



OREGON
DEPARTMENT OF
EDUCATION

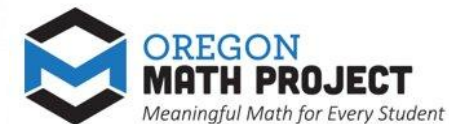
Oregon achieves . . . together!

Oregon Math Project: Taking the Next Steps in Standards, Instruction, and Pathways

2021 COSA Summer Conference

August 2021

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Goals for Today's Session

1. Deepen understanding of the equitable vision and goals of the Oregon Math Project.
2. Learn about current work with revised math standards and pathways.
3. Build awareness of equitable instructional strategies to deepen student learning

Everyone has a math story



Photo by [Nadine Shaabana](#) on [Unsplash](#)

Everyone has a math story



If you are an Oregon student

40% of students proficient in math

23% of community college students who start with developmental math earn a credential within 6 years.

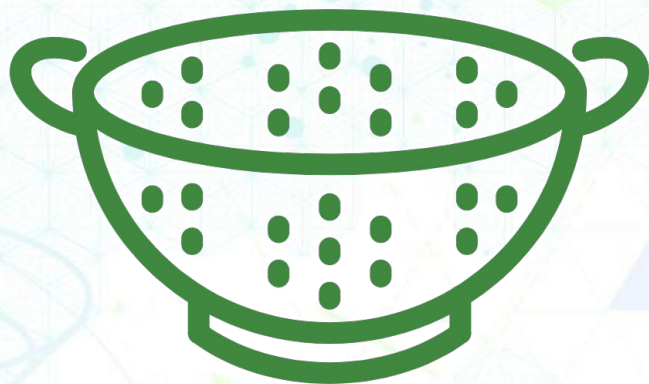
Less than half of students complete the AGA sequence in 4 years of high school.

64% of high school graduates take a developmental math course at community college (2015).

What are their stories? Who are the Ms. Wiley's in your school?

Mathematics as a Gatekeeper

Engineering Inequity: The Story of Modern Mathematics Education in the United States



Where We Are:
Math as a Filter



Where We Want to Be:
Math as a Pump

Commitment to Anti-Racist Math Outcomes and Actions of ODE Math Team

Anti-racist Math Outcomes

Working Draft for the ODE Math Team

Anti-racist Math Outcome 1

Shift to an asset-based perspective

Anti-racist Math Outcome 2

Eradicating mathematics as a gatekeeper

Anti-racist Math Outcome 3

Engaging the sociopolitical realities of math education

Anti-racist Math Outcome 4

Professional learning focus on mathematics and social justice

Sources used:

[Mathematics Education Through the Lens of Social Justice](#) (NCSM/TODOS, 2016)

[The Mo\(ve\)ment to Prioritize Anti-Racist Mathematics](#) (TODOS, 2020)

[The Impact of Identity in K-8 Mathematics Learning and Teaching: Rethinking Equity-Based Practices](#) (Aguirre, 2013)

[The Need to Rehumanize Mathematics](#) (Gutiérrez, 2018)

Engineering an Equitable Mathematics Education System

What is the Oregon Math Project?

Engineering a better system:
Meaningful math for every student



FOCUS



ENGAGEMENT



PATHWAYS



BELONGING

Oregon Math Project: Connection to Oregon Educational Goals (ORS 329.015)



FOCUS

Provide students with the **skills necessary** to pursue learning throughout their lives in an ever-changing world. (ORS 329.015(2)(a))



ENGAGEMENT

Provide an environment that **motivates students** to have experience in applying knowledge and skills and demonstrating achievement. (ORS 329.015(2)(b))



PATHWAYS

Equip students with the academic and career skills and information necessary to **pursue the future of their choice**. (ORS 329.015(2)(a))



BELONGING

Provide an environment that motivates students to **pursue serious scholarship**. (ORS 329.015(2)(b))



Engineering an Equitable Math System: **Identifying Core Math**



FOCUS

Provide students with the **skills necessary** to pursue learning throughout their lives in an ever-changing world. (ORS 329.015(2)(a))

Finding K-8 Focus

- K-8 standards are intended to be similar to previous standards.
- Standards have been further clarified by focusing wording.
- Moved additional content to a guidance document.
- Added a Data Reasoning domain.

