THE SET OF INTEGERS ARE EQUAL TO ONE ANOTHER

Mr. Nrusingh Charan Mohapatra, M.Sc, M.Phil.
Rtd. Reader in Mathematics, Boudh Panchayat College, Boudh, Odisha, India

ABSTRACT:

The integers are made up of positive numbers, negative numbers and zero. The positive numbers are the natural numbers. The integers are the real numbers. The real numbers are the rational and the irrational numbers. All integers are equal to one another. The complex numbers are made up of real numbers and imaginary numbers. The complex numbers are the sum of the imaginary numbers as well as the real numbers.

KEYWORDS:

Positive number, Negative number, Zero, Equal, Square root

SUBJECT MATTER:

All integers are equal to one another, so it is a paradox. Paradox is a statement, that seems to be absurd or contradictory, but it is true or it may be true.

Suppose X and Y are any two integers.

We have \((X - Y)^2 = X^2 + Y^2 - 2XY\) \(\text{(1)}\)

And \((Y - X)^2 = Y^2 + X^2 - 2YX \) \(\text{(2)}\)

Here \(-2XY = -2YX\), As Multiplication is commutative.

From the equation (1) and the equation (2)

It is obvious that \(X^2 + Y^2 - 2XY = Y^2 + X^2 - 2YX\)

As \(-2XY = -2YX\)

\(\text{The square root of a number } x \text{ is a number} +_y \text{ such that } y^2 = x\)

\(\text{where } -y = \sqrt{x} \text{ and } +y = \sqrt{x}\)

\(\text{The square of a negative number is positive and}\)

\(\text{the square of a positive number is also positive.}\)

\(\text{Taking the square root of both sides of the equation (3)}\)

\(\text{we get } +_y \sqrt{(X - Y)^2} = +_y \sqrt{(Y - X)^2}\)

This implies that \(- (X - Y) = - (Y - X)\) and

\(+ (X - Y) = + (Y - X) \) \(\text{(4)}\)
Taking the negative values of both sides of the equation (4)
we get \(- (X - Y) = -(Y - X)\)
\[ => (X - Y) = (Y - X) \] By the Left cancellation law
So \(X + X = Y + Y \Rightarrow 2X = 2Y\),
So \(X = Y\), By the Left cancellation law
Taking the positive values of both sides of the equation (4),
We get \(X - Y = Y - X \Rightarrow X + X = Y + Y\)
\[ => 2X = 2Y \]
So \(X = Y\) By the Left cancellation law
Hence any two integers are equal to each other.

**CASE – I**

All positive numbers are equal to one another
Show that \(4 = 5\)
Proof :- Let \(X = 4\) and \(Y = 5\)
We have \(\sqrt{(X - Y)^2} = \sqrt{(Y - X)^2}\)
Putting the values of \(X\) and \(Y\) in the above equation,
We get \(\sqrt{(4 - 5)^2} = \sqrt{(5 - 4)^2}\)
So \(4 - 5 = 5 - 4 \Rightarrow 4 + 4 = 5 + 5\)
\[ \Rightarrow 8 = 10 \Rightarrow 2 \times 4 = 2 \times 5 \]
\[ \Rightarrow 4 = 5 \] By Left cancellation law
Hence all positive numbers are equal to one another.

**CASE – II**

Any positive number is equal to zero
Show that \(3 = 0\)
Proof :- Let \(x = 3\) and \(y = 0\)
we have \(\sqrt{(X - Y)^2} = \sqrt{(Y - X)^2}\)
Putting the values of \(X\) and \(Y\) in the above equation
We get \(\sqrt{(3 - 0)^2} = \sqrt{(0 - 3)^2}\)
\[ => 3 - 0 = 0 - 3 \Rightarrow 3 + 3 = 0 + 0 \]
\[ \Rightarrow 6 = 0 \], \(\Rightarrow 2 \times 3 = 2 \times 0 \)
\[ \Rightarrow 3 = 0 \] By Left cancellation law
Hence any positive number is equal to zero

**CASE – III**

Any positive number and any negative number are equal to each other
Show that \(2 = -5\)
Proof :- We have \(\sqrt{(X - Y)^2} = \sqrt{(Y - X)^2}\)
Let \(x = 2\) and \(y = -5\)
Putting the values of \(X\) and \(Y\) in the above equation, we get
\[\sqrt{(2 - (-5))^2} = \sqrt{(-5 - 2)^2}\]
\[2 + 5 = -5 - 2 \Rightarrow 2 + 2 = -5 - 5\]
\[\Rightarrow 4 = 10 \Rightarrow 2 \times 2 = 2 \times (-5)\)
So \(2 = -5\) By Left cancellation law
Hence any positive number and any negative number are equal to each other.
CASE – IV  All negative numbers are equal to one another

Show that  - 7 = - 9

Proof :- :-
We have  \( \sqrt{(X - Y)^2} = \sqrt{(Y - X)^2} \)

Let  \( X = -7 \) and  \( Y = -9 \)

Putting the values of  \( X \) and  \( Y \) in the above equation

We get  \( \sqrt{(-7 - (-9))^2} = \sqrt{(-9 - (-7))^2} \)

\[ \Rightarrow -7 - (-9) = -9 - (-7) \]
\[ \Rightarrow -7 + (-7) = -9 + (-9) \]
\[ \Rightarrow -7 - 7 = -9 - 9 \]
\[ \Rightarrow 2*(-7) = 2*(-9) \]
\[ \Rightarrow -7 = -9 \] By Left cancellation law

Hence all negative numbers are equal to one another

N.B.- COPY FOR INFORMATION TO (Email Id)

1.diroff@barc.gov.in
2.barma@theory.tifr.res.in
3.regr@admin.iisc.ernet.in
4.Scientificsecretary@isro.gov.in

CASE -- V  Any negative number is equal to zero

Show that  - 8 = 0

Proof :-
We have  \( \sqrt{(X - Y)^2} = \sqrt{(Y - X)^2} \)

Let  \( X = -8 \) and  \( Y = 0 \)

Putting the values of  \( X \) and  \( Y \) in the above equation

We have  \( \sqrt{(X - Y)^2} = \sqrt{(Y - X)^2} \)

\[ \Rightarrow -8 - 0 = 0 - (-8) \]
\[ \Rightarrow 8 - 0 = 0 + 8 \]
\[ \Rightarrow -8 - 8 = 0 + 0 \]
\[ \Rightarrow 2*(-8) = 2*(0) \]
\[ \Rightarrow -8 = 0 \] By Left cancellation law

Hence any negative number is equal to zero.

CONCLUSION :-

The above cases show that all integers are equal to one another.