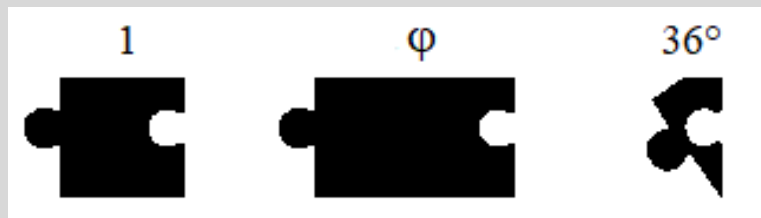


La Ora Stelo

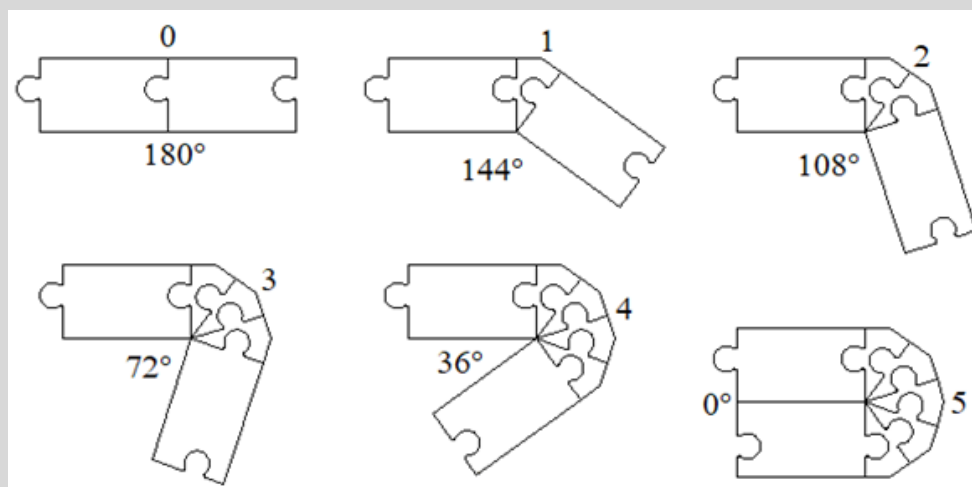
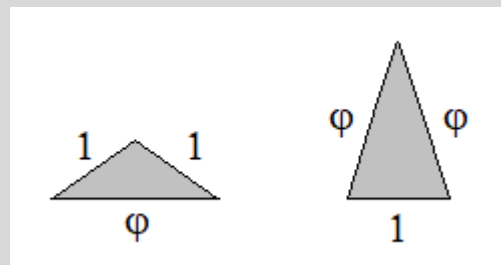
Fences

