# Virginia Department of Education 2019 Mathematics Institutes

# Facilitator’s Guide – Grade Band EOC

## 2019 Mathematics Institutes

*Project Purpose:* The purpose of the 2019 Developing Deeper Learning through Rich Mathematical Tasks – Mathematics Institute is to provide teachers and mathematics leaders with professional development focused on effective mathematics instruction.  Particular emphasis will be on the implementation of rich mathematical tasks to support deeper learning opportunities for students and to strengthen locally-designed curricula.

Specific goals of the Institute will include:

* strengthening the teaching and learning of mathematics through the use of rich tasks;
* supporting equitable learning opportunities and promoting positive mathematical identities and agency; and
* providing training materials for divisions and teachers for use as a local professional development tool.

## Professional Development Instructions

A product of the 2019 Mathematics 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, facilitated by a member of the team. Modifications could be made to adapt the professional development for more than one grade level/course or for large groups. Facilitators should review the activities and handouts in this guide prior to facilitating this professional development.

| **Approximate Time** | **Facilitator Instructions** | **Materials** |
| --- | --- | --- |
| **25 minutes TOTAL** | **Introduction**  **Overarching Session Learning Intentions**  **Content Learning Intention:**  I am learning about strategies and approaches that make teaching and learning more visible.  **Language Learning Intention:**  I am learning to use the language of a visible learning mathematics classroom.  **Social Learning Intention:**  I am learning how to listen and respond to my peers’ ideas in ways that move everyone forward as learners. |  |
| **25 minutes**   1. Introductions (2 min.) 2. VDOE Video Introduction/ Focus (15 min.) 3. Community Builder (5 min.) 4. Agenda/Learning Intentions (3 min.) | **Introduction**   1. Introductions **(slides 1-2)**    1. Facilitators introduce themselves 2. VDOE Video Introduction/Focus for 2019 Mathematics Institute **(slides 3-5)**    1. VDOE Overview Video – embedded in PowerPoint presentation    2. Discuss the focus of the 2019 Institutes using the Mathematics Teaching Practices Framework    3. Go over session logistics - parking lot, bathroom locations, times of breaks, etc. Facilitators may wish to keep a parking lot poster in the session room for questions that arise and a list on chart paper that catches the strategies being used throughout the session 3. Community Builder - *Just Like Me!* **(slides 6-14)**    1. For each slide, participants will stand if the statement applies to them. This gives the facilitator a chance to get to know the audience. The last *Just Like Me!* slide is designed to include everyone in the room as a community builder. 4. Agenda/Session Learning Intentions **(slide 15-16)**    1. The agenda and overarching learning intentions for the day will be shared with participants. | * VDOE Video Introduction * [Learning Intentions Poster](http://www.doe.virginia.gov/instruction/mathematics/professional_development/institutes/2019/eoc/0b-learning-intentions.docx) * [Grade Band EOC Session PowerPoint](http://www.doe.virginia.gov/instruction/mathematics/professional_development/institutes/2019/eoc/2019-eoc-institute-ppt.pptx) * Parking lot chart paper * Chart paper for strategy catcher |
| **80 minutes TOTAL** | **Module I: Overview – Visible Learning, Equity, and Identity**  **Success Criteria:**   * I can recognize strategies in teaching and learning that have high impacts (effect size) on student achievement. * I can recognize and support equitable learning opportunities for all students that promote positive student mathematical identity and agency. * I can describe how to create a classroom environment that supports the development of assessment-capable mathematics learners. |  |
| **80 minutes**   1. Visible Learning (15 min.) 2. Effect Size (10 min.) 3. Math Identity & Equity (10 min) 4. Visible Learning Classroom (8 min) 5. Jigsaw Reading (20 min) 6. Module Reflection (15 min) | **Module I (slides 17-33)**   1. Share the success criteria for Module I with participants **(slide 18)** 2. What is Visible Learning? video **(slides 19-20)**    1. Before video - Pass out the Anticipation/Reaction Guide to participants and have them complete T or F on the left-hand side of the form. Participants should randomly get one of the two versions (1a or 1b). Make 1/3 of the handouts be version 1b, which is a differentiated/scaffolded version.    2. [Watch the video](https://players.brightcove.net/268012963001/rJenILPQx_default/index.html?videoId=ref:cwn-almarode-inpr-wvlm-BA01102) (5:51)    3. During/After video – participants will complete T or F on the righthand side of the form based on new understanding.       1. Version 1a - Participants mark True (T) or False (F) and correct the false statements.       2. Version 1b - The backside of the form includes blanks to correct four statements, which scaffolds the activity for some learners.    4. Debrief with answer key       1. Discuss the two forms used. Ask for volunteers from to share out how they might correct the false statements. 3. Effect Size **(slides 21-22)**    1. Barometer of Influence       1. Reinforce the understanding of Hattie’s barometer of influence from the video. Highlight the concept that the hinge point is at 0.40 not 0. The effect sizes used in this session come from this book, and Hattie has updated new research.    2. Desmos Sort       1. Facilitators will use this link to [Teacher Desmos Activity](https://teacher.desmos.com/activitybuilder/custom/5cffc3e35a559b0bfa5173d5/edit), create a class code, and restrict Pacing to slides 1-3.       2. Participants will get on devices in pairs and access the [Desmos Student Activity Log-In Screen](http://www.student.desmos.com) and enter the unique code created by the facilitator (note that cell phone screens may be too small to use for this activity).       3. They will sort the strategies with their partners in groups by Low, Medium, or High Effect Size. Facilitator will monitor progress on Teacher Dashboard.       4. Answers will not be included at this point. Participants will deal with “opensure” rather than closure until the end of the session.       5. There are paper copies available in case of technical difficulties. 4. Math Identity & Equity **(slide 23-25)**    1. Math Timeline       1. Facilitator will discuss how each of our experiences (both highs and lows) contribute to our math identities.       2. Participants will complete the Math Timeline handout.       3. Participants will then Turn & Talk with a shoulder partner to have a conversation around the questions at the bottom of the handout.    2. Equity-Based Math Teaching Practices       1. Facilitator will point out that affirming math learners’ identity is one of the Equity Based practices.       2. Talk about how important it is for us as math educators to explicitly teach a growth mindset and create a classroom culture where all students have the ability to see themselves as a “math person”.       3. Could also talk about the “math people” included in Desmos anonymize option. 5. Visible Learning Classroom **(slides 26-29)**     1. Make predictions, facilitator will chart       1. On slide 26, participants discuss as a table and come up with as many descriptors as possible for visible teaching and visible learning to share out as a group.       2. Facilitator will make a T-chart on poster paper. Call on each table. Have groups share 1 of their descriptors (either teaching OR learning) around the room and then open up for additional descriptors once each group has shared.    2. Visible Teaching vs. Visible Learning       1. Participants will refer to page 20 for what the book says.    3. Assessment-capable visible learners roadmap       1. Talk about how if Visible Teaching and Visible Learning is happening, then the results should be Assessment-Capable Visible Learners who can do these things. Ideally, this is what we want for all students.    4. Mistake-friendly classroom       1. The teacher’s role in fostering the development of assessment-capable learners is to explicitly create a mistakes-friendly classroom. 6. Book concepts – surface, deep, and transfer learning; phases of learning; and differentiating tasks **(slides 30-32)**    1. Jigsaw reading of pages 21-35 of book (Almarode, J., Fisher, D., Assof, J., Hattie, J., & Frey, N. (2019). *Teaching Mathematics in the Visible Learning Classroom: High School*. Thousand Oaks, CA: Corwin Mathematics.).       1. Have participants form groups of 3 and read the pages identified on slide 32. They will then discuss commonalities of the sections they read.    2. Surface, Deep, and Transfer tornado       1. Facilitator will summarize different levels of learning. Surface does not mean superficial. There is an appropriate time for each level depending on the learning intentions.    3. The “Goldilocks” effect 7. Module reflection - Square, Circle, Triangle **(slide 33)**    1. The success criteria for the module are on the reflection form. Participants will fill it out in two columns - one in terms of their own role/classroom and the other column in terms of when they bring it back to their district. | * [Copies of Anticipation Reaction Guide 1a](http://www.doe.virginia.gov/instruction/mathematics/professional_development/institutes/2019/eoc/1a-anticip-react-guide.docx) * [Copies of Anticipation Reaction Guide 1b](http://www.doe.virginia.gov/instruction/mathematics/professional_development/institutes/2019/eoc/1b-ant-react-guide-sv.docx) * [Anticipation Guide Answer Key](http://www.doe.virginia.gov/instruction/mathematics/professional_development/institutes/2019/eoc/1c-antip-react-guide-key.docx) * Effect Size Sort on Desmos [(paper copies for backup)](http://www.doe.virginia.gov/instruction/mathematics/professional_development/institutes/2019/eoc/1d-effect-size-card-sort.docx) * [Copies of Math timeline](http://www.doe.virginia.gov/instruction/mathematics/professional_development/institutes/2019/eoc/2-math%20timeline.docx) * Pens * Visible Learning book for each participant * Mini Post-it Notes - For marking pages in the book * Highlighters * Chart paper * Markers * [Copies of Reflection Sheet](http://www.doe.virginia.gov/instruction/mathematics/professional_development/institutes/2019/eoc/3-reflections.docx) |

| **Approximate Time** | **Facilitator Instructions** | **Materials** |
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| **100 minutes TOTAL** | **Module II: Task Implementation (Before)**  **Success Criteria:**   * I can identify how teacher clarity about learning intentions and success criteria contributes to student success. * I can identify strategies, methods or approaches to meet the learning needs of individual students. * I can distinguish between tasks that will engage students in higher levels of cognitive demand versus lower levels of cognitive demand. * I can describe the factors associated with the decline or maintenance of the cognitive level of a rich mathematical task. * I can anticipate student solution strategies and misconceptions associated with the implementation of a mathematical task. |  |
| **100 minutes**   1. Learning Intentions & Success Criteria (20 min.) 2. Tasks by EOC group (20 min.) 3. Why tasks/what are rich tasks? (35 min.) 4. Maintaining the rigor of task implementation (15 min.) 5. Module Reflection (10 minutes) | **Module II: (slides 34-50)**   1. Share the success criteria for Module II with participants **(slide 35)** 2. Learning Intentions & Success Criteria **(slides 36-37)**    1. Have participants turn to the definitions of Learning Intentions & Success Criteria from text pgs. 48-50. Annotate and take notes of their learning. Each participant will then share one takeaway within their table.    2. Group participants based on high school mathematics courses using the instructions on slide 37 3. Tasks by EOC group **(slides 38-39)**    1. Participants will write learning intentions & success criteria for the topics provided by content, and record on copy paper.    2. Facilitator will pass out the appropriate content tasks (Algebra 1 – Full Parking Lot, Geometry – Take Me Out to the Ball Game, Algebra 2 – Function of a Ride).    3. Participants will answer in their trio - Does the VDOE task satisfy your learning intentions & success criteria? 4. Why Tasks / What are “Rich Mathematical Tasks”? **(slides 40-45)**    1. Why tasks? - research says task implementation impacts student learning    2. Definition of tasks according to the VDOE Rich Mathematical Task Committee (RMT)       1. Turn & Talk - based on this definition, what might be the characteristics of rich mathematical tasks? Participants will record their ideas on Post-it notes by trio and add them to a poster. As they add their ideas, they must first read those already posted and place duplicate ideas on top of similar ones.    3. Characteristics of tasks       1. These characteristics were developed by the RMT Committee based on current research.       2. Facilitator will compare characteristics from the committee with those generated by the participants.    4. Cognitive demand high/low sort       1. Based on the RMT’s definition and characteristics, mark high or low on the High or Low Cognitive Demand? handout individually.       2. Participants who finish early can fill out the Characteristics on the back of the handout, explaining justification for why they chose high or low for the specific items.       3. Check answers using [Kahoot!](https://create.kahoot.it/share/high-low-task-sort/fd2db8c0-a385-402d-94a6-f056d1ff970b) as an individual formative assessment. Facilitator will pause and discuss items those with a clear disagreement.    5. The book offers a Checklist on pg. 197 as a resource for creating and selecting tasks.    6. Using the Checklist in the book, trios will make adjustments to the task and/or learning intentions & success criteria ideas to align. Many task resources exist; however, modifications may need to be made to suit your classroom needs. 5. Maintaining the rigor of task implementation **(slides 46-49)**    1. Facilitator will explain the task itself does not result in learning. The implementation must also be there.    2. Go over the factors associated with maintenance and decline.    3. Groups will look over the Planning for Mathematical Discourse template for their course task. They will use the protocol“Read Something and Say Something” in their trio (each participant reads an excerpt from the document and then says something about the reading – this should be a sentence not a dissertation).    4. Last year’s 2018 Mathematics Institute focused on Planning Purposeful Questions, and these are included on the Planning for Mathematical Discourse template for all tasks shared. 6. Module Reflection 3-2-1 **(slide 50)** 7. Participants will return to their original seats. 8. The success criteria for the module are on the reflection form. Participants will fill it out in two columns - one in terms of their own role/classroom and the other column in terms of when they bring it back to their district. | * Copies of the tasks for each content (Alg 1 – [Full Parking Lot](http://www.doe.virginia.gov/instruction/mathematics/professional_development/institutes/2019/eoc/4a-alg1-task.docx), Geom – [Take Me Out](http://www.doe.virginia.gov/instruction/mathematics/professional_development/institutes/2019/eoc/4b-geom-task.docx), Alg 2 – [Function of a Ride](http://www.doe.virginia.gov/testing/sol/standards_docs/mathematics/2016/rich/eoc/a2-6-function-ride-task.docx)), 1 per participant * Copy paper * Post-it notes * [Copies of High or Low Cognitive Demand?](http://www.doe.virginia.gov/instruction/mathematics/professional_development/institutes/2019/eoc/5-task-sort.docx) * Copies of the Planning for Mathematical Discourse for each Task Template (one for [Alg 1](http://www.doe.virginia.gov/instruction/mathematics/professional_development/institutes/2019/eoc/6a-plan-dis-alg1-park-lot.docx), [Geom](http://www.doe.virginia.gov/instruction/mathematics/professional_development/institutes/2019/eoc/6b-plan-geom-ball-game.docx), and [Alg 2](http://www.doe.virginia.gov/instruction/mathematics/professional_development/institutes/2019/eoc/6c-plan-alg2-func-ride.docx) tasks) * Copies of Reflection Sheet |

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| **60 minutes TOTAL** | **Module III: Task Implementation (During/After)**  **Success Criteria:**   * I can use effective questioning strategies to assess and advance student thinking. |  |
| **60 minutes**   1. Implementing the task (25 min.) 2. Selecting and sequencing student work (15 min.) 3. Task Closure (10 min.) 4. Module Reflection (10 min.) | **Module III: (slides 51-60)**   1. Share the success criteria for Module III with participants **(slide 52)** 2. Implementing the Task *as students* - The Soccer Competition **(slides 53-56)**   *Participants complete this module from the perspective of a student.*   * 1. Which One Doesn’t Belong? Four corners: participants stand up and move to the corresponding corner, tell a partner why you chose, discuss with the corner group to see if all reasons are the same, and then have a spokesperson from each corner share 1 of their reasons.   2. Learning intentions & success criteria for the Soccer Competition Task   3. Do the task - Soccer Competition Task  1. Selecting and sequencing student work **(slide 57)**    1. Share selected responses with intentional sequencing as “students” using these steps: Facilitator will monitor the room and select a sample of “student work” - Asking 4-5 people to put their work on posters to share out in the order selected by the facilitator, at the end of the work time. Facilitator may have to tap some participants on the shoulder to complete as a student with a misconception. Could also have participants share graphs from Desmos to project/share.    2. Selecting & sequencing student work from the teacher perspective – “pull back the curtain” to share how facilitator selected and sequenced “student work”, part of the Planning for Mathematical Discourse document. Discuss how this connects to the Task & Share structure of Math Workshop. 2. Task Closure as students **(slides 58-59)**    1. Give participants individual think time to record an answer to one of the 5 questions on a post-it notes and be ready to share.    2. Facilitator will number the tables, and participants will number off at their table. Use these numbers with a [Random Number Generator](https://www.google.com/search?q=random+number+generator&rlz=1C1GCEA_enUS807US807&oq=random&aqs=chrome.1.69i57j0l5.2141j0j7&sourceid=chrome&ie=UTF-8&surl=1&tbs=li:1&safe=active&ssui=on) to call on participants to share.    3. Giving them the choice of which question to answer is a low-stakes way to “cold call”. Another option is to have participants talk about their answers with a partner first; then, they have choice in sharing their answer or their partner’s. 3. Reflection - 3 W’s Reflection **(slide 60)** 4. The success criteria for the module are on the reflection form. Participants will fill it out in two columns - one in terms of their own role/classroom and the other column in terms of when they bring it back to their district. | * [Copies of the Soccer Task](http://www.doe.virginia.gov/instruction/mathematics/professional_development/institutes/2019/eoc/7-soccer-task.docx) for each participant * Mechanical pencils * Chart paper * Table numbers * Post-it notes * Reflection Sheet |

| **Approximate Time** | **Facilitator Instructions** | **Materials** |
| --- | --- | --- |
| **75 minutes TOTAL** | **Module IV: Assessing Student Understanding**  **Success Criteria:**   * I can use a rubric to score student work samples and work collaboratively to calibrate my scores. * I can use success criteria to provide effective feedback to students to deepen student learning. * I can analyze student work to identify what students know and are able to do in order to plan instruction that moves all students forward as learners. |  |
| **75 minutes**   1. Calibration Protocol (60 min.) 2. Feedback (5 min.) 3. Reflection (10 minutes) | **Module IV: (slides 61-74)**  *Participants complete this module from the perspective of a student.*   1. Share the success criteria for Module IV with participants **(slide 62)** 2. Calibration Protocol **(slides 63-72)**    1. Protocol purpose & overview of steps and Rich Mathematical Task Rubric by facilitator before groups begin the process    2. Table groups will identify group roles    3. Preparing to score student work       1. Pass out the student work       2. Participants will cut student work in half in preparation of sorting    4. Scoring student work – participants will complete steps 3 & 4 individually    5. Sharing & discussing student work – participants will complete steps 5-7 as a table group. Conversations might start with those areas where there are larger discrepancies.    6. Anchor paper scoring & rationales are provided on the VDOE website for participants’ reference. 3. Elements of Effective Feedback **(slide 73)**    1. We spent time doing this in last year’s Mathematics Institute. You can refer back to those materials on the [2018 Mathematics SOL Institute](http://www.doe.virginia.gov/instruction/mathematics/professional_development/institutes/2018/index.shtml) VDOE webpage. 4. Module Reflection - Graffiti plus reflection sheet **(slide 74)**    1. Participants will graffiti a thought on one of the posters labeled Rubric, Calibration Protocol, or Feedback. They will gallery walk to view other thoughts and use a check mark to agree, question mark to wonder, arrow to make connections, etc. Then participants will use Reflection sheet to capture thinking. | * [Copies of the Calibration Protocol](http://www.doe.virginia.gov/instruction/mathematics/professional_development/institutes/2019/eoc/8-calib-protocol.pdf) * [Copies of the Rich Mathematical Task Rubric](http://www.doe.virginia.gov/instruction/mathematics/professional_development/institutes/2019/eoc/9-rich-math-task-rubric.docx) * [Copies of Soccer Anchor Papers Small with student work A-E for each participant](http://www.doe.virginia.gov/instruction/mathematics/professional_development/institutes/2019/eoc/11-soccer-anchor-papers.pdf) * Scissors * [Copies of the Individual Scoring Notes](http://www.doe.virginia.gov/instruction/mathematics/professional_development/institutes/2019/eoc/10-record-scoring-notes.docx), with extra copy per table to record group scores * Chart paper for duplicate graffiti topics * Markers * Reflection sheet |

| **Approximate Time** | **Facilitator Instructions** | **Materials** |
| --- | --- | --- |
| **20 minutes TOTAL** | **Session Closure and Reflection** |  |
| **20 minutes**   1. Learning Intentions (5 min.) 2. Effect Size (5 min.) 3. Exit Ticket (5 minutes) 4. Closing (5 minutes) | **Session Closure and Reflection: Content (slides 75-86)**   1. Revisit Learning Intentions for the day - thumbs up/down where participants might be in their progress towards these learning intentions **(slide 76)** 2. Effect Size **(slides 77-79)**    1. Finish the Desmos Activity – remove pacing restrictions so that participants can complete slides 4-6, to reveal answers to sort and reflect.    2. Use the Teacher Dashboard on Desmos to highlight and things that surprised the participants or aha’s they walked away with.    3. Numbers for Strategy Catcher based on the Teaching Mathematics in the Visible Learning Classroom companion book 3. Exit Ticket **(slides 80-81)**    1. Quote on taking risks    2. Traffic Light reflection - The success criteria for the module are on the reflection form. Participants will fill it out in two columns - one in terms of their own role/classroom and the other column in terms of when they bring it back to their district. 4. Closing - Additional Resources & Contact information **(slides 82-86)**    1. 2016 Math SOL Instructional Resources    2. Desmos Classroom Activities Log    3. Potential Website Resources    4. Teacher Direct email subscription    5. VDOE contact information | * Effect Size Sort on Desmos * Reflection Sheet |