My Mathematics

Grade 5

Government of Nepal
Ministry of Education
Curriculum Development Centre

Publisher: Government of Nepal
Ministry of Education
Curriculum Development Center

First Edition : 2055 BS

Revised Edition : 2075 BS

Price: 72/-

Preface

Continuity on the process of development and updating of curriculum and textbooks has been given so as to make school level education objective oriented, practical, contemporary and employment oriented. Fostering the feelings of unity towards the nation & nationality, developing attributes like morality, discipline, self-reliance, promoting fundamental language related and mathematical skills through the basic knowledge of science, environment and health-related issues. Education should instill life skills, create interest in art and beauty promote tolerance among different ethnicities, gender, religion, language, culture. Likewise it should make learners responsible citizen who can safeguard social values and norms. To fulfill this need this textbook has been revised and developed based on the curriculum 2065 which was updated according to the suggestions of various level committees, teachers, guardians and the final decisions of seminars and interactions including other stakeholders of education.

Previously, based on the old curriculum My Mathematics class 5 was written by Sambhu Narayan Vaidya & Hari Narayan Upadhya. Re-writing & revision work has been done on it, according to the suggestions of teachers, experts, guardians students & other stakeholders matching it up with the latest styles of national & international textbooks. We have tried to make this text book pictorial, activity oriented and child centered keeping in view with the all round development of grade five students. Based on the curriculum 2065, writing and revision work of this book was done by a panel comprised of Dinesh Kumar Shrestha, Chitra Prasad Devkota, Barun Prasad Vaidya, Hari Narayan Upadhya, Dilliswor Pradhan, Dandapani Sharma, Ram Chandra Poudel and Shyam Singha Dhami. Haribol Khanal, Dr. Siddhi Prasad Koirala, Dr. Siva Ram Neupane, Mukunda Raj Sharma, Nirmala Gautam were also involved in this work. Content editing was done by Dinesh Kumar Shrestha, Dandapani Sharma & Shyam Singha Dhami & language editing was done by Bishnu Prasad Adhikari and Lok Prasad Pandit. Type setting & layout design was done by Jayaram Kuikel and Ujwal Kundan Jyapu and Himalaya Gautam did the work of Illustration. Curriculum Development Centre remains grateful to all those who have contributed to the development & revision of this book. This English Version editon has been translated by Krishna Raj Hamal.

Textbook is an important tool of teaching learning process. To achieve the learning outcomes of the curriculum, experienced teachers & inquisitive students will use various resources and materials in teaching learning process. Effort has been put to make this book activity oriented and more interesting, however, there might be some rooms for corrections in its language, presentation style and illustrations. Teachers, students, guardians, intellectuals and general readers of the book can contribute a lot to eliminate these weakness by sending their suggetions. Curriculum Development Centre cordially invites for their constructive suggestions.

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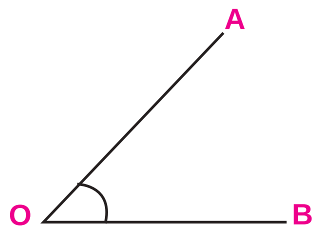
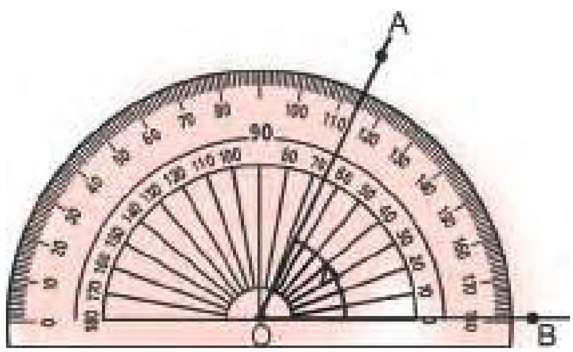
1 Geometry

1.1 Measurement of angles



What will be the measurement of this angle? What can be used to measure it ?

We use protractor to measure angles.
Look at the following picture.



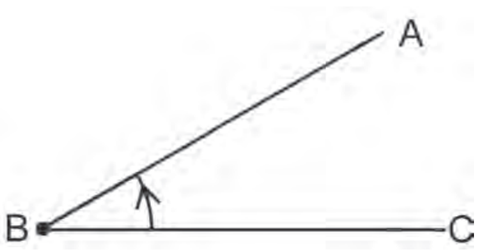
In the picture, the margin of the protractor is divided into 180 equal divisions. Each part is called a degree. Degree (°) is a unit which is used to measure angles. Two types of scales are written on the protractor. The outer scale starts from O (zero) degree on the left goes on increasing towards the right hand side and ends at 180°, whereas the inner scale starts from O (zero) degree on the right goes on increasing towards the left and ends at 180°. Why do you think there are two scales on a protractor?

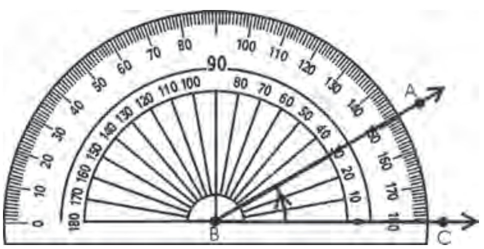
We use protractor for two things:

1. to measure angles

2. to draw angles of a given size.

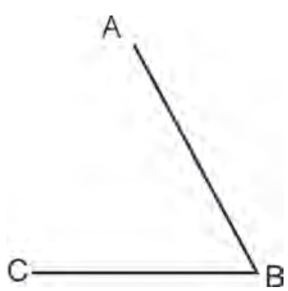
Activity 1

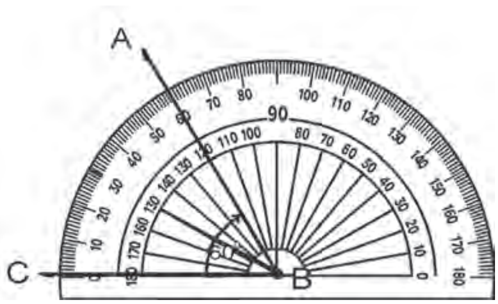




Let's take the measurement of angle ABC. Put the baseline of the protractor on BC arm of the angle. B should be in the centre of the protractor and BC should join the line of the protractor which shows O°. Now, let's see where AB touches the inner scale of the protractor. In the picture AB crosses the 30° line of the inner scale of the protractor. Therefore the measurement of the angle ABC is 30°(thirty degree). We used here the inner scale, why?

Activity 2





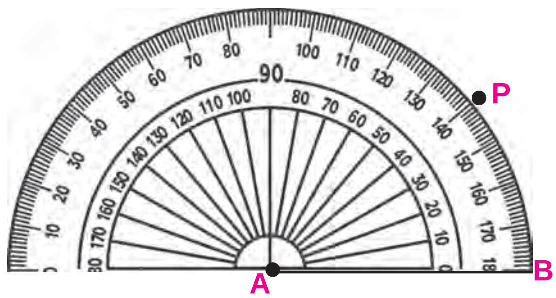
Let's take another measurement of angle ABC. Put BC arm of the angle ABC on the baseline of the protractor. Put B in the centre of the protractor so that BC joins the line of the protractor showing O° on the left. Now, see where AB touches the outer scale of the protractor. In the picture AB crosses the place of 60° in the outer scale of the protractor. Therefore, the measurement of the angle ABC is 60°. Here, we used the outer scale, why?

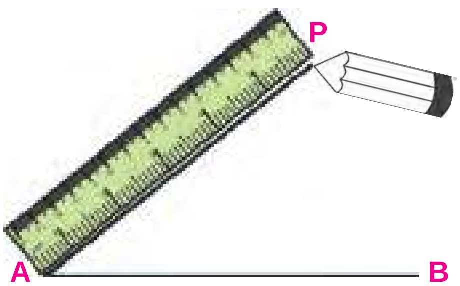
You have learnt to measure the angles using the inner and the outer scales of the protractor. Now, look at the following examples to learn how to draw angles of a given measurement.

Example 1

Draw angles of 40° measurement using both the inner and the outer scales of the protractor.

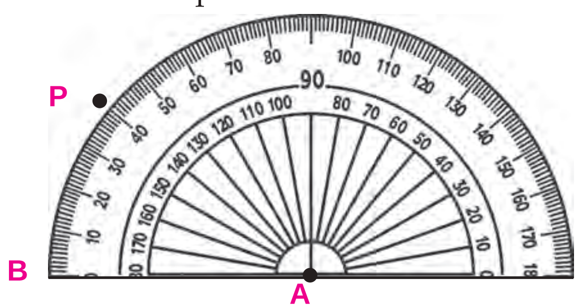
Draw AB placing A in the centre of the protractor. Join AB with the base line of the protractor along the right hand side. Mark P at 40° in the inner scale of the protractor.



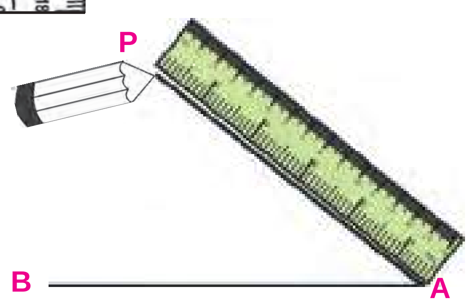


Remove the protractor and join the points A and P with the help of ruler and pencil. Thus the required ∠PAB = 40° is drawn.

Draw base line AB placing A in the centre of the protractor. Join AB with the base line of the protractor along the left hand side. Now mark P at 40° on outer scale of the protractor.

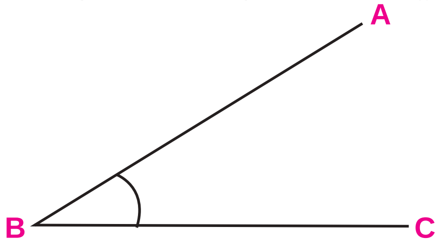


Remove protractor and join A and P with the help of ruler and pencil. The required ∠PAB = 40° is ready. Thus we can draw angles of the same measurement using the inner and the outer scales of the protractor.

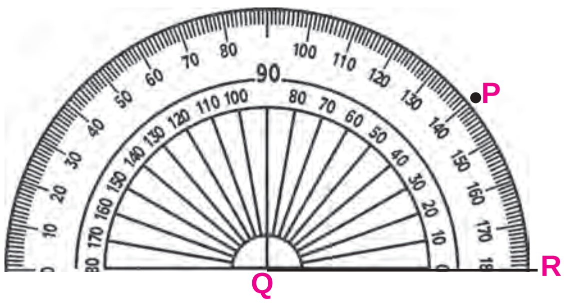


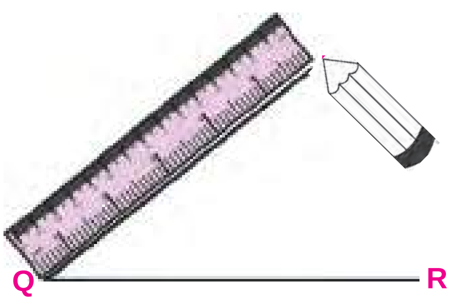
Example 2

With the help of the protractor draw angle PQR equal to the measurement of angle ABC as given in the picture below.

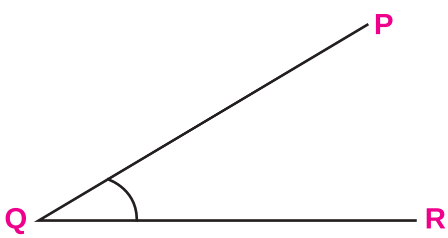


Given angle is ABC. We have to draw another angle PQR equal to the measurement of the given angle ABC. For this, we have to find out how big angle ABC is. Take the measurement by using protractor. Angle ABC = 30°.





Draw base line QR placing Q in the centre of the protractor. Join QR with the base line of the protractor stretching towards the 0° on the right. Mark P on the circumference of the protractor, where it makes 30°.

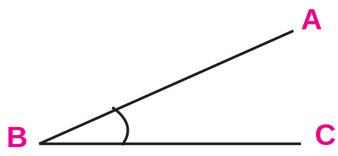


Remove protractor to join P and Q with the help of ruler and pencil. The angle PQR formed is equal to angle ABC.

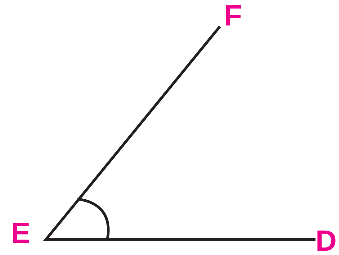
Exercise 1.1

1. Guess the measurement of each angle given below. Find out if your guess was correct or not by measuring them with the protractor.

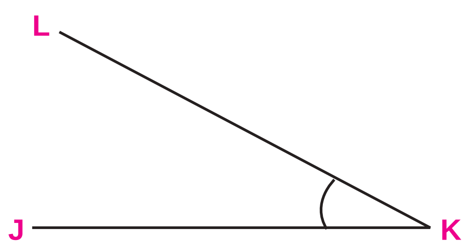
(a)



(b)



(c)



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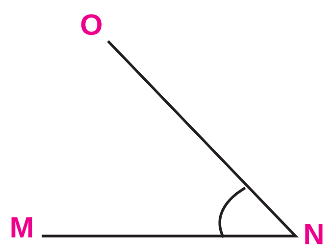
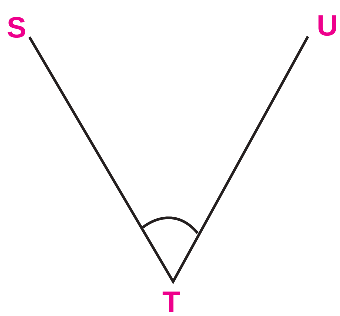


(e)



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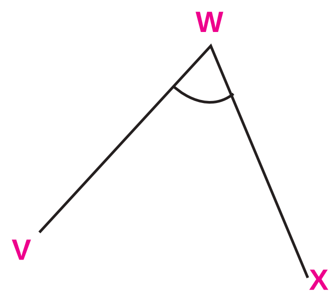
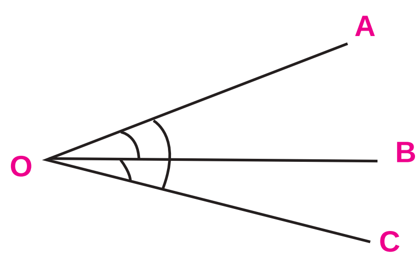
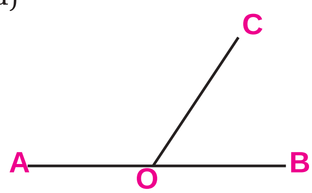


2. How many angles are there in the picture on the right? Write the measurement of the angles in degrees.

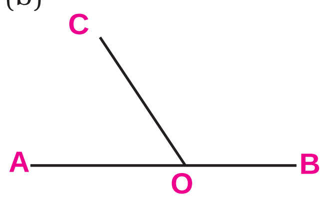


3. Write the measurement in degrees of ∠AOC and ∠ĐBOC in the following pictures. What degree is the sum of ∠AOC and ∠BOC?

(a)



(b)



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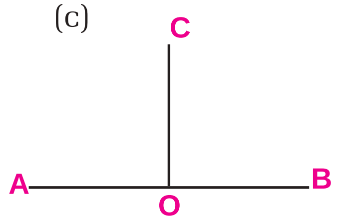
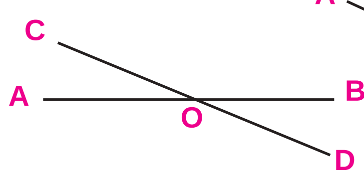
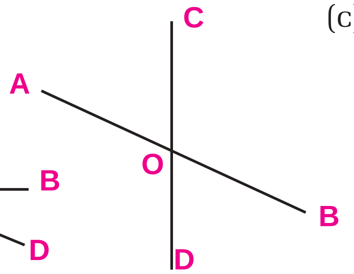


4. Measure ∠AOC, ∠COB, ∠BOD and ∠DOA from the following pictures and write in degrees.

(a)



(b)



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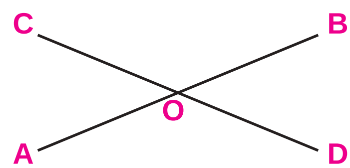
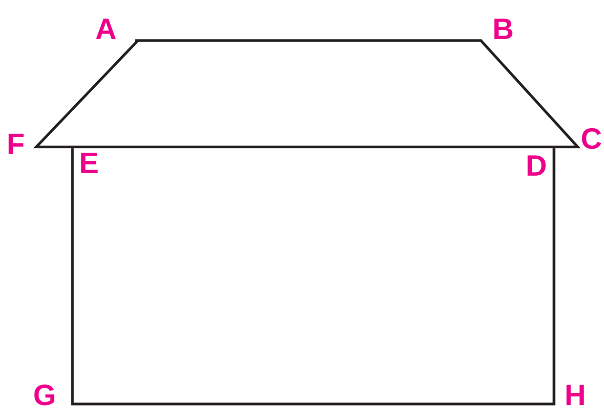
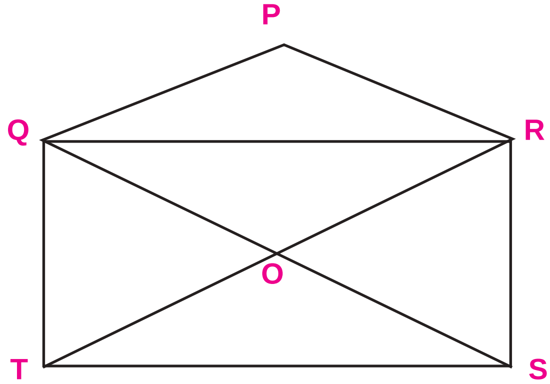


5. In the pictures of question number 4, which two pairs of angles are of the same measurement?

6. In the picture given below find out places where angles have formed and measure the angles.



7. How many angles are there in the following picture of the open envelope? Find out and measure them.



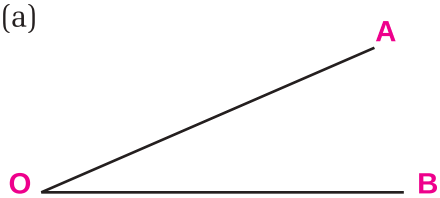
8. Draw the angles of the following measurement with the help of a protractor.

(a) 20° (b) 30° (c) 40° (d) 70° (e) 110°

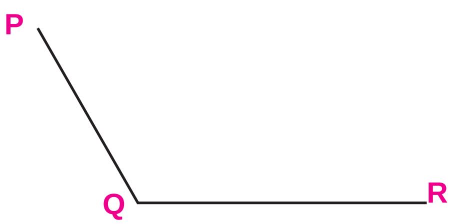
(f) 120° (g) 180° (h) 80° (i) 90° (j) 50°

9. With the help of the protractor, draw angles similar to that of the following pictures.

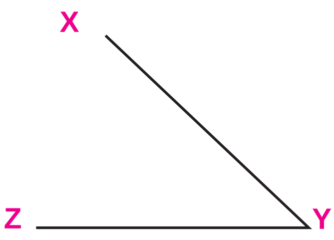
(a)



(b)



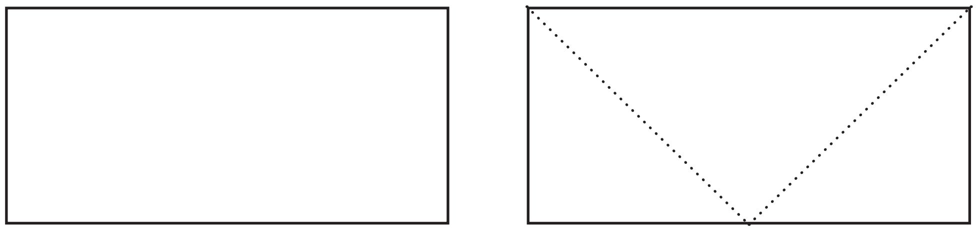
(c)



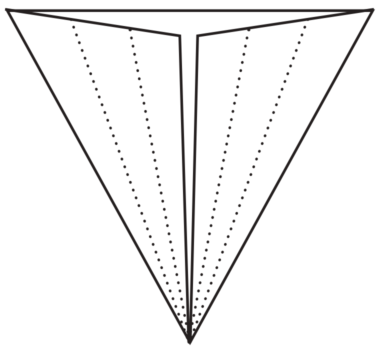
(d)

Let's make our own protractor (length is double the size of breadth).

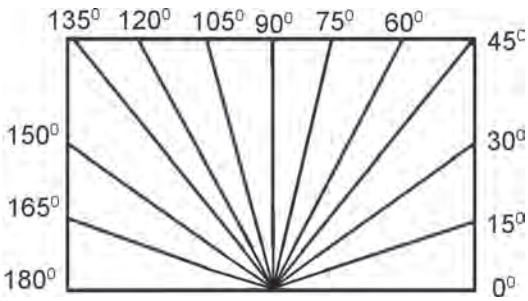
Take a piece of rectangular sized paper.



Let's keep on folding it in the following way:



Now, when we open the paper after folding it into 3 equal parts, this can be seen.



We can use it as a protractor to measure the angles of 15° degrees. How many angles are there? Can you write their degrees?

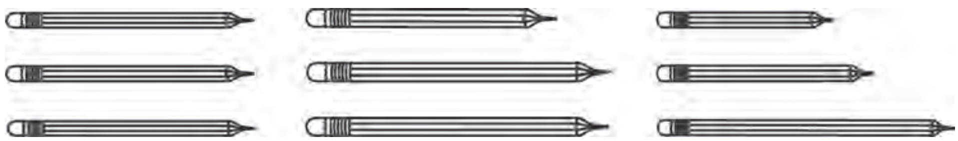
Teaching Instruction: *In the process of teaching and learning mathematics you are requested to design and use your own creative activities like this.*

1.2 Classification of triangles

a. Classification of triangles on the basis of sides.

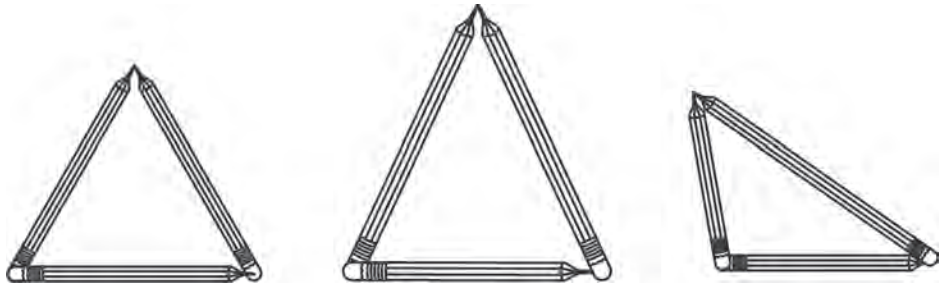
Activity 1

Collect 3 sets of pencils or sticks like the following.



Set 1	**Set 2**	**Set 3**
(all three are of equal size)	(two of them are of equal size)	(all of them are of different size)

Now make three different triangles from the above 3 sets.



Triangle made from set 1	Triangle made from set 2	Triangle made from set 3
(all sides are equal)	only two sides are equal)	(all the sides are of different size)

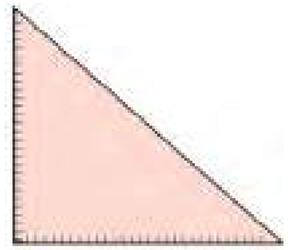
Thus on the basis of the length/ measurement of the sides we can make three different kinds of triangles as follows

1. A triangle having three equal sides is called an equilateral triangle.
2. A triangle having two equal sides is called an isosceles triangle.
3. A triangle having all the three unequal sides is called scalene triangle.

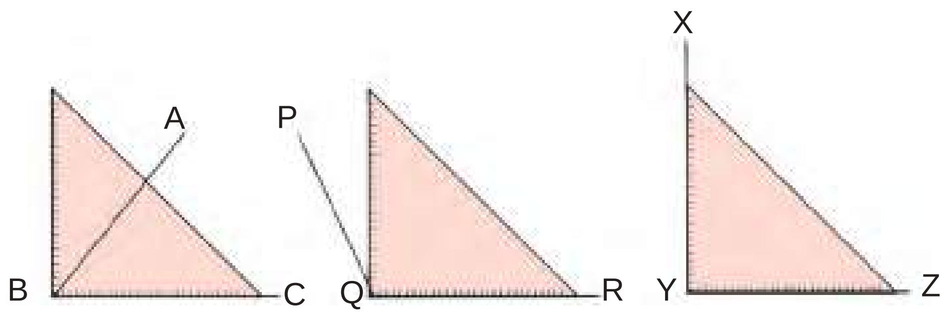
b. Classification of triangles on the basis of angles.

