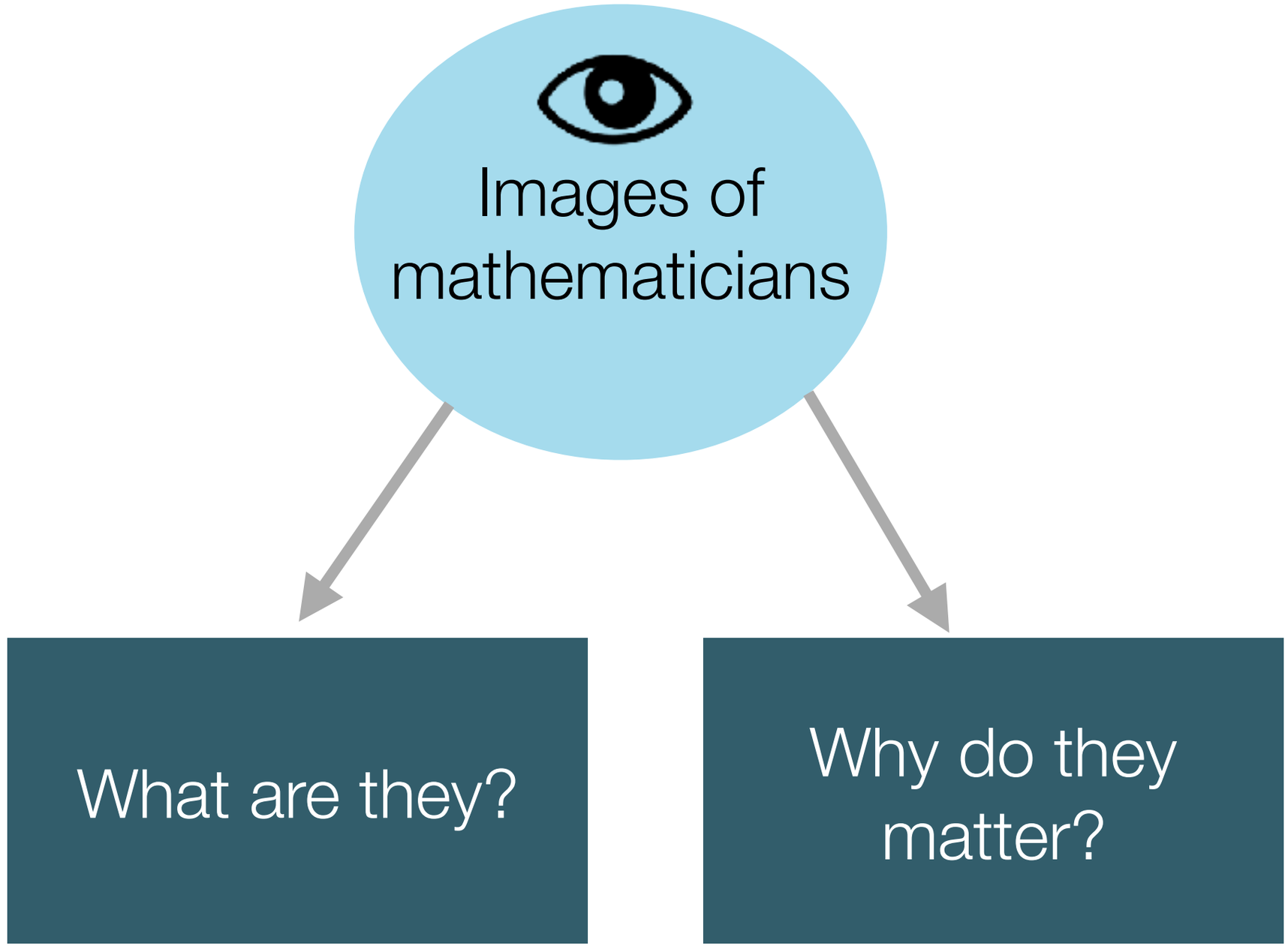
Using Women's Stories to Share Alternative Mathematical Experiences in a First Year Seminar

Sarah Mayes-Tang, University of Toronto

BIRS, Impact of Women Mathematicians on Research and Education in Math
March 2018


Images of mathematicians
What are they?
Why do they matter?

