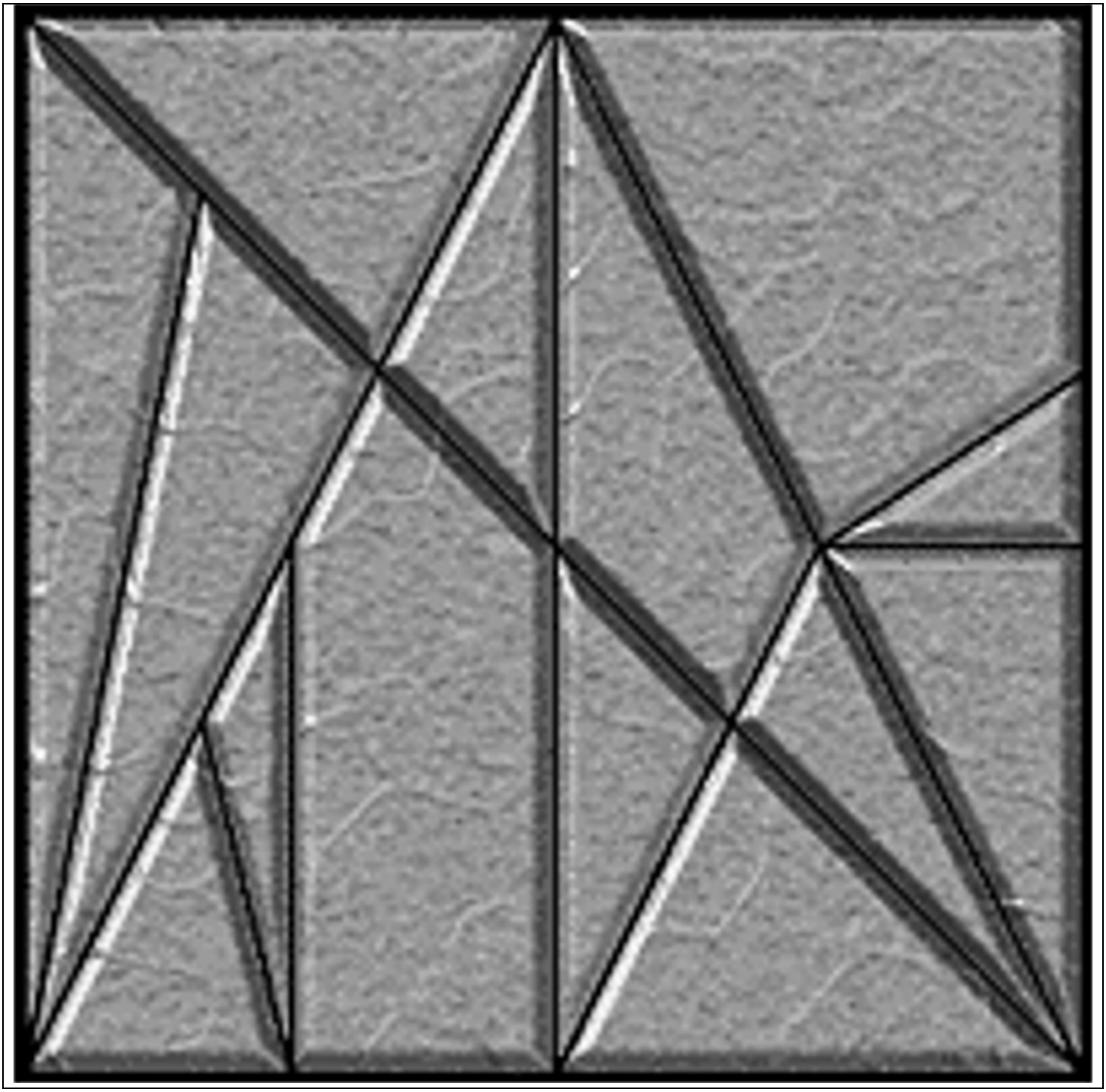


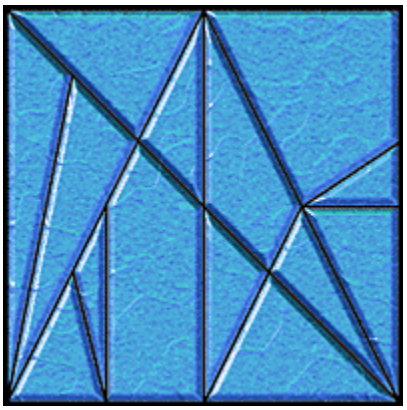
:: Loculus Archimedis ::
(Archimedes' puzzle)

