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STANDARD SIX

TERM III

Volume 2

MATHEMATICS

SCIENCE

SOCIAL SCIENCE

NOT FOR SALE

Untouchability is Inhuman and a Crime

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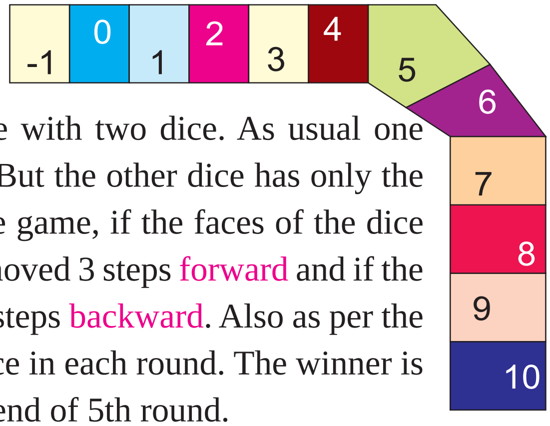
I. INTEGERS

1.1 Problem in a Number Game



Malliga and Victor are playing a game with two dice. As usual one of the dice has the face numbers from 1 to 6. But the other dice has only the symbols + and – . According to the rule of the game, if the faces of the dice show + in one and 3 in other, the coin is to be moved 3 steps forward and if the faces show – and 2 the coins is to be moved 2 steps backward. Also as per the rule of the game one has to throw the dice twice in each round. The winner is the person who is at the foremost place at the end of 5th round.

Malliga played first. She got + and 3 in his first throw and – and 2 in the second throw. So, she moved the coin 3 steps forward and 2 steps backward then she placed the coin in the box 1. Then Victor played and he got + and 5 in first throw, – and 3 in second throw. So he placed the coin in box2.

	Initial Position of the coin	Numbers in first throw	Numbers in second throw	Final Position of the coin
Malliga	0	+, 3	–, 2	1
Victor	0	+, 5	–, 3	2

They continued to play. At the end of the 5th round the position is as follows.

	Initial Position of the coin	Numbers in first throw	Numbers in second throw	Final Position of the coin
Malliga	7	–, 3	–, 2	2
Victor	4	–, 6	+, 3	?

Victor had a problem to continue. He tried to go 6 steps backward from 4. But after 0 it is not possible. So, he went 3 steps forward and he kept the coin in box 3. He declared that he was the winner.

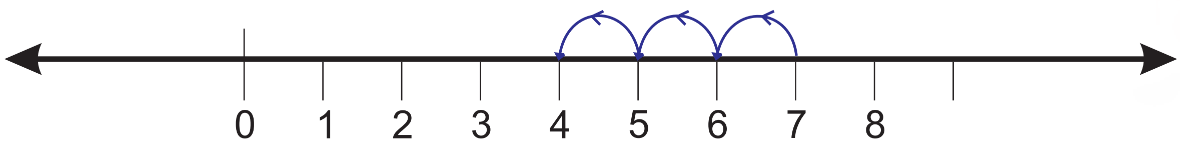
But, Malliga did not accept it. She said, "you are wrong. If you are not able to move -6 from 4, you must move + 3 first and then –6. Your coin will be in box 1. So, I am only the winner."

Can you guess the winner?

How to solve this problem?

Note : The solution is given in the last page of this unit.

What is the real problem in this game? We shall understand it by the number line. To find 7–3,We should move 3 units left from 7. The answer is 4.



But, to find 4-6, we cannot move 6 units left from 4. Because there are no numbers before 0. Can we find the answer if we move beyond 0 leftwards?

1.2 Integers - Introduction

The numbers on left of 0 are decreasing as they are increasing on right of 0. We represent the numbers on left of zero with the symbol '–'. The numbers can be written on left side of the number line as we write the Natural numbers on the right side.

Since the numbers on left of 0 are less than 0 they are called negative integers. The numbers on right of 0 are called positive integers.

Usually, we don't write + for positive integers. The numbers + 5 and 5 are one and the same. But negative integers are preceeded with–sign.

We use many such numbers in our daily life.

A shopkeeper sells an article and gains Rs.500. It is represented as +500 Rupees gain. If an article is sold with loss of Rs.200, It is represented as -200 rupees gain.

The average temperature of Tamilnadu = $+30^{\circ}C$

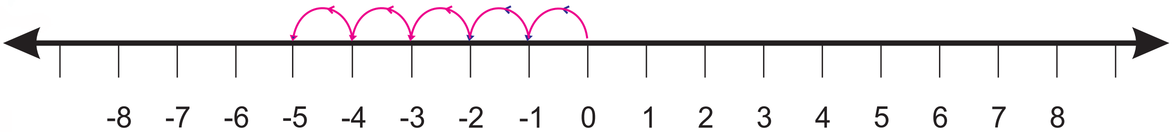
The average temperature of Antartica = $-25^{\circ}C$

Positive integers, zero and Negative integers altogether constitute Integers.

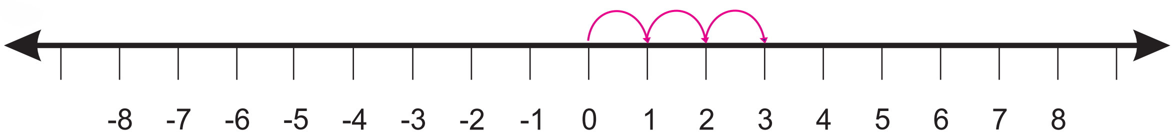
1.3 The position of integers on Number line.

First let us learn the method of marking numbers on the Number line.

-5 is marked on the number line after moving 5 units left of 0.

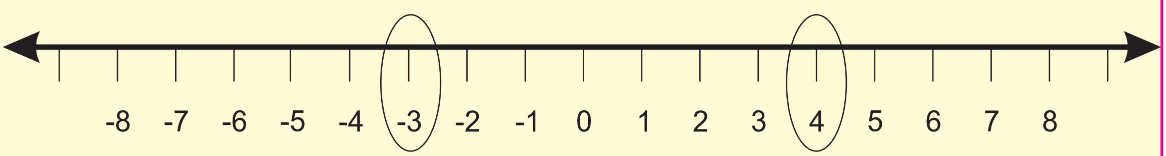


Similarly +3 is marked on the number line after moving 3 units right of 0.



Example : 1

Represent -3 and +4 on the number line.



Do it Yourself

Represent on the number line :

+7, –2, –6, –1, 8, –10

Here, smaller numbers alone are considered on the number line. But the number line extends on both the sides.

We have learnt that 5>1 in integers.

5 > 1 and 5 lies to the right of 1

3 > 0 and 3 lies to the right of 0

0 > –2 as 0 lies to the right of –2

–3 > –5 as -3 lies to the right of –5.

In other words,

Since –6 lies right of –8, we write –6 > –8

Since –2 lies right of -5, we write –2 > –5

So,

On number line, from right to left the numbers are getting decreased.

Every positive numbers is greater than a negative number.

Zero is less than a positive number.

Zero is greater than a negative number.

Is ‘0’ negative? or Is ‘0’ positive?

If not ‘0’ is ....

`Do it Yourself

Fill with proper symbols using < and >

1) 6 $\square$ 4   2) 5 $\square$ 0   3) 4 $\square$ -6   4) -3 $\square$ -1   5) -1 $\square$ 4

Example : 2

Find the predecessor and successor of the following.

-7, -3, 0, 4, 7

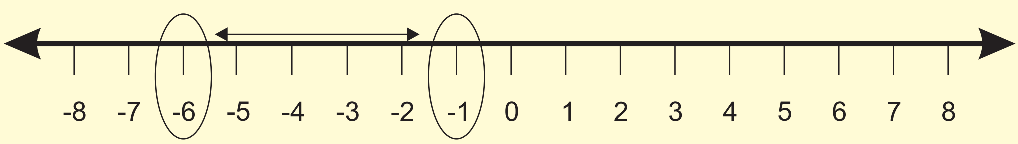
Solution

Predecessor	Integer	Successor
–8	–7	–6
–4	–3	–2
–1	0	1
3	4	5
6	7	8

Example : 3

Using the number line, write the integer between -6 and -1. Which of them is the greatest? Which of them is the smallest?

Solution



From the number line, the integers between –6 and –1 are –5, –4, –3, –2.

Since –2 lies right of –5, –2> –5.

greatest integer = –2

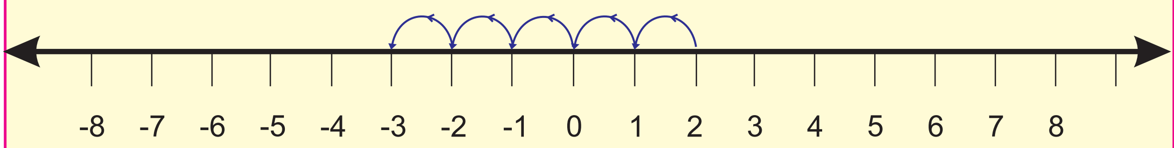
smallest integer = –5.

Example : 4

On the number line, (i) How many units are to be moved from 2 to reach –3?
(ii) How many units are to be moved from –5 to reach –1?

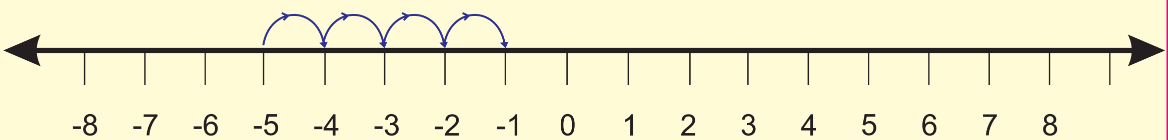
Solution

(i) Represent the given number on a number line.



So, move five units left of 2 to reach –3.

(ii) Represent the given number on a number line



So, move four units right of –5 to reach –1.

Exercise 1.1

1. Say whether True or False.
   - (i) Zero is less than every positive number.
   - (ii) Towards the left side of 0, the numbers are getting decreased.
   - (iii) -5 is on the right side of -4 on the number line.
   - (iv) -1 is the least negative number.
   - (v) Every positive number is greater than the negative numbers.
2. Identify the greater and smaller integer from the following using number line.
   (i) 7,3 (ii) -5, -3 (iii) -3, 2 (iv) 7, -3 (v) 1, -4 (vi) -4, -7
3. List the integers between the given number using number line
   (i) 3, -3 (ii) -4, 2 (iii) -1, 1 (iv) -5, -2 (v) -4, 3 (vi) -2, 2
4. Answer the following using number line.
   - (i) What is the number when we move 3 units right of -2?
   - (ii) What is the number when we move 7 units leftward from 3?
   - (iii) How many units are to be moved from 5 to reach -3?
   - (iv) How many units are to be moved from -6 to reach -1?

1.4 Addition and subtraction of integers

We can add integers as we do in Natural numbers. But in integers we have already + and – signs. So, we should differenciate the addition and subtraction operation signs from the sign of the number. For Example : In (+5) + (+3) the second + sign represents the operation addition. But first and third + signs represent the sign of the number

Addition of two positive numbers is easy. (+5) + (+3) and 5+3 are one and the same. Since the answer for 5+3 is 8, we understand (+5) + (+3) = 8.

How to add two negative integers? On a number line, when 1 is added to any number we get a number which lies in the immediate right of it. We know if 1 is added to a number 3 we get a new number 4, which lies to the right side of 3.

What happens if (+1) is added to (–1)? Is it not 0 (zero)! That is the required number.

So, (–1) + (+1) = 0. Using this concept we shall easily learn the addition and subtraction of positive and negative integers.

1.4.1. Addition using colour balls

We can easily understand the addition and subtraction of integers using balls of two different colours. Let us assume that green ball represents (+1) and red ball represents (–1). The integers are represented using colour balls in the following table.

Colour balls	Integers
⊕⊕⊕⊕⊕⊕⊕	+ 7
⊕⊕⊕⊕	+ 4
⊖⊖⊖	– 3
⊖⊖⊖⊖⊖	– 5
⊕⊕⊕	+ 3

We can understand that addition is nothing but union.

(a) Add +7 and +4.

⊕⊕⊕⊕⊕⊕⊕ + ⊕⊕⊕⊕ = ⊕⊕⊕⊕⊕⊕⊕⊕⊕⊕⊕

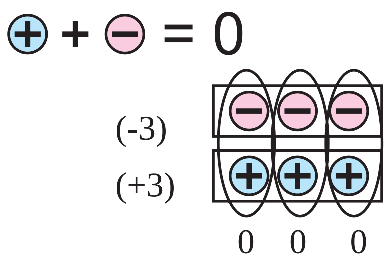
i.e, (+7) + (+4) = (+11)

(b) Add –3 and –5

⊖⊖⊖ + ⊖⊖⊖⊖⊖ = ⊖⊖⊖⊖⊖⊖⊖⊖

i.e, (–3) + (–5) = (–8)

As we did earlier, we use the concept (–1) + (+1) = 0. That is, a green ball and a red ball are coupled and can be removed.



