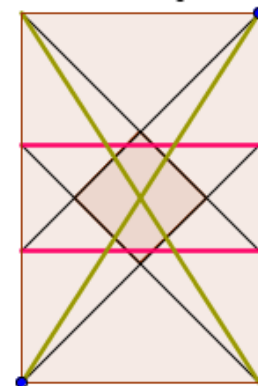


DynaMAT
DynaMAT



Dynamising the Mathematics Classes with Art Ideas

Jenny Sendova
representing the BG team



*Seeing is not as simple
as it looks*
Ad Reinhardt

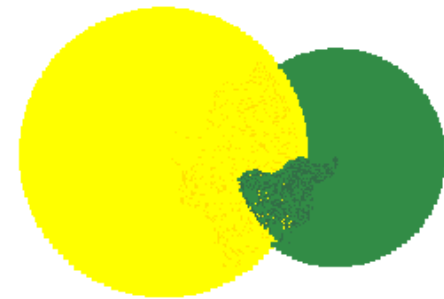
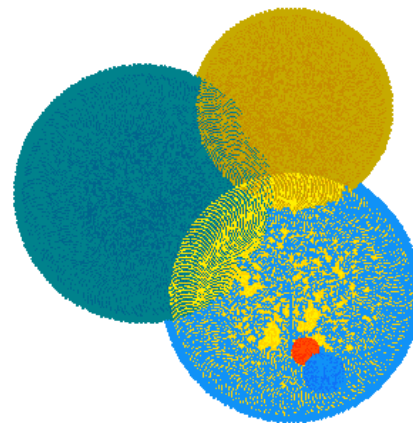
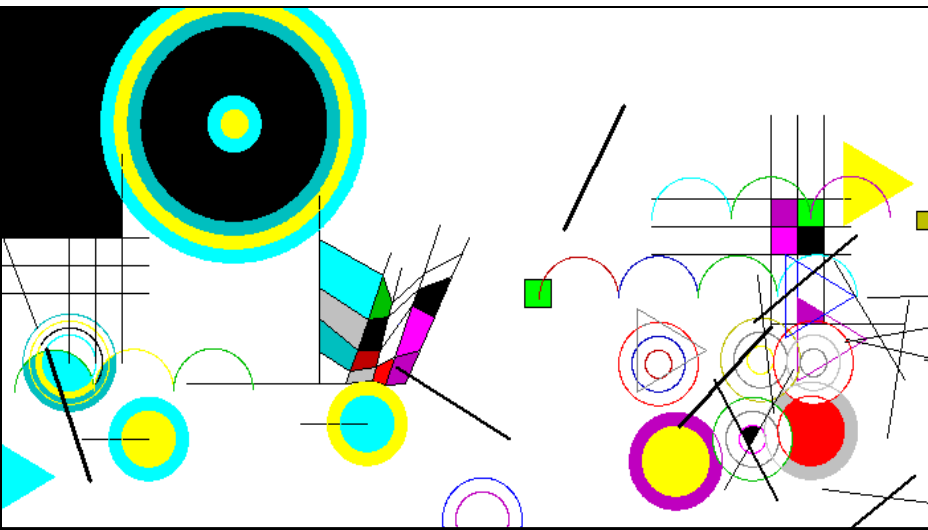
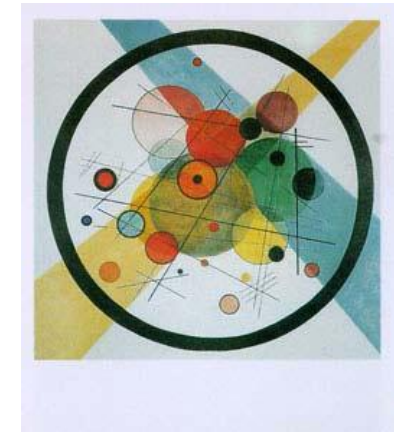


Visual Modeling

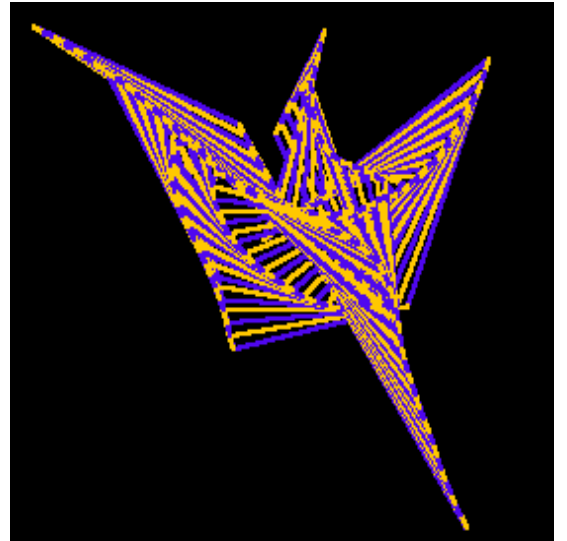
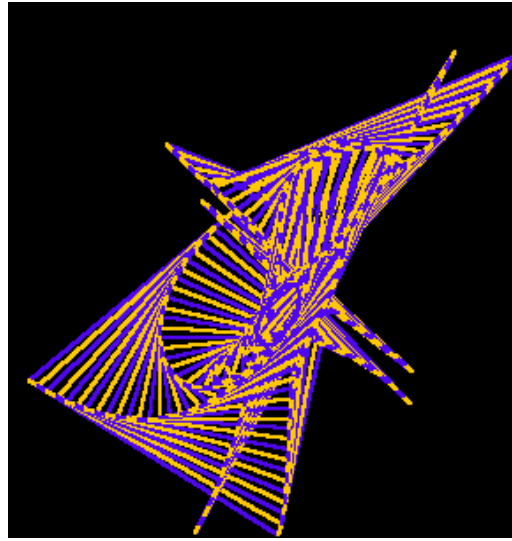
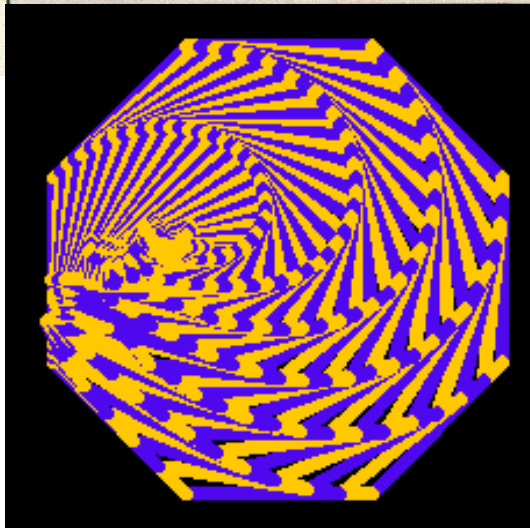
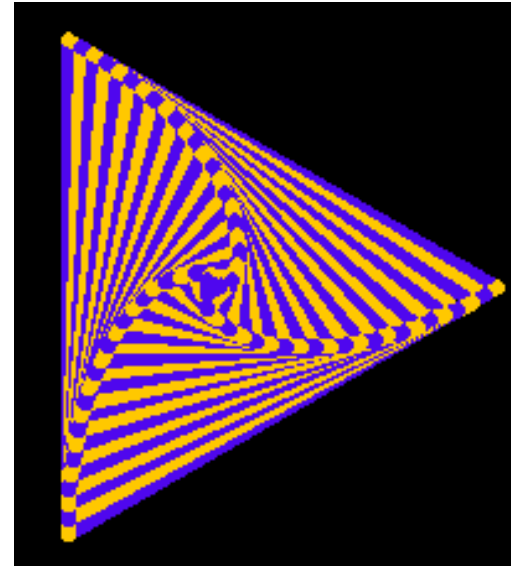
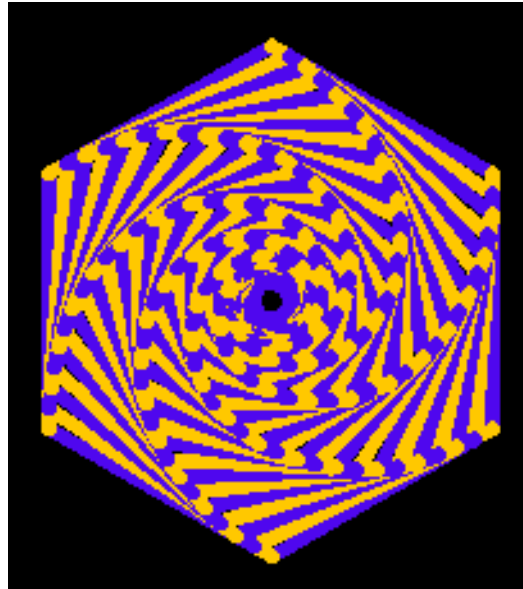
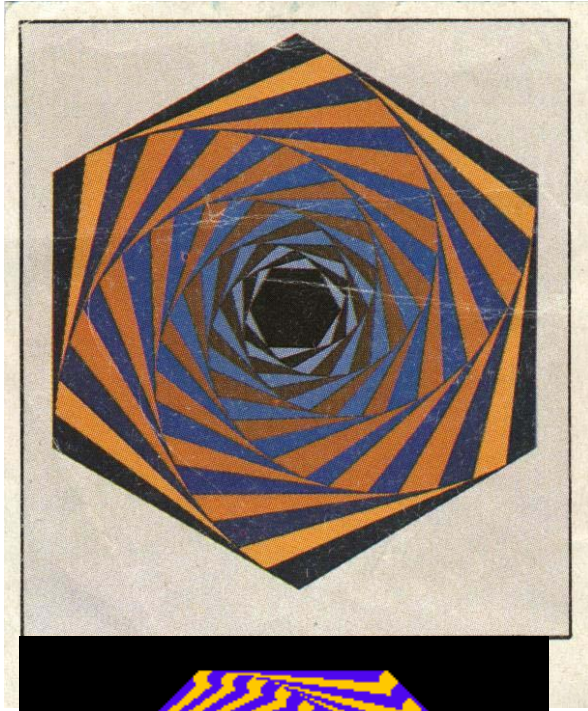
Integrating the classes in mathematics, informatics, arts and ICT in the style of constructionism and inquiry based learning

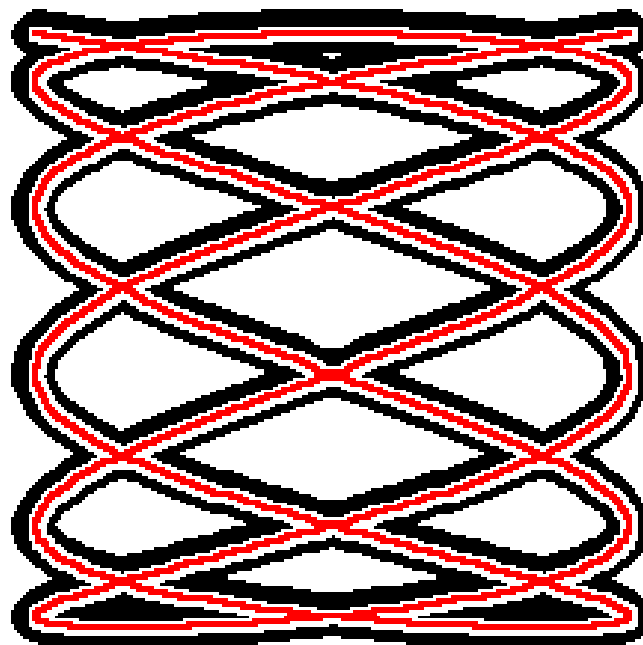
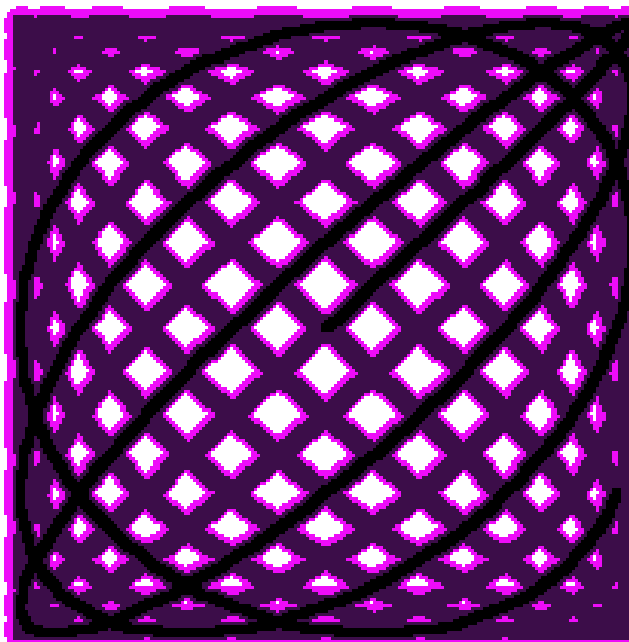
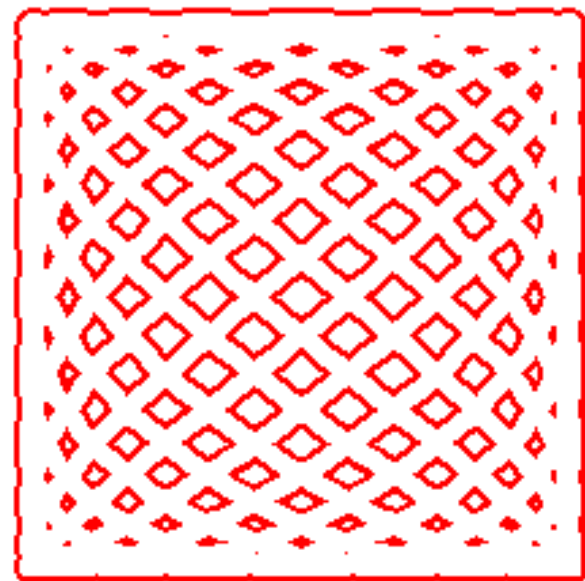
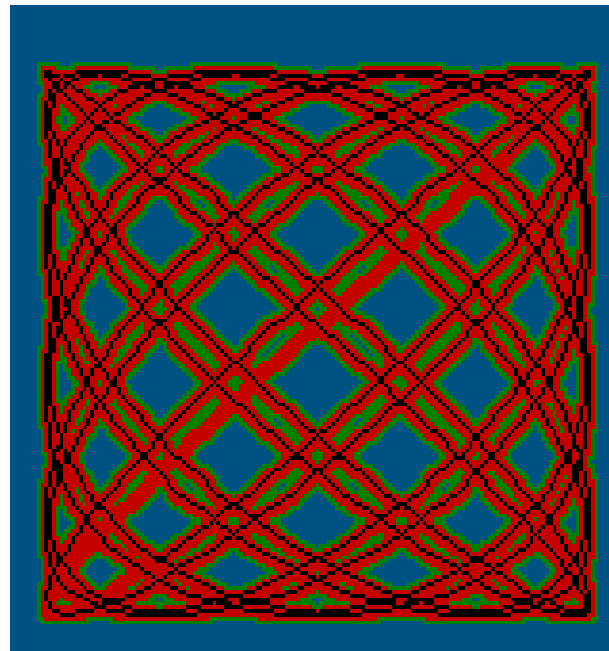
In teacher education
(pre-service)

In the style of Kandinski

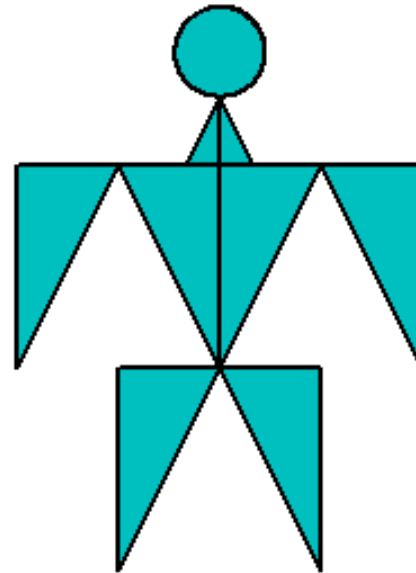
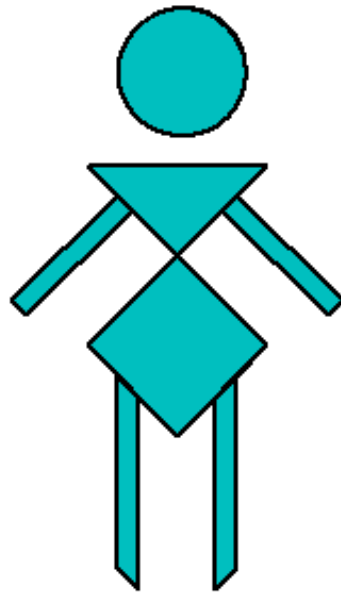


