Chapter - 1 Number System

REVIEW PROBLEMS-1



SHORT ANSWER TYPE PROBLEMS-I

1. Express $0.\overline{35}$ as a rational number in the form p/q, where p and q are integers and $q \neq 0$.

🤘 🖟 [CBSE 2012]

2. Simplify: $\left[5\left\{8^{\frac{1}{3}} + 27^{\frac{1}{3}}\right\}\right]^{\frac{1}{4}}$.

- 3. Determine on the number line, the points which represent $\sqrt{5}$ and $\sqrt{6}$.
- 4. Examine, whether the following numbers are rationals or irrationals:
 - (i) $(\sqrt{2}+2)^2$
- (ii) $(2-\sqrt{2})(2+\sqrt{2})$ (iii) $(\sqrt{2}+\sqrt{3})^2$

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- 5. Classify the following numbers as rational or irrational with justification:

- (ii) $3\sqrt{18}$ (iii) $\sqrt{1.44}$ (iv) $\sqrt{\frac{9}{27}}$ (v) $-\sqrt{0.64}$
- (vi) $(1+\sqrt{5})-(4+\sqrt{5})$.
- 6. Give irrational numbers lying betwen $\sqrt{2}$ and $\sqrt{3}$.
- 7. Express the following in the form $\frac{p}{q}$, where p and q are integers and $q \neq 0$:

- (ii) 0.272727... (iii) 3.7777... (iv) 18.484848...
- 8. Look at several examples of rational numbers in the form $(q \neq 0)$, where p and q are integers with no common factors other than 1 and having terminating decimal expansions. Can you guess what property q must satisfy?
 - what property q must satisfy?Simplify and state if the following are rationals or irrationals:

- $(viii) \quad (\sqrt{8} + \sqrt{2})^2$
- (ix) $\frac{3}{\sqrt{8}} + \frac{1}{\sqrt{2}}$.
- [NCERT]

- 10. Insert three rational numbers between (i) -1 and -2 (ii) 0.1 and 0.11.
- 11. Find three rational numbers between (i) $\frac{5}{7}$ and $\frac{6}{7}$ (ii) $\frac{1}{4}$ and $\frac{1}{5}$. [NCERT (EP)]
- 12. Insert a rational and an irrational number between 2 and 3. How many rational numbers and irrational numbers can be inserted between 2 and 3?
- 13. What can the maximum number of digits be in the repeating block of digits in the decimal expansion of $\frac{1}{17}$? Perform the division to check your answer.

SHORT ANSWER TYPE PROBLEMS-II

- 14. Rationalise the denominators of the following:
 - (i) $\sqrt{\frac{16}{11}}$
- (ii) $\frac{7}{\sqrt{r}}$
- $(iv) \quad \frac{\sqrt{5}}{3\sqrt{3}}$

- (v) $\frac{1}{\sqrt{6}-\sqrt{5}}$ (vi) $\frac{3+\sqrt{2}}{3-\sqrt{2}}$

[NCERT (EP)]

(vii) $\frac{3\sqrt{5} + \sqrt{3}}{\sqrt{5} - \sqrt{2}}$

[NCERT (EP), CBSE 2012]

(viii) $\frac{4\sqrt{3} + 5\sqrt{2}}{48 + \sqrt{10}}$

- [NCERT (EP), CBSE 2010]
- 15. Rationalise the denominators in each of the following and hence evaluate by taking $\sqrt{2} = 1.414$, $\sqrt{3}$ = 1.732 and $\sqrt{5}$ = 2.236, upto three places of decimal.
 - (i) $\frac{4}{\sqrt{2}}$
- (ii) $\frac{6}{\sqrt{6}}$
- (iii) $\frac{\sqrt{10} \sqrt{5}}{2}$ (iv) $\frac{\sqrt{2}}{2 + \sqrt{2}}$

(v) $\frac{1}{\sqrt{3}+\sqrt{2}}$

[NCERT (EP)]

16. If $x = 6 - \sqrt{35}$, find (i) $\frac{1}{x}$ (ii) $x + \frac{1}{x}$ (iii) $x^2 + \frac{1}{x^2}$

[CBSE 2012]

17. If $a = 2 + \sqrt{3}$, find the value of (i) $a + \frac{1}{a}$ and (ii) $a^2 + \frac{1}{a^2}$.

- 18. Express $0.6 + 0.\overline{7} + 0.4\overline{7}$ in the form $\frac{p}{q}$, where p and q are integers and $q \neq 0$. [NCERT (EP)]
- (a) Express the number $22.378\overline{2378}$ in the form $\frac{p'}{q}$, where p and q are integers and $q \neq 0$.
 - (b) Convert $0.12\overline{54}$ into $\frac{p'}{q}$ form, where $\frac{p}{q}$ is a rational number.
- 20. Find three different irrational numbers between the rational numbers $\frac{5}{7}$ and $\frac{9}{11}$.
- 21. Write three different numbers whose decimal expansions are non-terminating and non-recurring.
- 22. Prove: $\left(\frac{81}{16}\right)^{-\frac{3}{4}} \times \left| \left(\frac{25}{9}\right)^{-\frac{3}{2}} \div \left(\frac{5}{2}\right)^{-3} \right| = 1.$

