

XXXVIII Convegno UMI-CIIM

La matematica serve ancora?

L'EDUCAZIONE MATEMATICA
PER UNA CITTADINANZA ATTIVA,
CONSAPEVOLE E CRITICA

4-6

SETTEMBRE
2025

Genova

Albergo dei Poveri
Piazzale Brignole 2

ricomincio
da 3...
pieghe

Interventi

G. Agrusti, G. Anichini, L. Balletti,
M. Crivellini, F. Arzarello, P. Boero,
A. Brigaglia, A. Cusi, S. Demartini,
A. Dematté, F. Ferrara, F. Ferri,
S. Funghi, G. Gallo, G. Guidone,
A. Marino, M. Mellone, G. Rosolini,
S. Sbaragli, M. Testera, R. Tortora,
A. Zaccagnini

Spazio di approfondimento I

Matematica in verticale

Spazio di approfondimento II

Matematica e pace

Tavola Rotonda

La matematica per il cittadino

Spazio tematico

Matematica e linguaggio

Comitato Scientifico

Laura Branchetti, Maria Rosaria
Enea, Maria Flavia Mammana,
Marina Marchisio Conte,
Francesca Morselli, Domingo Paola,
Ketty Savioli, Carlo Toffalori,
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Ulteriori indicazioni
sul sito dell'UMI-CIIM:
[https://umi.dm.unibo.it/
attivita-della-ciim/convegni/
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Per la partecipazione è
riconosciuto l'esonero del
servizio ai sensi dell'art.36
comma 8 del CCNL/2019-2021.



UMI



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Università
di Genova

DIMA DIPARTIMENTO
DI MATEMATICA



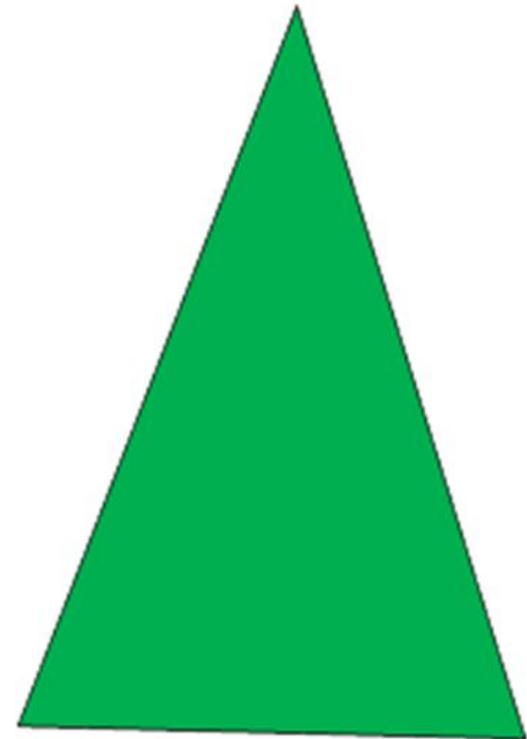
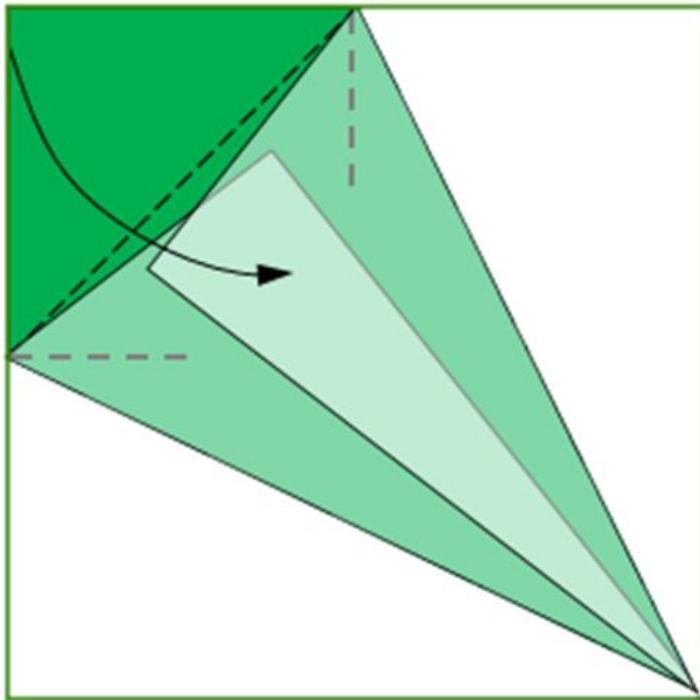
DIPARTIMENTO
DI ECCELLENZA
MIUR



DEASCUOLA

CASIO
www.casio-edu.it

Diagrammi

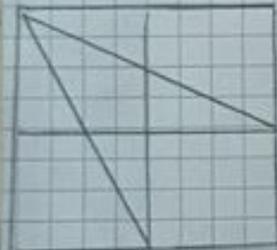


DISEGNARE I PIAGRAMMI

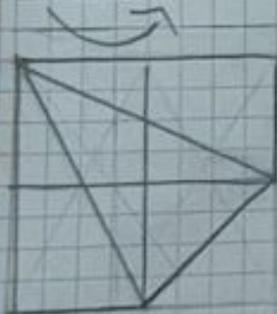
PER PIEGARE L'ALBERO



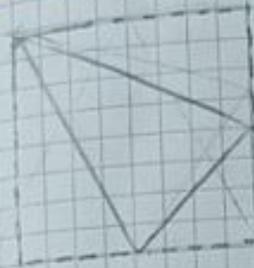
PIEGARE LE
MEDIANE



PIEGARE I DUE
RETTANGOLI A
METÀ



PIEGARE L'OTTAVO
AL CENTRO

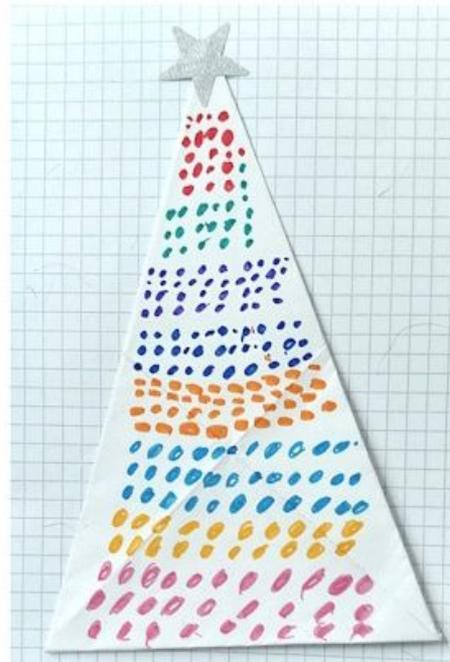


ALLA FINE

L'ALBERO È PRONTO

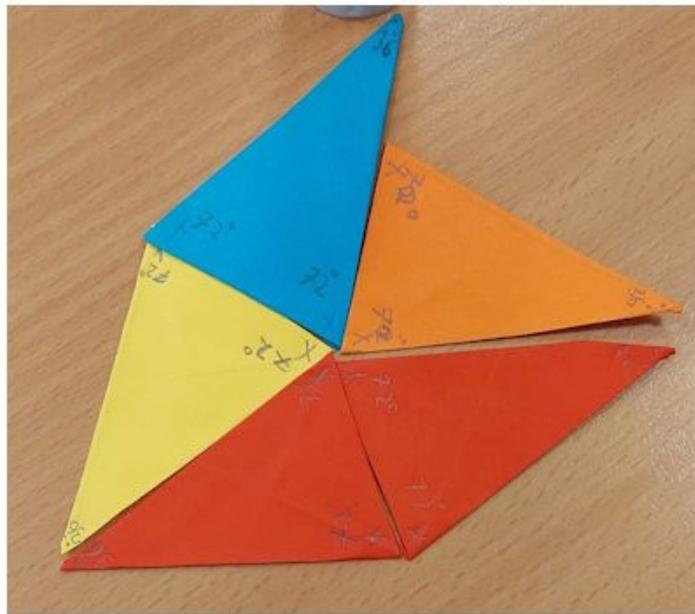
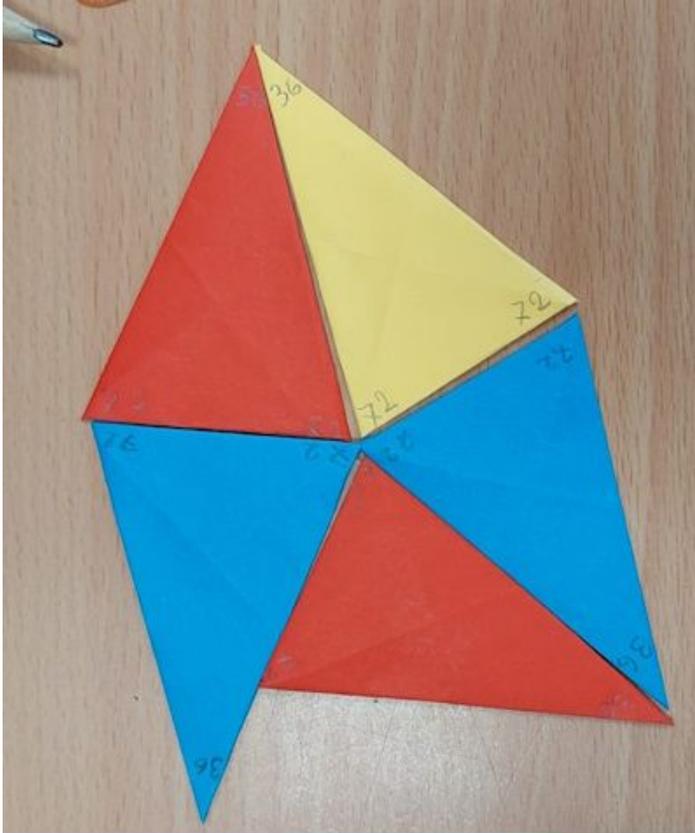


