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Binomial Expansion

| Past Paper Question | C2 OCR January 2013 Q4

(i) Find the binomial expansion of $(2+x)^5$, simplifying the terms. [4]

(ii) Hence find the coefficient of y^3 in the expansion of $(2+3y+y^2)^5$. [3]

$$(a+b)^n \equiv {}^nC_0 a^n b^0 + {}^nC_1 a^{n-1} b^1 + {}^nC_2 a^{n-2} b^2 + \dots + {}^nC_n a^0 b^n$$



$$\begin{aligned} \text{(i)} \quad (2+x)^5 &\equiv {}^5C_0 (2)^5 (x)^0 + {}^5C_1 (2)^4 (x)^1 + {}^5C_2 (2)^3 (x)^2 + {}^5C_3 (2)^2 (x)^3 + {}^5C_4 (2)^1 (x)^4 + {}^5C_5 (2)^0 (x)^5 \\ &\equiv 32 + 80x + 80x^2 + 40x^3 + 10x^4 + x^5 \end{aligned}$$

$$\text{(ii)} \quad (2+3y+y^2)^5 \equiv 32 + 80(3y+y^2) + 80(3y+y^2)^2 + 40(3y+y^2)^3 + \dots$$

$$\begin{aligned} \text{term in } y^3 &= 80(6y^3) + 40(3y)^3 \Rightarrow \text{coefficient of } y^3 = 1560 \end{aligned}$$

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