EXERCISE # 1

A. Very Short Answer Type Questions

Q.1 Express the following in the form of p/q.

(i) $.\overline{3}$ (ii) $.\overline{37}$

Q.2 Write two irrational numbers between 0.2 and 0.21.

Q.3 Write three irrational numbers between 0.202002000200002...and 0.203003000300003...

Q.4 Write three irrational numbers between $\sqrt{3}$ and $\sqrt{5}$.

Q.5 Find two irrational numbers between 0.5 and 0.55.

Q.6 Find two irrational numbers lying between 0.1 and 0.12.

Q.7 Given a rational approximation of $\sqrt{3}$ correct to two places of decimals.

Q.8 In the following express the result in the simplest form : $\sqrt[3]{108a^4b^3}$

Q.9 Express as a pure surd : $\frac{1}{3}\sqrt[3]{54}$

Q.10 Simplify : $2.\sqrt[3]{40} + 3.\sqrt[3]{625} + 4.\sqrt[3]{320}$

Q.11 Simplify : $(3\sqrt{5}-2\sqrt{3})(3\sqrt{5}+2\sqrt{3})$

Q.12 Simplify : $\sqrt{m^2n^2}\times\sqrt[6]{m^2n^2}\times\sqrt[3]{m^2n^2}$

Q.13 Simplify : $\sqrt[5]{\sqrt[4]{(2^4)^3}} - 5\sqrt[5]{8} + 2\sqrt[4]{\sqrt[5]{(2^3)^4}}$

Q.14 If $\sqrt{3}$ = 1.732, find the value of $\frac{2}{\sqrt{3}}$.

B. Short Answer Type Questions

Q.15 Which of the following is

(i) rational (ii) irrational number

(A) $(2+\sqrt{3})^2$ (B) $(3+\sqrt{4})^2$

Q.16 Given that $\sqrt{3}$ = 1.732, find the value of $\sqrt{75}+\frac{1}{2}\sqrt{48}-\sqrt{192}$.

Q.17 Determine a and b if $\frac{5+\sqrt{3}}{7-4\sqrt{3}} = 94\ a + 3\sqrt{3}\ b$.

Q.18 If $\sqrt{5}$ = 2.236 and $\sqrt{6}$ = 2.449, find the value of $\frac{1+\sqrt{2}}{\sqrt{5}+\sqrt{3}} + \frac{1-\sqrt{2}}{\sqrt{5}-\sqrt{3}}$.

Q.19 If $x = 7+ 4\sqrt{3}$, find the value of $\sqrt{x}+\frac{1}{\sqrt{x}}$.

Q.20 If $p = 3 - 2\sqrt{2}$, determine $p^2+\frac{1}{p^2}$.

Q.21 Find the simplest rationalising factor of $\sqrt{5} + \sqrt{3} + 2$.

Q.22 Simplify : $3\sqrt{2} + \sqrt[4]{64} + \sqrt[4]{2500} + \sqrt[6]{8}$.

Q.23 Simplify and express the results in simplest form : $\frac{\sqrt{x^2-y^2}+x}{\sqrt{x^2+y^2}+y} \div \frac{\sqrt{x^2+y^2}-y}{x-\sqrt{x^2-y^2}}$.

Q.24 Evaluate : $\sqrt{5+2\sqrt{6}}$.

C. Fill in the Blanks

Q.25 Every point on the number line corresponds to a ..... number which may be either ..... or .....

Q.26 The decimal form of an irrational number is neither ..... nor .....

Q.27 The decimal representation of the rational number $\frac{8}{27}$ is .....

Q.28 0 is a/an ..... number .
(Rational /Irrational)

Q.29 The decimal equivalent to $\frac{7}{12}$ is .....

Q.30 The decimal equivalent to $\frac{49}{396}$ is .....

Q.31 The common fraction equivalent to 0.09375 is .....

Q.32 The common fraction equivalent to $0.4\overline{312}$ is .....

Q.33 Every real number is either ..... number or ..... number.

D. True/False Type Questions

Q.34 The sum of two rational numbers is rational.

Q.35 The sum of two irrational numbers is irrational.

Q.36 The product of two rational numbers is rational.

Q.37 The product of two irrational numbers is irrational.

Q.38 The sum of a rational number and an irrational number is irrational.

Q.39 The product of a nonzero rational number and an irrational number is a rational number.

Q.40 Every real number is rational.

Q.41 π is irrational and $\frac{22}{7}$ is rational.

Q.42 Every rational number must be a whole number.

Q.43 The number zero is both positive and negative.

Q.44 The sum of the two prime numbers is always even.

Q.45 The product of two odd numbers is always odd.

Q.46 A number of three digits has for its middle digit, the sum of the other two digits. Then the number must be a multiple of 11.

Q.47 If $u = x^2 - y^2$ is an even number, where x and y are whole numbers, then u must be a multiple of 4.

