9. Negative Numbers

Questions Pg-165

1 A. Question

Use the principles above, compute the following:

5 – 10

Answer

Using the principle, for any two positive numbers x,y, we write,

-x + y = y-x

⇒ 5-10 = -5

Note: The sign of bigger number will come in the result.

1 B. Question

Use the principles above, compute the following:

–10 + 5

Answer

Using the principle, for any two positive numbers x,y, we write,

-x + y = y-x

-10 + 5 can be written as,

⇒ 5-10

⇒ 5-10 = -5

Note: The sign of bigger number will come in the result.

1 C. Question

Use the principles above, compute the following:

–5 – 10

Answer

Using the principle, For any two positive numbers x,y, we write,

-x-y = -(x + y)

⇒ -(5 + 10) = -(15)

Note: If both numbers are negative then result also will be negative.

1 D. Question

Use the principles above, compute the following:

–5 – 5

Answer

Using the principle, For any two positive numbers x,y, we write,

-x-y = -(x + y)

⇒ -(5 + 5) = -10

Note: If both numbers are negative then result also will be negative.

1 E. Question

Use the principles above, compute the following:

–5 + 5

Answer

Using the principle, for any two positive numbers x,y, we write,

-x + y = y-x

⇒ 5-5 = 0

Note: A number and it’s negative addition result in null and also called additive inverse.

1 F. Question

Use the principles above, compute the following:

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

Answer

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

$\Rightarrow -\frac{1}{2} + \frac{3}{2}$

$\Rightarrow \frac{2}{2}$

⇒1

Note: The sign of bigger number will come in the result.

1 G. Question

Use the principles above, compute the following:

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

Answer

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

$\Rightarrow -\frac{1}{2} - \frac{3}{2}$

$\Rightarrow -\frac{4}{2}$

⇒ -2

Note: If both fractions are negative then result also will be negative.

1 H. Question

Use the principles above, compute the following:

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

Answer

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

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

$\Rightarrow \frac{0}{2} = 0$

Note: if a fraction and its negative are added then their result is 0.

1 A. Question

Use the principles above, compute the following:

5 – 10

Answer

Using the principle, for any two positive numbers x,y, we write,

-x + y = y-x

⇒ 5-10 = -5

Note: The sign of bigger number will come in the result.

Questions Pg-170

1 A. Question

Take as x different positive numbers, negative numbers and zero, and compute x + 1, x – 1, 1 – x. Check whether the equations below hold for all numbers.

(1 + x) + (1 – x) = 2

Answer

Let take as positive numbers as: 1,2,3,4

Negative numbers: - 1,-2,-3,-4 and 0

For positive number:

(x + 1) = 1 + 1, 2 + 1 ,3 + 1 ,4 + 1

= 2,3,4,5

(x-1) = 1-1, 2-1 ,3-1 ,4-1

= 0, 1, 2, 3

(1-x) = 1-1, 1-2, 1-3, 1-4

= 0, -1, -2, -3

(i) (1 + x) + (1-x) = 2

Let’s check for x = 1

L.H.S = (1 + 1) + (1-1)

= 2 + 0

= 2

= R.H.S

Hence, it works for x = 2

Let’s check for x = 3

L.H.S = (1 + 3) + (1-3)

= 4 – 2

= 2

= R.H.S

Hence, it works for x = 3

Similarly, we can check for other values too. It will follow.

1 B. Question

Take as x different positive numbers, negative numbers and zero, and compute x + 1, x – 1, 1 – x. Check whether the equations below hold for all numbers.

x – (x – 1) = 1

Answer

x – (x – 1) = 1

Let’s check for x = -1

L.H.S = -1-(-1-1)

= -1-(-2)

= 1

= R.H.S

Hence, it works for x = -1

Let’s check for x = -2

L.H.S = -2 - (-2-1)

= -2 – (-3)

= 1

= R.H.S

Hence, it works for x = -2

Let’s check for x = -3

L.H.S = -3 – (-3 - 1)

= -3 – (-4)

= 1

= R.H.S

Hence, it works for x = -3

Similarly we can check for other values too. It will follow.

1 C. Question

Take as x different positive numbers, negative numbers and zero, and compute x + 1, x – 1, 1 – x. Check whether the equations below hold for all numbers.

