MATH 121

(Day 8)

More Anamorphoses
and
Projective Geometry

http://www.people.vcu.edu/~rhammack/Math121/index.html

István Orosz (1997)

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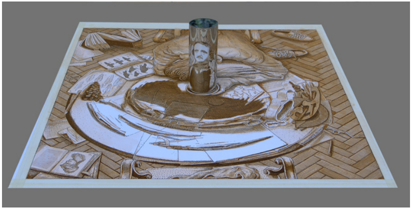

István Orosz

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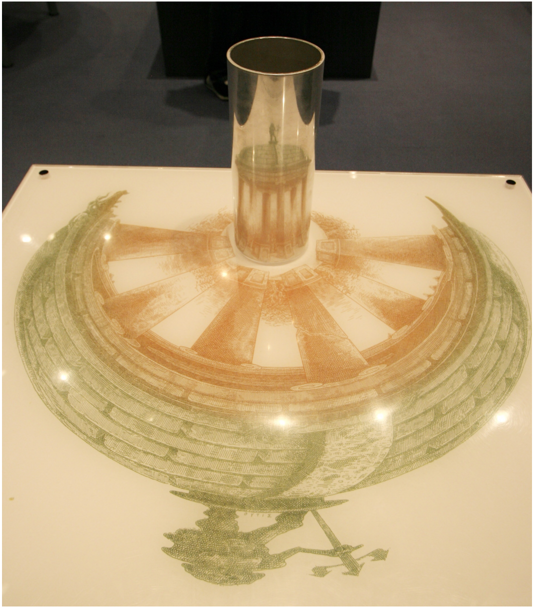

Edgar Müller, 2008

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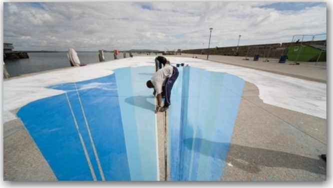
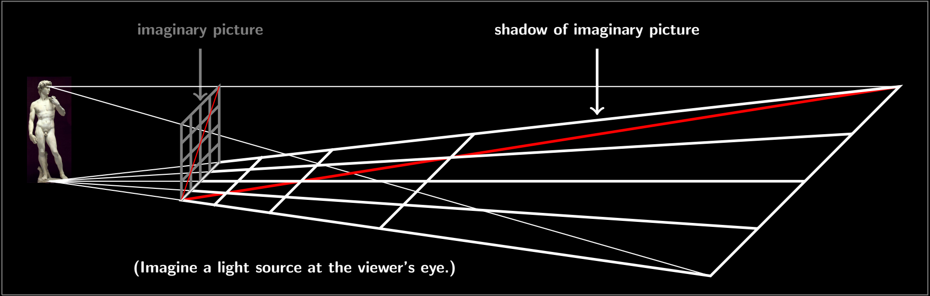


The Mathematics of Anamorphosis



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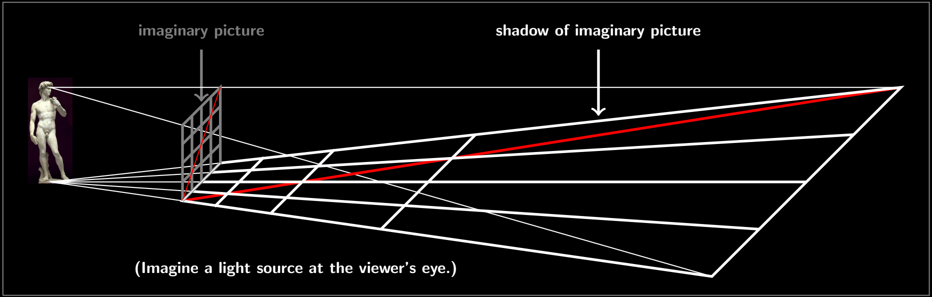
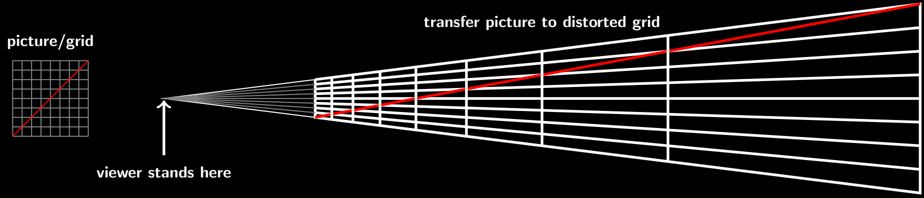
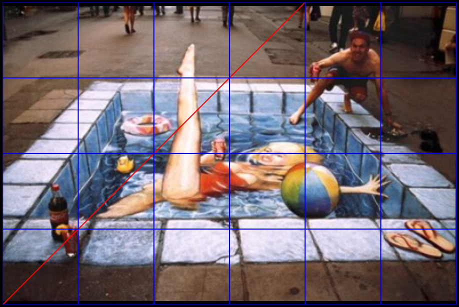
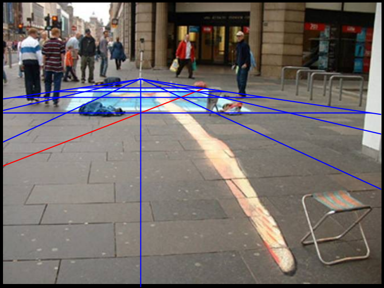


