



PREADMITERE POLITEHNICĂ 2026

6. Termenul din dezvoltarea $\left(x\sqrt[4]{x} + \frac{1}{\sqrt{x}}\right)^{24}$, cu $x > 0$, care îl conține pe x^9 este: (9 pct.)

a) T_{14} ; b) T_{13} ; c) T_{10} ; d) T_9 ; e) T_7 ; f) T_8 .

$$(a+b)^n \rightarrow T_{k+1} = C_n^k a^{n-k} \cdot b^k$$

$$a = x\sqrt[4]{x} = x \cdot x^{\frac{1}{4}} = x^{1+\frac{1}{4}} = x^{\frac{5}{4}}$$

$$b = \frac{1}{\sqrt{x}} = \frac{1}{x^{\frac{1}{2}}} = x^{-\frac{1}{2}}$$

$$T_{k+1} = C_{24}^k \left(x^{\frac{5}{4}}\right)^{24-k} \cdot \left(x^{-\frac{1}{2}}\right)^k = C_{24}^k x^{30-\frac{5k}{4}} \cdot x^{-\frac{k}{2}} =$$
$$= C_{24}^k x^{30-\frac{5k}{4}-\frac{k}{2}}$$

$$x^{30-\frac{5k}{4}-\frac{k}{2}} = x^9 \Rightarrow 30 - \frac{7k}{4} = 9 \Rightarrow$$

$$\Rightarrow \frac{7k}{4} = 21 \Rightarrow k = 12 \Rightarrow T_{13}$$

Răspuns: (b)