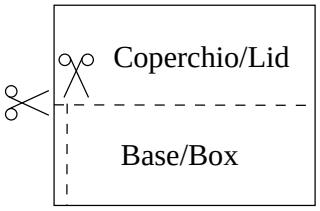
Primo dicembre

Roberto Gretter, primo dicembre 2000

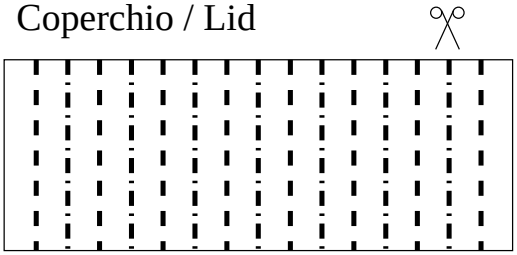
Scatola esagonale a stella, ispirata da una scatola ettagonale di Tomoko Fuse

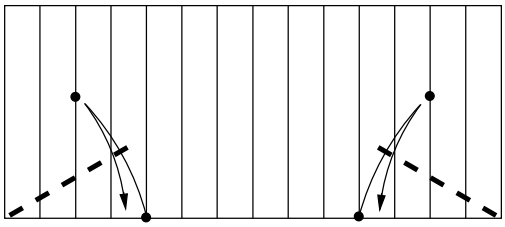
Hexagonal star box, inspired by an heptagonal box by Tomoko Fuse



A4 tagliato come da figura
A4, cut as shown

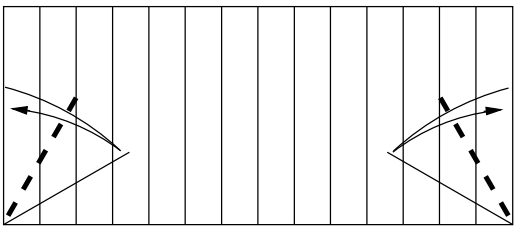
Coperchio / Lid

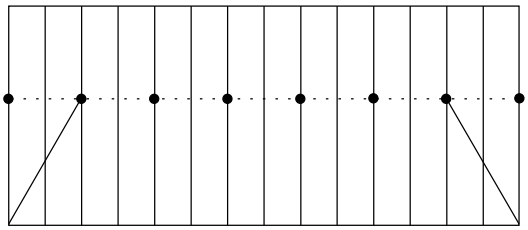




1. dividi in 16−esimi e taglia 2/16
1. divide in 16−th and cut 2/16

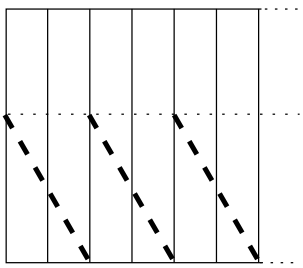
2. prepiega a 30 gradi
2. precrease at 30 degrees

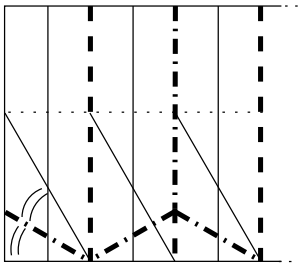


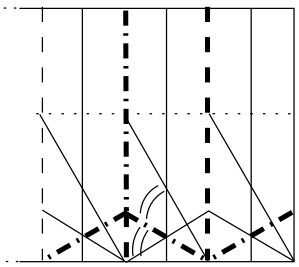


3. prepiega le bisettrici (a 60 gradi)
3. bisect (60 degrees) and reopen

4. pinza solo nelle posizioni dei bollini
4. pinch only on the bullets



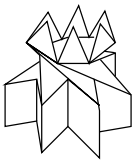


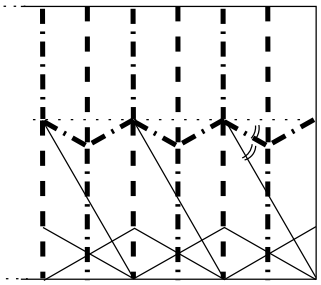


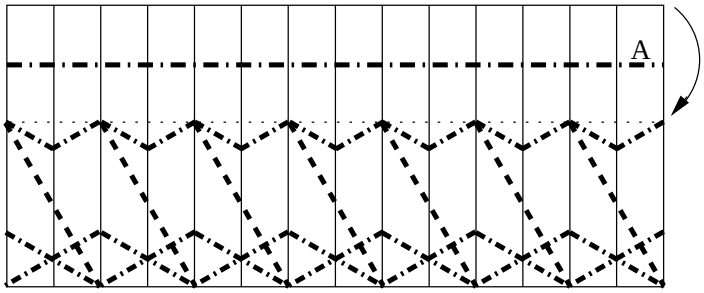
5. prepiega (a 60 gradi)
5. precrease (60 degrees)

