Worksheet nº 9

"Our forests, our future"

One of the products that forests have been giving us is wood. Due to Man's ingenuity
and talent, mankind has been doing outstanding artworks from that material.

That art is being promoted all over the world and our school is not an exception.

On the teacher's room, there is a frame made by some students from our school
directed by one professional, Mr. Carlos Ferreira.

You are going to reproduce that frame with the indications below.

- 1º Quadrant

Mark on the answer sheet that has a reference:

- a semi straight starting on the origin of the reference, making an angle of 30º with
  the positive half axis of the x-axis;
- trace the straight with equation x=1;
- appoint by an A the intersection point between this two straights;
- signalize the point B (2,0);
- signalize the point C (3,2);
- signalize the point D (1,2);
- signalize the point E (0,4);
- with a compass centered in the origin and with a radius OA, determine the point
  F, which is the intersection of that circumference arc with the positive Oy half
  axis.

- 2º Quadrant

- Mark the symmetric points of A,B,C, D,E and F (1ºquadrant), relatively to the
  Oy axis. Appoint them as A', B', D´, E´ and F´.

- 3º Quadrant

  - Mark the symmetric points of the ones in the 2º quadrant relatively to the Ox axis. Appoint them as A´´, B´´, C´´, D´´, E´´ and F´´.

- 4º Quadrant

  - Mark the symmetric points of the ones in the 1º quadrant relatively to the x-axis. Appoint them as A_1, B_1, C_1, D_1, E_1 and F_1.

Now, in the 1º quadrant, connect:

O with A; A with B; B with D; D with C; C with B; D with E; F with D; O with D

Despite D' is on the 2º quadrant, connect D with D' and D' with E.

Shade the triangle $[DBC], [AOB], [DOF]$ e $[DD'E]$ with a dark color.

Shade the triangle *[ADB]* and *[DD'F]* with a brighter color.

In the other quadrants, do the same with the corresponding points to the 1º quadrant.

Shade the corresponding triangles on the three lasting quadrants, knowing that *[AOB]* has rotations of 60º.
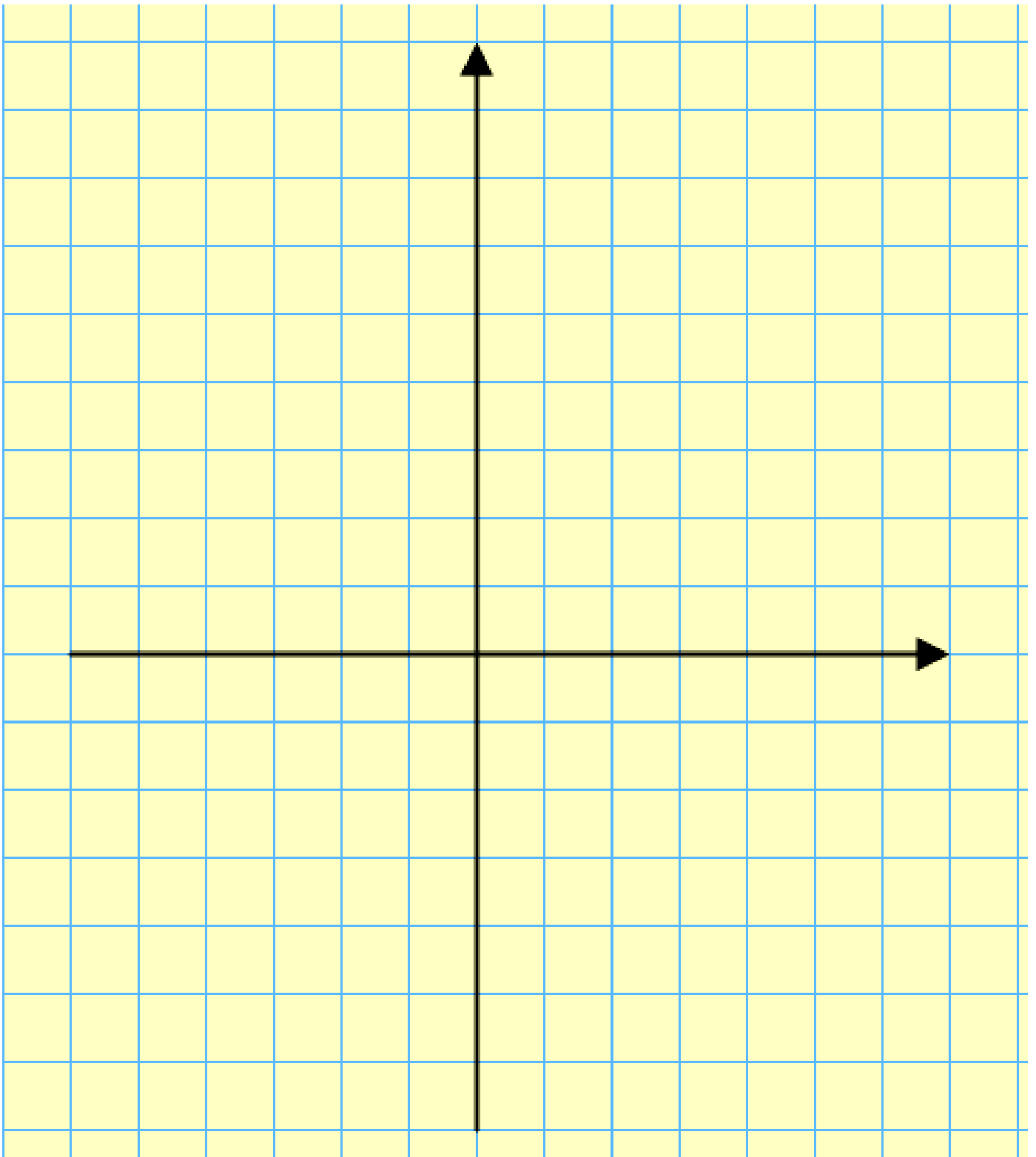
- In the 1º quadrant, also mark the points M and N, that are the intersection of the straight initially marked with the vertical straights x=4 and x=5, respectively.

- Mark the points T (0,5) and V (0,6)

- Determine the symmetric points of M and N in the 2º, 3º and 4º quadrant.

- Determine the symmetric points of T and V, relatively to the origin.

- Connect M with T, T with M´, M´ with M´´, M´´ with T´, T´ with M_1 and finally M_1 with M.

- Connect N with V, V with N´, N´ with N´´, N´´ with V´, V´ with N_1 and finally N_1 with N.

- You obtained two hexagons.

- Shade the region of the framing between this two hexagons.

- Draw two horizontal straights that pass through V and V'.

- You obtained a rectangle.

- Mark another rectangle, centered with the first but with bigger dimensions, making a frame, which has 1 unit of width.

After all this work, let's see if you obtained the frame idealized by Mr. Carlos.

Teacher Ana Maria S. L. Baptista