(-3) + (+3) = 0

Do it Yourself

(-2) + (+2) = ☐

(-1) + (+1) = ☐

(-5) + (+5) = ☐

(-8) + (+8) = ☐

> Sum of a positive number and its negative is zero
> Hence they are called additive inverse of each other.

Here, 3 and -3 are additive inverse of each other.

Now let us consider red balls and green balls of diffeernt numbers.

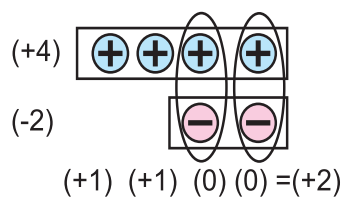
(a) Add: (+4), (-2)

(+4) + (-2) = (+2) + (+2) + (-2)

= (+2) + 0

= +2

∴ (+4) + (-2) = +2



Do it Yourself

(-5) + (+2) = ☐

(+4) + (-3) = ☐

(-2) + (+7) = ☐

(-3) + (-5) = ☐

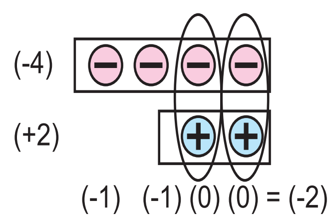
(b) Add: (–4) + (+2)

(-4) + (+2) = (–2) + (–2) + (+2)

= (–2) + 0

= –2

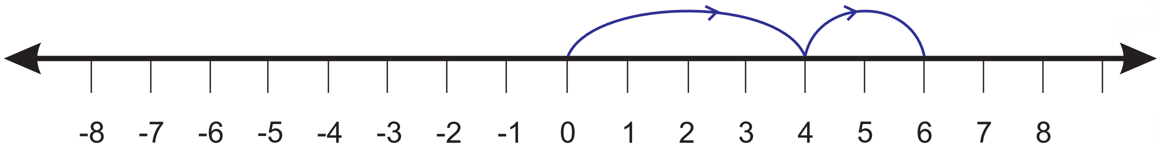
∴ (–4) + (+2)= –2



We have added the numbers using colours balls. Now, we shall do addition using number line.

1.4.2. Addition of integers using number line

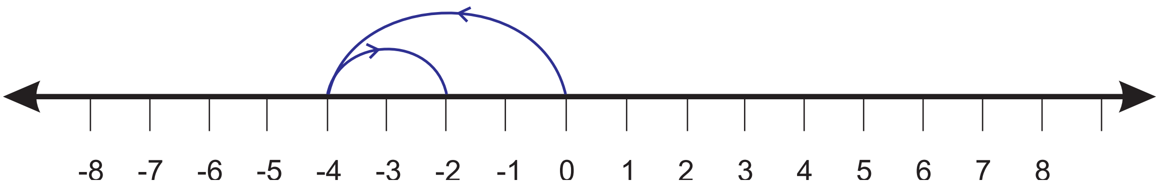
Now we shall learn to add +4 and +2 using a number line.



Since to add (+4) and (+2) starting from 4 we should move 2 units towards right, and we get +6.

$\therefore$ (+4) + (+2) = +6

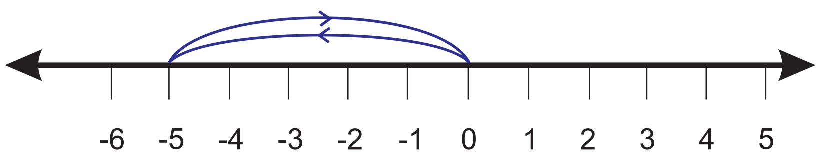
Now we shall add -4 and +2.



Since to add (-4) and (+2), starting from-4 we should move 2 units towards right and we get -2.

$\therefore$ (-4) + (+2) = (-2)

Now, we shall add -5 and +5.



Do it Yourself

(-5) + (+2) = $\boxed{}$

(-3) + (+6) = $\boxed{}$

(+1) + (+4) = $\boxed{}$

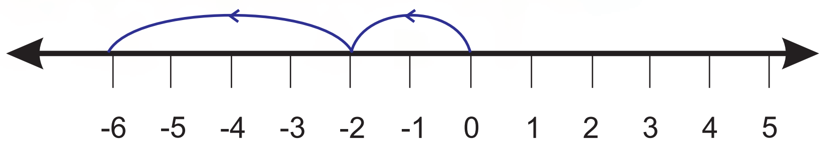
(-3) + (+5) = $\boxed{}$

Since to add (-5) and (+5), starting from-5 we should move 5 units towards right and we get 0. So,(-5) + (+5) = 0

Note : Move towards right for positive numbers and towards left for negative numbers.

We have already learnt using colour balls, when we add a negative and a positive of the same number (that is, additive inverse) we get 0. Just now we confirmed the same using number line. Here 5 and -5 are additive inverse of each other.

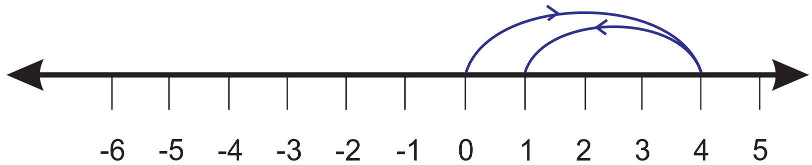
Now, we shall add –2 and –4. That is, (–2) + (–4). Now we should start from –2. The number to be added is –4. So, we should move towards left.



Since (–2) and (–4) are to be added, we should start from (–2) and move 4 units towards left. We reach –6

$\therefore$ (–2) + (–4) = –6

Now, we shall add (+4) and (–3) using a number line,



since (+4) and (–3) are to be added,

we should start from 4 and move 3 units towards left.

We reach (+1).

$\therefore$ (+4) + (–3) = +1

Do it Yourself

(–5) + (-2) = ☐

(–3) + (+6) = ☐

(+1) + (+4) = ☐

(+3) + (–5) = ☐

1.4.3 Subtraction using colour balls

We have already learnt addition of integers. similarly subtraction also can be done. We should find the additive inverse of the numbers to be subtracted and then it should be added with the number.

Example : 5

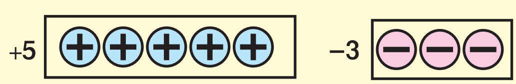
Find (+5) – (+3)

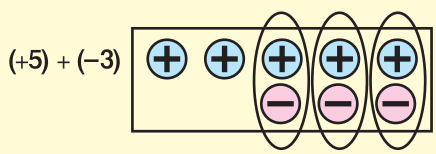
+3 is to be subtracted. Additive inverse of +3 is –3.

Note
As (–3) + +3 = 0
Additive inverse of +3 is -3.

Given : (+5) – (+3)

The answer will not be changed if we change it as (+5) + (–3). But we know, how to do (+5) + (–3).





The value is +2,

(+1) (+1) (0) (0) (0) = (+2)

So, we understand (+5) + (–3) = +2.
Hence the answer for the given problem is the same.

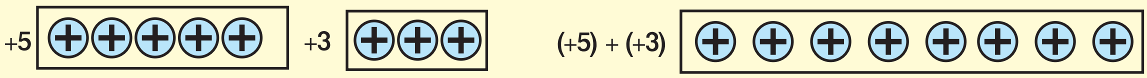
(ie) (+5) – (+3) = +2

Example : 6

Find (+5) – (–3).

Additive inverse of –3 is +3.

So, it is enough to find (+5) + (+3) instead of (+5) – (–3).



Its value is +8

(+5) + (+3) = +8

So, (+5) – (–3) = +8

Do it Yourself

(i) (– 4) – (–3) (ii) (+7) – (+2) (iii) (–7) – (+3) (iv) (–5) – (+4)

1.4.4 Subtraction of integers using number line

To subtract an integer from another integer it is enough to add the additive inverse of the second number.

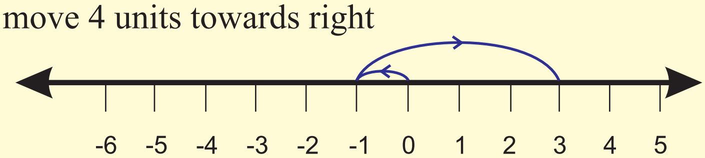
Example : 7

Solve using number line : (–1) – (– 4).

Additive inverse of – 4 = + 4.

Instead of subtracting as (–1) – (– 4) we can add it as (–1) + (+ 4).

Starting from –1 move 4 units towards right



Now we reach +3. So (–1) – (– 4) = +3

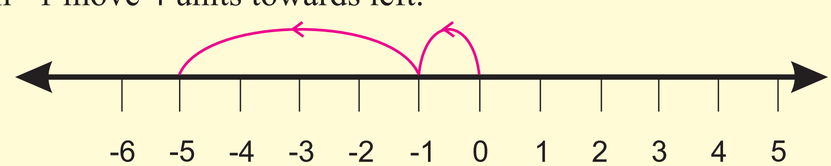
Example : 8

Solve using number line : (–1) – (+ 4)

Additive inverse of + 4 = – 4

Instead of subtracting as (–1) – (+4) we can add it as (–1) + (– 4).

Starting from –1 move 4 units towards left.



Now we reach –5. so (–1) – (+ 4) = –5

Exercise 1.2

1. Add using number line :

   (i) 8+(–4) (ii) (–1) + (–9) (iii) (–5) +(7) (iv) 3+(–6) (v) (+4) + (–7)

2. Find using number line :

   (i) What is the numer 4 more than –3? (ii) What is the number 3 less than –7?

3. Add :

   (i) (–10) + (+17) (ii) (+20) + (–13) (iii) (–50) + (–20)

   (iv) (+40) + (+70) (v) (+18) + (–75) (vi) (+75) + (–75)

   (vii) (–30) + (12) (viii) (–30) + (–22)

4. Simplify :

   (i) 5 +(–7) + (8) + (–9) (ii) (–13) + (12) + (–7) + (18)

5. Find the answer :

   (i) (+7) – (–3) (ii) (–12) – (+5) (iii) (–52) – (–52) (iv) (+40) – (+70)

Activity

1) Frame 10 questions to get the sum of any two integers are +1.
2) Frame 10 questions to get the sum of any two integers are 0.
3) Frame 10 questions to get the difference of any two integers are –1.
4) Form a 5x5 square grid. Let the students to add & subtract any 5(+ve) nos & 5(–ve) nos from o to 9 and –1 to –9 to form addition / subtraction table.
5) Construct a monogram to find the sum/difference of any two integers.

Solution to problem in first page of this unit.

If the number line is extended and the negative numbers are to be added, then Malliga will win the game. In the last round, Victor has to move the coin from 6 steps from 4 towards left and reaches -2 then move 3 steps towards right and reaches 1. But Malliga's coin is at box2. So, she is only the winner.

Points to remember

- Positive integers, zero and negative integers altogether constitute the integers.
- In the number line, the numbers on the right of 0 are increasing and the numbers on the left of 0 are decreasing.
- If the sum of two numbers is zero, then they are additive inverse of each other.
- Sum of two positive numbers is positive. The sum of two negative numbers is negative.
- The sum of a positive number and a negative number is either positive or negative or zero.
- Subtracting an integer from another integer is same as adding the additive inverse of the second to the first number.

Mathematical puzzles

1. Each row and column is a mathematical equation. Use the numbers 1 through 9 only once to complete the equation.
(Remember that division and multiplication are performed before addition and subtraction)

	X		–		7
–		+		+	
	+		–		0
X		–		–	
	X		–		68
-43		-6		6	

	X		÷		18
X		X		+	
	–		X		5
–		–		+	
	÷		X		10
55		2		10	

2. EXPRESSIONS AND EQUATIONS

2.1 Role of Variables in the Number System

Commutative property of addition of two numbers.

$1+2 = 2+1 = 3$

$4+3 = 3+4 = 7$

$4+5 = 5+4 = 9$

...

When the numbers are added in any order the value remains the same. So, this can be denoted using variables $a + b = b + a$ where a and b are any two whole numbers.

Do it Yourself

If a,b,c are variables in the set of whole numbers,verify the following laws

1. $a \times b = b \times a$
2. $a \times (b+c) = (a \times b) + (a \times c)$

2.2 Expressions

We have studied the following in the previous classes.

$11 = (1 \times 10) + 1,$

$12 = (1 \times 10) + 2$

$20 = (2 \times 10) + 0$

...

In the above numerical expressions we have used only numbers 1, 2, 3 ...

To form numerical expressions we use addition, subtraction, multiplication and division signs.

For Example : In the numerical expression (4 x 10) + 5 we have multiplied 10 with 4 and added 5 to the result.

For more numerical

expressions are : $(2 \times 10) - 7$, $3 + (7 \times 6)$, $(-5 \times 40) + 8$, $(6 \times 2) + 4$

A variable can take any numerical value.

All operations $+, -, \times, \div$ used for numbers are also applicable for variable.