6. prepiega a fisarmonica partendo da sinistra
6. precrease in accordion starting from left

7. prepiega a fisarmonica partendo da destra
7. precrease in accordion starting from right

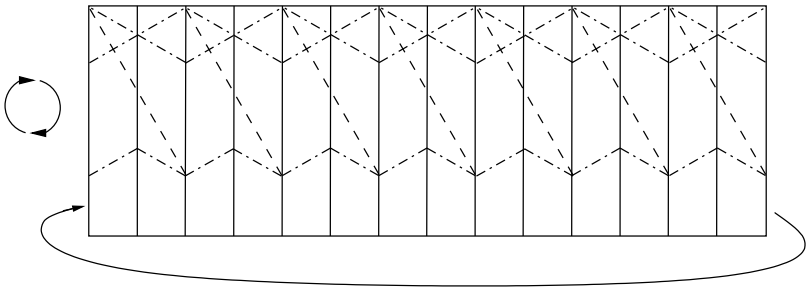


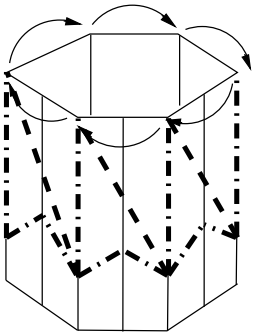




8. piega a fisarmonica e riapri
8. precrease in accordion

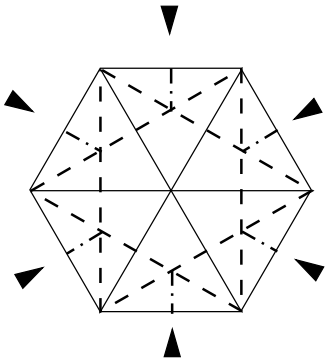
9. risultato finale (tutte le pieghe sono a 30 o 60 gradi)
9. final result (all creases are at 30 or 60 degrees)

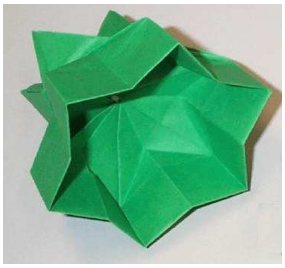


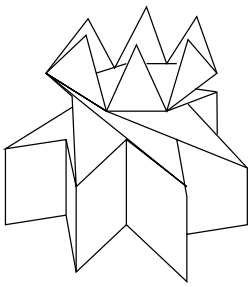


10. fai rientrare 1/7 (lato corto all'interno)
10. make re−enter 1/7 (short side inside)

11. piega la parte alta dell'esagono, tutti i lati contemporaneamente; delle graffette possono aiutare a tenere assieme il tutto...
11. fold all sides together; clips may help...

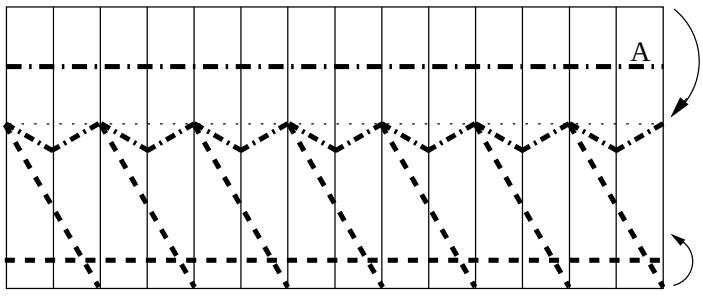


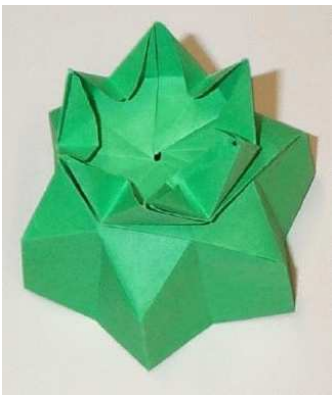




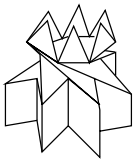
12. schiaccia la base del coperchio per ottenere la forma a stella; modella la parte alta in modo da formare la corona
12. squash the bottom part to get a star shape; model the top part to form the crown

13. coperchio finito; sono possibili altre decorazioni ...
13. finished lid; other patterns are possible...



