

1. Simplify:
 - a) $\left[\{(81)^{-1/2}\}^{-1/4}\right]^2$
 - b) $\frac{2\sqrt{6}}{\sqrt{2+\sqrt{3}}} + \frac{6\sqrt{2}}{\sqrt{6+\sqrt{3}}} - \frac{8\sqrt{3}}{\sqrt{6+\sqrt{2}}}$
 - c) $\frac{1}{\sqrt{5+\sqrt{6}}-\sqrt{11}}$
 - d) $\frac{4}{(216)^{-2/3}} + \frac{1}{(256)^{-3/4}} + \frac{2}{(243)^{-1/5}}$
 - e) $2^3\sqrt[3]{40} + 3^3\sqrt[3]{625} - 4^3\sqrt[3]{320}$
 - f) $\sqrt[4]{81} - 8\sqrt[3]{216} + 15\sqrt[5]{32} + \sqrt{225}$
2. Express the following in the form of $\frac{p}{q}$, where p and q are integers and $q \neq 0$.
 - a) 0.4777... b) $23.\overline{43}$ c) $1.\overline{27}$ d) $1.2\overline{35}$
3. Write three irrational numbers between:
 - a) $\sqrt{3}$ and $\sqrt{5}$ b) $\frac{6}{7}$ and $\frac{9}{11}$
4. If $x = 2 - \sqrt{3}$ then find the value of $\left(x + \frac{1}{x}\right)^3$.
5. If $2^a = 3^b = 6^c$ then show that $c = \frac{ab}{a+b}$
6. If $x = 9 + 4\sqrt{5}$, find the value of $\sqrt{x} - \frac{1}{\sqrt{x}}$
7. If $\sqrt{3} = 1.732$, then find the value of $\sqrt{75} + \frac{1}{2}\sqrt{48} - \sqrt{192}$
8. Locate the following on number line: a) $\sqrt{17}$ b) $\sqrt{5.3}$ c) $-\frac{\sqrt{3}}{2}$ d) $-\frac{1}{\sqrt{2}}$
9. If $x = 3 + \sqrt{8}$, find the value of $x^2 - \frac{1}{x^2}$
10. Simplify: $\frac{2^{x+5} - 4 \times 2^x}{16 \times 2^{x+2} - 2^{x+3}}$
11. Find the value of $(256)^{0.16} \times (256)^{0.09}$
12. If x, y and z are positive real numbers, then show that $\sqrt{x^{-1}y} \cdot \sqrt{y^{-1}z} \cdot \sqrt{z^{-1}x} = 1$
13. Express $2.3\overline{6} + 0.2\overline{3}$ as a rational numbers.
14. If $\sqrt{18 - 6\sqrt{5}} = \sqrt{a} - \sqrt{b}$, then prove that $a + b = 18$.
15. If $\frac{7+\sqrt{5}}{7-\sqrt{5}} - \frac{7-\sqrt{5}}{7+\sqrt{5}} = a + 7\sqrt{5}b$, then find the value of a and b.
16. 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 $x^2 + y^2 + xy$.
17. If $x^a = y, y^b = z$ and $z^c = x$, then prove that $abc = 1$.
18. Prove that $\frac{1}{3-\sqrt{8}} - \frac{1}{\sqrt{8}-\sqrt{7}} + \frac{1}{\sqrt{7}-\sqrt{6}} - \frac{1}{\sqrt{6}-\sqrt{5}} + \frac{1}{\sqrt{5}-2} = 5$