Example : 1

Write the algebraic expression for the following statements :

Situation	Introduction of variables	Algebraic expression
1. Length of a rectangle is 3 more than its breadth.	Let the breadth of the rectangle be 'x' units.	Length of the rectangle is (x+3)units.
2. Raghu is 10 years younger than sedhu.	Let the age of Sedhu be 'x' years.	Raghu's age is (x-10) years.
3. Ramkumar is 2 times as old as Nandhagopal.	Let the age of Nandhagopal be 'x' year.	Ramkumar's age is (2x) years.
4. Cost of one pen is Rs.9 less than the cost of one note book.	Let the Cost of one note book be Rs.'y'.	Cost of one pen is Rs.(y-9).
5. The diameter of a circle is twice its radius.	Let the radius of the circle be 'r' units.	Diameter of the circle is 2 r units.

Example : 2

Write the algebric expression for the following statements

Mathematical operations	Statements	Algebric expression
Addition	Add 10 to a number	x+10
Subraction	Subtract 9 from a number	x–9
Multiplication	5 times a number	5 x
Division	One fourth of a person's monthly income	$\frac{x}{4}$
Less than	10 less than a given number	x–10
Greater than	15 more than a given number	x+15
multiples	3 times Raghu's age	3z

Example : 3

Write the following expression in words

$$3m + 4, 3m - 4, \frac{3m}{4}, \frac{4m}{3}.$$

Solution:

I. $3m + 4$ Add 4 to 3 times a number.

II. $3m - 4$ Subtract 4 from 3 times a number.

III. $\frac{3m}{4}$ One fourth of 3 times a number.

IV. $\frac{4m}{3}$ One third of 4 times a number.

Exercise 2.1

1. Write an expression for the following statements
   (i) Add 7 to x.
   (ii) Subtract 10 from y.
   (iii) Subtract 8 from $3y$.
   (iv) One half of one-third of a number.
2. Write the following expression in statement form
   (i) $2y + 5$ (ii) $2y - 5$ (iii) $\frac{2y}{5}$ (iv) $\frac{5y}{2}$
3. Write an expression containing y, 7 and a numerical operation.
4. If Mangai is 'z' years old, answer the following (form algebraic expressions)
   (i) What will be the age of Mangai after 5 years?
   (ii) How old is Mangai's grandfather, if he is 7 times as old as Mangai?
   (iii) How old is Mangai's father if he is 5 more than 3 times as old as Mangai?
5. A rabbit covers a distance of 30 feet by walk and then runs with the speed of 2 feet per second for 't' seconds. Frame an algebraic expressions for the total distance covered by the rabbit.
6. The cost of 1 pen is Rs.10. What is the cost of 'y' pens?
7. Sachin saves Rs.x every day. How much does he save in one week?

2.3 Formation and solving Equations

We can identify whether two numerical expressions are equal or not from the following: $7+ (30 + 7) = (40 - 2) + 6$

Is it true? Ans: Yes

Other than = sign, we can utilize the symbols like >, <, $\neq$ also,

1) $135 \times (74 + 32) > 134 \times (72 + 34)$
2) $(20 - 10) \times 8 < (10 + 20) \times 8$
3) $(5+7) \times 6 \neq 5 + (7 \times 6)$

Check the above !

when we use 'equal to' sign between two expressions we get an equation. (Both the expressions should not be numerical expressions).

Instead if we use signs like > , <, ≠ it is an inequation. For example,

(1) $3x - 7 = 10$ (equation) (2) $4x + 8 > 23$ (inequation) (3) $2x - 1 < 11$ (inequation)

Example :

Number of 'F' Formation	1	2	3	4	5 ....
Number of match sticks used	4	8	12	16	20 ....
	4×1	4×2	4×3	4×4	4×5 ....

If variable 'x' represent the number of sticks used in the formation of 'F', then, we get the following equation from the above table.

$x = 4$, $2x = 8$, $3x = 12$, $4x = 16$, $5x = 20$

$6x = 24$, $7x = 28$, $8x = 32$ ... ...

From the above table the value of 'x' which satisfies the equation $3x = 12$ is 4.

Now, let us solve the equation $3x = 12$ by substitution method.

Equation	Value of the variable	Substituting the value of the variable	Solution / Not a Solution
$3x = 12$	$x = 1$	$3 \times 1 = 3$ (False)	Not a Solution
	$x = 2$	$3 \times 2 = 6$ (False)	Not a Solution
	$x = 3$	$3 \times 3 = 9$ (False)	Not a Solution
	$x = 4$	$3 \times 4 = 12$ (True)	Solution
	$x = 5$	$3 \times 5 = 15$ (False)	Not a Solution
	$x = 6$	$3 \times 6 = 18$ (False)	Not a Solution

Result for the equation $3x = 12$ is 4.

Example : 4

Write an algebraic expression for the following statement:

Statement	Algebraic expression
1) 10 added to a number gives 20	$y + 10 = 20$
2) Two times a number is 40	$2x = 40$
3) 5 subtracted from a number gives 20	$x - 5 = 20$
4) A number divided by 6 gives the quotient 5 leaving no remainder.	$\frac{x}{6} = 5$
5) 8 subracted from twice a number gives 10	$2y - 8 = 10$
6) 6 added to twice a number is 42	$42 = 2x + 6$

Example : 5

Complete the following table

Equation	Value of the variable	Substituting the value of the variable	Solution / Not a Solution
(i) $x + 3 = 8$	$x = 4$	$4+3=7 \neq 8$ (False)	Not a Solution
(ii) $x - 4 = 7$	$x = 11$	$11 - 4 = 7$ (True)	Solution
(iii) $3x = 12$	$x = 3$	$3 \times 3 = 9 \neq 12$ (False)	Not a Solution
(iv) $\frac{x}{7} = 6$	$x = 42$	$\frac{42}{7} = 6$ (True)	Solution

Example : 6

Using the table find the value of the variable which satisfies the equation $x + 7 = 12$.

x	1	2	3	4	5	6	7	8	9	10	11
$x + 7$	8	9	10	11	12	13	14	18	16	17	18

From the table, solution for $x + 7 = 12$ is $x = 5$.

Exercise 2.2

1. Choose the correct answer:

a) Which of the following is an equation?

(i) 3 + 7 = 8 + 2 (ii) $x < \frac{4}{3}$ (iii) 3x + 1 = 10 (iv) 4 x 7 = 28

b) Which equation has y = 4 as solution?

(i) 2y + 3 = 0 (ii) y - 7 = 2 (iii) y + 3 = 7 (iv) y + 4 = 0

c) Which is the variable in the equation 2s - 4 = 10?

(i) 2 (ii) 10 (iii) -4 (iv) s

2. Match the following :

Equation	Solution
a) y - 2 = 0	(i) y = 0
b) 2y = 6	(ii) y = 2
c) 2 = y + 2	(iii) y = 3

3. Complete the table :

Equation	Value of the variable	Substituting the value of the variable	Solution / Not a Solution
$x - 8 = 12$	$x = 4$		
$x - 8 = 12$	$x = 6$		
$x - 8 = 12$	$x = 20$		
$x - 8 = 12$	$x = 15$		

4. Complete the table :

Equation	Value of the variable	Substituting the value of the variable	Solution / Not a Solution
$y + 7 = 15$	$y = 6$		
$y + 7 = 15$	$y = 7$		
$y + 7 = 15$	$y = 8$		
$y + 7 = 15$	$y = 9$		

5. Complete the table :

S.No.	Equation	Value of the variable	Substituting the value of the variable	Solution / Not a Solution
(i)	$x - 3 = 0$	$x = 2$		
(ii)	$y + 7 = 2$	$y = -2$		
(iii)	$n + 8 = -18$	$n = 28$		
(iv)	$3 - p = 10$	$p = -7$		

6. Using the numbers given in the brackets find the value of the variable which satisfies the given equation.

(i) $x + 7 = 12$ (3, 4, 5, 6)

(ii) $x - 10 = 0$ (7, 8, 9, 10)

(iii) $3x = 27$ (6, 12, 9, 8)

(iv) $\frac{p}{7} = 5$ (21, 14, 7, 35)

(v) $\frac{r}{10} = 2 = 2$ (18, 19, 20, 21)

7. Find the value of 'y' which satisfies the equation $y - 3 = 9$.

8. Complete the following table and find the value of the variable that satisfies 3z = 30

z	5	6	7	8	9	10	11	12	13	14	15
3z			21					36			

9. Complete the following table and find the value of the variable that satisfies $\frac{P}{4} = 3$

P	4	8	12	16	20	24
$\frac{P}{4}$		2			5	

MATHEMATICS

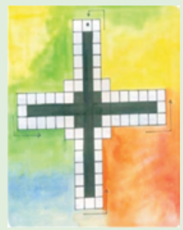
Activity

1) Write any 10 life situation statements. Convert them into mathematical statements, by using variables.

2) Construct a slide ruler to find the solution of simple linear equations.

Mathematical puzzles

1. I am a number. Go round the corners of the given figure 4 times. When you add my value with the number of corners you have crossed you get 46. Find any value.



2. I am a number. After crossing all the boxes given in the figure, the total of my value and the number of boxes crossed is 60. Find my value.

3. I am a two digit number. Moreover I am a multiple of 11. When I am divided by 7, 1 leave no remainder. When 4 is added to the quotient 15 is obtained. What is my value?

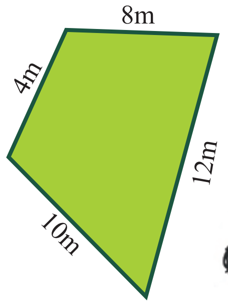
Points to remember

- Variable has no constant value. It take various values according to the given situation.
- Variables are denoted by small letters a, b, c, ... x, y, z...
- Expressions can be related using variables.
- In arithmetic and geometry formulae are obtained using varialbes.
- If we equate one expression with another expression we get an equation. (One expression must be a non numerical expression)
- Value of the variable that satisfies the equation is the solution for the equation.

3. PERIMETER AND AREA

3.1 Perimeter

Rahman is a farmer. He has to fence his field.



What length of the barbed wire I should buy to fence my field?

Can you help Rahman? Total length of the boundaries should be found.

The length of each boundary is given in the figure.

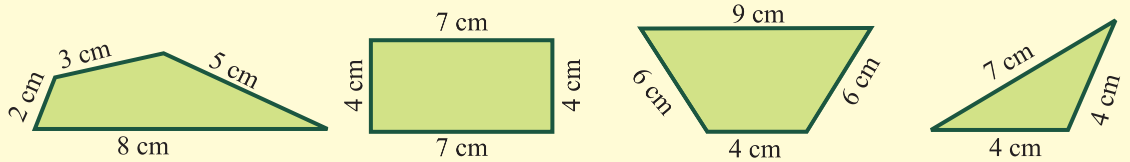
I found the answer I should buy 8 m + 12 m + 10 m + 4 m = 34 m barbed wire.

The perimeter of a closed figure is the total measure of the boundry.

Example : 1

Find the perimeter of the following shapes.

Perimeter of the shape = Sum of the measure of all the sides.

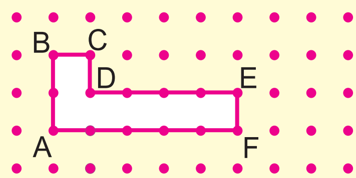


8 + 5 + 3 + 2 = 18 cm   4 + 7 + 4 + 7 + = 22 cm   4 + 6 + 9 + 6 = 25 cm   4 + 4 + 7 = 15 cm

Example : 2

The distance between two consecutive points is 1 unit.

Find the perimeter of ABCDEF.



Solution :

The distance between A to B is 2 units. In the same way,

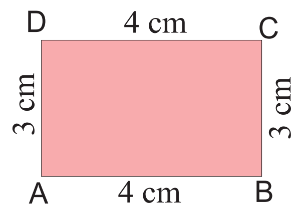
adding the lengths of all the sides, we get 2 + 1 + 1 + 4 + 1 + 5 = 14units.

The perimeter of the given figure = 14 units.

MATHEMATICS

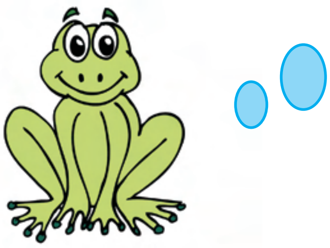
3.1.1 Perimeter of a rectangle and a square

We can find the perimeter of a rectangle ABCD easily as 4 + 3 + 4 + 3 = 14 cm



But in general, the perimeter of rectangles with different lengths and breadths is length + breadth + length + breadth

Perimeter $= 2 \times$ length $+ 2 \times$ breadth
$= 2$ (length + breadth)
$= 2\,(l + b)$
where 'l' denotes the length and 'b' denotes the breadth.



We use the first letters 'l' of length and 'b' of breadth in the formula

Perimeter = 2 (l+b)

We can denote length and breadth by any other letter also.

Example : 3

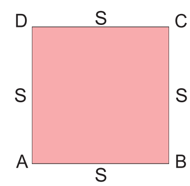
Find the perimeter of a rectangle, whose length is 5 cm and breadth is 3 cm.

Solution :

Perimeter $= 2$ (length + breadth)

$= 2\,(5 + 3) = 2 \times 8 = 16$ cm

Perimeter of a square



Every square is a rectangle whose length and breadth are equal.

