100 Paisa

Divide by 100 paisa

$$\begin{array}{r} 3 \\ 100\overline{)\,365} \\ -\,300 \\ \hline 65 \end{array}$$

Hence, 365 paisa is equal to 3 rupees 65 paisa.

Word problems related to money

Example 3

Suresh received Rs 2 and 60 paisa from mother and Rs 2 and 75 paisa from father. Now, how much money will Suresh have?

Adding Rupees and Paisa separately,

Rs.	Paisa
3	60
+2	75
5	135

= Rs. 6 and 35 Paisa

Because, 135 paisa = Rs. 1 and 35 paisa

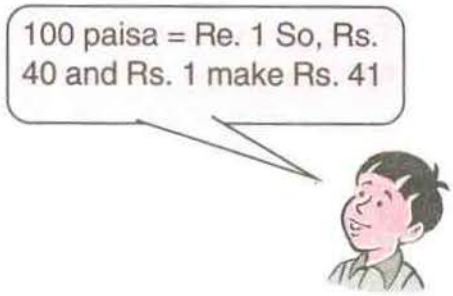
Example 4

Hadim has put money in four bags. Rs 10 and 25 paisa in each bag. How much paisa will he have?

Rupees and paisa multiplying separately-

Rs.	P.
10	25
x	4
40	100

= Rs. 41



Example 5

Dividing Rs. 12.60 paisa into 4 persons, how many paisa will each person get?

Dividing rupees and paisa seperately

	3	15
4	Rs.	P.
	12	60
	– 12	4
	x	20
		– 20
		x

Each will get Rs. 3.15 P.

Exercise 5.5

1. Food items and price menu of a restaurant are given in the following table. Looking at the following table, answer the given problems.

Drinks	Food Item
Juice: Rs. 15 Milk: Rs. 14 Water: Rs. 20	Momo per plate: Rs. 30 Chowmin per Plate: Rs. 20 and 40 paisa Meat and beaten rice per plate: Rs. 50 and 30 paisa

   a. If one juice and a plate of momo are bought, how much will be paid?

   b. If one bottle water and one plate of chow min was eaten, how much will be paid?

c. If Rs. 100 is paid for one plate meat and beaten rice, how much will he get back?

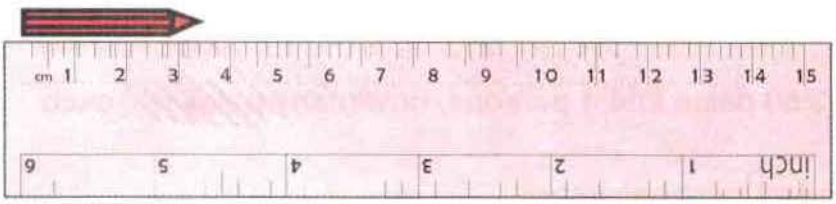
d. If 2 plates of chowmin are eaten, how much will you pay?

2. If someone bought similar five books for Rs. 175 and 50 paisa, how much a book will cost?

3. The price of watch is Rs. 750. If customer has only Rs. 540 and 50 paisa, how many rupees will he need to buy watch?

5.3 Distance

Read and learn:



The length of pencil above is more than 3cm. But its length is not 4 cm. In this situation, small units written among numbers of cm of ruler should be used. These small units are millimeter. There are 10 millimeter units in one centimeter.

Hence, **1 cm = 10 mm**

The length of above pencil reaches 3 cm and 5mm units. Hence, the length of above pencil is 3 cm and 5 mm.

Activities

1. What is the length of your pencil in cm and mm? Tell by measuring it.
2. Find the length of 3 objects which are lesser than 3 cm?
3. What is the length of your thumb of left hand in mm? Measure it with the help of your friend.

Example 1

There are 10 mm in one cm

How many mm are in 7 cm?

1 cm = 10mm

7 cm = 10 × 7 mm = 70 mm.

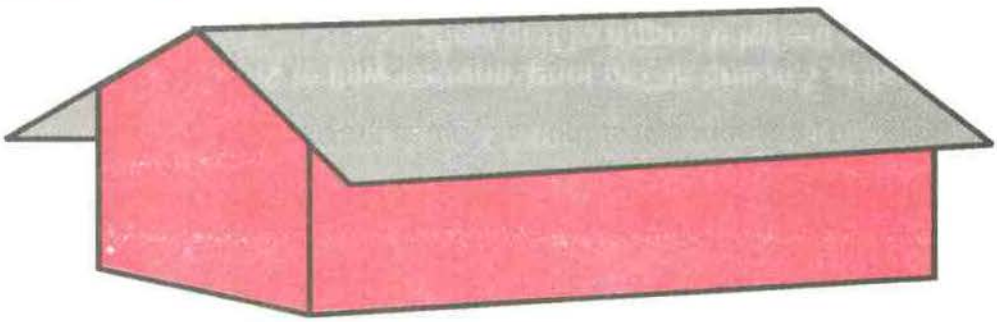
Exercise 5.6

1. **Convert into mm**

(a) 15 cm (b) 25 cm (c) 40 cm

(d) 80 cm 5 mm (e) 92 cm 2mm (f) 87 cm 7mm.

Centimetre, metre, kilometre



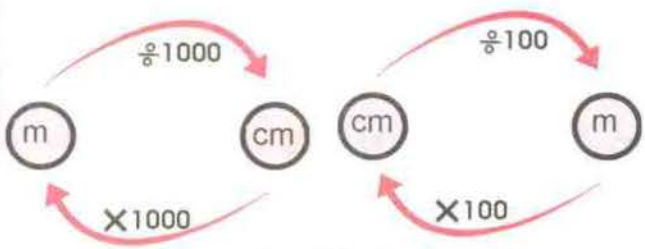
What is the length of this house? It is difficult to measure in cm. Why? To measure distance of one place to another place in also difficult. Hence, we use small and big unit of measurement according to size and distance to be.

Look at the following units of measurement:

10 mm = 1cm

100 cm = 1 metre

1000 metre = 1 kilometre



The length of your two steps (mocks) is approximately 1 metre. How many steps are there in a km? Approximately there are 2000 steps in 1km.

Can you walk 1 km. in one minute?

Which measurement units are appropriate to measure the following distance or length.

(a) length of the table (b) length of the class room

(c) length of the pen (d) length of the book

(e) height of the man (f) height of the tree

(g) length of duster (h) Distance from Pokhara to Birgunj.

(i) Distance from Kathmandu to Narayangadh.

(j) Distance from Mechi river to Mahakali river of Nepal

Exercise 5.7

Make rough estimate and measure in proper scale the distance of the following objects or a place surrounding the school:

(a) Distance from your classroom to room of the head teacher.

(b) Distance from the place where you sit to the place of teacher who is standing in the classroom.

(c) Distance from the school to the toilet.

(d) Distance between classroom of class 1 and 3.

(e) Distance from the school to the tap.

Example 1

How many metres and centimetres are there in 142 cm?

Here, 1m = 100 cm

so, 142 cm = (100 + 42) cm

= 100 cm + 42 cm

= 1m . 42 cm

Example 2

Convert 2m and 30 cm into cm.

Solution

Here, 2m = 2×100cm=200cm

So, 2m, 30cm= (200+30) cm=230cm

Example 3

How long will be the rope if 1m and 36cm long rope is joined to 2m and 85cm long rope?

Here, adding metre to metre and cm to cm

	m	cm
	1 1	36
+	2	85
	3	121
	= 4 m	21 cm

36 + 85 = 121 cm
121 cm = 1 m 21 cm. So 1 m is to add in the column of metre I understood.

Example 4

Out of 3m and 15 cm long stick (Pillar), 1 m 80 cm is painted. What length of the pillar is without paint?

Here, subtracting metre from metre and cm from cm

	metre	cm
	2	115
	3	15
−	1	80
	1 metre	35 cm

80 cm, cannot be substracted from 15 cm. So borrowing 1 m (=100 cm) from 3 m, we add it to 15 cm then, 100 + 15 = 115 cm

Hence, the length without paint= 1m 35 cm

Exercise 5.8

1. **Convert into cm:**

   (a) 2 m (b) 3 m (c) 5 m (d) 3m 55 cm

2. **Convert into metre and cm.**

   (a) 200 cm (b) 600 cm (c) 123 cm (d) 225 cm

3. **Convert into km. and m:**

   (a) 1025 m (b) 1500m (c) 2556 m (d) 2000 m.

4. **Convert into metre.**

(a) 3 km (b) 5 km

(c) 10 km 230 m (d) 15 km 30 m

5. **Add:**

(a) 15 m 75 cm
+ 7 m 35 cm

(b) 9 m 75 cm
+ 10 m 75 cm

(c) 150 km 900 m
+ 306 km 880 m

(d) 170 km 680 m 75 cm
+ 150 km 450 m 60 cm

6. **Subtract:**

(a) 15 m 60 cm
– 12 m 90 cm

(b) 17 m 76 cm
– 12 m 85 cm

(c) 100 km 700 m
– 90 km 800 m

(d) 324 km 582 m
– 190 km 683 m

7. **A wall is 7 m and 50 cm long, another wall of 2m and 60 cm long. What is the total length of this wall?**

8. **A blackboard is 2m and 15cm long and 1m and 75 cm width, How more is the length than its width?**

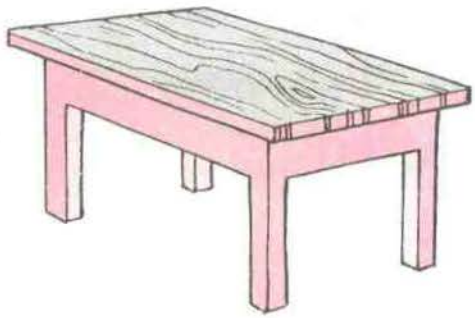
9. **A rubber of 1m and 20cm long in stretched. Then, its length is 1m and 55cm. How many cms of rubber is stretching?**

10. **A road is 200km long to be constructed. After constructing 120 km and 750m long road by local voluntary work, how much is left to construct?**

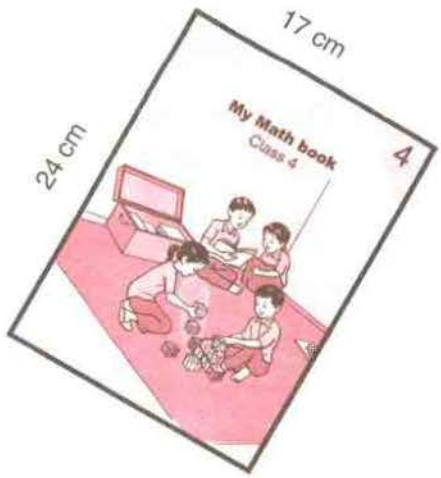
11. **How long the piece of cloth will be after sewing four pieces each of 10 m and 76 cm long?**

5.4 Perimeter of a rectangle

What is the shape of the upper surface of a table? Measure its length and breadth using meter scale. What is the difference between the length and breadth of the table? How long will be the perimeter of surface of upper part of the table? Make a list of such rectangular objects which are in the classroom.



