Algebra

Exercise-9.1.

Solution-01:-

If the variable n stands for the number of letters formed. then the number of matchsticks required is given by

(i) A pattern of letter 'T' - 2n

(ii) A pattern of letter 'V' - 2n

(iii) A pattern of Letter Z - 3n

(iv) A pattern of Letter U - 3n.

(v) A pattern of Letter F - 4n

(vi) A pattern of letters S - 5n.

Solution-02:-

G|T there are 24 mangoes in a box.

Let 'b' be the number of boxes

number of mangoes in terms of the number of boxes can be written as 24b.

Solution-03:-

Anuradha's Rangoli has '8' dots in a row so

Number of dots in her Rangoli for r rows is '8r'

if there there are 12 rows in Rangoli then

Number of dots = 8 x 12

= 96.

Solution -04:-

Given that.

Anu and Meenu are sisters.

Anu is 5 year years younger than Meen.

Let x be age of Meenu then

Age of Anu in terms of meenu's age $= (x-5)$ years.

Solution -05:-

G|T

oranges are shifting|Transferred from Larger box to smaller box.

Smaller box contains 'x' oranges.

Total oranges in smaller boxes $= 3x$.

oranges Left after transfering $= 7$.

∴ Total oranges in the Larger Box =

Total oranges in Smaller Boxes + oranges Left after transfer

$= \underline{3x+7}$

Solution -06:-

G|T

Harsha's score in Science = 'x'

Harsha's score in Mathematics $= \frac{3}{4} \times$ science marks $+15$

$= \frac{3x}{4} + 15.$

$= \frac{3x+60}{4}$

Solution-07:-

By the given figure

If the number of triangles formed is x, then the number of match sticks required $= 2x+1$

(eg:- $x = 1$

$2x+1 = 2(1)+1 = 3$

$x = 2$

$2(2)+1 = 2(2)+1 = 5$.

where 'x' is the number of Triangles).

Solution-08:-

By the observed Pattern.

If the number of letter 'A's formed is x then the number of match sticks required $4x+2$.

$$\left[\begin{array}{l} \because 4(1)+2 = 6 \\ 4(2)+2 = 10 \\ 4(3)+2 = 14 \end{array}\right].$$

Exercise- 9.2.

Solution -01:-

G|T

side of equilateral triangle = ℓ.

we know that,

perimeter of a triangle = side + side + side

$= \ell + \ell + \ell$

$= 3\ell$.

→ perimeter = 3ℓ.

Solution-02:-

G|T

side of regular hexagon = ℓ

Number of sides in hexagon = 6.

∴ perimeter of a regular hexagon = 6 × side

$= 6 \times \ell$

$= 6\ell$.

Solution -03:-

G|T

length of edge of cube = ℓ.

in a cube all lengths of edges are equal.

∴ Number of edges in cube (length) = 12.

∴ sum of lengths of all the edges of a cube

$= 12 \times \ell$.

$= 12\ell$.

Solution 4:-

Given

radius of circle = r units

By the above figure

we know that

diameter = 2 x radius

∴ Length of a diameter of a circle = $2 \times r$ [$\because r + r = 2r$]

$= 2r$

Exercise - 9.2 :-

Solution - 01 :-

Divisibility by 5 :-

A number is divisible by 5 if its last (unit's) digit 0 or 5.

Divisibility by 10 :-

A number is divisible by 10 if its last (unit's) digit is 0.

→ Each of the numbers 3725, 48970, 76035 and 4500010 is divisible by 5 whereas none of the numbers 56823, 7893217 is divisible by 5.

→ Each of the numbers 48970, 4500010 divisible by 10. Whereas none of the numbers 3725, 76035, 56823, 7893217 is divisible by 10.

Solution - 02 :-

Divisibility by 2 :-

A number is divisible by 2 if its last (unit's) divisible by 2 i.e. if its last digit is 0, 2, 4, 6 or 8.

Divisibility by 4 :-

A number is divisible by 4 if its last two (unit's and ten's) digits is divisible by 4.

Divisibility by 8 :-

A number is divisible by 8. if the the number formed by its last three digits (unit's, hundred's, ten's) digits divisible by 8.

→ Each of the numbers 54014, 723840, 6531088, 756896, 53821048 divisible by 2. 786235 is not divisible by 2.

