



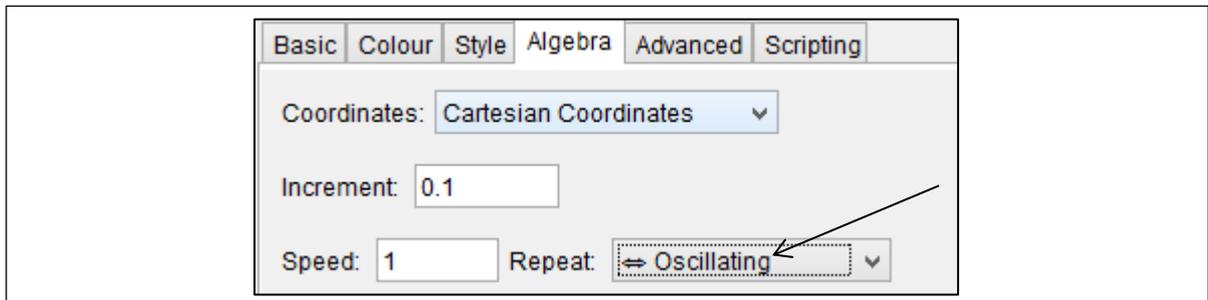
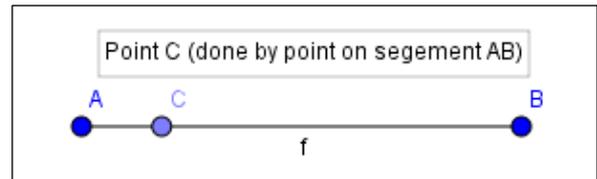
Workshop GeoGebra: Animated String Art and Minimal Art (1)

Some important basics before!

Q: What does it mean “Animation with Geogebra”?

A: Animated can be e.g. a point on a segment or a circle. All other points of a construction that are connected to this point or in relation to it are also moved if the animated point runs on a segment.

Animation by right mouse click on C. Point C runs from A to B and starts again from A. You can change its direction with right mouse click on C and choosing *object properties*.



Q: Can I animate objects later e.g. when I have done the whole construction?

A: Mostly it is possible. If a point A should run on a circle draw a circle with midpoint a point (not the point A. The circle should be near point A. Then chose from the *point* menu -> *Attach/Detach Point*.

Q: Can I animate more than one object?

A: Yes, it is possible. Keep in mind which object /point can be animated or is already animated. Then you may hide the line – segment or circle. Often it is easier to change object properties of animated objects le side of the screen in the listings of points, line, ...

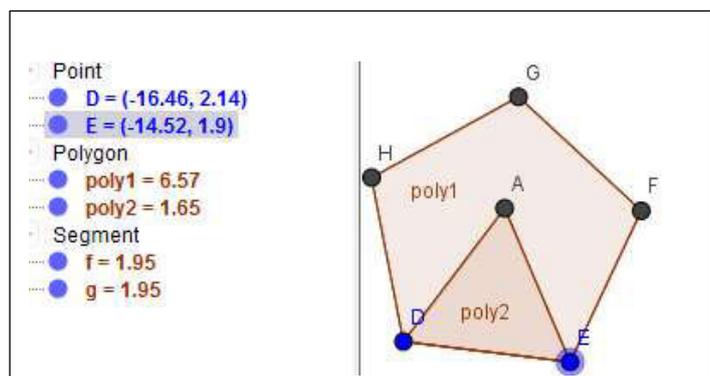
Be careful and watch the result after each new animation. Maybe you have to change positions of animated points.

Q: Sometimes the colouring of polygons or circles is difficult. How can I do it in an easier way?

A: Chose the form, here polygons, from the *Algebra Window* left side of your screen .

Click e.g. right mouse on *object properties* of the form that you want to colourize and chose your colour and opacity.

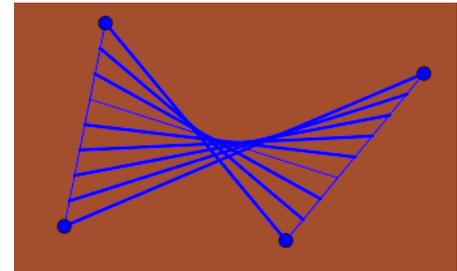
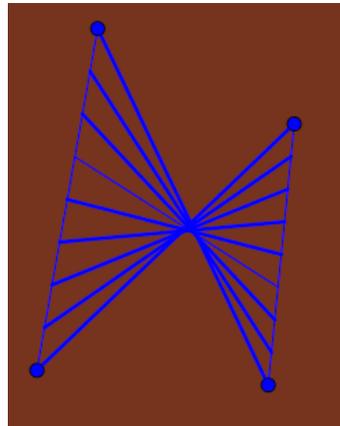
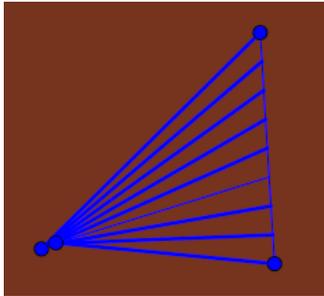
Hiding the right points is here easier than inside the construction.





Workshop GeoGebra: Animated String Art and Minimal Art (2)

String Art



These constructions belong to an animation based on two lines that had been divided in 8 parts by constructing midpoints (of midpoints) and segments that connect points on both segments.

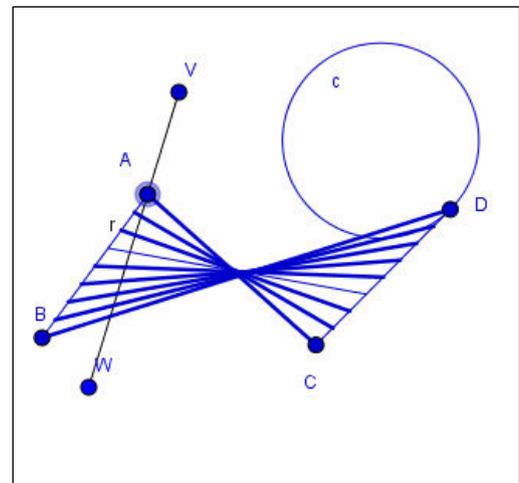
Step 1: Construct segment AB. Divide it by *midpoints* in 8 equal segments.

Step 2: Construct segment CD (not parallel). Divide it by *midpoints* in 8 equal segments.

Step 3: Construct all segments between the two lines.

Step 4: Construct segment VW (near point A). Choose from the point menu "Attach point" A to segment VW.

Step 5: Construct a Circle with Centre and Point near point D. Attach D to the circle.



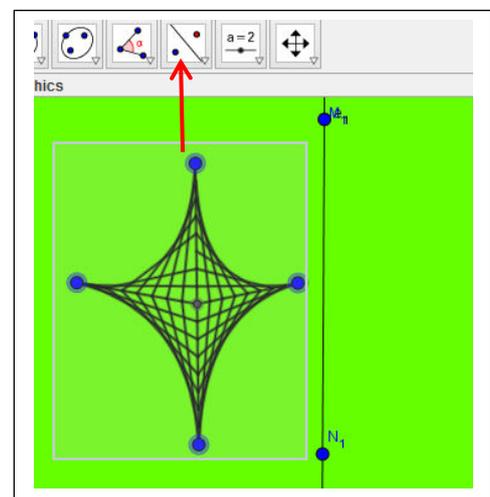
Step 6: Animate A and D. Object Properties should be *Oszillating* (see: animation1.ggb).

Tasks: Construct an animation with two segments e.g. like a cross or start with a triangle (polygon) and create nice string art.

In a second step try to attach some basic points to a segment or a circle and animate the construction.

Hint: a construction can be e.g. reflected at a once by marking the whole construction (right mouse) and using the reflect option if there is a point or a line. By this you can get wonderful and complex artwork.

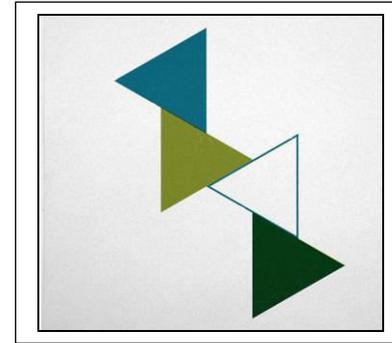
Save your files like *animantion_sabine_DE.ggb*





Workshop GeoGebra: Animated String art and Minimal Graphics (3)

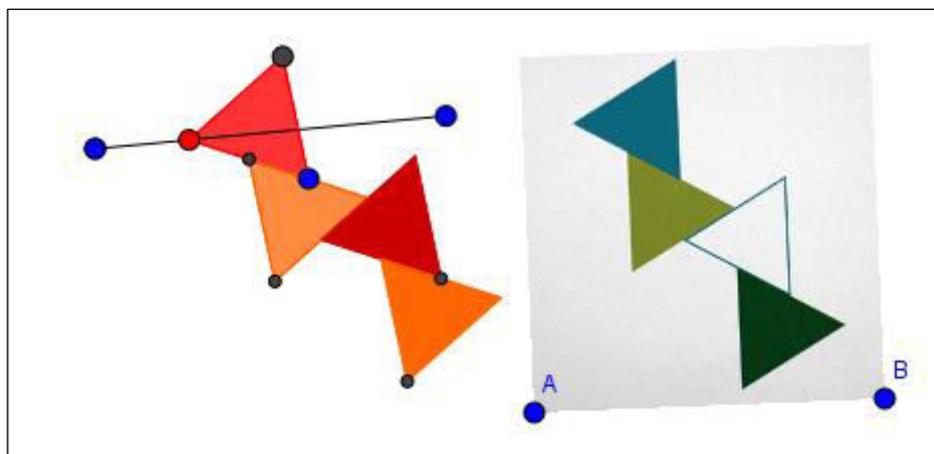
1. Minimal Art



Minimal Art means abstract painting (and sculpture) where any kind of personal expression is kept to a minimum. Minimal Art appeared as a trend in the late 1950s and flourished particularly in the 1960s and 1970s.

Paintings of minimalist painters are characterized by extremely simple, geometric forms, sometimes patterns with the same forms and only a few colours that separate different areas from each other. The pictures above (google search) are examples of this direction.

Example: Minimal art from Tilman, 2013



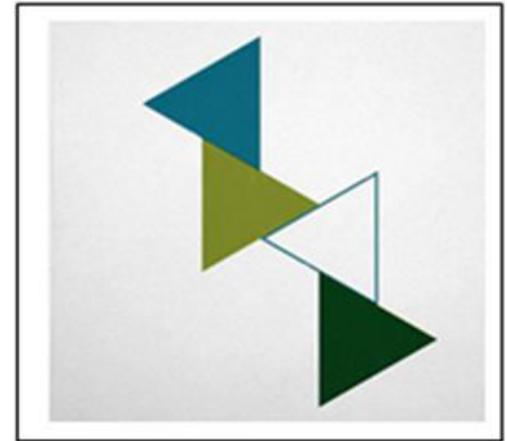
The construction of regular triangles is easy. The next triangles are constructed by midpoint and reflecting this midpoint on one corner of the previous triangle. So the length remains always the same. In the second steps you can animate the first two points of the triangle. They can be attached to a segment or a circle.

If you like you can mark the whole construction (right mouse) and reflect it on a point or line or rotate it.

Task:

Create a minimal graphic that can be inspired by the graphic on the next pages in a first step. Then animate it in a second step. Save your artwork like `sabine_DE_minimalart.ggb`.

Minimal Art



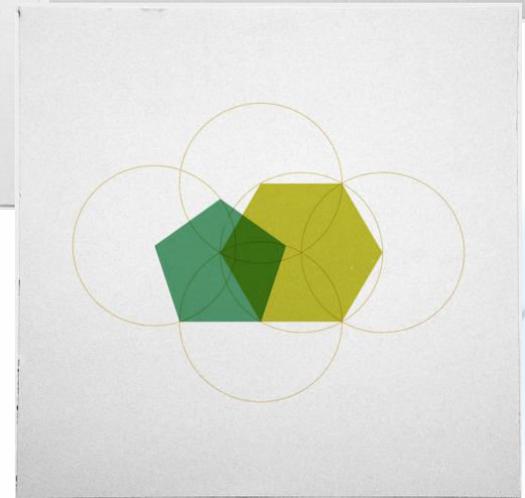
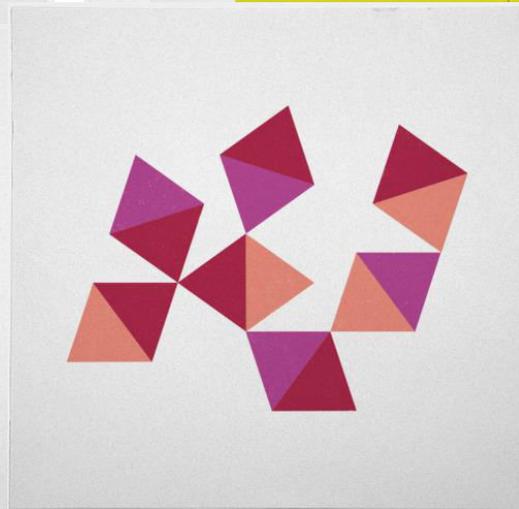
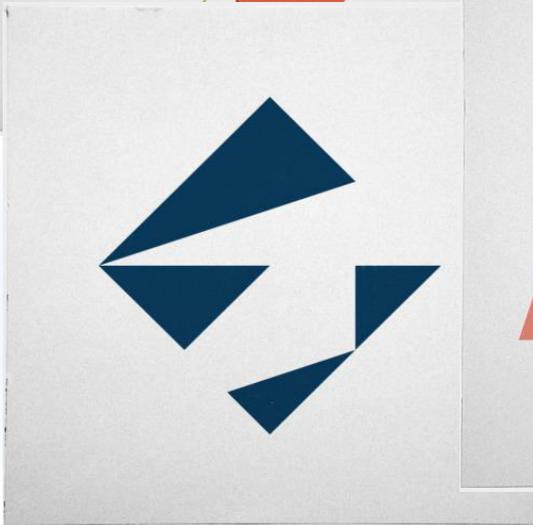
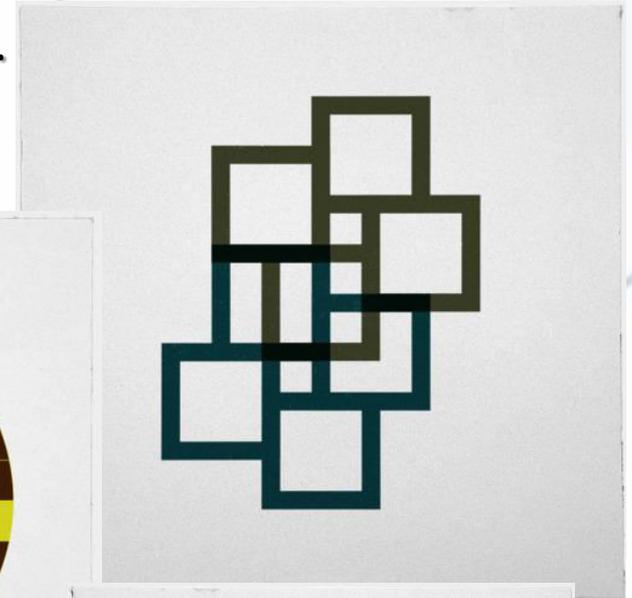
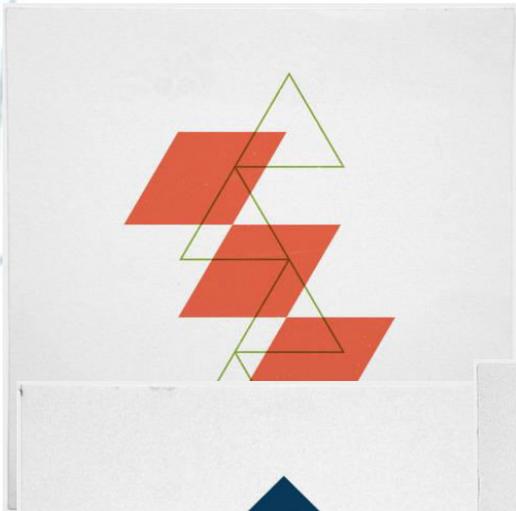
Minimal Art

Minimal Art ...

- ... means abstract painting (and sculpture) where any kind of personal expression is kept to a minimum
- ... means extremely simple, geometric forms
- ... have sometimes pattern containing only one form
- ... use only a few colours that separate different areas from each other
- ... appeared as a trend in the late 1950s and flourished particularly in the 1960s and 1970s.

Minimal Art

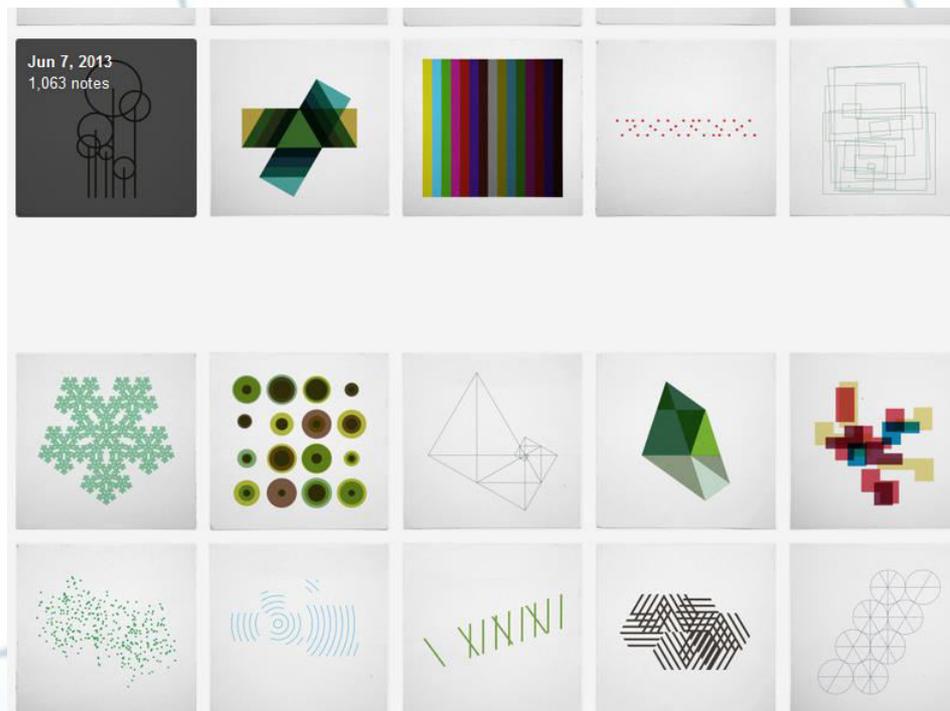
A famous artist of minimal art is Tilman Zitzmann, a German artist and designer.



Minimal Art

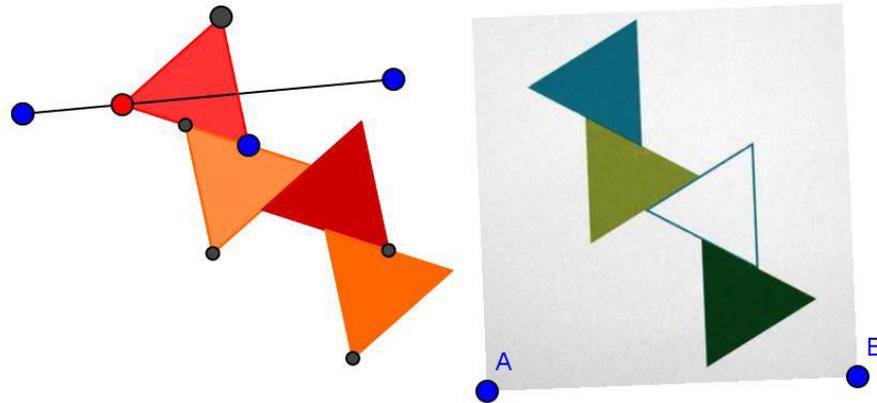
Meanwhile Tilman has 512 wonderful graphics in his blog

geometry daily at <http://geometrydaily.tumblr.com/>



Minimal Art

Animation can look like:



The construction of regular triangles is easy. The next triangles are constructed by midpoint and reflecting this midpoint on one corner of the previous triangle. So the length remains always the same.

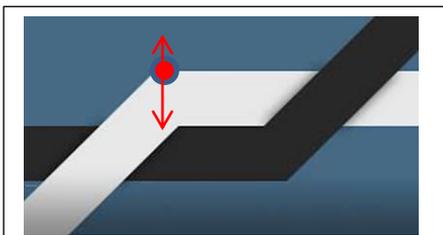
In a **second step** hen you can animate the first two points of the triangle. They can be attached to a segment or a circle.



Workshop GeoGebra: Animated String Art and Minimal Artwork

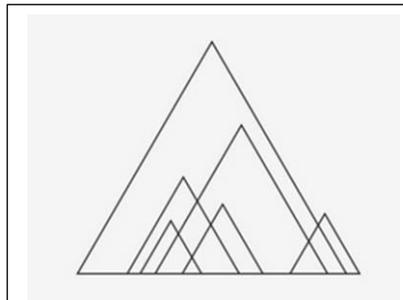
1. Minimal Art

There is a collection of minimal artwork that can be constructed with GeoGebra. There are some hints and suggestions to help you with easy constructions and animations. Use (regular) polygons often as possible. Keep always in mind that animations work well if you use segments, not lines.



Tilman Zitzmann

The red point can be e.g. attached on a segment (vertical or horizontal).



Tilman Zitzman

Construct a segment and put some points on it.



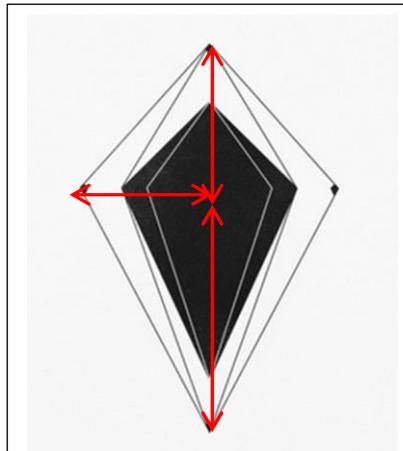
indulgy.com

Construct a few (not regular) polygons. Colourize. Attach each polygon on one corner to a short segment.



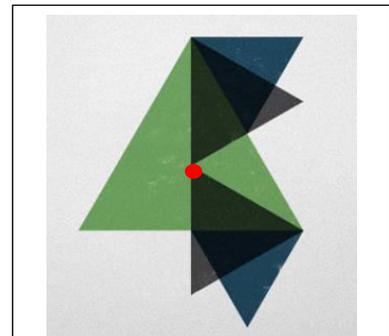
www.rebloggy.com

Put points on the left side of the square.. Colour the triangles . Animation mode: once



www.rebloggy.com

Start with horizontal and vertical segments and points on it. You can reflect the horizontal points. Animate only a few points.



Tilmann Zitzmann

Start with a regular triangle. Construct two perpendicular bisectors (menu under parallel lines) to find the red point. Animate A und B by attaching it to small circles.