Presepe



Angoli e triangoli





12 ER DECEMBER THURSDAY 2024
TRIANGOLO AUREO



Abbiamo sommato l'angolo giro (360°)
scostato $\times 1$ dei 2 ~~tri~~ angoli uguali
del triangolo.
Sono serviti 5 triangoli (invece di 10).
Abbiamo capito che ognuno degli
angoli uguali è il doppio dell'angolo da 72°

$$360 : 10 = 36$$

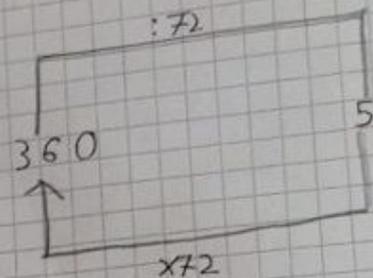
$$36 \times 10 = 360$$

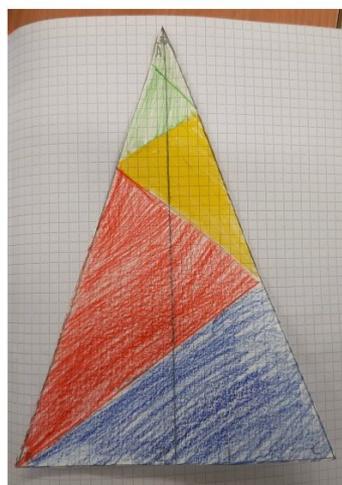
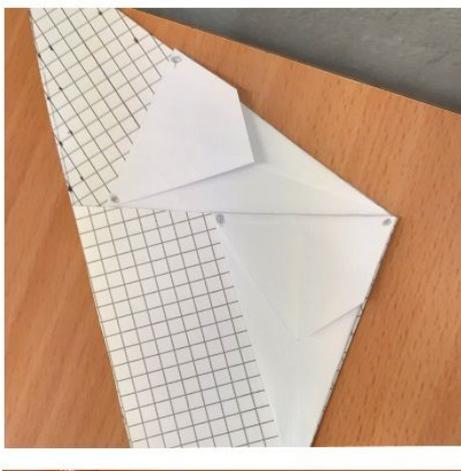
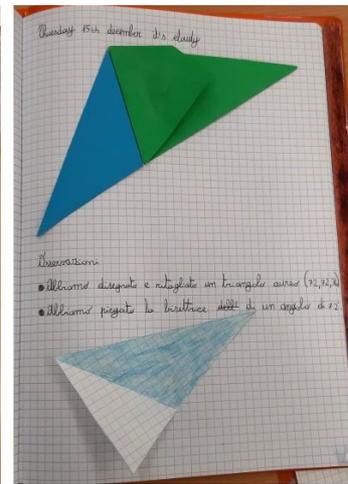
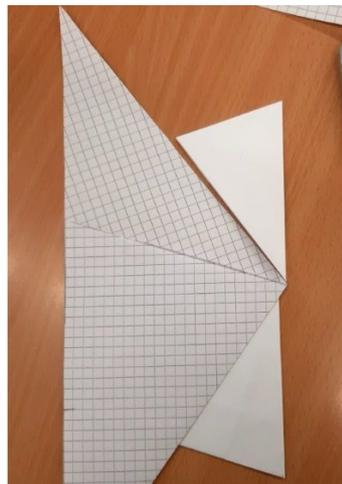
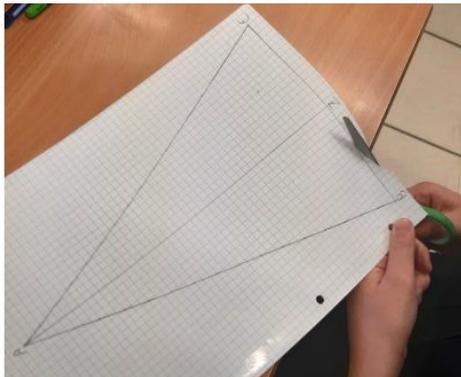
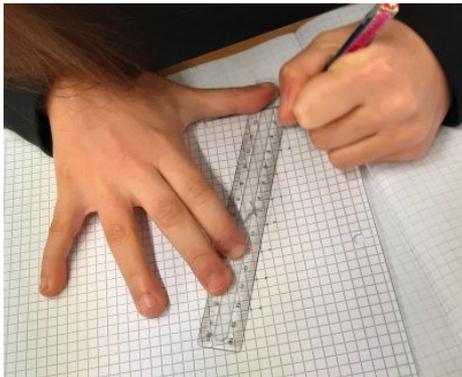
$$36 \times 2 = 72$$

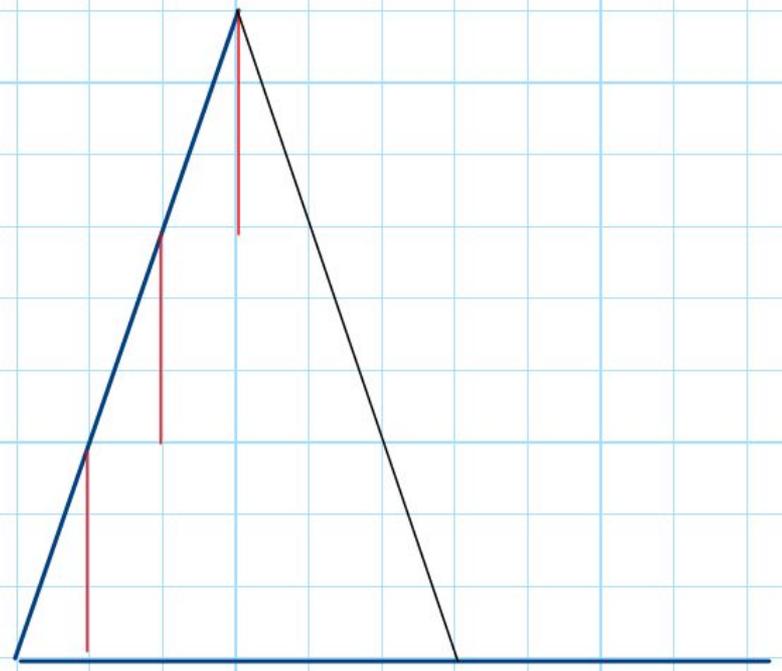
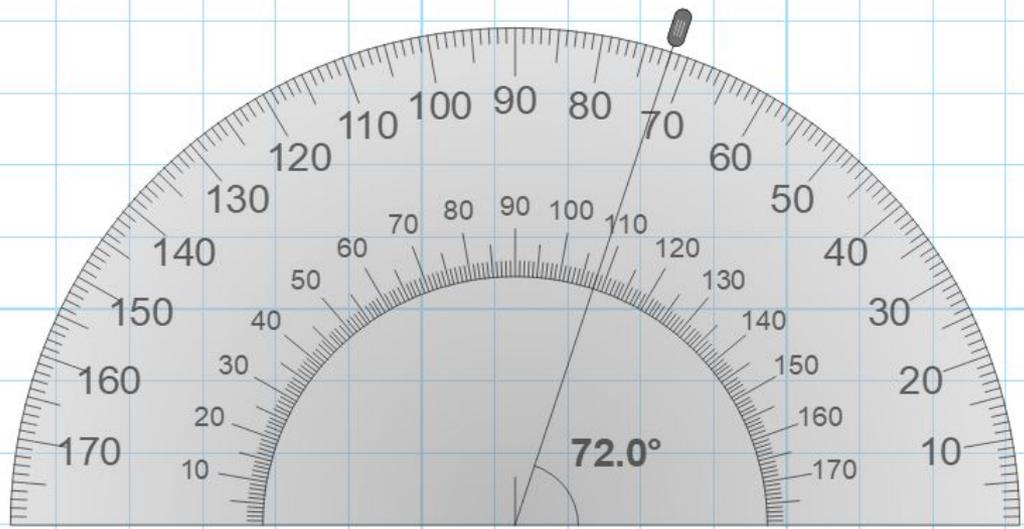
$$360 : 5 = 72$$

