

**2013 Mathematics SOL Institutes**

The purpose of the 2013 Mathematics SOL Institutes is to provide teachers with professional development focused on the relationship between curriculum, instruction, and assessment, by targeting the processes of analysis and modification of existing resources to match student learning expectations and promote problem solving.

**Introduction and Instructions**

This grade-band professional development will be comprised of two components:

- Module 1 Parts 1-3: Analyzing and modifying assessments – Participants will compare expectations of SOL and Curriculum Framework to an assessment and modify it to meet intended expectations.
- Module 2 Parts 1-3: Modifying mathematical tasks to promote problem solving – Participants will modify existing mathematical tasks to emphasize the use of process skills and problem solving.

[Virginia’s Process Goals for Students](#)

**SOL Vertical Articulation Technical Assistance Documents**

- [Grades K-3](#)
- [Grades 3-6](#)
- [Grades 5-8](#)
- [Algebra](#)
- [Geometry](#)

The product of the 2013 Mathematics SOL Institutes is a set of online professional development modules designed to be used by a group of teachers of a specific grade level or course. Modifications could be made to adapt the professional development for more than one grade level/course or for large groups. Each group of teachers should select a facilitator for which this Facilitator’s Guide was written. Facilitators should review the activities and handouts prior to facilitating this professional development.

Time	Facilitator Instructions	Materials
<b>45 minutes total</b>	<b>Module 1 Part 1: Analysis of Assessments</b>	
15 minutes	1) Have participants (whole group) discuss the following question: how do we assess? 2) With a partner, brainstorm and record answers to the following question, “What does assessment look like in a K-2 setting?” Share and record the responses.	<ul style="list-style-type: none"> <li>• <a href="#">Cognitive Demand Characteristics</a></li> <li>• <a href="#">Grade 3 Discussion Problems</a></li> </ul>
30 minutes	3) Have participants discuss the differences between the characteristics of high and low level tasks using the Cognitive Demand Characteristics handout. 4) Distribute the Grade 3 Discussion Problems. 5) Discuss the following questions: how both cover the SOL standard 3.5 but the main difference is in the level of the task. <ul style="list-style-type: none"> <li>– Are both problems aligned with SOL 3.5 (refer to the Curriculum Framework for SOL 3.5)?</li> </ul>	<ul style="list-style-type: none"> <li>• <a href="#">Curriculum Framework for SOL 3.5</a></li> <li>• <a href="#">Vertical Articulation Recording Sheet</a></li> </ul>

Time	Facilitator Instructions	Materials
	<ul style="list-style-type: none"> <li>- What is the level of cognitive demand required by each problem?</li> <li>- Which grades are responsible for teaching this mathematical idea to students?</li> <li>- Discuss how this is the responsibility of all the previous grade levels.</li> </ul> <p>6) Handout the Vertical Articulation Recording Sheet and ask the participants to record related standards to SOL 3.5 on the Vertical Articulation Recording Sheet.</p> <p>7) Compare and contrast your recorded related standards from each grade level.</p> <p><b>Facilitator's Note:</b> Participants may indicate that there is no direct correlation in the kindergarten standards. Discuss possible indirect correlations in kindergarten.</p>	
<b>40 minutes total</b>	<b>Module 1 Part 2: Analyzing SOL Alignment and Level of Cognitive Demand</b>	
20 minutes	<p><b>Facilitator's Note:</b> Prior to this module, game cards (included in the file with directions) for Garbage (by 5s to 50) need to be printed and cut out for each group of 2 teachers.</p> <ol style="list-style-type: none"> <li>1) Distribute and review the document Garbage by 5s.</li> <li>2) Pass out Garbage cards and Garbage mat then explain/model the directions.</li> <li>3) As participants play, ask them to be thinking about the following questions:           <ul style="list-style-type: none"> <li>- How does this activity connect to the standards?</li> <li>- How do you assess your students' understanding?</li> <li>- What does this tell us about our students' understanding?</li> </ul> </li> <li>4) Play the Garbage game.</li> </ol>	<ul style="list-style-type: none"> <li>• <a href="#">Garbage by 5s</a> (includes playing cards)</li> <li>• <a href="#">Garbage Mat</a></li> <li>• Curriculum Framework           <ul style="list-style-type: none"> <li>- <a href="#">SOL K.4</a></li> <li>- <a href="#">SOL 1.2</a></li> <li>- <a href="#">SOL 2.4</a></li> <li>- <a href="#">SOL 3.5</a></li> </ul> </li> <li>• <a href="#">Garbage Assessment</a></li> </ul>
20 minutes	<ol style="list-style-type: none"> <li>5) Distribute the Curriculum Frameworks for SOL K.4, 1.5, 2.4, and 3.5, then discuss how this activity correlates to each standard.</li> <li>6) Distribute the Garbage Assessment. Have participants answer the following questions:           <ul style="list-style-type: none"> <li>- How did we assess your understanding?</li> <li>- What does it tell us?</li> <li>- How can we make it better?</li> </ul> </li> </ol>	
<b>45 minutes total</b>	<b>Module 1 Part 3: Connecting Assessment to Instruction</b>	
15 minutes	<ol style="list-style-type: none"> <li>1) Discuss the following with participants and record thoughts in the Assessment Template – fill-in version (2 copies):           <ul style="list-style-type: none"> <li>- When and how should assessment be incorporated into the Garbage game?</li> <li>- What are the different methods of assessing students that you might use (ie., observations, questioning (interviews), paper and pencil, other)?</li> </ul> </li> </ol>	<ul style="list-style-type: none"> <li>• <a href="#">Assessment Template - fill-in version</a></li> <li>• <a href="#">Assessment Template - completed version</a></li> <li>• <a href="#">Bears in Caves</a></li> </ul>

Time	Facilitator Instructions	Materials
	2) Have participants record their methods in the Assessment Template – fill-in version. 3) Compare and contrast the groups’ recorded methods with those found in the Assessment Template - completed version.	
30 minutes	4) Describe/model the activity of Bears in Caves for participants. 5) Ask participants to think about the possible ways to assess the Bears in Caves activity by filling out the Assessment Template – fill-in version. 6) Discuss as a group how the activities of this module <ul style="list-style-type: none"> <li>– better prepare students for related instruction in the future; and</li> <li>– might impact instruction and assessment practices in your own classroom.</li> </ul>	
<b>40 minutes total</b>	<b>Module 2 Part 1: Doing the Mathematical Task</b>	<ul style="list-style-type: none"> <li>• <a href="#">Video – Dan Meyer: Math Class Needs a Makeover (11:39)</a></li> <li>• <a href="#">Task: Organizing a Table Tennis Tournament</a> © 2012 The University of Nottingham. <a href="#">Mathematics Assessment Project</a></li> </ul>
15 minutes	1) View the video “Dan Meyer: Math Class Needs a Makeover.”	
25 minutes	2) Have each individual solve the task “Organizing a Table Tennis Tournament” and list the mathematical or problem-solving decisions that are being made for students. 3) Have individuals share their different methods of solving the task to the whole group. 4) Ask individuals to share the decisions that were being made for students with the whole group and discuss.	
<b>45 minutes total</b>	<b>Module 2 Part 2: Returning Decision-Making and Problem Solving to Students</b>	<ul style="list-style-type: none"> <li>• <a href="#">Less-structured version of the Organizing a Table Tennis Tournament task</a></li> </ul>
25 minutes	1) In small groups, discuss how the task could be revised to return decision-making to students. 2) Have each group share their revisions to the task.	
20 minutes	3) Have each small group compare and contrast their “less-structured” version of the task with the one provided. 4) Discuss as a whole group – “What would be the benefits of using more unstructured tasks?” and “What challenges might teachers and students face when using unstructured tasks?”	
<b>40 minutes total</b>	<b>Module 2 Part 3: Teaching Problem Solving</b>	<ul style="list-style-type: none"> <li>• <a href="#">Practical advice for teaching problem solving</a></li> </ul>
15 minutes	1) In small groups, have participants review the handout “Practical advice for teaching problem solving.” 2) Discuss as a whole group – “What do you notice? ” “What do you wonder?” “What would you add to this list?”	

Time	Facilitator Instructions	Materials
10 minutes	3) View the video “Organizing a Table Tennis Tournament.”	
15 minutes	4) Discuss as a whole group – <ul style="list-style-type: none"> <li>- How did the teacher organize the lesson?</li> <li>- What resources were made available to students?</li> <li>- Why were students asked to work in small groups?</li> <li>- How did the teacher support struggling students?</li> <li>- How did the teacher encourage sharing of approaches and strategies?</li> </ul>	<ul style="list-style-type: none"> <li>• <a href="#">Video – Organizing a Table Tennis Tournament (9:18)</a>            © 2012 The University of Nottingham. <a href="#">Mathematics Assessment Project</a></li> <li>• <a href="#">Video Reflection Organizer</a></li> </ul>