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Chapter 11 (Algebra)

Algebra: Algebra is a branch of mathematics which studies the use of letters ($x, y, z, p, q, a, b, \ldots$). Use of letters will allow us to write rules and formulas in a general form.

Let us begin our study with simple examples:

Matchstick Patterns:

→ Some simple patterns of the letters of English alphabet.

Firstly taking the letter L

1 L	2 L	3 L
Number of Matchsticks = 2	Number of Matchsticks = 4	Number of Matchsticks = 6

It means, the number of matchsticks is double of the number of L's. Thus when we multiply number of L's by 2, we obtain the number of matchsticks.

means **Number of matchsticks required = 2 × number of L's**

Let us take number of L's as n, where n is any natural number. (1, 2, 3, ...)

When one L is made, $n = 1$

when two L's are made, $n = 2$

∴ Number of matchsticks required $= 2 \times n$, where n is number of L's
$= 2n$

This rule is very powerful. Using this rule, we can also find the

number of matchsticks required to form 100 L's. Using this rule, we don't need to draw patterns.

Variable: n is a variable. It's value is not fixed; here we take any value of n as 1, 2, 3, 4, ...

→ Ide write the rule for number of matchsticks required using the variable n

Thus the word 'variable' means something that can vary i.e. change.

Thus we learnt here,

In the L's Pattern, The rule of number of matchsticks required $= 2n$

Similarly we can also make some other rules by forming patterns of the other letters of english alphabet.

Exercise 11.1

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

a) A matchstick pattern of the letter T as 

Solution: To make 1 T, we require 2 matchsticks

Thus number of matchsticks required = 2 x the number of T's

$= 2 \times n = 2n$

where $n = 1, 2, 3, \ldots$

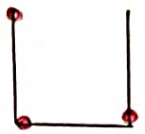
(b) A matchstick pattern of the letter Z as 

Soln. To make 1 Z, we require 3 matchsticks

Thus number of matchsticks required = 3 x number of Z's

= 3 x n

= 3n , n = 1, 2, 3, ...

(c) A matchstick pattern of letter U as 

Soln: To make 1 U, we require 3 matchsticks.

Thus number of matchsticks required = 3 x number of U's

= 3 x n

= 3n , n = 1, 2, 3, ...

(d) A matchstick pattern of letter V as 

Soln. To make 1 V, we require 2 matchsticks.

∴ The number of matchsticks required = 2 x number of V's

= 2 x n

= 2n , n = 1, 2, 3, ...

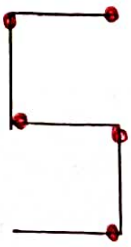
(e) A match stick pattern of letter E as 

Soln. To make 1 E, we require 5 matchsticks

∴ Number of matchstics required = 5 x Number of E's

= 5 x n

= 5n, n = 1, 2, 3, ...

(f) A match stick pattern of letter S as 

Soln. To make 1 S, we require 5 matchsticks

∴ The numbes of matchsticks required = 5 × Number of S's

$= 5 \times n$

$= 5n, n = 1, 2, 3, \ldots$

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g) A matchstick pattern of letter A as

Soln. To make A, we require 6 matchsticks.

∴ Number of matchsticks required = 6 × Number of A's

$= 6 \times n$

$= 6n, n = 1, 2, 3, \ldots$

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2 We already know the rule for the pattern of letters L, C and F. Some of the letters from Qus. 1 (given above) give us the same rule as that given by L. Which are these? Why does this happen?

Soln. T and V give the same rule as for L (in Ques 1.) because numbers of matchsticks used in the patterns of T, V and L are same (which is 2).

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3 Cadets are marching in a parade. There are 5 cadets in a row. What is the rule, which gives the numbes of Cadets, given the numbes of rows? (use n for the numbes of rows)

Soln. Numbes of Cadets in a parade = 5 × number of rows

$= 5 \times n$

$= 5n, n = 1, 2, 3, \ldots$

---

4 If there are 50 mangoes in a box, how will you write the total number of mangoes in terms of the number of boxes? (use b for the number of boxes).

Soln. Total number of mangoes = 50 × number of boxes

= 50 × b

= 50b , b = 1, 2, 3, ----

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5 The teacher distributes 5 pencils per student. Can you tell how many pencils are needed, given the number of students? (use s for the number of students).