How To Make an Anamorphosis (Top View)







Kokichi Sugihara

Meiji Institute for Advanced Study of Mathematical Sciences
Meiji University, Japan

Shigeo Fukuda (1936–2009)

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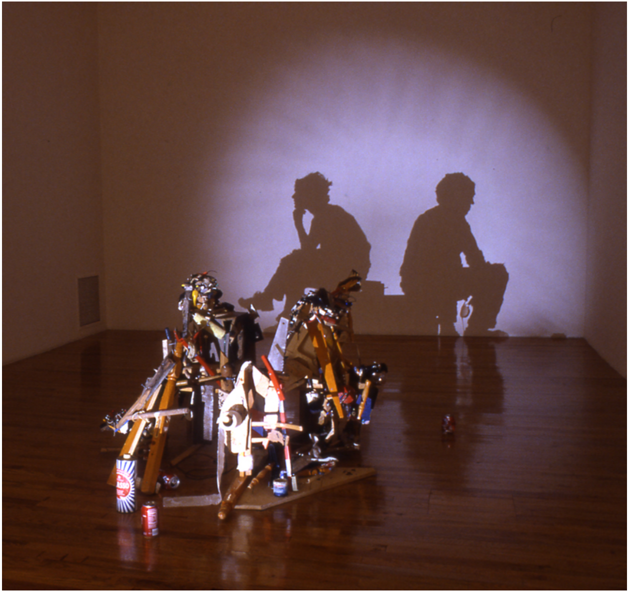
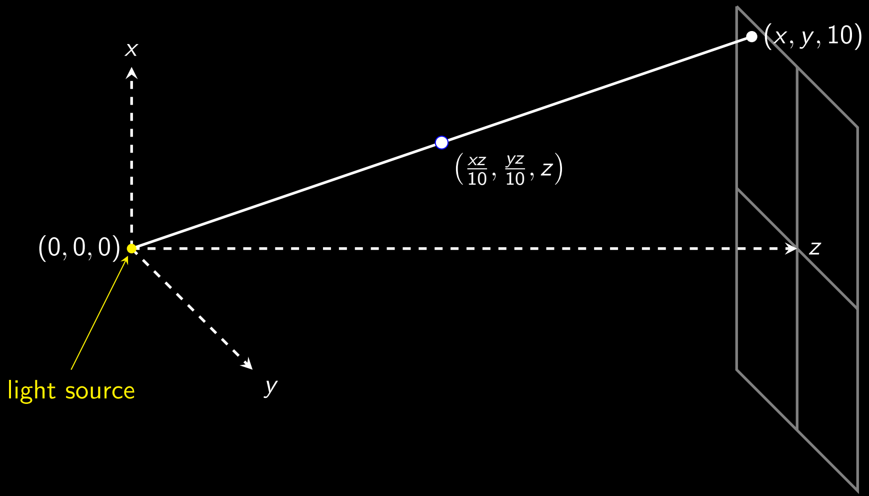
Tim Noble and Sue Webster



Real Life is Rubbish

Tim Noble and Sue Webster

How to Make "Shadow Images"



Wall is 10 feet from light source. To cast shadow at point $(x, y, 10)$ on wall, you need an obstruction at point $\left(\frac{xz}{10}, \frac{yz}{10}, z\right)$ in space.

MATH 121

(Day 8)

Projective Geometry

The Idea Behind Projective Geometry

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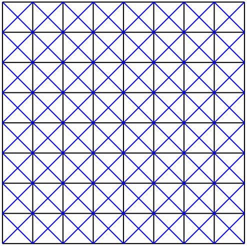
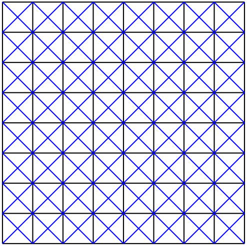


The Euclidean Plane

The Idea Behind Projective Geometry



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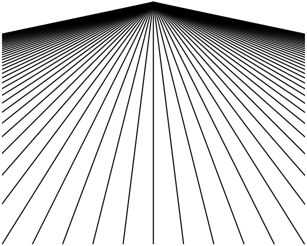

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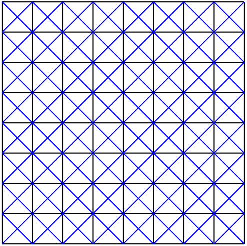

