

Chapter - 1 Number System

REVIEW PROBLEMS-1

SHORT ANSWER TYPE PROBLEMS-I

- 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]
- Simplify: $\left[5\left\{8^{\frac{1}{3}} + 27^{\frac{1}{3}}\right\}\right]^{\frac{1}{4}}$.
[CBSE 2012]
- Determine on the number line, the points which represent $\sqrt{5}$ and $\sqrt{6}$.
- Examine, whether the following numbers are rationals or irrationals:
 - $(\sqrt{2}+2)^2$
 - $(2-\sqrt{2})(2+\sqrt{2})$
 - $(\sqrt{2}+\sqrt{3})^2$
 - $\frac{6}{3\sqrt{2}}$
- Classify the following numbers as rational or irrational with justification:
 - $\sqrt{4}$
 - $3\sqrt{18}$
 - $\sqrt{1.44}$
 - $\sqrt{\frac{9}{27}}$
 - $-\sqrt{0.64}$
 - $(1+\sqrt{5})-(4+\sqrt{5})$.
- Give irrational numbers lying between $\sqrt{2}$ and $\sqrt{3}$.
- Express the following in the form $\frac{p}{q}$, where p and q are integers and $q \neq 0$:
 - 0.666...
 - 0.272727...
 - 3.7777...
 - 18.484848...
- Look at several examples of rational numbers in the form $\frac{p}{q}$ ($q \neq 0$), 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?
- Simplify and state if the following are rationals or irrationals:
 - $(2+3\sqrt{5})(2-3\sqrt{5})$
 - $(5-\sqrt{3})^2$
 - $(\sqrt{3}+\sqrt{5})^2$
 - $(2-\sqrt{2})(2+\sqrt{2})$
 - $\frac{6}{3\sqrt{2}}$
 - $(2+\sqrt{3})+(2-\sqrt{3})$
 - $(5-\sqrt{2})-(3+\sqrt{2})$
 - $(\sqrt{8}+\sqrt{2})^2$
 - $\frac{3}{\sqrt{8}}+\frac{1}{\sqrt{2}}$.
[NCERT]
- Insert three rational numbers between (i) -1 and -2 (ii) 0.1 and 0.11.
[NCERT (EP)]
- Find three rational numbers between (i) $\frac{5}{7}$ and $\frac{6}{7}$ (ii) $\frac{1}{4}$ and $\frac{1}{5}$.
[NCERT (EP)]
- 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?
- 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.
[NCERT]

SHORT ANSWER TYPE PROBLEMS-II

14. Rationalise the denominators of the following:

(i) $\sqrt{\frac{16}{y}}$

(ii) $\frac{7}{\sqrt{x}}$

(iii) $\frac{6x}{\sqrt{5}}$

(iv) $\frac{\sqrt{5}}{3\sqrt{3}}$

[NCERT (EP)]

(v) $\frac{1}{\sqrt{6}-\sqrt{5}}$

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

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

[NCERT (EP), CBSE 2012]

(viii) $\frac{4\sqrt{3}+5\sqrt{2}}{48+\sqrt{18}}$

[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) $\frac{4}{\sqrt{3}}$

(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) $a^2 + \frac{1}{a^2}$.

[CBSE 2012]

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)]

19. (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 $0.125\overline{4}$ 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 $\frac{9}{11}$. [NCERT]

21. Write three different numbers whose decimal expansions are non-terminating and non-recurring. [NCERT]

22. Prove: $\left(\frac{81}{16}\right)^{-\frac{3}{4}} \times \left[\left(\frac{25}{9}\right)^{-\frac{3}{2}} \div \left(\frac{5}{2}\right)^{-3}\right] = 1$.

[CBSE 2012]

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]

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. $\frac{167}{90}$ 19. (a) $\frac{223760}{9999}$ (b) $\frac{69}{550}$

20. 0.75075007500075000075...
0.76076007600076000076...
0.808008000800008000008...

21. 0.01001000100001... 23. 2.063 24. 1
0.202002000200002...
0.303003000300003...

26. $a = 11, b = -6$

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

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