Tarefa Básica - Teorema do Binômio

01- $(1+2x^2)^6$, coeficiente de x^8

$\binom{6}{k} \cdot 1^{6-k} \cdot (2x^2)^k = x^8$ | $2k = 8$, $k = \frac{8}{2}$, $k = 4$

$\binom{6}{4} \cdot 2^4 \cdot x^8$

$\frac{6!}{4! \cdot 2!} \cdot 16 \cdot x^8$ | $15 \cdot 16 \cdot x^8 = 240x^8$ (C)

02- $(14x-13y)^{237}$ soma de todos os coeficientes...

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

(B)

03- $(x+a)^{11}$

$\binom{11}{k} \cdot x^{11-k} \cdot a^k = 1.386x^5$ | $11-k=5$, $-k = 5-11 \cdot (-1)$, $k=6$

$\binom{11}{6} \cdot x^5 \cdot a^6 = 1.386x^5$

$\frac{11 \cdot 10 \cdot 9 \cdot 8 \cdot 7 \cdot 6!}{6! \, 5!} a^6 = 1386$

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

$462a^6 = 1386$

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

$a^6 = 3$ / $\boxed{a = \sqrt[6]{3}}$ (A)

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

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

$9-k-2k=0$
$9-3k=0$
$-3k=-9.(-1)$
$3k=9$
$k=3$

$\binom{9}{3}$ ← termo independente

D

$\binom{9}{3} x^6 \cdot x^{-6}$ | $\frac{9.8.7.6.5.4.\cancel{3!}}{\cancel{3!}} = 60480$

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

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

$n-k-2k=0$
$n-3k=0$
$-3k=-n.(-1)$
$k=\frac{n}{3}$

C

Vai existir termo independente se n for divisível por 3.

06- $x=1$. Real e não-nulo

$K=(3.1+2)^5-(243.1+810.1+1080.1+240+32)$

$\boxed{K=720}$

E

07 - $(2x+y)^5$

$(2x+y)^5 = \binom{5}{0}(2x)^5 y^0 + \binom{5}{1}(2x)^4 y^1 + \dots + \binom{5}{5} y^5$

$2^5 + 5 \cdot 2^4 + 10 \cdot 2^3 + 10 \cdot 2^2 + 5 \cdot 2 + 1 =$

$32 + 80 + 80 + 40 + 10 + 1 = \boxed{243}$

C