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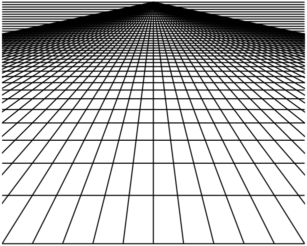

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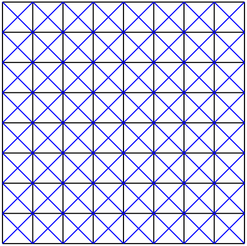

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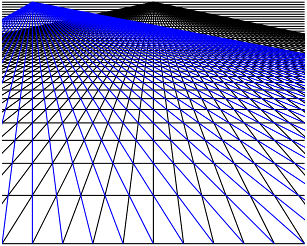

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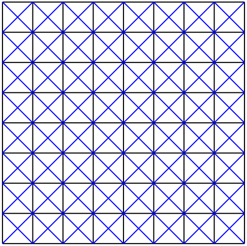

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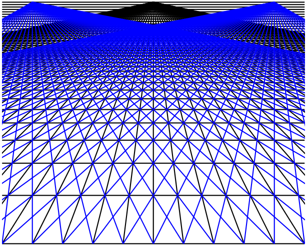

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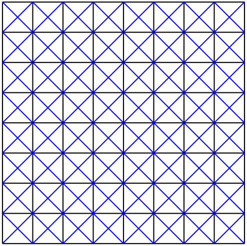

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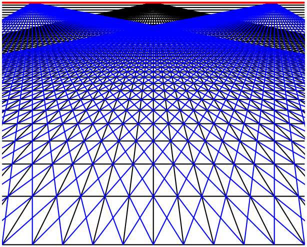

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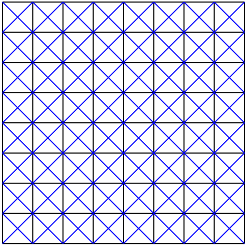
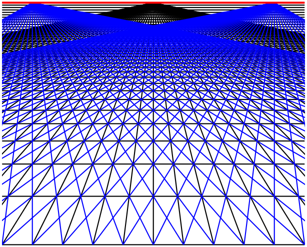


The Euclidean Plane

...add a line at infinity



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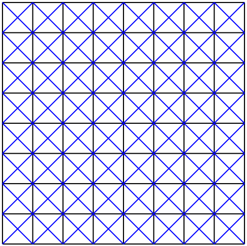

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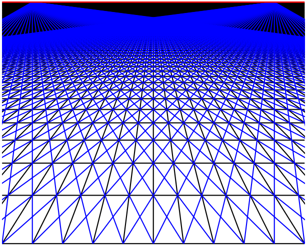
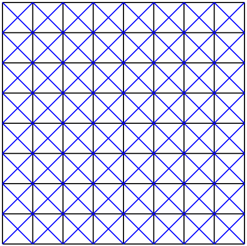


The Projective Plane

Any two points determine a line.

The Idea Behind Projective Geometry



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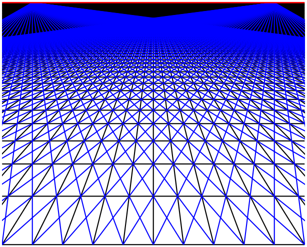
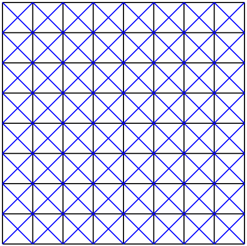


The Projective Plane

Any two points determine a line.
Any two lines determine a point,
unless the lines are parallel.

The Idea Behind Projective Geometry



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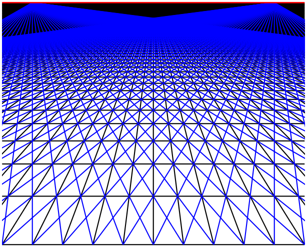

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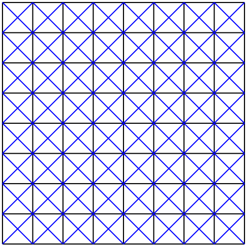

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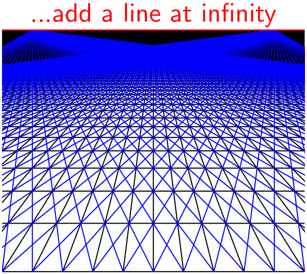

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The Inventors of Projective Geometry

Girard Desargues
1591–1661

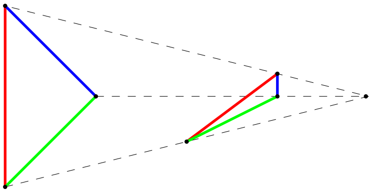
The Inventors of Projective Geometry

Girard Desargues
1591–1661

Blaise Pascal
1623–1662

Desargue's Theorem:

If two triangles are in perspective...



