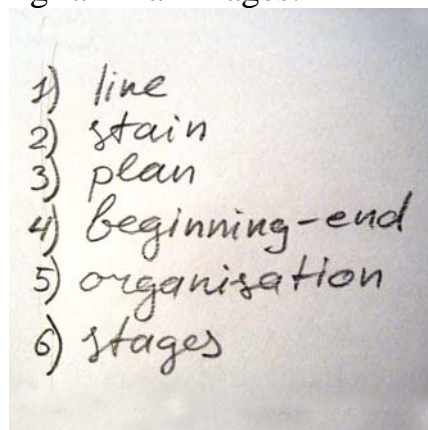Dr. Yana CHEBOTOVA, Kharkiv
Algorithm of Developing Abstract Thinking

We offer a complex of practical tasks aimed at developing abstract thinking, ability to form ideal images and transform them in the desired direction. The ability to generate ideas on the basis of abstract notions that have no precise visual image is the basis for the development of imagination, spatial reasoning, and intuition. Operating with images on the level of imagination is as activity of complicated structure and difficult realization. The creative imagination uses multitype images. The created graphic composition should describe most completely the complicated abstract notion by synthesizing in itself a few simpler ones. Often, the created image like the theoretical notion includes a lot of elements. Transferring abstract ideas into graphic images, we help generate a new formation using all the personality's higher functions.
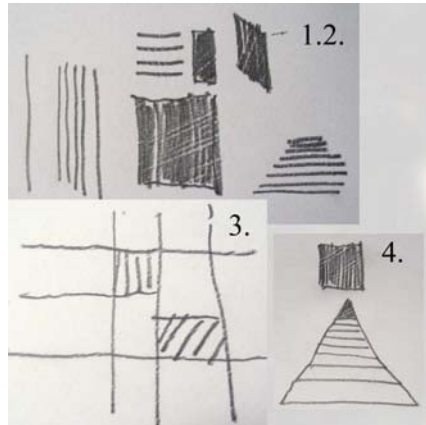
The source material (notion) for the work with the students should not contain familiar pictures (i.e. objects, colors, phenomena). The ideas are visualized in drawings, without using colors. The offered method is aimed at developing abstract thinking through drawing pictures. The students are suggested to make an image of a phenomenon or an idea which do not have a familiar visual symbol. As an example, philosophic notion – analysis, synthesis, theory; feelings – laughter, passion, uncertainty etc. can be taken. This task seems to be easy, but only at first glance. It can turn out to be quite difficult for persons with poorly developed imaginary and spatial reasoning. In such cases the teacher should suggest a special algorithm of actions furthering the work of imagination.
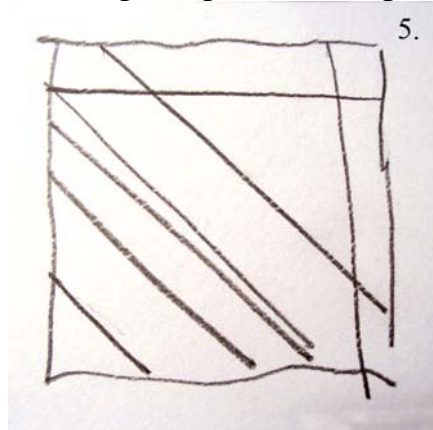**This algorithm consists of a few stages.**
The first stage. A list of associations is made characterizing this notion from different sides using familiar images.

1) line
2) stain
3) plan
4) beginning-end
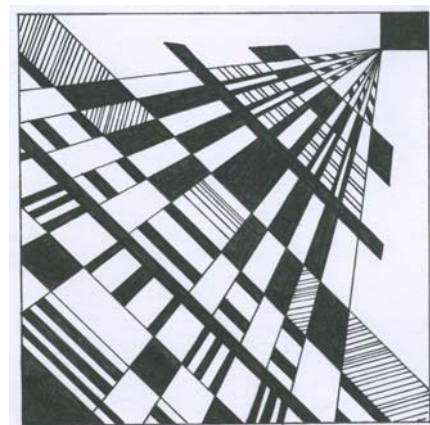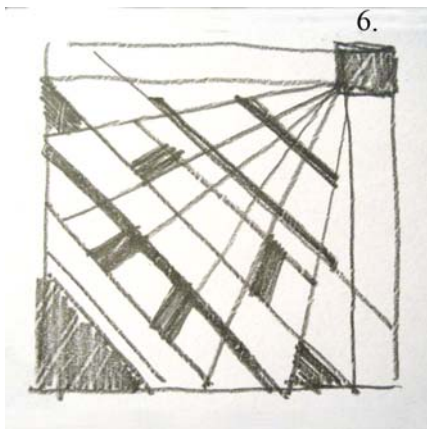5) organization
6) stages

The second stage. A visualization is found for the associations in the form of schematic sketches.

