The Tetrahedron Puzzle
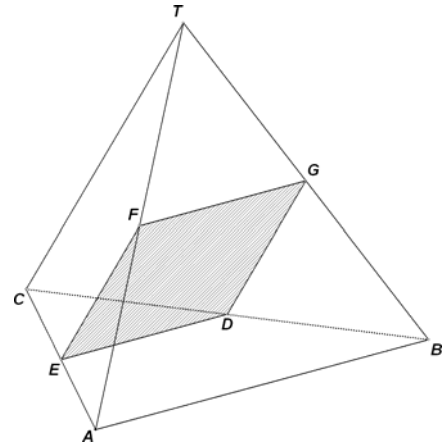
The tetrahedron puzzle provides an unexpected challenge when you split a tetrahedron as shown in the picture to the right along the filled area.

Construct this puzzle in Geocadabra.
Start with a tetrahedron:
➢ File, New, Three dimensional, Tetrahedron

Add the midpoints *D, E, F and G*:
➢ Maintenance, Points, Add, Midpoint of segment. Right click on the appropriate edges; use the correct line (*segment, show midpoint*) in the popup menu.

Fill the area *DEFG*:
➢ Maintenance, Planes, Apply fill pattern on area; click OK (Shade Section, Through three points); click with the left Mouse button on *D, E,* and *F*
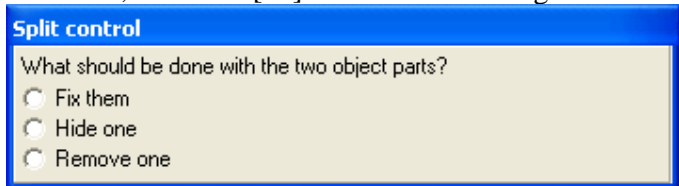
Split the object along this cross-sectional area:
➢ Right click on the area; select "Filled area DEF, Split object along filled section"

The tetrahedron splits along plane DEFG, shown as a dynamic animation.
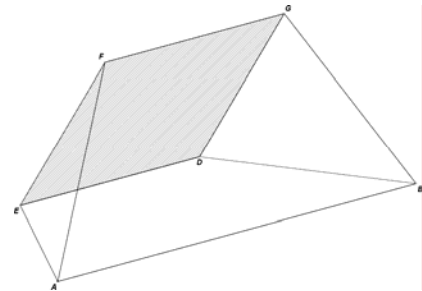A window appears, to further control the process:
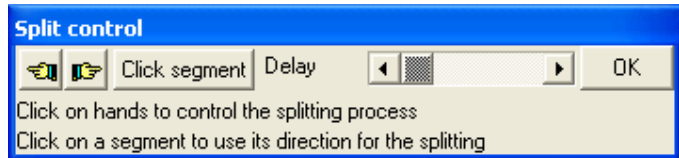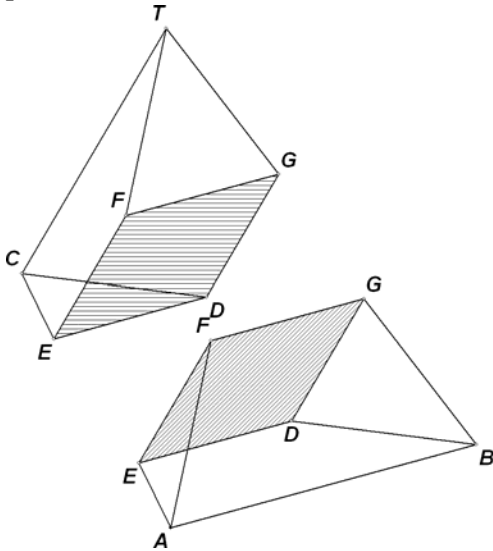
Adjust the distance between the two parts by clicking on the hands, and click [ok]. The window changes:

We want only one of the two parts, so we remove the other. Select "remove one" and click on vertex *T*.
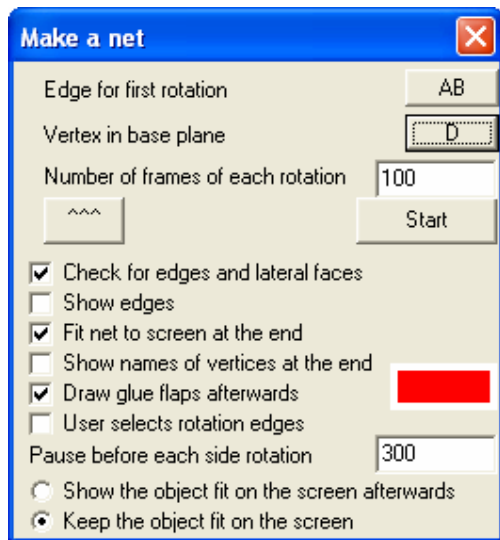
The lower part remains.

We will make a net from this part:
➢ Maintenance, 3D specials, Make a net.

A control window appears (next page).
Complete it as shown.
➢ Edge of first rotation: click on the first button, and click on *AB*.
➢ Vertex in base plane: click on the second button and click on *D*.
➢ Click on [vvv] to extend the window.

Check boxes as shown.
Click [Start].
The animation shows how the object is split into a net.
When the net is ready, it rotates to get it into printable view.
Now you can click *near* edges to get glue flaps. The distance between the edge and cursor arrow determines the width of the flap.
(Challenge: Which flap belongs to which edge?)

Now print two copies, cut out the printed nets, fold and glue. Can you combine them to make a tetrahedron?
Explain why the two figures are congruent to each other.