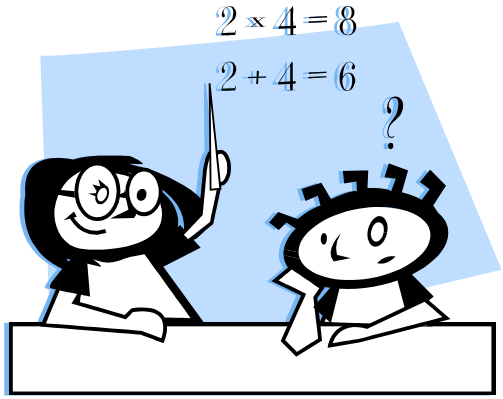
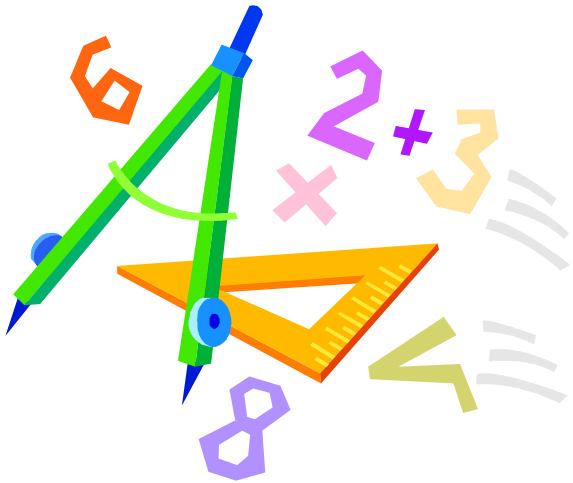
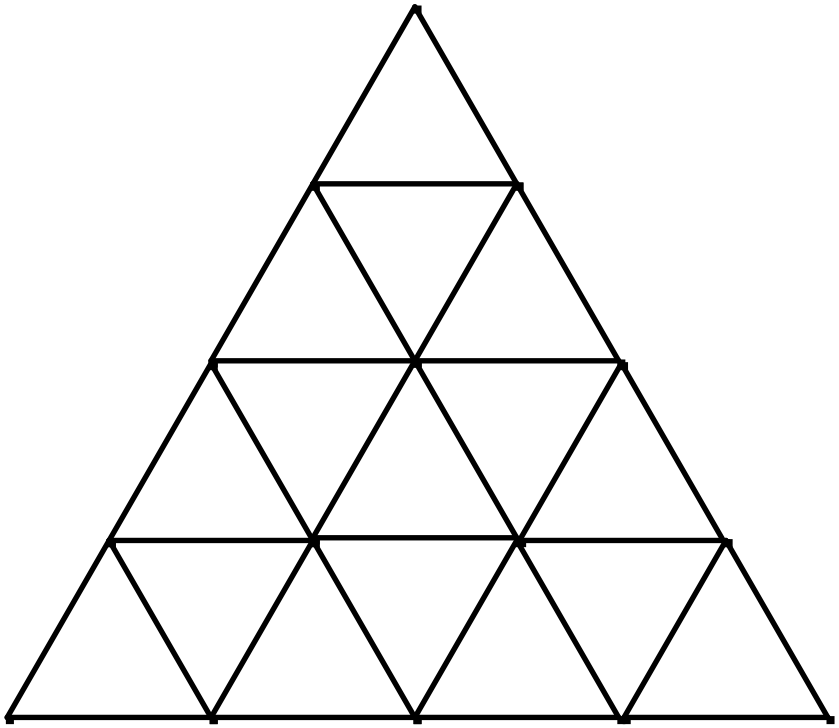


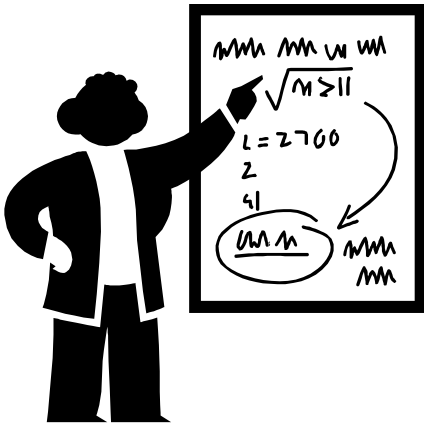
Dalla percezione al modello matematico



Presentazione di
Bruno Jannamorelli

Quanti triangoli vedi nella figura?

