

Art Round questions & answers

1)q: borromeo rings: 2 pics - what are they named after?

a: Named after its use in an Italian coat of arms

info:

The History of the Rings is probably lost in the past, but we do find them in Italy where they were used as a symbol of the Christian Trinity. The Borromeo family, who for years lived on a tiny island in the Italian Lake of Maggiore used the Rings as its Crest, so giving their name to the Symbol.

<http://www.popmath.org.uk/sculpture/pages/2creatio.html>)

<http://www.bathsheba.com/math/borromeo/> :-

'This is one of a delightful class of objects known as Seifert surfaces. Every knot and link (in mathematics knots are closed loops, links are assemblages of knots) has a continuous surface which it is the edge of. An introduction to these surfaces, along with free software to generate them, are at the SeifertView site.

These surfaces are often beautiful, especially for symmetrical knots and links, and here I've produced one of the sweeter ones. This surface has three edges, each a simple closed loop, which are locked together in an ancient form called the Borromeo Rings. Named after its use in an Italian coat of arms, these three rings are locked together inextricably although no two of them are linked. Their Seifert surface twists through the loops smoothly and gracefully, and I'm very happy with the organic mesh. It's wide enough to let light through, while responding sensitively to the curvature and giving a tactile texture.'

2)q: name this!

a: Klein bottle opener!!

info: from <http://www.bathsheba.com/math/klein/>

What is the central problem of beer? That it is contained in a bottle, which is to say a boundaryless compact 2-manifold homeomorphic to the sphere. Since beer bottles are not (usually) pathological or "wild" spheres, but rather smooth manifolds, they separate all of 3-space into two unconnected regions, viz. the region inside the bottle, containing beer, and the region outside the bottle, containing you.

What is to be done? Clearly, the elegant solution is to introduce a non-orientable manifold without distinct sides; indeed with only a single side. The Klein bottle pictured is an example of this class. When brought into proximity with the closed manifold described above, it acts at once to disrupt the closure of the bottle, obviating the outdated, dualistic paradigm of distinction between interior and exterior, thus enabling interaction between the beer and the self.

In summary, we have here a Klein bottle that opens beers. If I do say so, this is fine art.

)

3) q: how many faces in this picture? ( Eight Heads, 1922)

a: 32

4) q: Put the 4 escher pictures in date order (earliest first)

a:	C Eight Heads, 1922	A Sky & Water I, 1938
	D Swans, 1956	B Mobius strip II, 1963

5) q: What's this?  
a: Lyapunov Fractals

info: Extracting beauty from chaos  
by Andy Burbanks <http://plus.maths.org/issue9/features/lyapunov/>

There are any number of sites on the World Wide Web dedicated to galleries of computer-generated fractal images. Pictures based on Lyapunov Exponent fractals, such as the one pictured above, are some of the most striking and unusual.

Like most fractal images, Lyapunov Exponent fractals are produced by iterating functions and observing the chaotic behaviour that may result.

In this article, we'll be exploring what Lyapunov exponents are, how you iterate functions, what "chaos" really is, and how you go about turning simple maths into marvellous images. There's also a companion article, Computing the Mandelbrot set by Andrew Williams, which looks at the technical details involved in writing a program to compute the Mandelbrot set.

6) q: Aspect ratio of this picture?  
a:  $300:185 = 1.62162162 =$  golden ratio (approx)  
- the golden ratio is actually = 1.61803399

info:

[http://math.colorado.edu/~farsi/conference/artist\\_craft.html](http://math.colorado.edu/~farsi/conference/artist_craft.html)  
(Title: Ascorbic Acid Crystal; ans:  $300:185 = 1.62162162 =$  golden ratio  
the golden ratio actually = 1.61803399)

7) q: Complete the title: 'Elements Square-Root of ....'  
hint: size is 400 by 179  
a: 5  
( $400 / 179 = 2.23463687$   $\sqrt{5} = 2.23606798$  so ans = "5")

info:

[http://math.colorado.edu/~farsi/conference/artist\\_craft.html](http://math.colorado.edu/~farsi/conference/artist_craft.html)

My collage, photography, and painting explores sacred geometry with forms based on the Golden Ratio. Besides showing up as a proportion throughout nature, the Golden Ratio has been understood and used as a formal element by artists throughout the ages. All my recent work is based on Golden Rectangles (aspect ratio of 1: 1.618), overlapping Golden Rectangles (aspect ratio 1:2.236), and other combinations of Golden Rectangles.

<http://www.DougCraftFineArt.com>

8) q: Complete the title: "Texas ..... 13th eigenfunction "  
& for a bonus, what sort of fractal curve is it?

A: Snowflake, & "Helge Koch fractal snowflake curve")

info: "Texas snowflake 13th eigenfunction "

<http://www.helasculpt.com/gallery/snowflakelaplacdirichlet/>

Commissioned by: Professor John W. Neuberger, Mathematics, University of North Texas.

John and his colleague Robert Renka in collaboration with Michel L. Lapidus and especially Cheryl A. Griffith, numerically computed the first forty eigenfunctions on the Helge Koch fractal snowflake curve.

The 13th has seven bumps and sixfold symmetry. Special engraving: Dimensions: 6" x 20" x 20" Weight: 35 lbs Materials: Solid silicon bronze, polished  
Price: \$ 4,800.00 (USD) Copyright: © 1997