CENTRO DIFFUSIONE ORIGAMI

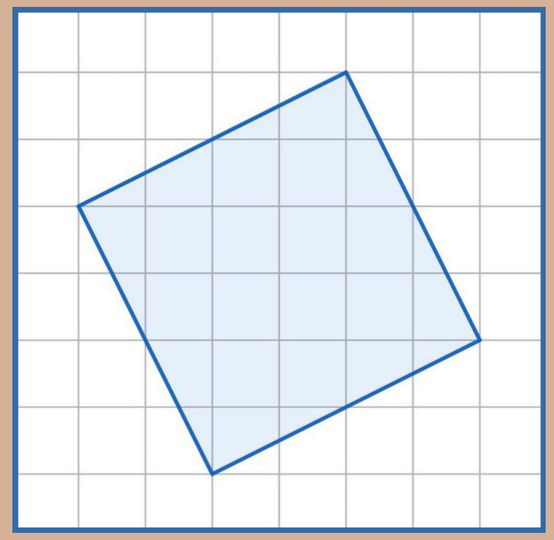
OriDidaZoom

QUADRATI

RETTANGOLI

&

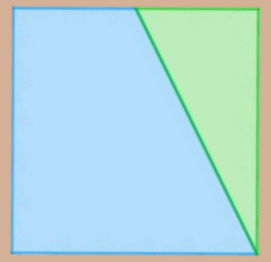
TAPPETI



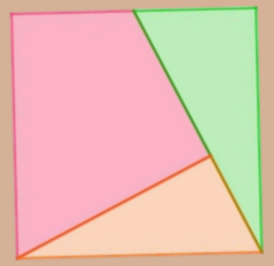
Luciana Piras & Barbara Sbrega

Affronteremo vari "puzzle":