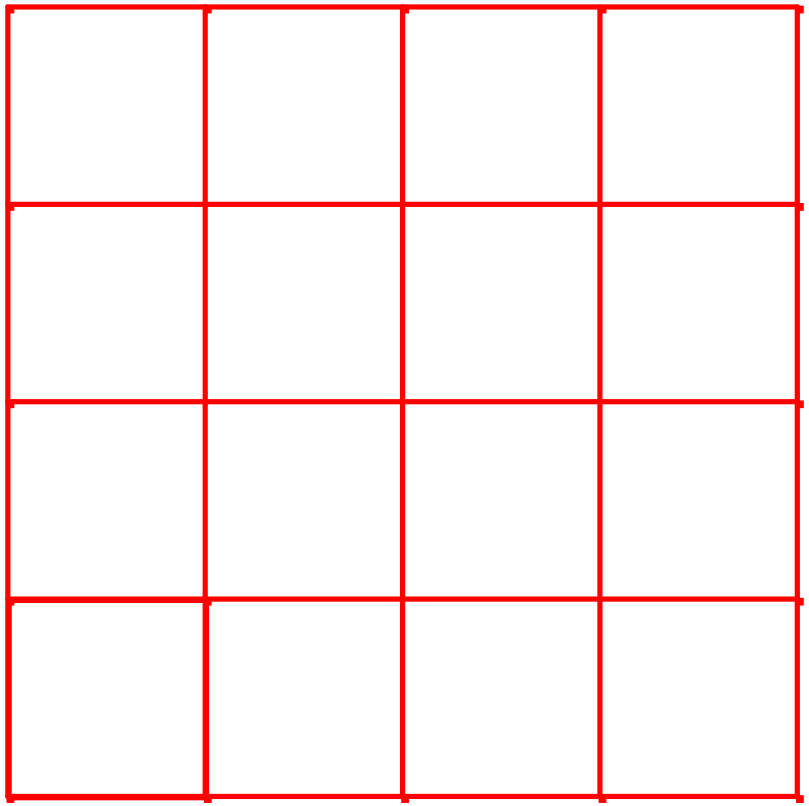




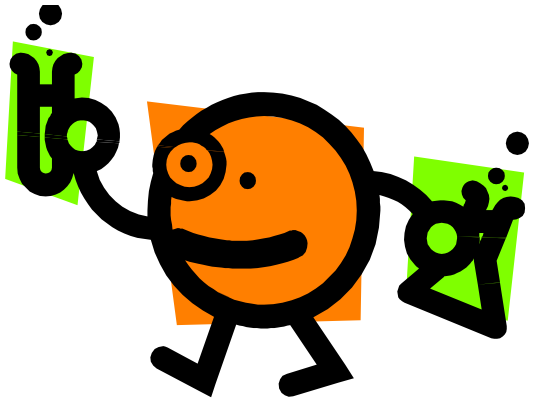
Problema:

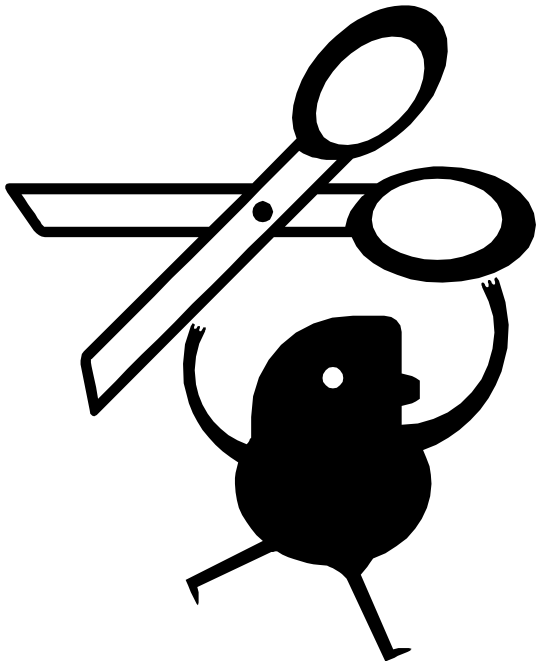
Esiste una formula, un modello matematico, per determinare il numero di triangoli equilateri contenuti in un qualunque triangolo equilatero di lato n (numero naturale) ?

Quanti quadrati vedi nella figura?

