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Mathematics 9709/12

Paper 1 Pure Mathematics 1 **October/November 2025**

Question No (2)

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

$$T_{r+1} = {}^{n}C_{r}\, a^{n-r} b^{r}$$

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

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

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

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

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

for the term independent of x

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

$$12 - 3r = 0$$

$$-3r = -12$$

$$r = 4$$

put $r = 4$ in (1)

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

$=$

$$= \frac{6\times5\times4\times3}{4\times3\times2\times1} \quad 2^2 \times 81 \times x^0$$

$$= 4860$$

So the term independent of x is 4860.