Activity 2

Look at the set square in the picture. Which angle is the right angle in the set square? One angle in the set square is right angle, so by using it we can find out whether a given angle is smaller or bigger than a right angle.



Look at the pictures below.

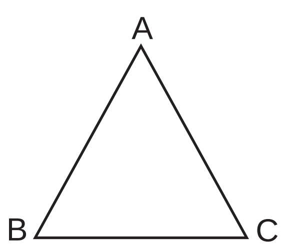


1. Both the arms of ∠ABC are within the set square. It is smaller than a right angle. So it is called an acute angle.

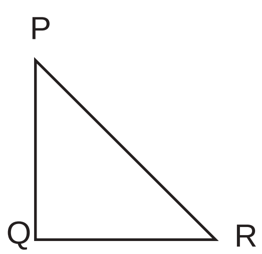
2. Sides PQ of ∠PQR is outside the set square. It is bigger than a right angle, So it is called an obtuse angle.

3. Both the sides of ∠XYZ are exactly the same with the set square. So it is a right angle.

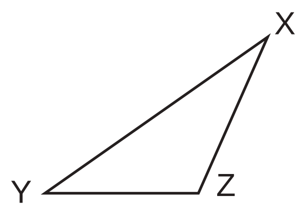
Now, using the set square, find out whether the inner angles of the following triangles are acute, obtuse or right angle.



Triangle 1



Triangle 2



Triangle 3

1. If all three angles of a triangle are smaller than the right angle, it is called an acute angled triangle. ΔABC is an acute angled triangle.

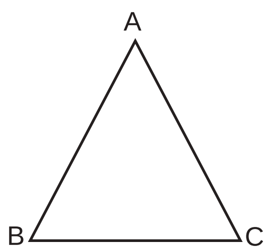
2. If one of the three angles in a triangle is right angle, it is called a right angled triangle. ΔPQR is a right angled triangle.

3. If one of the three angles in a triangle is bigger than the right angle, it is called an obtuse angled triangle. ΔXYZ is an obtuse angled triangle.

Exercise 1.2

1. Measure all the arms of the following triangles and find out whether they are equilateral, isosceles or scalene triangles.

(a)



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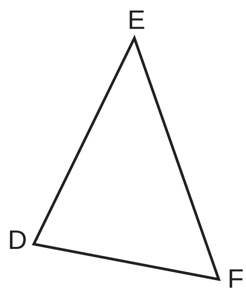
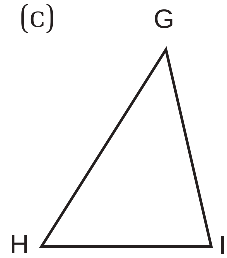


(c)



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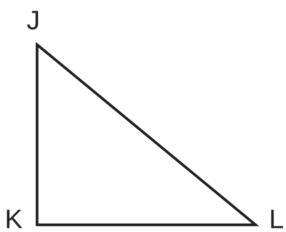
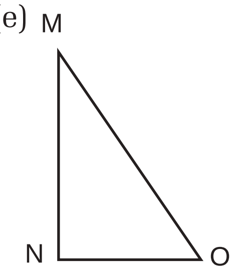
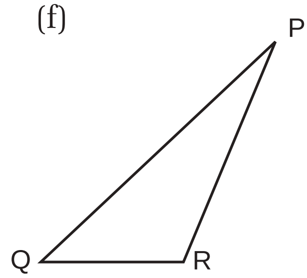


(e)

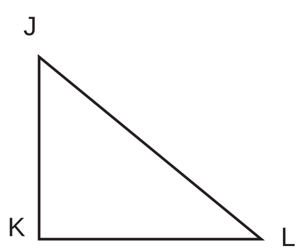


(f)



2. Find out whether the following triangles are acute angled, right angled or obtuse angled:

(a)



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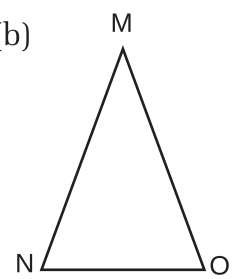
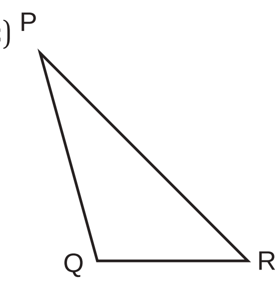
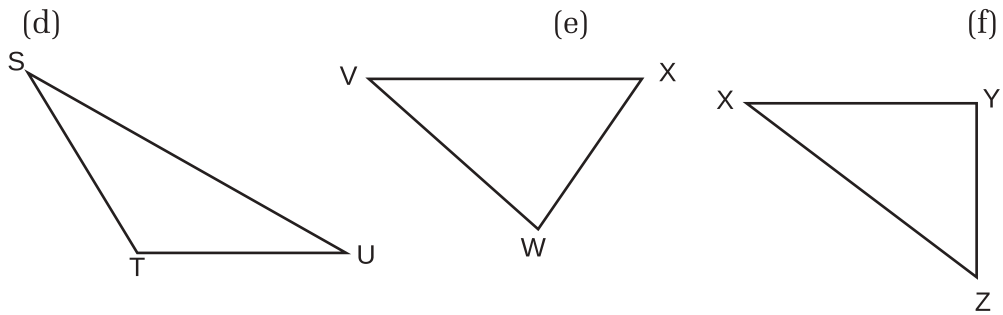


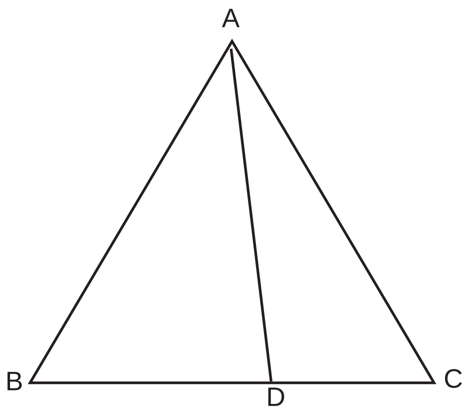
(c)





3. Find out whether the triangles in question number 2 above are equilateral, isosceles or scalene triangles.

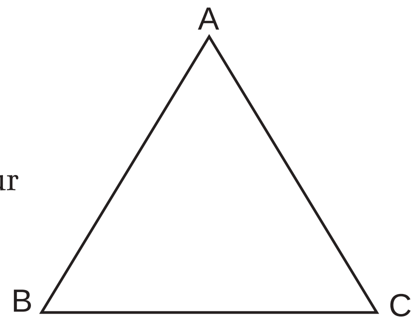
4. How many triangles are there in the following picture? Write whether they are equilateral, isosceles or scalene triangles.



5. Find out whether the triangles in question number 4 above are acute angled, right angled or obtuse angled triangles.

Teaching Instruction: *Create extra activities similar to the above ones and ask students to do them.*

1.3 Measurement of the angles of a triangle



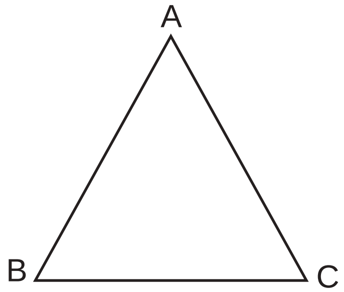
Draw ΔABC. Compare your triangle with your friend's traingle. Are both of your triangles of same shape? Measure all three angles of your triangle and fill in the table below.

Angle	∠BAC	∠ABC	∠ACB	∠BAC + ∠ABC + ∠ACB
Measurement				

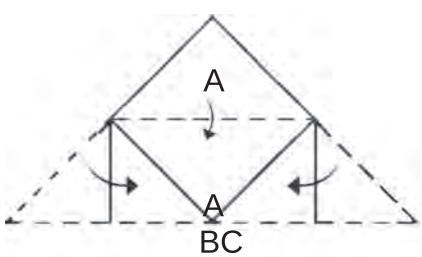
What is the sum of the measurement of the angles? Compare with your friend. Are the total numbers same? Consult with other friends as well, what can we conclude from this?

Conclusion: The sum of the angles of a triangle is 180°.

Activity 3

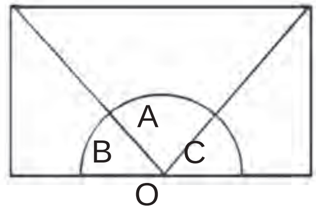


Draw a full page triangle. Write the names of the vertices of triangle as shown in picture. Cut the triangle off the page. Now fold them up in such a way that vertices B and C meet up together.



Now fold up vertex A to the point where B and C meet.

Now all the three vertices A, B and C meet at the point O. Angle A, B and C altogether make a simple traingle.



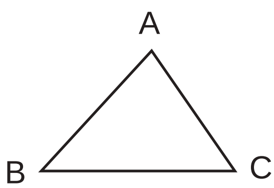
Therefore $\angle A + \angle B + \angle C = 180°$.

Repeat the above experiment with triangles of different sizes. Is the sum total of the 3 angles in these triangles still 180^o?

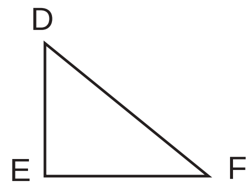
Exercise 1.3

1. Measure the angles in these triangles and find their sum.

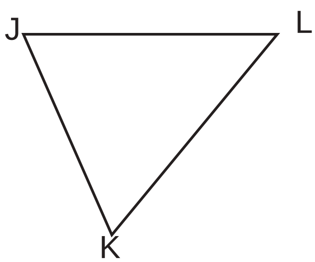
(a)



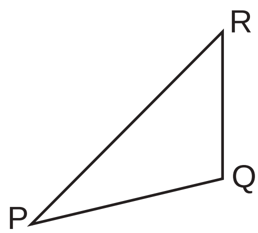
(b)



(c)

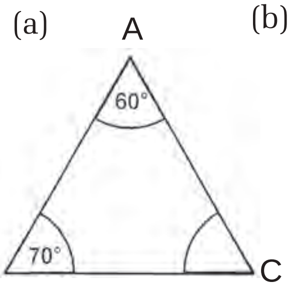


(d)

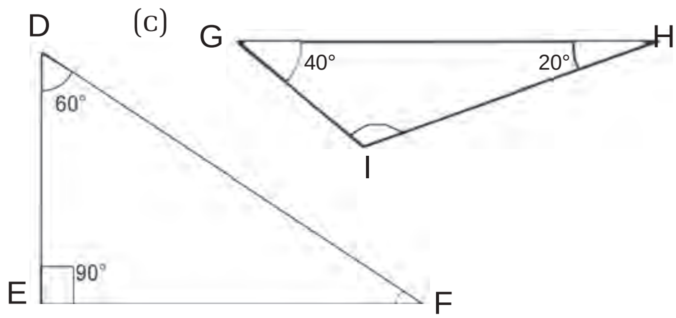


2. Find out the measurement of the remaining angles in these triangles. (Do not use protractor).

(a)



(b)



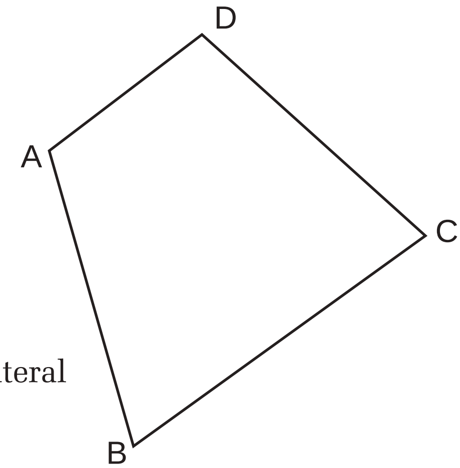
(d)

Teaching instruction: *Ask the students to draw different size triangles & find out the sum of them. Also prepare extra activities like in question number 2 above and let students practise them.*

1.4 Measurement of the angles in a quadrilateral.

Activity 1

Draw a quadrilateral ABCD. Show your quadrilateral to your nearest friend. Are the quadrilaterals of the same shape?



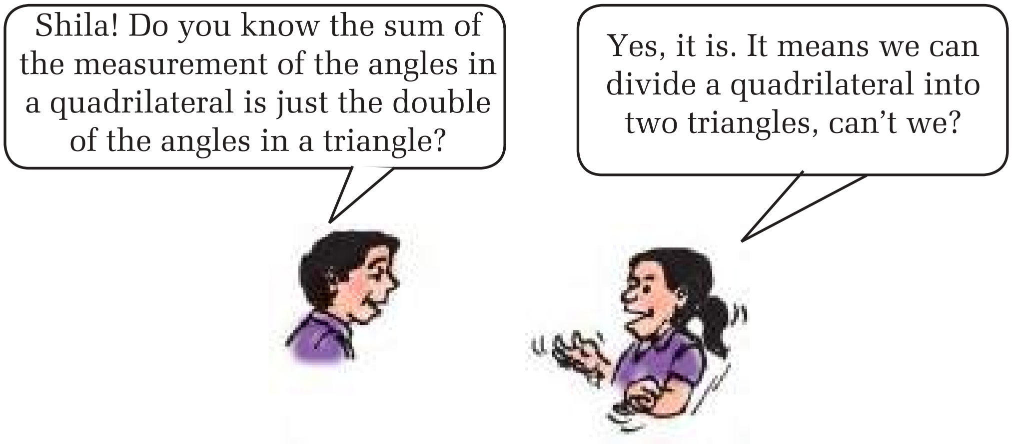
Now measure the angles in your quadrilateral and fill up in the following table:

Angle	$\angle ABC$	$\angle BCD$	$\angle CDA$	$\angle DAB$	$\angle A + \angle B + \angle C + \angle D$
Measurement					

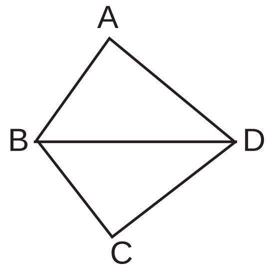
What is the sum of the measurement of the angles? Show your total number to your friend. Is the total number the same? Consult other friends as well. Do all of them have the same total of 360°? What can we conclude from this?

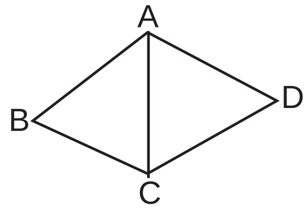
Conclusion: The sum total of the measurement of the angles in a quadrilateral is 360°.

Activity 2



Draw a quadrilateral ABCD. Join B and D with the help of a ruler and pencil. Now, look into how many triangles is the quadrilateral divided? The sum of the angles of ΔABD is 180°. Therefore the sum of the angles in ΔBCD is also 180°. Adding the total angles from both the traingles becomes 360°.



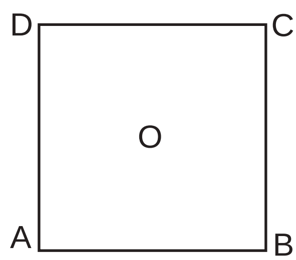


Again, in the above quadrilateral ABCD join points A and C. Into how many triangles is the quadrilateral divided? Do you think the sum of the angles in the quadrilateral ABCD is equal to the sum total of the angles of the triangles ABC and ADC?

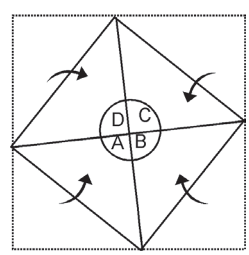
Lines BD and AC in the quadrilateral is called diagonals. Discuss and find out how many diagonals there are in a quadrilateral.

Activity 3

Draw a full page of square ABCD. Cut the square off the page and fold up all four vertices of the angles to the O point. While doing this, all the angles A, B, C and D combine to form complete angle.



We know that the measurement of a complete angle is 360°. Hence angles A, B, C and D sum became 360°.

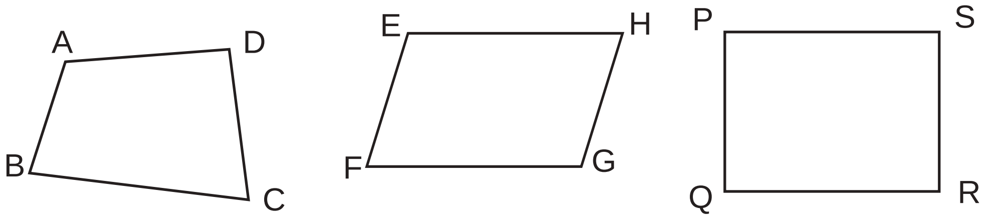


$$\angle A + \angle B + \angle C + \angle D = 360°.$$

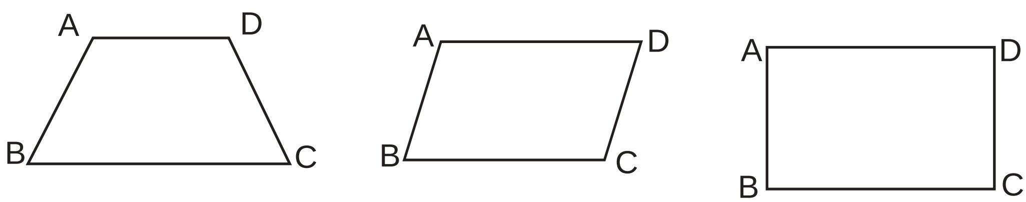
From the above activities can we conclude that the sum of the angles of a quadrilateral is 360°?

Exercise 1.4

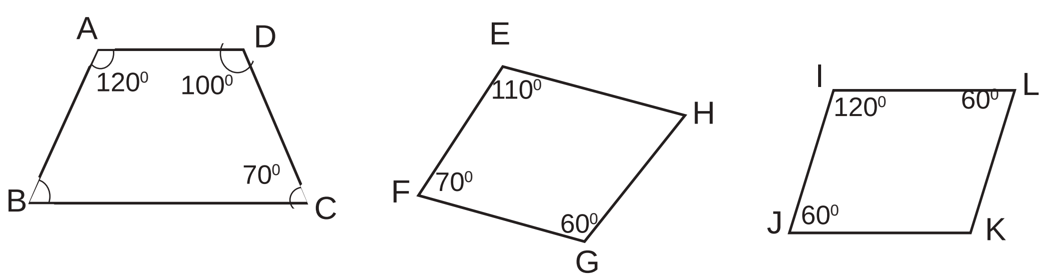
1. Measure the angles in each of these quadrilateral and write their sum.



2. Join A and C in each of these quadrilaterals ABCD and find out the sum of the measurement of both the triangles. Is the sum of the angles in the triangle 360°?



3. The sum of all the angles in a quadrilateral is 360°. Find out the measurement of the unknown angle in each of the following quadrilaterals.



Teaching instruction: *Create additional exercises of similar types and let students do them.*

2 Concept of Numbers

2.1 Counting of numbers and place value up to hundred million.

There are ten numbers in Hindu-Arabic. They are 0,1,2,3,4,5,6,7,8 and 9.

Let's make a figure using these numbers 36582292. Let's put them in the following place value table. Let's see what is the place value of 5.

Crore	Ten Lakhs	Lakhs	Ten thousands	Thousands	Hundreds	Tens	Ones
3	6	5	8	2	2	9	2

Number 5 is at the place value of lakh. So the place value of 5 is 5 lakh= 5,00,000. In the above table number 3 is at the place of crore. Therefore the place value of 3 is 3 crore = 3, 00, 00,000.

Thus the figure is read as three crore, sixty five lakh, eighty two thousand, two hundred and ninety two.

In the following table, counting figures up to ten crore and the way they are read or their numerical names are given. Look at the table carefully and discuss what you found out:

Made of numbers	**Figures**	**Numerical names**
The smallest figure made of one number	1	1 (one)
The smallest figure made of two numbers	10	10 (ten)
The smallest figure made of three numbers	100	100 (Hundred)
The smallest figure made of four numbers	1000	1000 (Thousand)
The smallest figure made of five numbers	10000	10000 (Ten Thousands)
The smallest figure made of six numbers	100000	100000 (Lakh)
The smallest figure made of seven numbers	1000000	1000000 (Ten Lakh)
The smallest figure made of eight numbers	10000000	10000000 (Crore)
The smallest figure made of nine numbers	100000000	100000000 (Ten crores)

Method of writing figures into words:

Figure 106739862 is written in the place value table in the following way:

<table>
<tr><th rowspan="2">Figure</th><th colspan="9">Place Value</th></tr>
<tr><th colspan="2">Crore</th><th colspan="2">Lakh</th><th colspan="2">Thousand</th><th colspan="3">Units</th></tr>
<tr><td></td><td>Ten Crores</td><td>Crore</td><td>Ten Lakh</td><td>Lakhs</td><td>Ten Thousands</td><td>Thousand</td><td>Hundred</td><td>Ten</td><td>One</td></tr>
<tr><td>106739862</td><td>1</td><td>0</td><td>6</td><td>7</td><td>3</td><td>9</td><td>8</td><td>6</td><td>2</td></tr>
</table>

We use comma (,) to show the place value so as to make reading a figure easier. So, we write figure 106739862 by using comma as: 10,67,39,862. While reading it we say: Ten crore, sixty seven lakh, thirty nine thousand, eight hundred and sixty two.

Example 1

Write in words: 19,56,02,183.

19,56,02,183 = Nineteen crores, fifty six lakhs, two thousands, one hundred and eighty three.

Method of writing word into numbers:

While writing ten crores, sixteen lakhs, eight thousands, nine hundreds and thirty six into figures we write:

Ten crores, sixteen lakhs, eight thousands, nine hundreds and thirty six = 10, 16, 08, 936.

Likewise if we have to write ten crores, eighty two lakhs, fifteen thousands and fifteen, we write: 10, 82, 15, 015.

Example 2

Write in figures: Eighteen crores, eleven lakhs, four thousands and sixty.

Eighteen crores, eleven lakhs four thousands and sixty = 18,11,04,060.

Exercise 2.1

1. Write the place value of 2 in each of the figures below.

a. 13524 b. 1235497

c. 2305343 d. 4263578

2. How many lakhs are there in each of the figures below?

a. 1234567 b. 50031247 c. 67853479

3. How many thousands are there in a crore?

4. Place comma (,) in each of the numbers below.

a. 1350739 b. 2467893 c. 275403016

d. 75003052 e. 105300274 f. 592070593

5. Write each number in question 4 into words.

6. Write in numbers.

a. One crore, eighty two lakhs and fifteen.

b. Seventeen crore, seventy five lakhs, three thousands, six hundreds and five.

c. Twenty two crores, sixty five thousands, seven hundreds and seventy.

d. Thirty six crores, fifty lakhs, six hundreds and ninety.

e. Ninety nine crores, five hundreds and five.

2.2 Writing numbers into international system:

International system is different from the Nepali system in placing comma in a figure e.g. 57363542. We keep on placing comma after every three numbers in international system from the right-hand side. According to this the above number is written in the following way: 57,363,542.

Placing it in place value table:

Number	Milion			Thousand			Unit		
	Hundred	Ten	One	Hundred	Ten	One	Hundred	Ten	One
57363542	-	5	7	3	6	3	5	4	2

We read it as 57 million, 363 thousand and 542.

Or fifty seven million, three hundred sixty three thousand, five hundred and forty two.

Example 1

Write in words: 123, 430, 316

123, 430, 316 = 123 million, 430 thousand and 316

= One hundred twenty three millions, four hundred thirty thousands, three hundreds and sixteen.

Writing word figures into numbers in international system

Sixty millions, three hundred forty two thousands and eighty two.

= 60 millions, 342 thousands and 082 = 60, 342, 082.

Example 2

Write in numbers:

One hundred seven millions, two hundred ninety three thousands, six hundreds and fifty.