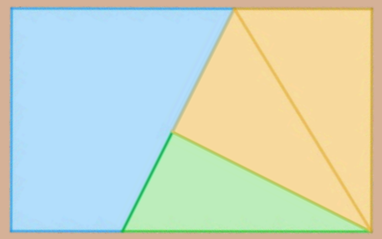
Tangram a 2 pezzi



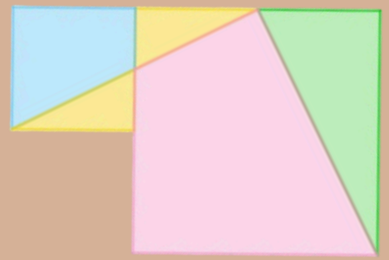
Tangram a 3 pezzi



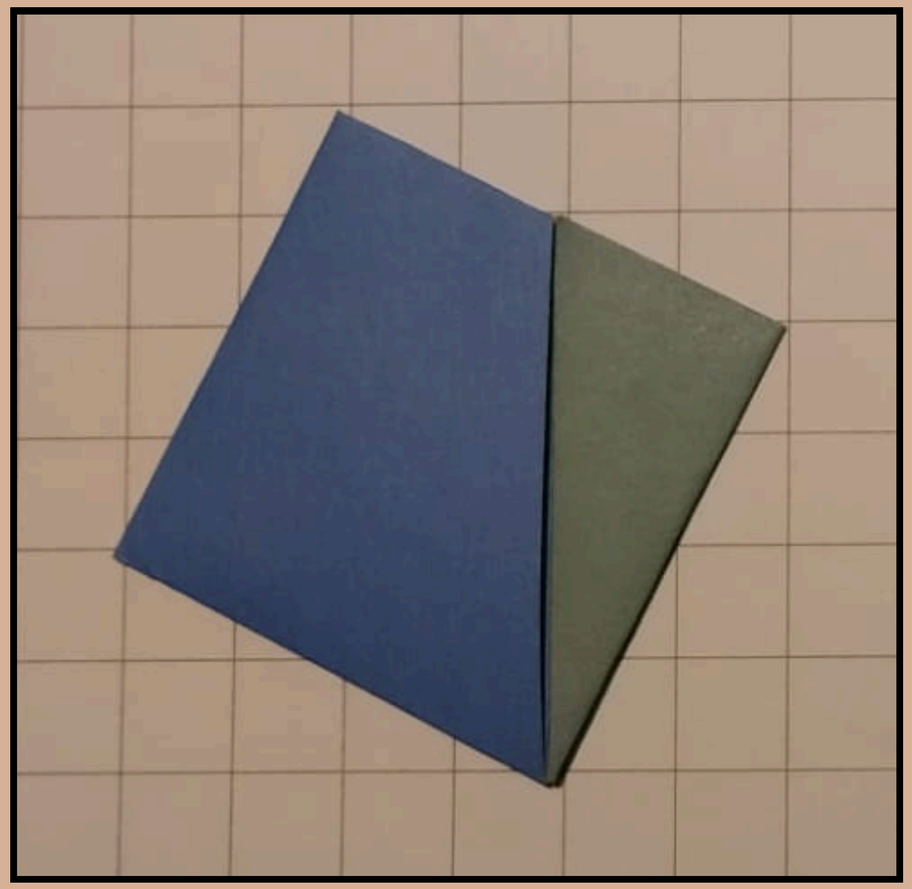
Rettangolo aureo



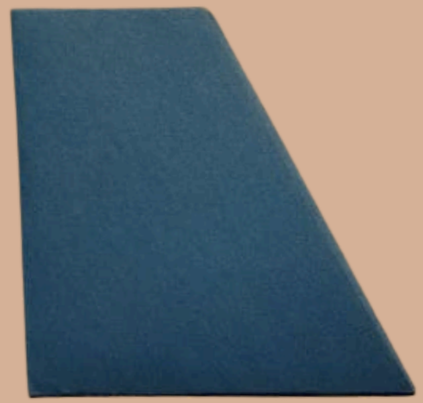
Dimostrazione dei 2 tappeti



Tangram a 2 pezzi

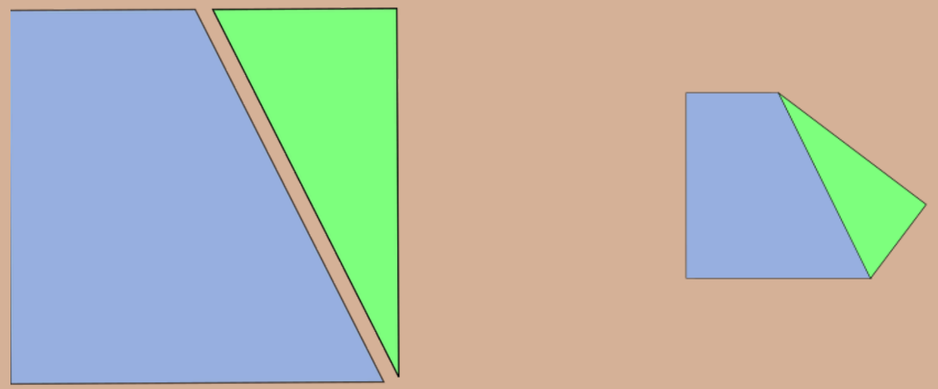


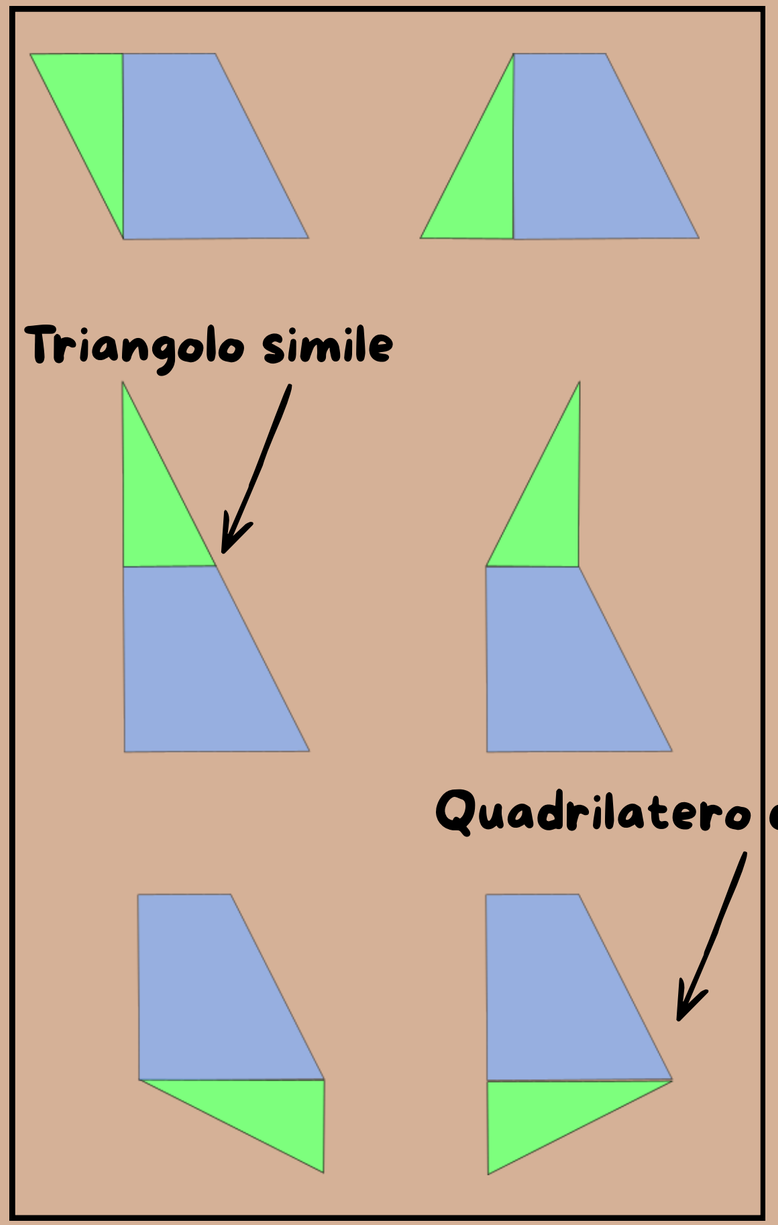
$\frac{3}{4}$



$\frac{1}{4}$

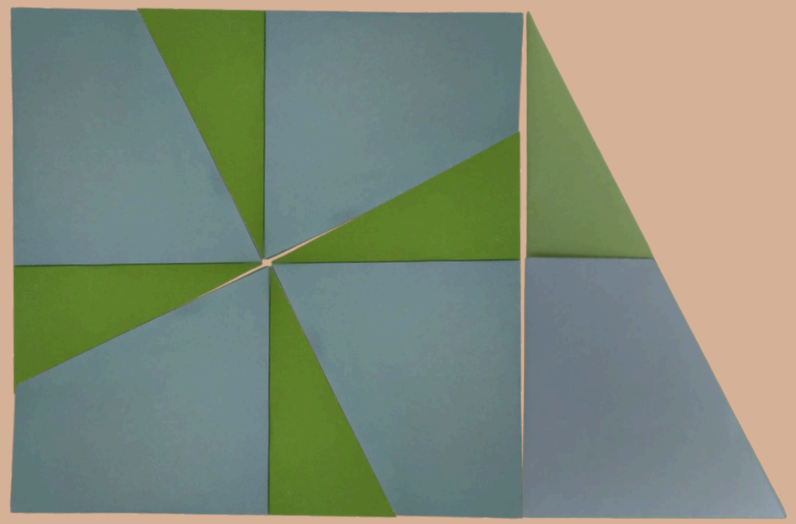
Composizioni

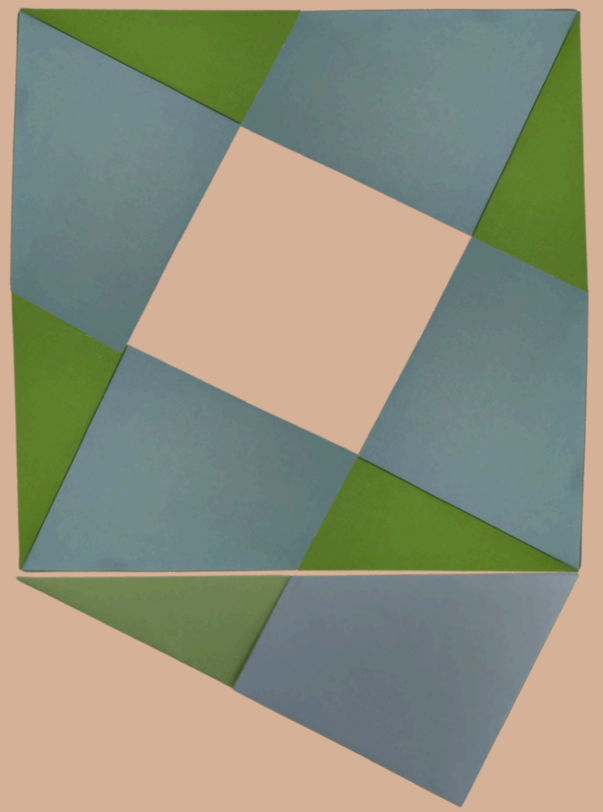




8 figure diverse perché il triangolo può combaciare con ognuno dei 4 lati del trapezio, in due modi diversi e speculari.

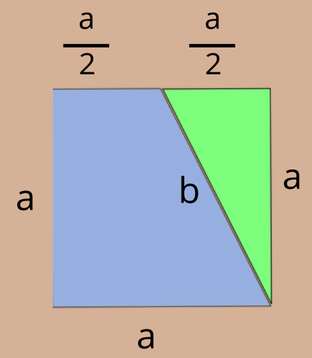
La composizione dei due quadrati per la dimostrazione di Perigal.
Si noti come nel primo si "vedono" i quadrilateri mentre nel secondo anche i triangoli