Finding High School Focus

- Core content for the first two credits. (1 cr. Alg; $\frac{1}{2}$ cr. Geometry, $\frac{1}{2}$ cr. data/stats)
- More options for the third credit.
- Development of guidance documents for the third credit.
- Significant reduction in number of standards.

What will the draft **STANDARDS** look like?

Kindergarten Example

Kindergarten Standards

Algebraic Reasoning: Operations (K.OA)

K.OA.A Understand addition, and understand subtraction.

- K.OA.A.1 Represent addition as putting together and adding to and subtraction as taking apart and taking from using objects, drawings, physical expressions, numbers or equations.
- K.OA.A.2 Add and subtract within 10. Model authentic contexts and solve problems that use addition and subtraction within 10.
- K.OA.A.3 Using objects or drawings, and equations, decompose numbers less than or equal to 10 into pairs in more than one way.
- K.OA.A.4 By using objects, drawings, or equations, find the unknown number that makes 10 when added to a given number from 1 - 9.
- K.OA.A.5 Fluently add and subtract within 5 with accurate, efficient, and flexible strategies.

Numeric Reasoning: Counting and Cardinality (K.NCC)

K.NCC.A Know number names and the count sequence.

- K.NCC.A.1 Orally count to 100 by ones and by tens in sequential order.
- K.NCC.A.2 Count forward beginning from a given number within 100 of a known sequence.
- K.NCC.A.3 Identify number names, write numbers, and the count sequence from 0-20. Represent a number of objects with a written number 0-20.

K.NCC.B Count to tell the number of objects.

- K.NCC.B.4 Understand the relationship between numbers and quantities; connect counting to cardinality.
- K.NCC.B.5 Count to answer "how many?" questions using up to 20 objects arranged in a variety of configurations or as 10 objects in a scattered configuration. Given a number from 1-20, count out that many objects.

High School Example

High School Standards

Algebraic Reasoning: Expressions and Equations (HS.AEE)

HS.AEE.A Rewrite expressions in equivalent forms by using algebraic properties to make different characteristics or features visible.

- HS.AEE.A.1 Interpret an expression which models a quantity by viewing one or more of its parts as a single entity and reasoning about how changes in these parts impact the whole, and vice versa.
- HS.AEE.A.2 Create and recognize an equivalent form of an expression to understand the quantity represented in an authentic context.
- HS.AEE.A.3 Rearrange formulas and equations to solve for different variables.
- HS.AEE.B Find and verify solutions to an equation, inequality, or system of equations or inequalities.*
- HS.AEE.B.4 Define variables and create equations with two or more variables to represent relationships between quantities in order to solve problems in authentic contexts.
- HS.AEE.B.5 Define variables and create inequalities with one or more variables and use them to solve problems in authentic contexts.
- HS.AEE.B.6 Solve systems of linear equations through algebraic means for simple systems and strategically using technology when needed.

Oregon Math Content Page will be updated with latest links and information
<https://www.oregon.gov/ode/educator-resources/standards/mathematics/Pages/default.aspx>

What will the draft **GUIDANCE** look like?

Clarification Guidance Example

STANDARD: 1.GM.A.2

Standards Statement (JUNE 2021):

Compose common two-dimensional shapes or three-dimensional shapes to create a composite shape, and create additional new shapes from composite shapes.

DRAFT Standards Guidance (JUNE 2021):

Clarifications

- It is important to note that the size of the shape does not necessary distinguish between common and composite.