$|T| = |R|$

$(F)(a+b) = mg\,a\cos\theta$

$= mg\,a\left(\frac{b}{c}\right)$

$F = mg\left(\frac{a}{a+b}\right)$

$f \in \Gamma(f^{q} f')$

$\in O'$

$+ \Gamma(\alpha' \beta' m)$

$= S_2 (3 - 4 3 2)$

$O < \pi < 1$

$\ominus^{\pi} = O$

$\nabla^{\pi} = \ominus$

Problem

Show that $\int_{-\infty}^{\infty} e^{x^2/2\sigma^2} dx$

Hint: First show that

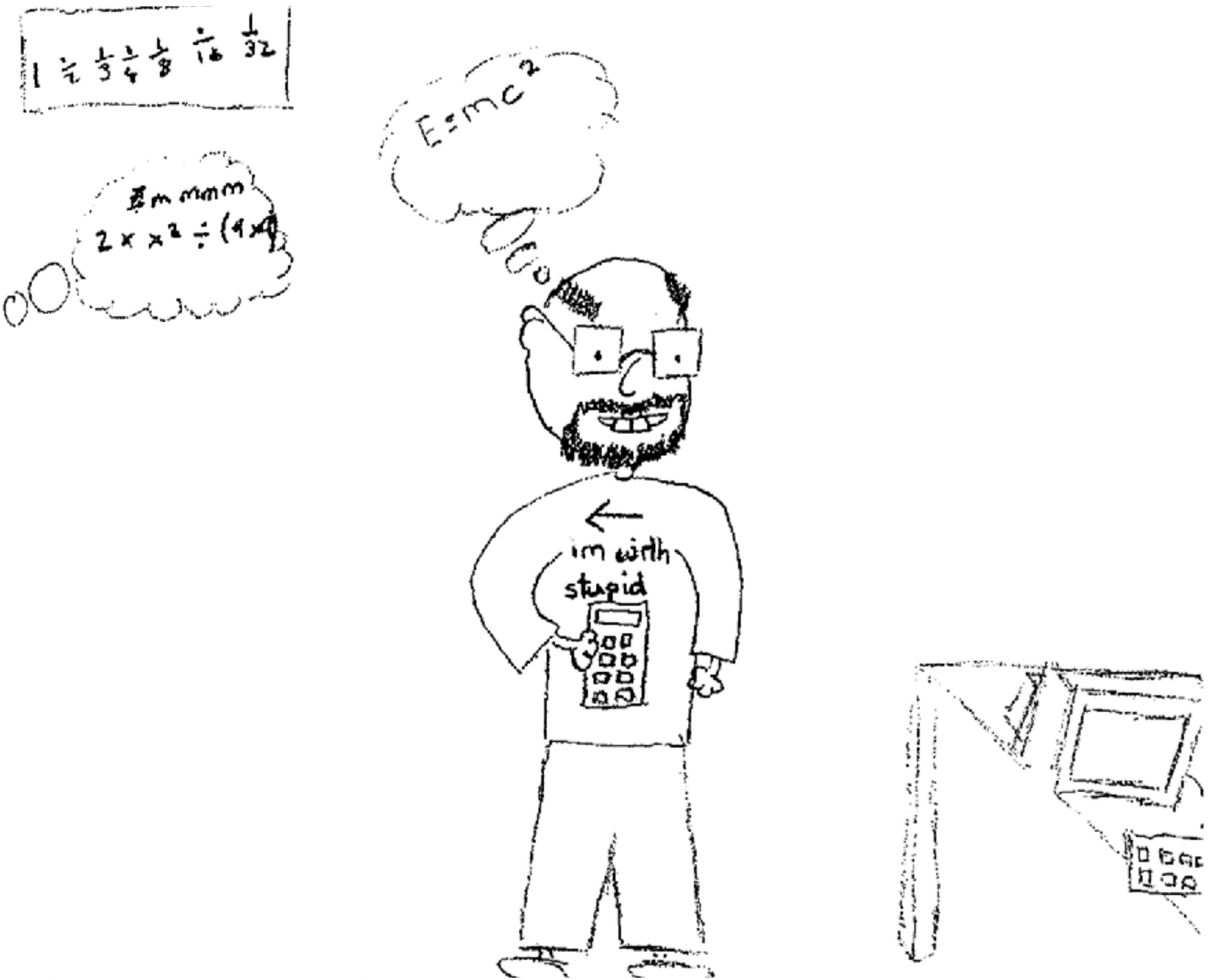
$\int_{-\infty}^{\infty}\int_{-\infty}^{\infty} e^{(x^2+y^2)/2\sigma^2} dxdy = 2\pi\sigma$