1 – x = – (x – 1)

Answer

1 – x = – (x – 1)

Let’s check for x = 0

L.H.S = 1 – 0

= 1

R.H.S = -(0 - 1)

= 1

= L.H.S

Hence, it works for x = 0

Let’s check for x = 1

L.H.S = 1 – 1

= 0

R.H.S = - (1 - 1)

= 0

= L.H.S

Hence, it works for x = 1

Let’s check for x = 2

L.H.S = 1 – 2

= -1

R.H.S = - (2 - 1)

= -1

= L.H.S

Hence, it works for x = 2

Similarly we can check for other values too. It will follow.

2 A. Question

Taking different numbers as x, y and compute x + y, x – y. Check whether the following hold for all kinds of numbers.

(x + y) – x = y

Answer

Let’s take x as : 1,2,3,4

And respectively y as : -1,-2,-3,-4

For x = 1 and y = -1:

(x + y) = (1 - 1) = 0

(x - y) = (1 – (-1)) = 2

For x = 2 and y = -2:

(x + y) = (2 - 2) = 0

(x - y) = (2 – (-2)) = 4

For x = 3 and y = -3:

(x + y) = (3 - 3) = 0

(x - y) = (3 – (-3)) = 6

For x = 4 and y = -4

(x + y) = (4 - 4) = 0

(x - y) = (4 – (-4)) = 8

(i) (x + y) – x = y

Let’s check for x = 1 and y = -1

L.H.S = (1 + (-1)) – 1

= (0) – 1

= -1

R.H.S = y

= -1

= L.H.S

Hence, it holds for x = 1 and y = -1

Let’s check for x = 2 and y = -2

L.H.S = (2 + (-2)) – 2

= (0) – 2

= -2

R.H.S = -2

= L.H.S

Hence, it works for x = 2 and y = -2

Similarly we can check for other values too. It will follow.

2 B. Question

Taking different numbers as x, y and compute x + y, x – y. Check whether the following hold for all kinds of numbers.

(x + y) – y = x

Answer

(x + y) – y = x

Let’s check for x = 3 and y = -3

L.H.S = (3 + (-3)) – (-3)

= (0) + 3

= 3

R.H.S = 3

= L.H.S

Hence, it works for x = 3 and y = -3

Let’s check for x = 4 and y = -4

L.H.S = (4 + (-4)) – (-4)

= (0) + 4

= 4

R.H.S = 4

= L.H.S

Hence, it works for x = 4 and y = -4

Similarly, we can check for other values too. It will follow.

2 C. Question

Taking different numbers as x, y and compute x + y, x – y. Check whether the following hold for all kinds of

numbers.

(x – y) + y = x

Answer

(x – y) + y = x

Let’s check for x = 1 and y = -1

L.H.S = (1 – (-1)) + (-1)

= (2) – 1

= 1

R.H.S = 1

= L.H.S

Hence, it works for x = 1 and y = -1

Let’s check for x = 2 and y = -2

L.H.S = (2 – (-2)) + (-2)

= (4) -2

= 2

R.H.S = 2

= L.H.S

Hence, it works for x = 2 and y = -2

Similarly we can check for other values too. It will follow.

Questions Pg-174

1 A. Question

Check whether the equations are identities. Write the patterns got form each,on taking x = 1, 2, 3, 4, 5 and x = –1, –2, –3, –4, –5.

–x + (x + 1) = 1

Answer

Let’s take as x = 1,2,3,4,5 (positive numbers)

And as x = -1,-2,-3,-4,-5 (negative numbers)

(i) –x + (x + 1) = 1

We will calculate LHS in every case and compare it with RHS taking x = 1, = -1 + (1 + 1) = -1 + 2

= 1

Taking x = 2, = -2 + (2 + 1) = -2 + 3

= 1

taking x = 3,

= -3 + (3 + 1)

= -3 + 4 = 1

taking x = 4,

= -4 + (4 + 1)

= -4 + 5 = 1

taking x = 5,

= -5 + (5 + 1)

= -5 + 6 = 1

now taking x as negative numbers Taking x = -1, = -(-1) + (-1 + 1)

= 1 – 1 + 1 = 1

Taking x = -2, = -(-2) + (-2 + 1)

= 2 + 1 -2 = 1

Taking x = -3, = -(-3) + (-3 + 1)

= 3 -3 + 1 = 1

Taking x = -4, = -(-4) + (-4 + 1)

= 4 -4 + 1 = 1

Taking x = -5, = -(-5) + (-5 + 1)

= 5 – 5 + 1 = 1

As in each case LHS = 1 so, LHS = RHS

Hence, above equation is an identity.