Terminology

- Shapes that are made up of two or more common shapes are called composite shapes.
- Students will be working with shapes to compose and decompose shapes to form new shapes.
 - Compose – put together
 - Decompose – break apart

Boundaries

- Students should use these common two-dimensional shapes to create composite shapes:
 - circles
 - half-circles
 - quarter-circles
 - triangles
 - squares
 - rectangles (Students should know that a square is a type of rectangle, based on its attributes.)
 - hexagons
 - trapezoids
- Students should use these common three-dimensional shapes to create composite shapes:
 - cubes

Order	Title	Description
1	Clarifications	A foundational or primary concept, rule, or principle that a student would have the opportunity to learn prior to the given standard. (clarifying statements, elaborations)
2	Terminology	Definitions of mathematical terms or nomenclature associated with a given content standard. (terms, vocabulary, nomenclature)
3	Boundaries	Boundary statements for a given standard such as inclusions and exclusions for a given grade or course.
4	Teaching Strategies	Strategies and methods for consideration by an educator to better understand types of instructional activities that could be used to support teaching a given standard.
5	Connections	Ideas to connect a learning standard to relevant applications and modeling tasks at a given grade level. Example connections could either include: <ul style="list-style-type: none"> Connections within a math (close or same time in a grade) Connections across disciplines (STEM, Writing, etc.)
6	Examples	Specific examples of tasks or resources that help illustrate the type of work associated with a given standard.

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<https://www.oregon.gov/ode/educator-resources/standards/mathematics/Pages/default.aspx>

Finding Focus:

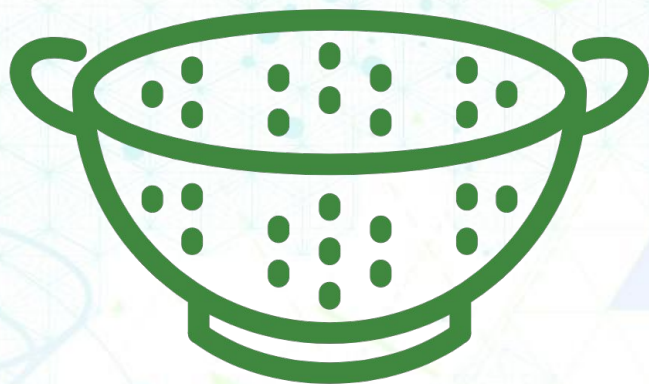
Word Count Difference between CCSS (2010) & Oregon Draft (July 2021)

Grade/Course Level	Original Word Count [CCSS, 2010]	Standard Statement Word Count [OR July 21 Draft]	Difference	Percent Decrease
K	651	413	(238)	-36.6%
1	926	493	(433)	-46.8%
2	816	583	(233)	-28.6%
3	1606	489	(1117)	-69.6%
4	1838	699	(1139)	-62.0%
5	1700	636	(1064)	-62.6%
6	1914	770	(1144)	-59.8%
7	2008	519	(1489)	-74.2%
8	1391	522	(869)	-62.5%
HSA	1047	260	(787)	-75.2%
HSN	799	80	(719)	-90.0%
HSF	1174	165	(1009)	-85.9%
HSG	1248	240	(1008)	-80.8%
HSS	832	323	(509)	-61.2%
K-8 Average	1427.8	569.3	(858.4)	-55.8%
HS Average	1020.0	213.6	(806.4)	-78.6%



Engineering an Equitable Math System: **Humanizing K-12 Mathematics**

Humanizing Mathematics: Recognizing the Harm of Designing the System for a Few

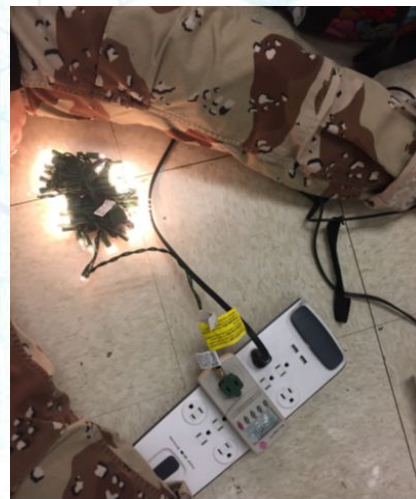


Where We Are:
Math as a Filter



Where We Want to Be:
Math as a Pump

Humanizing Mathematics: Recognizing the Harm of Designing the System for a Few



Re-imagining Math Engagement Stories from CTEC Center (Salem, OR)





