



Physics First
*Building STEM achievement in
Camden high schools*

*Presented By
Janel Williams, Senior Lead Educator of Math
and Science*

Hmmm....





9 million



\$69,830

3%



5%



6%



7%



20%↓



**What can
we do?**

Why Physics First?

STEM Careers

=

PHYSICS

Challenges we faced:

- In 2013, just 10% of high school students were enrolled in physics
- Schools offered physics in different grades, and using different curriculum





49%

21%

Challenge: Raising STEM achievement

- Disjointed science sequencing across our 5 high schools
- Lowest high school math scores in the State
- High vacancy rate for high school science teachers

Physics Plan

- Uniform science curriculum and sequencing across the District
- All students take Physics
- More Staff needed

We teamed with NJCTL

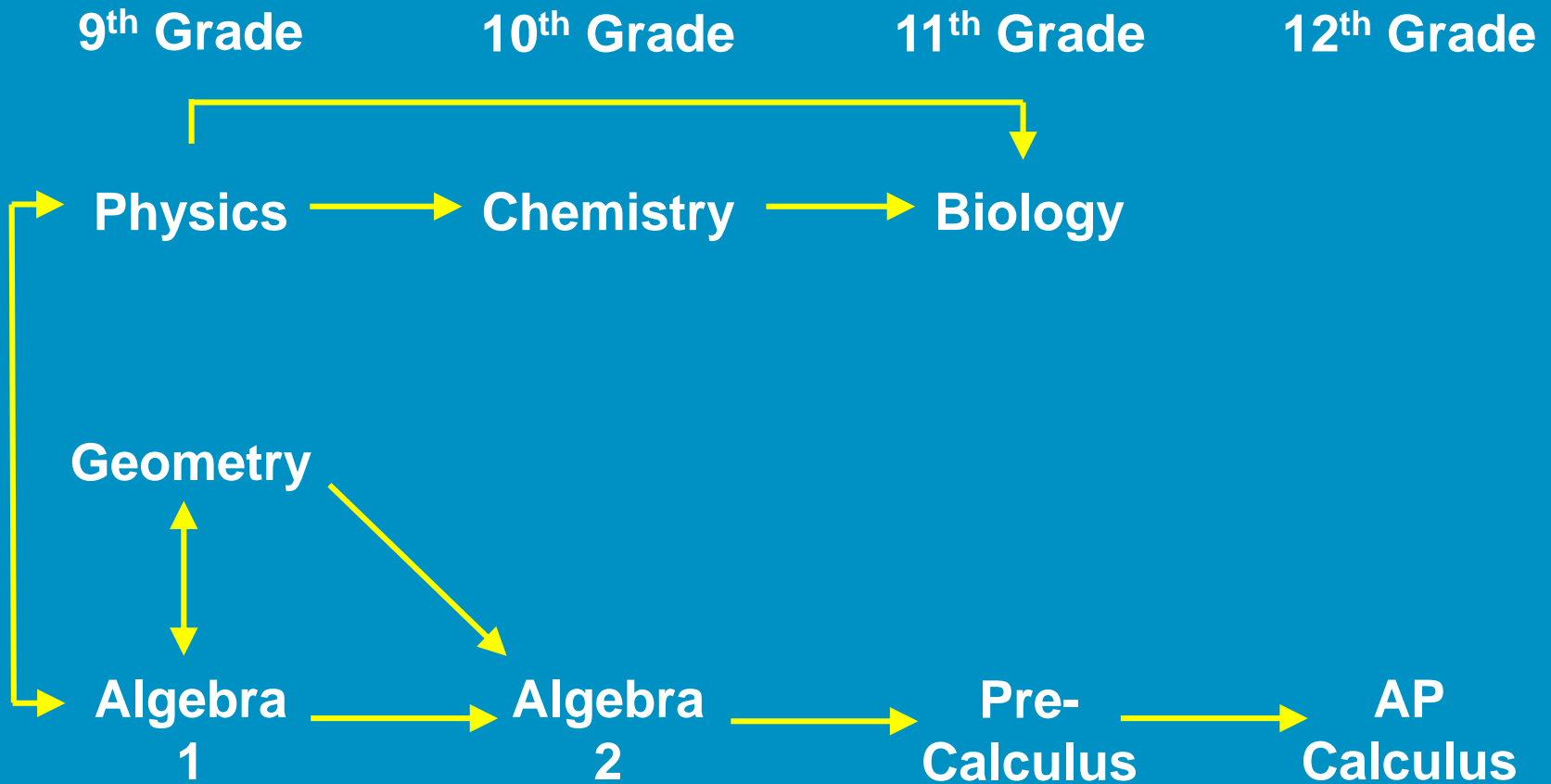


NEW JERSEY CENTER
FOR TEACHING & LEARNING

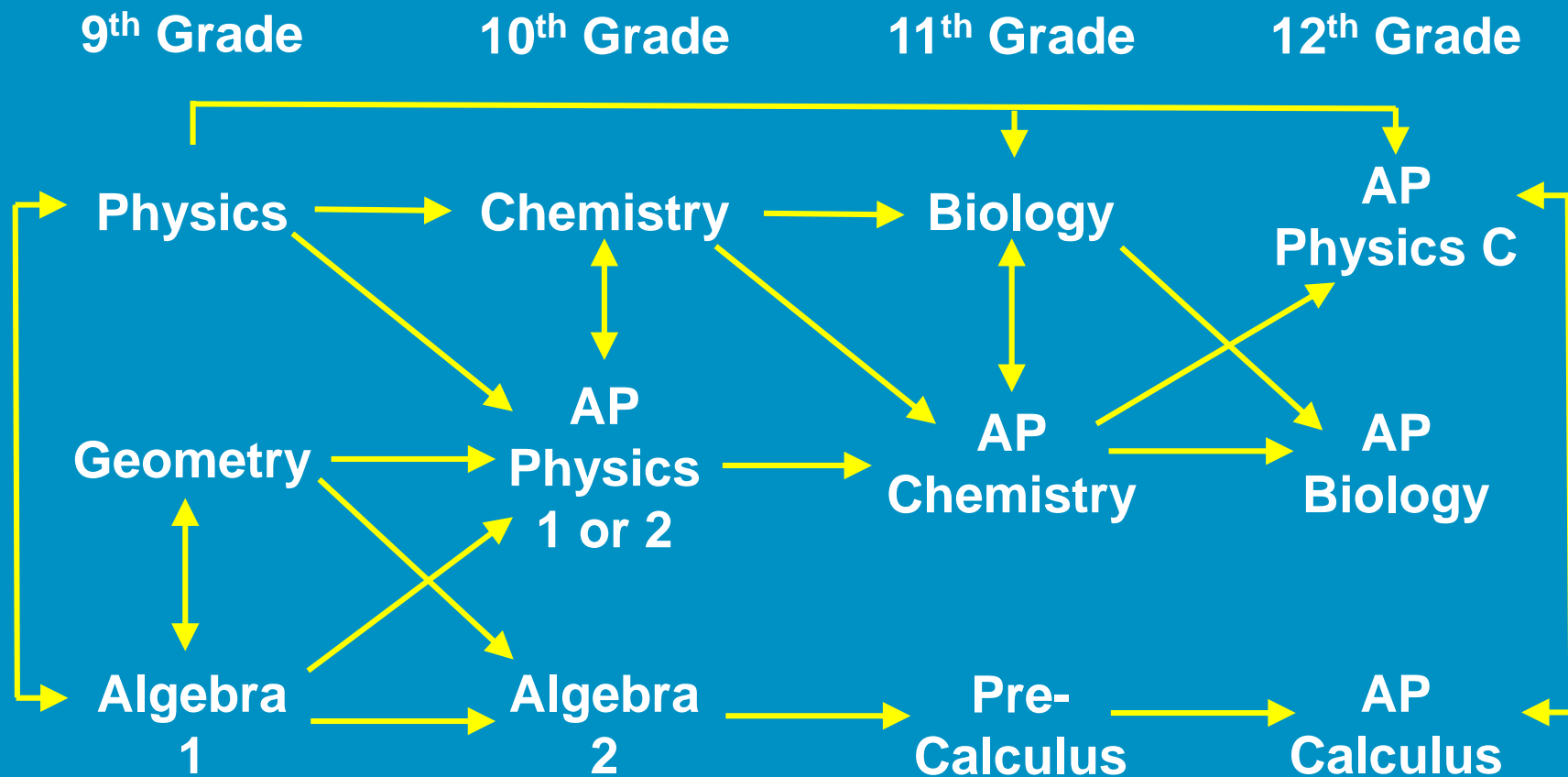
NJCTL's belief about Physics First

- Traditional science sequence is backwards
- Allows access for all students
- Biology is the most Macroscopic of all sciences

The New HS Science Sequence

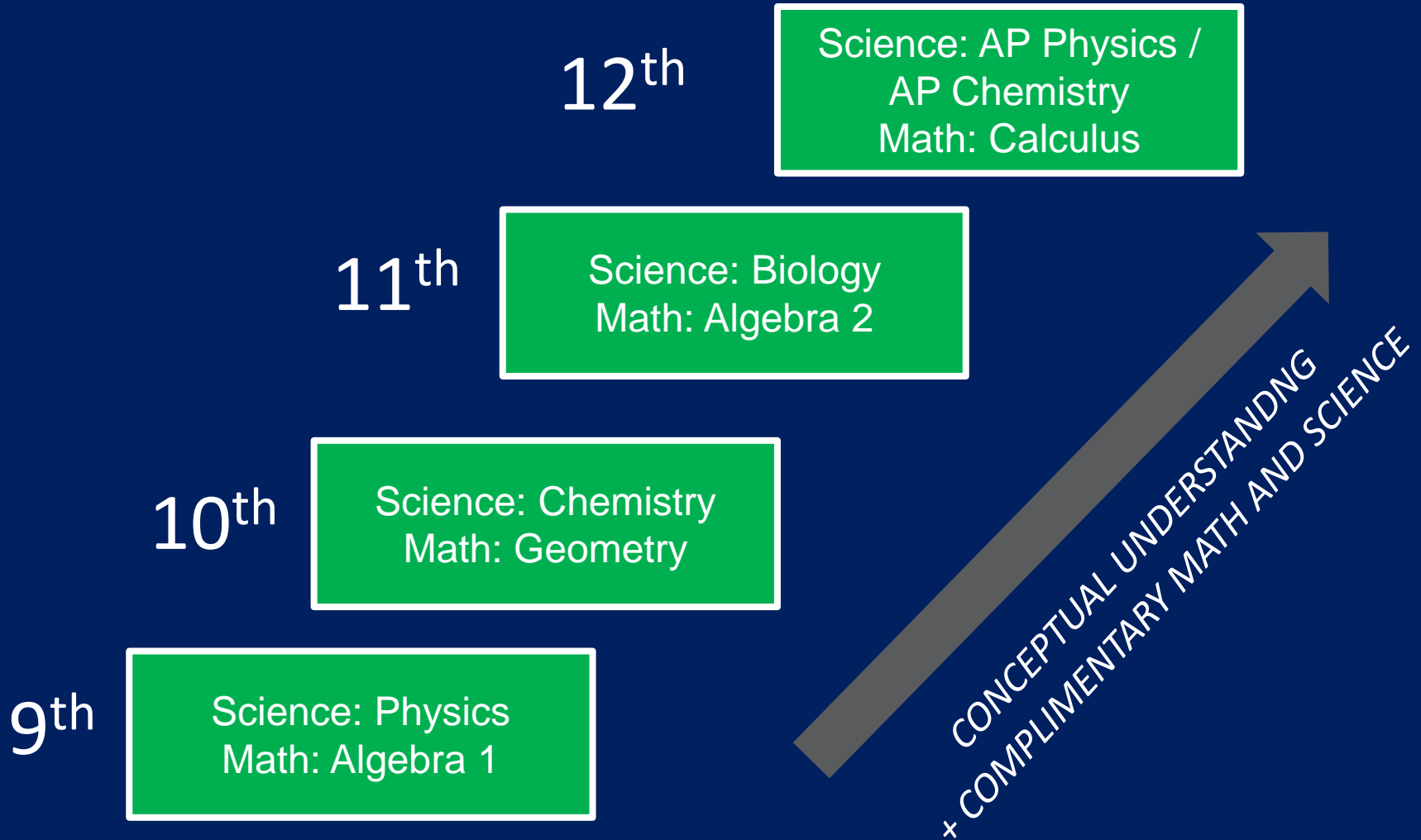


+ Expanded AP options



Why Physics First?

Build a strong foundation for learning



Why Physics First?

A young woman with dark hair in a bun, wearing a black leather jacket over a green shirt, stands in front of a physics classroom wall. The wall is decorated with various posters and equations, including:

- EXIT** (with a hand-drawn arrow pointing right)
- Google Classroom**
- EXIT TAB**
- ATOMS** (with a diagram of an atom)
- $E = mc^2$**
E = Energy
m = Mass
c = Speed of light (3.00×10^8 m/s)
- $V_f = V_o + at$**
Kinematics Equation 1
- $x = x_o + v_o t + \frac{1}{2} at^2$**
Kinematics Equation 2
- $V_f^2 = V_i^2 + 2a\Delta x$**
Kinematics Equation 3
- $a = \frac{\Delta v}{\Delta t}$**
- $Z_{eff} = Z - \sigma$** (Shielding Constant)
- GOAL SETTING** (with a list of goals: SPECIFIC, MEASURABLE, SUSTAINABLE)
- Michelle Robinson Obama** (with a photo and text: "knew her Kinematics equations!!!")
- Ten Key Practices for Creative Arts Morgan Village Academy** (with a list of practices: Publishing Expectations, Challenging Performing Art Courses, Practices That Teach from the College Curriculum, Graded Academic Core and Major, and Experiences of Academic and Career Technical Studies)
- Learning Station**

Jade Ayala
9th grade

Physics First in Camden



More students graduating and fewer dropping out, thanks to uniform course sequencing for high school science



Improved connections between math and science courses



More students showing interest in STEM fields and pursuing opportunities to learn more

Why Physics First?

Donna M Irons, M. Ed.
Teacher, HS Science

The background is a vibrant bulletin board filled with physics-related content. Visible items include:

- Kinematics Equation 1:** $c = \text{Speed of light } (3.00 \times 10^8 \text{ m/s})$
- Kinematics Equation 2:** $x = x_0 + v_0 t + \frac{1}{2} a t^2$
- Kinematics Equation 3:** $V_f^2 = V_i^2 + 2a\Delta x$
- Other Equations:** $Z_{\text{eff}} = Z - \sigma$ (Shielding Constant), $a = \frac{\Delta v}{\Delta t}$, $S = \frac{d}{t}$, $V_f = V_o + at$, $X = X_o + V_o t + \frac{1}{2} at^2$, and $V_f^2 = V_o^2 + 2a(X_2 - X_1)$.
- Portraits:** A portrait of a young man and a photo of Michelle Robinson Obama with the text "Michelle Robinson Obama knew her Kinematics equations!!!".
- Other Text:** "Why no Bohr anyone?", "SETTING SPECIFIC MEASURABLE", "Ten Key Practices for Creative Arts Morgan Village Academy", and "Dr. Davida Coe-Brockington, Principal".

Why Physics First?



“It’s almost impossible to get a physics teacher; it’s almost impossible to get a bilingual teacher,” said Janel Williams, Camden City School District’s lead educator for high school STEM. “The probability of finding a bilingual physics teacher was next to zero.”

– Hechinger Report, December 2017

Why Physics First?

Vianney Peregrino-Arreola
12th grade

Kinematics Equation 2
$$x = x_0 + v_0 t + \frac{1}{2} a t^2$$

Kinematics Equation 3
$$V_f^2 = V_i^2 + 2a\Delta x$$

Kinematics Equation 1
$$a = \frac{\Delta v}{\Delta t}$$

Kinematics Equation 4
$$s = \frac{d}{t}$$

Bohr Model
Why no Bohr anymore?