A la Vasarely

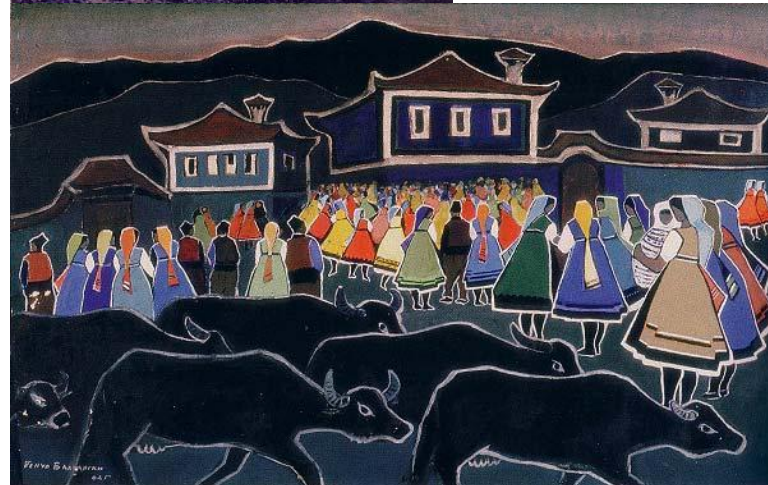
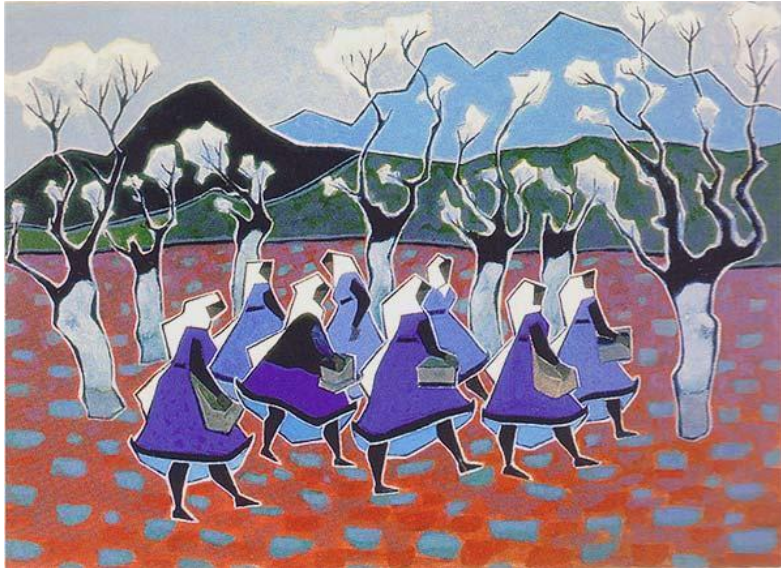




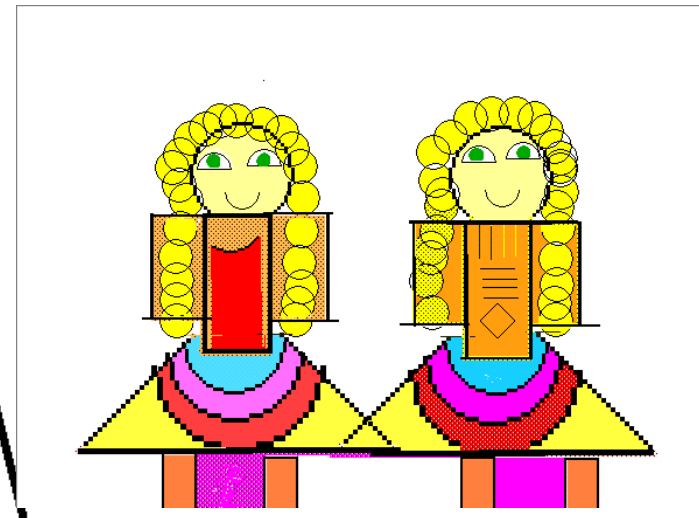
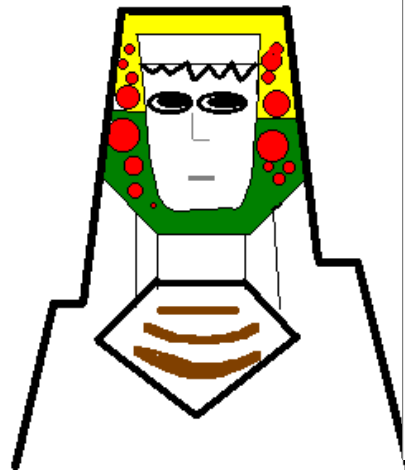
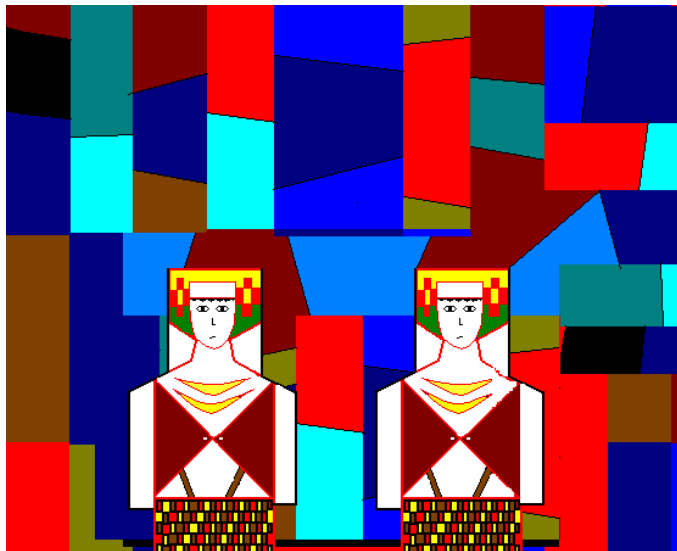
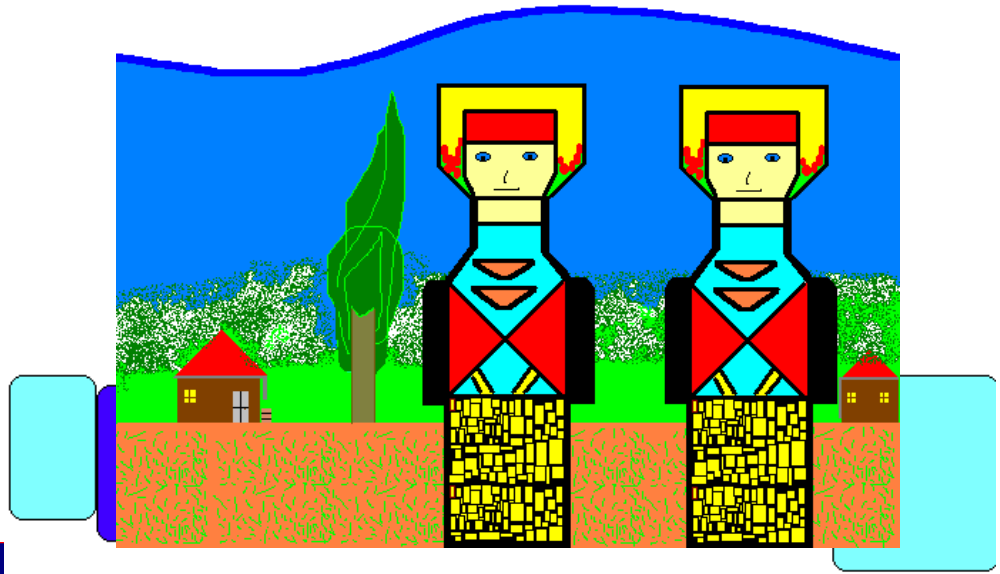
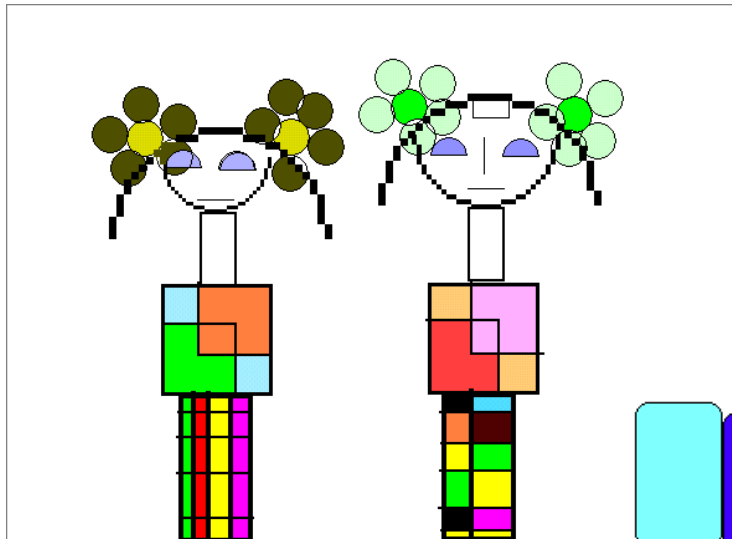
Create a “person” by geometric figures



Pencho Balkanski



A la Pencho Balkanski



A la Pencho Balkanski

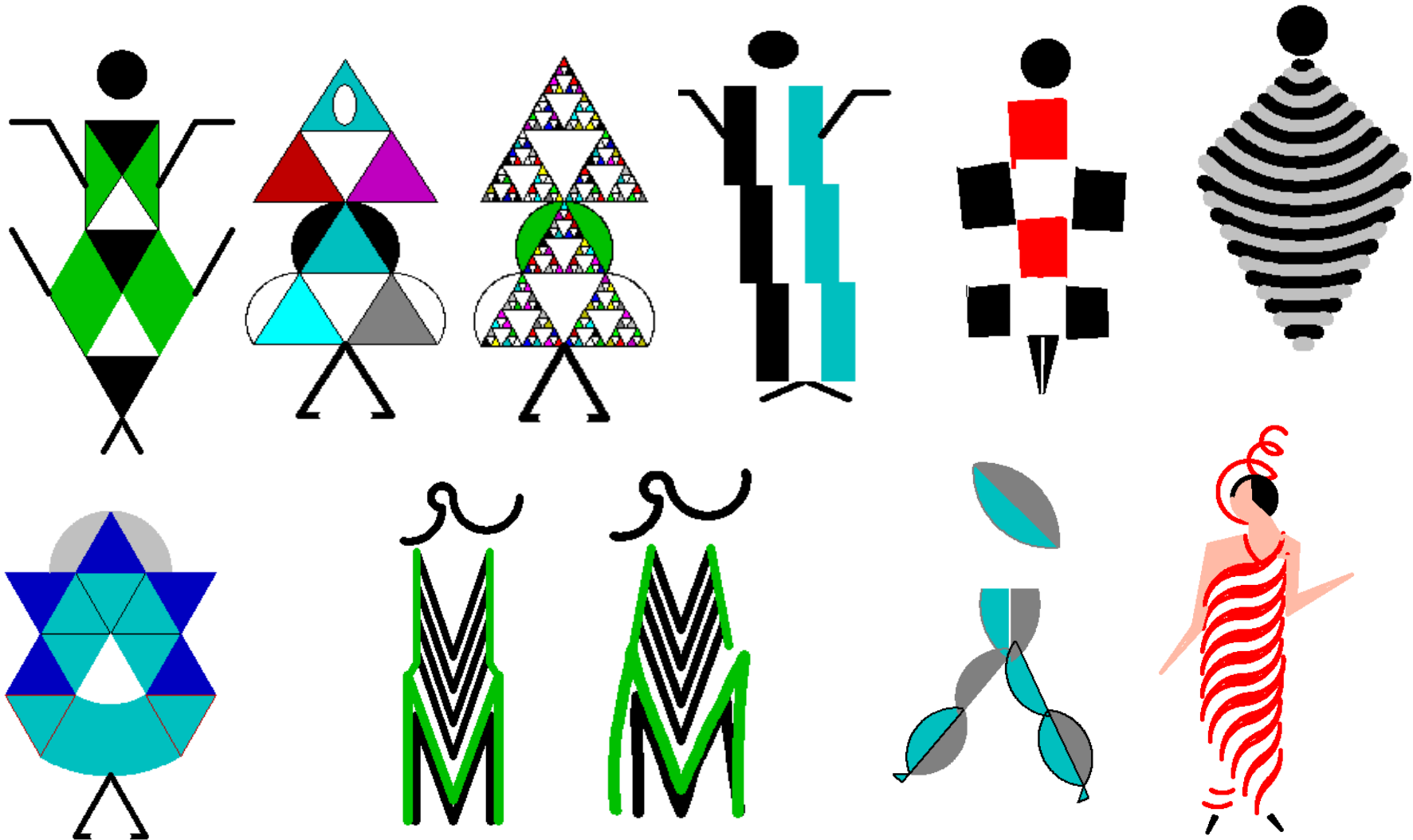


In the style of Sonia Delaunay

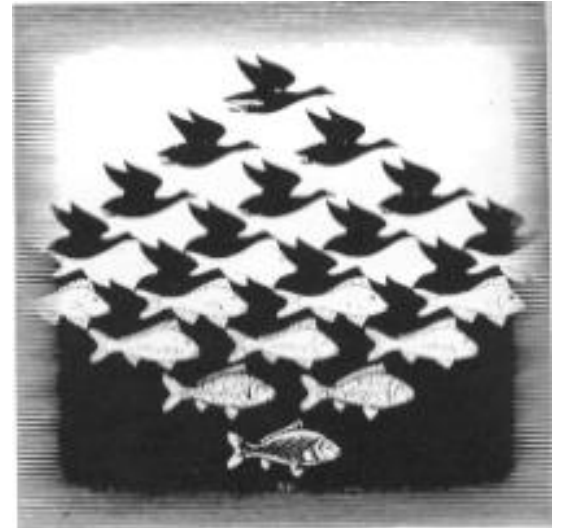
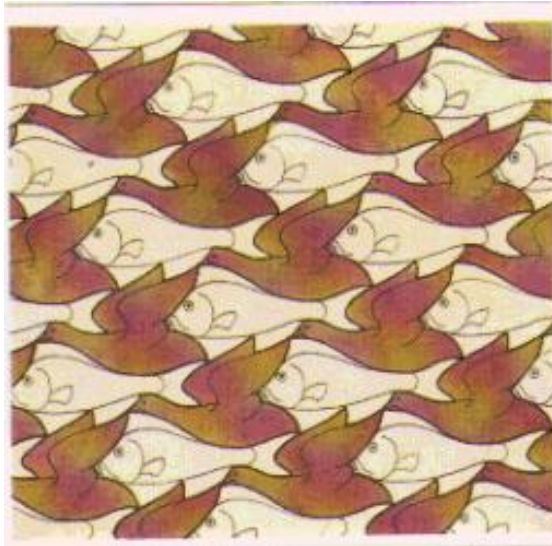


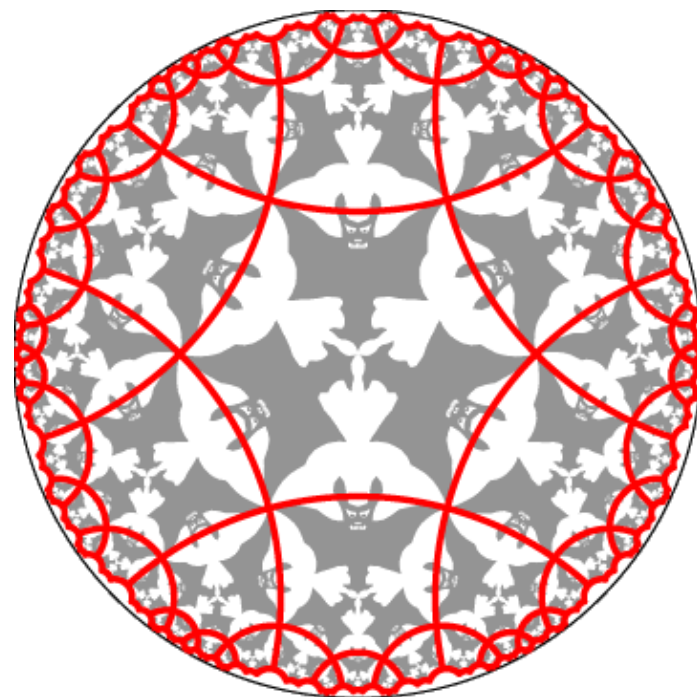
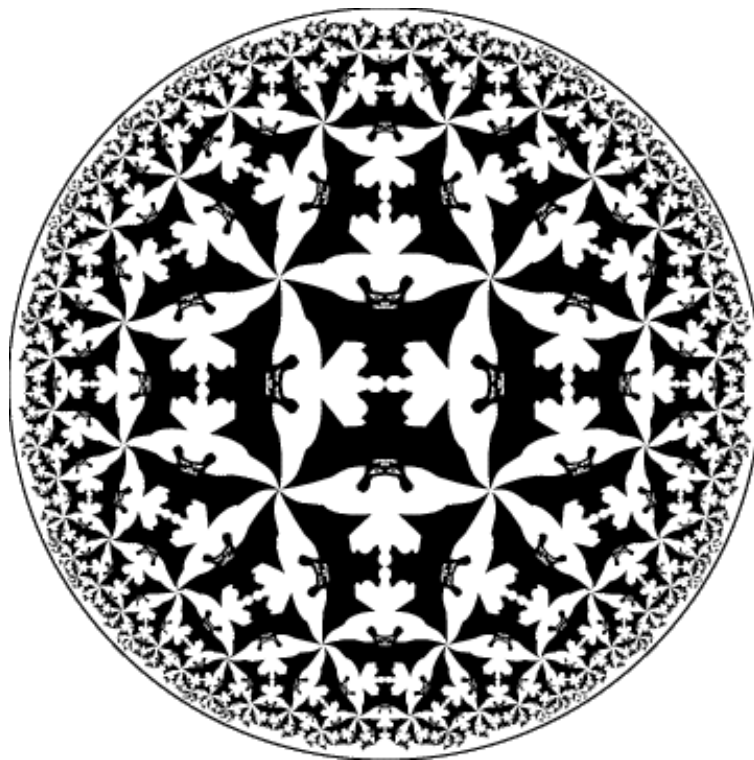
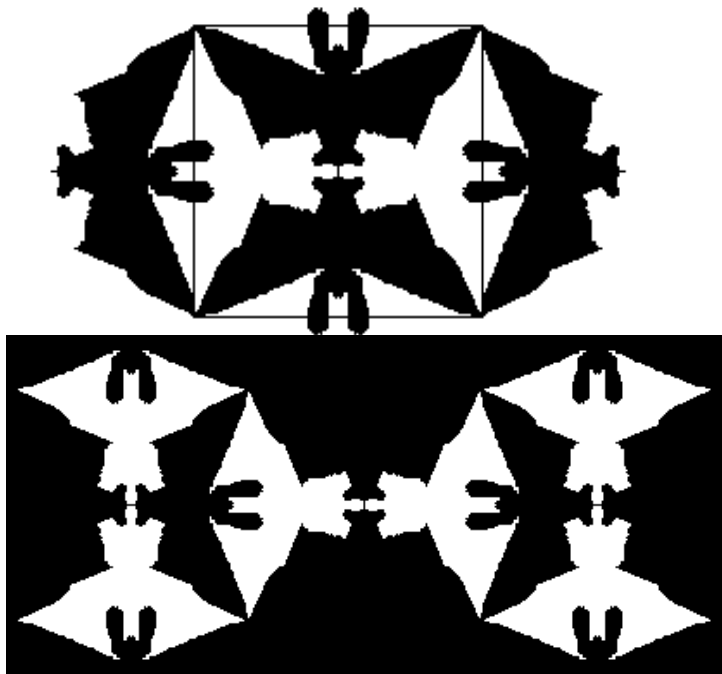
Robert and Maurine Rothschild Collection