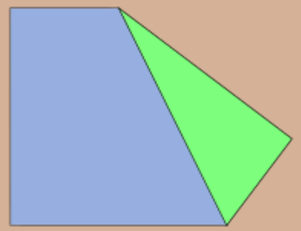


Confronto tra perimetri

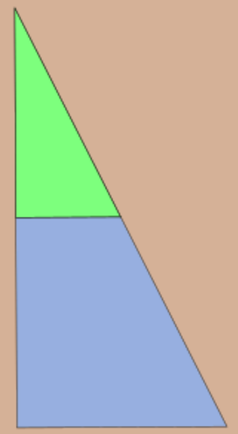
$\frac{a}{2} + \frac{a}{2} = a$



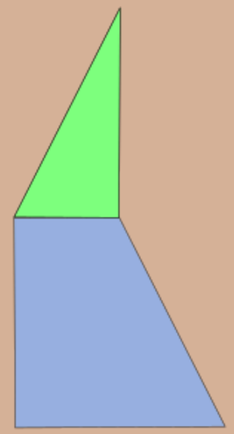
4a



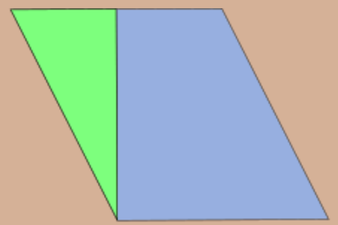
4a



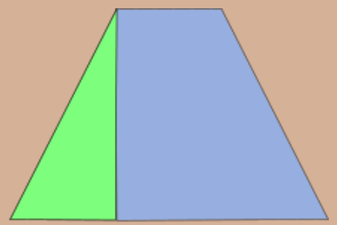
3a+2b



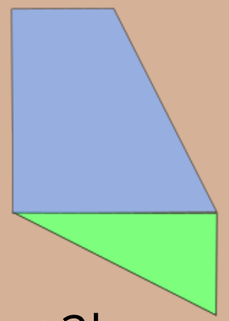
3a+2b



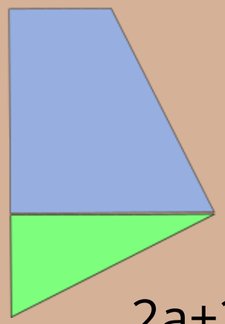
2a+2b



2a+2b

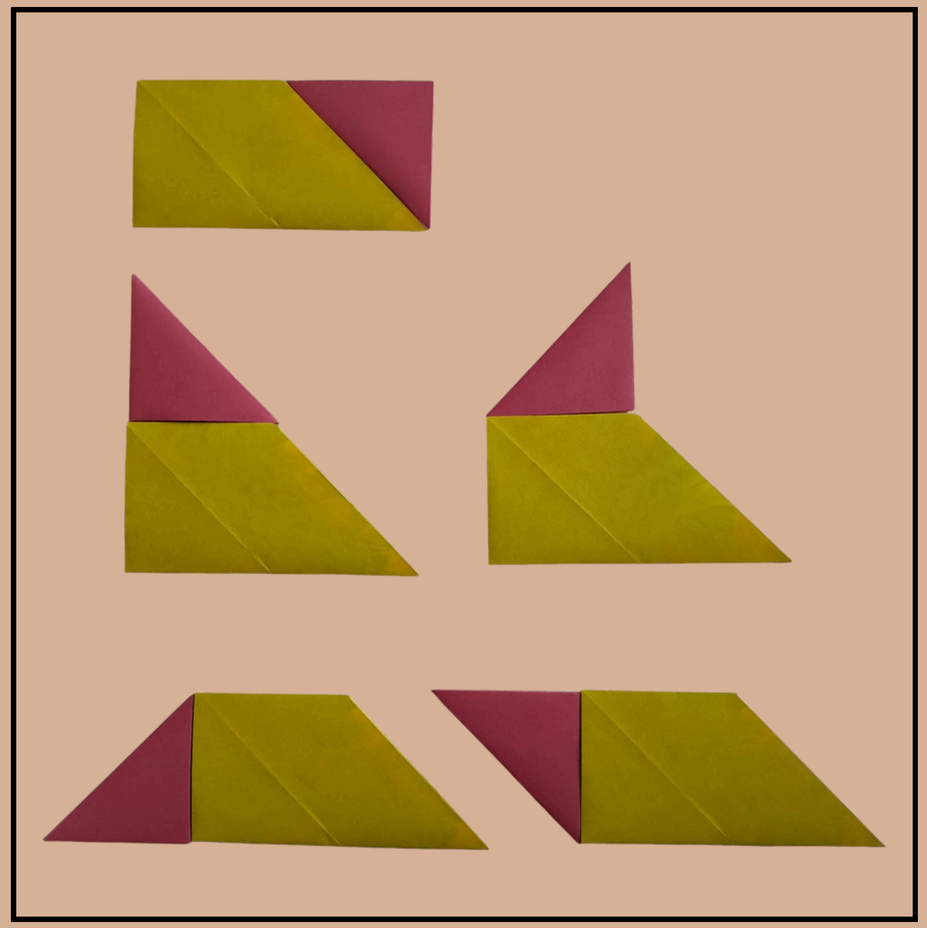


2a+2b



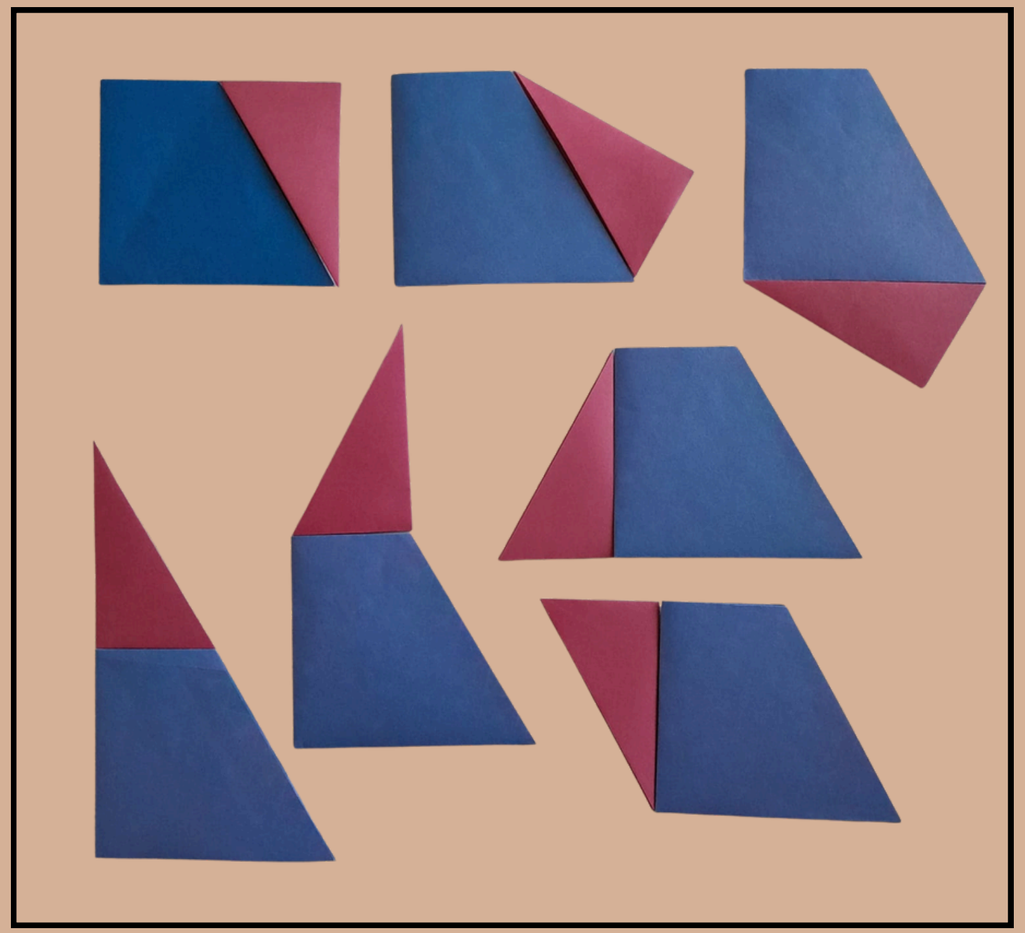
2a+2b

tangram a 2 pezzi alternativi:
cosa succede se invece di partire da un quadrato tagliamo un rettangolo?



rettangolo 1:2

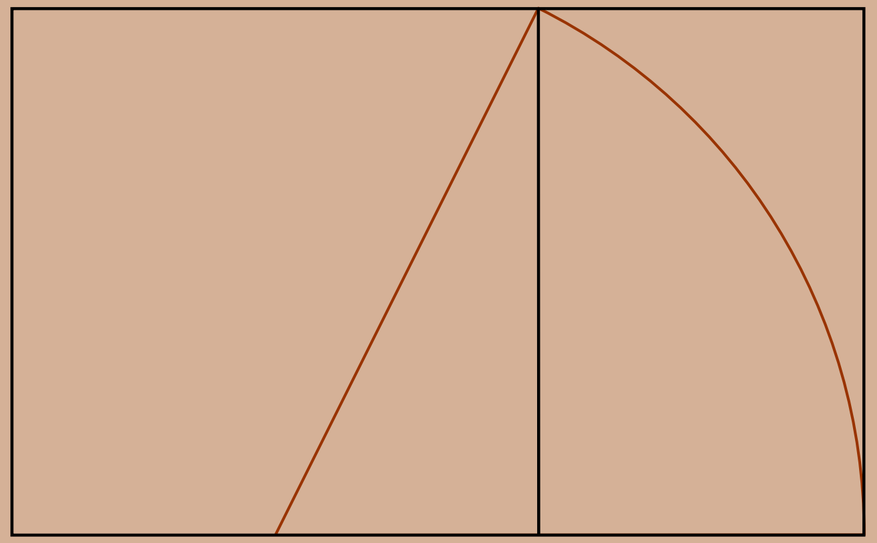
5 combinazioni possibili

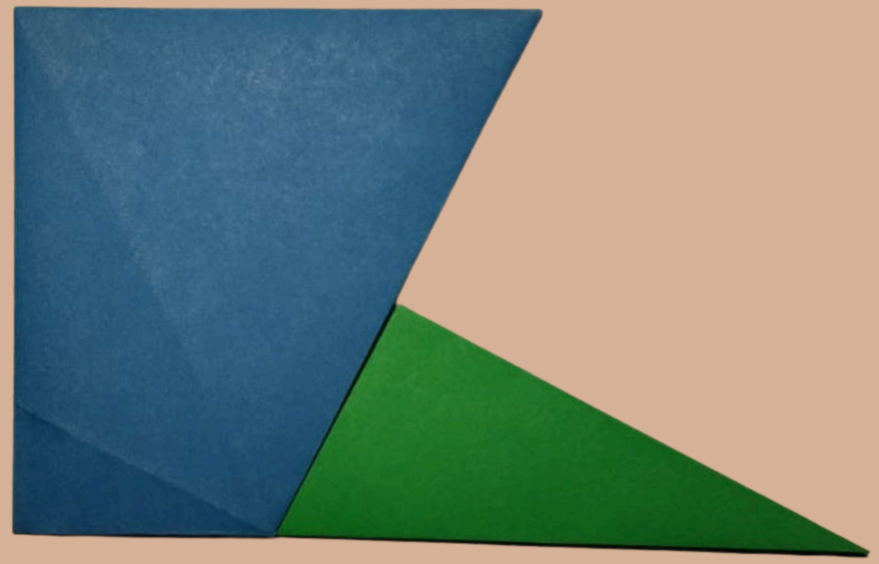


rettangolo 2:rad3

7 combinazioni possibili

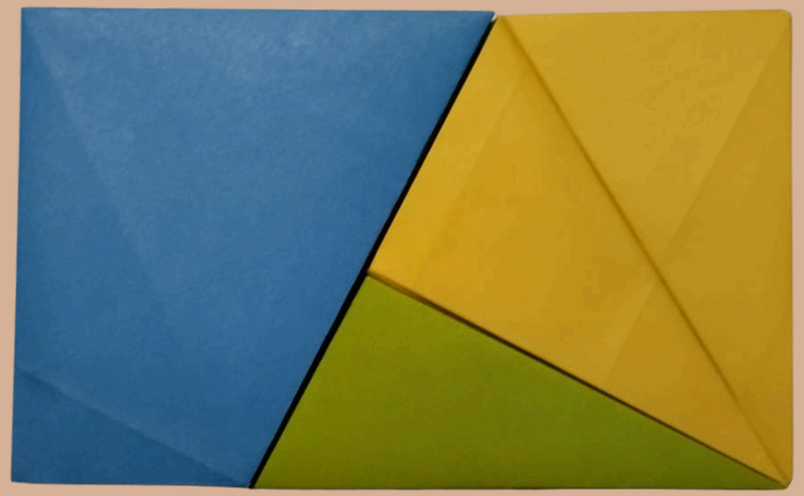
Dal Tangram a 2 pezzi al rettangolo aureo

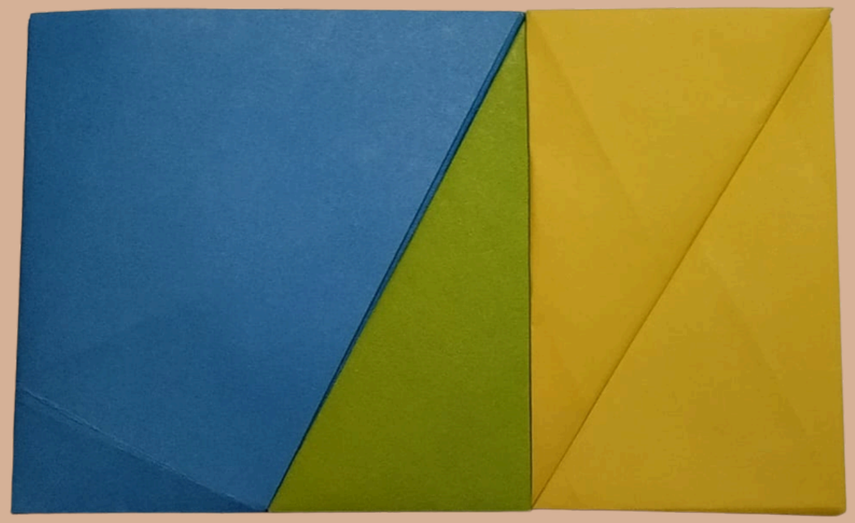


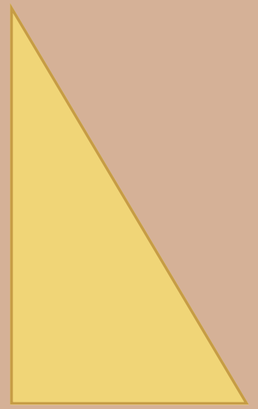


metodo di costruzione con riga e compasso

Per completare il rettangolo basta aggiungere due triangoli con i cateti in rapporto aureo