Perimeter $= 2 \times$ side + 2 x side

$= 4 \times$ side

= 4s where 's' is the side.

We use the first letter 's' of the word 'side' to denote the side.

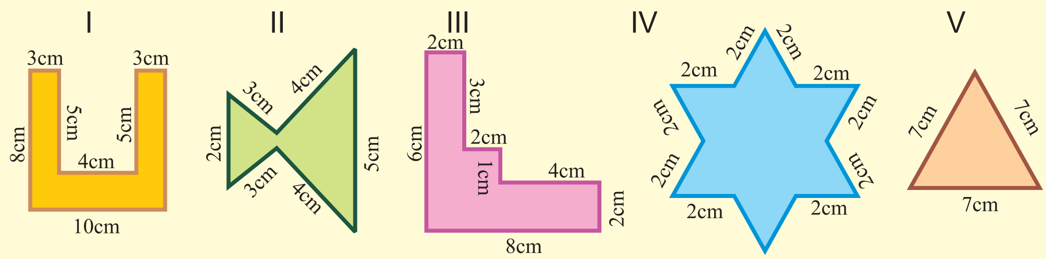
Example : 4

Find the perimeter of a square whose side is 20 cm.

Perimeter $= 4 \times$ side $= 4 \times 20 = 80$ cm

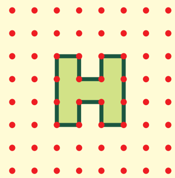
Exercise 3.1

1. Find the perimeter of the following shapes.

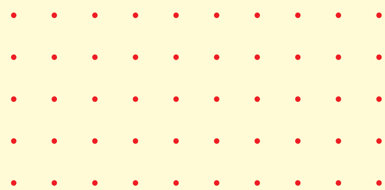


2. Find the perimeter of the following figure.

(Take the distance between any two consecutive points as 1 unit)

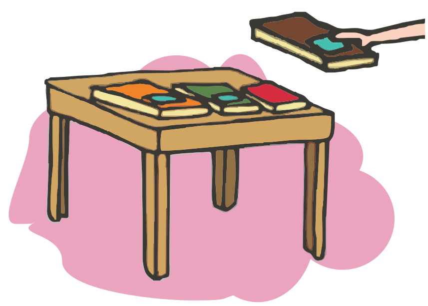


3. Draw different shapes with perimeter 8 units in the following dotted sheet.



4. Find the perimeter of a rectangle of length 4 cm and breadth 7cm.
5. The perimeter of a square is 48 cm. Find its side.

3.2 Area

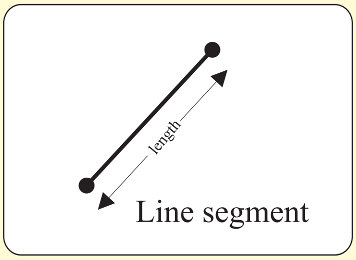


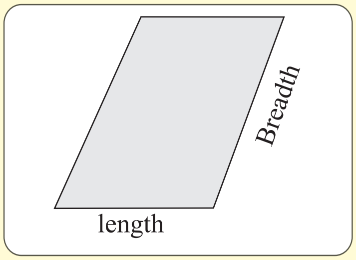
In the figure, look at the books on the table. Every book occupies a space. There is no space for the fourth book. The space that each book occupies is the area of that book.

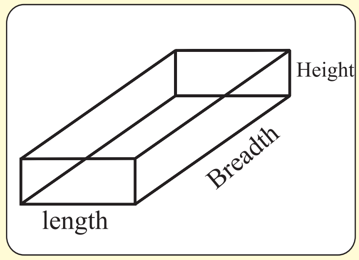
The area of an object is the space occupied by it on a plane surface.

Only two dimensional and three dimensional objects will have area.

Example : 5



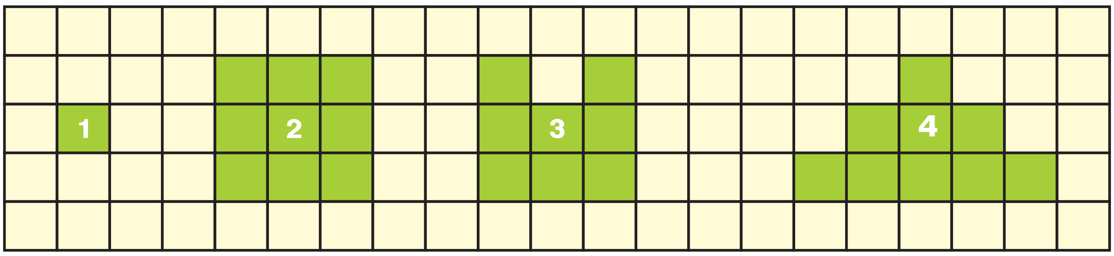




Line segment	Newspaper	Cardboard box
Only one dimension	Two dimensions	Three dimensions
No Area	Can you find its area?	The box has 6 surfaces. We can find the area of each surface.

How to calculate the area?

Count the number of green squares in each of the following shapes.



Shape 1 = 1 Square, Shape 2 = 9 Squares,

Shape 3 = 8 Squares, Shape 4 = 9 Squares.

Look at shape 1

The square of side 1 unit is called "Unit square".

The area occupied by it is 1 square unit (1 sq. unit).

Area of unit square = 1 unit x 1 unit = 1sq. unit.

We have denoted the side of a small square as 1 unit. The area of the squares of sides in mm, cm, m, km can be expressed as follows :

1 mm x 1 mm	= 1 sq. mm
1 cm x 1 cm	= 1 sq. cm
1 m x 1 m	= 1 sq. m
1 km x 1 km	= 1 sq. km

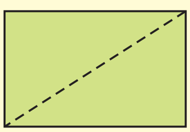
Exercise 3.2

Look at the following table. Find the suitable unit (✔) in to find the area of each.

Objects	Square cm	Square m	Square km
Handkerchief			
A page of a book			
The door of a classroom			
Area of the land surface of chennai city			
Saree			

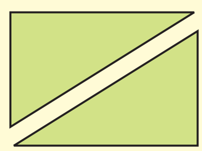
3.2.1 Area of differnt shapes

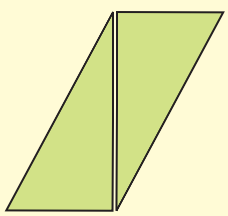
Activity :



Take a rectangular piece of paper. Fold it diagonally and cut it into two triangles.

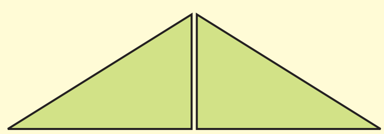
Different shapes are formed by joining the sides of the triangles in various ways.

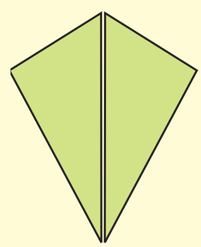




They all are in different shapes.

What can be said about their areas?





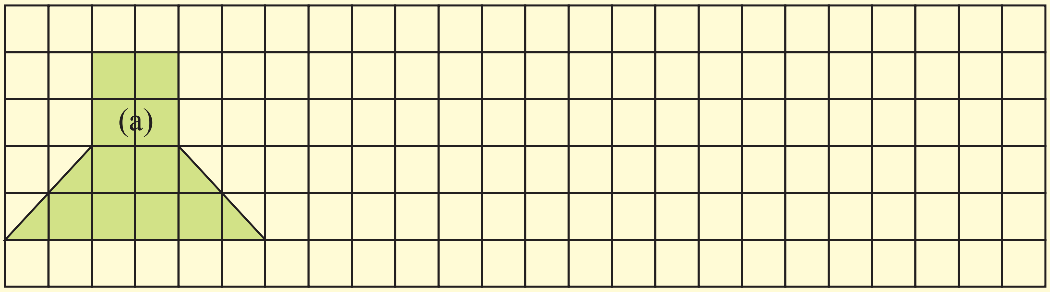
All shapes will be equal in areas as they are formed with the same two pieces of a paper.

Can you form two more shapes like this?

Area of these figures can be found by counting the number of unit squares in them.

Example : 6

Find the area of the given shape.



The area of each small square is 1 sq.cm.

Therefore area of the shape = 10 full squares + 4 half squares

= 10 full squares + 2 full squares

= 12 full squares

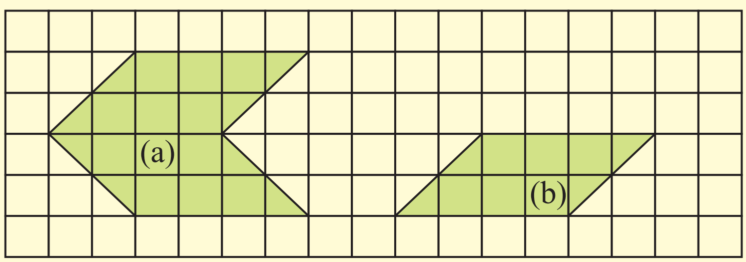
= 12 sq.cm.

Activity

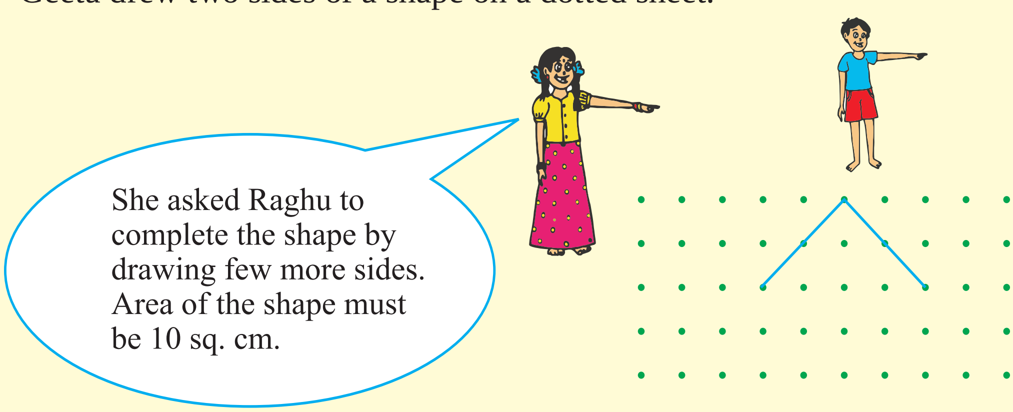
Draw a few more shapes on graph sheets and to find their areas.

Exercise 3.3

1. Find the area of the given shapes



2. Draw two different shapes of area 10 square units on a dotted sheet.
3. Geeta drew two sides of a shape on a dotted sheet.

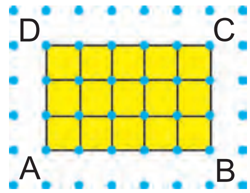


How did Raghu complete the shape? There can be many solutions for this.

In how many ways can you complete these shapes?

3.3 Area of a rectangle, square and a triangle

Area of a rectangle



The area of a rectangle connecting the dots can be found as 15 sq.units by counting the number of small squares.

How to calculate the area of the rectangle without counting the number of squares?

The length of the rectangle is the distance between A and B = 5 units
There fore, there are 5 small squares on the line AB

The breadth of the rectangle is the distance between B and C = 3 units.
There are 3 rows of 5 squares in each.

Now the area of the rectangle = Total number of squares.
= Number of squares in 3 rows.
= 5 + 5 + 5
= 5×3
= (length x breadth) sq. units

Usually we denote length as 'l', breadth as 'b'

$\therefore$ Area of a rectangle = $(l \times b)$ sq. units

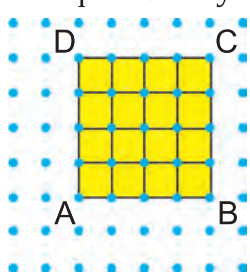
Example : 7

Find the area of a rectangle whose length is 8 cm and breadth 5 cm

Area of a rectangle = length $\times$ breadth = 8 cm $\times$ 5 cm = 40 sq. cm

Area of a square

We know that in a rectangle if the length is equal to the breadth, it is a square. They are called the sides of a square.



$\therefore$ Length = breadth = side of the square

$\therefore$ Area of a square = length $\times$ breadth
= (side $\times$ side) sq.units

(Formula for area of the rectangle is also suitable for area of square)

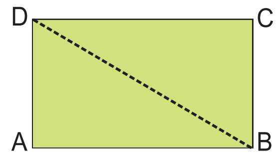
If you denote the side as 's' then the area of the square = (s $\times$ s) sq. units.

Example : 8

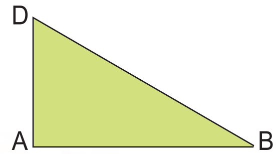
Find the area of a square of side 7 cm.

Area of a square = side $\times$ side = 7cm $\times$ 7cm = 49 sq. cm.

Area of a right triangle



Take a rectangular shaped card-board and cut it through a diagonal. We get 2 right triangles.



Area of a right triangle = half the area of the rectangle

$= \frac{1}{2} \times$ (length x breadth) sq. units

From this you know that
Area of a rectangle = Area of two right triangles.

