

Teaching Math courses for Non-STEM Majors

Annalisa Crannell
Franklin & Marshall College

December 5, 2015



The Crannell-Gussmans

/ Blended family: **yours, mine, and ours** /

*Clockwise from top left: Annalisa, Kiersten, Neil, Lisa, Jacari,
and Nigel. (Lauren and Iolanthe not pictured.)*

Outline of this presentation

1. “Math courses for non-STEM students” is the wrong title
2. The Liberal Arts
3. Size Matters: a non-math course.
4. Empowering colleagues in other disciplines
5. Math and perspective art
6. Calculus as a gateway drug

The Liberal Arts

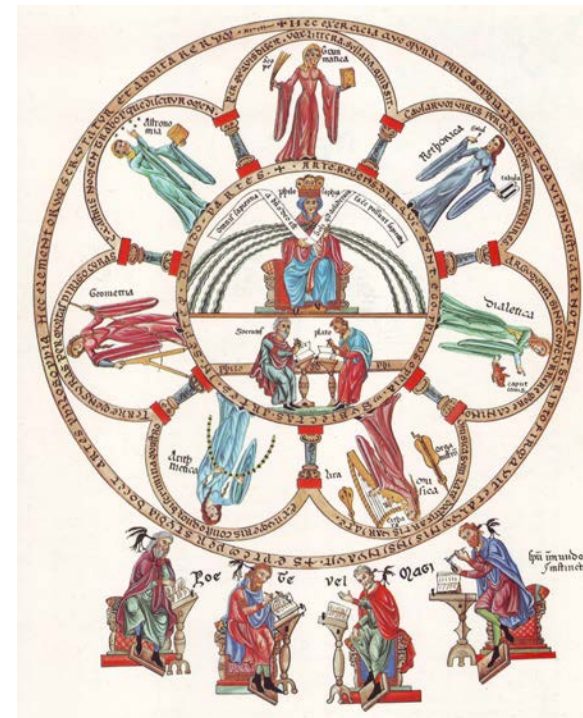
(Education for a 'free' or liberated person,
as opposed to the *Servile Arts*, or *apprenticeship*)

The Trivium

Grammar, rhetoric, dialectic

The Quadrivium

Geometry, Astronomy,
Arithmetic, Music



Teaching a Gen Ed course: *Size Matters*

- The size of dog skulls tells us about evolutionary constraints.
- *Auxology* tells economists how rich people are, by measuring how tall they are.
- Neighborliness correlates inversely with traffic quantity.

...and ... You can't learn humility without first being humiliated.


Empowering colleagues in other disciplines

How can we say that mathematics is an essential skill
for success in other endeavors,

if we also say that other professors
can't teach mathematics?

The mathematics of perspective art

Course Materials



Suppose an apple falls from an extraordinarily tall tree (400 feet), and lands on the ground beside Isaac Newton, contemplating calculus.

Acceleration due to gravity is constant: 9.8 m/s^2 or 32 ft/s^2 (downward, of course).

Even when an apple is on the tree, gravity pulls downward, that's why apples dangle from the tree instead of floating like balloons around the tree.

Calculus Resources

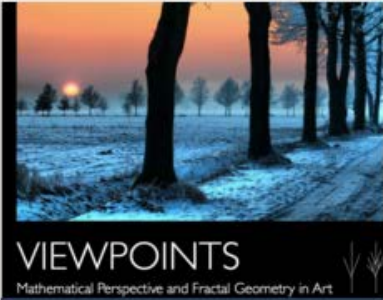
- [Writing Projects for Calculus](#)
- [Guide to Writing in Math Classes](#)
- [IBL Worksheets for Calculus I](#)
- [IBL Worksheets for Calculus II](#)

Worksheets for upper-level courses


- **Algebra** (IBL worksheets that coordinate with Gallian's *Algebra*)
- **Analysis** (IBL worksheets that coordinate with Abbott's *Understanding Analysis*)