My Mathematics, Book 4 is 24 cm long and 17 cm wide. What will be its perimeter? Measurement of all sides in called perimeter. How many times the length is measured when the perimeter of the book is measured?



Should the breadth of the book by measured two times as length was measured or not?

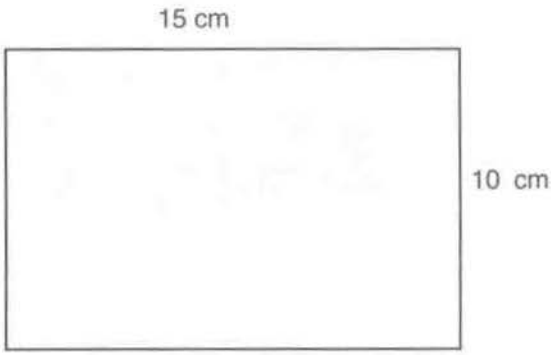
Here, Perimeter = 2×24 cm + 2×7 cm

48 cm + 34 cm = 82 cm

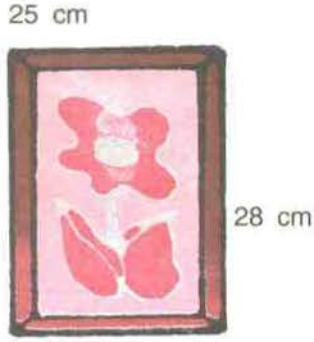
Exercise 5.9

1. Find the perimeter of each rectangular objects given below:

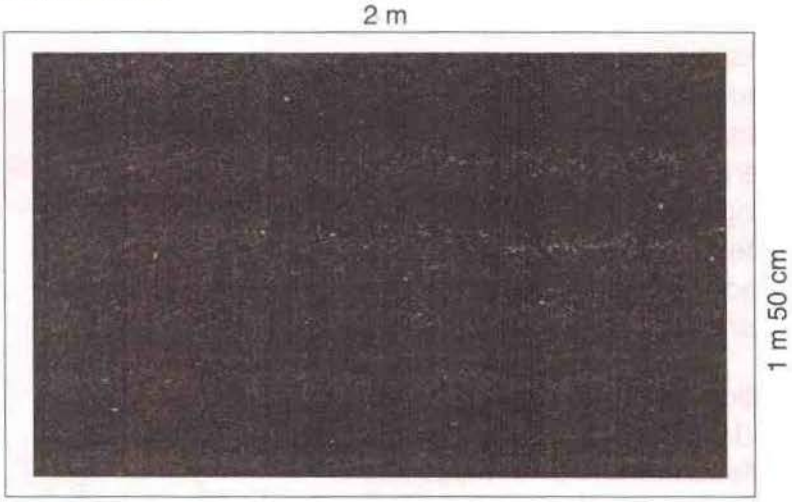
(a) A piece of paper



(b) A photo frame



(c) Blackboard



(d) The length of garden is 20m and 50cm and breadth of garden is 18m and 60 cm.

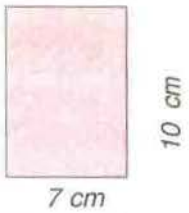
5.5 Area

Place covered by surface of an object is called area of surface of the object.Place covered by Book and copy is given in the figure. Look at these pictures. Which area is greater?

Book

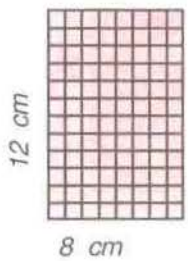
Note Copy

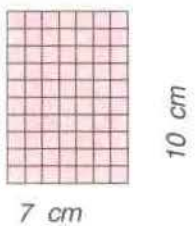
Perimeter of book



Perimeter of Copy

Now, draw lines for length and breadth in 1 cm difference in both pictures.





Count the square of book:

There are 12 squares in the length side.

There are 8 squares in the breadth side.

How many total squares are there in the figures?

Total 12×8=96 squares

Count the square of copy:

There are 10 squares in the length side.

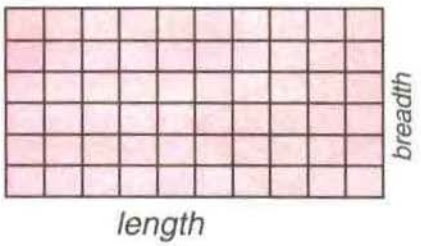
There are 7 squares in the breadth side

Total 10×7= 70 squares

So, the area of book is 96 square cm, and area of copy is 70 square cm. Hence, the area of book is greater than area of copy.

Example 1

Find out the area of complete figure by counting 1 cm^2 room in length and breadth.



Number of squares in the length side = 10

Number of squares in the breadth = 6. Therefore, Area of figure = 10×6 = 60cm^2

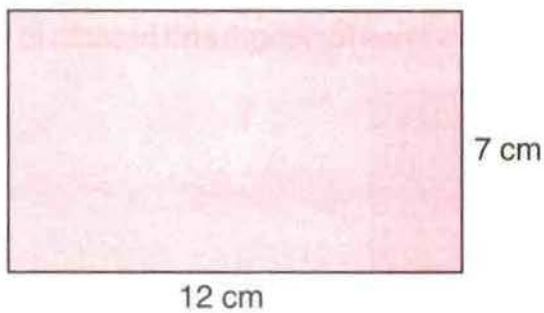
Example 2

Find out the area of rectangular shape given below:

The length of given rectangular = 12 cm

breadth = 7cm

area = 12 × 7 cm^2 = 84 cm^2

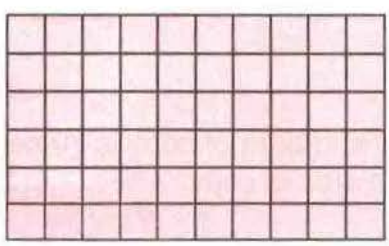


Exercise 5.10

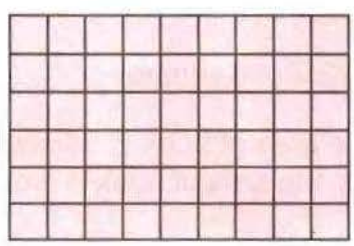
1. **Find the area of rectangular by counting square units of length and breadth as given below:**

   (area of square (1) = 1cm^2)

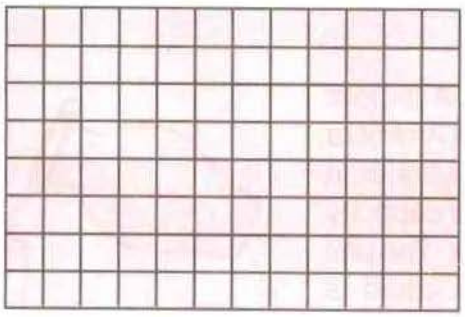
   (a)



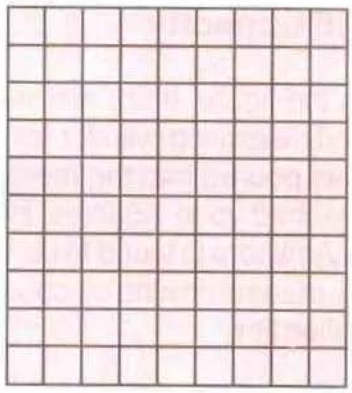
   (b)



(c)

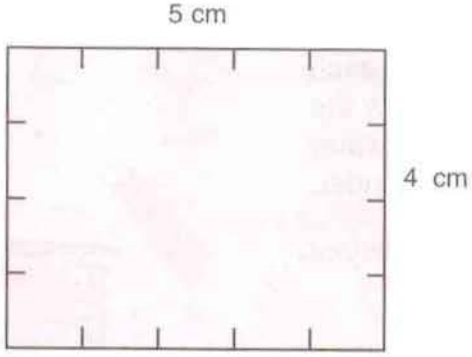


(d)



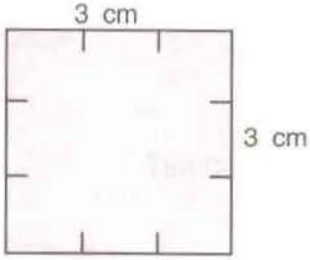
2. Draw the squares unit in each of the following rectangular shapes and find the area:

(a)



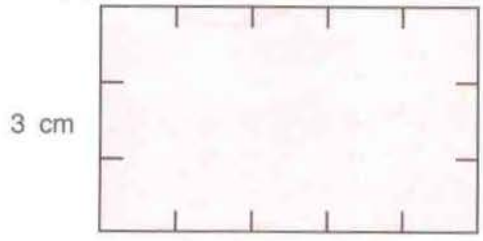
(b)

(c)

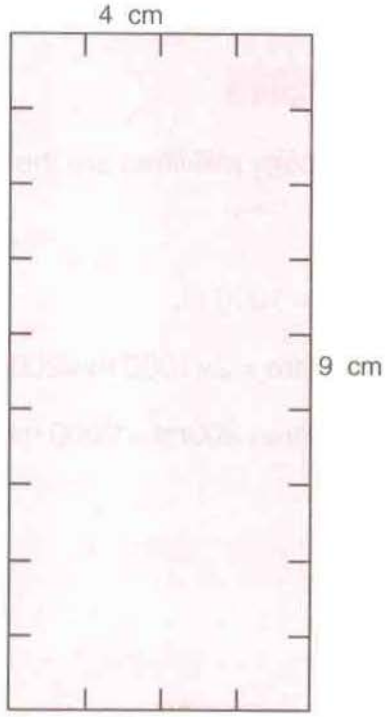


3. Find the area of rectangular shapes:

(a)



(b)



Exercise 5.11

1. Convert into millilitres:

(a) 2 litres (b) 5600 ml

(c) 7391 ml (d) 2 litres 500 ml.

