Pre-Calculus

J.S. Morton HS District 201
2016-2017

Teacher: Ms. Kane
Email: bkane@jsmorton.org
Classroom: Room 351
Web: www.mathkanection.com

What will students learn in this course?

Key Concept Semester 1	Standards (Students will be able to)
Functions	1A. Find extrema, zeroes, in odd or even functions
	1B. Analyze functions using specific properties
	1C. Build functions from functions
	1D. Identify and analyze the parent functions
	1E. Rigid and non-rigid transformation of quadratic, cubic, square root, and absolute value functions
	1F. Model real world situations and use regressions with the use of functions
Polynomials and Rational Functions	2A. Graph and solve quadratic functions
	2B. Graph, solve, and analyze polynomial functions
	2C. Find real and complex zeroes of polynomials by synthetic and long division
	2D. Construct polynomials given real or complex zeroes
	2E. Understand the Fundamental Theorem of Algebra
	2F. Graph, solve, and analyze rational functions
Exponential and Logarithmic Functions	3A. Identify and analyze properties of exponential, logarithmic, and logistic functions and their graphs
	3B. Know and understand the inverse relationships of exponential and logarithmic equations
	3C. Understand properties of common and natural logarithmic functions
	3D. Rigid and non-rigid transformation of exponential and logarithmic functions
	3E. Know and apply product, quotient and power rules of logarithmic functions
	3F. Model real world situations and use regressions with the use of functions
	3G. Solve real-world applications using exponential and logarithmic functions
Analytic Geometry	4A. Investigate the geometric properties of parabolas
	4B. Derive the standard equation of a parabola and graph given two or three criterion
	4C. Investigate the geometric properties of ellipses
	4D. Derive the standard equation of an ellipse and graph given two or three criterion
	4E. Investigate the geometric properties of hyperbolas
	4F. Derive the standard equation of a hyperbola and graph given two or three criterion
Key Concept Semester 2	**Standards (Students will be able to)**
Trigonometric Functions	5A. Describe and convert between radian and degree measure
	5B. Generate the unit circle from special right triangles
	5C. Evaluate the trigonometric functions and expressions using the unit circle
	5D. Use reference angles to evaluate trigonometric ratios given specific constraints
	5E. Rigid and non-rigid transformations of sinusoids
	5F. Evaluate inverse and composite trigonometric functions and expressions using the unit circle

Analytic Trigonometry	6A. Verify, evaluate, and apply trigonometric identities and formulas
	6B. Prove trigonometric identities
	6C. Solve equations using trigonometric identities
	6D. Use Law of Sines and Law of Cosines to solve triangles
Discrete Mathematics	7A. Expand the power of a binomial using the Binomial Theorem
	7B. Generate and identify the explicit rule for arithmetic sequences and series
	7C. Generate and identify the explicit rule for geometric sequences and series
	7D. Calculate the sums of finite and infinite series
Vectors & Matrices	8A. Perform vector operations: scalar multiple and sums and represent them graphically
	8B. Perform vector operations: magnitude, direction angle, and unit vector
	8C. Calculate and use properties of the Dot Product
	8D. Apply properties of vectors to real life situations
	8E. Represent a system of linear equations as a single matrix equation in a vector variable
	8F. Find the inverse of a matrix, if it exists, and use it to solve systems of linear equations
	8G. Decompose rational expressions into partial fractions
Limits	9A. Evaluate a limit of a function algebraically
	9B. Evaluate a limit of a function numerically
	9C. Evaluate a limit of a function graphically
	9D. Calculate one-sided limits and two-sided limits
	9E. Use and apply the limit definition of continuity

How will we know students have learned it?

Grade Scale	A- Advanced/Exemplary	B- Proficient	C- Basic	D- Needs Improvement	E- Not Passing
	4.0-5.0	3.0-3.9	2.0-2.9	1.0-1.9	0.0-0.9

Key concept Weights	**Semester 1**		**Semester 2**	
	Functions	20%	Trigonometric Functions	16%
	Polynomials and Rational Functions	20%	Analytic Trigonometry	16%
	Exponential and Logarithmic Functions	20%	Discrete Mathematics	16%
	Analytic Geometry	20%	Vectors & Matrices	16%
			Limits	16%
	Semester 1 exam	20.00%	Semester 2 Exam	20.00%

Within each key concept, assignments will be graded according to the following weights:

Assignment Categories	CA: Common Summative Assessment (Comprehensive key concept exam)	60%
	IA: Interim Assessments (Quizzes and/or projects; varies)	30%
	FA: Formative Assignments (Homework, In-class assignments, etc.; varies)	10%

Formative assignments are 10% in each key concept because students should not be unduly penalized for mistakes during the learning process. The grade is primarily based on mastery of standards, and mastery is demonstrated on assessments.