Soln. Total number of pencils needed = 5 × number of students

= 5 × s

= 5s , s = 1, 2, 3, ----

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6 A bird flies 1 km in 1 minute. Can you express the distance covered by the bird in terms of its flying time in minutes? (use t for flying times in minutes).

Soln. Total distance covered in given flying time = Speed × time

= (1 × number of flying minutes) km

= (1 × t) km

= t km

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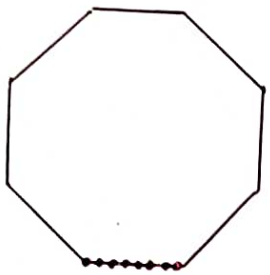
7 Radha is drawing a dot Rangoli (a beautiful pattern of lines joining dots with chalk powder as in Fig. She has 8 dots in a row. How many dots will her rangoli have if there are r rows? How many dots are there if there are 8 rows? If there are 10 rows?



Soln. Total numbes of dots = 8 x number of rows

$= 8 \times r$

$= 8r, \; r = 1, 2, 3, \ldots$

i) given $r = 8$, $\therefore$ number of dots $= 8r$

$= 8 \times 8$

$= 64$

given $r = 10$, $\therefore$ numbes of dots $= 8 \times r$

$= 8 \times 10$

$= 80$

---

8 Leela is Radha's younger sister. Leela is 4 years younger than Radha. Can you write leela's age in terms of Radha's age? (take Radha's age to be x years).

Soln. given, Radha's age = x years

$\therefore$ leela's age = $(x - 4)$ years

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9 Mother has made laddus. She gives some laddus to guests and family members; Still 5 laddus remain. If the number of laddus, mother gave away is l, how many laddus did she make?

Soln. Number of laddus, given to guests and family membess = l

Remaining number of laddus = 5

Total number of laddus made by mother = $l + 5$

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10 Oranges are to be transferred from larger boxes into smaller boxes. When a large box is emptied, the oranges from it, fill two smaller boxes and still 10 oranges remain

outside. If the number of oranges in a small box, are taken to be x; What is the number of oranges in the large box?

Soln. Number of oranges in small box = x

remainging oranges outside = 10

Total number of oranges in large box =

= 2 x number of oranges in smal box + remaining oranges outside

$= 2 \times x + 10$

$= 2x + 10$

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11 a) Observe the pattern and find the rule that gives the number of matchsticks in terms of the number of squares. (If you remove the vertical stick at the end, you will get a pattern of C's)

Soln removing the vertical stick at end, we get C

Number of matchsticks to make C = 3

∴ Required number of matchsticks = 3 x number of squares + 1

$= 3 \times x + 1$

$= 3x + 1$

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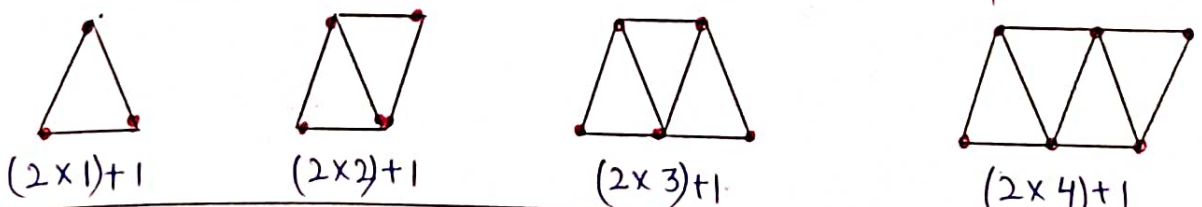
b) In following figure, find the general rule that gives the number of matchsticks in terms of number of trianges.



Soln. When we remove one horizontal stick from the pattern, we get V

Number of matchsticks required to make V = 2

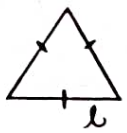
Required Number of matchsticks = 2 x number of triangles + 1

$= 2 \times x + 1$

$= 2x + 1$

Exercise 11.2

1. The side of an equilateral triangle is shown by l. Express the perimeter of the equilateral triangle using l.



Soln. Side of an equilateral triangle = l

Perimeter of the equilateral triangle = side + side + side

$= l + l + l$

$= 3l$

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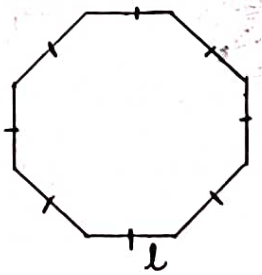
2. The side of a regular hexagon is denoted by l. Express the perimeter of the hexagon using l. (A regular hexagon has all its sides equal in length)



Soln. side of a regular hexagon = l

It's perimeter = $l + l + l + l + l + l$

$= 6l$

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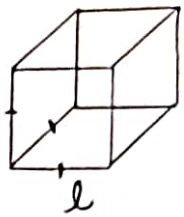
3. A cube is a three-dimensional figure. It has 6 faces and all of them are identical squares. The length of an edge of the cube is l. Find the formula for the total length of the edges of a cube.