Q.48 The distance between the points a and b on the number line is equal to $|b - a|$.

ANSWER KEY

A. VERY SHORT ANSWER TYPE :

1. (i) $\frac{1}{3}$ (ii) $\frac{37}{99}$

2. 0.2010010001....., 0.2020020002.....

3. 0.20201001000100001....., 0.202020020002..., 0.202030030003.....

4. 1.8010010001....., 1.9010010001....., 2.010010001.....

5. 0.501001001..... and 0.5020020002.....

6. 0.10100100010000..... and 0.1020020002.....

7. 1.73

8. 3ab $\sqrt[3]{4a}$

9. $\sqrt[3]{2}$

10. $35\sqrt[3]{5}$

11. 33

12. m^2n^2

13. $-2.\sqrt[5]{8}$

14. 1.154

B. SHORT ANSWER TYPE :

15. (a) irrational (b) rational

16. – 1.732

17. $a = \frac{1}{2}, b = 9$

18. – 0.213

19. 4

20. 34

21. $(2+\sqrt{3}-\sqrt{5})\ (1-2\sqrt{3})$

22. $11\sqrt{2}$

23. $\frac{y^2}{x^2}$

24. $\sqrt{3}+\sqrt{2}$

C. FILL IN THE BLANKS :

25. real, rational number, an irrational number

26. terminating, recurring

27. $0.\overline{296}$

28. rational

29. $0.58\bar{3}$

30. $0.1\overline{237}$

31. $\frac{3}{32}$

32. $\frac{718}{1665}$

33. rational, irrational

D. TRUE/FALSE TYPE :

34. True

35. False

36. True

37. False

38. True

39. False

40. False

41. True

42. False

43. False

44. False

45. True

46. True

47. True

48. True

EXERCISE # 2

Which of the following statements are True/False. (Q. 1 to 13)

Q.1 Every natural number is a whole number.

Q.2 Every whole number is an integer.

Q.3 Every whole number is a natural number.

Q.4 Collection of whole numbers is denoted by W.

Q.5 Collection of integers is denoted by N.

Q.6 A real number is a rational number.

Q.7 Every point on the number line is a real number.

Q.8 Reciprocal of an irrational number is an irrational number.

Q.9 Every real number can be expressed in the form $\frac{p}{q}$ where p and q are integers and $q \neq 0$.

Q.10 Square root of every natural number is an irrational number.

Q.11 Every rational number can be expressed in the form of terminating decimal expansion.

Q.12 Decimal expansion of $\frac{2}{7}$ is of recurring form.

Q.13 The number 0.21211211121111……is an irrational number.

Q.14 Express the rational number $\frac{1}{27}$ in recurring decimal form by using the recurring decimal expression of $\frac{1}{3}$. Hence write $\frac{59}{27}$ in recurring decimal form.

Q.15 Express in $\frac{p}{q}$ form

(i) $2.\overline{124}$, (ii) $0.2\overline{37}$

Q.16 Express $\frac{1}{37}$ in decimal form and hence write the decimal expansion of $\frac{79}{37}$.

Q.17 Visualize the position of 5.665 on the number line, through successive magnification.

Q.18 Visualize the representation of $1.\overline{3}$ on the number line upto 4 decimal places, that is, upto 1.3333. Further locate 1.33333.

Q.19 Express $\sqrt{3.5}$ geometrically.

Q.20 Express $\sqrt{5.42}$ geometrically and represent it on the number line.

Q.21 By taking $\pi = 3.141$ and $\sqrt{2} = 1.414$, evaluate $\frac{2\pi + 3\sqrt{2}}{5}$ upto three places of decimals.

Q.22 Simplify the following expressions :

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

(ii) $(3 + \sqrt{3})(2 + \sqrt{2})$

(iii) $(3 + \sqrt{5})(3 - \sqrt{5})$

Q.23 If $a = 2 + \sqrt{3} + \sqrt{5}$ and $b = 3 + \sqrt{3} - \sqrt{5}$, prove that $a^2 + b^2 - 4a - 6b - 3 = 0$.

Q.24 If $x = \sqrt{3} + 2\sqrt{2}$ and $y = \sqrt{3} - 2\sqrt{2}$, evaluate $x^4 + y^4 + 6x^2y^2$.

Q.25 If $x = 1 - \sqrt{2}$, find the value of

(i) $x + \frac{1}{x}$ (ii) $x - \frac{1}{x}$

(iii) $x^2 + \frac{1}{x^2}$ (iv) $x^2 - \frac{1}{x^2}$

(v) $x^4 + \frac{1}{x^4}$ (vi) $x^4 - \frac{1}{x^4}$

Q.26 For the identity $\frac{7+\sqrt{5}}{7-\sqrt{5}} - \frac{7-\sqrt{5}}{7+\sqrt{5}} = a + 7\sqrt{5}b$, determine the rational numbers a and b.