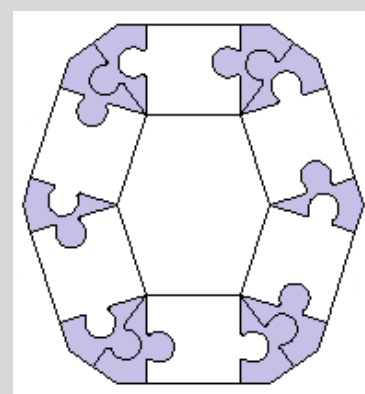
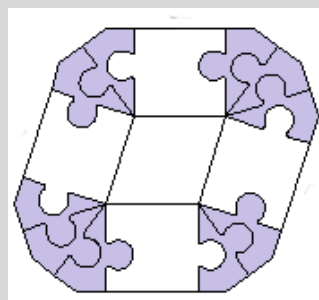
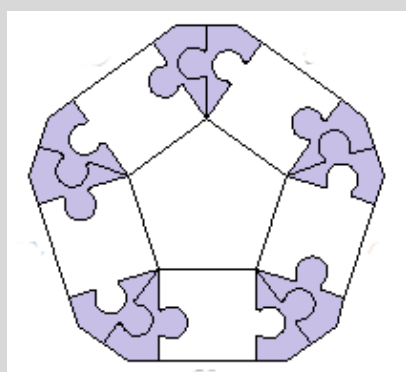
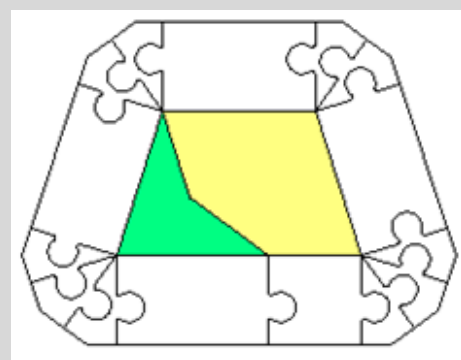
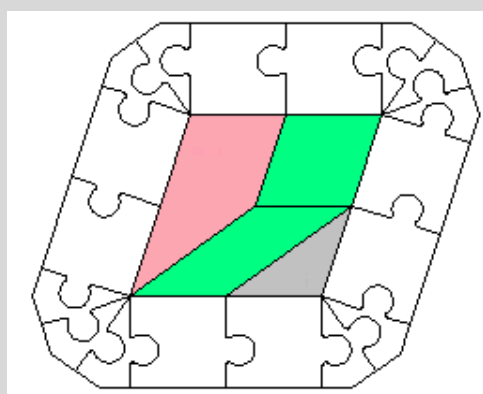
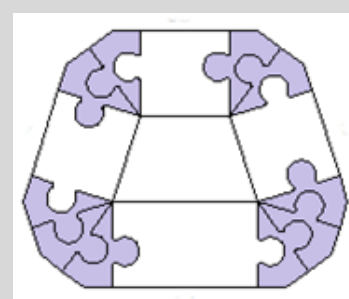
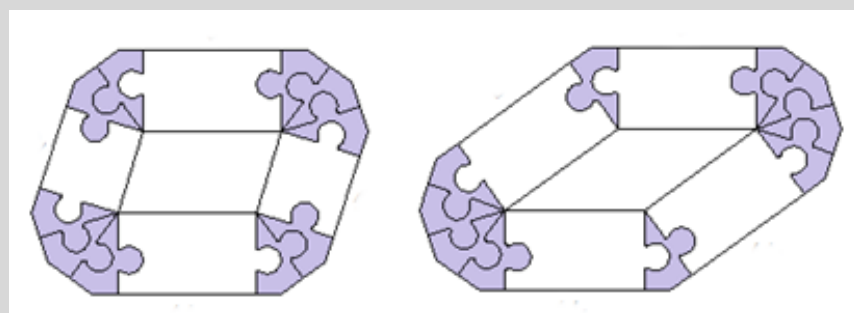
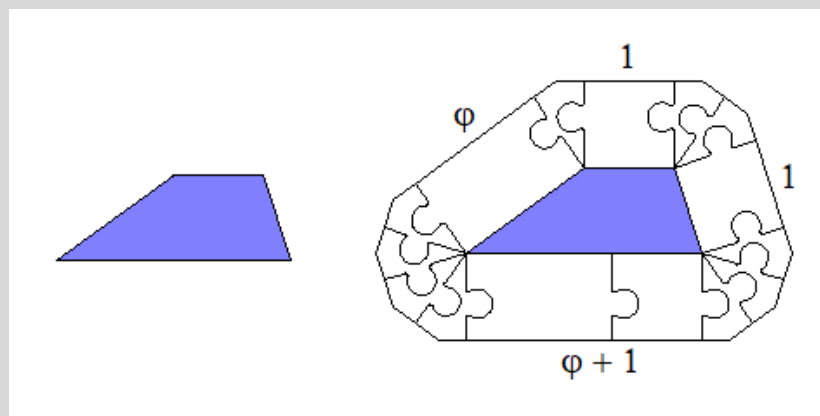
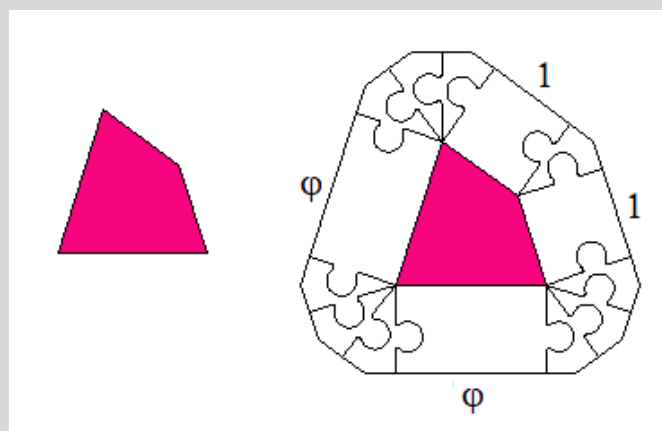
Jacques Ferroul, inventor of *La Ora Stelo*, has developed a convenient way to measure and surround one or more of the *La Ora Stelo* tiles with fences made of a variety of piece types. A supply of these fence pieces is available in three kits as accessories for the set. Kit 1 contains 20 rectangles, 22 squares, and 30 slender kites, each with a jigsaw style interlock:

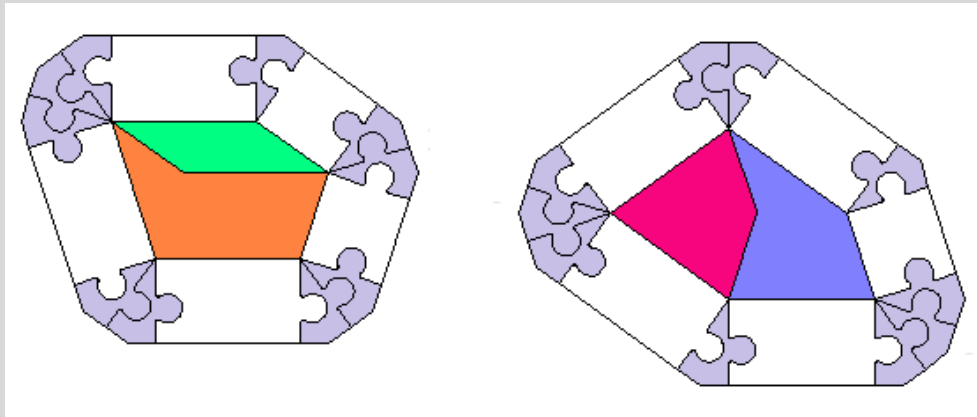
Kit 1



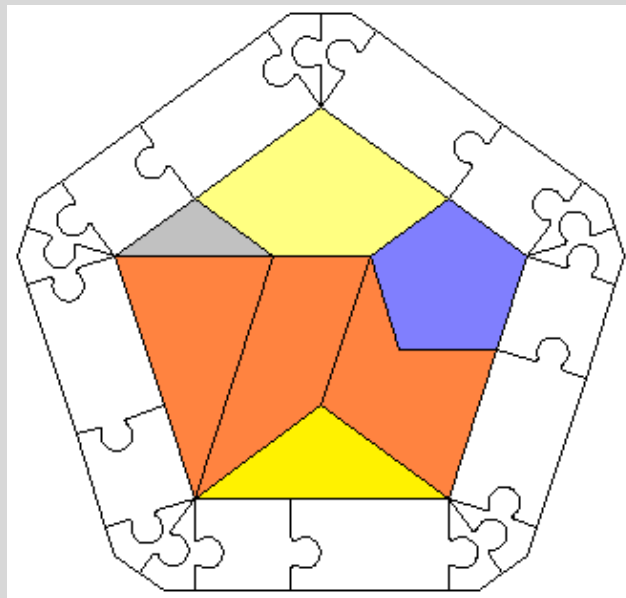
To coordinate with the sizes of *La Ora Stelo* tiles, the square has unit 1 length; the rectangle has length *phi* or φ that is the golden ratio designated with a Greek letter (an infinite decimal that starts like this: $\varphi = 1.618033988749894848\dots$). The third shape is a slender 36° “kite”. The three shapes are shown above and match by height when they interlock. Here are some examples of building fences around pieces that are combinations of the two golden triangles, the building blocks of all the component tiles of *La Ora Stelo*, with varying convex areas and numbers of sides (4, 5, and 6):







La Ora Stelo's tray is engraved with 9 concentric sizes of pentagons that serve as exact proportions for solving ascending sizes of pentagons, from the unit to the full set. For each, you can also surround it with the appropriate number of fence pieces.

