

За динамиката в часовете по математика - проектът *DynaMat*



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Национален семинар „Изследователски подход в математическото образование” - 19 декември, 2012, ИМИ-БАНТ

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<http://www.dynamathmat.eu/>



Comenius project

 www.dynamathmat.eu



DynaMAT is a Comenius project, focused on a dynamical approach to various mathematical topics, suitable for secondary schools and prospective mathematics teachers education. The use of ICT and dynamical software is essential.

Dyna MAT

Partners



Основни цели

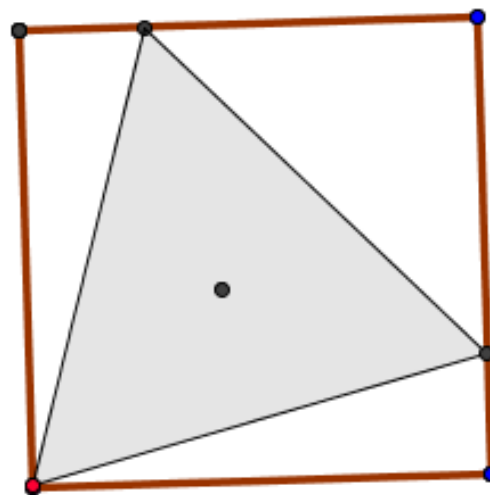
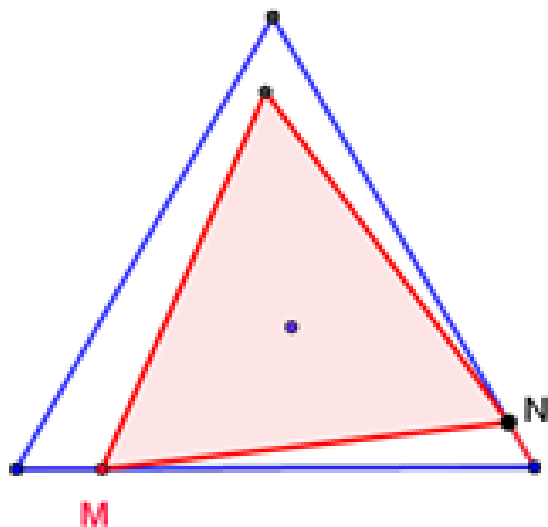
- Да се изготвят учебни материали във вид на динамична електронна книга в помощ на изследователския дух в часовете по математика
- Да се апробират и внедрят тези материали в курсове за настоящи и бъдещи учители

Последната среща по проекта в ИМИ-БАН



Българският принос към електронната книга

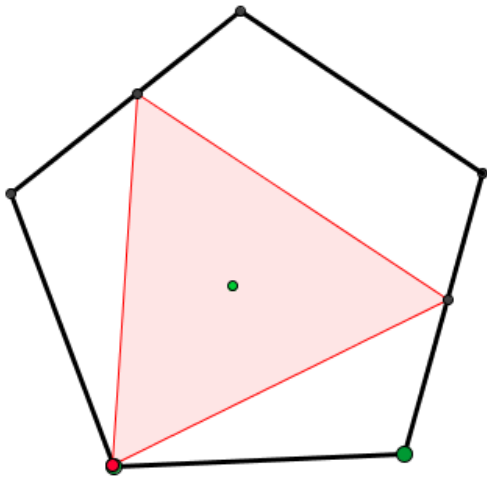
Геометрични закономерности като игра на динамични изследвания



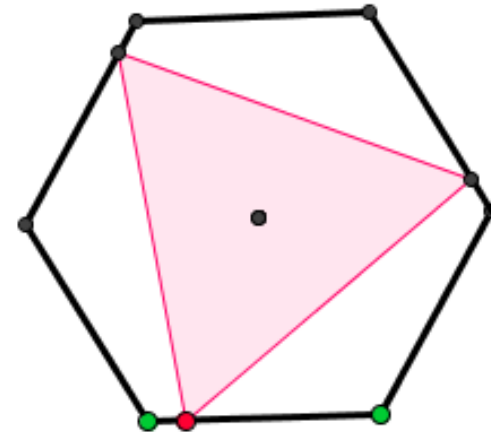
(3;4) construction

$(3;n)$

$(3;5)$ construction

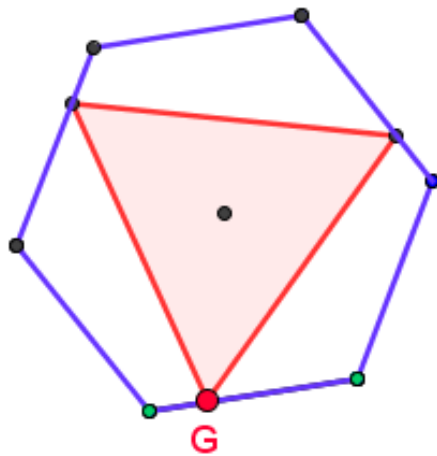


$(3;6)$

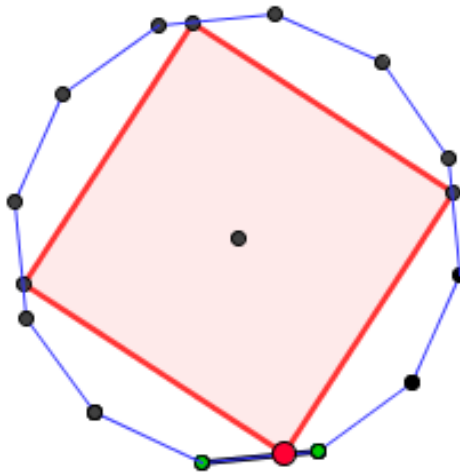


$(m;km)$

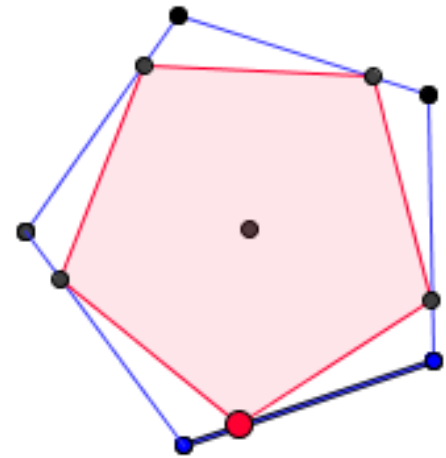
$(3;3k)$



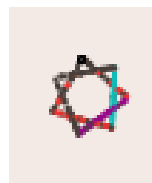
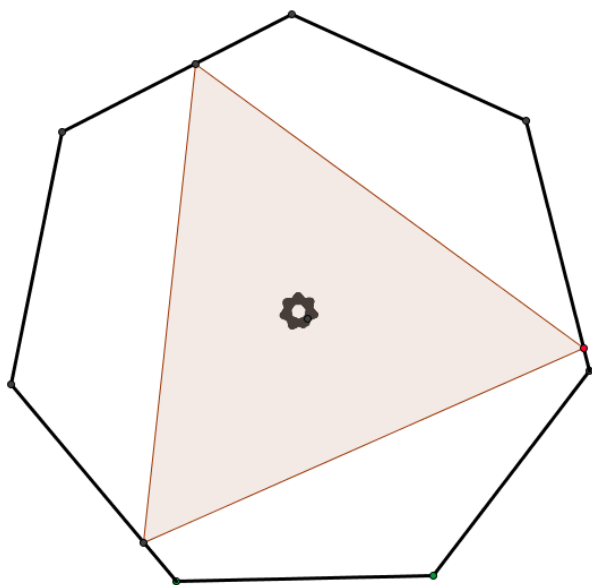
$(4;4k)$



$(5;5k)$

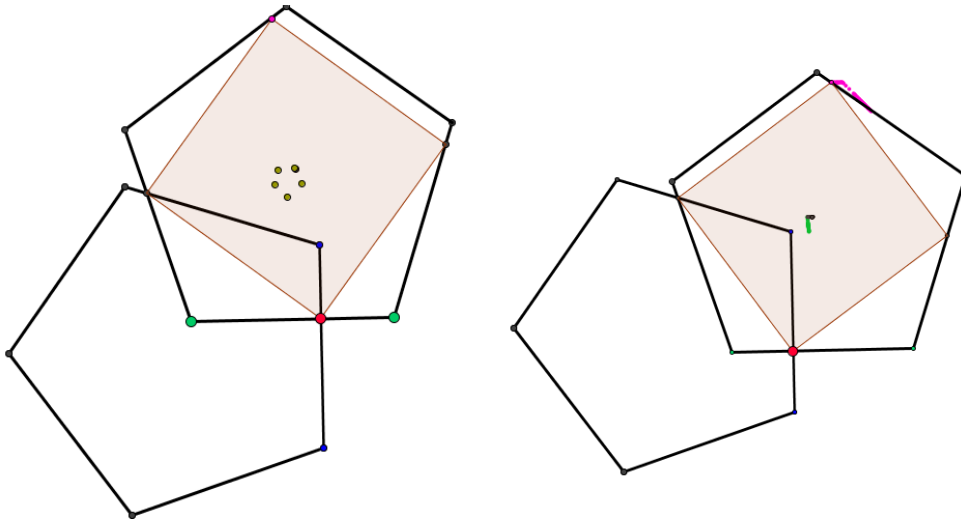


(3;7) model

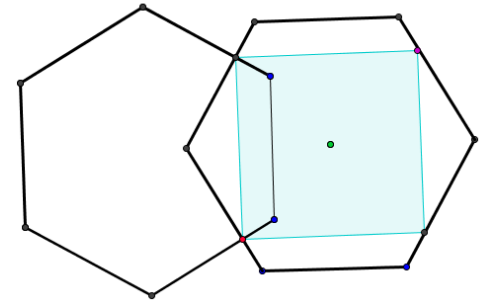


$(4;n)$

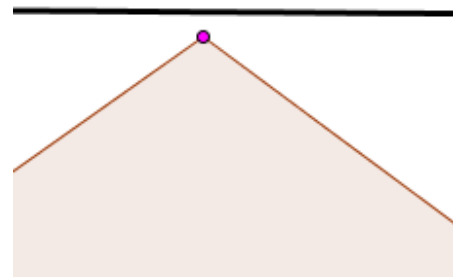
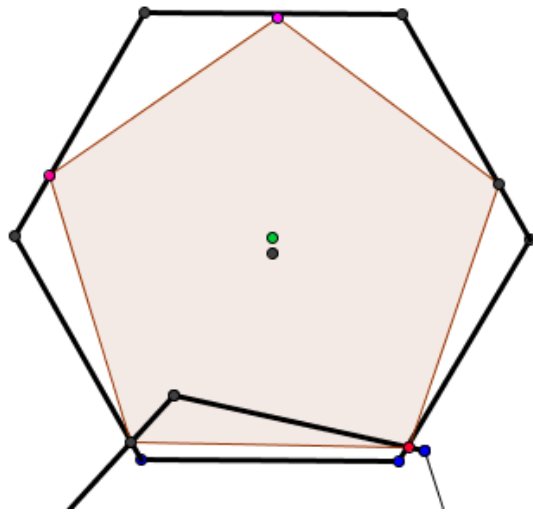
$(4;5)$ model



$(4;6)$ model

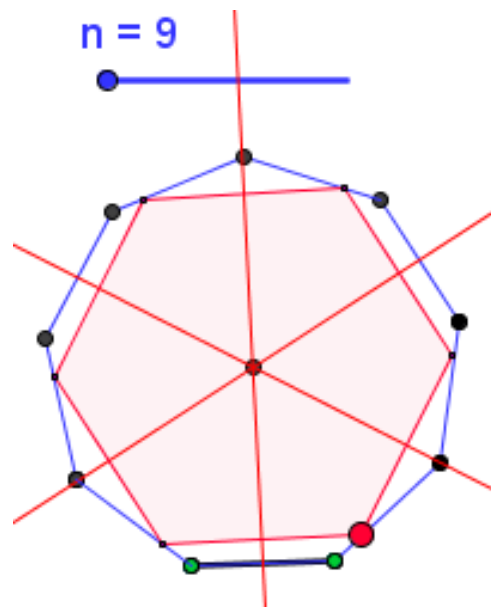


(5;6) model

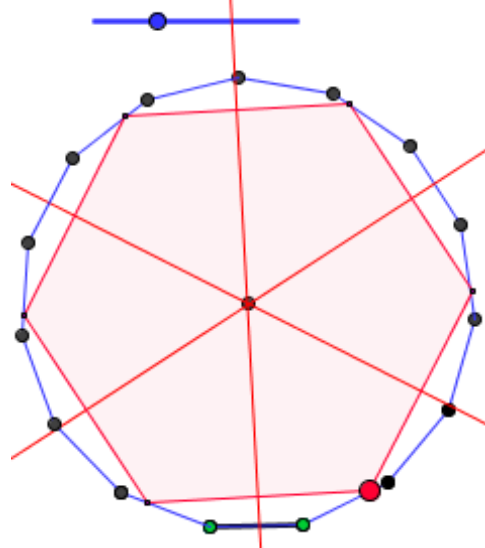


$$\left(m; \frac{m}{2} + km\right)$$

(6;3+6k)

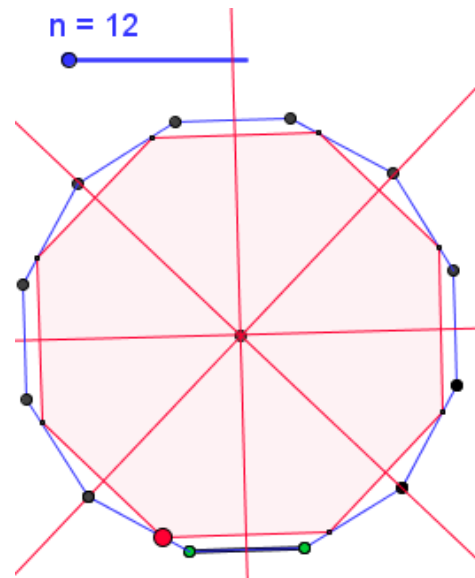


$n = 15$



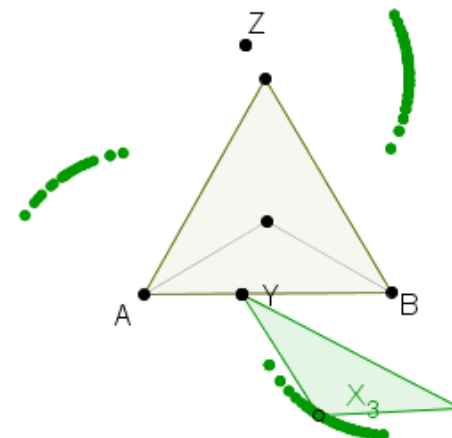
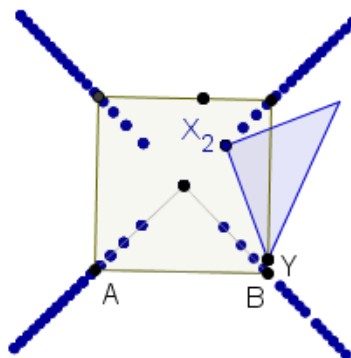
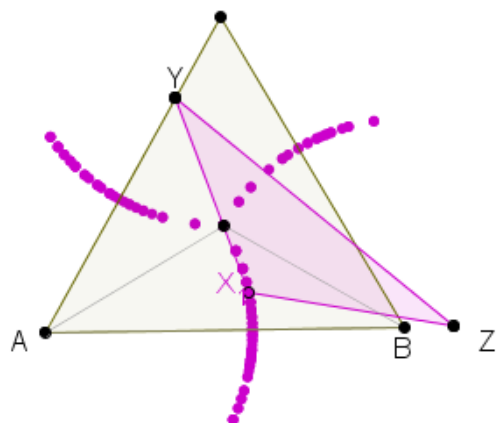
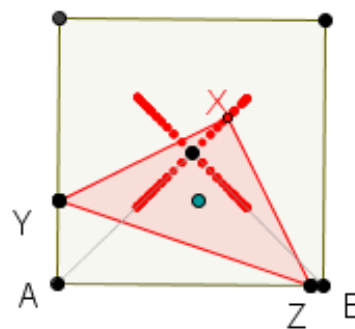
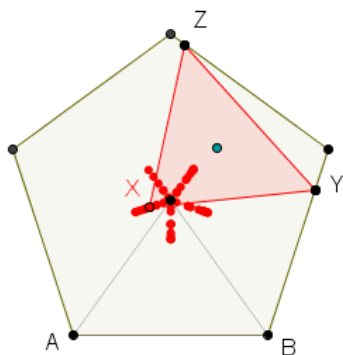
(8;4+8k)

$n = 12$

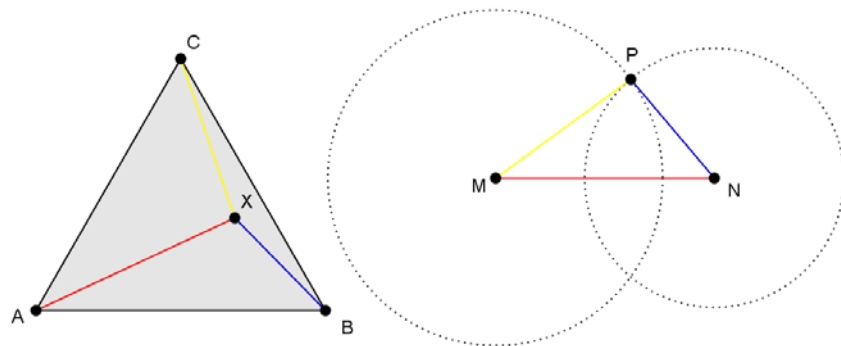


По една олимпийска задача

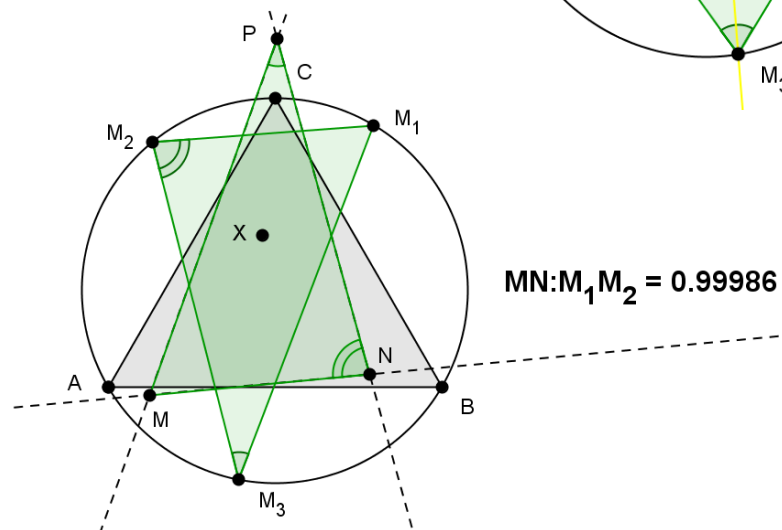
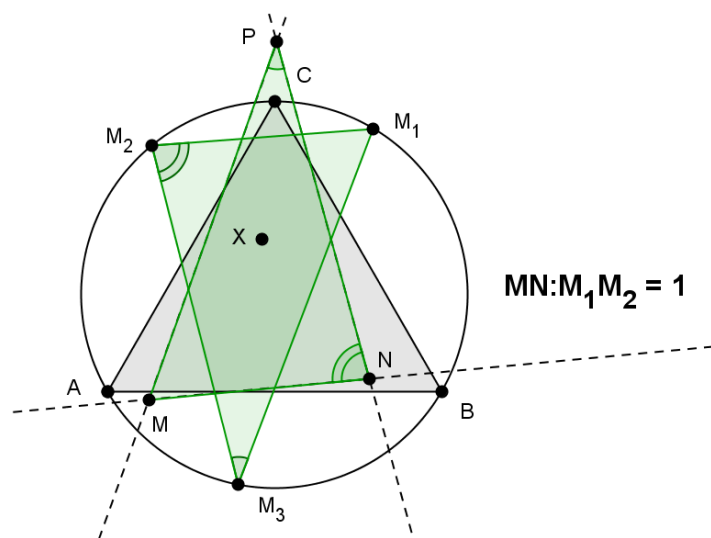
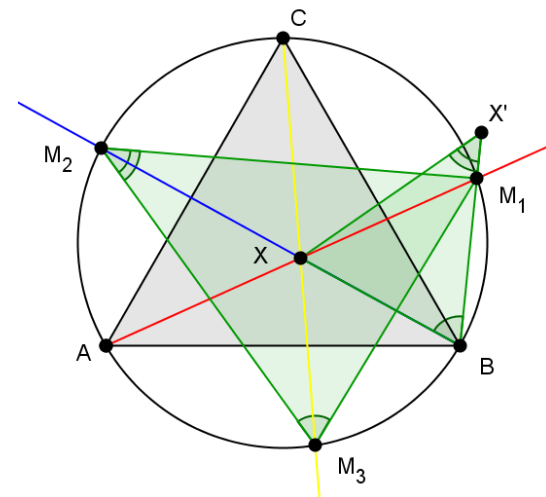
Сте́ла Ата́насова



Историята на един проект

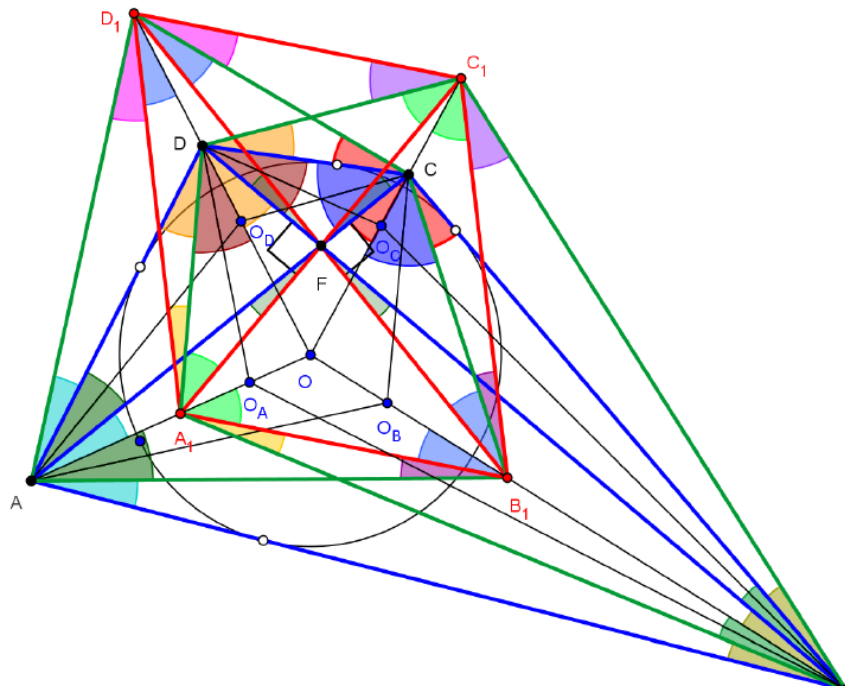


Яница Пехова



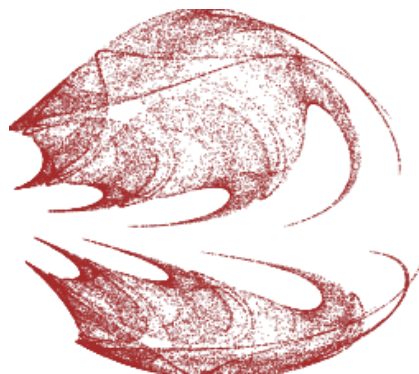
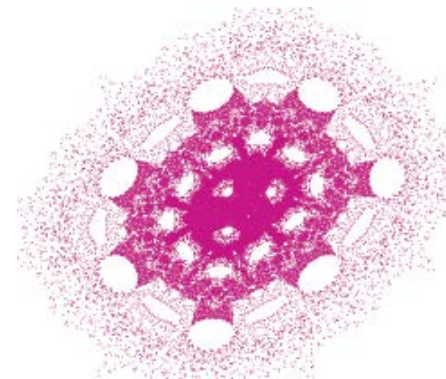
Когато просто решиш да мечтаеш

Калоян Буковски
Антон Белев

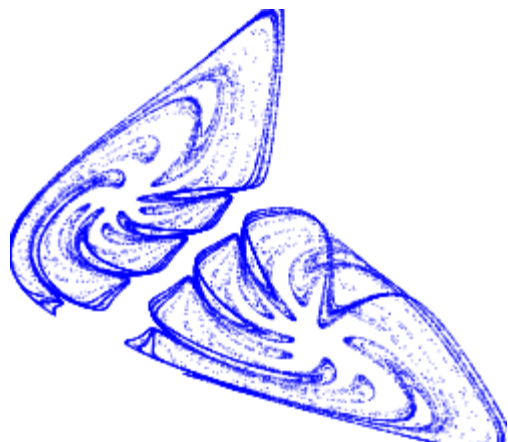


Калоян: Като цяло, причината за нашето „пристрастяване“ към динамичната математика е това, че макар и да работехме сами, имаше хора, които ни запалиха по идеята, такива, които поддържаха огъня и такива, които допринесоха за това този огън да се превърне във вечен...

Могат ли уравнения да вълнуващи?



Нели Димитрова



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

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

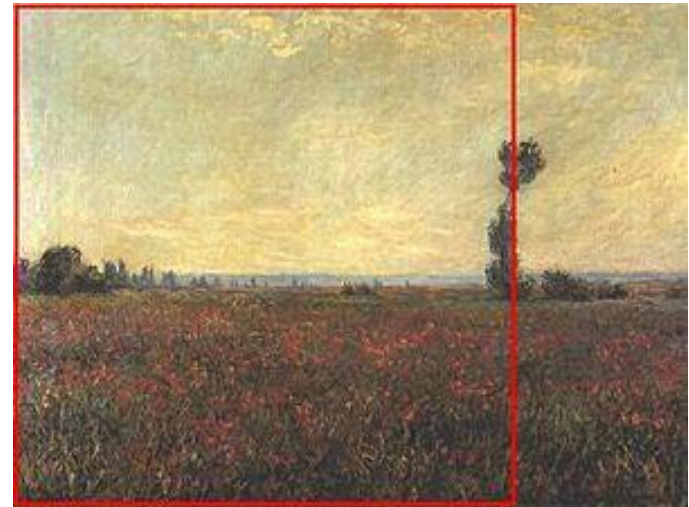
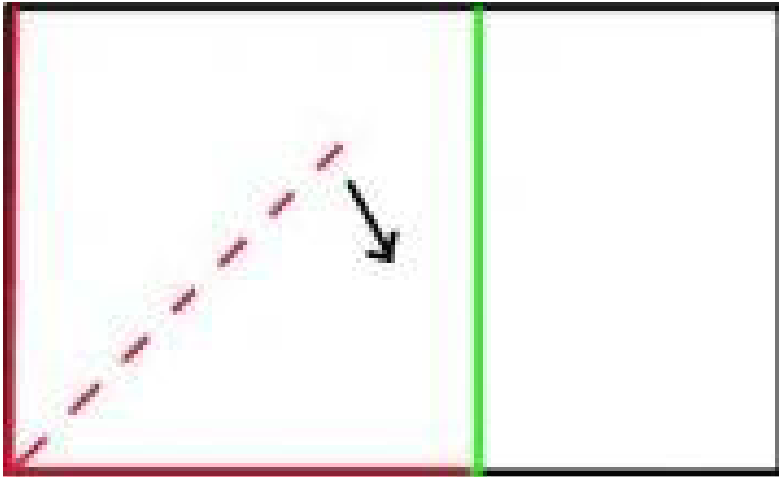
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> restart:
> with(plots):
> iterations:=35000:
> a:=array(1..6, [-1.2, -0.6, -0.5, 0.1, -0.7, 0.2]);
> b:=array(1..6, [-0.9, 0.9, 0.1, -0.3, -1, 0.3]);
> x:=array(0..iterations):
> y:=array(0..iterations):
> x[0]:=0: y[0]:=0: #initial condition
> for i from 0 to iterations-1 do
>   x[i+1]:=a[1]+a[2]*x[i]+a[3]*(x[i])^2+a[4]*x[i]*y[i]
>   +a[5]*y[i]+a[6]*(y[i])^2:
>   y[i+1]:=b[1]+b[2]*x[i]+b[3]*(x[i])^2+b[4]*x[i]*y[i]
>   +b[5]*y[i]+b[6]*(y[i])^2
> end do:
> points:=[[x[n],y[n]]$n=1..iterations]:
> pointplot(points,style=point,symbol=solidcircle,symbolsize=4,
> color=blue,axes=boxed,labels=['x','y']);

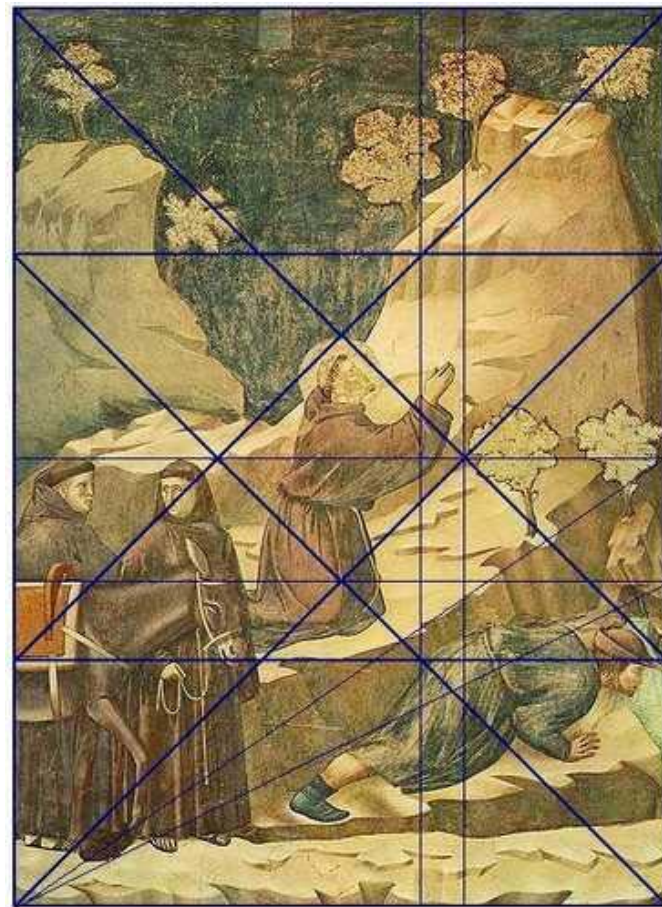
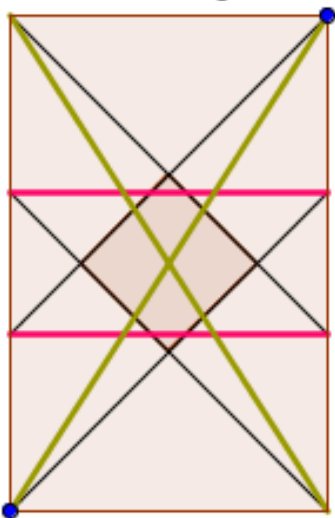
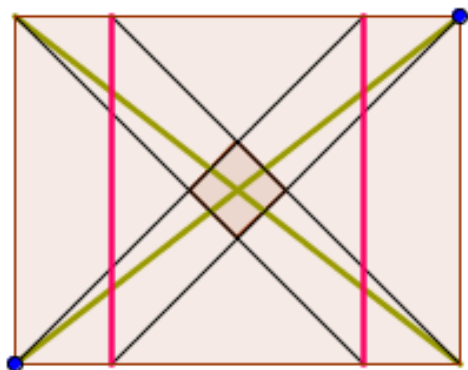
```

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

Геометрични конструкции като изследователски инструментариум

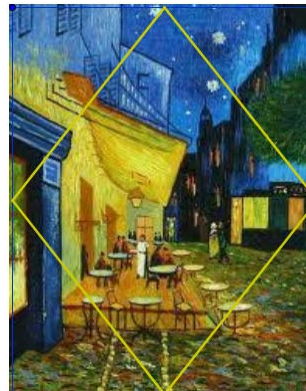
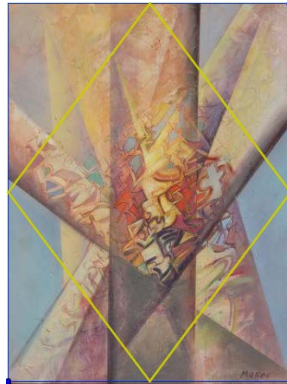
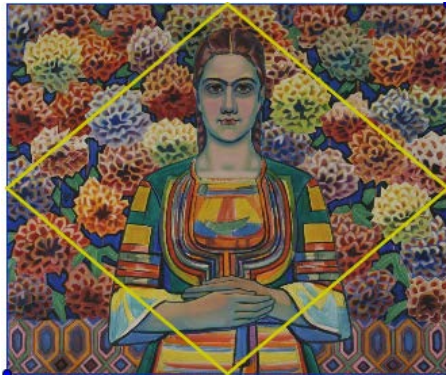
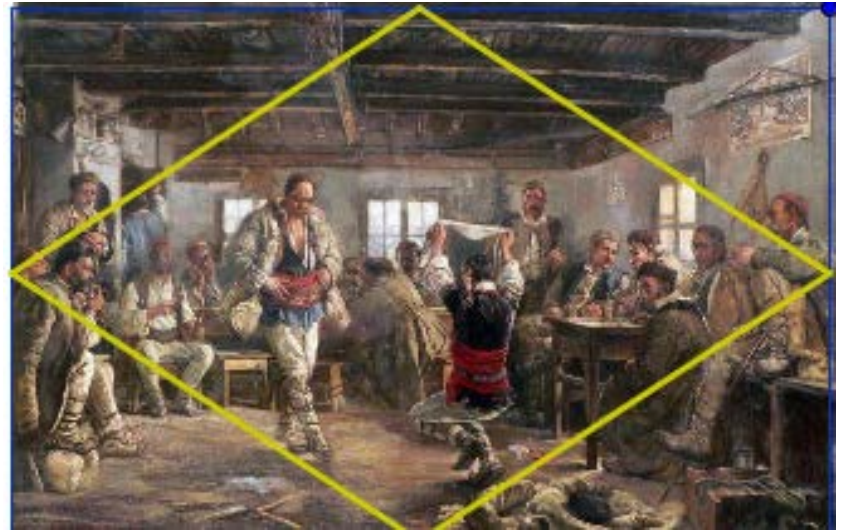


Изследване с рабатмант

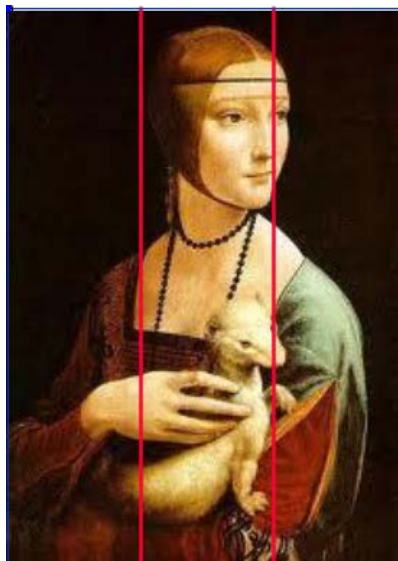
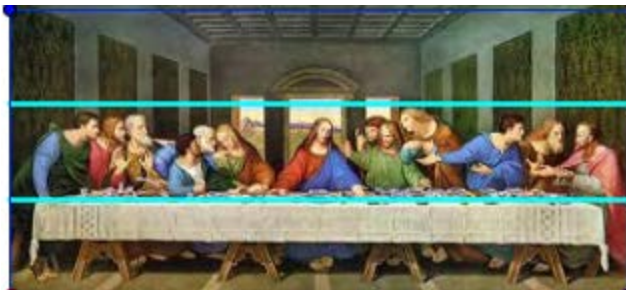




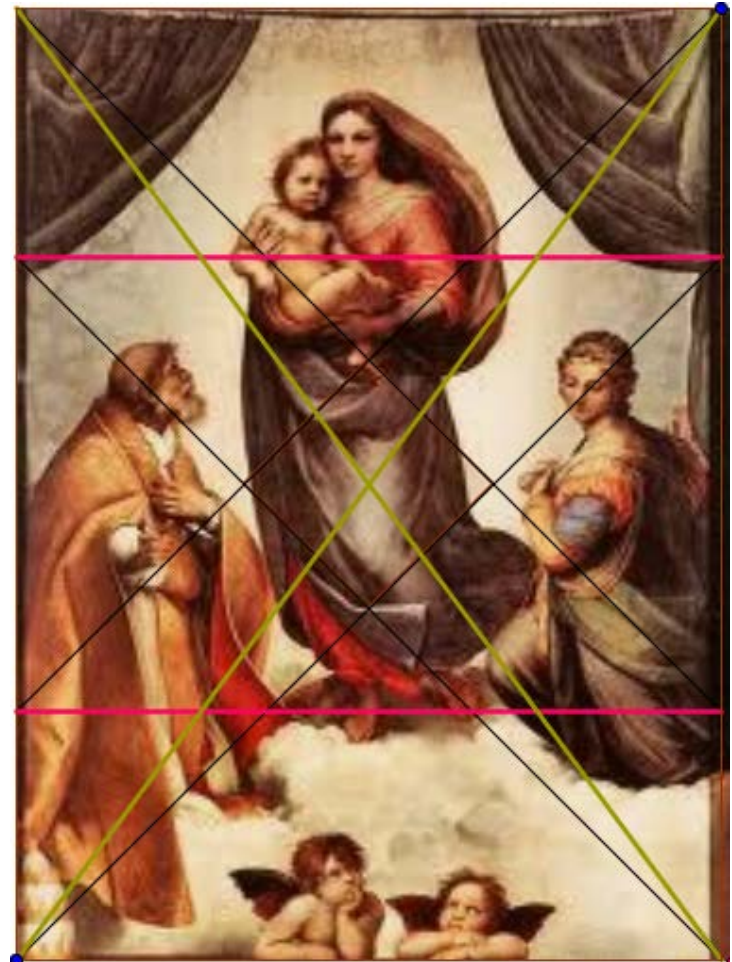
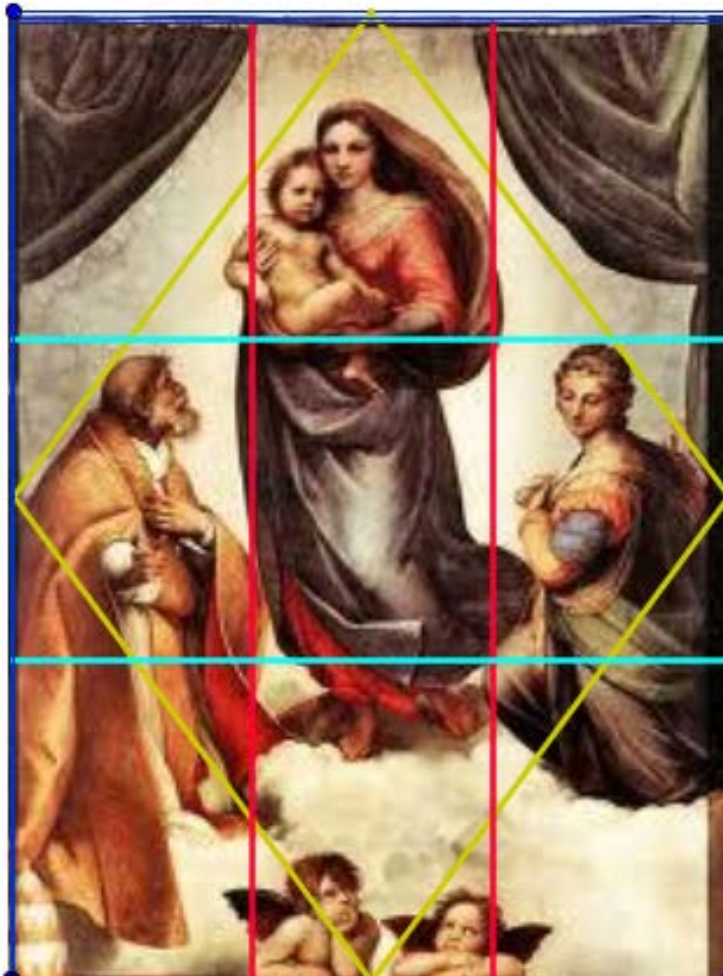
Ромб

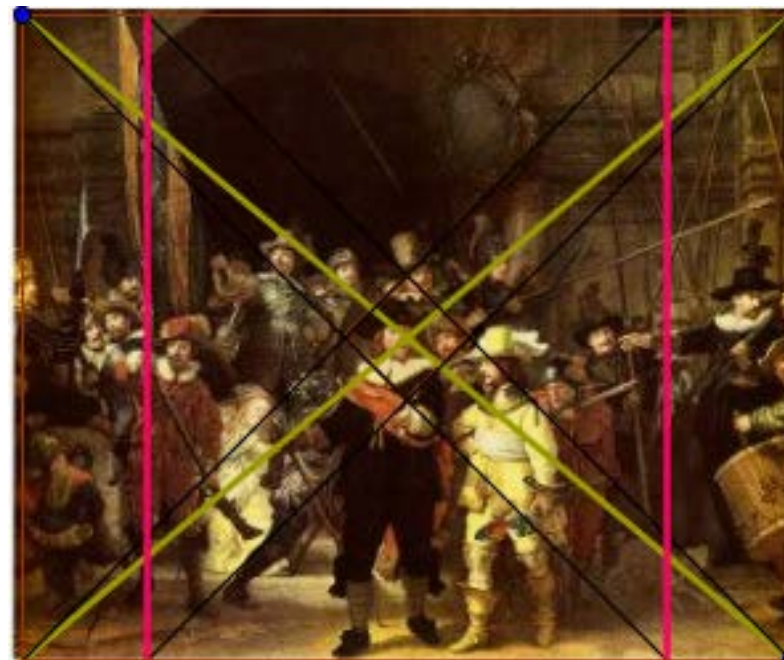
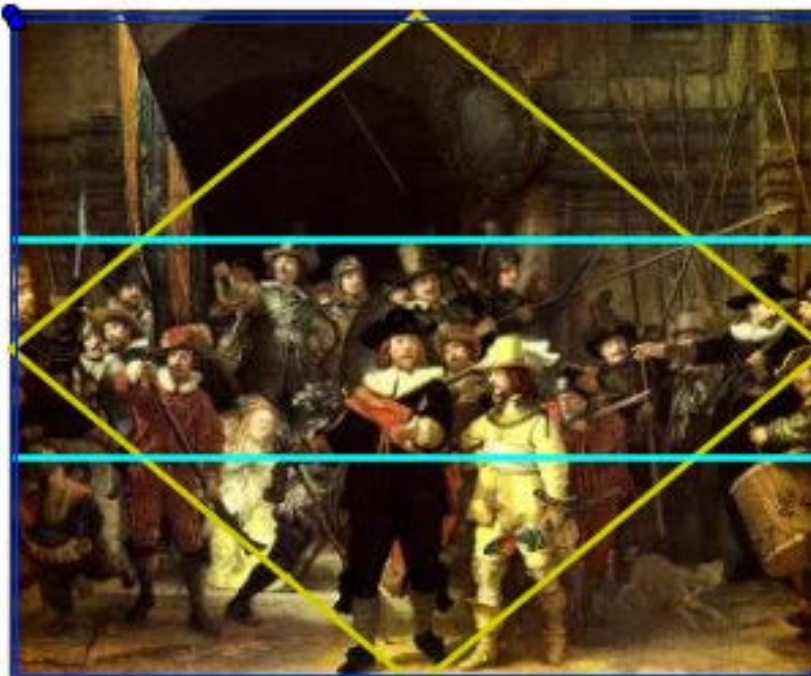


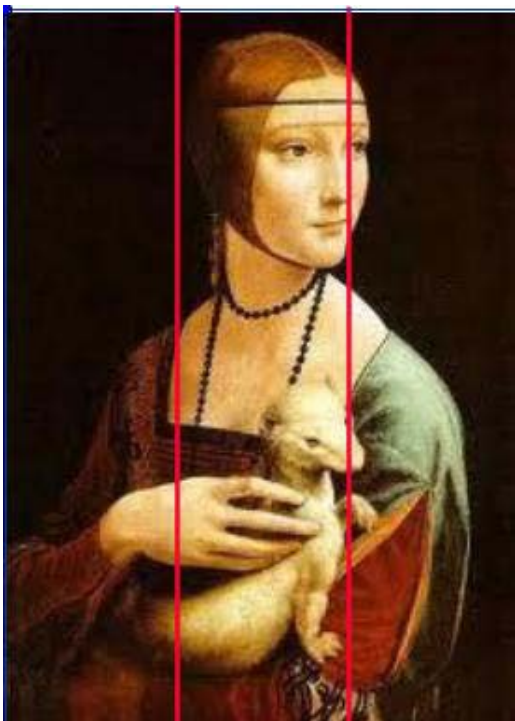
Трисекция

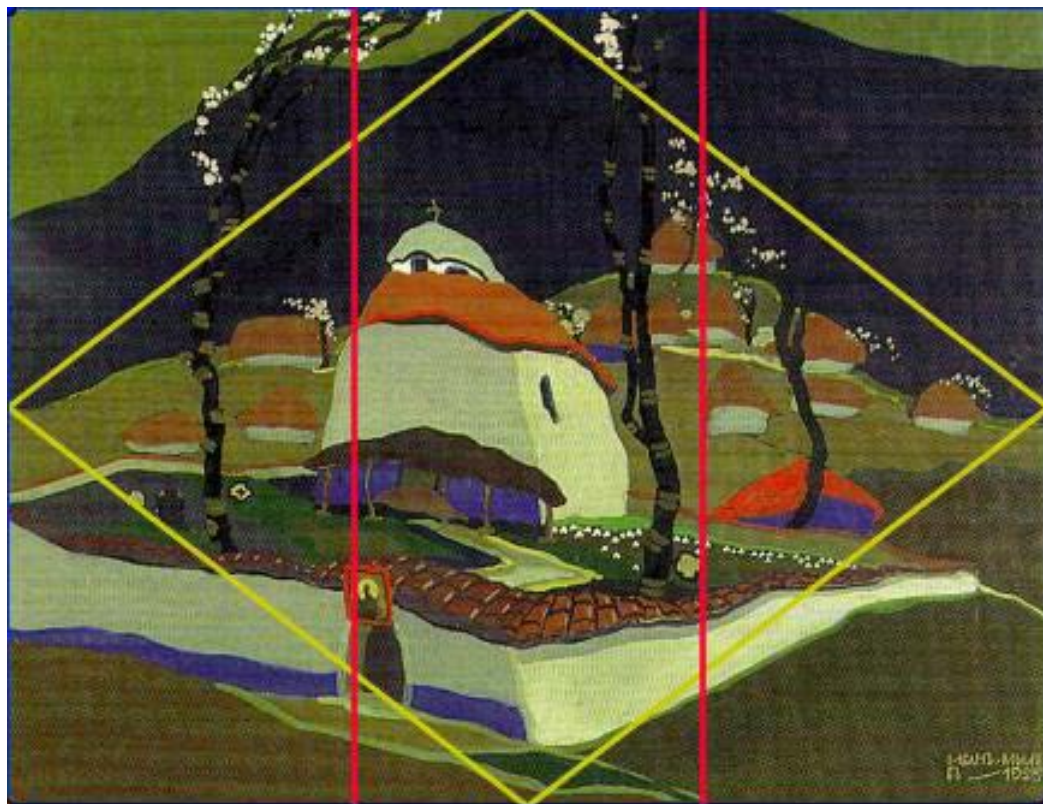


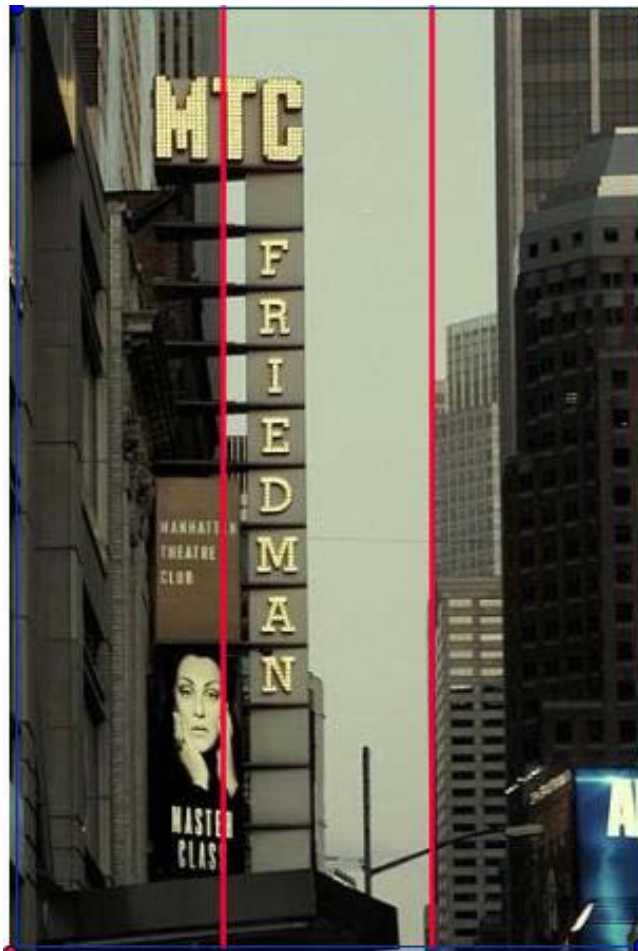
Композиции от конструкции

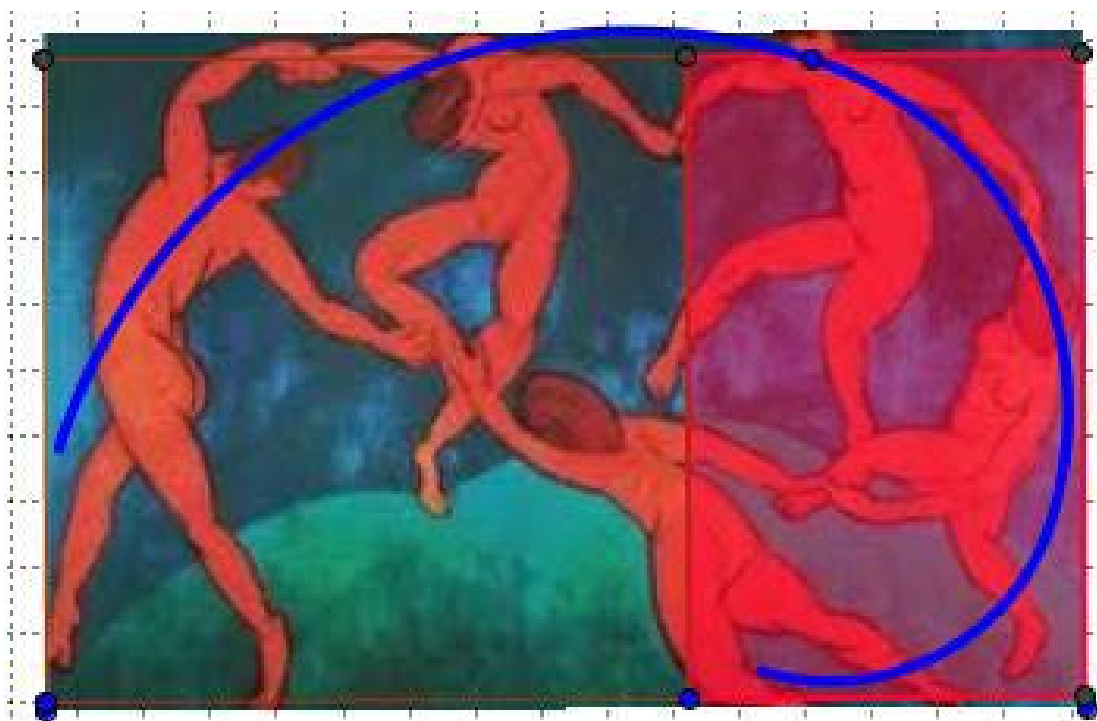












Arrange for a picture in two ways (according to two methods for composition):

- 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

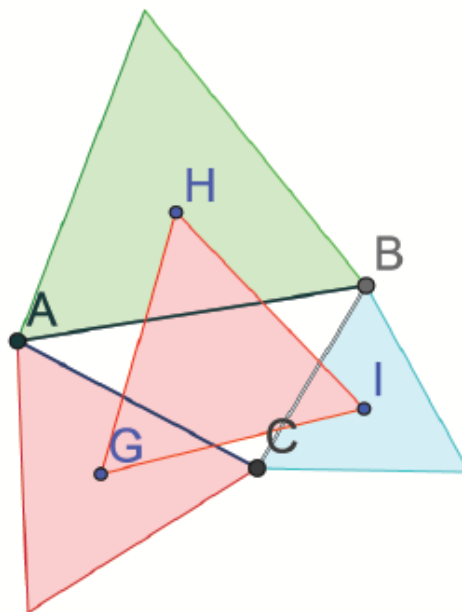
Make an advertisement in two ways of:

- your school
- your hobby
- natural juices
- an old town

Някои материали на партньорите