1 B. Question

Check whether the equations are identities. Write the patterns got form each,on taking x = 1, 2, 3, 4, 5 and x = –1, –2, –3, –4, –5.

–x + (x + 1) + (x + 2) – (x + 3) = 0

Answer

–x + (x + 1) + (x + 2) – (x + 3) = 0

We will calculate LHS in every case and copare it with LHS

Taking x = 1,

= -1 + (1 + 1) + (1 + 2)-(1 + 3)

= -1 + 2 + 3-4

= 0

Taking x = 2,

= -2 + (2 + 1) + (2 + 2)-(2 + 3)

= -2 + 3 + 4-5

= 0

Taking x = 3,

= -3 + (3 + 1) + (3 + 2)-(3 + 3)

= -3 + 4 + 5-6

= 0

Taking x = 4,

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

= -4 + 5 + 6-7

= 0

Taking x = 5,

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

= -5 + 6 + 7-8

= 0

Taking x = -1,

= -(-1) + (-1 + 1) + (-1 + 2)-(-1 + 3)

= 1 + 0 + 1-2

= 0

Taking x = -2,

= -(-2) + (-2 + 1) + (-2 + 2)-(-2 + 3)

= 2-1 + 0-1

= 0

Taking x = -3,

= -(-3) + (-3 + 1) + (-3 + 2)-(-3 + 3)

= 3-2-1 + 0

= 0

Taking x = -4,

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

= 4-3-2 + 1

= 0

Taking x = -5,

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

= 5-4-3 + 2

= 0

As in each case in LHS = 0 so, LHS = RHS

Hence, above equation is an identity.

1 C. Question

Check whether the equations are identities. Write the patterns got form each,on taking x = 1, 2, 3, 4, 5 and x = –1, –2, –3, –4, –5.

–x – (x + 1) + (x + 2) + (x + 3) = 4

Answer

–x – (x + 1) + (x + 2) + (x + 3) = 4

We will calulate LHS in every case and compare it with RHS

Taking x = 1,

= -1-(1 + 1) + (1 + 2) + (1 + 3)

= -1-2 + 3 + 4

= 4

Taking x = 2,

= -2-(2 + 1) + (2 + 2) + (2 + 3)

= -2-3 + 4 + 5

= 4

Taking x = 3,

= -3-(3 + 1) + (3 + 2) + (3 + 3)

= -3-4 + 5 + 6

= 4

Taking x = 4,

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

= -4-5 + 6 + 7

= 4

Taking x = 5,

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

= -5-6 + 7 + 8

= 4

Taking x = -1,

= 1-(-1 + 1) + (-1 + 2) + (-1 + 3)

= 1 + 0 + 1 + 2

= 4

Taking x = -2,

= 2-(-2 + 1) + (-2 + 2) + (-2 + 3)

= 2 + 1 + 0 + 1

= 4

Taking x = -3,

= 3-(-3 + 1) + (-3 + 2) + (-3 + 3)

= 3 + 2-1 + 0

= 4

Taking x = -4,

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

= 4 + 3-2-1

= 4

Taking x = -5,

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

= 5 + 4-3-2

= 4

As in each case in LHS = 4 so, LHS = RHS

Hence, above equation is an identity.

2. Question

Taking different numbers, positive negative and zero, as x, y, z and compute x + (y + z) and (x + y) + z. Check whether the equation, x + (y + z) = (x + y) + z holds for all these numbers.

Answer

Let’s take x = 0,1,-1 y = 1,0,-1 and z = -1,1,0 respectively.

CASE 1: When x = 0, y = 1 and z = -1

Then, x + (y + z),

= 0 + (1-1)

= 0

CASE 2: When x = 1, y = 0 and z = 1

Then, x + (y + z)

= 1 + (0 + 1)

= 2

CASE 3: When x = -1, y = -1 and z = 0,

Then, x + (y + z)

= -1 + (-1 + 0)

= -2

Calculating (x + y) + z

CASE 1: When x = 0, y = 1 and z = -1

= (0 + 1) + (-1)

= 0

CASE 2:When x = 1, y = 0 and z = 1

= (1 + 0) + 1

= 2

CASE 3:When x = -1, y = -1 and z = 0

= (-1-1) + 0

= -2

Since, in every case x + (y + z) = (x + y) + z so,this holds for all these numbers.