→ Each of the numbers 723840, 6531088, 75689604, 5321048 divisible by 4. 54014, 786235 are not divisible by 4.

→ Each of the numbers 723840, 6531088, 5321048 divisible by 8. none of the numbers 54014, 786235 & 75689604 isnot divisible by 8.

Solution -03:-

divisibility by 3:-

A number is divisible by 3 if the sum of its divisible by 3.

(i) Here, the sum of the digits 7+3+4+1 = 15, which is divisible by 3, ∴ 7341 is divisible by 3.

(ii) Here the sum of the digits 5+9+0+3+1 = 18, which is divisible by 3.

Therefore 59031 is divisible by 3.

(iii) Here the sum of digits 1+2+3+4+5+6+7+8 = 36. which is divisible by 3.

Therefore, 12345678 is divisible by 3.

(iv) Here the Sum of digits 5+6+0+3+1+9 = 24. which is divisible by 24.3.

Therefore, 560319 is divisible by 3.

(v) Here, Sum of the digits $7+2+0+6+3+4 = 22$,
which is not divisible by 3.
Therefore 720634 is not divisible by 3.

(vi) Here, Sum of digits $3+7+2+1+5+0+9 = 27$
which is divisible by 3.
Therefore, 3721509 is divisible by 3.

Divisibility by 9:-

A number is divisible by 9, if the sum of the digits digits divisible by 9.

(i) Sum of digits = 15; not divisible by 9
(ii) Sum of digits = 18; divisible by 9.
(iii) Sum of digits = 36; divisible by 9.
(iv) Sum of digits = 24; not divisible by 9.
(v) Sum of digits = 22; not divisible by 9.
(vi) Sum of digits = 27, divisible by 9.

Solution-04:-

(i) **divisibility by 11:-**

A number is divisible by 11 if the difference of the Sum of the digits at the odd places (starting from ones place) and & the sum of digits at even places (starting from tens place) is either 0 or divisible by 11.

Sum of digits at odd places = $1+4+8 = 13$
Sum of digits at even places = $0+2 = 2$.
Their diff = $13-2 = 11$; divisible by 11.
Therefore, 10428 is divisible by 11

(ii) Sum of the digits at odd Places = 7+1+9+0 = 17

Sum of the digits at even places = 0+6+8+3 = 17

Their difference = 17-17 = 0.

Therefore, 70169803 is divisible by 11.

(iii) Sum of the digits at odd Places = 7+3+9+5 = 24

Sum of the digits at even places = 1+6+8 = 15

Their difference = 24-15 = 9.

Therefore, 7136985 is not divisible by 11.

Solution - 05:-

(i) divisibility by 6:-

A number is divisible by 6 if it is divisible by 2 as well as 3.

Since the unit digit in the given number is 3, so the given number not divisible by 2.

93573 is not divisible by 6.

(ii) 217944

Since the unit digit in the given number is 4, so the given number is divisible by 2.

Sum of the digits in the number = 2+1+7+9+4+4
= 27

which is divisible by 3.

∴ 217944 is divisible by 6.

(iii) 5034126

Since the unit digit in the given number is 6, so the given number is divisible by 2.

Sum of the digits in the given number = 5+0+3+4+1+6
= 19+2
= 21

which is not divisible by 3.

∴ 5034126 is divisible by 6.

(iv) 901352.

Since the unit digit in the given number is 2, which is divisible by 2.

sum of the digits in the given number

= 9+1+3+5+2+0

= 20.

which is not divisible by 3.

∴ 901352 is not divisible by 6.

(v) 639210.

since the unit digit in the given number is 0, which is divisible by 2.

Sum of the digits in the given number

= 6+3+9+2+1+0

= 21.

which is divisible by 3.

∴ 639210 is divisible by 6.

(vi) 1790184.

Since the unit digit in the given number is 4, which is divisible by 2.

Sum of the digits in the given number

= 1+7+9+0+1+8+4

= 30

which is divisible by 3.

∴ 1790184 is divisible by 6.

Solution - 06:-

(i) For a number to be divisible by 9, sum of its digits should be divisible by 9.