Mathematics and Art

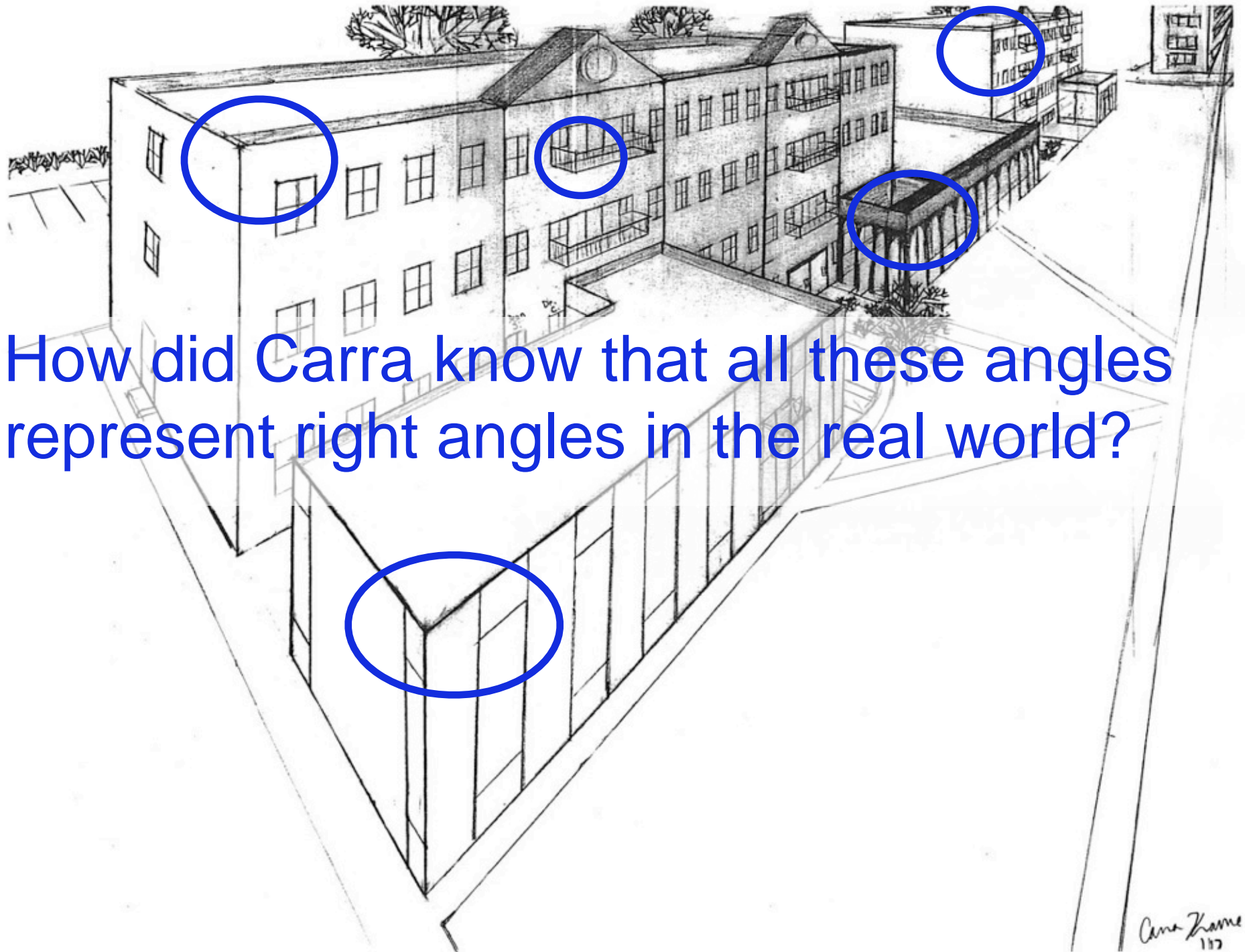
- Instructor's Materials for a **First Year Seminar**
- Projective Geometry applied to Perspective Art, for math majors (**class modules**)
- Perspective Geometry **Course-Follow-up Blog**
- the book: **Viewpoints: Mathematical Perspective and Fractal Geometry in Art**



