Orange Public Schools

Office of Curriculum & Instruction

2020-2021 Mathematics Curriculum Guide

Pre-Calculus

Unit 4: Analytic Geometry & Systems of Equations

April 10, 2021 – June 22, 2021

Board Approved: 1.14.2020

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Contents

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Curriculum Map

A STORY OF UNITS (Yearlong Pacing Guide)				
Marking Period	**Unit 1** (9/9/20 – 11/13/20)	**Unit 2** (11/14/20- 1/30/21)	**Unit 3** (1/31/21-4/9/21)	**Unit 4** (4/10/21-6/22/21)
Unit Topic	**Functions, Polynomial and Rational Functions**	**Exponential and Logarithmic Functions, Trigonometry**	**Solving Trigonometric Equations, Inverse of Trigonometric Applications**	**Analytic Geometry and Systems of Equations**
Description	Explore properties and patterns of polynomial, rational, piecewise functions. Elate different types of functions with their graphs.	Understand the logarithmic function is an inverse function of Exponential. Explore trigonometry function and use special triangles of determine geometrically and value of sine, cosine, tangent for an angle	Use unit circle to explain symmetry and periodicity of trigonometric functions. Use inverse functions to solve trigonometric equations	Derive the equations of ellipses and hyperbolas. Use matrices to solve systems of equations

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Unit Overview

Unit 4: Analytic Geometry & Systems of Equations
Course Description
Pre-Calculus provides a balance of analytical techniques and theoretical instruction. This course focuses on standards to prepare students for more intense study of mathematics. The study of circles and parabolas is extended to include other conics such as ellipses and hyperbolas. Trigonometric functions are further developed to include inverse, general triangles and identities. Matrices provide an organizational structure in which to represent and solve complex problems. Students expand the concepts of complex numbers and the coordinate plane to represent and operate upon vectors.
Learning Material
Textbook: Precalculus,(Ron Larson, Robert Hostetler)
Essential Questions
• Besides rectangular coordinates, how else can we describe the location of a point? • How do we write the equation of non-function relations? • What are the defining characteristics of ellipses, hyperbolas, parabolas, and conics? • How can matrices be used to simplify mathematical processes? • How can we solve systems that have more than two unknowns? • What are the similarities and differences of matrices and numbers?
Enduring Understandings
• Trigonometric identities can be used to convert expressions to equivalent expressions that can be more effectively used to solve a problem. • Trigonometric equations can be treated like much more basic equations by using the concept of substitution • Many real-world problems can be set up and solved as a system of equations or inequalities. • Matrices are an efficient way to solve systems of equations.
NJSLS
G.CPE.3. Derive the equations of ellipses and hyperbolas given the foci, using the fact that the sum of difference of distances from the foci is constant. **G.CPE.3a.** Use equations and graphs of conic sections to model real-world problems. **N.CN.4.** Represent complex numbers on the complex plane in rectangular and polar form (including real and imaginary numbers) and explain why the rectangular and polar forms of a given complex number represent the same number. **A.REI.7.** Solve a simple system consisting of a linear and a quadratic equation in two variables algebraically and graphically. **A.REI.8.** Represent a system of linear equations as a single matrix in a vector variable. **A.REI.9.** Find the inverse of a matrix if it exists and use it to solve systems of linear equations (using technology for matrices of dimension 3 x 3 or greater).

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A.REI.11 Explain why the x-coordinates of the points where the graphs of the equations y = f(x) and y = g(x) intersect are the solutions of the equation f(x) = g(x); find the solutions approximately, e.g., using technology to graph the functions, make tables of values, or find successive approximations. Include cases where f(x) and/or g(x) are linear, polynomial, rational, absolute value, exponential, and logarithmic functions.

N.VM.6. Use matrices to represent and manipulate data, e.g., to represent payoffs or incidence relationships in a network.

N.VM.7. Multiply matrices by scalars to produce new matrices, e.g., as when all payoffs in a game are doubled.

N.VM.8. Adds, subtracts, and multiplies matrices of appropriate dimensions.

N.VM.9. Understand that unlike multiplication of numbers, matrix multiplication for square matrices is not a commutative operation, but still satisfies the associate and distributive properties.

N.VM.10. Understand that the zero and identity matrices play a role in matrix addition and multiplication similar to the role of 0 and 1 in the real numbers. The determinant of a square matrix is nonzero if and only if the matrix has a multiplicative inverse.

Modifications

Special Education/ 504:	English Language Learners:
-Adhere to all modifications and health concerns stated in each IEP. -Give students a MENU options, allowing students to pick assignments from different levels based on difficulty. -Accommodate Instructional Strategies: reading aloud text, graphic organizers, one-on-one instruction, class website (Google Classroom), handouts, definition list with visuals, extended time -Allow students to demonstrate understanding of a problem by drawing the picture of the answer and then explaining the reasoning orally and/or writing , such as Read-Draw-Write -Provide breaks between tasks, use positive reinforcement, use proximity -Assure students have experiences that are on the Concrete- Pictorial- Abstract spectrum by using manipulatives -Common Core Approach to Differentiate Instruction: Students with Disabilities (pg 17-18) -Strategies for Students with 504 Plans	- Use manipulatives to promote conceptual understanding and enhance vocabulary usage - Provide graphic representations, gestures, drawings, equations, realia, and pictures during all segments of instruction - During ALEKS lessons, click on “Español” to hear specific words in Spanish - Utilize graphic organizers which are concrete, pictorial ways of constructing knowledge and organizing information - Use sentence frames and questioning strategies so that students will explain their thinking/ process of how to solve word problems - Utilize program translations (if available) for L1/ L2 students - Reword questions in simpler language - Make use of the ELL Mathematical Language Routines (click here for additional information) -Scaffolding instruction for ELL Learners -Common Core Approach to Differentiate Instruction: Students with Disabilities (pg 16-17)
Gifted and Talented:	**Students at Risk for Failure:**
- Elevated contextual complexity - Inquiry based or open ended assignments and projects - More time to study concepts with greater depth - Promote the synthesis of concepts and making real world connections - Provide students with enrichment practice that are imbedded in the curriculum such as:	- Assure students have experiences that are on the Concrete- Pictorial- Abstract spectrum - Modify Instructional Strategies, reading aloud text, graphic organizers, one-on-one instruction, class website (Google Classroom), inclusion of more visuals and manipulatives, Field Trips, Google Expeditions, Peer Support, one on one instruction - Assure constant parental/ guardian contact throughout

● Application / Conceptual Development ● Are you ready for more? - Common Core Approach to Differentiate Instruction: Students with Disabilities (pg. 20) - Provide opportunities for math competitions - Alternative instruction pathways available	the year with successes/ challenges - Provide academic contracts to students and guardians - Create an interactive notebook with samples, key vocabulary words, student goals/ objectives. - Always plan to address students at risk in your learning tasks, instructions, and directions. Try to anticipate where the needs will be and then address them prior to lessons. -Common Core Approach to Differentiate Instruction: Students with Disabilities (pg 19)

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21st Century Life and Career Skills:

21st Century Life and Career Skills:	
Career Ready Practices describe the career-ready skills that all educators in all content areas should seek to develop in their students. They are practices that have been linked to increase college, career, and life success. Career Ready Practices should be taught and reinforced in all career exploration and preparation programs with increasingly higher levels of complexity and expectation as a student advances through a program of study. https://www.state.nj.us/education/cccs/2014/career/9.pdf	
• **CRP1**. Act as a responsible and contributing citizen and employee. • **CRP2**. Apply appropriate academic and technical skills. • **CRP3**. Attend to personal health and financial well-being. • **CRP4**. Communicate clearly and effectively and with reason. • **CRP5**. Consider the environmental, social and economic impacts of decisions. • **CRP6**. Demonstrate creativity and innovation.	• **CRP7**. Employ valid and reliable research strategies. • **CRP8**. Utilize critical thinking to make sense of problems and persevere in solving them. • **CRP9**. Model integrity, ethical leadership and effective management. • **CRP10**. Plan education and career paths aligned to personal goals. • **CRP11**. Use technology to enhance productivity. • **CRP12**. Work productively in teams while using cultural global competence.
Students are given an opportunity to communicate with peers effectively, clearly, and with the use of technical language. They are encouraged to reason through experiences that promote critical thinking and emphasize the importance of perseverance. Students are exposed to various mediums of technology, such as digital learning, calculators, and educational websites.	

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Technology Standards

Technology Standards:

All students will be prepared to meet the challenge of a dynamic global society in which they participate, contribute, achieve, and flourish through universal access to people, information, and ideas.

https://www.state.nj.us/education/cccs/2014/tech/

8.1 Educational Technology:

All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and to create and communicate knowledge.

A. **Technology Operations and Concepts:** Students demonstrate a sound understanding of technology concepts, systems and operations.
B. **Creativity and Innovation:** Students demonstrate creative thinking, construct knowledge and develop innovative products and process using technology.
C. **Communication and Collaboration:** Students use digital media and environments to communicate and work collaboratively, including at a distance, to support individual learning and contribute to the learning of others.
D. **Digital Citizenship:** Students understand human, cultural, and societal issues related to technology and practice legal and ethical behavior.
E. **Research and Information Fluency:** Students apply digital tools to gather, evaluate, and use of information.
F. **Critical thinking, problem solving, and decision making:** Students use critical thinking skills to plan and conduct research, manage projects, solve problems, and make informed decisions using appropriate digital tools and resources.

8.2 Technology Education, Engineering, Design, and Computational Thinking - Programming:

All students will develop an understanding of the nature and impact of technology, engineering, technological design, computational thinking and the designed world as they relate to the individual, global society, and the environment.

A. **The Nature of Technology: Creativity and Innovation-** Technology systems impact every aspect of the world in which we live.
B. **Technology and Society:** Knowledge and understanding of human, cultural, and societal values are fundamental when designing technological systems and products in the global society.
C. **Design:** The design process is a systematic approach to solving problems.
D. **Abilities in a Technological World:** The designed world in a product of a design process that provides the means to convert resources into products and systems.
E. **Computational Thinking: Programming-** Computational thinking builds and enhances problem solving, allowing students to move beyond using knowledge to creating knowledge.

Interdisciplinary Connections:	
English Language Arts:	
ELA.Literacy.RI-9-10.4	Determine the meaning of words and phrases as they are used in a text, including figurative, connotative, and technical meanings; analyze the cumulative impact of specific word choices on meaning and tone (e.g., how the language of a court opinion differs from that of a newspaper).
NJSLS ELA-LITERACY.SL.9-10.4	Present information, findings, and supporting evidence clearly, concisely, and logically such that listeners can follow the line of reasoning and the organization, development, substance, and style are appropriate to purpose, audience, and task.
NJSLS .ELA-LITERACY.W.9-10.2.A	Introduce a topic; organize complex ideas, concepts, and information to make important connections and distinctions; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension.

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Pacing Guide

Overview		
Lesson (Textbook)	Topic	Suggesting Pacing
10.1	Lines	1 day
10.2	Introduction to Conics: parabolas	1 days
10.3	Ellipses	2 days
10.4	Hyperbolas	2 days
10.5	Rotation of Conics	2 days
10.6	Parametric Equations	2 days
10.7	Polar Coordinates	2 days
10.8	Graphs of Polar Equations	2 days
10.9	Polar Equations of Conics	2 days
7.1	Linear and Nonlinear Systems of Equations	1 day
7.2	Two-Variable Linear System	1 day
7.3	Multivariable Linear Systems	2 days
8.1	Matrices and Systems of Equations	2 days
8.2	Operations with Matrices	2 days
8.3	The Inverse of a Square Matrix	2 days
8.4	The Determinant of a Square Matrix	2 days
8.5	Applications of Matrices and Determinants	2 das
Summary: 30 days on new content (9 lessons/topics) 2 review day 1 quiz days 2 test day 2 Days Benchmark Assessment **37 days in Unit 4**		

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Calendar

Please complete the pacing calendar based on the suggested pacing

April 2021						
Sun	**Mon**	**Tue**	**Wed**	**Thu**	**Fri**	**Sat**

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May 2021						
Sun	Mon	Tue	Wed	Thu	Fri	Sat

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June 2021						
Sun	Mon	Tue	Wed	Thu	Fri	Sat

Assessment Framework

Assessment	Estimated Time	Format	Graded
Quizzes (3 to 4)	1/2 period per quiz	Individual	No

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Chapter tests (2 tests)	1 period per test	Individual	Yes
Authentic assessment	TBD	Individual	Yes
Mp1 Benchmark Assessment (Part A and B)	2 periods	Individual	Yes
Assessment check points (exit tickets)	5-10 minutes	Individual	Varies

MP 4 BENCHMARK ASSESSMENT: 6/1/2021 – 6/14/2021

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Chapter Analysis

Chapter 7: Analytic Geometry

Objectives:

1. Using transformation and the general form of its equation, SWBAT graph and identify important characteristics of ellipses
2. Using transformation and the general form of its equation, SWBAT graph and identify important characteristics of hyperbolas
3. Using transformation and the general form of its equation, SWBAT graph and identify important characteristics of translated conics
4. Using transformation and the general form of its equation, SWBAT graph and identify important characteristics of parabolas
5. Using polar coordinates, SWBAT locate points in a polar coordinate system
6. Using polar coordinates, SWBAT create graphs of equations

Skills/Knowledge/Understandings:
Understandings:

1. Define and write the equation of an ellipse
2. Identify important characteristics and graph ellipses
3. Define and write the equation of a hyperbola
4. Identify important characteristics and graph hyperbolas
5. Graph and write the equation of a translated conic
6. Determine the shape of a translated conic without graphing
7. Define and write the equation of a parabola
8. Identify important characteristics and graph parabolas
9. Locate points in a polar coordinate system
10. Convert between coordinates in rectangular and polar systems
11. Create graphs of equations in polar coordinates
12. Define eccentricity of an ellipse, parabola, and a hyperbola

NJSLS:
G.CPE.3. Derive the equations of ellipses and hyperbolas given the foci, using the fact that the sum of difference of distances from the foci is constant.

G.CPE.3a. Use equations and graphs of conic sections to model real-world problems.

N.CN.4. Represent complex numbers on the complex plane in rectangular and polar form (including real and imaginary numbers) and explain why the rectangular and polar forms of a given complex number represent the same number.

Assessments:

Formative:	Summative:	Authentic:
Daily exit slips, always including at least one question that requires students to summarize and write, in their	Teacher-created Chapter 10 (Textbook) assessment (sample can be found on textbook page 805). Multiple choice, short	Students will need to research monuments (either natural or man-made) and choose two that are closely approximated

own words, what they learned that day.	response, plotting, and extended response/open ended questions will all be included. Calculators allowed.	by either an ellipse, hyperbola, parabola, or a translated conic (each of the two should be unique). Students will then use its properties to approximate their equations and present this on a poster.

Literacy Connections:
Included with their poster will be at least a 1-paragraph summary of their monument—what it is, where it is, and a brief history of it. Students will need to write clearly and concisely here.

By the end of the chapter, students should be able to clearly compare and contrast ellipses, hyperbolas, conics, and parabolas.

Interdisciplinary Connections:
Astronomy/Physics—Asteroids generally take a parabolic path

Astronomy—Orbits

Architecture—Parabolic archways often used

Physics—Kepler's Laws

Technology Integration:
TI-84 assistance in solving and graphing.

Smart Board to visualize the representation and meaning of the major/minor axis, foci, vertex, etc.

Online diagrams to label all the important components of ellipses, hyperbolas, conics, and parabolas.

Key Vocabulary:

Ellipse, Hyperbola, Foci, Eccentricity, Major Axis, Minor axis, Polar Coordinates, Parabola, Translated Conics

Useful Sites:
Equation of an Ellipse-- http://www.mathopenref.com/coordgeneralellipse.html

Equation of a Hyperbola and its Eccentricity-- http://www.mathsisfun.com/geometry/hyperbola.html

Comparing and Contrasting Conic Sections-- http://math2.org/math/algebra/conics.htm

Polar Coordinates-- http://tutorial.math.lamar.edu/Classes/CalcII/PolarCoordinates.aspx

Major and Minor Axis-- http://hotmath.com/hotmath_help/topics/major-and-minor-axes-of-conics.html

Lesson Reviews--http://www.khanacademy.org

Text Crosswalk:

Larson and Hostetler, Brooks/Cole, 7th edition. 2007.

Unit 7 covers pages 727-810.

A checklist summary of Unit 7 objectives is found on page 800.

An extensive set of review problems is found on pages 801-804.

Page 805 offers a sample Unit Assessment.

Page 806 offers a proof of the inclination and slope of a line, as well as the equation for the distance between a point and a line.

Page 807 offers a proof of the Standard Equation of a Parabola.

Page 808 offers a proof of the Polar Equations of Conics.

Pages 809-810 offer challenging problems that require extra critical thinking from students dealing with Unit 7.

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Chapter 8: System of Equations and Matrics

Objectives:

1. Using inverse matrices, SWBAT solve squares systems
2. Using matrices, SWBAT solve systems of equations
3. Using systems, SWBAT solve applications with multiple equations and multiple unknowns
4. Using the order of the matrices, SWBAT identify if two matrices can be multiplied, and, if so, compute the product

Skills/Knowledge/Understandings:
Understandings:

1) Solve a system of equations using elimination
2) Solve a system of equations using substitution
3) Solve systems using matrices
4) Add, subtract, and multiply matrices by scalars
5) Multiply two matrices
6) Define the order of a matrix
7) Recognize consistent and inconsistent systems
8) Find the inverse of a matrix
9) Solve nonlinear systems algebraically
10) Find the determinant of a matrix

NJSLS:

A.REI.7. Solve a simple system consisting of a linear and a quadratic equation in two variables algebraically and graphically.

A.REI.8. Represent a system of linear equations as a single matrix in a vector variable.

A.REI.9. Find the inverse of a matrix if it exists and use it to solve systems of linear equations (using technology for matrices of dimension 3 x 3 or greater).

A.REI.11 Explain why the x-coordinates of the points where the graphs of the equations y = f(x) and y = g(x) intersect are the solutions of the equation f(x) = g(x); find the solutions approximately, e.g., using technology to graph the functions, make tables of values, or find successive approximations. Include cases where f(x) and/or g(x) are linear, polynomial, rational, absolute value, exponential, and logarithmic functions.

N.VM.6. Use matrices to represent and manipulate data, e.g., to represent payoffs or incidence relationships in a network.

N.VM.7. Multiply matrices by scalars to produce new matrices, e.g., as when all payoffs in a game are doubled.

N.VM.8. Adds, subtracts, and multiplies matrices of appropriate dimensions.

N.VM.9. Understand that unlike multiplication of numbers, matrix multiplication for square matrices is not a commutative operation, but still satisfies the associate and distributive properties.

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N.VM.10. Understand that the zero and identity matrices play a role in matrix addition and multiplication similar to the role of 0 and 1 in the real numbers. The determinant of a square matrix is nonzero if and only if the matrix has a multiplicative inverse.

Assessments:

Formative:	Summative:	Authentic:
Daily exit slips, always including at least one question that requires students to summarize and write, in their own words, what they learned that day.	Teacher-created combination of chapters 7 and 8 assessment (samples can be found on textbook pages 567 and 637). Multiple choice, short response, and extended response/open ended questions will all be included. Teacher should either not permit graphing calculators or permit them only on specific questions (most matrix operations and solving of systems should be done arithmetically).	Students will create a message they would like to encode. They will then create the encryption matrix multiply it, and the resulting matrix will be their encrypted matrix. After all students have turned them in, students will pass around their matrix and try and unencrypt their peers' matrices.

Literacy Connections:

Students will need to be able to describe a matrix, its properties, and its applications, including how it can simplify mathematical problems.

Students will need to translate English story problems into a mathematical system of equations, identifying the variables and how they combine to form a system of multiple equations and multiple unknowns, which can be mathematically solved.

Students will be encrypting and unencrypting English phrases.

Interdisciplinary Connections:

Cryptology—Matrices often used to store cryptic information

Economics—The payoff matrix

Text Mining—Document term matrices used to track frequencies of certain words

Chemistry—Matrices used to discuss bonding in quantum theory

Technology Integration:

TI-84 for inputting matrices.

TI-84 for computing matrix operations.

TI-84 for solving systems of equations using Row Reduced matrices.

Statistics—Probability theory (Markov chains)

Key Vocabulary:

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System, Matrix, Scalar, Order, Matrix Inverse, Identity Matrix, Determinant, Row Echelon Form, Reduced Row Echelon Form

Useful Sites:
Matrix Operations-- http://www.stanford.edu/~wfsharpe/mia/mat/mia_mat2.htm

Row Reducing Matrices-- http://www.sparknotes.com/math/algebra2/matrices/section4.rhtml

Augmented and Coefficient Matrices-- http://www.purplemath.com/modules/matrices.htm

Solving Systems Using Substitution-- http://cstl.syr.edu/fipse/algebra/unit5/subst.htm

Solving Systems by Elimination-- http://www.purplemath.com/modules/systlin5.htm

Lesson Reviews--http://www.khanacademy.org

Text Crosswalk:

Larson and Hostetler, Brooks/Cole, 7th edition. 2007.

Unit 8 covers pages 495-640.

A checklist summary of Unit 8 objectives is found on page 562 (systems) and page 631 (matrices).

An extensive set of review problems is found on pages 563-566 (systems) and pages 632-636 (matrices).

Pages 567 (systems) and 636 (matrices) offer partial sample Unit Assessments.

Page 568 introduces indirect proofs/proofs by contradictions.

Page 638 introduces proofs without words.

Pages 569-570 and 639-640 offer challenging problems that require extra critical thinking from students dealing with Unit 6.

5 practices for Orchestrating Productive Mathematical Discussion

5 Practices for Orchestrating Productive Mathematics Discussions	
Practice	Description/ Questions
1. Anticipating	What strategies are students likely to use to approach or solve a challenging high-level mathematical task? How do you respond to the work that students are likely to produce? Which strategies from student work will be most useful in addressing the mathematical goals?
2. Monitoring	Paying attention to what and how students are thinking during the lesson. Students working in pairs or groups Listening to and making note of what students are discussing and the strategies they are using Asking students questions that will help them stay on track or help them think more deeply about the task. (Promote productive struggle)
3. Selecting	This is the process of deciding the *what* and the *who* to focus on during the discussion.
4. Sequencing	What order will the solutions be shared with the class?
5. Connecting	Asking the questions that will make the mathematics explicit and understandable. Focus must be on mathematical meaning and relationships; making links between mathematical ideas and representations.

Ideal Math Block

The following outline is the department approved ideal math block for grades 9-12.

1) Do Now (7-10 min)
    a. Serves as review from last class' or of prerequisite material
    b. Provides multiple entry points so that it is accessible by all students and quickly scaffolds up

2) Starter/Launch (5-10 min)
    a. Designed to introduce the lesson
    b. Uses concrete or pictorial examples
    c. Attempts to bridge the gap between grade level deficits and rigorous, on grade level content
    d. Provides multiple entry points so that it is accessible by all students and quickly scaffolds up

3) Mini-Lesson (15-20 min)
    a. Design varies based on content
    b. May include an investigative approach, direct instruction approach, whole class discussion led approach, etc.
    c. Includes CFU's
    d. Anticipates misconceptions and addresses common mistakes

4) Class Activity (25-30 min)
    a. Design varies based on content
    b. May include partner work, group work/project, experiments, investigations, game based activities, etc.

5) Independent Practice (7-10 min)
    a. Provides students an opportunity to work/think independently

6) Closure (5-10 min)
    a. Connects lesson/activities to big ideas
    b. Allows students to reflect and summarize what they have learned
    c. May occur after the activity or independent practice depending on the content and objective

7) DOL (5 min)
    a. Exit ticket

Ideal math block with Intervention Station

Whole Group Instruction	50 min	INSTRUCTION (Grades 9 – 12) Daily Routine: Mathematical Content or Language Routine Anchor Task: Anticipate, Monitor, Select, Sequence, Connect Collaborative Work* Guided Practice Independent Work (Demonstration of Student Thinking)		TOOLS Manipulatives RESOURCES Agile Mind
Rotation Stations (Student Notebooks & Chromebooks Needed)	1-2X 35 min	STATION 1: Focus on current Grade Level Content STUDENT EXPLORATION* Independent or groups of 2-3 Emphasis on MP's 3, 6 (Reasoning and Precision) And MP's 1 & 4 (Problem Solving and Application) TOOLS/RESOURCES Agile Mind Math Journals	STATION 2: Focus on Student Needs TECH STATION Independent TOOLS/ RESOURCES Khan Academy Approved Digital Provider Fluency Practice	TEACHER STATION: Focus on Grade Level Content; heavily scaffolded to connect deficiencies TARGETED INSTRUCTION 4 – 5 Students TOOLS/ RESOURCES Agile Homework Manipulatives
	5 min	INSTRUCTION Exit Ticket (Demonstration of Student Thinking) TOOLS/RESOURCES Notebooks or Exit Ticket Slips		

ECR

Math Department ECR Protocol

ECR Protocol

(Extended Constructed Response)

Issuing

- Moving forward ECR'S will be disseminated by the first of each month and collected by the end of each month
- Method of Issuing: email and post on the website

Dissemination

- Teachers can elect to print copies for each student or use the Smartboard to project the ECR. (Note: Student work will be included in Student Portfolios)
- Students should be given up to 30 minutes depending on the complexity of the ECR
- Assure appropriate testing environment
- ECR should be completed independently

Scoring

- Conversion tables are available in the *Assessment & Data in Mathematics Bulletin* for genesis inputting purposes
- ECR's will count as Authentic Assessments
- Naming Protocol "Course Month ECR" (ex: Grade 6 October ECR)

Collection

- ECR's will be collected & kept in student portfolios
- Student work will be reviewed during CPT's

October ECR Link

https://www.dropbox.com/sh/1u8442j0c5enzah/AACUyak5wtNm5OO8z0InTCUJa?dl=0

November ECR Link

https://www.dropbox.com/sh/pwz2fqtga59m911/AAAUhMDJyiXPLBuXg3tPyczta?dl=0

ECR Conversion Chart

Points	Genesis Conversion	Points	Genesis Conversion	Points	Genesis Conversion
0	55	0	55	0	55
1	59	1	69	1	69
2	69	2	79	2	89
3	79	3	89	3	100
4	89	4	100		
5	100				