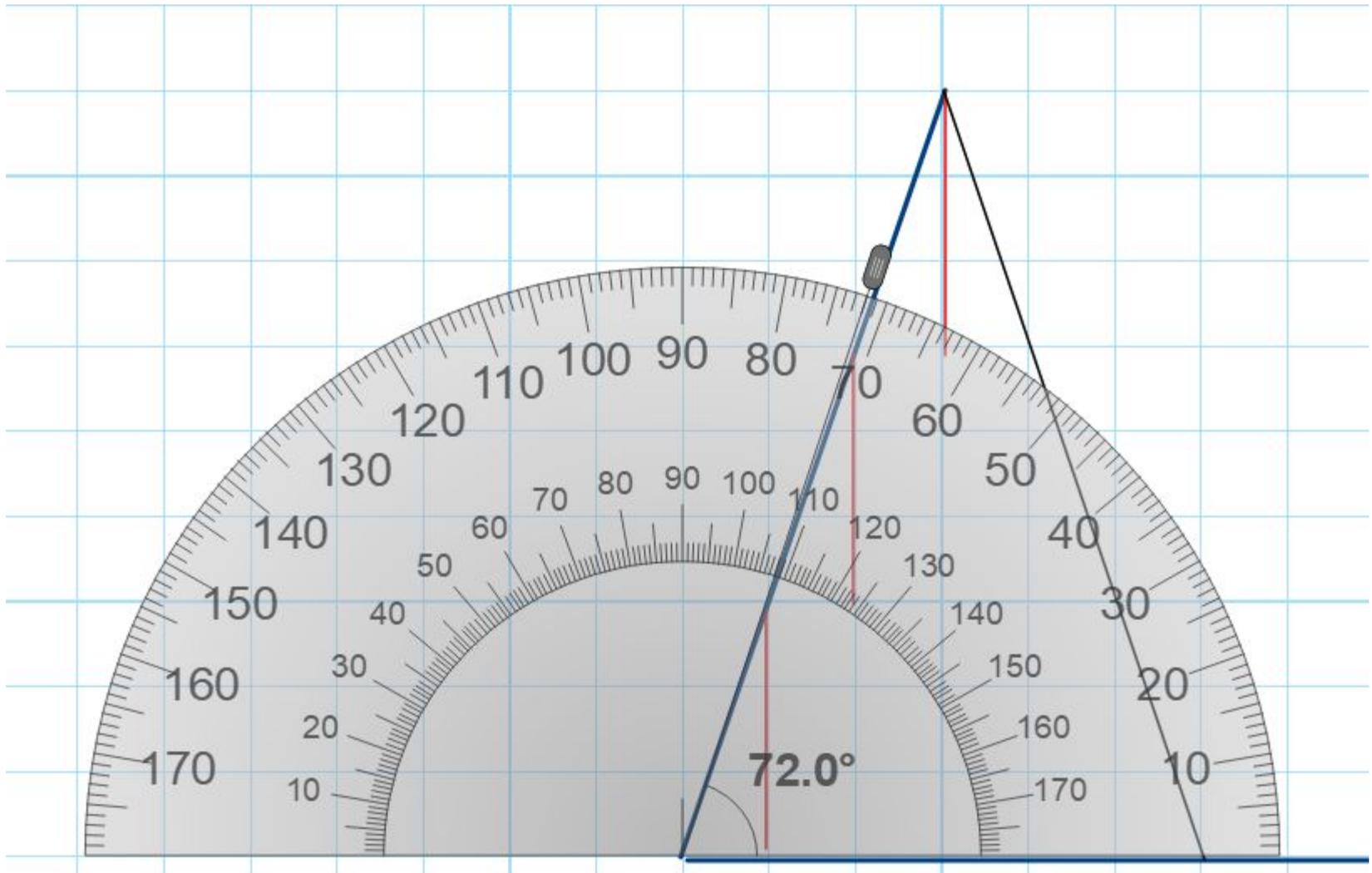
$$72 \times 5 = 360$$

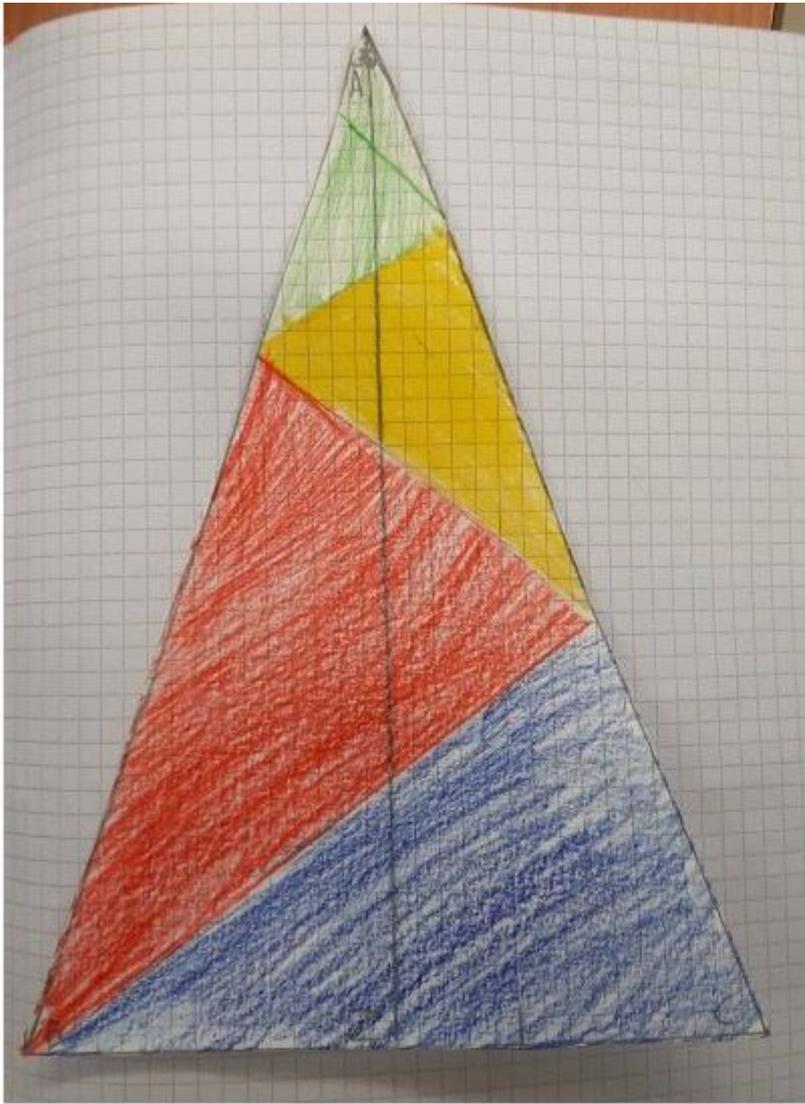
$$360 : 72 = 5$$



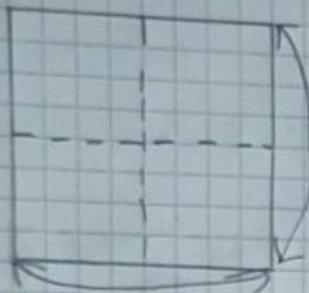








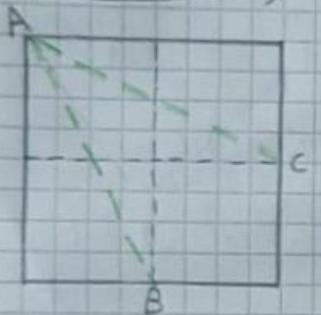
LAVORIAMO INSIEME



PIEGARE LE

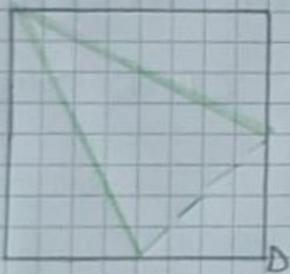
MEDIANE

RIAPRIRE



PIEGARE AB E

AC



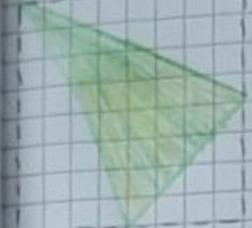
PORTARE IL

VERTICE D AL

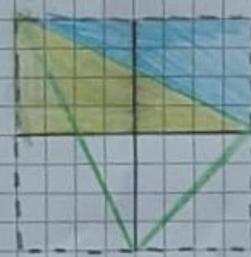
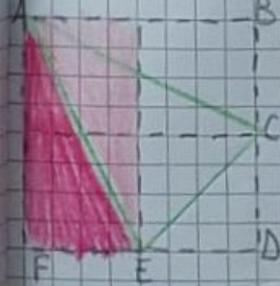
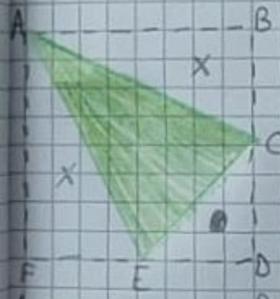
CENTRO

