

CHAPTER - 7

Algebra

(Eng. med.)

Class - 6th

Variable → The letters which stand for unknown numbers and can take any numerical value are called Variable. In other words, a letter whose value varies is called variable.

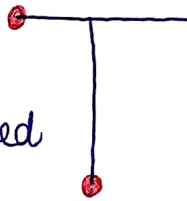
for example → x, y, z, t, s -----

Constant → The number 0, 1, 2, 3 ----- have fixed value. They have a fixed numerical value and are called Constants.

Exercise - 7.1

1) Find which gives the number of matchsticks required to make the following 'n' matchstick patterns. Use a variable to write the rule.

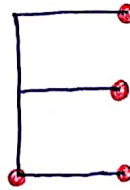
(i) A Pattern of letter T as



Solution - No. of matchstick used to make one T = 2

No. of matchstick used to make n "T" = $2n$

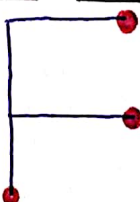
(ii) A Pattern of letter E as



Solution - No. of Matchstick used to make one E = 4

No. of Matchstick used to make n "E" = $4n$

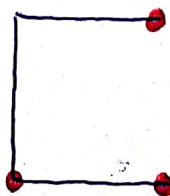
(iii) A Pattern of letter F as



Solution - No. of matchstick used to make one F = 3

No. of Matchstick used to make n "F" = $3n$

(iv) A Pattern of letter C as

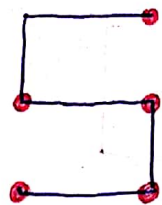


Solution - No. of matchstick used to make one C = 3

No. of matchstick used to make n "C" = $3n$

(1) A Pattern of letter 'S' as

Solution - No. of matchstick
used to make one S = 5



No. of matchstick used to make n "S" = $5n$

(2) Students are sitting in rows. There are 12 students in a row. what is the rule. what is the rule which gives the number of student in " n " row?

Solution → No. of students in one row = 12

No. of students in 2 row = 2×12

No. of students in 3 row = 3×12

No. of students in n row = $12n$

(3) The Teacher distributes 3 pencils to a student. what is the rule which gives the number of pencils if there are " a " number of students?

Solution → No. of Pencils distribute to one students = 3

No. of Pencils distribute to 2 students = $2 \times 3 = 6$

No. of Pencils distribute to " a " number of student = $3a$

(4) There are 8 pen in a pen stand. what is the rule which gives the total cost of the pens if the cost of each pen is represented by the variable " C "

Solution → Total pen in one stand = 8

Cost of one pen = C

Total cost of 8 pen = $8C$

(5) Gurleen is drawing picture by joining dots. To make one picture, she has to join 5 dots. find the rule that gives number of dots if the number of picture is represented by symbol " p ".

Solution → No. of dots join to make one picture = 5

No. of pictures draw = P

Total numbers of dots used to Draw " P " picture = $5P$

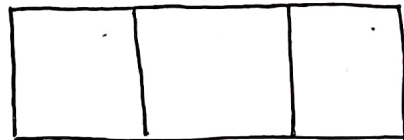
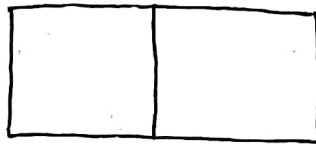
(6) The cost of a dozen bananas is Rs 50. find the rules of total cost of bananas if there are "d" dozen bananas.

Solutions → Cost of a dozen bananas = 50

Total dozen of bananas = d

Cost of "d" dozen of bananas = $50d$

(7) Look at following matchstick pattern of squares given below. The squares are not separate as there are two adjoined adjacent squares have a common match stick. Observe the patterns and find the rule that gives the number of matchsticks in terms of the number of square.



Solution → Each square is formed by adding one matchsticks to pattern [

∴ Number of square = x

Number of matchstick used to make pattern
[= 3

Total numbers of Match sticks used to make
 x numbers of square = $3x + 1$



Exercise 7.2

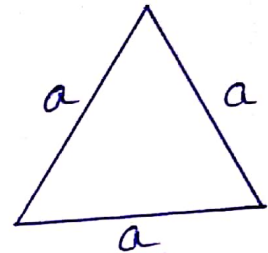
- 1) Each side of equilateral triangle is denoted by 'a' then Express the perimeter of the triangle using 'a'.