The 14-piece puzzle opposite is supposed to have been invented by Archimedes (287-212 B.C.), an inventor and mathematician who lived in Syracuse, Sicily. Magnus Ausonius (310-395 A.C.) described the puzzle in this way: *"...simile ut dicas ludicro quod Graeci **Ostomachion** vocavere. Ossicula ea sunt: ad summam XIV figuras geometricas habent. Sunt enim aequaliter triquetra, vel extentis lineis, vel ejusdem frontis, vel rectis angulis, vel obliqui: isoskele ipsi, vel isopleura vocant, orthogonia quoque et skalena. Harum verticularum varis coagmentis simulantur species mille formarum...".*

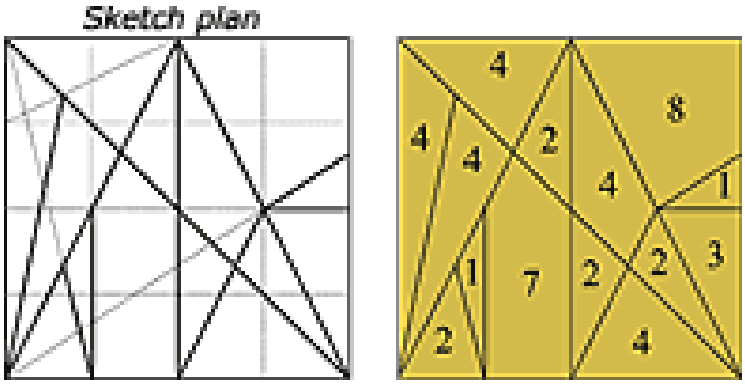
→Continue to Ostomachion original texts.

This puzzle is improperly named *Stomachion* by some puzzle game researchers who assert that the word *Stomachion* has as its root the Greek word, meaning 'stomach' (?)... That's nonsense, because 'stomach' in ancient Greek is called *gaster*! Actually, *Stomakhos* in ancient Greek means 'orifice, gullet, humor' (from *stoma* 'mouth'); there is also an infinitive *stomachêin* which means 'to be disgusted, to resent'. In our opinion, *Ostomáchion* or *Syntemáchion* are more accurate names meaning approximately "**challenge**, **contest** [*mákhion* < dim. or subst. of *makhê*, 'battle'] **with** (ivory) **bone pieces** [*osto* < *ostoun*, *ostéon*]" or "**challenging** [*mákhion*] **pieces to assemble** [*syntê* < *syntithémi* 'put together']".

Ostomachion wasn't originally a put-together puzzle at all, but rather a geometric dissection problem. The challenge was to divide a square into 14 pieces, so that each piece has an area in rational proportion to the whole area of the puzzle. Could you represent geometrically the numbers 1, 2 and 3 with the pieces of the Ostomachion? (→ Solution)



The Ostomachion, also called Syntemachion or Loculus Archimedis, consists of 14 flat pieces of various shapes (*lamellae eboreae*, in Latin) forming a square.



The area of each piece is commensurate with the area of the square in the ratio 1:48

How many possible distinct square arrangements can be made using all 14 pieces of the Ostomachion? **Bill Cutler**, a seasoned puzzlist, by means of a computer program he wrote found the answer: **536 possibilities** (reflections and rotations of a square arrangement were not considered).

Do you need further information about this puzzle? Or any original figures to match with the puzzle pieces? Try these ones or visit this site!