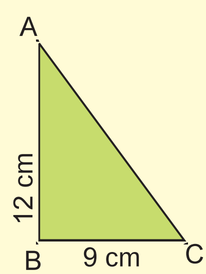
The length and breadth of the rectangle become the base and height of the right triangle. Length is used as the base and breadth is used as the height.

Hence, area of a right triangle = $\frac{1}{2} \times$ (base x height) sq.units.

If base is denoted as '*b*' and height as '*h*', then the area of a right triangle = $\frac{1}{2}(b \times h)$ sq.units.

Example : 9

Find the area of the following right triangle.



Solution :

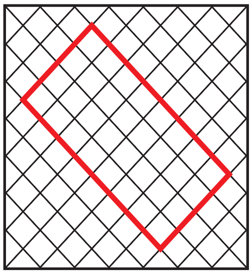
Area = $\frac{1}{2} \times$ base $\times$ height

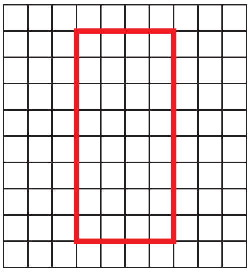
Base of triangle = 9 cm

Height = 12 cm

$\therefore$ Area = $\frac{1}{2} \times 9 \times 12 = 9 \times 6 = 54$ sq.cm.

Which of the following shapes has greater area?



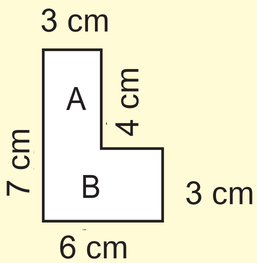


Area of both the shapes are equal. We get the second shape by rotating the first shape.

The area of the shapes do not change when they are rotated or moved from their places.

Example : 10

Find the area of the following shape.



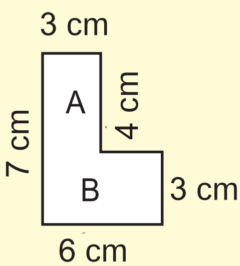
Solution : There are three methods to solve this problem.

I method

Area of (A) = 4 × 3 = 12 sq. cm.

Area of (B) = 6 × 3 = 18 sq. cm.

Therefore, area of the shape = 30 sq. cm.

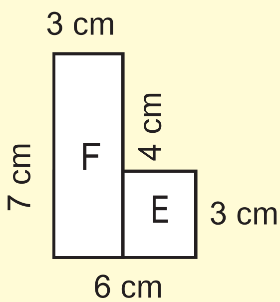


II method

Area of (F) = 7 × 3 = 21 sq. cm.

Area of (E) = 3 × 3 = 9 sq. cm.

Therefore, area of the shape = 30 sq. cm.



MATHEMATICS

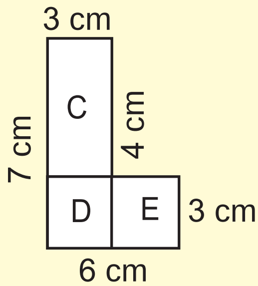
III method

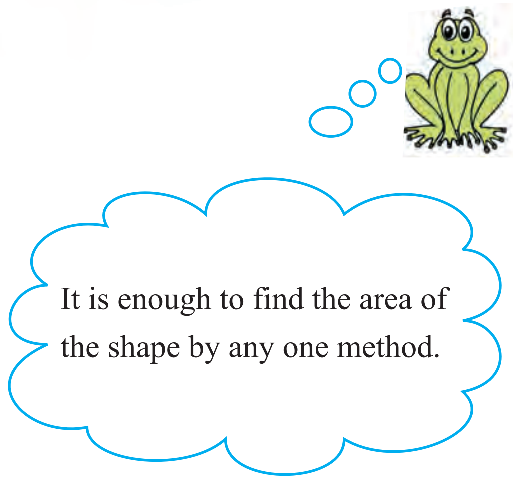
Area of (C) = $4 \times 3 = 12$ sq. cm.

Area of (D) = $3 \times 3 = 9$ sq. cm.

Area of (E) = $3 \times 3 = 9$ sq. cm.

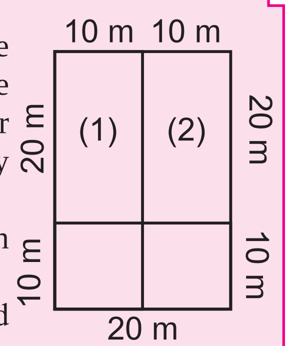
Therefore, area of the shape = 30 sq. cm.





Activity

1. An old man divided the land which is mentioned in the picture and gave it to his three sons equally. He asked them to fence their land at their own cost. But the third son told that his father made him only spend more than his brothers. Why did he say like this? Did he say correctly?
2. Find the length and breadth of any 5 things, which are useful in every day and find their area & perimeter.
3. Draw Square, Rectangle and Triangle in a graph sheet and find the area & perimeter of each figure.



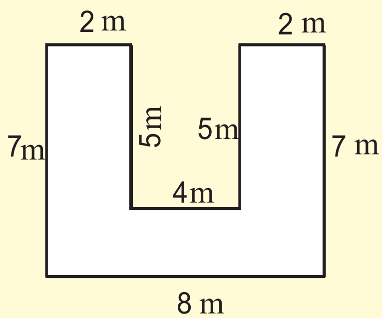
Exercise 3.4

1. Fill in the blanks :

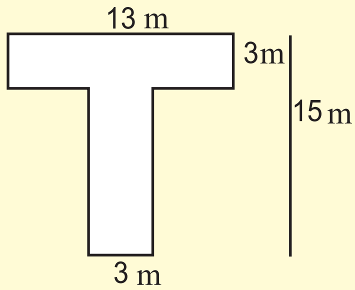
S.No	Length of the rectangle (l)	Breadth of the rectangle (b)	Perimeter of the rectangle	Area of the rectangle
(i)	7 cm	5 cm	-	-
(ii)	10 cm	-	28 m	-
(iii)	-	6 m	-	72 sq.m
(iv)	9 m	-	-	63 sq.m

2. Find the area of the following shapes.

(i)

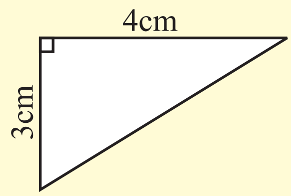


(ii)

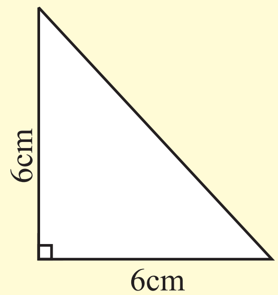


3. Find the area of the following right triangles

(i)



(ii)



Activity

1. Using graph sheet construct different rectangles whose areas are equal. Find the perimeter of each figure. Are the areas & perimeters same or not. Discuss.
2. By using sticks, make Squares, Rectangles, Triangles and paste it in the chart. Mention their area and perimeter

Points to remember

- The Perimeter of a closed figure is the total measure of the boundry.
- The Perimeter of a rectangle = $2 \times (l + \mathrm{b})$ units.
- The Perimeter of a Square = $(4 \times \mathrm{s})$ units.
- The area of an object is the space occupied by it on a plane surface.
- The area of a rectangle = $(l \times \mathrm{b})$ sq. units
- The area of a Square = $(\mathrm{s} \times \mathrm{s})$ sq.units.
- The area of a right angled triangle = $\frac{1}{2} \times (\text{base} \times \text{height})$.
- The area of a shape do not change when they are rotated or move from their places.

4. TRIANGLES

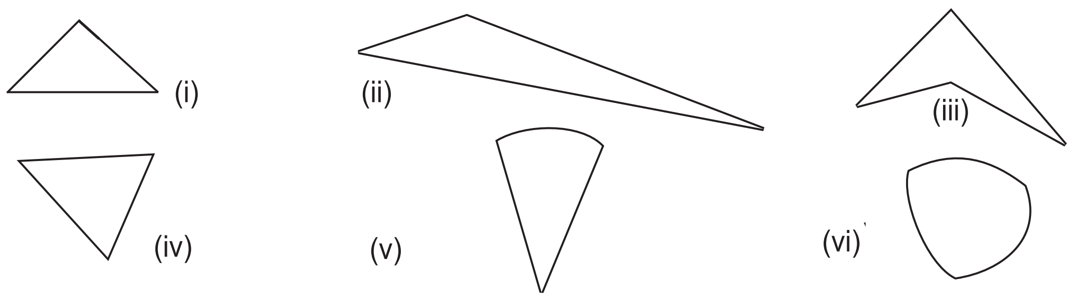
4.1 Triangles

We know angles and triangles. What is the relation between them?

We have already learnt that a three sided (line segments) closed plane figure is called a triangle. Then we wonder why is it called a triangle?

When the three sides of a triangles meet, they also form three angles. So it is called a triangle.

Find which of the following are triangles?



Types of triangles

Triangles are classified according to the measures of their sides and angles.

Measure the sides and angles of the following triangles and fill the table given

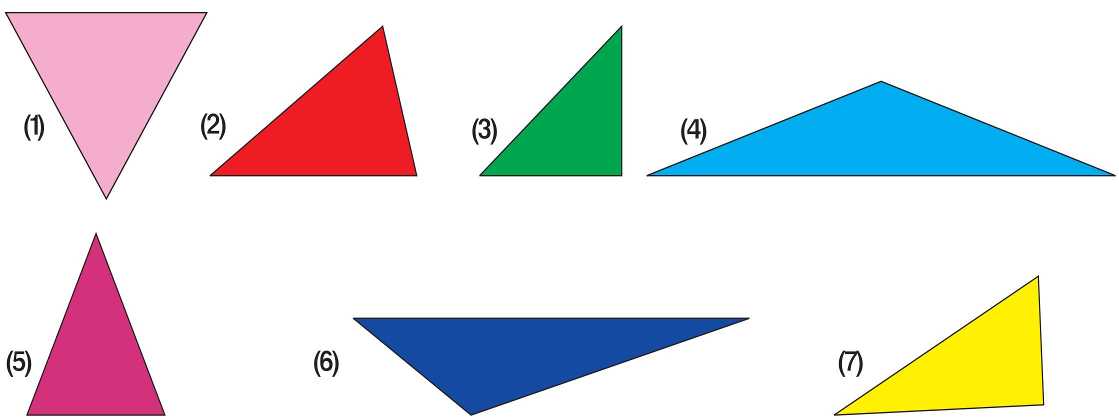


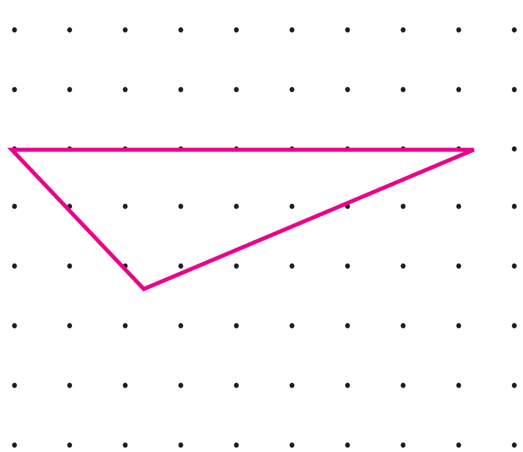
Figure	Measure of the angle	sum of the measure of the angles	Nature of the angles	Measure of the sides	Kinds of Triangles
1	60°, 60°, 60°	180°,	Three angles are equal	3 cm, 3 cm, 3 cm	Equilateral triangles
2					
3					
4					
5					
6					
7					

In the above triangles, compare the sum of any two sides with the third side.

From this, we come to know

- If the measure of three angles of a triangle are equal then its sides are also equal.
- If the measure of two angles of a triangle are equal then its two sides are equal.
- If the measure of two sides of a triangle are equal then its two angles are equal.
- If the measure of the angles are different then the measure of its sides are also different.
- If the measure of the sides are different then the measure of its angles are also different.
- Sum of the three angles of a triangles is 180°.
- Sum of any two sides of a triangle is greater than the third side.

The above points are applicable to all triangles.



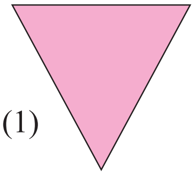
Do it yourself

Using rubber bands in a Geo-board try to form various triangle and observe their properties.

Classification of triangles on the basis of sides :

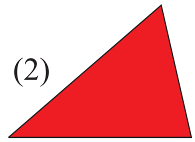
If all the three sides of a triangle are equal then it is called an equilateral triangle.

Example : Fig(1)

(1)


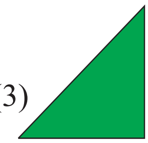
If any two sides of a triangle are equal then it is called an isosceles triangle.

Example : Figures (3), (4), (5).

(2)


If all the three sides of a triangle are unequal then it is called a scalene triangle

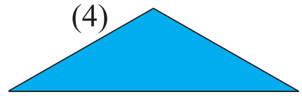
Example : Figures (2), (6), (7).

(3)


Classification of triangle on the basis of angles :

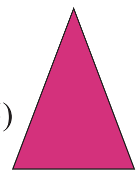
If each angle of a triangle is an acute angle, it is called an acute angled triangle.