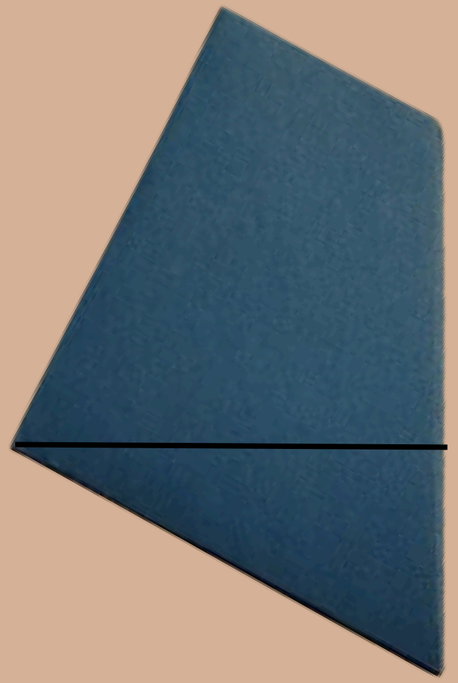


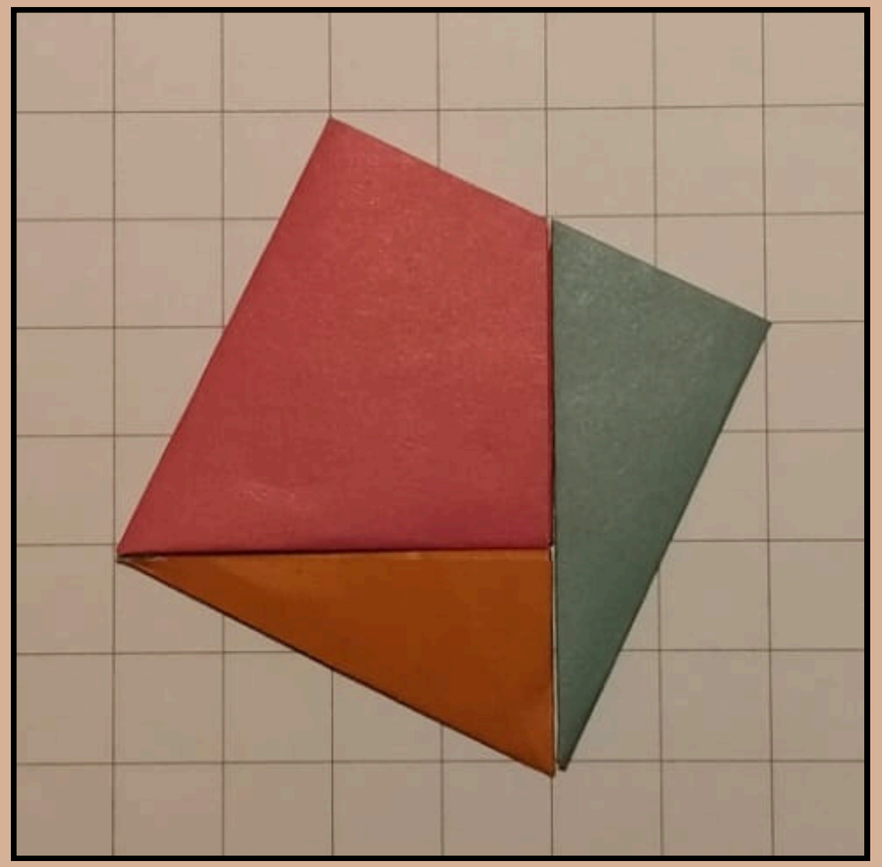


triangolo
con cateti in
rapporto aureo

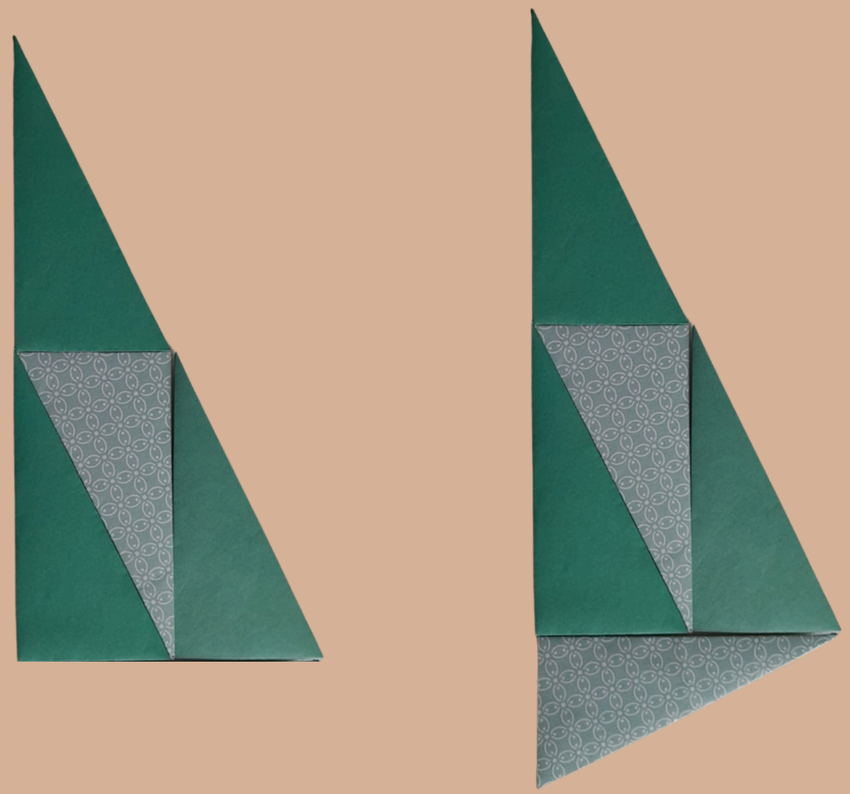
Tangram a 3 pezzi

Se tracciamo una linea perpendicolare al lato più lungo possiamo ottenere una scomposizione del quadrato in 3 parti.



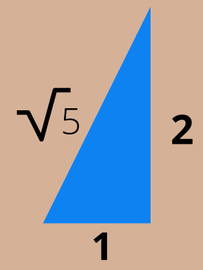


Il rapporto tra i due triangoli rettangoli è di 4:5

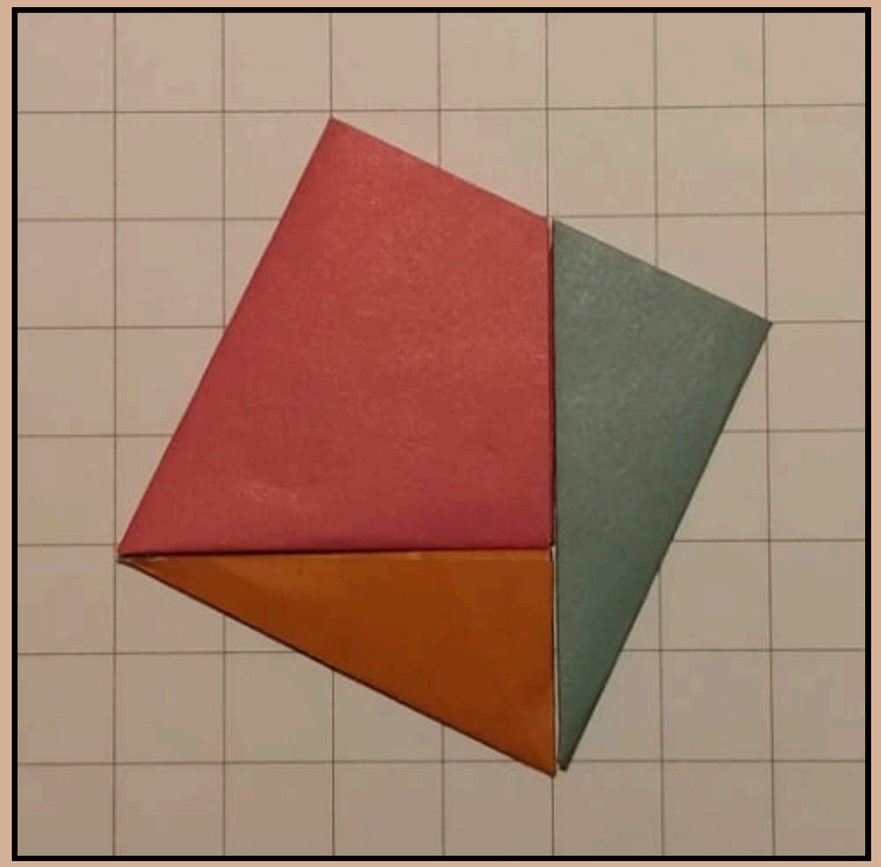


I triangoli con cateti in rapporto tra loro come i numeri interi **m** e **k** e ipotenusa **√n** sono **rep-n** in quanto si possono formare con una combinazione di due triangoli.

Ricordiamo che il triangolo con i cateti uno doppio dell'altro è un rep-4 ma anche un rep-5



Se poniamo l'area del quadrato uguale a 20 cm^2 è più agevole esprimere i rapporti tra le aree.



$\frac{1}{5} = \frac{4}{20}$

rep-4

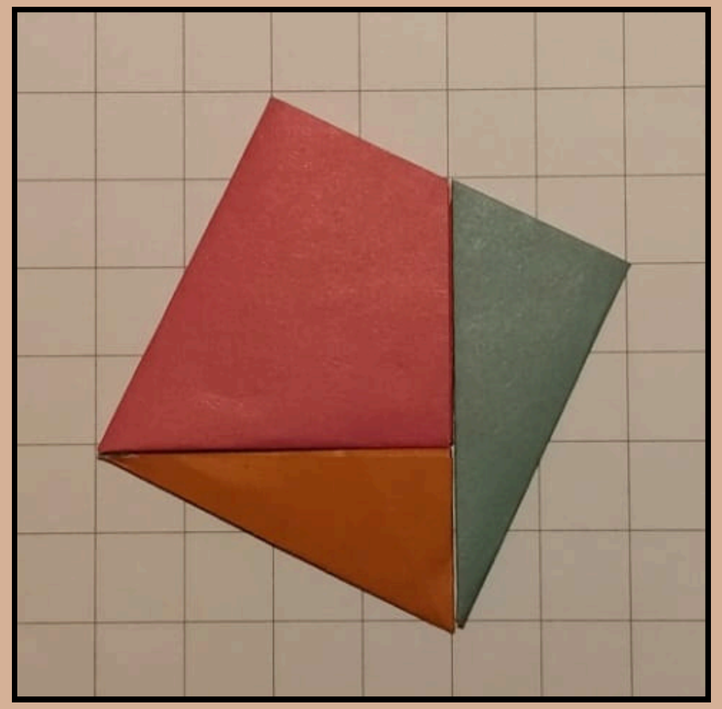
$\frac{11}{20}$

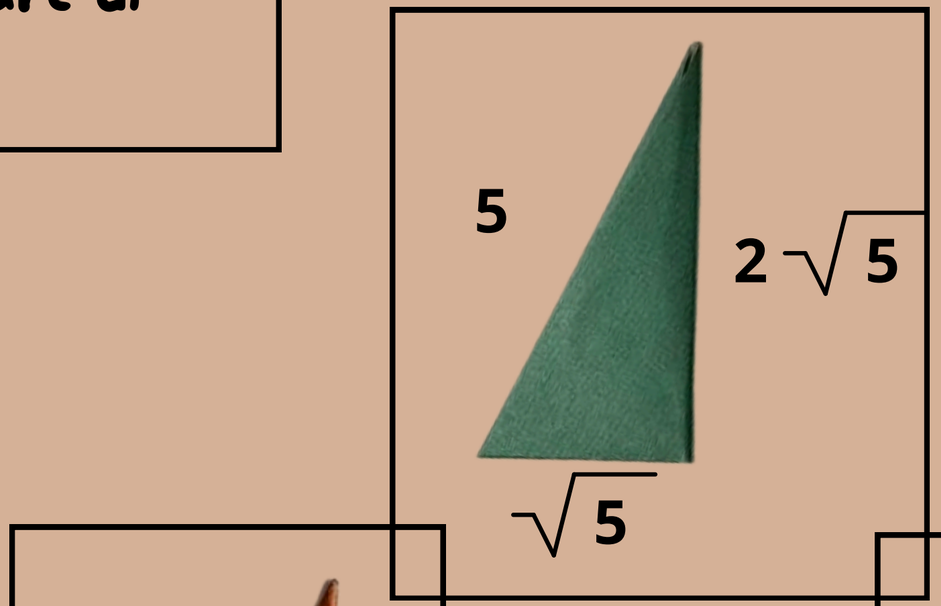
$\frac{1}{4} = \frac{5}{20}$

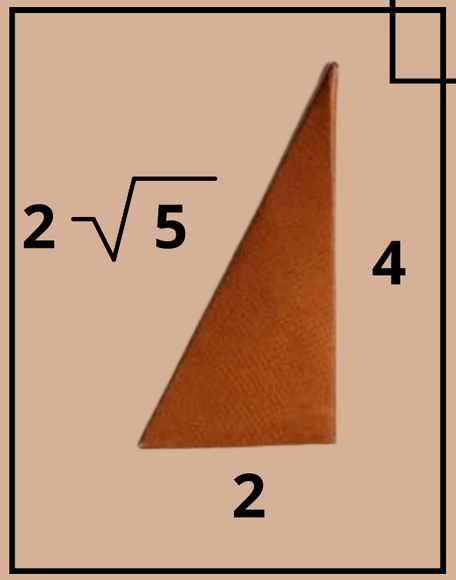
rep-5

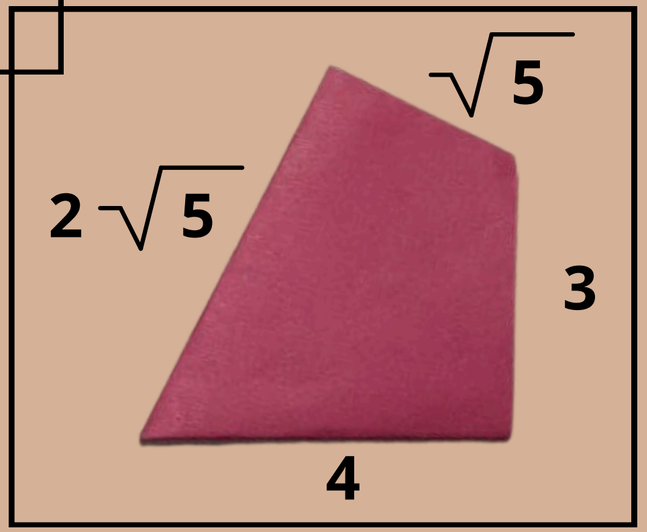
E' possibile ricavare le misure di tutti i lati

$2\sqrt{5} = \sqrt{20}$









Da quadrato a rettangolo

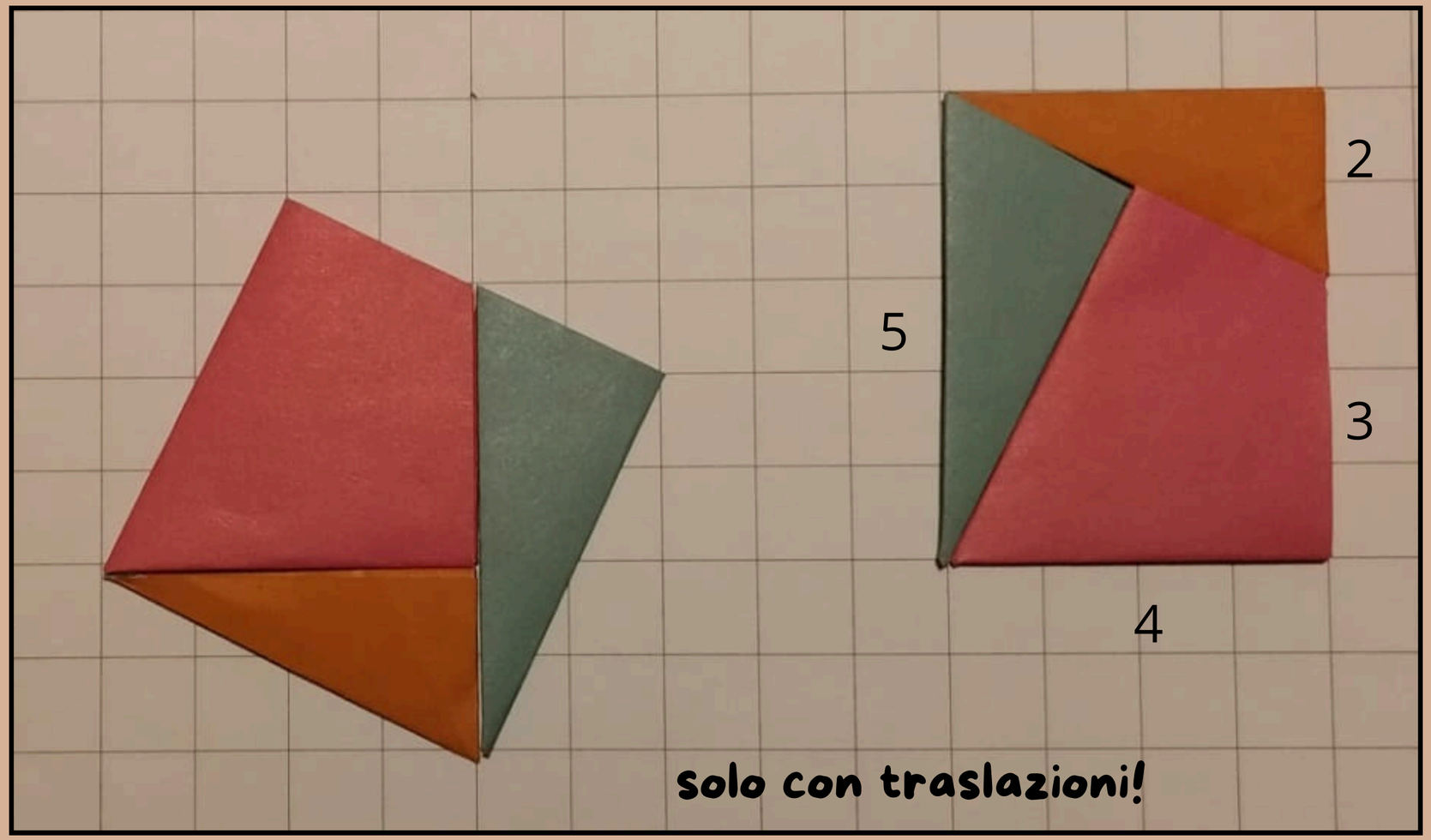
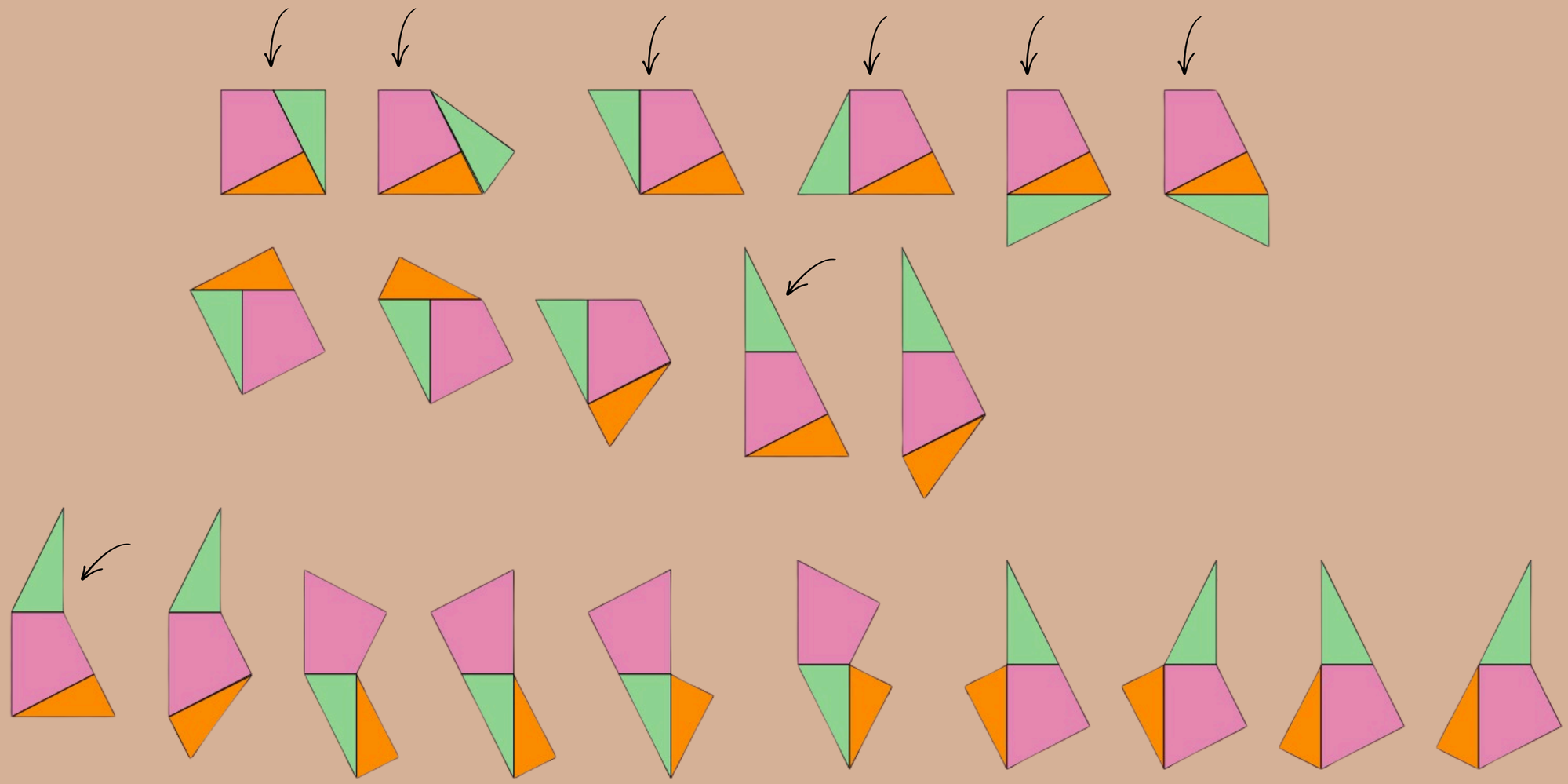
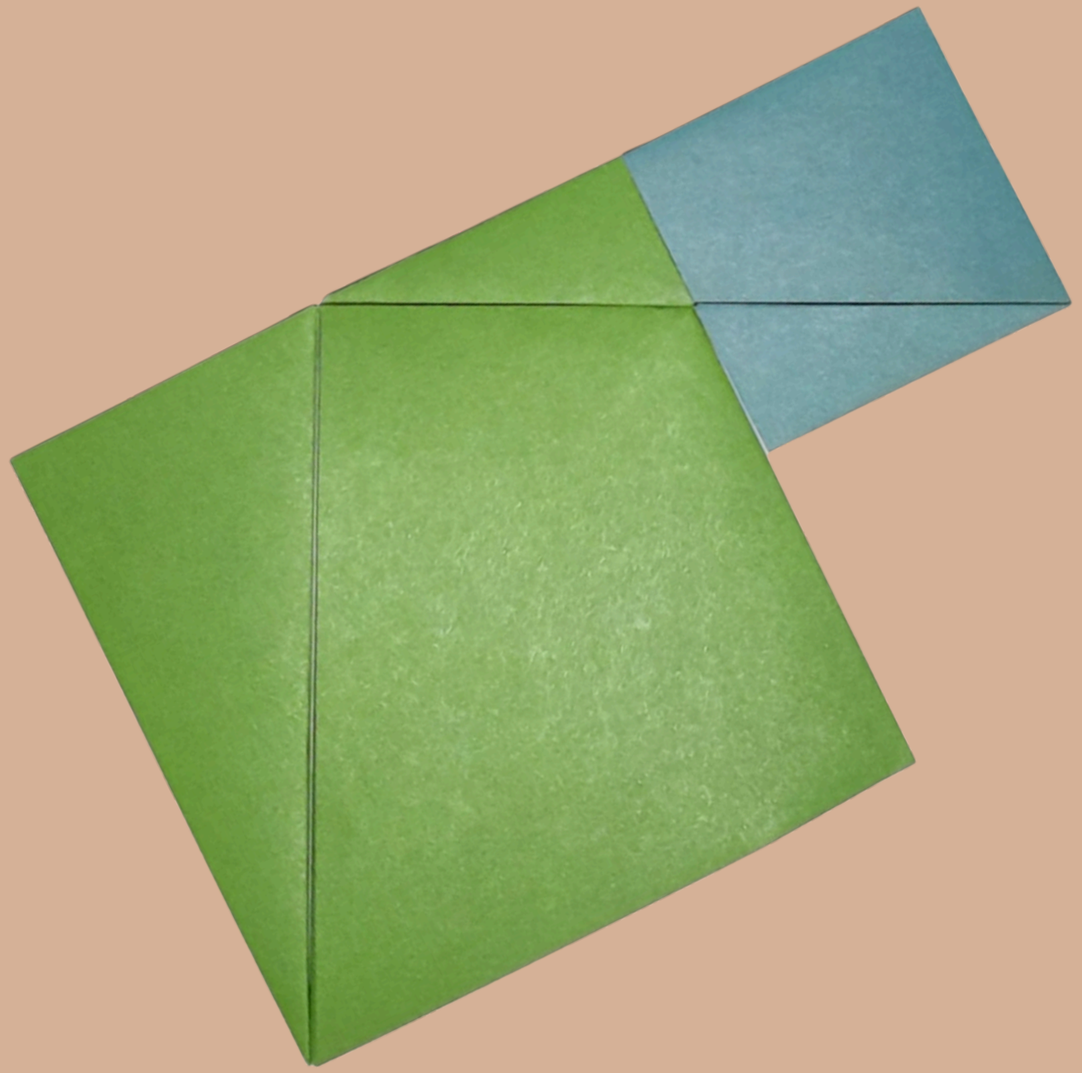