Pre-Calculus Homework Assignment Rubric

0	1	2	3	4	5
more than 3 homework assignments missing or more than 4 incomplete for the Unit	3 missing homework assignments or 4 incomplete homework assignments for the Unit	2 missing homework assignments or 3 incomplete homework assignments for the Unit	1 missing homework assignment or 2 incomplete homework assignments for the Unit	1 incomplete homework assignment for the Unit	all homework assignments accurately completed with proper notation for the Unit

Definitions
Missing Assignment – student did not complete for discussion that day
Incomplete Assignment – student did not complete more than one problem

Course Requirements	What must every student pass to earn credit for the course? Student must pass every key concept with a 1.0 to earn course credit.
	What must every student complete to earn credit for the course? Students must complete every classroom test, quiz, and project in order to earn credit for the course.
	What other requirements must every student meet? Students must complete 4 key concepts 1st semester and 5 key concepts 2nd semester.

Students who do not meet these requirements will receive an I (incomplete) for the semester. If requirements are not met within three weeks after the semester, the student will earn a grade of E.

What will we do when students aren't learning?

Additional Help

Students who are not passing the course are expected to seek extra help. In addition, any student who wants to improve his or her performance and grade is encouraged to ask for support.

- Room 351 at 7am – 7:55am (except on late start days), 2:40pm – 6 pm (except on Fridays b/c of Mathletes)
- NHS and/or Supervisory tutoring
- Math Lab (Room 112)
- Parent Liaison: Mr. Joshua Galvan
  - 708-780-4000 ext. 2009
  - JoshuaGalvan@jsmorton.org

Re-do/Re-Take

Students are eligible and **expected** to re-do projects, quizzes, and tests that do not meet or exceed standards:

- Retake mandatory: $0.0 \leq$ key concept score < 1.0
- Retake suggested: key concept score ≥ 1.0

Daily assignments may be eligible for re-do only at the teacher's discretion.

Students will be provided one opportunity for re-do on a given item, with any additional attempts at the teacher's discretion.

- IA: Students must retake interim assessments at least one day prior to the common summative assessment, and must attend at least 1 study session with their teacher to be eligible for the retake.
- CA: Students must retake common summative assessments on the school-wide designated retake date, and must attend a study session with their teacher at least 2 days prior to the retake date in order to be eligible for the retake.

The maximum grade earned shall be full credit, given the original item is submitted on time with full effort. The teacher has the discretion to return any item, ungraded, that is incomplete or does not demonstrate full effort. That item will be subject to the teacher's late work policy, with the final grade reflecting any loss of credit due to late or incomplete submission.

What will we do when students have already learned it?

Students who master the standards before the end of the key concept will be offered enrichment assignments or projects to extend their learning. Students who decline are expected to complete required key concept assignments and assessments. Students are also encouraged to join Mathletes and/or take the IML math competitions in order to extend their knowledge of challenging topics. The dates of contests are posted on the classroom bulletin board.

Procedures/Student Expectations

- Students are expected to carry on with the key concept assignment schedule, even when they are absent. Students are encouraged to use the textbook and class webpage as a resource to learn the content that was missed.
- Daily class participation is expected. Parents and students are strongly encouraged to use Skyward Family Access to be informed on students' progress.

TI-Nspire Graphing Calculators

Graphing calculators are an integral part of Pre-Calculus and AP Calculus. The Texas Instrument TI-NSpire CX (CX stands for color) is the suggested graphing calculator. Alternative graphing calculators would be the TI-83+ or TI-84. These can be purchased at local stores or online.

A free on-line graphing calculator can be accessed at www.desmos.com.