= 107, 293, 650

Exercise 2.2

1. **Put comma (,) in each of these numbers according to the International system.**

    a. 35768229   b. 38962352

    c. 158632932   d. 628293563

2. **Place it in the place value table and write in words according to the International System.**

    a. 32, 567, 832   b. 178, 625, 123

    c. 595, 207, 257   d. 185, 090, 159

3. **Write in numbers.**

    a. Fifty seven millions, nine hundred twenty-six thousands, one hundred and thirty-three.

    b. One hundred twenty-four millions, sixty-six thousands and three hundred four.

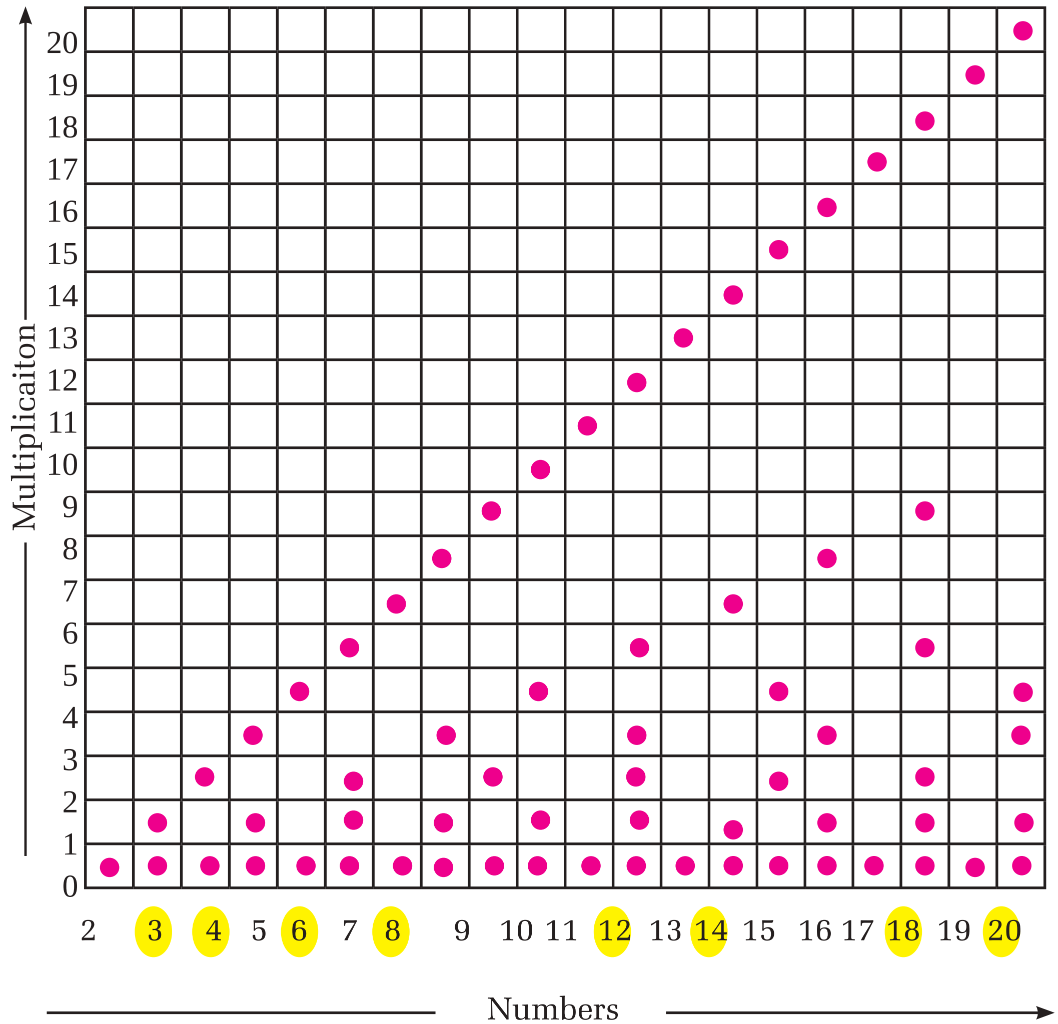
    c. Two hundred fifty-seven millions, four hundred twenty thou sands and seventy-four.

    d. Seven hundred thirty-four millions, thirty seven thousands, two hundreds and sixty-three.

Teaching Instruction: Ask the students to make their own questions like in the above exercise and hold quiz contest in groups.

2.3 Prime and composite numbers

Given below are the prime and composite numbers from 1-20. Dot used in the figure represents that it is a factor of the number just below them. Find and list how many factors there are between numbers 1-20 using the figure below.



Look at the table you have made and give the answers to the questions below.

a) List the numbers which have the factor itself and 1.

b) What can you say about the numbers which have been circled?

c) List and discuss the numbers between 1-20 which have factors other than itself and 1.

Numbers multiple of itself and 1 is called Prime number. The number multiple of itself, 1 and also other numbers is called composite number. A prime number is only multiple of itself and 1. There are 8 prime numbers between 1-20; 2,3,5,7,11,13,17,19. 1 is neither prime number nor composite number. 2 is the only even prime number. All other prime numbers are odd.

Exercise 2.3

1. a) Write all the numbers between 1-100 in 10x10 grid or squared paper.
   b) Cut number 1.
   c) Leaving number 2, cut all the numbers divisible by 2.
   d) Leaving number 3, cut all the numbers divisible by 3.
   e) Leaving number 5, cut all the numbers divisible by 5.
   f) Leaving number 7, cut all the numbers divisible by 7.
   g) What are the numbers left after cutting, prime or composite?
   h) How many prime numbers are there between 1-100?
   i) How many prime numbers are there which are greater than 50 and less than 60?

Note: The method by which we find prime number like we did in question is called "Erathones chalnoe". It is named after who first derived this method.

2) Find out which numbers given below are prime or composite.

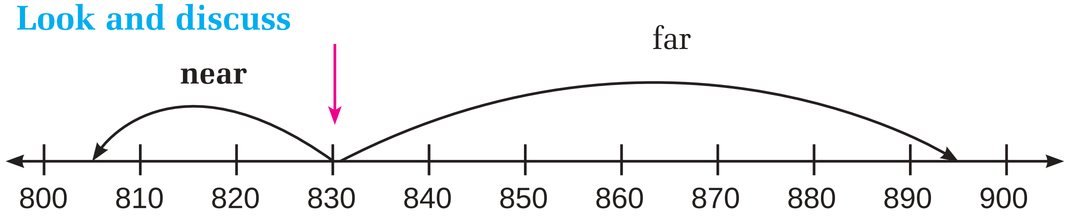
a) 2	b) 5	c) 6	d) 7	e) 13	f) 23
g) 33	h) 41	i) 53	j) 72	k) 75	l) 79
m) 81	n) 83	o) 9			

3) Write all the prime numbers between 75 and 85.

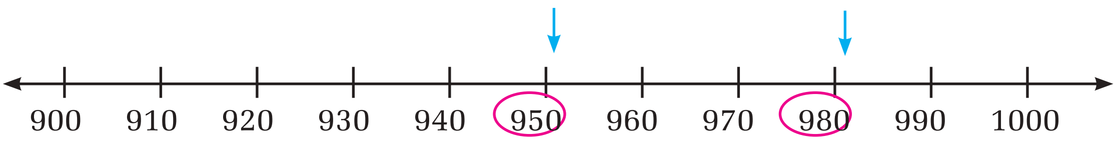
4) 11 x 11= 121, 11 is a prime number. What is 121?

2.4 Rounding off the numbers

Look and discuss



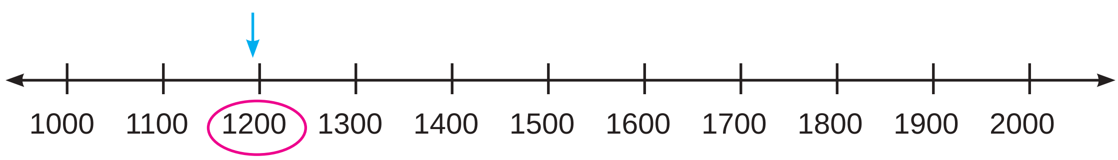
In number line 800 is near to 830 but far from 900. So 800 is the near round off of 830.



In the number line 1000 is near to 980 but far from 900. So the near rounding off of 980 is 1000. Similarly both 1000 and 900 are equidistant from 950 for which near round off of 950 will be 1000.

Exampe 1

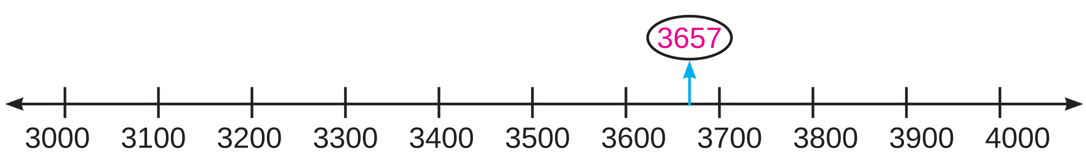
Round off 1200 into nearest thousand.



1000 is nearest to 1200. Hence nearest thousand round off of 1200 is 1000.

Example 2

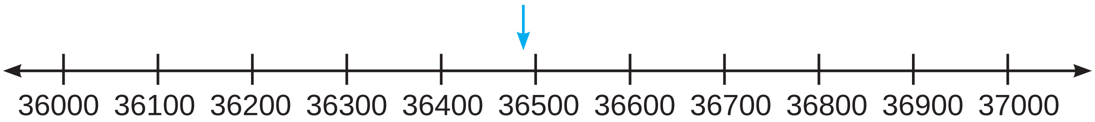
Round off 3657 into nearest thousand.



3657 is nearest to 4000. Hence nearest thousand round off of 3657 is 4000.

Example 3

Round off 36500 into neareset thousand.



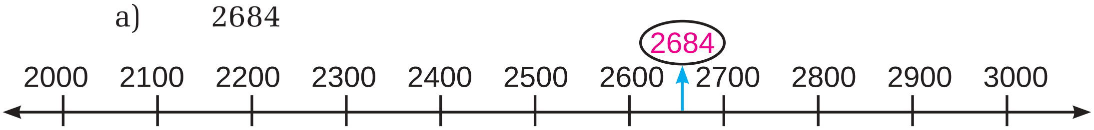
36500 lies just in between 36000 and 37000. The nearest thousand round off of 36500 is 37000.

Teaching Instruction : using number lines discuss about the nearest hundred and thousand round off.

Exercise 2.4

1) Find the nearest hundred round off of the given numbers.

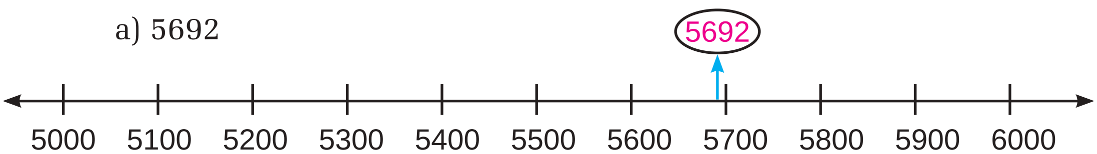
a) 2684



b) 3824, c) 5613, d) 6123, e) 12345

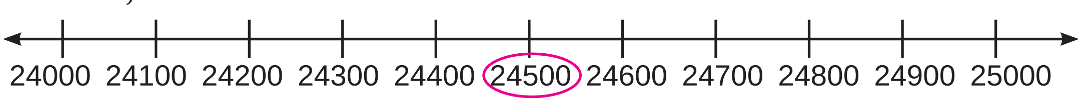
2) Find the nearest thousand round off of the given numbers:

a) 5692



b) 24287

c) 24500



d) 1697 e) 15287 f) 58999 g) 93902

2.5 Square numbers and cubic numbers

2.5.1 Square numbers

Read and discuss the table below. (table from the book)

x	1	2	3	4	5	6	7	8	9	10
1	1	2	3	4	5	6	7	8	9	10
2	2	4	6	8	10	12	14	16	18	20
3	3	6	9	12	15	18	21	24	27	30
4	4	8	12	16	20	24	28	32	36	40
5	5	10	15	20	25	30	35	40	45	50
6	6	12	18	24	30	36	42	48	54	60
7	7	14	21	28	35	42	49	56	63	70
8	8	16	24	32	40	48	56	64	72	80
9	9	18	27	36	45	54	63	72	81	90
10	10	20	30	40	50	60	70	80	90	100

What can we say about the numbers circled in the table?

1 x 1 = 1

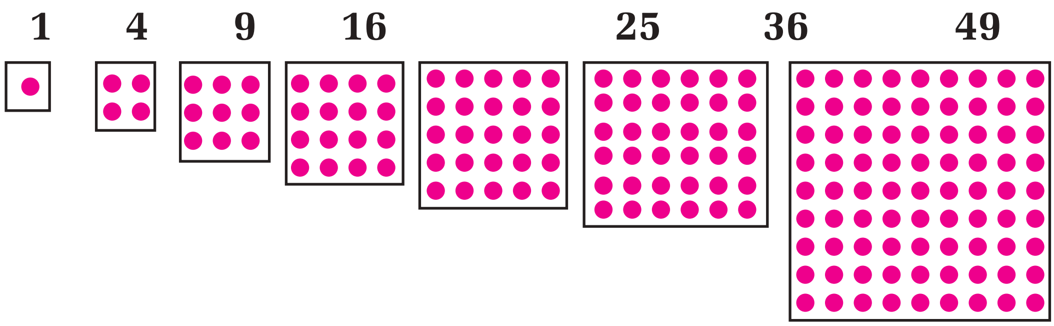
2 x 2 = 4

3 x 3 = 9

Are the circled numbers multiple of same two numbers?

Can all the circled numbers be expressed in the same way? Multiply and see.

Now, draw the circled numbers in a dotted pattern in a box and see what happens.



Here every dotted pattern makes a square. Thus all numbers which represent a dotted square are called square numbers.

These square numbers can be found by multiplying the number by itself.

Look at the table below:

Number	Multiply (number x number	Square number
1	1 x 1	1
2	2 x 2	4
3	3 x 3	9
4	4 x 4	16
5	5 x 5	25

Thus a square number is the product of a number multiplied by itself. So to find out whether a number is a square number or not, we have to see whether the number can be expressed or not in the multiplication of two same numbers. For example 64 = 8 x 8. So 64 is a square number but 15 = 3 x 5 So 15 is not a square number.

Here, two same factors of 64 are 8 and 8, 8 x 8 = 64. 8 is the square root of 64 and 64 is the square number of 8.

Look at the flowchart below to understand the square number and square root.

square number	1	4	9	16	25	....	100
factors	1 x 1	2 x 2	3 x 3	4 x 4	5 x 5	....	10 x 10
square root	1	2	3	4	5	....	10

In the above chart when we see from bottom to top it gives sqaure numbers. Sqaure of 3 is 9. When we see from top to bottom it gives square root. Square root of 16 is 4. Similarly square root of 100 is 10.

Example 1

Find square number of 9.

Here,

Given number = 9.

Hence square number of 9 = 9 x 9 = 81.

Example 2

Chessboard is square in shape and has 64 small square boxes. How many square boxes are there in each row and column?

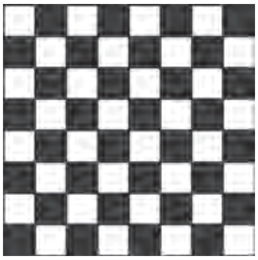
Here,

Square boxes in chessboard = 64.

64 = 8 x 8.

Hence in each row and column square boxes are 8.

Example 3



Find square root of 25.

Here,

25 = 5 x 5.

Hence, square root of 25 = 5.

Exercise 2.5.1

1) **Find square number of given numbers.**

(a) 2 (b) 5 (c) 6 (d) 7 (e) 8 (f) 9

(g) 10 (h) 11 (i) 12 (j) 13 (k) 14 (l) 15

2) **Find which of the given numbers are square numbers.**

(a) 16 (b) 25 (c) 42 (d) 49 (e) 60 (f) 81

(g) 100 (h) 120 (i) 121 (j) 225

3) **Find square root of given numbers.**

(a) 36 (b) 49 (c) 64 (d) 81 (e) 100 (f) 121

(g) 144 (h) 169 (i) 196 (j) 225

4) **How many seedlings of cauliflowers are required to plant in an square field where in each line 20 seedlings can be planted?**

5) **In a class 36 students are seated in a square form, then how many students are there in each line?**

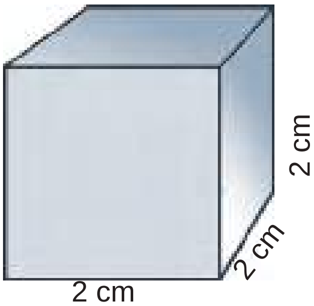
6) **If 144 soldiers are kept in a square pattern during parading, how many soldiers are there in each line?**

7) **When a line is maintained using 45 students in a square pattern, 6 students exceeded, what is the total number of students?**

8) **How many square numbers are there between 1 and 100?**

2.5.2 Cubic numbers

A dice has length, breadth and height of each 2/2cm. It is a cubical object. Multiple of its length, breadth and height gives; 2 x 2 x 2=8. Here are three sides of 8 cm. These numbers are called cubic numbers.



In table below, cubic numbers of 1- 5 are given.

Numbers	Product of three times	Cubic numbers
1	1 x 1 x 1	1
2	2 x 2 x 2	8
3	3 x 3 x 3	27
4	4 x 4 x 4	64
5	5 x 5 x 5	125

Hence , to find out the cubic number of a given number we should multiply the given number by two same numbers.

Example 1

Find the cubic number of six.

Here,

Cubic number of 6

= 6 x 6x 6

=36 x 6 = 216

Example 2

Find cubic root of 64.

Here,

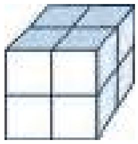
64= 4 x 4 x 4.

Hence cubic root of 64 = 4.

Exercise 2.5.2

1. Find the cubic number of given numbers.

(a) 2 (b) 5 (c) 7 (d) 8 (e) 10

2.  **This is a cuboid with length, breadth and height of 3cm. When it is cut so that its length, breadth and height are 1/1. How many pieces will it be?**

3. **If one of the three same sides of an object is 5, what is the cubic number?**

4. **Which of the numbers are cubic numbers?**

2.6 Prime factorization of numbers

Look at the example below.

12 = 12 x 1 two multiple factorization (12 is the composite number)

= 6 x 2 two multiple factorization (6 is the composite number)

= 4 x 3 two multiple factorization (4 is the composite number)

= 2 x 2 x 3 three multiple factorization (all are prime factorization)

Can these numbers be more factorised? Discuss.

This process of deeomposing a number multiplying it by two similar numbers is called factorization. The process of expressing number in the form of prime numbers is called prime factorization.

Prime factorization can be done using two methods:

1. Continuous division process

Example 1

What is the prime factorization of 12?

Here,

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

12 → 12 is even, so divided by 2

6 → 6 is even, so divided by 2

3 → 3 is a prime number, so cannot be divided further.

Hence, 12 = 2 x 2 x 3

Example 2

What is the prime factorization of 675?

Here,

3	675	675 was divided by 3
3	225	225 was divided by 3
3	75	75 was divided by 3
5	25	25 was divided by 5
	5	Hence, 675 = 3 x 3 x 3 x 5 x 5

2. Factor tree method

Example 3

Factorize 675 by factor tree method.

Here, 675

675
3 x 225
3 x 3 x 75
3 x 3 x 3 x 25
3 x 3 x 3 x 5 x 5

Hence, 675 = 3 x 3 x 3 x 5 x 5

Exercise 2.6

1. Using continuous factorization method, find the prime factors of the given numbers.

(a) 8	(b) 12	(c) 18	(d) 24	(e) 42
(f) 62	(g) 64	(h) 85	(i) 121	(j) 144

2. Use factor tree method to find the prime factors of the givennumbers below.

a)16	b) 30	c) 44	d) 70	e) 162
f)252	g) 676	h) 625	i) 750	j) 925

3 Fundamental Operation in Mathematics

3.1 Simplifications for fundamental operations of a problem

Read, discuss and learn

Solution of problems using four basic rules of mathematics; addition (+), substraction (–), multiplication (x) and division (÷) is called simplification. During simplification multiplication or division which ever comes first can be operated.

Then addition or substraction which ever comes first can be operated.

Example 1

Simplify : 15 ÷ 5 x 3 + 7 - 15

This problem when expressed in words respresents; 5 parts of 15 is multiplied by 3 which is added with 7 and 15 is substracted from. It becomes easier to simplify with order of division, multiplication, addition and substraction.

Hence,

$15 \div 5 \times 3 + 7 - 15$

$= 3 \times 3 + 7 - 15$ (15 ÷ 3=3, division)

$= 9 + 7 - 15$ (3 x 3=9, multiplication)

$= 16 - 15$ (9 + 7=16, addition)

$= 1$ (16 – 15=1, substraction)

Example 2

Simplify: 55 - 576 ÷ 12 + 11 x 3

Here, $55 - 576 \div 12 + 11 \times 3$

$= 55 - 48 + 11 \times 3$ [by division]

$= 55 - 48 + 33$ [by multiplication]

$= 7 + 33$ [by substraction]

$= 40$ [by addition]

Example 3

How much will it be when twice of 16 is substracted from 20 and then13 is added to it?

When this is represented in mathematical form it becomes $16 \times 2 - 20 + 13$.

Hence, $16 \times 2 - 20 + 13$

$= 32 - 20 + 13$ [by multiplication]

$= 12 + 13$ [by substraction]

$= 25$ [by addition]

or,

$16 \times 2 - 20 + 13$

$= 32 - 20 + 13$

$= 32 + 13 - 20$

$= 45 - 20$

$= 25$

Exercise 3.1

1. Simplify.

(a) $44 + 24 \div 3 - 30$

(b) $63 \div 9 \times 7 + 4 - 52$

(c) $6 \times 64 \div 16 + 7 - 21$

(d) $24 \times 12 \div 12 - 24 + 17$

(e) $55 \div 11 + 7 \times 3 - 13$

(f) $132 \div 12 \times 12 - 124 \div 31$

(g) $422 + 124 \div 4 \times 2 - 355$

(h) $144 \div 24 - 3 \times 15 \div 5 + 16$

(i) $625 \div 25 - 25 \times 25 \div 5 + 100$

(j) $576 \div 24 + 51 \div 17 - 20$

2. Write the following verbal problems in mathematical language and solve.

a) How much does it become when 3 is added to 5 times 2?

b) How much does it become when 7 is added to 12 times 3?

c) How much does it become when 5 is substracted from one third of 36 and 7 is added to it?

d) How much does it become when 50 is added to 10 times 15 and 200 is subtracted from it?

e) How much does it become when twice of one third of 9 is subtracted from 15 ?

3.2 Uses of brackets in simplification

Read, discuss and learn

How much will it cost to buy a copy of Rs.10 and an eraser of Rs.2 for three people each ?

Cost for one person = 10 + 2

Cost for three people = 3 x (10 + 2)

= 3 x (10 + 2) simplifying

= 3x12 [operation inside brackets]

= Rs. 36

Example 1

Simplify : 12 - (20 - 12)

Here, 12 - (20 - 12)

= 12 - 8 [operation inside bracket]

= 4

Example 2

Simplify: 5 + 8 x 2 - (5 - 2)

Here, 5 + 8 x 2 - (5 - 2)

= 5 + 8 x 2 – 3 [operation inside bracket]

= 5 + 16 – 3 [multiplication]

= 21 – 3 (addition)

= 18 (subtraction)

Example 3

How much is it when we add 2 to 5, multiply it by 3 and subtract 6 from it ? Addition, substraction and multiplication are involved in this problem. Among these, we should do multiplication first. But according to the problem, it is three times the total of 5 and 2. So we should do addition first.

Hence, addition of 2 to 5 comes first so the mathematical expression using bracket is:

(5+2) x3-6

=7x3-6 {first simplification is done inside bracket. After that bracket should be removed.}

=21-6

=15

Therefore if there is bracket in the problem then simplification should be first performed inside the bracket and then remaining simplification should be performed. Simplification in brackets should be done according to order ( ) parenthesis, {} braces and then [ ] square brackets.