Sol:- Each side of the equilateral triangle = a

$$\therefore \text{Perimeter of triangle} = a + a + a$$

(Sum of all sides)

$$= 3a$$

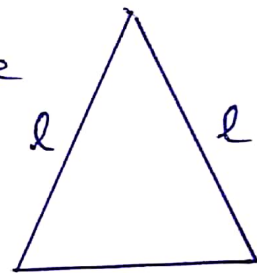


$\therefore$ Perimeter of triangle can be expressed as $3a$ Ans.

- 2) An isosceles triangle is shown. Express its perimeter in terms of 'l' and 'b'.

Sol:- Each side of isosceles triangle = l

Third side of isosceles triangle = b



$$\therefore \text{Perimeter of isosceles triangle} = l + l + b$$

(Sum of all sides)

$$= 2l + b \quad \text{Ans.}$$

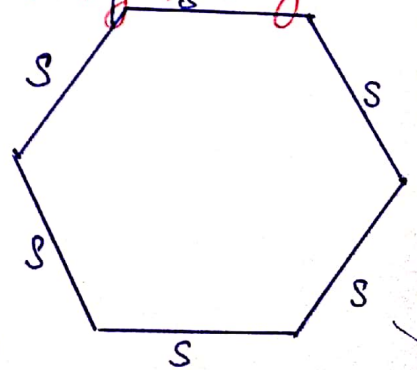
- 3) Each side of regular hexagon is denoted by 's' then express the perimeter of the regular hexagon using 's'.

Sol:- Each side of the regular hexagon = s

$\therefore$ Perimeter of the regular hexagon

$$= s + s + s + s + s + s$$

$$= 6s \quad \text{(Sum of all sides)}$$



Perimeter of the regular hexagon can be expressed as $6s$. Ans.

- 4) The Cube has 6 faces and all of them are identical squares. If 'l' is the length of an edge of a Cube, Find the total length of all edges of the Cube in terms 'l'.

Sol:- No. of faces of Cube = 6

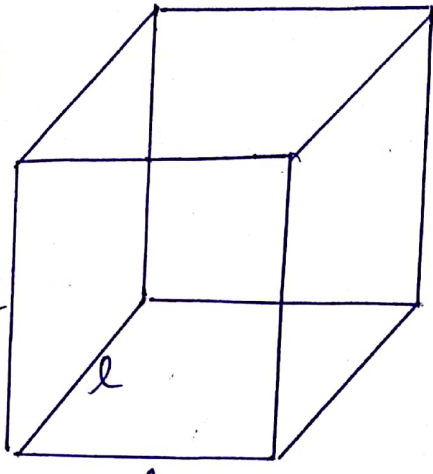
Length of one edge of Cube = l

∴ Length of all edges of l

the cube = $l+l+l+l+l+l+l+l+l+l+l+l$

$l+l+l+l+l+l+l+l+l+l+l+l$

$l+l = 12l$ Ans,,



- 5) Write commutative property of addition using Variables 'x' and 'y'

Sol:-

$$x+y = y+x$$

Ans,,

- 6) Write associative property of multiplication using Variables l, m and n.

Sol:- $(l \times m) \times n = l \times (m \times n)$ Ans,,

- 7) Write distributive property of multiplication over addition in terms of variables p, q and r respectively.

Sol:- $p \times (q+r) = p \times q + p \times r$ Ans,,

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Exercise 7.3

1) Pick the algebraic expressions and the arithmetic expressions from the following.

i) $2l - 3$

Sol:- $2l - 3$

Algebraic expressions. Ans,

ii) $5 \times 3 + 8$

Sol:- $5 \times 3 + 8$

$= 15 + 8$

$= 23$

Arithmetic Expressions Ans.

iii) $6 - 3x$

Sol:- $6 - 3x$

Algebraic Expressions Ans,

iv) $5l$

Sol:- $5l$

Algebraic Expressions Ans,

v) $2 \times (21 - 18) + 9$

Sol:- $2 \times (21 - 18) + 9$

$= 2 \times (3) + 9$

$= 6 + 9 = 15$

Arithmetic Expressions Ans,

vi) $\frac{6a}{5} + 2$

Sol:- $\frac{6a}{5} + 2$

Algebraic Expressions Ans,

vii) $7 \times 20 \div 5 + 3$

Sol:- $7 \times 20 \div 5 + 3$

Arithmetic Expressions Ans,

viii) 8

Sol:- 8

Arithmetic Expression Ans.