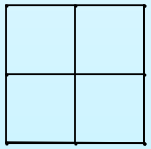
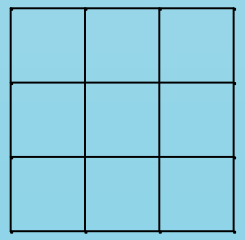
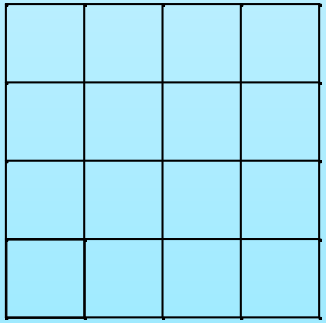


Andiamo in laboratorio …



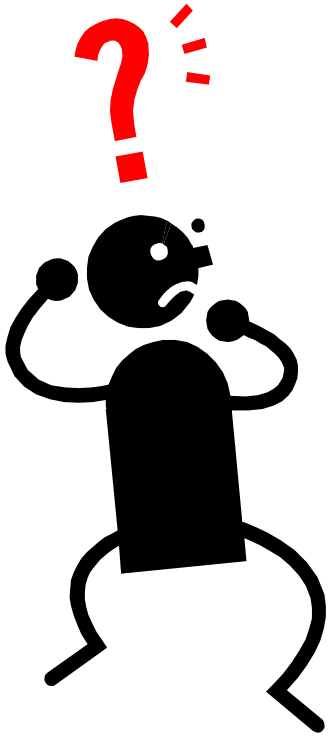


Disegniamo su cartoncino quadrati di lato 1, di lato 2, di lato 3, … e ritagliamoli.

n	Lato n	Lato n - 1	Lato n - 2	Lato n - 3
1 	1			
2 	1	4		
3 	1	4	9	
4 	1	4	9	16

Il numero di quadrati contenuti nel quadrato di lato 4 è:
1+4+9+16 = 30

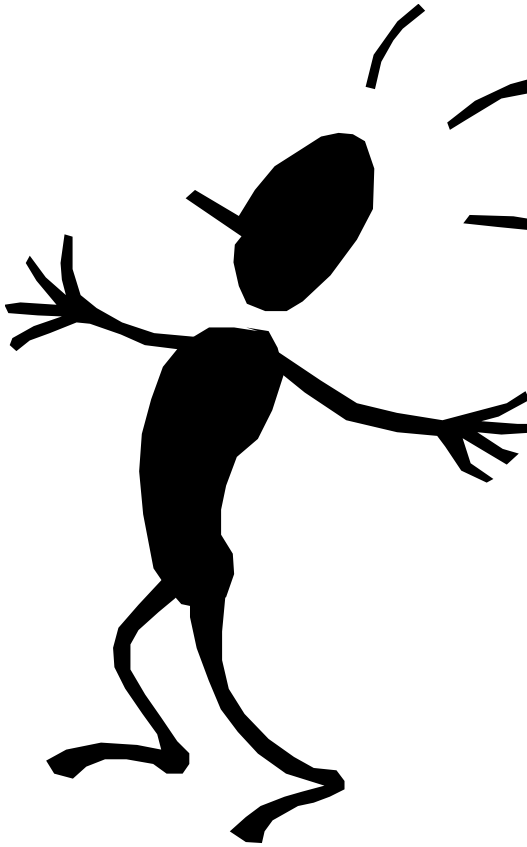
… ma 1, 4, 9, 16 sono numeri quadrati!