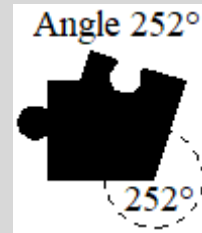
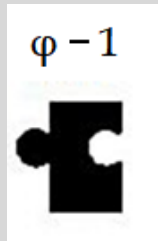


Below are images using fences from multiple kits. What other shapes can you make?

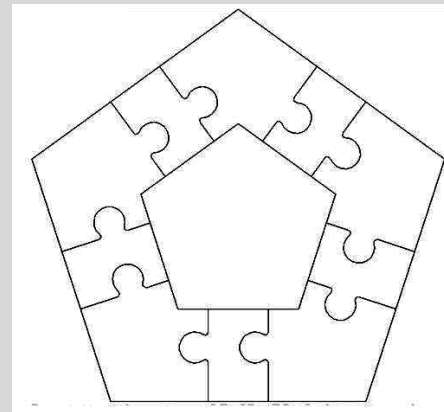
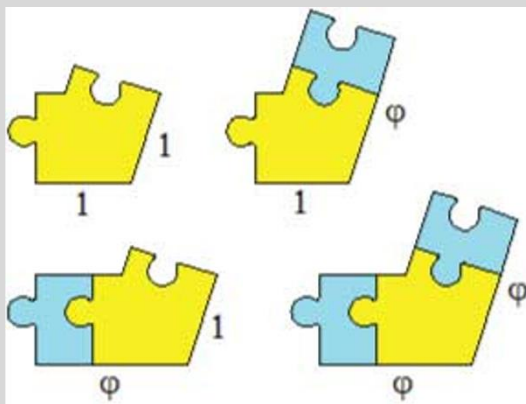


Kit 2 contains 10 mini-rectangles, 10 outer kites, and 10 slender kites to supplement those in Kit 1, each with a jigsaw style interlock. Combined with Kit 1 fences, concave angles can also be explored.

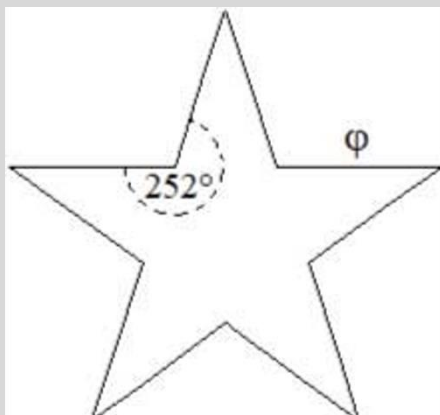
Kit 2



The 252° angle piece can be combined with the $\phi - 1$ (*phi* minus 1) width mini-rectangle in 4 ways and assembled into larger fences:

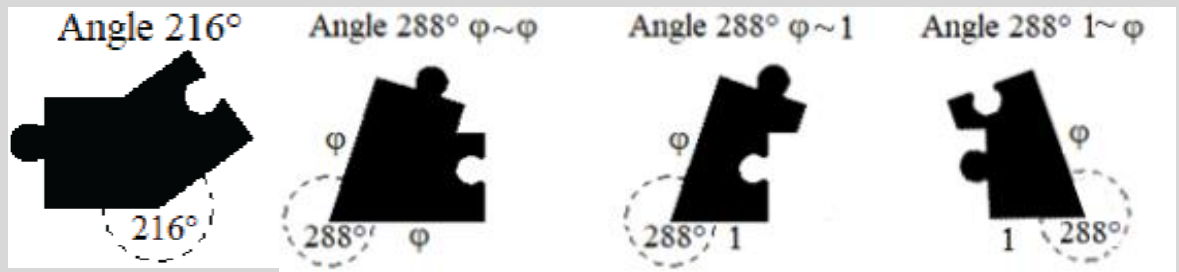


This 5-pointed star (below left) has angles of 252° . Using the 252° outer kites, mini-rectangles and 36° angles from Kit 1, we can enclose the star. How many other figures can you enclose?