Sum of the given digits in 4710*82
$= 4+7+1+0+8+2$
$= 22.$

If we add 5; it becomes 27, which is divisible by 9.

Therefore, * is to be replaced by 5.

The number formed is 4710582, which is divisible by 9.

(ii) sum of the given digits in 70*356722
$= 7+0+3+5+6+7+2+2$
$= 32.$

If we add 4, It becomes 36, which is divisible by 9.

Therefore, * is to be replaced by 9.

The number formed is 70435 6722, which is divisible by 9.

Solution - 07

(a) 4*672.

the Sum of digits (except *) $= 4+6+7+2$
$= 19$

(i) the smallest digit that we have to add to 19 is 2 to get 21, which is divisible by 3.

The number formed is 7+0295, which is 42672.

divisible by 2.

∴ The smallest digit by which '*' is to be replaced is 2.

(ii) The greatest digit that we have to add to 19 is 8 to get 27, which is divisible by 3.

The number formed is 48672, which is divisible by 3.

∴ The greatest digit by which '*' is to be replaced is 8.

(b). 4756*2.

(i) Sum of the digits in 4756*2 (except *)

$= 4+7+5+6+2$

$= 24.$

The smallest digit that we can add to 24 is 0 to get 24, which is divisible by 3.

The number formed is 475602

∴ The smallest digit by which '*' is to be replaced is '0'.

(ii) The greatest digit that we have to add to 24 is 9 to get 33, which is divisible by 3.

The number formed is 475692.

∴ The greatest digit by which * is to be replaced is '9'.

Solution-08

(i) 8 * 9484, * occurs at even place.

Sum of digits at odd place = 8+9+8 = 25

Sum of digits at even place (except *) = 4+4 = 8

Their difference = 25-8

= 17

If '*' is replaced by 5, then the sum of the digits at even places = 5+4+4

= 13.

Their difference (Sum of digits at even place - Sum of digits at odd places)

= 25-14 = 11, which is divisible by 11. So that the number formed will be divisible by 11.

∴ '*' → 6.

Number formed → 869484.

(ii) 9*53762

* occurs at even place.

Sum of digits at odd place = 3+6 = 9

Sum of digits at even place = 9+5+7+2 = 23.

Sum their difference = 23-9

= 14.

If * is represented by 3, then sum of digits at even places = 3+6+3

= 12.

Their difference = 23-12

= 11, which is divisible by 11. So that the number formed divisible by 11.

∴ '*' → 3.

Number formed → 9353762.

Solution -09:-

(a) 2*4706

Since the unit digit in the given number is 6, which is divisible by 2.

∴ 2*4706 is divisible by 2.

the sum of the digits (except *) = 2+4+7+0+6
= 19.

(i) the smallest number digit that we add to 19 to get 21, is 2, 21 is divisible by 3.

The number formed is 224706.

∴ the smallest digit by which '*' is to be replaced is 2.

∴ 224706 is divisible by 6.

(ii) the greatest digit that we add to 19 is 8 to get 27, which ø is divisible by 3.

the number formed is 284706, which is divisible by 3.

∴ The greatest digit by which '*' is to be replaced is 8.

∴ 284706 is divisible by 6.

(b) 5825*34.

Since the unit digit in the given numbey is 4 which is divisible by 2.

the sum of the digits (except *) = 5+8+2+5+3+4
= 27.

(i) the smallest digit that we add to 27 is 0 to get 27. which is divisible by 3.

the number formed is 5825034, which is divisible by 3.

the smallest digit by which '*' is to replaced is '0'.

(ii) the greatest digit that we add to 27 is 9 to get 36, which is divisible by 3.

The number formed 5825934, which is divisible by 3.

the greatest number 5825934, '*' → 9, which is divisible by 6.

Solution -10:-

(i) 101.

AS $10 \times 10 = 100$ and $11 \times 11 = 121$

$100 < 101$ & $121 > 101$.

So 10 is the Largest number such that $10 \times 10 \leq 101$.

The prime numbers less than or equal to 10 are 2, 3, 5, 7

Note that 101 is not divisible by 2, 3, 5 and 7.

Therefore, 101 is a prime number.

(ii) 251.

AS $15 \times 15 = 225 < 251$ and $16 \times 16 = 256 > 251$.