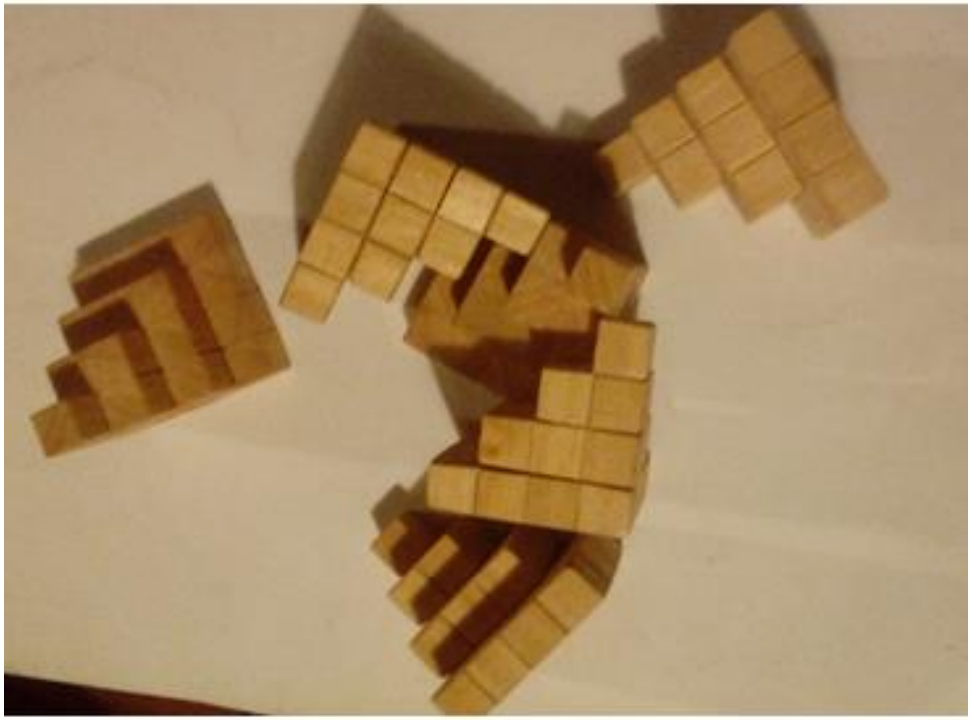
Come si calcola la somma dei primi n numeri quadrati?

Bisogna tornare in laboratorio!

$1 + 4 + 9 + 16$

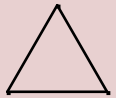
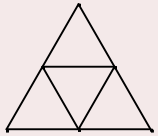
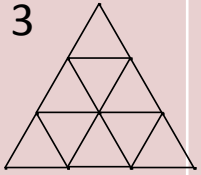


