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Mathematics

9709/12

Paper 1 Pure Mathematics 1

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Question No (2)

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- 2 Find the term independent of x in the expansion of $\left(2x^2 - \frac{3}{x}\right)^6$.

Solution:

$$\left(2x^2 - \frac{3}{x}\right)^6$$

General term Formula

$$T_{r+1} = C_r^n a^{n-r} b^r$$

General term, $T_{r+1} = C_r^6 (2x^2)^{6-r} \left(-\frac{3}{x}\right)^r$

$$= C_r^6 2^{6-r} (x^2)^{6-r} (-3)^r \left(\frac{1}{x}\right)^r$$

$$= C_r^6 2^{6-r} x^{12-2r} (-3)^r (x^{-1})^r$$

$$= C_r^6 2^{6-r} x^{12-2r} (-3)^r x^{-r}$$

$$= C_r^6 2^{6-r} (-3)^r x^{12-2r-r} \rightarrow (1)$$

For the term independent of x
compare

$$x^{12-3r} = x^0$$

$$12-3r=0$$

$$-3r = -12$$

$$r = 4$$

put $r=4$ in (1)

$$= C_4^6 2^{6-4} (-3)^4 x^{12-12}$$

=

$$= \frac{6 \times 5 \times 4 \times 3}{4 \times 3 \times 2 \times 1} 2^2 \times 81 \times x^0$$

$$= 4860$$

So the term independent of x is 4860.