

(2) Surds and Indices

1. Find the value of k and m if $\frac{3^{3n+2} + 3^{3n-1}}{2 \times 3^{nk}} = m$. m is a constant and $n > 0$.
2. Without using a calculator, solve the equation $\left(\frac{3^{y+1}}{24}\right)^{\frac{1}{x}} = \sqrt{108}$.
3. Find the values of a and b if $(2x^3)^a \left(\frac{1}{4x}\right)^{2-a} = \frac{ba^2}{x^{-2}}$
4. Find the exact value of x is $32^x = \sqrt{4\sqrt{8\sqrt{32}}}$
5. Simplify $\frac{5}{\sqrt{1+\sqrt{2}}} + \frac{5}{\sqrt{2+\sqrt{3}}} + \dots + \frac{5}{\sqrt{14+\sqrt{15}}} + \frac{5}{\sqrt{15+\sqrt{16}}}$
6. Solve $\sqrt{y-4} + \sqrt{3y+1} = 5$
7. Given that $5(3^{3x-2}) + 4(2^{2x+2}) = 4^x$, express $\left(\frac{4}{27}\right)^x$ in the form $\frac{a}{b}$ where a and b are integers.
8. Without using a calculator, find the values of a , b and c for which the solution of the equation $x\sqrt{20} = \sqrt{24} + x\sqrt{6}$ is $\frac{a+b\sqrt{c}}{7}$.
9. Show that $3^{n+3} + 3^n - 3^{n+2}$ is exactly divisible by 19 for all positive integer values of n .
10. Solve $2(3^x) + 5\sqrt{3^x} = 3$
11. a) Find the value of x given that $\sqrt{(x+8)\sqrt{(x+8)\sqrt{(x+8)}}} = 2^{\frac{7}{2}}$
b) Given that $x = 3 + 2\sqrt{2}$, find the value of $\sqrt{x} + \frac{1}{\sqrt{x}}$.