2) Write the terms for the following expressions:-

i) $2y + 5z$

Sol:- $2y + 5z$

$2y, 5z$ Ans.

ii) $6x - 3y + 8$

Sol:- $6x - 3y + 8$

$6x, -3y, 8$ Ans.

iii) $7a$

Sol:- $7a$

$7a$ Ans,

iv) $3l - 5m + 2n$

Sol:- $3l - 5m + 2n$

$3l, -5m, 2n$ Ans,

v) $\frac{2l}{3} + x$

Sol:- $\frac{2l}{3} + x$

$\frac{2l}{3}, x$ Ans,

3) Tell how the following expressions are formed.

i) $a+11$

Sol:- $a+11$

a is increased by 11 Ans

ii) $12-x$

Sol:- $12-x$

x is subtracted from 12 Ans

iii) $3z+8$

Sol:- $3z+8$

Three times of z is increased by 8 Ans

iv) $6-5l$

Sol:- $6-5l$

5 times l is subtracted from 6 Ans

v) $\frac{5a}{4}$

Sol:- $\frac{5a}{4}$

5 times a is divided by 4 Ans

4) Give expressions for the following:-

i) 10 is added to p

Sol:- $p+10$ Ans

ii) 5 is subtracted from y

Sol:- $y-5$ Ans

iii) d is divided by 3.

Sol:- $\frac{d}{3}$ Ans.

Q. No. (4)
iv) l is multiplied by -6

Sol:- $l \times -6 = -6l$ Ans

v) m is subtracted from 1

Sol:- $1-m$ Ans

vi) 11 is added to $3x$

Sol:- $3x+11$ Ans

vii) y is multiplied by -2 and then 2 is added to the result.

Sol:- $y \times -2 + 2$
 $= -2y + 2$ Ans

viii) c is divided by 5 and then 7 is multiplied to the result.

Sol:- $\frac{c}{5} \times 7 = \frac{7c}{5}$ Ans

ix) x is multiplied by 3 then subtracted this result from y

Sol:- $x \times 3 - y$
 $= 3x - y$ Ans

x) a is added to b then c is multiplied with this result

Sol:- $(a+b) \times c$
 $= ac + bc$ Ans

5) Write the number which is 15 less than y

Sol:- Required Number = $y - 15$ Ans.

6) Write the Number which is 3 more than 'a'.

Sol:- Req. Number = $a + 3$ Ans.

7) Find the Number which is 1 more than twice of 'x'.

Sol:- Twice of $x = 2 \times x = 2x$
 $\therefore$ Required Number = $2x + 1$ Ans.

8) Find the number which is 7 less than 5 times of y .

Sol:- 5 times of $y = 5 \times y = 5y$
 $\therefore$ Required Number = $5y - 7$ Ans.

9) Soni's present age is 'a' years. Express the following in Algebraic Forms:

i) Her age after 15 years. Sol:- Present age of Soni = a years.
 $\therefore$ Age after 15 years = $a + 15$ years. Ans.

ii) Her age 2 years ago.

Sol:- Present age of Soni = a years.

$\therefore$ Age 2 years ago = $a - 2$ years. Ans.

III) If Soni's father's age is 5 more than twice of her present age. Express her father's age.

Sol:- Present age of Soni = a

$\therefore$ Present age of her father = $2 \times a + 5$ years
= $2a + 5$ years. Ans.

Q.No(9)

IV) If Somi's sister is 4 years younger to her.
Express her sister's age.

Sol:- Present age of Somi = a years.

$\therefore$ Somi's sister age = $a - 4$ years. Ans

V) If Somi's mother is 3 less than 3 times her present age. Express her mother's age.

Sol:- Present age of Somi = a years

$\therefore$ Age of Somi's mother = $3 \times a - 3$
 $= 3a - 3$ Ans

10) The length of a floor is 10 more than two times of breadth, what is the length if breadth is 1 meters.

Sol:- Let Breadth of floor = 1 meter

$\therefore$ Length of floor = $2 \times 1 + 10$
 $= 2 + 10$ mt. Ans

Exercise 7.4

1) Write the following statements as algebraic equations:

i) The sum of x and 3 gives 10.

Sol:- $x + 3 = 10$ Ans,,

ii) 5 less than a number 'a' is 12.

Sol:- $a - 5 = 12$ Ans,,

iii) 2 more than 5 times of p gives 32.

Sol:- $5x(p) + 2 = 32$

$\Rightarrow 5p + 2 = 32$ Ans,,

iv) Half of a number is 10.

Sol:- Let the number = x

Half of a number = $\frac{1}{2} \times x = \frac{x}{2}$

$\Rightarrow \frac{x}{2} = 10$ Ans,,

v) Twice of a number added to 3 gives 17.