The third stage. The images are united into a structure containing a lot of simple characteristics of a complicated notion. The most capacious of them are the basic ones making the general composition structure.

The fourth stage. Details (i.e. small elements) are added to the general composition structure which gives more detailed characteristic of the basic notion
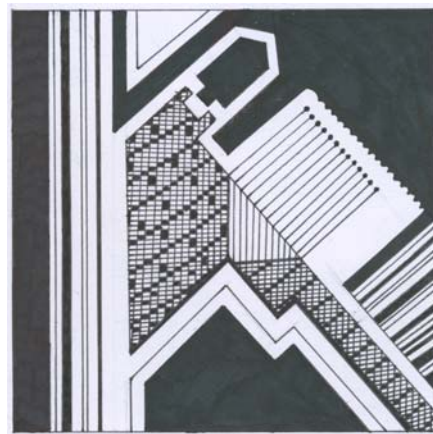
In the end of task the teacher can complicate the students' work and recommend coloring the composition. Depending on the students' emotional state the color gamut can be warm, cold or mixed.

For those students who cope with these tasks the teacher can suggest changing the created image under effect of imaginary circumstances. For example, the project is made more complicated (optimized) or, on the contrary, simplified.

The criteria of successful coping with the task is richness in details (their number), expressiveness of the general structure of the composition and its comprehensibility for detached onlookers. Neither the level of graphic competence nor implementation accuracy is evaluated.
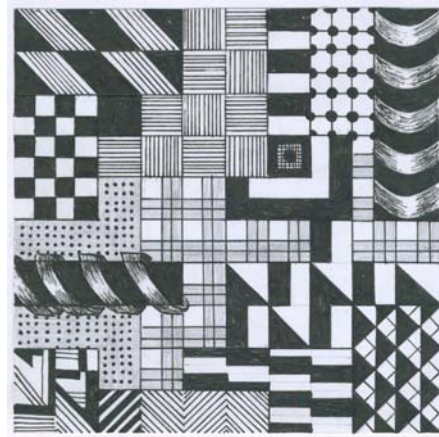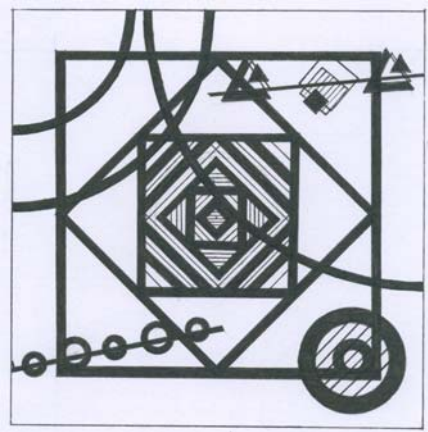
While fulfilling such tasks, the students of mathematical subjects acquire certain habits in forming pictures in their imagination. These images are generalized and can be transformed and have tendencies to complication. It easies intellectual work with symbols and gives an active impulse to developing abstract thinking. Also the students learn the specific algorithm which simplifies first steps in their work with imaginary structures and gives certainty in successful implementation of the whole educational program.

Fulfilling the suggested tasks is useful for the students studying both mathematics and arts.
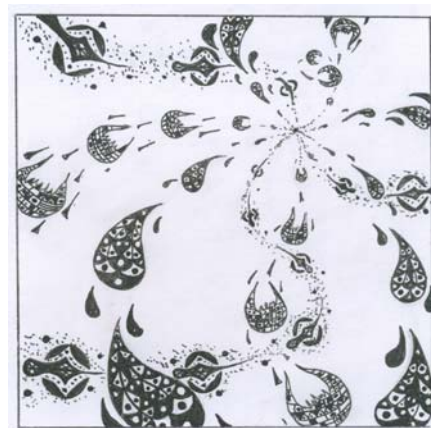
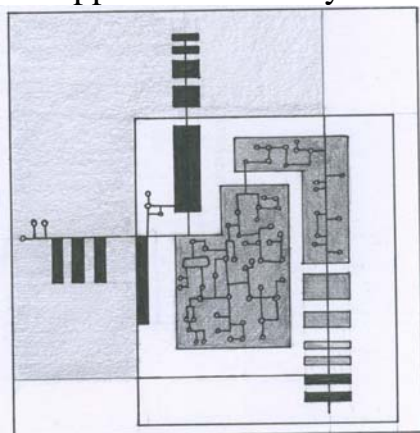-"Statistics". Made by the second year student Seleznyov D.O.
- "Matrix". Made by the second year student Seleznyov D.O.

- "The project". Made by the second year student
Lesovskaya Tatyana.
- "Project" Made by the first year student
 Gopanchyk E.O.

-"Laughter" Made by the first year student Brik J.
-"Happiness" Made by the second year student Petrova J.

-"Analyse" Made by the second year student Timchenko A.