So 15 is the largest number, such that $15 \times 15 \leq 251$.

The prime numbers less than or equal to 15 are 2, 3, 5, 7, 11 and 13.

Note that 2, 3, 5, 7, 11 and 13 are not factors for 251.

Therefore, 251 is a prime number.

(iii) 323.

AS $17 \times 17 = 289 < 323$ and $18 \times 18 = 324 \geq 323$.

So 17 is the largest number such that $17 \times 17 \leq 323$

The prime numbers less than or equal to 17 are 2, 3, 5, 7, 11, 13, 17.

∴ 323 is divisible by 17 so 323 is not a prime number.

Exercise-9.3

Solution-01:-

Q17

Numbers are 7, 5 and 8.

The expressions formed from the given numbers satisfying the given conditions are:

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

In fact, we can form more expressions satisfying the given conditions

Solution-02:-

By observing the given observations (iii) and (vi) are with numers only (i), (ii), (iv), (v) are with variables, Numbers etc.

Solution-03:-

(i) addition; 5 added to x.

(ii) Subtraction; 7 Subtracted from y

(iii) multiplication; z multiplied by 3.

(iv) division; p divided by 5

(v) multiplication and addition; first x multiplied by 2 and 17 added to the Product

(vi) multiplication and subtraction;

first y multiplied by 3 and 5 Subtracted from the Production

(VII) multiplication and addition;

first m multiplied by -7 and then $\frac{2}{3}$ added to the product.

(VIII) division and subtraction; first x divided by 3 and then 15 subtracted from the quotient

Solution-04:-

(i) 7 added to p

$p+7$

(ii) p subtracted from 7

$7-p$

(iii) p multiplied by 7

$7p$

(iv) p divided by 7

$p/7$

(v) 7 divided by p

$\frac{7}{p}$

(vi) 7 subtracted from -m

$-m-7$

(vii) p multiplied by -5

$-5p$

(viii) -p divided by 5.

$\frac{-p}{5}$

Solution-05:

Expressions for the following

(i) 11 added to 2m

$2m + 11$

(ii) 11 subtracted from 2m

$2m - 11$

(iii) 3 added to 5 times y

5 times y $= 5y$

$5y + 3$

(iv) 3 subtracted from 5 times y.

$5y - 3$

(v) y is multiplied by -8 and then added to the result

$-8y + 5$

(vi) y multiplied by 5 and then then the result subtracted from 16.

$y \times 5 = 5y$

Expression $\rightarrow 16 - 5y$

Solution-06:

(i) 6 more than the thrice of a number x

$3x$

$\therefore$ Expression or mathematical form

$3x + 6$

(ii) 7 taken away from y

Mathematical form

$y-7$

(iii) 3 less than the quotient of x by y

$\frac{x}{y} - 3$ (mathematical form)

Solution-07:-

The expressions formed from the given numbers satisfying the given conditions are:

$t+4,\ t-4,\ 4-t,\ 4+t,\ 4t,\ \frac{t}{4}$.

In fact, we can form more expressions satisfying the given conditions.

Solution-08:-

The expressions formed from the given numbers satisfying the given conditions are

$2y+7,\ 2y-7,\ 7y+2,\ 7y-2,\ \frac{y}{2}+7,\ \frac{y}{2}-7, \ldots\ldots$

In fact, we can form more expressions satisfying the given conditions.

Solution-09:-

Student scored marks in English = x

deducted marks for hand writing = 5.

student's final score in English = $x-5$ marks.

Solution-10:-

Raju's present Age = 'y' years

Raju's father Age = 3 (Raju's Age) + 2 years

= (3y + 2) years

Solution-11:-

(i) three times Mohini's Age next year = 3(x+1) years

(ii) four times Mohini's age 3 years ago = 4(x-3) years

(iii) the present Age of Mohini's uncle, if his uncle is 5 times as old as Mohini will be two years from now = 5(x+2) years

(iv) the present Age of Mohini's cousin, if her cousin is 2 years less than one third of Mohini's Age five years ago. = $\left(\frac{1}{3}(x-5)-2\right)$ years

Solution-12:-

Given that,

height of the cuboid box = h cm.

Length = 5 (height)

= 5h cm.

Breadth = Length - 10cm

= 5h - 10 cm

Solution-13:-

Bus travels in hour → V km.

