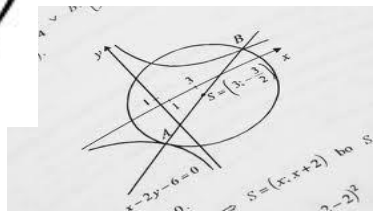
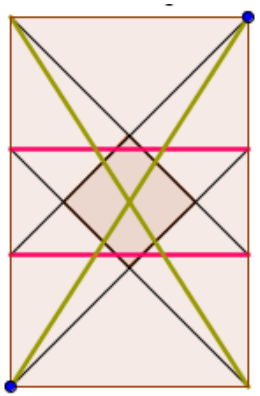
Lifelong Learning Programme



DynaMAT



Dynamising the Mathematics Classes with Art Ideas

Jenny Sendova

representing the BG team

Seeing is not as simple as it looks

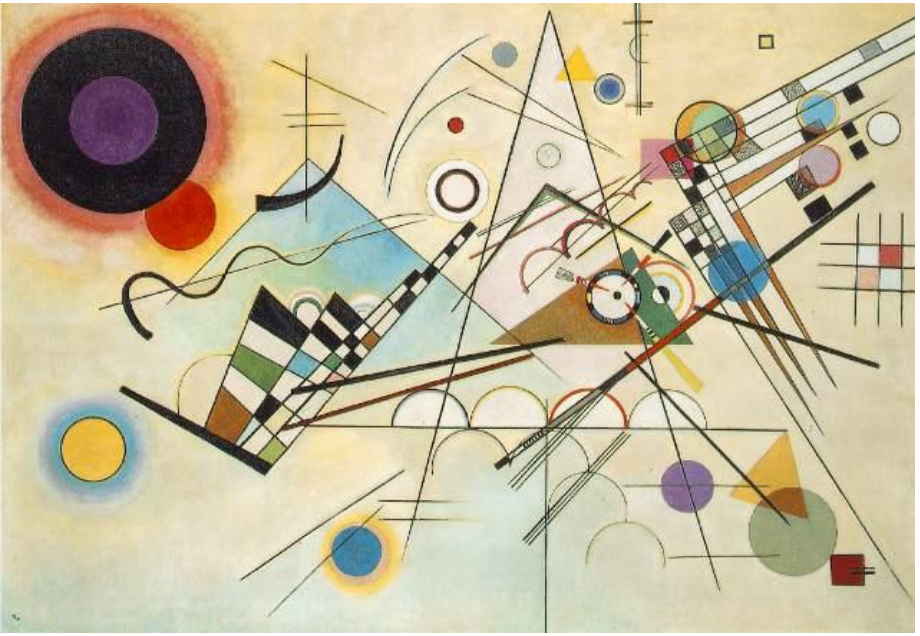
Ad Reinhardt

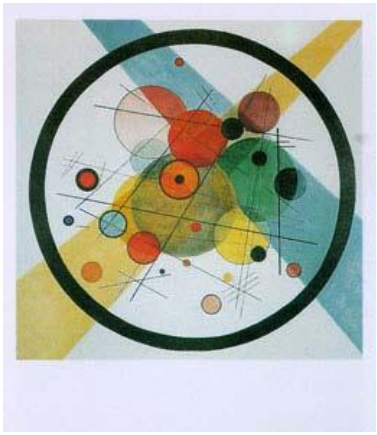
Visual Modeling

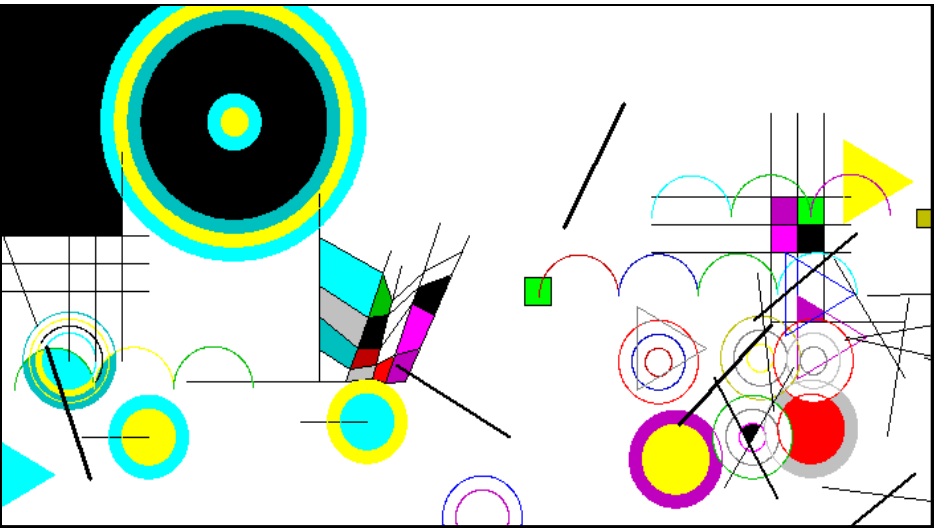
Integrating the classes in mathematics, informatics, arts and ICT in the style of constructionism and inquiry based learning

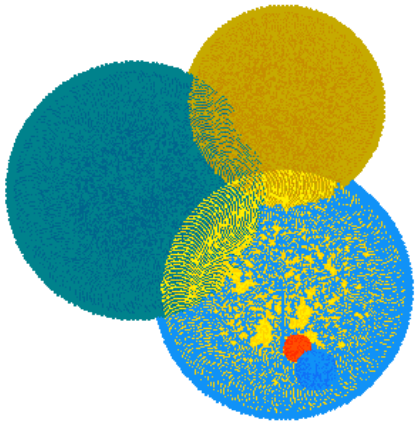
In teacher education (pre-service)