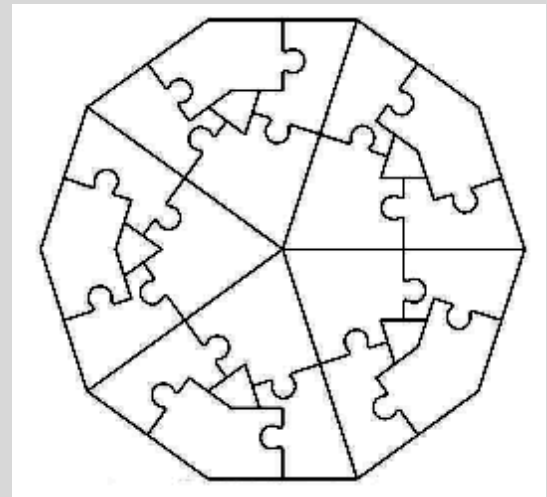
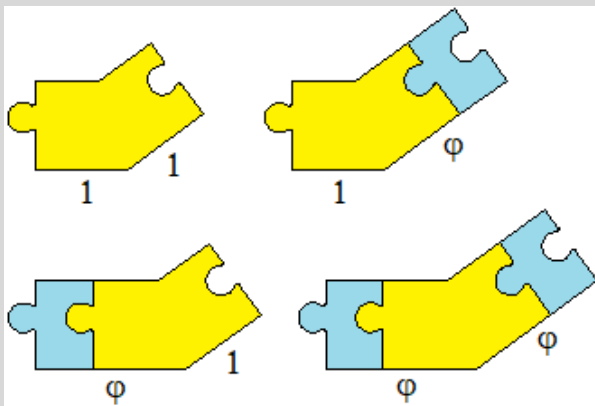


Kit 3 contains 10 of the 216° chevrons, 10 of the 288° inner kites, 10 of the $288^\circ \varphi \sim 1$ and 10 of the $288^\circ 1 \sim \varphi$ angles (we call these bookends); each has a jigsaw-style interlock. The \sim linking two digits indicates the respective lengths of two sides. Combined with Kit 1 and Kit 2 fences, every combination of angles can be explored.

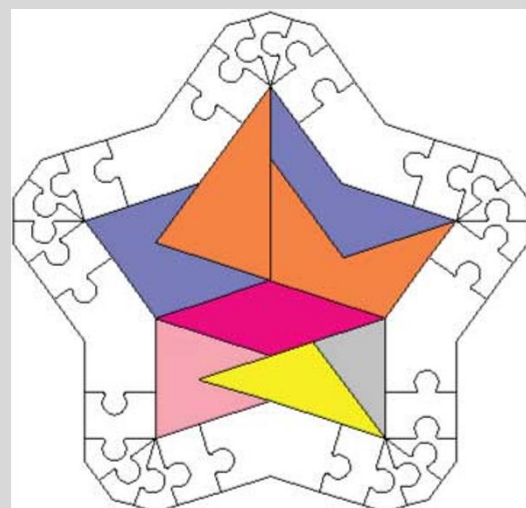
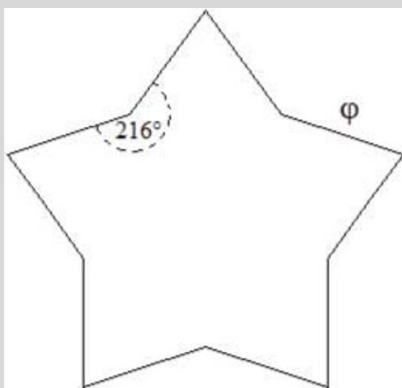
Kit 3