Questions Pg-178

1. Question

Take various positive and negative numbers as x, y, z and compute (x + y)z and xz + yz. Check whether the equation (x + y)z = xz + yz holds for all these.

Answer

let, take x = 0,1,-1 y = 1,0,-1 and z = -1,1,0 respectively.

CASE 1:When x = 0, y = 1, and z = -1,

(x + y)z = (0 + 1)-1

= 1×-1

= -1

CASE 2:When x = 1, y = 0, and z = 1,

(x + y)z = (1 + 0)1

= 1×1

= 1

CASE 3:When x = -1, y = -1, and z = 0,

(x + y)z = (-1-1)0

= -2×0

= 0

Calculating xz + yz

CASE 1:when x = 0, y = 1, and z = -1,

xz + yz = 0×-1 + 1×-1

= 0 - 1

= -1

CASE 2:When x = 1, y = 0 and z = 1,

xz + yz = 1×1 + 0×1

= 1 + 0

= 1

CASE 3: When x = -1, y = -1 and z = 0

Xz + yz = -1×0 + (-1×0)

= 0 + 0

= 0

As in all case (x + y)z = xz + yz hence, it will holds for all numbers.

2 A. Question

In each of the following equations, take x as the given numbers and compute the numbers y.

$y = x^2$, x = –5, x = 5

Answer

1. $y = x^2$, x = –5, x =2. 5

Putting x = -5,

y = (-5)

^{2} = -5×-5 = 25

Putting x = 5,

$y = (5)^2 = 5×5$

= 25

2 B. Question

In each of the following equations, take x as the given numbers and compute the numbers y.

$y = x^2 + 3x + 2$, x = –2

Answer

$y = x^2 + 3x + 2$, x = –2

Putting y = -2,

$Y = (-2)^2 + 3\times(-2) + 2$

= 4-6 + 2

= 0

2 C. Question

In each of the following equations, take x as the given numbers and compute the numbers y.

$y = x^2 + 5x + 4$, x = –2, x = –3

Answer

$y = x^2 + 5x + 4$, x = –2, x = –3

When x = -2,

$y = (-2)^2 + 5\times-2 + 4$

= 4-10 + 4

= -2

When x = -3,

$y = (-3)^2 + 5\times-3 + 4$

= 9-15 + 4

= -2

2 D. Question

In each of the following equations, take x as the given numbers and compute the numbers y.

$y = x^3 + 1$, x = –1

Answer

$y = x^3 + 1$, x = –1

Putting x = -1,

$y = (-1)^3 + 1$

= 0

2 E. Question

In each of the following equations, take x as the given numbers and compute the numbers y.

$y = x^3 + x^2 + x + 1$, x = –1

Answer

$y = x^3 + x^2 + x + 1$, y = –1

putting y = -1,

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

y = -1 + 1 -1 + 1

= 0

3. Question

For a point starting at a point P and travelling along a straight line, time of travel is taken as t and the distance from P as s. The relation between s and t is found to be $s = 12t - 2t^2$, there distances to the right are taken as positive numbers and to the left as negative numbers.

(i) Is the position of the point to the right or left of P, till 6 seconds?

(ii) Where is the position at 6 seconds?

(iii) After 6 seconds?

Here it is convenient to write $12t - 2t^2 = 2t(6 - t)$.

Answer

$s = 12t - 2t^2$

(i) when $t = 6$, $s = 12\times6-2(6)^2$

$= 72-36\times2$

$= 0$

Thus, it is neither left nor right of point P.

(ii) $s = 2t(6-t)$

At $t = 6s$,

$s = 2\times6(6-6) = 0$

Hence, it is at point P.