2. convert into litre and millilitre:

(a) 1760 ml (b) 3 litres

(c) 2 litres 500 ml (d) 2 litres 750 ml

3. Add:

(a) 3 litres 750 ml
+ 5 litres 200 ml

(b) 6 litres 390 ml
+ 8 litres 715 ml

(c) 4 litres 126 ml
+ 9 litres 900 ml

(d) 13 litres 678 ml
+ 17 litres 588 ml

4. Subtract:

(a) 9 litres 315 ml
− 6 litres 500 ml

(b) 5 litres 600 ml
− 3 litres 875 ml

(c) 17 litres 750 ml
− 9 litres 900 ml

(d) 8 litres 28 ml
− 7 litres 588 ml

5. Shila went to the shop taking a bottle of 750 ml and she bought 1 litre of oil. How much oil is excess?

Example 2

How many litres and millilitre are there in 3500 millilitre?

1000 ml = 1 litre

So, by division

3500 ml = 3 litre 500 ml

500 ml = 0.5 litre

so, 35 ml = $3\frac{1}{2}$ litres

```
        3
   ┌──────
1000 3500
   -3000
   ──────
     500
```

Example 3

Add: 3 litres 720 ml and 5 litres 630 ml

solution,

	litres	ml
	3	720
+	5	630
	8	1350
	= 9 l	350 ml

Exmaple 4

Subtract 2 litres and 500 ml from 4 litres and 325 ml.

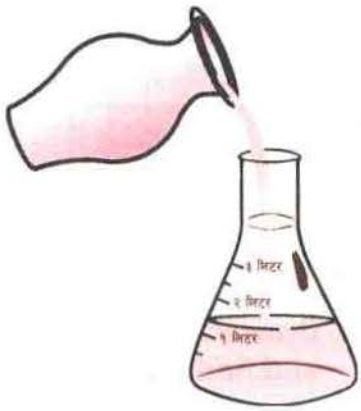
solution,

litres	ml
3	
~~4~~	1325
– 2	500
1 l	825 ml

500ml cannot be subtracted from 325 ml. So, we borrow 1 litre from 4 litres and add it to 325. Then we have 1325. and subtract from 500 from it.

5.6 Capacity

In the figure, there are two pots: Amkhora and measuring cylinder, full water of Amkhora was poured into the measuring cylinder. It reached up to 1.5 litres. Here, the capacity of Amkhora is found to be 1.5 litres. The unit of measurement of capacity of liquid is called litre.



In the adjoining figure, there are measuring cylinder and a test tube. How much water does the test tube contain? Or what is the capacity of the test tube? Amount of 1 litre is divided into 1000 equal parts and each part is called 1 millilitre. Now, to know the capacity of the test tube, we pour the water of the test tube into the measuring cylinder.

So, unit of measurement of the quantity of liquid is litre,

1 litre = 1000 millilitre

= 1000ml

Example 1

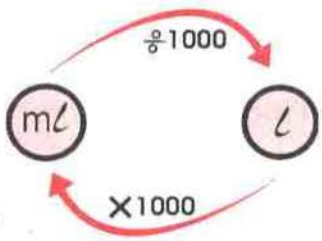
How many millilitres are there in 2 litres and 360 ml?

Here,

1 litre = 1000 m.

So, 2 litre = 2×1000 ml=2000ml

So, 2 litres 300ml = 2000 ml + 300ml =2300 ml.

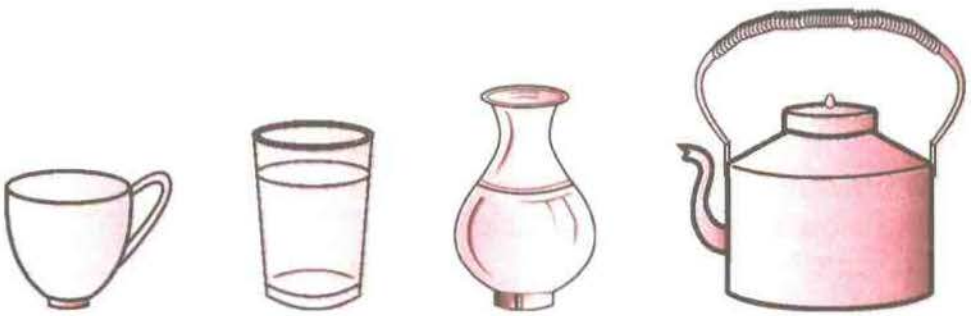


6. **How many bottles of 500ml are needed to hold 2 litre oil?**

7. **Four persons drank 1 litre and 200ml milk equally. How much did each drink?**

8. **A kettle contains 1250 ml. How much tea will hold in such 4 kettles?**

9. **Look at the pots and their capacities in the figure. Answer the following questions.**



265 ml *385 ml* *563 ml* *1 l 250 ml*

(a) How many litres and millilitres had altogether in all pots?

(b) How much water in kettle is less or more than the collective amount of water in the cup glass and amkhora?

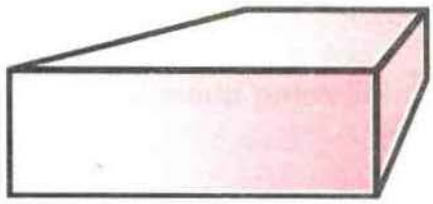
(c) If water from the kettle is poured into the glass, what amount of water is left in the kettle?

(d) How many cups can be filled with the water of kettle, and how much water is left in the kettle?

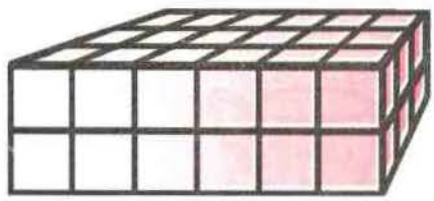
5.7 Volume

Adjoining block of wood is one cm each in length, breadth and height. So, its volume is 1 cubic cm.

Objects whose length, breadth and height is equal is called cubic object.



Look at adjoining block of Wood, what is the volume of the block of wood? To know the volume of block of wood, add 1 cm length, breadth and height by marking line, in this way, we get a figure:



Now, draw the lines dividing it into blocks. How many blocks of 1 cubic cm in figure?

Solve it,

Number of small blocks in the length = 6

number of small blocks in the breadth=3

number of small blocks in the height = 2

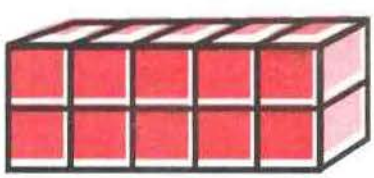
Total blocks = $6 \times 3 \times 2 = 36$

So, the value of block = 36 cubic cm.

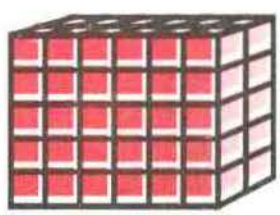
Exercise

1. What is the volume of the following cuboids, and find out the volume by counting the unit cubes.

(a)



(b)

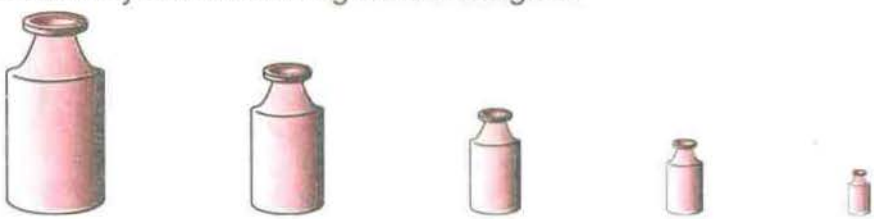


(c) (d)

2. Determine by observation, length, breadth, length of each objects in question no 1. Multiply them in the same number as the volume of the objects?

5.8 Weight

Look carefully at the following units of weights.

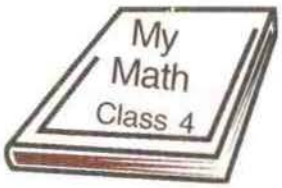


1 kg *500 gram* *200 gram* *100 gram* *50 gram*

Using balance, determine how many weight of 100 grams are in 1 kilogram. Similarly, determine how many weights of 500 grams are there in 1 kg? would one kilogram be equal to 5 weight of 200 grams? check it by using the balance, from these experiments, you have learnt that 1 kg = 1000 grams.

Now, which types of measurity weights will be proper to measure the weights of the following objects. Think about it.

(a) (b) (c)

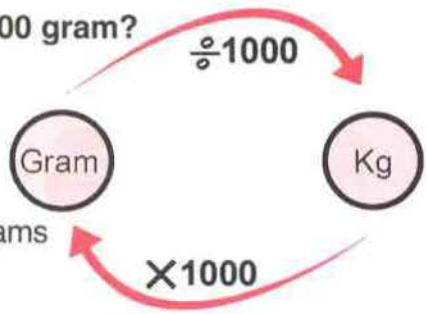
(d) 

(e) 

We know that we chould use proper weights to measure the weight of the given objects. 1 kilogram contains 1000 gms. Hence, we can convert units or gram into one another.

Example 1

How many grams are there in 3 kg and 600 gram?