Distance between Jaipur and delhi

= 5(V km) + 20km

= 5V + 20 km

Solution - 14:-

(i) The cost of a book is 3 times the cost of a note book.

(ii) The cost of oil per litre is 5 times the cost of rice per Bag.

(iii) The speed of a bus is 10 km per hour more than the speed of the truck.

(iv) Tony puts 9 marbles on the table. He has 89 marbles in his box.

(v) our class has n students. The school has 20n students.

(vi) Raju's uncle is 4 times older than Raju and his aunt is 3 years younger than his uncle.

(vii) The total number of dots is 5 times the number of rows.

Exercise - 9.4.

solution - 01:-

(i) $4^3 = 4 \times 4 \times 4$

$= 16 \times 4$

$= 64$

(ii) $(-6)^4 = (-6) \times (-6) \times (-6) \times (-6)$

$= 36 \times 36$

$= 1296$

(iii) $\left(\frac{2}{3}\right)^4 = \frac{2 \times 2 \times 2 \times 2}{3 \times 3 \times 3 \times 3}$

$= \frac{4 \times 4}{9 \times 9}$

$= \frac{16}{81}$

(iv) $(-2)^3 \times (5)^2 = (-2) \times -2 \times -2 \times 5 \times 5$

$= 4 \times (-2) \times 25$

$= -8 \times 25$

$= -200.$

solution - 02:-

(i) $3x + 2y$

Substituting $x = 3$, $y = 2$ in the expression

we get $3x + 2y = 3(3) + 2(2)$

$= 9 + 4$

$= 13$

$3x + 2y = 13.$

(ii) $5x-3y$

Substituting $x=2$ and $y=-5$ in the given expression, we get.

$$5x-3y = 5(2)-3(-5)$$
$$= 5\times 2-(-15)$$
$$= 10+15$$
$$= 25$$

(iii) $a+2b-5c$.

Substituting $a=2$, $b=-3$ and $c=1$ in the given expression we get.

$$a+2b-5c = 2+2(-3)-5(1)$$
$$= 2-6-5$$
$$= 2-11$$
$$= -9.$$

(iv) $2p+3q+4r+pqr$

Substituting $p=-1$, $q=2$ and $r=3$.

$$2p+3q+4r+pqr = 2(-1)+3(2)+4(3)+(-1)\times 2\times(3)$$
$$= -2+6+12+(-6)$$
$$= 12-2$$
$$= 10$$

$\therefore 2p+3q+4r+pqr = 10.$

(v) $3ab+4bc-5ca$

Substituting $a=4$, $b=5$ and $c=-2$.

$$3ab+4bc-5ca = 3(4)(5)+4(5)(-2)-5(-2)(4)$$
$$= 3(20)+4(-10)-5(-8)$$
$$= 60-40+40$$
$$= 60$$

Solution - 03:-

(i) $2x^2-3x+4$.

Substituting $x=2$ in the given expression, we get

$$2x^2-3x+4 = (2)(2)^2-3(2)+4 = 8+4-6$$
$$= 12-6$$
$$= 6.$$

$\therefore 2x^2-3x+4 = 6.$

(ii) $4x^3-5x^2+6x+7$

Substituting $x=3$ in the given expression, we get

$$4x^3-5x^2-6x+7 = 4(3)^3-5(3)^2-6(3)+7$$
$$= 4(27)-5(9)-18+7$$
$$= 108-45-18+7$$
$$= 115-63$$
$$= 52.$$

(iii) $3x^3+9x^2-x+8$

Substituting $x=-2$ in the given expression, we get

$$3x^3+9x^2-x+8 = 3(-2)^3+9(-2)^2-(-2)+8$$
$$= 3(-8)+9(4)+2+8$$
$$= -24+36+10$$
$$= 46-24$$
$$= 22$$

