1. Which of the following is true?

A. Every whole number is a natural number
B. Every integer is a rational number
C. Every rational number is an integer
D. Every integer is a whole number

2. For positive real numbers a and b

A. $\sqrt{ab}=\sqrt{a}\,\sqrt{b}$ B. $(a+\sqrt{b})(a-\sqrt{b})=a^2-b$

C. $\sqrt{\frac{a}{b}}=\frac{\sqrt{a}}{\sqrt{b}}$ C. $(\sqrt{a}+\sqrt{b})(\sqrt{a}-\sqrt{b})=a+b$

3. Out of the following, the irrational number is

A. $1.\overline{5}$ B. $1.2\overline{77}$ C. π D. $2.4\overline{77}$

4. To rationalise the denominator of $\frac{1}{\sqrt{a}+b}$, we multiply this by

A. $\frac{1}{\sqrt{a}+b}$ B. $\frac{\sqrt{a}-b}{\sqrt{a}-b}$ C. $\frac{1}{\sqrt{a}+b}$ D. $\frac{\sqrt{a}+b}{\sqrt{a}+b}$

5. The number of rational numbers between $\sqrt{3}$ and $\sqrt{5}$ is

A. One B. 3 C. None D. Infinitely many

6. If we add two irrational numbers, the resulting number

A. is always an irrational number B. is always a rational number
C. may be a rational or an irrational number D. always an integer

7. The rationalising factor of $7-2\sqrt{3}$ is

A. $7+2\sqrt{3}$ B. $7-2\sqrt{3}$ C. $4+2\sqrt{3}$ D. $5+2\sqrt{3}$

8. If $\frac{1}{7}=0.\overline{142857}$, then $\frac{4}{7}$ equals

A. $0.\overline{428571}$ B. $0.\overline{285718}$ C. $0.\overline{857142}$ D. $0.\overline{571428}$

9. The value of n for which $\sqrt{n}$ be a rational number is

A. 2 B. 4 C. 3 D. 5

10. $\frac{3\sqrt{12}}{6\sqrt{27}}$ equals

A. $\frac{1}{2}$ B. $\sqrt{3}$ C. $\frac{1}{3}$ D. $\sqrt{2}$

11. $(3+\sqrt{3})(3-\sqrt{2})$ equals

A. $9-5\sqrt{2}-\sqrt{6}$ B. $9-\sqrt{6}$

C. $3+\sqrt{2}$ D. $9-3\sqrt{2}+3\sqrt{3}-\sqrt{6}$

12. The arrangement of $\sqrt{2}, \sqrt{3}, \sqrt{5}$ in ascending order is

A. $\sqrt{2}, \sqrt{3}, \sqrt{5}$ B. $\sqrt{5}, \sqrt{3}, \sqrt{2}$

C. $\sqrt{2}, \sqrt{5}, \sqrt{3}$ D. $\sqrt{3}, \sqrt{2}, \sqrt{5}$

13. If m and n are two natural numbers and $m^n = 32$, then n^{mn} is

A. 5^2 B. 5^3 C. 5^{10} D. 5^{12}

14. If $\sqrt{10}=3.162$, then the value of $\frac{1}{\sqrt{10}}$ is

A. 0.3162 B. 3.162 C. 31.62 D. 316.2

15. If $\left(\frac{3}{4}\right)^6 \times \left(\frac{16}{9}\right)^5 = \left(\frac{4}{3}\right)^{x+2}$, then the value of x is

A. 4 B. –2 C. 2 D. 6

1. Prove that $\sqrt{5}-\sqrt{3}$ is not a rational number.

2. Arrange the following in descending order of magnitude: $\sqrt[8]{90}$, $\sqrt[4]{10}$, $\sqrt{6}$

3. Simplify the following: $(4\sqrt{3}-2\sqrt{2})(3\sqrt{2}+4\sqrt{3})$

4. If $a=6-\sqrt{35}$, find the value of $a^2+\frac{1}{a^2}$

5. Simplify, by rationalising the denominator

$$\frac{2\sqrt{6}}{\sqrt{2}+\sqrt{3}}+\frac{6\sqrt{2}}{\sqrt{6}+\sqrt{3}}-\frac{8\sqrt{3}}{\sqrt{6}+\sqrt{2}}$$

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

7. If $\frac{5+2\sqrt{3}}{7+\sqrt{3}}=a-\sqrt{3b}$, find a and b where a and b are rational numbers.

8. Evaluate:

$$\frac{1}{\sqrt{2}+1}+\frac{1}{\sqrt{3}+\sqrt{2}}+\frac{1}{\sqrt{4}+\sqrt{3}}+.....+\frac{1}{\sqrt{9}+\sqrt{8}}$$

9. If $x=\frac{1}{2+\sqrt{3}}$, find the value of $2x^3-7x^2-2x+1$

10. If $\sqrt{2}$ = 1.414 and $\sqrt{5}$ = 2.236, find the value of $\frac{\sqrt{10}-\sqrt{5}}{2\sqrt{2}}$ upto three places of decimals