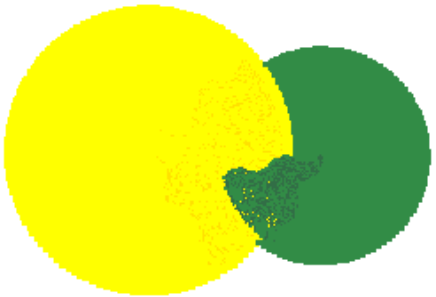
In the style of Kandinski



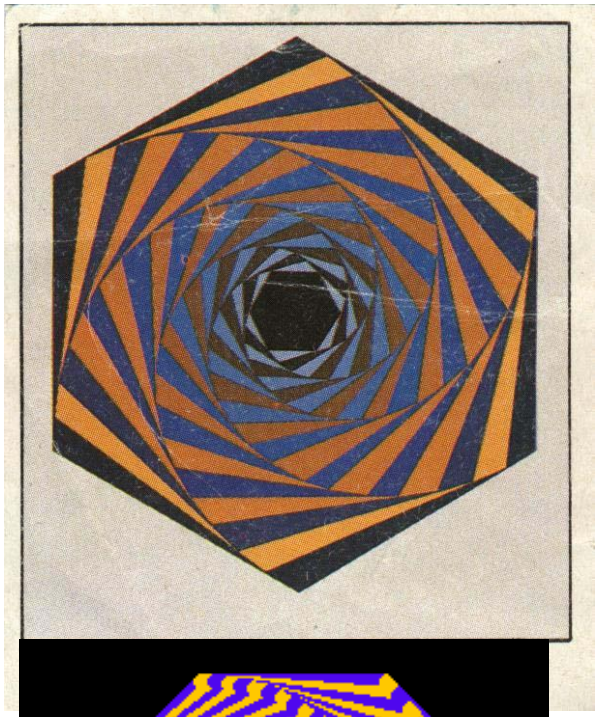


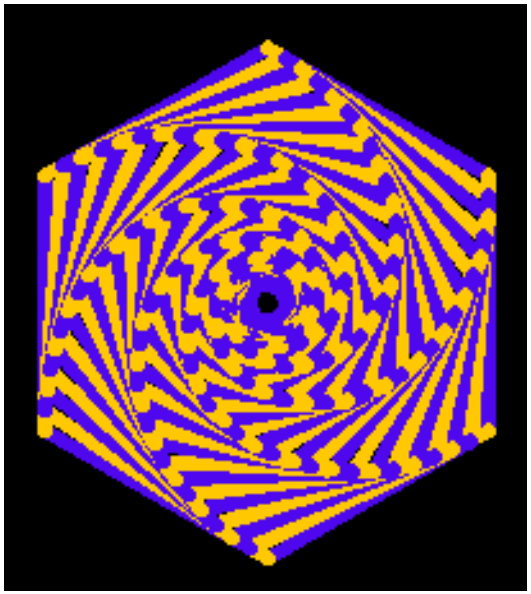


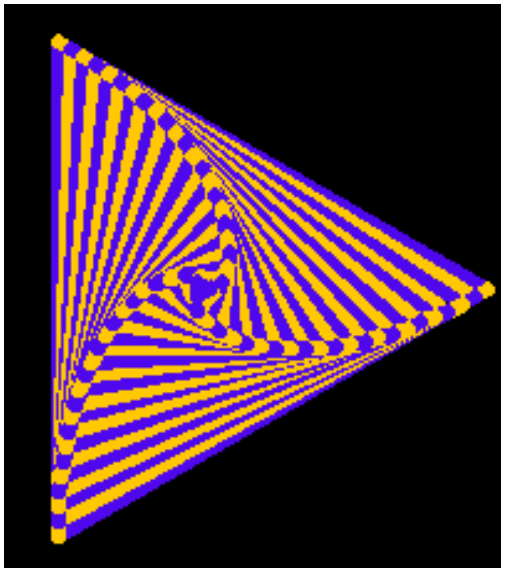


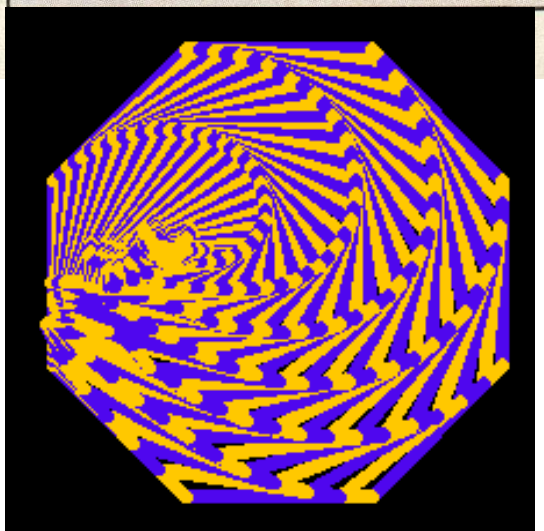


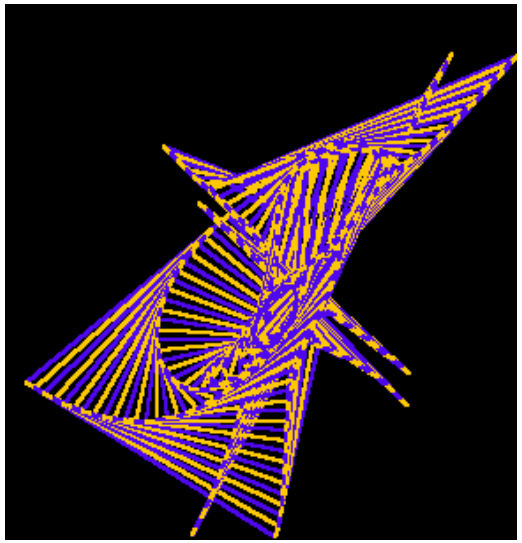
A la Vasarely

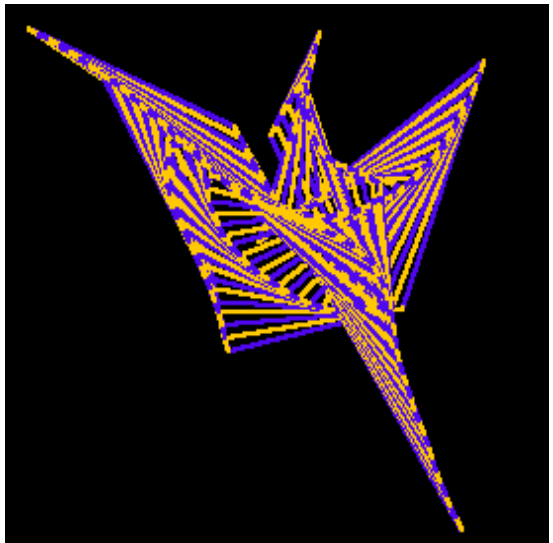


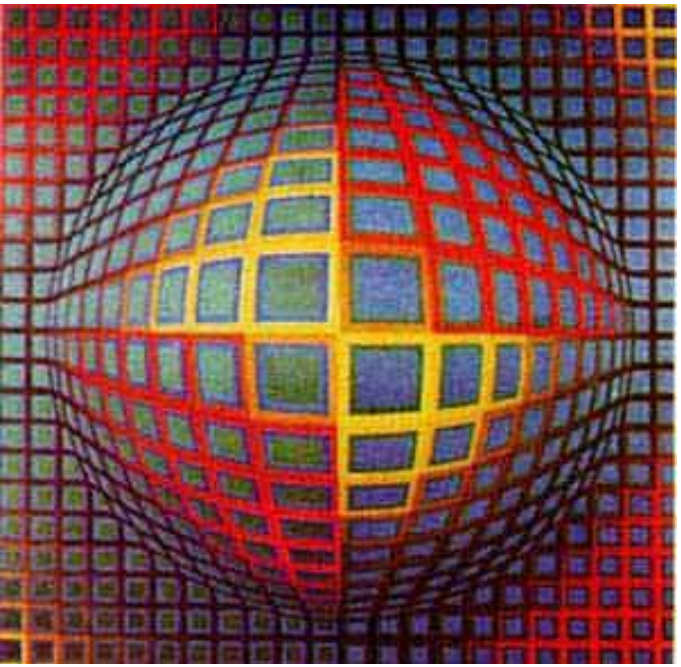


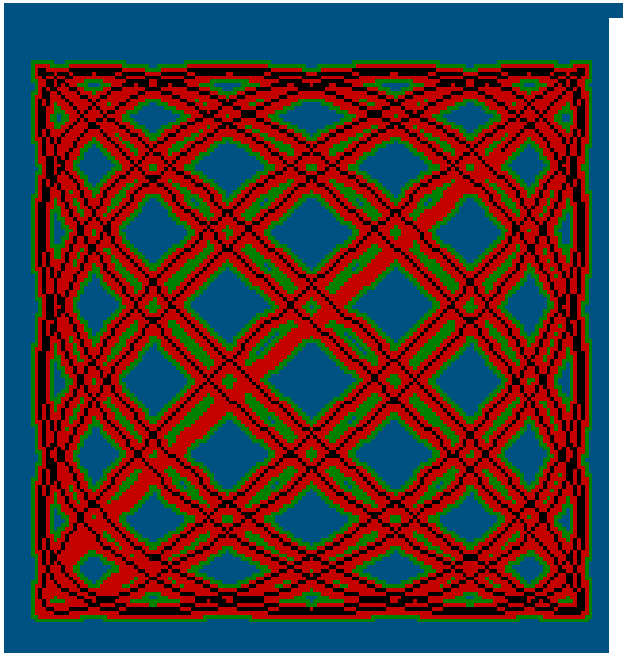


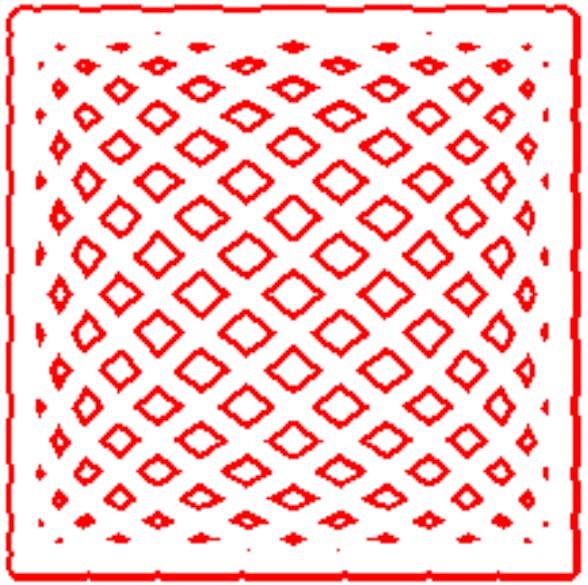


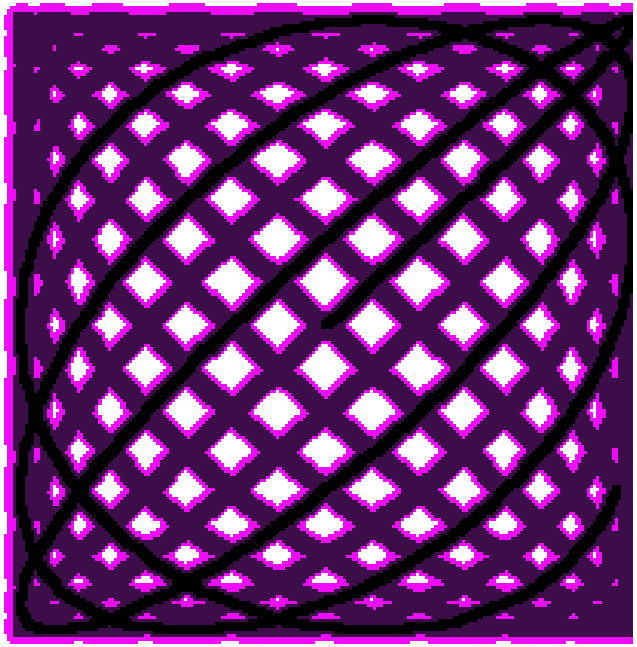


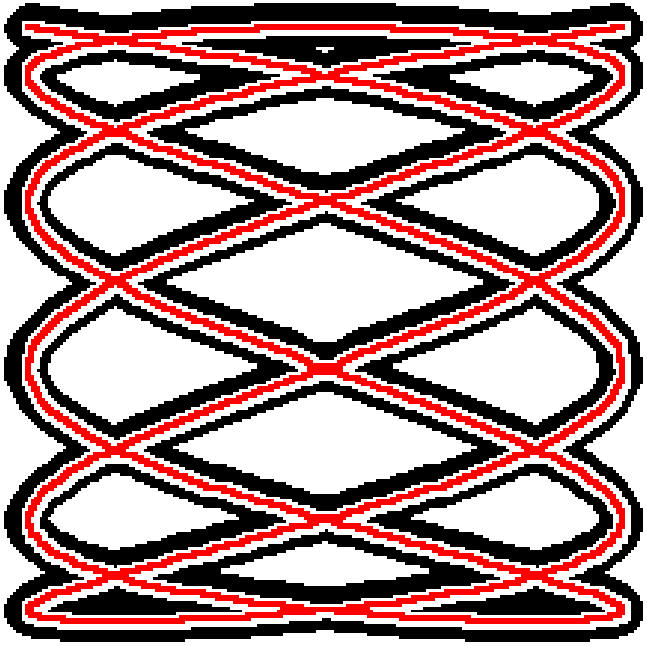




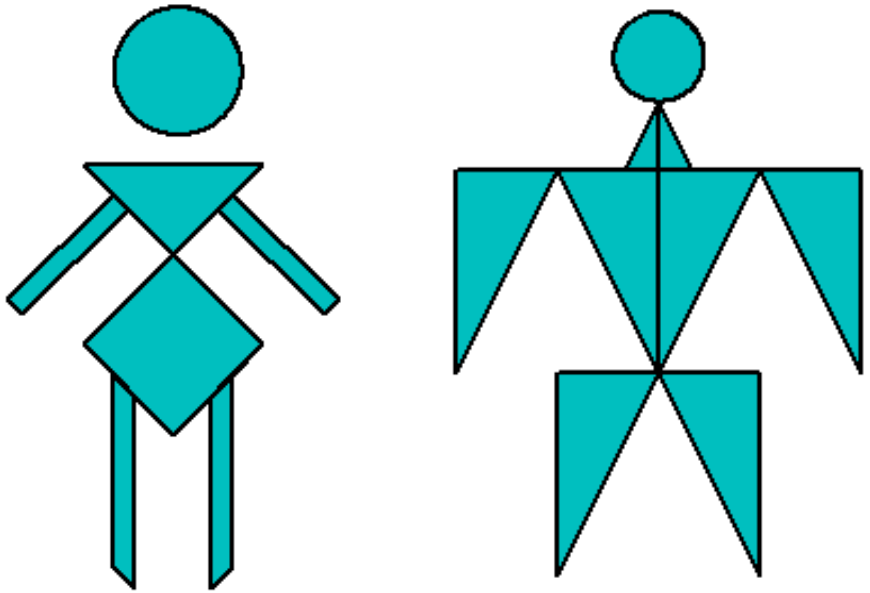




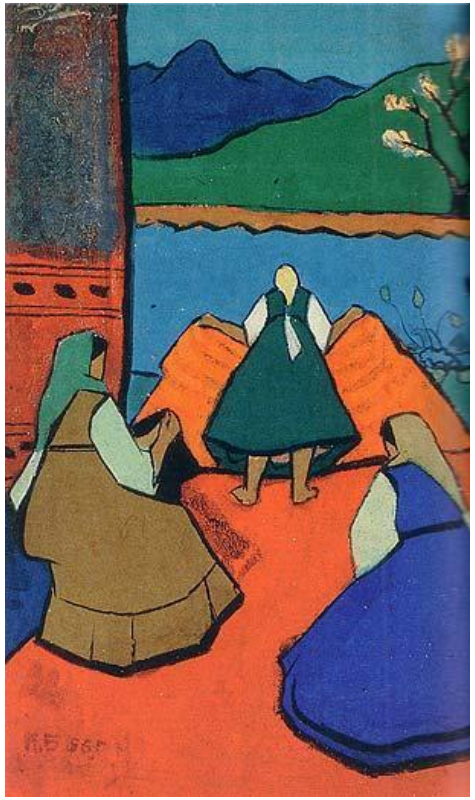


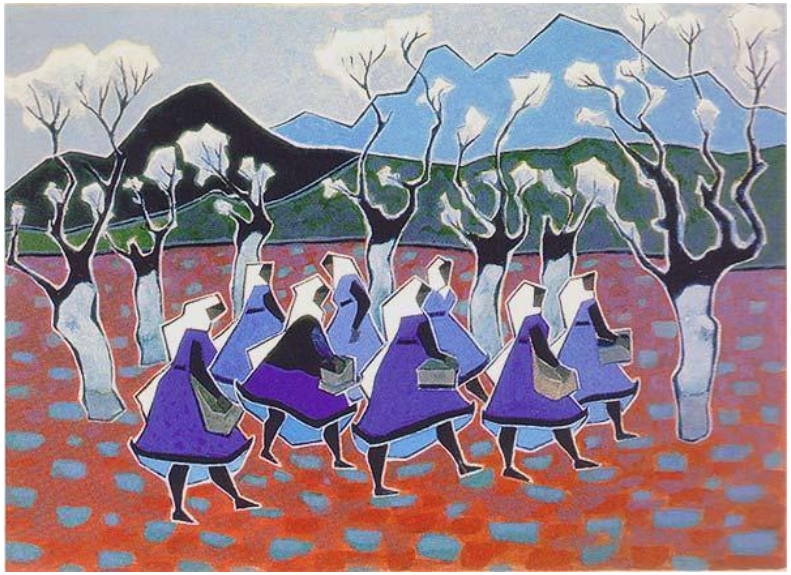


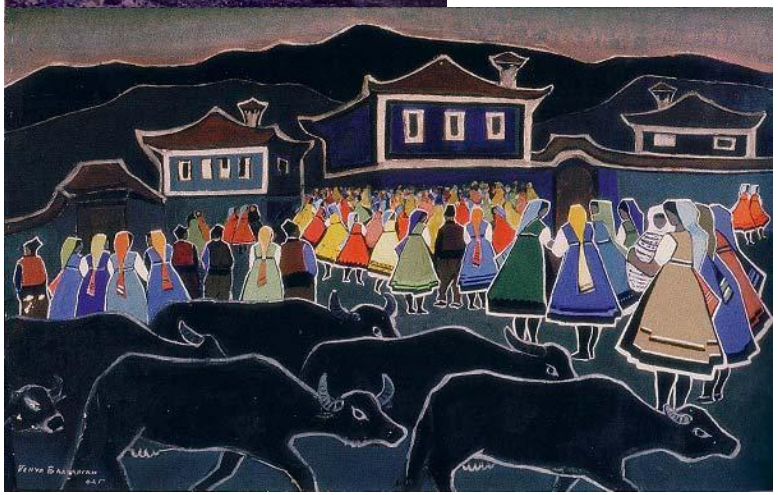
Create a “person” by geometric figures



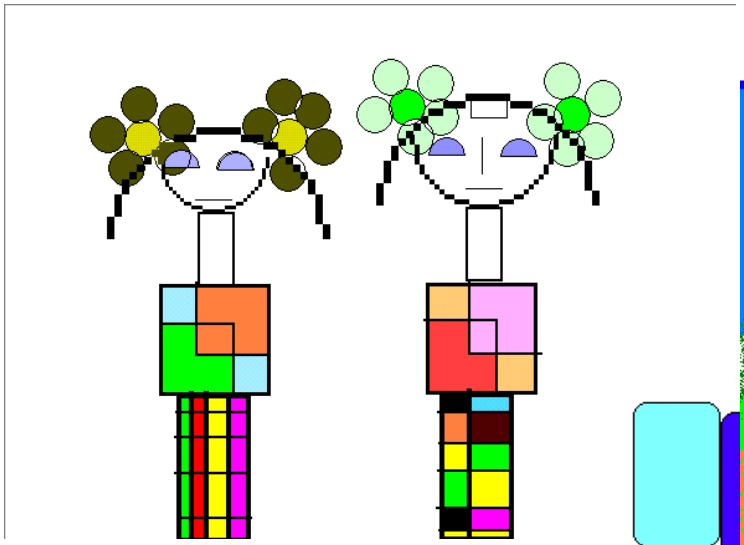
Pencho Balkanski

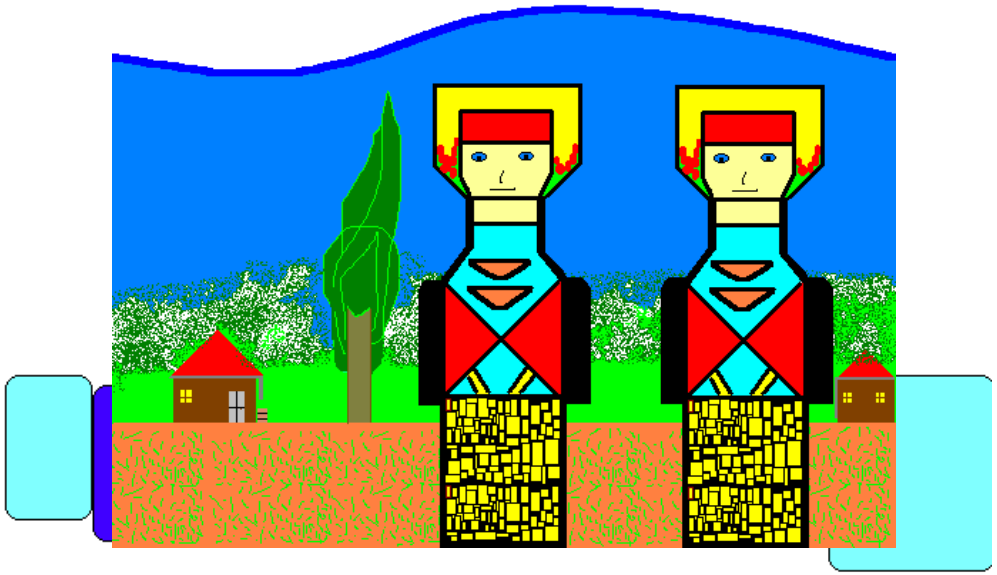


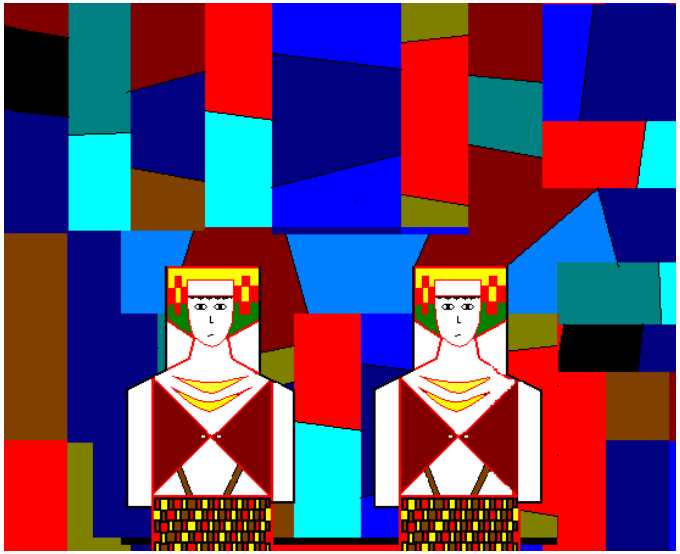


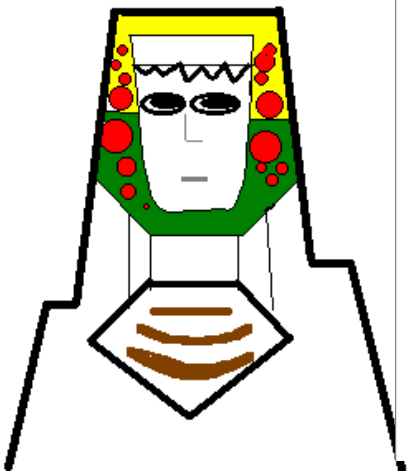


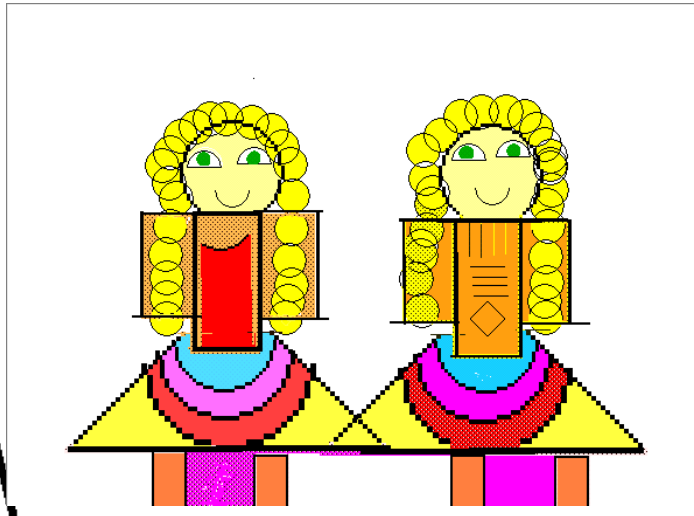
A la Pencho Balkanski









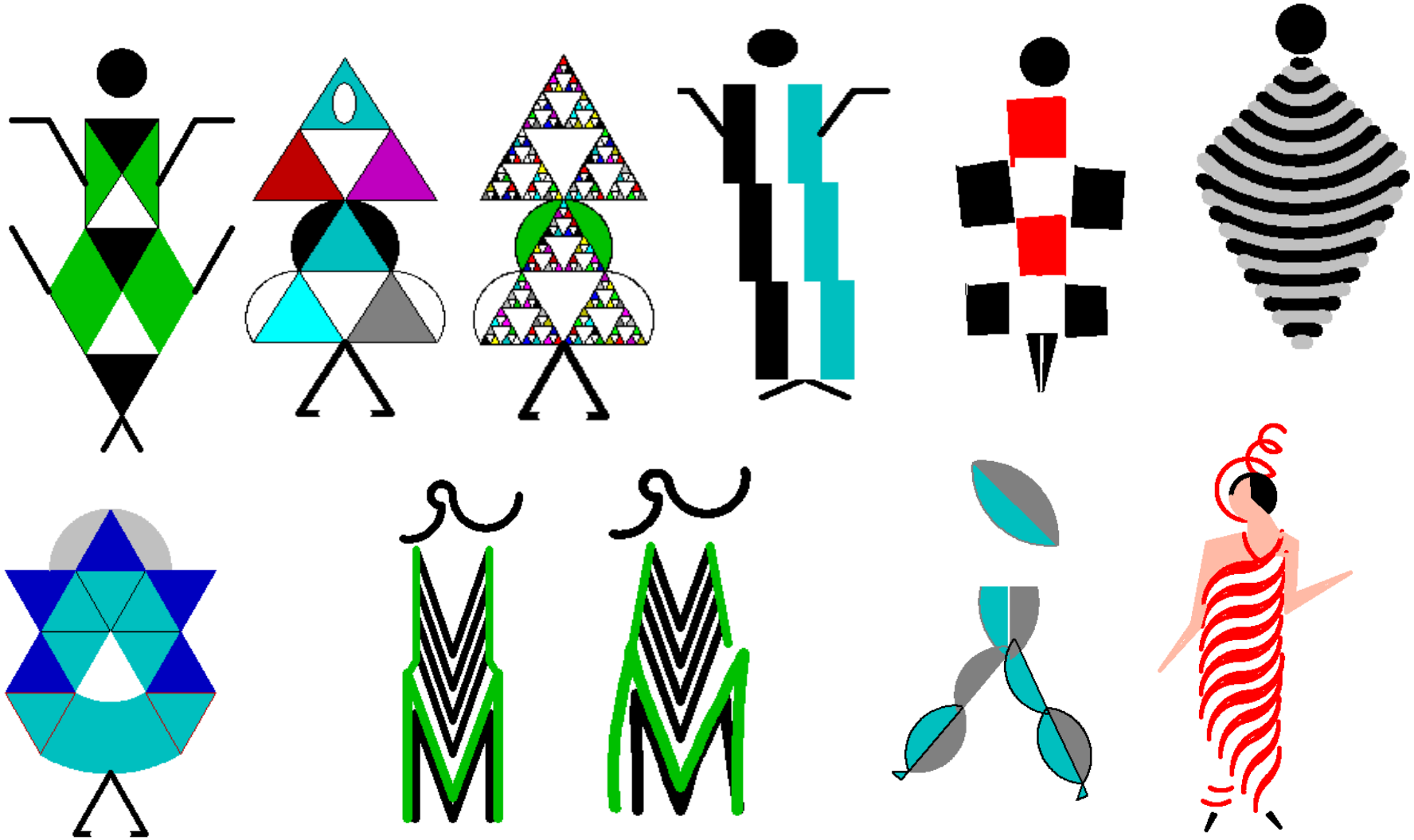


A la Pencho Balkanski

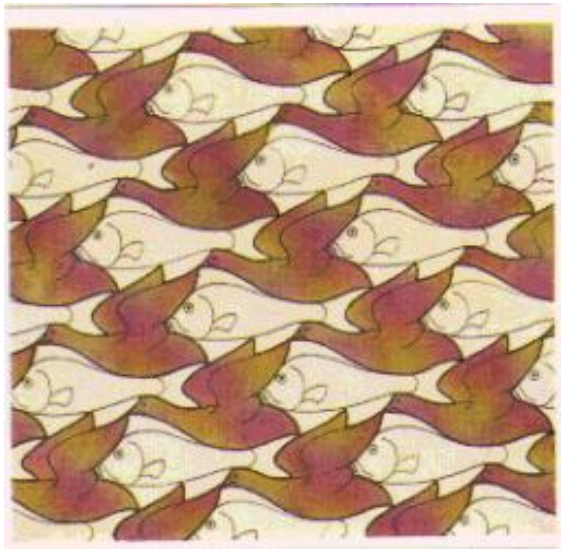
In the style of Sonia Delaunay

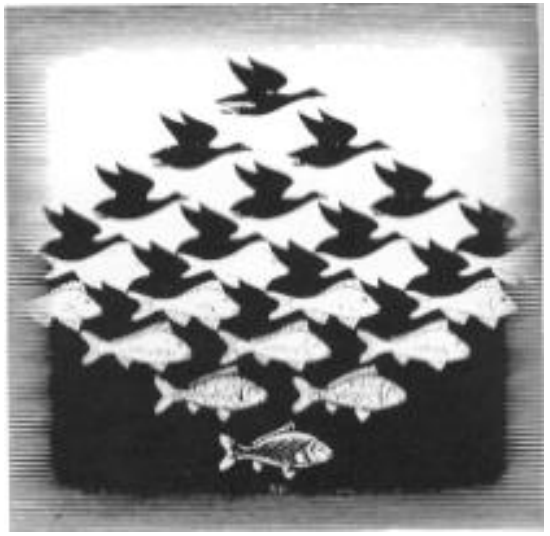
Robert and Maurine Rothschild Collection

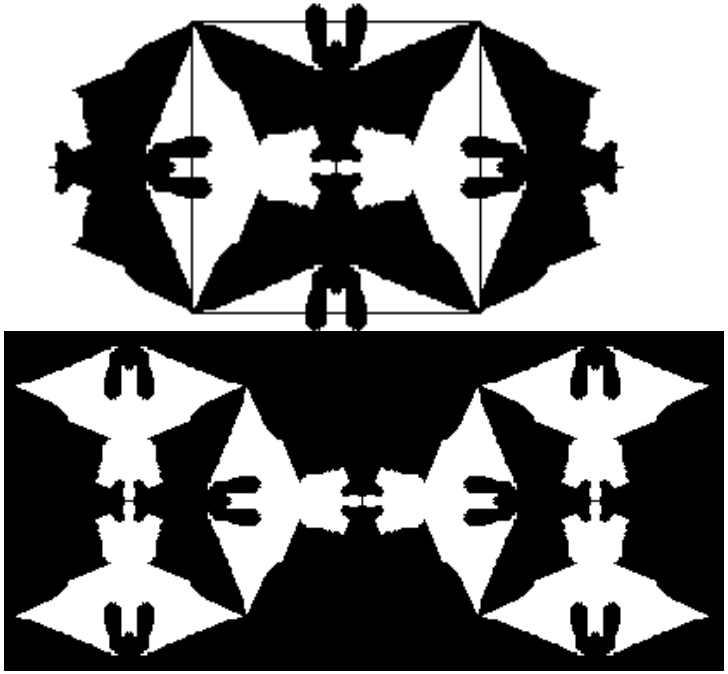
Computer variations of Sonia Delaunay's models