Sol:- Let the number = x

$\Rightarrow 2x(x) + 3 = 17$

$\Rightarrow 2x + 3 = 17$ Ans,,

2) Write the LHS and RHS for the following equations.

i) $l + 5 = 8$

Sol:- L.H.S = $l + 5$ Ans,,

R.H.S = 8 Ans,,

ii) $13 = 2m + 3$

Sol:- L.H.S = 13 Ans,,

R.H.S = $2m + 3$ Ans,,

iii)

$\frac{t}{4} = 6$

Sol:- $\frac{t}{4} = 6$

L.H.S = $\frac{t}{4}$, R.H.S = 6 Ans,,

iv) $2h - 5 = 13$

Sol:- $2h - 5 = 13$

L.H.S = $2h - 5$ Ans,,

R.H.S = 13 Ans,,

v) $\frac{5x}{7} = 15$

Sol:- $\frac{5x}{7} = 15$

L.H.S = $\frac{5x}{7}$ Ans,,

R.H.S = 15 Ans,,

③ Solve the following Equations by trial and Error Method.

i) $x + 2 = 7$

Sol:-

Value of 'x'	L.H.S = $x + 2$	R.H.S = 7	LHS = RHS
1	$1 + 2 = 3$	7	No
2	$2 + 2 = 4$	7	No
3	$3 + 2 = 5$	7	No
4	$4 + 2 = 6$	7	No
5	$5 + 2 = 7$	7	Yes.

$\therefore$ If $x = 5$ then L.H.S = R.H.S

$\therefore x = 5$ Ans,,

ii) $5p = 20$

Sol:-

Value of 'p'	LHS = $5p$	RHS = 20	LHS = RHS
1	$5 \times 1 = 5$	20	No
2	$5 \times 2 = 10$	20	No
3	$5 \times 3 = 15$	20	No
4	$5 \times 4 = 20$	20	Yes.

If $p = 4$ then LHS = RHS

$\therefore p = 4$ Ans,,

iii) $\frac{a}{5} = 2$

Sol:-

Value of 'a'	LHS = $\frac{a}{5}$	RHS = 2	LHS = RHS
5	$\frac{5}{5} = 1$	2	No
10	$\frac{10}{5} = 2$	2	YES

If $a = 10$ then LHS = RHS

$\therefore a = 10$ Ans,,

IV)

$$2l - 4 = 8$$

Sol:-

Value of l	LHS = $2l - 4$	RHS = 8	LHS = RHS
1	$2 \times 1 - 4 = -2$	8	No
2	$2 \times 2 - 4 = 0$	8	No
3	$2 \times 3 - 4 = 2$	8	No
4	$2 \times 4 - 4 = 4$	8	No
5	$2 \times 5 - 4 = 6$	8	No
6	$2 \times 6 - 4 = 8$	8	Yes.

$\therefore$ If $l = 6$ then LHS = RHS

$\therefore l = 6$ Ans.

V)

$$3x + 2 = 11$$

Sol:-

Value of x	LHS = $3x + 2$	RHS = 11	LHS = RHS
1	$3 \times 1 + 2 = 5$	11	No
2	$3 \times 2 + 2 = 8$	11	No
3	$3 \times 3 + 2 = 11$	11	Yes.

$\therefore$ If $x = 3$ then LHS = RHS

$\therefore x = 3$ Ans.

4) Solve the following equations by systematic method.

i) $z - 4 = 10$

Sol:- $z - 4 = 10$

Adding 4 to both sides:

$$z - \cancel{4} + \cancel{4} = 10 + 4$$

$$z = 14 \text{ Ans.}$$

ii) $a + 3 = 15$

Sol:- $a + 3 = 15$

Subtracting 3 to both sides we get

$$a + \cancel{3} - \cancel{3} = 15 - 3$$

$$a = 12 \text{ Ans.}$$

iii) $4m = 20$

Sol:- $4m = 20$

Divide by 4 both sides we get

$$\frac{4}{4}m = \frac{20}{4} = \frac{4 \times 5}{4 \times 1} = \frac{5}{1} = 5$$

$$m = 5 \text{ Ans.}$$

iv) $3x - 3 = 15$

Sol:- $3x - 3 = 15$

Adding 3 to both sides we get

$$3x - \cancel{3} + \cancel{3} = 15 + 3$$

$$3x = 18 \Rightarrow x = \frac{18}{3} = \frac{3 \times 6}{3 \times 1} = \frac{6}{1} = 6$$

$$x = 6 \text{ Ans.}$$

v) $4x + 5 = 13$

Sol:- $4x + 5 = 13$

Subtract 5 to both sides we get

$$4x + \cancel{5} - \cancel{5} = 13 - 5$$

$$4x = 8 \Rightarrow x = \frac{8}{4} = \frac{4 \times 2}{4 \times 1} = \frac{2}{1} = 2$$

$$x = 2 \text{ Ans.}$$

5) Solve the following equation by transposition.

