
Exercise 1C

Answer 1. Irrational numbers are those numbers which can neither be expressed as a terminating decimal nor as a repeating decimal, is called an irrational number. Rational numbers can be possible in both fraction and decimal form. On the contrary, an irrational number can only be presented in decimal form but not in a fraction.

Eg. Rational number

1) $2 = \frac{2}{1}$

2) $-3.1 = \frac{-31}{10}$

Irrational numbers

1) 0.200200020000

2) $\sqrt{2}, \sqrt{3}$

Answer 2.

i) $\sqrt{\frac{3}{81}}$

it is irrational number because $\sqrt{3}$ is irrational number and $\sqrt{81} = 9$ which is rational number. Dividing a irrational number with rational is always Irrational number.

ii) $\sqrt{361} = 19$

it is a rational number, as it can be written in the form $\frac{p}{q}$ and decimal form also.

iii) $\sqrt{21}$

it is a irrational number because it does not have a perfect square.

iv) $\sqrt{1.44} = 2.1$

it is rational number because it can be written in form $\frac{p}{q}$ and decimal form also.

v) $\frac{2}{3}\sqrt{6}$

It is a irrational number as $\sqrt{6}$ is irrational number and $\frac{2}{3} = 0.\overline{66}$ is rational

and rational X irrational is always Irrational number.

vi) $4.1276 = \frac{41276}{10000}$

it is rational number because it can be written in form $\frac{p}{q}$ and decimal form also.

vii) $\frac{22}{7} = 3.14$

it is rational number because it can be written in form $\frac{p}{q}$ and decimal form also.

viii) 1.232332333...

it is an irrational number because it is nonterminating and nonrepeating decimal.

ix) 3.040040004...

it is an irrational number because it is nonterminating and nonrepeating decimal.

x) $2.3565656... = 2.3\overline{56} = \frac{23\overline{56}}{1000}$

it is a rational number because it can be written in form $\frac{p}{q}$ and decimal form also.

xi) $6.834834... = 6.\overline{834} = \frac{6834}{1000}$

it is a rational number because it can be written in form $\frac{p}{q}$ and decimal form also.

Answer.3. Yes,

Let take $x = 2$ and $y = \sqrt{2}$

When we add $x + y = 2 + \sqrt{2}$

Which is rational + irrational = Irrational, as it is an irrational number because it is nonterminating and nonrepeating decimal.

Answer.4. Yes

If a is a rational number b is an irrational number then ab will always be irrational.

Rational \times irrational is always Irrational

Except $a = 0$, other all are irrational numbers only.

Answer.5. No

$$\sqrt{2} \times \sqrt{2} = 2$$

Irrational \times Irrational is not always Irrational, it may be Rational

As 2 is a rational number whereas $\sqrt{2}$ is an irrational number.

Answer.6.

- i) $(2 + \sqrt{3})$ and $(2 - \sqrt{3})$
- ii) $(2 + \sqrt{3})$ and $(7 + \sqrt{3})$
- iii) $(5 + \sqrt{3})$ and $(\sqrt{3} - 6)$
- iv) $(3 + \sqrt{2})$ and $(3 - \sqrt{2})$
- v) $(3 + \sqrt{3})$ and $(4 - \sqrt{3})$

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- vi) $(2 + \sqrt{3})$ and $(2 - \sqrt{3})$
vii) $\sqrt{3}$ and $\sqrt{18}$
viii) $\sqrt{3}$ and $\sqrt{27}$

Answer.7.

- i) $3 + \sqrt{3}$
As rational + irrational is always Irrational
- ii) $\sqrt{7} - 2$
As irrational - rational is always Irrational
- iii) $\sqrt[3]{5} \times \sqrt[3]{25}$
As irrational \times irrational is Rational
- iv) $\sqrt{7} \times \sqrt{343}$
As irrational \times irrational is Rational.
- v) $\sqrt{\frac{3}{117}}$
As irrational \div irrational is Rational
- vi) $\sqrt{8} \times \sqrt{2}$
As irrational \times irrational is Rational

Answer.8.

A rational number between 2 and 2.5 is $\frac{2+2.5}{2} = 2.25$

An irrational number between 2 and 2.5 is $\sqrt{2 \times 2.5} = \sqrt{5}$

Answer.9.

$$\sqrt{2} = 1.414 \text{ and } \sqrt{3} = 1.732$$

Now, we can write n number of rational numbers between these. That is just greater than 1.414 and less than 1.732 and it should be terminating or not terminating but repeating.

Infinite numbers lie between $\sqrt{2}$ and $\sqrt{3}$

Like, 1.4144144414444, 1.505005000, 1.606006000

Answer.10.

2 rational number between 0.5 and 0.55 can be anything

$$\Rightarrow 0.50 \text{ and } 0.5\bar{2}$$

2 irrational number between 0.5 and 0.55

$$\Rightarrow 0.511511151111 \text{ and } 0.535335333$$

There are infinite number which lie between 0.5 and 0.55

Answer.11. $\frac{5}{7}$ and $\frac{9}{11}$

First, we have to change the number into decimal or rational decimal form of $\frac{5}{7}$ is 0.71428571 and the decimal form of $\frac{9}{11}$ is 0.81818181

Any rational number can lie between 0.71428571 and 0.81818181

3 Irrational number are

$$\Rightarrow 0.737337333, 0.747447444, 0.797997999$$

Answer.12. A rational is always in the form $\frac{p}{q}$

So, we have $\frac{53}{250}$ and $\frac{105}{500}$.

Answer.13. Two irrational number that lie between 0.16 and 0.17 can be many

$$\Rightarrow 0.16116111 \text{ and } 0.1656656665$$

Answer.14.

i) True, rational + rational = Rational

$$\text{Eg. } \frac{5}{9} + \frac{17}{9} = \frac{22}{9}$$

ii) False, irrational + irrational \neq irrational

$$\text{Eg. Let } a = (1 + \sqrt{2}) \text{ and } b = (1 - \sqrt{2})$$

So, $a + b = 2$ which is rational number.

iii) True, rational \times rational = rational

$$\text{Eg. } 4.5 \times 2.3 = 10.35$$

iv) False, irrational \times irrational \neq irrational.

Eg. $\sqrt{8} \times \sqrt{2} = \sqrt{16} \rightarrow 4$

v) True, rational \times irrational = irrational

Eg. $2 \times \sqrt{2} = 2\sqrt{2}$

vi) False, rational \times irrational \neq rational number.

Eg. $3 \times \sqrt{2} = 3\sqrt{2}$, which is a irrational number.

vii) False,

As rational numbers can be written in form $\frac{p}{q}$. Rational numbers cannot be written on number line and all numbers written on number line are real.

viii) True,

Rational numbers are numbers which can be expressed as fractions. Real number is a set of all the numbers. So, each and every kind of number, rational or irrational will be considered as a real number.

ix) True,

π is a number whose exact value is not $\frac{22}{7}$.

π has a value which is nonterminating and nonrepeating.