1 kg = 1000 grams

So, 3 kg = 3×1000 grams = 3000 grams

Then, 3 kg 600 grams = 3000 grams + 600 grams

= 3600 grams

Example 2

How many grams and kg are there in 2780 gram?

solution:

Here, 1 k 10 gram = 1000 grams

So,
$$\begin{array}{r} 2 \\ 1000\overline{)2780} \\ -\ 2000 \\ \hline 780 \end{array}$$

2780 grams = 2kg 780 grams

another method-

2780 = 2000 + 780

= 2×100+780

= 2 kg 780 gram

Example 3

How many kilograms and grams will be there while mixing 3 kg and 700 grams to 5 kg and 600 grams?

	kg	gram
	3	700
+	5	600
	9	300

= 9 kg 300 gram

Exmaple 4

How much will the difference between 5 kilograms and 700 gram and 2 kilograms and 870 grams?

	kg	gram
	$^{4}\not{5}$	700
—	2	890
	2	810

Difference = 2 kg 810 gram

Exercise 5.12

1. **Convert into grams:**

   (a) 2 kg (b) 5 kg (c) 12 kg 50gm

   (d) 3 kg 250 g (e) 7 kg 750 gm

2. **Convert into kg and grams:**

   (a) 1190 grams (b) 1755 grams (c) $3\frac{1}{4}$ kg

3. **Add:**

   (a) 3 kg 300 grams (b) 8 kg 690 grams

   + 2 kg 550 grams + 7 kg 580 grams

(c)
$$\begin{array}{rrr} & 350 \text{ grams} \\ + & 2 \text{ kg} & 690 \text{ grams} \\ \hline \end{array}$$

(d)
$$\begin{array}{rrr} 12 \text{ kg} & 986 \text{ grams} \\ + & 894 \text{ grams} \\ \hline \end{array}$$

4. **Subtract:**

(a)
$$\begin{array}{rrr} 8 \text{ kg} & 300 \text{ grams} \\ - 3 \text{ kg} & 520 \text{ grams} \\ \hline \end{array}$$

(b)
$$\begin{array}{rrr} 12 \text{ kg} & 375 \text{ grams} \\ - 10 \text{ kg} & 650 \text{ grams} \\ \hline \end{array}$$

(c)
$$\begin{array}{rrr} 7 \text{ kg} & 600 \text{ grams} \\ - 5 \text{ kg} & 776 \text{ grams} \\ \hline \end{array}$$

5. **How many grams should be added to 720 gms to make it 1 kg?**

6. **The weight of pair of shoe was 910 gm. When it was repaired changing the sole, its weight reached 1 kg and 120 gms. What was the weight of sole added to it?**

7. **Raja bought 5 kg apple, and out of them 2 kg and 270 grams were rotten. What is the weight of non rotten apples?**

8. **Ghee produced by banspati company is available in plastic bag. If 1 kg ghee is packed in the plastic bag weighting 70 gms. What will be the total weight of ghee and the bag?**

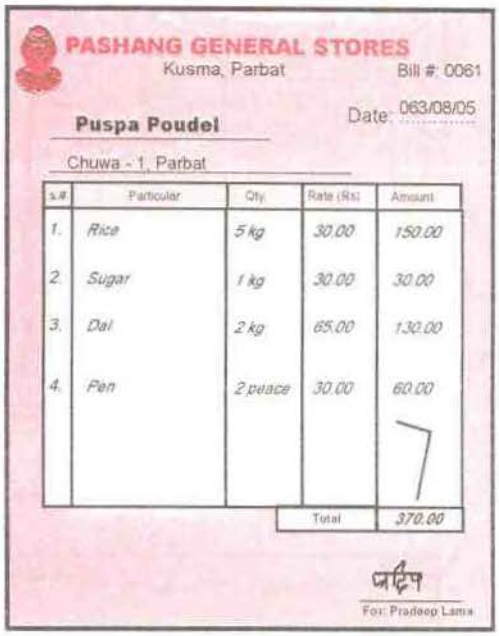
9. **1 kg and 250 gms of apples is divided among five persons equally. How many grams of apples each person get?**

10. **1 kg and 200 gms grapes are divided among four persons. How many grapes will each get?**

11. **A shopkeeper bought 350 kg sugar, out of it, she sold $189\frac{1}{2}$ kg. How much sugar is left at home? Give your answer in kg and gms.**

Lesson 6 Bill and budget

Puspa bought rice, Dal, sugar, and pen from a shop. Shopkeeper gave a bill to her. The bill was like as follow:



PASHANG GENERAL STORES
Kusma, Parbat
Bill #: 0061

Puspa Poudel
Date: 063/08/05

Chuwa - 1, Parbat

S.#	Particular	Qty.	Rate (Rs)	Amount
1.	Rice	5 kg	30.00	150.00
2.	Sugar	1 kg	30.00	30.00
3.	Dal	2 kg	65.00	130.00
4.	Pen	2 peace	30.00	60.00
			Total	370.00

प्रदीप
For: Pradeep Lama

Look at the above bill and answer the following questions:

(a) What was the name of the shop where Puspa bought goods?

(b) Who did sell the goods to Puspa?

(c) What goods did she buy?

(d) How much did she pay altogether?

(e) What parts are included in a simple bill?

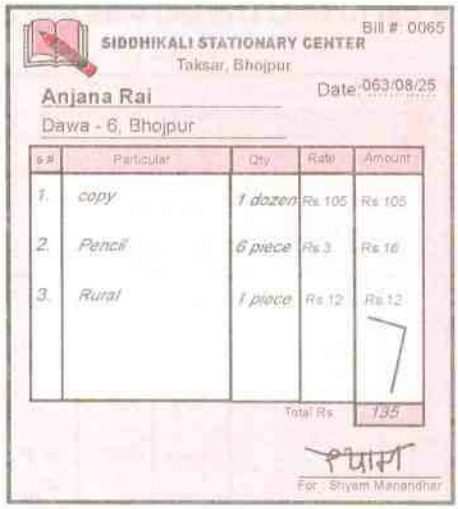
(f) What are the advantages of taking a bill?

Teaching Instructions:

Collect yourself or make students collect original bills. Show the bills and make clear about the parts mentioned in the bill. Make students discuss in the class on the method of calculating total price from quantity and rate, information available in the bill and advantages of taking bills.

Exercise 6.1

1. Read the following bill and answer the following questions.



SIDDHIKALI STATIONARY CENTER
Taksar, Bhojpur

Bill #: 0065

Anjana Rai
Dawa - 6, Bhojpur

Date: 063/08/25

S.#	Particular	Qty	Rate	Amount
1.	copy	1 dozen	Rs 105	Rs 105
2.	Pencil	6 piece	Rs 3	Rs 18
3.	Rural	1 piece	Rs 12	Rs 12
			Total Rs	135

For : Shyam Manandhar

(a) Who purchase the goods?

(b) Who was the seller of the goods?

(c) How many copies did Anjana buy?

(d) What was the price of one pencil?

(e) What was the name of the shop? Where Anjana bought goods?

(f) How much money did Anjana pay?

2. Read the following bill and answer the following questions.

SIRJANA FRUIT SHOP
Mahendrapool, Pokhar

Bill #: 0070

Reeta Gurung
Ghandruk, Pkhara

Date: 064/08/04

S.#	Particular	Qty	Rate	Amount
1.	Apple	2 kg	Rs 55	Rs 110
2.	Orange	1 kg	Rs 40	Rs 40
3.	Banana	1 dozen	Rs 30	Rs 30
3.	Junar	1 kg	Rs 35	Rs 35
			Total Rs	215
			Discount Rs	15
			Grand Total Rs	200

For : Rabin Shrestha

(a) What was the name of the shop where Rita bought fruit?

(b) Which fruits did she purchase?

(c) What was the total price of fruits?

(d) How much did Rita pay to shopkeeper?

(e) Why did the shopkeeper take lesser amount than total price?

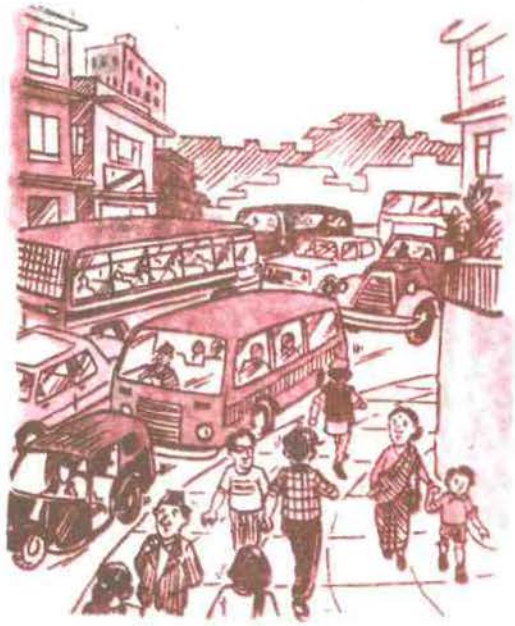
(f) How much discount did the shopkeeper give to Rita?

Teaching Instructions

Show real bills (discount, vat, tax not included ones), and practice to take and give information from the bills.

Lesson 7 Statistics

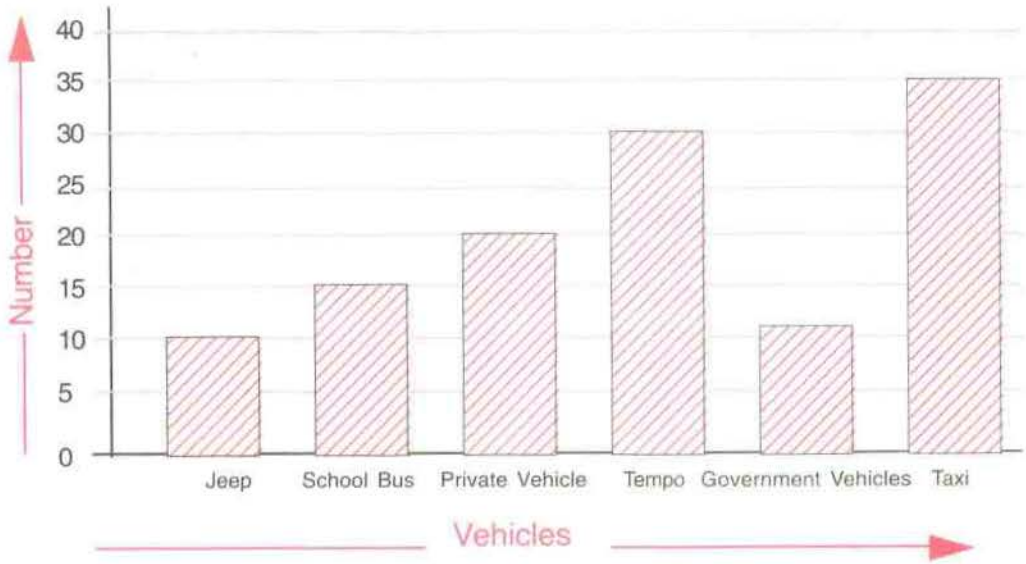
7.1 Bar graph



10 jeeps, 15 school buses, 20 private vehicles, 30 tempos, 12 government vehicles and 35 taxis passed through New road in Kathmandu in the morning , between 9 to 10 o'clock. How this information can be presented so that it is easier to understand for all? Making a table is one of ways to understand information easily. The above information can be presented in the table as follow:

Jeep	School Bus	Private Vehicle	Tempo	Government Vehicles	Taxi
10	15	20	30	12	35

It is easier to understand various facts from the table. If above information is presented in bar graph, it is very easy to compare the facts. The information can be presented in bar graph as below:



Answer the following questions on the basis of the above bar graph.

