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. $\frac{8}{10}$

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 $\frac{1}{7} = 0.142857\ldots\ldots$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 $0.6 + 0.\overline{7} + 0.\overline{47}$ 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:

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

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

   $0.\overline{23} + 0.\overline{23} = 0.45454545...$

   $= 0.\overline{45}$
2. (a) $\frac{50}{75}$

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

   1 cm = 75

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

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

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

$= \frac{\sqrt{3}}{\sqrt{5}} \times \sqrt{5} + \frac{\sqrt{3}}{\sqrt{5}} \times \sqrt{2} + \frac{\sqrt{5}}{\sqrt{2}} \times \sqrt{5} + \frac{\sqrt{5}}{\sqrt{2}} \times \sqrt{2}$
$= \sqrt{3} + \frac{\sqrt{6}}{\sqrt{5}} + \frac{5}{\sqrt{2}} + \sqrt{5}$

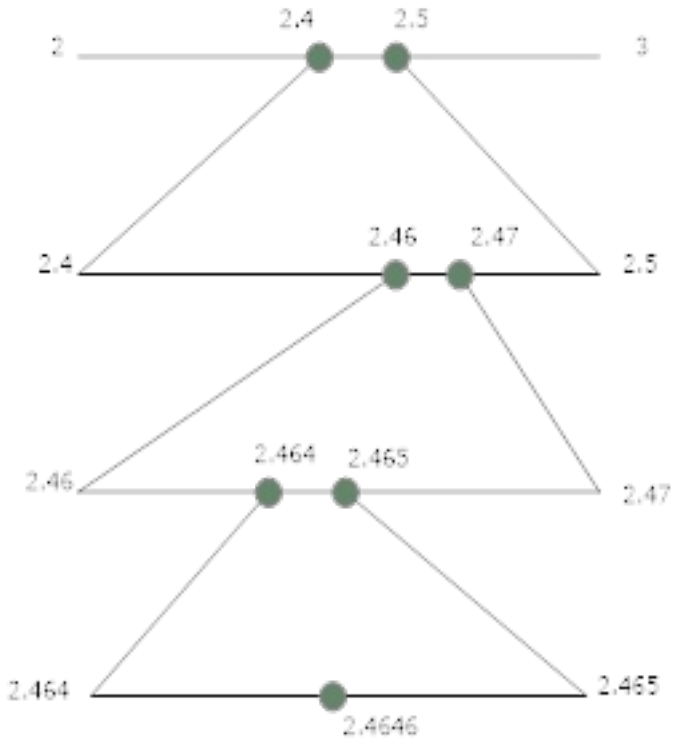
9. We can cancel$\sqrt{7}$ in the numerator and denominator, as $\sqrt{7}$ is the common number in numerator as well as denominator, to get $\frac{2}{7}$
   Therefore, we conclude that $\frac{2\sqrt{7}}{7\sqrt{7}}$ is a rational number.

10. We are given that $\frac{1}{7} = 0.\overline{142857}$ or $\frac{1}{7} = 0.142857.....$ 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 $0.142857.....$ we get
    $2 \times \frac{1}{7} = 2 \times 0.142857..... = 0.285714$
    $3 \times \frac{1}{7} = 3 \times 0.142857..... = 0.428571$
    $4 \times \frac{1}{7} = 4 \times 0.142857..... = 0.571428$
    $5 \times \frac{1}{7} = 5 \times 0.142857..... = 0.714285$
    $6 \times \frac{1}{7} = 6 \times 0.142857..... = 0.857142$

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.



14. $\frac{4+\sqrt{5}}{4-\sqrt{5}}+\frac{4-\sqrt{5}}{4+\sqrt{5}}$

$=\frac{(4+\sqrt{5})(4+\sqrt{5})+(4-\sqrt{5})(4-\sqrt{5})}{(4-\sqrt{5})(4+\sqrt{5})}$

$=\frac{(4+\sqrt{5})^2+(4-\sqrt{5})^2}{(4-\sqrt{5})(4+\sqrt{5})}$

$=\frac{\left\{(4)^2+2(4)(\sqrt{5})+(\sqrt{5})^2\right\}+\left\{(4)^2-2(4)(\sqrt{5})+(\sqrt{5})^2\right\}}{(4)^2-(\sqrt{5})^2}$

$=\frac{(16+8\sqrt{5}+5)+(16-8\sqrt{5}+5)}{16-5}=\frac{42}{11}$

15. We have $0.6=\frac{6}{10}$ ...(1)

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

Subtracting (1) from (2), we get

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

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

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

Subtracting (3) from (4), we get

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

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

Now, $0.6+0.\bar{7}+0.4\bar{7}=\frac{6}{10}+\frac{7}{9}+\frac{43}{90}=\frac{54+70+43}{90}=\frac{167}{90}$

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