Engineering an Equitable Math System: **Re-imagining K-12 Pathways**

K-12 Reasoning Pathways

Oregon Common Core (2010)	Revised Domains (Oregon July 2021)
Operations and Algebraic Reasoning (OA); Expressions and Equations (EE); Functions (8.F); HS Algebra (HSA); HS Functions (HSF)	Algebraic Reasoning
Counting and Cardinality (K.CC); Numbers Base 10 (NBT); Number: Fractions (NF) Number Systems (NS); High School Number (HSN)	Numeric Reasoning
Geometry (G); High School Geometry (HSG); Measurement from Measurement & Data (MD)	Geometric Reasoning and Measurement
Data from Measurement and Data (MD); High School Statistics (HSS)	Data Reasoning

Data Reasoning: Elementary Example

Formulate Questions

Summary Questions:

- What does a ladybug usually look like?
- How many spots do ladybugs typically have?



Comparison Question:

- Do red ladybugs tend to have more spots than black ladybugs?



Collect/Consider Data



- How many spots are on the ladybugs?

6 R B

10 O B

- What color is the ladybug?
- What color are the spots on the ladybug?

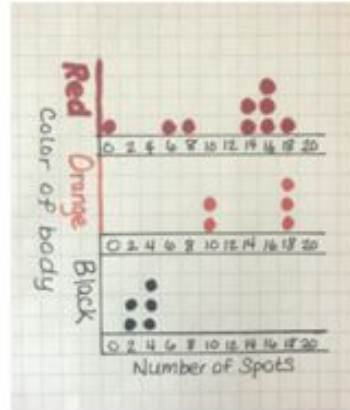
Ladybug #	Number of Spots	Color of Body	Color of Spots
1	6	R	B
2	10	O	B
...

Data Reasoning: Elementary Example

Analyze Data

Analysis Questions

- What number of spots were most common/typical for all the ladybugs? **Red ladybugs only?** **Orange ladybugs?** **Black ladybugs?**
- What is the least/greatest number of spots for the ladybugs? **Red ladybugs only?** **Orange ladybugs?** **Black ladybugs?**



Analyze the Data

Interpret Results

Possible student responses

Interpret the Results

- **How many spots do ladybugs typically have?**

Red ladybugs have between 0 and 20 spots. The most common number of spots is 16. The median number of spots for red ladybugs is 14 spots.

- **Do red ladybugs tend to have more spots than black ladybugs?**

The median number of spots for black ladybugs is 4. Black ladybugs only have 2 or 4 spots, suggesting that they tend to have fewer spots than red ladybugs.

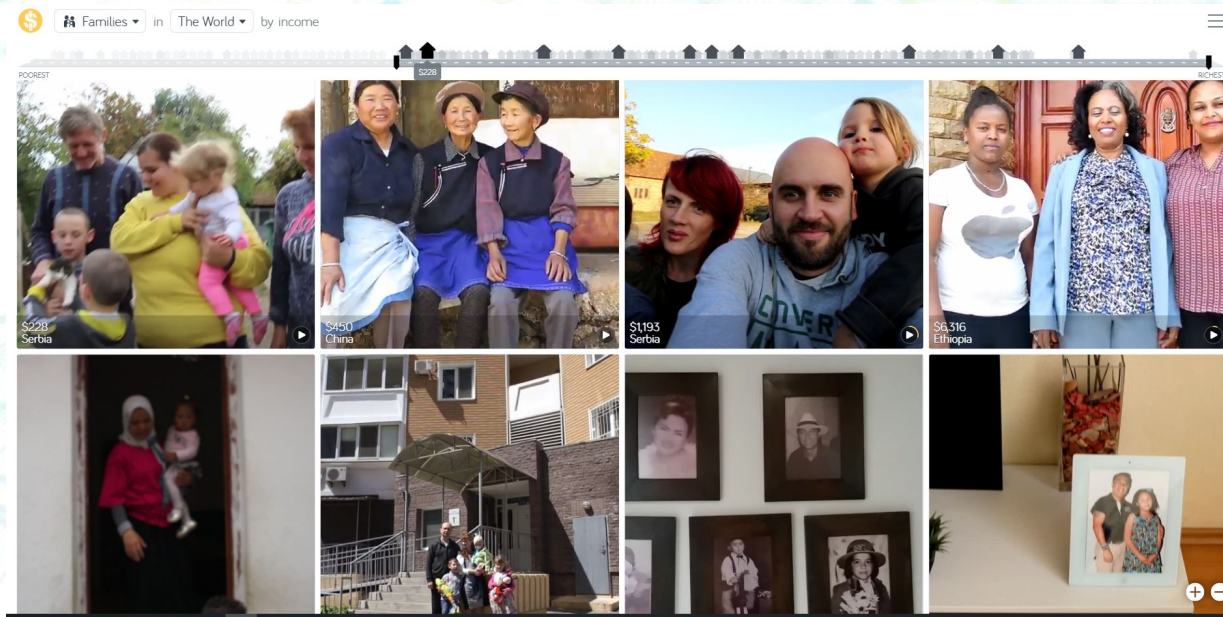


6 RB	10 OB	14 RB	8 RB
10 OB	16 RB	14 RB	16 RB
18 OB	18 OB	4 BR	16 RB
0 R -	2 BR	4 BO	2 BR
18 OB	16 RB	4 BR	

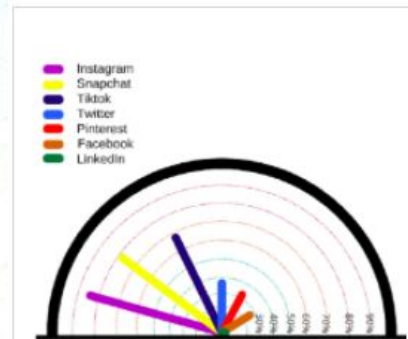


Data Reasoning: Secondary Examples

Dollar Street: Engaging Stories from Data



YouCubed Data Talks



Social Media
Grades 5-12



The New York Times

What's Going On in This Graph?

