6-12 MATHEMATICS INSTRUCTIONAL MODELS

LEARNER-CENTERED MODEL

TEACHER PLANNING GUIDANCE

Teachers will provide guidance to students as they work through a problem or task related to the application of the essential knowledge and skills students need to learn.

Prior to selecting problems and tasks, teachers should identify the specific required content that has not been taught and develop learning opportunities to address the missing content. Teachers may utilize the VDOE *Learning in Place* Mathematics Resources that include *Mathematics Standards of Learning* Tracking Logs (K-Algebra II) to record standards addressed prior to the COVID-19 closure and how to plan learning recovery. Teachers may also wish to refer to the Mathematics Vertical Articulation Tool (MVAT) to guide understanding of the vertical articulation of mathematics content and skills beyond the current grade level or course.

SUGGESTED STRATEGIES

- Administer pre-assessment to identify strengths/ weaknesses and to inform the selection of ancillary materials.
- Encourage students to create a timeline for the project, so they can divide the workload as they see fit.
- Hold teacher office hours that provide an opportunity to address individual student questions and give extra support - may include virtual learning platforms, telephone calls, and email
- Provide consistent and timely feedback to students and provide opportunities for them to work collaboratively through the use of tools such as:
    - Video Conferencing (Google Meet, Zoom, etc.)
    - Telephone calls and email
    - Collaborative platforms (Google, Padlet, Flipgrid, etc.)
- Ancillary materials should be provided by the teacher to support student learning. These may include:
    - Videos, example problems, or practice items
    - Teacher-created learning materials
    - Textbook resources - online or hardcover
- Teachers should continuously monitor students/collaborative groups to observe and address misconceptions that might arise
- Support continuous skill-building opportunities through online sites such as Khan Academy or other resources

SAMPLE WEEKLY SCHEDULE

Monday:

- Students are introduced to the learning goals and essential knowledge and skills for the targeted standards/content
- Students are provided (either synchronously or asynchronously) options, parameters, and performance expectations of the project/task
- Students begin to review ancillary materials (rubrics, videos, content support, etc.) that are either suggested by the teacher or sought out on their own to support completion of the task/project

Tuesday:

- Students (individually or collaboratively)
    - Begin research to explore the project/task.
    - Create a plan to complete the project/task utilizing ancillary resources as needed

Wednesday:

- Students consult with teacher to review project/task plan and receive feedback

Thursday:

- Students (individually or collaboratively) work on completing project/task

Friday:

- Students (or teams of students) complete a reflection on their learning to be reviewed by the teacher
    - Reflections should ask students to think about successes, challenges, and questions they still might have
    - Students and teacher collaboratively discuss the various project/tasks completed and compare problem-solving strategies and representations, justify thinking, and identify common errors and misconceptions

**The teacher begins the next week debriefing and giving feedback to students/teams based on reflections.

6-12 MATHEMATICS INSTRUCTIONAL MODELS

RESOURCES • VDOE Mathematical Tasks - collection of tasks that teachers may choose to use with students • Robert Kaplinsky - includes a variety of lesson ideas, problem-based resources, and links to Open Middle math problems • TED Talks - Video Playlists about Math - talks from experts around the world to promote student interest and provide project ideas • An Inquiry-Based Approach: Project-Based Learning - NCTM - a useful article for educators beginning to implement project-based learning in mathematics; includes project planning templates and other documents for teachers and students to use • MARS - Mathematics Assessment Project - site includes tasks, professional learning modules, and tools to aid deep understanding • 6-12 Online Resources - additional resources	This process would continue until the conclusion of the project. Projects may span multiple weeks. **Throughout the week students should participate in continuous skill-building. These are opportunities for students to practice skills that continue to develop fluency and make connections to new content.

6-12 MATHEMATICS INSTRUCTIONAL MODELS

TEACHER-CENTERED MODEL

TEACHER PLANNING GUIDANCE

Teachers should focus on identifying the essential knowledge and skills students will learn each week and curate and design appropriate instructional resources for student use.

Prior to selecting problems and tasks, teachers should identify the specific required content that has not been taught and develop learning opportunities to address the missing content. Teachers may utilize the VDOE *Learning in Place* Mathematics Resources that include *Mathematics Standards of Learning* Tracking Logs (K-Algebra II) to record standards addressed prior to the COVID-19 closure and how to plan learning recovery. Teachers may also wish to refer to the Mathematics Vertical Articulation Tool (MVAT) to guide understanding of the vertical articulation of mathematics content and skills beyond the current grade level or course.

SUGGESTED STRATEGIES

- Administer pre-assessments to identify individual student strengths/ weaknesses
- Provide consistent weekly communication - may include written (email, Google Doc), video, or telephone communication
- Hold teacher office hours that provide an opportunity to address individual student questions and give extra support - may include virtual learning platforms, telephone calls, and email
- Establish weekly goals - may include "I can" statements with descriptions of learning outcomes
- Incorporate teacher-created video lessons
- Include access to learning experiences and tasks. These may be paper documents or electronic versions. Sources may include:
    - Teacher created - online or paper
    - Textbooks - online or hard copies
    - Vendor Resources - online or paper
    - Desmos Activities - online
    - Other Resources - online or paper
- Provide consistent and timely feedback to students through:
    - Video Conferencing (Google Meet, Zoom)
    - Telephone calls and email
    - Collaborative platforms (Google, Padlet, Flipgrid, Discussion Board, etc.)
    - Shared Google documents of common questions and teacher responses
    - Desmos self-checking activities
    - Answer keys and worked out solutions
- Reference the VDOE Mathematics Word Wall Cards to ensure vocabulary development and understanding

SAMPLE WEEKLY SCHEDULE

Monday:

- Students are introduced to the learning goals and essential knowledge and skills for the specific standards/content
- Students engage in an introductory problem or hook associated with the content

Tuesday:

- Students review lessons assigned by the teacher which may include synchronous or asynchronous virtual lessons or other mediums for learning
- Students select from a teacher-created choice of content learning experiences and tasks
- Students engage in learning through a choice of virtual resources, virtual manipulatives, and games suggested by the teacher to make connections to the targeted content

Wednesday:

- Students complete targeted content practice which may include:
    - Desmos self-checking activities
    - CK-12 - online textbook, adaptive practice, and video examples
    - Wizer.me - interactive and engaging online activities
    - Mathigon - online lessons for mathematics topics grades 6 - 12
    - Geogebra - a dynamic mathematics software for geometry, algebra, graphing, statistics and calculus
    - Teacher created problems and activities (virtual and paper versions)
- Students attend office hours to receive content clarification, feedback, and support

6-12 MATHEMATICS INSTRUCTIONAL MODELS

- Support continuous skill-building opportunities through online sites such as Khan Academy or other resources

RESOURCES

- Illustrative Mathematics- problem-based core curricula and professional learning resources that help teachers and students excel in teaching and learning mathematics
- NCTM Free Resources - a collection of resources provided by the National Council of Teachers of Mathematics
- Desmos Classroom Activities - activities to facilitate student exploration and practice. The teacher dashboard collects and organizes student responses. Teachers can now provide written feedback. There are premade activities grouped as distance friendly collections, and there is a starter screen collection to help check in with students. Additional Desmos COVID-19 resources are available.
- 6-12 Online Resources - additional resources

Thursday:

- Students complete a learning log to reflect on learning and identify additional support needed
- Students review feedback provided by the teacher including common errors, student misconceptions, multiple representations and participates in remediation

Friday:

- Students complete a formative assessment to demonstrate acquisition of knowledge and skills
- Students may complete an extension activity to make connections between concepts and real-world applications

**Throughout the week students should participate in continuous skill building. These are opportunities for students to practice skills that continue to develop fluency and make connections to new content.

6-12 MATHEMATICS INSTRUCTIONAL MODELS

HYBRID MODEL

TEACHER PLANNING GUIDANCE

Teachers will provide guidance to students as they work collaboratively through a problem or task related to the application of essential knowledge and skills.

Prior to selecting problems and tasks, teachers should identify the specific required content that has not been taught and develop learning opportunities to address the missing content. Teachers may utilize the VDOE *Learning in Place* Mathematics Resources that include *Mathematics Standards of Learning* Tracking Logs (K-Algebra II) to record standards addressed prior to the COVID-19 closure and how to plan learning recovery. Teachers may also wish to refer to the Mathematics Vertical Articulation Tool (MVAT) to guide understanding of the vertical articulation of mathematics content and skills beyond the current grade level or course.

SUGGESTED STRATEGIES

- Administer a pre-assessment to identify student strengths/weaknesses and to inform planning
- Include a rubric when introducing a task
- Provide consistent weekly communication - may include written (email, Google Doc), video, or telephone communication
- Hold teacher office hours that provide an opportunity to address individual student questions and give extra support - may include virtual learning platforms, telephone calls, and email
- Establish weekly goals - may include "I can" statements with descriptions of learning outcomes
- Incorporate teacher-created video lessons
- Provide access and choice to varied learning experiences and tasks
- Provide timely student feedback to students through:
    - Video Conferencing (Google Meet, Zoom)
    - Telephone calls and email
    - Collaborative platforms (Google, Padlet, Flipgrid, Discussion Board, etc.)
    - Shared Google documents of common questions and teacher responses
    - Desmos self-checking activities
- Answer keys and worked out solutions
- Reference the VDOE Mathematics Word Wall Cards to ensure vocabulary development and understanding
- Support continuous skill-building opportunities through online sites such as Khan Academy or other resources

SAMPLE WEEKLY AGENDA

Monday:

- Students are introduced to the learning goals and essential knowledge and skills for the targeted standards/content
- Students collaborate with peers to engage in exploring a task/discovery activity/hook associated with the content

Tuesday:

- Students review lessons provided by the teacher which may include synchronous or asynchronous virtual lessons
- Students identify additional skills needed to solve an assigned task or master a skill
- Students select from a choice of learning experiences and tasks targeting the content (online or paper activities and resources provided by the teacher)

Wednesday:

- Students collaborate with peers to share possible strategies to address the selected task
- Students complete targeted learning experiences, tasks, and content practice which may include:
    - Teacher created resources - online or paper
    - Textbooks - online or hard copies
    - Vendor resources - online or paper
    - Desmos activities - online
- Students attend office hours to receive content clarification, feedback, and support

Thursday:

- Students and teacher collaboratively discuss the completed tasks and compare problem-solving strategies and representations, justify thinking, and identify common errors and misconceptions
- Students complete a learning log to reflect on learning and identify additional support needed

6-12 MATHEMATICS INSTRUCTIONAL MODELS

RESOURCES • VDOE Rich Mathematical Tasks - collection of tasks that teachers may choose to use with students. • Robert Kaplinsky - includes a variety of lesson ideas, problem-based resources, and links to Open Middle math problems • Illustrative Mathematics- problem-based core curricula and professional learning resources that help teachers and students excel in teaching and learning mathematics • 6-12 Online Resources - additional resources	*Friday:* • Students complete a formative assessment to demonstrate learning **Throughout the week students should participate in continuous skill-building. These are opportunities for students to practice skills that continue to develop fluency and make connections to new content.