Q.27 Simplify the following expressions :

(i) $\frac{1}{\sqrt{2}+1} + \frac{1}{\sqrt{3}+\sqrt{2}} + \frac{1}{\sqrt{4}+\sqrt{3}} + \frac{1}{\sqrt{5}+\sqrt{4}}$

(ii) $\frac{1}{\sqrt{2}+1} + \frac{1}{\sqrt{3}+2} + \frac{2}{\sqrt{5}+3} + \frac{2}{\sqrt{5}-3}$

Q.28 Simplify :

(i) $(9)^{\frac{9}{2}}$ (ii) $(9)^{-\frac{3}{2}}$ (iii) $(25)^{\frac{3}{2}}$

(iv) $(36)^{\frac{3}{2}}$ (v) $(49)^{-\frac{3}{2}}$ (vi) $(.0001)^{-\frac{3}{4}}$

Q.29 Simplify :

(i) $\left(\frac{243}{32}\right)^{-\frac{4}{5}}$ (ii) $\sqrt[3]{(343)^{-2}}$

Q.30 If $a^x = b$, $b^y = c$ and $c^z = a$, then prove that $xyz = 1$. Here a, b, c are positive real numbers and x, y, z are rational numbers.

ANSWER KEY

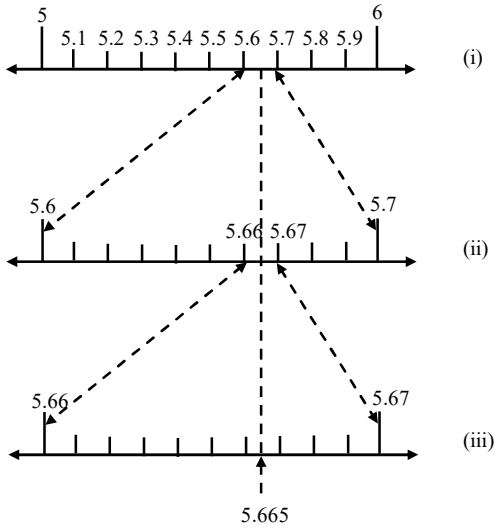
1. True **2.** True **3.** False **4.** True

5. False **6.** False **7.** True **8.** True

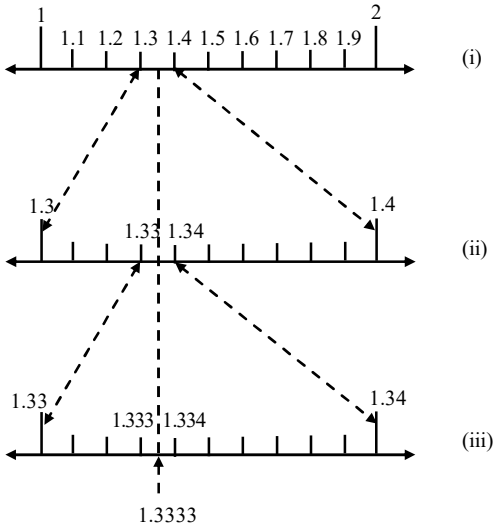
9. False **10.** False **11.** False **12.** True

13. True **14.** $0.\overline{037}, 2.\overline{185}$ **15.** (i) $\frac{2122}{999}$ (ii) $\frac{47}{198}$ **16.** $0.\overline{027}, 2.\overline{135},$

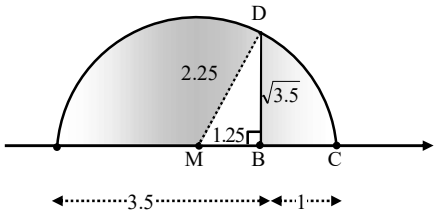
17.



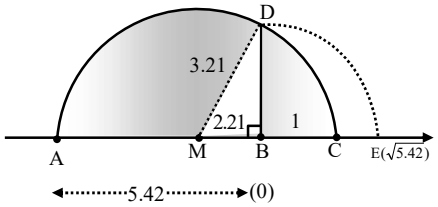
18.



19.



20.



21. 2.105 (approx)

22. (i) $3\sqrt{2}+2\sqrt{3}$ (ii) $6+3\sqrt{2}+2\sqrt{3}+\sqrt{6}$ (iii) 4

24. 585

25. (i) $-2\sqrt{2}$, (ii) 2, (iii) 6, (iv) $-4\sqrt{2}$, (v) 34, (vi) $-24\sqrt{2}$

26. $a=0, b=\frac{1}{11}$

27. (i) $\sqrt{5}-1$, (ii) $1+\sqrt{2}-\sqrt{3}-\sqrt{5}$

28. (i) 27, (ii) $\frac{1}{27}$, (iii) 125, (iv) 216, (v) $\frac{1}{343}$, (vi) 1000

29. (i) $\frac{16}{81}$, (ii) $\frac{1}{49}$