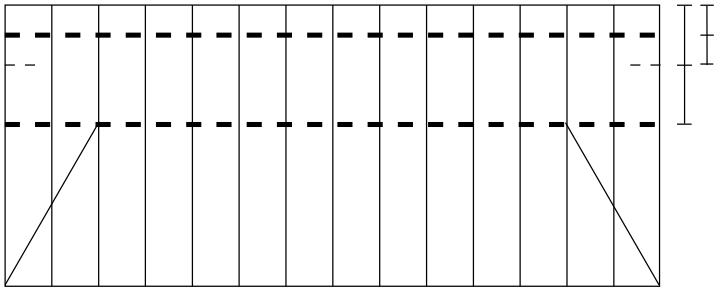


... come questa (alternativa ai passi 6−9)
... like this (instead of steps 6−9)

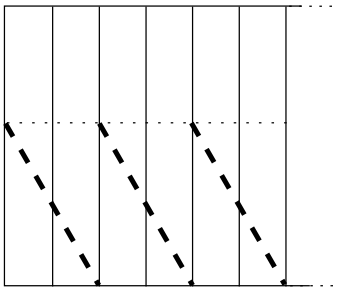


Base − parti dal passo 3 del coperchio

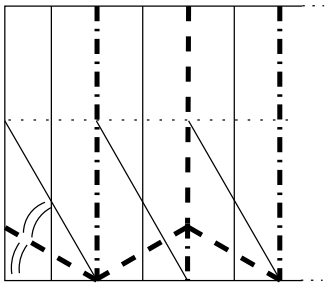
Box − start from step 3 of the lid



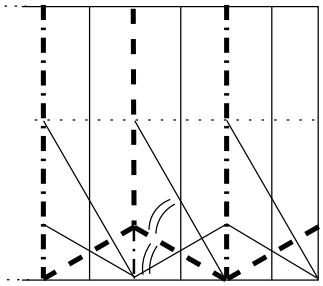
4. piega a valle e riapri
4. valley fold and reopen



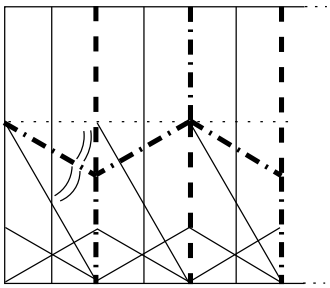
5. piega e riapri (tutte le pieghe sono a 60 gradi);
5. fold and reopen (all creases at 60 degrees);



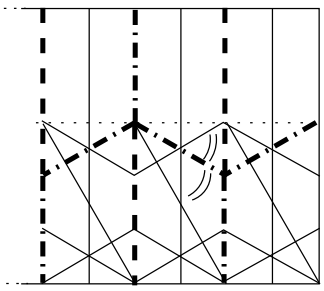
6. prepiega a fisarmonica partendo da sinistra
6. precrease in accordion starting from left



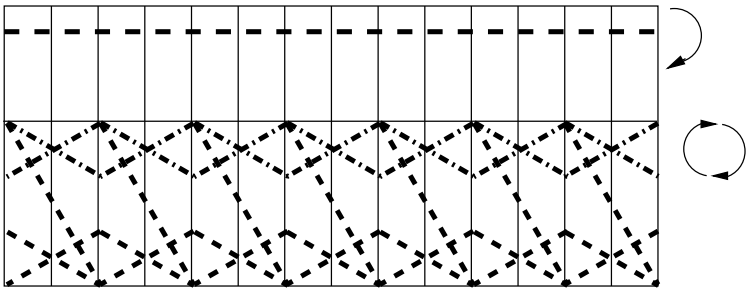
7. prepiega a fisarmonica partendo da destra
7. precrease in accordion starting from right



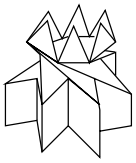
8. prepiega a fisarmonica partendo da sinistra
8. precrease in accordion starting from left

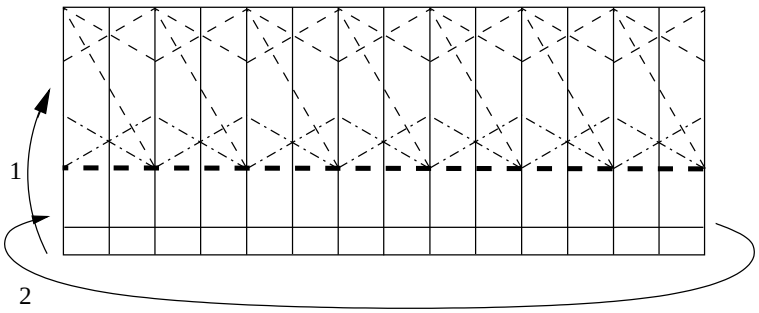


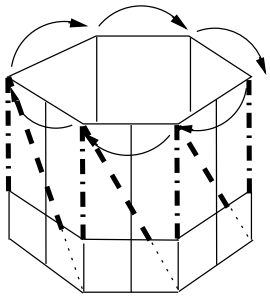
9. prepiega a fisarmonica partendo da destra
9. precrease in accordion starting from right



10. questo e‘ il risultato (tutte le pieghe sono a 30 o 60 gradi); ripeti la piega a valle del passo 4
10. this is the result (all of the creases are at 30 or 60 degrees); repeat the valley fold of step 4

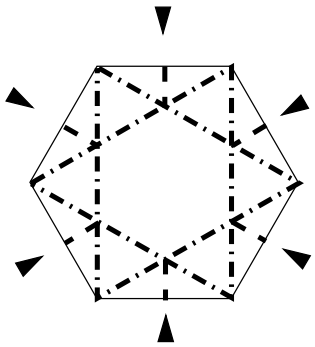


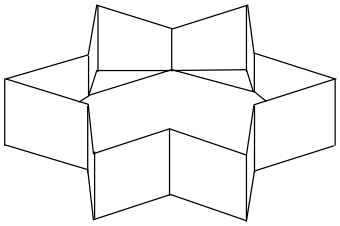




11. prima piega a valle e poi fai rientrare 1/7 (lato corto all'esterno)
11. first valley fold and then make re−enter 1/7 (short side outside)

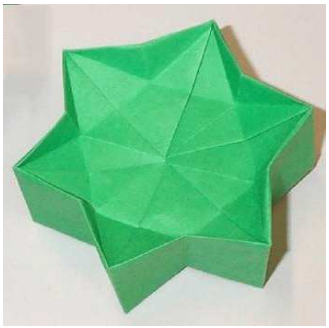
12. piega la parte interna dell'esagono, tutti i lati assieme. delle graffette possono aiutare a tenere assieme il tutto...
12. fold the inner part of the hexagon, all sides together; clips may help...

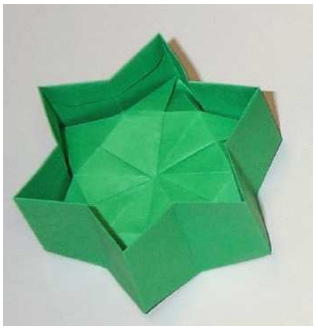




13. schiaccia la base dall'esterno per ottenere la forma a stella; il fondo si deve alzare
13. squash from outside to get the star shape; the bottom will lift up

14. base finita
14. finished box



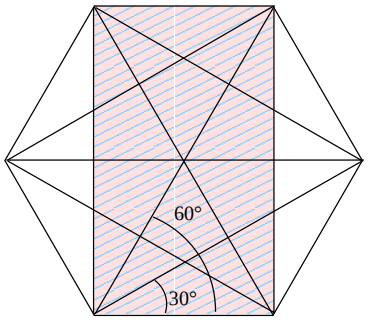


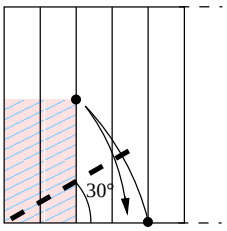
per ottenere la forma a stella e' necessario dare tridimensionalita' alle parti orizzontali della base e del coperchio. mentre sul coperchio va bene, il rialzo nella base (che peraltro a me piace) puo' appiattirsi se la scatola viene riempita con pallini di piombo. se invece riempite la scatola con i vostri sogni, funzionera' benissimo.

