

CBSE Test Paper 02
CH-1 Number Systems

1. The value of $0.\overline{23} + 0.\overline{22}$ is
- a. $0.\overline{45}$
 - b. $0.4\overline{5}$
 - c. $0.\overline{44}$
 - d. $0.4\overline{4}$
2. The rational number not lying between $\frac{3}{5}$ and $\frac{2}{3}$ is
- a. $\frac{50}{75}$
 - b. $\frac{46}{75}$
 - c. $\frac{47}{75}$
 - d. $\frac{49}{75}$
3. The value of $(32)^{\frac{1}{5}} + (-7)^0 + (64)^{\frac{1}{2}}$ is
- a. 10
 - b. 0
 - c. 11
 - d. 1
4. The $\frac{p}{q}$ form of the number 0.8 is
- a. 1
 - b. $\frac{1}{8}$
 - c. $\frac{8}{10}$

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d. $\frac{8}{100}$

5. Between any two rational numbers there

- a. is no irrational number
- b. is no rational number
- c. are many rational numbers
- d. are exactly two rational numbers

6. Fill in the blanks:

The value of $0.\overline{23} + 0.\overline{22}$ is _____.

7. Fill in the blanks:

0.83458456764 is _____.

8. Find the product of $\left(\sqrt{\frac{3}{5}} + \sqrt{\frac{5}{2}}\right)$ and $(\sqrt{5} + \sqrt{2})$.

9. Prove that $\frac{2\sqrt{7}}{7\sqrt{7}}$ is a rational number.

10. You know that $\frac{1}{7} = 0.142857\ldots$. Can you predict what the decimal expansions of $\frac{2}{7}, \frac{3}{7}, \frac{4}{7}, \frac{5}{7}, \frac{6}{7}$ are, without actually doing the long division? If so, how?
[Hint: Study the remainders while finding the value of $\frac{1}{7}$ carefully.]

11. Prove that $\sqrt{3} + 2$ is irrational.

12. Find five rational numbers between $\frac{3}{5}$ and $\frac{4}{5}$.

13. Visualize 2.4646 on the number line using successive magnification.

14. Simplify the following by rationalizing the denominator: $\frac{4+\sqrt{5}}{4-\sqrt{5}} + \frac{4-\sqrt{5}}{4+\sqrt{5}}$

15. Express $0.\overline{6} + 0.\overline{7} + 0.\overline{47}$ in the form $\frac{p}{q}$, where p and q are integers and $q \neq 0$.

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Solution

1. (a) $0.\overline{45}$

Explanation:

$$0.\overline{23} = 0.232323\ldots$$

$$0.\overline{22} = 0.222222\ldots$$

$$0.\overline{23} + 0.\overline{22} = 0.45454545\ldots \\ = 0.\overline{45}$$

2. (a) $\frac{50}{75}$

Explanation: $\frac{3}{5}$ and $\frac{2}{3}$

$$1 \text{ cm} = 75$$

$$\text{So, } \frac{3}{5} \times \frac{15}{15} \text{ and } \frac{2}{3} \times \frac{25}{25}$$

$$\text{i.e. } \frac{45}{75} \text{ and } \frac{50}{75}$$

$$\text{So, } \frac{46}{75}, \frac{47}{75}, \frac{48}{75}, \frac{49}{75}$$

3. (c) 11

Explanation:

$$= 2 + 1 + 8$$

$$= 11$$

4. (c) $\frac{8}{10}$

Explanation: $\frac{8}{10}$ Or, $\frac{4}{5}$

5. (c) are many rational numbers

Explanation: Between any two rational number there are many rational number,

Example — 4 and 8

We have 5, 6, 7, 7.5, ..., and many more

6. $0.\overline{45}$

7. an irrational number

8. $\left(\sqrt{\frac{3}{5}} + \sqrt{\frac{5}{2}}\right)(\sqrt{5} + \sqrt{2})$

$$\begin{aligned}
 &= \frac{\sqrt{3}}{\sqrt{5}} \times \sqrt{5} + \frac{\sqrt{3}}{\sqrt{5}} \times \sqrt{2} + \frac{\sqrt{5}}{\sqrt{2}} \times \sqrt{5} + \frac{\sqrt{5}}{\sqrt{2}} \times \sqrt{2} \\
 &= \sqrt{3} + \frac{\sqrt{6}}{\sqrt{5}} + \frac{5}{\sqrt{2}} + \sqrt{5}
 \end{aligned}$$

9. We can cancel $\sqrt{7}$ in the numerator and denominator, as $\sqrt{7}$ is the common number in numerator as well as denominator, to get $\frac{2}{7}$

Therefore, we conclude that $\frac{2\sqrt{7}}{7\sqrt{7}}$ is a rational number.

10. We are given that $\frac{1}{7} = 0.\overline{142857}$ or $\frac{1}{7} = 0.142857\dots$. We need to find the values of $\frac{2}{7}, \frac{3}{7}, \frac{4}{7}, \frac{5}{7}$ and $\frac{6}{7}$, without performing long division.