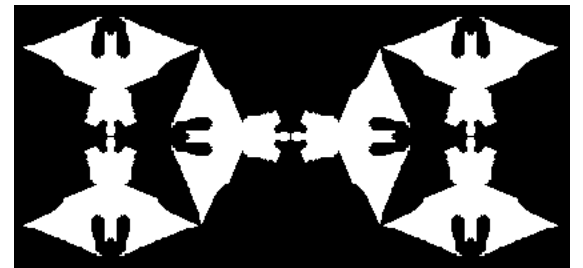
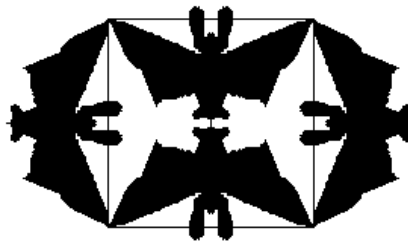
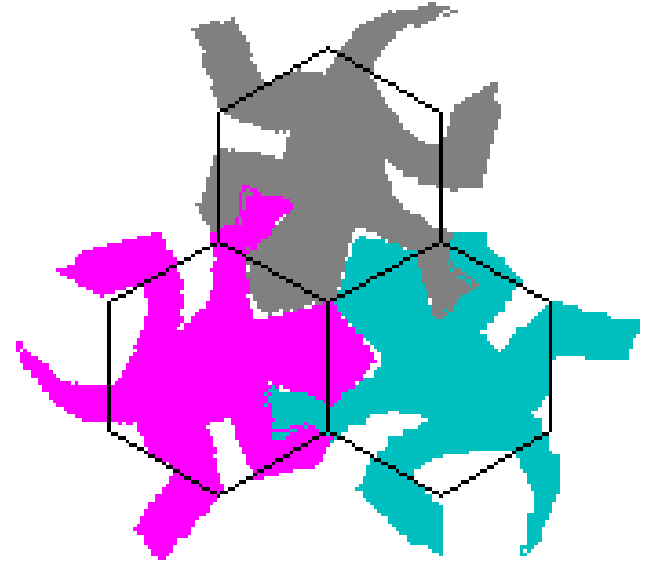
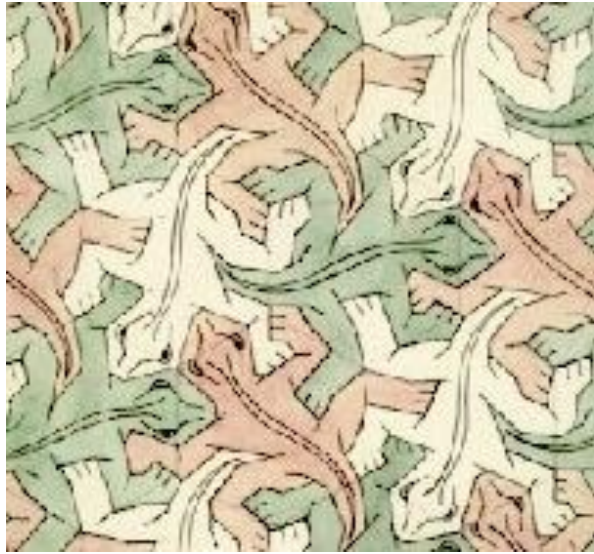
Computer variations of Sonia Delaunay's models



In the style of Escher







Tessellations



Ideas in practice

...и с различни графични елементи, можете да ги поставите – **Align** да означите посоките на позицията (Order) или да ги групирате (Group) и отново изберете за работа.


Сигурно си забелязвате, че тук ние работим с **шестостъгълници** и шестостъгълници. Опитай се да имитираш една пчелна пета със **AutoShape** избори шестостъгълник. Нарисувай 5 реда, всеки от които да съдържа по 5 клетки. След като подвържиш избори шестостъгълник – разшири го (с клавишите **RL+D**).

Създай отново модел на пчелна пета, но този път направи само първия ред с 5 клетки, а останалите 4 реда дублирай от първия.

Означете **пчелната пета**:

- клетките от всеки ред да са запълнени с един цвят, а рамките на всяка клетка в една колона да са с друг цвят;
- през едни клетките да са еднакви.

Опитай да направиш текст, подходящ за ураса... Как ще изглежда твоята табела за твоята стая?




Употребяване: Обърни внимание на символа  от менюто с инструменти.

...и пчелите покриват пчелна пета, без да се застъпват и без да оставя празно – е пример за **паркетирани равнината**. Има точно три вида фигури, които могат да **паркетират равнината** – **квадрат** и **шестостъгълник**.

Избрали именно шестостъгълник, а не друга на хилюнките? Отговор ще ти даде такава структура се употребява много количество мед.

Пчелната пета е пчелите и клетките.

Има Ешер (Maurits Cornelis Escher) холандец, М. С. Escher) и е част от нас се в света на този гениален човечко форма има в картините му... Как **паркетира** равнината с дъждовни петащата страници).



Развихри се

1. Потърси в интернет информация за картината **Метафората** (Metaphors II) (на английски могат да се използват ключовите думи М. С. Escher, Metaphors II).

Употребяване:

- Накарай Google да ти покаже само изображения;
- Въведи името му по следния начин: М. С. Escher.

(Ако нямаш интернет достъп – погледай на диска в папката **integratimi** (ocher).



2. Потърси в интернет информация за живота и творчеството на **Бари Кота** е животът и своя техника е използвал, за да рисува. В една Word файл изберете най-интересното от прочетената информация – от своя творческото му, така и най-привлекателните за теб рисунки. **Бари Кота** (**integratimi word**) можеш да направиш някои примерни снимки за веридиш намерената информация.

Употребяване:

За да копираш текст от интернет, трябва:

- да го маркираш (добре е) с мишката;
- след това да го копираш (Edit → Copy или CTRL+C) и
- да го „поставиш“ (Edit → Paste или CTRL+V) на белия лист в Word.





3. Паркетирай равнината с клоните.



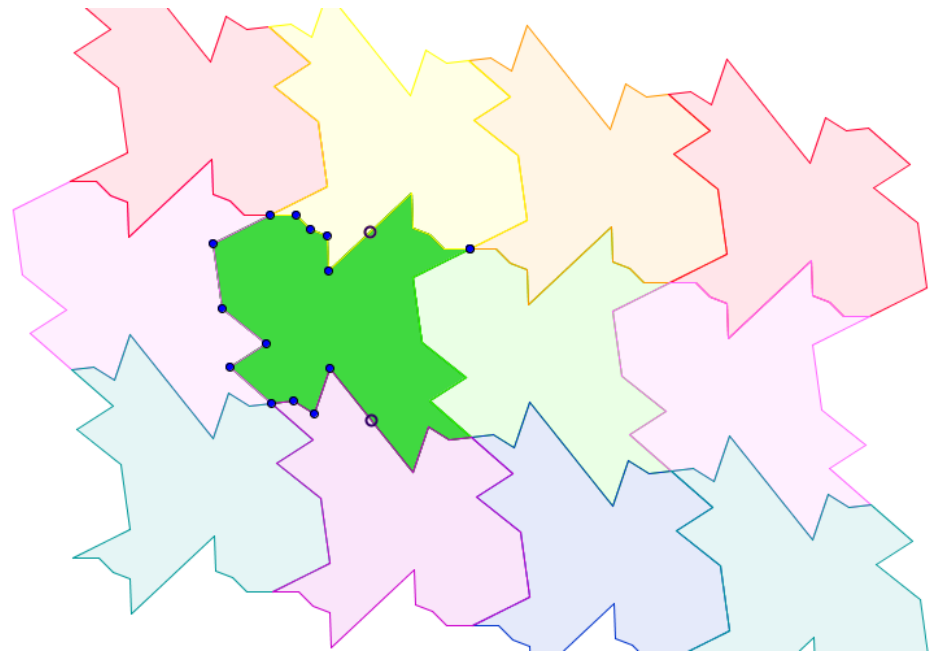
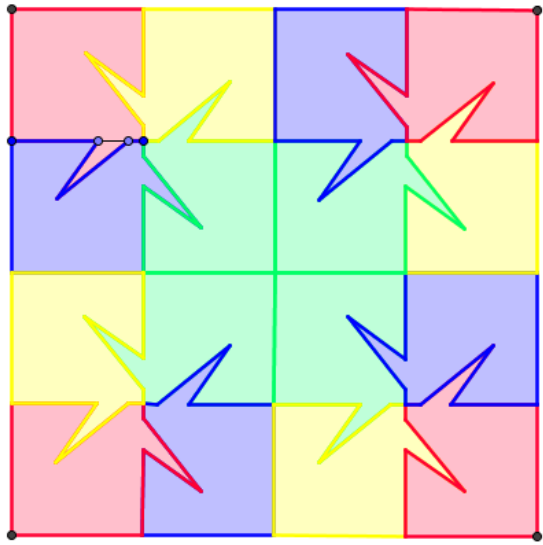
- На някои сайтове дори са написани трикула за поставяне на изображения.
- Тезица част от сайтовете са запълнени с **перфорирани** так и перфорирани.
- **Непривичайното** копирание на информацията поставя на гласно събитие.

2. Препоръчвам с подготовката за **тържеството** – какво ще копирате да **рисунте** стаята с **доденавдори**? Потърси информация за **запечатване** в **систем**. Как изглежда **запечатването**? Изчертай неговата равнина на **пчелна пета** в Word – имаш основния му графичен елемент: **равностранен триъгълник** от **AutoShapes**.

3. Направи разгънатата точка от:
 - шестостъгълници и петостъгълници;
 - шестостъгълници и квадрати;
 - триъгълници, квадрати, шестостъгълници и осемъгълници.Или биха стояли добре на **тържеството**, ако всеки от вас **постави** **свои** **многогостен в различен пият** – **пъстро** и **весело** като за **тържество**. За целта може да ти помогне програмата **Origami**.



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



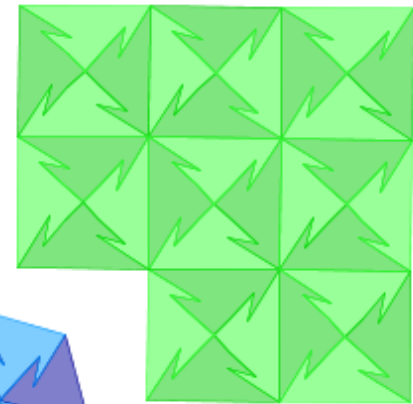
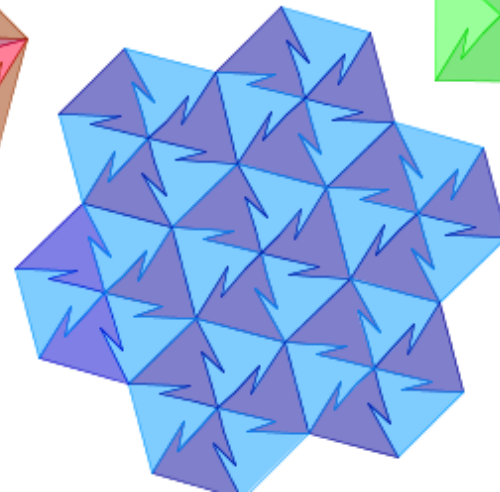
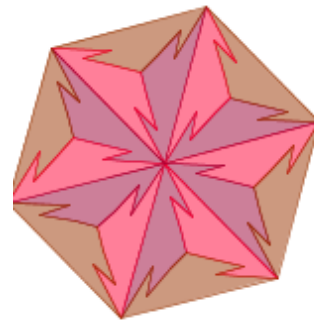


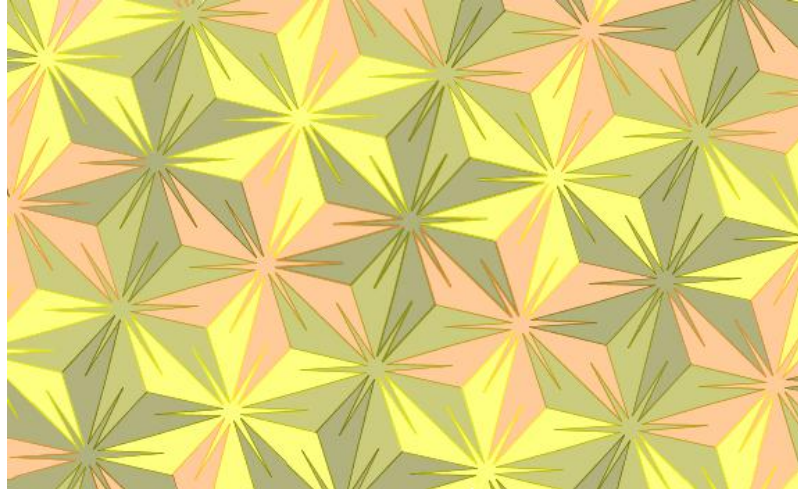
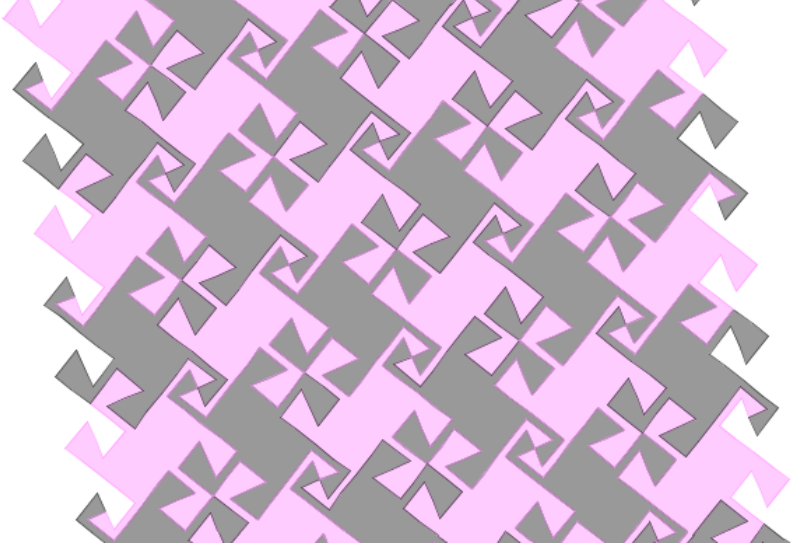
**DON'T PREACH FACTS, STIMULATE
ACTS!**

