



Manhattan Center for Science and Math High School

Mathematics Department Curriculum

Content/Discipline Pre-Calculus

<http://mcsportal.net>

Spring Marking Period 1

Topic and Essential Question

- Unit 1** – 1. How do we solve problems involving appreciation, depreciation, and interest?
2. How do we solve annuity problems?
3. How do we find the value of an annuity?
4. How do we prove formulas by mathematical induction?

- Unit 2** – 1. How do you write and graph exponential functions?
2. How do you recognize, evaluate, and graph logarithmic functions?
3. How do you rewrite logarithmic expressions to simplify or evaluate them?
4. How do we solve exponential and logarithmic equations?
5. How do you combine two functions to form a new function?
6. What is the inverse of a function, and how do you represent it graphically and algebraically?

Unit/Topics **Unit 1** – Annuities and Mathematical Induction
Unit 2 – Exponential and Logarithmic Functions

SWBAT/Objectives **Unit 1**

1. Students will be able to prove formulas use mathematical induction by testing whether the truth of one term implies the truth of next term
2. Students will be able to solve real world applications using appreciation, depreciation and interest problems.

Unit 2

1. Students will learn how to answer this question by studying the characteristics of the function $f(x) = a^x$
2. Students will learn how to answer this question by studying the properties of logarithms and the relationship between logarithmic and exponential forms.
3. Students will learn how to answer this question by studying formulas and properties that expand or condense logarithmic expressions.
4. Students will learn how to answer this question by studying strategies based on the definitions and properties of exponents and logarithms.

Vocabulary/Key Terms	Unit 1: annuity, depreciate, appreciate, interest, compounding Unit 2: exponential growth, extraneous, logarithm & transcendental
Assessments:	Uniform Test/Quiz
Common Core Standards:	www.corestandards.org/Math/Content/HSS/MD/A/1/ www.corestandards.org/Math/Content/HSA/APR/
Differentiated Instruction:	Teacher performs formative assessments through lessons to check student understanding, including cold-calling, student board work, and exit tickets. Teacher circulates room to perform further formative assessments and to guide small groups and individuals.
ELLs:	<i>Lower-performing students</i> are grouped heterogeneously with higher-performing students using assessment data, interests, and work habits, to encourage student-to-student engagement and learning. They are also provided guided notes and graphic organizers to build schemas.
SWDs:	
High-Achievers:	<i>English Language Learners</i> are paired with students who are fluent in English, and given extra time. Vocabulary is pronounced several times and accompanied by alternative words or phrases that are simplified. Visual aids, including pictures, Smartboards, and manipulatives, help students make clear connections to the text. <i>Students with Special Needs</i> are grouped with helpers and given instructions or assessments with simplified language or extra time. Color-coding on the Smartboard help illustrate steps required to solve a problem. Hands-on activities are provided to help construct student learning. <i>Gifted/Honor students</i> are given challenge problems during lessons, homework, and summative assessments, which earn extra credits. They are expected to complete the whole worksheet, and are given challenge (e.g. open-ended) problems that develop higher-level thinking.
Resources/Books	Pre-Calculus with Limits by Larson Class Website

Homework: List of HW Assignments is given out to students at the beginning of every unit.



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Spring Marking Period 2

Topic and Essential Question

- Unit 3** – 1. How do we describe the position of a point in a plane using the distance and angle rather than x- and y-coordinates?
2. How do we sketch graphs of polar equations?
3. How do we represent conic sections in polar coordinates?
4. How do we convert complex number to trigonometric (polar) form and vice versa?
5. How do we multiply and divide complex numbers in trig form?
6. How do we use De Moivre’s Theorem and polar coordinates to find roots of complex numbers?

- Unit 4** – 1. How do we evaluate trigonometric functions using the unit circle?
2. How do we use the domain and period to evaluate sine and cosine function?
3. How do we evaluate trigonometric functions of acute angles?
4. How do we use fundamental trigonometric identities to model and solve real-life problems?
5. How do we evaluate trigonometric functions of any angle and any real numbers?
6. How do we sketch graphs of trigonometric functions?
7. How do we sketch graphs of inverse trigonometric functions?

Unit/Topics **Unit 3** – Polar Coordinates
 Unit 4 – Trigonometry

SWBAT/Objectives **Unit 3**

3. Students will be able to understand polar coordinates and the conversion of points and equations from rectangular to polar form and vice versa.
4. Students will be able to create and plot a table of points, identifying symmetry, and find intercepts and maximum points.
5. Students will be able to understand the eccentricity definition of a conic and the resulting polar conic equations.
6. Students will be able to understand how to perform arithmetic operations of complex number in trig form.
7. Students will be able to understand De Moivre’s Theorem and polar coordinates.

Unit 4

5. Students will be able to understand radian and degree measure.
6. Students will be able to understand trigonometric functions.
7. Students will be able to understand right triangle trigonometry.
8. Students will be able to understand sine and cosine functions.
9. Students will be able to understand cosecant, secant, and cotangent functions.
10. Students will be able to understand inverse trigonometric functions.

Vocabulary/Key Terms

Unit 3: polar coordinates, rectangular coordinate, polar coordinate, conic equation, De Moivre's Theorem
Unit 4: radian, degree, trigonometric functions, sine, cosine, tangent, cosecant, secant, tangent, cotangent, inverse trigonometric functions

Assessments:

Uniform Test/Quiz

Common Core Standards:

CCSS.MATH.CONTENT.HSN.CN.B
CCSS.MATH.CONTENT.HSF.IF.C.7
CCSS.MATH.CONTENT.HSF.TF.A
CCSS.MATH.CONTENT.HSF.TF.B

Differentiated Instruction:

Teacher performs formative assessments through lessons to check student understanding, including cold-calling, student board work, and exit tickets. Teacher circulates room to perform further formative assessments and to guide small groups and individuals.

ELLs:

Lower-performing students are grouped heterogeneously with higher-performing students using assessment data, interests, and work habits, to encourage student-to-student engagement and learning. They are also provided guided notes and graphic organizers to build schemas.

SWDs:

High-Achievers:

English Language Learners are paired with students who are fluent in English, and given extra time. Vocabulary is pronounced several times and accompanied by alternative words or phrases that are simplified. Visual aids, including pictures, Smartboards, and manipulatives, help students make clear connections to the text.

Students with Special Needs are grouped with helpers and given instructions or assessments with simplified language or extra time. Color-coding on the Smartboard help illustrate steps required to solve a problem. Hands-on activities are provided to help construct student learning.

Gifted/Honor students are given challenge problems during lessons, homework, and summative assessments, which earn extra credits.

They are expected to complete the whole worksheet, and are given challenge (e.g. open-ended) problems that develop higher-level thinking.

Resources/Books

Pre-Calculus with Limits by Larson
Class Website

Homework: List of HW Assignments is given out to students at the beginning of every unit.



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Spring Marking Period 3

Topic and Essential Question

Unit 5 – 1. How do we use the Fundamental Counting Principle to solve complicated counting problems?

2. How do we use permutations to solve counting problems?
3. How do we use combinations to solve counting problems?
4. How do we find probabilities of events?
5. How do we find probabilities of mutually exclusive events?
6. How do we find probabilities of mutually independent events?

Unit 6 – 1. How do we find and interpret the limit of a function for a certain value of x ?

2. How do we recognize, evaluate, and graph logarithmic functions?
3. How do we rewrite logarithmic expressions to simplify or evaluate them?
4. How do we solve exponential and logarithmic equations?
5. How do we find limits for functions involving trigonometry?

Unit/Topics

Unit 5 – Probability

Unit 6 – Limits and an Introduction to Calculus

SWBAT/Objectives

Unit 5

8. Students will be able to understand the Fundamental Counting Principle.
9. Students will be able to understand permutations and combinations.
10. Students will be able to understand probabilities of exclusive and independent events.

Unit 6

1. Students will be able to understand how to calculate the values of a function for x -values that are very close to a given x -value.
2. Students will be able to understand the properties of logarithms and the relationship between logarithmic and exponential forms.
3. Students will be able to understand limits.

4. Students will be able to understand how to evaluate limits of functions and sequence.
5. Students will be able to understand limits of summations.

Vocabulary/Key Terms **Unit 5:** Fundamental Counting Principle, permutations, combinations, probability, exclusive events, independent events.
Unit 6: converge, derivative, diverge, indeterminate, limit, secant, tangent

Assessments: Uniform Test/Quiz

Common Core Standards: CCSS.MATH.CONTENT.HSS.MD.A.
 CCSS.MATH.CONTENT.HSS.MD.B

Differentiated Instruction: Teacher performs formative assessments through lessons to check student understanding, including cold-calling, student board work, and exit tickets. Teacher circulates room to perform further formative assessments and to guide small groups and individuals.

ELLs: *Lower-performing students* are grouped heterogeneously with higher-performing students using assessment data, interests, and work habits, to encourage student-to-student engagement and learning. They are also provided guided notes and graphic organizers to build schemas.

SWDs:

High-Achievers: *English Language Learners* are paired with students who are fluent in English, and given extra time. Vocabulary is pronounced several times and accompanied by alternative words or phrases that are simplified. Visual aids, including pictures, Smartboards, and manipulatives, help students make clear connections to the text.

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Resources/Books Pre-Calculus with Limits by Larson
 Class Website

Homework: List of HW Assignments is given out to students at the beginning of every unit.

