Oregon Math Project:

Engineering a System of Meaningful Math for All Students

COSA Principal Conference
Bend, OR

April 25, 2022

Agenda

- Overview of Timelines
- Oregon Math Project - Elementary Focus
  - *Elementary Examples*
  - *Pathways from a K-8 perspective: Limit HS Pathways (2+1) conversations*
- Data Science Experience (new K-12 reasoning domain)

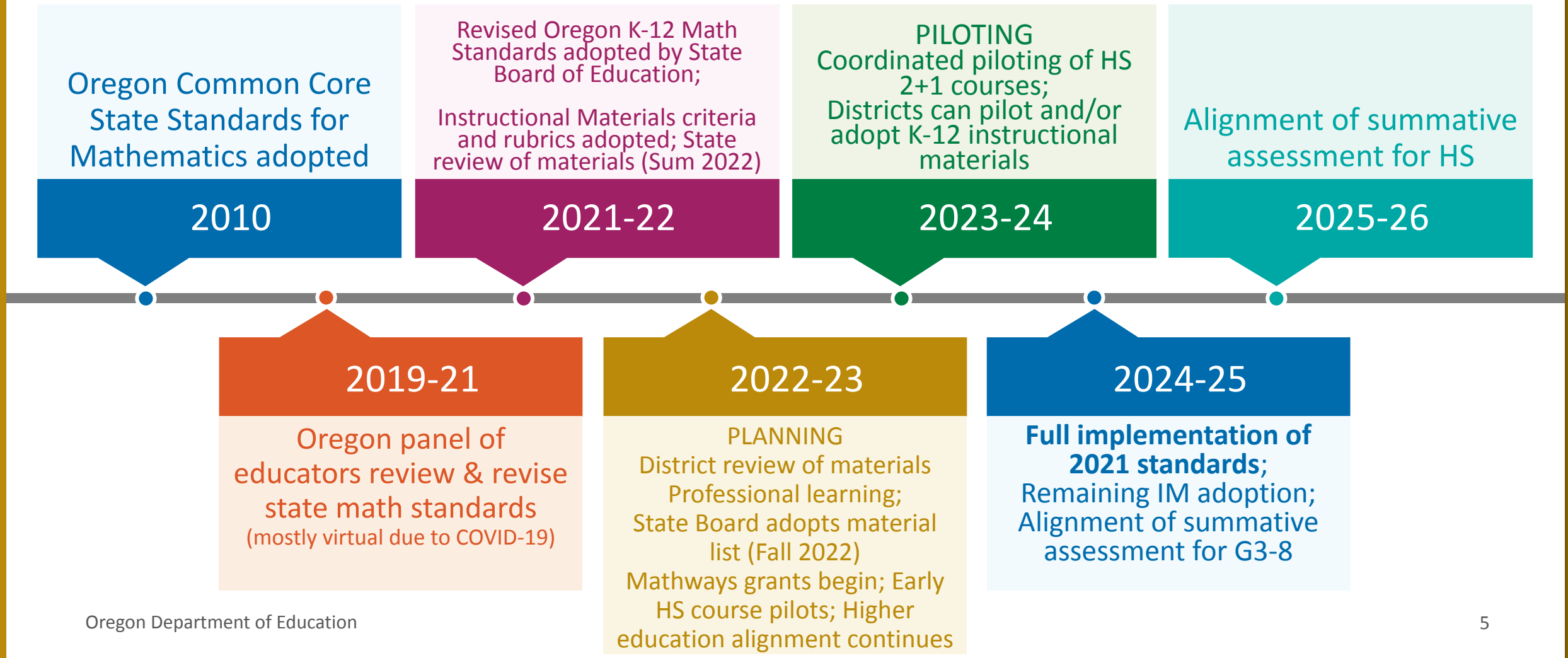
Centering on Care and Connection

- Challenge of past two years
  - Distance learning was difficult
  - Value of in-person for many students
- Challenge of past two decades
  - NAEP Math:
    - Significant increase in 1990s,
    - Essentially flat since 2000
  - Increased focus on math within accountability
- New Tech, New Opportunities
  - Normalization of Online Meetings → Statewide collaboration
    - Instructional opportunities for collaboration in classes
  - Virtual Math Leader Network
    - weekly spring 2020 → now monthly
- K-12 Math Standards Review and Revision
  - Original timeline: May 2019-June 2021
  - Revised timeline: May 2019-Sept 2021 (State Board Adoption 10/2021)
  - State materials review on track for Summer 2022

Timeline overview

May 2019-Sept 2021	Math Standards Review/revision
Oct 2021	State Board Adoption of Math Standards
Jan 2022	State Board Adoption of Instructional Materials Criteria
March 2022	Posting of K-12 Guidance Document
Summer 2022	State Instructional Materials Review
October 2022	State Board adoption of Materials List
Fall 2023	Updated materials for use by students - can postpone two additional years if needed (Fall 2024 or Fall 2025)

Implementation Timeline [DRAFT]



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Moving Forward with Math

Part 1: Visioning

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Warm-Up

Jamboard Activity

Add stickies to the first slide:

Name a shift you would like to see in math education in the next 10 years?

EXAMPLE: Gresham-Barlow Math Visioning Work

- Creating a common path and shared vision from research-based best practices
- Opportunity to audit where we are at
- Preparing for math adoption
- Engage and include all stakeholders
- Determine professional learning needs

Name a shift you'd like to see in math education in the next 10 years?

Credit Recovery where skills are also recovered instead of just Credits. It needs more time.....

Challenge of creating vision is that we need a program that meets our kids needs that also meet the requirements from state/district.

Rigorous pacing so that all the content is covered in Algebra 2, not watered down like it has been for the last 5+ years

What would it look like if we made grades 10-12 look more like college; with GE req's that have options to fulfill, self-directed class selection so they have more say in their classes, and flexible schedules to allow students to meet the

I would like to see better understanding and alignment on a K-12 basis (in disrtict, and state and country wide)

More focus on deeper understanding and less standards

More opportunities for students to collaborate, do real life applicable projects, and show learning in ways beyond worksheets

Offering prealgebra classes for credit for those who need that level.

More focus on deep content understanding and less on hitting standards at surface level with tons of practice problems

I'd like to see new course options that increase student buy in and provide more relevant learning opportunities

Multiple pathways to advanced math content not just calculus

I would like to see pre-algebra make a comeback to high school.

I would like to see a remedial pre-algebra class at the high school level for elective, or possibly one math credit.

+

+1

Classes that meet needs for post high school.. college pathway, trades pathway, real-life math pathway

Return to only requiring 2 years of math.

I would like to see few standards in a year that can do deeper. We also need to allow teachers some creativity, freedom, flexiblity. (no require all of us to be on the same page, same asssesssment, same time)

Collaborative thinking and project based learning pushed for in the classroom.

Adding Data Science Curriculum, good career pathways

Creativity brought back to the learning with fewer topics to cover so we can take our students to deeper levels of understanding.

Math electives that are project based.

I'd like to see more project based learning and shop brought back.

More Advanced math options for TAG students at 9th grade level

I'd like to see a shift to presenting "math" as a rational thinking topic and a shift away from rote Standardized tests

While we can talk about a vision, much of it seems to be out of our hands.. state makes mandates... district makes changes.. world things happen....

It would be great to have math specialists in elementary schools the way we have reading specialists. Our students seem to be further and further behind in their math skills when they arrive in high school.

Options for Math in the real world classes for students who struggle with the Algebra

I would love to see shop brought back so kids can learn practical skills. I would also love to see more application discussions and project based learning.

+1

Gresham-Barlow Math Visioning: Where we are now

- Working through Visioning Tool process
- Considering Core Framework template

Gresham-Barlow School District's K-12 Core Literacy Framework

Our framework outlines the essential elements of our research based literacy program, consisting of evidence-based practices that promote success for each student, especially those who are most marginalized. This framework supports our vision of culturally responsive graduates who will thrive in an ever-changing global community.

Language Arts Standards and Adopted Materials

- The Language Arts Standards determine the concepts and skills taught and assessed in each grade.
- District-adopted, standards aligned materials are the primary resources to implement for teaching the standards. They provide a research-based progression of skills that support the implementation of our Core Literacy Framework.
- The GBSD Literacy Scope and Sequence for each grade drives the depth, breadth, and order of priority standards instruction to ensure an equitable education for our students within each school and across the district.

The Foundation of Instruction

- *It is foundational to create a social-cultural community that includes* ***relevant and engaging instruction*** *representative of the students we serve. The classroom community values identity, expects excellence, is inclusive and honors student contributions and experiences.*
- *We are committed to providing equitable access and outcomes for all of our students. We strive to center student voices and celebrate the unique cultures, languages, races, abilities, genders, sexual identities, and strengths that they bring into our classrooms.*
- *Responding to each student, as well as their needs and aspirations, will help them meet the high expectations that we have for all students.*

Intentional, Collaborative, Reflective Instruction

Strategies supporting Universal Design for Learning and differentiation	Explicit instruction of grade-level and Language Proficiency Standards	Opportunities for student voice and choice through multiple modalities and technology	Formative assessment as well as ongoing, specific and actionable feedback provided frequently to students	Opportunities for independent practice and intentional application connected to instruction

Instructional Elements

Critical Thinking

- Engage in research and inquiry
- Analyze, integrate, and present information

Reading

- Close Reading: closely read a wide range of quality, complex, representative, and culturally responsive texts across content areas.
- Key Ideas and Details: cite specific textual evidence to support conclusions drawn from text
- Craft and Structure: make meaning from both literary and informational text
- Integration of Knowledge and Ideas: analysis, synthesis, and reflection
- Reading Foundations: concepts of print, phonological awareness, phonics and word recognition, and fluency
- Academic Vocabulary: word origins, multiple meanings, abstract concepts

Writing

- Explicit Writing Instruction
  - Write in a variety of text modes, purposes, and for a variety of audiences
  - Writing production and process
  - Writing encompassing academic language
- Analysis, synthesis, and reflection
  - Writing in response to reading
  - Writing across content areas

Speaking/Listening

- Comprehension and Collaboration
  - Critical listening
  - Purposeful student-to-student discourse
- Presentation of knowledge and ideas

Language and Vocabulary

- Conventions of the language of instruction
- Flexible and fluent use of academic and conversational language when speaking and writing
- Explicit instruction of vocabulary in context

Measurement of Equitable Instruction and Outcomes

Universal Screening and Diagnostic assessments to inform instruction	Frequent, collaborative formative assessments to monitor progress of different student populations and inform continued instruction	A variety of summative assessments that honor differentiation

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Moving Forward with Math

Part 2: Oregon Math Project

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Why Revision?

Continuous Improvement: 2021 Oregon Math Standards

- **Seven Year Review Cycle in Oregon Rules**
  - Last math materials review 2015
  - Next math materials review 2022
- **We have learned a lot about shifts in student learning, curriculum, and instructional practice over the last 10 years of Common Core**
  - Process of revision must involve diverse experiences and perspectives
- **Any revisions must maintain or improve focus, coherence, and rigor**
  - Cluster structure remains in tact (K-8)
  - Domains updated to reflect reasoning pathways
  - Math Practices are vital and remain unchanged

What is the Oregon Math Project?

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Meaningful Math for Every Student

Engineering a better system:

Meaningful math for every student

Example Revisions: Finding Focus

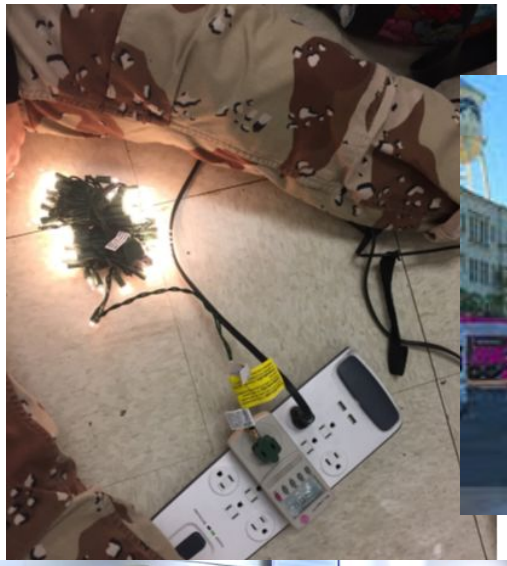
OR Math Index (2021)	OR Draft Math Standard (2021)	CCSS Index (2010)	CCSS Standard (2010)	Revision Type
K.NCC.C.7	Compare two numbers between 1 and 10 presented as written numerals.	K.CC.C.7	Compare two numbers between 1 and 10 presented as written numerals.	**Null** Domain letter now included in index to reflect numeric reasoning
3.OA.A.2	Represent and interpret whole-number quotients as dividing an amount into equal sized groups.	3.OA.A.2	Interpret whole-number quotients of whole numbers, e.g., interpret 56 ÷ 8 as the number of objects in each share when 56 objects are partitioned equally into 8 shares, or as a number of shares when 56 objects are partitioned into equal shares of 8 objects each. For example, describe a context in which a number of shares or a number of groups can be expressed as 56 ÷ 8.	**Improved focus/clarity**, examples removed and moved to the guidance document

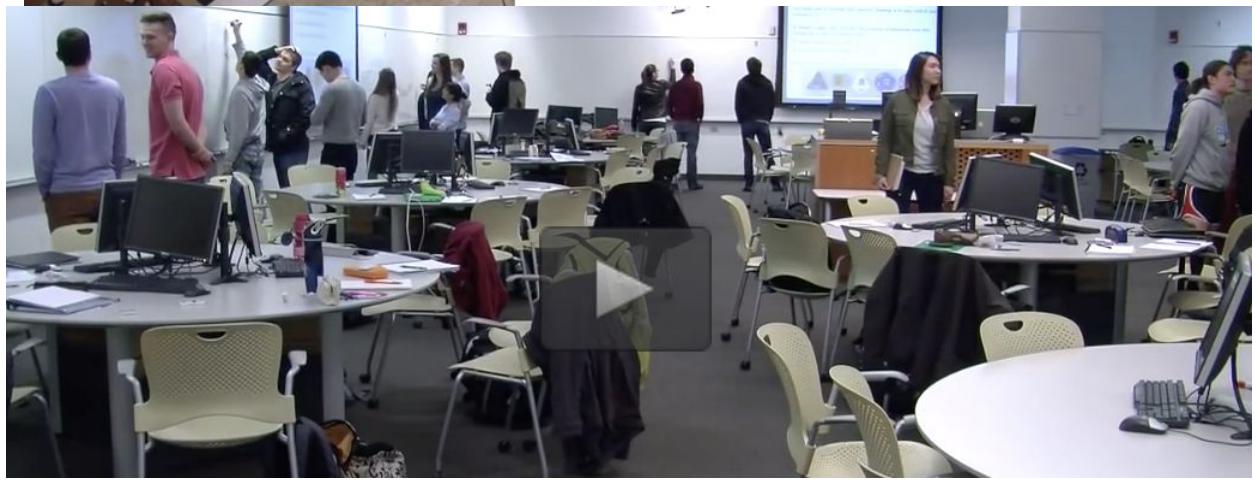
Example Revisions: Finding Focus

OR Math Index (2021)	OR Math Standard (2021)	CCSS Index	CCSS Standard (2010)	Revision Type
7.NS.A.2	Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers. Interpret operations of rational numbers solving problems in authentic contexts.	7.NS.A.2	Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers. --(2.a) Understand that multiplication is extended from fractions to rational numbers by requiring that operations continue to satisfy the properties of operations, particularly the distributive property, leading to products such as (–1)(–1) = 1 and the rules for multiplying signed numbers. Interpret products of rational numbers by describing real-world contexts. --(2.b) Understand that integers can be divided, provided that the divisor is not zero, and every quotient of integers (with non-zero divisor) is a rational number. If p and q are integers then –(p/q) = (–p)/q = p/(–q). Interpret quotients of rational numbers by describing real-world contexts. --(2.c) Apply properties of operations as strategies to multiply and divide rational numbers. --(2.d) Convert a rational number to a decimal using long division; know that the decimal form of a rational number terminates in 0s or eventually repeats.	**Improved focus/clarity** (examples are moved to guidance document) and **opportunities for improved student engagement** (opening door to more teacher autonomy and student choice)

Reimagining Engagement

ENGAGEMENT

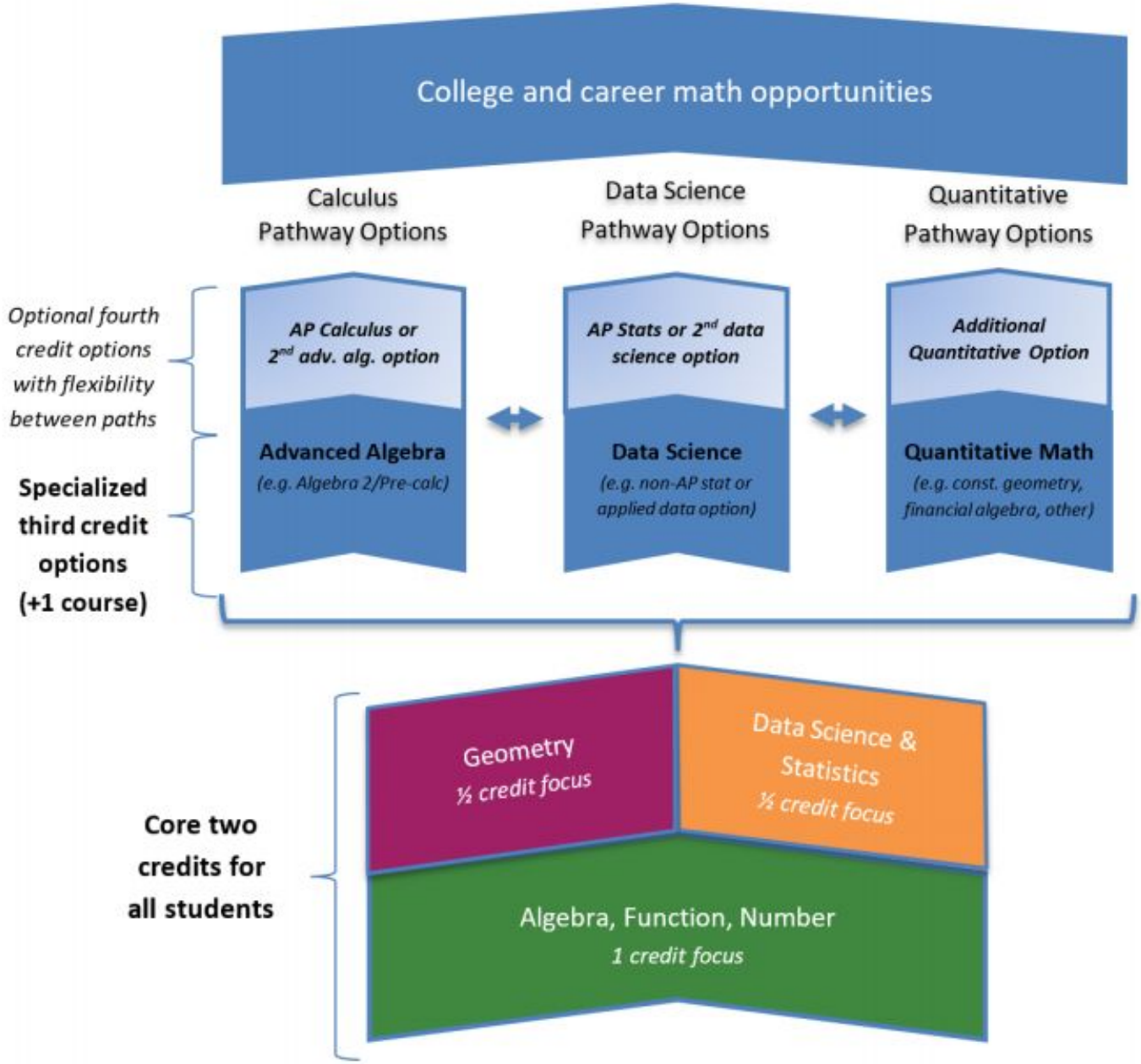




Pathway Reasoning Progressions

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

PATHWAYS


College and career math opportunities
Calculus Pathway Options
Data Science Pathway Options
Quantitative Pathway Options
Optional fourth credit options with flexibility between paths
AP Calculus or 2nd adv. alg. option
AP Stats or 2nd data science option
Additional Quantitative Option
Specialized third credit options (+1 course)
Advanced Algebra
(e.g. Algebra 2/Pre-calc)
Data Science
(e.g. non-AP stat or applied data option)
Quantitative Math
(e.g. const. geometry, financial algebra, other)
Core two credits for all students
Geometry
½ credit focus
Data Science & Statistics
½ credit focus
Algebra, Function, Number
1 credit focus

Engineering Belonging - Student Stories

Lane County Math in Real Life (MiRL) Grant

BELONGING

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Part 3: Experience Data Reasoning

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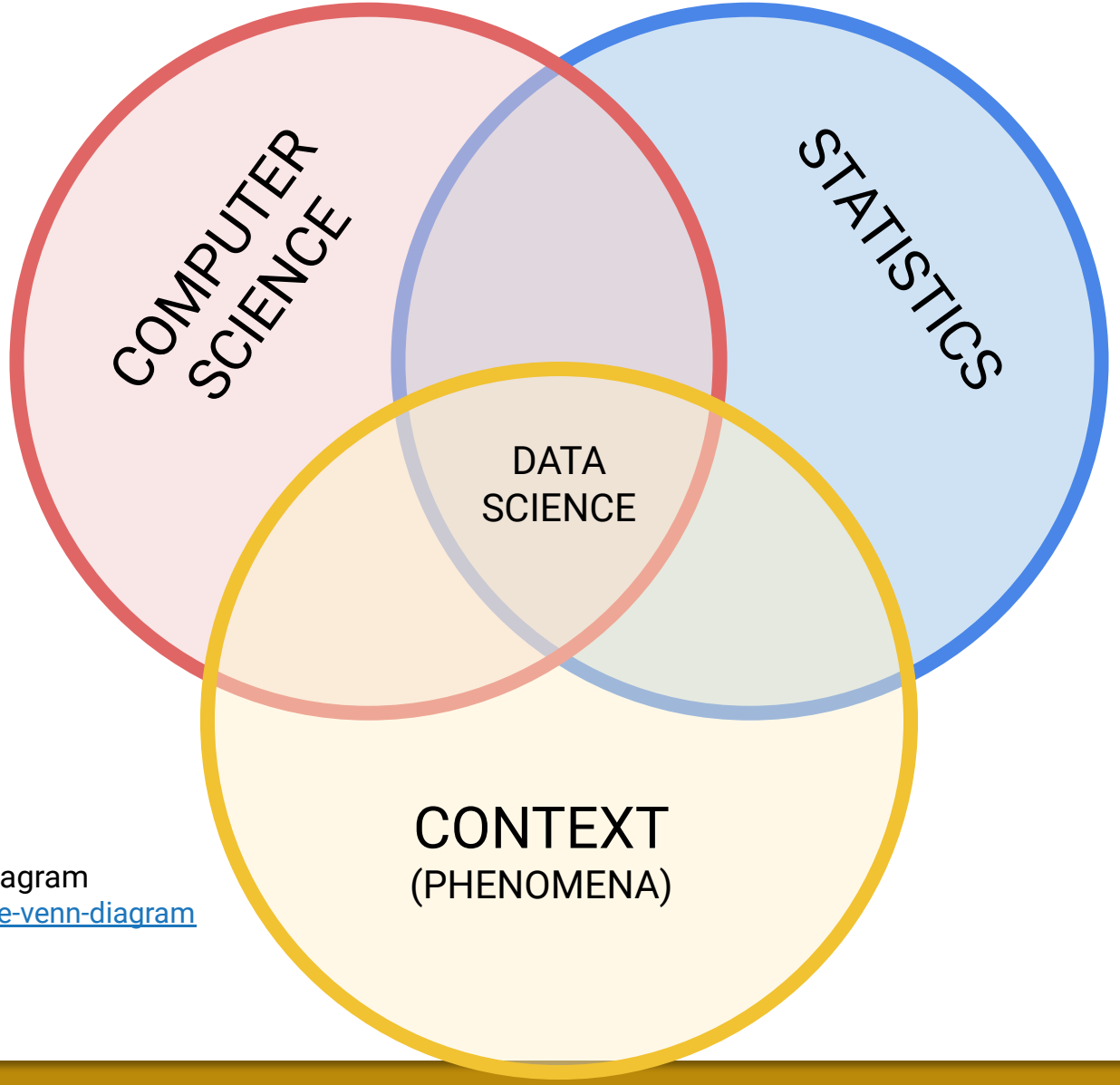
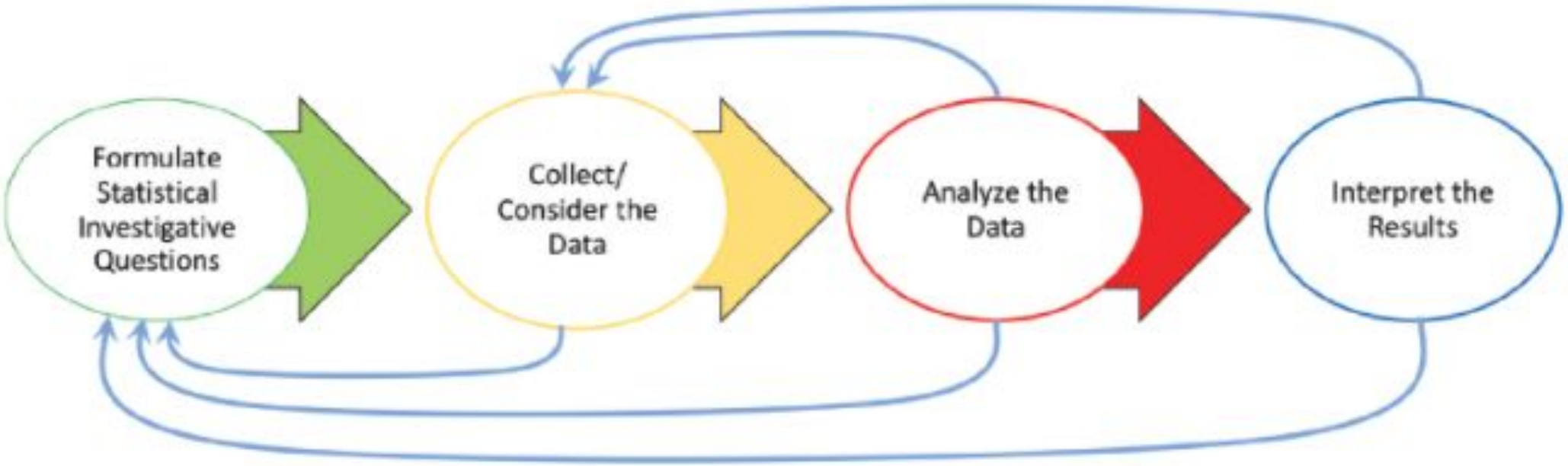
Proposed Conceptualization of Data Science



Adapted from Drew Conway's Data Science Venn Diagram
http://drewconway.com/zia/2013/3/26/the-data-science-venn-diagram

Data Reasoning Framework



Source

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

6 R B

10 O B

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

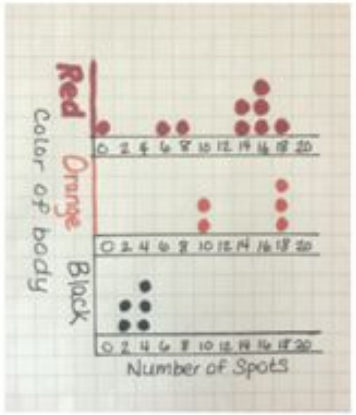
Data Reasoning: Elementary Example

Analyze Data

Analysis Questions

Analyze the Data

- *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?*



Interpret Results

Possible student responses

Interpret the Results

- *How many spots do ladybugs typically have?*

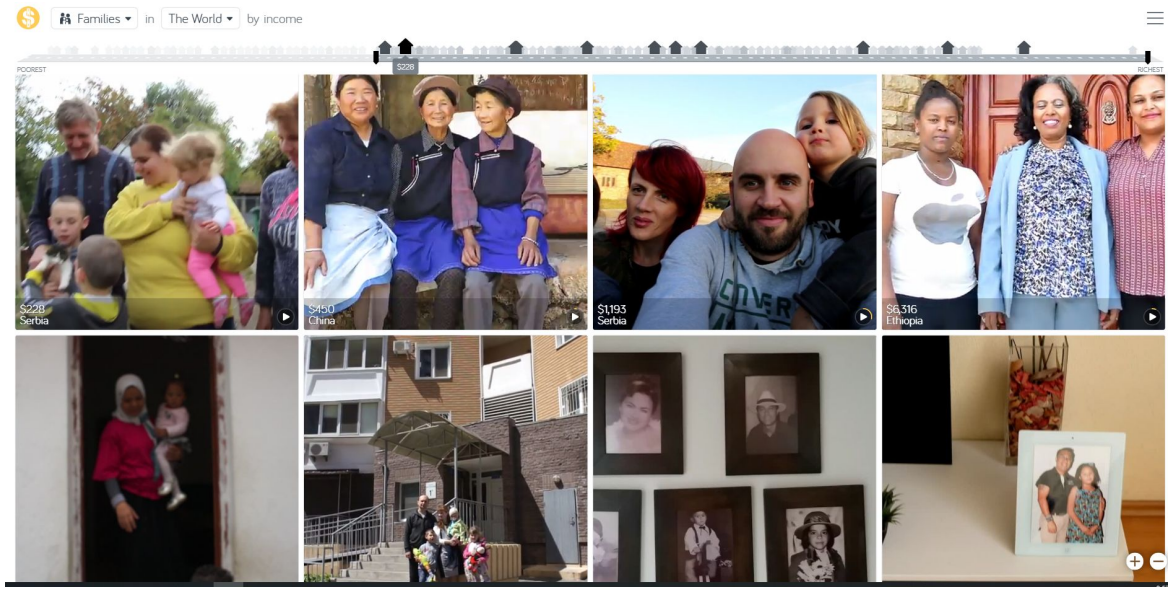
Red ladybugs have between 0 and 20 spots. The most common number of spots is 16. The median number of spots for red ladybugs is 14 spots.

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

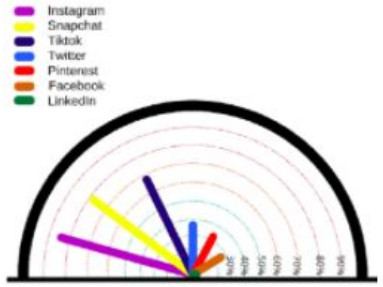
The median number of spots for black ladybugs is 4. Black ladybugs only have 2 or 4 spots, suggesting that they tend to have fewer spots than red ladybugs.

Data Reasoning: Secondary Examples

Dollar Street: Engaging Stories from Data



YouCubed Data Talks



Social Media

Grades 5-12

What's Going On in This Graph?

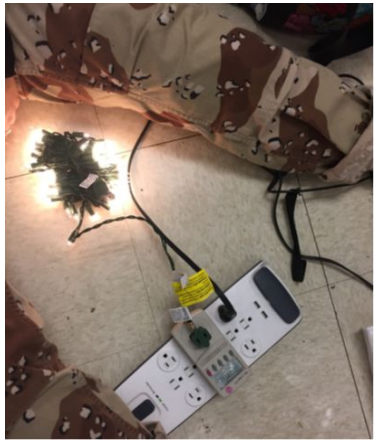
An activity from The Learning Network of the New York Times featuring sonic "fingerprints"

Hand Washing

Grades K-16

ODE Updates: HS Mathways Grants

1. **Regional Mathways Partnerships**
    - Set up grants with 5-6 STEM Hubs to plan 2022-23 support & growth of 2+1
2. **Statewide Professional Learning Provider**
    - Single grant to develop and implement PD modules on instructional practices
    - Three teacher PD modules, one administrator module
    - Proposed training for math leaders to learn and then take back to their districts (Fall/Winter/Spring 2022-23)
3. **Higher Education Collaboration**
    - Phase 1 (Mar-Sept 2022) - Oregon HECC leading workgroup to review/revise admissions at four year public universities
    - Phase 2 (Aug 2022-June 2023)- K-12/IHE workgroup to identify connectors for HS & IHE courses



Six Principles of Trauma Informed Care

Centering Care, Connection, and Trauma Informed Teaching

- **Safety:** Build a sense of safety through providing predictability in the classroom.
  - Avoid shaming language.
  - Develop group agreements.
  - Be mindful of how you discuss choice.
  - Be prepared to handle disclosures.

- **Trustworthiness and Transparency:** Keep your communication clear.
  - Be honest and kind.
  - Provide content warnings.
  - Be clear about reporting and confidentiality.

- **Peer Support:** Encourage community when interest is expressed--peer support, processing and play time.
  - Give space for student questions and answers, discussions.
  - Use peer educators, when possible.

- **Collaboration & mutuality:** Take action and make decisions that value varying voices and experiences.
  - Solicit youth input.
  - Use Q&A boxes.

- **Empowerment, voice, and choice:** Give young people opportunities to express what they need for learning and life.
  - Address and define consent.
  - Allow youth to make decisions about lessons.

- **Cultural, historical, and gender issues:** Current and historical trauma affects marginalized groups.
  - Understand social determinants of health.
  - Link youth to culturally specific resources.
  - Listen to and believe youth stories.