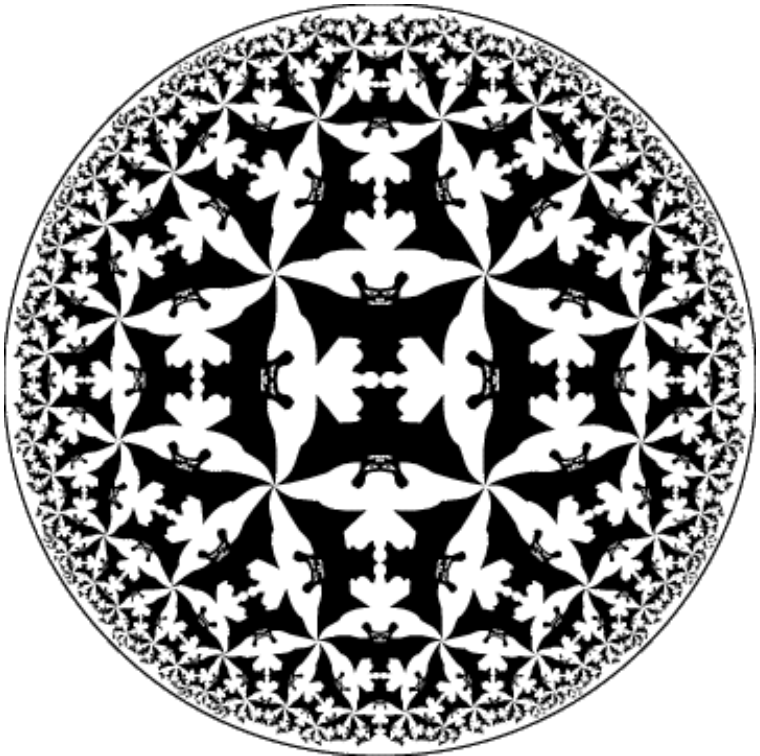


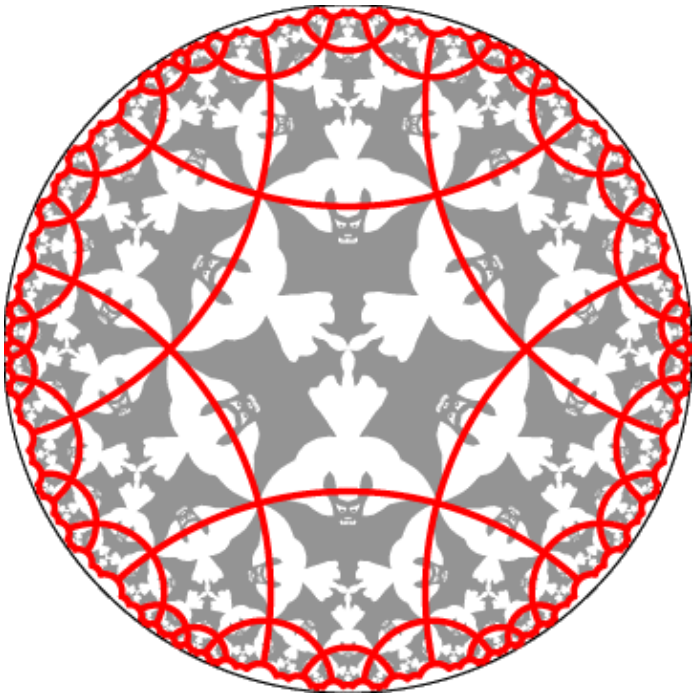
In the style of Escher

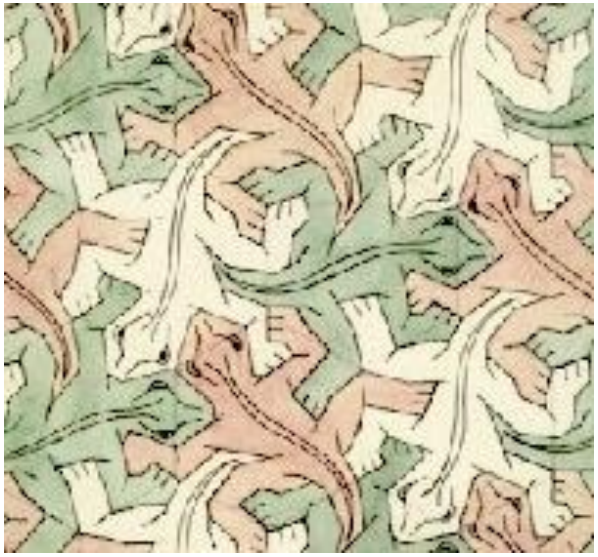


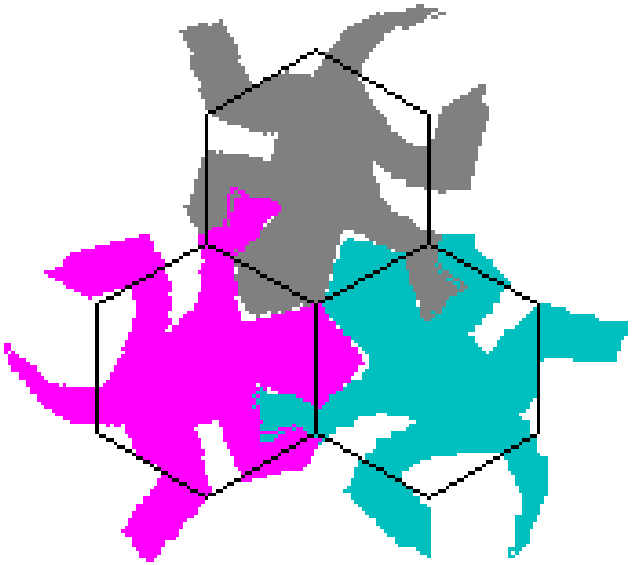


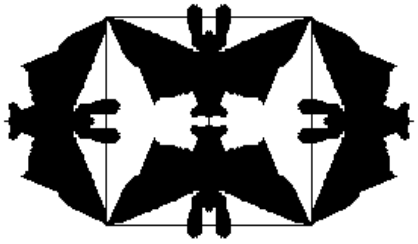


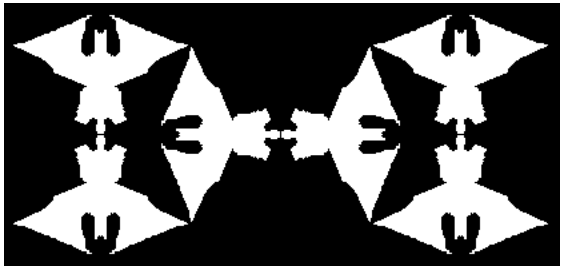




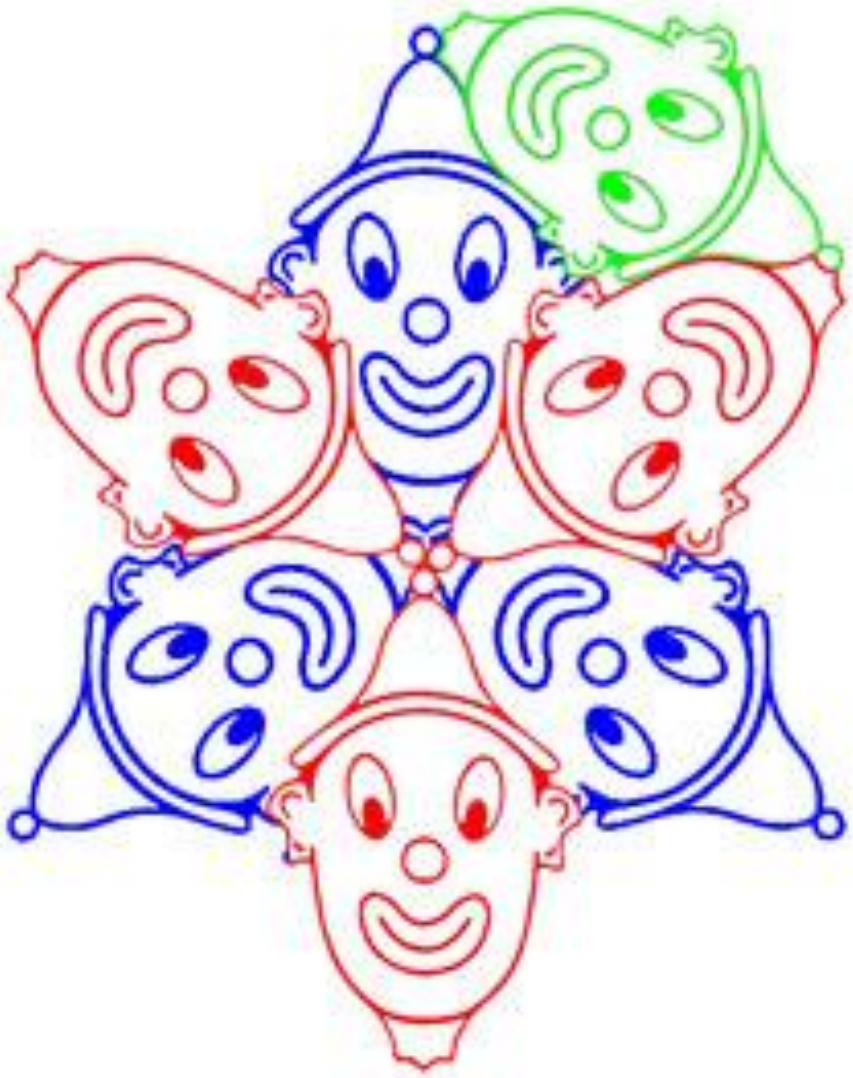




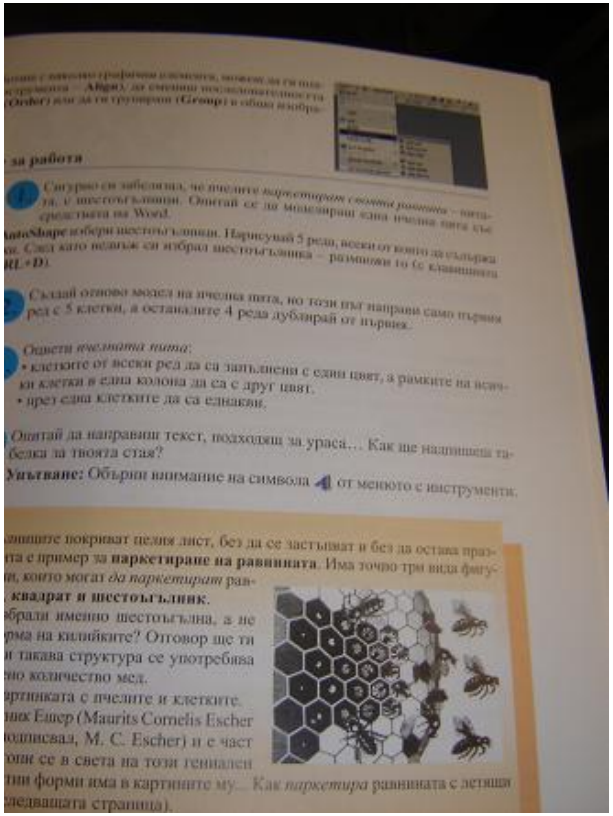


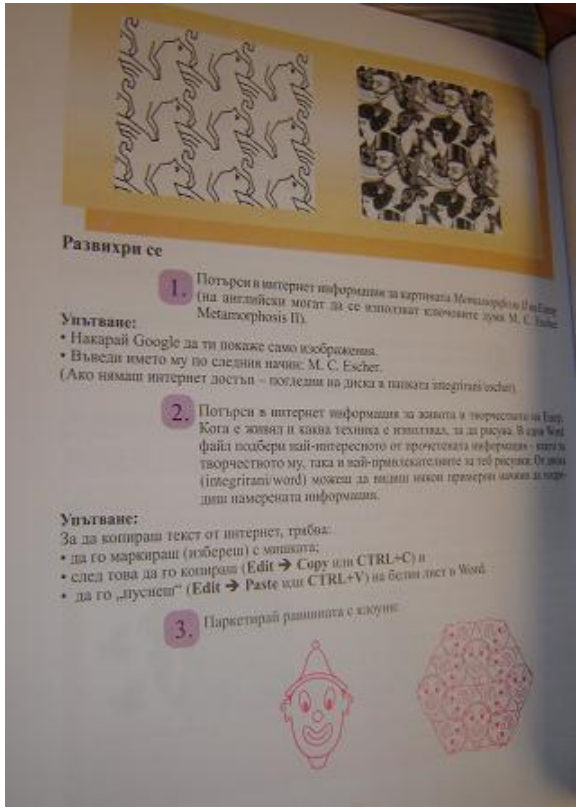


Tessellations



Ideas in practice





Развихри се

1. Потърси в интернет информация за картината *Метаморфоза II* на Ешер (на английски могат да се използват ключовите думи M. C. Escher Metamorphosis II).

Упътване:
- Накарай Google да ти покаже само изображения.
- Въведи името му по следния начин: M. C. Escher.

(Ако нямаш интернет достъп – погледни на диска в папката integrirani/escher).

2. Потърси в интернет информация за живота и творчеството на Ешер. Кога е живял и каква техника е използвал, за да рисува. В един Word файл подбери най-интересното от прочетената информация – както за творчеството му, така и най-привлекателните за теб рисунки. От диска (integrirani/word) можеш да видиш някои примери, както и допълнителна намерена информация.

Упътване:
За да копираш текст от интернет, трябва:
- да го маркираш (избереш) с мишката;
- след това да го копираш (**Edit → Copy** или **CTRL+C**) и
- да го „пуснеш" (**Edit → Paste** или **CTRL+V**) на белия лист в Word.

3. Паркетирай равнината с клоуни:

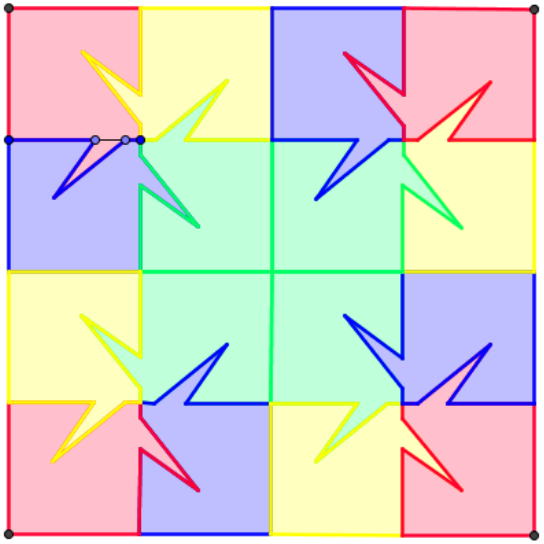
2. Предлагаме ти подготовката за тържеството – какво ще кажеш да украсиш стаята с *додекаедри*? Потърси информация за тях в *http://www.google.com* или *http://bg.wikipedia.org* (с ключови думи *додекаедър*). Как изглежда *додекаедърът*? Начертай неговата развивка на един лист в Word – имаш основния му триъгълен елемент: равностранен триъгълник от AutoShapes.

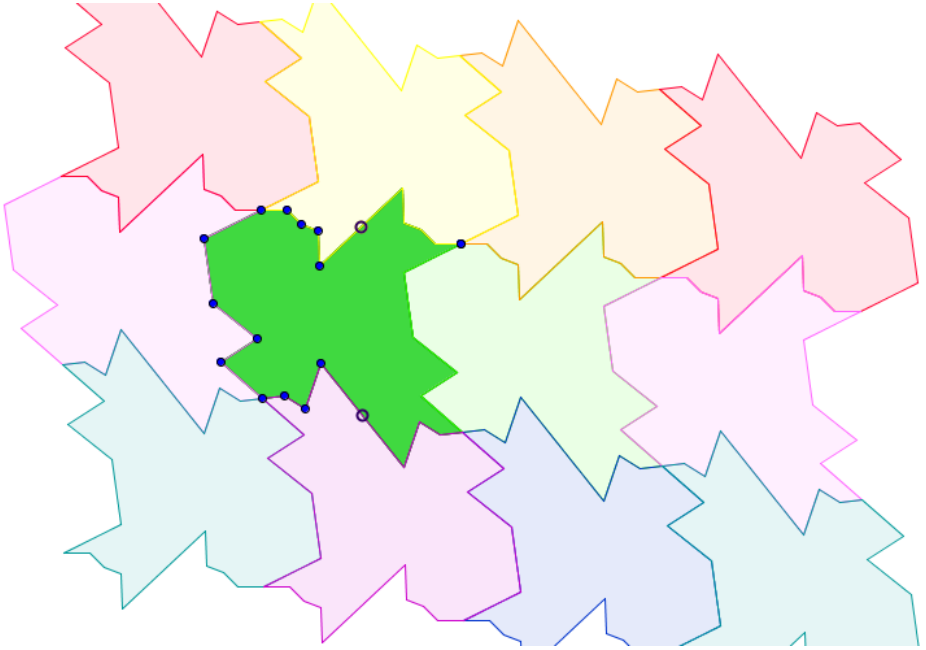
3. Направи разгъната топка от:
- шестоъгълници и петоъгълници;
- шестоъгълници и квадрати;
- триъгълници, квадрати, шестоъгълници и осмоъгълници.

Нали бяха стояли добре на тържеството, ако всеки от **вас** оцвети своя **многостен в различен цвят – пъстро и весело като за тържество**. За целта може да ти помогне програмата *Оригами*.

(1) (2) (3)

Оригами от диска, въведи името си (**Enter your name**) и натисни

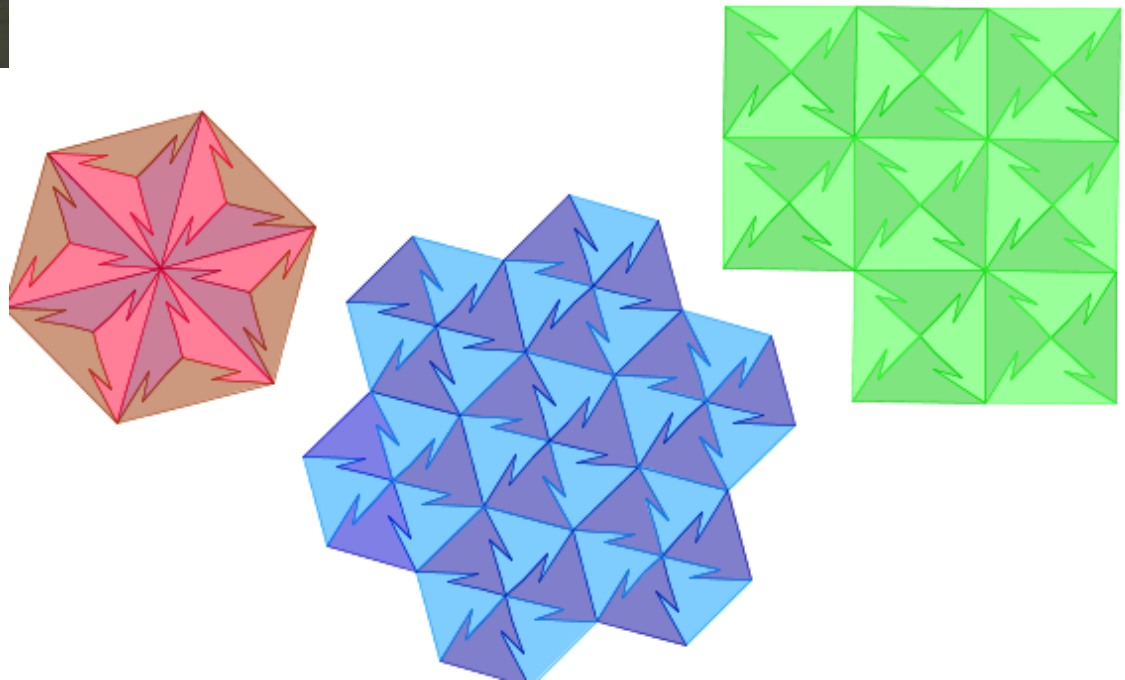


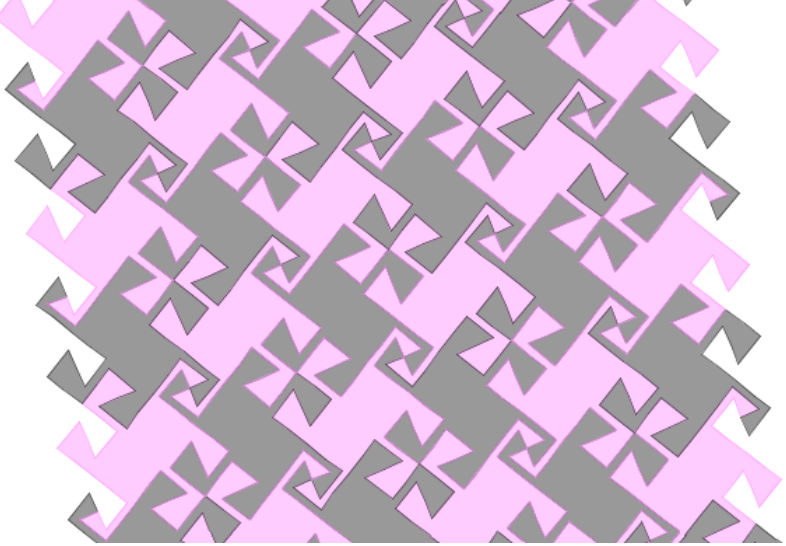


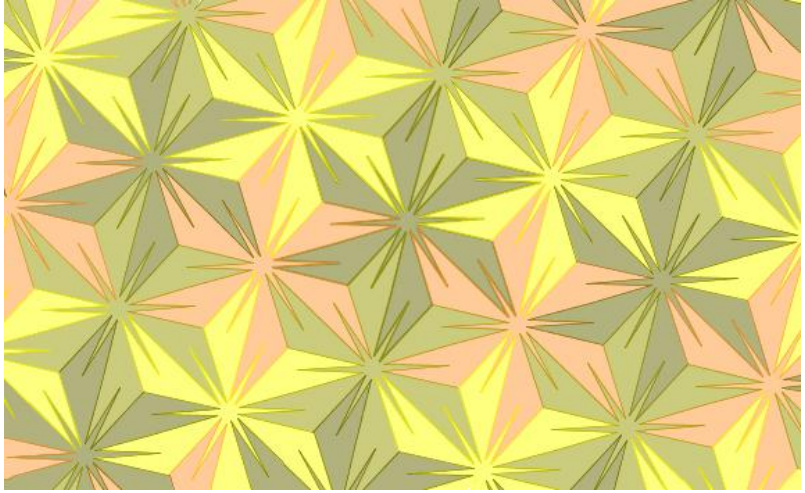
DON’T PREACH FACTS, STIMULATE ACTS!