LONG ANSWER TYPE PROBLEMS

- 23. If $\sqrt{2} = 1.414$, $\sqrt{3} = 1.732$, then find the value of $\frac{4}{3\sqrt{3} 2\sqrt{2}} + \frac{3}{3\sqrt{3} + 2\sqrt{2}}$.
 - [NCERT (EP), CBSE 2010]

24. Simplify:
$$\frac{1}{1+x^{b-a}+x^{c-a}} + \frac{1}{1+x^{a-b}+x^{c-b}} + \frac{1}{1+x^{a-c}+x^{b-c}}.$$

25. Prove that:
$$\left(\frac{x^a}{x^b}\right)^{\frac{1}{ab}} \cdot \left(\frac{x^b}{x^c}\right)^{\frac{1}{bc}} \cdot \left(\frac{x^c}{x^a}\right)^{\frac{1}{ca}} = 1.$$

26. If
$$\frac{5-2\sqrt{3}}{7-4\sqrt{3}} = a-b\sqrt{3}$$
, find a and b.

[CBSE 2012]

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27. If
$$\frac{5+\sqrt{6}}{5-\sqrt{6}} = a+b\sqrt{6}$$
, find a and b.

28. If
$$x = 3 + 2\sqrt{2}$$
, then find whether $x + \frac{1}{x}$ is rational or irrational.

[CBSE 2012]

29. Simplify:
$$\frac{\sqrt{5+2\sqrt{6}} - \sqrt{5-2\sqrt{6}}}{\sqrt{5+2\sqrt{6}} + \sqrt{5-2\sqrt{6}}}$$

30. Show that:

$$\frac{1}{3-\sqrt{8}} - \frac{1}{\sqrt{8}-\sqrt{7}} + \frac{1}{\sqrt{7}-\sqrt{6}} - \frac{1}{\sqrt{6}-\sqrt{5}} + \frac{1}{\sqrt{5}-2} = 5.$$

1.
$$\frac{35}{99}$$

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- (i) Irrational
- (ii) Rational
- (iii) Irrational
- (iv) Irrational.

(i) Rational

(vi) Rational.

- (ii) Irrational
- (iii) Rational
- (iv) Irrational
- (v) Rational

6. $\sqrt{2.1}$, $\sqrt{2.2}$

7. (i)
$$-\frac{2}{3}$$

- Chanse the cornect suswer and al (ii) $\frac{3}{11}$ (iii) $\frac{34}{9}$ (iv) $\frac{610}{33}$.
- 8. q must have no prime factors other than 2 and 5.
- 9. (i) -41, rational,
- (ii) $28 10\sqrt{3}$, irrational
- (iii) $8 + 2\sqrt{15}$, irrational

- (iv) 2, rational
- (v) $\sqrt{2}$, irrational
- (vi) 4, rational

- (vii) $2-2\sqrt{2}$, irrational
- (viii) 18, rational
- (ix) $\frac{\sqrt{3}}{2}$ irrational.

- **10.** (i) -1.1, -1.2, -1.3
- (ii) 0.101, 0.102, 0.103
- 11. (i) $\frac{51}{70}$, $\frac{52}{70}$, $\frac{53}{70}$
- (ii) $\frac{9}{40}$, $\frac{17}{80}$, $\frac{19}{80}$
- 12. $\frac{5}{2}$, 2.010020003..., infinite

- **13.** 16; $\frac{1}{17} = 0.0588235294117647$
- 14. (i) $\frac{4\sqrt{y}}{y}$
- (ii) $\frac{7\sqrt{x}}{x}$
- (iii) $\frac{6x\sqrt{5}}{5}$
- (iv) $\frac{\sqrt{15}}{9}$

- (v) $\sqrt{6} + \sqrt{5}$
- $(vi) \quad \frac{11+6\sqrt{2}}{7}$
- (*vii*) $9 + 2\sqrt{15}$
- (viii) $\frac{9+4\sqrt{6}}{15}$

15. (i) 2.309 (ii) 2.449 (iii) 0.463 (iv) 0.414 (v) 0.318

16.

(i) $6 + \sqrt{35}$

(ii) 12

(iii) 142

17. (i) 4 (ii) 14

18.

19. (a) $\frac{223760}{9999}$ (b) $\frac{69}{550}$

20. 0.75075007500075000075...

0.76076007600076000076...

0.808008000800008000008...

21. 0.01001000100001...

0.202002000200002...

0.303003000300003...

26. a = 11, b = -6

23, 2.063

27. $a = \frac{31}{19}$, $b = \frac{10}{19}$ **28.** Rational (= 6)

29. $\sqrt{\frac{2}{3}}$.