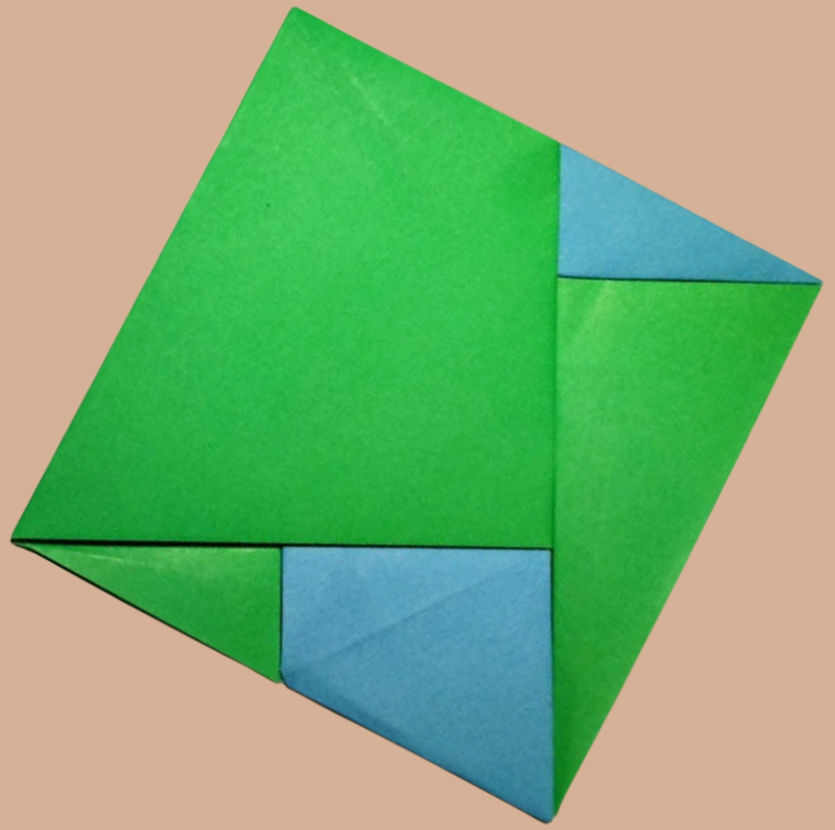
Figure che si possono comporre con il tangram a 3 pezzi

