Assessment & Test Construction:

Learning to Build & Use High-Quality Assessments

Rhode Island Department of Education

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Goals

- Gain insight into the development of the PARCC Assessment and how it may parallel the process you use when creating an assessment through the RIIA Test Construction Tool.
- Gain experience using the PARCC Evidence Statements.

Assessment Design

Mathematics, Grades 3-8 and High School End-of-Course

BEGINNING OF YEAR

END OF YEAR

2 Optional Assessments/Flexible Administration

Diagnostic Assessment
- Early indicator of student knowledge and skills to inform instruction, supports, and PD
- Non-summative

Mid-Year Assessment
- Performance-based
- Emphasis on hard-to-measure standards
- Potentially summative

Performance-Based Assessment (PBA)
- Extended tasks
- Applications of concepts and skills
- Required

End-of-Year Assessment
- Innovative, computer-based items
- Required

Claims Driving Design: Mathematics

Students are on-track or ready for college and careers

Sub-claim A: Students **solve problems involving the major content** for their grade level with connections to practices

Sub-Claim B: Students **solve problems involving the additional and supporting content** for their grade level with connections to practices

Sub-claim C: Students **express mathematical reasoning** by constructing mathematical arguments and critiques

Sub-Claim D: Students solve real world problems engaging particularly in the **modeling practice**

Sub-Claim E: Student **demonstrate fluency** in areas set forth in the Standards for Content in grades 3-6

Model Content Frameworks
Grade 3 Example

Key: ■ Major Clusters; □ Supporting Clusters; ○ Additional Clusters

Operations and Algebraic Thinking

- ■ **Represent and solve problems involving multiplication and division.**
- ■ **Understand properties of multiplication and the relationship between multiplication and division.**
- ■ **Multiply and divide within 100.**
- ■ **Solve problems involving the four operations, and identify and explain patterns in arithmetic.**

Number and Operations in Base Ten

- ○ **Use place value understanding and properties of operations to perform multi-digit arithmetic.**

Number and Operations — Fractions

- ■ **Develop understanding of fractions as numbers.**

Measurement and Data

- ■ **Solve problems involving measurement and estimation of intervals of time, liquid volumes, and masses of objects.**
- □ **Represent and interpret data.**
- ■ **Geometric measurement: understand concepts of area and relate area to multiplication and addition.**
- ○ **Geometric measurement: recognize perimeter as an attribute of plane figures and distinguish between linear and area measures.**

Geometry

- □ **Reason with shapes and their attributes.**

PARCC Pathway Summary Table: AI – G – AII

- ***Table 1***. This table summarizes what will be assessed on PARCC end-of-course assessments. A dot indicates that the standard is assessed in the indicated course. Shaded standards are addressed in more than one course. Algebra I and II are adjacent so as to make the shading continuous, despite being generally taught a year apart.
- *Refer to your handout for the actual table.*

How we have been presenting Evidence-Centered Design (ECD)

Claims

Design begins with the inferences (**claims**) we want to make about students

Evidence

In order to support **claims**, we must gather **evidence**

Task Models

Tasks are designed to elicit specific **evidence** from students in support of **claims**

ECD is a deliberate and systematic approach to assessment development that will help to **establish the validity** of the assessments, **increase the comparability** of year-to year results, and **increase efficiencies/reduce costs**.

Overview of Task Types

- The PARCC assessments for mathematics will involve three primary types of tasks: Type I, II, and III.
- Each task type is described on the basis of several factors, principally the purpose of the task in generating evidence for certain sub-claims.

 Source: Appendix D of the PARCC Task Development ITN on page 17

Overview of PARCC Mathematics Task Types

Task Type	Description of Task Type
I. Tasks assessing *concepts, skills and procedures*	• Balance of conceptual understanding, fluency, and application • Can involve any or all mathematical practice standards • Machine scorable including innovative, computer-based formats • Will appear on the End of Year and Performance Based Assessment components • Sub-claims A, B and E
II. Tasks assessing *expressing mathematical reasoning*	• Each task calls for written arguments / justifications, critique of reasoning, or precision in mathematical statements (MP.3, 6). • Can involve other mathematical practice standards • May include a mix of machine scored and hand scored responses • Included on the Performance Based Assessment component • Sub-claim C
III. Tasks assessing *modeling / applications*	• Each task calls for modeling/application in a real-world context or scenario (MP.4) • Can involve other mathematical practice standards • May include a mix of machine scored and hand scored responses • Included on the Performance Based Assessment component • Sub-claim D

For more information see PARCC Task Development ITN Appendix D.