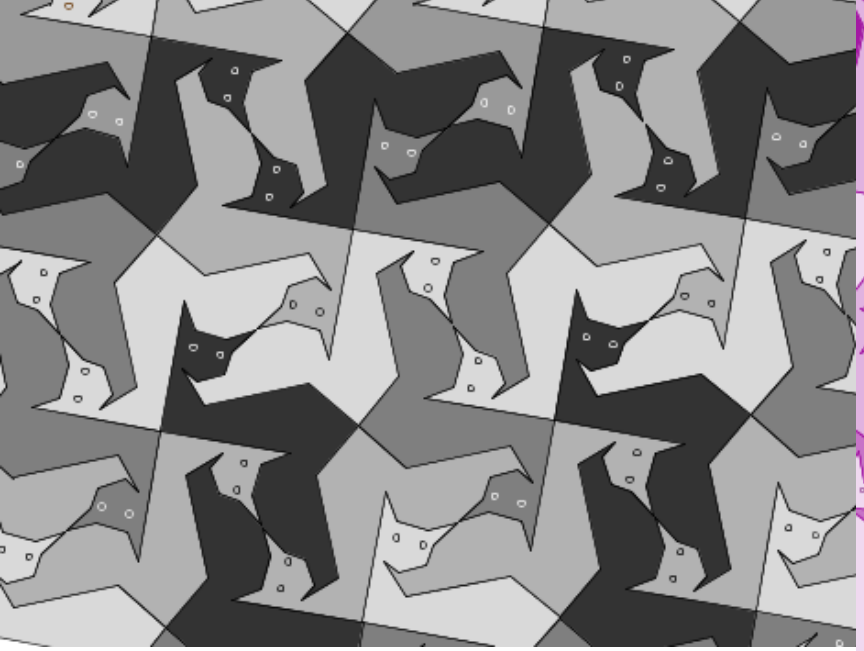
Paul Halmos

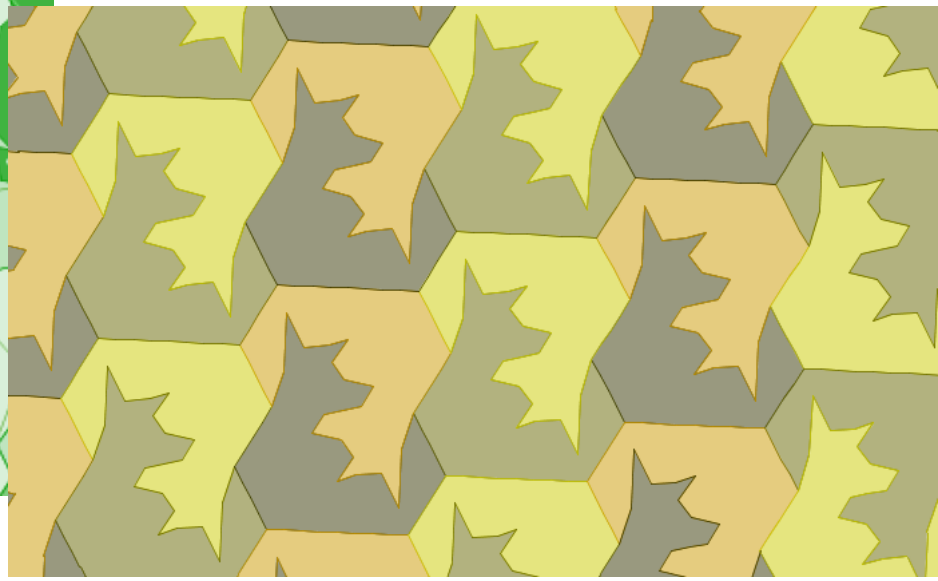
A teacher stimulating acts

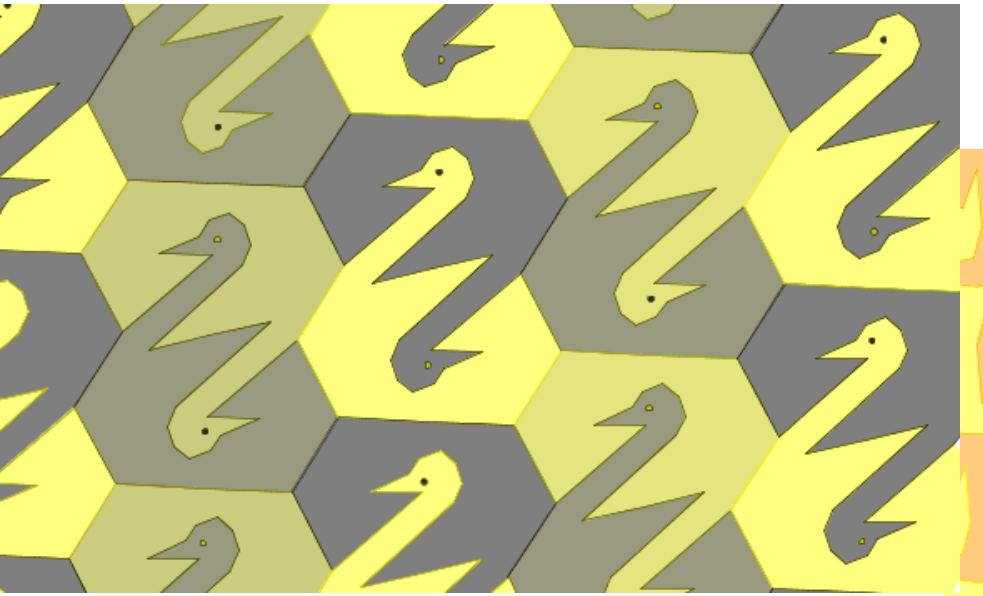


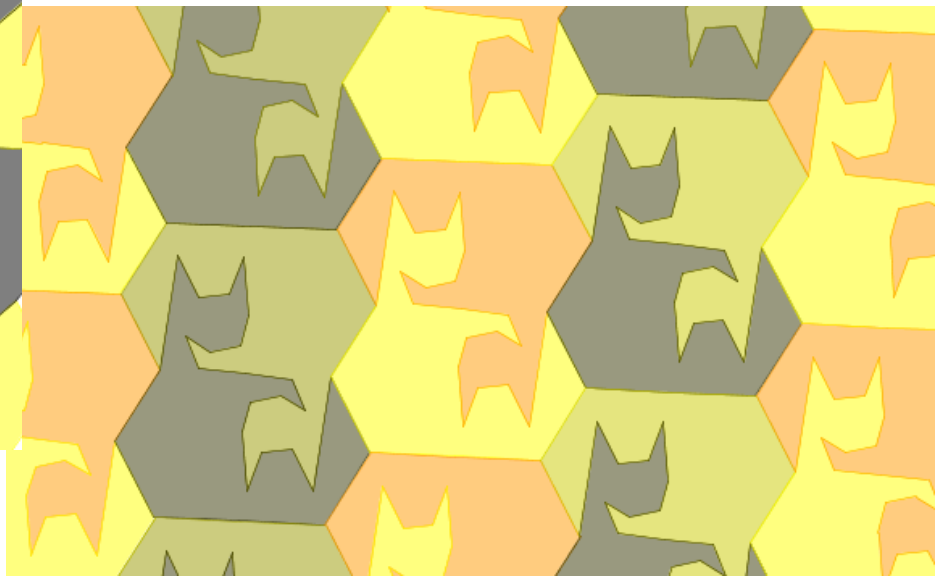


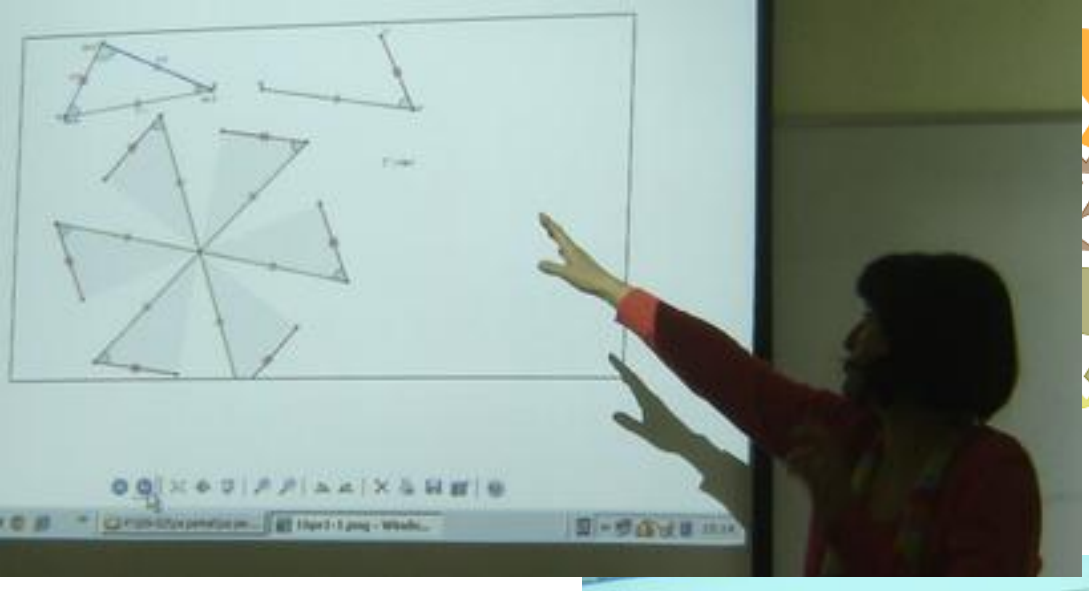


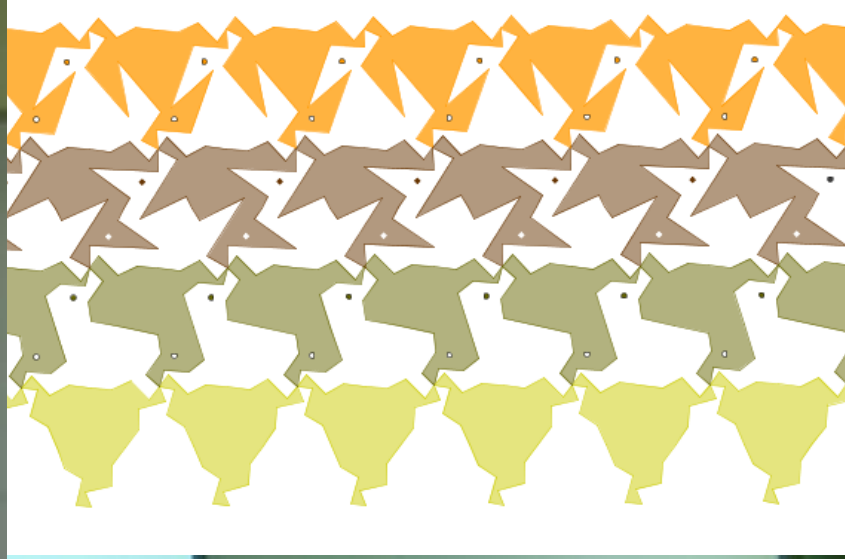


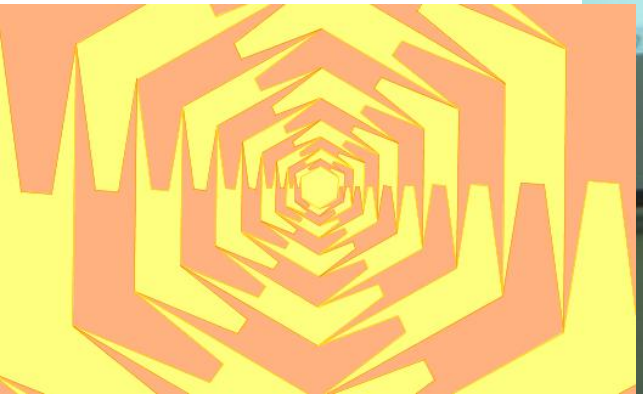






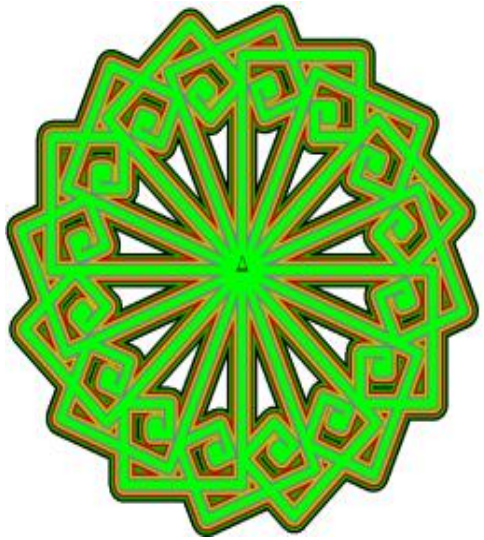


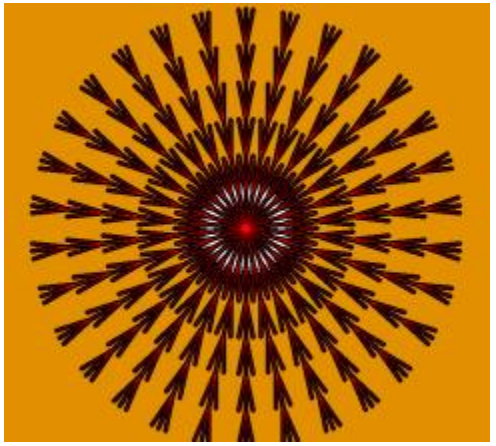




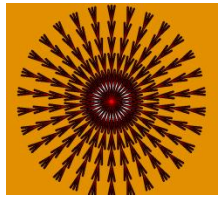
In-service teacher education

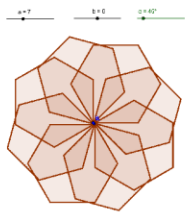
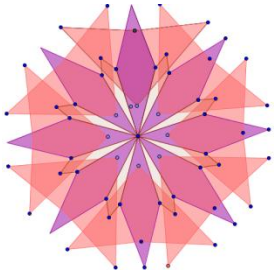
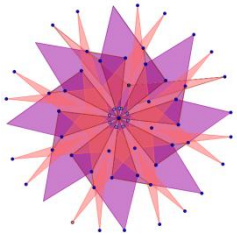
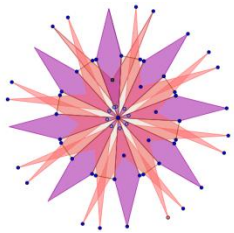
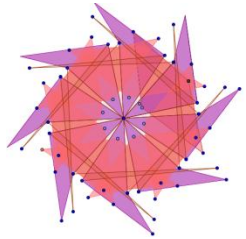
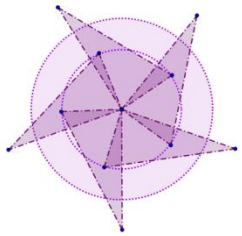
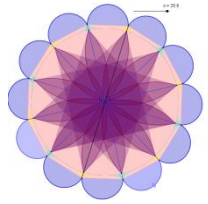
Modeling the beauty around them