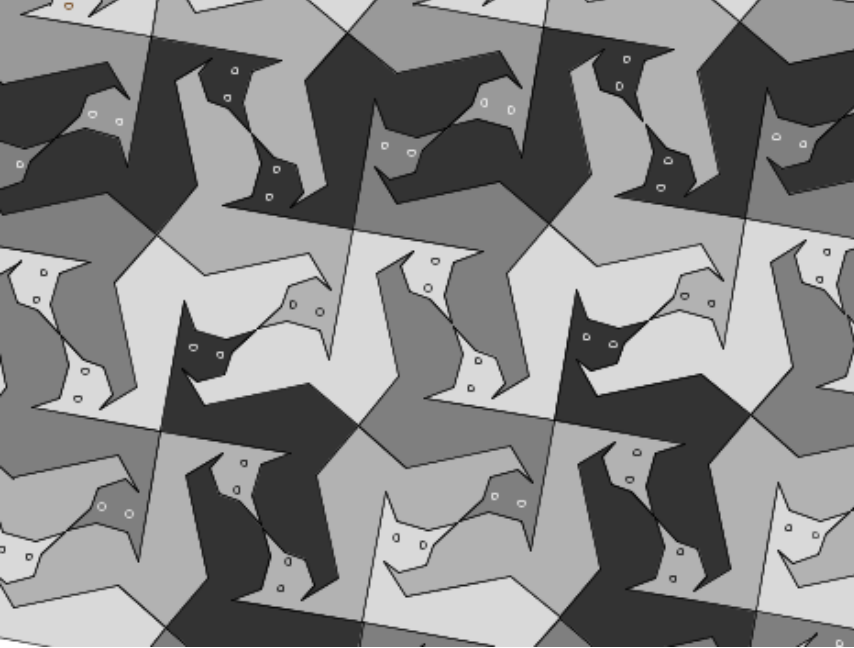


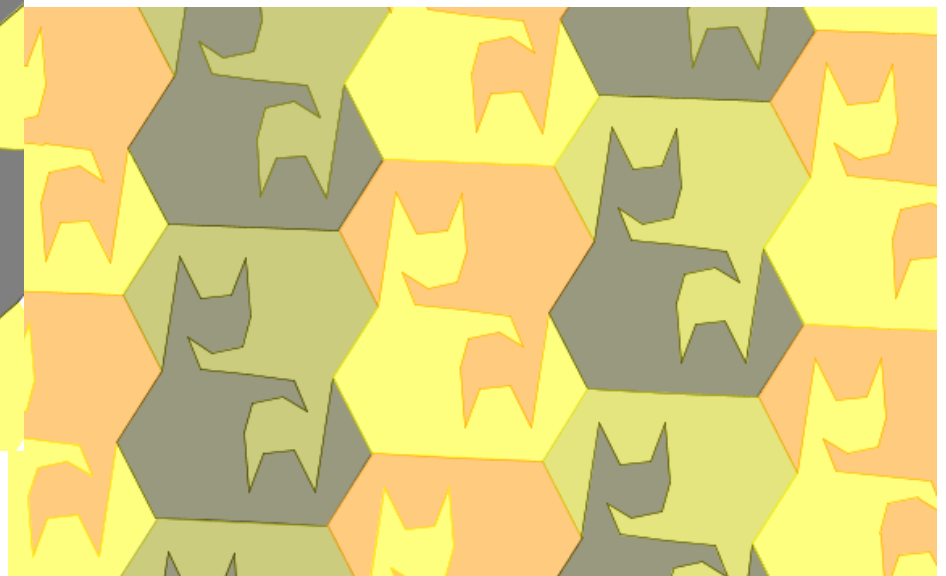
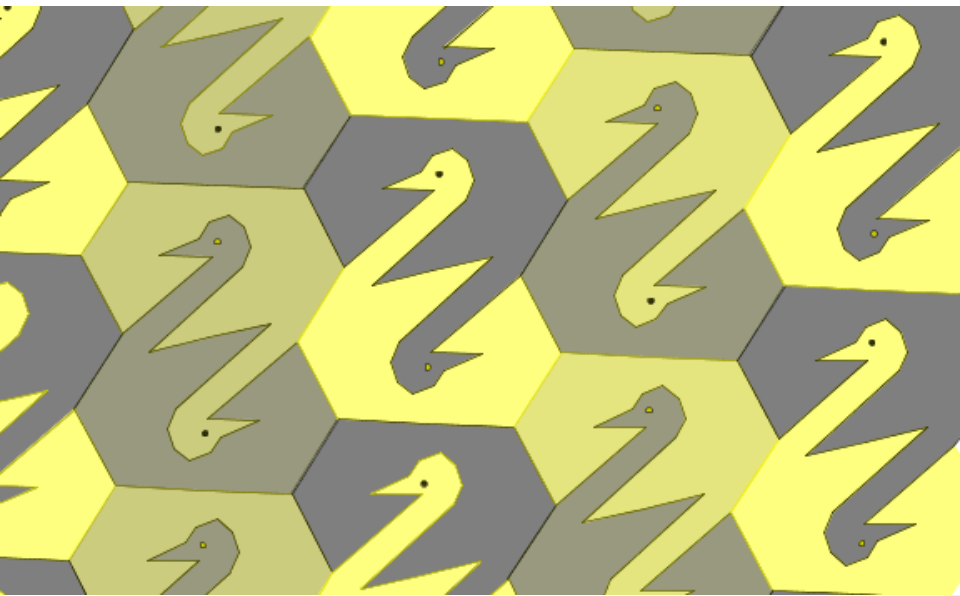
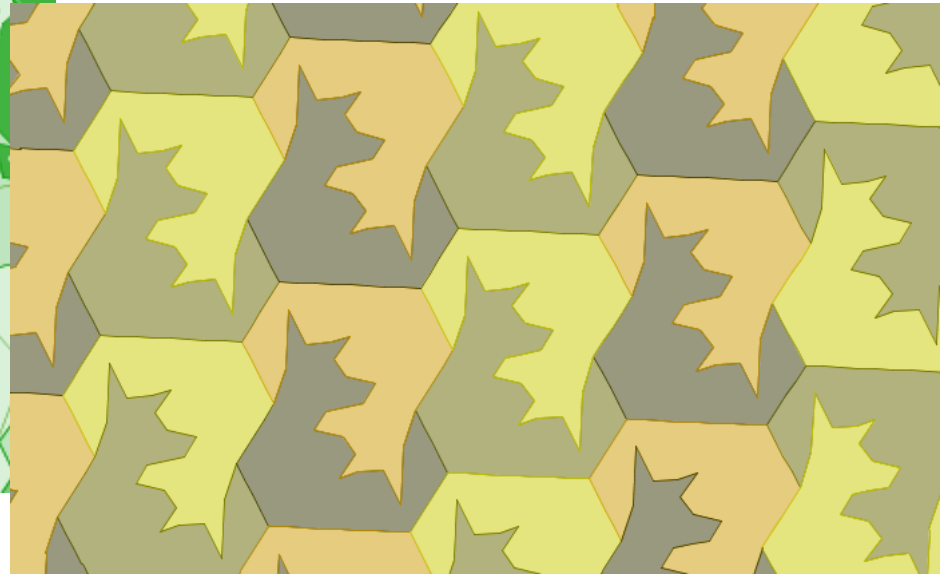
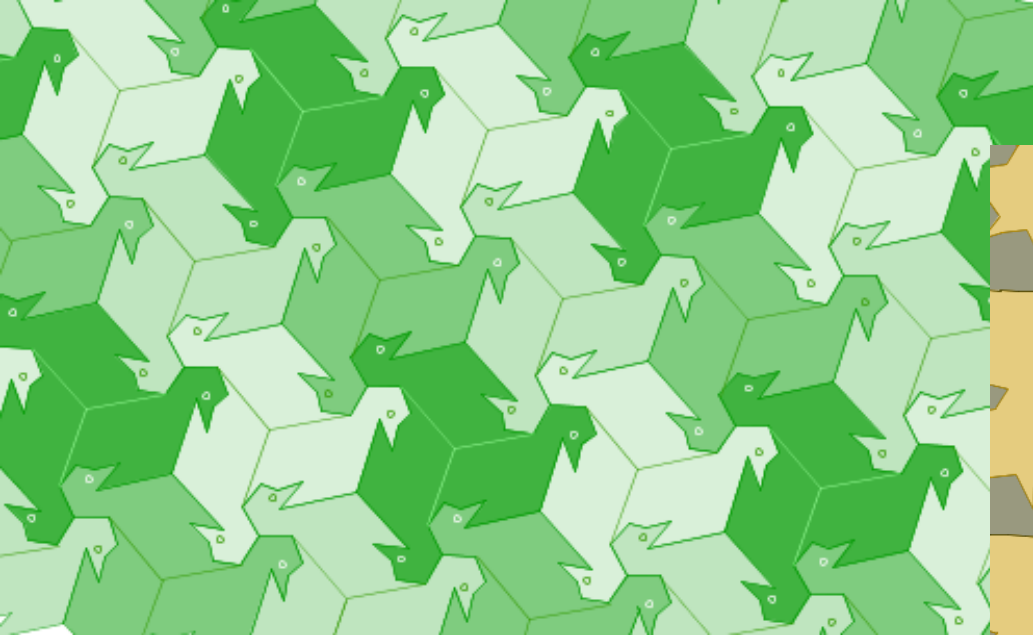
Paul Halmos

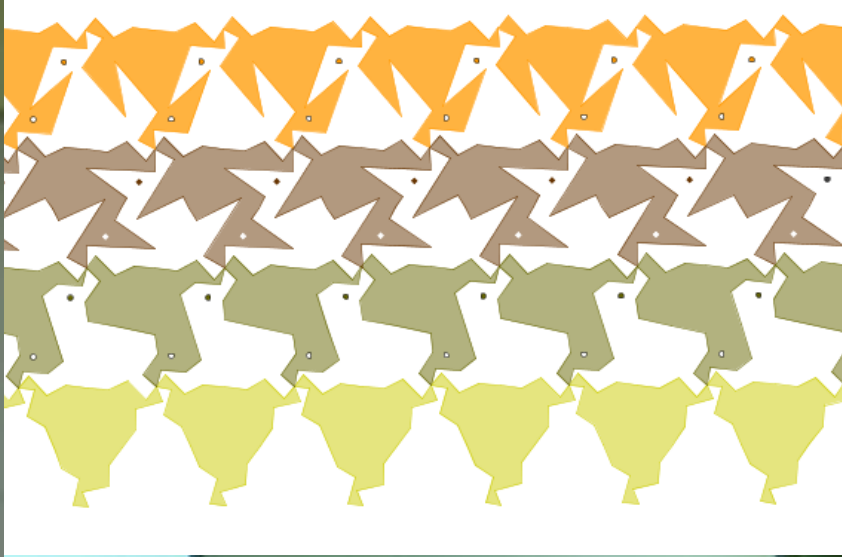
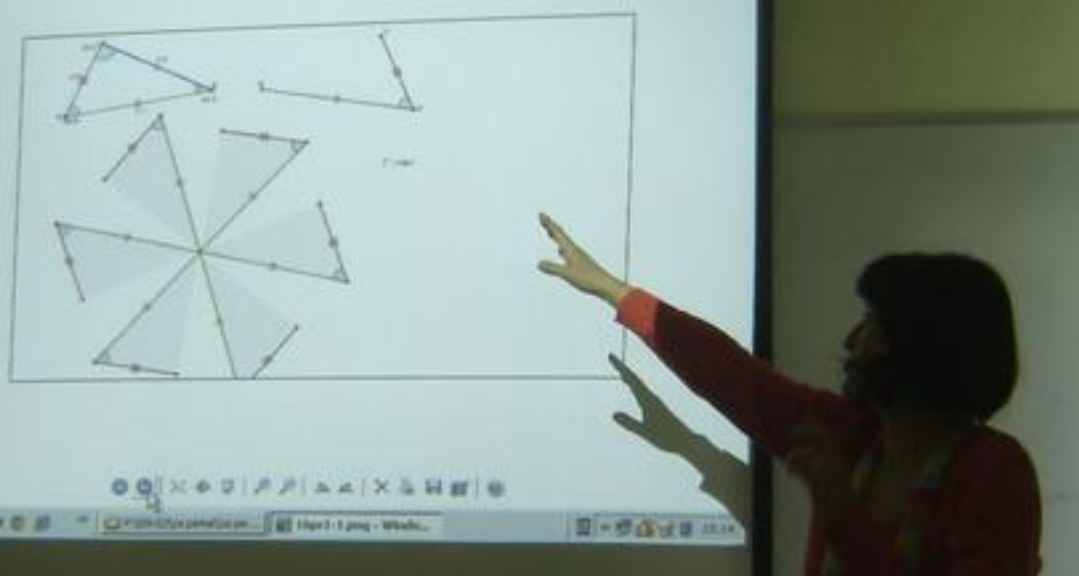
A teacher stimulating acts





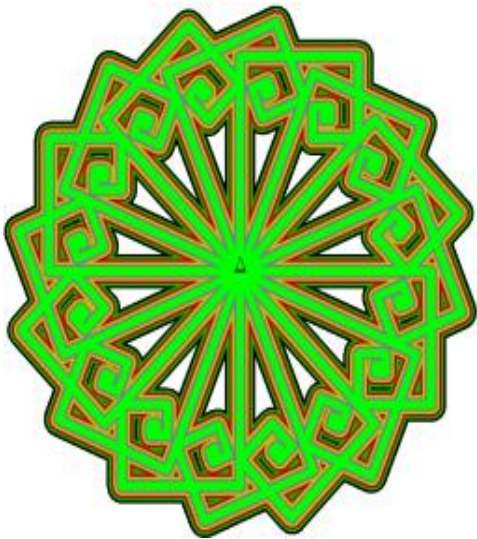






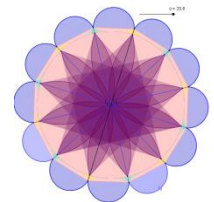
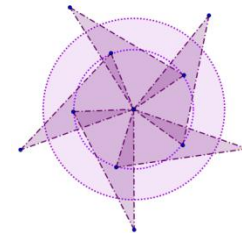
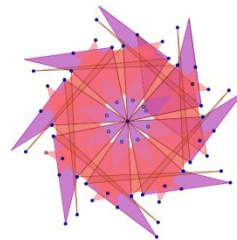
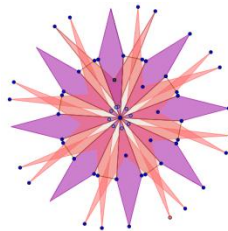
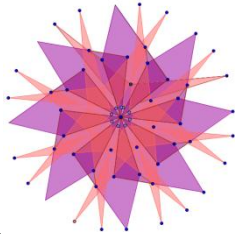
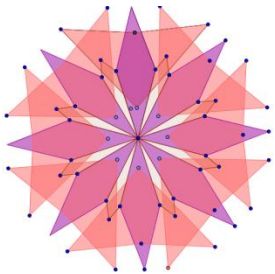
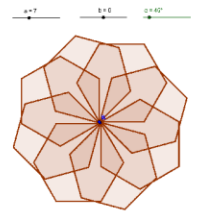
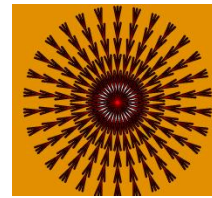
In-service teacher education

Modeling the beauty around them

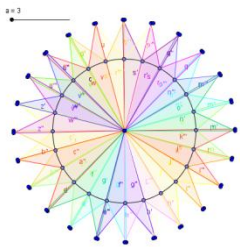




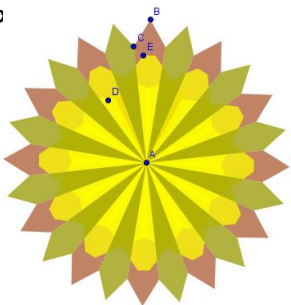
Wood-carved ceilings from Triavna and Plovdiv and some computer models