VIEWPOINTS
Mathematical Perspective and Fractal Geometry in Art

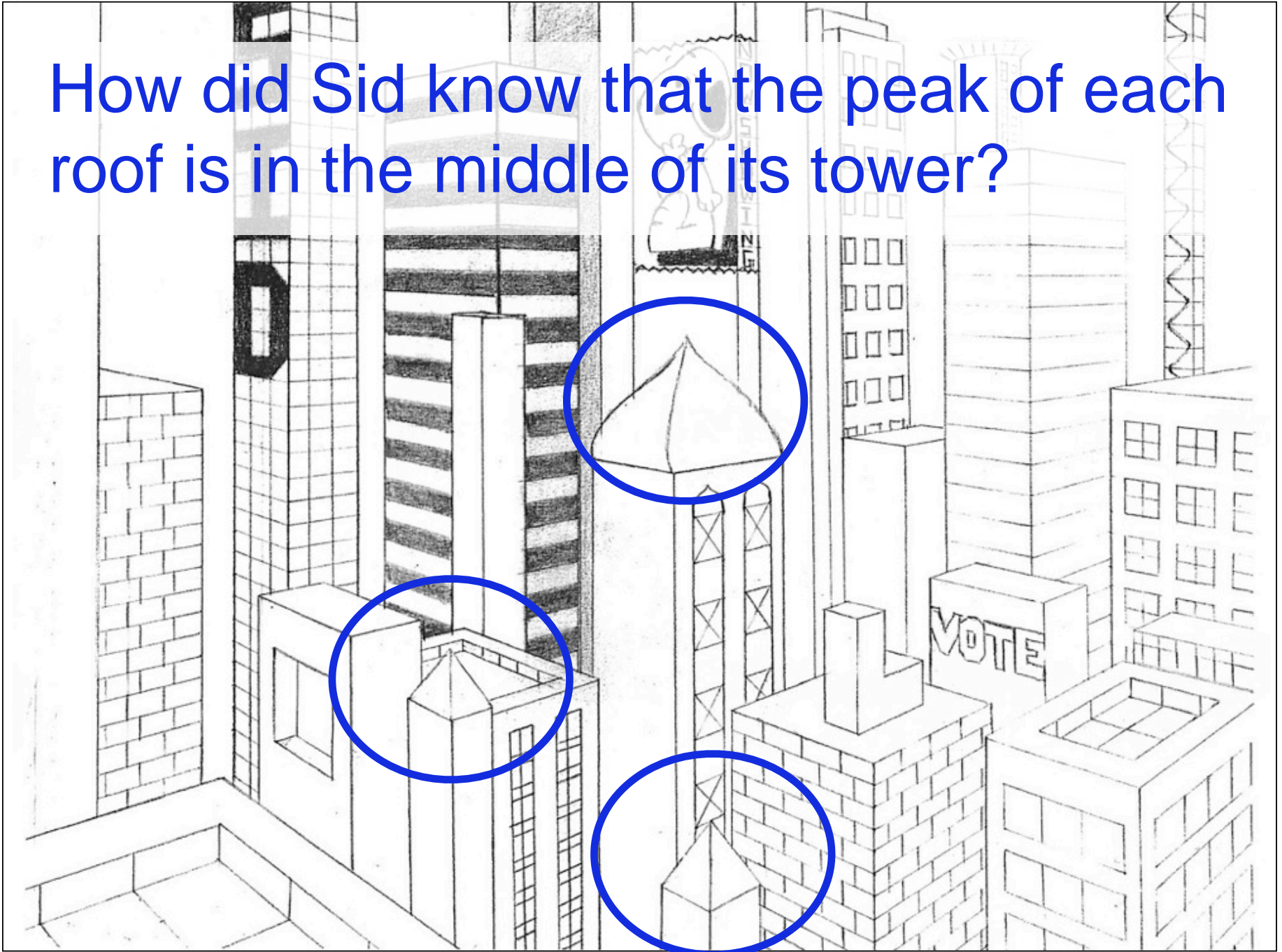


<http://www.fandm.edu/annalisa-crannell/course-materials>



How did Carra know that all these angles represent right angles in the real world?

How did Sid know that the peak of each roof is in the middle of its tower?



How did Tim know how to space those bricks,
or those sidewalk tiles,
so they look like they're the same size?



Calculus as a gateway to academic success

- connections to faculty members
- working in groups to solve problems
- academic maturity (how to study)
- writing projects
- understanding graphical information
- translating between physical situations and their symbolic/quantitative representations

References

How College Works, Daniel F. Chambliss and Christopher G. Takacs

Viewpoints: : Mathematical Perspective and Fractal Geometry in Art, Marc Frantz & Annalisa Crannell