# G.D. GOENKA PUBLIC SCHOOL

**Shivpuri Link Road, Gwalior**

**Question Bank 1**
**Class : IX**
**Subject : Maths**
**Topic : Number Systems**

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1. If $x = \dfrac{\sqrt{5}-\sqrt{2}}{\sqrt{5}+\sqrt{2}}$ and $y = \dfrac{\sqrt{5}+\sqrt{2}}{\sqrt{5}-\sqrt{2}}$ find the value of $x^2 + xy + y^2$.

2. Simplify : $\dfrac{\sqrt{6}}{\sqrt{2}+\sqrt{3}} + \dfrac{3\sqrt{2}}{\sqrt{6}+\sqrt{3}} - \dfrac{4\sqrt{3}}{\sqrt{6}+\sqrt{2}}$

3. Simplify : $3\sqrt{45} - \sqrt{125} + \sqrt{200} - \sqrt{50}$ .

4. Find the value of :

$$\frac{4}{(216)^{\frac{-2}{3}}} - \frac{1}{(256)^{\frac{-3}{4}}}$$

5. If $a = 1 - \sqrt{2}$ find $\left(a - \dfrac{1}{a}\right)^3$

6. Locate $\sqrt{17}$ on the number line :

7. Locate $\sqrt{4.5}$ on the number line.

8. Prove that $\dfrac{1}{2+\sqrt{3}} + \dfrac{2}{\sqrt{5}-\sqrt{3}} + \dfrac{1}{2-\sqrt{5}} = 0.$

9. Evaluate : $\dfrac{\sqrt{5}+\sqrt{2}}{\sqrt{5}-\sqrt{2}}$ given that $\sqrt{10} = 3.162.$

10. Simplify the following by rationalising the denominators

$$\frac{1}{\sqrt{6}+\sqrt{5}} - \frac{2}{\sqrt{5}+\sqrt{7}} + \frac{1}{\sqrt{7}+\sqrt{6}}$$

11. Evaluate : $\dfrac{\sqrt{5}+\sqrt{3}}{\sqrt{5}-\sqrt{3}}$, given that $\sqrt{15} = 3.87.$

12. If $\dfrac{3+\sqrt{7}}{3-\sqrt{7}} + \dfrac{3-\sqrt{7}}{3+\sqrt{7}} = a + b\sqrt{7}$, find the value or $a$ and $b$.

13. Represent $\sqrt{10}$ on the number line.

14. If $\dfrac{3+\sqrt{8}}{3-\sqrt{8}} + \dfrac{3-\sqrt{8}}{3+\sqrt{8}} = a + b\sqrt{2}$ , find $a$ and $b$.

15. Simplify the following into a fraction with rational denominator.

$$\frac{1}{\sqrt{5}+\sqrt{6}-\sqrt{11}}$$

16. If $x = 3 + 2\sqrt{2}$, find the value of $\left(\sqrt{x} - \frac{1}{\sqrt{x}}\right)$.

17. Express $0.\overline{001}$ as a rational number in the form $\frac{p}{q}$ where $p$ and $q$ are integers and $q \neq 0$.

18. Find the square root of 4.5 geometrically.

19. Express $\frac{1}{1+\sqrt{2}-\sqrt{3}}$ with rational denominator.

20. If $\sqrt{5} = 2.236$ and $\sqrt{10} = 3.162$, find the value of $\left(\frac{\sqrt{10}-\sqrt{5}}{\sqrt{2}}\right)$.

21. If $x = \frac{\sqrt{3}+\sqrt{2}}{\sqrt{3}-\sqrt{2}}$ and $y = \frac{\sqrt{3}-\sqrt{2}}{\sqrt{3}+\sqrt{2}}$ then find the value of $x^2 + y^2 - 10xy$.

22. Find the square root of 4.2 geometrically.

23. If $x = 2 + \sqrt{3}$, find the value of $x^2 + \frac{1}{x^2}$.

24. If $a$ and $b$ are rational numbers, find the value of $a$ and $b$.

$$\frac{\sqrt{3}-1}{\sqrt{3}+1} = a + b\sqrt{3}$$

25. Simplify the following by rationalising the denominators.

$$\frac{3}{5-\sqrt{3}} + \frac{2}{5+\sqrt{3}}$$

26. If $x = \sqrt{13} + 2\sqrt{3}$, then find the value of $x - \frac{1}{x}$.

27. If $a = 2$, $b = 3$ then find the values of the following :

(*i*) $(a^b + b^a)^{-1}$ (*ii*) $(a^a + b^b)^{-1}$

28. Prove that $\frac{2^{30}+2^{29}+2^{28}}{2^{31}+2^{30}-2^{29}} = \frac{7}{10}$

29. Show that $\frac{1}{1+\sqrt{2}} + \frac{1}{\sqrt{2}+\sqrt{3}} = -1 + \sqrt{3}$.

30. If $x = 3 - 2\sqrt{2}$ then fine the value of $\left(x^2 - \frac{1}{x^2}\right)$.

31. If $a = \frac{3+\sqrt{7}}{2}$, then find the value of $a^2 + \frac{1}{a^2}$.

32. Simplify the following by rationalising the denominators.

$$\frac{\sqrt{5}-1}{\sqrt{5}+1} + \frac{\sqrt{5}+1}{\sqrt{5}-1}$$

33. If $x = 5 - 2\sqrt{6}$ then find the value of $x^2 + \frac{1}{x^2}$.

34. If $\frac{5+2\sqrt{3}}{7+4\sqrt{3}} = a + b\sqrt{3}$ then find the value of $a$ and $b$.

35. If $x = \frac{\sqrt{3}-1}{\sqrt{3}+1}$ and $y = \frac{3+2\sqrt{2}}{3-2\sqrt{2}}$ then find the value of $x + y$

36. If $a = \frac{4}{3-\sqrt{5}}$. Find the value of $a + \frac{4}{a}$.

37. Represent $\sqrt{10}$ on the number line.

38. Prove that $\left(\frac{2^a}{2^b}\right)^{a+b} \times \left(\frac{2^b}{2^c}\right)^{b+c} \times \left(\frac{2^c}{2^a}\right)^{c+a} = 1$

39. If $(5)^{x-3} \times (3)^{2x-8} = 225$ then find the value of $x$.

40. Prove that $\frac{1}{1+x^{a-b}} + \frac{1}{1+x^{b-a}} = 1$