(iv) $2x^4-5x^3+7x-3$

Substituting $x=-3$ in the given expression we get

$2(-3)^4-5(-3)^3+7(-3)-3 = 2(9)(9)-5(-3)^2(-3)+7(-3)-3$

$= 162-5(27)-21-3$

$= 162+135-24$

$= 162+111$

$= 273.$

Solution-04:-

(i) $6-7x^2$

Substituting $x=5$ in the given expressions we get

$6-7x^2 = 6-7(5)^2$

$= 6-7(25)$

$= 6-175$

$= -169$

(ii) $3x^2+8x-10$; $x=5$

$3x^2+8x-10 = 3(5)^2+8(5)-10$

$= 3(25)+40-10$

$= 75+30$

$= 105$

(iii) $2x^3-4x^2-6x+25$; $x=5$

$2x^3-4x^2-6x+25 = 2(5)^3-4(5)^2-6(5)+25$

$= 2(125)-4(25)-30+25$

$= 250-100-30+25$

$= 145.$

Solution-05:-

(i) By substituting the given values $x=2$, $y=3$ and $z=-1$, in the given expressions we get.

$$x \div y = \frac{2}{3}$$

(ii) $$\frac{xy}{z} = \frac{(2)(3)}{-1}$$

$$= \frac{6}{-1}$$

$$= -6$$

(iii) $$\frac{2x+3y-4z}{3x-z} = \frac{2(2)+3(3)-4(-1)}{3(2)-(-1)}$$

$$= \frac{14}{6+1}$$

$$= \frac{14}{7}$$

$$= 2$$

Solution-06:-

Given Expression is

$$a^2+b^2+c^2-2ab-2bc-2ca+3abc.$$

By substituting the values $a=2, b=3$ and $c=-2$ in the given expressions we get.

$$a^2+b^2+c^2-2ab-2bc-2ca+3abc =$$

$$(2)^2+(3)^2+(-2)^2-2(2)(3)-2(3)(-2)+3(2)(3)(-2)-2(2)(-2)$$

$$= 4+9+4-12-(-12)+3(-12)+8$$

$$= 17-36+8$$

$$= 25-36 = -11.$$

Solution - 07:-

Given Expression is $= p^3+q^3-r^3-3pqr$

By substituting $p=4, q=-3$ and $r=2$, we get.

$$p^3+q^3+r^3-3pqr = (4)^3+(-3)^3+(2)^3-3(4)(-3)(2)$$
$$= 64+(-27)-8-(-72)$$
$$= 64+72-35$$
$$= 64+37$$
$$= 101.$$

Solution-08:-

Given Expression is $2mn^4-15m^2n+p$

By substitution $m=1, n=2$ and $p=-3$ we get.

$$2mn^4-15m^2n+p = 2(1)(2)^4-15(1)^2(2)+(-3)$$
$$= 2(16)-15(2)-3.$$
$$= 32-30-3$$
$$= 32-33$$
$$= -1.$$

Solution-09:-

(i) The value of $3x-2 = 3(0)-2$

$$= -2 \quad (\because x=0)$$

$$-2 \neq 1$$

false.

(ii) $2x^2-x-3 = (2)(-1)^2-(-1)-3$

$$= 2+1-3$$
$$= 0$$

$$0=0$$

True.

(iii) $p=5,\ q=12$ & $r=13$

$$p^2+q^2=r^2$$

$$\Rightarrow 5^2+12^2=13^2$$

$$\Rightarrow 25+144=169$$

$$\Rightarrow 169=169$$

True.

(iv) $16-3x=5x$

$$x=2$$

$$16-3(2)=5(2)$$

$$16-6=10$$

$$10=10$$

True.

Solution-10:-

(i) $(x+y)^2=x^2+2xy+y^2$

$x=2,\ y=-3$

$$(2-3)^2=2^2+2(2)(-3)+(-3)^2$$

$$1=4-12+9$$

$$1=1$$

(ii) $(x-y)^2=x^2-2xy+y^2$

$$(2-(-3))^2=2^2-2(2)(-3)+(-3)^2$$

$$(2+3)^2=4+9+12$$

$$5^2=13+12$$

$$25=25$$

(iii) $x^2 - y^2 = (x+y)(x-y)$

$2^2 - (-3)^2 = (2+(-3))(2-(-3))$

$4 - 9 = (2-3)(2+3)$

$-5 = (-1)(5)$

$-5 = -5$.

(iv) $(x+y)^2 = (x-y)^2 + 4xy$

$(2-3)^2 = (2-(-3))^2 + 4(2)(-3)$

$(-1)^2 = (2+3)^2 + 8(-3)$

$1 = 25 - 24$

$1 = 1$.