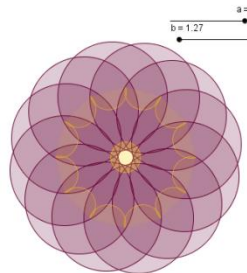
D1.ggb



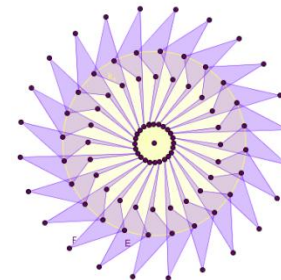
D2.ggb



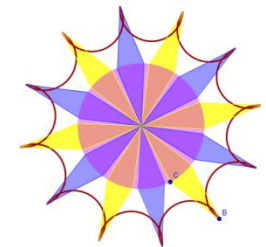
D5.ggb



D6.ggb

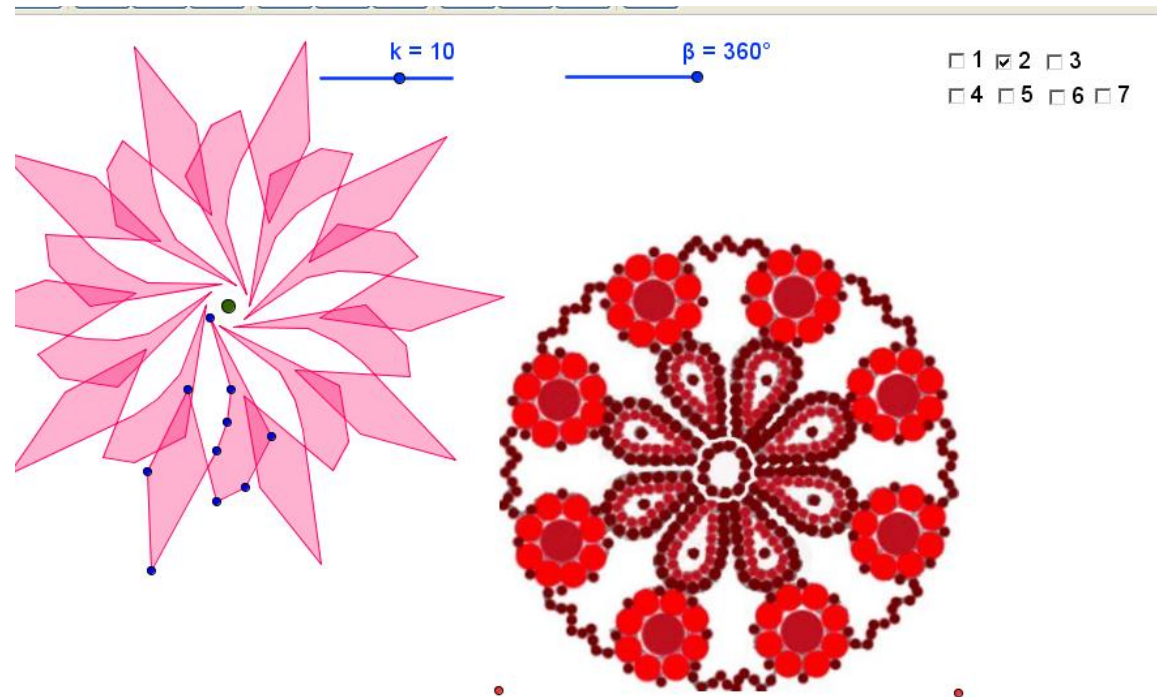


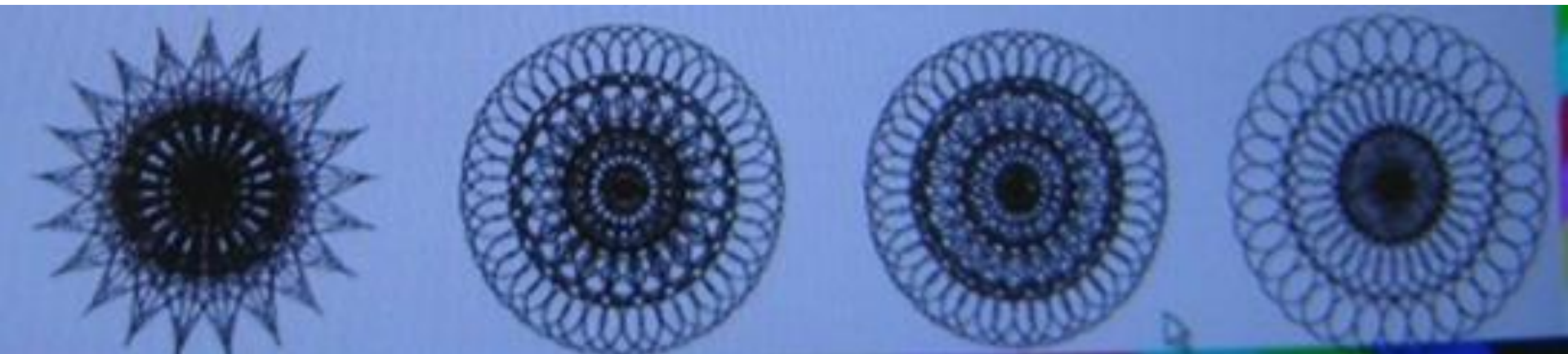
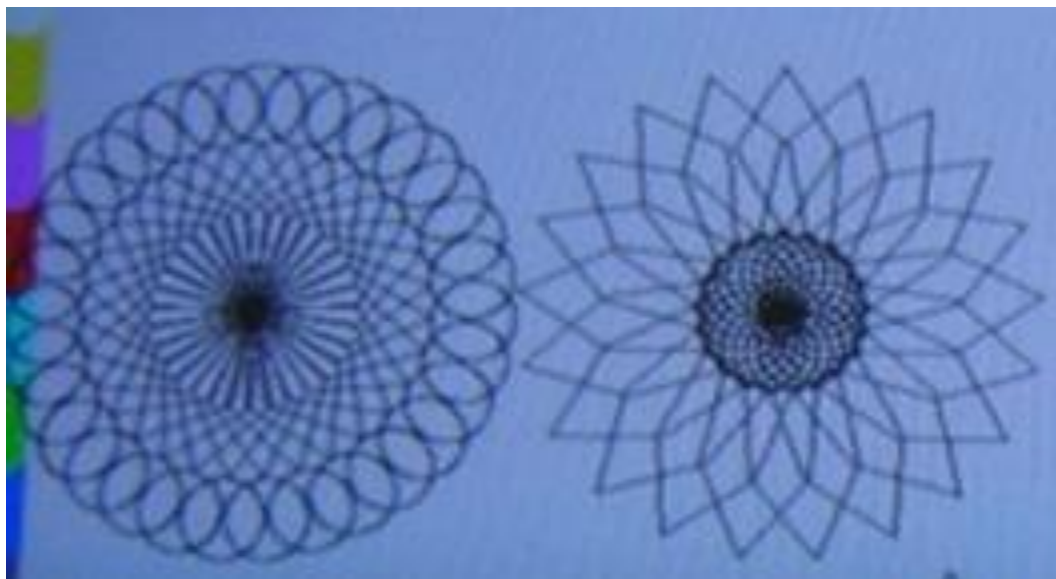
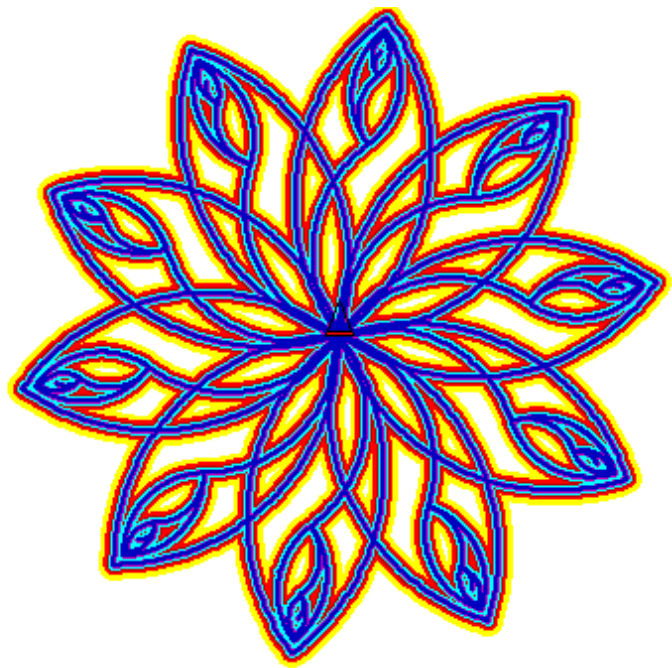
D9.ggb

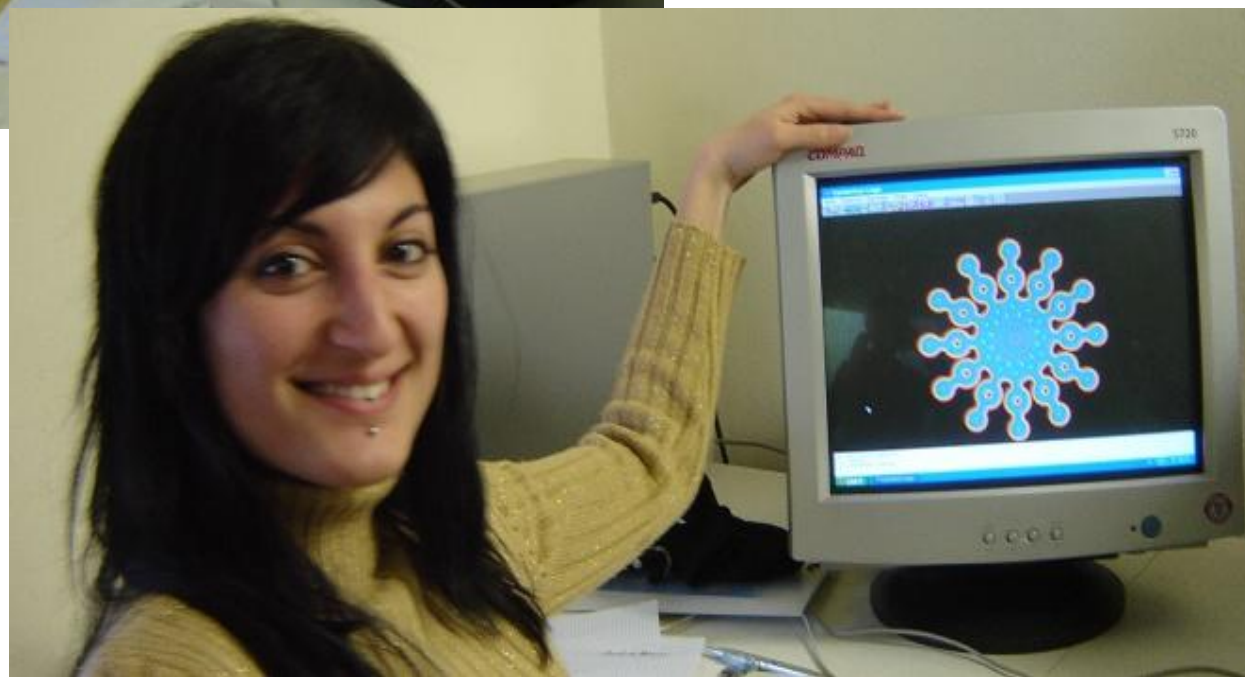


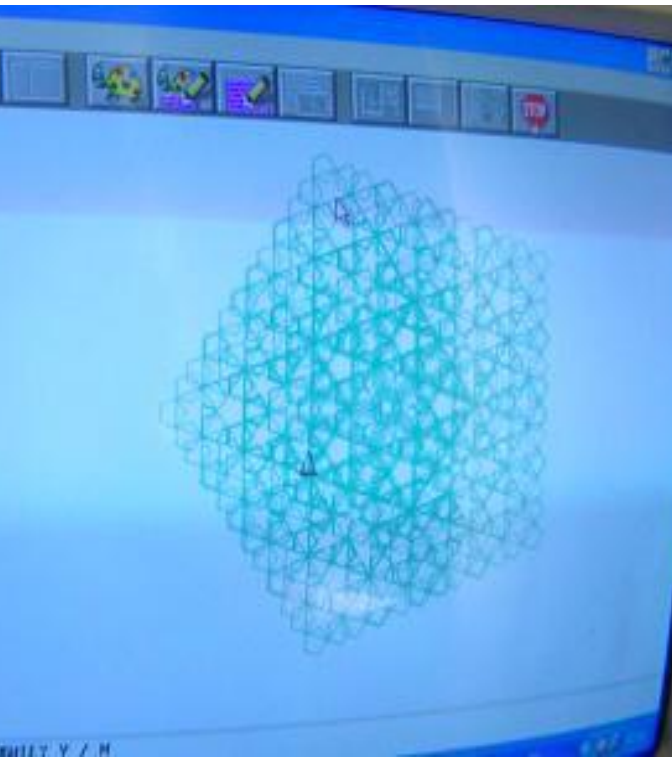
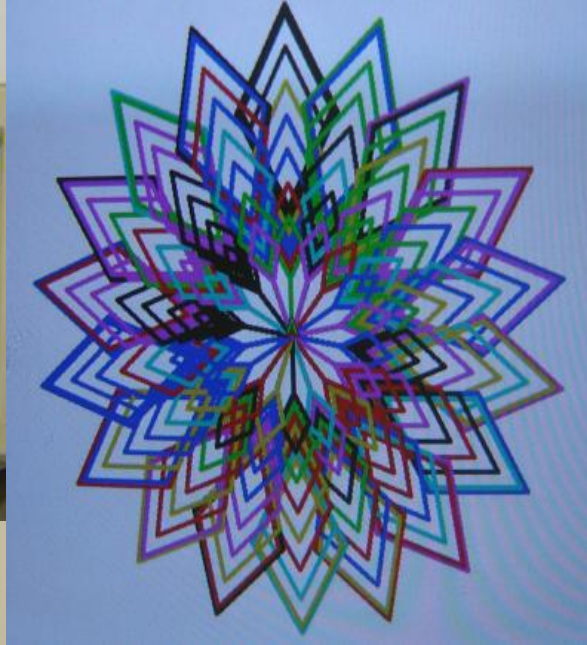
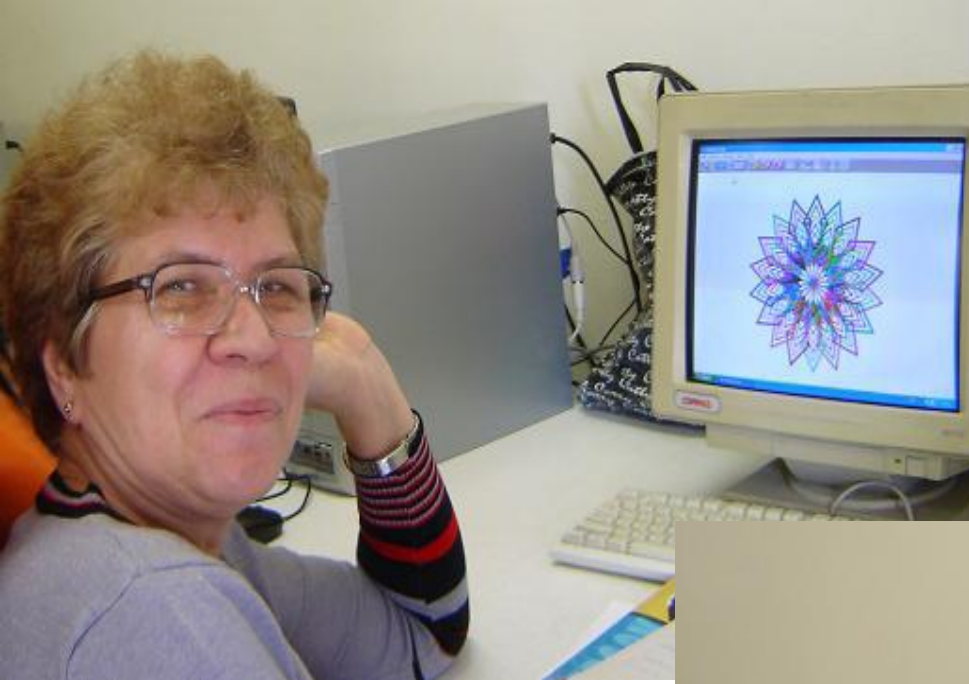
D10.ggb

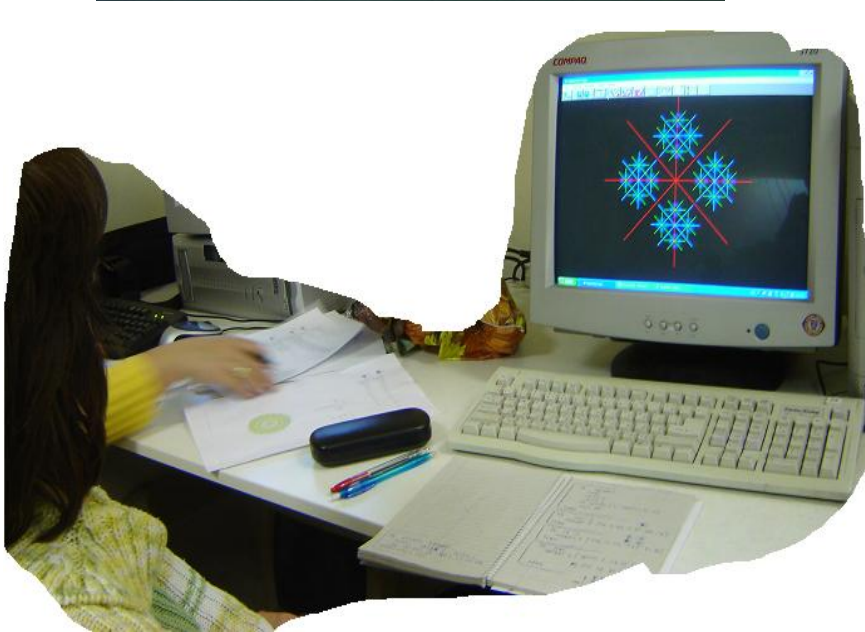
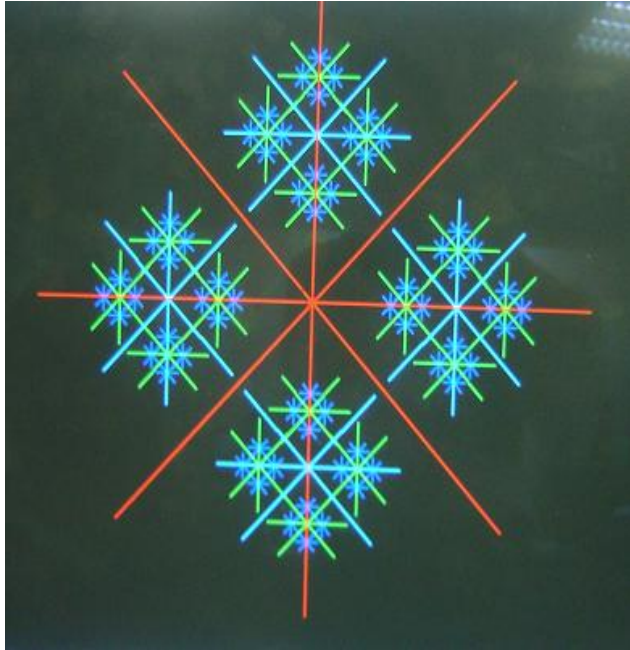
Explore the rotational dynamic constructions by means of the sliders so as to create models similar to the pictures of rotational objects











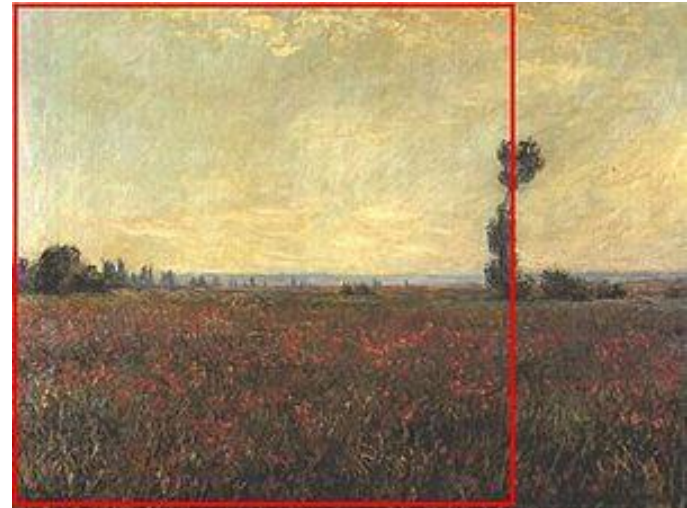
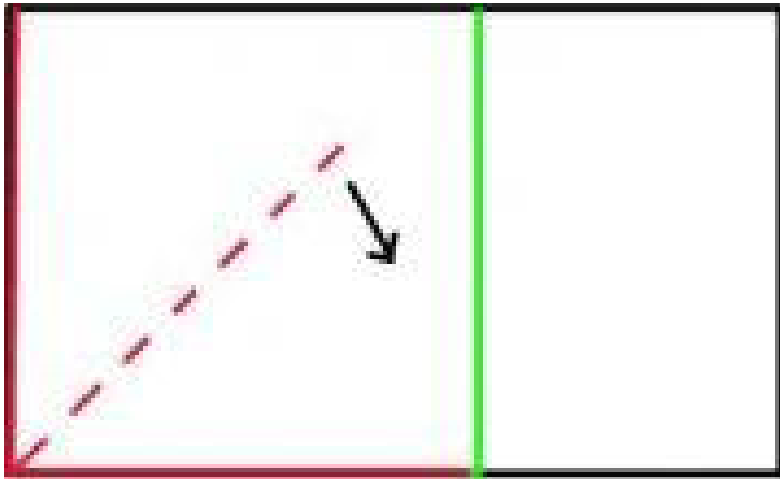