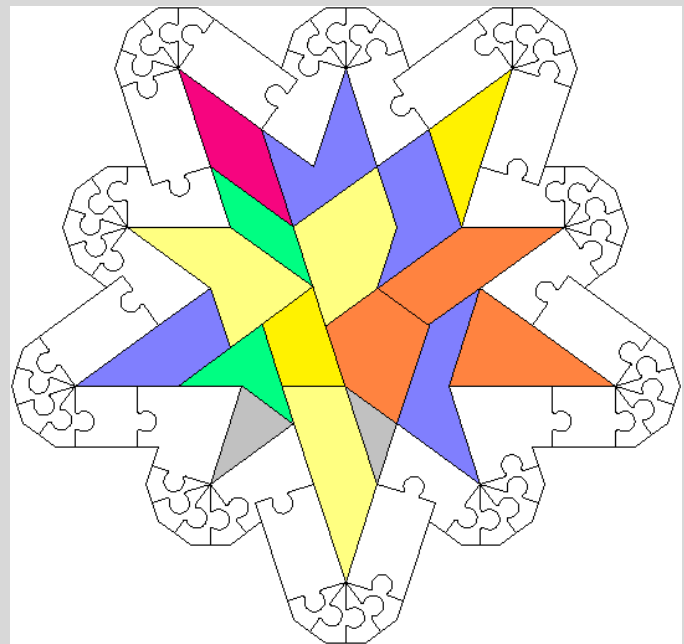
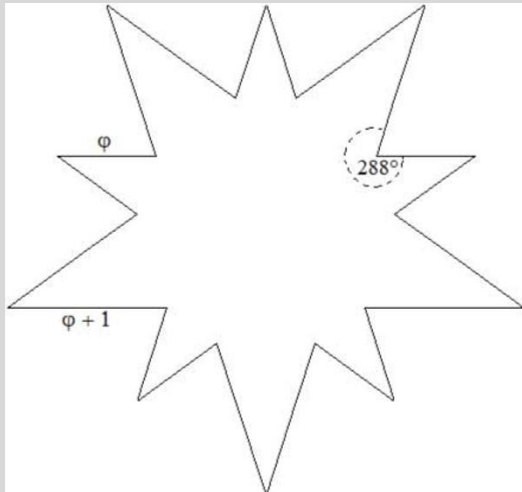
The short edge φ -1 from Kit 2 is combined with the 216° chevron in 4 different ways to adapt to the shape to be surrounded. The four pieces of Kit 3 can build large “kites” that are $1/5$ of a decagon.



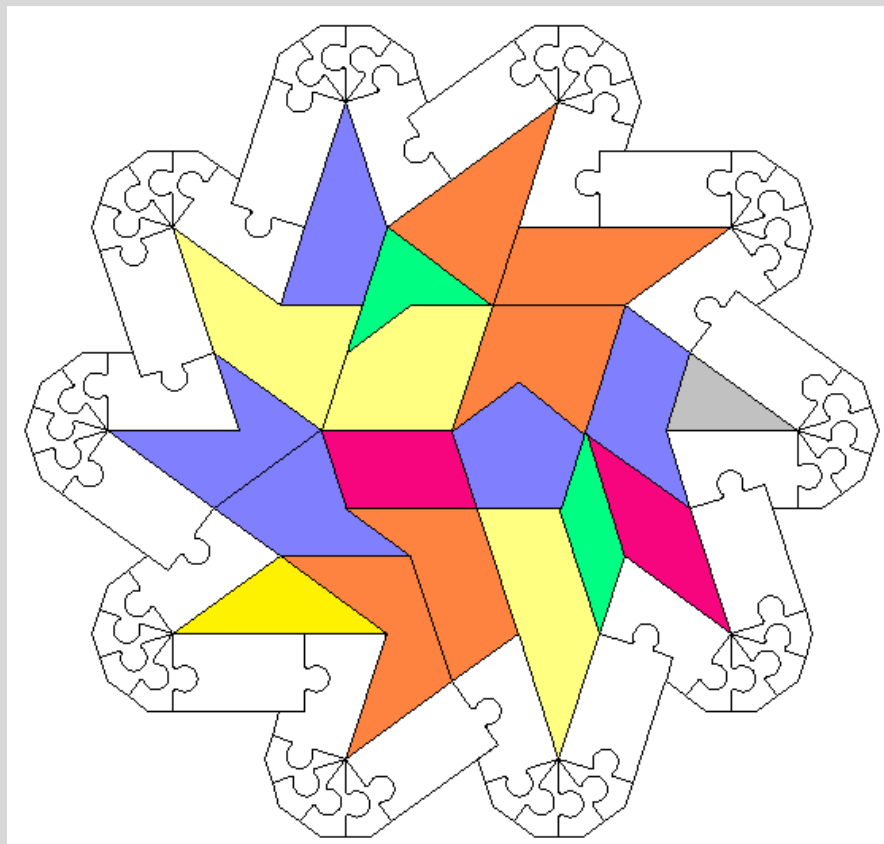
This first star has several angles of 216° (these are concave angles), so that the border fence follows the sides of the shape. Using the 216° chevron, mini-rectangle from Kit 2, and 36° angle from Kit 1, we can enclose the star.



