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CTII348

Teorema do Binômio

① $(1+2x^2)^6$ → COEFICIENTE DE x^8

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

$2k = 8$

$k = 4$

$\binom{6}{2} 1^2 \cdot (2x^2)^4$

$\frac{6.5.\cancel{4!}}{2.1.\cancel{4!}} = \frac{6.5}{2} = \frac{30}{2} \Rightarrow$

$15 . 1 . 16x^8 = \boxed{240x^8}$

C

② $(14x - 13y)^{237}$ → SOMA DOS COEFICIENTES

$(14-13)^{237} = 1^{237} = \boxed{1}$

B

③ $(x+a)^{11} = 1386x^5$ $a = ?$

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

$11 - k = 5$

$11 - 5 = k$

$k = 6$

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

$\binom{11}{6} a^6 = 1386 \Rightarrow \frac{11!}{6!5!} a^6 = 1386$

$\frac{11.10.9.8.7.6!}{6!5.4.3.2.1} = 1386 \Rightarrow \frac{55440}{120} a^6 = 1368 \Rightarrow 462a^6 = 1368$

A

$a^6 = \frac{1368}{462} \Rightarrow a^6 = 3 \Rightarrow a = \sqrt[6]{3}$

(/ /)

④ $\left(x+\frac{1}{x^2}\right)^9 = \left(x-(x^2)^{-1}\right)^9$

$\binom{9}{k} x^{9-k} \cdot (-x^{-2})^k$

$9-k-2k=0$

$9-3k=0$

$9=3k$

$k=9/3$

$\boxed{k=3}$

o termo independente $\binom{9}{3}$

D

⑤ $\left(x+\frac{1}{x^2}\right)^n = \left(x+(x^2)^{-1}\right)^n$

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

$n-k-2k=0$

$n-3k=0$

$\boxed{n=3k}$ → n quando multiplica 3, se torna divisível por 3.

C

⑥ $R = \left(3x^3+\frac{2}{x^2}\right)^5 = \left(243x^{15}+810x^{10}+1080x^5+\frac{240}{x^5}+\dots\right.$

$\left.\dots\frac{32}{x^{10}}\right)$ $x = \mathbb{R}$ e $x \neq 0$

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

$$\therefore \left(\binom{5}{2} \cdot (3x^3)^3 \cdot \left(\frac{2}{x^2}\right)^2 \right) + \left(\binom{5}{3} \cdot (3x^3)^2 \cdot \left(\frac{2}{x^2}\right)^3 \right) + \therefore$$

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

$$\left(\cancel{243x^{15}} + \cancel{810x^{10}} + \cancel{1080x^5} + 720 + \left(\cancel{\frac{240}{x^5}}\right) + \left(\cancel{\frac{32}{x^{10}}}\right) \right) \therefore$$

$$\therefore \left(\cancel{243x^{15}} + \cancel{810x^{10}} + \cancel{1080x^5} + \left(\cancel{\frac{240}{x^5}}\right) + \left(\cancel{\frac{32}{x^{10}}}\right) \right) = \boxed{720}$$

E

7) $(2x+y)^5 \rightarrow$ SOMA DOS COEFICIENTES

$(2+1)^5 = 3^5 = 3.3.3.3.3 = \boxed{243}$ C