Surds & Indices

b – Index
a – base

$\sqrt[3]{8}$ Surd

$p^m p^n = p^{(m+n)}$ $\quad \frac{p^m}{p^n} = p^{(m-n)}$

$(p^m)^n = p^{mn}$ $\quad p^1 = p$ $\quad p^0 = 1$

$\left(\frac{a}{b}\right)^p = \frac{a^p}{b^p}$ $\quad p^{-n} = \frac{1}{p^n}$

$p^n = a \pm \sqrt{b}$ $\quad p^{-n} = a - \sqrt{b}$

Indices tips

$\left(\frac{x^a}{x^b}\right)^c \times \left(\frac{x^b}{x^c}\right)^a \times \left(\frac{x^c}{x^a}\right)^b = 1$

$\left(\frac{x^a}{x^b}\right)^{(a+b)} \times \left(\frac{x^b}{x^c}\right)^{(b+c)} \times \left(\frac{x^c}{x^a}\right)^{(c+a)} = 1$

$\left(\frac{x^a}{x^b}\right)^{(a^2+b^2+ab)} \times \left(\frac{x^b}{x^c}\right)^{(b^2+c^2+bc)} \times \left(\frac{x^c}{x^a}\right)^{(c^2+a^2+ac)} = 1$

Surd tips

$\sqrt[m]{p} = p^{1/m}$ $\quad \sqrt[m]{ab} = \sqrt[m]{a} \times \sqrt[m]{b}$

$\sqrt[5]{ab} = \sqrt[5]{6} \times \sqrt[5]{8} = \sqrt[5]{6 \times 8}$

$\sqrt[m]{\frac{a}{b}} = \frac{\sqrt[m]{a}}{\sqrt[m]{b}}$ $\quad \left(\frac{a}{b}\right)^{1/m} = \frac{a^{1/m}}{b^{1/m}}$ $\quad (ab)^{1/m} = a^{1/m} b^{1/m}$

$(\sqrt[m]{a})^m = a$

$(\sqrt[m]{a})^n = (a^{1/m})^n = a^{n/m}$ //

$a^{\frac{1}{m} \times n}$

$\sqrt[m]{a^n}$

1.) what will be the product of $\sqrt{2}$, $\sqrt[3]{3}$, $\sqrt[6]{5}$

$\sqrt{a} + \sqrt{b} \neq \sqrt{a+b}$

$2^{1/2} \quad 3^{1/3} \quad 5^{1/6}$

$\frac{1}{2} : \frac{1}{3} \quad \frac{1}{6}$

$\frac{3}{6} \quad \frac{2}{6} \quad \frac{1}{6}$

$2^{\frac{3}{6}} \quad 3^{2/6} \quad 5^{1/6}$

$(2^3)^{1/6} \quad (3^2)^{1/6} \quad (5^1)^{1/6}$

$(360)^{1/6}$

//

2.) Solve for m in $47^{6.5} \times 47^{5.9} \times 47^{3.7} \times 47^{11.3} = 47^{2m}$

$(6.5 + 5.9 + 3.7 + 11.3)$

$47^{29.4} = 47^{2m}$

$m = 13.7$

//

3) if $m^{3b+6} = 1$, what is the value of b

$1 = 1^0$

$m^{3b+6} = m^0$

$3b+6 = 0$

$b = \frac{-6}{3} = b = -2$

4) $10^{65982} \div 10^{65979} = 1000^?$

$\frac{10^{65981}}{10^{65979}} =$

$10^3 = 1000$

$(1000)^1 = 1000^?$

$? = 1$

5) find $(m^2 + m^{-2})$, when it is given that $m = 9 + \sqrt{43}$

$\left(m^2 + \frac{1}{m^2}\right)$

$\left(m + \frac{1}{m}\right)^2 = m^2 + \frac{1}{m^2} + 2m\frac{1}{m}$

$\left(9+\sqrt{43} + 9-\sqrt{43}\right)^2 = m^2 + \frac{1}{m^2} + 2$

$324 - 2 = m^2 + m^{-2}$

$322 = m^2 + m^{-2}$

6) which is the smallest amongst $\sqrt{3}, \sqrt[3]{2}, \sqrt[5]{5}, \sqrt[4]{4}$