L'ALBERO E

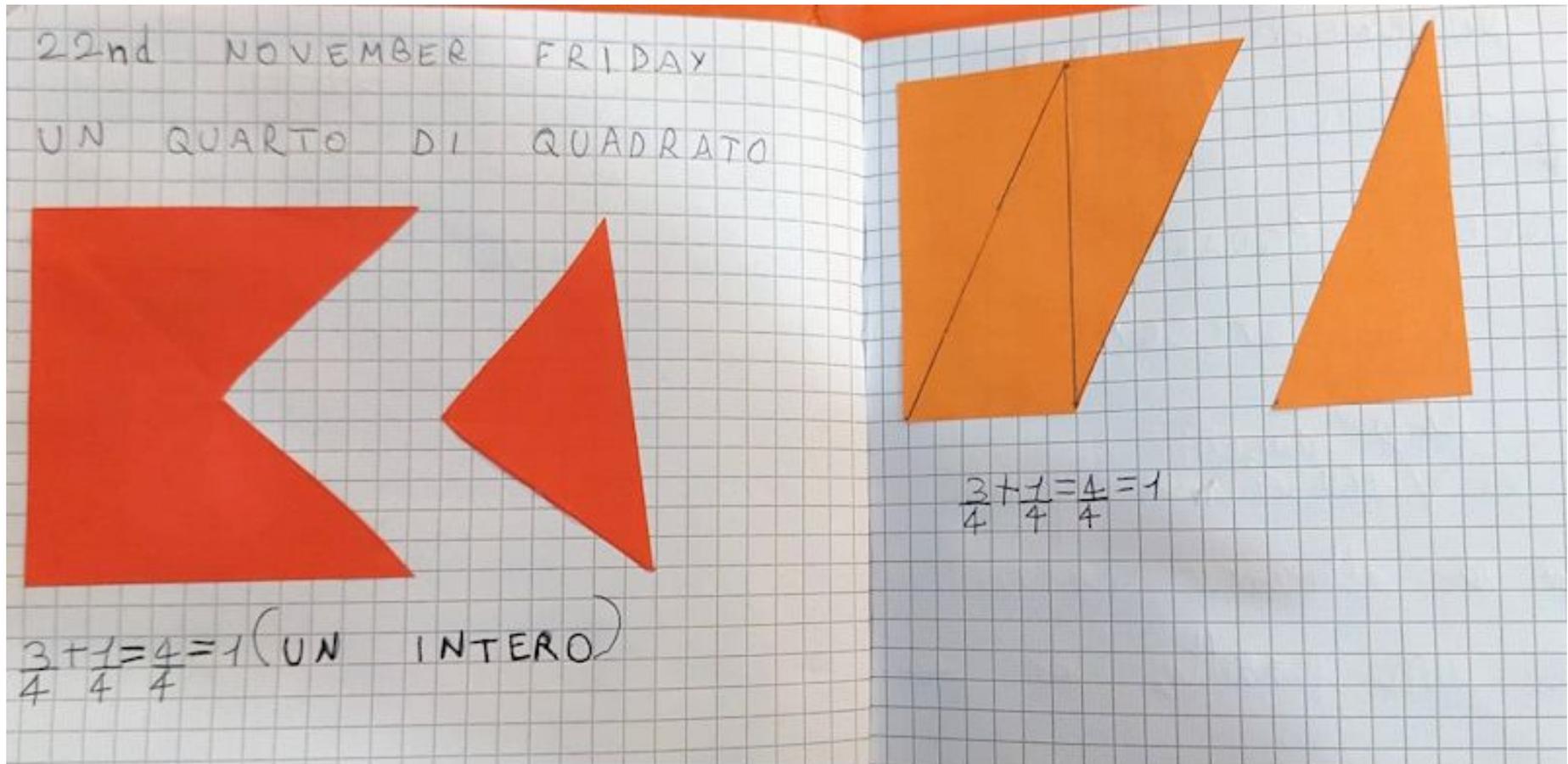
PRONTO



Quale frazione ~~non~~ rappresenta
rappresentano i triangoli $\triangle AFE$
 $\triangle ABC$ e $\triangle DCE$ rispetto al quadrato?

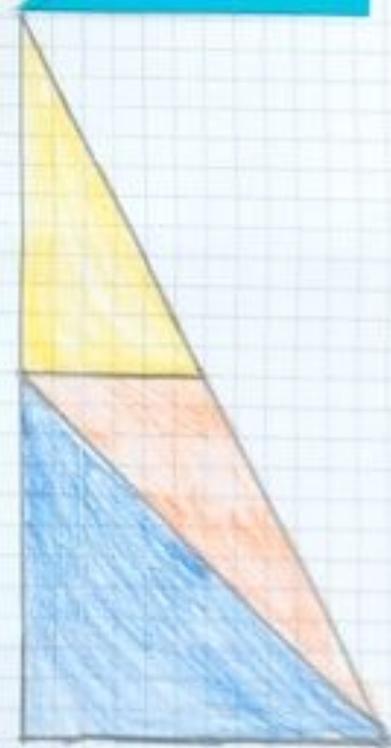
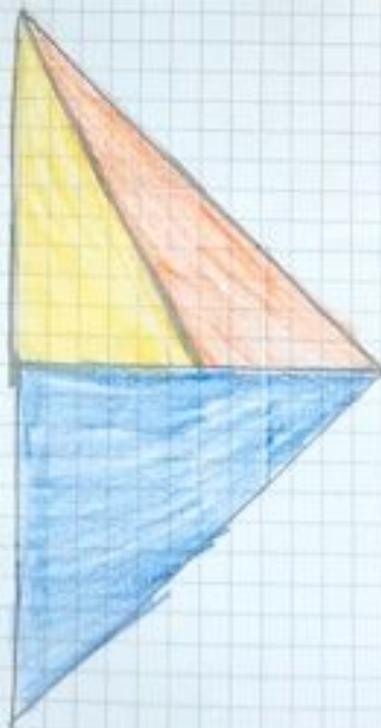
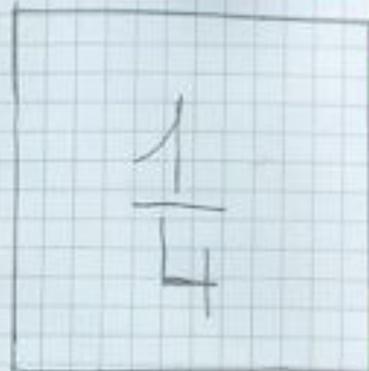
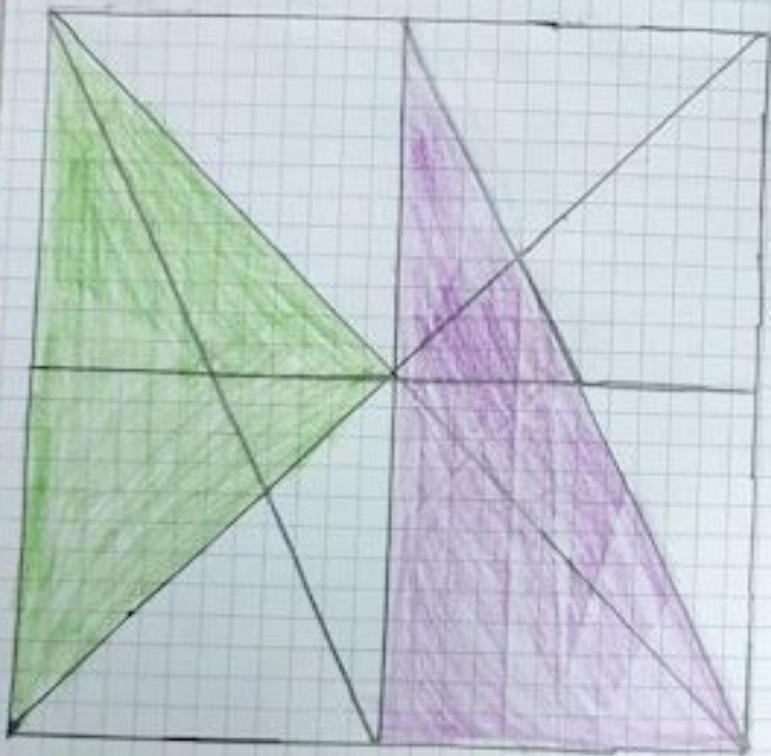


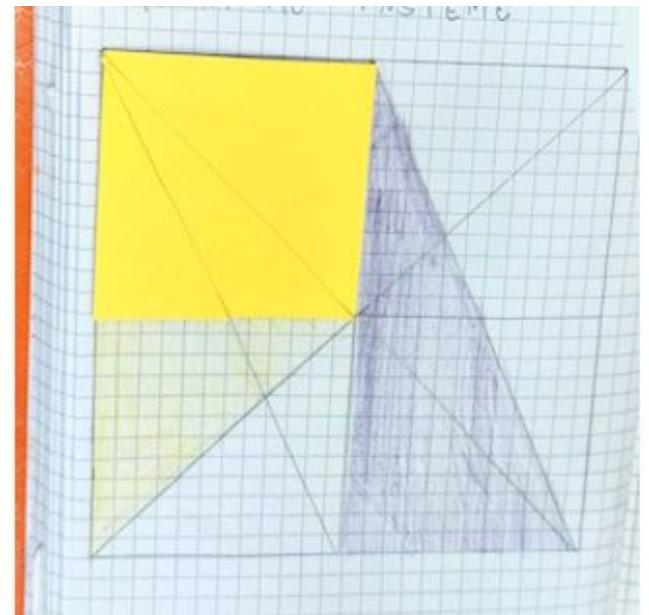
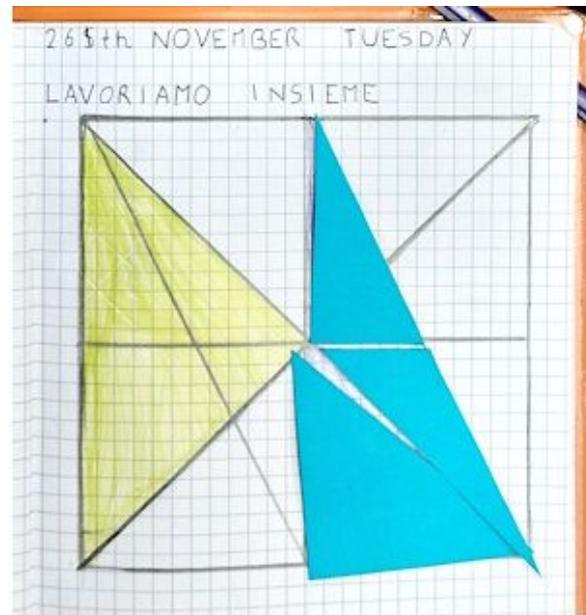
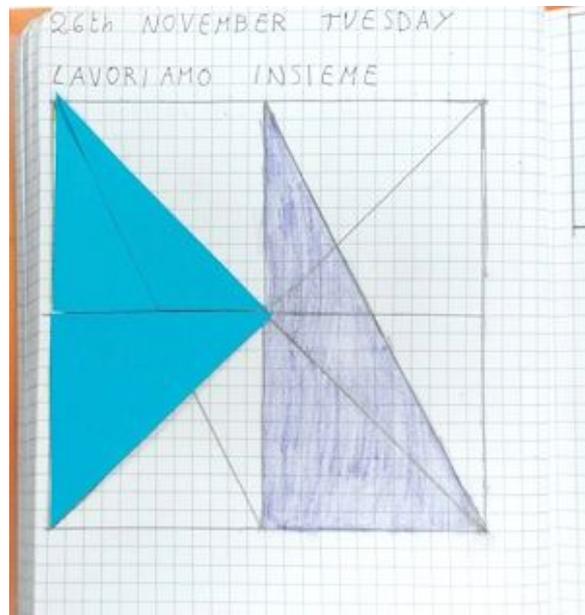
Frazioni alla primaria e...