Ten Key Practices for Creative Arts Morgan Village Academy
Dr. Davida Coe-Brockington, Principal

- Raising Expectations
- Challenging Performing Art Courses
- Academics That Teach from the College Curriculum
- Integrated Academic Core and Major
- Shared Experiences
- Integration of Academic and Career Technical Studies
- Engagement of Students in the Learning Process
- Controlled Guidance and Advisement System

How we achieved

NJ Center for Teaching and Learning

- Accreditation Program

- Teacher PD

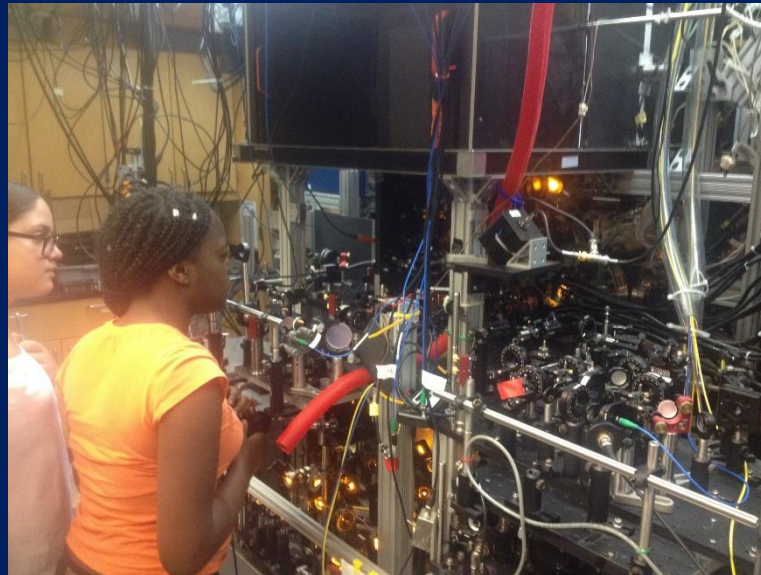
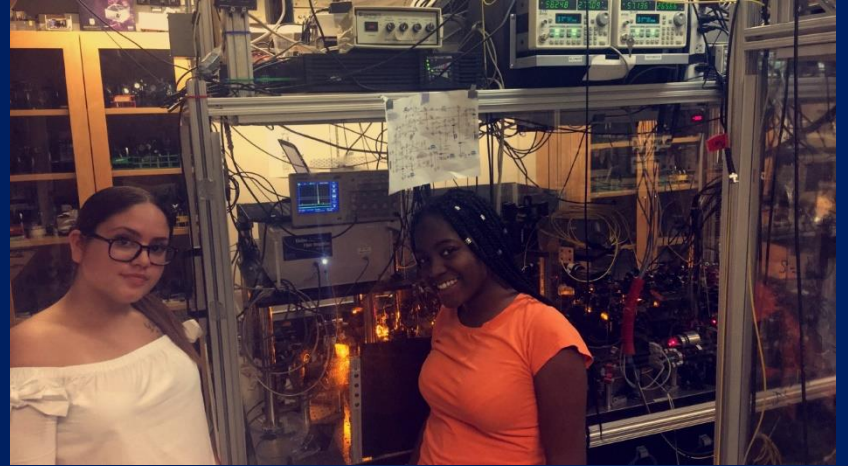
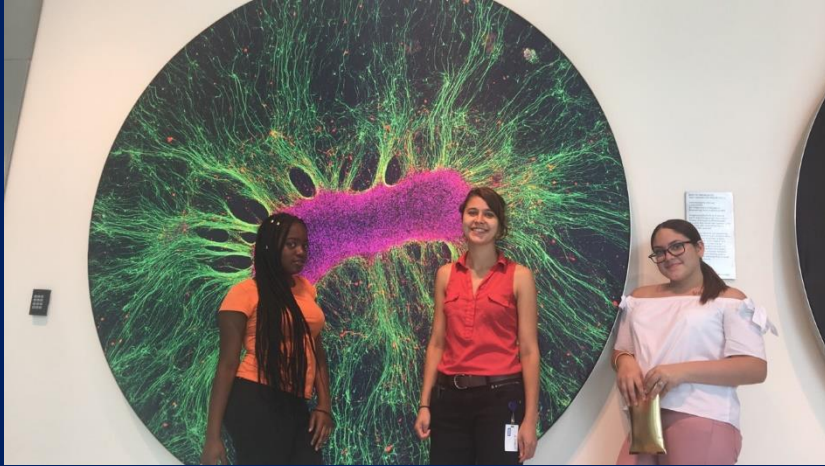
- Technology