We know that, $\frac{2}{7}, \frac{3}{7}, \frac{4}{7}, \frac{5}{7}$ and $\frac{6}{7}$ can be rewritten as

$2 \times \frac{1}{7}, 3 \times \frac{1}{7}, 4 \times \frac{1}{7}, 5 \times \frac{1}{7}$ and $6 \times \frac{1}{7}$ On substituting value of $\frac{1}{7}$ as $0.142857\dots$ we get

$$2 \times \frac{1}{7} = 2 \times 0.142857\dots = 0.285714$$

$$3 \times \frac{1}{7} = 3 \times 0.142857\dots = 0.428571$$

$$4 \times \frac{1}{7} = 4 \times 0.142857\dots = 0.571428$$

$$5 \times \frac{1}{7} = 5 \times 0.142857\dots = 0.714285$$

$$6 \times \frac{1}{7} = 6 \times 0.142857\dots = 0.857142$$

11. $\sqrt{3}$ is irrational and 2 is rational.

$\therefore \sqrt{3} + 2$ is irrational.

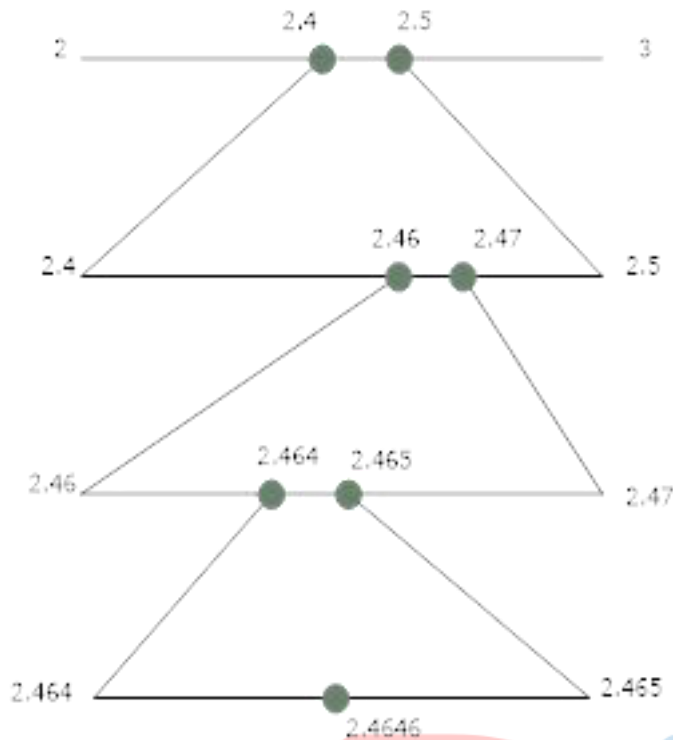
(\because The sum of a rational number and an irrational number is irrational)

12. $\frac{3}{5} = \frac{30}{50},$
 $\frac{4}{5} = \frac{40}{50}.$

\therefore five rational numbers between

$\frac{3}{5}$ and $\frac{4}{5}$ are $\frac{31}{50}, \frac{32}{50}, \frac{33}{50}, \frac{34}{50}, \frac{35}{50}$

13.



$$\begin{aligned}
 14. \quad & \frac{4+\sqrt{5}}{4-\sqrt{5}} + \frac{4-\sqrt{5}}{4+\sqrt{5}} \\
 &= \frac{(4+\sqrt{5})(4+\sqrt{5}) + (4-\sqrt{5})(4-\sqrt{5})}{(4-\sqrt{5})(4+\sqrt{5})} \\
 &= \frac{(4+\sqrt{5})^2 + (4-\sqrt{5})^2}{(4-\sqrt{5})(4+\sqrt{5})} \\
 &= \frac{\{(4)^2 + 2(4)(\sqrt{5}) + (\sqrt{5})^2\} + \{(4)^2 - 2(4)(\sqrt{5}) + (\sqrt{5})^2\}}{(4)^2 - (\sqrt{5})^2} \\
 &= \frac{(16+8\sqrt{5}+5) + (16-8\sqrt{5}+5)}{16-5} = \frac{42}{11}
 \end{aligned}$$

$$15. \text{ We have } 0.\bar{6} = \frac{6}{10} \dots (1)$$

$$\text{Let } x = 0.\bar{7} = 0.777\dots \dots (2)$$

Subtracting (1) from (2), we get

$$9x = 7 \Rightarrow x = \frac{7}{9} \text{ or } 0.\bar{7} = \frac{7}{9}$$

$$\text{Now, let } y = 0.4\bar{7} = 0.4777\dots$$

$$\therefore 10y = 4.\bar{7} \dots (3) \text{ And } 100y = 47.\bar{7} \dots (4)$$

Subtracting (3) from (4), we get

$$90y = 43 \Rightarrow y = \frac{43}{90}$$

$$\therefore 0.4\bar{7} = \frac{43}{90}$$

$$\text{Now, } 0.\bar{6} + 0.\bar{7} + 0.4\bar{7} = \frac{6}{10} + \frac{7}{9} + \frac{43}{90} = \frac{54+70+43}{90} = \frac{167}{90}$$

So, $\frac{167}{90}$ is of the form $\frac{p}{q}$ and $q \neq 0$.