TAREFA: TEORIA DO BINÔMIO

01: $(1+2x^2)^6$ $x^8 = ?$

coeficiente do termo x^2

↳ linha 6

$\binom{6}{k} 1^{6-k} \cdot (2 \cdot x^2)^k =$

$\binom{6}{k} 2^k \cdot x^{2k} =$ $x, \, k = 0, 1, \ldots 6.$

$2k = 8$

$k = 4$

$\binom{6}{4} 2^4 \cdot x^8 = \dfrac{6!}{4! \, 2!} \cdot 16 \cdot x^8 \Rightarrow \dfrac{6 \cdot 5 \cdot 4!}{4! \, 2!} \cdot 16 \cdot x^8$

$\dfrac{6 \cdot 5 \cdot 16 x^8}{2!} = \dfrac{30 \cdot 16 x^8}{2!} = \dfrac{480 x^8}{2!} = \dfrac{480 x^8}{2} = 240 x^2$

Ⓒ

2: $(14x - 13y)^{237}$

$(14x - 13y)^{237} = (14 \cdot 1 - 13 \cdot 1)^{237} = (14 - 13)^{237} = 1^{237} = 1$ Ⓑ

03: $(x+a)^{11} = 1386 x^5$

$\binom{11}{k} x^{11-k} . a^k = 1386 x^5$ $11 - k = 5$

$k = 6$

$\binom{11}{6} x^{11-6} . a^6 = 1386 x^5$

$\binom{11}{6} x^5 . a^6 = 1386 x^5$ $\rightarrow$ $\dfrac{11!}{6! \, 5!} . a^6 = 1386 \rightarrow$

$\dfrac{11 \cdot 10 \cdot 9 \cdot 8 \cdot 7 \cdot 6!}{6! \, 5!} . a^6 = 1386 \rightarrow \dfrac{55440}{120} . a^6 = 1386$

$462 \, a^6 = 1386$

$a^6 = \dfrac{1386}{462}$ R: Ⓐ

$a^6 = 3$

$a = \sqrt[6]{3}$

04: $\left(x + \dfrac{1}{x^2}\right)^9$

$$\binom{9}{k} x^{9-k} \cdot \left(\dfrac{1}{x^2}\right)^k \rightarrow \binom{9}{k} \cdot x^{9-k} \cdot (1)^k \cdot \left(x^{-2}\right)^k$$

$$(1)^k \cdot \binom{9}{k} \cdot \left(x^{9-k}\right) \cdot x^{-2k} \rightarrow 1^k \cdot \dfrac{9}{k} \cdot x$$

$9 - 3k = 0$ R: (D)

$9 = 3k$

$\dfrac{9}{3} = k$

05: $\left(x + \dfrac{1}{x^2}\right)^n$

$$\binom{n}{p} x^{n-p} \cdot \left(\dfrac{1}{x^2}\right)^p \rightarrow \binom{n}{p} \cdot x^{n-p} \cdot (1)^p \cdot \left(x^{-2}\right)^p$$

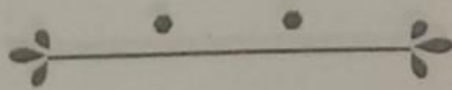$$(1)^k \cdot \binom{n}{k} \cdot x^{n-k} \cdot x^{-2k}$$

$n - 3k = 0$

$n = 3k$ (C)

06: $\left(3x^3 + \dfrac{2}{x^2}\right)^5 - \left(243x^{15} + 810x^{10} + 1.080x^5 + \dfrac{240}{x^5} + \dfrac{32}{x^{10}}\right)$

$$\left(3x^2 + \dfrac{2}{x^2}\right)^5 = \binom{5}{0}\cdot(3x^3)^5 + \binom{5}{1}(3x^3)^4\cdot\left(\dfrac{2}{x^2}\right) + \binom{5}{2}\cdot(3x^3)^3\cdot$$

$$\cdot\left(\dfrac{2}{x^2}\right)^2 + \binom{5}{3}\cdot(3x^3)^2\cdot\left(\dfrac{2}{x^2}\right)^3 + \binom{5}{4}\cdot(3x^3)\cdot\left(\dfrac{2}{x^2}\right)^4 + \binom{5}{5}\cdot\left(\dfrac{2}{x^2}\right)^5 =$$

$$243x^{15} + 810x^{10} + 1080x^5 + 720 + \dfrac{240}{x^5} + \dfrac{32}{x^{10}} = 720$$

R: E

Q7: $(2x + y)^5 = ?$ $x = 1$ $y = 1$

$(2x + y)^5 = (2 \cdot 1 + 1)^5 = 3^5 = 243$

R: Ⓒ