$3^{1/2} \quad 2^{1/3} \quad 5^{1/6} \quad 4^{1/4}$

$\frac{6}{12} \quad \frac{4}{12} \quad \frac{2}{12} \quad \frac{3}{12}$

$3 \quad 2 \quad 5 \quad 9$

$(3^6)^{1/12} \quad (2^4)^{1/12} \quad (5^2)^{1/12} \quad (9)^{3/12}$

$(729)^{1/12} \quad (76)^{1/12} \quad (25)^{1/12} \quad (641)^{1/4}$

smallest = smallest value

Thus $(16)^{1/12}$

2 | 2 3 4 4

2 | 1, 3, 3 2

3 | 1, 3, 1, 2

1, 1, 1,

7) what will be the value $\sqrt{1+m} + \sqrt{1-m}$ $m = 4/5$

$(\sqrt{1+m} + \sqrt{1-m})^2 = 1+m+1-m+2\sqrt{1+m}\sqrt{1-m}$

$2+2\sqrt{1-m^2}$

$2+2\sqrt{1-\frac{16}{25}}$

$2+2\sqrt{\frac{9}{25}} = 2+\frac{6}{5} = \frac{16}{5}$ Sqrt $= \frac{9}{\sqrt{5}}$

8.) Find the value of $m^{23/59}$, if $3^m + 3^{-m} = 10$

$P = m^{23/59}$

$3P + \frac{3}{P} = 10$

$3P^2 + 3 = 10P$

$3P^2 - 10P + 3 = 0$

$3P^2 - 9P - P + 3 = 0$

$3P(P-1) \quad P = 3$

$3P = 1$

$P = \frac{1}{3}$

$S = \frac{-10}{6} = \frac{5}{3}$

$P = 1$

$\left(\frac{5}{6} - x\right)\left(\frac{5}{6} + x\right)$

$\frac{25}{36} - x^2 = 1$

$-9 \quad -1$

$x^2 = \frac{25}{36} - 36$

$-\frac{9}{36} = \frac{3}{12}$

$x^2 = \frac{3}{12}$

$x = +$

9.) $\sqrt{3\sqrt{3\sqrt{3}}} = ?$

$\sqrt{3\sqrt{3\sqrt{3}}} \ldots \infty = A$

$A^{\frac{2^n-1}{2^n}}$

$A^{\frac{2^n-1}{2^n}}$

$3^{\frac{8-1}{8}} = 3^{7/8}$

10) which of the expression is not same

$6^2 \times 6 = (6)^3 = 2^3 + 3^3 = 8^3 - 11^2 - 10^2$

$216 = 6^{1+3} = 216 \neq 35$

11) value of $2^{(-2)^2}$

$2^{(-2)^2} = 2^4 = 16$

12) what is the value of $2^{2(-2)}$

$2^{-2} = \frac{1}{2^2} = \frac{1}{2^1} = 2^{\frac{1}{4}} = \sqrt[4]{2}$

$2^{-2} = \frac{1}{}$

13) value of M in $\left(\frac{p}{q}\right)^{2m+2} = \left(\frac{q}{p}\right)^{q-m}$

$a^2 = \frac{1}{a^2}$ $a^{-2} = \frac{1}{a^2}$

$\left(\frac{q}{p}\right)^{-(q-m)} = \left(\frac{p}{q}\right)^{m-q} = \left(\frac{p}{q}\right)^{2m+2}$

$m - q = 2m + 2$

$m = -11$

$m - 11 = 2m$

$-11 = m$

14) what is the value of $(36)^{1/6}$

$(6^2)^{1/6}$

$6^{1/3}$

$\sqrt[3]{6}$

15) How many zeros are there in 2000^{10}

$2 \times 1000^3 = 3 \times 10 = 30$

16) What will come in Place of ?

$\frac{72}{?^{8/5}} = \frac{?^{7/5}}{24}$

$72 \times 24 = ?^{8/5} \cdot ?^{7/5}$

$72 \times 24 = ?^{\frac{8}{5}+\frac{7}{5}} = ?^{\frac{15}{5}} = ?^3$

$72 \times 24 = ?^3$

$? = 12$

72
×9
288
1040
1728