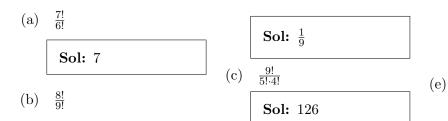
Departamento de Matemáticas $1^{\underline{0}}$ Bachillerato



3 - Números combinatorios. Binomio de Newton

1. Simplifica los cocientes entre factoriales:



 $(d) \quad \frac{m!}{(m-1)!}$

Sol: m

Sol: m(m+1)

 $\frac{(m+1)!}{(m-1)!}$

2. Calcula las siguientes operaciones:

(-)	(252)	·			(7) , (8)
(a)	$\binom{252}{250}$		Sol: 14950	1	$\binom{\binom{7}{6}+\binom{8}{7}}{}$
	Sol: 31626	(c)	$\binom{9}{6} + \binom{9}{7} + \binom{10}{2}$		Sol: 36
(1-)	(25) (25)	(c)	(2)	(e)	$\binom{4}{0} + \binom{4}{1} + \binom{4}{2} + \binom{4}{3}$
(b)	$\binom{25}{3} + \binom{25}{4}$		Sol: 165		
		(d)	$\binom{4}{2} + \binom{4}{3} + \binom{5}{4} + \binom{6}{5} +$		Sol: 15

3. Simplifica:

(a)
$$\frac{6!}{5!} + \frac{8!}{6!}$$

Sol: 62

(b) $\frac{n!}{(n-1)!} + \frac{(n+2)!}{n!}$

(c) $\frac{\binom{n+3}{n} + \binom{n+2}{n}}{\frac{n+6}{6}}$

Sol: $\frac{n(n+1)(n+2)(n+6)}{6(n^2+6)}$

4. Realiza los desarrollos de los siguientes binomios:

(a)
$$(2+x)^4$$
 Sol: $-90\sqrt{2} + 116$ Sol: $-90\sqrt{2} + 116$ Sol: $-2480\sqrt{6} + 6244$ Sol: $-2480\sqrt{6} + 624$

5. Realiza los desarrollos de los siguientes binomios para identificar determinados términos y coeficientes:

(a)
$$(2+x)^8$$

Sol:
$$x^8 + 16x^7 + 112x^6 + 448x^5 + 1120x^4 + 1792x^3 + 1792x^2 + 1024x + 256$$

(b)
$$(\frac{2}{5} + \frac{3}{x})^8$$

$$\begin{array}{c} \textbf{Sol:} \ \frac{256}{390625} + \frac{3072}{78125x} + \\ \frac{16128}{15625x^2} + \frac{48384}{3125x^3} + \\ \frac{18144}{125x^4} + \frac{108864}{125x^5} + \frac{81648}{25x^6} + \\ \frac{34992}{5x^7} + \frac{6561}{x^8} \end{array}$$

(c)
$$(2a^2b - 3a^3)^7$$

(d)
$$(3x - \frac{1}{x})^7$$

Sol:
$$2187x^7 - 5103x^5 + 5103x^3 - 2835x + \frac{945}{x} - \frac{189}{x^3} + \frac{21}{x^5} - \frac{1}{x^7}$$

(e)
$$(x^2 + \frac{1}{x})^{12}$$

Sol:
$$x^{24} + 12x^{21} + 66x^{18} + 220x^{15} + 495x^{12} + 792x^{9} + 924x^{6} + 792x^{3} + 495 + \frac{220}{x^{3}} + \frac{66}{x^{6}} + \frac{12}{x^{9}} + \frac{1}{x^{12}}$$

(f)
$$(2x - \frac{1}{x})^{18}$$

(g)
$$(x^2 + \frac{1}{x})^8$$

Sol:
$$x^{16} + 8x^{13} + 28x^{10} + 56x^7 + 70x^4 + 56x + \frac{28}{x^2} + \frac{8}{x^5} + \frac{1}{x^8}$$

(h)
$$(\frac{2}{\sqrt{x}} + 1)^{10}$$

Sol:
$$1 + \frac{180}{x} + \frac{3360}{x^2} + \frac{13440}{x^3} + \frac{11520}{x^4} + \frac{1024}{x^5} + \frac{20}{\sqrt{x}} + \frac{960}{x^{\frac{3}{2}}} + \frac{8064}{x^{\frac{5}{2}}} + \frac{15360}{x^{\frac{7}{2}}} + \frac{5120}{x^{\frac{9}{2}}}$$

$$(i) \quad (\frac{x^2}{2} - \frac{3}{x})^6$$

Sol:
$$\frac{x^{12}}{64} - \frac{9x^9}{16} + \frac{135x^6}{16} - \frac{135x^3}{2} + \frac{1215}{4} - \frac{729}{x^3} + \frac{729}{x^6}$$

$$(j) \quad (\frac{x^2}{2} - \frac{3}{x})^8$$

Sol:
$$\frac{x^{16}}{256} - \frac{3x^{13}}{16} + \frac{63x^{10}}{16} - \frac{189x^7}{4} + \frac{2835x^4}{x^5} - 1701x + \frac{5103}{x^2} - \frac{8748}{x^5} + \frac{6561}{x^8}$$