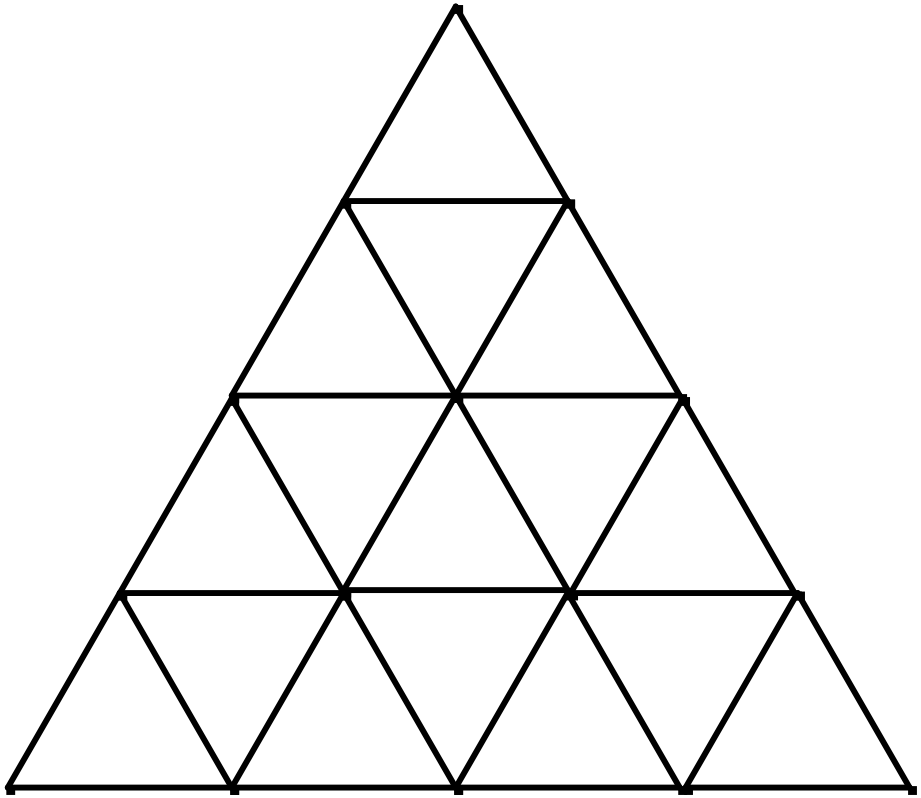
6 pezzi …

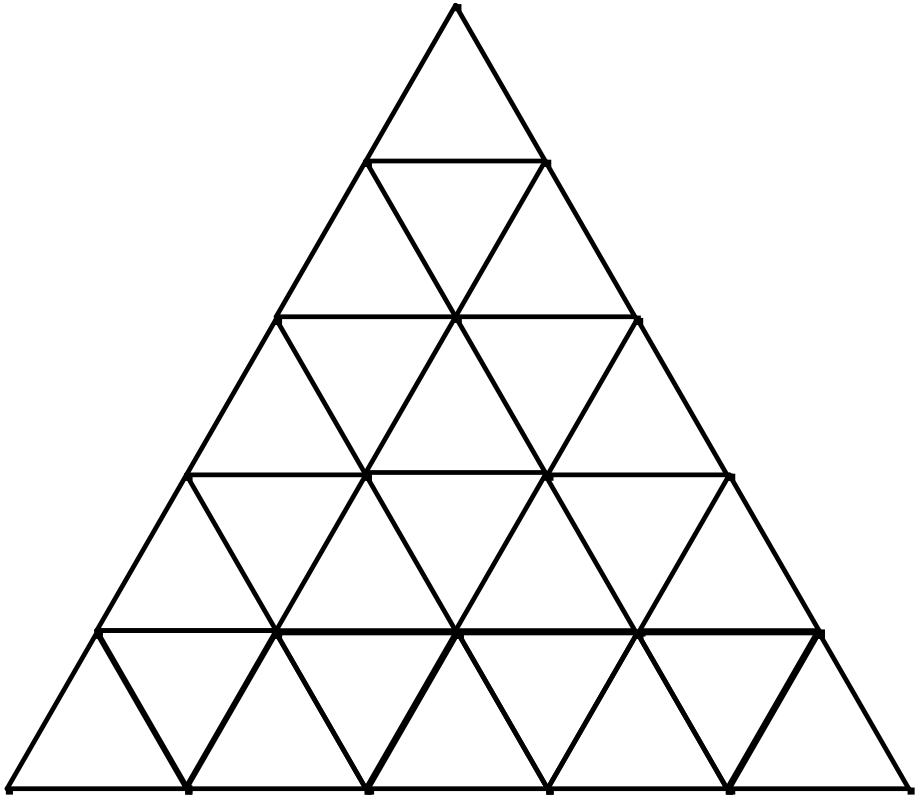


$$S = \frac{n(n+1)(2n+1)}{6}$$

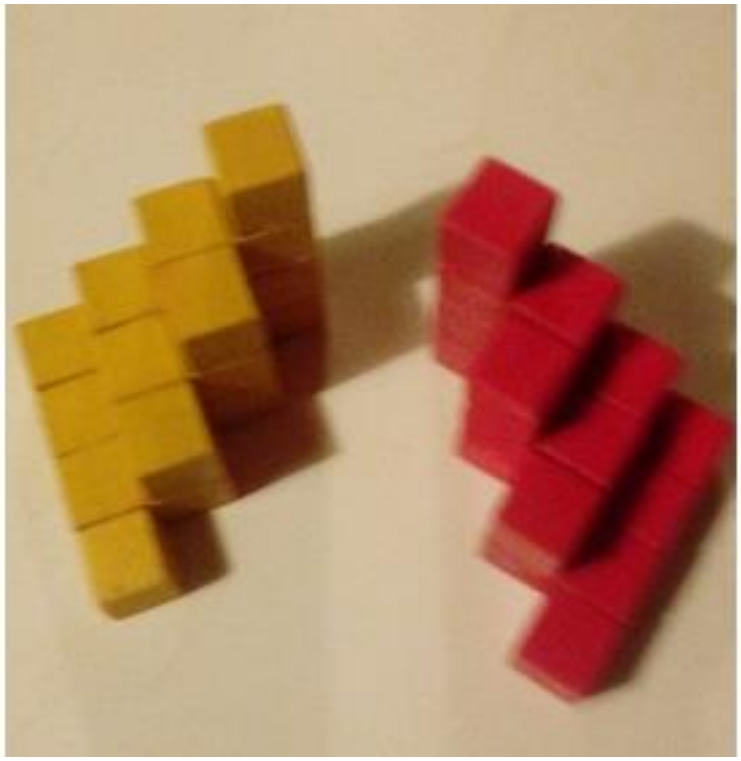
… ma come si fa a contare i triangoli?

Lato / Figura	n	n-1 △	n-1 ▽	n-2 △	n-2 ▽	n-3 △	n-3 ▽	n-4 △	n-4 ▽
1 	1								
2 	1	3	1						
3 	1	3	0	6	3				
4	1	3	0	6	1	10	6		
5	1	3	0	6	0	10	3	15	10





Somma di numeri triangolari



$1 + 3 + 6 + 10 + \ldots$

$$S = \frac{n(n+1)(n+2)}{6}$$