

NCERT Class 9 Maths - Chapter 1

Number Systems: Exercise Answer Key

Q1. Is zero ... $q \neq 0$?

Ans: Yes, zero is a rational number because it can be expressed as $0/1$, where numerator and denominator are integers and denominator is not zero.

Q2. Find six ... between 3 and 4.

Ans: We can write $3 = 30/10$ and $4 = 40/10$. Numbers like $31/10, 32/10, 33/10, 34/10, 35/10, 36/10$ are between 3 and 4.

Q3. Find five ... $3/5$ and $4/5$.

Ans: Write with denominator 10: $3/5 = 6/10$ and $4/5 = 8/10$. The numbers $61/100, 62/100, 63/100, 64/100, 65/100$ are between $3/5$ and $4/5$.

Q4. State whether ... reasons for your answers.

Ans: (i) True, all natural numbers are whole numbers.

(ii) False, negative integers are not whole numbers.

(iii) False, e.g., $1/2$ is rational but not a whole number.

Q1. State whether ... justify your answers.

Ans: (i) True, irrational numbers are real.

(ii) False, many real numbers are fractions or irrationals.

(iii) False, rationals are also real.

Q2. Are the square ... rational number.

Ans: Not all. Example: $\sqrt{4} = 2$, which is rational. But $\sqrt{2}, \sqrt{3}$ are irrational.

Q3. Show how ... on the number line.

Ans: Construct right triangle with sides 2 and 1. Hypotenuse = $\sqrt{5}$, mark it on number line using compass.

Q4. Classroom activity ... spiral depicting $\sqrt{2}, \sqrt{3}, \dots$

Ans: Square root spiral is drawn by consecutive right triangles of unit lengths, showing square roots of natural numbers.

Q1. Write the following ... decimal expansion each has:

Ans: $36/100 = 0.36$ (terminating)

$1/11 = 0.0909...$ (non-terminating recurring)

$1/4 = 0.25$ (terminating)

$3/13 = 0.230769...$ (non-terminating recurring)

$2/11 = 0.1818...$ (non-terminating recurring)

$329/400 = 0.8225$ (terminating).

Q2. You know that ... without long division?

Ans: Yes. Since $1/7 = 0.142857$ recurring, other fractions are cyclic shifts of 142857, e.g., $2/7 = 0.285714$ recurring.

Q3. Express the following ... $q \neq 0$.

Ans: 0.6 recurring $= 2/3$, 0.47 recurring $= 47/99$, 0.001 recurring $= 1/999$.

Q4. Express $0.9999...$... makes sense.

Ans: $0.999... = 1$. Because difference between them is zero, so they are equal.

Q5. What can the ... check your answer.

Ans: Maximum block length < 17 . On division, $1/17$ gives repeating block of 16 digits.

Q6. Look at several ... q must satisfy?

Ans: If denominator has prime factors only 2 or 5, decimal terminates. Otherwise it repeats.

Q7. Write three numbers ... non-recurring.

Ans: Examples: $\sqrt{2}$, π , $0.101101110111...$

Q8. Find three different ... $5/7$ and $9/11$.

Ans: Between $0.714...$ and $0.818...$ we can take $\sqrt{0.72}$, $0.730330033...$, $\pi/4$.

Q9. Classify the following ... rational or irrational:

Ans: $\sqrt{23}$ irrational, $\sqrt{225} = 15$ rational, 0.3796 rational, 7.478478... recurring rational, 1.10100100010

Q1. Classify the following ... rational or irrational:

Ans: $2 - \sqrt{5}$ irrational, $3 + \sqrt{23}$ irrational, $2/7$ rational, $1/\sqrt{2}$ irrational, 2π irrational.

Q2. Simplify each ... following expressions:

Ans: (i) $(\sqrt{3} + \sqrt{2})^2 = 5 + 2\sqrt{6}$

(ii) $(\sqrt{3} + \sqrt{3})(\sqrt{3} - \sqrt{3}) = 0$

(iii) $(\sqrt{5} + \sqrt{2})^2 = 7 + 2\sqrt{10}$

(iv) $(\sqrt{5} + \sqrt{2})(\sqrt{5} - \sqrt{2}) = 3$

Q3. Recall, π is defined ... contradiction?

Ans: π is defined as ratio, but circle is not constructible by rationals. So π remains irrational though de

Q4. Represent $\sqrt{9.3}$... on the number line.

Ans: Use geometric construction with semicircle method as taught earlier.

Q5. Rationalise the denominators ... following:

Ans: (i) $1/\sqrt{7} = \sqrt{7}/7$

(ii) $1/(\sqrt{7} - \sqrt{6})$ multiply conjugate = $\sqrt{7} + \sqrt{6}$

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

(iv) $1/(\sqrt{7} - \sqrt{2}) = (\sqrt{7} + \sqrt{2})/5$

Q1. Find : (i) ... (iii) $\sqrt[3]{125}$

Ans: $\sqrt{64} = 8$, $\sqrt[3]{125} = 5$, $\sqrt[4]{32} = 2$

Q2. Find : (i) ... (iv) $1/\sqrt[3]{125}$

Ans: $\sqrt[3]{9}$ irrational, $\sqrt{(32^2)} = 32$, $\sqrt[3]{16} = 2.52$ approx, $\sqrt[1/3]{125} = 1/5$

Q3. Simplify : (i) ... (iv) $\sqrt[1/2]{7} \times 8^{1/2}$

Ans: (i) $\sqrt{(5^2/3^2)} = 5/3$

(ii) $7^{(3/7 * 1/3)} = 7^{(1/7)}$

(iii) $\sqrt{(1/11 * 1/11)} = 1/11$

(iv) $\sqrt{2} \times \sqrt[3]{8} = 2\sqrt{2}$