(v) $(x+y)^3 = x^3 + y^3 + 3x^2y + 3xy^2$

$(2-3)^3 = 2^3 + (-3)^3 + 3(2)^2(-3) + 3(2)(-3)^2$

$(-1)^3 = 8 - 27 + 3(4)(-3) + 3(2)(9)$

$-1 = 8 - 27 + 3(-12) + 3(18)$

$-1 = 8 - 27 + (36) + 54$

$-1 = -45 + 62 - 63$

$-1 = -1$

Exercise- 9.5.

Solution-01:-

(i) an equation with variable x

(ii) an equation with variable b.

(iii) It is not an equation

(iv) It is not an equation

(v) It is not an equation.

(vi) It is an equation with variable t

(vii) It is not an equation

(viii) It is not an equation

(ix) an equation with variable q.

Solution-02:-

(i) $x+6=8$

$x=8-6$ (Transporting 6 to RHS)

$x=2$

(ii) $2-x=5$

$-x=5-2$ Transporting 2 to RHS

$-x=3$

$\boxed{x=-3}$

(iii) $4x=-6$.

dividing both sides by 4

$\frac{4x}{4}=-\frac{6}{4}$

$\Rightarrow x = -\frac{6}{4}$

$\Rightarrow x = \frac{-3}{2}$

(iv) $\frac{x}{2} = 5$

multiplying both sides by 2

$\frac{x}{2} \times 2 = 5 \times 2$

$x = 10$

(v) $2y - 3 = 2$.

Transporting -3 to RHS

$2y = 2 + 3$

$2y = 5$

dividing both sides by 2

$\frac{2y}{2} = \frac{5}{2}$

$y = \frac{5}{2}$

(vi) $4 - 5y = 2$.

Transporting 4 to RHS

$-5y = 2 - 4$

$+5y = +2$

dividide both sides by 5

$\frac{5y}{5} = \frac{2}{5}$

$y = \frac{2}{5}$

Solution -03:-

(i) $5(x+1) = 25$

dividing by 5 on both sides.

$$\frac{5(x+1)}{5} = \frac{25}{5}$$

$$x+1 = 5.$$

(ii) $2(3x-1) = 10$

dividing by 2 on both sides

$$\frac{2(3x-1)}{2} = \frac{10}{2}$$

$$\Rightarrow 3x-1 = 5.$$

(iii) $\frac{3x-1}{4} = 11$

multiply by 4 on both sides

$$\frac{3x-1}{4} \times 4 = 11 \times 4$$

$$3x-1 = 44$$

Transport -1 to RHS

$$3x = 44+1$$

divide by 3 on both sides

$$\frac{3x}{3} = \frac{45}{3}$$

$$x = 15.$$

Solution -04:-

(i) $5x - 6 = 12 - x$

Transport -6 on RHS

$-x$ on LHS

$5x + x = 12 + 6$

$6x = 18$

divide by '6' on both sides

$\frac{6x}{6} = \frac{18}{6}$

$x = 3.$

(ii) $\frac{n}{3} + 1 = 4 - n$

Transport $+1$ on RHS

$-n$ on LHS

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

$\frac{n}{3} + n = 3$

$\frac{n + 3n}{3} = 3$

multiply both sides by '3'

$\frac{4n \times 3}{3} = 3 \times 3$

$4n = 9$

$n = \frac{9}{4}.$

(iii) $5P+7 = 19-2P$

Transport 7 to RHS

$-2P$ to LHS

$5P+2P = 19-7$

$7P = 12$

divide both sides by '7'