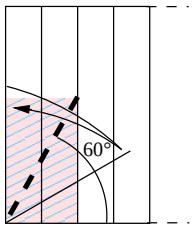
in order to obtain the star shape, a 3−D modeling is necessary for both the top and the bottom parts. while for the lid this is ok, for the base of the box this 3−D shape (which I like, BTW) may cause some problem if you fill the box with iron or similar. anyway, if you will fill the box with your dreams, it will work fine.

... e per passare da 6 a 8 punte? qualche considerazione geometrica ...

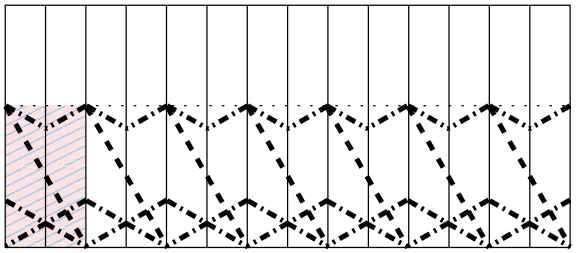
Notare che nell'esagono (base) c'e' un rettangolo, evidenziato anche nei diagrammi.



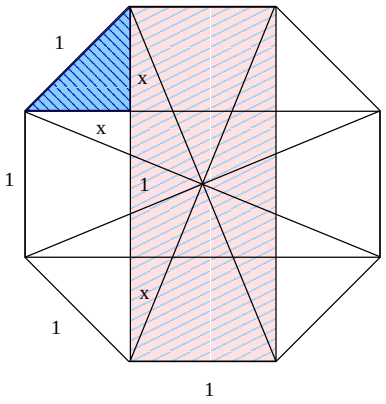


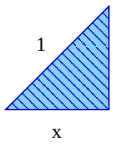


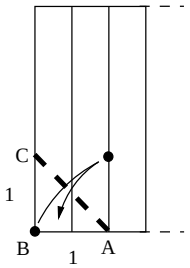
Gli angoli a 30° e 60°, onnipresenti nell'esagono, sono stati usati per ottenere un rettangolo con le giuste proporzioni.

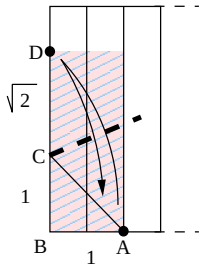


Per fare una scatola a 8 punte, la figura di partenza e' l'ottagono. In questo caso e' piu' facile ragionare sui lati, che hanno lunghezza 1 (che e' anche la base del rettangolo). Per calcolare l'altezza, osserviamo il triangolo (rettangolo e isoscele) evidenziato. L'ipotenusa e' 1, i cateti sono x e per il teorema di Pitagora $x^2 + x^2 = 1^2$ da cui si ricava: $x = \sqrt{2}/2$ per cui l'altezza del rettangolo e': $1 + \sqrt{2}$

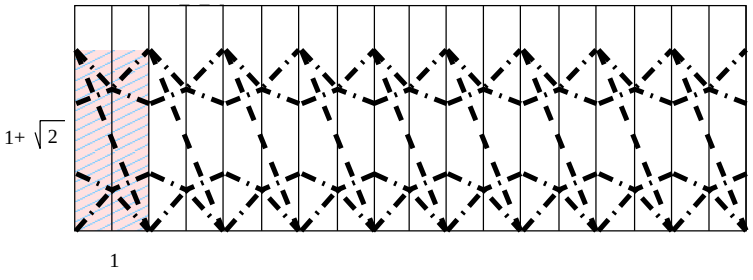








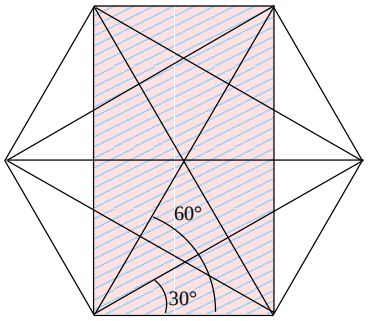
La prima piega a 45° ci fa trovare il punto C (AB = BC = 1); notare che AC e' la diagonale di un quadrato di lato 1, cioe' vale proprio $\sqrt{2}$! La seconda piega impone AC=CD, per cui abbiamo l'altezza voluta. Il diagramma finale mostra le pieghe della base.