(a) Which vehicles run most within one hour?

(b) Which vehicles run the least?

(c) What does the height of the bar graph represent?

d) What do the vertical and the horizontal lines represent in the bar graph?

(e) How many vehicles are represented by one square unit in the vertical line?

Thus, the bar graph is very useful to compare the objects having the same characteristics. We can get various information at a glance. The bar graph is used to show and compare height and weight of members of a family; class wise number of students in a school; investment and return of government offices; rainfall and temperature in seven days etc. In which tasks bar graph can be used besides the above mentioned things?

Exercise 7.1

1. There were 100 students in a school. When we asked "Which subject do you like most?" We got the following responses:

Favourite subjects	Nepali	Mathematics	English	Science	Health	Geography
Number of students	15	30	10	25	15	5

Draw a bar graph to represent the above information taking 1 room = 10 students in vertical axis.

2. The number of students who did not do homework among 50 students in class 4 last week is given in the table below. Draw a bar graph taking 1 room = 2 students in vertical axis.

Days	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday
Number of students	6	7	10	3	6	2

Answer the following questions from your bar graph.

(a) Which day most of the students did homework?

(b) Which day least of the students did not do homework?

(c) How many students did not do homework in a week?

3. The height of students of class 4 in cm is given in the following table:

Height	102 cm	103 cm	104 cm	105 cm	106 cm
Number of students	5	10	15	12	8

Draw a bar graph to represent the height of students and answer the following questions.

(a) What is the height of the maximum number of students?

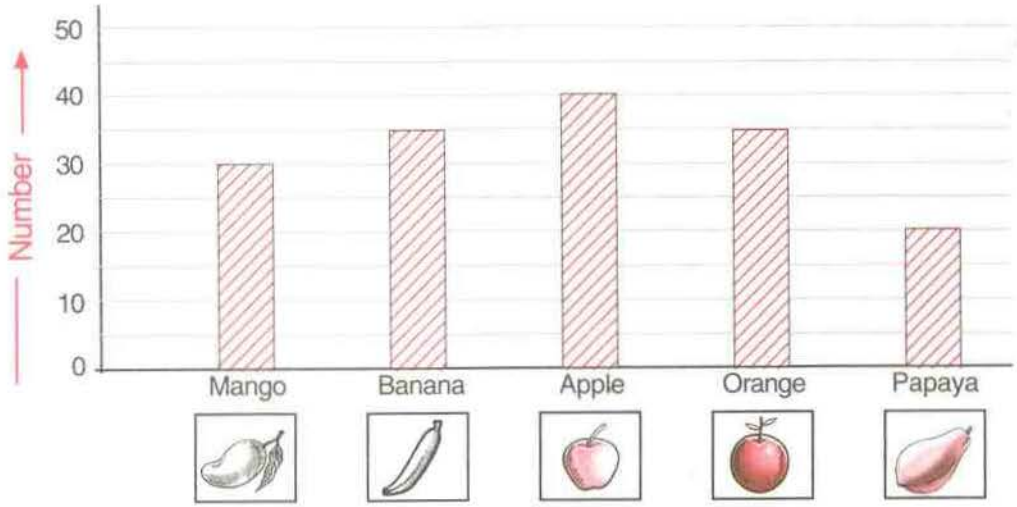
(b) What is the height of the least number of students?

(c) The students with more than 104 cm are considered taller. How many students are taller in the class?

(d) What is the percentage of students whose height is 102 cm?

(e) How many students are there whose height is lesser than 105 cm?

4. Students ate fruits in a picnic as follow.



Answer the following questions from your bar graph:

(a) How many kinds of fruits were taken in the picnic?

(b) Which fruits were used the most and the least?

(c) Which fruits were used in equal number?

(d) If each student had eaten only one fruit. How many students were there altogether in the picnic?

7.2 Reading a thermometer

Sometimes, we feel severe cold. Sometimes, it is scorching hot and we sweat a lot. Temperature is high and low according to the changes in weather. You might have heard about the temperature of various places from Radio Nepal or Television. One who listens to radio or watches television knows where it is too hot or cold in the various places of Nepal. The instrument used to measure temperature is called Thermometer.

The adjoining figure is of thermometer. What does the black shaded portion indicate in the figure? The black shaded portion indicates mercury in the thermometer. Its height changes according to temperature. The serial numbers are written vertically in both sides. In the left side of the vertical scale, temperature is read in Celsius scale. In the right side, temperature is read in Fahrenheit scale. The unit of temperature is ° C (degree Celsius) or ° F (degree Fahrenheit). Look at the figure carefully and answer the following questions.

- How many ° F does represent by 4 ° C in the thermometer?
- What is the lowest temperature shown in Fahrenheit scale of the thermometer?

Look at the thermometer given below. It shows 36.5 °C temperature. What is the temperature in Fahrenheit scale?

Look at the Figure:

The above thermometer is used to measure the body temperature of people. The mercury shows 98°F. When we suffer from fever, body temperature raises up to 100° F, 104° F, 108° F. Have you ever seen a doctor measuring the body temperature of patients? Measuring temperature means knowing the temperature of body. It is not good to have body temperature higher or lower than 98°F.

Activities

1. Keep a thermometer in the classroom and read the temperature at 10 o'clock and 3 o'clock every day. Does the thermometer show the same or different temperature in the morning and afternoon? List the temperature.

2. Do the above activity for a week. Draw two bar graphs to show the temperature in the morning and afternoon in a week. Can you show this in one bar graph?

3. If you have a clinical thermometer in your house, measure your temperature early in the morning and note in a paper. Note body temperature for a week. Is the temperature same or different?

7.3 Ordered pairs

Look at the following figure. Vertical and horizontal lines are crossed at point O in the figure. There is written 1, 2, 3, 4 and 5 numbers towards the right from O. Similarly, there is written 1, 2, 3, 4 and 5 numbers upwards in the vertical line.

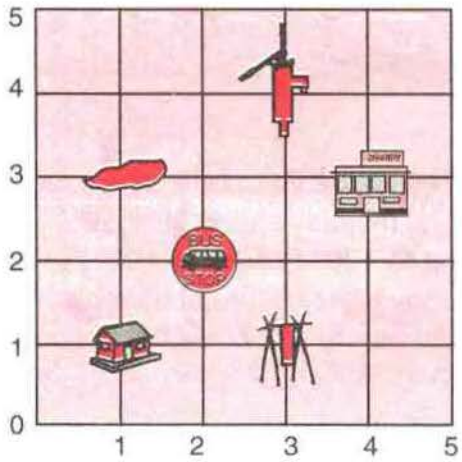
If we are at O and want to reach at swing, we have to move 3 units to the right and then 1 unit up. We denote this by ordered pair (3, 1). The ordered pair (3, 1) means 3 units towards right horizontally and 1 unit upward. If the order is taken as horizontal first and vertical second for all points in the figure, the ordered pair for house is (1, 1). The ground is denoted by order pair (1, 3).

Similarly, can you write the ordered pair for the following places?

a) water pump

b) bus stop

c) hospital



The order of numbers is very important in ordered pair. In the above figure if we take ordered pair (1, 3), we reach at ground but if we take ordered pair (3, 1), we reach at swing. Therefore, ordered pairs (1, 3) and (3, 1) denote quite different places. Ordered pair is used to represent the situation of points in plane surface.

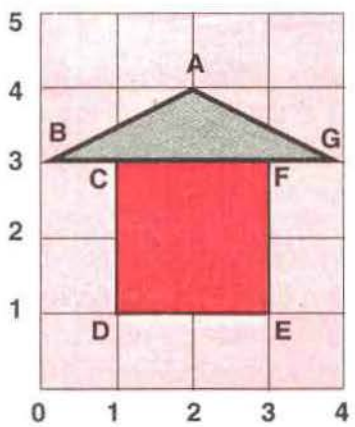
In the adjoining figure, if the ordered pair (2, 4) represents point A. Then,

a) What is the ordered pair to denote point B?

b) What is the ordered pair to denote point F?

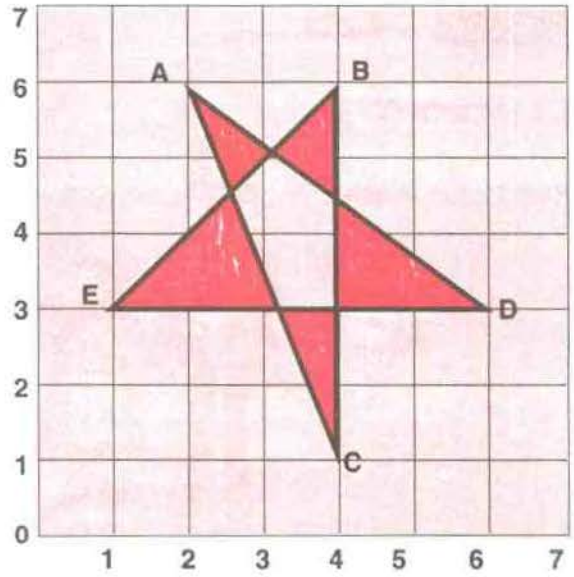
c) Which point does the ordered pair (3, 1) denote?

d) Which point does the ordered pair (4, 3) denote?