CONIC PERTAINING

$$\left[\frac{(1.172)}{2.382} + \sin\left(\frac{\pi}{5}\right)\right.$$

OVERSHOOT

$$\oint^{2+1} = \oint^{2} + \frac{(0.001)}{(1.155)}(2.872)(\cos(\pi/4)$$



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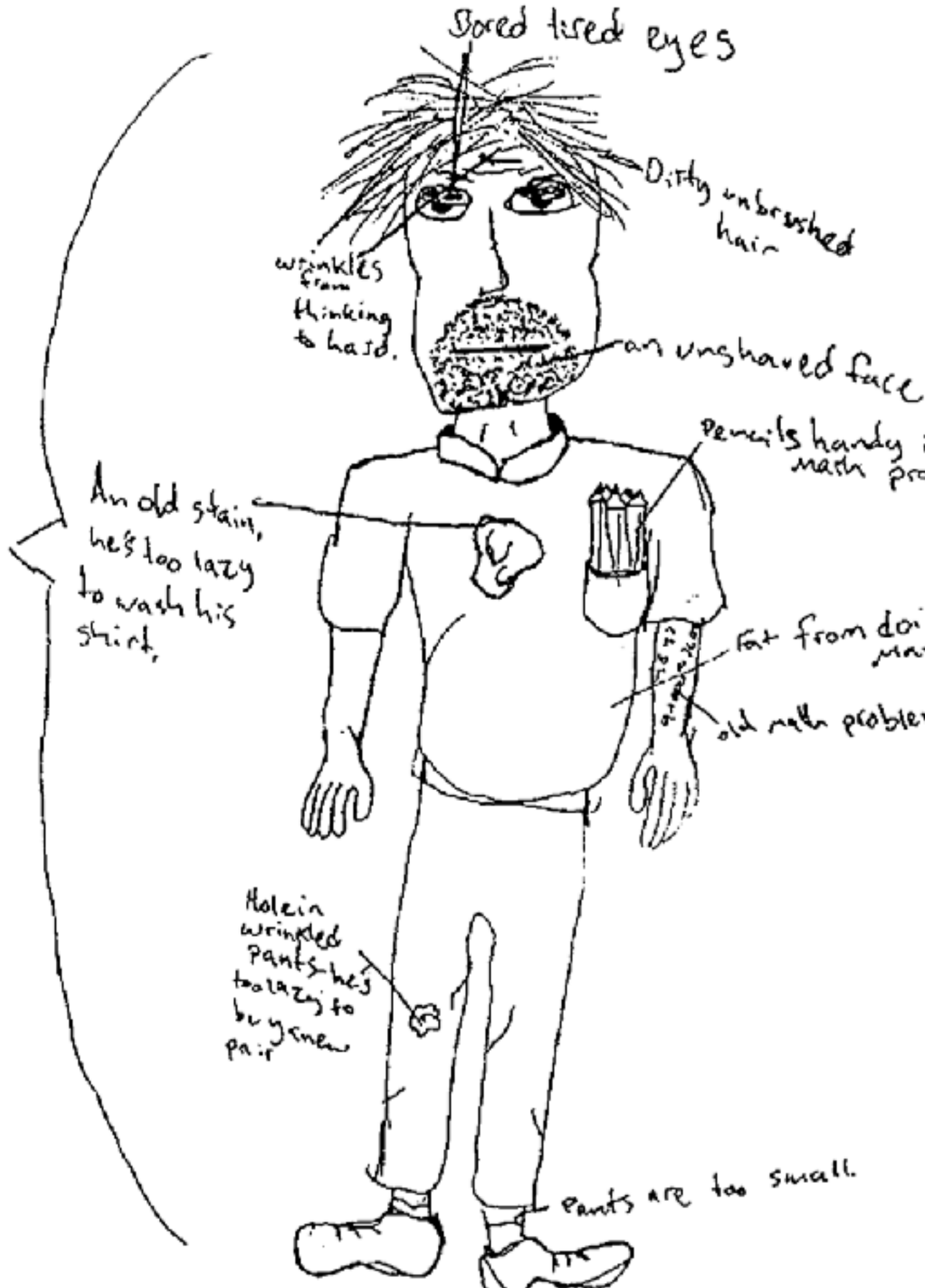
Draw a Mathematician: Themes

- Mathematics as coercion
- Foolish mathematician
- Overwrought mathematician
- Mathematician who can't teach
- Disparagement of mathematicians
- Einstein effect
- Mathematician with special powers



