Trick here is to just do exactly the thing that is being asked in question.

Example 15 If a_1, a_2, a_3 and a_4 are the coefficient of any four consecutive terms in the expansion of $(1 + x)^n$, prove that

$$\frac{a_1}{a_1+a_2}+\frac{a_3}{a_3+a_4}=\frac{2a_2}{a_2+a_3}$$

Solution Let a_1, a_2, a_3 and a_4 be the coefficient of four consecutive terms T_{r+1}, T_{r+2}, T_{r+3}, and T_{r+4} respectively. Then

$$a_1 = \text{coefficient of } T_{r+1} = {}^nC_r$$
$$a_2 = \text{coefficient of } T_{r+2} = {}^nC_{r+1}$$
$$a_3 = \text{coefficient of } T_{r+3} = {}^nC_{r+2}$$
and
$$a_4 = \text{coefficient of } T_{r+4} = {}^nC_{r+3}$$

Thus
$$\frac{a_1}{a_1+a_2}=\frac{{}^nC_r}{{}^nC_r+{}^nC_{r+1}}$$

$$=\frac{{}^nC_r}{{}^{n+1}C_{r+1}} \qquad (\because\ {}^nC_r+{}^nC_{r+1}={}^{n+1}C_{r+1})$$

$$=\frac{\lfloor n}{\lfloor r\,\lfloor n-r}\times\frac{\lfloor r+1\,\lfloor n-r}{\lfloor n+1}=\frac{r+1}{n+1}$$

Similarly,
$$\frac{a_3}{a_3+a_4}=\frac{{}^nC_{r+2}}{{}^nC_{r+2}+{}^nC_{r+3}}$$

$$=\frac{{}^nC_{r+2}}{{}^{n+1}C_{r+3}}=\frac{r+3}{n+1}$$

Hence,
$$\text{L.H.S.}=\frac{a_1}{a_1+a_2}+\frac{a_3}{a_3+a_4}=\frac{r+1}{n+1}+\frac{r+3}{n+1}=\frac{2r+4}{n+1}$$

and
$$\text{R.H.S.}=\frac{2a_2}{a_2+a_3}=\frac{2\left({}^nC_{r+1}\right)}{{}^nC_{r+1}+{}^nC_{r+2}}=\frac{2\left({}^nC_{r+1}\right)}{{}^{n+1}C_{r+2}}$$

$$=2\frac{\lfloor n}{\lfloor r+1\,\lfloor n-r-1}\times\frac{\lfloor r+2\,\lfloor n-r-1}{\lfloor n+1}=\frac{2\,(r+2)}{n+1}$$