Wood-carved ceilings from Triavna and Plovdiv and some computer models

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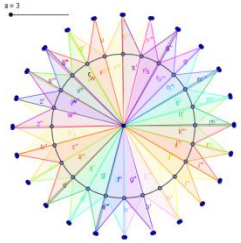
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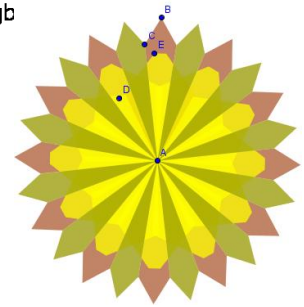
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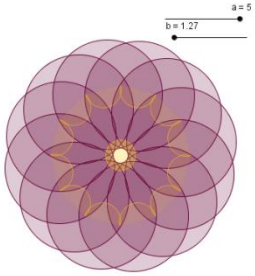
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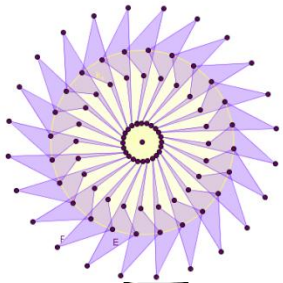
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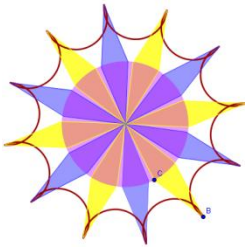
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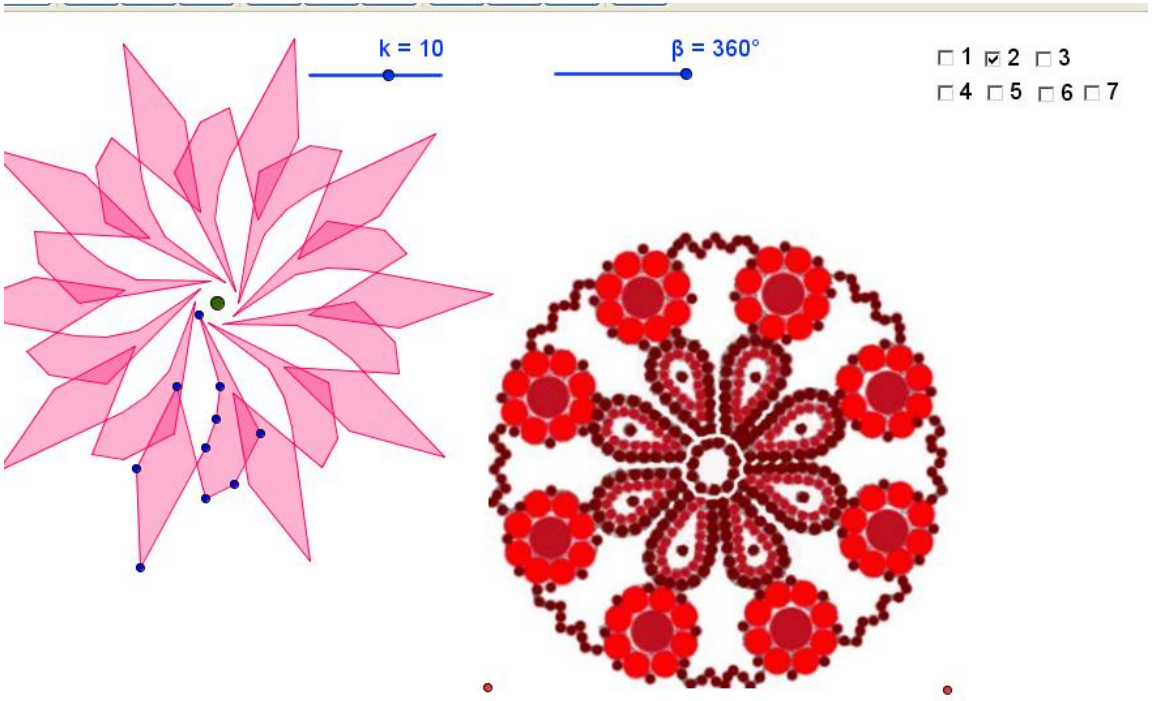
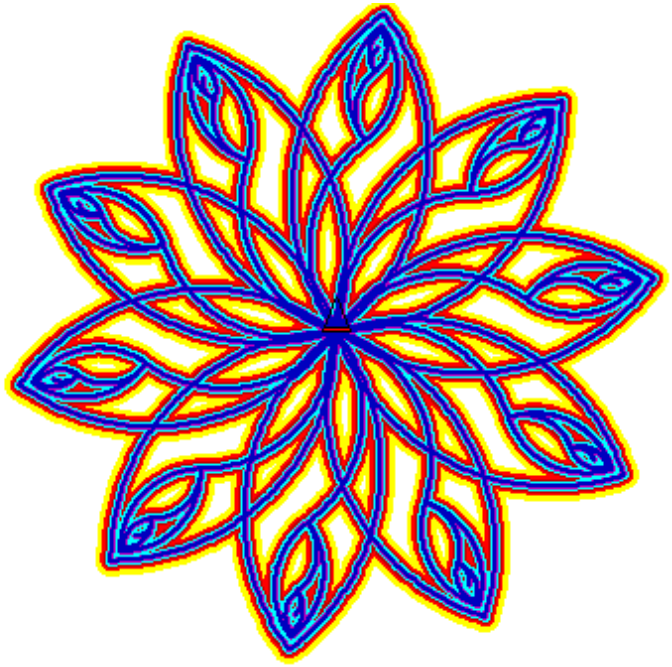
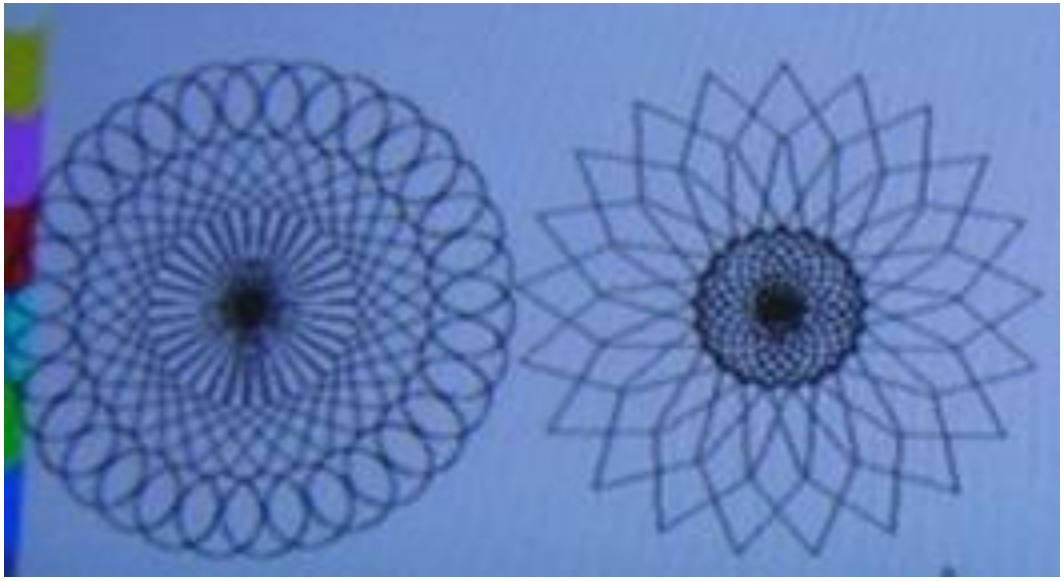
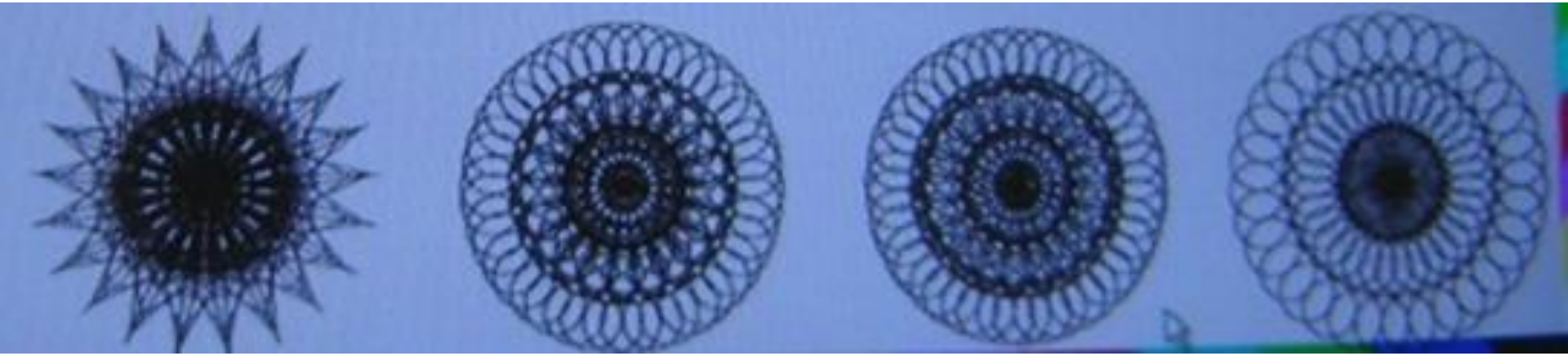
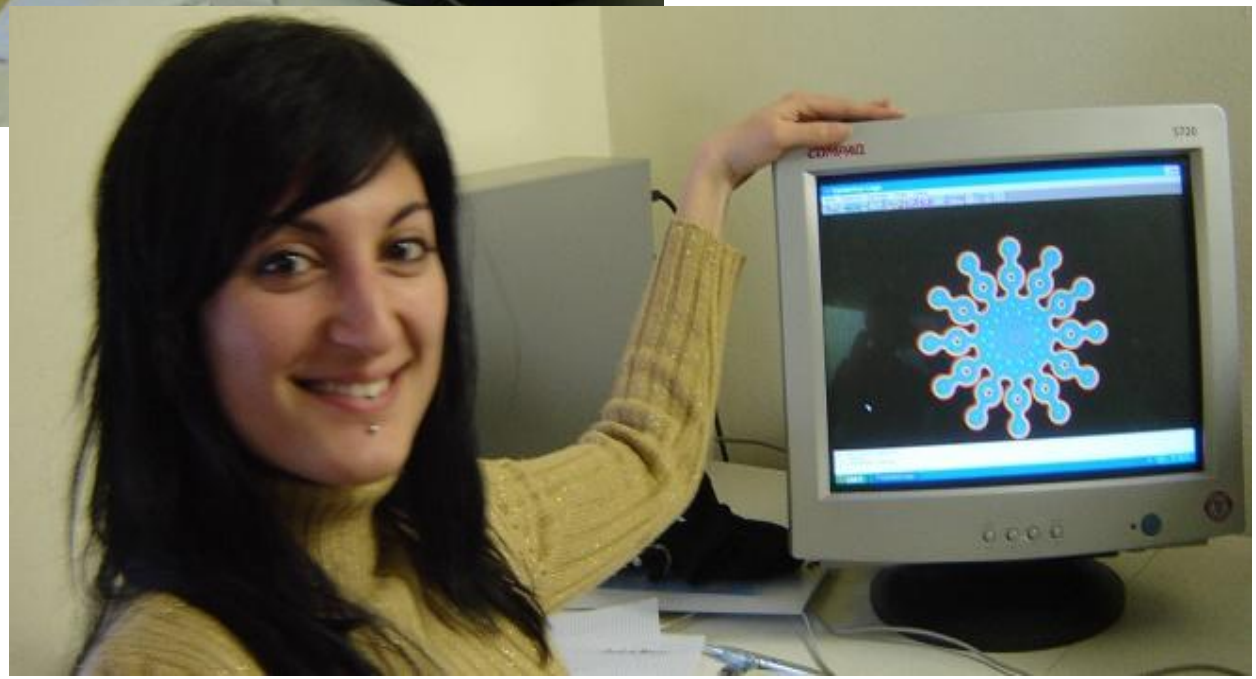
Explore the rotational dynamic constructions by means of the sliders so as to create models similar to the pictures of rotational objects

