Cambridge International AS & A Level

Mathematics 9709/32

Paper 3 Pure Mathematics 3 October/November 2024

Question No(1)

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Expand $(9-3x)^{\frac{1}{2}}$ in ascending powers of x, up to and including the term in x^2, simplifying the coefficients.

Solution:

$(9-3x)^{1/2}$

$(9-3x)^{1/2} = (9)^{1/2}\left[1-\frac{3x}{9}\right]^{1/2}$

$= (3^2)^{1/2}\left(1-\frac{x}{3}\right)^{1/2}$

$= 3\left(1-\frac{x}{3}\right)^{1/2}$

Binomial expansion

$(1+x)^n = 1+nx+\frac{n(n-1)}{2!}x^2+\ldots\ldots$

$= 3\left[1+\left(\frac{1}{2}\right)(-x/3)+\frac{1/2(1/2-1)}{2!}(-x/3)^2\right]$

$= 3\left[1-\frac{x}{6}+\frac{1/2(-1/2)}{2\times1}\left(\frac{x^2}{9}\right)\right]$

$(9-3x)^{1/2} = 3-\frac{x}{2}-\frac{x^2}{24}$ Ans