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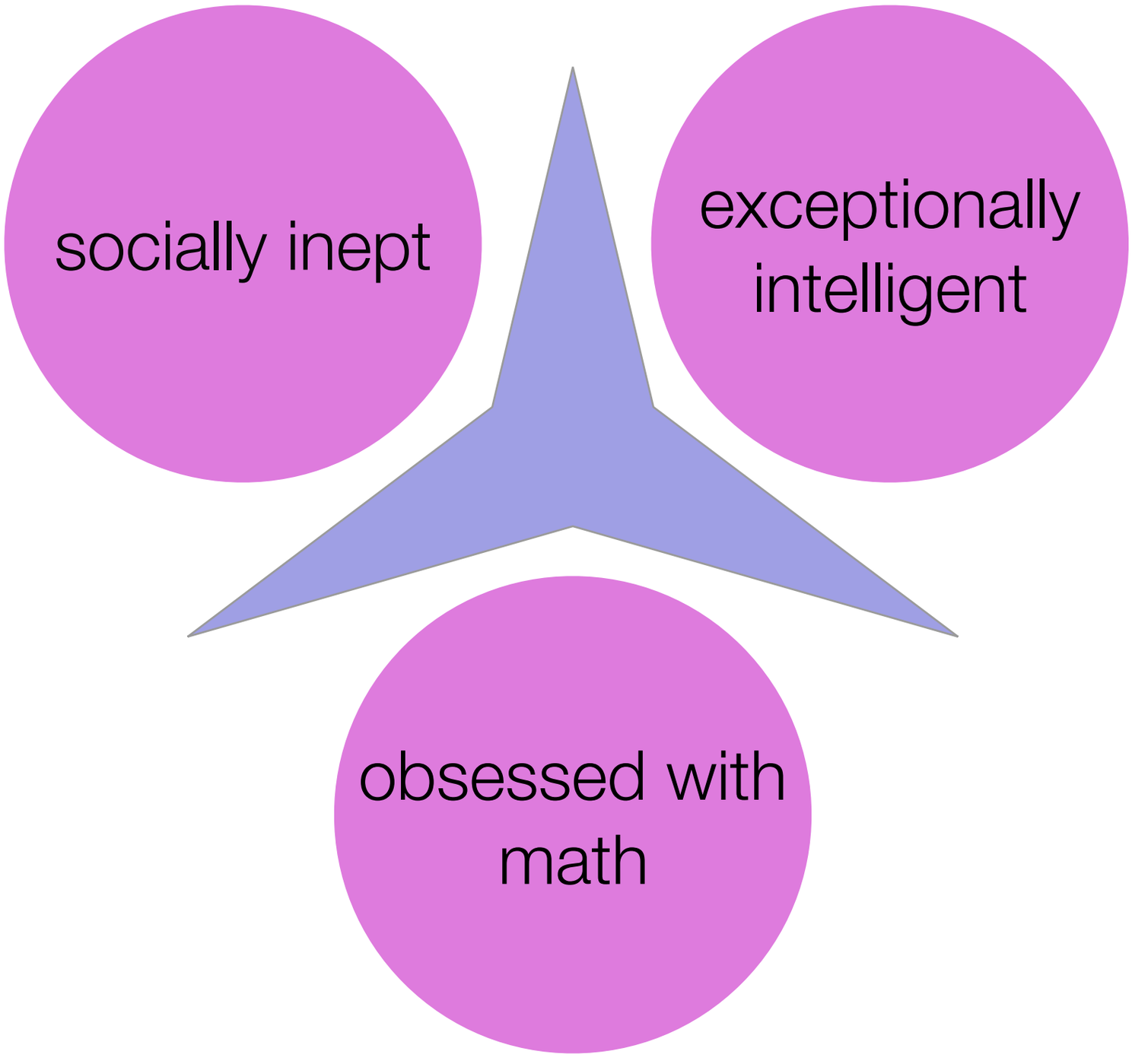
Undergraduate women's images



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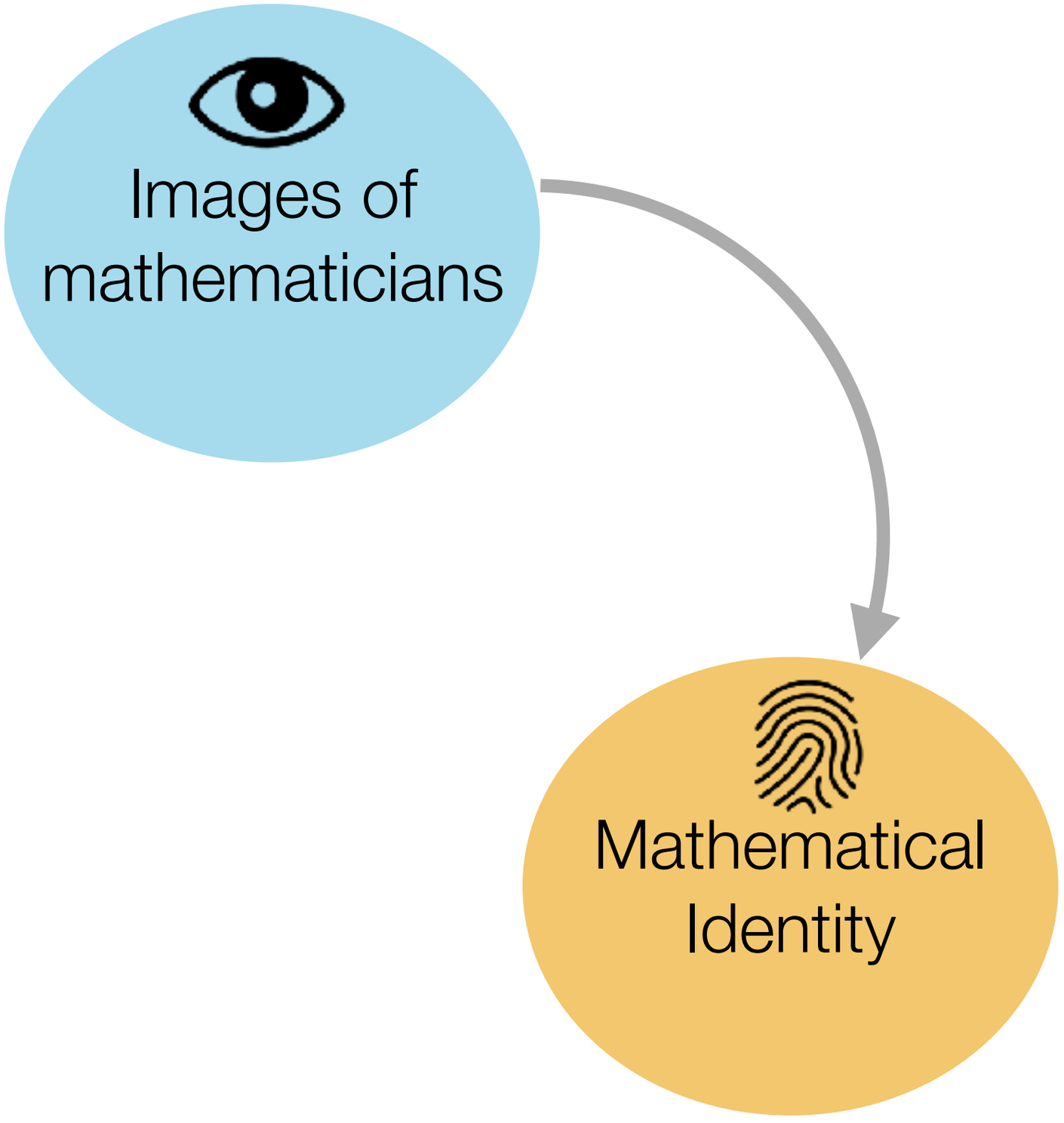

