

MATHEMATICAL
PROJECT

$5VA/5VB$

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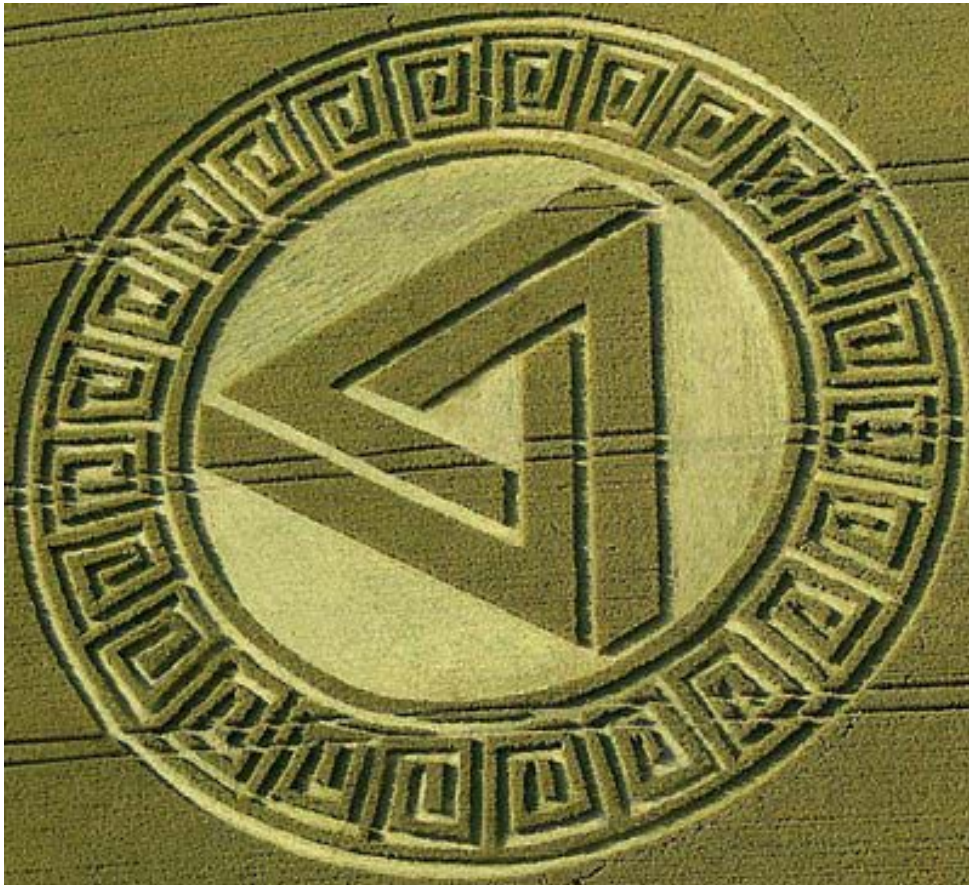
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- Explanation: Refined analysis (2)

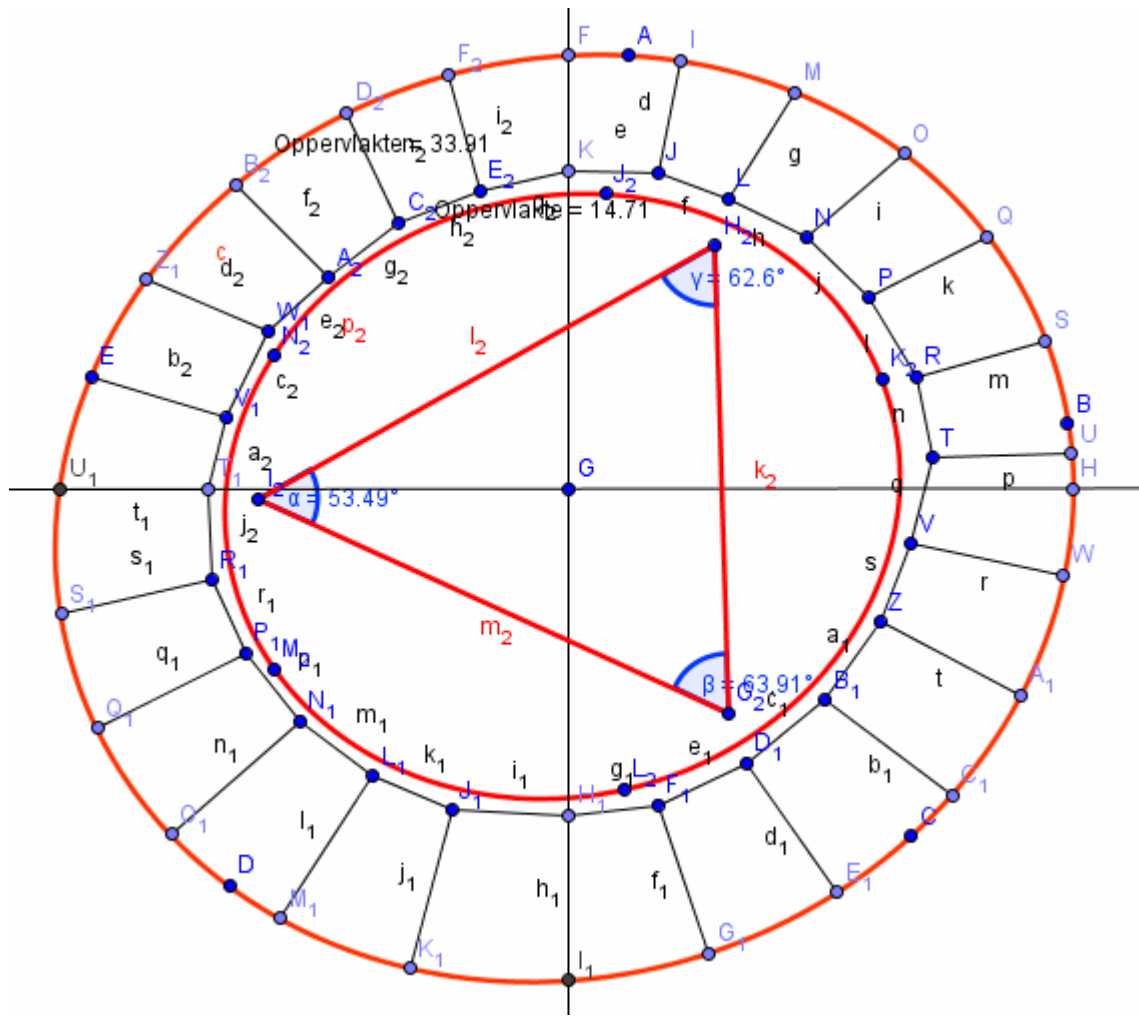
Preliminary

The assignment for this project was to analyze an object and to translate the shapes from the object into mathematical equations. We started by searching for an object and finally we decided to analyze a grain circle. We chose this grain circle because we thought it had some interesting shapes. We decided to divide the project into multiple steps, in which the first step was to analyze the grain circle at a global level. The second step was to analyze the grain circle at a more refined level.

Our chosen image:



Overall analysis



Both formulas are constructed in the following way: $a x^2 + b x y + c y^2 + d x + e y = f$

Ellipse c:

Nr.	Naam	Definitie	Algebra
1	Punt A		A = (3.93, 6.35)
2	Punt B		B = (6.9, 3.86)
3	Punt C		C = (5.84, 1.06)
4	Punt D		D = (1.22, 0.72)
5	Punt E		E = (0.29, 4.17)
6	Ellips c		Kegelsnede door A, B, C, D, E: $374.02x^2 - 52.62xy + 449.87y^2 - 2443.19x - 2709.63y = -4204.77$

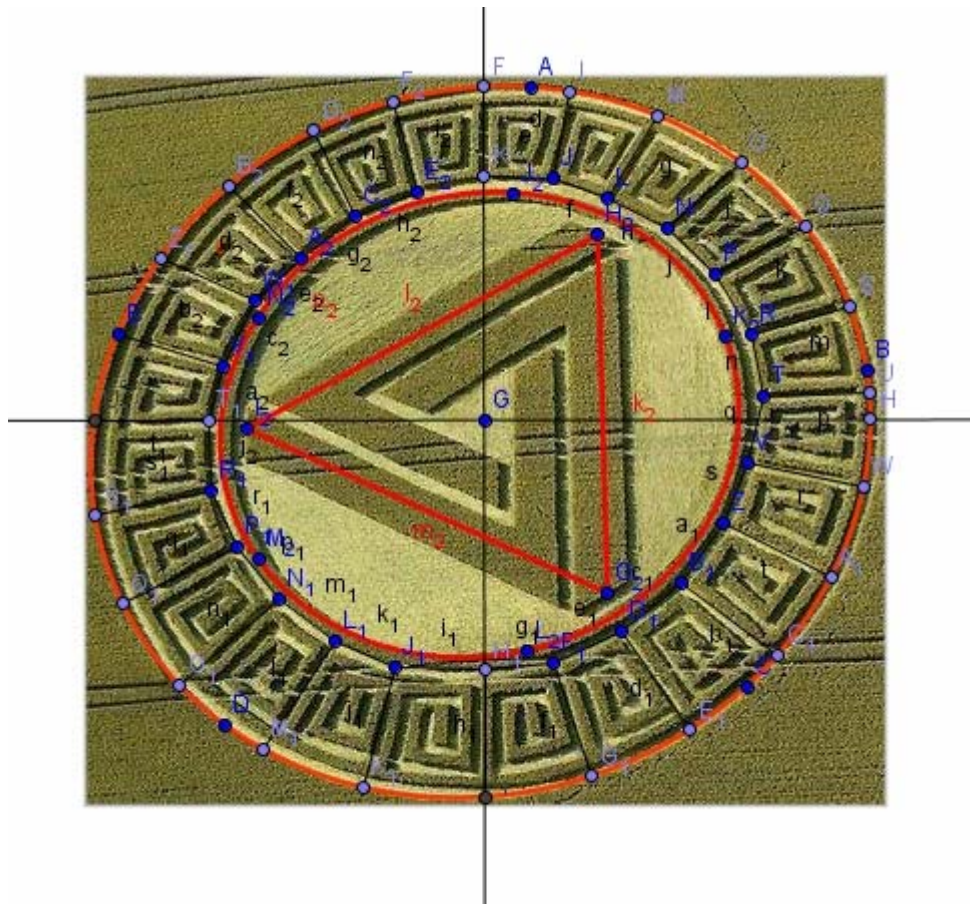
Ellipse c2:

Nr.	Naam	Definitie	Algebra
1	Punt a		a = (3.77, 5.41)
2	Punt b		b = (5.65, 4.16)
3	Punt c		c = (3.9, 1.38)
4	Punt d		d = (1.52, 2.19)
5	Punt e		e = (1.52, 4.32)
6	Ellips c2		Kegelsnede door a, b, c, d, e c2: $276.53x^2 - 39.73xy + 345y^2 - 1791.75x - 2184.88y = -5354.32$

Explanation: Overall analysis

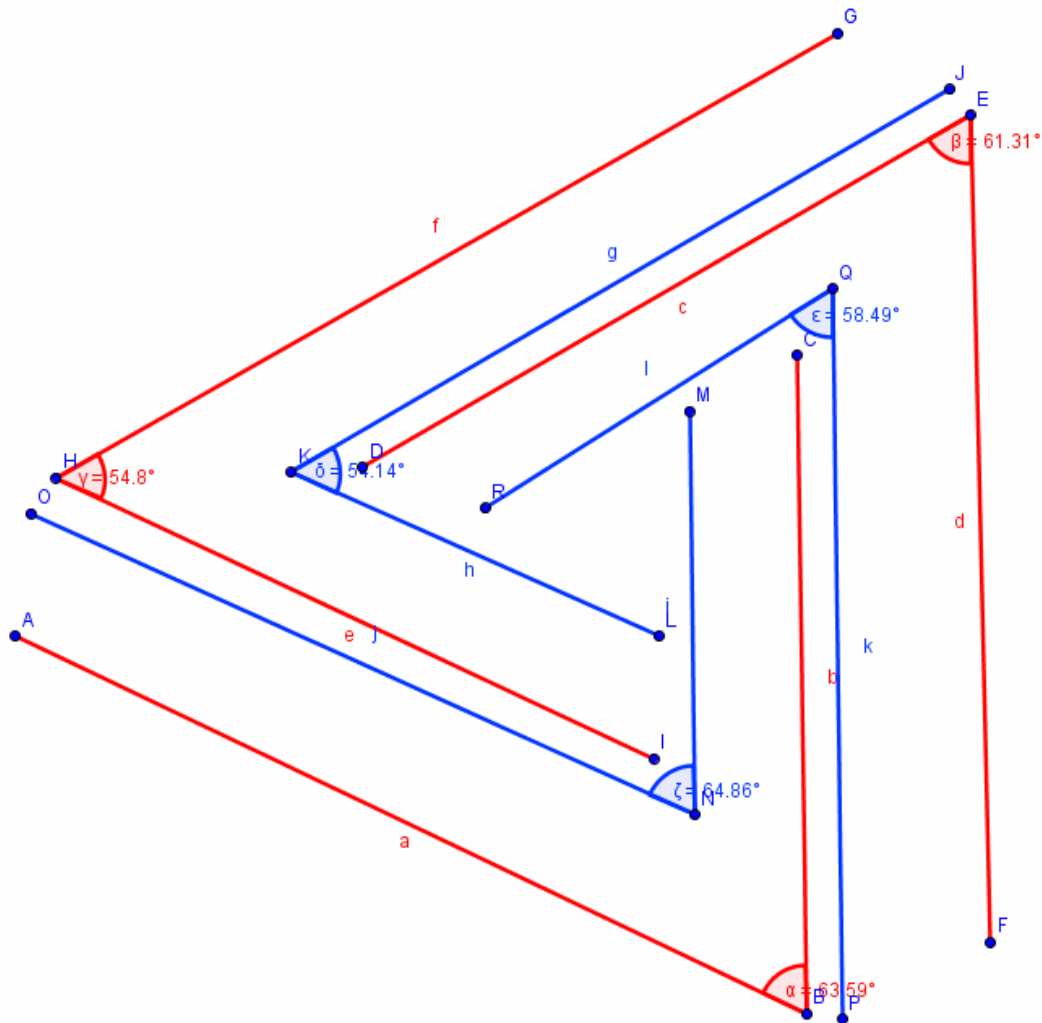
As you can see we only took the most basic shapes for the overall analysis and besides that we just took the shapes that were easily spotted. Like the triangle and the two circles we chose. We divided the picture into four quadrants, each quadrant contains six squares. Both the equation of the inner circle as the equation of the outer circle are equations for an ellipse. These so-called circles are ellipses because they're not perfect, that is because the radius isn't equal at every point. The triangle consists out of three lines in relation with each other. In our analysis the triangle is made out of point G2, H2 and I2. By using the program, which is called, 'Geogebra' we also calculated the surface of the two ellipses. The surface of ellipse $c = 33.91 \text{ cm}^2$ and the surface of ellipse $c2 = 14.71 \text{ cm}^2$. We were able to measure the angles of the triangle. In which angle " α " = 53.49 degrees, " β " = 63.91 degrees and " γ " 62.60 degrees.

Analysis with picture:



Refined Analysis:

We also analyzed the more interesting and 'hard-to-find' shapes. We were able to analyze the triangle in the centre of the grain-circle and to calculate its angles. This is how it looks like:

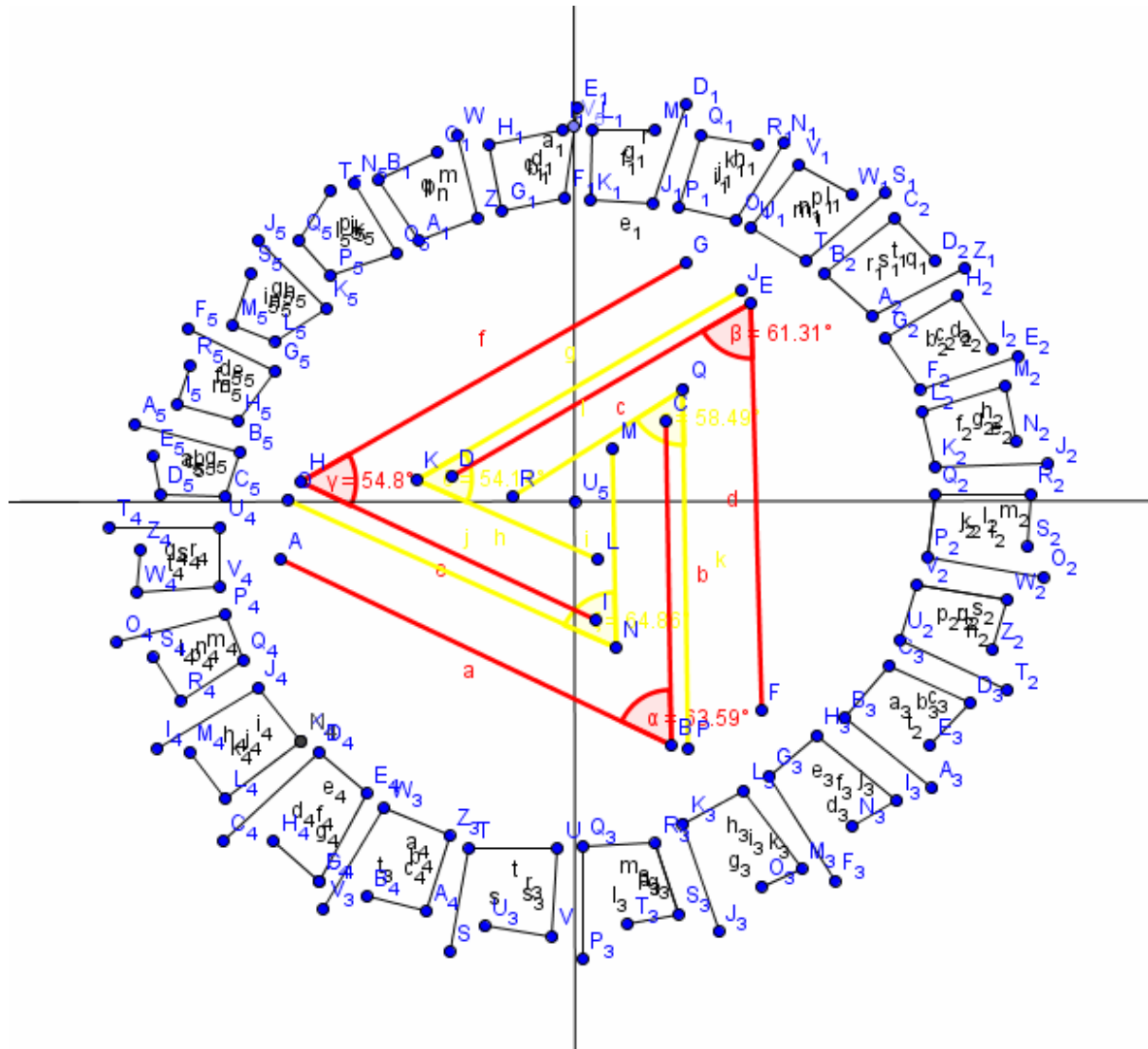


Explanation: Refined analysis

We were able to measure the angles of each individual corner of the centre triangle. In which corner " α " = 63.59 degrees, " β " = 61.31 degrees, " γ " = 54.80 = degrees, " δ " = 54.14 degrees, " ϵ " = 58.49 degrees and " ζ " = 64.86 degrees. We decided to make the three "inner triangles" blue to improve the visibility. As you can see, the outer triangles are red.

Refined analysis (2):

We also analyzed the squares in the outer ellipse. This is how it looks like:



Explanation: Refined analysis (2):

The “outer ellipse” consists out of a total of twenty-four “squares”. As you might have noticed each quadrant of the ellipse contains six of these twenty-four “squares”. They have the similar shape and are divided equally in each quadrant.

Analysis with picture:

