# Virginia Department of Education 2019 Mathematics Institutes

# Facilitator’s Guide – Grade Band 6-8

## 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** |
| --- | --- | --- |
| **20 Minutes** | **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. |  |
| 1. Community Builder (5 min) 2. Agenda   (3 min)   1. VDOE Video (10 min) 2. Learning Intentions   (2 min) | 1. Community Builder    1. Just Like Me (slides 3-11)- Participants will stand up for each statement that describes them.    2. Turn and Talk (slide 12)- How might you use this activity in your classroom to build community? What is the importance of building a classroom community? What additional ways do you foster a classroom community? 2. Share Agenda for the day, parking lot, location of restrooms, lunch time, etc. (slide 13) 3. VDOE Video Introduction (slide 14) – Explain that the team at VDOE has prepared a video for viewing to help set the stage for our work today. (Show video) 4. Share Learning Intentions for the day (slide 15): Explain that dividing learning intentions into content, language, and social varieties can provide teachers and students alike a clearer sense of the day’s expectations.    * Content learning intentions: What is the math I am supposed to use and learn today?    * Language learning intentions: How should I communicate my mathematical thinking today?    * Social learning intentions: How should I interact with my learning community today? | * [Grade band 6-8 Powerpoint](http://www.doe.virginia.gov/instruction/mathematics/professional_development/institutes/2019/6-8/2019-6-8-institute.pptx) * VDOE Video Introduction * Parking Lot Poster or Digital * [1a Learning Intention Posters](http://www.doe.virginia.gov/instruction/mathematics/professional_development/institutes/2019/6-8/1-1a-learning-intentions.docx) * Post-it notes per table (only if parking lot is a poster) |
| **55 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. |  |
| **55 minutes**   1. Review Success Criteria (2 min) 2. Effect Size Sort (15 min) 3. Identity, Agency & Equity (15 minutes) 4. Visible Learning (15 minutes) 5. Been and Going (3 min) 6. Reflection (5 min) 7. Break (10 min) | **Module I**   1. Review success criteria for this module (slide 17). 2. **Effect Size Sort**     1. Review Barometer of Influence and the different zones (slides 18-20). Have participants think about their familiarity with Hattie’s barometer with 1 being no experience and 10 being an expert)    2. Explain that we will now visit the Desmos website to complete an Effect Size Sorting activity (slide 21).       1. Facilitators will use this link to [Teacher Desmos Activity](https://teacher.desmos.com/activitybuilder/custom/5cffc3e35a559b0bfa5173d5/edit) to create a student code.       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. Pair Up (slide 22)- Participants will pair up with someone new. Use the sentence starts to drive the conversation.       1. My name is ...       2. I am from …       3. My familiarity with Hattie’s research is…       4. My reaction to the sort is…    4. Review the Effect Sizes of NCTM’s Mathematical Teaching Practices (slides 23-29)    5. Let participants read quote (slide 30)       1. Turn & Talk- What is your take-away from this excerpt? (Just because something is below 0.4, it can still be effective if used at the appropriate time.) 3. **Mathematical Identity Agency and Equity**    1. As we begin to think about creating an equitable environment for teaching and learning math, we will begin with our own experiences as a student in the math classroom (slide 31).    2. Participants will graph their math story as a line graph and answer the questions (slide 32).       1. Think-Pair-Share: What is the leverage point for a mathematical experience to be positive or negative?    3. Have participants think to themselves- How do the belief statements you wrote in the last question from the Math Identity Graph connect to the mindframes from the book (slide 33)    4. Revisit VDOE video from earlier and discuss how math identity and agency come together to create equitable learning (slides 34-36) 4. **Visible Learning**    1. A visible learning classroom is… Have participants predict the two questions. As they predict, the facilitator will chart the ideas on poster paper (slide 37).    2. Show [Assessment Capable Visible Learner Video](https://players.brightcove.net/268012963001/rJenILPQx_default/index.html?videoId=ref:cwn-almarode-inte-cacvl-BA01166) (slide 38)       1. As participants watch the video, have them identify the characteristics that are discussed in the video?    3. Reveal the characteristics of an assessment Capable Visible Learner (slide 39). Explain: As practitioners, we must identify what works best within instruction, in order to implement the most effective strategies with high levels of fidelity.    4. Reveal visible teaching and learning from Visible Learning Book (slide 40)    5. In order to create assessment capable visible learners we need to create environments that make mistakes friendly (slide 42). 5. **Where have we been? Where do we need to go?**    1. Focus of 2018 institutes (slide 43)    2. Focus of 2019 institutes (slide 44) 6. **Reflection**    1. Have participants reflect on this module on the reflection sheet (slide 45-46).       1. What is one idea that squared with your thinking?       2. What is a question circling in your mind?       3. What points would you like to remember, that might impact your work? | * 1 piece Poster Paper * Markers * Grade Band 6-8 Session PowerPoint * [Creating Assessment Capable Visible Learning Video](https://players.brightcove.net/268012963001/rJenILPQx_default/index.html?videoId=ref:cwn-almarode-inte-cacvl-BA01166) * Parking lot poster or digital * [1-2b-Effect Size Card Sort](http://www.doe.virginia.gov/instruction/mathematics/professional_development/institutes/2019/6-8/1-2b-effect-size-card-sort.docx) (Desmos or Paper Copy) * [1-3a-Math Identity Graph](http://www.doe.virginia.gov/instruction/mathematics/professional_development/institutes/2019/6-8/1-3a-math-id-graph.docx) * [1-6-Reflection Sheet](http://www.doe.virginia.gov/instruction/mathematics/professional_development/institutes/2019/6-8/1-6-reflection-sheet.docx) |

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| **115 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. |  |
| **115 minutes**   1. Success Criteria (2 min) 2. Clear Learning Intention (20 min) 3. Math Tasks (8 min) 4. Task (25 min) 5. Jigsaw (30 min) 6. Anticipating Student Responses (15 min) 7. Reflect (5 min) | **Module II: Content**   1. Review the success criteria for this module. (Slide 48) 2. **Clear Learning Intentions**    1. Discuss the Ingredients for progress toward mastery (slide 49)    2. Have participants read page 47 and look at the learning intentions at the top of pg 48. Refer to learning intentions for the day- Notice that learning intentions begin with “I am learning to…” (slide 50)    3. In groups, participants will write a content, language, and social learning intention for this SOL on poster paper (slide 51). Gallery walk to 3 other groups.    4. Reveal the learning intentions and success criteria from the book for the task (slide 52-54). Point out that success criteria start with “I can…” 3. **Math Tasks**    1. Have participants read the quote (slide 55).       1. Turn and Talk: What are characteristics of a rich math task? Facilitator track characteristics on chart paper.    2. Reveal Math Task definition and characteristics and compare to the list the participant generated list (slide 56-58). 4. **Using Positive and Negative Numbers in Context Task**    1. Launch the Task (Slide 59): Walk through the activity like you would with students.       1. If it is 8 degrees in London, and you add 7 degrees, what is the temperature in Madrid?       2. If it is -7 degrees in Tromso and Tromso is 12 degrees less than Berlin, what is the temperature in Berlin?       3. If it is -7 degrees in Tromoso and 8 degrees in London, what is the difference in temperature?    2. Do the Task (slide 60): Participants should work in groups of 3-4 to complete the task.       1. Participants should use dry erase markers, number line, and/or two-color tiles. They can record strategies using post-it notes as needed.       2. Note that in a classroom, teachers would want students to record their strategies on the paper and glue down their work.       3. As needed, give the scaffold paper for participants to know how to organize the cards.    3. Reflect (slide 61-62)       1. Why is it important to experience a task yourself prior to implementing the task in class?       2. What is the benefit of experiencing the task in a collaborative learning team?       3. How could this task be scaffolded to support differing student needs?          1. When discussing scaffolding, point out that just in time scaffolding was provided to participants as they needed it instead of giving just in case scaffolding which lowers the rigor of the task. 5. **Effective Task Implementation** **Jigsaw** (slide 63-64)    1. Explain we are going to do a Jigsaw to determine the important components of task implementation.    2. Have participants count off by 3’s. Each number should receive a different sort? below. After doing the activity, participants will record the main ideas.       1. Surface, Deep, Transfer Learning       2. Level of demand sort       3. Decline vs. maintenance sort    3. Upon returning to groups, participants will share the information they learned.    4. Come back together and have participants share the learning of each sort. Use the slides 65-67 to emphasize main ideas: with deep and transfer learning, tasks are important. Selecting a high level task does not guarantee high results. Implementation is a key factor and it is important not to decline the level of the task.    5. Checklists for creating or selecting tasks (slide 68): At their tables, have participants go to page 197 in the book and use the checklist to evaluate the task they completed in the module.    6. Goldilocks challenge (slides 69-70)-       1. Ask someone to give a 30 second synopsis of Goldilocks and the three bears. Relate this to Goldilocks challenge.       2. These ideas lead us to the right strategy at the right time, for the right level of thinking, with the right level of challenge. 6. **Anticipating Student Responses**    1. Show participants MAPS website to access tasks such as those in the book (slide 71).    2. Go to VDOE Math website and show the location of the rich mathematical tasks (slide 72). The state has at least one per grade level currently and have a committee working on more.    3. Have participants read the printout about anticipation and underline the phrase that sticks out most to them. Share as a table. (slide 73)    4. Open a middle school task and point out that there is a lot of information there for teachers who do not have collaborative groups to work through the task with. Draw participants to the planning for math discourse page in the document (slide 74).    5. Review Assessing and Advancing Questions and that more information can be found in the math institute from last year (slide 75-76). 7. Participants should reflect on this module on their reflection guide (slide 77-78).    1. What is the most important point you would like to hold on to?    2. What is something you are excited to share with your colleagues? | * Grade Band 6-8 Session PowerPoint * Parking Lot Poster or Digital * Post-it Notes * Dry Erase Markers * Number Lines * Two-Color Tiles * Poster Paper per Group * [2-4a-Positive and Negative Numbers in Context Task Cards](http://www.doe.virginia.gov/instruction/mathematics/professional_development/institutes/2019/6-8/2-4a-pos-neg-num-cards.pdf) * [2-4b-Positive and Negative Numbers Task Scaffold Organizer](http://www.doe.virginia.gov/instruction/mathematics/professional_development/institutes/2019/6-8/2-4b-pos-neg-num-scaffold.docx) * [2-4c Vertical Number Line](http://www.doe.virginia.gov/instruction/mathematics/professional_development/institutes/2019/6-8/2-4c-vertical-number-line.docx) * [2-5a-Low High Demand Sort](http://www.doe.virginia.gov/instruction/mathematics/professional_development/institutes/2019/6-8/2-5a-cog-demand-sort.docx) * [2-5b-Decline and Maintenance Sort](http://www.doe.virginia.gov/instruction/mathematics/professional_development/institutes/2019/6-8/2-5b-decline-maint-sort.docx) * [2-5c-Surface Deep Transfer Sort](http://www.doe.virginia.gov/instruction/mathematics/professional_development/institutes/2019/6-8/2-5c-surf-deep-trans-sort.docx) * [2-5d-Jigsaw Recording Sheet](http://www.doe.virginia.gov/instruction/mathematics/professional_development/institutes/2019/6-8/2-5d-jigsaw-recording.docx) * [2-5e-Checklist for creating or selecting tasks that promote mastery](http://www.doe.virginia.gov/instruction/mathematics/professional_development/institutes/2019/6-8/2-5e-create-select-tasks.pdf) * [2-6a- Anticipating Student Responses](http://www.doe.virginia.gov/instruction/mathematics/professional_development/institutes/2019/6-8/2-6a-anticip-st-responses.docx) * 1-6- Reflection Sheet |

| **Approximate Time** | **Facilitator Instructions** | **Materials** |
| --- | --- | --- |
| **60 minutes TOTAL** | **Module III: Task Implementation (During/After)**  **Success Criteria:**   * I can implement a rich mathematical task to support deeper learning for all students. |  |
| **60 minutes**   1. Welcome Back and Community Builder(10 min) 2. Model the Task (45 min) 3. Reflection (5 min) | **Module III: Content**   1. Welcome Back and Community Builder    1. Open Middle Task (slide 80)       1. With the integers -3 to 3 and symbols provided, participants will cut out the cards and create two true statements.       2. After a few minutes, click of animation to appear with provided “frame” for participants as an additional support.       3. Call on participants to share their true equations. Record responses on chart paper.       4. Discuss with participants the giving the frame later provided additional support for those who needed it as on the spot differentiated instruction.    2. Synectics (slide 81)       1. Participants will pick a picture on the screen to complete the sentence frame: Rich tasks are like \_\_\_\_\_\_\_\_\_\_\_ because \_\_\_\_\_\_\_\_\_\_.       2. Have participants get up and find a new person, introduce themselves, and complete the sentence frame. Share out some as a group.    3. Review success criteria (slide 82) 2. Model implementation of task    1. Launch the task by inviting participants to determine which one doesn’t belong (slide 83). Chart responses. Highlight key vocabulary    2. Review Learning Intentions and Success Criteria for the Dog Park Task (slides 84-85).    3. Model three reads of a text (slide 86).       1. On the first read, participants should just listen to the reading of the task.       2. On the second read, participants should identify any word or phrase that is unclear. Review these words as a group.       3. On the third read, participants should identify any key information.    4. Participants work individually at first and then join together as a group to get more ideas. On poster paper, record group answer and thinking.    5. While participants are working, select and sequence work. Then have selected groups present and ask connecting questions.    6. Debrief (slide 87-88)       1. Intentional move- what did you notice we were doing during task? Facilitator chart out what was said.       2. Think-Pair-Share: What scaffolds may you provide so that all students can meet success with this task    7. Task Implementation Checklist (slide 89)-       1. Give participants a minute to review.       2. Tell participants that this is a tool for task implementation that can be used to determine what should be done, with whom it should happen, and when it occurs.    8. Bring the task to the process goals (slide 90)       1. Review the mathematics process goals. Rich mathematical tasks are a way to incorporate all of the process goals, thus why they are so important to use with all students.       2. Have participants fill out the graphic organizer to identify how the math process goals were in action during this task. Participants should work as a table to do this. 3. Participants should reflect on this module on their reflection guide (slides 91-92).    1. What are the benefits of monitoring, selecting, sequencing, and connecting?    2. How does anticipating help you to monitor, select, sequence, and connect during task implementation? | * Grade Band 6-8 Session PowerPoint * Parking Lot Poster or Digital * Post-it Notes * Scissors * Linking cubes * Graph paper * Poster paper per group * Poster paper for presenter (2) * [3-1-Open Middle Cards](http://www.doe.virginia.gov/instruction/mathematics/professional_development/institutes/2019/6-8/3-1-open-middle-cards.docx) * [3-2a-Planning a Dog Park Task](http://www.doe.virginia.gov/instruction/mathematics/professional_development/institutes/2019/6-8/3-2a-dog-park-task.docx) * [3-2b-Task Implementation Checklist](http://www.doe.virginia.gov/instruction/mathematics/professional_development/institutes/2019/6-8/3-2b-task-implem-chcklst.docx) * [3-2c- Process Goal Graphic Organizer](http://www.doe.virginia.gov/instruction/mathematics/professional_development/institutes/2019/6-8/3-2c-process-goal-org.docx) * 1-6-Reflection Sheet |

| **Approximate Time** | **Facilitator Instructions** | **Materials** |
| --- | --- | --- |
| **60 minutes TOTAL** | **Module IV: Assessing Student Understanding**  **Success Criteria:**   * I can use success criteria to provide effective feedback to students to deepen student learning. * I can use a rubric to score student work samples and work collaboratively to calibrate my scores. * 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. |  |
| **60 minutes**   1. Review Success Criteria (2 min) 2. Task Calibration (35 min) 3. Elements of Effective Feedback (10 min) 4. Anchor paper scoring and rationale (8 min) 5. Reflect (5 min) | **Module IV: Content**   1. Review Success Criteria (slide 94) 2. **Task Calibration**    1. Calibration protocol purpose (slide 95) – discuss that having a protocol provides a process whereby groups can discuss student work in order to reach consensus about how to score the work based on a rubric or scoring criteria.    2. Review the calibration protocol handout to discuss the steps in scoring student work (slide 96)       1. Examination – work through task (individual)       2. Discussion of proficient responses (small group)       3. Read and place in groups (individual)       4. Score student work (Individual)       5. Discussion (small group)       6. Debrief discussion (small group)    3. Identify the group roles: recorder, facilitator, speaker, and time keeper (slide 97)    4. Preparing to score student work (slide 98)- Since the participants have already worked on the task, have them discuss what a Proficient score looks like for each of the process standards (specific to task). Use the Rich Mathematical Task Rubric as a guide.    5. Revisit the mathematics process goals - Talk about connections between the process goals and the mathematics practice (e.g., Facilitating Discourse)    6. Scoring student work (slide 99)– have the participants read and place the student work in groups (individually). Participants should sort the student work into 3 piles – low, medium, and high based on overall impression       1. Individually, participants should score each student work sample.       2. Record their scores on the individual scoring notes sheet       3. Evidence from the student work and the rubric should be used to support the score    7. Sharing and discussing student work (collaboratively) (slide 100)       1. Score sharing without explanation – one at a time, team members share their score for each of the rubric criteria while a recorder completes the group’s score sheet.       2. Discussion – Score each student work sample. Record the scores on the Individual Scoring Notes sheet. Use evidence from the work and the rubric to support the scores.       3. Debrief – Discuss the questions found on the handout.    8. Come back together as a group and think-pair-share the benefits of the calibration process. Review the benefits of calibration slide. (slide 102-103) 3. **Elements of Effective Feedback**    1. Depending on the level of proficiency demonstrated by the learner, specific, constructive, and timely feedback supports learners as they-together with the teacher-evaluate where they are going, how they are doing, and where they are going next. Feedback should be tied to success criteria. (slide 104)       1. Where am I going?       2. How am I going?       3. Where do I go next?       4. Progress toward mastery       5. Feedback should be tied to success criteria    2. Practice giving feedback (slide 105-106)- As a table, participants will pick on student work sample and discuss the following questions:       1. What misconceptions, if any, does the student have?       2. What feedback would you give the students?       3. What are the next instructional steps for the student? 4. **Anchor paper scoring and rationales** (slide 107-108)– Show where to access the anchor paper scoring and rationales on the VDOE website for the tasks. Hand out paper copies. What do you notice about task developers scoring? How does this compare to how you scored? Identified anchor papers…    1. Guide formative and summative assessments    2. Explain why the work is assessed at a specific performance level    3. Identify where students are in terms of mathematical understanding    4. Can be examined as a way to understand the learning opportunities we are, and are not, giving our students    5. Provide consistency in assessment students 5. Participants should reflect on this module on their reflection guide (slide 109-110).    1. What are the benefits of discussing student work with a collaborative learning team? | * Grade Band 6-8 Session PowerPoint * Parking Lot Poster or Digital * Post-it Notes * [4-2a- Rich Mathematical Task Rubric](http://www.doe.virginia.gov/instruction/mathematics/professional_development/institutes/2019/6-8/4-2a-rich-math-task-rubric.docx) * [4-2b- Dog Park Student Work Small](http://www.doe.virginia.gov/instruction/mathematics/professional_development/institutes/2019/6-8/4-2b-dog-park-stud-work.docx) * [4-2c- Calibration Protocol](http://www.doe.virginia.gov/instruction/mathematics/professional_development/institutes/2019/6-8/4-2c-calibration-protocol.pdf) * [4-2d- Task Scoring Sheet](http://www.doe.virginia.gov/instruction/mathematics/professional_development/institutes/2019/6-8/4-2d-indiv-scoring-notes.docx) * [4-4a- Dog Park Anchor Paper Scoring Rationale](http://www.doe.virginia.gov/instruction/mathematics/professional_development/institutes/2019/6-8/4-4a-dogpark-scor-ration.docx) |

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| --- | --- | --- |
| **20 minutes TOTAL** | **Session Closure and Reflection** |  |
| **20 minutes**   1. Resources (5 min) 2. Strategy Catcher (5 min) 3. VDOE Resources (5 min) 4. Exit Ticket (5 min) | **Session Closure and Reflection: Content**   1. Provide participants a list of resources to find tasks, including VDOE work on writing tasks. (slide 112) 2. Review Strategy Catcher and Effect Sizes (slide 113) 3. Think-Pair-Share: How do tasks promote assessment-capable visible learners? (slide 114) 4. Review VDOE resources (slide 115). Point out again where the VDOE tasks are and let participants know that VDOE is working on creating more. 5. Show Desmos Activity Log (slide 116) 6. Show Teacher Direct Slide and encourage participants to sign up (slide 117) 7. Tell participants that another way to get information from VDOE math can email [mathematics@doe.virginia.gov](mailto:mathematics@doe.virginia.gov) (slide 118) 8. Exit Ticket (slides 119-120) Review learning intentions. What is one thing you will stop, continue, and start doing? 9. Finally, show slide giving participants permission to spend more time developing student’s deep understanding of mathematics as a well-rounded discipline (slide 121). | * Grade Band 6-8 Session PowerPoint * Parking Lot Poster or Digital * Post-it Notes * [5-Sites for Mathematical Tasks](http://www.doe.virginia.gov/instruction/mathematics/professional_development/institutes/2019/6-8/5-sites-for-math-tasks.docx) |