http://www.archimedes-lab.org/latin.html#archimede

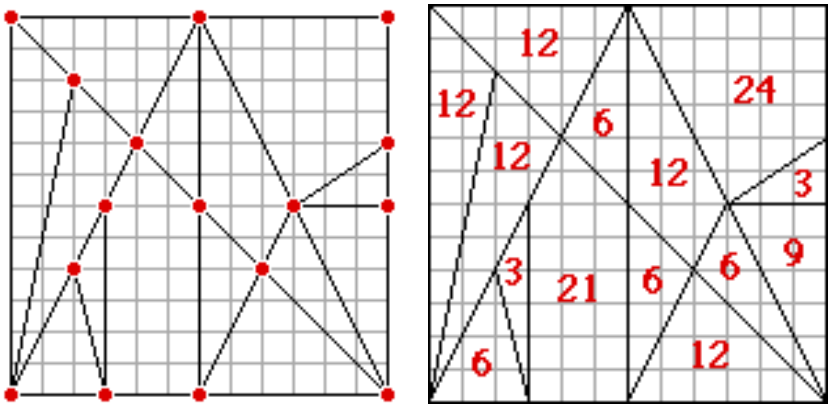
Archimedes' Square, "Stomachion": The world's oldest known puzzle

Archimedes lived from 287 to 212 B.C., a generation after Euclid. He was a great inventor (remember "Eureka"?) and is credited with creating, 2200 years ago, the first puzzle ever known. Like all of his other ingenious inventions, his puzzle is brilliant and challenging even today. The most interesting fact is that his puzzle was discovered accidentally, in 1846, but lay in obscurity for over a century.

In October 1998, a manuscript containing some of Archimedes's works, known to scholars as the *Archimedes Palimpsest*, resurfaced and was sold in New York for two million dollars.

This exciting artifact is a unique source of evidence for Archimedes' thought and contains the oldest, by far, surviving description of Archimedes' work in the original Greek. Among its many treasures is the only evidence we have for the treatise known as the *Method*, in which physics and mathematics are most intimately combined by Archimedes.

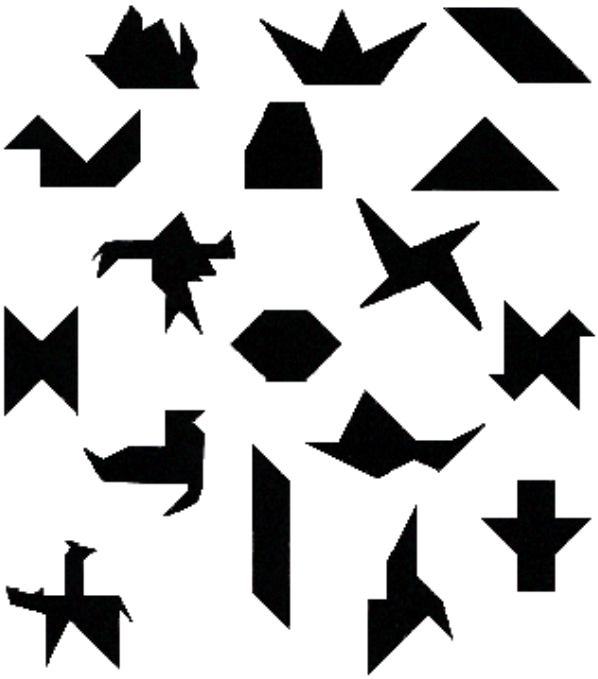
Another reason all this is so intriguing is that the *Palimpsest* is the only (albeit fragmentary) information from the original Greek we have on the dissection puzzle variously called the *Loculus of Archimedes*, *Syntemachion* or *Loculus Archimedis*, the *Stomachion* or *Ostomachion*, or simply **Archimedes' Square**. Here is an illustration, courtesy of Prof. Chris Rorres, University of Pennsylvania, of how each tile has an area that's an integer (whole number):



Archimedes' Square consists of 14 polygons of varying sizes and shapes dissected from a 12x12 square grid as shown above. Historical writings have recorded 18 shapes to solve with the pieces that form the square. The other 17 are illustrated below. More have been discovered since then.

We thank Joe Marasco for suggesting this puzzle to us and for supplying many of the research references. It's the crown jewel in our Treasured Oldies collection. Joe also instigated the search for the full solution count and offered a bounty to the first solver. The winner was Bill Cutler in November 2003; he used a computer program he had written for a similar challenge, and it came up with the answer of 536 solutions, the first time this knowledge has been found in over 2200 years. Hurray, Bill! Read more about this story in our journal, *The Life of Games*.

The classic shapes to make:



Instruction booklet includes historical notes, new figures, and links to major online sources of further information. You can order it in your choice of three luminous Lucite colors.

http://www.gamepuzzles.com/archsqu.htm