Example 4

Simplify: 8 + 14 x {(8 - 2) + 3} ÷ 18

Here, 8 + 14 x {(8 - 2) + 3} ÷ 18

= 8 + 14 x {6 + 3} ÷ 18

= 8 + 14 x 9 ÷ 18

= $8 + 14 \times \frac{9}{18}$

= 8 + 7

= 15

or

8 + 14 x {(8 - 2) + 3} ÷ 18

= 8 + 14 x {6 + 3} ÷ 18

= 8 + 14 x 9 ÷ 18

= 8 + 126 ÷ 18

= 8 + 7

= 15

Exercise 3.2

1. Simplify:

(a) 6 - (5 - 2)

(b) (16 - 4) x (5 - 3)

(c) (16 + 4) ÷ 5 - 3

(d) 20 - {8 - (5 + 2)}

(e) 3 - {12 ÷ (2 x 3)}

(f) 19 - 7 + {4 - (5 - 2)} x 2

(g)3 + 4 ÷ {2 + 4 ÷ (4 - 2)}

(h) 30 ÷ {60 - 3 (21 - 6)}

(i) 22 ÷ {20 ÷ (4 + 6)} x 2

(j) 80 - 5 {9 - (14 - 12)} ÷ 5

2. Simplify by converting into mathematical language.

(a) How much is thrice the difference between 12 and 5 divided by 7?

(b) How much is when thrice the difference between 9 and 5 is substracted from 20?

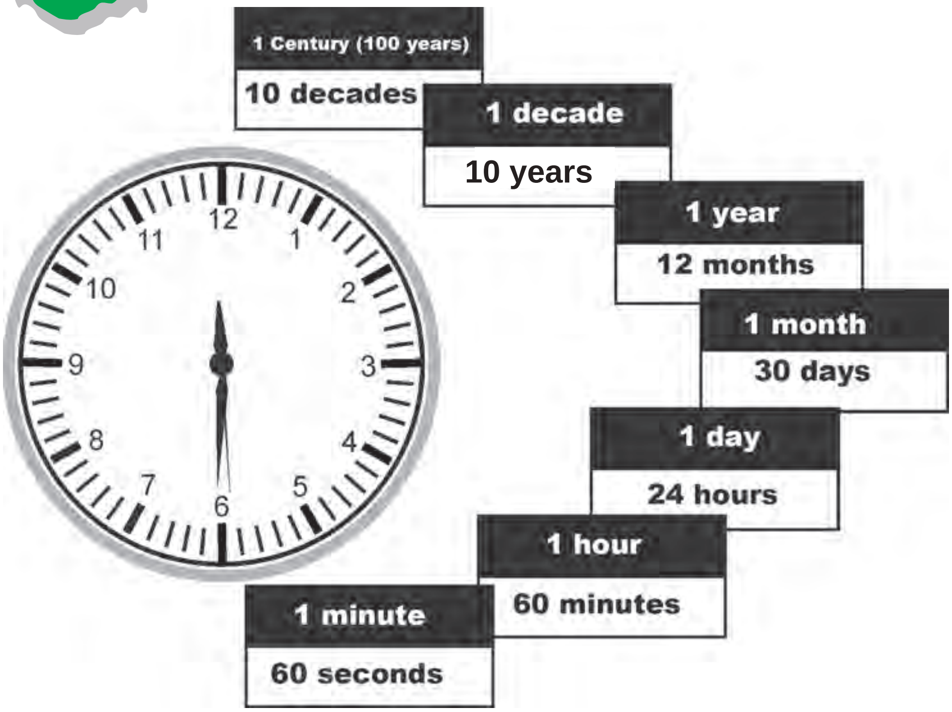
(c) How much is when difference between 70 and 30 is substracted from five times the sum of 7 and 3?

(d) How much is when difference between 16 and 7 is substracted from one fourth the sum of 16 and 20?

(e) How much is when one third of two times 12 is substracted from 50 and is divided into 6 parts?

(6) How much is when 4 added to difference between 5 and 2 is substracted from 7 and 9 is added?

4 Time



Compare the units of time given above with each other and find out their relationship. The small hand (hand showing seconds) of the clock crosses sixty smaller lines when it makes a circle around the clock. At that time the long hand (hand showing minute) of the clock reaches just another line. Now discuss with your friends and find out answers to the following questions which are related to the speed of the hands of the clock and their relationship with each other:

a. How many lines does a minute hand cross while the second hand makes a full circle?

b. How many full circles does a second hand make while the minute hand makes one full circle?

c. How much time does the hour hand take to make one full circle around the clock?

d. How many circles does an hour hand make in a day? And how many circles does a minute hand make around the clock in a day?

Example 1

Multiply 3 years, 8 months and 12 days by 3.

Multiplying years, months and days separately by 3,

Year	Months	Day
3	8	12
	x	3
9	24	36
9	25	6
11	1	6

30 days= 1 month, 36 days = 1 month 6 days, 12 months = 1 year, 25 months = 2 years 1 month

Example 2

Divide 15 hours 30 minutes 48 seconds by 4.

Dividing hours, minutes and seconds separately by 4.

$$
\begin{array}{rl}
 & \text{3 H.}\quad \text{52 M.}\quad \text{42 S.} \\
4\,\big) & 15\quad 30\quad 48 \\
 & -12 \\
\hline
 & 3\quad 30\quad 48 \\
\hline
 & 210\quad 48 \longrightarrow \text{30 hours} = \text{180 minutes} \\
 & -20 \\
\hline
 & 10 \\
 & -8 \\
\hline
 & 2\quad 48 \\
\hline
 & 168 \longrightarrow \text{2 minutes} = 120 \\
 & -16 \\
\hline
 & 8 \\
 & -8 \\
\hline
 & 0
\end{array}
$$

Example 3

Divide 10 years 7 months 12 days by 6:

Dividing years months and days separately.

6 Yr. Mon. Day

10 7 12

6

4 7 12

55 12 → 4 years = 48 months

54

1 12

42 → 1 month = 30 days

42

x

Example 4

A micro bus travelled to Kathmandu from Narayangadh continuously for 6 times. If the bus took 28 hours and 34 minutes for completing its journey 6 times and if it takes the same amount of time for each journey, how much time did it take for its one journey from Narayangardh to Kathmandu?

Total time taken for 6 journeys = 28 hours and 34 minutes

So time taken for 1 journey is,

4 hours 45 minutes 40 seconds

6 | 28 34

-24

4 x 60 → 240 + 34

274

- 24

34

– 30

4 x 60 – 240

– 240

0

Exercise 4

1. **Multiply:**
   a. 2 years 7 months 16 days by 7
   b. 5 years 6 months 12 days by 5
   c. 7 years 4 months 18 days by 3
   d. 8 years 9 months 6 days by 8
   e. 6 hours 40 minutes 15 seconds by 5

2. **Divide:**
   a. 10 years 8 months 20 days by 2
   b. 15 years 6 months 21 days by 3
   c. 13 years 7 months 12 days by 6
   d. 5 hours 7 minutes 32 seconds by 4
   e. 8 hours 10 minutes 35 seconds by 7

3. **If it takes 6 hours and 30 minutes to complete half of the work, how much time will it take to complete the whole work?**

4. **If it takes 2 hours and 15 minutes to plant the seedlings of cauliflower in a square-shaped field, how much time will it take to do the same in six such fields?**

5. **A pipe fills up a tank in 1 and ½ hours. How much time will the same pipe take to fill up 5 tanks of the same size?**

6. **Seven subjects are taught in Shila's class. If it takes 45 minutes for one subject, how many minutes will Shila take to study all 7 subjects?**

7. **Shiva finishes up the homework of all 7 subjects in 3 and ½ hours. If he spends equal time for doing each subject's homework then, how much time does he take to do homework of 1 subject?**

8. The time table of the departure of buses from Pokhara is given below. Both the buses A and B departed from Pokhara to Kathmandut at 5; 30 and reached the following places at the given times:

Pokhara	Bus A	Bus B
Khairenitar	6:45 am	7:00 am
Damauli	7:50 am	8:45 am
Dumre	9:30 am	10:30 am
Anbukhaireni	10:15 am	12:30 noon
Muglin	11:00 am	1:00 pm
Mahadev Besi	11:50 am	2:30 pm
Naubise	1:00 pm	4:00 pm
Kathmandu	2:00 pm	5:30 pm

Now answer the following questions:

a. At what time did Bus A reach Damauli?

b. How long after Bus A did Bus B reach Damauli?

c. How long will it take for passangers from Dumre to reach Muglin if they are in Bus A?

d. How long did the Bus B take to reach Mahadev Besi from Dumre?

e. Where was Bus B while Bus A was at Naubise?

f. Which bus shall we take to reach Mahadev Besi within 2 pm?

g. How later does the But 'B' reach Kathmandu then the Bus 'A'?

6 Distance

Division and multiplication of unit of distance

Guess, what will be the distance between your house and school? What is the distance you will have to walk in a week from home to school? How can we find it out? Discuss.

Example 1

Multiply 3km, 200m, 55cm by 8.

Multiplying the units of distance separately,

km	m	cm	
3	200	55	
		x 8	
24	1600	440	440cm = 4m 40 cm
24	1604	40	1604m = 1km 604cm
25	604	40	

Example 2

Divide 5km, 600m, 56cm by 8.

Here, dividing the units of distance seperately,

	0km	700m	7cm	
8	5	600	56	
	0	5000 ←		5x1000
		5600	56	
		– 56		
		00	56	
			– 56	
			x	

Hence, dividend = 700m 7cm.

Example 3

Hari’s school is 1km 5m far from his home. If the distance of Shyam’s school is 3 times more than Hari’s, what is the distance between Shyam’s home and school?

Here, the distance between Hari’s home and school= 1km 5m

The distance between Shyam’s home and school

= 3 x (distance between Hari's home and school)

= 3 x (1km 5m)

= 3km 1500m

= 4km 500m

Hence, the distance between Shyam’s home and school= 4km 500m

Example 4

If there is a plan to blacktop a road of 35km 600m 80cm length. dividing it into 4 equal sections. What is the length of 1 section?

Here, division of 55km 600m 80 cm road into 4 equal sections means dividing the distance by 4. Therefore dividing the units of distance seperately by 4,

	km	m	cm
	13km	900m	200cm
4	km	m	cm
	55	600	80
	− 4		
	15		
	− 12		
	3	600	80
		3600	80
		− 36	
		00	80
			− 8
			0

Hence the length of each section blacktopped = 13km 900m 20cm

Exercise 6

1. Guess the length of the following objects and measure them, Are you correct?

a. The length and breadth of " My Mathematics Class 5"

b. The length and breadth of the blackboard

c. The length and breadth of your desk

d. The length and breadth of your classroom door

e. The length and breadth of your classroom

2. Convert the following units of distance into cm.

a. 1km 75cm b. 5m 65cm

c. 1km 200m 80cm d. $1\frac{1}{2}$m

e. 5km 350m 75cm f. 3.2m

g. 5.72m

3. Convert the following units of distance into m.

a. 1km 200m b. 1.5km

c. 3m 80cm d. 5m 70cm

e. 250cm f. 15cm

4. Multiply.

a.

km	m	cm
5	320	25
		x 6

b.

km	m	cm
3	750	75
		x9

c.

km	m	cm
6	20	5
		x 12

d.

km	m	cm
8	425	60
		x 1 5

e.

km	m	cm
17	250	65
		x 17

f.

km	m	cm
22	560	30
		x 25

5. Divide.

a. 5km 600m 75cm by 5.

b. 3km 145m 20cm by 6.

c. 12km 200m 64cm by 8

d. 8km 650m 71cm by 9.

e. 12km 330m 96cm by 6.

f. 2km 580m 83cm by 7.

g. 3.693km by 3.

6. If the height of a brick is 12cm, how many bricks are needed to make a wall of 3.6m height? (cement not counted)

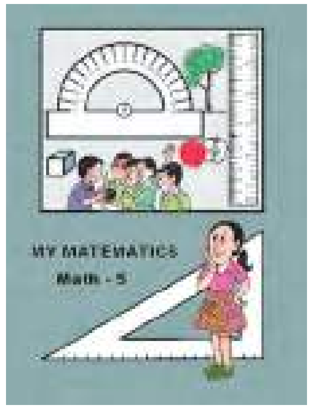
7. If a 6m long ribbon is equally divided among 10 girls, what will be the length of ribbon each girl gets?

8. If a 2m 50cm sugar cane was eaten up by 5 persons in equal poportion, what length did each get?

9. A 200km long road was black topped dividing it into 8 equal sections. What was the length of each section?

10. If a road is constructed at the rate of 10km 650m per months, and completed in 7 months, what is the distance of the road?

7 Perimeter



Perimeter of rectangular objects

Lets tie the book of " Mathematics class 5" from its length side to its every end with a thread. What length of thread will we need to tie the book in this way?

Will a measurement of book of length = 24 cm and breath = 18cm be equal to the thread used to cover its every end?

Measurement of the border of any surface or objects is called its perimeter.

How many times do we have to measure the length to find out the perimeter of a rectangular book? Do we have to measure the breadth same way as length?

Here, perimeter of book " Mathematics Class 5"
= 24 cm + 18 cm + 24 cm + 18 cm = 84 cm.

While calculating perimeter of any rectangular surface or object,

Perimeter (p) = length + breadth + length + breadth
= 2 x length + 2 x breadth
= 2 (length + breadth)
= 2 (l + b)

When the surface is square,

Perimeter (p) = 2 (length + breadth)
= 2 (length + length)   because length = breadth
= 2 (2 length)
= 4 length = 4l

So, perimeter of square = 4 x length.

Example 1

What is the perimeter of an object having length 8 cm and breadth = 6cm?

Here,

Length of rectangle (l) = 8 cm

Breadth (b) = 6 cm

Perimeter (p) = ?

According to formula, perimeter (P) of rectangle = 2 (l+ b)

= 2 (8cm + 6 cm)

= 2 x 14 cm

= 28 cm.

Therefore the circumference of rectangle = 28 cm.

Example 1

If the length of a square is 8 cm, what will be its perimeter?

Here,

Length of the square (l) = 8 cm

Perimeter (p) = ?

According to formula, perimeter of a square (p) = 4 l

= 4 x 8 cm

= 32 cm

Therefore the perimeter of the square = 32 cm

Example 1

What length of barbed wire will be required to barbe around a field 5 times which has length 50 meter and breadth 30 meter?

Length of barbed wire = 5 times of the perimeter of the field.

Here,

length (l) = 50 m

breadth (b) = 30 m

perimeter (p) = ?

Perimeter of field (p) = 2 (l +b)

= 2 (50m +30m)

= 2 x 80 m

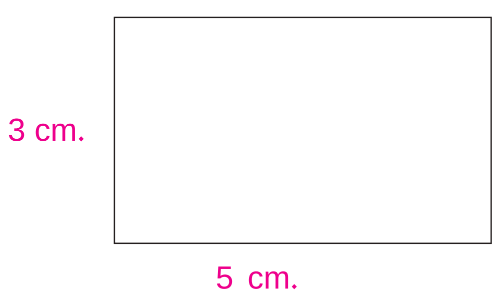
= 160 m

Therefore, the length of barbed wire = 5 x 160 m = 800 m.

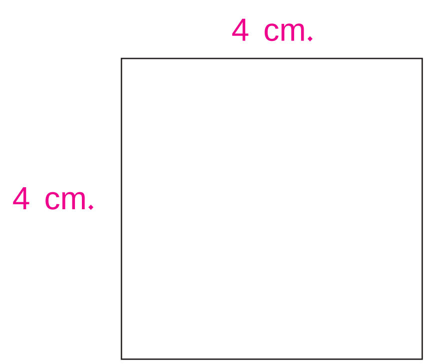
Exercise 7

1. Find out the perimeter of the following shapes.

(a)

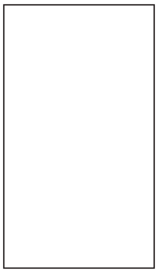


(b)



(c)

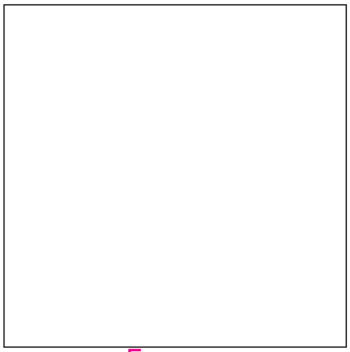
3.5 cm



2 cm

(d)

5 cm



5 cm

2. Find out the perimeter of rectangular surface having the following length and breadth.

a. L = 8cm, b = 6 cm

b. L = 7 cm, b = 3 cm

c. L = 6 cm, b = 5 cm

d. L = 10 cm, b = 5 cm

e. L = 6.8 cm, b = 3cm

f. L = 5.6 cm, b = 2 cm

g. L = 10.3 cm, b = 6.5 cm.

3. Find out the perimeter of a square with the following length.

a. Length = 3 cm

b. L = 5 cm

c. Length = 8 cm

d. L = 12 cm

e. Length = 51/2 cm

f. L = 7.5 cm

4. What will be the perimeter of a field which is 55 m in length and 40 m in breadth?

5. If a rectangular chautari is 12 m in length, 6 m in breadth, what will be its perimeter?

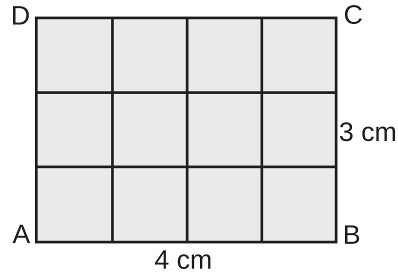
6. A square- shaped field is 30m in length. If you put a wall around it, how long will the wall be?

7. What length of barbed wire will be needed to fence 3 times around a rectangular field with 60m length and 40m breadth?

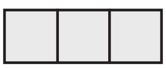
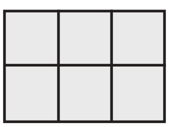
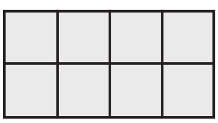
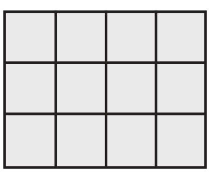
8 Area

Area of a rectangular surface

To say how much is the area of an object means counting how many sqaures of 1 square unit it contains.



In the picture the length of the rectangle is 4 cm. and its breadth is 3 cm. There are 12 squares of 1 square unit. Therefore the area of the rectangle ABCD is 12 square centimeter. Square centimeter is called cm2 in short. To count square unit always in every given figure for calculating area is difficult. Therefore to find out the shortcut method read, discuss and complete the table given below.

Rectangular Surface	Length	Breadth	Area (Counting squares)	Length x Breadth
	3 cm	1 cm	3 cm^2	3 cm x 1 cm = 3 cm^2
	3 cm	2 cm	6 cm^2	3 cm x 2 cm = 6 cm^2
	4 cm	2 cm	8 cm^2	....
	4 cm	3 cm	12 cm^2	....

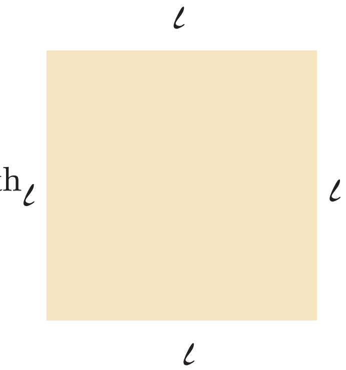
What did you learn from the table?

Is product of length and breadth of square equal to its area?

From discussion above:

Area of rectangular object = length x breadth

Or A = Lx b



A square shaped object has its length and breadth equal.

Therefore b = L and L x b = L x L

So the area of surface (A) = L^2

Example 1

What is the area of a square which is 5 cm in length and 3 cm in breadth?

Here, Length (L) = 5 cm

Breadth (b) = 3 cm

Area (A) = ?

According to the formula,

A = L x b

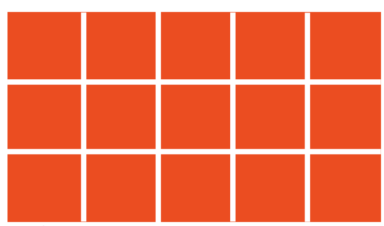
= 5 cm x 3 cm = 15 cm^2

:. Area of the rectangle = 15 cm^2

Lets divide the rectangle into 1 square cms:

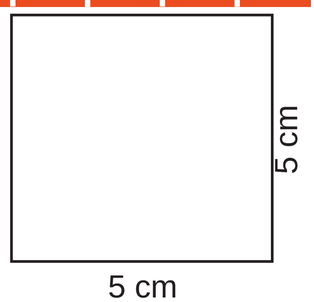
Now there are 15 squares of 1 square cm.

Therefore area A = 15 cm^2



Example 2

What is the area of a square which is 5 cm in length?



Here, Length (L) = 5 cm

Area (A) = ?

Area of square (A) = L2

= (5 cm) 2

= 25 cm2

Example 3

If the length of a rectangle room is 6 m and breadth is 4 m, what will be its area?

Here, length of room (L) = 6m

Breadth (b) = 4m

Area (A) = ?

So, area (A) = L + b

= 6m + 4m

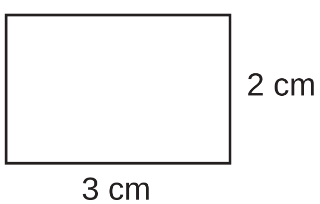
= 24 m2

Area of room = 24 m^2

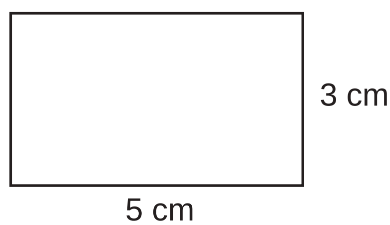
Exercise 8

1. Find out the area of each of the following rectangular shapes.

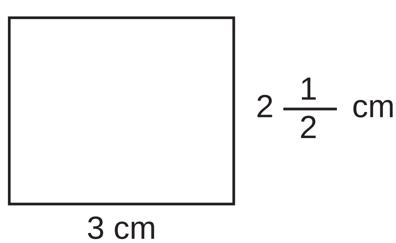
(a)



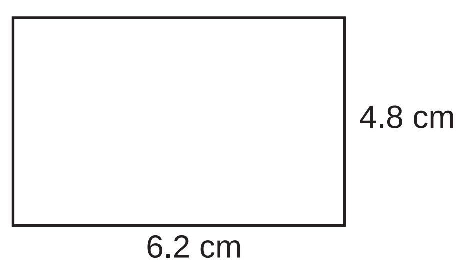
(b)



(c)

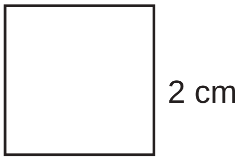


(d)

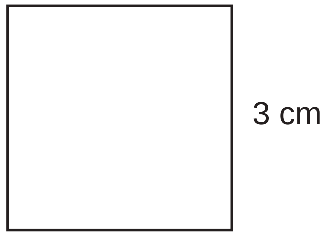


2. Find out the area of each of the following squares:

(a)

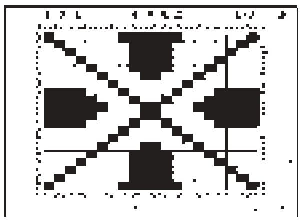


(b)



3. Find out the area of the surface of each of the following objects:

(a)



length of carpet = 2.5 m

breadth = 1.8 m

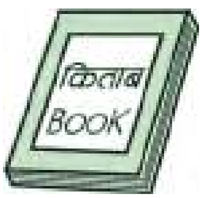
(b)

length of frame = 30cm

breadth = 22cm

(c)

length of book = 20.2 cm
breadth = 15.9 cm



(d)

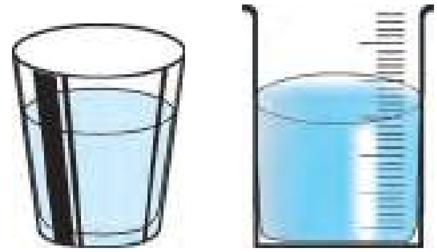
length of the surface of the table = 1.3m
breadth = 80 cm

4. If the length of the surface of a table is 3.1 m and its breadth is 24m, what will be its area?

5. What will be the area of a rectangular field of length 52 m and breadth 32.5m?

6. Find the area of a square handkerchief which has length of 30 cm.

9 Capacity



How much water does a glass contain?
How much water fills up a water pot?
To answer such questions we have to measure the water in it. We use objects like cylinder or litre to measure liquid.
Units like litre and milliliters are used to measure water or other liquids. Capacity is the measurement of the amount of liquid in a container.