Creating dynamic composition tools in art and photography – a DynaMat scenario

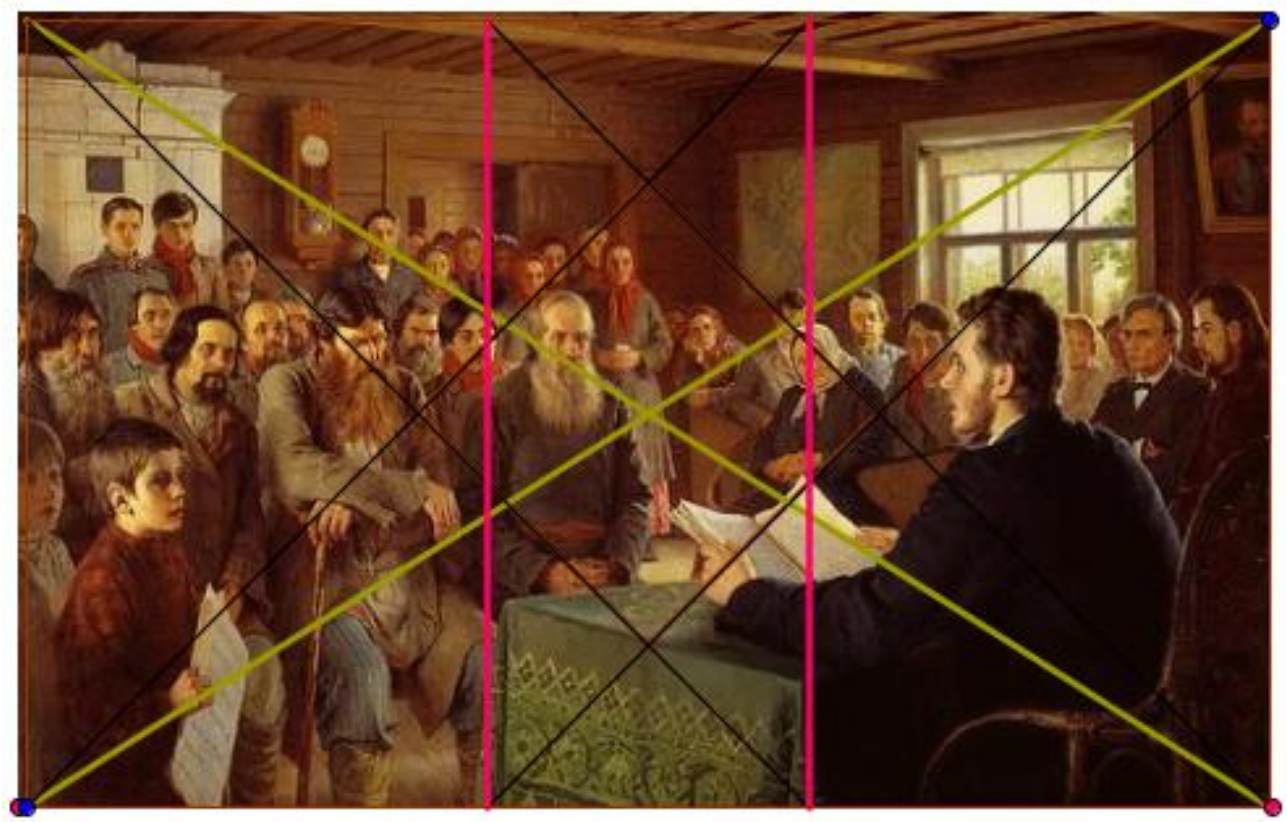
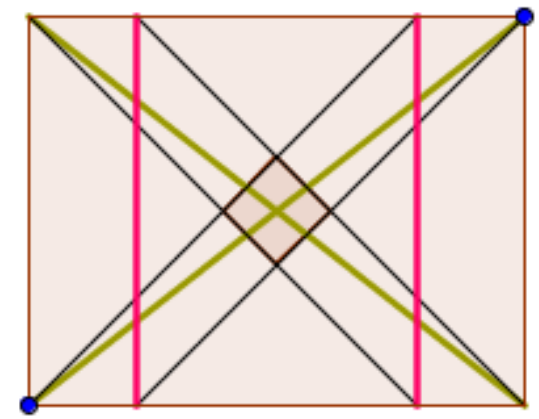
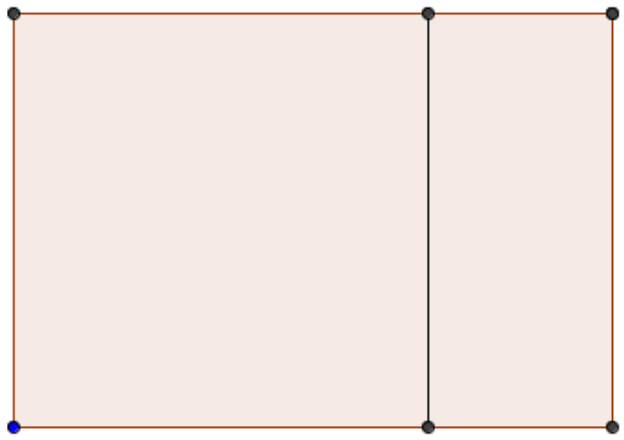
The idea behind this chapter is:

- 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

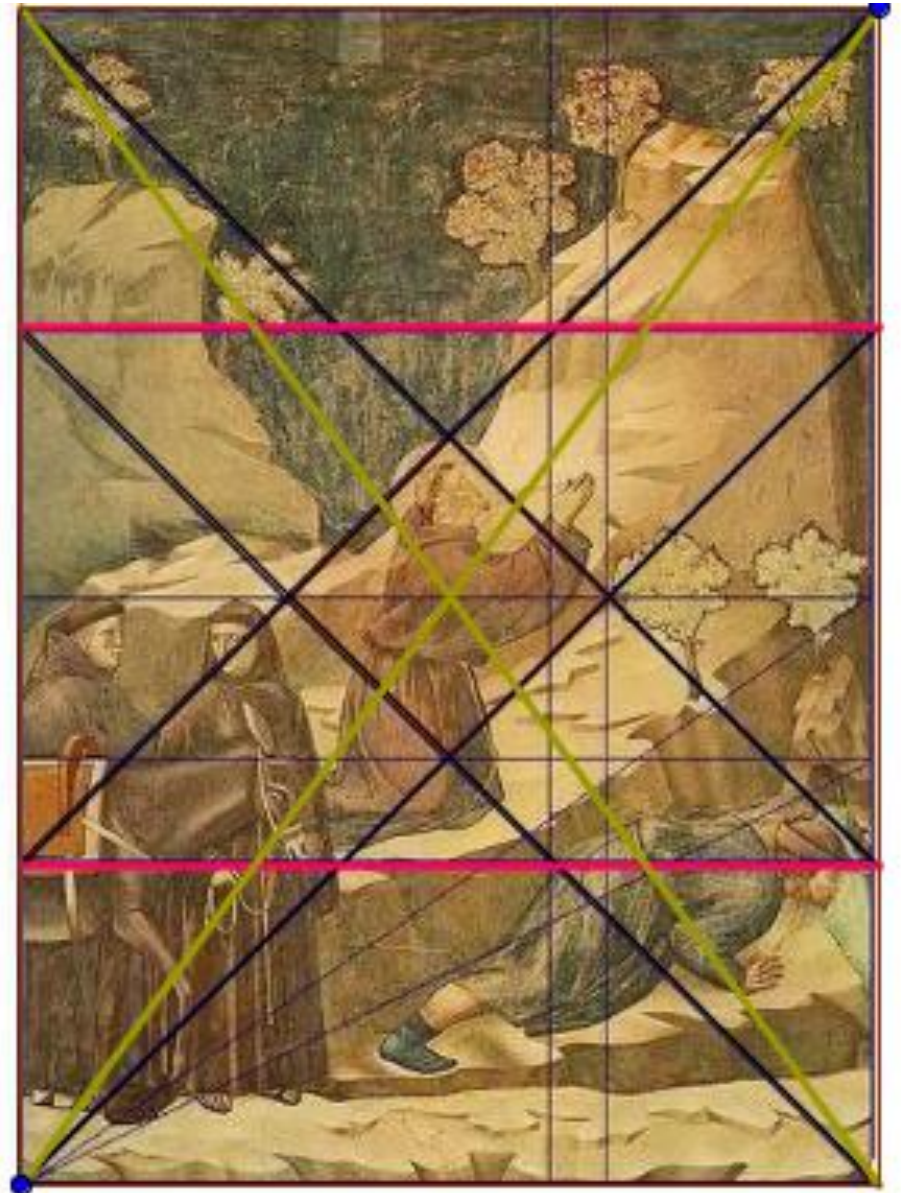
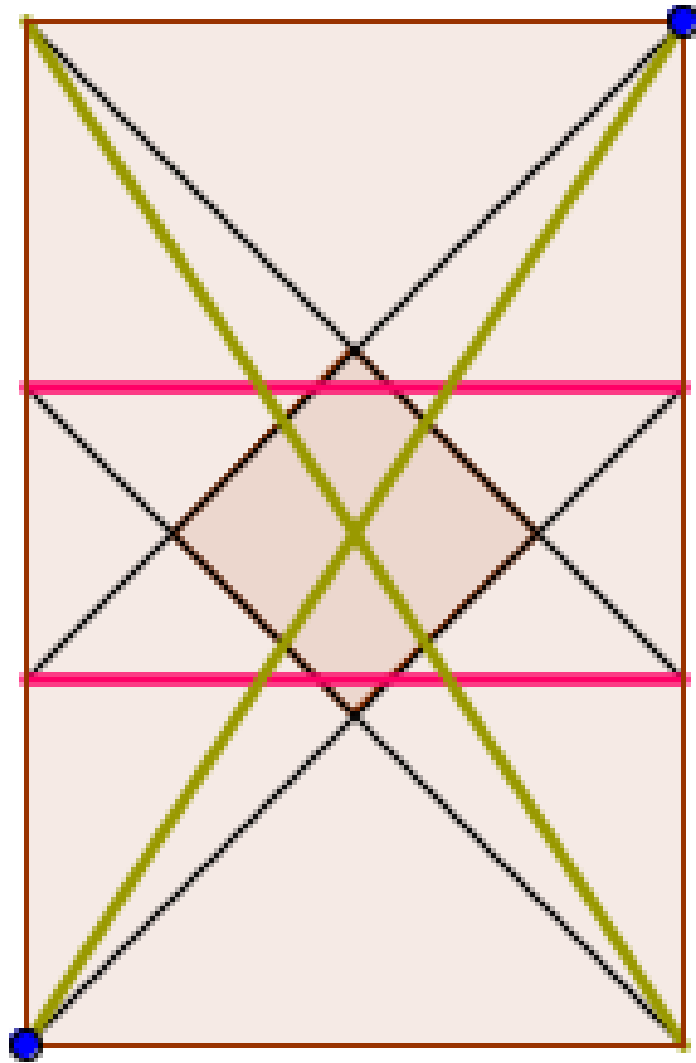
Geometric constructions as an exploratory tool in art



Rabatment with diagonals



Rabatment





Creating a Rabatment button (in GeoGebra)

Step-by-step description of the process

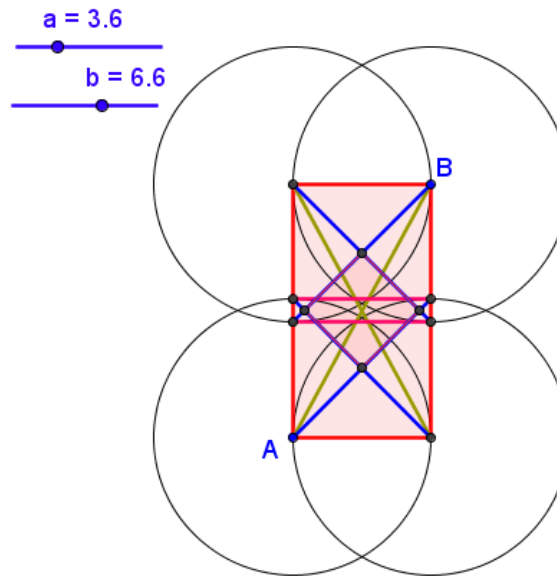
File Edit View Options Tools Window Help

Free Objects

- A = (-1.14, 1.98)
- a = 5.8
- b = 3.3

Dependent Objects

- B = (4.66, 5.28)
- C = (-1.14, 5.28)
- D = (4.66, 1.98)
- a₁ = 5.8
- b₁ = 5.8
- b₂: y = 1.98
- c: y = 5.28
- c₁ = 3.3
- d: x = -1.14
- d₁ = 3.3
- e: x = 4.66
- многоъгълник1



Tools Window Help

- Create New Tool ...
- Manage Tools ...
- Customize Toolbar ...

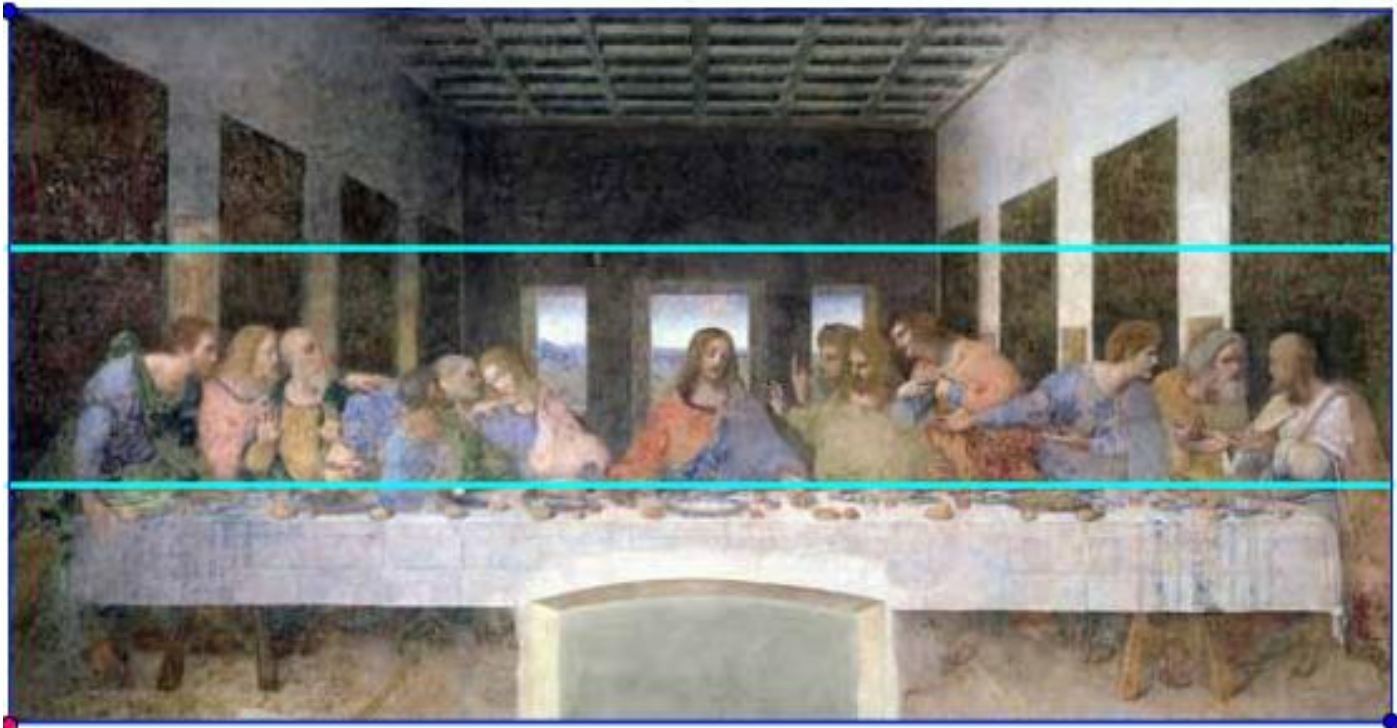
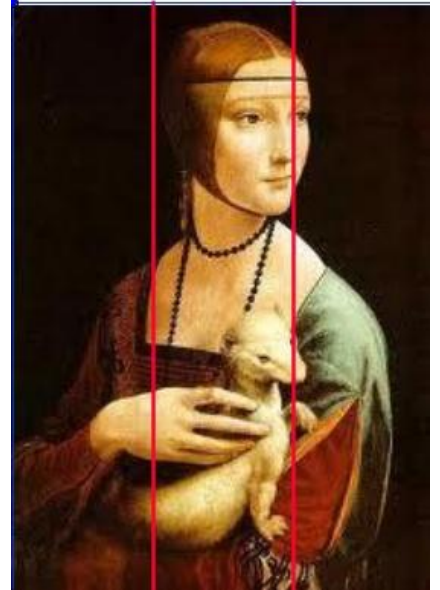
Create New Tool