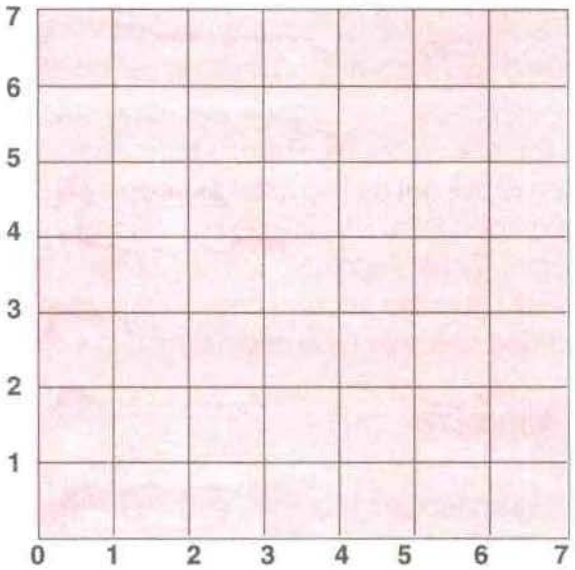


Exercise 7.2

1. Write down the ordered pair to denote the points A, B, C, D, E in the adjoining figure.



2. Plot the following points A, B, C, D, E, F, G, H, I, J, K having ordered pairs (0, 4), (2, 5), (4, 5), (5, 4), (6, 6), (6, 1), (5, 3), (4, 2), (2, 2), (1, 3), (2, 4) respectively. Join the points in order and also join points A and K. What figure have you made?



Teaching Instructions:

The above activities are a few examples to make able to read information from graph and to develop skill of representing information in graph while teaching statistics. In addition of the above examples, let students collect data, make table and graph to represent class-wise students in a school, student's attendance and absence in a week, and other familiar events in their surroundings. Similarly, make exercise in ordered pair to represent various shapes and tell to read and plot the ordered pair.

Lesson 8 **Sets**

8.1 Introduction

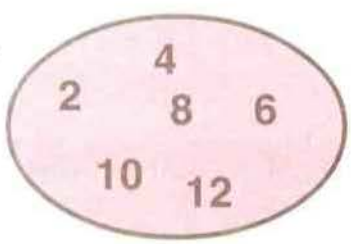
Read and learn:

This set can be called 'set of children' because Ram, Gopini and Sita are members of a set. Can this set called as 'set of taller people'?

In the above figure, Ram is taller than Sita and shorter than Gopini. If we named the set as 'set of taller people', Ram belongs to the set because he is taller than Sita. Ram does not belong to the set because he is shorter than Gopini. Thus, Ram belongs to that set in the first case and he does not belong to the set in the second case. It means the members of the set are not well defined. So, this type of collection is not a set.

Example 1

In this collection, there are even numbers from 2 to 12. This set is called a set of even numbers, which are smaller than 13.



3 does not belong to the set. Why? The reason is that 3 is an odd number. 14 also does not belong to the set because even it is an even number, the set consists even numbers which are smaller than 13. Thus, it should be clear that which belongs to the set and which does not belong to the set.

A set is a well defined collection of objects.

Objects, which belongs to a set, are members of the set. Ram's family has seven members. They are Hari, Bhagawati, Ram, Rambilas, shila, Shiva and Pasang. Ram's family is a set. Hari is a member of the set and and Bhagawati is also a member of the set. Similarly, who are the other members of the set? But Bhunte is not a member of the set.

Exercise 8.1

1. Identify the following statements for a set or not and list the members of the set.

(a) The set of seven days of a week.

(b) The set of numbers from 1 to 10.

(c) The set of taller students of class 4.

(d) The set of students of class 4.

(e) The set of girls having black hair.

(f) The set of vowels of English alphabets.

(g) The set of English alphabets.

(h) The set of instruments in geometry box.

(i) The set of students who can jump higher.

2. Identify the following statements about the set as right or wrong.

(a) Sunday is a member of the set of seven days of a week.

(b) Saturday is a member of the set of office opening days.

(c) 3 is a member of the set of even numbers.

(d) Triangle is not a member of the set of geometrical shapes.

(e) Raju's family has Shila, Krishna, Shiva and Kailash. Krishna is a member of the set of the family.

(f) Number of members of a set may be one, two or more than two.

(g) Blackboard is not a member of the set of furniture.

8.2 Methods of writing sets

Look at the following figure:

Figure 'A'

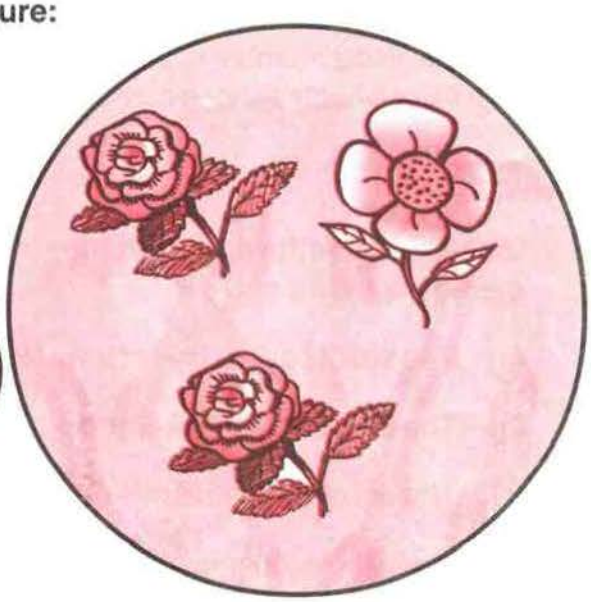


Figure 'B'

In the figure A, Democracy day, Women day and Bhanu jayanti are written within an oval. Democracy day, Women day and Bhanu jayanti represent the set of national festival days. Similarly, in the figure B, flowers are enclosed within a circle. Thus, objects are enclosed within a circle and the objects are taken as members of the set. This is one of the methods of writing a set.

Next method of writing a set is listing all its members enclosed within a curly brackets { } with each member separated by commas. Look at the following examples:

- The set of school opening days can be written as {Sunday, Monday, Tuesday, Wednesday, Thursday, Friday}

- The set of sense organs = {eye, nose, ear, tongue, skin}

Thus, the method of writing set by listing its all members within a curly brackets { } and separating each elements by commas is called listing method.

Exercise 8.2

Write the following sets by listing method.

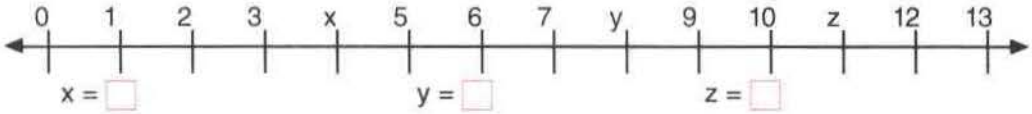
1. The set of all zones of Nepal.
2. The set of all subjects taught in class four.
3. The set of odd numbers from 1 to 10.
4. The set of the last three alphabets of English.
5. The set of sub-metropolitan city of Nepal.
6. The set of roman numerals from 1 to 10.
7. The set of vowels of English alphabets.
8. The set of the last five alphabets of Nepali.
9. The set of the first three vowel alphabets of English.
10. The set of colour used in Nepalese national flag.

Lesson 9

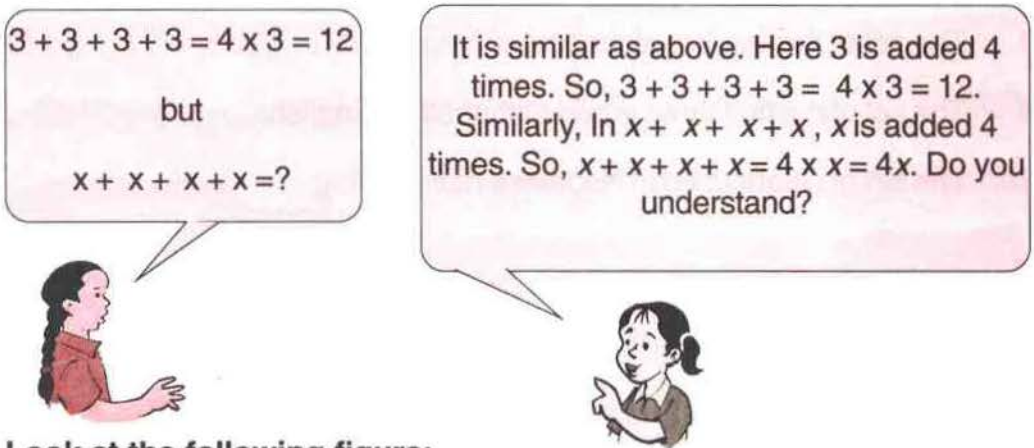
Algebra

9.1 Variable and value

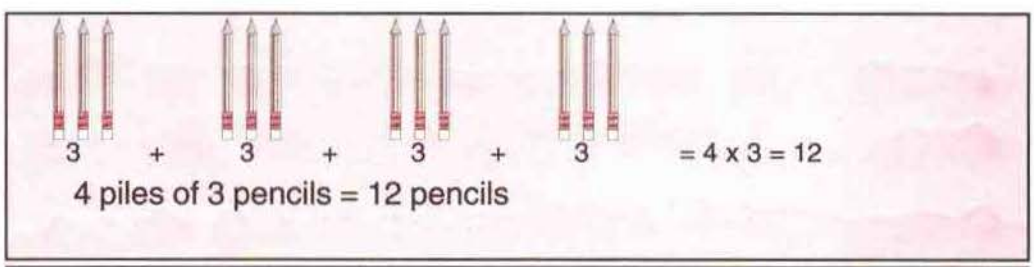
In the following number line, which numbers should be written in place of x, y and z. Write in your copy.

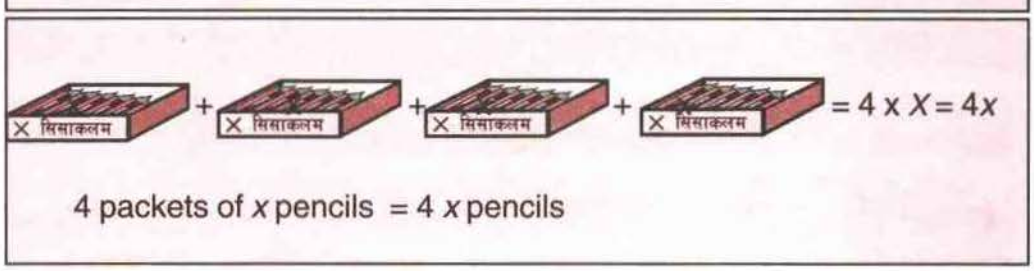


In algebra, we can use letters or symbols in place of numbers. The letter or symbol which is used in place of numbers is called variable.