Example : Figures (1), (2), (5).

(4)


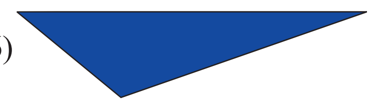
In a triangle, if any one angle is a right angle, then the triangle is called a right angled triangle.

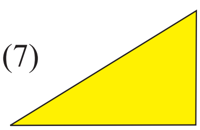
Example : Figures (3), (7).

(5)


In a triangle, if one angle is an obtuse angle, then the triangle is called an obtuse angled triangle.

Example : Figures (4), (6)

(6)


(7)


A few questions may arise now.

1. What type of triangle is it if it has a right angle and an obtuse angle?
2. Is it possible for a triangle to have either two obtuse angles or two right angles?

According to question (1) if a right angle and an obtuse angle is present in the same triangle the sum of the angles will always be more than 180° (why?)

So, such a triangle is not possible.

Example : 1

Write the type of triangle, based on their sides

(i) In ΔABC, AB = 7 cm, BC = 8 cm, CA = 6 cm

(ii) In ΔPQR, PQ = 5 cm, QR = 4 cm, PR = 4 cm

Solution :

(i) All the three sides are unequal. So, Δ ABC is a scalene triangle.

(ii) QR = PR = 4 cm. Two sides are equal. So, ΔPQR is an isosceles triangle.

Example : 2

Can a triangle be drawn using measurements 4 cm, 10 cm and 5 cm? Give reason.

Solution :

10 + 4 = 14 is greater than 5.

10 + 5 = 15 is greater than 4.

4 + 5 = 9 is less than 10.

A triangle cannot be formed, because the sum of two sides is less than the third side.

Example : 3

Determine the kind of triangle if the three angles are

(i) $60^\circ, 45^\circ, 75^\circ$ (ii) $20^\circ, 90^\circ, 70^\circ$ (iii) $104^\circ, 35^\circ, 41^\circ$

Solution :

(i) Each angle is less than 90°. So, it is an acute angled triangle.

(ii) One angle measure 90°. So, it is a right angled triangle.

(iii) One angle is greater than 90°. So, it is an obtuse angled triangle.

Example : 4

Can we draw a triangle with angles $30^\circ, 80^\circ, 85^\circ$?

Solution :

The sum of the measure of the three angles is $30^\circ + 80^\circ + 85^\circ = 195^\circ$

But the sum of the measure of the angles of a triangle is 180°.

Therefore a triangle cannot be formed using the given angles.

Example : 5

Can $100^\circ, 120^\circ$ be any two angles of a triangle?

Solution :

Sum of the given angles is $100^\circ + 120^\circ = 220^\circ$. This is greater than 180°, but the sum of the measures of the angles of a triangle should always be 180°. Even though the third angle is not known it is not possible to form a triangle with the given measures.

Therefore a triangle cannot have two obtuse angles.

Exercise 4.1

1. Fill in the blanks :

   (i) The sum of the three angles of a triangle is ....

   (ii) In a equilateral triangle .... sides are equal.

   (iii) The triangle in which two sides are equal is called .... Triangle.

   (iv) If a triangle has one right angle it is called a .... Triangle.

   (v) In a triangle the sum of the measure of any two sides is .... than the third side.

   (vi) Triangle can be classified into .... kinds according to their sides.

   (vii) Triangle can be classified into .... kinds according to their angles.

2. What are six parts of a triangle?

3. Classify the triangle based on their angles.

S.No.	$\angle A$	$\angle B$	$\angle C$	Type
(i)	30°	45°	105°	
(ii)	25°	90°	65°	
(iii)	62°	45°	73°	
(iv)	120°	30°	30°	

4. Can we have a triangle whose degree measures as :

   (i) $30^\circ, 60^\circ, 90^\circ$ (ii) $40^\circ, 100^\circ, 40^\circ$

   (iii) $60^\circ, 70^\circ, 20^\circ$ (iv) $50^\circ, 75^\circ, 65^\circ$

   (v) $90^\circ, 90^\circ, 0^\circ$

5. Classify the triangles based on their sides

Sl. No.	AB cm	BC cm	CA cm	Type
(i)	5	2	5	
(ii)	3	3	3	
(iii)	6	7	3	
(iv)	4	5	7	

6. State if the following could be the possible lengths of the sides of a triangle.

(i) 3 cm, 6 cm, 9 cm (ii) 10 cm, 6 cm, 3 cm

(iii) 15 cm, 10 cm, 8 cm (iv) 12 cm, 20 cm, 8 cm

Activity

1) Using colour thread, straws or sticks, make different type of triangles based on its sides & angles.
2) Draw different type of triangles and measure its sides & angles of each triangle and then classify them.
3) Demonstrate the different types of triangle through Geo-board.

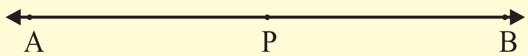
5. CONSTRUCTION OF PERPENDICULAR LINES AND PARALLEL LINES

5.1 Construction of Perpendicular lines and parallel lines

Example : 1

Using a set square and a ruler construct a line perpendicular to given line at a point on it.

Step 1 :



(i) Draw a line AB with the help of a ruler.

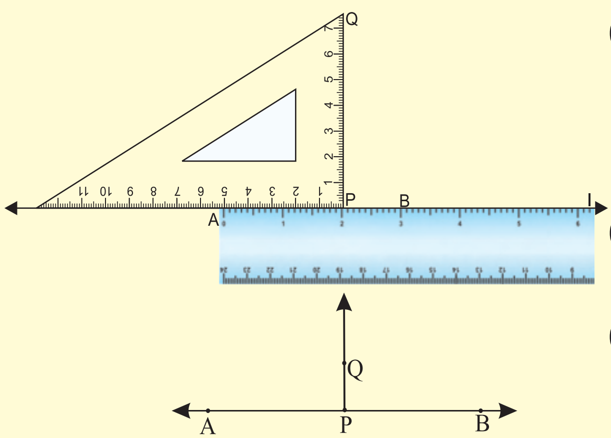
(ii) Mark a point P on it.

Step 2 :

(i) Place a ruler on the line AB

(ii) Place one edge of a set square containing the right angle along the given line AB as shown in the figure.

Step 3 :



(i) Pressing the ruler tightly with the left hand, slide the set square along the ruler till the edge of the set square touches the point P.

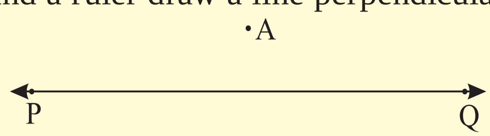
(ii) Through P, draw a line PQ along the edge.

(iii) PQ is the required line perpendicular to AB. Measure and check if $m\angle APQ = m\angle BPQ = 90^\circ$

Example : 2

Using a set square and a ruler draw a line perpendicular to the given line through a point above it.

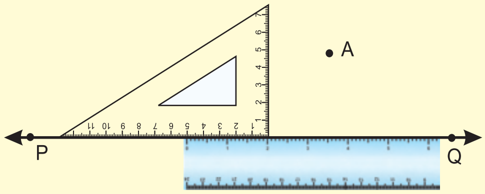
Step 1 :



(i) Draw a line PQ using a ruler

(ii) Mark a point A above the given line

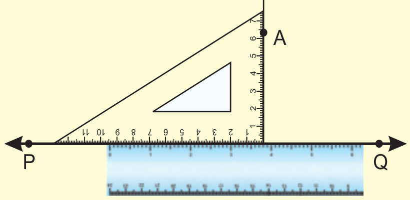
Step 2 :



(i) Place the ruler on the line PQ

(ii) Place one edge of a set square containing the right angle along the given line PQ as shown in the figure.

Step 3 :

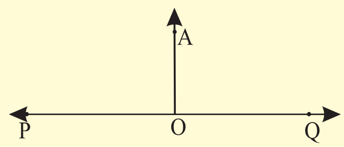


(i) Pressing tightly the ruler with the left hand, slide the set square along the ruler till the edge of the set square touches the point A

(ii) Through A draw a line AO along the edge.

(iii) AO is the required line perpendicular to PQ

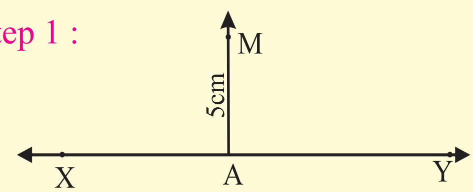
Measure and check : $m\angle POA = m\angle QOA = 90^\circ$



Example : 3

Using a set square and a ruler draw a line parallel to a given line through a point at a distance of 5cm above it.

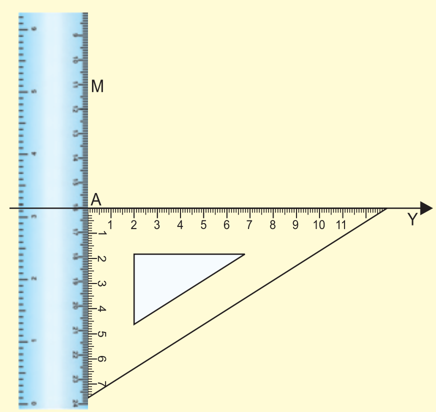
Step 1 :



(i) Draw a line XY using ruler and mark a point A on it.

(ii) Draw AM = 5cm with the help of a set square.

Step 2 :

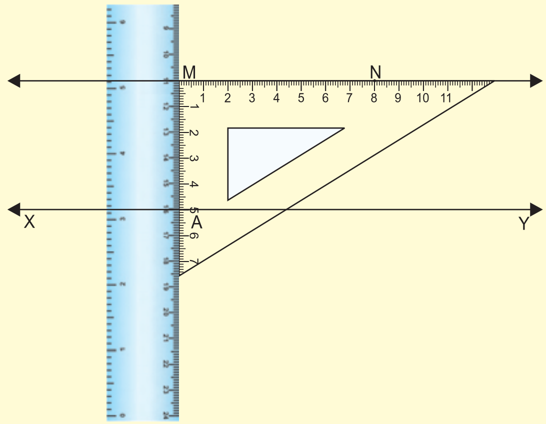


Place the set square on the line segment XY.

(i) Place the set scale as shown in the figure.

Example : 4

Step 3 :



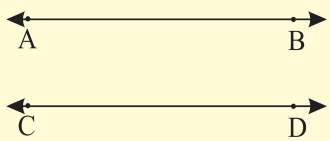
(i) Pressing tightly the ruler, slide the set square along the ruler till the edge of the set square touches the point M.

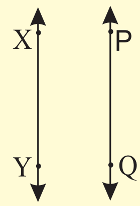
(ii) Through M, draw a line MN along the edge.

(iii) MN is the required line parallel to XY through M.

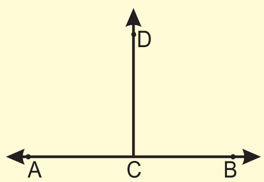
Exercis e 5.1

1. Find the distance between the given parallel lines





2. Find the length of the perpendicular lines AB and CD



3. Draw a line segment measuring 5.6 cm. Mark a point P on it. Through P draw line perpendicular to the given line.

4. Draw a line segment measuring 6.2 cm. Mark a point A above it. Through A draw a line perpendicular to the given line.

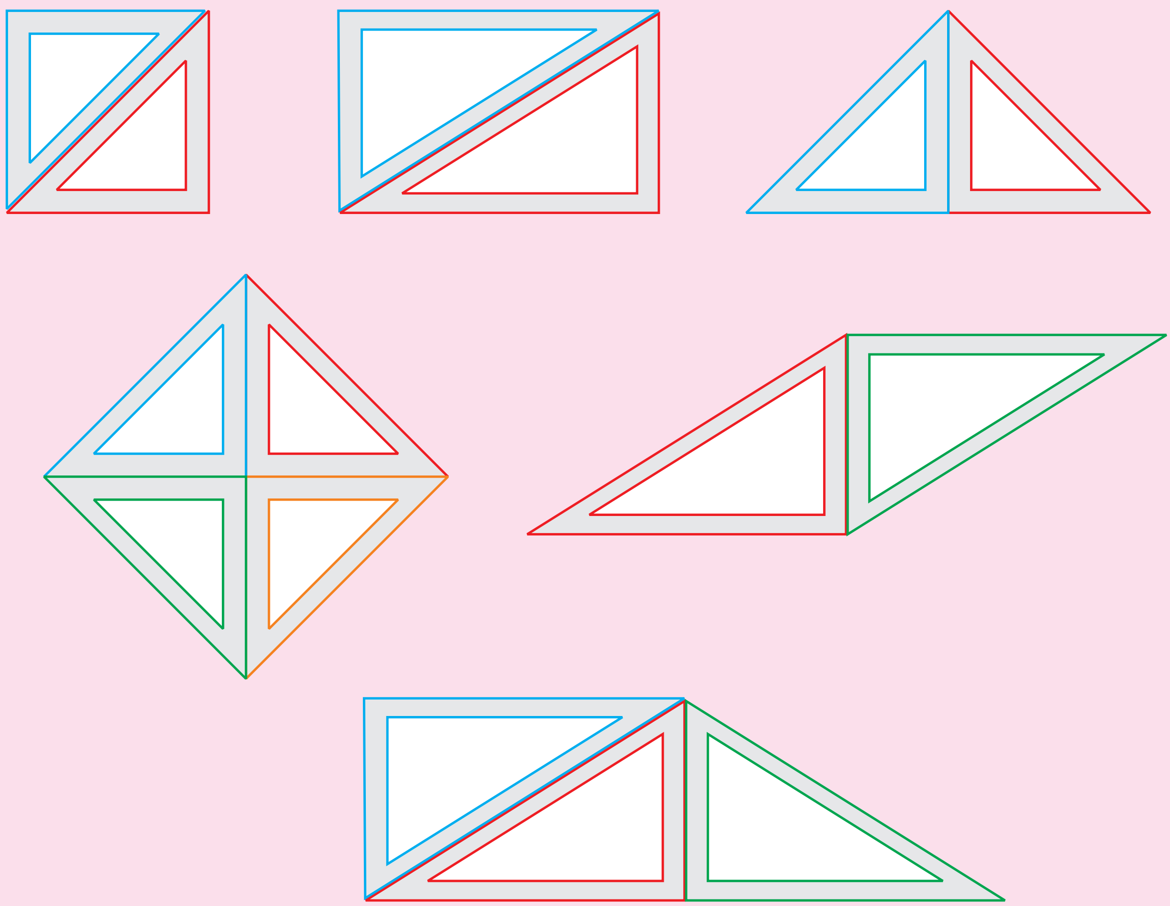
5. Draw a line segment measuring 7.1 cm. Mark a point M below the line segment. Through M draw a line perpendicular to the given line segment.