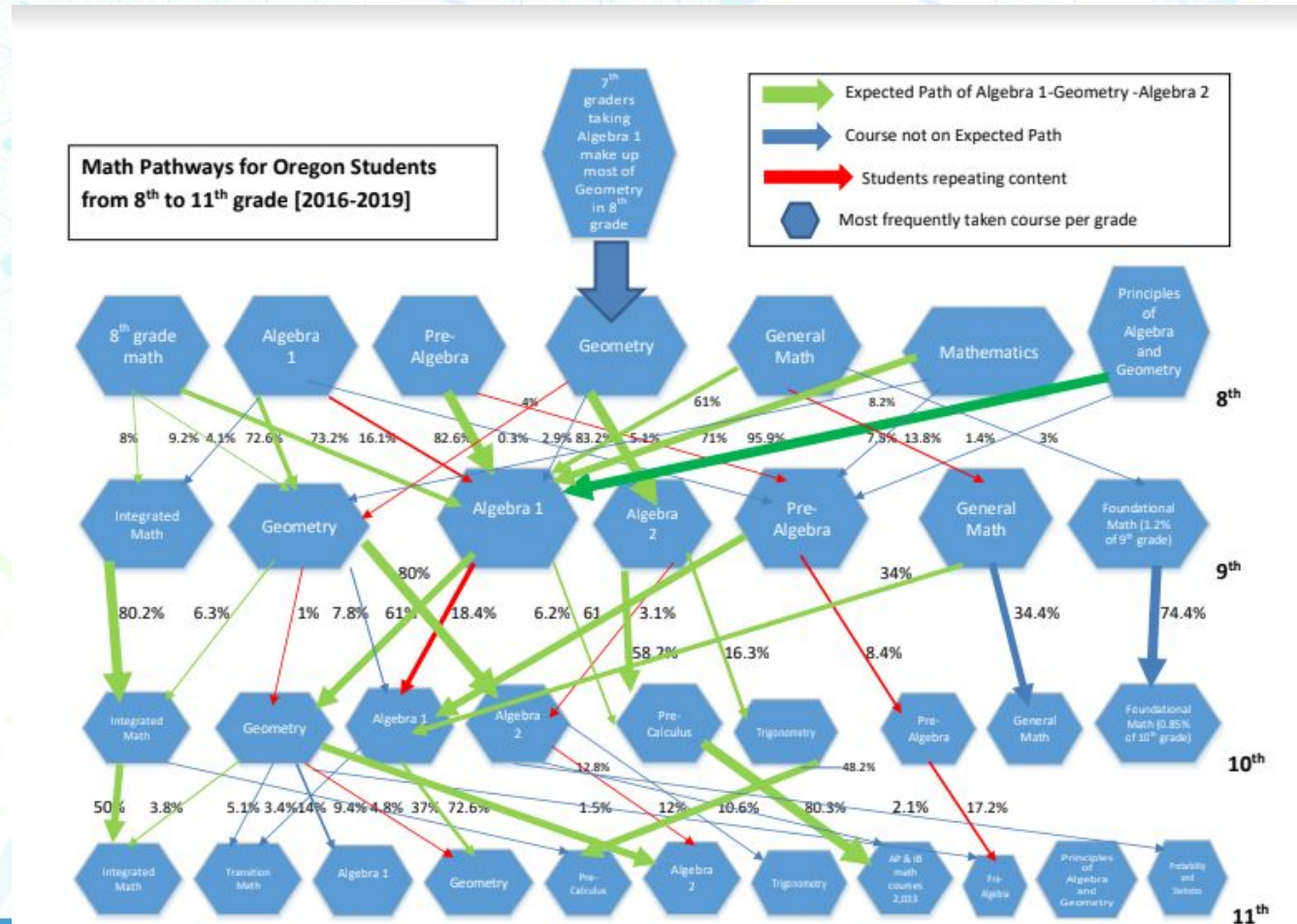
An activity from The Learning Network of the New York Times featuring sonic "fingerprints"

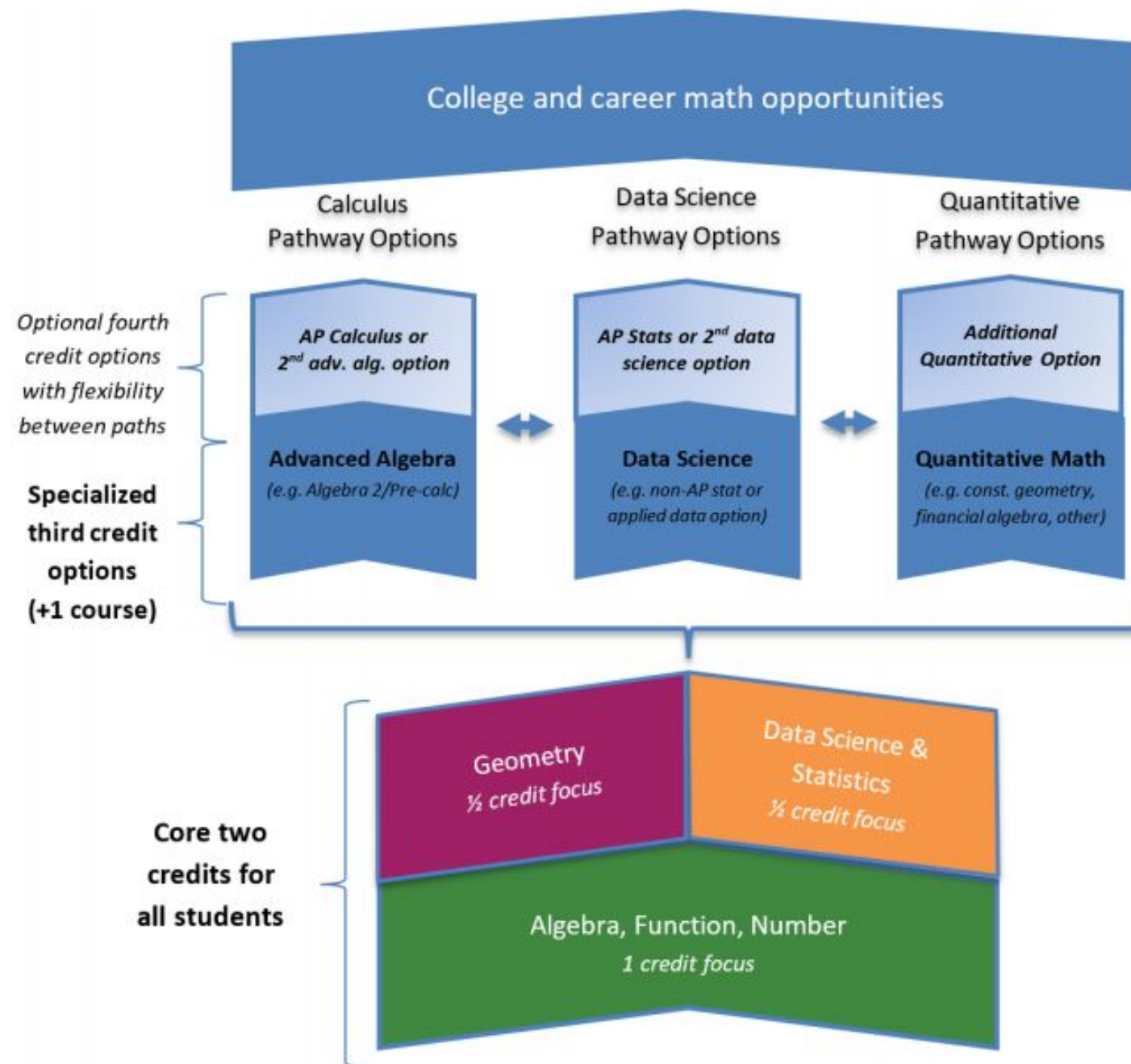


Hand Washing
Grades K-16

What data are you collecting to measure impact?

Communicating where we are today: [Pathways Diagram](#)







Engineering an Equitable Math System: **Creating Math Classes for All**

Creating Belonging - Student Stories

Lane County Math in Real Life (MiRL) Grant



Challenges and Successes: Promises and Perils of Re-imagining math systems

Oregon Math Project Challenges and Successes

Successes

- Revised math standards going to the State Board Fall 2021.
 - Communication of Vision of 2+1 course framework.
 - Balance between college and career readiness work.
- Secure Legislative funding for 2021-23 to support math pathways work.
- Connection with two and four year high education math departments.
 - Alternate pathway to college algebra.
 - Placement practices at two year colleges and combining of remedial coursework.
 - Optional ACT/SAT use for admissions at public four year universities.

Challenges

- Resources to support new courses that may not exist yet (materials, assessments).
- Connecting with counselors and admissions to shift prerequisites.
- Licensure alignment to pathways.
- University admission alignment.

Oregon Math Project

Lessons Learned

As you reflect on the work of the Oregon Math Project:

- Lead from the Head & Heart
 - Head - Focus and Pathways
 - Heart - Engagement and Belonging
- Embrace Design Thinking practices
 - Do Something
 - Iterate
- Think intentionally in terms of systems change
- Have patience, systems change will take time