

Exponents and Indices (Set 02)

1. Find the value of x

a. $2^{2x+3} - 9 \times 2^x + 1 = 0$

b. $9 \times 3^x = 27^{2x-5}$

c. $(\sqrt[3]{\frac{2}{3}})^{x-1} = \frac{27}{8}$

d. $\sqrt{\left(\frac{3}{5}\right)^{1-2x}} = 4 \frac{17}{27}$

e. $(\sqrt{\frac{3}{5}})^{x+1} = \frac{125}{27}$

2. Evolute

a. $\frac{4}{216^{-\frac{2}{3}}} + \frac{1}{256^{-\frac{3}{4}}} + \frac{2}{243^{-\frac{1}{5}}}$

b. $\frac{5^{n+3} - 6 \times 5^{n+1}}{9 \times 5^n - 5^n \times 2^2}$

c. $\frac{3 \times 27^{n+1} + 9 \times 3^{3n-1}}{8 \times 3^{3n} - 5 \times 27^x}$

d. $\frac{8^{3a} \times 2^5 \times 2^{2a}}{4 \times 2^{11a} \times 2^{-2a}}$

e. $\frac{3 \times 9^{n+1} - 9 \times 3^{2n}}{3 \times 3^{2n+3} - 9^{n+1}}$

f. $\frac{2^n \times 6^{m+1} \times 10^{m-n} \times 15^{m+n-2}}{4^m \times 3^{2m+n} \times 25^{m-1}}$

g. If $m = \sqrt[3]{15}$ and $n = \sqrt[3]{14}$ find the value of $m - n - \frac{1}{m^2 + mn + n^2}$

h. If $(a^m)^n = a^m a^n$, find the value of $m(n-1) - (n-1)$

i. $(64)^{2/3} - \sqrt[3]{125} - 1/2^{-5} + 27^{-2/3} \times (25/9)^{-1/2}$

j. $\left[\left(-\frac{2}{3}\right)^{-2}\right]^3 \times (1/3)^{-4} \times 3^{-1} \times 1/6$

3. Prove that

a. $\frac{a^{-1}}{a^{-1} + b^{-1}} + \frac{a^{-1}}{a^{-1} - b^{-1}} = \frac{2b^2}{b^2 - a^2}$

b. $\frac{1}{1+x^{b-a}+x^{c-a}} + \frac{1}{1+x^{a-b}+x^{c-b}} + \frac{1}{1+x^{b-c}+x^{a-c}} = 1$

c. If $a = b^{2x}$, $b = c^{2y}$, $c = a^{2z}$, show that $8xyz = 1$

Answer

1. a. 0, b. $3 \frac{2}{5}$, c. -8, d. 3.5, e. -7

2. a. 214, b. 19, c. 28, d. 2^{2a+3} , e. $\frac{1}{4}$, f. $\frac{2}{3}$, g. 0, h. 1, i. $-20 \frac{14}{15}$, j. $3^8 \div 2^7$