Litre and millilitre are the units used to measure capacity.

1 litre (l) = 1000 millilitre (ml)

Example 1

How many millilitres are there in 5 litres and 200ml.

Here, 5 *l* = 5000m*l*

= 5 x 5000 m*l*

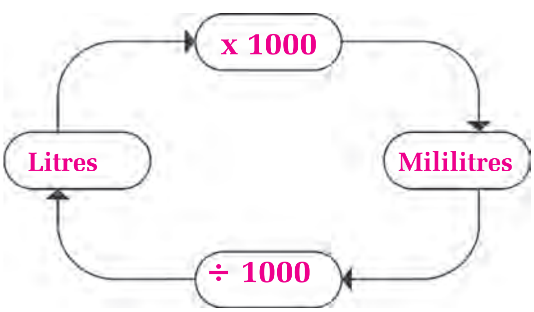
Now, 5*l*, 200mℓ = (5000 + 200) m*l*

= 5200 m*l*

Example 2

Multiply:

l	m*l*
2	300
	x 4
8	1200
= 9*l*	200 m*l*



Example 3

Solve : 15l 600 ml ÷ 5

$$
\begin{array}{r|ll}
 & 3\ l & 120ml \\ \hline
5 & l & ml \\
 & 15 & 600 \\
 & -15 & \\ \hline
 & X & 600 \\
 & & -5 \\ \hline
 & & 10 \\
 & & -10 \\ \hline
 & & 0
\end{array}
$$

Example 4

Capacity of a glass is 250 ml. Sujan drank 5 glasses of water at one time. How much water did he drink? Express in litres.

Here, 5 glasses = 5 x 250 mℓ

= 1250 mℓ

= 1250 ÷ 1000ℓ

= 1.250 litres

Example 5

How many glasses with the capacity of 500ml are required to fill up a jug with a capacity of 2l 500 ml?

Here,

Capacity of jug = 2l 500 ml

= (2 x 1000 + 500 ml) ml

= 2500 ml

Capacity of glass = 500ml

Therefore,

Number of glasses required to fill up the Jug $= \frac{2500}{500}$

$= 5$

:. The jug will be filled up with 5 glasses.

Exercise 9

1. Solve.

(a)

l	ml
3	400
	x 3

(b)

l	ml
15	250
	x 4

(c)

l	ml
21	250
	x 6

(d)

l	ml
16	750
	x 8

(e) 10l. 200ml ÷ 3 (f) 15l. 750ml ÷ 6

(g) 48l. 500ml ÷ 5 (h) 28l. 250ml ÷ 10

2. If a glass contains 280 ml of water, how many glasses are required to fill a jug with the capacity of 4l 200ml?

3. What capacity kettle is required to serve tea to 50 people with 300ml each at once?

4. With a pot of 750 ml capacity, Shila poured oil 4 times into a gallon. How much oil did she pour?

5. **How many 250 ml glasses of squash can we make out of the squash bottle with the capacity of 1.5 litre?**

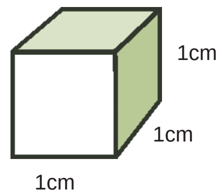
6. **If 15 glasses having capacity 180 ml each fill a jug, what will be the capacity of the jug?**

7. **A dairy fills milk in 500 ml packets. How many plastic packets will the dairy require if it sells 40,000 litres of milk?**

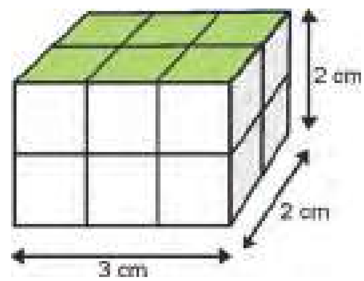
***Teaching Instruction**: For further multiplication and division, exercise of capacity (ℓ and mℓ* related*), design your own exercise similar to that of exercise.*

10 Volume

Volume of a rectangular solid object:



In the picture, a cube is shown with length, breadth and height of 1 cm each. Its volume = 1 cube cm. This unit cube of 1 cube cm is the unit of measuring a rectangular solid figure.

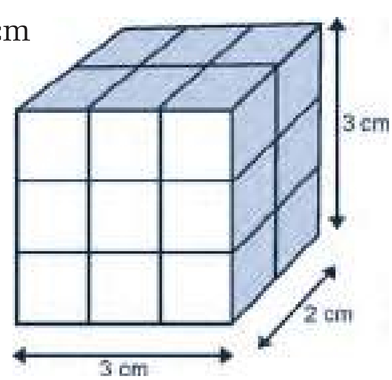


To find out the volume of a rectangular solid object we count the number of unit cubes it contains. The rectangular solid object in the picture has length 3 cm, breadth 2 cm and height 2 cm. There are 6 unit cubes in the lower row 3 length wise and 2 breadth wise. Likewise there are 6 unit cubes on the upper row as well. The volume of each unit cube is 1 cube cm (1 cm^3). So the volume of the rectangular solid figure is 12 cube cm (12 cm^3).

Here, by multiplying length, breadth and height of the rectangular solid figure,

Length x breadth x height = 3 cm x 2 cm x 2 cm

= 12 cm^3



Now, if we add one more layer to the above picture we have to add 6 unit cubes.
The volume of the rectangular figure is 18 cm3.

Here, l x b x h = 3 cm x 2 cm x 3cm

= 18 cm^3

On the basis of the above discussion

The volume of a rectangular solid figure = length x breadth x height

Or V= l x b x h

Similarly, if the length, breadth and height of a cube is equal. Volume of cube (v) = $(\text{arm})^3$ or $(\text{length})^3$

Or V = l^3

Example 1

What is the volume of a rectangular solid which has length 4 cm, breadth 3 cm and height 2 cm?

Here, length (l) = 4 cm

Breadth (b) = 3 cm

Height (h) = 2 cm

Volume (V) = ?

So, V = l x b x h

= 4 cm x 3 cm x 2 cm

= 24 cm^3

Example 2

What is the volume of a cube with 4 cm arms?

Here, length of cube (l) = 4cm

Volume (V) = ?

So, volume of cube (V) = l 3

= $(4cm)^3$

= 4cm x 4cm x 4cm

∴ V = $64cm^3$

Example 3

What will be the volume of a soap with length 5 cm, breadth 4 cm and height 3 cm?

Here, Length (l) = 5 cm

Breadth (b) = 4 cm

Height (h) = 3 cm

Volume (v) = ?

According to the formula,

v = l x b x h

= 5 cm x 4 cm x 3cm

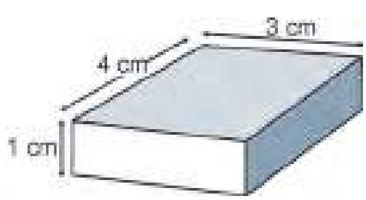
= 60 cm3

Volume of a soap (v) = 60 cm3

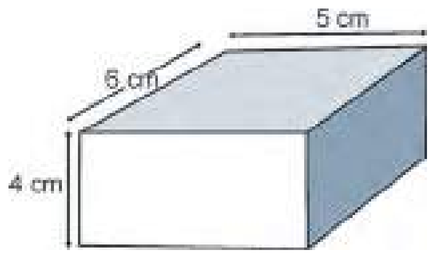
Exercise 10

1. Find out the volume of each of the following rectangular figure.

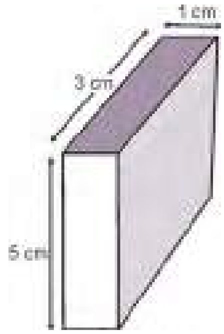
(a)



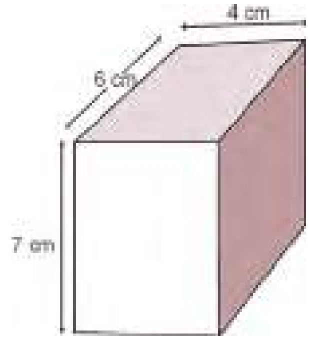
(b)



(c)



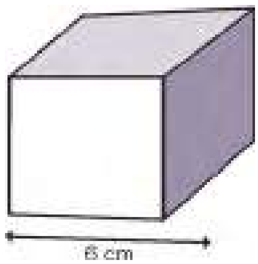
(d)



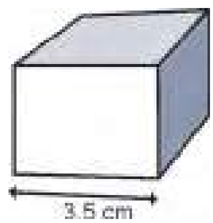
2. Find out the volume of each of the following cubic figure.

(a)

(b)



(c)



3. Find the volume of each of the following rectangular solids with given measurement:

a) length = 4 cm, breadth = 3 cm, height = 2 cm

b) length = 5 cm, breadth = 2 cm, height = 1 cm

c) length = 3.5 cm, breadth = 2.2 cm, height = 4 cm

d) length = 4.8 cm, breadth = 3.3 cm, height = 2.5 cm

4. The length, breadth and height of a match box is 13 cm, 3 cm and 3 cm respectively. What's its volume?

5. What will be the volume of a tooth paste tube with length 13 cm, breadth 3 cm and height 3 cm?

6. **The cover of an ink-bottle has length 8 cm, breadth 4 cm and height 5 cm. What will be the volume of the cover? What will be the total volume of 18 such covers?**

7. **While making a table showing length, breadth and height of different rectangular solid objects, Ram has put some boxes empty. The table is given below. Complete the empty boxes.**

Measurement	a	b	c	d	e
Length (l)	3 cm	7 cm	6 cm	7 cm	5 cm
Breadth (b)	2 cm	5 cm	5 cm	6 cm	4 cm
Height (h)	4 cm	2 cm	4 cm	4 cm	4 cm
Volume (V)	?	?	?	?	?

Teaching Instruction: *While doing teaching learning activities on volume ask students to find out volume of rectangular solid objects found around the school and their home.*

11 Weight

What will be the weight of " My Mathematics Class 5" ? Guess.

What is used to measure weight? What is the unit of weight? We use a weighting scale to measure weight. The weights used in the balance are of various weights like 100 gram, 200 gram, 500 gram, kilogram etc.

Read the following facts about weight:

Weight of 1 kilogram = 2 weights of ½ kilogram each.

= 5 weights of 200 gram

= 10 weights of 100 gram

= 1000 gram

100 kilogram = 1 quintal

Example

Convert 3.5 kg into gram.

Here, 1 kg is equal to 1000 gram.

Hence, 3.5 kg = 3.5 x 1000 = 3500 gram.

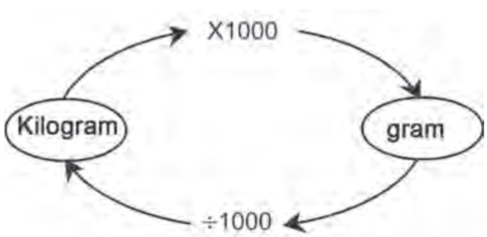
Example 2

Convert 75 gram into kg.

Here, 1000 gram is equal to 1 kg

Hence, 75 gram $\frac{75}{1000}$ kg = 0.075 kg.

We can make the following conversion circle to convert gram and kilogram.



Example 3

The weight of a packet of tea is 1 kg 200 grams. What will be the total weight of 8 such packets?

Here, the weight of 8 packets of tea is eight times more than 1 packet of tea.

By multiplying kg and gram separately,

kg	gram
1	250
x	8
8	2000
10	000

$\rightarrow$ 2000 gram = 2 kg

= 10 kilogram

Let's try it another way.

Weight of 8 packets of tea

$$\begin{array}{r} 1.25 \\ \times\ 8 \\ \hline 10.000\text{kg} \end{array} = 10\text{kg.}$$

Example 4

What will be the weight of 1 packet of chocolate if the weight of 7 packets of chocolate is 5 kg 200 gram?

Here, to find out the weight of 1 packet of chocolate we have to divide 5 kg 250 gram into 7 equal divisions. Therefore,

$$\begin{array}{r|ll} & 0\text{ kg} & 750\text{ gram} \\ \hline 7 & \text{kg} & \text{gram} \\ & 5 & 250 \\ & 0 & \\ \hline & & 5250 \\ & & -49 \\ \hline & & 35 \\ & & -\ 35 \\ \hline & & 00 \end{array}$$

5250 $\rightarrow$ 5kg. = 5000 gram

Hence, the weight of 1 packet of chocolate = 0.750 kg or 750 gram.

Example 5

What will be the total weight of 2 packet biscuits each with 450 gram weight, 4 packet tea each with 125 gram weight and 3 butters each with $\frac{1}{2}$ kg weight ?

Here, weight of 2 packet biscuits = 2 x 450 gram

= 900 gram

Weight of 4 packet tea = 4 x 125 gram

= 500 gram

Weight of 3 butters = 3 x 500 gram

= 1500 gram

Hence, total weight = 900 gram + 500 gram + 1500 gram

= 2900 gram

= 2 kg 900 gram

= 2.9 kg

Exercise 11

1. Convert into grams.

a. 5 kg b. 12 kg c. 16 kg

d. $\frac{1}{2}$ kg e. $\frac{1}{4}$ kg f. $6\frac{1}{2}$ kg

g. $7\frac{1}{5}$ kg h. $5\frac{1}{4}$ kg. i. 0.2 kg

j. 0.34 kg k. 5.05 kg l. 0.005 kg

2. Convert into kilogram.

a. 3000 gram b. 5000 gram c. 2100 gram

d. 350 gram e. 250 gram f. 200 gram

g. 15 gram h. 90 gram i. 5 gram

j. 2 quintals k. 5 quintals

3. Multiply.

(a) 2 kg 250 gram
x 5

(b) 6 kg 720 gram
x 6

(c) 5 kg 650 gram
x 8

(d) 8 kg 105 gram
x 9

(e) 16 kg 270 gram
x 5

(f) 17 kg 350 gram
x 7

4. Divide.

a. 500 g by 25

b. 750 g by 15

c. 3 kg by 650g by 6

d. 5 kg 460g by 4

e. 9 kg 300g by 6

f. 12 kg 420g by 9

5. There are 36 packets of powder in a box. The weight of one packet is 750 g and the weight of the box is 2.3 kg, What will be the weight of the powder and the box?

6. If the weight of a tea-cup is 350 g:

a. What will be the weight of 12 tea-cups?

b. How many tea-cups weigh 1.05 kg?

7. If the weight of 1 ink-pot is 270 gram-

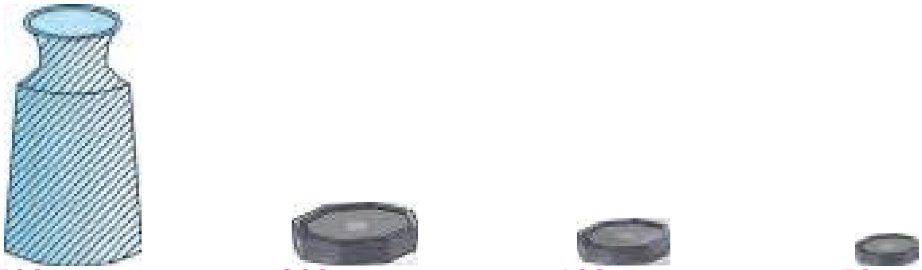
a. What will be the weight of 14 ink-pots?

b. How many ink-pots weigh 5.4 kg?

8. **15.6 kg of beaten rice was distributed equally among 30 students. What was the weight of beaten rice each child got?**

9. **3 ¼ kg of apples were distributed equally among 25 people. What is the weight of the apple each would get?**

10. **Using only one unit of the following weight how can a weighing scale take the weight of only 400 gram at a time?**



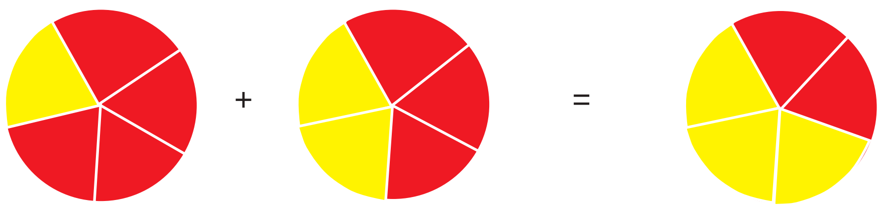
500 gram **200 gram** **100 gram** **50 gram**

Teaching Instruction: *While doing the teaching learning activities on weight ask students to guess the weight of the solid objects around them. Then tell them to take the weight of these objects and ask them to compare their guesses with the real weight.*

12 Fraction and Decimal

12.1 Addition of mixed numbers

Mother gave a bread to Shila. Shila divided the bread into 5 equal pieces and ate up 1 piece first. After some times she ate up 2 pieces. Thus, she ate up 3 pieces out of 5. Showing it in the figure,



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

To express it mathematically,

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

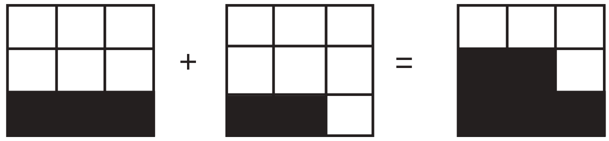
$$= \frac{1+2}{5}$$

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

If the fraction to be added have same denominator, we have to add only the numerators. and the denominator remains the same.

Example 1

$$\frac{1}{3}+\frac{2}{9}$$
$$=\frac{1\times3}{3\times3}+\frac{2}{9}$$
$$=\frac{3}{9}+\frac{2}{9}$$
$$=\frac{3+2}{9}=\frac{5}{9}$$

$\frac{1}{3}+\frac{2}{9}=$ 

To make the same denominator of both the fractions, we multiply both the numerator and denominator by 3, $\frac{1}{3}=\frac{1\times3}{3\times3}=\frac{3}{9}$.

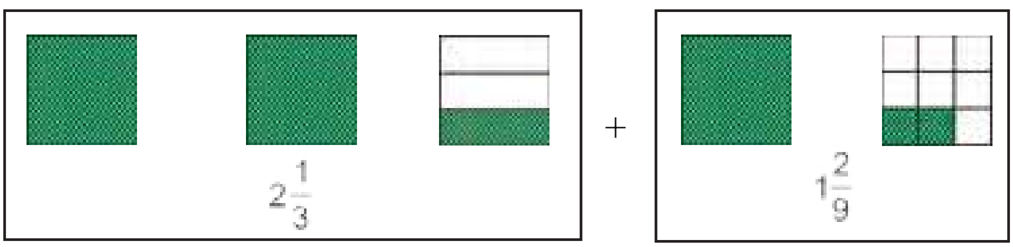
If the denominators to be added are different, additions are made after converting them into same denominator.

Example 2

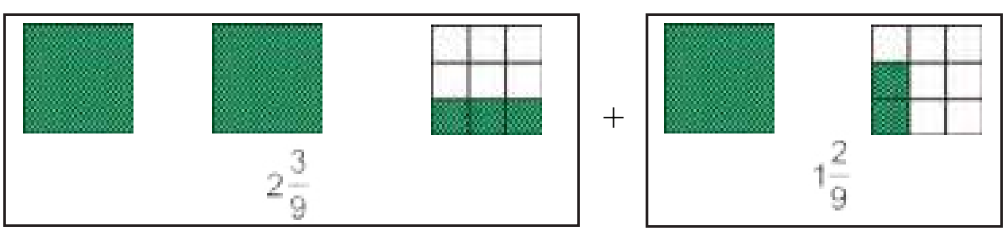
Add.

$$2\frac{1}{3}+1\frac{2}{9}$$

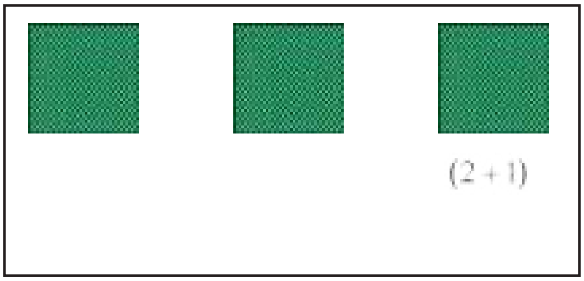
Here, the numerals to be added are mixed numerals. Look at the following pictures



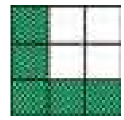
Now, to make common denominator,



Adding the whole and parts separately -



+



$$\left(\frac{3}{9}+\frac{2}{9}\right)=\frac{5}{9}$$

Therefore, $2\frac{1}{3}+1\frac{2}{9}=2\frac{3}{9}+1\frac{2}{9}=(2+1)+\left(\frac{3}{9}+\frac{2}{9}\right)=3+\frac{5}{9}=3\frac{5}{9}$

Example 3

Add.

$5\frac{3}{8}+3\frac{3}{4}$

Here,

$$5\frac{3}{8}+3\frac{3}{4}$$

$$=(5+3)+\left(\frac{3}{8}+\frac{3}{4}\right)$$

$$=8+\left(\frac{3}{8}+\frac{3\times 2}{4\times 2}\right)$$

$$=8+\left(\frac{3}{8}+\frac{6}{8}\right)$$

$$=8+\frac{9}{8} \longrightarrow$$

$\frac{9}{8}$ is improper fraction.

$$=8+1\frac{1}{8}=(8+1)+\frac{1}{8}=9\frac{1}{8}$$

Exercise 12.1

Solve.

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

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

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

(10) $3\frac{1}{4} + 5\frac{1}{12}$ (11) $7\frac{1}{3}+2\frac{5}{6}$ (12) $4\frac{2}{7} + 1\frac{1}{14}$

(13) $10\frac{2}{3} + 7\frac{1}{6}$ (14) $3\frac{5}{6} + 2\frac{5}{12}$ (15) $9\frac{3}{11} + 6\frac{21}{22}$

12.2 Substraction of mixed numbers

Like addition of mixed numbers, substraction of mixed numbers can be done by substracting whole number from whole number and fraction number from fraction numbers.

Example 2

Substract:

$6\frac{1}{3} - 3\frac{2}{9}$

Here,

$$6\frac{1}{3} - 3\frac{2}{9} = (6-3) + \left(\frac{1}{3} - \frac{2}{9}\right) \longrightarrow$$

(subtracting single number from single number and fraction from fraction.)

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

$$= 3 + \left(\frac{3-2}{9}\right) = 3 + \frac{1}{9} = 3\frac{1}{9}$$

Example 2

Simplify:

$10\frac{3}{4} - 5\frac{7}{8}$

Here,

$$10\frac{3}{4} - 5\frac{7}{8} = (10-5) + \left(\frac{1}{2} - \frac{7}{8}\right) = 5 + \left(\frac{3 \text{ x } 2}{4 \text{ x } 2} - \frac{7}{8}\right)$$

$$= 5 + \left(\frac{6}{8} - \frac{7}{8}\right) = 4 + \left(\frac{8}{8} + \frac{6}{8} - \frac{7}{8}\right) \longrightarrow$$

(since 7 is not subtracted from 6 whole number $1 = \frac{8}{8}$ is borrowed from 5]

$$= 4 + \left(\frac{8+6+7}{8}\right) = 4 + \frac{7}{8} = 4\frac{7}{8}$$

Example 3

If $\frac{1}{3}$ part of a garden has orange trees and $\frac{1}{6}$ part of it has mango trees. If pineapple is planted in the remaining area what parts of the garden does it cover?

Here, the parts covered by orange and mangoes

$$= \frac{1}{3} + \frac{1}{6}$$

$$= \frac{1 \times 2}{3 \times 2} + \frac{1}{6}$$

$$= \frac{2+1}{6}$$

$$= \frac{3}{6} = \frac{1}{2} \text{ part}$$

Therefore, the remaining part

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

$$= \frac{2}{2} - \frac{1}{2} \longrightarrow$$

Changing the whole number into fraction 2.

