9th - Class Maths
Chapter - 1 (Number Systems)
Exercise - 1.5

(Solution)

Que1) Classify the following numbers as rational or irrational:

(i) 2 – √5

(ii) (3 + √23) – √23

(iii) 2√7/7√7

(iv) 1/√2

(v) 2π

Solution:

(i) 2 – √5

As we known that √5 is an irrational number.
As we see above in explanation of exercise given RN – IRN = IRN
SO, we can say this is an irrational number.

Or

We can calculate by this method also:
2 – √5 = 2 – 2.2360679… = – 0.2360679…
Since the number is a non-terminating non-recurring therefore, it is an irrational number.

(ii) **(3 + √23) – √23** = 3 + √23 – √23 = 3 = 3/1

Rational numbers series: .....-2,-1,-1/2,0,1,2,3,3/2,3/4.....
Since the number is rational number as it can represented in p/q form.

(iii) **2√7/7√7** = 2/7

As it can represented in p/q form.

Since the number is rational number

(iv) **1/√2** = it is in the form of RN/IRN.

So, it is an irrational number.

(V) **2π** = as we know that π is a rational number.

And we know that, IRN X RN = IRN

Therefore, it is an irrational number.

Que2). Simplify each of the following expressions:

(i) (3 + √3) (2 + √2)

(ii) (3 + √3) (3 – √3)

(iii) $(\sqrt{5} + \sqrt{2})^2$

(iv) (√5 – √2) (√5 + √2)

Solution:

(i) (3 + √3) (2 + √2)

Do multiply of them

= 3 × 2 + 2 x √3 + 3√2+ √3 ×√2

= 6 + 2√3 +3√2 + √6

(ii) (3 + √3) (3 – √3)

As we know that, (a + b) (a – b) = $a^2 - b^2$

$3^2-(\sqrt{3})^2$

9 – 3 = 6

(iii) **$(\sqrt{5} + \sqrt{2})^2$**

As we know: $(a + b)^2 = a^2 + b^2 + 2ab$

$= (\sqrt{5})^2 + (\sqrt{2})^2 + 2 \times \sqrt{5} \times \sqrt{2}$

$= 5 + 2 + 2 \times \sqrt{5} \times 2 = 7 + 2\sqrt{10}$

(iv) **$(\sqrt{5} - \sqrt{2})(\sqrt{5} + \sqrt{2})$**

As we know: $(a + b)(a - b) = a^2 - b^2$

$= (\sqrt{5})^2 - (\sqrt{2})^2$

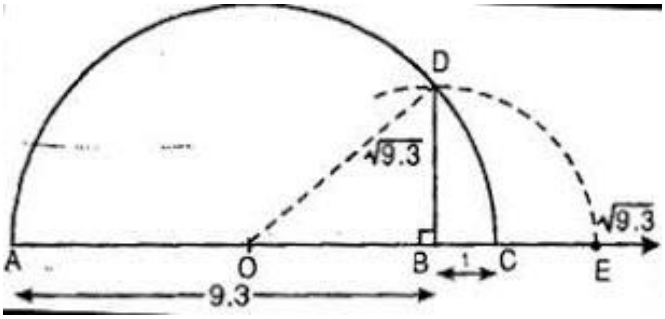
$= 5 - 2 = 3$

Que3). Recall, π is defined as the ratio of the circumference (say c) of a circle to its diameter (say d). That is, π = C/D. This seems to contradict the fact that π is irrational. How will you resolve this contradiction?

Solution: There is no contradiction. When we measure a value with a scale, we only obtain an approximate value. We never obtain an exact value. Therefore, we may not realise that either c or d is irrational. The value of π is almost equal to 22/7 or 3.142857…

Que4). Represent $\sqrt{9.3}$ on the number line.

Solution:



Step 1: Draw a line segment of unit 9.3. Extend it to C so that BC is of 1 unit.

Step 2: Now, AC = 10.3 units. Find the centre of AC by 10.3/2 and name it as O.

Step 3: Draw a semi-circle with radius OC and centre O.

Step 4: Draw a perpendicular line BD to AC at point B which intersect the semicircle at D. Also, Join OD.

Step 5: Now, OBD is a right angled triangle.

Here, OD = 10.3/2 (radius of semi circle), OC = 10.3/2, BC = 1

OB = OC – BC = (10.3/2) – 1 = 8.3/2

Using Pythagoras theorem,

OD = BD + OB

⇒ (10.3/2) = BD2 + (8.3/2)

⇒ BD = (10.3/2) – (8.3/2)

⇒ BD = (10.3/2 – 8.3/2) (10.3/2 + 8.3/2)

⇒ BD = 9.3

⇒ BD = √9.3

Thus, the length of BD is √9.3.

Step 6: Taking BD as radius and B as centre draw an arc which touches the line segment. The point where it touches the line segment is at a distance of √9.3 from O as shown in the figure.

To understand in well manner see the related video which is given below this page.

Que5). Rationalise the denominators of the following:

(i) 1/√7

(ii) 1/√7-√6

(iii) 1/√5+√2

(iv) 1/√7-2

Solution: To rationalise the given term we will do multiply in numerator and denominator by given denominator in question.

i) $\frac{1}{\sqrt{7}} = \frac{1\times\sqrt{7}}{\sqrt{7}\times\sqrt{7}} = \frac{\sqrt{7}}{7}$

ii) $\frac{1}{\sqrt{7}-\sqrt{6}} = \frac{1(\sqrt{7}+\sqrt{6})}{(\sqrt{7}-\sqrt{6})(\sqrt{7}+\sqrt{6})} = \frac{\sqrt{7}+\sqrt{6})}{1}$

iii)) $\frac{1}{\sqrt{5}+\sqrt{2}} = \frac{1(\sqrt{5}-\sqrt{2})}{(\sqrt{5}+\sqrt{2})(\sqrt{5}-\sqrt{2})} = \frac{\sqrt{5}-\sqrt{2})}{3}$

iv) $\frac{1}{\sqrt{7}-2} = \frac{1(\sqrt{7}+2)}{(\sqrt{7}-2)(\sqrt{7}+2)} = \frac{\sqrt{7}+2}{3}$