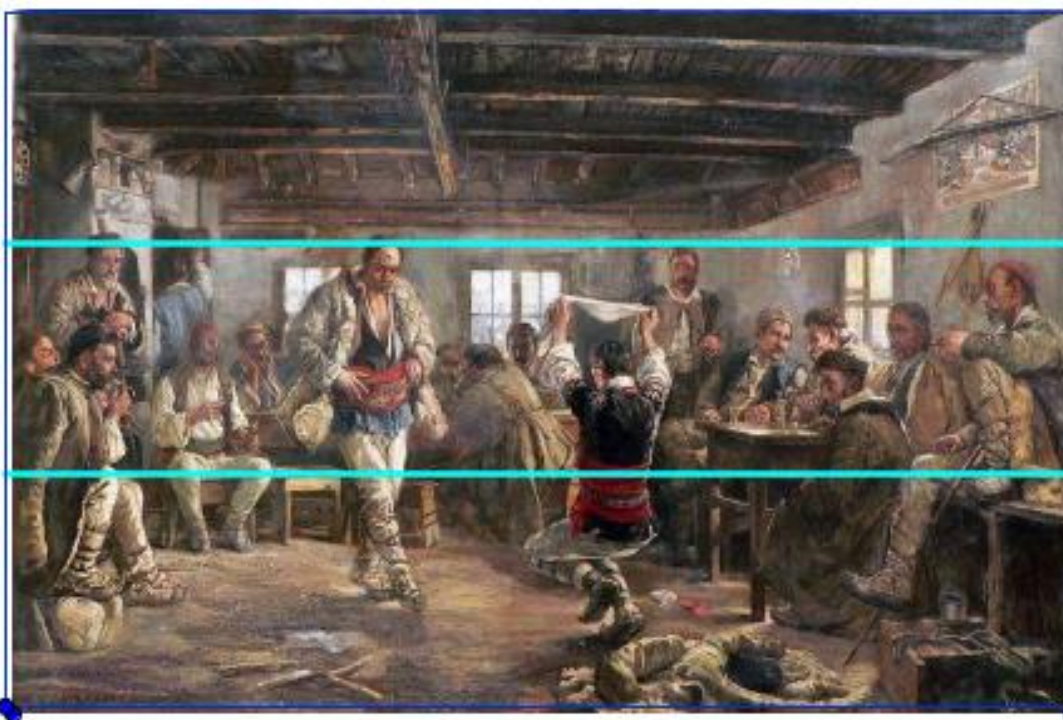
Output Objects Input Objects Name & Icon

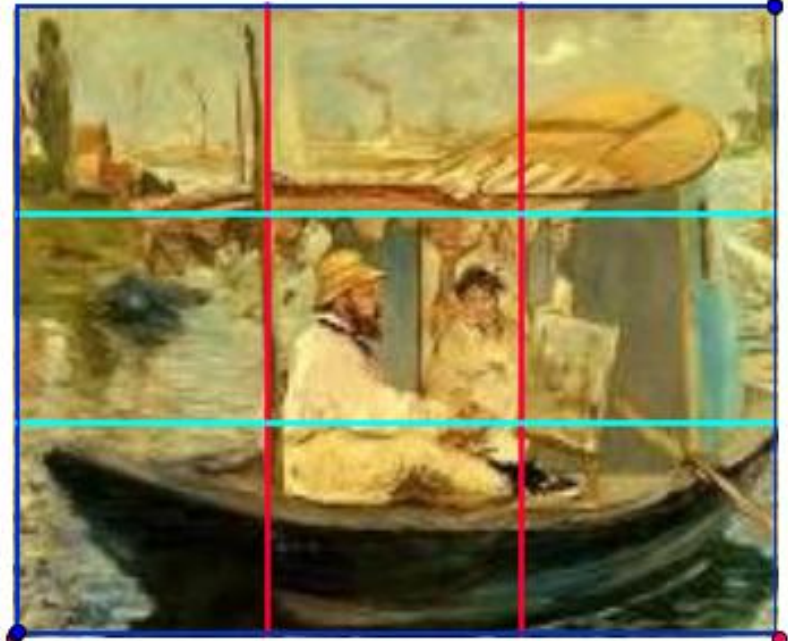
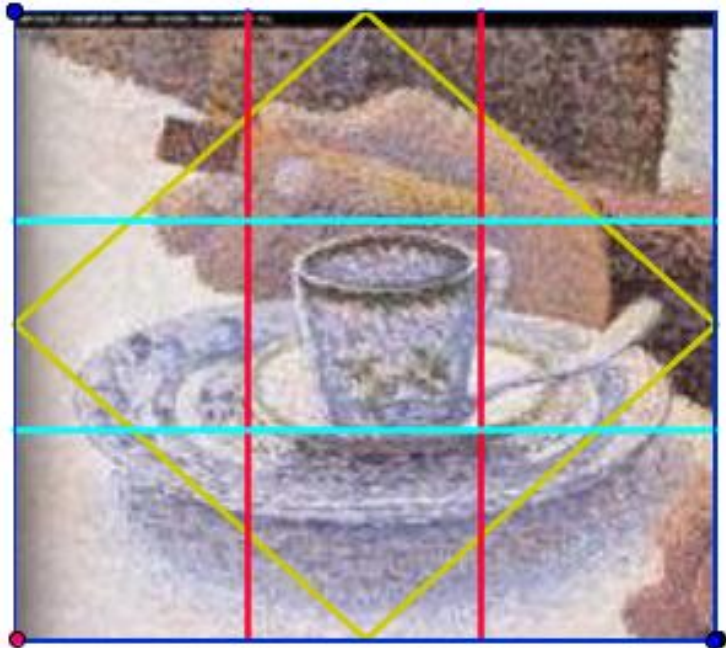
Select objects in construction or choose from list

- Quadrilateral многоъгълник3
- Segment a₁
- Segment b₁
- Segment c₁
- Segment d₁
- Segment g
- Segment h

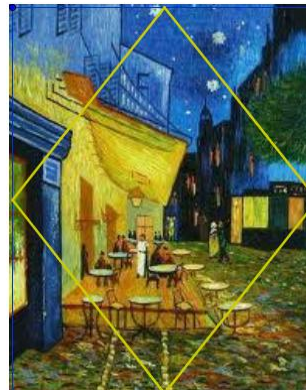
The rule of thirds

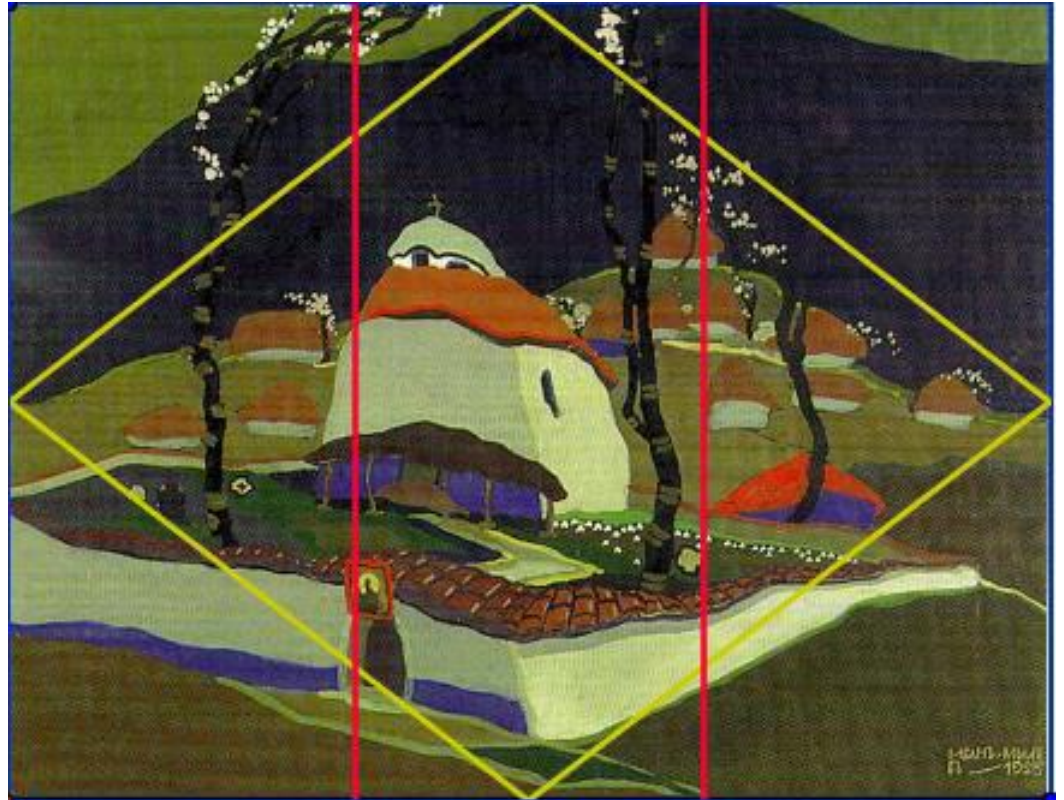
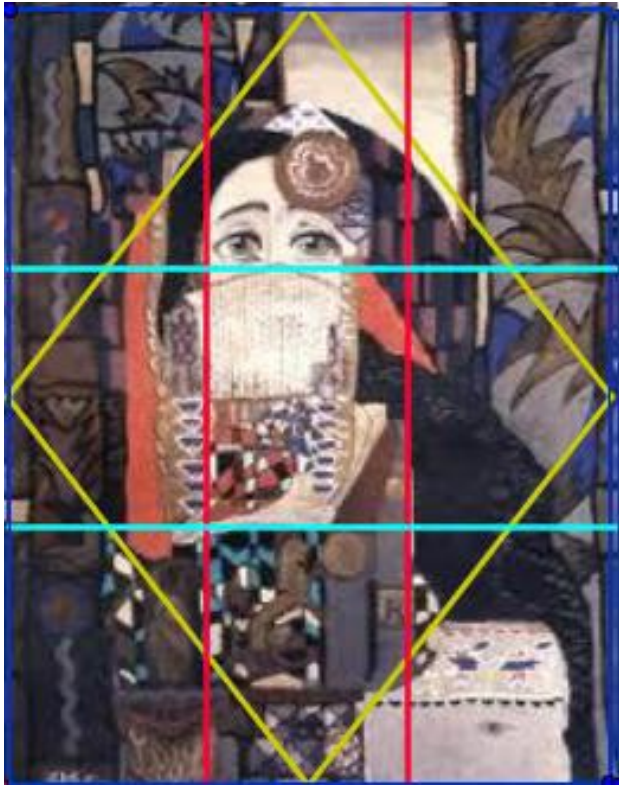




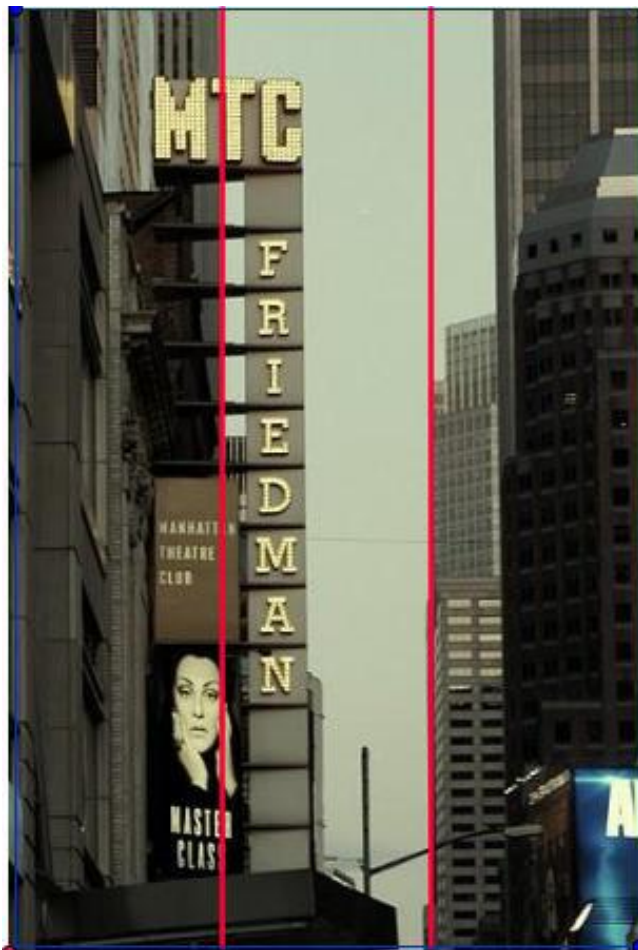


Rhombus

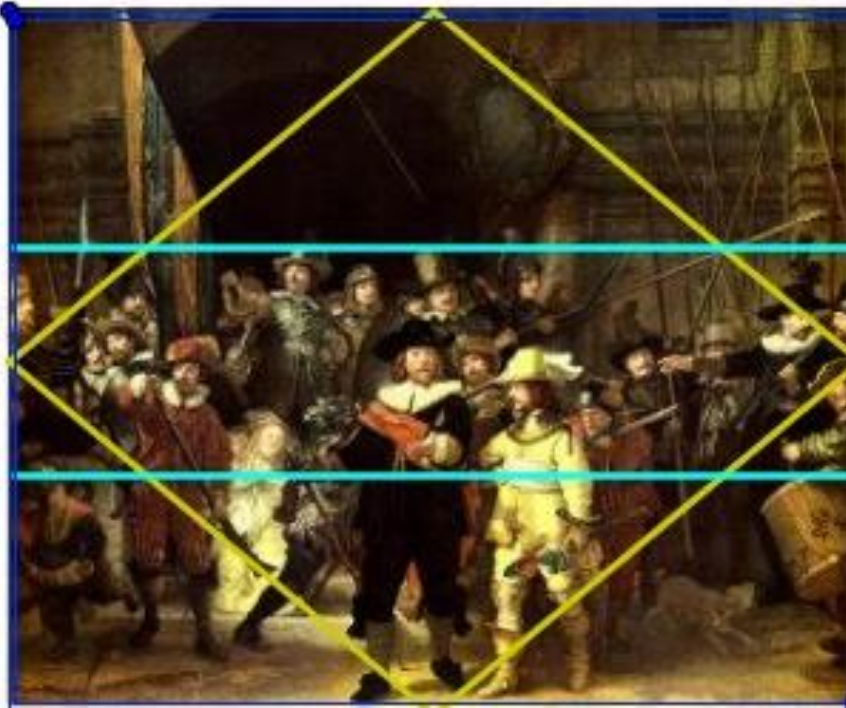


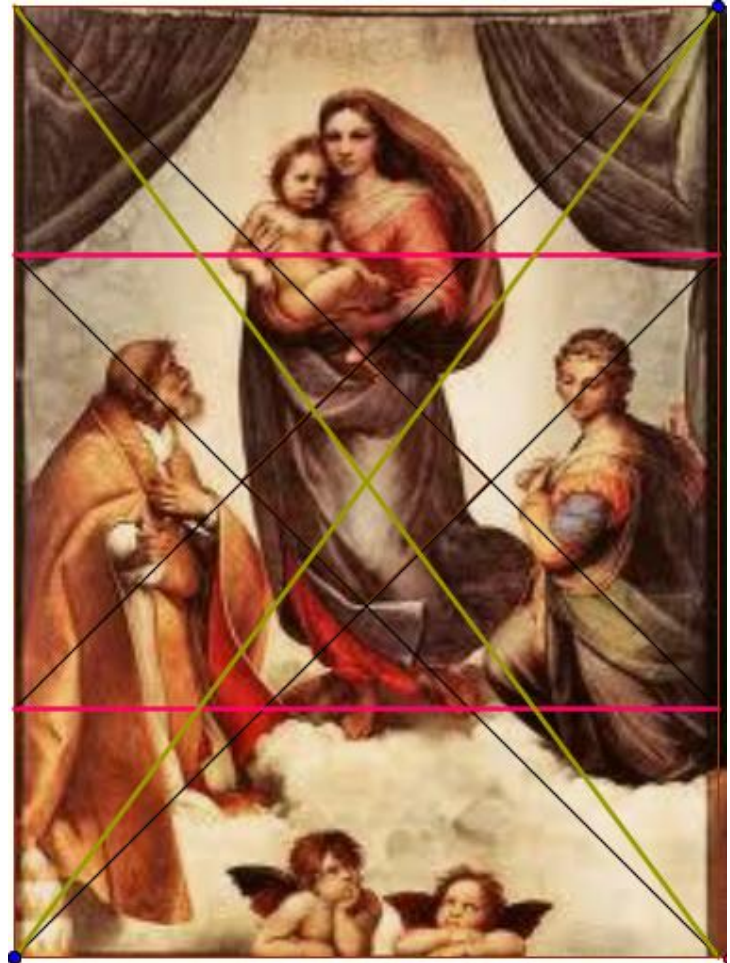
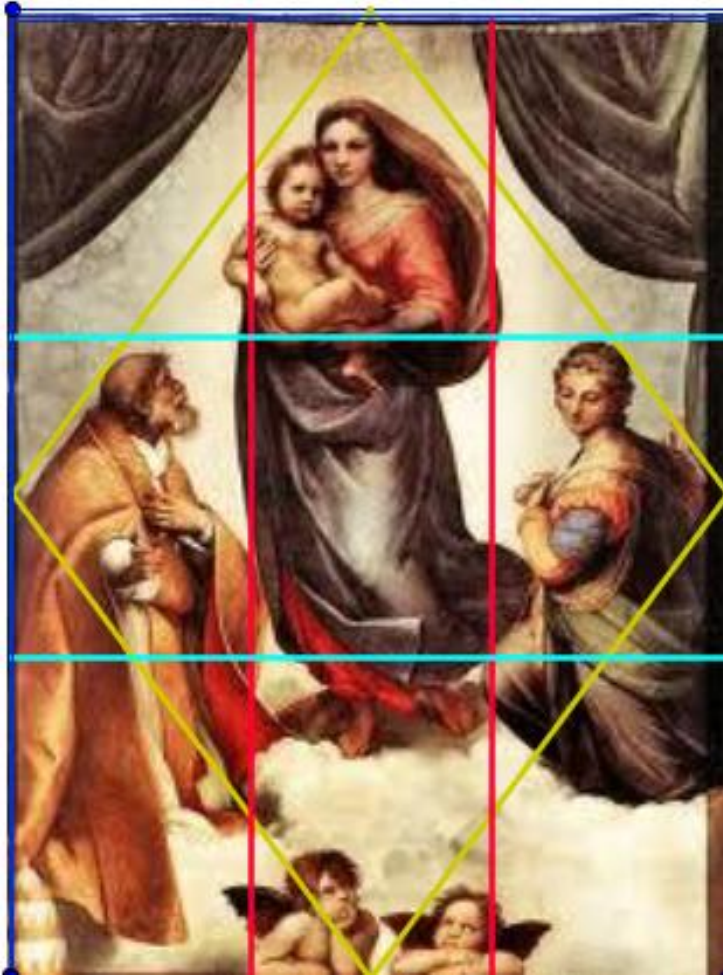