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

or

$$\longrightarrow 1 - \left(\frac{1}{2} + \frac{1}{6}\right)$$

$$= 1 - \left(\frac{2+1}{6}\right)$$

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

Hence, the parts covered by pineapple $= \frac{1}{2}$

Exercise 12.2

1. Substract:

(a) $5\frac{3}{7} - 3\frac{1}{4}$ (b) $4\frac{1}{5} - 2\frac{3}{10}$ (c) $15 - 13\frac{1}{2}$

(d) $5\frac{3}{7} - 3\frac{5}{14}$ (e) $8\frac{13}{14} - 7\frac{1}{2}$ (f) $10\frac{4}{5} - 3\frac{3}{10}$

2. Simplify:

(a) $2\frac{4}{7} - 1\frac{3}{14}$

(b) $13\frac{1}{4} - 9\frac{1}{12}$

(c) $85\frac{4}{5} - 20\frac{11}{15}$

(d) $87\frac{3}{13} - 37\frac{5}{26}$

(e) $18\frac{7}{8} - 6\frac{33}{40}$

(f) $12\frac{1}{13} - 7\frac{4}{39}$

(g) $1\frac{3}{4} - \frac{5}{6} + 2\frac{1}{2}$

(h) $5 - 1\frac{1}{2} - \frac{5}{8}$

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

3. If a student does $\frac{1}{2}$ fraction of work and another student does $\frac{1}{4}$ fraction of it what fraction of the work remains to be done?

4. Two parties got $\frac{1}{2}$ and $\frac{1}{3}$ fraction of the total votes cast and the rest of the votes were invalid. What fraction of the votes were invalid?

5. Out of the total money in the purse, Ram took $\frac{1}{2}$ and Shyam took $\frac{3}{10}$ parts. If Mahesh took the rest, what fraction of the money did he take?

6. Of all the seats in a cinema hall, $\frac{3}{7}$ fraction is for first class and $\frac{1}{4}$ fraction is for second class. What fraction of the seats are there for third class?

12.3 Multiplication of Fractions

a. Multiplication of a fraction by whole number.

Multiplying the whole numbers means continuous adding.

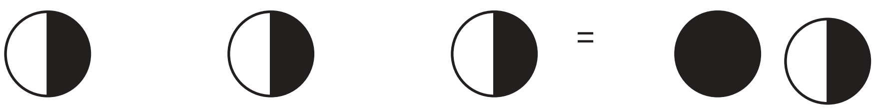
3 x 4 means 3 times 4.

Hence, 3 x 4 = 4 + 4 + 4 = 12.

Hence, $3\times\frac{1}{2}$ means 3 times $\frac{1}{2}$.

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

To show it in picture –



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

Or, $3\times\frac{1}{2}= \frac{3\times 1}{2} = \frac{3}{2} = 1\frac{1}{2}$

In multiplication of whole number and fraction, the numerator of the fraction will be multiplied by the whole number and the denominator will remain the same. If the result is the improper fraction, it should be expressed in mixed number.

Example 1

Multiply.

$5 \times \frac{7}{12}$

Here,

$5 \times \frac{7}{12}$

$= \frac{5 \times 7}{12}$

$= \frac{35}{12} = 2\frac{11}{12}$

Note: converting $\frac{35}{12}$ into mixed number, numerator is divided by denominator. As

For example:

$$12 \overline{\big)\, 35 \,}\; 2$$

12	35
	24
	11

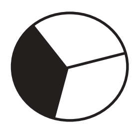
Quotient = 2

Hence, $\frac{35}{12} = 2\frac{11}{12}$

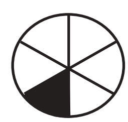
b. Multiplication of fractions

$\frac{1}{2} \times \frac{1}{3}$ means $\frac{1}{2}$ times $\frac{1}{3}$.

It means half of $\frac{1}{3}$. In figure $\frac{1}{3}$ when ½ each part divided by $\frac{1}{2}$ shows $\frac{1}{6}$. Thinking another way, we can say one third of $\frac{1}{2}$.

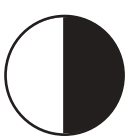


Dividing $\frac{1}{2}$ of each part.

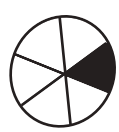


Shaded part $= \frac{1}{3}$ of $\frac{1}{2}$

$= \frac{1}{6}$



Dividing one third of each part.



Shaded part $= \frac{1}{2} \times \frac{1}{3}$

$= \frac{1}{6}$

Let's think in this way.

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

When multiplying fractions, each numerator should be multiplied by numerator and denominator by denominator

Example 1

Multiply:

$$\frac{3}{4} \times \frac{5}{7}$$

$$= \frac{3 \times 5}{4 \times 7} = \frac{15}{28}$$

Exercise 12.3

1. Multiply.

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

(e) $12 \times \frac{1}{5}$ (f) $15 \times \frac{11}{12}$ (g) $6 \times \frac{1}{8}$ (h) $4 \times \frac{1}{12}$

(i) $6 \times \frac{5}{12}$ (j) $\frac{3}{5} \times \frac{2}{5}$ (k) $\frac{6}{7} \times \frac{1}{5}$ (l) $\frac{2}{7} \times \frac{3}{5}$

2. Simplify.

(a) $\frac{3}{5} \times \frac{2}{5}$ (b) $\frac{6}{7} \times \frac{1}{5}$ (c) $\frac{2}{7} \times \frac{3}{5}$

(d) $\frac{3}{10} \times \frac{5}{12}$ (e) $\frac{2}{5} \times \frac{9}{10}$ (f) $\frac{4}{11} \times \frac{7}{9}$

(g) $\frac{5}{11} \times \frac{7}{13}$ (h) $\frac{6}{7} \times \frac{8}{9}$ (i) $\frac{11}{12} \times \frac{1}{7}$

3. Draw figure that shows multiplication from below.

(a) $5 \times \frac{1}{7}$ (b) $3 \times \frac{1}{7}$ (c) $4 \times \frac{2}{3}$

12.4 Decimal

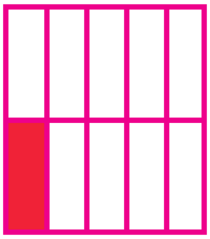
Fraction having denominator 10 or multiplier of 10 is called decimal.
In the figure shaded part shows one tenth $\frac{1}{10}$.

We write, $\frac{1}{10} = 0.1$

Similarly one hundredth is

written as- $\frac{1}{100} = 0.01$, $\frac{1}{100} = 0.10$

One thousandth $= \frac{1}{1000} = 0.001$



$\frac{1}{10} = 0.1$

While converting fraction into decimal, denominator should be converted into 10 or multiple of 10 or neumerator should be divided by denominator.

Example 1

Convert fraction into decimal.

$\frac{1}{10} = \frac{1 \times 5}{2 \times 5} = \frac{5}{10} = 0.5$

Example 2

Convert fraction into decimal.

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

$$= 3 + \frac{1 \times 25}{4 \times 25} = 3 + \frac{25}{100}$$

$$= 3.25$$

Look at the place value table given below of decimal system. 13.204 has been shown in place value table.

Ten	One	Tenth	Hundredth	Thousandth
10 (10)	1 (1)	$\frac{1}{10}$ (0.1)	$\frac{1}{100}$ (0.01)	$\frac{1}{1000}$ (0.001)
1	3	2	0	4

While converting decimal into fraction whole number should be kept as it is and its fractional form should be decided as per the type of decimal tenth, hundredth or thousandth.

Example 3

Add.

$$\begin{array}{r} 16.10 \\ +\ 31.32 \\ \hline 47.42 \end{array}$$

Example

Substract.

$$\begin{array}{r} 21.50 \\ -\ 16.59 \\ \hline 4.91 \end{array}$$ → Zero is added to make the decimals equal.

Exercise 12.4

1. Convert the fractions given below to decimals.

(a) $\frac{2}{10}$ (b) $\frac{3}{10}$ (c) $\frac{7}{10}$ (d) $\frac{1}{4}$ (e) $1\frac{1}{2}$

(f) $21\frac{3}{7}$ (g) $13\frac{1}{3}$ (h) $15\frac{1}{5}$

2. Convert the decimals given below into fraction.

(a) 0.12 (b) 0.08 (c) 3.06 (d) 12.05

(e) 0.25 (f) 0.009 (g) 17.012 (h) 0.005

3. Make place value table of the numbers given below.

(a) 1.35 (b) 13.01 (c) 15.12 (d) 0.05

(e) 6.48 (f) 10.73 (g) 0.123 (h) 15.01

4. Simplify.

(a) 5.01 + 3.25 (b) 6.07 + 3.2 (c) 0.69 + 1.28

(d) 73.68 - 9.07 (e) 15.04 - 11.06 (f) 12 - 9.37

(g) 0.06 - 4.27 + 5.38 (h) 4.5 - 8.25 + 5.07

5. How much more will be the sum of 3.91 and 6.04 than 2.46?

6. From a 50 cm long ribbon, if 16.80 cm and 14.25 cm are cut off how many cm is left ?

7. If Rs. 50 is given after buying a pen for Rs. 11.65 and dozen of copies for Rs. 36.25, how much will be returned back?

8. Distance from Pokhara to Kathmandu is 200km. If 103.675km is travelled through bus and 73.025km through taxi, how much distance is left to travel?

12.5 Multiplication of decimal by 10, 100 and 1000.

$\frac{2}{1000} \times \frac{10}{1} = \frac{20}{1000}$. Two thousandth when multiplied by 10 becomes 20 thousandth. Saying 20 parts in thousand and 2 parts in hundred is the same.

Therefore, $\frac{2}{1000} \times \frac{10}{1} = \frac{20}{1000}$ Or $0.002 \times 10 = 0.02$

Therefore, $\frac{2}{1000} \times \frac{100}{1} = \frac{200}{1000}$, Or $0.002 \times 100 = 0.2$

and $\frac{2}{1000} \times \frac{1000}{1} = \frac{2000}{1000}$, Or, $0.002 \times 1000 = 2$

Therefore, when decimal is multiplied by 10, decimal sign shifts one place right or gets removed. Similarly when decimal is multiplied by 100 and 1000 respectively decimal sign shifts 2, 3 places right or gets removed respectively.

This process has been shown clearly in the table below:

Decimal	Multiplying number	What to do while multiplying?
0.001 place right	10	0.001 x 10 = 0.001 = 0.01 shift decimal sign to one
0.001	100	0.001 x 100 =0 .001 = 0.1 shift decimal sign to two places right
0.001	1000	0.001 x 1000 = 0.001 = 1.0 shift decimal sign three steps right.

Example 1

Multiply 10.3045 by 10, 100 and 1000 separately:

Here,

10.3045 x 10 = 10.3045 = 103.045

10.3045 x 100 = 10.3045 = 1030.45

10.3045 x 1000 = 10.3045 = 10304.5

Exercise 12.5

Multiply each numbers below by 10, 100 and 1000.

(1)	0.002	(2)	0.013	(3)	0.137	(4)	1.005
(5)	2.679	(6)	10.805	(7)	1.2	(8)	13.5

12.6 Multiplication of decimal by whole number.

See example about multiplication below

Example 1

(a) 3 x 5 = 15

(b) 3 x 10 x 5 = 30 x 5 = 150 or 3 x 5 x 10 = 3 x 50 = 150

3 x 5 = 15 when either 3 or 5 is multiplied by 10 then product increases 10 times.

Example 2

3 x 100 x 5 = 300 x 5 = 1500

or 3 x 5 x 100 = 3 x 500 = 1500

3 x 5 = 15 or 5 x 3 = 15, either 3 or 5 when multiplied by 100 the product increases by 100 times.

Based on these examples and exercise 12.5, multiplications on decimals can be done.

Example 3

Multiply.

0.3 x 5

Here,

$$\begin{array}{ccc} 0.3 & \xrightarrow{\times 10} & 3 \\ \times 5 & & \times 5 \\ \hline 1.5 & \xleftarrow{\div 10} & 15 \end{array}$$

0.3 x 10 = 3 , when multiplied by 5 , 3 x 5 becomes 10 times 0.3 x 5. hence 0.3 x 5 = 3 x 5 ÷ 10

Another method

$0.3 \times 5 = \frac{3}{10} \times 5$

$= \frac{15}{10} = 1.5$

Example 4

Multiply.

0.03 x 5

Here,

$$\begin{array}{ccc} 0.03 & \xrightarrow{\times 100} & 3 \\ \times 5 & & \times 5 \\ \hline 0.15 & \xleftarrow{\div 100} & 15 \end{array}$$

0.03 x 100 = 3 when multiplied by 5 we get 15, which is hundredth Times greater than 0.03 x 5. hence to get the result 15 should be divided by 100.

Another method

$0.03 \times 5 = \frac{3}{100} \times 5$

$= \frac{15}{100} = 0.15$

While calculating by both methods we got same result. What did you learn from this? What is similar between decimal sign in multiplier and decimal sign in product?

Therefore,

While multiplying decimals we use the same process used in natural numbers and in answers we make equal positioning of decimals

Example 5

Multiply.

3.57 x 12

Here,

$$\begin{array}{r} 3.57 \\ \times\ 12 \\ \hline 714 \\ 357 \\ \hline 42.84 \end{array}$$

This method is like basic multiplication process. In 3.57 there are two numbers after decimal sign So in product, decimal sign must be placed before two numbers.

Exercise 12.6

1. Multiply.

(a) 0.4 x 2	(b) 0.5 x 3	(c) 0.3 x 7	(d) 0.2 x 2
(e) 3 x 0.8	(f) 5 x 0.6	(g) 8 x 0.4	(h) 9 x 0.9
(i) 0.05 x 5	(j) 0.03 x 4	(k) 0.07 x 6	(l) 0.08 x 9
(m) 6 x 0.12	(n) 7 x 0.45	(o) 9 x 0.99	(p) 7.45 x 6
(q) 15.02 x 3	(r) 14 x 0.235	(s) 21.096 x 12	(t) 17.651 x 13

2. Multiply.

(a) 32.4 x 0.3	(b) 7.24 x 0.5	(c) 17.32 x 2.3
(d) 42.07 x 3.4	(e) 33.33 x 0.9	(f) 56.6 x 3.23
(g) 76.5 x 3.02	(h) 0.05 x 0.02	(i) 33.07 x 14.04
(j) 2.5 x 2.5 x 2.5	(k) 7 x 0.7 x 0.07	

3. Find the total cost of every situation given below.

a) 12 oranges at the rate of Rs 2.25 per piece.

b) 15 copies at the rate of Rs 4.75 per piece.

c) 32 envelops at the rate of Rs 0.75 per piece.

d) 35 pencils at the rate of Rs 1.05 per piece.

4. If a sewing machine is bought on condition that Rs. 500 will be paid in the beginning and Rs. 205.75 per month for 12 months on installations. What will be the total cost?

5. Volume of rectangular object = length x breadth x height. Using this formula find the volume of the rectangular objects given below.

a) Length = 1.2 cm, breadth = 0.8 cm and height = 1.1 cm.

b) Length = 4.5 cm, breadth = 2.2 cm and height = 1.8 cm.

12.7 Rounding off decimals

If Rs 9 is distributed equally among 8 persons, how much will each receive?

Here, 9 is divided by 8

$$
\begin{array}{r|l}
 & 1 \\ \hline
8 & 9 \\
 & -8 \\ \hline
 & 1
\end{array}
$$

Therefore, each will receive Rs $1\frac{1}{3}$ =

Representing in decimal, $\frac{1}{8} = 0.125$

Therefore each will receive Rs 0.125. This means that each will recieve Rs 1 and out of 1000 parts of Rs 1 they get 125 part.

But in daily practice this is not possible.

Means Rs 1 cannot be divided equally in 1000 parts. So what should we do? In this type of situation we divide to each nearly Rs 1.13 or Rs 1 and 13 paisa. Here making Rs 1.125 = Rs 1.13 means in Rs 1.125 we are placing 0 in thousandth or rounding off in hundreth. While rounding off like this we place 0 if there is number equal to 5 or greater than 5 then we add one number to its left. If the rounding off place has number less than 5 then we make that number zero and write the left side number as it is.

For example, 5.20735

= 502074, rounding off at 4th place of decimal

= 5.207, rounding off at 3rd place of decimal

= 5.21, rounding off at 2nd place of decimal

=5.2, rounding off at 1st place of decimal

Exercise 12.7

1. Round off at 1st place of decimal.

(a) 8.53 (b) 2.67 (c) 4.07 (d) 13.51

2. Round off at 2nd place of decimal.

(a) 4.821 (b) 3.456 (c) 0.493 (d) 3.008

3. Round off at 3rd place of decimal.

(a) 3.4156 (b) 4.0051 (c) 13.5305 (d) 15.6708

4. Round off the given numbers according to the places given in the bracket.

(a) 5.635 (2) (b) 1.8918 (3)

(c) 15.3445 (2) (d) 3.0729 (1)

(e) 0.00581 (2) (f) 3.14159 (3)

13 Percentage

13.1 Meaning of percentage

Dhruba scored the following in the exam.

Subject	Nepali	English	Math	Science
Score	16	19	34	45
Full marks	20	25	50	100

In which subject did Dhruba perform best?

In the table, the score of science is 45 and that of Nepali is 16. From this can we say that Dhruba did best in Science and worst in Nepali?

Here, writing it in fraction on the basis of the score and full mark,

Nepali, $\frac{16}{20}$ English, $\frac{19}{25}$

Math, $\frac{34}{50}$ Science, $\frac{45}{100}$

Which is the largest fraction? How do we know it? Converting them into fractions with the same denominator,

Nepali, $\frac{16}{20} = \frac{16 \times 5}{20 \times 5} = \frac{80}{100}$ English, $\frac{19}{25} = \frac{19 \times 4}{25 \times 4} = \frac{76}{100}$

Math, $\frac{34}{50} = \frac{34 \times 2}{50 \times 2} = \frac{68}{100}$ Science, $\frac{45}{100}$

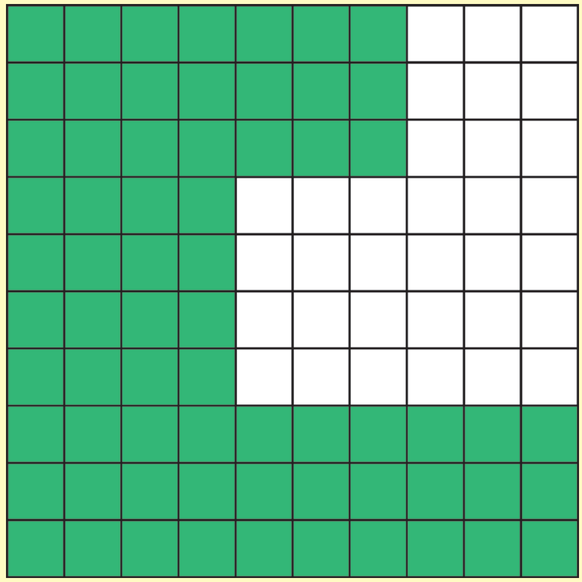
From this we can say that Dhruba did best in Nepali and worst in Science. Here the denominator of each fraction is 100. Therefore, the numerator of each fraction denotes the percentage of the score. The sign % denotes percentage.

Here, Dhruba has scored 80% in Neplai, 76% in English, 68% in Maths and 45% in Science.

If the denominator of a fraction is 100, the numerator denotes the percentage which shows how much out of each hundred. In the adjoining picture 67 out of 100 percent shaded.

It is written $\frac{19}{25} = 67\%$ and is read as 67 percentage.

Percentage helps us to compare two or more quantities.



13.2 Converting fractions into percentage:

Convert $\frac{3}{4}$ into percentage.

Method -1

$\frac{3}{4} = \frac{3 \times 25}{4 \times 25}$ (suppose the denominator is 100)

$\frac{75}{100} = 75\%$

Method - 2

$\frac{3}{4}$ means 3 out of 4 parts.

It is $\frac{3}{4}$ of 1 part.

Hence, it is out of 100 parts $\frac{3}{\cancel{4}_{1}} \times \cancel{100}^{25}$

$= 3 \times 25\% = 75\ \%$

While converting a fraction into percentage the given fraction should be multiplied by 100.

13.3 Converting percentage into fraction.

Example

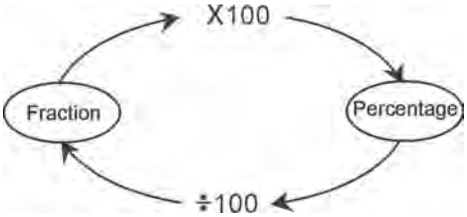
Convert 75% into fraction.

Here, 75% means 75 out of 100 parts.

Hence, 75% $= \dfrac{\overset{3}{\cancel{75}}}{\underset{4}{\cancel{100}}} = \dfrac{3}{4}$

To convert percentage into fraction given number of percentage should be divided by 100.

Based on above discussion method of converting fraction and percentage into each other is shown in the circle on the right.



Exercise 3.1

1. **Write in percentage:**

(a) $\frac{25}{100}$ (b) $\frac{27}{100}$ (c) $\frac{33}{100}$

(d) $\frac{45}{100}$ (e) $\frac{83}{100}$ (f) $\frac{125}{100}$

2. **Convert into percentage (use both methods).**

(a) $\frac{1}{2}$ (b) $\frac{3}{4}$ (c) $\frac{2}{5}$ (d) $\frac{7}{10}$ (e) $\frac{3}{5}$

(f) $\frac{17}{20}$ (g) $\frac{22}{25}$ (h) $\frac{33}{50}$ (i) $\frac{5}{2}$ (j) $\frac{7}{5}$

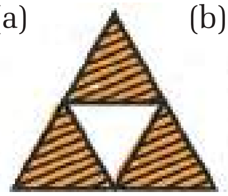
3. **Convert percentage into fraction.**

(a) 15% (b) 20% (c) 25% (d) 35%

(e) 50% (f) 85% (g) 48% (h) 16%

(i) $12\frac{1}{2}\%$ (j) 115% (k) $14\frac{1}{2}\%$

4. First write the shaded parts into fractions then change them into percentage.

(a)

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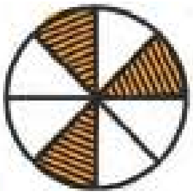
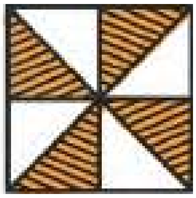
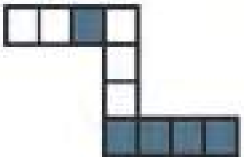
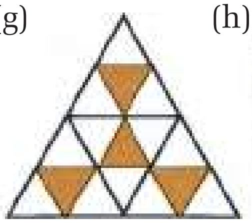
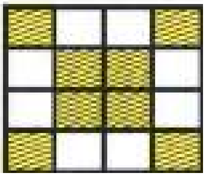

(c)

(d)


(e)

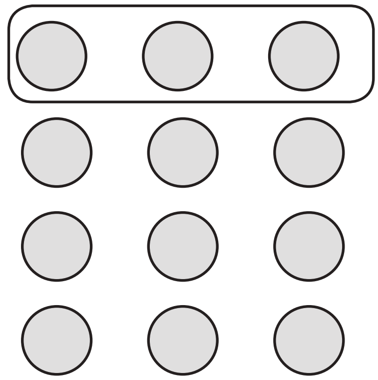
(f)

(g)

(h)


5. Express the non shaded parts of each of the pictures in question 4 in percentage.

5. What will be the total of the addition of the non shaded percentage and shaded percentage of each of the picture in question number 4?

13.4 Use of percentage

We can use percentage to solve different practical problem of our daily life. Look at the following examples.



25% of 12 = $\frac{1}{4}$ of 12

Example 1

How much is the 25% of Rs 12?

Here, 25% of Rs 12/-

= Rs 12 x

= Rs $\frac{\overset{1}{\cancel{25}}}{\underset{4}{\cancel{100}}}$ (of means multiplication in fraction)

= Rs $\overset{3}{\cancel{12}} \times \frac{1}{4}$

Example 2

There are 400 students in a school. Among them 35% are girls. What is the number of girls and boys?

Here, number of girls = 35% of 400

= 400 of $\frac{35}{100}$

$= \overset{4}{\cancel{400}} \times \frac{35}{\underset{1}{\cancel{100}}}$

= 140 persons

Boys % = (100 - 35)% = 65%

Hence, number of boys = 400 of 65%

$= \overset{4}{\cancel{400}} \times \frac{6}{\cancel{100}_{1}}$

= 260 persons

Can you find out another method of finding out boy's number?

