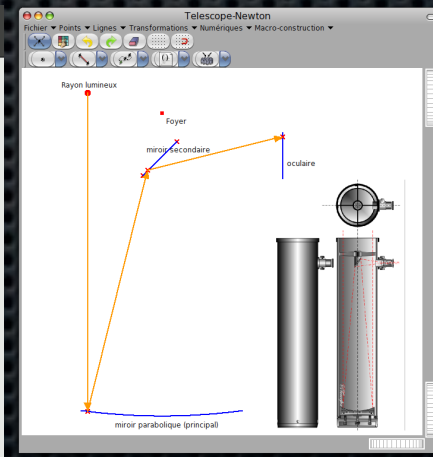
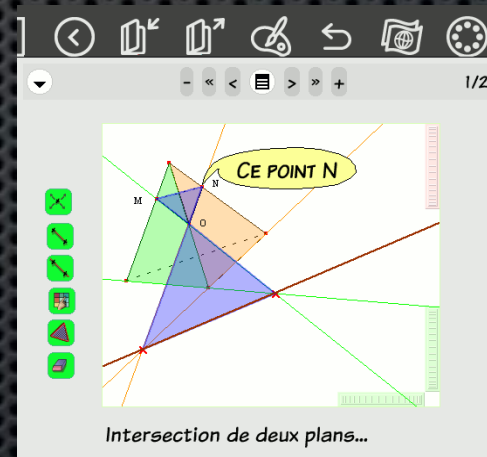
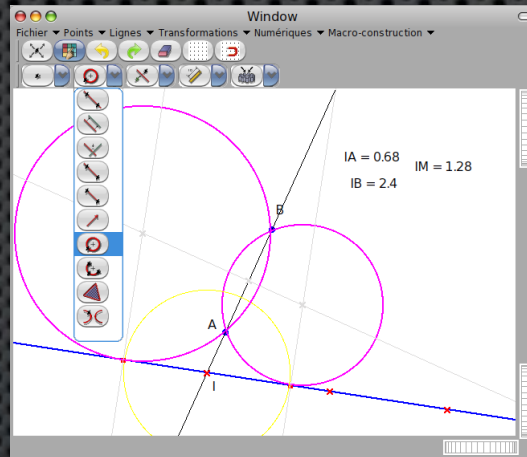
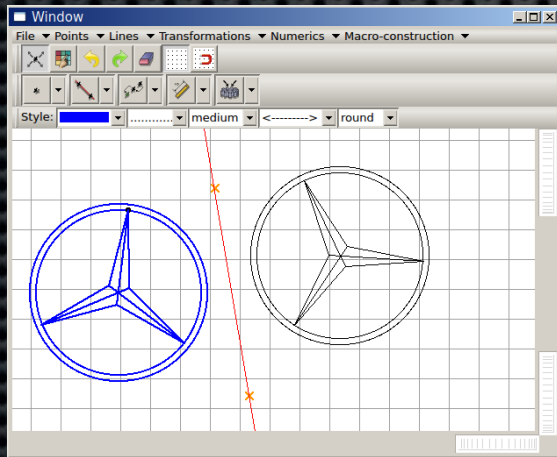
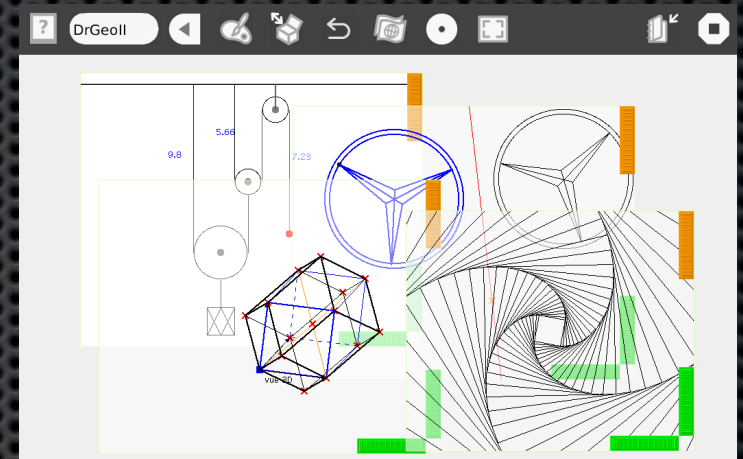
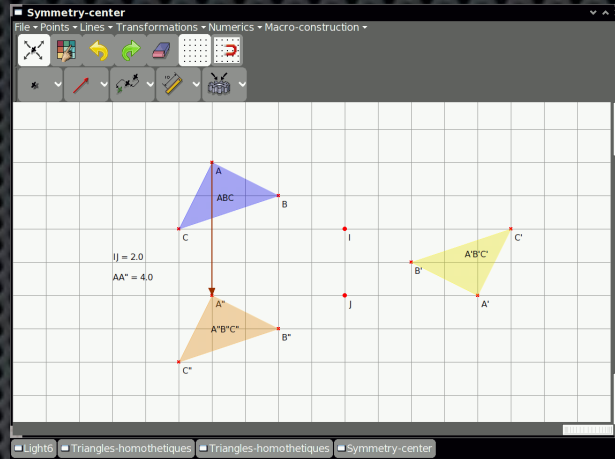
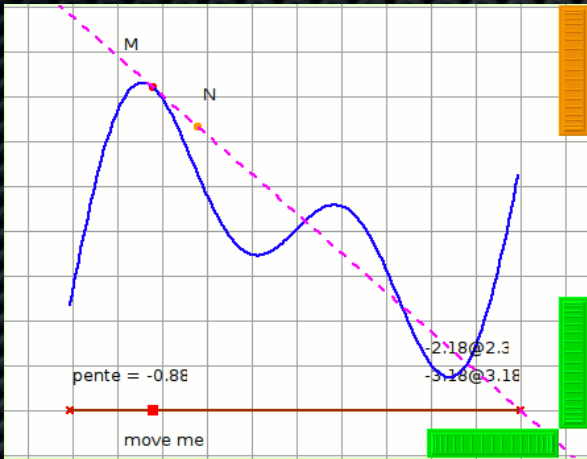


Dr. Geo
Interactive Geometry
with
Pharo Smalltalk

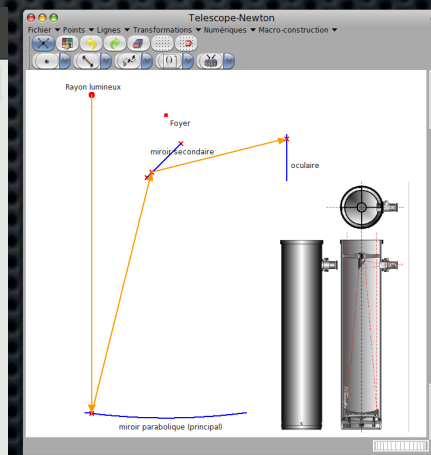
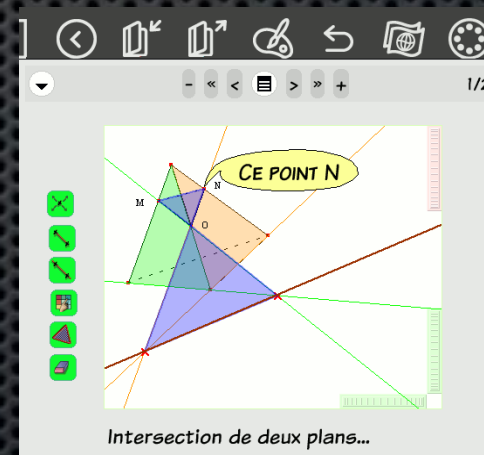
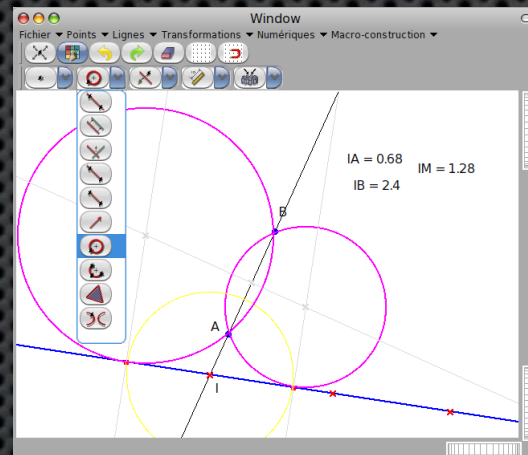
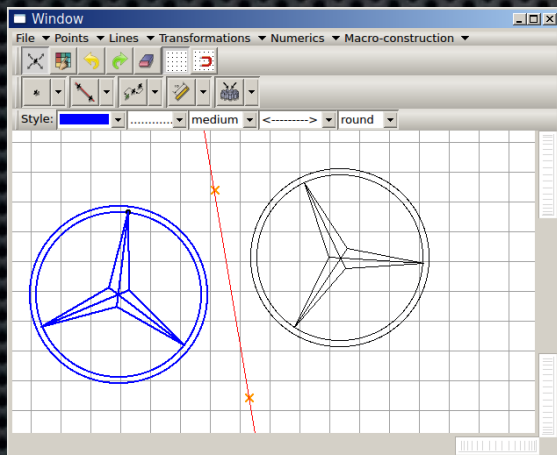
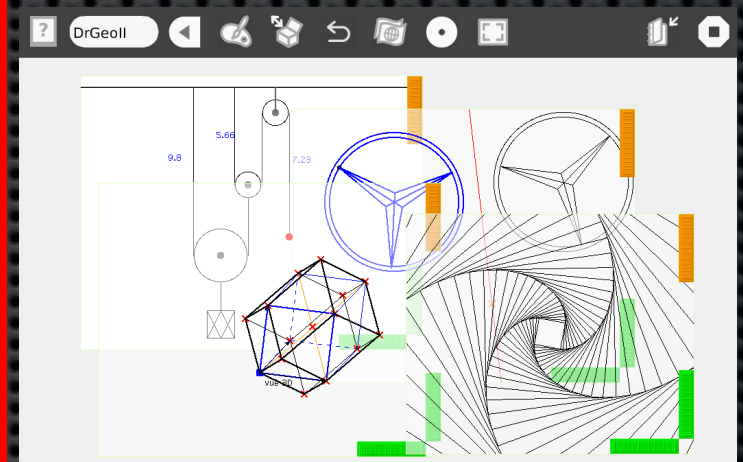
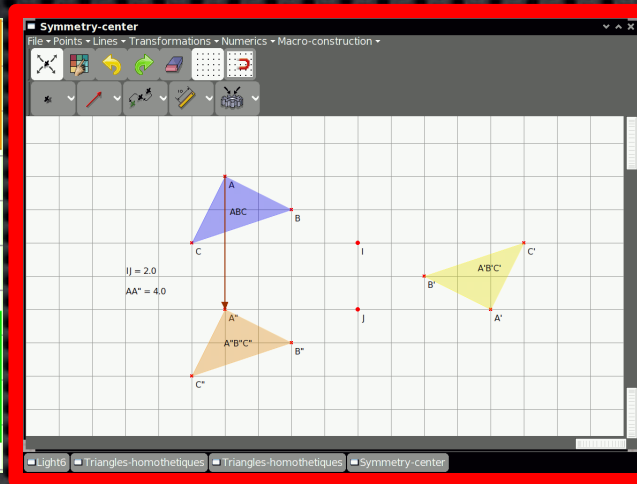
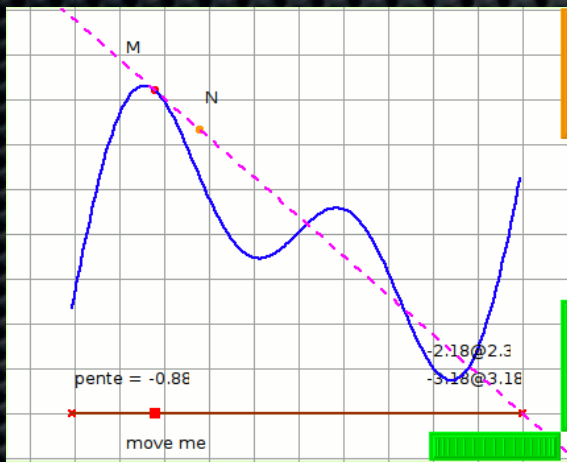
Hilaire Fernandes



Interactive Geometry ?



Euclidean Geometry



Zoom

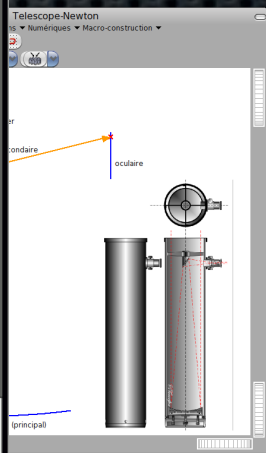
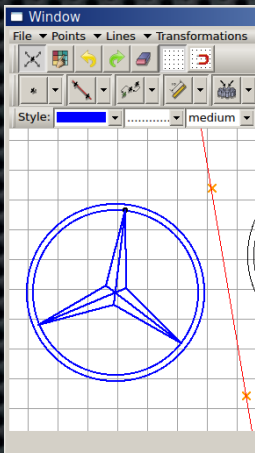
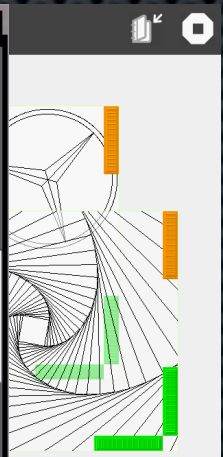


Symmetry-center

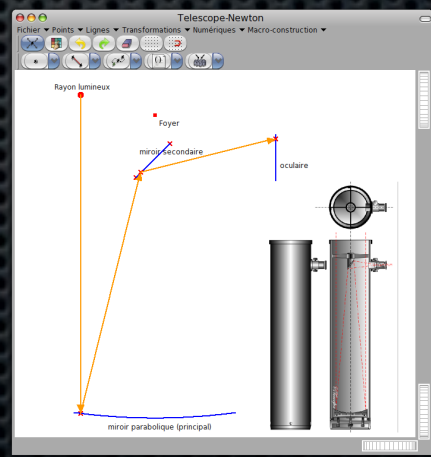
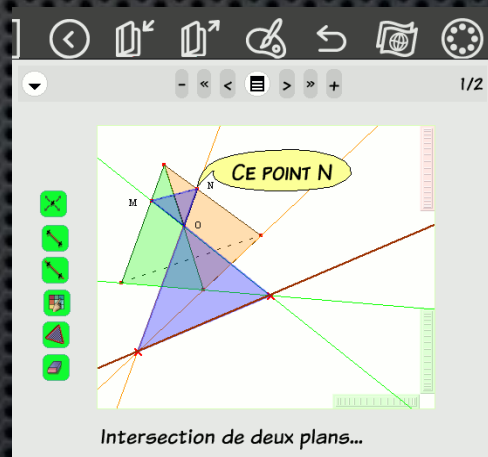
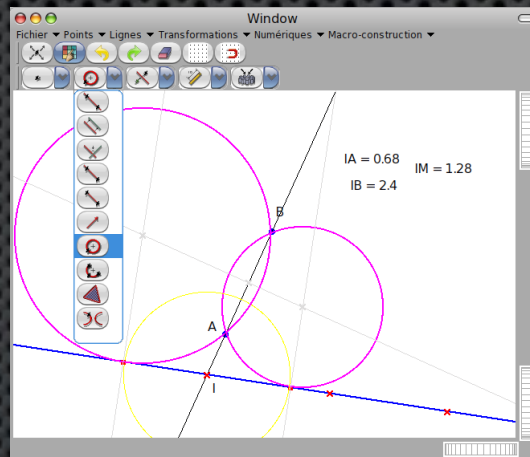
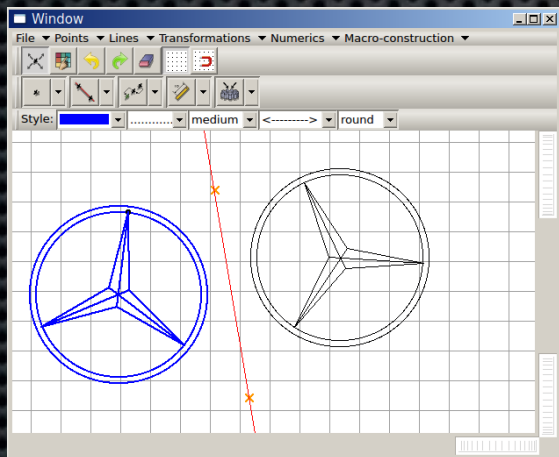
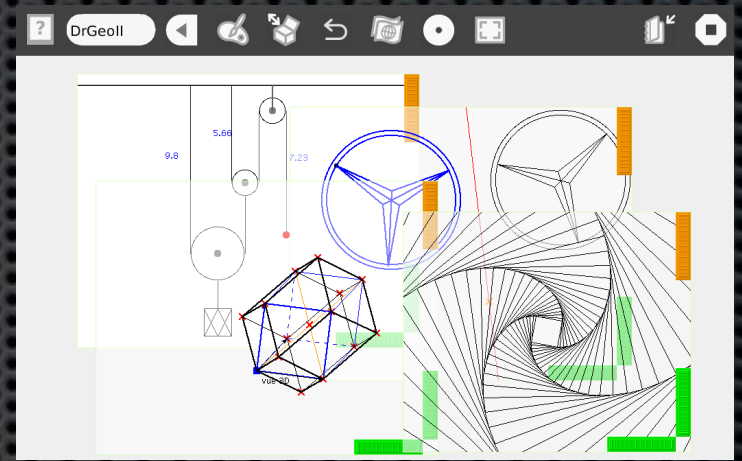
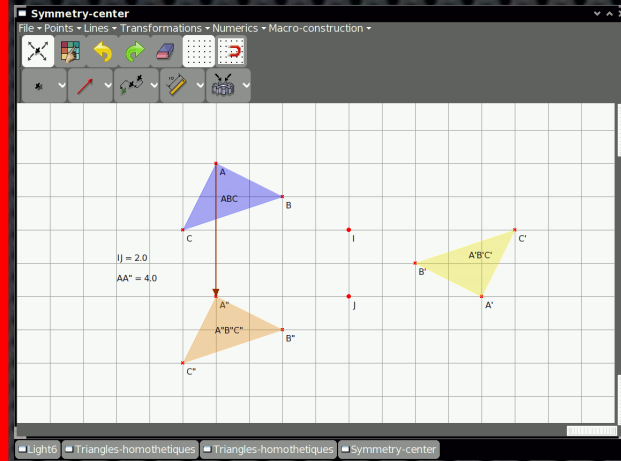
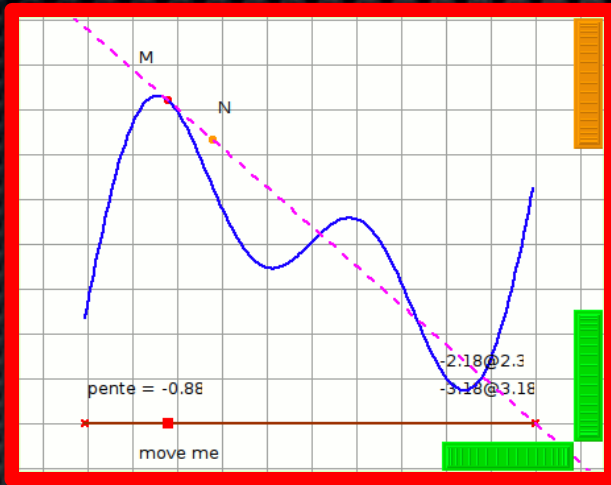
File ▾ Points ▾ Lines ▾ Transformations ▾ Numerics ▾ Macro-construction ▾

$IJ = 2.0$
 $AA'' = 4.0$

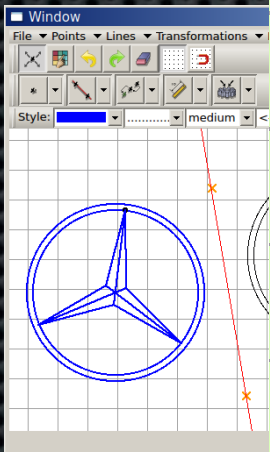
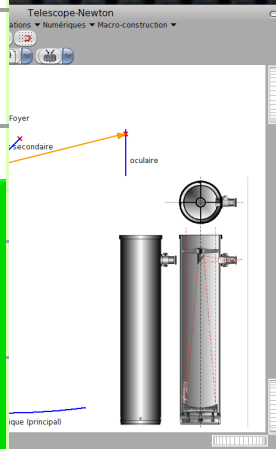
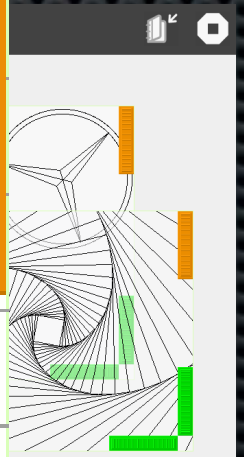
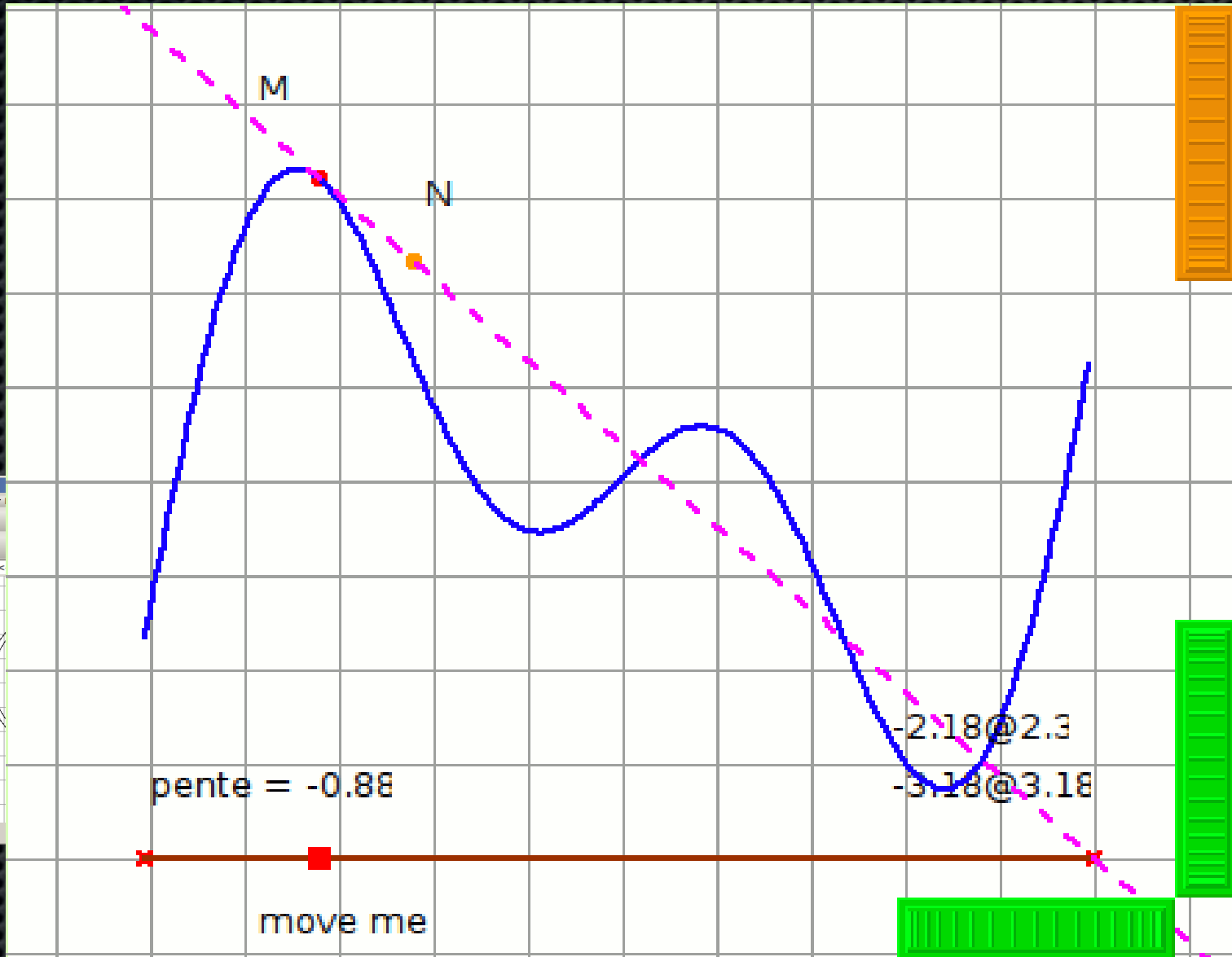
Diagram illustrating a geometric construction on a grid. A blue triangle ABC is shown above a yellow triangle $A'B'C'$. A vertical line passes through point I (the center of symmetry) and point A . Below the line, point A'' is marked, and a red arrow points from A to A'' . A third triangle, $A''B''C''$ (orange), is shown below A'' . Points C , B , C' , B' , C'' , and B'' are also labeled. Text labels indicate $IJ = 2.0$ and $AA'' = 4.0$.



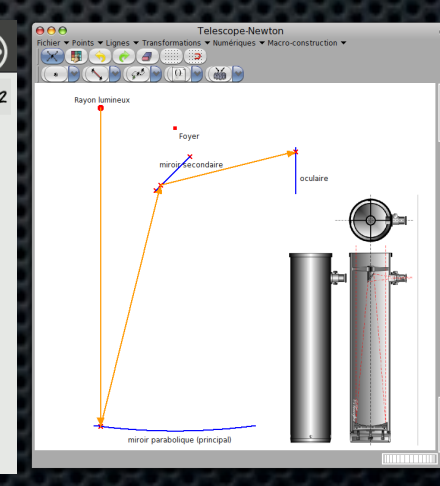
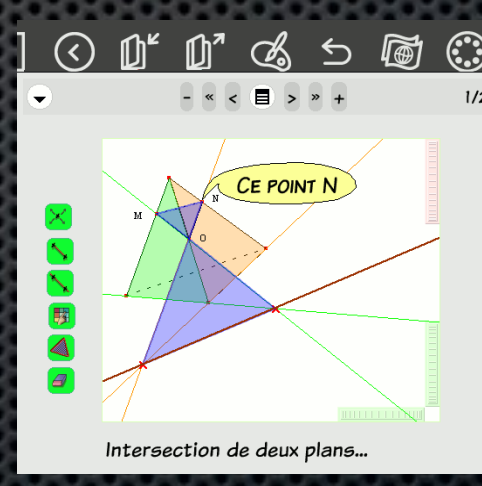
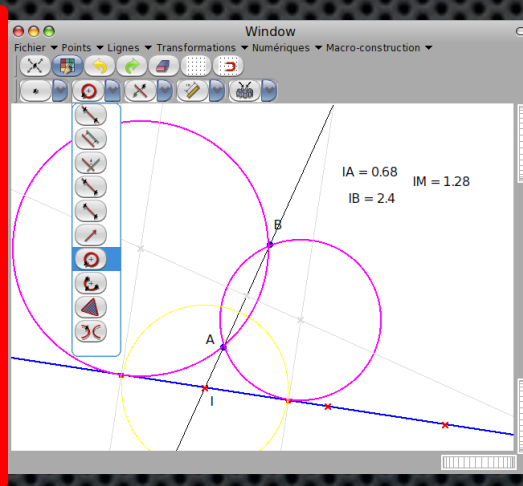
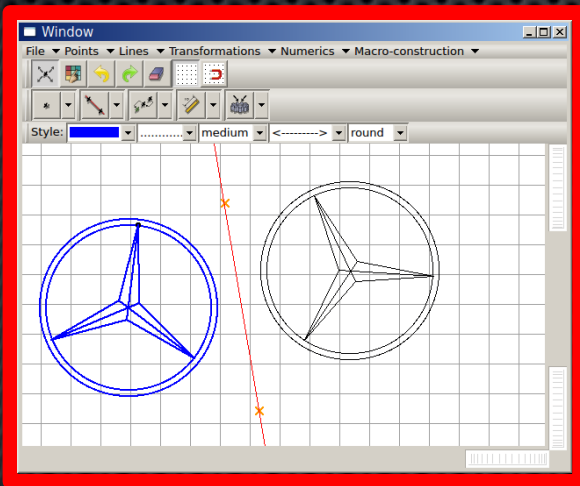
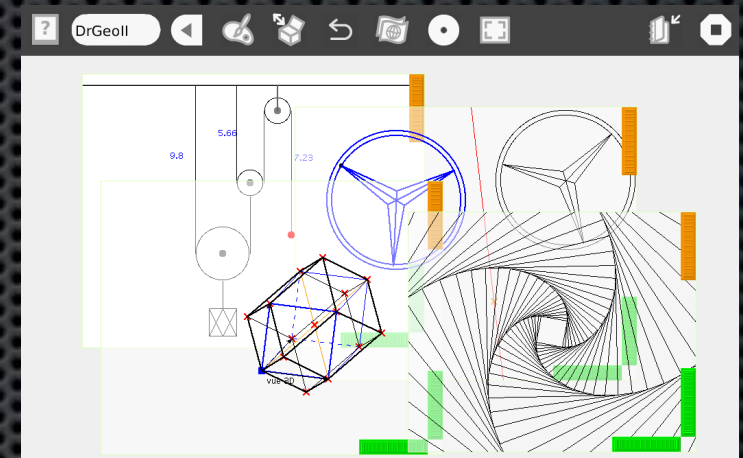
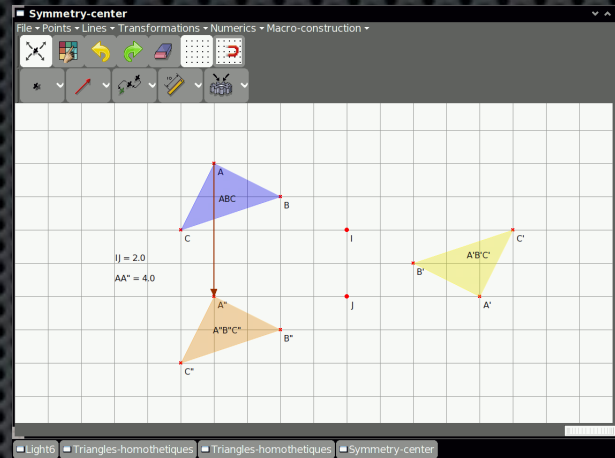
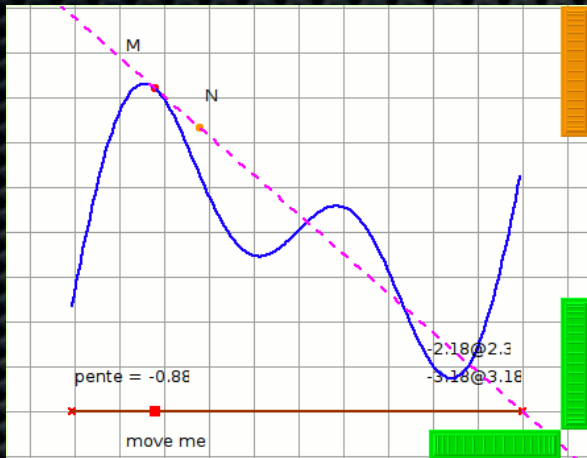
Analysis



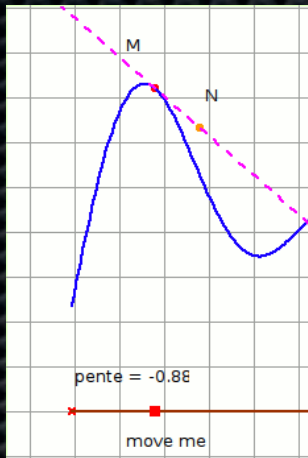
Zoom



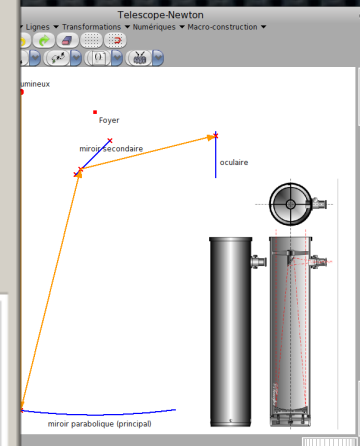
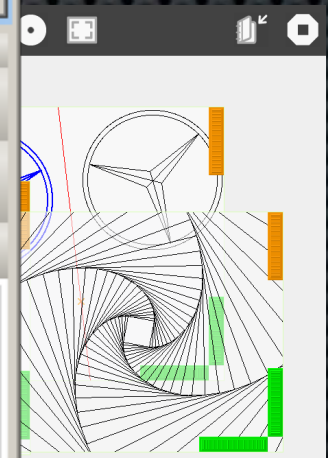
Des transformations



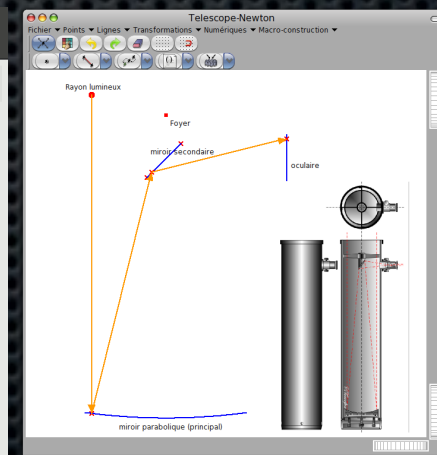
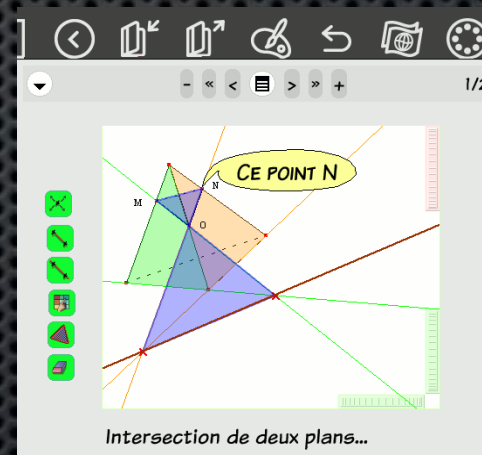
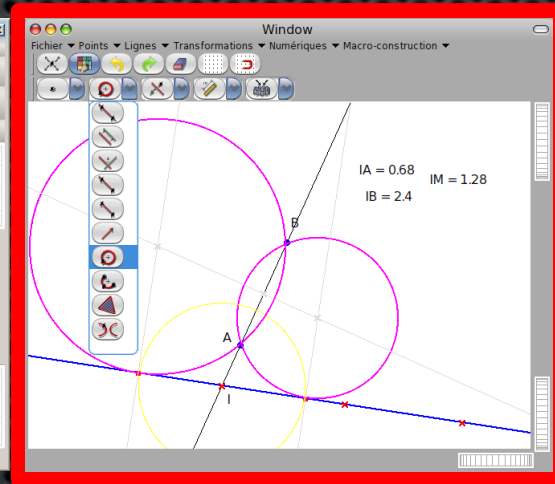
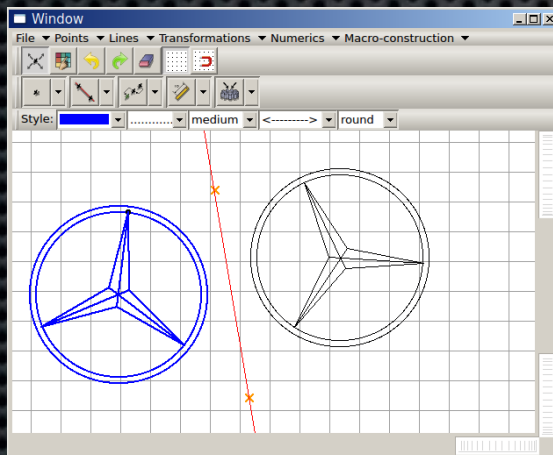
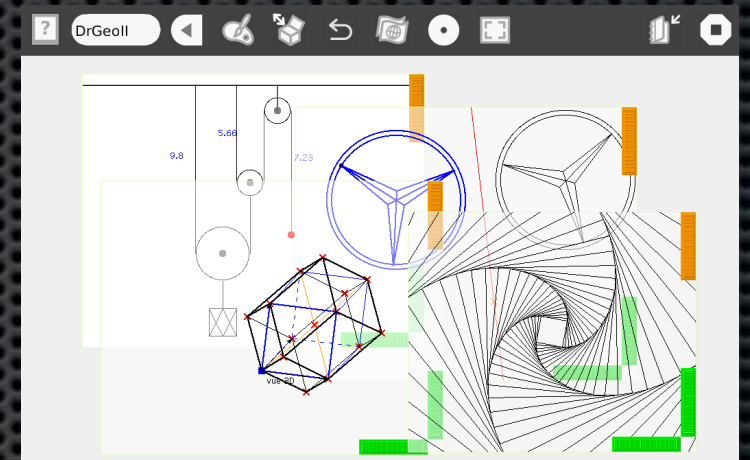
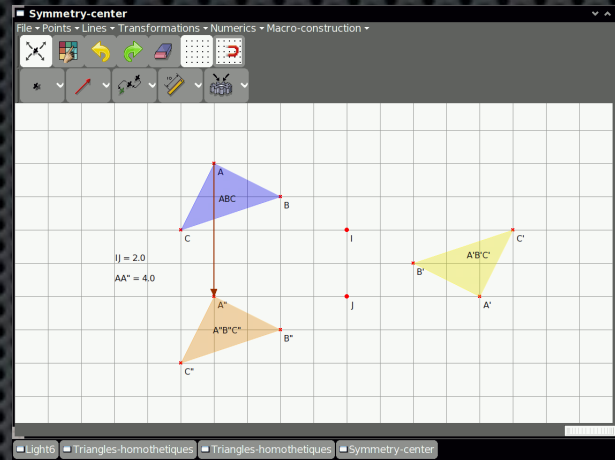
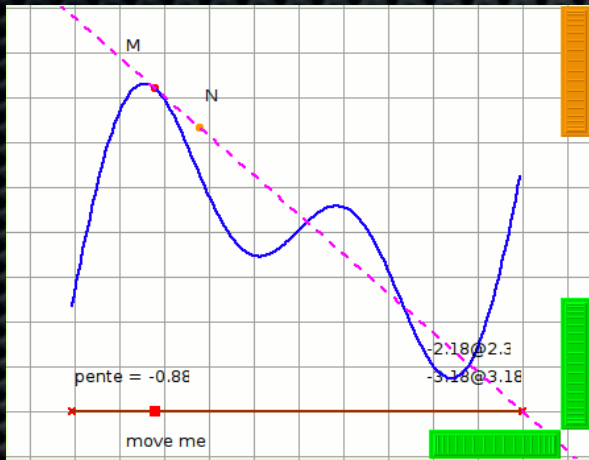
Zoom



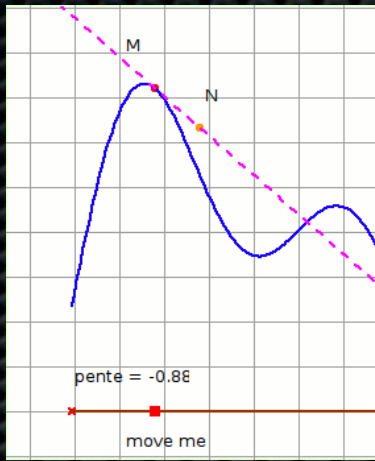
A screenshot of a software window titled "Window". The menu bar includes "File", "Points", "Lines", "Transformations", "Numerics", and "Macro-construction". Below the menu are two toolbars with various icons. A "Style:" section shows a blue color swatch, a dotted line style, the word "medium", and a "round" corner style. The main workspace is a grid with two diagrams: a blue three-lobed shape on the left and a black three-lobed shape on the right. A red dashed line passes through both shapes, with orange 'X' marks at its ends.



Scripts



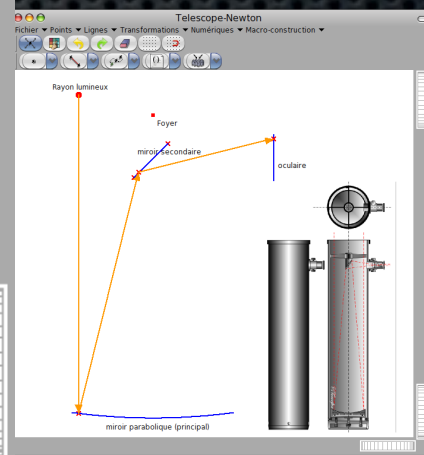
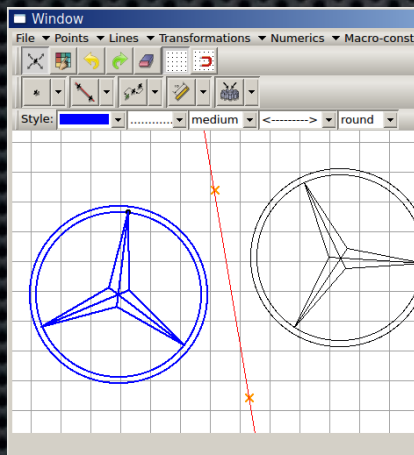
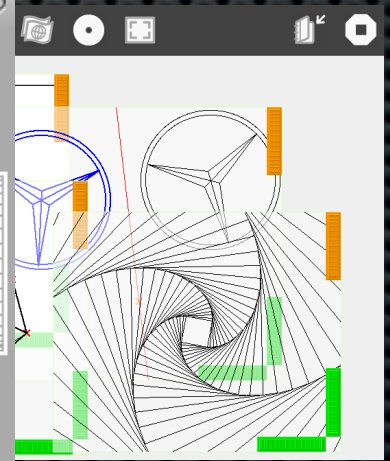
Zoom



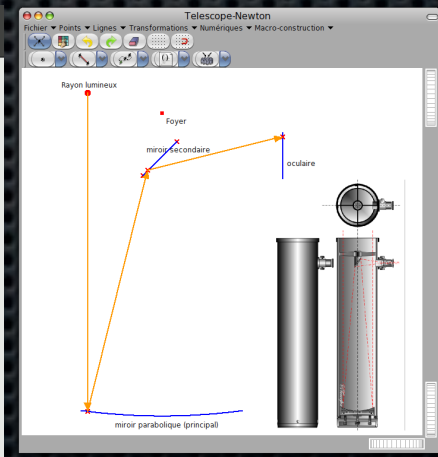
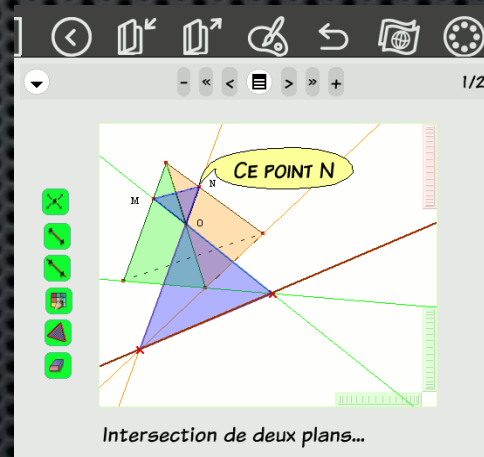
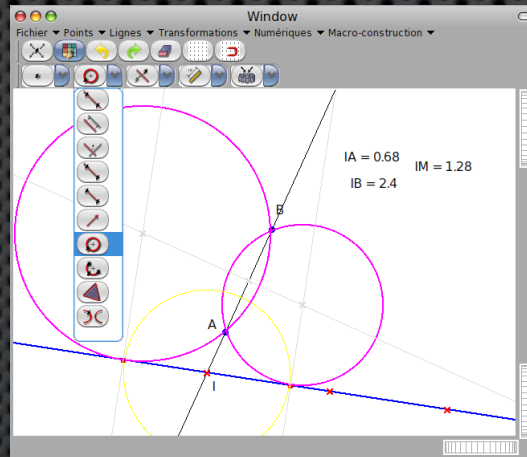
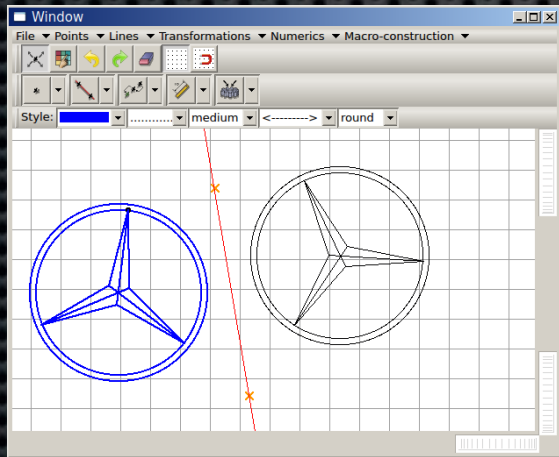
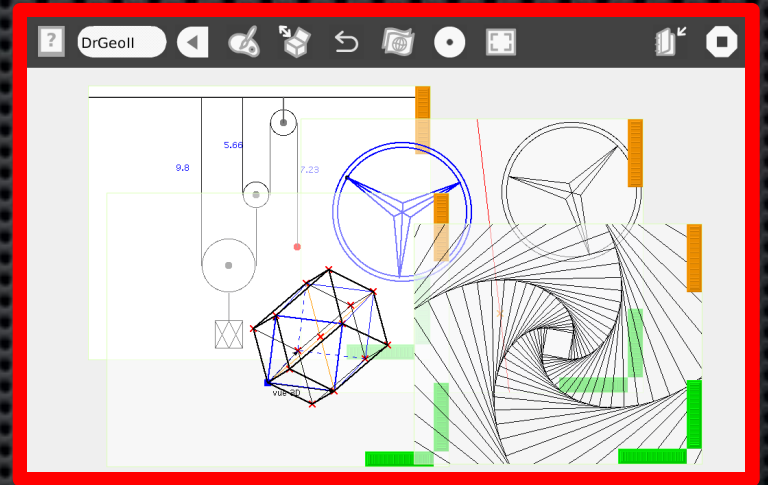
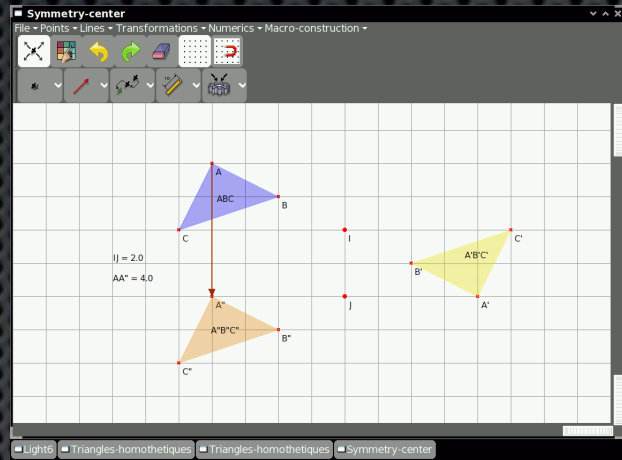
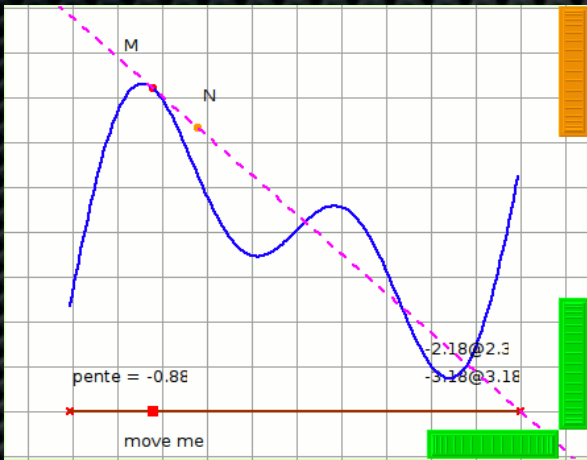
Window
Fichier ▾ Points ▾ Lignes ▾ Transformations ▾ Numériques ▾ Macro-construction ▾

IA = 0.68
IB = 2.4
IM = 1.28

The main window displays a geometric construction of a telescope. It features several overlapping circles in magenta and yellow, and a blue curve. Points A, B, and I are labeled on the diagram. A vertical toolbar on the left contains various geometric tools. The interface includes a menu bar and a toolbar at the top.



Various



Zoom

The image displays the DrGeoll software interface, which is used for technical drawing and 3D modeling. The main window shows a complex technical drawing with several zoomed-in areas highlighted by green rectangles. The drawing includes a pulley system with numerical values (9.8, 5.66, 7.23), a 3D wireframe model of a cube labeled "vue 3D", and a detailed view of a spiral or helix structure. The interface features a top toolbar with various icons for navigation and editing, and a bottom toolbar with a "Window" menu and a "Style" dropdown. A small inset window on the left shows a grid with a blue curve and a red line, and another inset on the right shows a detailed view of a mechanical component labeled "oculaire".

DrGeoll

9.8

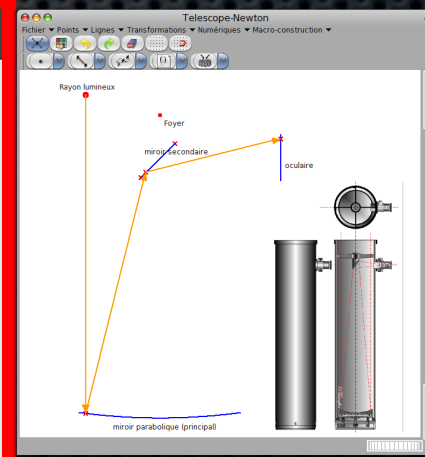
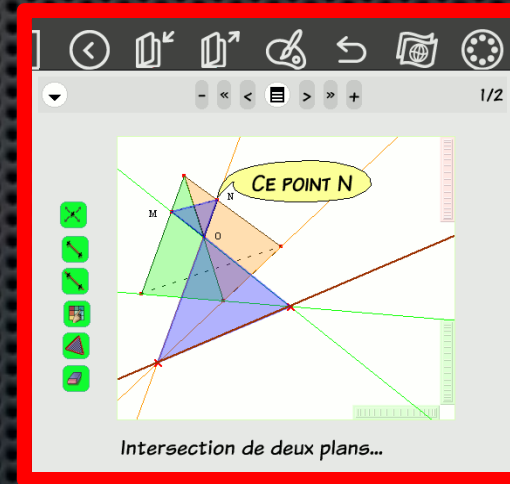
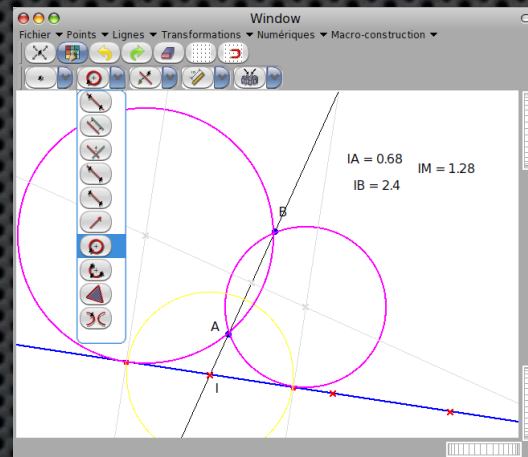
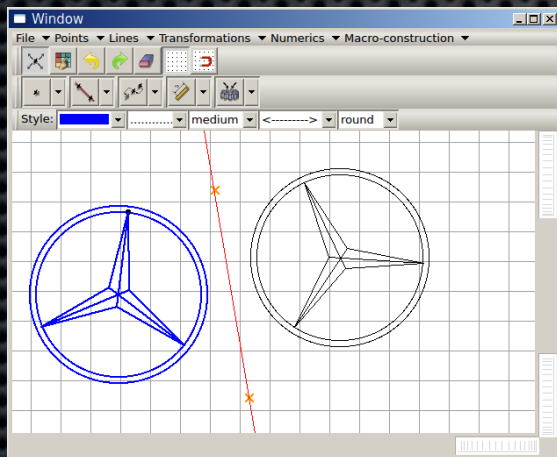
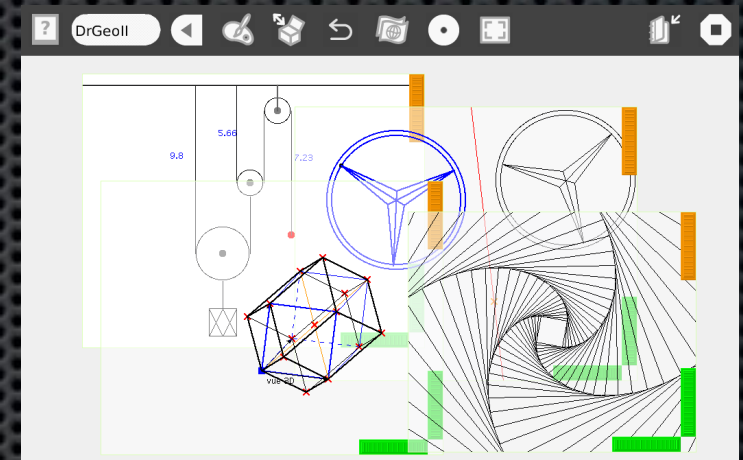
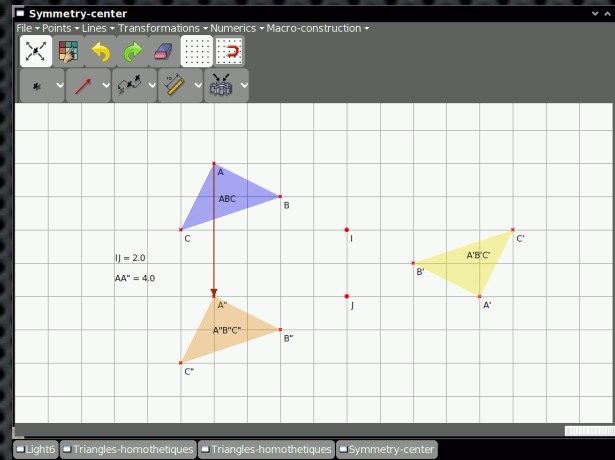
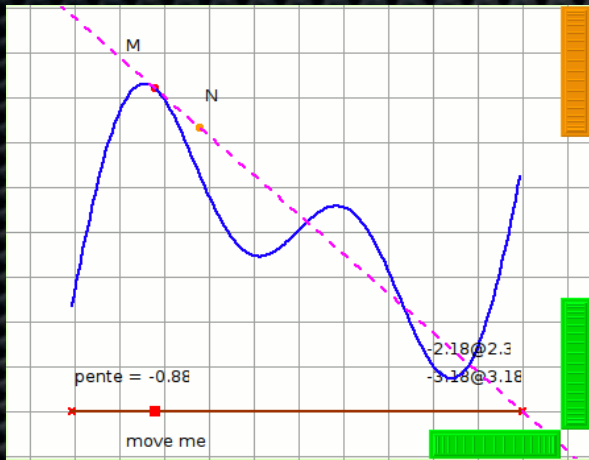
5.66

7.23

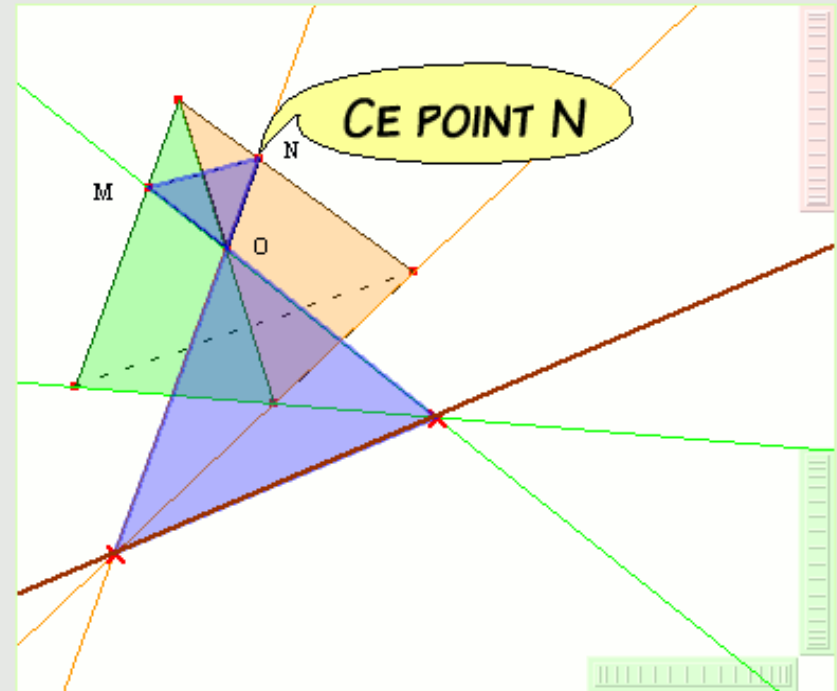
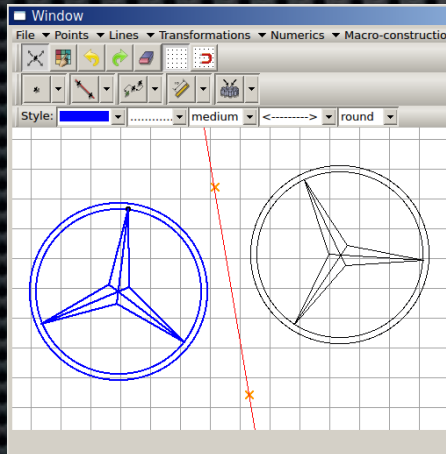
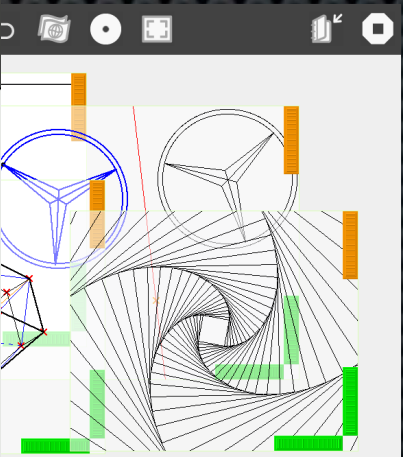
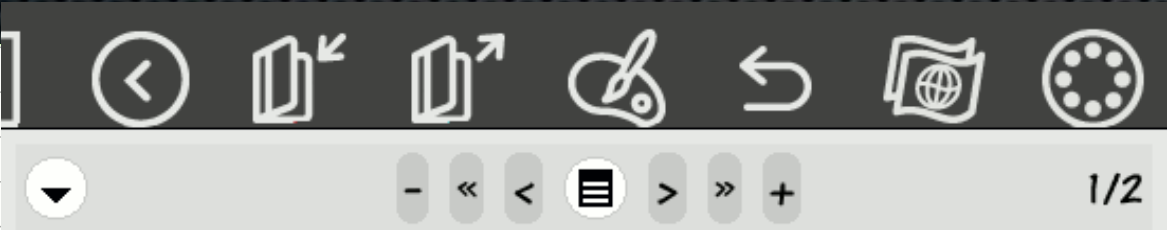
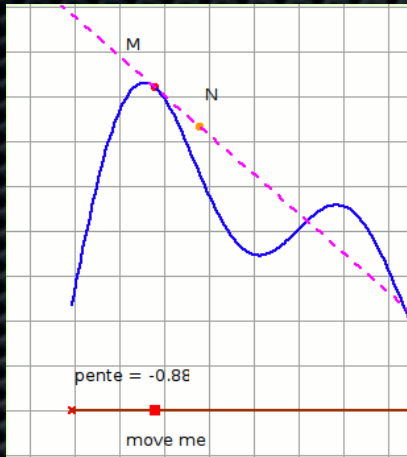
vue 3D

oculaire

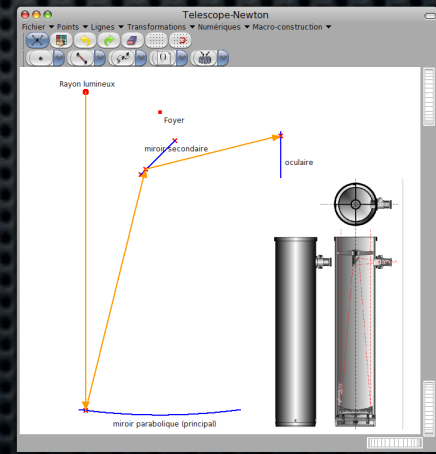
Interactive Book/Etoys



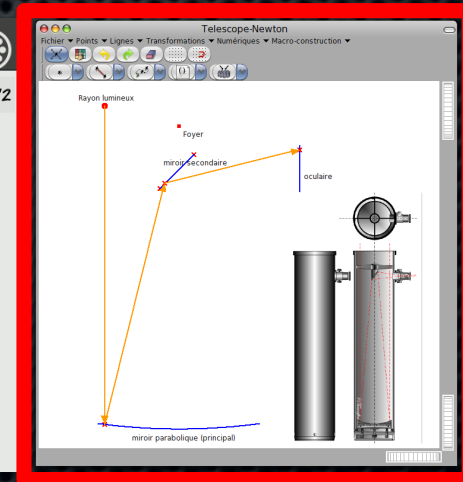
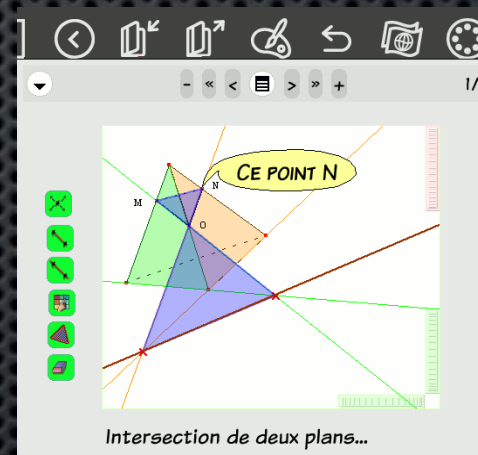
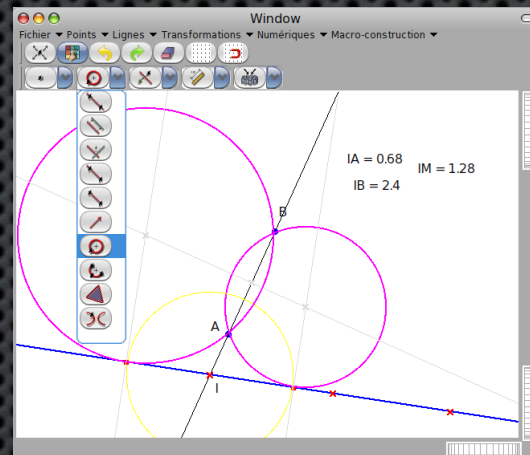
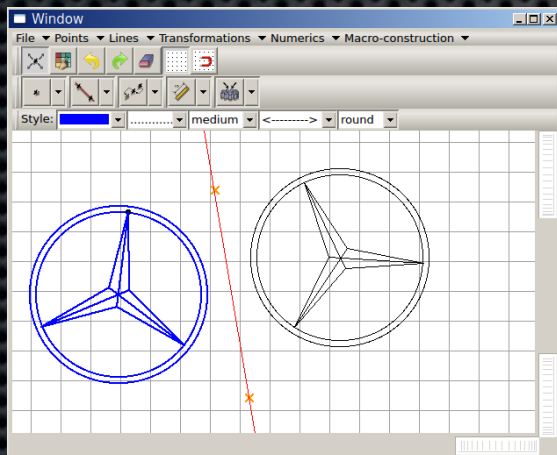
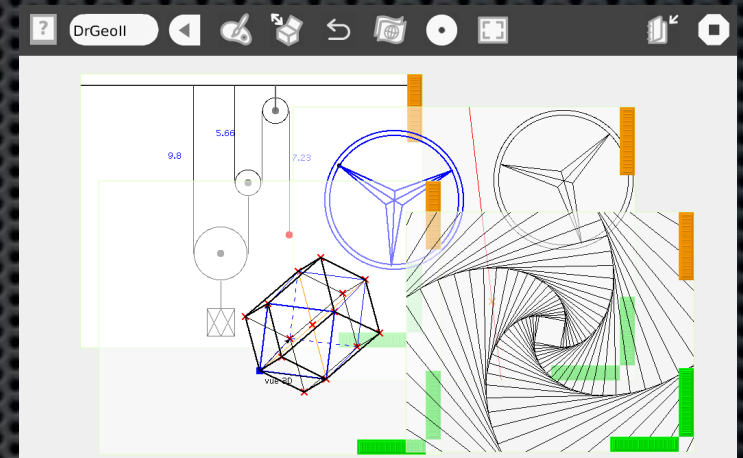
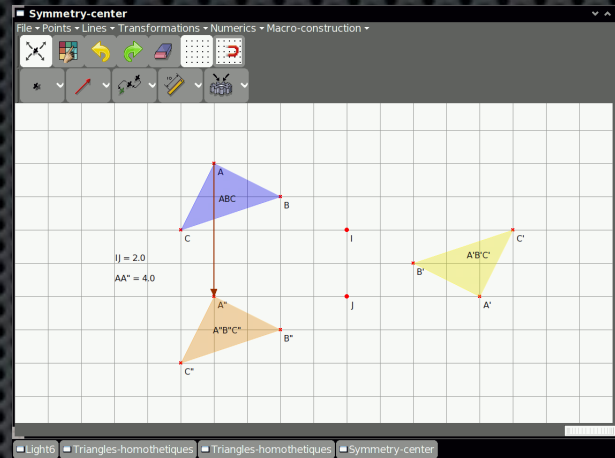
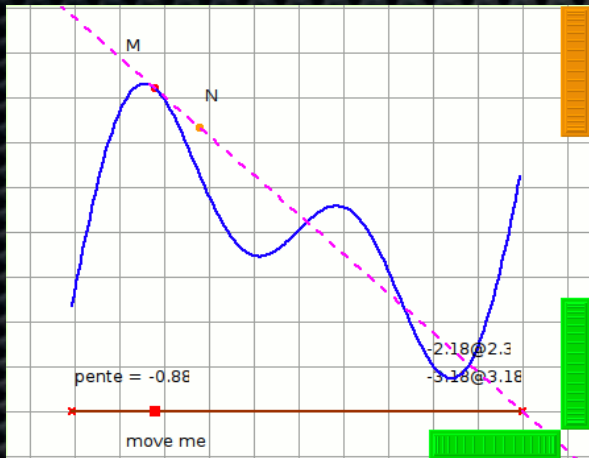
Zoom



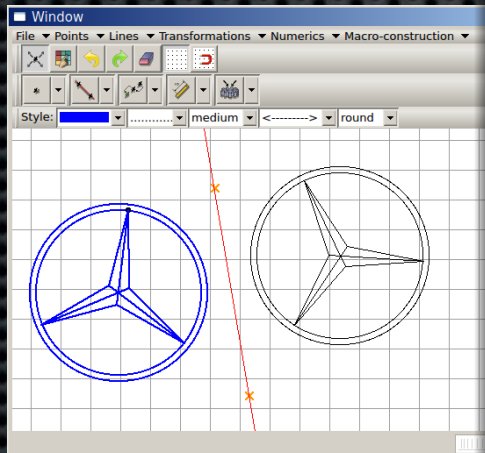
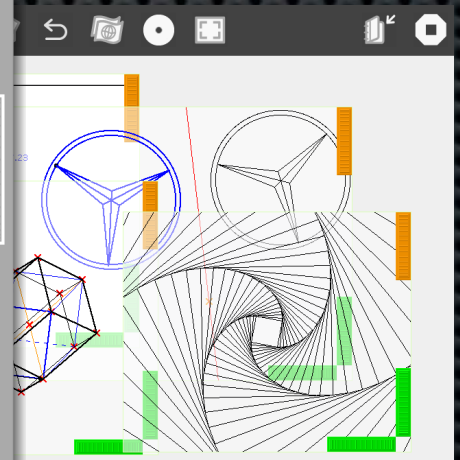
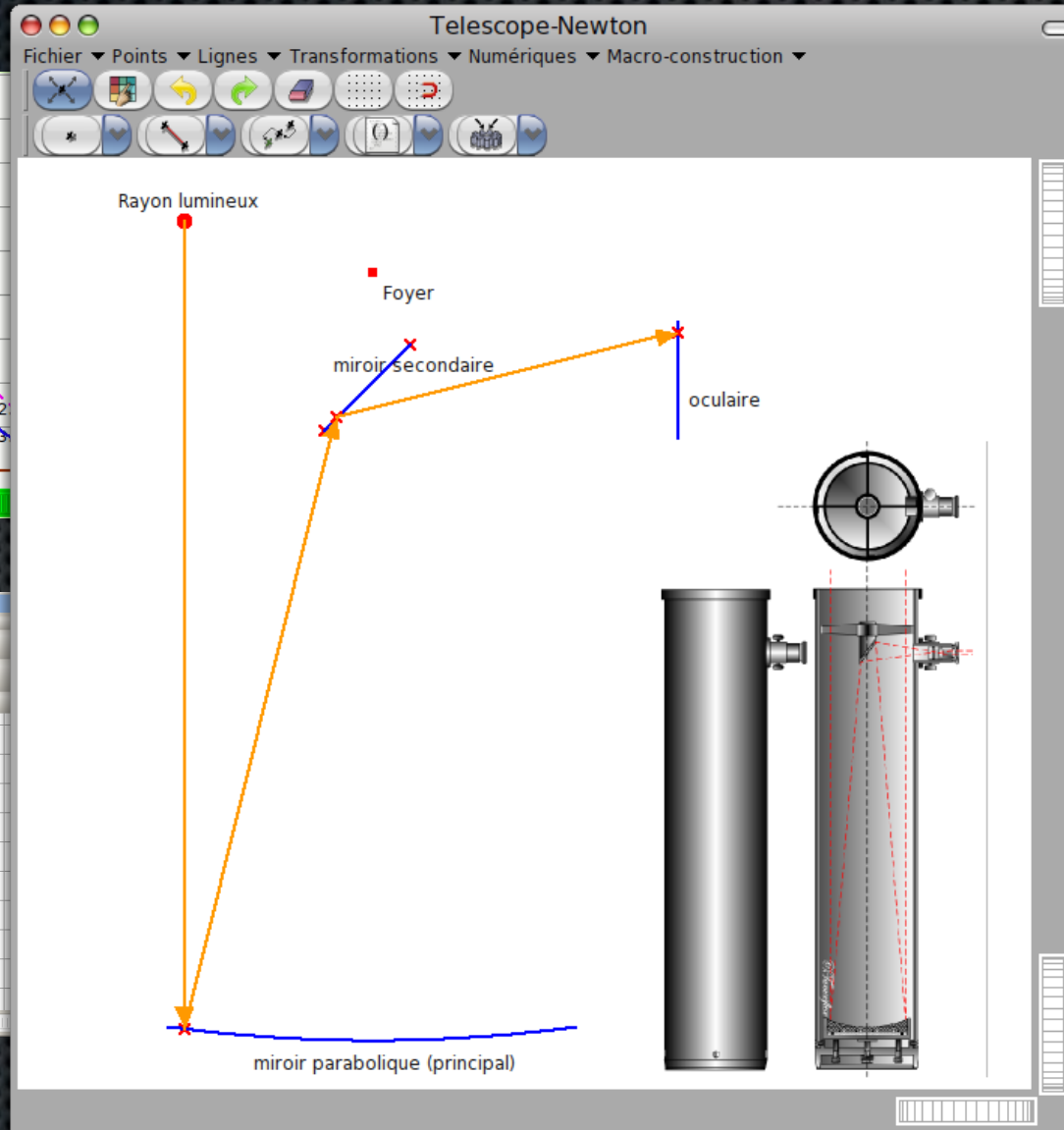
Intersection de deux plans...



Physics



Zoom



Interactive Geometry

It's

Dynamic!

Demonstrations...

Technical

Dr. Geo written

with

Pharo Smalltalk

Why Pharo Smalltalk ?

- Portability : Linux, Mac, Windows, Android, iOS
- Boost on productivity
- Comfort of the programming environment
- Dr. Geo is *modify-me-ready!*

Dr. Geo Smalltalk Script

EMPOWERING THE USER

Inserting Code Snippet

Scripts:

Mathematical objects you pin in your sketch as points, lines,...

Edit your Script

The screenshot displays the Dr. Geo software interface. At the top, the title bar reads "Dr. Geo -- 2013-07-01". Below it is a menu bar with options: 檔案 (File), 編輯 (Edit), 點 (Point), 線 (Line), 變換 (Transform), 數字 (Number), Animate, and 巨集 (Macro). A toolbar contains various icons for these functions. Below the toolbar are tabs for 點 (Point), 線 (Line), 變換 (Transform), 數字 (Number), Animate, and 巨集 (Macro). The left sidebar shows a list of objects: 點 A(1.3 ; 1.1) and 點 B(5.9 ; -1.3). The main workspace contains two red 'x' marks labeled 'A' and 'B'. A script editor window is open, titled "DrGeoUserScripts>>distance:to:". It shows a list of scripts with "distance:to:" selected. The script details are: "distance: pointA to: pointB", "Calculate the distance from pointA to pointB", and "pointA point dist: pointB point". The status bar at the bottom left says "選取並移動一個物件" (Select and move an object). The taskbar at the bottom shows the active window: "Dr. Geo -- 2013-07-01" and "DrGeoUserScripts>>distance:to:".

Use your Script 1/3

Dr. Geo -- 2013-07-01

檔案 ▾ 編輯 ▾ 點 ▾ 線 ▾ 變換 ▾ 數字 ▾ Animate ▾ 巨集 ▾

點 線 變換 數字 Animate 巨集

▶ 點 A(1.3 ; 1.1)
▶ 點 B(5.9 ; -1.3)

使用命令稿

使用命令稿的步驟:

1. 從清單當中選取一個先前定義好的命令稿
2. 在圖稿當中選取輸入參數
3. 在背景點一下

請按「下一步」開始選取。

取消 上一步 下一步

在繪圖區域裡插入一個 Smalltalk 命令稿

Dr. Geo -- 2013-07-01 使用命令稿

Use your Script 2/3

The screenshot shows the Dr. Geo software interface. The title bar reads "Dr. Geo -- 2013-07-01". The menu bar includes "檔案", "編輯", "點", "線", "變換", "數字", "Animate", and "巨集". The toolbar contains various icons for drawing and editing. The main workspace shows two points: "點 A(1.3 ; 1.1)" and "點 B(5.9 ; -1.3)". A dialog box titled "選取一個命令稿及輸入參數" (Select a command script and input parameters) is open. It has a list of command scripts: "pointOnParabol:", "distance:to:", "pointM:", and "example3". The "distance:to:" script is selected. Below the list is a text field with the description "Calculate the distance from pointA to pointB". At the bottom of the dialog are buttons for "取消" (Cancel), "上一步" (Previous Step), and "下一步" (Next Step). The main workspace also shows a coordinate grid and two points labeled A and B. The status bar at the bottom contains the text "在繪圖區域裡插入一個 Smalltalk 命令稿" (Insert a Smalltalk command script in the drawing area) and a progress indicator.

Dr. Geo -- 2013-07-01

檔案 ▾ 編輯 ▾ 點 ▾ 線 ▾ 變換 ▾ 數字 ▾ Animate ▾ 巨集 ▾

點 線 變換 數字 Animate 巨集

▶ 點 A(1.3 ; 1.1)
▶ 點 B(5.9 ; -1.3)

選取一個命令稿及輸入參數

命令稿名稱:

- pointOnParabol:
- distance:to:
- pointM:
- example3

說明:

Calculate the distance from pointA to pointB

取消 上一步 下一步

在繪圖區域裡插入一個 Smalltalk 命令稿

Dr. Geo -- 2013-07-01 選取一個命令稿及輸入參數

Use your Script 3/3

The screenshot shows the Dr. Geo software interface. The title bar reads "Dr. Geo -- 2013-07-01". The menu bar includes "檔案", "編輯", "點", "線", "變換", "數字", "Animate", and "巨集". The toolbar contains various geometric construction tools. The left sidebar shows a list of objects: "點 A(1.3 ; 1.1)", "點 B(5.9 ; -1.3)", and "Script distance:to:". The main workspace displays two points, A and B, marked with red 'x' symbols. A blue tooltip box is positioned near point B, containing the text: "以 A, B 為參數的命令稿" and "DrGeoUserScripts>>distance:to:". The value "5.17" is displayed next to point B, representing the distance between A and B. The bottom status bar shows "選取並移動一個物件" and a set of vertical grid lines.

Dr. Geo -- 2013-07-01

檔案 ▾ 編輯 ▾ 點 ▾ 線 ▾ 變換 ▾ 數字 ▾ Animate ▾ 巨集 ▾

點 線 變換 數字 Animate 巨集

- ▶ 點 A(1.3 ; 1.1)
- ▶ 點 B(5.9 ; -1.3)
- ▶ Script distance:to:

5.17

以 A, B 為參數的命令稿
DrGeoUserScripts>>distance:to:

Dr. Geo -- 2013-07-01

Smalltalk programmed interactive sketches

- ◆ API-easy thanks to Smalltalk
- ◆ Nice written sketches
- ◆ The power of code bloc

Smalltalk sketch: Workflow

The image shows a Smalltalk IDE workflow for creating a sketch. It consists of three main windows:

- DrGeoCanvas Class Browser:** Shows the class hierarchy for `DrGeoCanvas`. The `curve` class is selected in the middle pane. The right pane lists methods such as `finalizeCurve:`, `line:to:`, `locusOf:when:`, `parallel:at:`, `perpendicular:at:`, `perpendicularBisector:`, `perpendicularBisector:`, and `polygon:`. A red dot is placed on the `line:to:` method name.
- Dr. Geo -- 2013-07-01:** A sketch window showing a coordinate plane with several lines and points. The left sidebar lists objects: 點 (0 ; 0), 點 (3 ; 0), 直線, 點 (1 ; 1), 直線, 直線, and 直線.
- Workspace:** Contains the following Smalltalk code:

```
| sketch l1 l2 |
sketch := DrGeoCanvas new.
l1 := sketch line: 0@0 to: 3@0.
l2 := sketch line: 0@0 to: 1@1.
sketch parallel: l1 at: 1@1.
sketch parallel: l2 at: 3@0.
```

Red arrows indicate the workflow: one arrow points from the `line:to:` method in the class browser to the `l1 := sketch line: 0@0 to: 3@0.` line in the workspace; another arrow points from the `l2 := sketch line: 0@0 to: 1@1.` line in the workspace to the sketch window. A third arrow points from the `sketch parallel: l1 at: 1@1.` line in the workspace to the sketch window.

Learn the API

compile & run

Smalltalk sketch animated

The image shows a screenshot of the Dr. Geo software interface. On the left, a menu lists various geometric objects like points and line segments. The main area displays a bar chart with 12 bars, each labeled with a numerical value. On the right, a Smalltalk code window shows the script used to generate the chart.

Dr. Geo -- 2013-07-01

檔案 ▾ 編輯 ▾ 點 ▾ 線 ▾ 變換 ▾ 數字 ▾ Animate ▾ 巨集 ▾

- ▶ 點 2.7(2 ; 0)
- ▶ 點 (2 ; 0)
- ▶ 線段 (277)
- ▶ 點 5.43(3 ; 0)
- ▶ 點 (3 ; 0)
- ▶ 線段 (543)
- ▶ 點 7.99(4 ; 0)
- ▶ 點 (4 ; 0)
- ▶ 線段 (799)
- ▶ 點 10.83(5 ; 0)
- ▶ 點 (5 ; 0)
- ▶ 線段 (108)
- ▶ 點 14.0(6 ; 0)
- ▶ 點 (6 ; 0)
- ▶ 線段 14
- ▶ 點 16.47(7 ; 0)
- ▶ 點 (7 ; 0)
- ▶ 線段 (164)
- ▶ 點 13.94(8 ; 0)
- ▶ 點 (8 ; 0)
- ▶ 線段 (697)
- ▶ 點 11.46(9 ; 0)
- ▶ 點 (9 ; 0)
- ▶ 線段 (573)

Smalltalk Code:

```
| canvas s stats points |  
  
points := Array new: 12.  
stats := Array new: 12 withAll: 0.  
  
canvas := DrGeoCanvas new.  
canvas fullscreen;  
scale: 30;  
centerTo: 6@10;  
gridOn.  
2 to: 12 do: [:i |  
points at: i put: (canvas point: i@0.1).  
(points at: i) square; color: Color blue.  
s := canvas segment: i@0 to: (points at: i).  
s color: Color red].  
  
canvas do: [  
1 to: 10000 do: [:i |  
s := 6 atRandom + 6 atRandom.  
stats at: s put: ((stats at: s)+1).  
(points at: s)  
name: (stats at: s) asString;  
moveTo: s @ ((stats at: s) / 100).  
canvas update].  
2 to: 12 do: [:i | (points at: i) name: (stats at: i) / 100.0]].
```

Boost your Creativity

NOW, imagine it

for your software project