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Binomial Expansion & Coefficients | Past Paper Question | P1 CIE Nov 2013 Q1

(i) Find the first three terms when $(2 + 3x)^6$ is expanded in ascending powers of x . [3]

(ii) In the expansion of $(1 + ax)(2 + 3x)^6$, the coefficient of x^2 is zero. Find the value of a . [2]

$$(a+b)^n \equiv {}^n C_0 a^n b^0 + {}^n C_1 a^{n-1} b^1 + {}^n C_2 a^{n-2} b^2 + \dots$$

(i)

$$\begin{aligned}(2+3x)^6 &\equiv {}^6 C_0 2^6 (3x)^0 + {}^6 C_1 2^5 (3x)^1 + {}^6 C_2 2^4 (3x)^2 + \dots \\ &\equiv 64 + 576x + 2160x^2 + \dots\end{aligned}$$

$$(ii) (1+ax)(2+3x)^6 \equiv (1+ax)(64 + 576x + 2160x^2 + \dots)$$

Since coefficient of $x^2 = 0$

$$\therefore 2160 + 576a = 0$$

$$\begin{aligned}\therefore 576a &= -2160 \\ \therefore a &= -2160/576 = -\frac{15}{4} = -3.75\end{aligned}$$

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