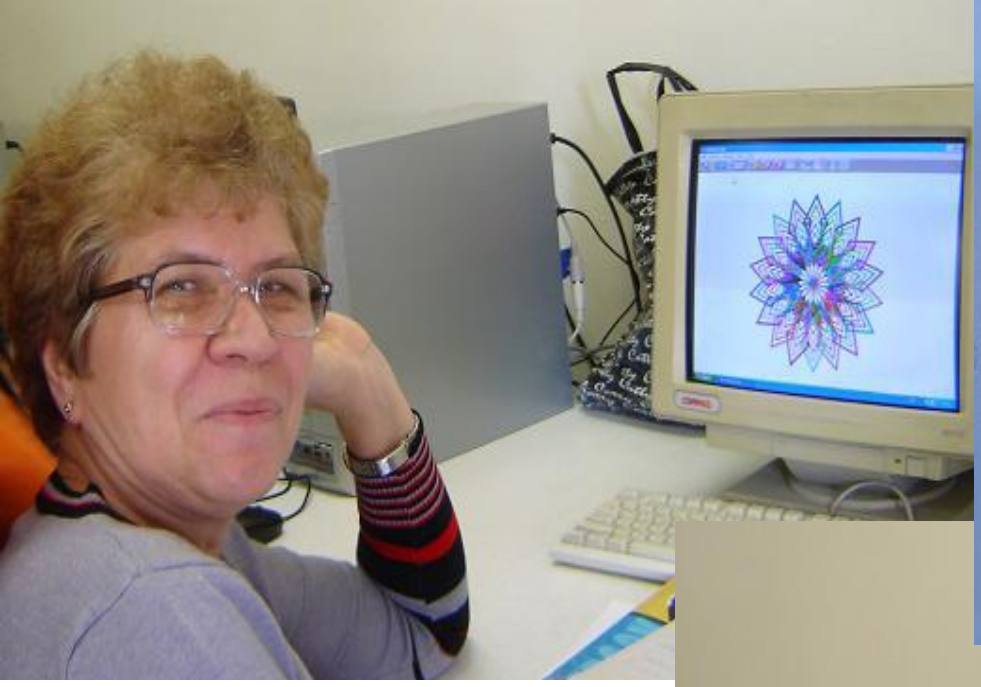


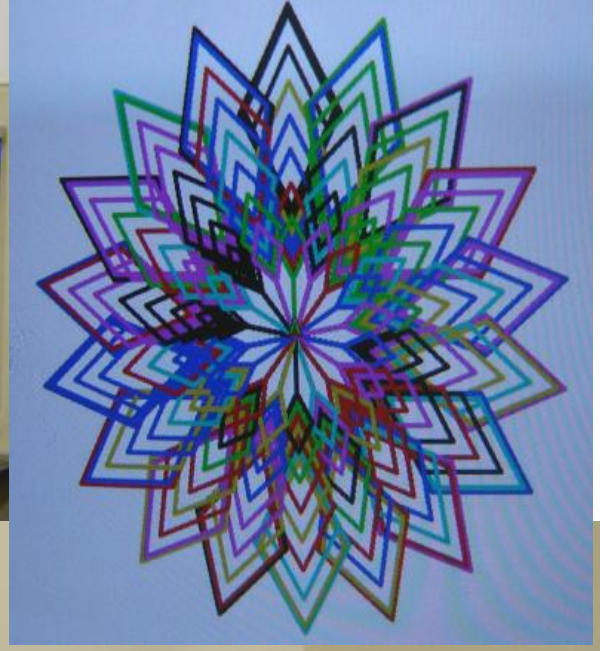


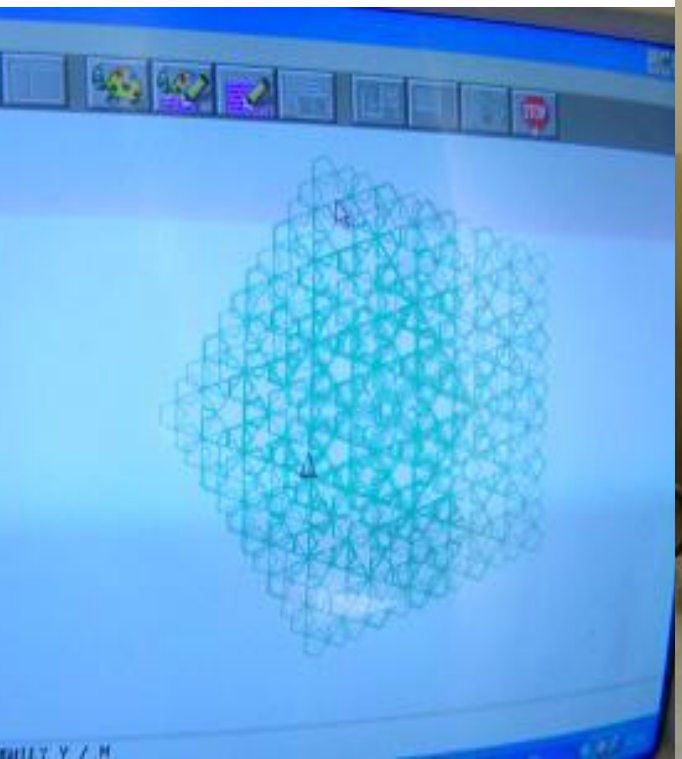


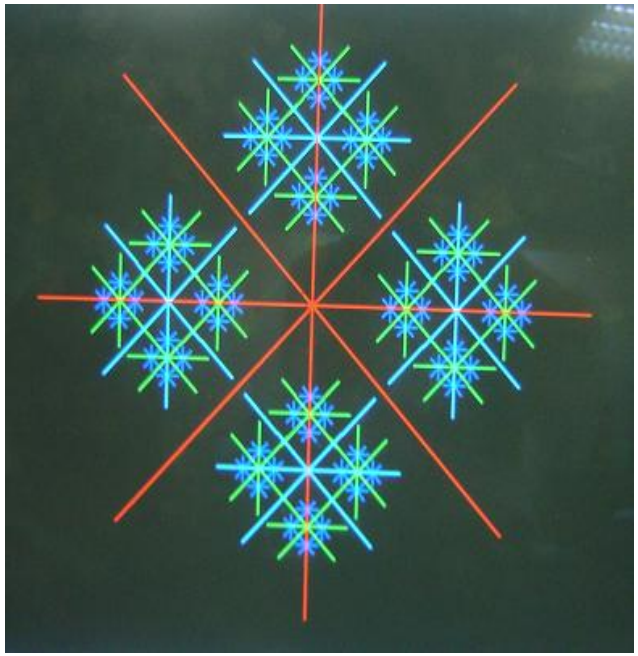


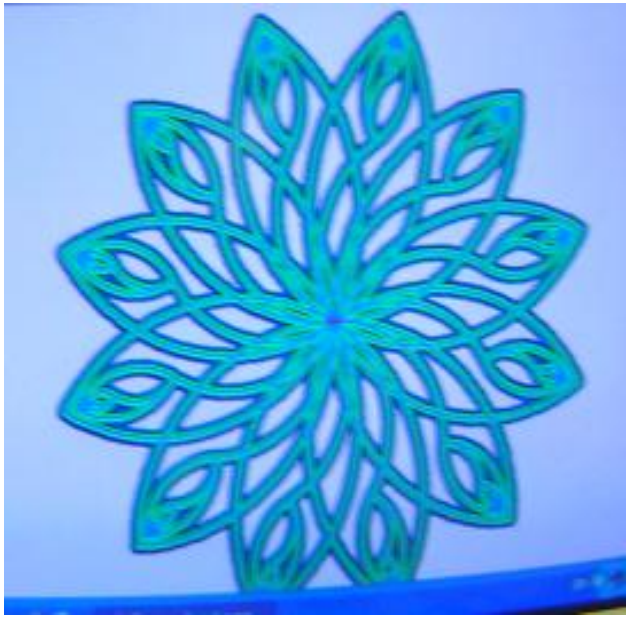


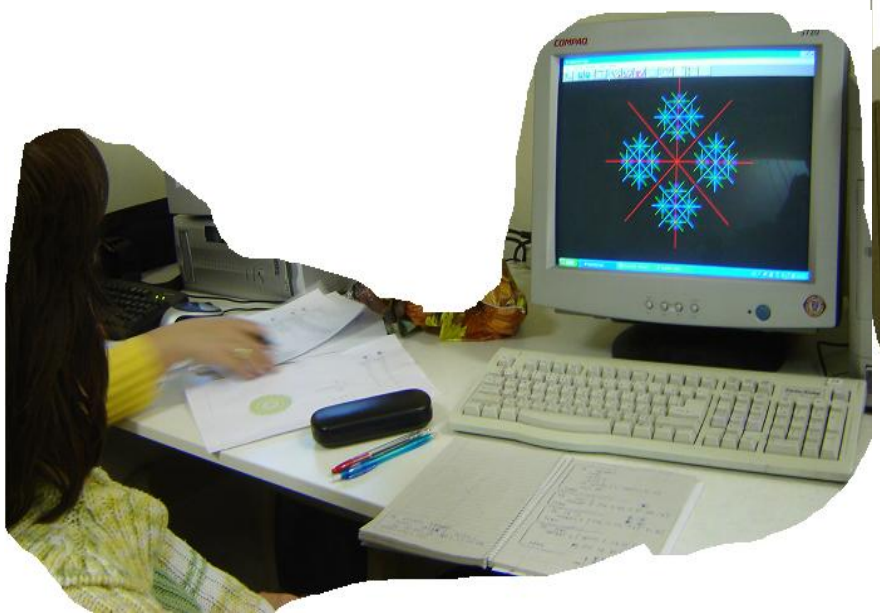


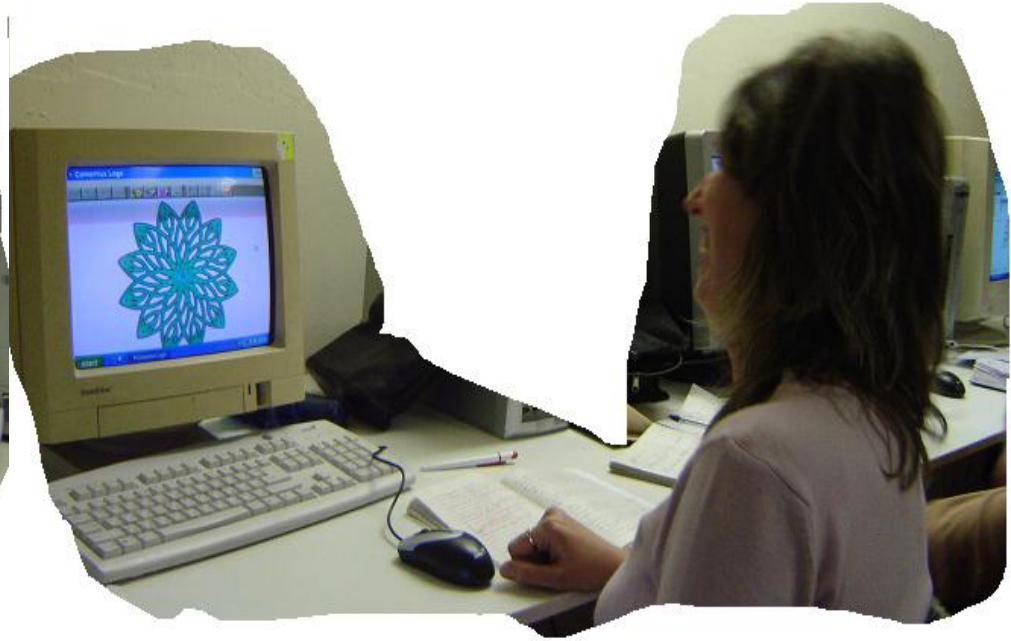










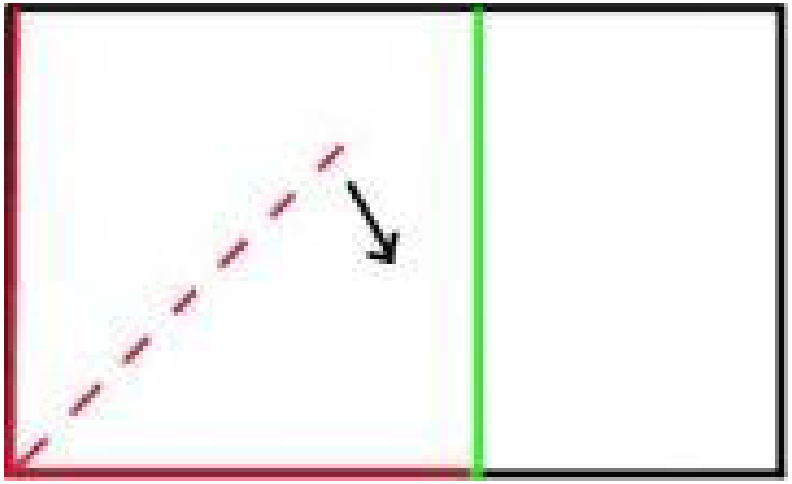


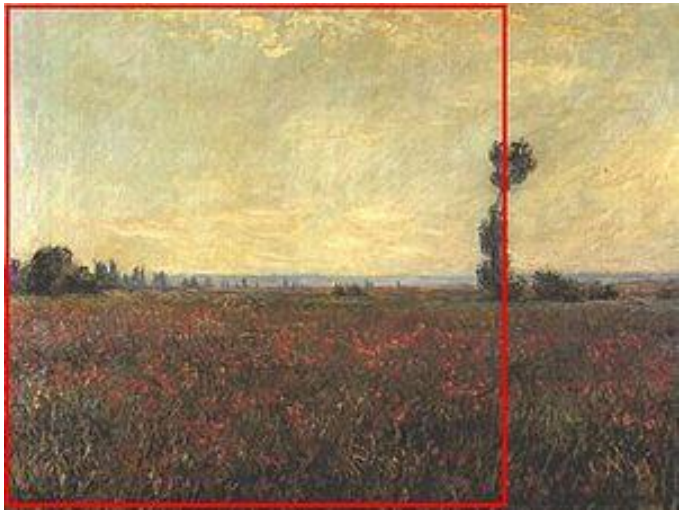
Creating dynamic composition tools in art and photography – a DynaMat scenario

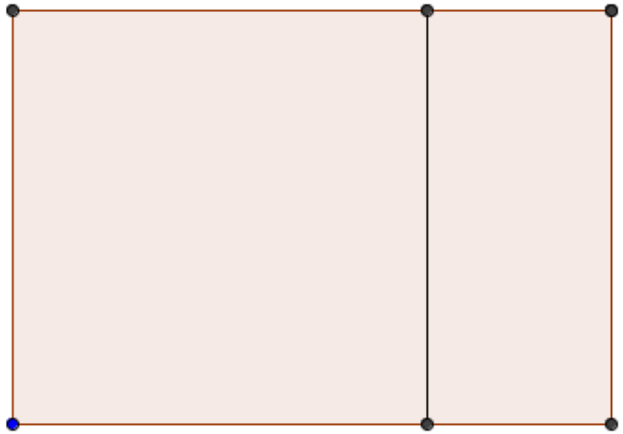
The idea behind this chapter is:

- to motivate better the study of geometry for students with interests in art by revealing for them the strong relation between the esthetics of an artistic compositions and some geometric principles;
- To consider several methods for studying and creating compositions in art
- To create dynamic consturctions (in GeoGebra) for implementing these methods

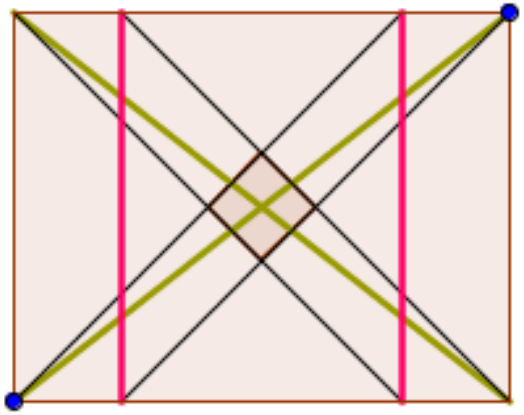
Geometric constructions as an exploratory tool in art

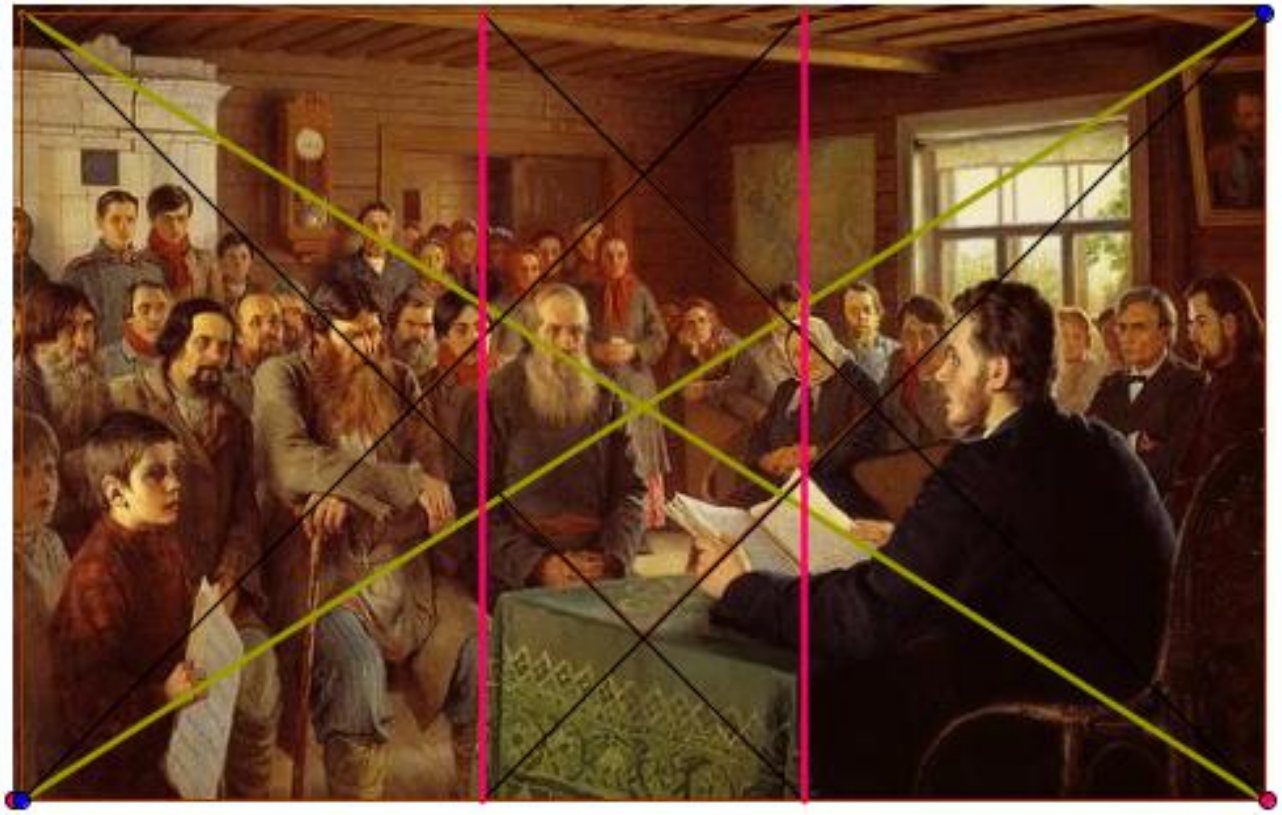




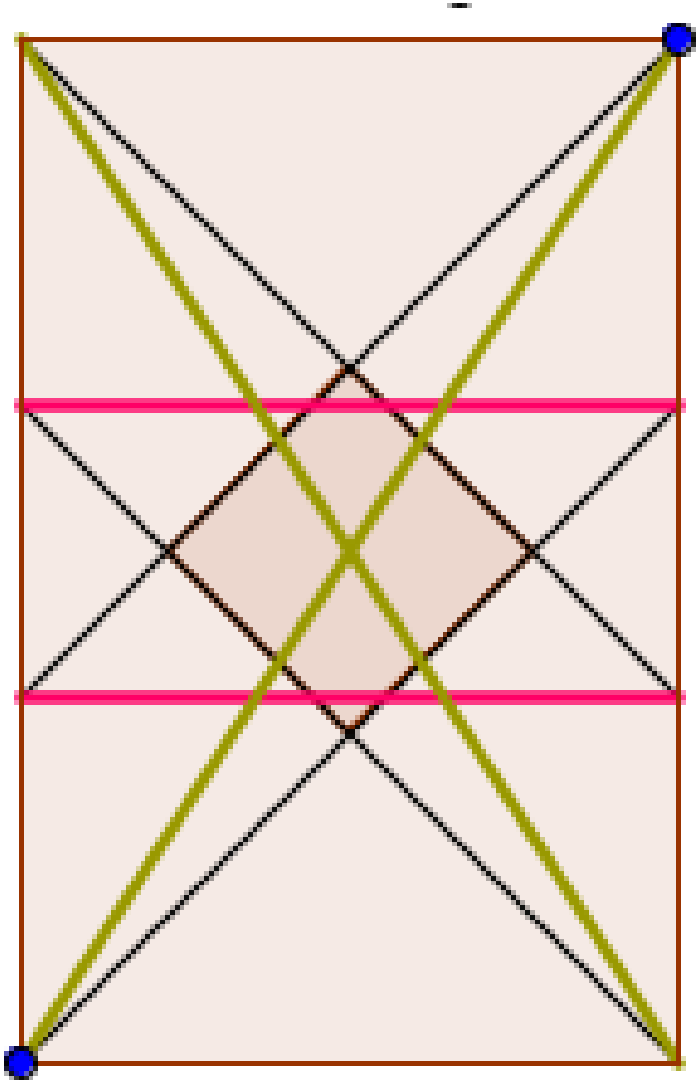


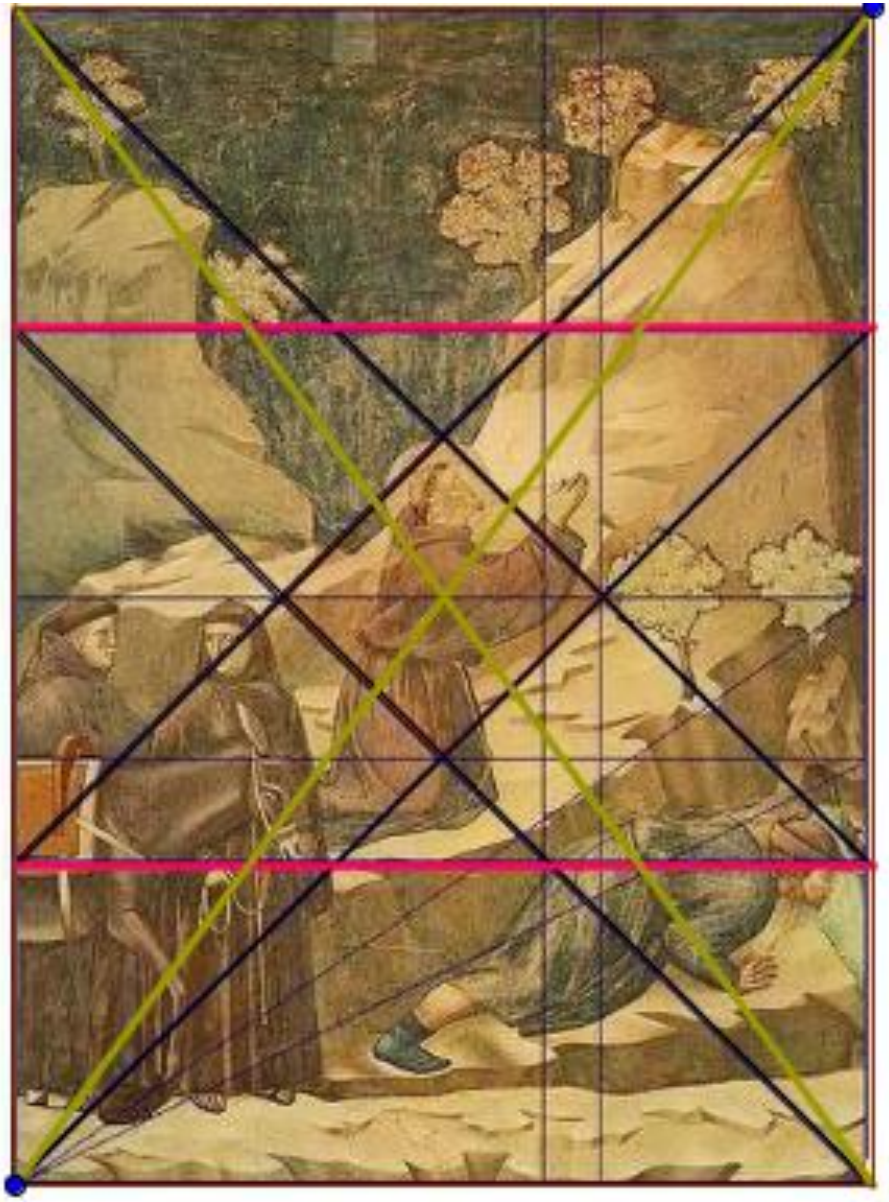
Rabatment with diagonals





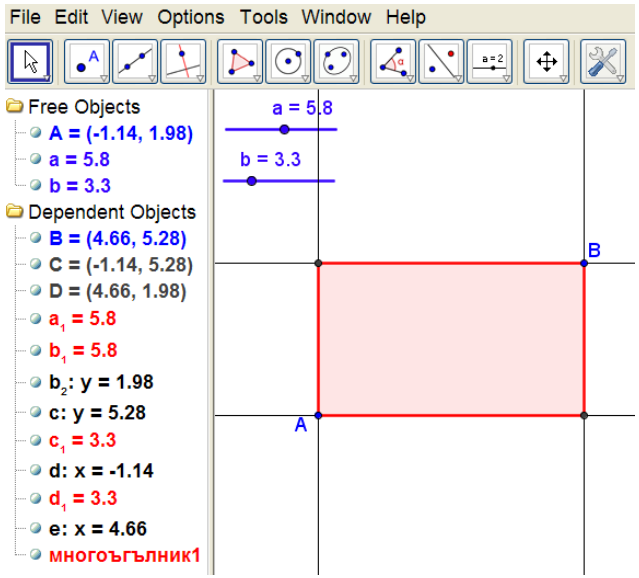
Rabatment

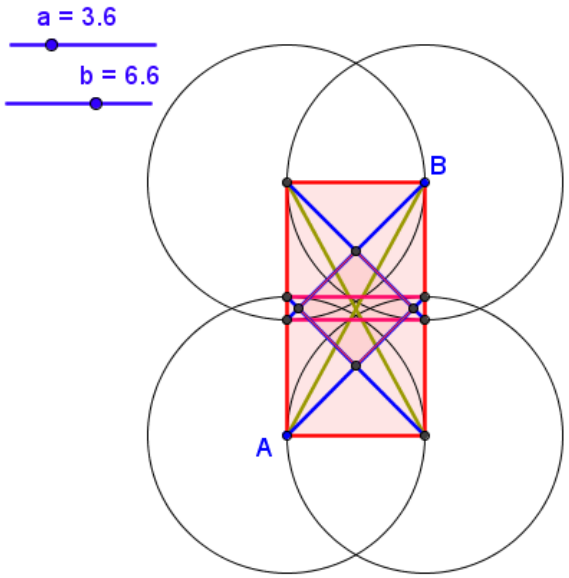


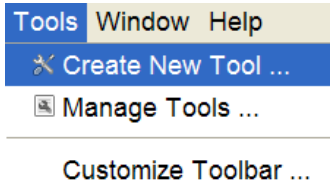


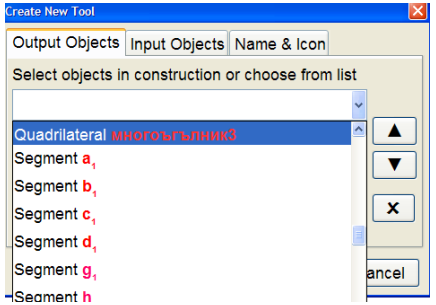
Creating a Rabatment button (in GeoGebra)