(iii) $s = 12t- 2t^2$ it can have written as $2t(6-t)$

After 6 seconds the term (6-t) will be negative

At $t = 7$ $s = 2\times7(6-7)$

$s = 14 \times-1$

$s = -14$

At $t = 8$ $s = 2\times8(6-8)$

$s = 16\times -2$

$s = -32$

It will be left of point P after t = 6 seconds

4. Question

Natural numbers, their netiaves and zero are together called intergers. How many pairs of integers are there, satisfying the equation, $x^2 + y^2 = 25$?

Answer

We have to find how many pairs of integers are there, satisfying the equation, $x^2 + y^2 = 25$

When $x = 0$, $0 + y^2 = 25$ so, $y = + 5,-5$

Same will be for when $y = 0$, $x^2 + 0 = 25$ so, $x = 5,-5$

By hit and trial we can also find $9 + 16$ or $16 + 9 = 25$

So, $x = 3,-3,4,-4$ and respective $y = 4,-4,3,3$

So pairs are (0,5),(0,-5),(5,0),(-5,0),(3,4),(-3,4),(4,3),(4,-3),(-4,-3),(-3,-4).

Questions Pg-180

1. Question

In the equation $y = \frac{1}{x}$ take z as the numbers $-\frac{2}{3}, -\frac{1}{2}, -\frac{3}{5}$ and compute y.

Answer

$y = \frac{1}{x}$ and $x = -\frac{2}{3}, -\frac{1}{2}, -\frac{3}{5}$

when $x = -\frac{2}{3}$ $y = \frac{1}{\frac{2}{-3}}$ so, $y = -\frac{3}{2}$

when $x = \frac{1}{2}$ $y = \frac{1}{\frac{1}{-2}}$ so, $y = -2$

when $x = \frac{3}{5}$ $y = \frac{1}{\frac{3}{-5}}$ so, $y = \frac{5}{3}$

2. Question

In the equation $y = \frac{1}{x-1} + \frac{1}{x+1}$, take x = –2 and $x = -\frac{1}{2}$ and compute y.

Answer

$y = \frac{1}{x-1} + \frac{1}{x+1}$,

When x = -2 : $y = \frac{1}{-2-1} + \frac{1}{-2+1}$

So, $y = \frac{1}{-3} + (-1)$ $y = -1\frac{1}{3} = \frac{4}{3}$

When $x = \frac{1}{2}$: $y = \frac{1}{\frac{1}{2}-1} + \frac{1}{-\frac{1}{2}+1}$ so, $y = \frac{1}{-\frac{1}{2}} + \frac{1}{\frac{1}{2}}$

So, $y = -\frac{2}{3} + 2 = \frac{4}{3}$

3 A. Question

In the equation $z = \frac{x}{y} - \frac{y}{x}$, take x as the numbers given below and calculate the number z.

x = 10, y = –5

Answer

$z = \frac{x}{y} - \frac{y}{x}$,

When x = 10, y = –5

Then, $z = \frac{10}{-5} - \frac{-5}{10}$ so, $z = -2 + \frac{1}{2}$

$z = \frac{-3}{2}$

3 B. Question

In the equation $z = \frac{x}{y} - \frac{y}{x}$, take x as the numbers given below and calculate the number z.

x = –10, y = 5

Answer

when x = –10, y = 5

then, $z = \frac{-10}{5} - \frac{5}{-10}$ so, z = -2 + $\frac{1}{2}$

$z = \frac{-3}{2}$

3 C. Question

In the equation $z = \frac{x}{y} - \frac{y}{x}$, take x as the numbers given below and calculate the number z.

x = –10, y = –5

Answer

when x = –10, y = –5

then, $z = \frac{-10}{-5} - \frac{-5}{-10}$ so, z = 2$\frac{1}{2}$

$z = \frac{3}{2}$

3 D. Question

In the equation $z = \frac{x}{y} - \frac{y}{x}$, take x as the numbers given below and calculate the number z.

x = 5, y = –10

Answer

when x = 5, y = –10

then, $z = \frac{5}{-10} - \frac{-10}{5}$ so, z = 2$\frac{1}{2}$

$z = \frac{3}{2}$

3 E. Question

In the equation $z = \frac{x}{y} - \frac{y}{x}$, take x as the numbers given below and calculate the number z.

x = –5, y = 10

Answer

when x = –5, y = 10

then, $z = \frac{-5}{10} - \frac{10}{5}$ so, z = -2$\frac{1}{2}$

$z = \frac{-5}{2}$