Images of mathematicians
Mathematical Identity

"The image of mathematicians… causes dissonance with the traditional *female gender identity*. Therefore, whether consciously done so or not, women who become mathematicians must either choose not to accept the stereotypical traits of mathematicians or choose not to identify with traits of their traditional *female gender identity..*"

- Katrina Piatek-Jimenez

Images of mathematicians

Mathematical Identity

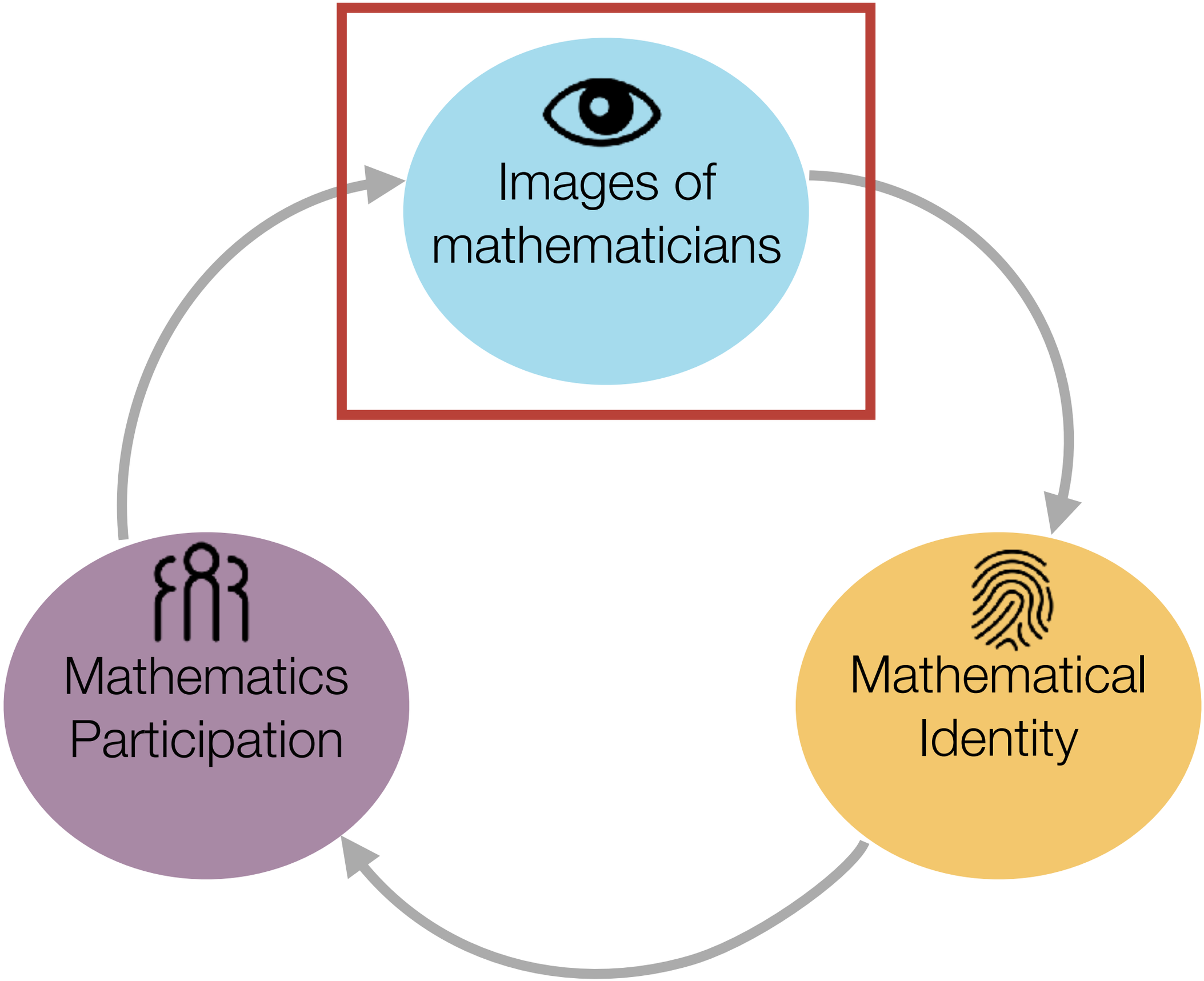
Mathematics Participation


Dad, can you help me with my reading?
Sorry Ella, I'm just not a reading person

Images of mathematicians

Mathematics Participation

Mathematical Identity


Images of mathematicians
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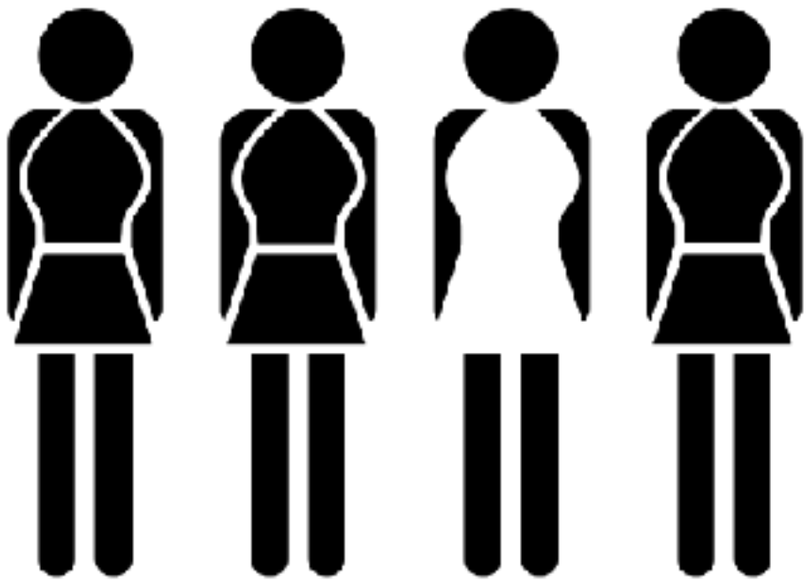
Mathematical Identity

Mathematicians who counter stereotypes….



may be seen only as exceptions to the rule

may be viewed as ‘unbelievable’ or ‘too good’

Bamberger, Yael M. "Encouraging girls into science and technology with feminine role model: Does this work?." *Journal of Science Education and Technology* 23.4 (2014): 549-561.

Betz, Diana E., and Denise Sekaquaptewa. "My fair physicist? Feminine math and science role models demotivate young girls." *Social psychological and personality science* 3.6 (2012): 738-746.