6. Draw a line segment measuring 5.2 cm. Mark a point B above it at a distance of 4.3 cm. Through B draw a line parallel to the given line segment.

7. Draw a line segment. Mark a point Q below it at a distance of 5.1 cm. Through Q draw a line parallel to the given line segment.

Activity

Try to make different shapes like this by using set squares and mark along the boundary lines and name it.
For example



6. DATA HANDLING

6.1 Data

You must have seen your teacher writing information regarding attendance of the students on the blackboard.

Information regarding number on roll and attendance		Boys	Girls	Total
Class : 6	Number on Roll	20	20	40
Day : Monday	No. of students present	20	18	38

In the same way, the marks obtained by students of a class in a particular examination, the maximum and minimum temperature of different places in a state are collection of information in the form of numerical figures.

> Any collection of information in the form of numerical figures giving the required information is called a data.

6.1.1 Collection of data

To submit information to the Government, the data of the mode of transport of 40 children of a school was collected.

They tabulated the same as follows.

S.No.	Mode of transport	S.No.	Mode of transport	S.No.	Mode of transport	S.No.	Mode of transport
1	Bus	11	Bus	21	Bus	31	Bus
2	Train	12	Cycle	22	Cycle	32	Cycle
3	Cycle	13	Bus	23	Walk	33	Train
4	Bus	14	Walk	24	Walk	34	Bus
5	Walk	15	Walk	25	Walk	35	Bus
6	Walk	16	Walk	26	Bus	36	Walk
7	Train	17	Bus	27	Bus	37	Walk
8	Bus	18	Bus	28	Walk	38	Walk
9	Cycle	19	Train	29	Cycle	39	Train
10	Bus	20	Cycle	30	Bus	40	Bus

6.1.2 Raw data (unclassified data)

It is difficult to find how many different modes of transports are used by the students. How many of them use each mode? etc. from the above table. It is just a collection of data. They are not classified to give specific information.

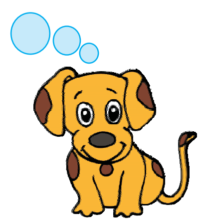
6.1.3 Classification of data

From the above unclassified data, we come to know that many students use bus, cycle and train as a mode of transport or they come by walk.

From the information collected from students the modes of transport are listed one below the other as shown in the table. A mark is made against each mode for each student using it. Finally we count the number of marks to get the number of students using each mode.

Bus	||||||||||||||||	16
Train	|||||	5
Cycle	|||||||	7
By walk	||||||||||||	12
Total		40

'|' is called a 'tally mark'. It is difficult to count if there are more number of tally marks. Therefore to make it easier to count, we change it as follows.



Mode of transport	Tally Mark	Number of students
Bus	𝍸 𝍸 𝍸 |	16
Train	𝍸	5
Cycle	𝍸 ||	7
By walk	𝍸 𝍸 ||	12
Total		40

After 4 tally marks the fifth tally mark is entered as a cross line cutting across diagnolly all the 4 tally marks as shown (卌) and it is counted as 5. We can calculate the number of students coming by bus as 5 + 5 + 5 + 1 = 16. In the same way we can find the remaining data also.

The raw data is rearranged and tabulated to get classified or tabulated data.

Example : 1

Information was collected from 20 students of a class regarding competitions they like to participate.

No. of the student	Competition	No. of the student	Competition	No. of the student	Competition	No. of the student	Competition
1	Cricket	6	Kabadi	11	Ball Badminton	16	Ball Badminton
2	Kabadi	7	Cricket	12	Kabadi	17	Foot Ball
3	Foot Ball	8	Cricket	13	Foot Ball	18	Ball Badminton
4	Foot Ball	9	Kabadi	14	Ball Badminton	19	Ball Badminton
5	Kabadi	10	Foot Ball	15	Kabadi	20	Foot Ball

Tabulate the above information using tally mark.

All the students have chosen any one of the games.

We can tabulate it as follows :-

Cricket	|||	3
Kabadi	卌 |	6
Foot Ball	卌 |	6
Ball Badminton	||||	5
	Total	20

Example : 2

The classified data of the number of students who were absent in a class room in a particular week is given.

If each student is denoted by a tally mark, answer the following :-

Days	No.of students (tally marks)
Monday	𝍸
Tuesday	𝍷𝍷𝍷𝍷
Wednesday	𝍷𝍷
Thursday	
Friday	𝍷
Saturday	𝍸 𝍷𝍷𝍷

1 How many students were absent on each day of the week?

Answer : Monday - 5, Tuesday - 4, Wednesday - 2, Thursday - 0, Friday - 1, Saturday - 8

2 Which day had maximum number of absentees?

Answer : Saturday

3 Which day had minimum number of absentees?

Answer : Thursday

Do it yourself

Ask the students to collect and tabulate the information about the different types of houses in villages.

Type of house	Tally mark	Total no. of houses
Thatched house		
Tiled house		
Asbestos house		
Concrete house		

1) Which type of houses are more in number?

2) Which type of houses are less in number?

3) Are there two or more type of houses in the same number? If so, name them.

6.2. Drawing Pictographs:

Information is easily understood when represented by pictures.

Example : 3

The following pictures shows the number of people who visited the tourism trade fair in 5 weeks.

☺ Represents 10,000

First week	☺ ☺ ☺ ☺
Second week	☺ ☺ ☺ ☺ ☺
Third week	☺ ☺ ☺ ☺ ☺ ☺
Fourth week	☺ ☺ ☺
Fifth week	☺ ☺ ☺ ☺ ☺ ☺ ☺

Question :

1. How many of them visited the fair in the 1st week?
2. Which week had maximum visitors?
3. Which week had minimum visitors?
4. Find the total number of visitors who enjoyed the fair?

Solution :

1. 40,000 people visited in the first week.
2. Maximum people visited in the fifth week
3. Minimum people visited in the fourth week
4. Total number of visitors in the fair = 2,50,000

Example : 4

The manufacturing of cars in a factory during the years 2005 to 2009 is given in the following table.

Year	No. of cars
2005	2000
2006	3000
2007	1000
2008	4000
2009	5000

The following pictograph represents the above information.

Pictograph of the manufacture of cars in a car factory during the years 2005 to 2009.

Questions :

1. In which year the minimum number of cars were manufactured?
2. Find the year in which the number of cars manufactured was 3000
3. Find the total number of cars manufactured upto 2008 (inclusive of2008).
4. Find the total number of cars manufactured in 2008 and 2009.

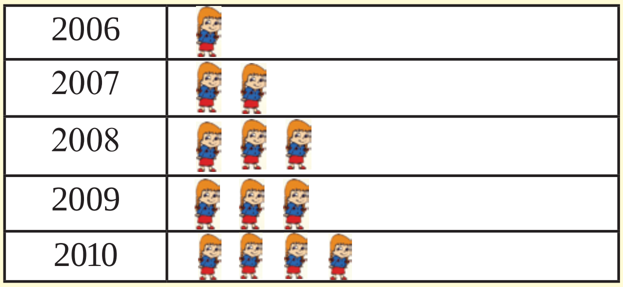
Solution :

1. Minimum number of cars were manufactured in 2007.
2. 3000 cars were manufactured in 2006.
3. 10,000 cars were manufactured up to 2008.
   (2000 + 3000 + 1000 + 4000 = 10,000)
4. 9000 cars were manufactured in 2008 and 2009.

Exercise 6.1

I. See the pictograph and answer the questions

 represents 200 girls



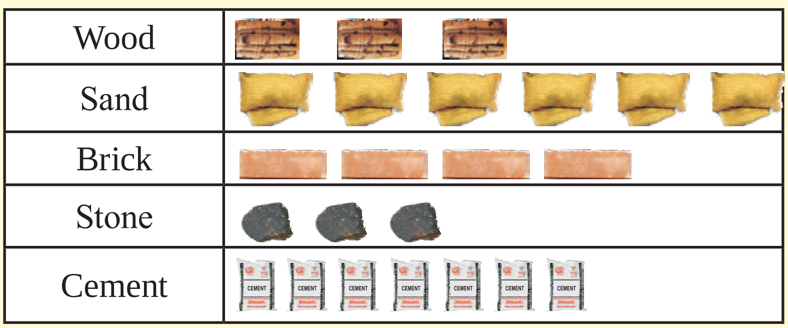
Pictograph of the total number of girls studied in a high school in the years 2006 to 2010.

Questions :

1 Find the year in which the minimum numbers of girls studied.
2 Find the year in which the maximum number of girls studied.
3 Find the year in which the number of girls studied was 600.
4 Find the difference between the maximum number of students and minimum number of students.
5 Say true or false
   1 Equal number of girls studied in the year 2008 and 2009

II. See the pictograph and answer the following questions.

Each picture represents Rs. 10,000



Pictograph shows the expenses in constructing a house.

Questions :

1 What information is given by the pictograph?
2 How much did he spend for sand?
3 What is the total amount spent for bricks and stones?
4 State the item on which maximum amount was spent?
5 What is the total expenses of constructing a house?

6.3 BAR DIAGRAM

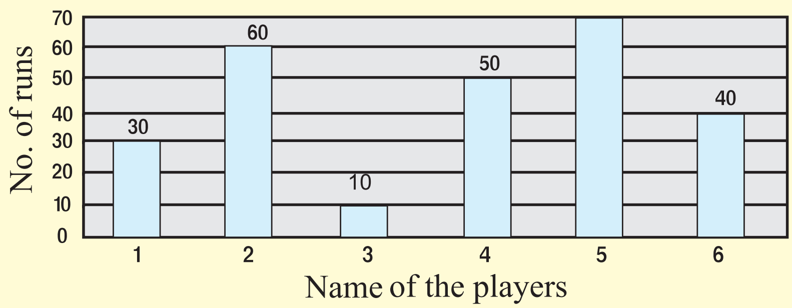
- Through bar diagrams the statistical data can be understood easily.
- It can be used to compare two items easily.
- A bar diagram consists of many rectangular bars.
- The bars are drawn between the horizontal line and the vertical line. The interval between the bars must be equal and the thickness of the bars must be same.

Example : 5

The total number of runs scored by a few players in one-day match in india is given

Draw the bar diagram.

Players	1	2	3	4	5	6
No. of runs	30	60	10	50	70	40



Represent the number of players on the horizontal line and represent the number of runs on the vertical line

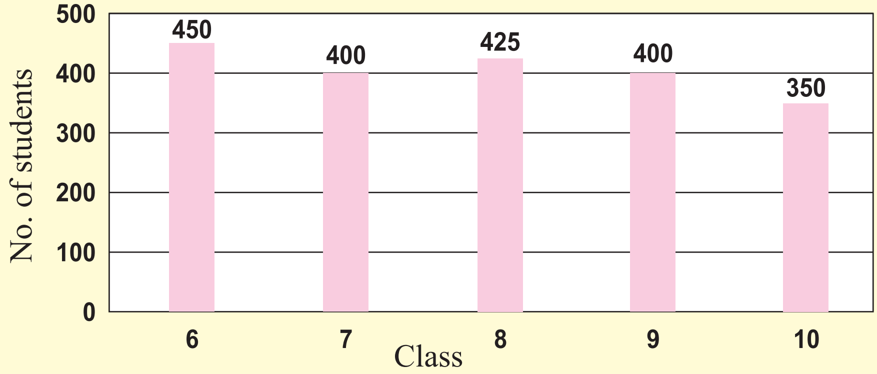
Scale - In vertical line 1 cm = 10 runs

Example : 6

The number of students in each class of a high school is given below.

Draw a bar diagram.

Class	6	7	8	9	10
No. of students	450	400	425	400	350



The number of students should be written on the vertical line and the classes 6 to 10 must be given on the horizontal line.

1 cm on the vertical line = 100 students.

Exercise - 6.2

1. Construct a bar graph to represent the following information. Number of absentees in a week in a corporation high school are given

Class	6	7	8	9	10
Absentees	8	12	9	15	6

2. The number of students taking part in various games in a higher secondary school are given below. Draw a bar diagram

Game	Foot Ball	Net Ball	Basket Ball	Cricket	Athletics
No. of students	25	30	15	20	10

3. The savings of a student is given in the table. Draw a bar diagram.

Month	June	July	August	September	October	November	December
Amount (Rs)	20	35	25	15	10	40	30

4. Draw a bar diagram to represent the most popular television programmes.

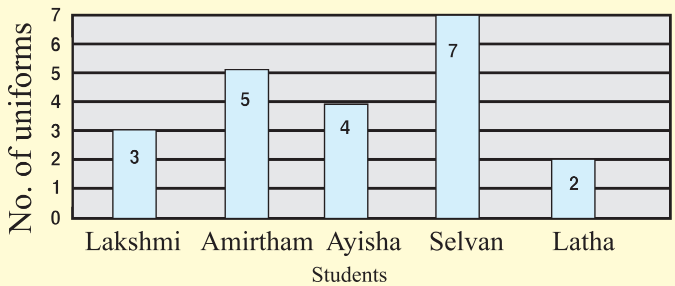
Television programme	Cartoon	Games	Pogo	Animal Planet	Tourism	News
No. of viewers	150	100	125	200	100	250

6.4. Reading bar diagrams

Example : 7

The number of uniform sets a few 6 standard students have with them are given in the table followed by a bar diagram.

Name of the students	Lakshmi	Amirtham	Ayisha	Selvan	Latha
Number of uniforms	3	5	4	7	2



From the above bar diagram, answer the following :-

1 What is the name of the student having maximum number of uniform? (Selvan)

2 How many uniforms does Ayisha have? (4)

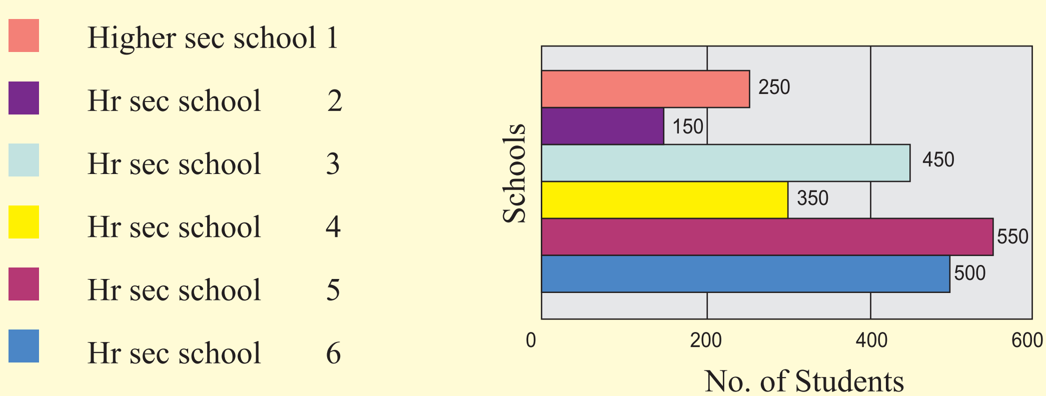
3 Who has the minimum number of uniforms? (Latha)

4 The information is given about .... students. (5)

5 How many students have more than two sets of uniform? (4)

Example : 8

The bar diagram is given to represent the names of the schools and the number of the students who took part in an examination conducted by a Municipal Higher Secondary School. Answer the following questions:



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1 Name the school from which maximum number of students participated? (Hr sec school 5)

2 How many schools took part in the examination? (6)

3 Name the school from which minimum number of students participated? (Hr sec school - 4)

4 Name the school from which 350 students paricipated? (Hr sec school - 4)

5 How many students participated from Hr sec school - 6? (500)

Activity

1) Select a paragraph from a newspaper, List out 2 letter words, 3 letter words, 4 letter words & 5 letter words. Represent the data in a table and draw a pictograph.

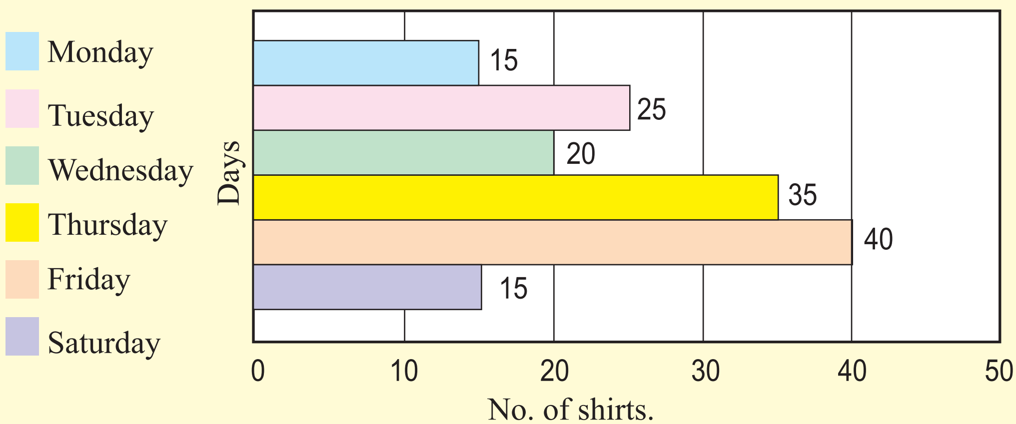
2) Collect informations from your hamlet /village/ area regarding the number of students studying in primary, middle, high school, higher secondary schools, colleges. Represent the data in a table and draw a pictograph.

3) Collect the runs scored by 5 favourite players. Represent the data in a table and draw a bar diagram.

4) List out the number and types of vehicles crossing your residence and draw a pictograph for the data collected.

Exercise 6.3

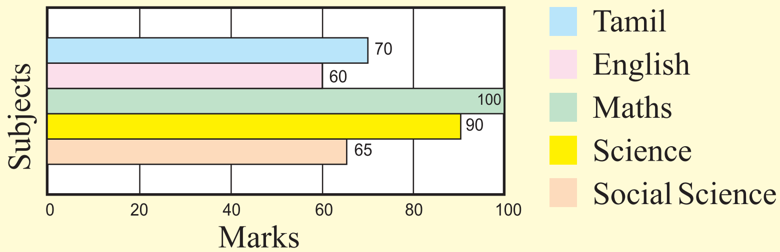
I. The bar diagram represents the number of shirts produced in a tailoring unit in 6 days. Answer the following.



Questions :

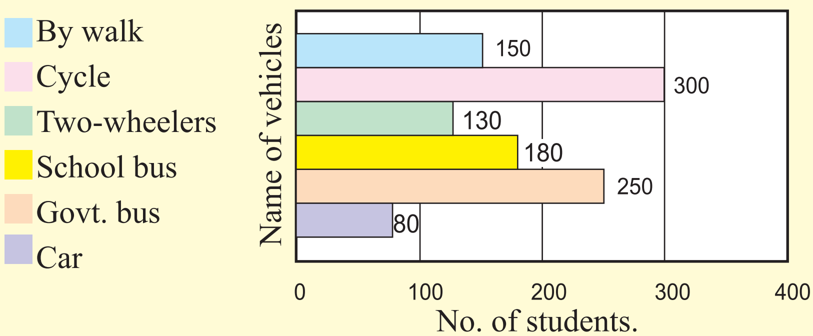
1. On which day of the week the maximum number of shirts were produced?
2. What is the number of shirts produced on Tuesday?
3. On which days of the week, were equal number of shirts produced?
4. What is the information given by the bar graph?
5. How many shirts does one cm represent on the horizontal line?

II. The marks scored by a student in half yearly examination are given below. Answer the following questions :



1. What is the information given by the bar diagram?
2. How much did the student score in Science ?
3. Name the subject in which he has scored the maximum marks?
4. What is the total marks scored by him in both the languages together?
5. Form a table to show the marks scored by the student in all the 5 subjects.

III. The bar diagram represents the number of students using different modes of transport. Answer the following questions.



Questions :

1. Which mode of transport is mostly used by the students?
2. What is the information given by the bar diagram?
3. How many students come by walk to school?
4. How many students were represented by 1 cm on the horizontal line?
5. Name the mode of transport used by minimum number of students?

Points to remember

- Data is a collection of numerical figures giving required information.
- The information which is collected initially is called the raw data or unclassified data.
- The classified and tabulated information help us to get a better understanding of the data collected.
- Pictograph are used to represent information through pictures.

ANSWERS

Exercise 1.1

1.	(i) True	(ii) True	(iii) False	(iv) False	(v) True	
2.	(i) 7>3	(ii) -3>-5	(iii) 2>-3	(iv) 7>-3	(v) 1>-4	(vi) -4>-7
3.	(i) -2,-1,0,1,2	(ii) -3,-2,-1,0,1	(iii) 0	(iv) -4,-3		
	(v)-3,-2,-1,0,1,2	(vi) -1,0,1				
4.	(i) 1	(ii) -4	(iii) 8 units	(iv) 5 units		

Exercise 1.2

1.	(i) 4	(ii) -10	(iii) 2	(iv) -3	(v) -3	
2.	(i) 1	(ii) -10				
3.	(i) 7	(ii) 7	(iii) -70	(iv) 110	(v) -57	(vi) 0
	(vii) -18	(viii) -52				
4.	(i) -3	(ii) 10				
5.	(i) 10	(ii) -17	(iii) 0	(iv) -30		

Exercise 2.1

1) (i) x+7 (ii) y-10 (iii) 3y-8 (iv) $\frac{3x}{2}$

2) (i) Add 5 with twice y (ii) Subtract 5 from twice y

(iii) Divide twice y by 5 (iv) Divide 5 times y by 2

3) (i) y+7, 7y,y-7,7-y, $\frac{y}{7}$, $\frac{7}{y}$

4) (i) z+5 (ii) 7z (iii) 3z+5 (iv) 2t+30 (v) 10y (vi) 7x

Exercise 2.2

1)	a) iii	b) iii	c) iv
2)	a) ii	b) iii	c) i

3) Not a solution. Not a solution. Is a solution. Not a solution

4) 6+7 =13 Not a solution. 7+7 = 14 Not a solution. 8+7 = 15 Is a solution. 9+7 = 16 Not a solution

5) i) 2-3 = -1 Not a solution ii) -2+7 = 5 Not a solution

iii) 28+8 = 36 Not a solution iv) 3-(-7) = 10 Is a solutio

6) (i) 5 ii) 10 iii) 9 iv) 35 v) 20

7) y = 12

8) 15, 18, 24, 27, 30, 33, 39, 42, 45 ; z = 10

9) 1, 3, 4, 6 ; p = 12

Exercise 3.1

1) (I) 46 sq.cm (II) 21 cm (III) 28cm (IV) 24cm

(V) 21cm

2) 16 units

4) 22 cm

5) 12cm

Exercise 3.2

1) sq.cm, sq.cm, sq.m, sq.km, sq.m

Exercise 3.3

1) a) 16 sq.units b) 8sq.units

Exercise 3.4

1) (i) 24 cm, 35 sq.cm (ii) 4cm, 40sq.cm (iii) 12m, 36m (iv) 7m, 32m

2) (i) 36 sq.m (ii) 75 sq.m 3) (i) 6 sq.cm (ii) 18 sq.cm

Exercise 4.1

1) (i) 180^o (ii) all three (iii) an isosceles (iv) right angled

(v) greater (vi) 3 (vii) 3

2) Three angles and three sides

3) (i) obtuse angled triangle (ii) right angled triangle (iii) acute angled triangle

(iv) obtuse angled triangle

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4) (i) yes (ii) yes (iii) no (iv) no (v) no

5) (i) isosceles triangle (ii) equilateral triangle (iii) scalene triangle
(iv) scalene triangle

6) (i) impossible (ii) impossible (iii) possible (iv) impossible

Exercise 6.1

I) 1) 2006 2) 2010 3) 2008, 2009 4) 600 5) true

II) 1) The pictograph shows the expenses in constructing a house.
2) Rs. 60,000 3) Rs. 70,000 4) Cement Rs. 70,000
5) Total expenses Rs. 2,30,000

Exercise 6.3

I) 1) Friday, 40 2) 25 3) Monday, Saturday
4) The bar graph shows the number of shirts produced in 6 days.

II) 1) The bar diagram shows the marks scored by a student in half-yearly examination.
2) 90 3) Maths 4) 130

5)

Subject	Tamil	English	Maths	Science	Social Science
Marks	70	60	100	90	65

III) 1) cycle
2) The bar diagram shows the number of students using different modes of transport
3) 150 4) 100 students 5) car