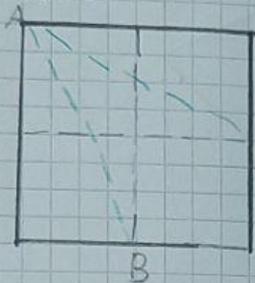
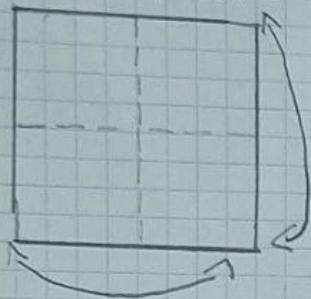
26TH NOVEMBER TUESDAY

LAVORIAMO INSIEME



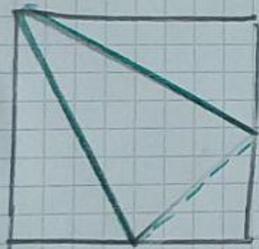


LAVORIAMO INSIEME



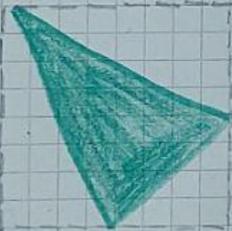
PIE CARE
 \overline{ABE} \overline{AOC}

Piegare le mediane e
riaprire



PORTARE IL VERTICE

D AL CENTRO
L'ALBERO
È PRONTO

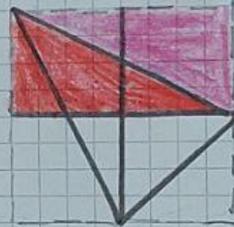
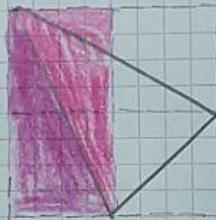
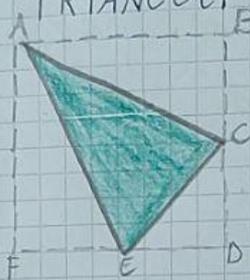


QUALE FRAZIONE RAPPRESENTANO

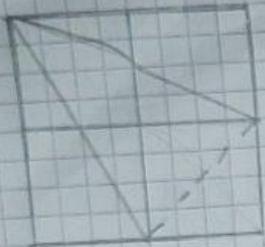
TRIANGOLI

$\triangle AFE$ E $\triangle ABC$ E $\triangle DCE$

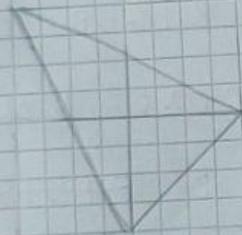
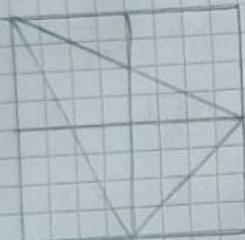
RISPETTO AL QUADRATO



$\triangle AFE = \triangle ABC$ sono $\frac{1}{4}$ del quadrato perché sono metà della metà.



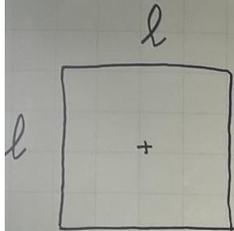
RIPIEGA TUTTO



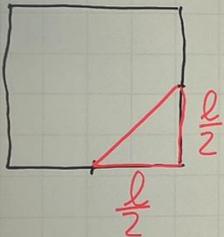
È UN OTTAVO PERCHÉ SE
DIVIDIAMO I QUADRATINI
COME QUEL QUADRATINO
DIVENTANO 8 TRIANGOLINI
CHE SONO LA METÀ DELLA
METÀ DELLA METÀ CIOÈ
OTTAVI.

... alla secondaria

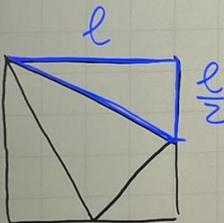
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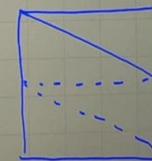
quadrato \rightarrow 4 angoli retti
4 lati congruenti $\rightarrow l \rightarrow A = l^2$



triangolo rettangolo isoscele
cateti di lunghezza $\frac{l}{2} \Rightarrow A = \frac{l}{2} \cdot \frac{l}{2} \cdot \frac{1}{2} = \frac{l^2}{8}$



triangolo rettangolo scaleno
cateti uno il doppio dell'altro,
di lunghezza $\frac{l}{2}$ e $l \Rightarrow A = l \cdot \frac{l}{2} \cdot \frac{1}{2} = \frac{l^2}{4}$



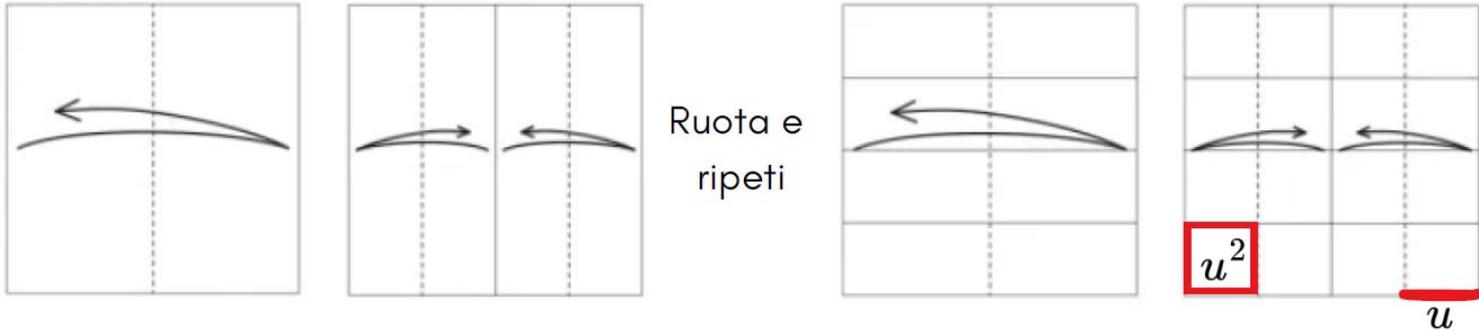
triangolo



1/1

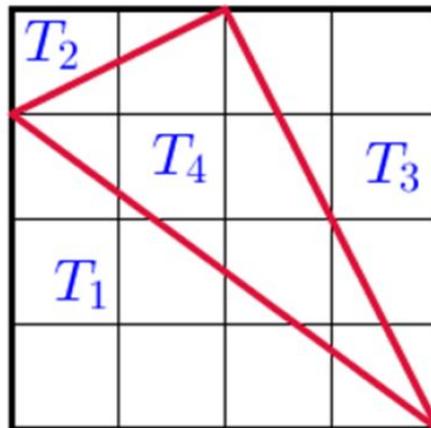
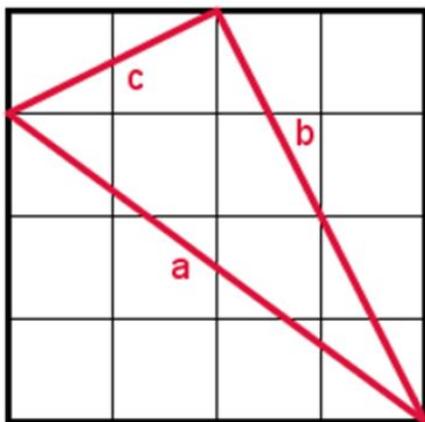
altri triangoli

Costruisci una griglia quadrata 4x4



Ruota e
ripeti

Usando un righello traccia i segmenti a , b , c e ottieni 4 triangoli come nelle figure



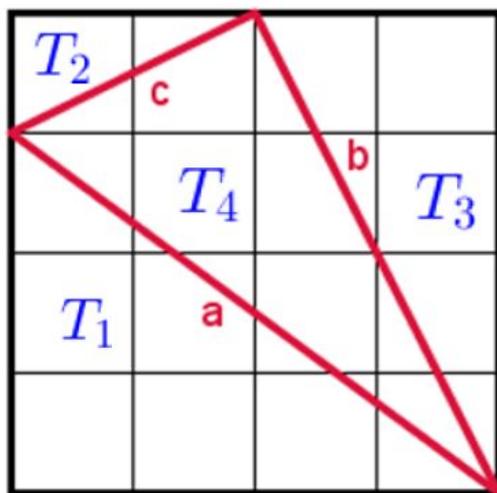
Calcola le aree dei 4
triangoli in funzione di u .

Come puoi determinare
l'area di T_4 ?

Tre scritture, un significato

Calcola il rapporto tra l'area di ciascun triangolo e il quadrato di partenza, esprimendolo prima in frazione, poi in decimale e infine in percentuale.

Triangolo /Totale	Frazione	Decimale	Percentuale
T1/Q			
T2/Q			
T3/Q			
T4/Q			



2 pieghe

Piega il foglio lungo i segmenti b e c e osserva attentamente.

Quanto misura il segmento a ?