Exercise 13.2

1. Find out the value of.

(a) 12% of 50　　(b) 15% of 20

(c) 35% of 60　　(d) 60% of Rs 5/-

(e) 35% of 150　　(f) 25% of 1 kg

g. $6\frac{2}{3}\%$ of 30km　　h. $12\frac{1}{2}\%$ of 16 litres

i. 100ml of 200%　　j. 150% of Rs 30/-

2. There are 40 students in a class among which 15 are girls. What is the percentage of the number of boys and girls?

3. There are 30 eggs in a crate. If 5 of them are broken -

a. What percent is broken?

b. What percentage is not broken?

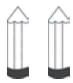
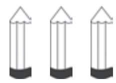
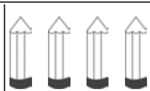
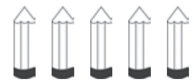
4. If Hari scored 45 out of 60 in Mathematics, what percentage did he score?

5. A sweater costs Rs 500/-. If 20% is discounted how much money is discounted?

14 Unitary method & simple interest

14.1 Unitary method

On the following table the number of pencils and their costs are given. Look at the table and discuss the questions given below:

Pencils					
Cost	5	10	15	20	25

a. Has the cost changed as the no. of pencils change?

b. Can the cost of the pencil deduct the cost of required number of pencils? How?

c. Can we decide the cost of 1 pencil from the cost of some pencils? How?

According to the above table, to deduct the cost of some pencils from the cost of 1 pencil we have to multiply the cost of 1 pencil with the number of pencils. For example: in the above table the cost of 1 pencil = Rs 5/-. Therefore the cost of 4 pencils = Rs 5 x 4 = Rs 20/-.

Or, **total cost of objects = cost of 1 object x number of objects.**

Similarly, to deduct the cost of 1 object from the cost of some objects we should divide the cost of object by the no. of objects. According to the above table cost of 3 pencils = Rs 15/-. Therefore cost of 1 pencil = Rs 15/3 = Rs 5/-. Therefore,

$$\text{Cost of 1 object} = \frac{\text{Total cost of objects}}{\text{No. of objects}}$$

If we know the cost of some objects of same kinds we can deduct the cost of 1 object by dividing total cost of objects by the number of objects. It is called unit cost. Similarly, if we know the cost of 1 object we can know the cost of some objects by multiplying the no. of objects with the cost of 1 object. The process of finding unit cost and vice versa is called unitary method.

Example 1

If one pen costs Rs 25/-, what will be the total cost of 5 pens?

Here, cost of one pen = Rs 25/-.

No. of pens = 5

Total cost of 5 pens = Rs 25 x 5 = Rs 125/-.

Cost of 5 pens = Rs 125

Exercise 14.1

1. **Find out the total cost.**

	Unit cost	No. of objects
(a)	Rs. 20	15
(b)	Rs. 400	45
(c)	Rs. 15.50	24
(d)	Rs. 250.50	64

2. **Find out the unit cost.**

	No. of objects	**Total cost**
(a)	10	Rs 250
(b)	32	Rs 672
(c)	60	Rs 5,460
(d)	234	Rs 18,720

3. **If the cost of 1 kg of sugar is Rs 40, what will be the cost of 25 kg of sugar?**

4. **If a business man buys a box of 12 dozen biscuits for Rs. 1860, what will be the cost of 1 dozen biscuits?**

5. **If Shivaram sold out 45 kg of potatoes at Rs 27. per kg, how much money did he get?**

6. **If the cost of 2 dozen exercise books is Rs 240, what will be the cost of 1 exercise book?**

7. **If 8 people divided and ate up 64 pieces of oranges equally among them how many pieces of oranges did 1 person eat?**

8. **How many pieces of bread do we need for 15 persons to feed 5 pieces of bread per person?**

14.2 Simple interest

Jairam took a loan of Rs 8000 from Agricultural Development Bank. While returning the loan after a year, he paid Rs 8800.

Here, the loan taken from the bank is called principal. So, Rs 8000 is principal. The payment of extra money is called interest. The bank takes interest at certain rate.

Here, Rs 800 has been paid as interest on Rs 8000 for 1 year.

Therefore, annual interest rate $= \frac{800}{8000} \times 100\% = 10\%$

Loan, taken or given for a certain time is called time period. The interest of a principal for a definite time period can be deducted by using unitary method.

Example 1

Rama loaned Rs. 100 to Bishnu at the annual interest rate of 10%. Find out how much interest Rama will get after 3 years.

Here, rate interest is 10%

Interest of Rs 100 for 1 year = Rs. 10

Interest of Rs 100 for 3 years = Rs. 10 x 3 = Rs. 30

Rama will get Rs 30 as interest in 3 years.

Exampel 2

Suraj deposited Rs 400 in the bank. At the annual rate of 5%, how much interest did he get after 1 year?

Here, at the interest rate of 5% per annum,

Interest of Rs 100 for 1 year = Rs 5

Interest of Rs 1 for 1 year = Rs $\frac{5}{100}$

Interest of Rs 400 for 1 year = Rs. $\frac{5}{100}$ x 400 = 20%

Suraj got the interest of Rs 20 in 1 year.

Exercise 14.2

1. **Find the simple interest on Rs 300 for 1 year at 15% per year.**
2. **How much is the simple interest on Rs 1200 for 1 year at 10% per year?**
3. **What will be the interest on Rs 100 for 5 years at 7% per year?**
4. **What will be the interest on Rs 1oo for 7 years at 11% per year?**
5. **How much is the simple interest on Rs 100 for 5 years at 8% per year?**
6. **How much is the interest on Rs 600 for 1 year of the interest of Rs 100 at 12% per year?**
7. **What will be the simple interest on Rs 400 for 7 years at Rs 48 per year?**

15 Bill and budget

Bill.

Look at the bill Rupa received from Siddheswar Khadya Bhandar and answer the questions.

SIDDESWOR KHADYA BHANDAR

Dawa, Bhojpur

Bill #: 0061

Customer's name **Rupa Pariyar** Date: 0636/07/20

Dawan Mahariya Bhojpur

s.#	Particular	Qty.	Rate (Rs)	Amount
1.	*Sugar*	*5 kg*	*70.00*	*350.00*
2.	*Rice*	*7 kg*	*30.00*	*210.00*
3.	*Flour*	*3 kg*	*40.00*	*120.00*
4.	*Dal Musuro*	*2 kg*	*80.00*	*160.00*
4.	*Gram*	*1 kg*	*60.00*	*60.00*
			Total	***900.00***

E 2 O.E.

Sold by: Bimala

a. What is the name and address of the customer?

b. Who is the seller who gave away the bill?

c. Which item did Rupa buy most?

d. How much did Rupa pay in total?

e. Can you too prepare such a bill?

f. How did the total cost of rice become Rs 210?

Budget.

We need budget to operate a family, organization, office etc. We have to estimate or plan on how to spend money in relation to our income. This helps us to do what we need to do. For this we have to plan our budget in the beginning. Look at the example:

The following is the annual budget of Ramsevak Tharu's family. Look at the budget and discuss the questions;

Income		Expenditure	
Source	**Amount (Rs)**	**Heading/Title**	**Amount (Rs)**
Vegetable	7000	Food otems	7000
Chicken	10000	Clothes	4000
Milk	8000	Education	12000
Goats	9000	Miscellaneous	5000
Total	**34000**		**28000**

a. Which is greater, Ramsevak's family's income or expenditure?

b. How much does the family save in a year?

c. What's the most and least source of their income?

d. On what titles do they spend the most and the least?

e. Can you also prepare such a budget for your family?

Ramsevak's family has got more income than expenditure. So the family can make a surplus. If our expenditure is more than income we have to manage the shortage of amount from some other sources.

Teaching Instruction:

Involve the students in the activities of giving and taking information on bills and get the students to prepare them by showing the real bills (reduction, vat, tax excluded).

Exercise 15.1

1. **Read the following one day price-list of the wholesale vegetable market of Kalimati and answer the following questions:**

Price-list

Particular	Cost per kg
Cauliflower	Rs. 30
Cabbage	Rs. 25
Tomato	Rs. 40
Bean	Rs. 35
Pea(green)	Rs. 32
Bitter gourd	Rs. 36
Chilly	Rs. 60
Carrot	Rs. 24
Radish	Rs. 18

a. What is the cheapest vegetable?

b. What is the most expensive vegetable?

c. What is the difference in cost between pea(green) and bean?

d. How much should one pay to the shopkeeper for 2 kg carrot?

2. **Four persons bought vegetables respectively according to the lists A, B, C and D. How much did each of them pay? Show it by making bills.**

(a)

2 kg cauliflower
1 kg potato
2 kg radish

(b)

2 kg bean
1 kg carrot
2 kg cabbage

(c)

1 kg chilly
3 kg radish
1 kg Carrot
1 kg potato

(d)

2 kg bitter gourd
2 kg potato
1 kg radish
1 kg chilly

e. Which of the above bills is the most expensive?

2. The following is the annual budget of Janata Primary School, Mugu. Look at it and write answers to the following questions.

Income		Expenditure	
Source	**Amount Rs**	**Titles**	**Amount Rs**
District Education	2,00,000		
Salary	2,30,000		
Aid from V.D.C	50,000	Repair/Renovation	25,000
Local Donation	20,000	Stationary	12,000
Others	25,000	Educational Materials	5,000
		Miscellenous	2,000
Total	2,95,000	2,74,000	

a. What is the largest source of income of the school?

b. On what title is the largest expenditure?

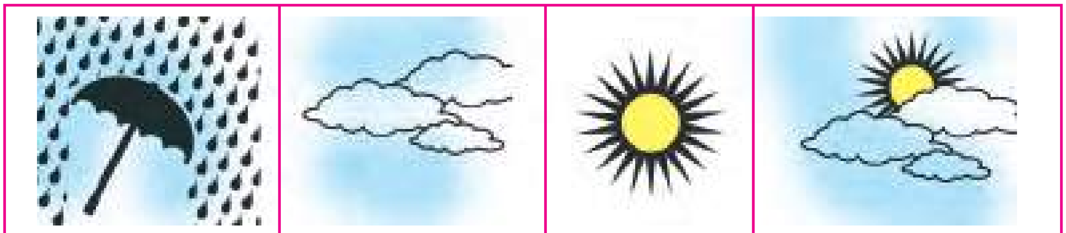
c. Which is greater, income or expenditure of the school?

d. How much is the annual surplus of the school?

16 Statistics

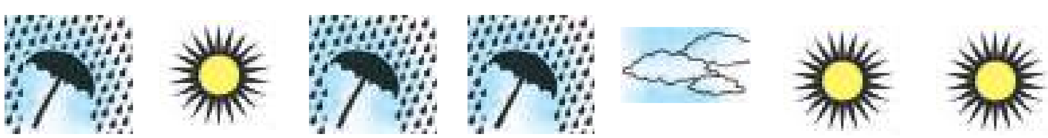
16.1 Introduction.

Notices or information are expressed on charts and pictures in many places. We can see the food varieties and their cost on the menu of the hotels and restaurants. For the items bought and their cost we receive bills from the shop. We have seen the progress report, annual calendar, budget etc of so many offices, schools and factories in the form of chart or graph. It is easier to understand and reach conclusion of the notices and information expressed in the form of pictures, chart or graph at one close look. For example the following chart shows what the weather was like in the first two weeks of Bhadra. Read the symbols first and then charts:

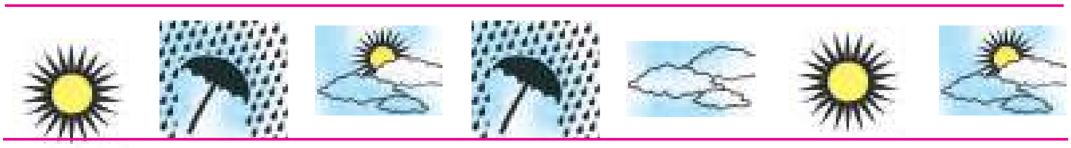


Heavy rain	Cloudy	Sunny	Partially cloudy

2 week's weather report of Pokhara (Bhadra 1 - 14).



1	2	3	4	5	6	7



8	9	10	11	12	13	14

Now, answer the following questions.

a. How many days did it rain in Pokhara in the last 14 days?

b. How many days did Pokhara have clear weather in the last 14 days?

c. How many days did Pokhara have cloudy weather?

d. Which 2 days did Pokhara have partly cloudy weather?

e. How many days did it not rain in Pokhara in the last two weeks?

f. Which week had more rain in Pokhara?

g. How was the weather in Pokhara on the last day of the two weeks?

Exercise 16.1

1. Read the price list of the food market in Janakpur and answer the following questions.

Price list	
Food items	**Cost (per kg)**
Rice short grain	Rs. 45
Mansuli rice	Rs. 35
Mansoor dal	Rs. 90
Gram	Rs. 75
Pea (green)	Rs. 62
Sugar	Rs. 52
Flour	Rs. 25
Wheat flour	Rs. 20

a. What is the cheapest food item?

b. What is the most expensive food item?

c. What is the difference between the cost of green pea & gram?

d. How much will someone pay to the shopkeeper for 2 kg of sugar?

2. In the following table, the types and number of vehicles that departed from Sahid Gate between 6 an 7 on Sunday morning are given. Read the table carefully and answer the questions below it.

Types of vehicle	No. of vehicles
Bus	12
Mini Bus	16
Private car	20
Tempo	10
Taxi	22

a. Which vehicle was used most?

b. Which vehicle was used least?

c. If one-third of the buses went outside of the Kathmandu Valley, how many buses went outside?

d. How many passengers travel by bus if 40 people travel by each bus on average?

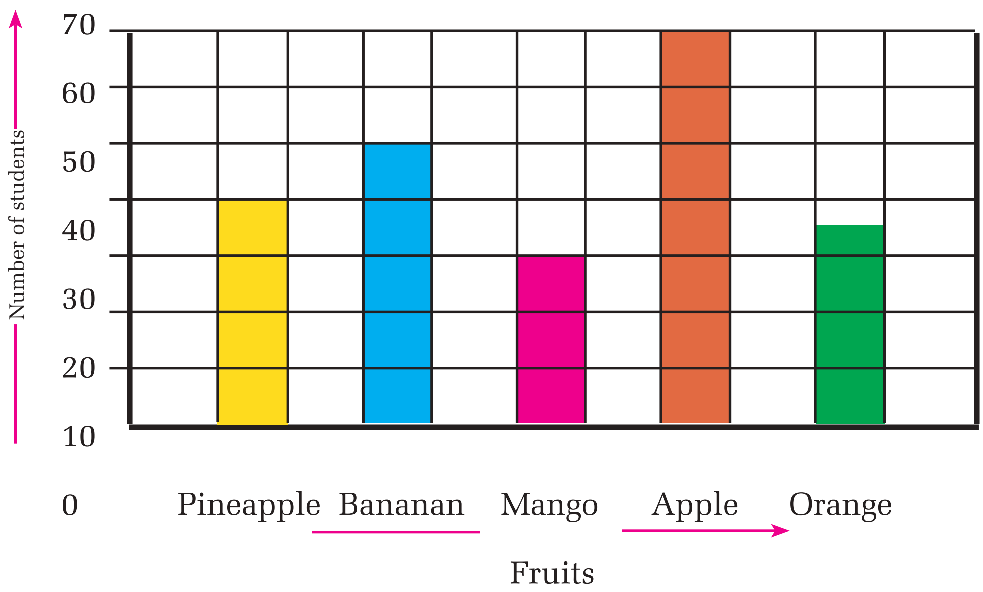
16.2. Bar graph

Ramesh was told to collect out information on what types of fruits students like to have during their snack time. Ramesh found out that 40 people liked pineapple, 50 people liked banana, 30 people liked mango, 70 people liked apple and 35 people liked orange. Ramesh thought about how he could express this information so that it is easily understandable by all. He expressed this information on a table.

Fruits	Pineapple	Banana	Mango	Apple	Orange
No. of students who prefer	40	50	30	70	35

In this way, if we put information on a table, we can understand things easily.

How can we make facts more understandable, comparable, accessible and attractive? Ramesh thought seriously and decided to make a bar graph. On a piece of rectangular paper he went on writing 10,20,30,40 etc on the vertical line and he wrote the names of fruits on the horizontal line. Thus he made the following bar graph.



In the bar graph Ramesh made the breadth of all the bars equal. The height of the bar denotes the number of students and the distance between the bars is the same. Thus expression of information or statistics on a bar graph makes it easier to understand and compare many things at a glance.

We should know the following things while making a bar graph:

- We should put variables along the horizontal line.
- We should put numbers on the vertical line.
- The breadth and the distance between two columns should be equal. The numbers on the vertical line should be denoted at equal distance and unit.

Exercise 16.2

Use a graph paper for the following

1. **The traffic police collected the following statistics on the types of vehicles that move around Tansen Bazaar between 6 and 9 in the morning:**

Name of the Vehicle	Passenger Bus	School Bus	Private Car	Government Vehicle	Taxi
Number	10	7	3	10	25

Draw a bar graph to show types of vehicles on the horizontal line and one unit equal to one vehicle on the vertical line.

2. **The following statistics was collected while measuring the height of class 5 students.**

Height (cm)	105	106	107	108	109	110
Number	3	12	20	13	7	5

Draw a bar graph showing 1 unit = 1 student on the vertical line.

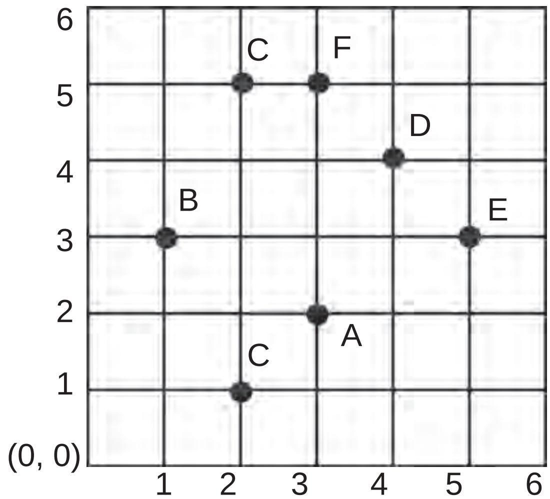
3. The table shows the number of students present at school in a week.

Days	Sun	Mon	Tues	Wedn	Thurs	Fri
No. of students present	25	20	22	18	21	23

Draw a bar graph to represent this information.

16.3 Pair of numbers and coordinates

In graph paper, every point can be represented by using a pair of numbers.



Suppose Hari is at point (0,0).If he wants to go to point A then he has to go 3 units right and 2 units above.

We can denote point A by writing (3, 2). In this way the numbers which are used to denote specific points are called pair of numbers or coordinate.

Similarly to go to point E he has to go 5 unit right and 3 units above. The pair of numbers or coordinate of E are (5,3).So in order to go any points from (0,0) then we must have to move right first and then above.

Write down the pair of numbers or coordinate of D.

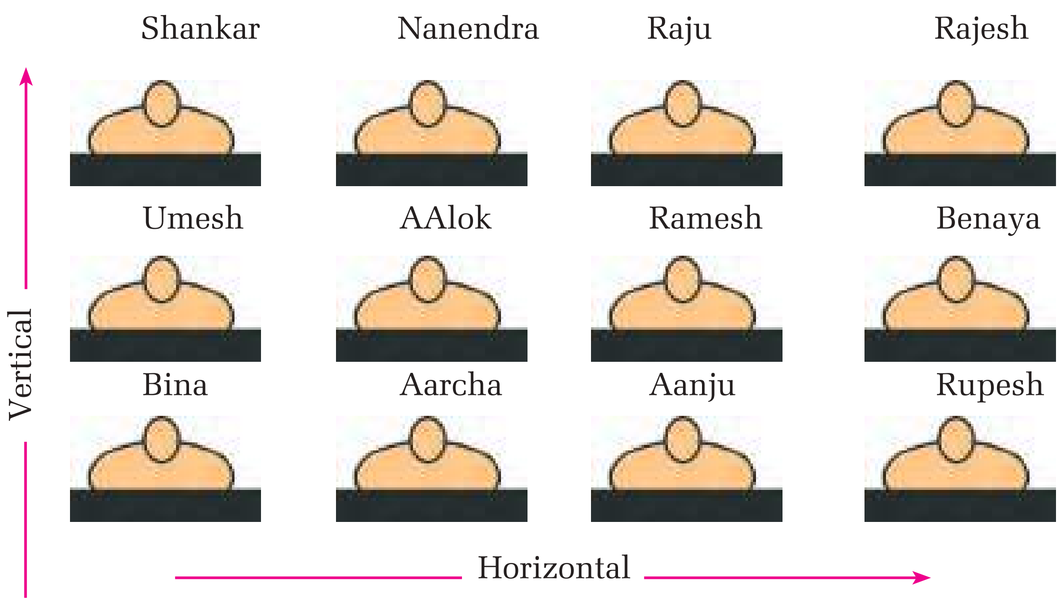
What does the points (1, 3) represent?

Write the alphabetical point from the graph.

Which letter does the point (4, 4) represent?

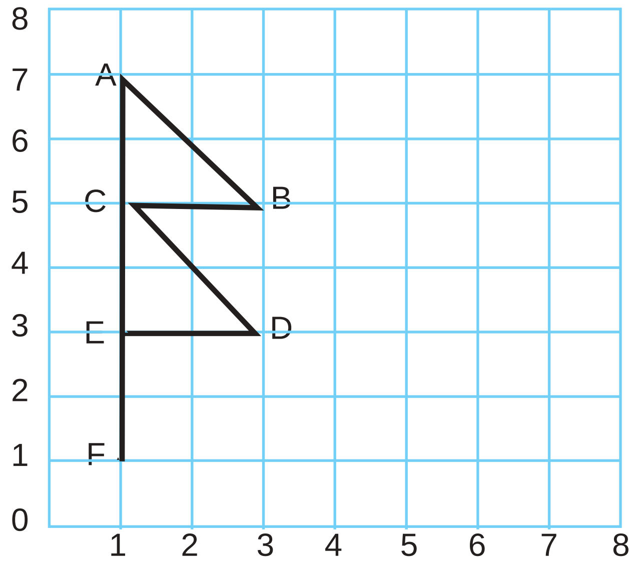
Exercise 16.3

1. **12 students of class 5 are arranged to form 3 rows and 4 columns. To know the position of any student we have to move left and then up. In this way if we write the coordinate of Ramesh then, frist we move 3 students left & 2 students up, so it is found to be (3,2). Similarly, find out the position or points of each of them except Ramesh.**

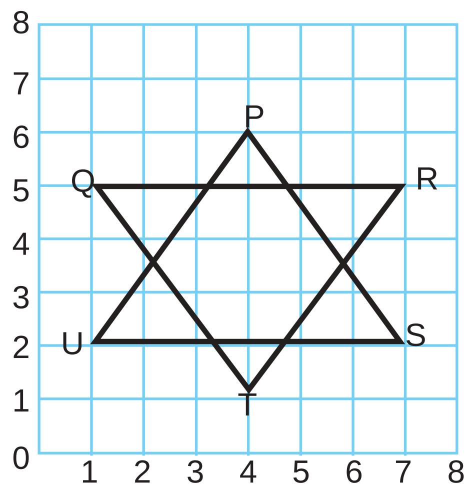


a. Shankar	b. Narendra	c. Raju	d. Rajesh
e. Umesh	f. Alok	g. Ramesh	h. Binay
i. Bina	j. Archana	k. Anju	l. Rupesh

2. **Look at the picture carefully and find out the pair of numbers of points A, B, C, D, E, F.**



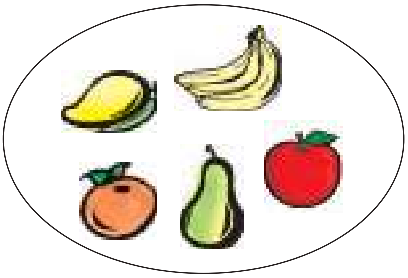
3. **In the given figure write down the points of hexagram.**



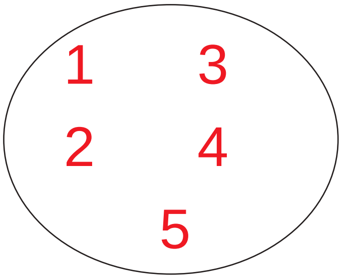
4. **Draw out the points (2,2), (2,4), (1,4), (3,6), (3,7), (2,7), (4,9), (6,7), (5,7), (5,6), (7,4), (6,4) and (6,2) into a graph paper and write what it forms after joining all the points respectively.**

17 Set

In the given figure, a set of apple, mango, papaya, banana and orange is shown. In this set, every member is called element. Can you write down how these sets are represented?



