

4. Find the term in $\left(\sqrt[3]{\frac{a}{b}} + \sqrt{\frac{b}{3a}}\right)^{21}$ which has the same power of a and b .

Solution:

$$\begin{aligned}T_{r+1} &= {}^{21}C_r \left(\sqrt[3]{\frac{a}{b}}\right)^{21-r} \left(\sqrt{\frac{b}{3a}}\right)^r \\ &= {}^{21}C_r a^{7-\frac{r}{3}} b^{\frac{2r}{3}-\frac{r}{2}}.\end{aligned}$$

Since the powers of a and b are the same, therefore

$$7 - \frac{r}{3} = \frac{2r}{3} - \frac{r}{2} \Rightarrow r = 9$$

\therefore 10th ~~power~~ term in $\left(\sqrt[3]{\frac{a}{b}} + \sqrt{\frac{b}{3a}}\right)^{21}$ has the same power of a and b .