Look at the following figure:





Similarly, y + y + y = 3 x y = 3 y

Here, y is added three times. The repeated times is written in front of y. In 3y, 3 which is written in front of y, is called the coefficient.

What is the coefficient of the following terms?

The coefficient of m in 6m = ☐

The coefficient of p in 4p = ☐

The coefficient of x in 7x = ☐

The coefficient of a in 5a = ☐

Example 1

If a = 3, find the value of a + 4.

Here,

a + 4

= 3 + 4 (putting 3 in place of a)

= 7 Ans

Example 2

If p = 7, what is the value of 13−p?

Here,

13−p

= 13−7 (putting 7 in place of p)

= 6 Ans

Example 3

If a = 3 and b = 4, what is the value of 2a + 5b ?

Here,

2a + 5b

= (2 x a) + (5 x b) [2a = 2 x a and 5b = 5 x b]

= (2 x 3) + (5 x 4) (putting 3 in place of a and 4 in place of b)

= 6 + 20

= 26 Ans

Exercise 9.1

1. If a = 5, b = 3, c = 4 and d = 0. Find the value of followings:

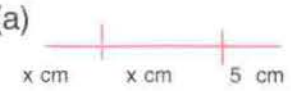
(a) a + 3 (b) b + c (c) 6 – a (d) 3b + 2 (e) 2b – 3d

(f) ab – bc (g) ab (h) bc (i) cd (j) a + b + c

(k) a – b + c (l) 2a – (b + c)

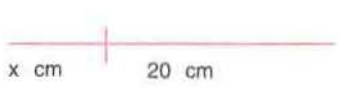
2. If x = 5, find the length of the following line segments:

(a)



(b)

(c)

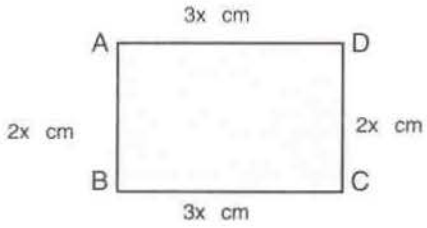


(d)

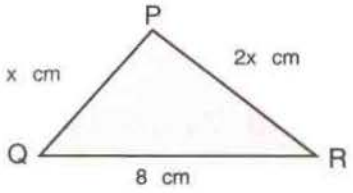
(e)

3. If x = 3, find the perimeter of the followings:

(a)



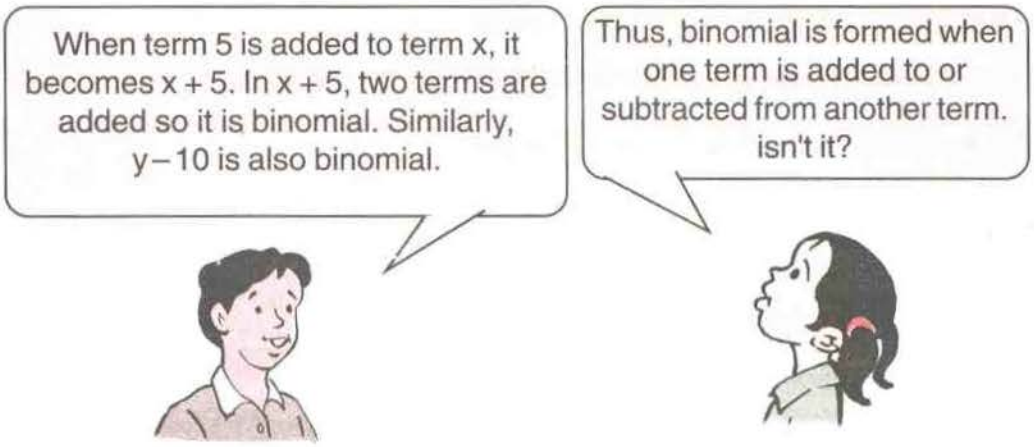
(b)



9.2 Algebraic terms and expressions

Raju had x marbles. His mother gave him 5 marbles. Now, Raju had x + 5 marbles. Shila had Rs. y. She bought a pen for Rs. 10. Then she had Rs. (y – 10) left. Here, x, 5, y, 10 are known as algebraic terms.

When algebraic terms are connected by '+' or '–' sign, it is called algebraic expression. In the above examples, x + 5 and y – 10 are algebraic expressions. How many terms are there in these two expressions?



Suraj has x marbles and Saurav has 3x marbles. They have 4x marbles altogether. x, 3x and 4x are monomials.

So, there may be one, two or more than two terms in algebraic expressions.

(a) x, y, 5x, 3z, 4 etc are monomials.

(b) x + y, x – y, 3a + 4b etc are binomials.

(c) x + y + z, 2a + 3b + 4c, p + 2q + 3r etc are trinomials.

Exercise 9.2

How many terms are there in the following algebraic expressions:

(a) 3x (b) 5y (c) m (d) 2x + y (e) 4z - z

(f) 5m – 3n (g) x + y + z (h) 3 – 2x + 5y (i) 10 – p – q (j) a - b + c + d + e

9.3 Like and unlike terms

Look, read and discuss

5 Apples 7 Apples

There are 5 apples in the first basket.

There are 7 apples in the second basket.

There are same things in two baskets. These are like objects.

Now, writing variable 'a' in place of apple,

Apples in the first basket = 5a

Apples in the second basket = 7a

What types of terms 5a and 7a are?

Apples in the both baskets are the same objects or like objects. Terms 5a and 7a use to represent the objects are like terms. isn't it?

5 Apples

4 Oranges

Here, there are 5 apples in the first basket.

There are 4 oranges in the second basket.

There two different types (unlike) fruit in the two baskets.

If we write variable 'a' in place of apple and variable 'b' in place of orange, we get.

Apples in the first basket = 5a

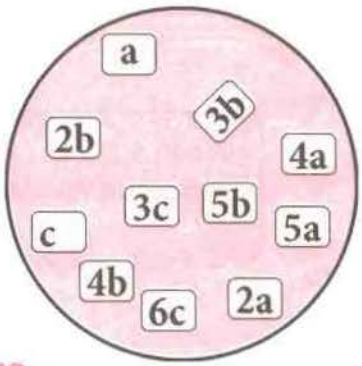
Oranges in the second basket = 4b

What types of terms 5a abd 4b are?

Apples in the first basket and oranges in the second basket are different types (unlike) of fruit. So, terms used to represent them, 5a and 4b, are unlike terms.

Objects having the same characteristics are known as like objects. Objects having different characteristics are known as unlike objects. Similarly, terms having same variable are called like terms and terms having different variables are called unlike terms.

Like terms and unlike terms are displayed at randomly in the following figure. How many terms are there having a, b, and c?



Addition of like terms

Example 1

Add 3a and 4a.

We know that,

3a = a + a + a (three a) and

4a = a + a + a + a (four a)

So, 3a + 4a = a + a + a + a + a + a + a = 7a (seven a)

Example 2

Add 3a and 3b.

Here,

3a = a + a + a (three a) and

3b = b + b + b (three b)

So, 3a + 3b = a + a + a + b + b + b

= (3 x a) + (3x b)

= 3a + 3b

Thus, 3a and 4a are like terms so the terms can be added but 3a and 3b are unlike terms so terms can not be added. Only addition sign is put to show operation.

Like terms can be added in short way. Look at the following example:

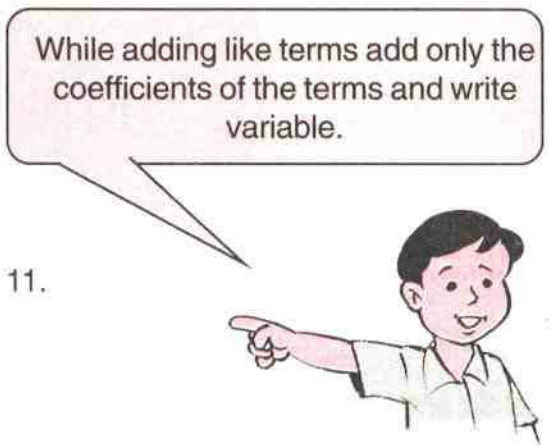
Example 3

$4x + 7x = (4 + 7)\,x = 11\,x$

The coefficients of 4x and 7x are 4 and 7 respectively.

On adding 4 and 7, we get $4 + 7 = 11$.

x is symbol to denote type.



Exercise 9.3

1. Calculate the sum of the following like terms:

(a) $a + 3a$ (b) $3a + 4a$ (c) $2b + 3b$ (d) $3c + 7c$

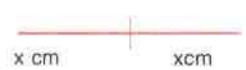
(e) $4d + 5d$ (f) $9t + 3t$ (g) $11x + 12\,x$ (h) $15y + 12\,y$

(i) $9z + 9z$ (j) $5a + 3b + 4a + 3b$ (k) $3x + 4y + 3x + 7y$

(m) $a + a + a + 2a + 3b$

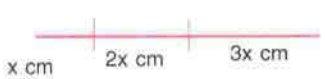
2. Find the length of the following line segments:

(a)

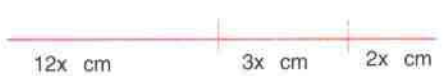


(b)

(c)



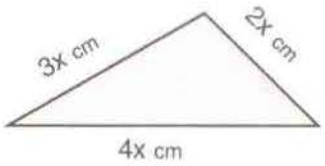
(d)



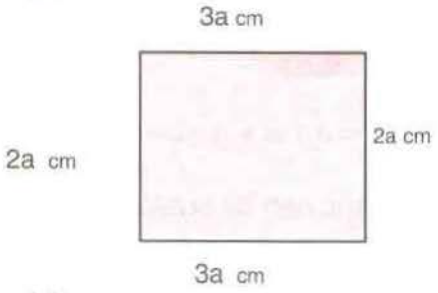
3. If $x = 2$ find the length of the line segments in the above question No. 2.