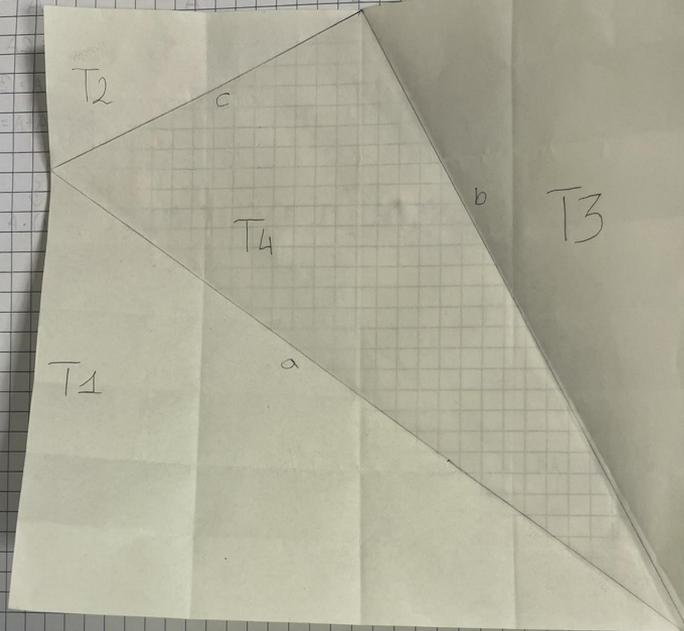
Che triangolo è $T4$?

Cosa puoi dire delle aree di $T2$ e $T3$ rispetto a $T4$?

Che cosa rappresenta per $T4$ il segmento individuato dai cateti di $T2$ e $T3$ che vanno a toccarsi?

Puoi usare queste osservazioni per calcolare l'area di $T4$ con strategie diverse rispetto a prima?

Lezione 3



Calcolo delle aree

$$T1 = A1 = \frac{b \cdot h}{2} = \frac{3u \cdot 4u}{2} = 6u^2$$

$$T2 = A2 = \frac{b \cdot h}{2} = \frac{1u \cdot 5u}{2} = 1u^2$$

$$T3 = A3 = \frac{b \cdot h}{2} = \frac{1u \cdot 4u}{2} = 2u^2$$

$$T4 = A4 = A - A1 - A2 - A3 = (4u)^2 = 16u^2 - 6u^2 - 1u^2 - 2u^2 = 5u^2$$

Triangolo/ totale	Frazione	Decimale	Percentuale
T1/A	$6u^2/16u^2 = 3/8$	$3:8 = 0,375$	37,5%
T2/A	$1u^2/16u^2 = 1/16$	$1:16 = 0,0625$	6,25%
T3/A	$2u^2/16u^2 = 1/4$	$1:4 = 0,25$	25%
T4/A	$5u^2/16u^2 = 5/16$	$5:16 = 0,3125$	31,25%
Tot	$16/16$	1	100%

$$\left. \begin{array}{l} a = 5u \\ h_u = 2u \end{array} \right\} A_{Tu} = \frac{5 \cdot 2u}{2} = 5u^2$$

$$T2 = \sqrt{1^2 + 2^2} = \sqrt{1+4} = \sqrt{5}u$$

$$T3 = \sqrt{2^2 + 4^2} = \sqrt{4+16} = \sqrt{20}u$$

$$A_{Tu} = \frac{\sqrt{20}u \cdot \sqrt{5}u}{2} = \frac{\sqrt{100}u^2}{2} = \frac{10u^2}{2} = 5u^2$$

Perimetri

$$T1 \quad 2p1 = 5u + 3u + 4u = 12u$$

$$T2 \quad 2p2 = 1u + 2u + \sqrt{5}u = (3u + \sqrt{5}u)$$

$$T3 \quad 2p3 = 2u + 4u + \sqrt{20}u = (6u + \sqrt{20}u)$$

$$T4 \quad 2p4 = 5u + \sqrt{20}u + \sqrt{5}u = (5u + 3\sqrt{5}u)$$

$$a = 5u$$

$$b = \sqrt{20}u$$

$$c = \sqrt{5}u$$

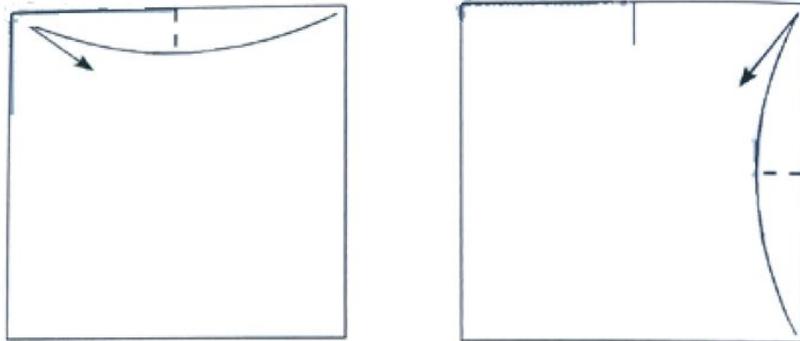
$$\sqrt{20} = \sqrt{2 \cdot 5} = \sqrt{2} \cdot \sqrt{5} = 2\sqrt{5}$$

tornando a noi

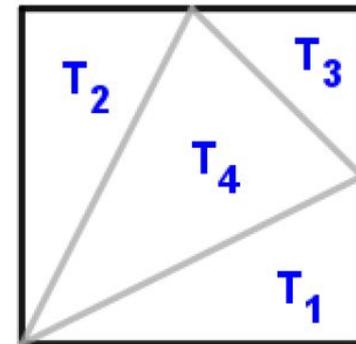
Ancora triangoli

FOGLIO QUADRATO

Fare due piccoli "pinch" per evidenziare i punti medi di due lati consecutivi



Con righello e matita unisci i punti medi tra loro e al vertice opposto



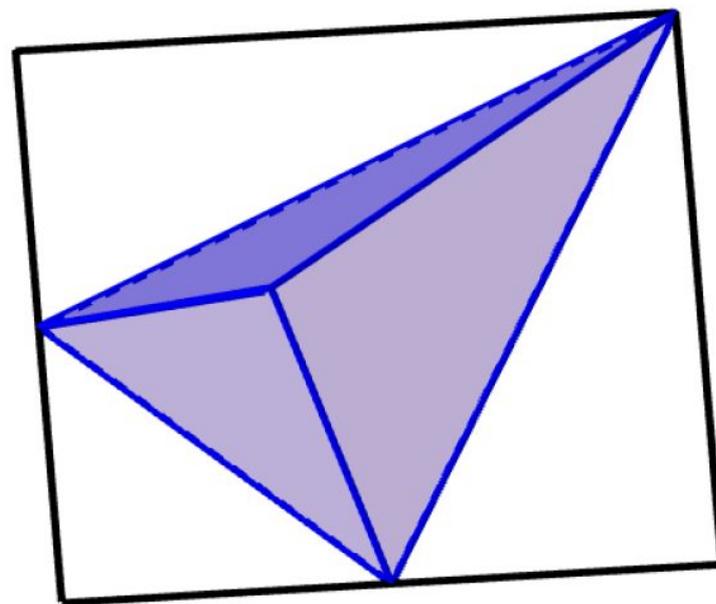
D'ora in avanti utilizza il lato del quadrato come unità di misura della lunghezza.

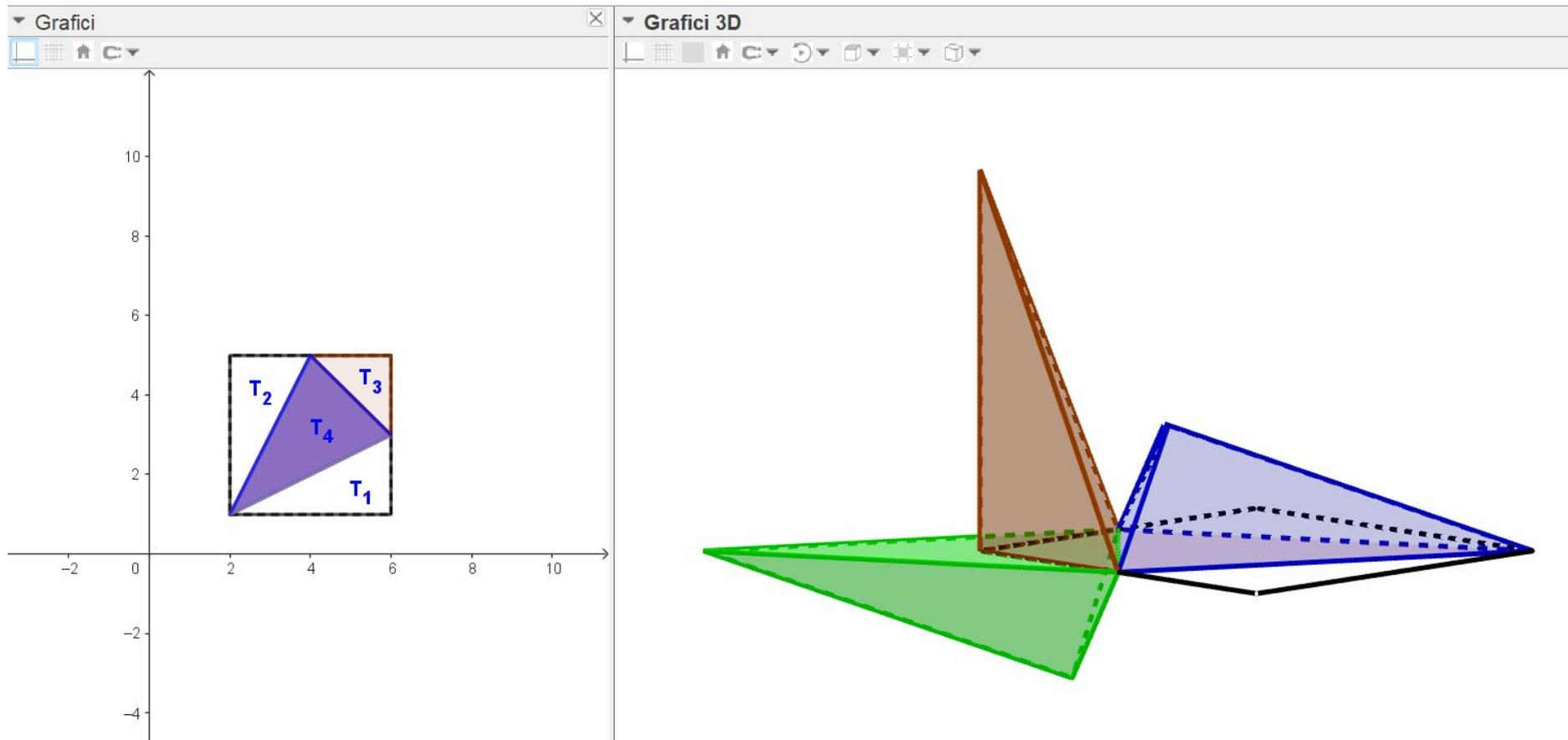
Sai esprimere perimetro e area di ogni triangolo?