Design of PARCC Math Summative Assessment

- Performance Based Assessment (PBA)
  - Type I items (Machine-scorable)
  - Type II items (Mathematical Reasoning/Hand-Scored – scoring rubrics are drafted but PLD development will inform final rubrics)
  - Type III items (Mathematical Modeling/Hand-Scored and/or Machine-scored - scoring rubrics are drafted but PLD development will inform final rubrics)
- End-of-Year Assessment (EOY)
  - Type I items only (All Machine-scorable)

Overview of Evidence Statements: Types of Evidence Statements

Several types of evidence statements are being used to describe what a task should be assessing, including:

- Those using **exact standards language**
- Those transparently **derived from exact standards** language, e.g., by splitting a content standard
- **Integrative evidence statements** that express plausible direct implications of the standards without going beyond the standards to create new requirements
- **Sub-claim C & D evidence statements**, which put MP.3, 4, 6 as primary with connections to content

Overview of Evidence Statements: Examples

Several types of evidence statements are being used to describe what a task should be assessing, including:

1. Those using **exact standards language**

Key	Evidence Statement Text	Clarifications, limits, emphases, and other information intended to ensure appropriate variety in tasks	Relationship to Mathematical Practices
8.EE.1	Know and apply the properties of integer exponents to generate equivalent numerical expressions. *For example,* $3^2 \times 3^{-5} = 1/3^3 = 1/27$.	i) Tasks do not have a context. ii) Tasks center on the properties and equivalence, not on simplification. For example, a task might ask a student to classify expressions according to whether or not they are equivalent to a given expression.	MP.7

Overview of Evidence Statements: Examples

Several types of evidence statements are being used to describe what a task should be assessing, including:

2. Those transparently **derived from exact standards** language, e.g., by splitting a content standard

Key	Evidence Statement Text	Clarifications, limits, emphases, and other information intended to ensure appropriate variety in tasks	Relationship to MP
8.F.5-1	Describe qualitatively the functional relationship between two quantities by analyzing a graph (e.g., where the function is increasing or decreasing, linear or nonlinear).	i) Pool should contain tasks with and without contexts.	MP.2, MP.5
8.F.5-2	Sketch a graph that exhibits the qualitative features of a function that has been described verbally.	i) Pool should contain tasks with and without contexts.	MP.2, MP.5, MP.7

Overview of Evidence Statements: Examples

Several types of evidence statements are being used to describe what a task should be assessing, including:

3. **Integrative evidence statements** that express plausible direct implications of the standards without going beyond the standards to create new requirements

Key	Evidence Statement Text	Clarifications, limits, emphases, and other information intended to ensure appropriate variety in tasks	Relationship to MP
4.Int.1	Solve one-step word problems involving adding or subtracting two four-digit numbers.	The given numbers are such as to require an efficient/standard algorithm (e.g., 7263 + 4875, 7263 – 4875, 7406 – 4637). The given numbers do not suggest any obvious *ad hoc* or mental strategy (as would be present for example in a case such as 16,999 + 3,501 or 7300 – 6301, for example). i) Grade 4 expectations in CCSSM are limited to whole numbers less than or equal to 1,000,000; for purposes of assessment, both of the given numbers should be limited to 4 digits.	MP.1

Overview of Evidence Statements: Examples

Several types of evidence statements are being used to describe what a task should be assessing, including:

4. **Sub-claim C & Sub-claim D Evidence Statements**, which put MP.3, 4, 6 as primary with connections to content

Key	Evidence Statement Text	Clarifications, limits, emphases, and other information intended to ensure appropriate variety in tasks	Relationship to MP
HS.C.5.11	Given an equation or system of equations, reason about the number or nature of the solutions. Content scope: A-REI.11, involving any of the function types measured in the standards.	i) For example, students might be asked how many positive solutions there are to the equation e^x = x+2 or the equation e^x = x+1, explaining how they know. The student might use technology strategically to plot both sides of the equation without prompting.	MP.3

PARCC Evidence Statement Activity

As a group:

- Locate an example of each of the four types of Evidence Statements.
- Read each of the examples and use the Model Content Frameworks to identify each statement as belonging to a Major, Supporting, or Additional cluster.
- Discuss the Clarifications provided by each statement.

As individuals:

- Record and be prepared to share at least one insight and one lingering question that you have as a result of this activity.

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