$\frac{7P}{7} = \frac{12}{7}$

$P = \frac{12}{7}$

(iv) $2x + \frac{5}{2} = \frac{2}{3} - x$

Transport $\frac{5}{2}$ to RHS

$-x$ to LHS

$2x+x = \frac{2}{3} - \frac{5}{2}$

$3x = \frac{2(2)-5(3)}{6}$

$\frac{3x \times 6}{6} = \frac{(4-15)6}{6}$

$18x = -11$

$x = \frac{-11}{18}$

(v) $\frac{x}{2} - 5 = \frac{x}{3} - 4$

Transport -5 to RHS

$\frac{x}{3}$ to LHS

$$\frac{x}{2} - \frac{x}{3} = 5 - 4$$

$$\frac{3x - 2x}{6} = 1$$

multiply by 6 on both sides

$$\frac{x \times 6}{6} = 6$$

$$x = 6.$$

(vi) $18 - \frac{3y}{4} = 11 + y$

Transport $-\frac{3y}{4}$ to RHS

11 to LHS

$$18 - 11 = y + \frac{3y}{4}$$

$$7 = \frac{4y + 3y}{4}$$

multiply by 4 on both sides

$$7 \times 4 = \frac{(4y + 3y)4}{4}$$

$$7y = 28$$

$$y = 4$$

Solution-05:-

(i) $3(x+7) = 18$

$\frac{3(x+7)}{3} = \frac{18}{3}$ [∵ divide by '3' on both sides]

$x+7 = 6$

$x = 6-7$ [∵ Transport '7' to RHS]

$x = -1$

$x=-1$; $3(-1+7) = 3(6) = 18$

$\therefore \quad 3(x+7) = 18$

(ii) $2(x-1) = x+2$

divide by 2 on both sides

$\frac{2(x-1)}{2} = \frac{x+2}{2}$

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

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

$x = \frac{x+4}{2}$

$2x = x+4$

$2x - x = 4$

$x = 4$

$x = 4$;

$2(4-1) = 6$

$4+2 = 6$

$\therefore 2(x-1) = (x+2)$.

(iii) $3x - \frac{1}{3} = 2\left(x - \frac{1}{2}\right) + 5$

Transport $\frac{-1}{3}$ to RHS

$$3x = 2\left(x - \frac{1}{2}\right) + 5 + \frac{1}{3}$$

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

Transport $2x$ to LHS

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

$$x = \frac{-3 + 15 + 1}{3}$$

$$x = \frac{13}{3}$$

$$3\left(\frac{13}{3}\right) - \frac{1}{3} = 2\left(\frac{13}{2} - \frac{1}{2}\right) + 5$$

$$\frac{38}{3} = 2\left(\frac{26-3}{6}\right) + 5$$

$$\frac{38}{3} = \frac{23+15}{3}$$

$$\frac{38}{3} = \frac{38}{3}$$

$\therefore$ LHS = RHS

$\therefore$ $3x - \frac{1}{3} = 2\left(x - \frac{1}{2}\right) + 5$.

(iv) $4(2x-1)-2(x-5)=5(x+1)+3$

$8x-4-2x+10=5x+5+3$

$6x+6=5x+8$

Transpose $5x$ to LHS

9 to RHS

$6x-5x=8-6$

$x=2$

$x=2$;

$4(2(2)-1)-2(2)-5)=5(2+1)+3$

$\Rightarrow 4(+3)-2(-3)=18$

$\Rightarrow 12+6=18$

$\Rightarrow 18=18$

$\therefore x=2;\ 4(2x-1)-2(x-5)=5(x+1)+3)$

(iv) 397.

As $19 \times 19 = 361 < 397$ and $20 \times 20 = 400 > 397$.

So 19 is the largest number such that $19 \times 19 \leq 397$.

The prime numbers less than or equal to 19 are

2, 3, 5, 7, 11, 13, 17 and 19.

Note that 397 is not divisible by 2, 3, 5, 7, 11, 13, 17 and 19.

Therefore, 397 is a prime number.

Solution-11:-

To determine 372645 is divisible by 45, we test it for divisible by 5 and 9 both.

As the number 5 in the unit's digit place, so it is divisible by 5.

As the sum = 3+7+2+6+4+5

= 27

divisible by 9.

we note that 5 and 9 are co primes, therefore

372645 is divisible by 45.

Solution-12:-

~~To determine~~

factors for 12 → 1, 2, 3, 4, 6

∴ A number divisible by 12 is divisible by

1, 2, 3, 4 and 6

Solution-13:-

factors for 8 → 1, 2, 4.

∴ A number divisible by both 3 and 8. (24)

divisible by 1, 2, ~~4~~ 6, 12, 24.

Solution-14:-

(i) False

(ii) False

(iii) True

(iv) True

(v) True

(vi) False

(vii) True

(viii). False.