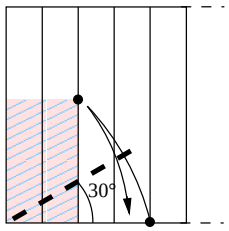


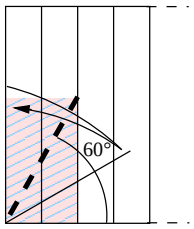
Il foglio di partenza dovra' avere proporzioni diverse rispetto a prima (ad es. un A4 intero invece di meta'), altrimenti non rimane carta per il lato. I segmenti devono essere 18 invece di 14.

... and to move from 6 to 8 points? a bit of geometry ...

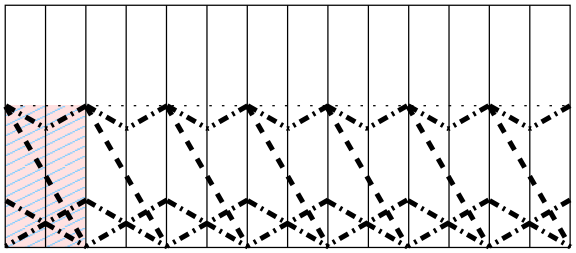
Note that in the hexagon there is a rectangle, also shown in the diagrams.



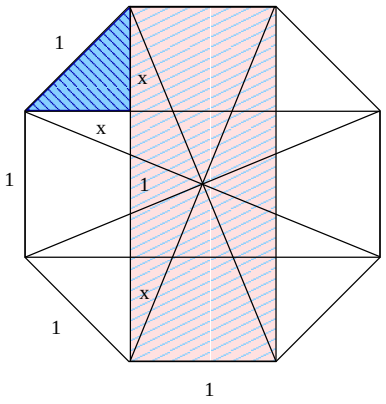


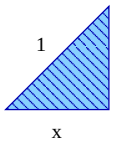


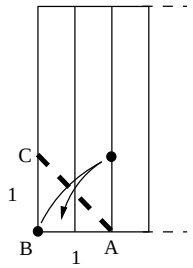
30° and 60° angles, present everywhere in the hexagon, were used to obtain a rectangle having the right proportions.

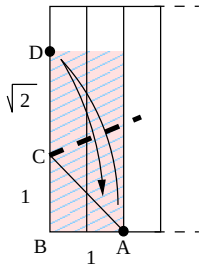


To get an 8−point star box, the initial figure is the octagon. In this case it is easier to work with the sides, having length 1 (which is also the base of the rectangle). To compute the heigth, let's have a look at the highlighted triangle (half a square). Hypotenuse is 1, catheti are x and by Pitagora's theorem: $x^2 + x^2 = 1^2$ thus we get: $x = \sqrt{2}/2$ and the height of the rectangle is: $1 + \sqrt{2}$

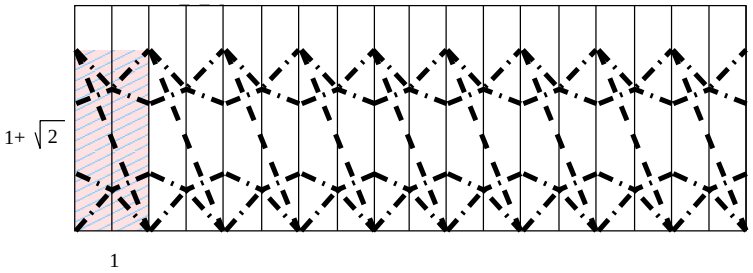








The first fold at 45° leads us to find point C (AB = BC = 1); note that AC is the diagonal of a square having side 1, so it is exactly $\sqrt{2}$! With the second fold we get AC=CD, so we have the desired height. The final diagram shows the crease pattern.



The starting sheet should have different proportions with respect to the hexagon (a whole A4 instead of half), otherwise will not remain paper for the side. Segments needed are 18 instead of 14.