APA

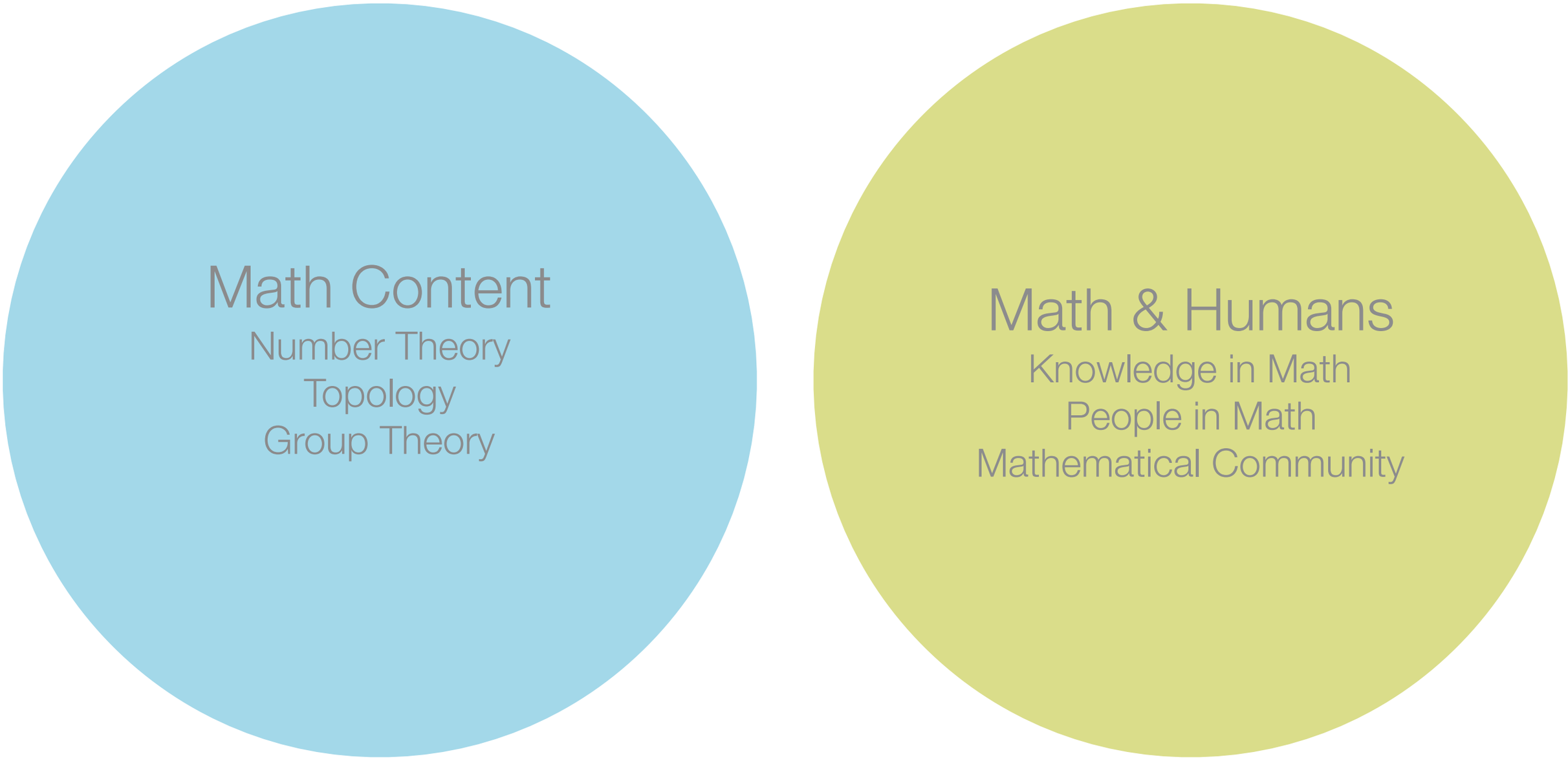
Seminar: Context

20 1st and 2nd year students