Tre pieghe ... 3D

Piega lungo i segmenti tracciati a matita fino a far coincidere i margini del foglio. Cerca di mantenere l'oggetto in posizione tridimensionale (scotch).

Che solido hai ottenuto?
Sai esprimere la sua superficie totale in funzione del lato del quadrato iniziale? e il suo volume?





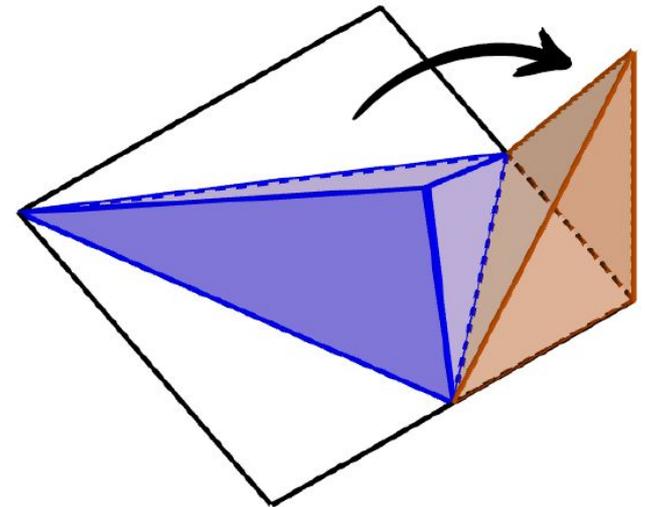
Muovere gli oggetti nello spazio
Scegliere i riferimenti più comodi



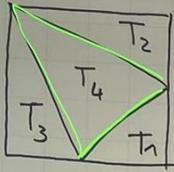
Ricorda che il volume di una piramide è un terzo del volume del prisma che ha la stessa base e la stessa altezza.

$$V = \frac{b \times h}{3}$$

Scegli opportunamente la base, in modo da ricavare facilmente l'altezza.



Cambiare prospettiva



triangolo isoscele

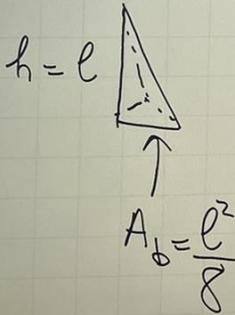
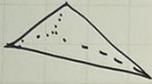
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$$A_{T_4} = A_Q - (A_{T_1} + A_{T_2} + A_{T_3}) = l^2 - \left(\frac{l^2}{8} + \frac{l^2}{4} + \frac{l^2}{4} \right) = l^2 - \left(\frac{l^2 + 2l^2 + 2l^2}{8} \right) =$$

$$= l^2 - \frac{5}{8} l^2 = \frac{8-5}{8} l^2 = \frac{3}{8} l^2$$

$$A_{TOT} = (A_{T_1} + A_{T_2} + A_{T_3} + A_{T_4}) = A_Q = l^2$$

$$V = \frac{A_b \cdot h}{3} = \frac{1}{3} \cdot \frac{l^2}{8} \cdot l = \frac{l^3}{24}$$



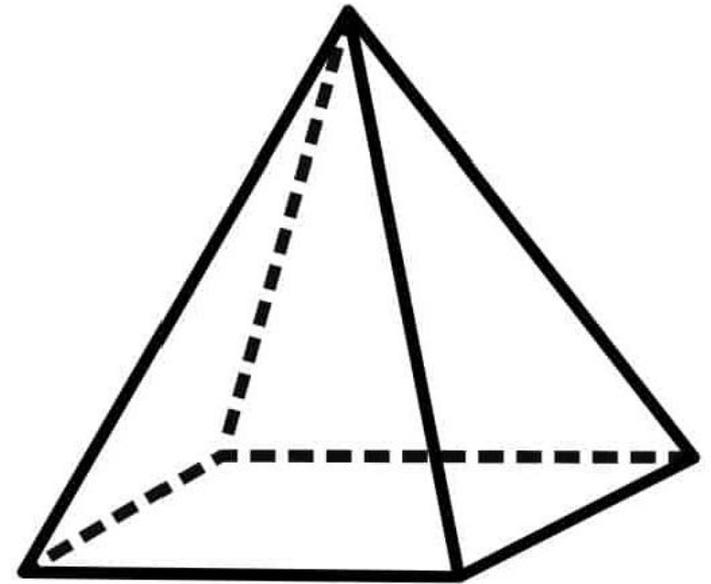
1h - Fine Classe 1a Liceo a indirizzo economico-sociale

Espandere il laboratorio

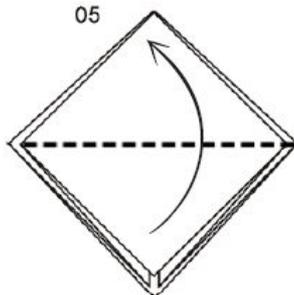
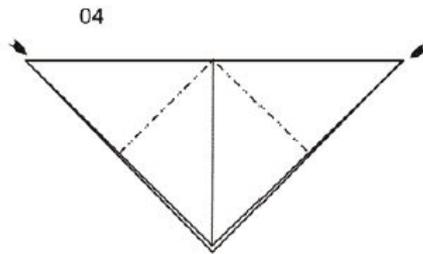
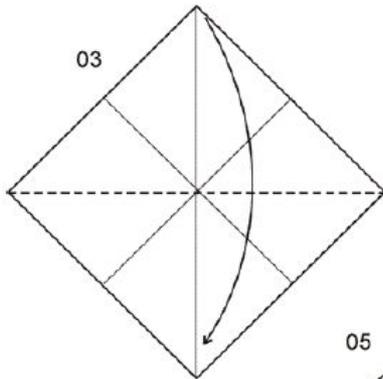
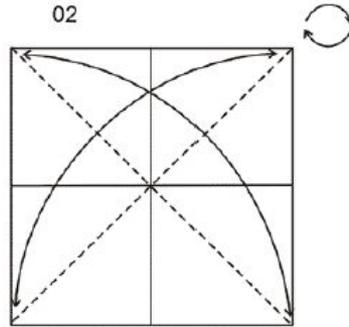
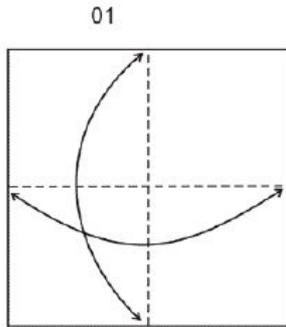
Piramide regolare

Riesci a comporre una piramide regolare a base quadrata accostando più moduli?

Sai esprimere la sua superficie totale in funzione del lato del quadrato iniziale? e il suo volume?



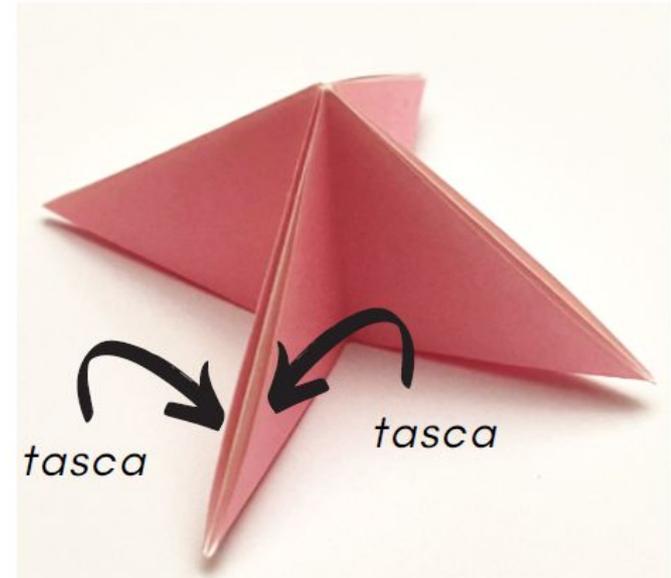
non solo matematica



*Base quadrata
terminata*

Piega solo il lembo
superiore, poi ripeti
con gli altri tre

Un supporto



Montaggio



Inserire le facce di una piramide nelle tasche del supporto, come in figura a sx.

Ripetere con le restanti tre per ottenere la piramide regolare a base quadrata (a dx).

