CBSE Test Paper 03
CH-1 Number Systems

1. $\sqrt{8}+2\sqrt{32}-5\sqrt{2}$ is equal to
   a. none of these
   b. $\sqrt{32}$
   c. $\sqrt{8}$
   d. $5\sqrt{2}$
2. If $\sqrt{3}=1.732$ and $\sqrt{2}=1.414$, then the value of $\frac{1}{\sqrt{3}-\sqrt{2}}$ is
   a. 3.146
   b. $\frac{1}{3.146}$
   c. 0.318
   d. $\frac{1}{\sqrt{1.732}-\sqrt{1.414}}$
3. Which of the following is an rational number?
   a. $\sqrt{180}$
   b. 0.323223222322223.......
   c. $\sqrt{31}$
   d. $\sqrt{196}$
4. Which of the following is a true statement?
   a. π is irrational and $\frac{22}{7}$ is irrational
   b. π is rational and $\frac{22}{7}$ is rational
   c. π is irrational and $\frac{22}{7}$ is rational

d. π is rational and $\frac{22}{7}$ is irrational

5. The value of $\left(2+\sqrt{3}\right)\left(2-\sqrt{3}\right)$ in

   a. -1

   b. 2

   c. none of these

   d. 1

6. Fill in the blanks:

   A number which can neither be expressed as a terminating decimal nor as a repeating decimal is called ________.

7. Fill in the blanks:

   $16^{\frac{1}{4}}$ is equals to ________.

8. Rationalise the denominator of $\frac{3\sqrt{5}+\sqrt{3}}{\sqrt{5}-\sqrt{3}}$

9. Express 0.15 in the form $\frac{p}{q}$.

10. Write the decimal form and state its kind of decimal expansion. $\frac{3}{13}$

11. Simplify the following expression: $(3+\sqrt{3})(3-\sqrt{3})$

12. Simplify $(\sqrt{5}+\sqrt{2})^2$

13. If $\sqrt{2}$=1.4142, find the value of $\sqrt{\frac{\sqrt{2}-1}{\sqrt{2}+1}}$.

14. Show how $\sqrt{5}$ can be represented on the number line.

15. Simplify: $\frac{7\sqrt{3}}{\sqrt{10}+\sqrt{3}}-\frac{2\sqrt{5}}{\sqrt{6}+\sqrt{5}}-\frac{3\sqrt{2}}{\sqrt{15}+3\sqrt{2}}$.

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Solution

1. (d) $5\sqrt{2}$

   Explanation:

   $\sqrt{8}+2\sqrt{32}-5\sqrt{2}$

   $\Rightarrow 2\sqrt{2}+2\times 4\sqrt{2}-5\sqrt{2}$

   $\Rightarrow 10\sqrt{2}-5\sqrt{2}$

   $\Rightarrow 5\sqrt{2}$

2. (a) 3.146

   Explanation:

   $\frac{1}{\sqrt{3}-\sqrt{2}}$

   $\Rightarrow \frac{1}{\sqrt{3}-\sqrt{2}}\times\frac{\sqrt{3}+\sqrt{2}}{\sqrt{3}+\sqrt{2}}$

   $\Rightarrow \frac{\sqrt{3}+\sqrt{2}}{3-2}=\sqrt{3}+\sqrt{2}$

   $\Rightarrow 1.732+1.414$

   $\Rightarrow 3.146$

3. (d) $\sqrt{196}$

   Explanation:

   Because it is the square of 14 and can be

   Written in the form of $\frac{p}{q}$

4. (c) π is irrational and $\frac{22}{7}$ is rational

   Explanation:

   π is irrational because $\frac{22}{7}$ is not the exact value of π

   But,here $\frac{22}{7}$ is fraction so ,it is rational

5. (d) 1

   Explanation:

   We know the formula

   $a^2 - b^2 = (a+b)(a - b)$

Here put a =2 and b= √3

So, $2^2 - (\sqrt{3})^2 = 4 - 3 = 1$

6. an irrational number

7. 2

8. $\frac{3\sqrt{5}+\sqrt{3}}{\sqrt{5}-\sqrt{3}} = \frac{3\sqrt{5}+\sqrt{3}}{\sqrt{5}-\sqrt{3}} \times \frac{\sqrt{5}+\sqrt{3}}{\sqrt{5}+\sqrt{3}}$

$= \frac{15+3\sqrt{15}+\sqrt{15}+3}{(\sqrt{15})^2-(\sqrt{3})^2}$

$= \frac{18+4\sqrt{15}}{5-3} = \frac{2(9+2\sqrt{15})}{2}$

$= 9 + 2\sqrt{15}$

9. We have,

0.15 = $\frac{15}{100}$

$\Rightarrow$ 0.15 = $\frac{15 \div 5}{100 \div 5}$ [Dividing numerator and denominator by the common divisor 5 of numerator and denominator]

$\Rightarrow$ 0.15 = $\frac{3}{20}$

10.

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13) 3.00000000000 ( 0.230769230769......
     26
     40
     39
     100
      91
       90
       78
       120
       117
         30
         26
          40
          39
          100
           91
            90
            78
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$$\begin{array}{r} \overline{120} \\ 117 \\ \hline 3 \end{array}$$

$\therefore \frac{3}{13}$ = 0.230769230769 ... $= 0.\overline{230769}$

The decimal expansion is non-terminating repeating.

11. $(3+\sqrt{3})(3-\sqrt{3})$ = $(3)^2$ - $(\sqrt{3})^2$

= 9 - 3 = 6

12. $(\sqrt{5}+\sqrt{2})^2 = (\sqrt{5})^2 + (\sqrt{2})^2 + 2\sqrt{5} \times \sqrt{2} = 5 + 2 + 2\sqrt{10} = 7 + 2\sqrt{2}$

$\left[(a+b)^2 = a^2 + b^2 + 2ab\right]$

13. Given,

$\sqrt{2}$ = 1.4142

Now, $\sqrt{\frac{\sqrt{2}-1}{\sqrt{2}+1}} = \sqrt{\frac{(\sqrt{2}-1)}{(\sqrt{2}+1)} \times \frac{(\sqrt{2}-1)}{(\sqrt{2}-1)}}$ [by rationalising]

$= \sqrt{\frac{(\sqrt{2}-1)^2}{2-1}} = \frac{\sqrt{(\sqrt{2}-1)^2}}{1}$ [$\because$(a + b)(a - b) = a^2 - b^2]

$= \sqrt{2}$ - 1 = 1.4142 - 1 [$\because$ $\sqrt{2}$ = 1.4142]

= 0.4142

14. Representation of $\sqrt{5}$ on the number line

Consider a unit square OABC and transfer it onto the number line making sure that the vertex O coincides with zero.

Then OB = $\sqrt{1^2+1^2} = \sqrt{2}$

Construct BD of unit length perpendicular to OB.

Then OD = $\sqrt{(\sqrt{2})^2+1^2} = \sqrt{3}$

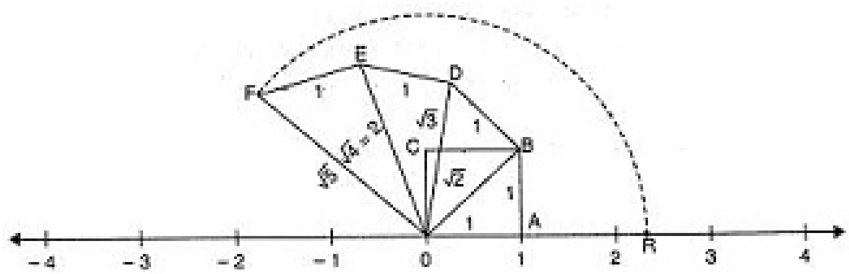
Construct DE of unit length perpendicular to OD.

Then OE = $\sqrt{(\sqrt{3})^2+1^2} = \sqrt{4}$ = 2

Construct EF of unit length perpendicular to OE.

Then OF =$\sqrt{2^2+1^2} = \sqrt{5}$

Using a compass, with centre O and radius OF, draw an arc which intersects the number line in the point R. Then R corresponds to $\sqrt{5}$.



Representation of $\sqrt{5}$

15. Given, $\frac{7\sqrt{3}}{\sqrt{10}+\sqrt{3}} - \frac{2\sqrt{5}}{\sqrt{6}+\sqrt{5}} - \frac{3\sqrt{2}}{\sqrt{15}+3\sqrt{2}}$

$= \frac{7\sqrt{3}}{\sqrt{10}+\sqrt{3}} \times \frac{\sqrt{10}-\sqrt{3}}{\sqrt{10}-\sqrt{3}} - \frac{2\sqrt{5}}{\sqrt{6}+\sqrt{5}} \times \frac{\sqrt{6}-\sqrt{5}}{\sqrt{6}-\sqrt{5}} - \frac{3\sqrt{2}}{\sqrt{15}+3\sqrt{2}} \times \frac{\sqrt{15}-3\sqrt{2}}{\sqrt{15}-3\sqrt{2}}$

$= \frac{7\sqrt{3}(\sqrt{10}-\sqrt{3})}{(\sqrt{10})^2-(\sqrt{3})^2} - \frac{2\sqrt{30}-2\times 5}{(\sqrt{6})^2-(\sqrt{5})^2} - \frac{3\sqrt{30}-18}{(\sqrt{15})^2-(3\sqrt{2})^2}$

$= \frac{7(\sqrt{30}-3)}{10-3} - \frac{(2\sqrt{30}-10)}{6-5} - \frac{3\sqrt{30}-18}{15-18}$

$= \sqrt{30} - 3 - (2\sqrt{30} - 10) - (6 - \sqrt{30})$

$= \sqrt{30} - 3 - 2\sqrt{30} + 10 - 6 + \sqrt{30}$

$= 10 - 9 + 2\sqrt{30} - 2\sqrt{30} = 1$