- PLCs

How we achieved

- Teacher PD and PLCs
- Technology

Physics in Camden Today



Physics in Camden Today

- Science scores are up
- Teacher vacancies are down
- Graduation rate is up
- Dropouts have been cut in half
- Students will graduate prepared for college-level science and math

Lessons Learned

- Just Do it!
- Drown out the noise of nay sayers by focusing on the end result
- Nelson Mandela said it best, “It always seems impossible until it is done!”
- Don’t expect perfection during the first year, but continue to advocate for our students with a sense of urgency

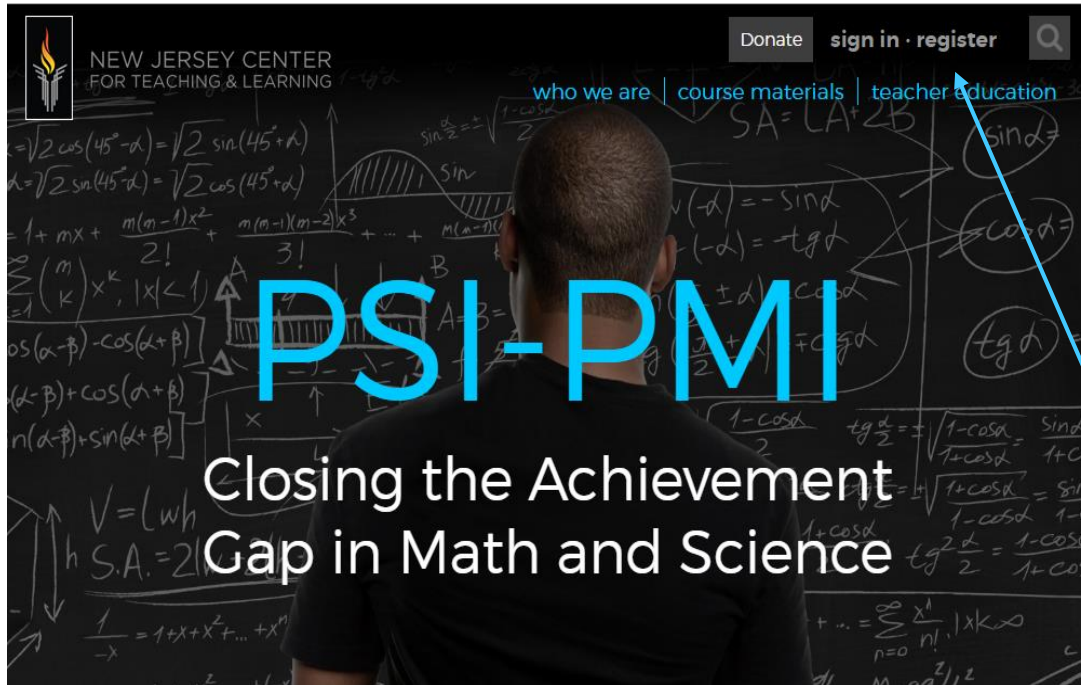
Three tips for success

- Prepare,
- Prepare,
- Prepare!

What's next?

- More and better PD for Physics teachers
- Continued partnership with NJCTL
- Better alignment between Algebra I and Physics curriculum

Contact NJCTL



NJCTL Website

www.njctl.org

Educators register to see assessments.

(Register in the upper right hand corner of the webpage).

For more information:

info@njctl.org

Contact me

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- Call: 631-882-6319
- For more information with Physics
First in Camden

- "[Science] is more than a school subject, or the periodic table, or the properties of waves. It is an approach to the world, a critical way to understand and explore and engage with the world, and then have the capacity to change that world..."

- — President Barack Obama, March
23, 2015