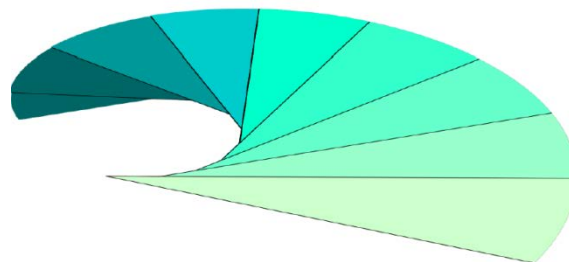
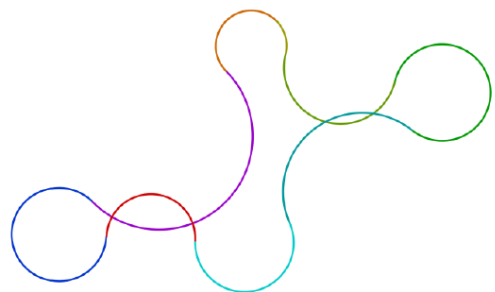
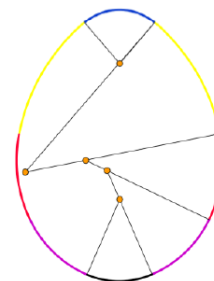
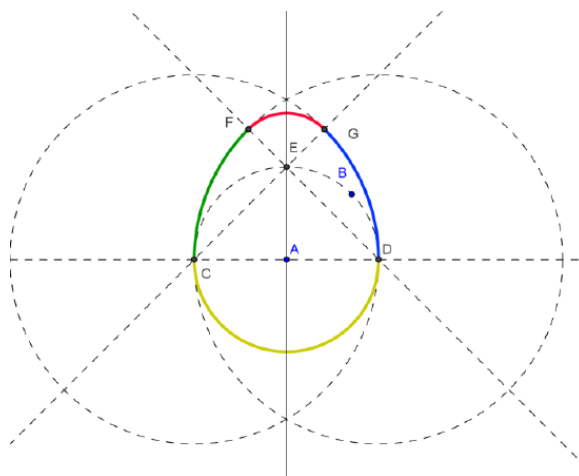
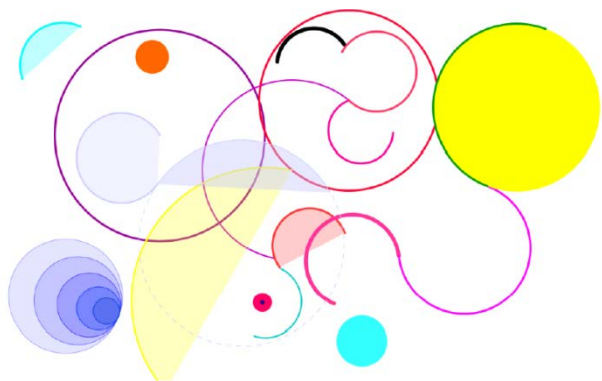
Проблемът на Наполеон

Владимир Георгиев



Яйцето на Евклид

Freyja Hreinsdóttir



А сега малко динамика и от вас:

Кои материали от проекта DynaMath искате да видите на български?