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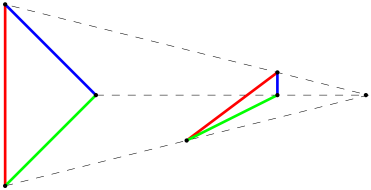

... then their corresponding sides, if extended, will intersect at three points that lie on a straight line.

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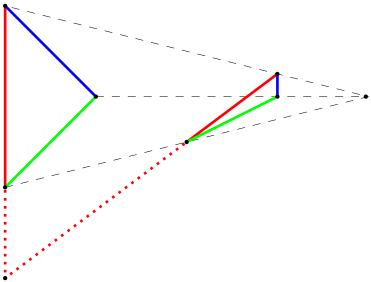

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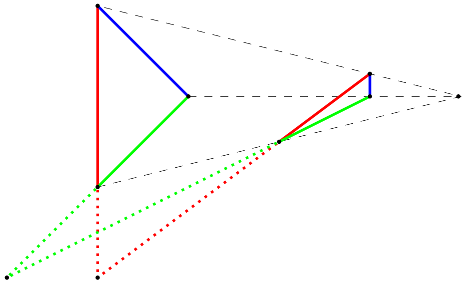

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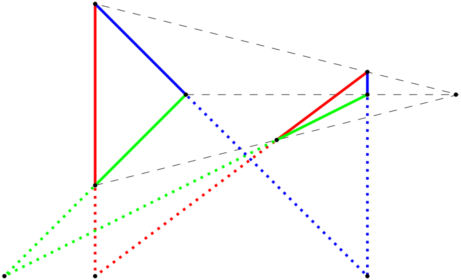

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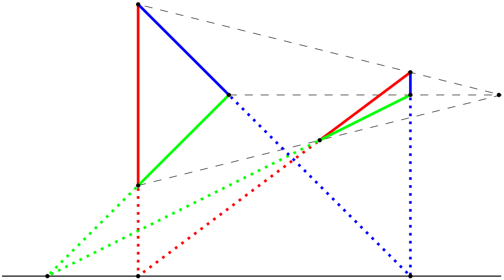

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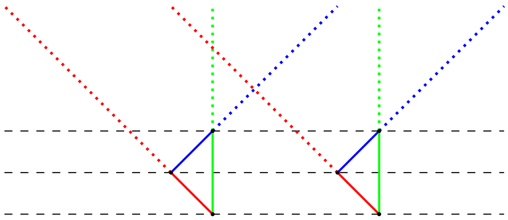
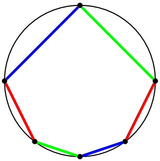
Rough idea of proof:



It's this diagram seen in perspective.
Sets of parallel lines meet on the horizon.

Pascal's Theorem: (The Magic Hexagram)

If a hexagon is arbitrarily inscribed in a circle (or conic), then...



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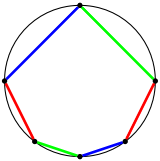

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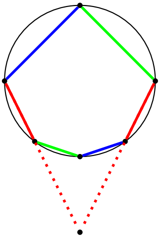

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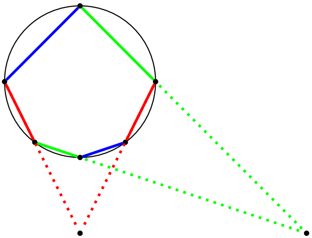

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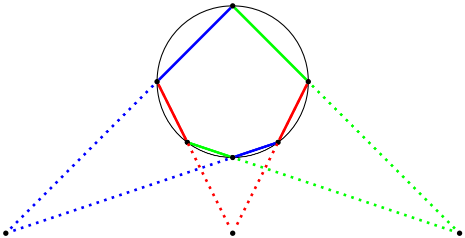

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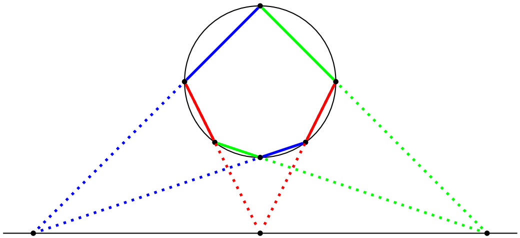

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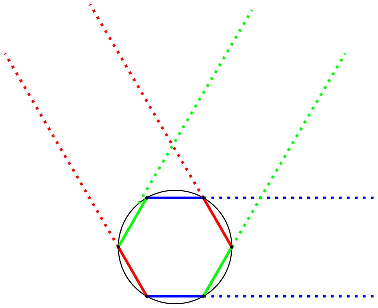

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Next time: **Crit Day!**

http://www.people.vcu.edu/∼rhammack/Math121/index.html