In photography

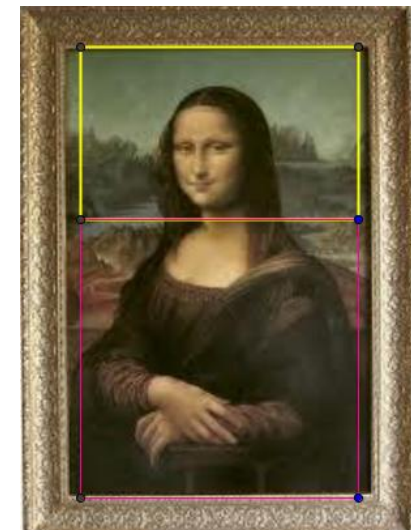
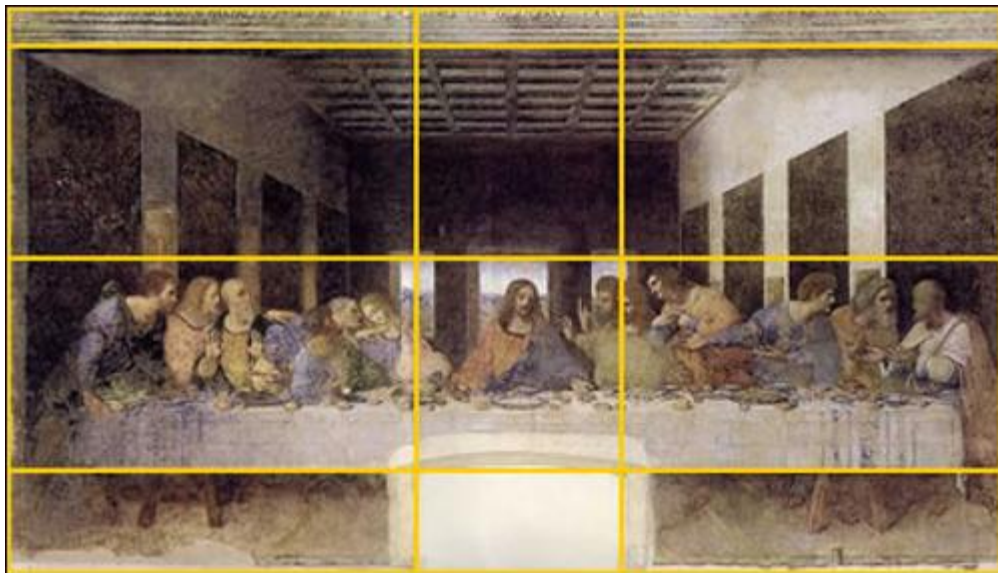
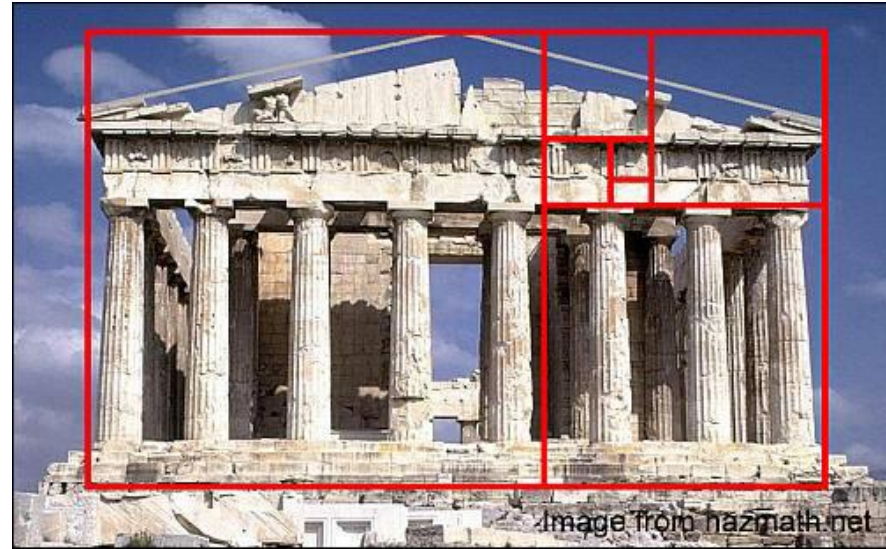
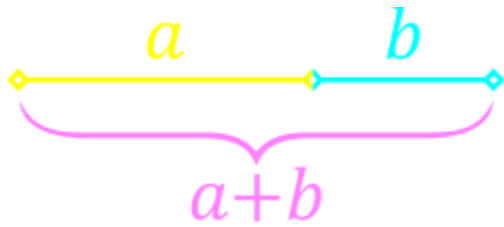


Combining the methods

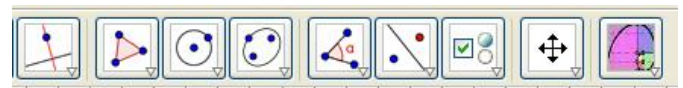
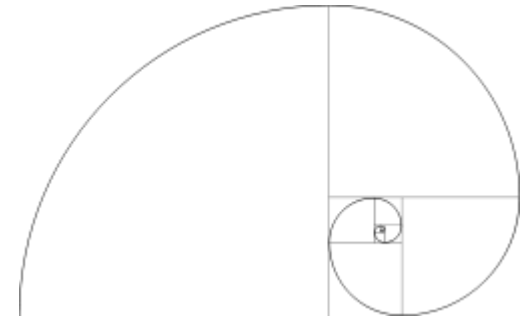
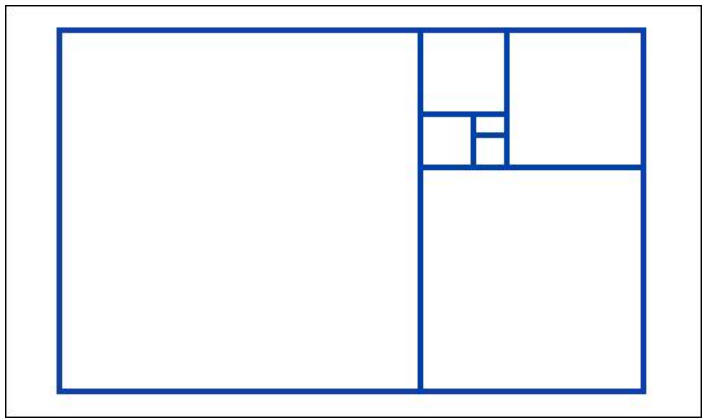
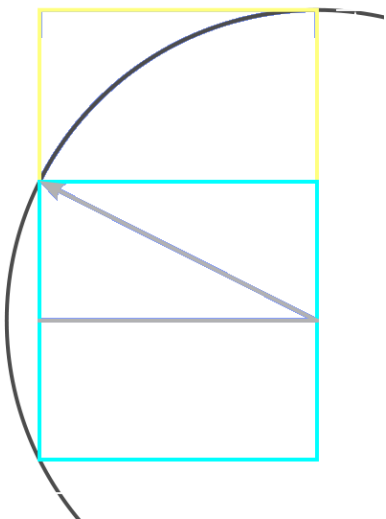
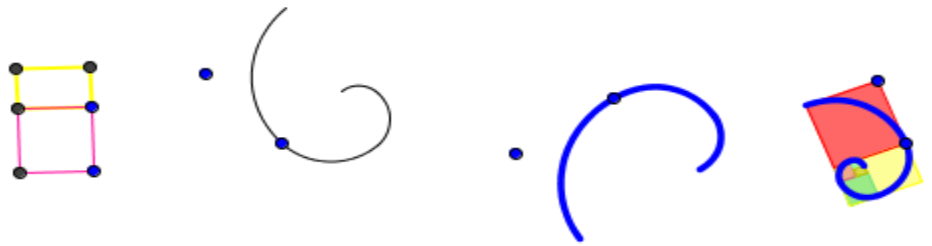




The golden section in art

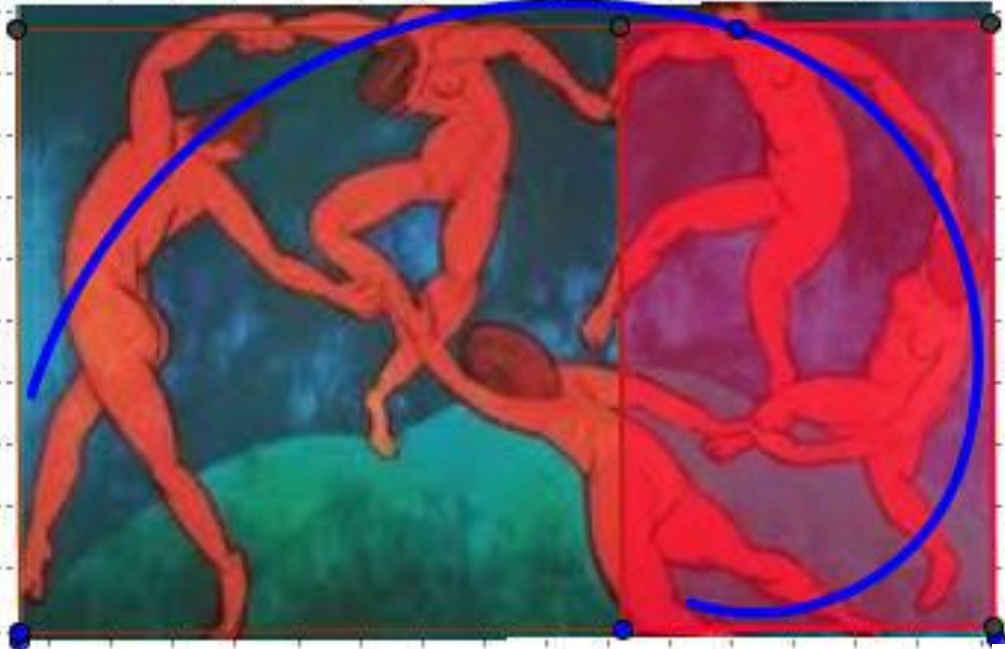


“Golden” buttons in GG



- 1 2 3 4 5 6 7 8 9 10
- 11 12 13 14 15 16 17 18 19 20
- 21 22 23 24



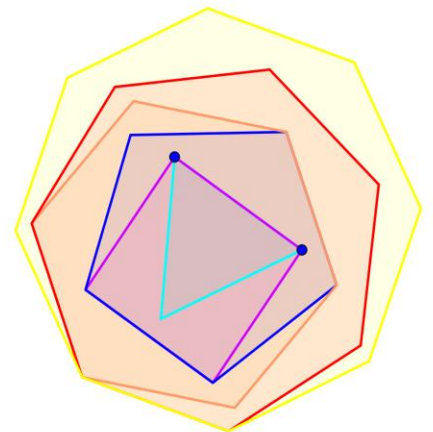


Dynamic mini-projects

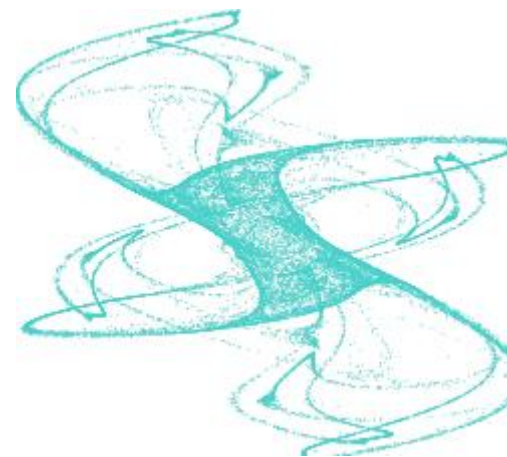
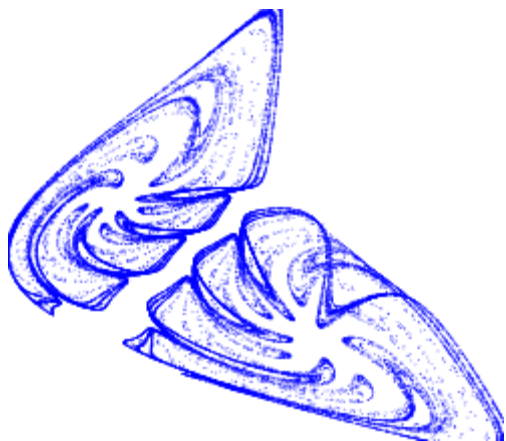
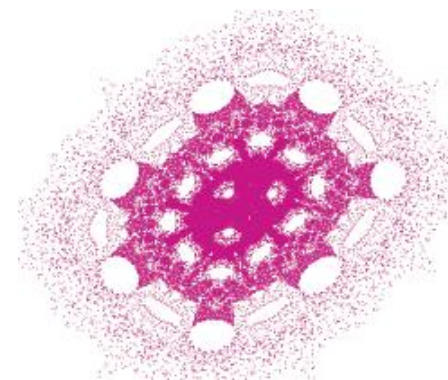
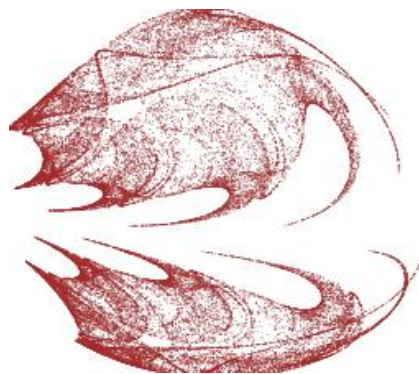
1. Arrange for a picture in two ways (according to two methods for composition):
 - 6 persons at a birthday party sitting around a round table
 - a class of 24 pupils and their teacher
 - flowers and fruits
 - perfumes and an advertisement

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?



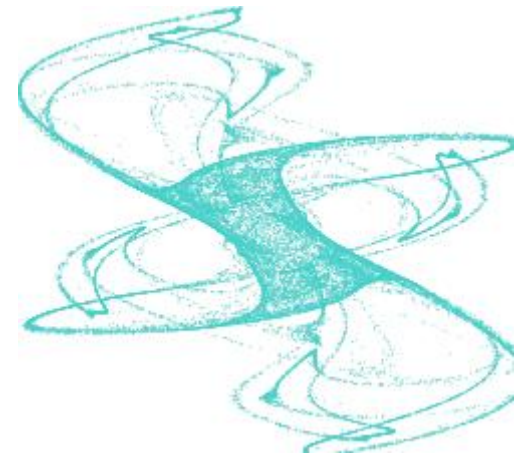
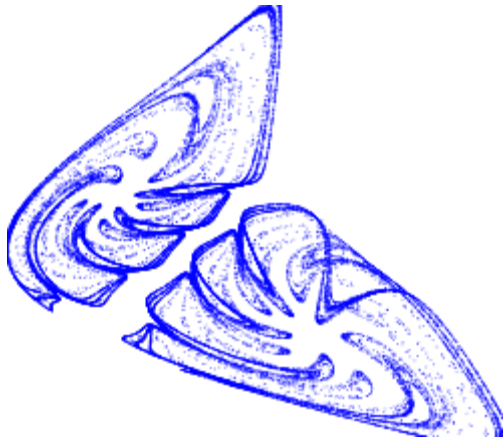
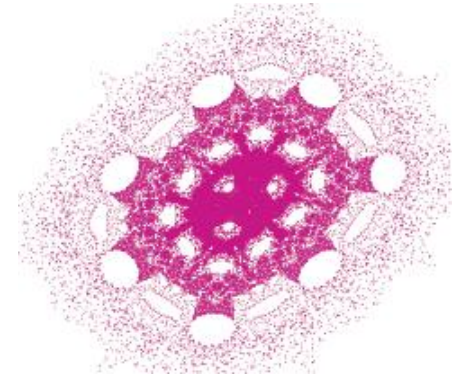
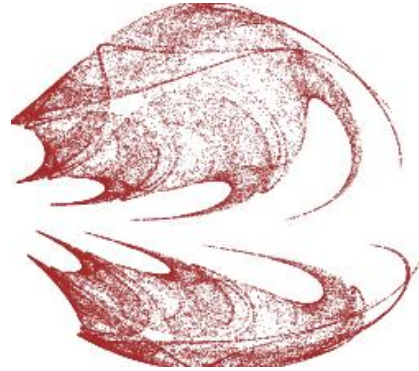
Can the equations be exciting?

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	$a = (0.2, 0.9, -0.7, -0.2, 1, -0.2, -0.8, -0.4, -1.1, 0.3)$ $b = (-0.6, 0.1, 1.2, 0.3, 0.9, -0.2, 1, -1, 1.2, 0.8)$

$$\begin{aligned}
 x_{n+1} &= a_1 + a_2x_n + a_3x_n^2 + a_4x_n^3 + a_5x_n^2y_n + a_6x_ny_n + a_7x_ny_n^2 + a_8y_n + a_9y_n^2 + a_{10}y_n^3 \\
 y_{n+1} &= b_1 + b_2x_n + b_3x_n^2 + b_4x_n^3 + b_5x_n^2y_n + b_6x_ny_n + b_7x_ny_n^2 + b_8y_n + b_9y_n^2 + b_{10}y_n^3 \\
 n &= 0, 1, 2, \dots
 \end{aligned}$$

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

Judge for yourselves



 Thank you!

This project has been funded with support from the European Commission in its Lifelong Learning Programme (510028-LLP-1-2010-1-IT-COMENIUS-CMP). This publication reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein.