<u>**Important Questions**</u>
<u>**Chapter 1: Number Systems**</u>

Q.1: Find five rational numbers between 1 and 2.

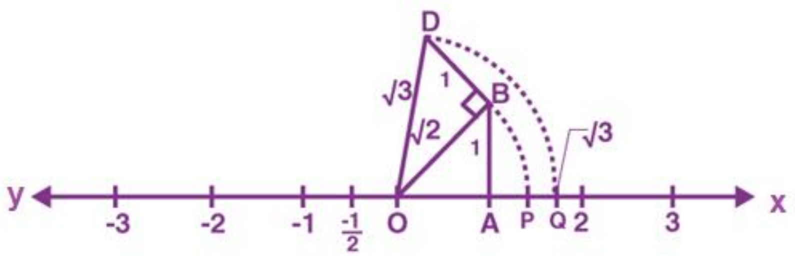
Solution: We have to find five rational numbers between 1 and 2.
So, let us write the numbers with denominator 5 + 1 = 6
Thus, 6/6 = 1, 12/6 = 2
From this, we can write the five rational numbers between 6/6 and 12/6 as:
7/6, 8/6, 9/6, 10/6, 11/6

Q.2: Find five rational numbers between 3/5 and 4/5.

Solution: We have to find five rational numbers between 3/5 and 4/5.
So, let us write the given numbers by multiplying with 6/6, (here 6 = 5 + 1)
Now,
3/5 = (3/5) × (6/6) = 18/30
4/5 = (4/5) × (6/6) = 24/30
Thus, the required five rational numbers will be: 19/30, 20/30, 21/30, 22/30, 23/30

Q.3: Locate √3 on the number line.

Solution:



Construct BD of unit length perpendicular to OB (here, OA = AB = 1 unit) as shown in the figure.
By Pythagoras theorem,
OD = √(2 + 1) = √3

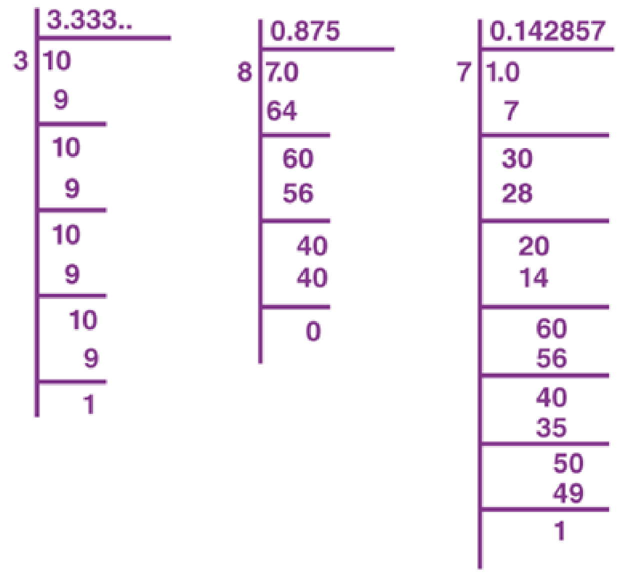
Taking O as the centre and OD as radius, draw an arc that intersects the number line at point Q using a compass. Therefore, Q corresponds to the value of √3 on the number line.

Q.4: Are the square roots of all positive integers irrational? If not, give an example of the square root of a number that is rational.

Solution: No, since the square root of a positive integer 16 is equal to 4. Here, 4 is a rational number.

Q.5: Find the decimal expansions of 10/3, 7/8 and 1/7.

Solution:



Therefore, 10/3 = 3.3333…
7/8 = 0.875
1/7 = 0.1428571…

Q.6: Show that 0.3333… = 1/3 can be expressed in the form p/q, where p and q are integers and q ≠ 0.

Solution:

Let x = 0.3333….

Multiply with 10,

10x = 3.3333…

Now, 3.3333… = 3 + x (as we assumed x = 0.3333…)

Thus, 10x = 3 + x

10x – x = 3

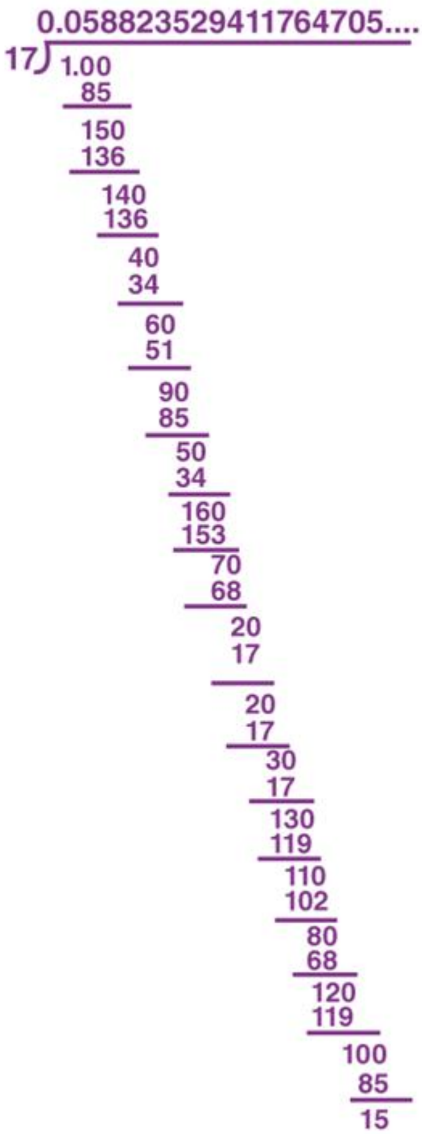
9x = 3

x = 1/3

Therefore, 0.3333… = 1/3. Here, 1/3 is in the form of p/q and q ≠ 0.

Q.7: What can the maximum number of digits be in the repeating block of digits in the decimal expansion of 1/17? Perform the division to check your answer.

Solution:



Thus, 1/17 = 0.0588235294117647….
Therefore, 1/17 has 16 digits in the repeating block of digits in the decimal expansion.

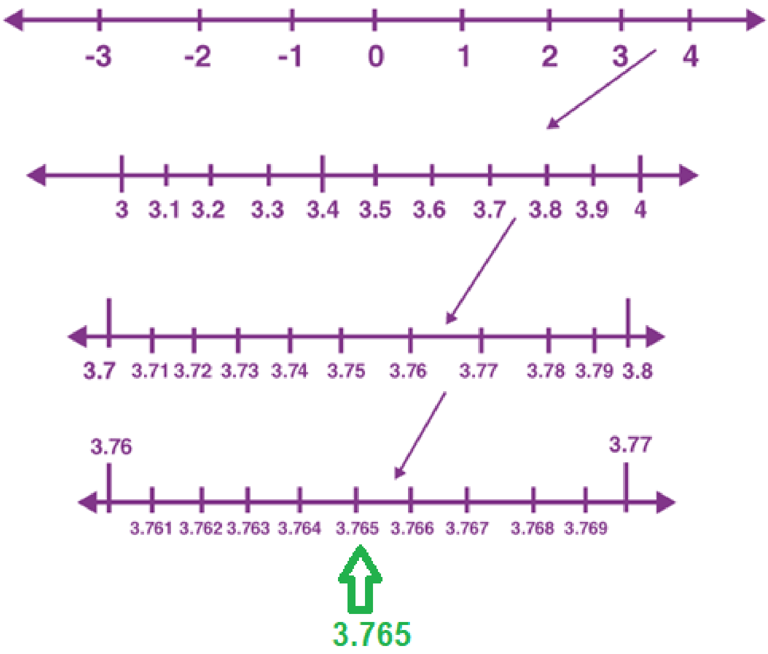
Q.8: Find three different irrational numbers between the rational numbers 5/7 and 9/11.

Solution: The given two rational numbers are 5/7 and 9/11.
5/7 = 0.714285714…..
9/11 = 0.81818181……
Hence, the three irrational numbers between 5/7 and 9/11 can be:
0.720720072000…
0.730730073000…
0.808008000…

Q.9: Visualise 3.765 on the number line, using successive magnification.

Solution:

Visualisation of 3.765 on the number line, using successive magnification is given below:



Q.10: Add 2√2+ 5√3 and √2 – 3√3.

Solution:

(2√2 + 5√3) + (√2 – 3√3)

= 2√2 + 5√3 + √2 – 3√3

= (2 + 1)√2 + (5 – 3)√3

= 3√2 + 2√3

Q.11: Simplify: (√3+√7) (√3-√7).

Solution:

(√3 + √7)(√3 – √7)

Using the identity $(a + b)(a – b) = a^2 – b^2$,

$(\sqrt{3} + \sqrt{7})(\sqrt{3} – \sqrt{7}) = (\sqrt{3})^2 – (\sqrt{7})^2$

= 3 – 7

= -4

Q.12: Rationalise the denominator of 1/[7+3√3].

Solution:

1/(7 + 3√3)

By rationalizing the denominator,

$= [1/(7 + 3\sqrt{3})] [(7 – 3\sqrt{3})/(7 – 3\sqrt{3})]$

$= (7 – 3\sqrt{3})/[(7)^2 – (3\sqrt{3})^2]$

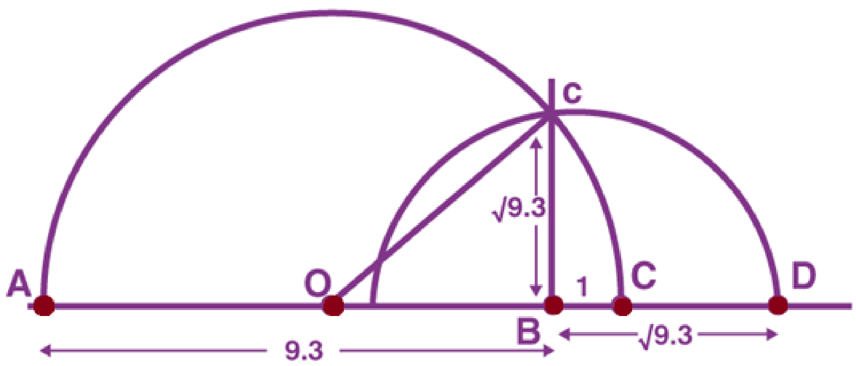
$= (7 – 3\sqrt{3})/(49 – 27)$

$= (7 – 3\sqrt{3})/22$

Q.13: Represent √(9.3) on the number line.

Solution:

Representation of √9.3 on the number line is given below:



Q.14: Simplify:

(i) $7^{2/3}.7^{1/5}$
(ii) $10^{1/2}/10^{1/4}$

Solution:

(i) $7^{2/3}.7^{1/5}$

Bases are equal, so add the powers.

$7^{(2/3 + 1/5)}$

$= 7^{(10 + 3)/15}$

$= 7^{13/15}$

(ii) $10^{1/2}/10^{1/4}$

Bases are equal, so subtract the powers.

$= 10^{(1/2 – 1/4)}$

$= 10^{1/4}$

Q.15: What is the product of a rational and an irrational number?
a) Always an integer
b) Always a rational number
c) Always an irrational number
d) Sometimes rational and sometimes irrational

Correct Answer: Option (c)

Explanation:

The product of a rational and an irrational number is always an irrational number.

For example, 2 is a rational number and $\sqrt{3}$ is irrational. Thus, $2\sqrt{3}$ is always an irrational number.

Q.16: What is the value of $(256)^{0.16}$ X $(256)^{0.09}$?
a) 4
b) 16
c) 64
d) 256.25

Correct answer: Option (a)

$(256)^{0.16} \times (256)^{0.09} = (256)^{(0.16 + 0.09)}$

$= (256)^{0.25}$

$= (256)^{(25/100)}$

$= (256)^{(1/4)}$

$= (4^4)^{(1/4)}$

$= 4^{4(1/4)}$

$= 4$

Q. 17: Are the square roots of all the positive integers irrational? If not, give an example of the square root of a number that is rational.

Solution: We know that the square root of every positive integer will not yield an integer.
We know that, $\sqrt{4}$ is 2, which is an integer. But $\sqrt{7}$ or $\sqrt{10}$ will give an irrational number. Thus, we can conclude that the square roots of every positive number are not an irrational number.