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Tarefa Básica 11

Teorema do Binômio

1. $(1+2x^2)^6$ coeficiente de x^8 ?

$$\binom{6}{k} \cdot 1^{6-k} \cdot (2x^2)^k \Rightarrow \binom{6}{k} 2^k \cdot x^{2k} \begin{cases} 2k = 8 \\ k = 8/2 \\ k = 4 \end{cases} \Rightarrow$$

$$\Rightarrow \binom{6}{4} 2^4 \cdot x^8 = \frac{6!}{4!(6-4)!} \cdot 16 \cdot x^8 = \frac{6 \cdot 5 \cdot \cancel{4!}}{\cancel{4!}\, 2 \cdot 1} \cdot 16 \cdot x^8 \Rightarrow$$

$$\Rightarrow \frac{30}{2} \cdot 16 \cdot x^8 = 15 \cdot 16 \cdot x^8 = \underline{\underline{240}}\, x^8$$

C

2.

Considerando x e y iguais a 1, podemos calcular a soma dos coeficientes:

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

B

3. $(x+a)^{11}$

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

$11 - k = 5$

$k = 6$

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

$$\frac{11!}{6!(11-6)!} \cdot \cancel{x^5} \cdot a^6 = 1386\, \cancel{x^5} \Rightarrow$$

$$\Rightarrow \frac{11 \cdot 10 \cdot 9 \cdot 8 \cdot 7 \cdot \cancel{6!}}{\cancel{6!}\, 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1} \cdot a^6 = 1386$$

$$\frac{55440}{120} \cdot a^6 = 1386$$

$$462 \cdot a^6 = 1386$$

$$a^6 = \frac{1386}{462}$$

$$a^6 = 3$$

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

A

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

$\binom{9}{k} \cdot x^{9-k} \cdot (x^{-2})^k \quad \begin{cases} 9 - k - 2k = 0 \\ -3k = -9 \rightarrow k = 3 \end{cases}$

$\boxed{\binom{9}{3}} \cdot x^{9-3} \cdot (x^{-2})^3$ D

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

$\binom{n}{k} \cdot x^{n-k} \cdot (x^{-2})^k \quad \begin{cases} n - k - 2k = 0 \\ n - 3k = 0 \rightarrow 3k = n \rightarrow \boxed{k = \frac{n}{3}} \end{cases}$

C   {se n é divisível por 3}

6.
$$K = \underbrace{\left(3x^3 + \frac{2}{x^2}\right)^5}_{} - \left(243x^{15} + 810x^{10} + 1080x^5 + \frac{240}{x^5} + \frac{32}{x^{10}}\right)$$

$$1(3x^3)^5 + 5(3x^3)^4(2x^{-2}) + 10(3x^3)^3(2x^{-2})^2 + 10(3x^3)^2(2x^{-2})^3 + 5(3x^3)(2x^{-2})^4 + 1(2x^{-2})^5$$

$$1.3^5x^{15} + 5.3^4x^{12}2x^{-2} + 10.3^3x^9 2^2x^{-4} + 10.3^2x^6.2^3x^{-6} + 5.3x^3.2^4x^{-8} + 1.2^5x^{-10}$$

$$\boxed{243x^{15} + 810x^{10} + 1080x^5 + 720x^0 + 240x^{-5} + 32x^{-10}}$$

$$243x^{15} + 810x^{10} + 1080x^5 + 720x^0 + 240x^{-5} + 32x^{-10} - (243x^{15} + 810x^{10} + 1080x^5 + 240x^{-5} + 32x^{-10})$$

$$\cancel{243x^{15}} + \cancel{810x^{10}} + \cancel{1080x^5} + 720.1 + \cancel{240x^{-5}} + \cancel{32x^{-10}} - \cancel{243x^{15}} - \cancel{810x^{10}} - \cancel{1080x^5} - \cancel{240x^{-5}} + \cancel{32x^{-10}}$$

$$720.1 = \boxed{720}$$

E

7. considerando x e y iguais a 1...

$$(2x+y)^5 = (2.1+1)^5 = 3^5 = \boxed{243}$$

C