i) $x - 5 = 6$

Sol:-

$$x - 5 = 6$$

$$x = 6 + 5$$

$$x = 11 \text{ Ans,,}$$

(Transposing -5 to the other side)
it becomes $+5$.

ii) $y + 2 = 3$

Sol:-

$$y + 2 = 3$$

$$y = 3 - 2$$

$$y = 1 \text{ Ans,,}$$

(Transposing $+2$ to the other side)
it becomes -2

iii) $5x = 10$

Sol:-

$$5x = 10$$

$$\therefore x = \frac{10}{5} = \frac{5 \times 2}{5 \times 1} = \frac{2}{1} = 2$$

$$\Rightarrow x = 2 \text{ Ans,,}$$

(Transposing multiplication it becomes division)

iv) $\frac{a}{6} = 4$

Sol:-

$$\frac{a}{6} = 4$$

(Transposing division it becomes multiplication)

$$\therefore \frac{a}{6} = \frac{4}{1}$$

$$\Rightarrow a = 4 \times 6 = 24$$

$$a = 24 \text{ Ans,,}$$

$$\text{V)} \quad 4y - 2 = 30$$

$$\text{Sol:} - 4y - 2 = 30 \quad (\text{Transposing } -2 \text{ it becomes } +2)$$

$$\therefore 4y = 30 + 2$$

$$4y = 32$$

$$\therefore y = \frac{32}{4} = 8 \quad y = 8 \text{ Ans,,}$$

6) Solve the following Equations.

$$\text{i)} \quad x + 7 = 11$$

$$\text{Sol:} - x + 7 = 11$$

$$x = 11 - 7$$

$$x = 4 \text{ Ans,,}$$

$$\text{ii)} \quad x - 3 = 15$$

$$x = 15 + 3$$

$$x = 18 \text{ Ans,,}$$

$$\text{iii)} \quad x - 2 = 13$$

$$x = 13 + 2$$

$$x = 15 \text{ Ans,,}$$

$$\text{iv)} \quad 6x = 18$$

$$\text{Sol:} - 6x = 18$$

$$x = \frac{18}{6} = \frac{3 \times \cancel{6}}{1 \times \cancel{6}} = \frac{3}{1}$$

$$x = 3 \text{ Ans,,}$$

$$\text{v)} \quad 3x = 24$$

$$\text{Sol:} - 3x = 24$$

$$x = \frac{24}{3}$$

$$x = \frac{8 \times \cancel{3}}{1 \times \cancel{3}} = \frac{8}{1}$$

$$x = 8 \text{ Ans,,}$$

$$\text{vi)} \quad \frac{x}{4} = 7$$

$$\text{Sol:} - \frac{x}{4} = 7$$

$$x = 4 \times 7 = 28$$

$$x = 28 \text{ Ans,,}$$

$$\text{vii)} \quad \frac{x}{8} = 5$$

$$\text{Sol:} - \frac{x}{8} = 5$$

$$x = 8 \times 5 = 40$$

$$x = 40 \text{ Ans,,}$$

$$\text{viii)} \quad 2x - 5 = 17$$

$$\text{Sol:} - 2x - 5 = 17$$

$$2x = 17 + 5 = 22$$

$$2x = 22$$

$$x = \frac{22}{2} = 11 \quad x = 11 \text{ Ans,,}$$

$$\text{ix)} \quad 4x + 5 = 21$$

$$4x = 21 - 5$$

$$4x = 16$$

$$x = \frac{16}{4} = \frac{4 \times 4}{1 \times 1} = 4$$

$$x = 4 \text{ Ans,,}$$

$$\text{x)} \quad 5x - 2 = 13$$

$$5x = 13 + 2$$

$$5x = 15$$

$$x = \frac{15}{5} = \frac{5 \times 3}{5 \times 1} = \frac{3}{1}$$

$$x = \frac{3}{1} = 3 \quad x = 3 \text{ Ans,,}$$

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