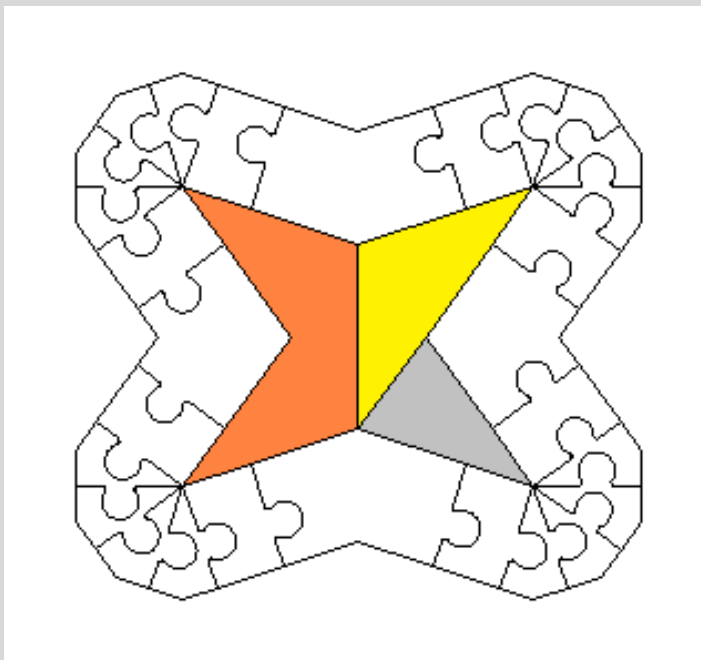
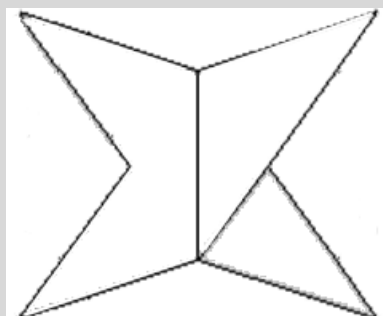
Let's take this 10-pointed star. It has 10 angles of 288° . The angle of 288° is so large and the outside angle so small that we cannot put a corner fence with 2 sides of length 1. We are obliged to use the rectangle and 36° angle from Kit 1, the additional 36° angles from Kit 2, and both angle 288° $\varphi+1$ and $1-\varphi$ "bookends" from Kit 3 to surround the dekastar.



This spiral pinwheel also has angles of 288° , so we can use the same fences as for the dekastar, in a different order.



This four-pointed star has several angles of 252° and 216° so that the fence follows the sides of the shape. Using the 216° chevrons from Kit 3, mini-rectangles and 252° outer kite from Kit 2, and 36° angles from Kit 1, we can enclose the star.



Here are some more images with fences joined from multiple kits:



Visit Jacques' magnificent webpages for all the elegant mathematics associated with this set and many more examples of their relationships. The text is in French, with English translation available if you select it. Lots of pictures make the subject easily understood. Two different pages cover the variations well:

<http://www.polyforme.fr/php/LaOraStelo.php>

http://www.polyforme.fr/php/defi_OraStelo_Explications_English.php

Fence kits are an accessory introduced in 2020. If you already own *La Ora Stelo*, you can order just the fences by themselves. Kit 1, \$20 | Kit 2, \$9 | Kit 3, \$16

You can also order *La Ora Stelo* alone or with the fences. See:

<http://www.gamepuzzles.com/pentuni2.htm#LOS>

La Ora Stelo was named the best puzzle of the year 2010 by *Games Magazine*.

gamepuzzles



for the joy of thinking

More complex images with fences from multiple kits--can you build them?