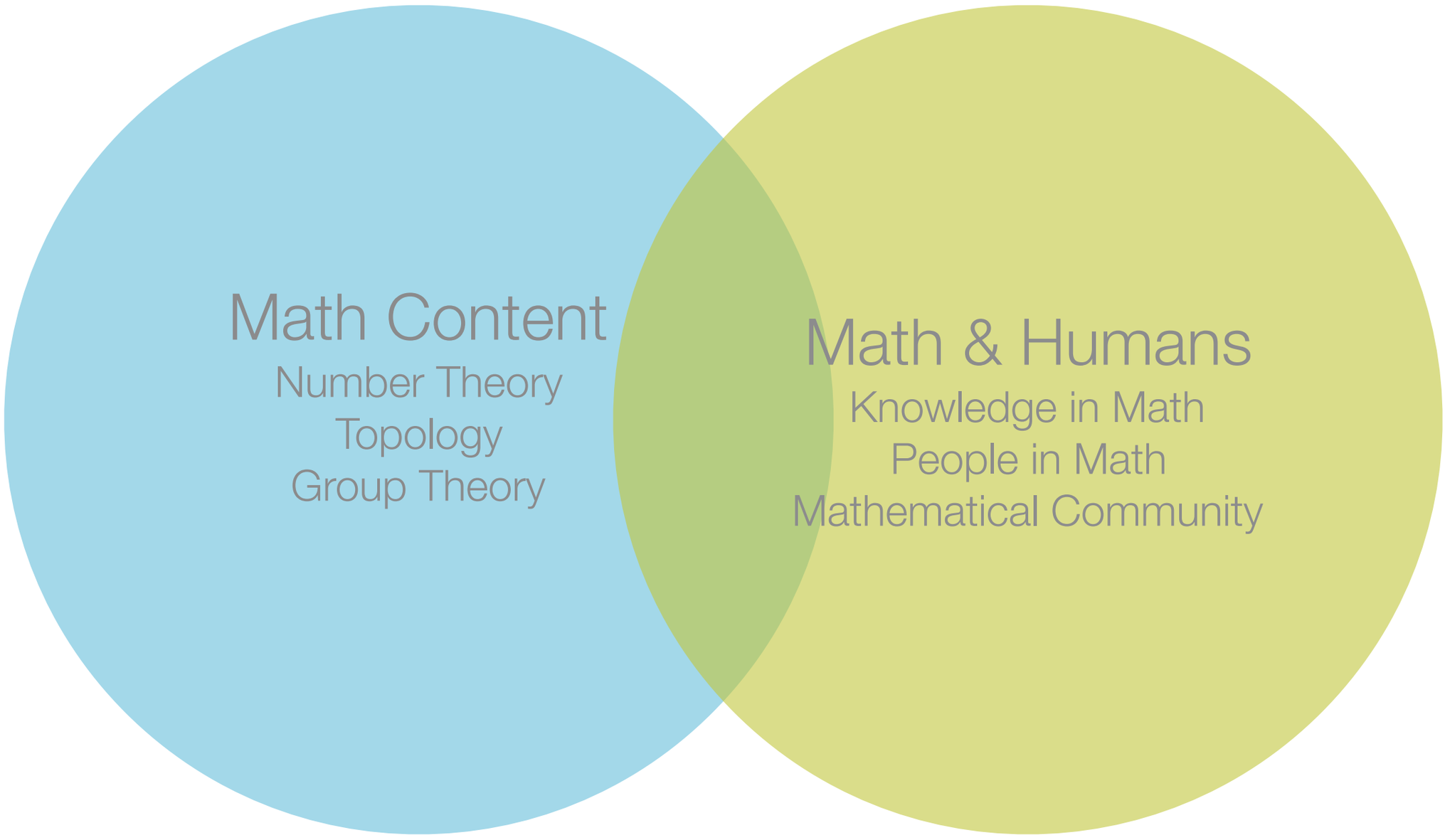
Required liberal arts distribution requirement

Purpose: “think like a mathematician”

What is Math?


Math Content
Number Theory
Topology
Group Theory
Math & Humans
Knowledge in Math
People in Math
Mathematical Community

What is Math?



“modern” mathematics

“Storytelling is the most powerful way to put ideas into the world.”

–Robert McKee

Joan Birman, 1927-

- Share a **variety of stories**, of both traditional and non-traditional paths
  - *Women in Mathematics: The Addition of Difference*
  - Simons Foundation *Science Lives*
  - Fields Medal videos
- Topologist, braid and knot theory
- “the community has bought hook, line, and sinker this whole idea that if you are going to do research, you do it when you are young…. I don't think there is merit in it. I think doing math when you're enthusiastic, yes, that's what is important. Not your age.”

Mary Ellen Rudin, 1924-2013

- Tell **rich & complex stories**, of both professional and personal lives
- **Connect** to students' lives
- Topologist, known for constructing counterexamples
- "I have never minded doing mathematics lying on the sofa in the middle of the living room with the children climbing all over me"

Marian Pour-El, 1928-2009

- Address **internal and external influences**
- Discuss both **barriers and successes**
- Logician, computability

- “It was depressing…. I remember thinking after a while that I was not getting anything done. I was very, very despondent.”

Judith Roitman, 1945-

- **Women's stories** are unique
- Set Theorist and Topologist
- "… a very common written comment that a woman would get would be `works very hard'...So It's like they were giving me credit for something I wasn't doing and taking away credit for my natural intelligence. That really got on my nerves."

Requires intentionality

Variety of experiences

Why women?

Counter mathematical myths

Richness of stories

Media & Reading

Media & Reading

Personal Reflections

Media & Reading

Personal Reflections

Discussion & Analysis

Media & Reading

Personal Reflections

Discussion & Analysis

Synthesis: Panel Discussions

"Also, those stories gave me faith and courage that despite the challenges that these women faced, most of them were able to overcome them and become successful in the end. Hence, I know I would persevere as well, as long as I am passionate about Math and can find a strong group/association to be part of throughout the process. "

–Student from *The Mathematical Experience*

Images of mathematicians

Mathematics Participation

Mathematical Identity

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Henrion, Claudia. *Women in mathematics: The addition of difference*. Indiana University Press, 1997.

Davis, Philip, Reuben Hersh, and Elena Anne Marchisotto. *The mathematical experience*. Springer Science & Business Media, 2011.

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“The mathematical life of a mathematician is short. Work rarely improves after the age of 25 or 30. If little has been accomplished by then, little will ever be accomplished.”

- Davis & Hersh, *The Mathematical Experience*

The Ideal Mathematician
(from *The Mathematical Experience)*

- "he"
- Intelligible only to a small group of specialists
- Incapable of showing or telling what he studies
- Finds it difficult to establish conversation with that large portion of humanity who doesn't understand his work