There are different ways to represent the sets. The easiest way to represent a set is by writing any English capital letter. for eg: A,B,C,D...............Z. The elements of a set is represented by small letters. We write the set by writing any capital letter first and then giving equals sign and a curly bracket is given { } and the elements of a set is separated by giving comma(,) . From the given figure write down the elements of sets by the above mentioned process.



That set is written as {1,2,3,4,5}. Let's denote the set by C and these numbers are first five natural numbers. Here,the number of elements in the set is 5 and the set is written as:

C={1, 2, 3, 4, 5} or C={5, 4, 3, 2, 1}

In this way, the set can be written in any order of the elements present in the set but the repeated elements is not written in a set. For eg:

{S,C,H,O,O,l] is not written but it is written as {S,C,H,O,L}. So an element is written only once.

Example 1

Write down seven days of a week by listing method

D = {Sunday, Monday, Tuesday, Wednesday, Thursday, Friday, Saturday}

Exampl 2

What is the set of E={2,4,6,8,10}

They are the set of first five even numbers.

Exercise 17

1. Write down the following sets by listing method using the symbols:

a. Sets of 12 Nepali months

b. Sets of five development regions of Nepal

c. Sets of English vowel letters

d. Sets of class 5 books that you should read

e. Sets of odd numbers less than ten

f. Sets of numbers with no remainder when divided to 24

2. Write down the following sets into sentence:

a. C = {cow, buffalo, horse}

b. D = {Kathmandu, Lalitpur, Bhaktapur}

c. S = {Nepal, India, Bangladesh, Srilanka, Pakistan, Afghanistan, Maldieves, Bhutan}

d. V = {a, e, i, o, u}

e. R = {I, II, III, IV, V}

f. E = {10, 12, 14, 16, 18, 20}

g. {5, 10, 15, 20, 25}

h. {△, □, ○, ▭ }

i. F= {0}

18 Algebra

18.1 Algebraic expressions and its value.

To denote the numbers in algebra we use $\square$, $\triangle$, $*$ types of symbols. As in the arithmetic 2×4 represents product of 2 and 4. Similarly in algebra 2X represents the product of 2 and X. In algebra 2a, 3b, 5x, 7x, $\square$ etc are called algebraic terms. The letters used in algebra are called variables. For example a, b, x and '$\square$'. In the algebraic term 2a, 2 is the coefficient of a, the value of 2a depends upon the value of a.

If a = 2 then, 2a = 2 × 2 = 4

If a = 3 then, 2a = 2 × 3 = 6

If a = 0 then, 2a = 2 × 0 = 0

> Note: if there is more than two algebraic terms and are seperated by symbols like (+,—, ÷,×) then such terms are called algebraic expressions.

For example a + 4, x2 - xy + y2, 8a2bc, $\frac{2x+3}{5y}$

Example 1

a. Polynomial $\square$ + 4 means the sum of $\square$ and 4.

b. Polynomial x-5 means the difference of x and 5.

c. Polynomial 2a means the product of 2 and a.

d. $\triangle$ ÷ 4 means the number which comes after dividing $\triangle$ by 4.

Example 2

If x = 4 and y =3, then find out the value of following terms

(a) $x + 5$ (b) $3x-2y$ (c) $\frac{3x+2y}{2y}$

(a) Here, $x + 5$

$= 4 + 5$ (putting x=4)

$= 9$

(b) Here, $3x - 2y$

$= 3 \times 4 - 2 \times 3$ (putting x = 4 and y = 3)

$= 12-6$

$= 6$

(c) Here,

$\frac{3x + 2y}{2y}$

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

$= \frac{12 + 6}{6}$ (putting x = 4 and y = 3)

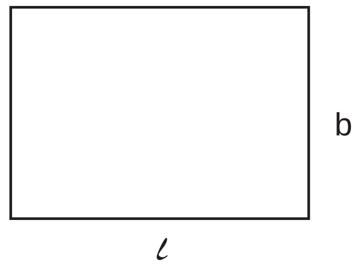
$= \frac{\cancel{18}^{3}}{\cancel{6}_{1}}$

$= 3$

We simplify an algebraic expression by putting the value of variables in it.

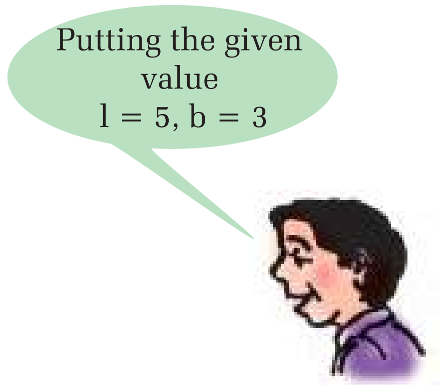
Example 3

If a rectangle has its length = l and breadth b, then the perimeter is denoted by algebraic term 2(l+b). If we write P=2(l+b) then it is a algebraic formula. Now, if l=5 cm and b=3 cm, what is the perimeter?



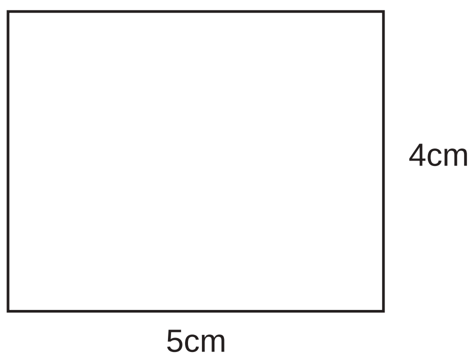
ℓ = 5cm and b = 3cm

Here, perimeter (P)	=	2(l +b)
	=	2(5cm+3cm)
	=	2 x 8cm
	=	16 cm



Example 4

A rectangle has area A = l x b, if
l = 5cm and b= 4cm,
what is the area of rectangle?



Here, area of rectangle A = l x b

= 5cm x 4cm

= 20 cm2

Hence area A= 20 cm2

Note: Unit of area is always unit square. If in cm, it is in cm square.

Exercise 18.1

1. Write down the meaning of the following terms.

(a) $\square$, + 3 (b) $\square$, ÷ 3 (c) $\square$, - 5 (d) 3 x, $\square$

(e) 3a (f) 5m (g) ab (h) 5 mn

2. Express the following into algebraic expression.

a. Sum of a and 3.

b. Difference of $\square$ and 7.

c. The quotient left after dividing 16 by $\square$

d. Thrice of the product of p and q

e. Thrice the difference of 7 and y

f. Product of twice of a and difference of b

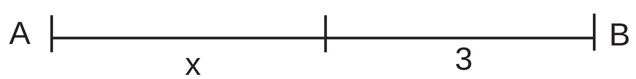
3. What does the following algebraic term represent? Write in language.

(a) 2(p + q) (b) 3(r - s)

(c) 4(x ÷ y) (d) qyz

4. Write the algebraic expressions for the length of the following lines:

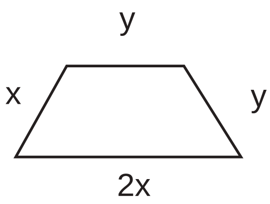
(a)



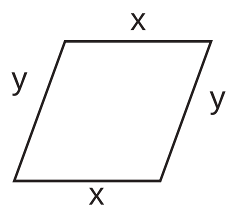
(b)

5. Write down the algebraic term to find the perimeter of following figures.

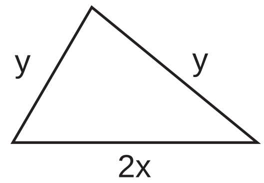
(a)



(b)



(c)



6. Write down the algebraic expressions for the following phrases:

(a) Bikash has x apples. He bought 2 more apples. How many apples Bikash has got now?

(b) If x students out of 500 are absent in a school then find the number of students those are present.

(c) There were 30 birds in a tree. Other birds came on the tree. How many birds are there in the tree now?

7. What will be the value of the following expressions if x=2?

(a) $3x$ (b) $3 + x$ (c) $5 - x$ (d) $x - 1$

(e) $3x + 2$ (f) $2x \div 4$ (g) $(5x+2) \div 4$ (h) $\frac{12x + 4x}{2x}$

8. If a = 1, b = 3 and c = 5, then find the values of the following expressions.

(a) $a + b + c$ (b) $2a + 3b + 4c$ (c) $b + c - 8a$

(d) abc (e) $10a + 10b + 10c$ (f) $ab + bc + ca$

18.2 Addition and subtraction of algebraic expressions

Example 1

What is the sum of 3a and 5a?

Here, 3a = a + a + a (three times a)

And 5a = a + a + a + a + a (five times a)

So, 3a + 5a = a + a + a + a + a + a + a + a (eight a)

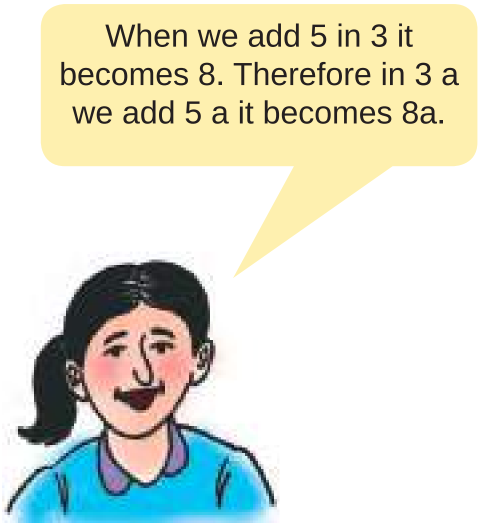
= 8a

In other way,

3 a + 5a

= (3 + 5)a

= 8a



If we add those in column then,

$$\begin{array}{r} 3a \\ +\ 5a \\ \hline \end{array}$$

8a, we will get same result.

Example 1

Substract 3a from 5a

Here, substracting 3a from 5a is to subtract 3 times a from 5 times a

5a - 3a = (5-3)a = 2a

If we keep those in column then,

$$\begin{array}{r} 5a \\ -\ 3a \\ \hline \end{array}$$

2a, we will get same result.

Form the above examples we see that -

5a and 3a are both common terms. The addition and subtraction of the common terms means the addition and subtraction of the multiples of the variable. Similarly, in the addition or subtraction of two or more than two algebraic expressions we add or subtract the common terms only. Look at the following examples:

Example 3

Simplify.

$3ab - 4bc + 7ab$

$3ab-4bc+7ab$

$= 3ab + 7ab - 4bc$ (keeping the common terms together)

$=(3 + 7)ab - 4bc$

$=10ab-4bc$ (ab and bc are not common terms, so they can't be subtracted, but are only expressed in algebraic terms)

Example 4

Add: $2x + 8y - 10z$ to $5x - 7y + 12z$

Here, $2x + 8y - 10z + 5x - 7y + 12z$

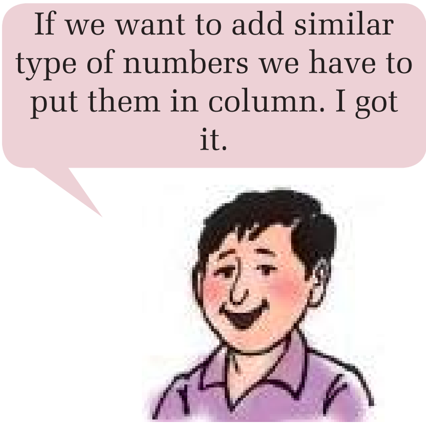
$= 2x + 5x + 8y - 7y - 10z + 12z$

$= (2 + 5)x + (8-7)y + (12-10)z$

$= 7x + y + 2z$

If we keep those in column and add,

$$\begin{array}{r} 2x + 8y - 10z \\ + \; 5x - 7y + 12z \\ \hline 7x + y + 2z \end{array}$$



Example 5

Simplify: 3a + 4b +7c - (2a+3b)

Here, $3a + 4b + 7c - (2a + 3b)$

$= 3a + 4b + 7c - 2a - 3b$

$= (3a - 2a) + (4b - 3b) + 7c$

$= (3 - 2)a + (4 - 3)b + 7c$

$= a + b + 7c$

While substracting like this, if similar type of number has sign +, then we have to convert it to - and if - then to +

If we keep those in column and substract then -

$$\begin{array}{l} 3a + 4b + 7c \\ -\,2a \pm 3b \\ \hline a + b + 7c \end{array}$$

Example 6

To make 7a +2b from 5a +6b how much should we add? Think in this way, to make 7 from 5 how much should we add? We can easily say 2. But what mathematical simplification is hidden? We must consider that. Here given number 5 and sum is 7. So to make 7, how much should we add? We know that the number to be added is 2, and while subtracting 5 from 7 we get 2. So by subtracting given number to the sum we get the required number. Therefore in the above problem -

$7a + 2b -(5a +6b)$

$=7a +2a- 5a -6b$

$=7a- 5a + 2b -6b$

$=2a -4b$, is the given number

Exercise 18.2

1. **Simplify.**

(a) $a + 3a$ (b) $3m + 4m$ (c) $45p - 13p$

(d) $17n - 3n$ (e) $3x + 4x - 5x$ (f) $5cd - 10cd + 12cd$

(g) $30pr - 35pr + 5pr$ (h) $17x + 3 + 5x - 2$ (e) $a + b + a + c$

2. **Add.**

(a) $\begin{array}{r} 13c \\ +\ 8c \\ \hline \end{array}$ (b) $\begin{array}{r} 10c \\ +\ 8c \\ \hline \end{array}$ (c) $\begin{array}{r} 4a + 5b \\ +\ 4a + 7b \\ \hline \end{array}$

(d) $\begin{array}{r} 4m + 3n \\ +\ 2m + n \\ \hline \end{array}$ (e) $\begin{array}{r} 9ab + 5bc \\ +\ 7ab - 3bc \\ \hline \end{array}$ (f) $\begin{array}{r} 16ab + 14cd \\ +\ 2ab - 10cd \\ \hline \end{array}$

3. **Subtract.**

(a) $7m$ from $2m$ (b) $16x$ from $9x$ (c)$7x + 9y$ from $6\ 3x + 4y$

(d) $3pq - 2qr$ from $2pq - 4qr$ (e) $14ab - 7pc$ from $9ab + 6pc$

(f) $12mn + 10ny$ from $10mn + 2ny$

4. **Add the following expressions by keeping them in columns.**

(a)$5x + 7y - z$ and $6x + 3y - z$

(b) $m - 4n + 3$ and $7m + 5n + 2$

(c)$17ab - 13bc + 8ca$ and $13ab + 2bc - 6ca$

(c)$12x - 16y + 2z$ and $2x + 8y - z$

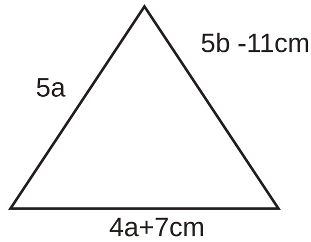
5. **Subtract the second expressions from the first by vertical method.**

a. $5x + 7y + 12z$, $3x + 2y + 10z$

b. $3a + 5b + 7c$, $a + 3b + c$

c. 13bc + 11ab + 4ac, 7bc - 2ab + 3ac

d. 3x - 6y + z, x - 4y + 3z



6. If a = 2 cm and b = 9 cm, what is the perimeter of the given triangle?

7. What must be added to x + y so that the sum may be 7x + 3y?

8. By how many times is 7x - 4y + 3z greater than 3x - 6y + z?

9. What must be added to 4a + 36 so that the sum may be 7a + 116?

10. What must be added to 2a + 7b + 4c so that the sum may be 7a + 7b +xc?

18.3 Equation

Football team A scored 5 goals in the first half of the football match and the score was equal to team B. Here, we may suppose x as the score of team B and because the goals scored by team B is equal to team A we may write x = 5. x= 5 is an equation. In the second half both the teams scored 2 goals each and the game was draw. Adding the scores of both halves team B scored x+2 goals and team A scored 5+2 but bo

Hence, $x+2 = 5 + 2$

Or $x + 2 = 7$ is called an equation.

Thus we can add the same number to both sides of an equation.

Let's think it in a different way. Total game equation is x+2 = 7. How can we find out the number of goals x in the first half ?

We know that both team scored 2 goals each in the second half. So, to know the scores in the first half we can subtract 2 from both sides of the equation.

Hence, x+2-2 = 7-2

Or, x = 5 is the score of the first half. We say that 5 is the solution of the equation x+2 = 7. Because team A scored 5 goals and equal its score with B. Thus we can subtract the same number from both sides of the equation, can't we? Can we also multiply or divide by the same number from both sides of the equation?

Let's see another example.

Shiva had 6 apples. Kailash has got the same number of apples too. Here, if x denotes the number of apples with Kailash and because Shiva also has equal number of apples, we can write x=6. It is an equation. Now, if Shiva and Kailash both ate up half of their apples, equal number of apples will remain with them.

Here, $\frac{1}{2}$ of 6 means $6\times\frac{1}{2}$ and $\frac{1}{2}$ of x means $x\times\frac{1}{2}$. Because both of them have equal number of apples,

$$x\times\frac{1}{2}=6\times\frac{1}{2}$$

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

It means $\frac{1}{2}$ of x means 3 which is the number of apples remaining with Shiva and Kailash. Here, multiplication by the same number $\frac{1}{2}$ on both sides of the equation x = 6 is the same as the division by the same number 2 on both sides of the equation. It means we can multiply or divide by the same number on both sides of the equation.

On the basis of the discussion above learn the following axioms about equation:

– If the same number is added to both sides of an equation, the two sides are still equal.

  If $x = 5$, $x + 2 = 5 + 2$

- If the same number is subtracted from both sides of the equation, the two sides are still equal.

  If $x = 5$, $x - 2 = 5 - 2$

- If both sides of an equation are multiplied by the same numbe,r the two sides are still equal.

  If $x=6$, $2 \times X = 2 \times 6$

- If both sides of an equation are divided by the same number the two sides are still equal.

  If $x = 6$, $\frac{x}{3} = \frac{6}{3}$.

Example 1

Solve. x + 5 =7

Here, $x + 5 = 7$

Or, $x + 5-5 = 7-5$ (subtracting 5 from both sides)

Or, $x = 2$.

Example 2

Solve: $y - 7 = 11$

Here, $y - 7 = 11$

Or, $y - 7+7 = 11 +7$(adding 7 on both sides)

Or, $y = 18$.

Example 3

Solve: $3x + 2 = 14$

Here, $3x + 2 = 14$

Or, $3x + 2 - 2 = 14 - 2$ (Subtracting 2 from both sides)

Or, $3x = 12$

Or, $\frac{1}{3} \times 3X = \frac{1}{3} \times 12$ (multiplying both sides by $\frac{1}{3}$)

Or, $x = 4$.

To find out whether the equation is correct or not, we can check it by putting
$x = 4$ in the equation.

Here, $3x + 2 = 14$

Or, $3 \times 4 + 2 = 14$

Or, $12 + 2 + 14$

Or, $14 = 14$ which is true.

In this example $3x = 12$, to find out the value of x, multiplication is done by $\frac{1}{3}$ for 3.

3 multiplied by $\frac{1}{3}$, $3 \times \frac{1}{3} = 1$. 3 multiplied by $\frac{1}{3}$ or 3 divided by 3 is the same. Therefore,

$3x = 12$ divided by 3 on both sides

$$\frac{3x}{3} = \frac{12}{3}$$

$x = 4$, Its meaning and value is the same.

In short,

Subtracting 2 from each side of the equation, $3x + 2 - 2 = 14$

Or, $3x = 12$ dividing both sides by 3

$X = \frac{12}{3}$ which means $x = 4$

Again, $3x + 2 = 14$

Or, $3x = 14 - 2 = 12$

Or, $X = \frac{12}{3} = 4$

Therefore,

$X = 4$.

Example 4

Solve.

$5x + 4 = 2x + 7$

Here, $5x + 4 = 2x + 7$

Or, $5x - 2x + 4 = 2x - 2x + 7$ (subtracting 2x from both sides)

Or, $3x + 4 = 7$

$3x + 4 - 4 = 7 - 4$(subtracting 4 from each side)

Or, $3x = 3$

Or, $\frac{3x}{3} = \frac{3}{3}$ (dividing both sides by 3)

Therefore, $x = 1$

Exercise 18.3

1. **Find the value of x in each of the following equation.**

(a) $x - 5 = 12$ (b) $x + 7 = 10$ (c) $x - 6 = 2$

(d) $x + 10 = 21$ (e) $9 = x - 4$ (f) $48 = x + 15$

2. **Solve and check if it is true or not.**

(a) $2x = 4$ (b) $3y = 9$ (c) $5k = 10$

(d) $\frac{1}{2}m = 6$ (e) $\frac{3}{4}n = 12$ (f) $3x = \frac{1}{3}$

3. **Simplify and solve.**

(a) $2x + 3x = 15$ (b) $3m + m = 12$ (c) $2y + 5y = 14$

(d) $8x = 24 + 5x$ (e) $5z - 2z = 4$ (f) $6z = 9 + 2z$

(g) $4m - 8 = 2m$ (h) $5p - 3 = 2p$

4. Solve.

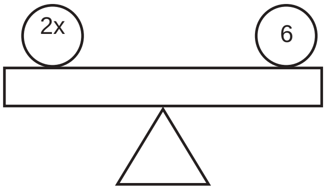
(a) $5x + 7 = 22$ (b) $2x - 3 = 9$ (c) $3x + 11 = 14$

(d) $3x - 4 = 18$ (e) $2x + 5 = 9$ (f) $5x + 4 = 2x + 6$

(g) $x - 100 = 0$ (h) $7x + 5 = 9 + 5x$ (i) $7x - 2 = 4x + 10$

5. If each of the following see-saw are balanced being parallel to the ground, what is the value of x?

(a)



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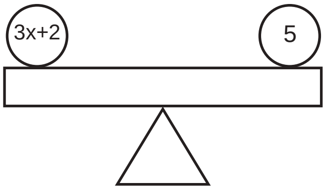

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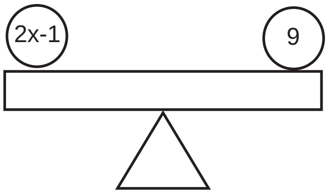

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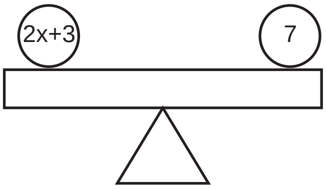

18.4 Use the equation

One of the several uses of equation is to solve problems that come across in our daily life. For this, the given problem should be changed into mathematical language, in other words, this should be solved by changing it into equation. Here, the unknown terms can be expressed as x and y. See the following examples.

Example 1

If 5 is added to a certain number and the result is 18, what will be the number?

Here, if the required number = x, $x + 5 = 18$

Or, $x + 5 - 5 = 18 - 5$

Or, $x = 13$ is the required number.

Example 2

What is the number, which when added to its two times gives 15.

Here, if the required number = x, $x + 2x = 15$

Or, $3x = 15$

Or, $\frac{1}{3} \times 3x = \frac{1}{3} \times 15$

Hence, $x = 5$

Exercise 18.4

Write each of the following open sentence in the form of equation and solve.

1. **After spending Rs. 5 if Sunil has got Rs. 15, how much money did he have?**

2. **If Rs. 5 is added to two times of Ram's money and the sum is 17 rupees, how much rupees does he have?**

3. **The number of boys in a school is two times more than that of girls. If there are 300 students in the school, what is the number of girls?**

4. **If $\frac{1}{3}$ of a work takes 20 days to complete, how many days does it take to accomplish it?**

5. **If the sum of a certain number and its half is 30, what is the number?**

6. **Pokhara had y ml rainfall on Saturday and the next day it had (y-1) ml rainfall. If the total rainfall was 43 ml, how many ml of rainfall did Pokhara have on Saturday?**

7. **One stick is 2x meter and the other is x + 2 meter in length. If the total length is 17 meter, what is the length of each stick?**