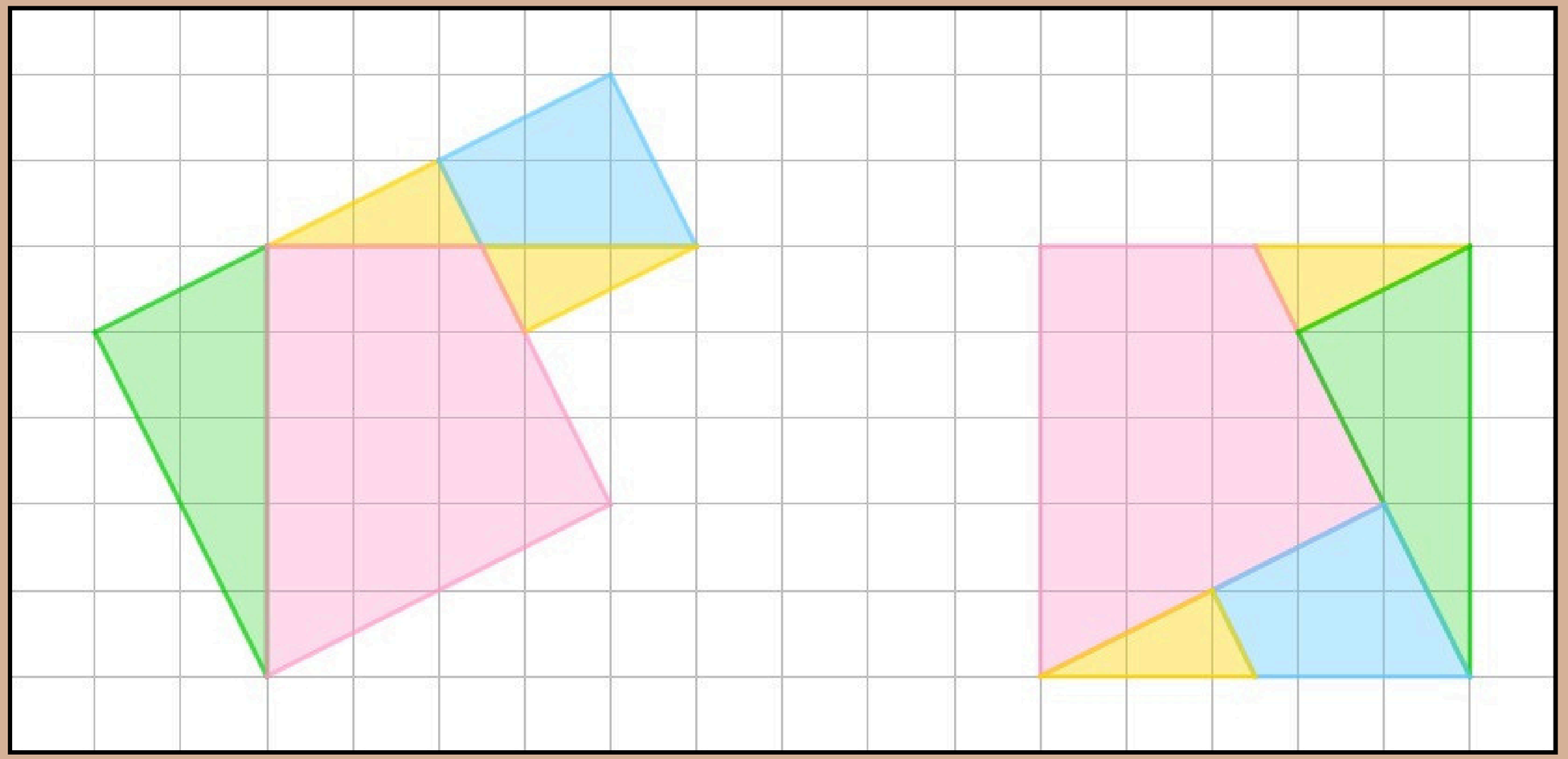


Dimostrazione di Pitagora con "I due tappeti"

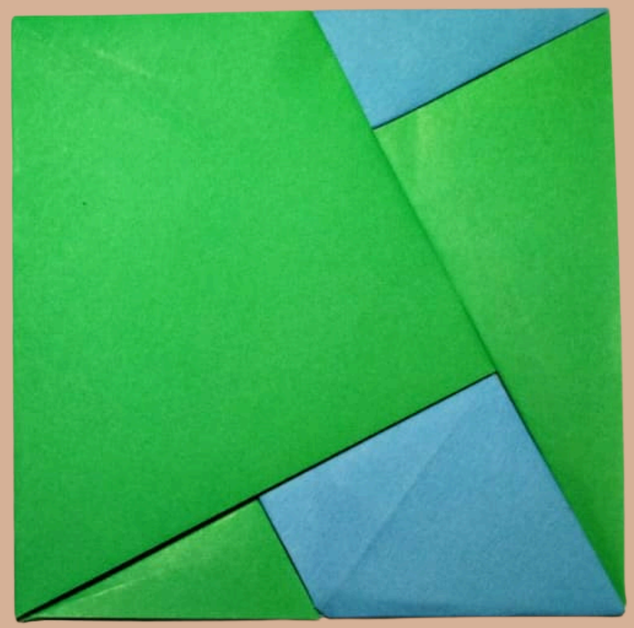


Dopo aver piegato il tangram a 3 pezzi non si può non osservare che il quadrato ottenuto con "I due tappeti" ha la stessa struttura



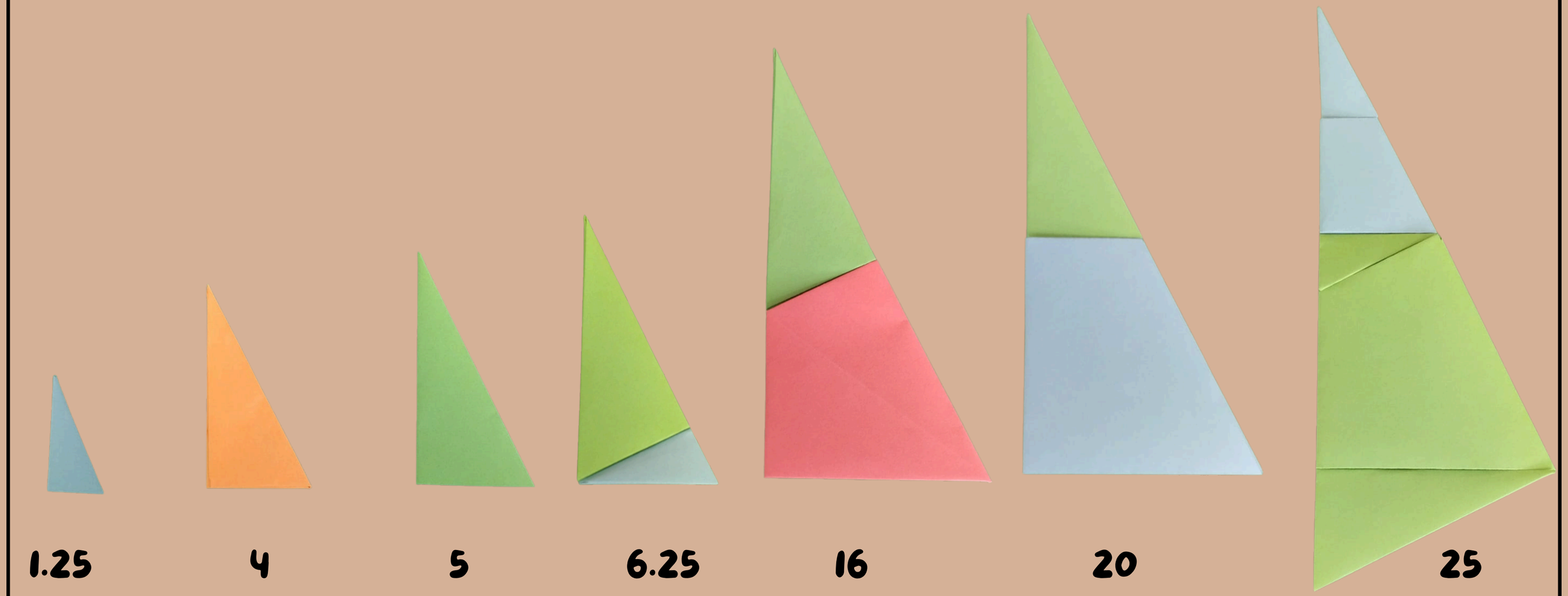


Se manteniamo l'area del quadrato sul cateto maggiore $20cm^2$ l'area del quadrato somma sarà $25\ cm^2$



Dato che il rapporto tra le aree dei due quadrati è di 4:5 anche il rapporto tra i due quadrilateri sarà lo stesso

Serie di triangoli simili con cateti 1:2



GRAZIE!

Luciana Piras & Barbara Sbrega

Sitografia e Bibliografia

- Oridida zoom n. 8 - Triangoli noti e... divertimenti imprevisti
  di F. Decio e S. Serre
- Oridida zoom n. 12 - Triangoli Rep-Tiles di L. Piras e B. Sbrega
- Puzzle e Tassellazioni - Matematica creativa e ricreativa in Origami
  di F. Decio, S. Serre, L. Piras e B. Sbrega Ed. CDO
- Puzzle e rompicapo in origami di P. Bascetta
  consultabile sul sito paolobascetta.com