4. Find the perimeter of the following figures.

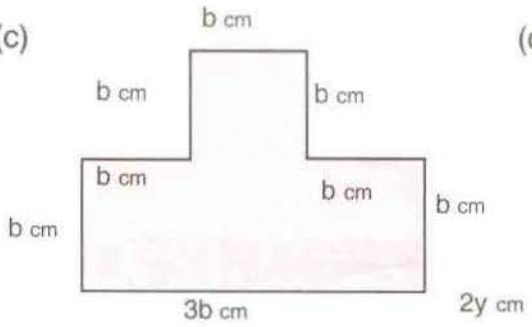
(a)



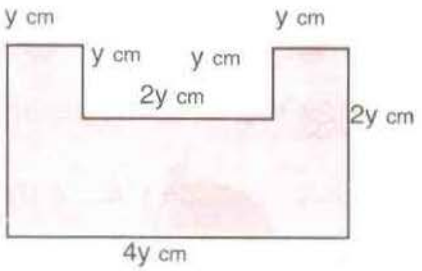
(b)



(c)



(d)



Subtraction of like terms

Look, discuss and learn:

3a 3a – a 2a

$3a - a = \overbrace{a + a + a} - a$

one 'a' has to be removed from '3a' so it is written as '–a'

$= a + a + a - a$

$= 2a$

Canceling like terms having equal coefficients and opposite sign.

Example 1

$3a - 2a = a + a + a - a - a = a$

Example 2

$3a - 3a = a + a + a - a - a - a = 0$

Example 3

$3a - 2b = a + a + a - b - b = (3 \times a) - (2 \times b) = 3a - 2b$

Like terms can be subtracted but unlike terms can not.

Example 4

$12a - 7a$

How can we subtract this? Let's think for a while.

So, $12a - 7a = (12 - 7)\, a = 5a$

Subtract the coefficients of like terms as it is done for addition and write the variable.

Exercise 9.4

1. Subtract the following like terms:

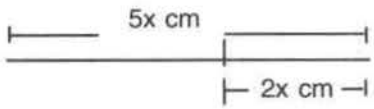
(a) $6a - 4a$ (b) $3a - 2a$ (c) $4b - 3b$ (d) $5e - 2e$

(e) $17p - 13p$ (f) $15x - 3x$ (g) $7x - 7x$ (h) $12y - 9y$

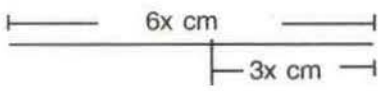
(i) $-b + 9b$ (j) $12x - 3x - 2x$ (k) $14y - 4y - y$

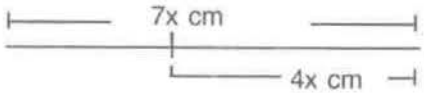
2. Whole length and partial length of the line segments are given in the following figures. Find the length of the remaining portions.

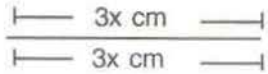
(a)



(b)



(c) 

(d) 

2. If x = 3 in the above question No. 2. Find the length of each whole and partial line segments.

9.4 Algebraic equation

Mathematical sentences

When 2 is added to 5, the sum is 7.

This is a mathematical sentence. It is written as 5 + 2 = 7 in mathematical form. Similarly, the difference of 15 and 9 is 6, it is written mathematically as 15−9 = 6.

Look at the following mathematical sentences:

(a) 5 is an odd number.

(b) 12 is exactly divisible by 5.

(c) Cows have ☐ legs.

These sentences are true, false or open? Let's think.

The first sentence is a true sentence. The second sentence is a false sentence. The third sentence is not a clear sentence. If we put 1 or 2 or 3 in the place of the box, the sentence gives false meaning but if we put 4 in the place of the box, the sentence gives true meaning.

Those sentences which are neither true nor false are called open sentences.

Now, let your friend who is next to you, make mathematical sentences one by one and try to find whether they are true or false or open sentences.

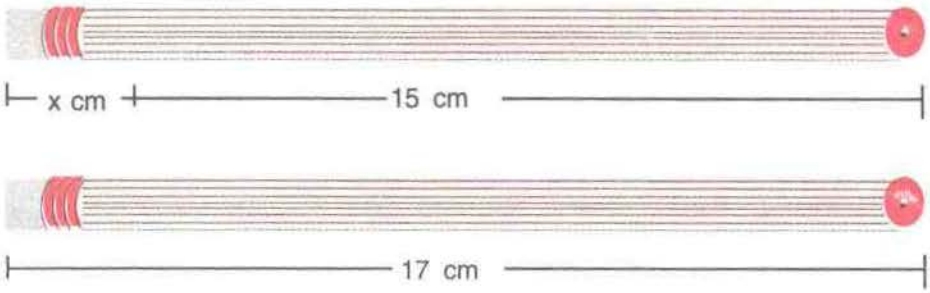
Exercise 9.5

State whether each of the following mathematical sentences is true or false or open.

1. The sum of 12 and 15 is 27.
2. 5 lies between 3 and 5.
3. The difference of 15 and 12 is 13.
4. 31 is an odd number.
5. There are ☐ sides in a triangle.
6. The half of 12 is ☐.
7. There is ☐ centimeter in a meter.
8. 121 is exactly divisible by 12.
9. ☐ x ☐ = 9
10. ☐ is greater than 6.
11. What number should be put in the box to make a true sentence for each of the following open sentences?
    a. ☐ is a number greater than 5 and smaller than 7.
    b. ☐ is a square number among 2, 3, 4, 5.
    c. When 5 is subtracted from 8, we get ☐.
    d. ☐ is a positive number smaller than 5.
    e. 12 is exactly divisible by ☐.

Solving Equation

Raju and Shila bought one pencil each having equal lengths. Raju said, "Shila, length of my pencil is (x + 15) cm, what is yours?"



Shila said, "How clever are you, brother. As you say open sentence, it may be true or false. I can say only after measuring the length of my pencil." Shila measured her pencil. Her pencil was 17 cm long. She said' " your and my pencils are equal, hence x + 15 = 17, is not it? It was another open sentence. It is different type of open sentence than previous one. There is equal sign in the open sentence. Let's think for a while."

Raju said, "Open sentence can be converted into true sentence. x + 15 = 17 means 15 is added to x to get 17. What should be added to 15 to get 17?"

"2". Shila answered quickly.

Then, in the open sentence x + 15 = 17, when we put x = 2, then we get it a true sentence; is not it? "Now what is the length of my pencil" Raju asked "2 + 15 = 17" Sila said.

Thus, Raju and Shila found a new mathematical method. They said,

> Open sentences such as x + 5 = 15, 3 x □ = 12, x–9 = 1 which contains equality sign are called equations. The method of calculating the value of the variable to make the open sentence true is called solution of equation.

Write three open sentences to represent equations and show your teacher.

Example 1

What number should be written in the box?

15 + □ = 19

Here,

15 + □ = 19 means what should be added to 15 to make 19.

4 need to be added to 15 to make 19. Therefore, 4 need to write in the box.

Example 2

What number should be written in the box?

9 – □ = 6

Here,

9 – □ = 6 means what should be subtracted from 9 to get 6. 3 need to be subtracted from 9 to get 6. Therefore, 3 need to be written in the box. This can be another method, 3 need to be added to 6 to make 9. So, 3 should be subtracted from 9 to get 6. Therefore, 3 need to be written in the box. 9 – □ = 6

Example 3

What is the value of x in 5 + x = 8?

5 + x = 8 means what should be added to 5 to make 8. 3 need to be added to 5 to make 8. Therefore, 3 need to write in the place of x to get 5 + 3 = 8.

3 is written in the place of x. So, the value of x is 3.

Example 4

Solve: 3 × y = 15

Here, 3 y = 15 means how many times of 3 is 15.

Let's recall multiplication table of 3.

3 × 1 = 3 Not correct

3 × 2 = 6 Not correct

3 × 3 = 9 Not correct

3 × 4 = 12 Not correct

3 × 5 = 15 Correct

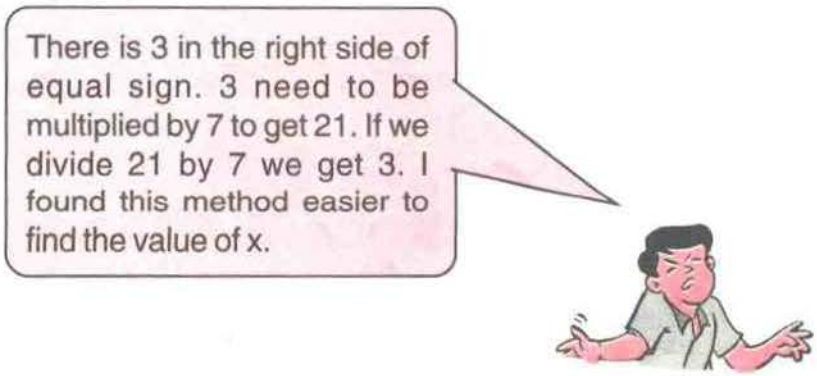
Thus, when 5 is multiply by 3 we get 15. Therefore, y = 4.

Example 5

What is the value of x in $\frac{21}{X} = 3$?

Here,

$\frac{21}{X} = 3$ means what is divisor of 21 so that quotient is 3. How to find?



Yes, correct.

In $\frac{21}{X} = 3$ what is divisor of 21 so that quotient is 3. When 3 is multiplied by 7 we get 21. 21 divided by 7 gives 3. Therefore, the value of x is 7.

Exercise 9.6

1. Fill appropriate number in each box.

(a) $4 + \square = 9$ (b) $12 - \square = 8$ (c) $\square + 7 = 10$

(d) $\square - 5 = 15$ (e) $3 \times \square = 15$ (f) $7 \times \square = 1$

(g) $\square \times 6 = 48$ (h) $\frac{49}{\square} = 7$ (i) $\frac{125}{\square} = 25$

(j) $\frac{4 \times 15}{\square} = 5$

2. Solve

(a) $x + 7 = 12$ (b) $x - 6 = 15$ (c) $16 + x = 20$ (d) $8 - y = 7$

(e) $15 = x + 5$ (f) $3x = 27$ (g) $4y = 36$ (h) $9z + 6 = 60$

(i) $\frac{36}{X} = 12$ (j) $\frac{125}{y} = 25$

3. If $x - 10 = 16$, $x = ?$

4. If $5y + 3 = 23$, $y = ?$

5. If $6z/4 = 12$, $z = ?$

6. $25 - y = 18$, $y = ?$

7. If the following two line segments are equal in length, find the value of x and y.

(a)

(3x +1) cm

13 cm

(2x +2) cm

(x + 5) cm

(b)

(2y +2) cm

20 cm