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# Tarefa Básica 10

## Coeficientes Binomiais

## Triângulo de Pascal e Tartaglia

1. $\binom{8}{3} = \frac{8!}{3!(8-3)!} = \frac{8.7.6.\cancel{5!}}{3.2.1.\cancel{5!}} = \frac{336}{6} = \boxed{56}$ B

2. $\binom{200}{198} = \frac{200!}{198!(200-198)!} = \frac{200.199.\cancel{198!}}{\cancel{198!}.2!} = \frac{200.199}{2.1} =$

$= \frac{39\,800}{2} = \boxed{19\,900}$ A

3. $\binom{n-1}{2} = \binom{n+1}{4}$

$\downarrow$

$\frac{(n-1)!}{2!(n-1-2)!} = 0 \to \frac{(n-1)(n-2)\cancel{(n-3)!}}{2.1\,\cancel{(n-3)!}} = 0 \to$

$\to \frac{n^2-2n-n+2}{2} = 0 \to 0,5n^2 - 1,5n + 1 = 0 \;\left\{ \boxed{\begin{array}{l} \underline{1} + \underline{2} = 3 \\ \underline{1} \cdot \underline{2} = 2 \end{array}} \right.$

$\frac{(n-1)!}{2!(n-1-2)!} = \frac{(n+1)!}{4!(n+1-4)!} \to \frac{\cancel{(n-1)!}}{2!\cancel{(n-3)!}} = \frac{(n+1)n\cancel{(n-1)!}}{4!\cancel{(n-3)!}} \to$

$\frac{1}{2} = \frac{n^2+n}{24} \to \begin{array}{l} 2n^2+2n = 24 \\ 2n^2+2n-24 = 0 \end{array} \left\} \begin{array}{l} \underline{3} + \underline{-4} = -1 \\ \underline{3} \cdot \underline{-4} = -12 \end{array} \right\}$ $\boxed{3}$; $-4 \to$ não convém

$n' = 1$, $n'' = 2$ e $n''' = 3 \to \boxed{V = \{1, 2, 3\}}$

4. $\binom{20}{13} + \binom{20}{14}$

$\binom{n}{k} + \binom{n}{k+1} = \binom{n+1}{k+1} \rightarrow \binom{20}{13} + \binom{20}{14} = \boxed{\binom{21}{14}}$

$\underbrace{\binom{21}{14} = \boxed{\binom{21}{7}}}$

C

Complementares $(14+7=21)$

5. Soma na linha $n = 2^n$

ou seja

$\binom{n}{0} + \binom{n}{1} + \binom{n}{2} + \dots + \binom{n}{n} = \boxed{2^n}$

6.

a) $\sum_{p=0}^{10} \binom{10}{p} = \binom{10}{0} + \binom{10}{1} + \dots + \binom{10}{10} = 2^{10} = \boxed{1024}$

b) $\sum_{p=0}^{9} \binom{10}{p} = \binom{10}{0} + \binom{10}{1} + \dots + \binom{10}{9} = 2^{10} - \binom{10}{10} \rightarrow$

$\rightarrow 2^{10} - \binom{10}{10} = 1024 - 1 = \boxed{1023}$

$\binom{n}{n} = 1$

c) $\sum_{p=2}^{9} \binom{9}{p} = \binom{9}{2} + \binom{9}{3} + \dots + \binom{9}{9} = 2^9 - \binom{9}{0} - \binom{9}{1} \Rightarrow$

$\Rightarrow 2^9 - \binom{9}{0} - \binom{9}{1} = 512 - 1 - 9 = \boxed{502}$

$\binom{n}{0} = 1$ $\binom{n}{1} = n$

d) $\sum_{p=4}^{10} \binom{p}{4}$

$\binom{4}{4}$

$\binom{5}{4}$

...

$\binom{10}{4}$

$\Rightarrow \binom{11}{5}$

$\dfrac{11!}{5!\,(11-5)!} = \dfrac{11.10.9.8.7.\cancel{6!}}{5.4.3.2.1\,.\,\cancel{6!}}$

$\Rightarrow \dfrac{55\,440}{120} = \boxed{462}$

e) $\sum_{p=5}^{10} \binom{p}{5}$

$\binom{5}{5}$

$\binom{6}{5}$

...

$\binom{10}{5}$

$\Rightarrow \underbrace{\binom{11}{6}}$

complementar de $\binom{11}{5}$

pois $5+6=11$

logo:

$\binom{11}{6} = \boxed{462}$

7.

$$\sum_{k=0}^{m} \binom{m}{k} = 512$$ } soma na linha !!! $\rightarrow 2^m$

$$2^m = 512$$
$$2^m = 2^9$$
$$\boxed{m = 9}$$

$$\binom{9}{0} + \binom{9}{1} + \dots + \binom{9}{9} = 2^9 = 512$$

E