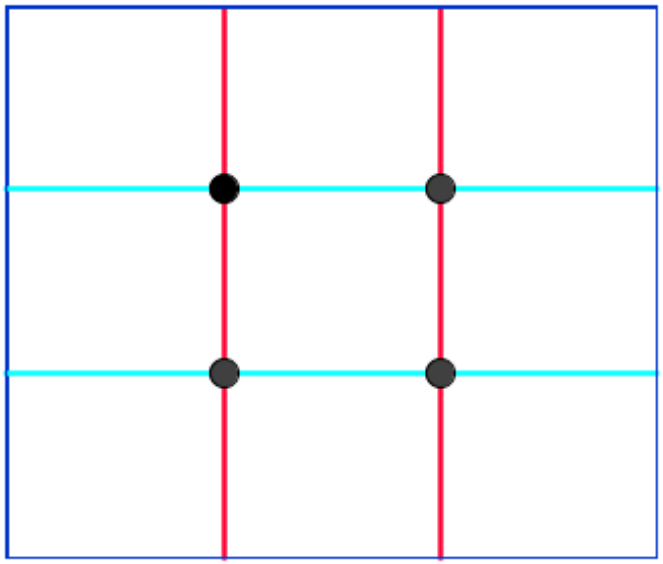
Step-by-step description of the process



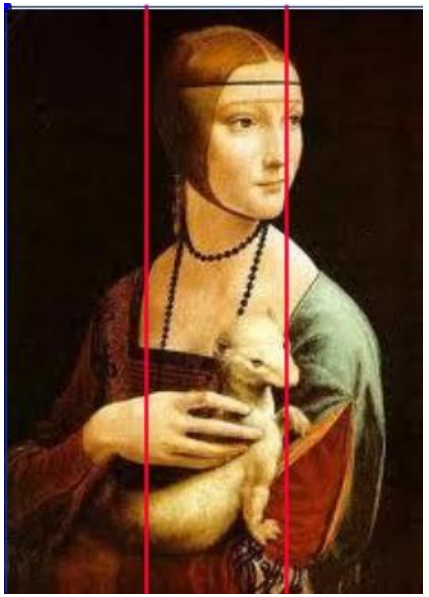


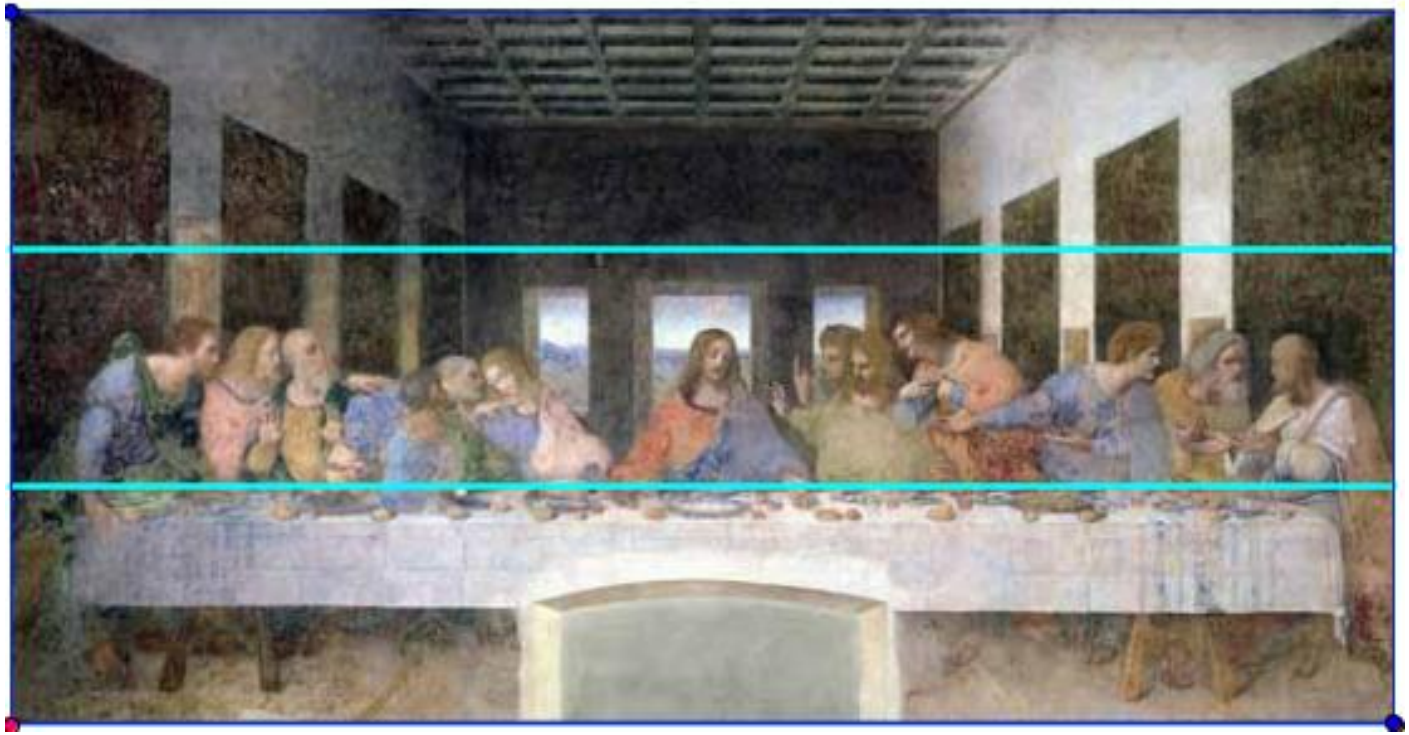


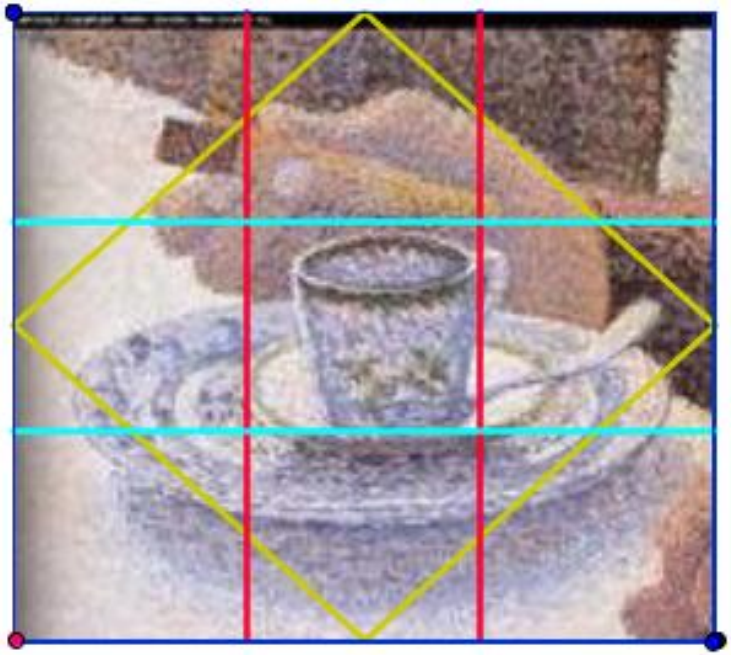


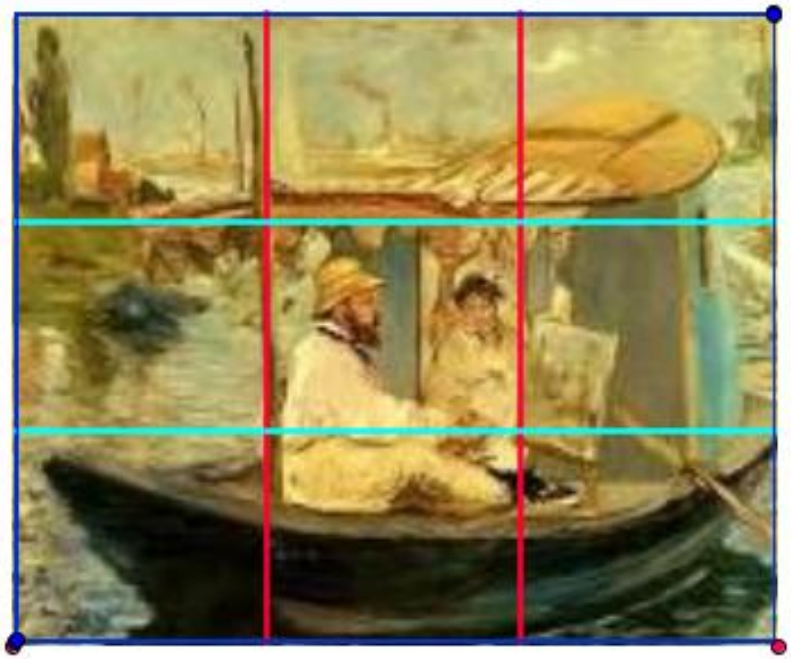


The rule of thirds

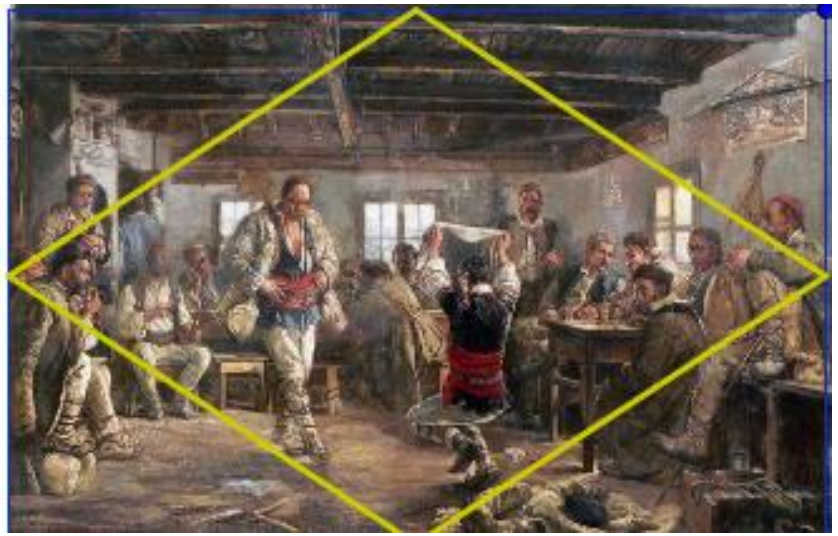


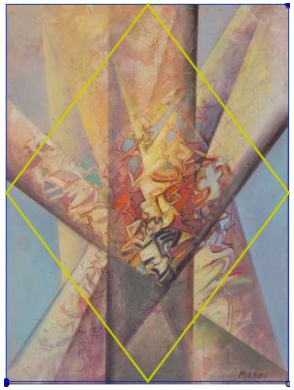


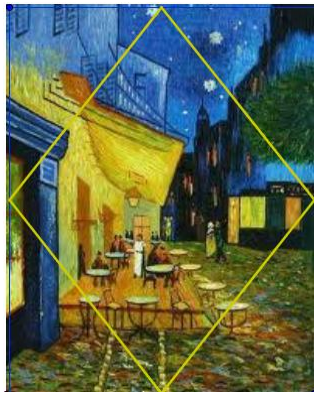


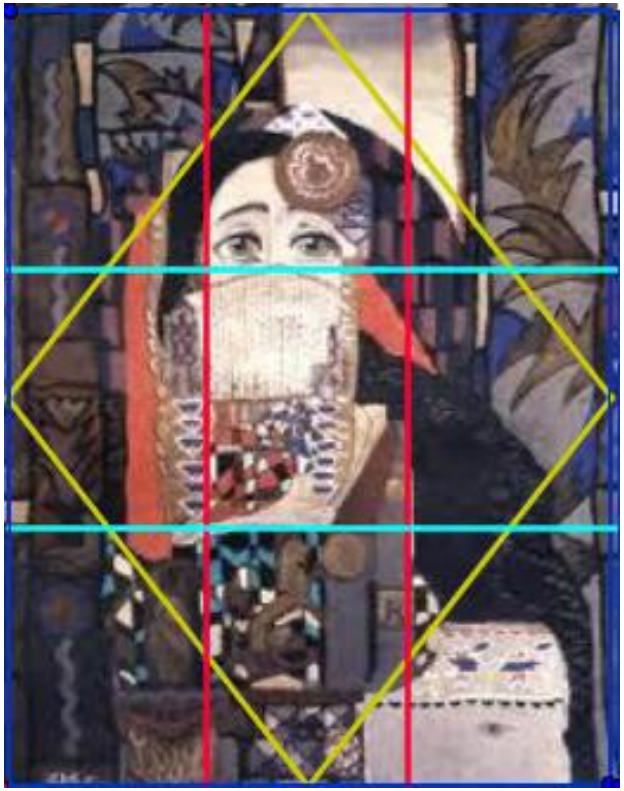


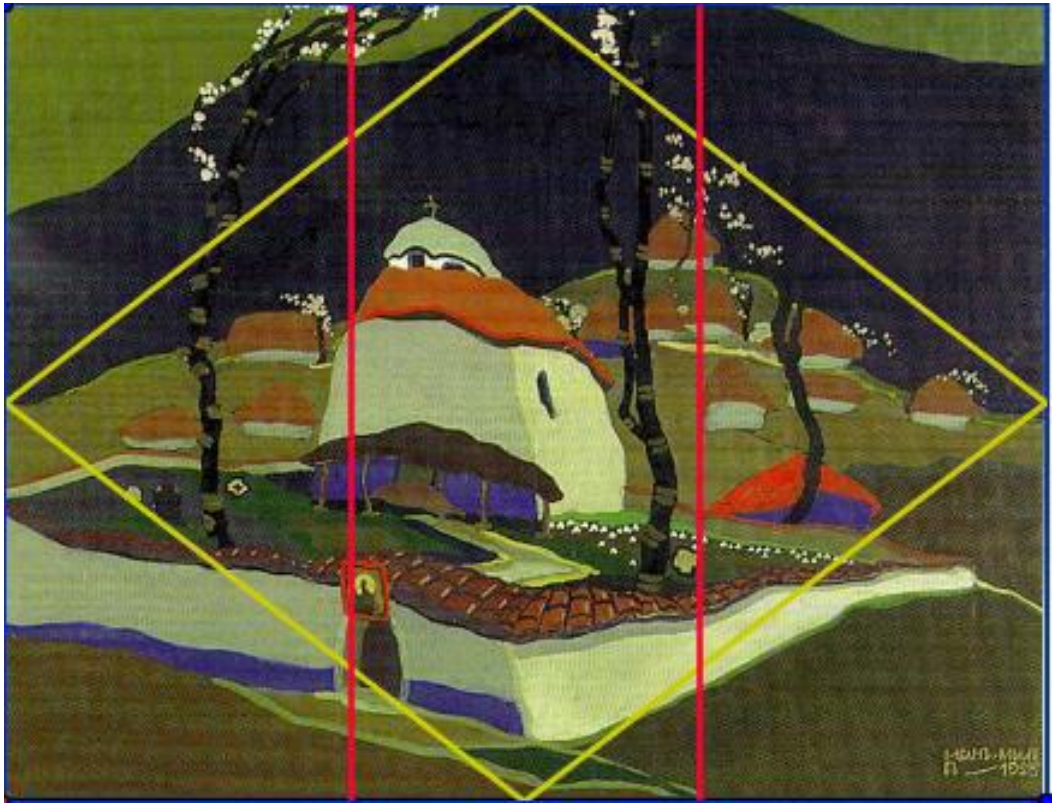
Rhombus



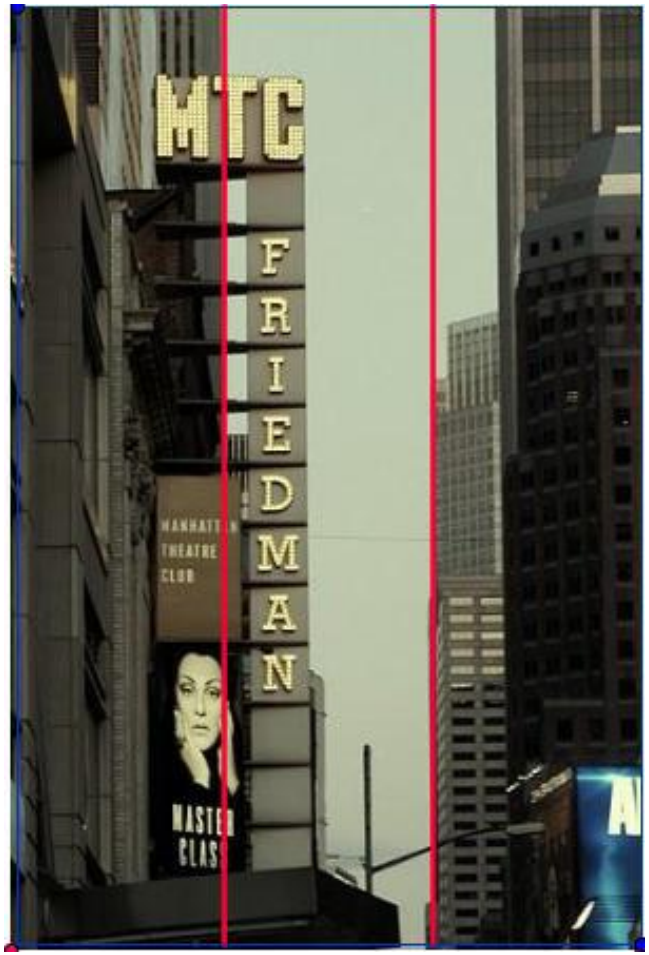




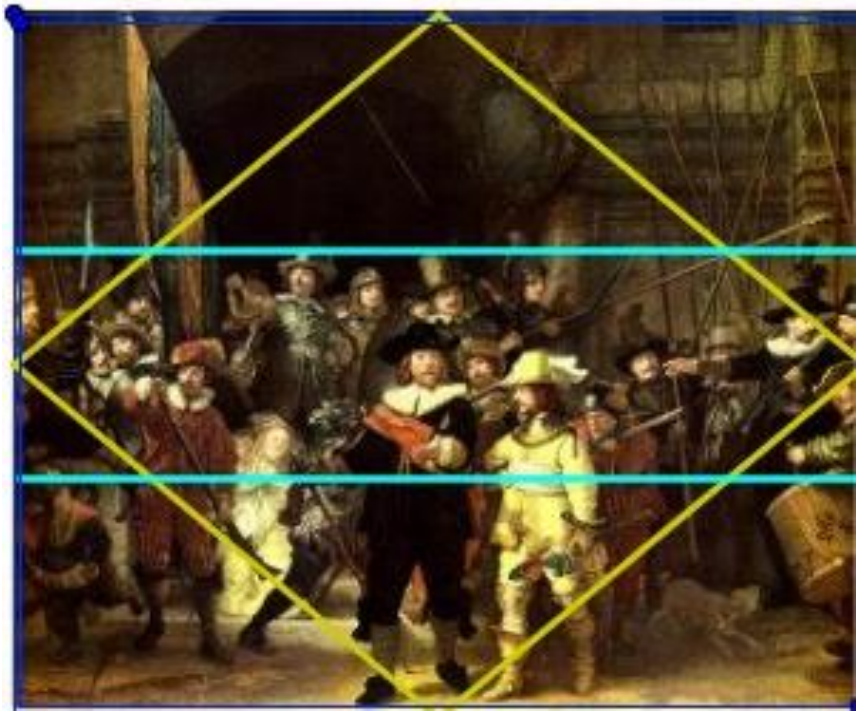


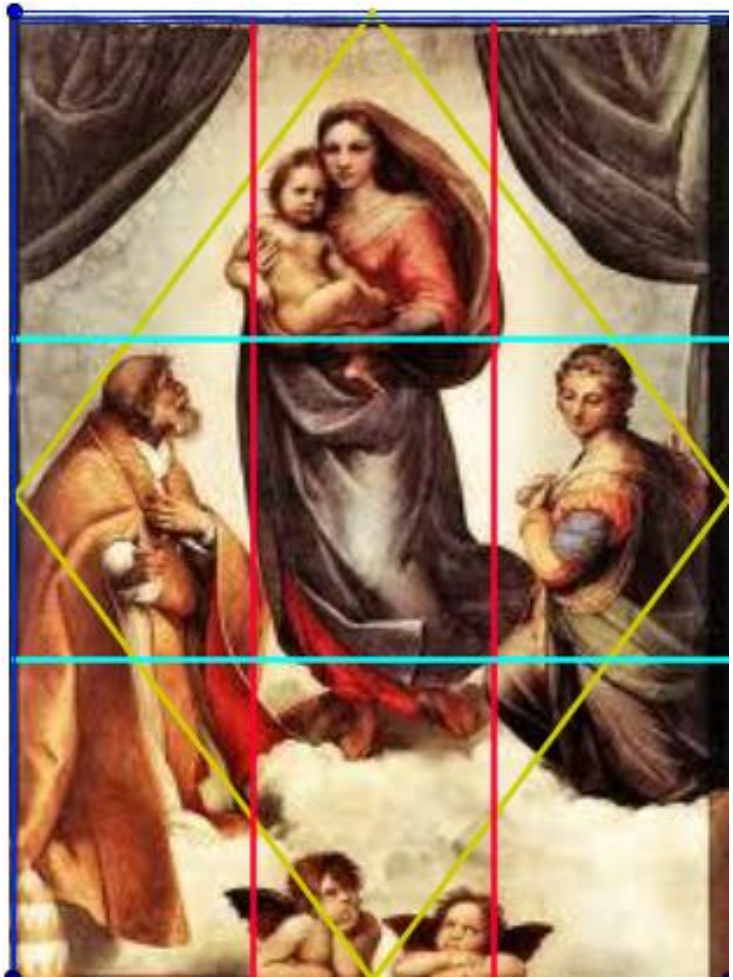


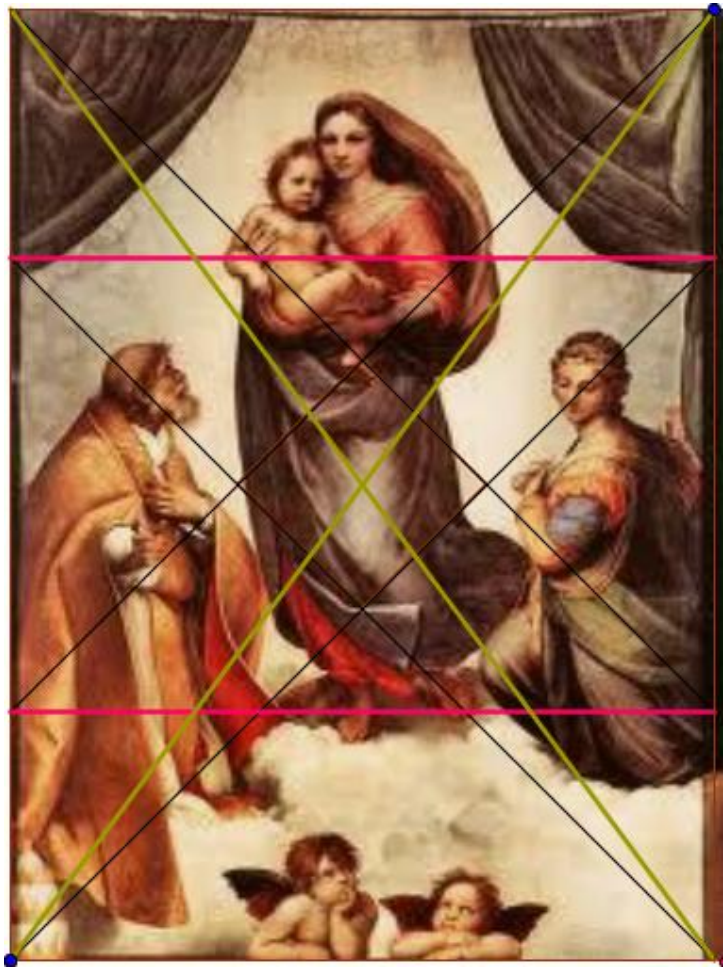
In photography



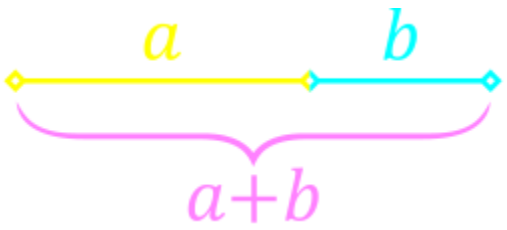
Combining the methods

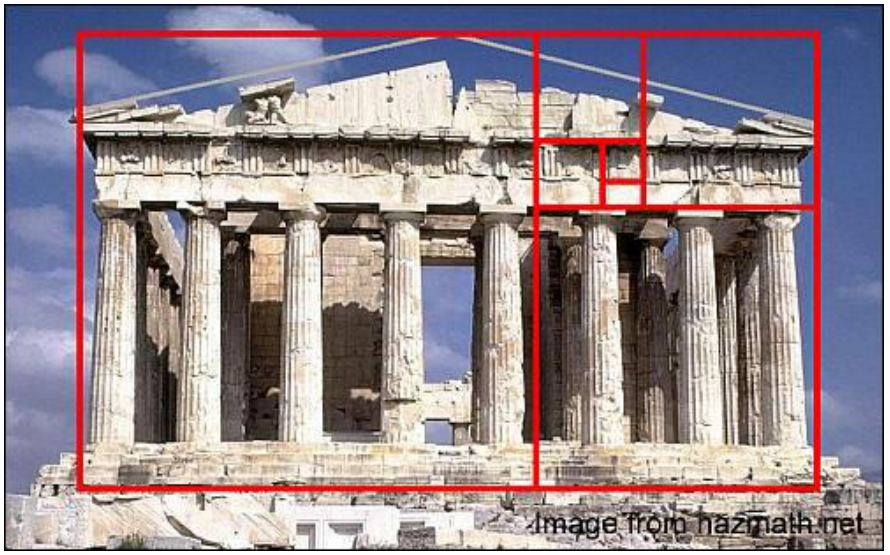


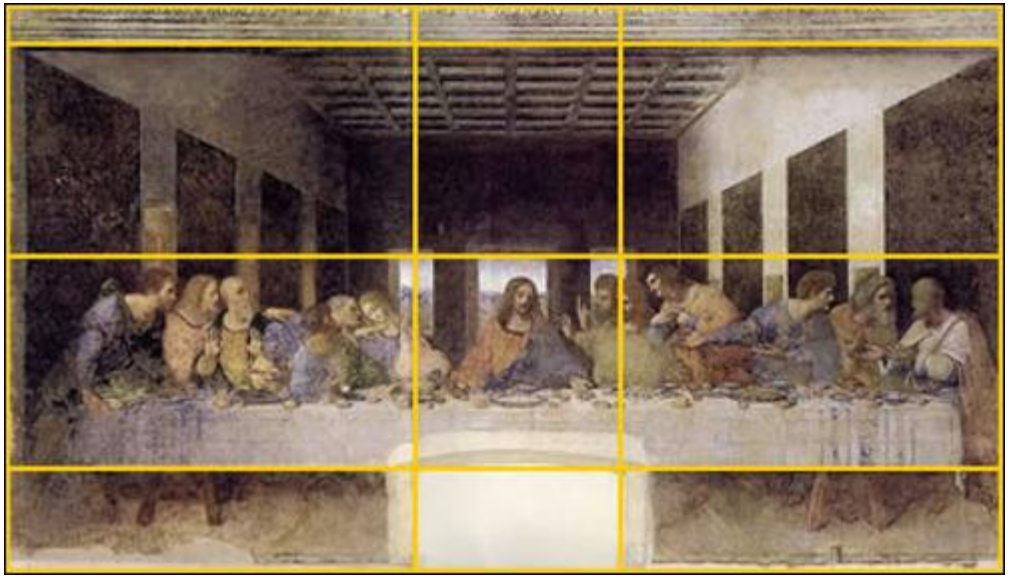




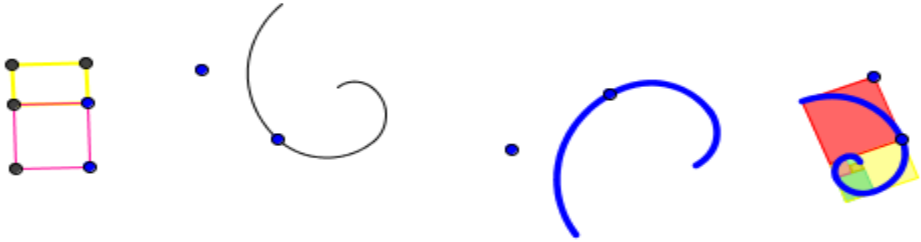
The golden section in art

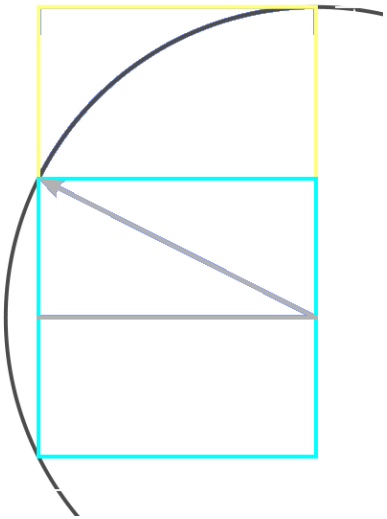


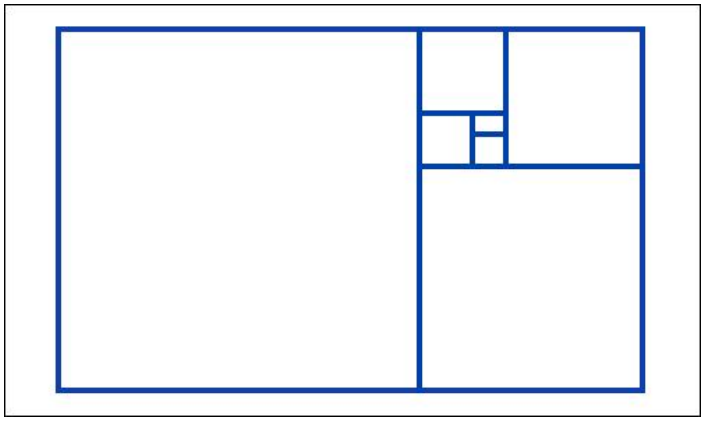


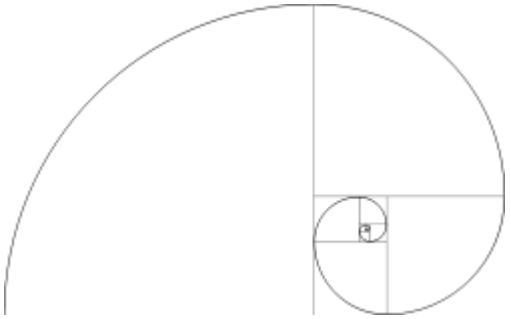


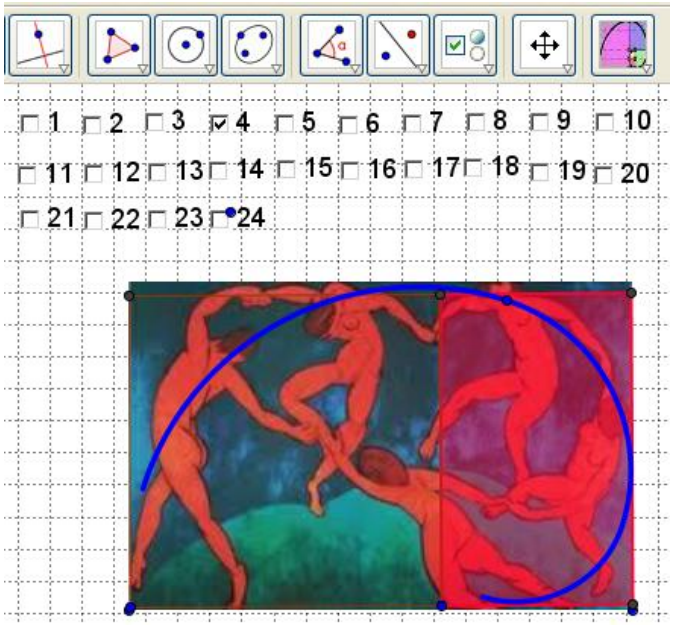
“Golden” buttons in GG







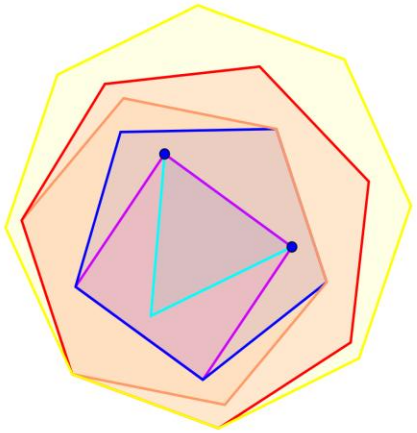




Dynamic mini-projects

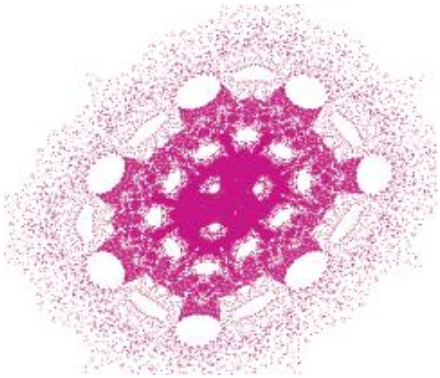
1. Arrange for a picture in two ways (according to two methods for composition):
   - 6 persons at a birthday party sitting around a round table
   - a class of 24 pupils and their teacher
   - flowers and fruits
   - perfumes and an advertisement

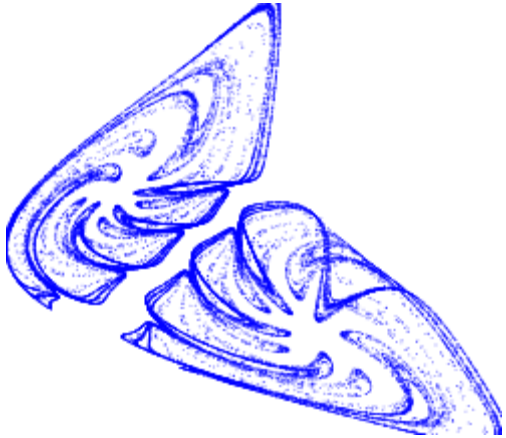
Explore the result with dynamic constructions and make corrections if necessary.

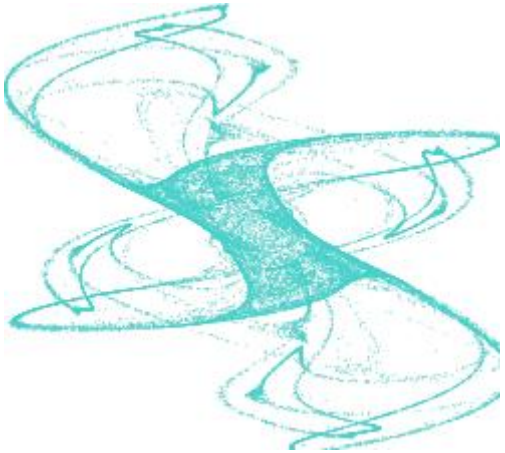


2. Create a dynamic construction in the style of the artist Max Bill

Can the equations be exciting?







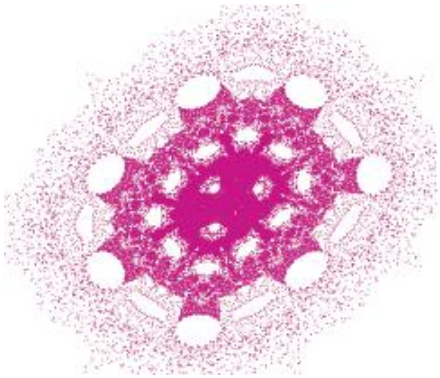
Can the equations be exciting?

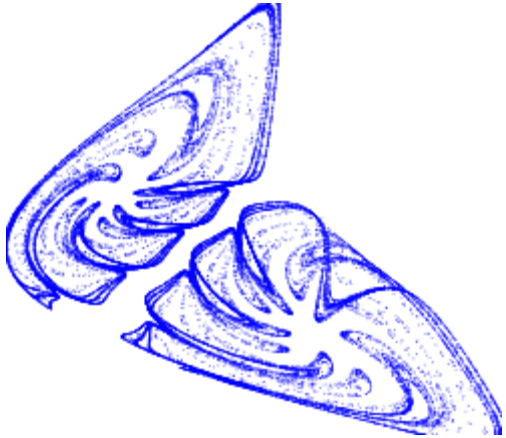
Example	Coefficient vectors a and b
7	$a = (-0.1, -0.6, 0.5, 0.2, -0.2, -0.3, -0.7, -0.8, -0.1, -0.9)$ $b = (-0.6, -0.2, 1.1, 0.6, 0.8, -0.8, -0.8, 1, 1.2, -0.8)$
8	$a = (-0.4, 0.6, 0, -0.5, 0.4, -1, -0.5, 0.3, -0.9, -0.7)$ $b = (-0.2, -0.7, -1.1, -0.2, -0.8, -1.2, -0.1, -0.4, -0.7, -0.9)$
9	$a = (0, -0.6, -0.6, 0.1, -0.9, 0.3, -0.5, 1, 0.2, 0.1)$ $b = (-0.2, -0.7, 0.4, 0.8, -0.4, -0.4, -0.5, -1.1, 0.9, 0.3)$
10	$a = (0.2, 0.9, -0.7, -0.2, 1, -0.2, -0.8, -0.4, -1.1, 0.3)$ $b = (-0.6, 0.1, 1.2, 0.3, 0.9, -0.2, 1, -1, 1.2, 0.8)$

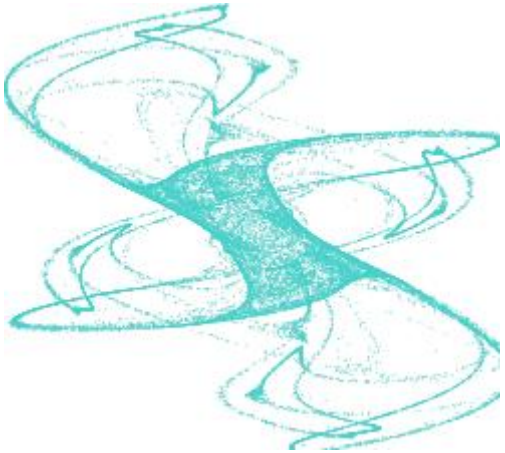
$$
\begin{aligned}
x_{n+1} &= a_1 + a_2 x_n + a_3 x_n^2 + a_4 x_n^3 + a_5 x_n^2 y_n + a_6 x_n y_n + a_7 x_n y_n^2 + a_8 y_n + a_9 y_n^2 + a_{10} y_n^3 \\
y_{n+1} &= b_1 + b_2 x_n + b_3 x_n^2 + b_4 x_n^3 + b_5 x_n^2 y_n + b_6 x_n y_n + b_7 x_n y_n^2 + b_8 y_n + b_9 y_n^2 + b_{10} y_n^3 \\
& \quad n = 0, 1, 2, \ldots
\end{aligned}
$$

$$
\begin{aligned}
x_{n+1} &= y_n - sign\,(x_n)\sqrt{|bx_n - c|} \\
y_{n+1} &= a - x_n, \quad n = 0, 1, 2, \ldots; \quad x_0 = y_0 = 0.1
\end{aligned}
$$

Judge for yourselves







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