# The Leonardo, Salt Lake City. When Math Meets Art Everything Changes


Do you want to think about geometry in a whole new way? Explore ideas and create amazing designs and dynamic 3D structures? I'll be presenting old and new geometries that create everything from labyrinths to moon bases at The Leonardo in Salt Lake City, Utah, during October, 2012. The presentation will take the form of a small exhibition/workshop of high-definition animations, 3D structures that change shape and size, geometrical designs that change before your eyes, and all sorts of models and diagrams. The exhibition/workshops falls under the name, **"Geomorph – Everything Changes When Math Meets Art."** I'm hoping that there will be funds, at a later date, to put on a full exhibition with lots of interactives – structures you can walk into and have them change shape all around you, etc. For October, and at the moment, there's a tiny budget, but still, we'll do the best we can! If we can find corporate sponsors then we could really make an impact on transforming math from a sort of calculating machine into an adventure.

**Background:**

In my opinion most of us have the wrong opinion about math. Even saying the word, “math,” sends shudders down the spines of most people – and many people will blank out immediately they hear the word! So, for those that have managed to read past the dreaded word, I’d like to say the following…

Things such as Algebra and Calculus have been pushed upon us and they are called Mathematics. Trouble is that they are mathematics, in as much as such things are the tools and means to calculate. But the heart of mathematics is not such things as calculus, algebra, and trigonometry, it is, rather, a way of thinking.

When we think about things, analyze them, think logically, and wonder how things might work; or model something to try to understand it; we’re acting as true mathematicians. In fact we can be hopeless at algebra but still be great mathematicians*. In my opinion most of us have been, “lead down the garden path,” so to speak. We’re taught so-called mathematics in school, in the hope that we’ll acquire the various tools of math but, mostly, we have no idea why we have to plod through the drudgery! Confusion reigns!

Take a step back and ask yourselves why and when you need to think logically, analyze a situation, figure things out. “Most of the time!” right? So where’s the disconnect?

School mathematics is largely just a “tool,” sort of like a calculator. But it’s a calculator without a store/shop, so to speak – we’re shown little purpose for it, there are, for example, no prices to add – and I don’t mean the math of money. The “need” for the tools of math is sidelined – so too is true math! We’re just taught the tools with little or no application except for, maybe, money, and something to do with angles and lengths. Now clear your heads for a moment. Forget the word “math,” and instead think of an idea you’d like to explore, something to build, make, model… Now think of the elements of your idea, break them down into components, then

see how they combine. Play with the combinations, look for originality, dare to be different, be unafraid of mistakes. Then, maybe, see what sort of math “tools” you might need – and it might not be anymore than a flow chart, measuring cup, compass or ruler..but it could be trigonometry or calculus (oh, oh!).

Geomorph is all about thinking, analyzing, and logic. It looks at the logical geometrical systems of the past, such as the logic of building a labyrinth 4,000 years ago. It also looks at geometrical systems of the future. In a way **geometry is the visual language of mathematics**. You can use the simple or complex tools of mathematics in geometry, but you don’t have to. The exhibition aims to show things that are surprising – things that you have never seen before. Its math that moves, transforms, changes – and it’s dynamic, and serves as a means to discover. **With Geomorph you’re no longer a math calculating machine but an explorer!**

A key thing to note is that, at one time, no mathematical concept existed. Every branch of mathematics was, at some point, invented, usually in response to a need: “We’re lost, how do we find out where we are?” “How tall is that mountain?” “Counting on our fingers is OK but how do we count really big numbers?” “How do we figure out how to send a spacecraft to the moon?” etc. It’s insightful to remember that there was always an initial need  or a problem to be solved, and a beginning, to each branch of mathematics. If we can go back to, “the point of need,” and to the, “beginning of each branch of mathematics,” we can not only rekindle the excitement, and drive, that lay behind the original discovery or solution, but also, better understand the math, and why it was or is useful, how it can apply, or, even better, figure out a better way solve the original problem. Focusing on the need might lead to novel and more efficient solutions as an alternative to math languages that have grown in complexity as they have evolved. It’s a bit like programming and using a lot of old code, “cut

and pasted," into an application, or operating system. Maybe people don't even think about the efficiency of that old code because it's so deep in the pile – but maybe it's time to take a new look at those old routines, because they might be too complex, or not so efficient, or even, illogical.

* According to my old friend and mentor, Dr. Ensor Holiday, Albert Einstein, travelled with his own personal, "mathematician." Not sure if this was Marcel Grossmann, or not, as I cannot remember the details of Ensor's meeting with Einstein. From my perspective, Albert Einstein was a "discoverer" mathematician, and Grossmann, if Grossman, served more as a "calculator" mathematician – at least as far as Einstein was concerned. I stand to be corrected if anyone knows more…