Soln. length of an edge of the cube = l

Number of edges of the cube = 12

$\therefore$ It's Total of all edges = $12 \times l$

$= 12l$



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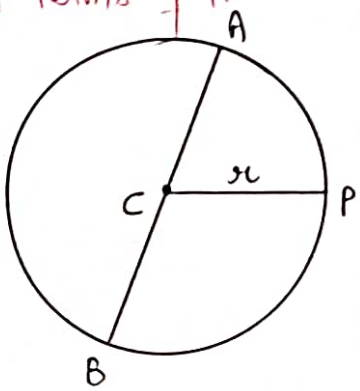
4 The diameter of a circle is a line, which joins two points on the circle and also passes through the centre of the circle (In figure, AB is the diameter of the circle; C is its centre.) Express the diameter of the circle (d) in terms of its radius.



Soln Diameter = AC + CB

$\Rightarrow d = CP + CP$

(∵ AC and CB are radii of given circle, ∴ $AC = CB = CP = r$)

$\Rightarrow d = r + r$

$= 2r$

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5 Consider the sum of three numbers 14, 27 and 13. We may do the sum in two ways:

a) We may first add 14 and 27, to get 41 and then add 13 to it, to get the total sum 54 or

b) We may add 27 and 13, to get 40 and then add it to 14, to get the total sum 54. Thus,

$(14 + 27) + 13 = 14 + (27 + 13)$

This can be done for any 3 numbers. This property is known as the associativity of addition of numbers. Express this property which we have already studied in the chapter on whole numbers, in a general way, by using variables a, b and c.

Soln: Associative property of addition for 3 variables a, b and c is $(a+b)+c = a+(b+c)$, where a, b and c are whole numbers.

Exercise 11.3

1 Make up as many expressions with numbers (no variables) as you can from 3 numbers 5, 7 and 8. Every number should be used, not more than once. Use only addition, subtraction and multiplication. (The three possible expressions are $5+(8-7)$, $5-(8-7)$, $5\times 8+7$, make the other expressions.)

Soln. possible expressions using 5, 7 and 8 are

$5+(8+7)$,	$5-(8-7)$,	$5+(8-7)$,	$5\times 7+8$
$5+(7+8)$,	$5-(7-8)$,	$5+(7-8)$,	$5\times 8+7$
$(5+8)+7$,	$(5-8)-7$,	$(5+8)-7$,	$8\times 5-7$
$(8+5)+7$,	$(8-5)-7$,	$(8+5)-7$,	$8\times 7-5$
$(5+7)+8$,	$(5-7)-8$,	$(5+7)-8$,	$7\times 5+8$
$(7+5)+8$,	$(7-5)-8$,	$(7+5)-8$,	$7\times 8-5$ etc.

2 Which expressions are in numbers only:

a. $y+3$: it is not expression with numbers only

b. $7\times 20-8z$: No

c. $5(21-7)+7\times 2$: is a expression with numbers only

d. 5 : Yes

e. $3x$: No

f. $5-5n$: No

g. $7\times 20-5\times 10-45+p$: No

3 Identify the operations (addition, subtraction, division and multiplication) in forming the following expressions and

tell how the expressions have been formed:

a. $z+1$: 1 added to z

$z-1$: 1 subtracted from z

$y+17$: 17 added to y

$y-17$: 17 subtracted from y

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b. $17y$: y multiplied by 17

$\frac{y}{17}$: y divided by 17

$5z$: z multiplied by 5

---

c. $2y+17$: y multiplied by 2 and then added to 17

$2y-17$: y multiplied by 2 and then 17 is subtracted from product.

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d. $7m$: m multiplied by 7

$-7m+3$: m multiplied by (-7), then 3 added to the product

$-7m-3$: m multiplied by (-7), then 3 subtracted from the product.

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4 Give expressions in the following cases:

a. 7 added to p = $p+7$

b. 7 subtracted from p = $p-7$

c. p multiplied by 7 = $7p$

d. p divides by 7 = $\frac{p}{7}$

e. 7 subtracted from $-m$ = $-m-7$

f. $-p$ multiplied by 5 $= (-p) \times 5$

$= -5p$

g. $-p$ divided by 5 $= \frac{-p}{5}$

h. p multiplied by $-5 = p \times (-5)$

$= -5p$

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5 Give expressions in the following cases:

a. 11 added to $2m = 2m + 11$

b. 11 subtracted from $2m = 2m - 11$

c. 5 times y, to which 3 is added $= 5y + 3$

d. 5 times y, from which 3 is subtracted $= 5y - 3$

e. y is multiplied by $-8 = y \times (-8)$

$= -8y$

f. y is multiplied by -8 and then 5 is added to the result $= -8y + 5$

g. y is multiplied by 5 and the result is subtracted from 16 $= 16 - 5y$

h. y is multiplied by -5 and the result is added to 16 $= -5y + 16$

6(a) Form expressions using t and 4. Don't use more than one number of operations. Every expression must have t in it.

a. expressions using t and 4 are $t+4$, $t-4$, $4t$, $\frac{t}{4}$, $4+t$, $4-t$ etc.

(b) Form expressions using y, 2 and 7. Every expression must have y in it. Use only 2 number operations; these should be different

Soln: Some expressions using y, 2 and 7 are

$2y+7$, $2y-7$, $7y+2$, $7y-2$, $\frac{y}{2}+7$, $\frac{y}{2}-7$, $\frac{y}{7}+2$, $\frac{y}{7}-2$ etc.

Exercise 11.4

1 Answer the following:

a. Take Sarita's present age to be y years.

i) What will be her age 5 years from now.

Soln. $(y+5)$ years

ii) What was her age 3 years back = $(y-3)$ years

iii) Sarita's grandfather's age is 6 times her age. What is her grandfather's age = $(6y)$ years

iv) Grandmother is 2 years younger than grandfather. What is grandmother's age = $(6y-2)$ years

v) Sarita's father's age is 5 year more than 3 times sarita's age. What is her father's age? = $(3y+5)$ years

b. The length of a rectangular hall is 4 meters less than 3 times the breadth of the hall. What is length, if the breadth is b meters?

Soln. breadth of a rectangular hall = b meters.

$\therefore$ length = $(3b-4)$ meters

c. A rectangular box has height h cm. Its length is 5 times the height and breadth is 10 cm less than the length. Express length and breadth of the box in terms of height.

Soln. height of rectangular box = h cm

its length = $5h$ cm

and its breadth = $(5h - 10)$ cm

d. Meena, Beena and Leena are climbing the steps to the hill top. Meena is at step s, Beena is 8 steps ahead and Leena 7 steps behind. Where are Beena and Meena? The total number of steps to the hill top is 10 less than 4 times what meena has reached. Express the total number of steps using s.

Soln. Meena is at step $= s$

Beena is at step $= s + 8$

Leena is at step $= s - 7$

The total number of steps to the hill top $= 4s - 10$

e. A bus travels at 20 km per hour. It is going from Daspur to Beespur. After the bus has travelled 5 hours, Beespur is still 20 km away. What is the distance from Daspur to Beespur? Express it using v.

Soln. Speed of bus = v km / hour

Distance travelled in 5 hours = speed x time

$= (v \times 5)$ km

$= (5v)$ km

Total distance = $(5v + 20)$ km

2 Change the following statements using expressions into statements in ordinary language:

a. A note book costs Rs. p. A book costs Rs. $3p$.

Soln. A book costs 3 times the cost of a notebook.

b. Tony puts q marbles on the table. He has $8q$ marbles in his box.

Soln. Tony's box has 8 times the marbles on the table.

c. Our class has n students. The school has $20n$ students.

Soln. Our school has students 20 times that of our class.

d. Jaggu is z years old. His uncle is $4z$ years old and his aunt is $(4z-3)$ years old.

Soln. Jaggu's uncle is 4 times older than Jaggu and Jaggu's aunt 3 years younger than his uncle.

e. In an arrangement of dots, there are r rows. Each row Contains 5 dots.

Soln. The total number of dots is 5 times the number of rows.

3 Given Munnu's age to be x-years, Can you guess what $(x-2)$ may show? (Think of Munnu's younger brothers). Can you guess what $(x+4)$ may show? (his elder sister) What $(3x+7)$ may show? (his grandmother)

Soln. $(x-2)$ may show age of his younger brother

means, Munnu's brother is 2 years younger than him

$(x+4)$ may show age of his elder sister

means, Munnu's sister is 4 years older than him.

$(3x+7)$ may show age of his grandmother

means his grandmother's age is 7 years more than 3 times that of Munnu's age.

b. Given Sara's age today to be y years. Think of her age in the future or in the past. What will be the following expressions indicate? $y+7$, $y-3$, $y+4\frac{1}{2}$, $y-2\frac{1}{2}$.

Soln. Her ages in future are $(y+7)$ and $y+4\frac{1}{2}$

her ages in past are $(y-3)$ and $y-2\frac{1}{2}$

c. Given n students in the class like football, what may $2n$ show? What may $\frac{n}{2}$ show? (Think of games other than football).

Soln. $2n$ may show number of students like cricket

means the number of students like cricket is twice that of football

and $\frac{n}{2}$ may show number of students like hockey

means the number of students like hockey is half that of football.

Exercise 11.5

Solution of the Equation: That value of the variable which satisfies the given equation, is called the solution of the equation.

e.g $x=5$, is a solution of the equation $2x=10$

Where in an Equation, there is a sign of equality on both the sides of it. Equation tells us that value of Right hand side (RHS) is equal to that of Left hand side (LHS)

→ If there is no variable in an equation, then it is called a Numerical Equation. eg $8 \times 3 = 24$

→ If there is variable in an equation, then it is called an equation with a variable. eg $x + 20 = 70$ is an equation with a variable.

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1 State which are the equations with a variable. Give reason for your answer. Identify the variable from the equations with a variable.

a. $17 = x + 7$ is an equation with a variable x

b. $(t-7) > 5$ is not an equation because sign of equality is not there.

c. $\frac{4}{2} = 2$ not an equation with a variable.

d. $7 \times 3 - 19 = 8$ No

e. $5 \times 4 - 8 = 2x$ Yes (variable is x)

f. $x - 2 = 0$ Yes (variable is x)

g. $2m < 30$ No (∵ of no equality sign)

h. $2n + 1 = 11$ Yes (variable is n)

i. $7 = 11 \times 5 - 12 \times 4$ No

j. $7 = 11 \times 2 + p$ Yes (variable is p)

k. $20 = 5y$ Yes (variable is y)

l. $\frac{3q}{2} < 5$ No (∵ of no equality sign)

m. $3 + 12 > 24$ No (∵ of no equality sign)

n. $20 - (10 - 5) = 3 \times 5$ No

o. $7 - x = 5$ Yes (variable is x)

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2 Complete the entries in the 3rd column of the table:

Sr. No	Equation	Value of Variable	Equation satisfied (Yes/Not)
1	$10y \neq 80$	$y = 10$	LHS $= 10y = 10(10) = 100 \neq$ RHS, ∴ Not satisfied
2.	$10y = 80$	$y = 8$	LHS $= 10y = 10(8) = 80 =$ RHS, ∴ Yes, satisfied
3	$10y = 80$	$y = 5$	LHS $= 10(5) = 50 \neq 80$, ∴ No
4.	$4l = 20$	$l = 20$	LHS $= 4l = 4(20) = 80 \neq$ RHS, ∴ No
5.	$4l = 20$	$l = 80$	LHS $= 4l = 4(80) = 320 \neq 0$, ∴ No
6.	$4l = 20$	$l = 5$	LHS $= 4(5) = 20 =$ RHS, ∴ Yes
7	$b + 5 = 9$	$b = 5$	LHS $= 5 + 5 = 10 \neq$ RHS, ∴ No
8.	$b + 5 = 9$	$b = 9$	LHS $= 9 + 5 = 14 \neq$ R.H.S, ∴ No
9.	$b + 5 = 9$	$b = 4$	LHS $= 4 + 5 = 9 =$ R.H.S, ∴ Yes
10.	$h - 8 = 5$	$h = 13$	LHS $= 13 - 8 = 5 =$ R.H.S, ∴ Yes
11.	$h - 8 = 5$	$h = 8$	LHS $= 8 - 8 = 0 \neq$ R.H.S, ∴ No
12.	$h - 8 = 5$	$h = 0$	LHS $= h - 8 = 0 - 8 = -8 \neq$ RHS, ∴ No
13.	$p + 3 = 1$	$p = 3$	LHS $= 3 + 3 = 6 \neq$ RHS, ∴ No
14	$p + 3 = 1$	$p = 1$	LHS $= 1 + 3 = 4 \neq$ RHS, ∴ No
15	$p + 3 = 1$	$p = 0$	LHS $= 0 + 3 = 3 \neq$ RHS, ∴ No
16.	$p + 3 = 1$	$p = -1$	LHS $= -1 + 3 = 2 \neq$ RHS, ∴ No
17	$p + 3 = 1$	$p = -2$	LHS $= -2 + 3 = 1 =$ RHS, ∴ Yes

2 Pick out the solution from the values given in the bracket next to each equation. Show that the number of values, don't satisfy the equation.

a. $5m = 60$ $(10, 5, 12, 15)$

Soln. For $m = 10$, LHS $= 5m = 5(10) = 50 \neq$ RHS, $\therefore$ $m = 10$ don't satisfies the equation

For $m = 5$, LHS $= 5m = 5(5) = 25 \neq$ RHS, $\therefore$ No

For $m = 12$, LHS $= 5m = 5(12) = 60 =$ RHS, $\therefore$ Yes

For $m = 15$, LHS $= 5m = 5(15) = 75 \neq$ RHS, $\therefore$ No] → No need to solve

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b. $n + 12 = 20$ $(12, 8, 20, 0)$

Soln.

For $n = 12$, LHS $= n + 12 = 12 + 12 = 24 \neq$ RHS, $\therefore$ No

For $n = 8$, LHS $= n + 12 = 8 + 12 = 20 =$ RHS, $\therefore$ Yes

For $n = 20$, LHS $= n + 12 = 20 + 12 = 32 \neq$ RHS, $\therefore$ No] No need to solve

For $n = 0$, LHS $= n + 12 = 0 + 12 = 12 \neq$ RHS, $\therefore$ No]

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c. $p - 5 = 5$ $(0, 10, 5, -5)$

Soln. For $p = 0$, LHS $= p - 5 = 0 - 5 = -5 \neq$ RHS, $\therefore$ No

For $p = 10$, LHS $= p - 5 = 10 - 5 = 5 =$ RHS, $\therefore$ Yes

For $p = 5$, LHS $= p - 5 = 5 - 5 = 0 \neq$ RHS, $\therefore$ No] No need to Solve

For $p = -5$, LHS $\neq$ RHS]

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d. $\frac{q}{2} = 7$ $(7, 2, 10, 14)$

Soln: For $q = 7$, LHS $= \frac{q}{2} = \frac{7}{2} \neq$ RHS, $\therefore$ No

For $q = 2$, LHS $= \frac{q}{2} = \frac{2}{2} = 1 \neq$ RHS, $\therefore$ No

For $q = 10$, LHS $= \frac{q}{2} = \frac{10}{2} = 5 \neq$ RHS, $\therefore$ No

For $q = 14$, LHS $= \frac{q}{2} = \frac{14}{2} = 7 =$ RHS, ∴ Yes

e. $x - 4 = 0$ $(4, -4, 8, 0)$

Soln For $x = 4$, LHS $= x - 4 = 4 - 4 = 0 =$ RHS, ∴ Yes

For $x = -4$, LHS ≠ RHS
For $x = 8$, LHS ≠ RHS
For $x = 0$, LHS ≠ RHS
} No need to solve

f. $x + 4 = 2$ $(-2, 0, 2, 4)$

Soln. For $x = -2$, LHS $= x + 4 = -2 + 4 = 2 =$ RHS, ∴ Yes

∴ For $x = 0, 2, 4$, LHS ≠ RHS

4 Complete the table and inspection of the table, find the solution of the equation (a) $m + 10 = 16$

m	1	2	3	4	5	6	7	8	9	10	11	12	13
$m+10$	11	12	13	14	15	16	17	18	19	20	21	22	23

↑

for $m + 10 = 16$, $m = 6$ is a solution of the equation

b) $5t = 35$

t	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
$5t$	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85

↑

for $5t = 35$, $t = 7$ is a solution of the equation

c) $z/3 = 4$

z	8	9	10	11	12	13	14	15	16	17	18	19
$\frac{z}{3}$	$\frac{8}{3} = 2\frac{2}{3}$	3	$\frac{10}{3} = 3\frac{1}{3}$	$\frac{11}{3} = 3\frac{2}{3}$	4	$\frac{13}{3} = 4\frac{1}{3}$	$\frac{14}{3} 4\frac{2}{3}$	5	$\frac{16}{3} = 5\frac{1}{3}$	$\frac{17}{3} = 5\frac{2}{3}$	6	$\frac{19}{3} = 6\frac{1}{3}$

↑ $z = 12$ is a Solution

d. $m-7=3$

m	5	6	7	8	9	10	11	12	13	14	15
$m-7$	-2	-1	0	1	2	3	4	5	6	7	8

↑

$m = 10$ is a soln.

---

5 Solve:

a. $x+5=12$

Soln. Subtracting 5 from both sides

$\Rightarrow x+5-5=12-5$

$\Rightarrow x=7$

---

b. $y-2=10$

Soln. Adding 2 on both sides

$\Rightarrow y-2+2=10+2$

$\Rightarrow y=12$

---

c. $7p=210$

Soln. dividing both sides by 7

$\Rightarrow \frac{7p}{7}=\frac{210}{7}$

$\Rightarrow p=30$

---

d. $\frac{q}{2}=5$

Soln. multiplying both sides by 2

$\Rightarrow 2\left(\frac{q}{2}\right)=2(5)$

$\Rightarrow q=10$

---

e. $t+100=125$

Soln. Subtracting 100 from both sides

$\Rightarrow t+100-100=125-100$

$\Rightarrow t=25$

---

f. $l-20=30$

Soln. Adding 20 on both sides

$\Rightarrow l-20+20=30+20$

$\Rightarrow l=50$

---

g. $9u=81$

Soln. dividing both sides by 9

$\Rightarrow \frac{9u}{9}=\frac{81}{9}$

$\Rightarrow u=9$

---

h. $\frac{k}{8} = 20$

Soln. multiplying both sides by 8

$\Rightarrow 8\left(\frac{k}{8}\right) = 8(20)$

$\Rightarrow k = 160$

---

i. $3y = 33$

Soln. dividing both sides by 3

$\Rightarrow \frac{3y}{3} = \frac{33}{3}$

$\Rightarrow y = 11$

---

j. $x - 3 = 0$

Soln Adding both Sides 3

$\Rightarrow x - 3 + 3 = 3$

$\Rightarrow x = 3$

---

k. $\frac{k}{8} = 8$

Soln. multiplying both sides by 8

$\Rightarrow 8\left(\frac{k}{8}\right) = 8(8)$

$\Rightarrow k = 64$

---

l. $13y = 65$

Solution. Dividing both Sides by 13

$\Rightarrow \frac{13y}{13} = \frac{65}{13}$

$\Rightarrow y = 5$

---

6 Solve the following riddles. Who Am I?

i. Go round a square
Counting every corner
Thrice and no more
Add the count to me
To get exactly thirty four

Soln. let I am x

A square has Corners = 4

According to ques,

ATQ $x + 3(4) = 34$

$\Rightarrow x + 12 = 34$

$\Rightarrow x + 12 - 12 = 34 - 12$

$\Rightarrow x = 22$

$\Rightarrow$ I am $x = 22$

ii I am a special number
Take away from me a six!
A whole cricket team
You will still be able to fix!

Soln. let I am x (a special number)

ATQ, $x-6=11$

$\Rightarrow x-6+6=11+6$

$\Rightarrow x=17$

$\therefore$ I am $x=17$

---

iii. For each day of the week
make an upcount from me.
If you make no mistake
you will get twenty three!

Soln. let I am x

Days in a week $=7$

ATQ $x+7=23$

$\Rightarrow x+7-7=23-7$

$\Rightarrow x=16$

$\therefore$ I am $x=16$

---

iv. Tell me who I am
I shall give a pretty clue!
You will get me back
If you take me out of twenty two!

Soln. let I am x

ATQ $22-x=x$

$\Rightarrow 22-x+x=x+x$

$\Rightarrow 22=2x$

$\Rightarrow \frac{22}{2}=\frac{2x}{2}$

$\Rightarrow 11=x \Rightarrow$ I am $x=11$
