

EXERCISE 1(A)

1. Is zero a rational number? Can it be written in the form p/q , where p and q are integers and $q \neq 0$?

Solution:

Yes, zero is a rational number.

It can be written in the form of p/q , where p and q are integers and $q \neq 0 \Rightarrow 0 = 0/1$.

2. Are the following statements true or false? Give reasons for your answers.

(i) Every whole number is a natural number.

(ii) Every whole number is a rational number.

(iii) Every integer is a rational number.

(iv) Every rational number is a whole number.

Solution:

(i) False

Natural numbers- Numbers starting from 1 to infinity (without fractions or decimals)

i.e., Natural numbers = 1, 2, 3, 4 ...

Whole numbers- Numbers starting from 0 to infinity (without fractions or decimals)

i.e., Whole numbers = 0, 1, 2, 3, ...

Or, we can say that whole numbers have all the elements of natural numbers and zero.

\therefore Every natural number is a whole number; however, every whole number is not a natural number.

(ii) True

Whole numbers- Numbers starting from 0 to infinity (without fractions or decimals)

i.e., Whole numbers = 0, 1, 2, 3...

Rational numbers- All numbers in the form p/q , where p and q are integers and $q \neq 0$.

i.e., Rational numbers = 0, $19/30$, 2, $9/-3$, $-12/7$...

\therefore Every whole number is a rational number; however, every rational number is not a whole number.

(iii) True

Integers- Integers are set of numbers that contain positive, negative and 0; excluding fractional and decimal numbers.

i.e., integers = $\{\dots-4,-3,-2,-1,0,1,2,3,4\dots\}$

Rational numbers- All numbers in the form p/q , where p and q are integers and $q \neq 0$.

i.e., Rational numbers = 0, $19/30$, 2, $9/-3$, $-12/7$...

\therefore Every integer is a rational number; however, every rational number is not an integer.

(iv) False

Rational numbers- All numbers in the form p/q , where p and q are integers and $q \neq 0$.

i.e., Rational numbers = 0, $19/30$, 2, $9/-3$, $-12/7$...

Whole numbers- Numbers starting from 0 to infinity (without fractions or decimals)

i.e., Whole numbers = 0, 1, 2, 3, ...

Hence, we can say that integers include whole numbers as well as negative numbers.

\therefore Every whole numbers are rational, however, every rational numbers are not whole numbers.

3. Arrange $-5/9$, $7/12$, $-2/3$ and $11/18$ in the ascending order of their magnitudes. Also, find the difference between the largest and the smallest of these rational numbers. Express this difference as a decimal fraction

correct to one decimal place.

Solution:

The given numbers are: $-5/9$, $7/12$, $-2/3$ and $11/18$

Now, the L.C.M of 9, 12 and 18 is 36

So, the given numbers are:

$-5/9$, $7/12$, $-2/3$ and $11/18$

$= -5 \times 4/9 \times 4$, $7 \times 3/12 \times 3$, $-2 \times 12/3 \times 12$ and $11 \times 2/18 \times 2$

$= -20/36$, $21/36$, $-24/36$ and $22/36$

Numbers in ascending order are:

$-24/36$, $-20/36$, $21/36$ and $22/36$

Hence, given numbers in ascending order are

$-2/3$, $-5/9$, $7/12$ and $11/18$

Now, to find the difference between the largest and smallest of the above number

Difference $= 11/18 - (-2/3)$

$$= 11/18 + 2/3$$

$$= 11/18 + (2 \times 6)/(3 \times 6)$$

$$= 11/18 + 12/18$$

$$= (11 + 12)/18$$

$$= 23/18$$

Now, to express this fraction as a decimal by correcting to one decimal place

Hence, $23/18 = 1.27777777... \approx 1.3$

4. Arrange $5/8$, $-3/16$, $-1/4$ and $17/32$ in the descending order of their magnitudes. Also, find the sum of the lowest and the largest of these rational numbers. Express the result obtained as a decimal fraction correct to two decimal places.

Solution:

Given numbers are: $5/8$, $-3/16$, $-1/4$ and $17/32$

The L.C.M of 8, 16, 4 and 32 is 32

So, the given numbers are:

$5/8$, $-3/16$, $-1/4$ and $17/32$

$= 5 \times 4/8 \times 4$, $-3 \times 2/16 \times 2$, $-1 \times 8/4 \times 8$ and $17 \times 1/32 \times 1$

$= 20/32$, $-6/32$, $-8/32$ and $17/32$

Numbers in descending order are:

$20/32$, $17/32$, $-6/32$, $-8/32$

Hence, given numbers in descending order are

$5/8$, $17/32$, $-3/16$ and $-1/4$

Now, to find the sum of the largest and the smallest of the above numbers

Sum $= 5/8 + (-1/4)$

$$= 5/8 - 1/4$$

$$= 5/8 - (1 \times 2)/(4 \times 2)$$

$$= 5/8 - 2/8$$

$$= (5 - 2)/8$$

$$= 3/8$$

Now, to express this fraction as a decimal by correcting to two decimal place

Hence, $3/8 = 0.375 \approx 0.38$

5. Without doing any actual division, find which of the following rational numbers have terminating decimal representation:

(i) $7/16$

(ii) $23/125$

(iii) $9/14$

(iv) $32/45$

(v) $43/50$

(vi) $17/40$

(vii) $61/75$

(viii) $123/250$

Solution:

(i) Given number is $7/16$

$$16 = 2 \times 2 \times 2 \times 2 = 2^4 = 2^4 \times 5^0$$

So, 16 can be expressed as $2^m \times 5^n$

Hence, $7/16$ is convertible into the terminating decimal

(ii) Given number is $23/125$

$$125 = 5 \times 5 \times 5 = 5^3 = 2^0 \times 5^3$$

So, 125 can be expressed as $2^m \times 5^n$

Hence, $23/125$ is convertible into the terminating decimal

(iii) Given number is $9/14$

$$14 = 2 \times 7 = 2^1 \times 7^1$$

So, 14 cannot be expressed as $2^m \times 5^n$

Hence, $9/14$ is not convertible into the terminating decimal

(iv) Given number is $32/45$

$$45 = 3 \times 3 \times 5 = 3^2 \times 5^1$$

So, 45 cannot be expressed as $2^m \times 5^n$

Hence, $32/45$ is not convertible into the terminating decimal

(v) Given number is $43/50$

$$50 = 2 \times 5 \times 5 = 2^1 \times 5^2$$

So, 50 can be expressed as $2^m \times 5^n$

Hence, $43/50$ is convertible into the terminating decimal

(vi) Given number is $17/40$

$$40 = 2 \times 2 \times 2 \times 5 = 2^3 \times 5^1$$

So, 40 can be expressed as $2^m \times 5^n$

Hence, $17/40$ is convertible into the terminating decimal

(vii) Given number is $61/75$

$$75 = 3 \times 5 \times 5 = 3^1 \times 5^2$$

So, 75 cannot be expressed as $2^m \times 5^n$

Hence, $61/75$ is not convertible into the terminating decimal

(viii) Given number is $123/250$

$$250 = 2 \times 5 \times 5 \times 5 = 2^1 \times 5^3$$

So, 250 can be expressed as $2^m \times 5^n$

Hence, $123/250$ is convertible into the terminating decimal



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