$\forall\ a, b$ des expressions littérales,

$$\begin{array}{c} 1 \\ 1 \quad 1 \\ 1 \quad 2 \quad 1 \\ 1 \quad 3 \quad 3 \quad 1 \\ 1 \quad 4 \quad 6 \quad 4 \quad 1 \\ 1 \quad 5 \quad 10 \quad 10 \quad 5 \quad 1 \end{array}$$

Blaise Pascal

$$(a+b)^2 = a^2 + 2ab + b^2$$

$$(a+b)^3 = a^3 + 3a^2b + 3ab^2 + b^3$$

$$(a+b)^4 = a^4 + 4a^3b + 6a^2b^2 + 4ab^3 + b^4$$

$\vdots$

$$(a+b)^n = \sum_{k=0}^{n} \binom{n}{k} \cdot a^{n-k} \cdot b^k \qquad \binom{n}{k} = \frac{n!}{(n-k)! \cdot k!}$$

$$(a-b)^2 = (a+(-b))^2 = a^2 + 2a(-b) + b^2 = a^2 - 2ab + b^2$$

$$(a-b)^3 = a^3 - 3a^2b + 3ab^2 - b^3$$

$$(a-b)^4 = a^4 - 4a^3b + 6a^2b^2 - 4ab^3 + b^4$$

$\vdots$

$$(a-b)^n = \sum_{k=0}^{n} (-1)^k \cdot \binom{n}{k} \cdot a^{n-k} \cdot b^k$$

$\forall a,b \qquad a^2-b^2=(a-b)(a+b)$

$$a^3-b^3=(a-b)(a^3+ab+b^3)$$

$\forall a,b \qquad (a-b) \mid a^n-b^n$

$\forall n \in \mathbb{N}^*$

$$\Longleftrightarrow \exists\, Q \in \mathbb{R}[a;b] \text{ tq.}$$

$$a^n-b^n=(a-b)\cdot Q \qquad \text{démo ?}$$

$$a^4-b^4=(a-b)(a+b)(a^2+b^2)$$

démo $\qquad a^5-b^5=(a-b)(a^4+a^3b+a^2b^2+ab^3+b^4)$

$$\boxed{\begin{aligned} &a^5+\cancel{a^4b}+\cancel{a^3b^2}+\cancel{a^2b^3}+\cancel{ab^4} \\ &-\cancel{a^4b}-\cancel{a^3b^2}-\cancel{a^2b^3}-\cancel{ab^4}-b^5 \end{aligned}}$$

$$a^6-b^6=(a^3-b^3)(a^3+b^3)$$

$$=(a-b)(a^2+ab+b^2)\cdot(a+b)(a^2-ab+b^2)$$