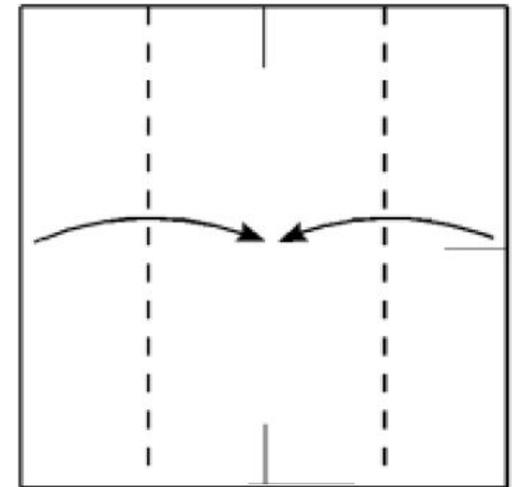
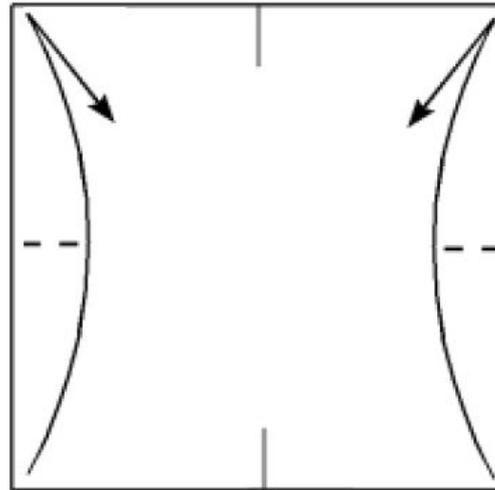
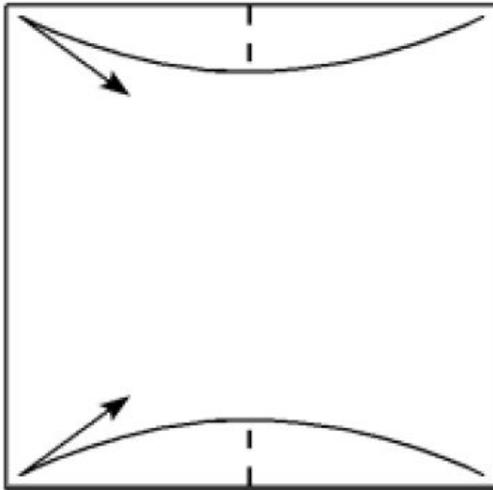


divertiamoci ancora un po'

Cubo

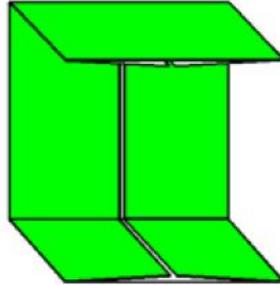
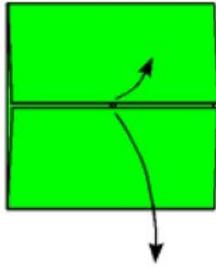
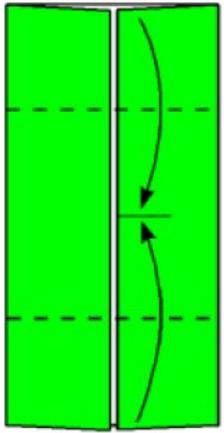
MODELLO DI
PAUL JACKSON

FOGLIO QUADRATO
DI LATO DOPPIO RISPETTO A
QUELLO USATO PER LA PIRAMIDE

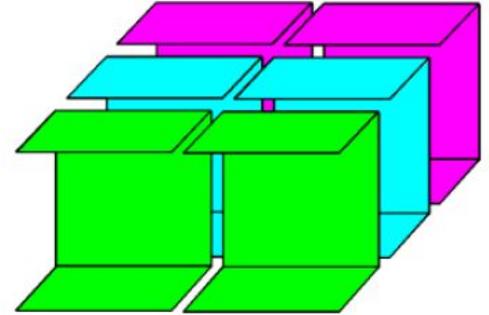


Fare due pinch per segnare i punti medi dei
lati opposti, poi ripetere sugli altri due

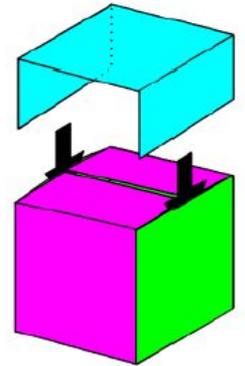
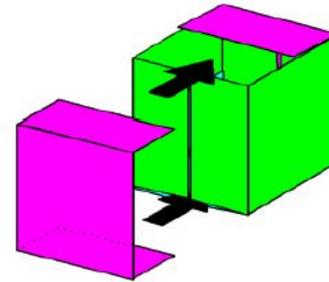
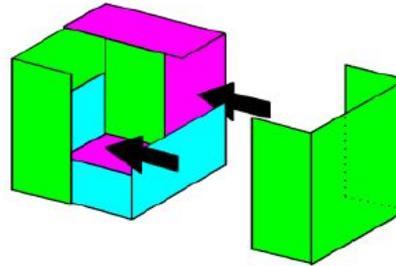
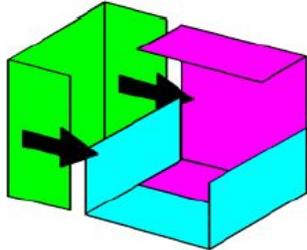
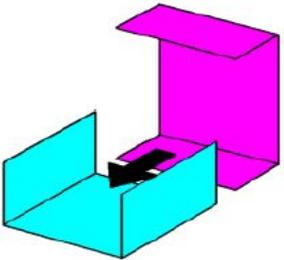
Portare i lati sulla
mediana



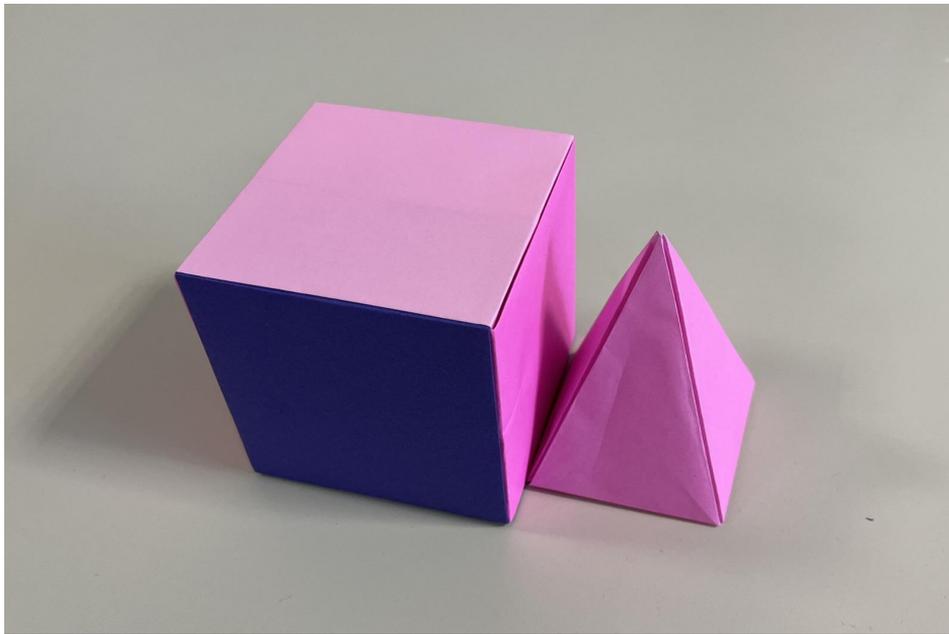
*Modulo
terminato
Piegare 6
moduli uguali*



Assemblaggio



<https://www.origamiheaven.com/pdfs/pauljacksonscube.pdf>



XXXVIII convegno UMI-CIIM - Genova 4-6
Settembre 2025 - G. Romano L. Brighi

Relazioni

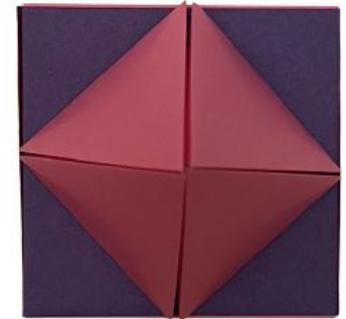
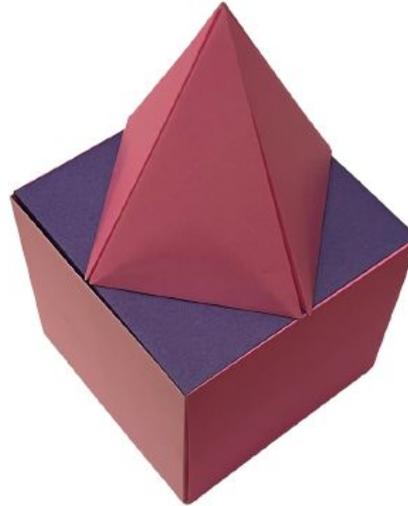
Confronta il cubo con la piramide regolare a base quadrata.

Che relazione noti tra le basi?

E tra le altezze?

Che rapporto c'è tra la superficie totale delle due figure?

E tra i volumi?



... e si potrebbe continuare ...

4

Piega e RISPIEGA



Liceo V. Monti Cesena (FC)
Settembre 2024 10h 4 incontri
STEM PNRR - Accoglienza
Alumni classico tradizionale - 4a lez.





Gabriella Romano (Schoolmate)

<https://www.schoolmate.it/>

Livia Brighi