Notice: The TI-Nspire CAS (CAS stands for computer algebra system) and TI-89 *ARE NOT* allowed for the ACT, but are allowed for the AP exam.

Procedures/Student Expectations

- Students are expected to inquire about missed learning/assignments immediately upon return from an absence.
- Daily class participation is expected. Parents and students are strongly encouraged to use Skyward Family Access to be informed on students' progress.
- Students must have a pencil and a binder.
- Learn as best as you can every minute of every day and encourage others to do the same.

Key Concept 1 Proficiency Scale: Functions	
5.0	The student who earns a 5.0 in this key concept has shown high level performance. The student's work is not only clear, precise, and well-reasoned, but insightful as well. Essential terms and key concepts are mastered at *all* levels: Basic, Proficient, and Advanced. The 5.0 student consistently raises questions and issues, analyzes questions and problems clearly and precisely, clarifies key concepts competently, identifies relevant competing points of view, and reasons carefully from clearly stated premises in a subject. Problem-solving within real-world applications displays a unique level of reasoning. They construct inferences and applications that go beyond what was taught. **The student has mastered Basic- and Proficient-level understanding for all 6 Learning Targets. The student displays complete understanding of Advanced-Level tasks.**
4.0	The student who earns a 4.0 in this key concept has comprehensive thinking and performance. The student's work is, the vast majority of the time, clear, precise, and well-reasoned, and has some depth of insight. Essential terms and key concepts are learned at a level which implies mastery of all Basic- and Proficient-level standards. The 4.0 student regularly raises questions and issues, analyzes questions and problems clearly and precisely, clarifies key concepts competently, often identifies relevant competing points of view, and reasons carefully from clearly stated premises in a subject. Problem-solving within real-world applications displays thorough reasoning. **The student has mastered Basic- and Proficient-level understanding for all 6 Learning Targets. The student displays partial understanding of Advanced-Level tasks.**
3.0	The student who earns a 3.0 in this key concept has sound thinking and performance. The student's work is, the majority of the time, clear, precise, and well-reasoned, but does not have depth of insight. Essential terms and key concepts are learned at a level which implies comprehension of Basic-level concepts and standards. The 3.0 student often raises questions and issues, analyzes questions and problems clearly and precisely, clarifies key concepts competently, sometimes identifies relevant competing points of view, and demonstrates the beginnings of a commitment to reason carefully from clearly stated premises in a subject. Problem-solving within real-world applications displays sound reasoning. **The student can demonstrate Basic-level understanding for all 6 Learning Targets *and* Proficient-Level understanding in most Learning Targets.**
2.0	The student who earns a 2.0 in this key concept has mixed thinking and performance. The student's work is inconsistently clear, precise, and well-reasoned. The work does not display depth of insight or even consistent competence. Essential terms and key concepts are learned at a Basic level. Problem-solving within real-world applications displays inconsistent reasoning. **The student can demonstrate Basic-level understanding for all 6 Learning Targets.**
1.0	The student who earns a 1.0 on this key concept has poor thinking and performance. The majority of the time, the student tries to get through the course by means of rote recall, attempting to acquire knowledge by memorization rather than through comprehension and understanding. The student has not developed critical thinking skills and understandings as requisite to understanding course content. A 1.0 on the key concept represents thinking that is typically unclear, imprecise, and poorly reasoned. The student has not yet achieved competence on the Basic level. Essential terms and key concepts are often incorrectly used and reflect a superficial or mistaken comprehension of basic concepts and standards. **The student can demonstrate Basic-level understanding for 4 of 6 Learning Targets.**
0.0	The student who earns a 0.0 on this key concept has tried to get through the course by means of rote recall. The student has not developed critical thinking skills and concepts as required to understanding course content. A 0.0 on the key concept represents thinking that is regularly unclear, imprecise, and poorly reasoned. The student has not yet achieved competence in his/her academic work. Essential terms and key concepts are consistently incorrect and reflect a mistaken comprehension of Basic-level concepts and standards. **The student can only demonstrate Basic-level understanding for 0 – 4 Learning Targets.**

Honors Pre-Calculus

Unit 1: Functions

Key Concept	5	4	3	2	1	0
1.A. Find extrema and zeroes in odd or even functions.	Student can demonstrate and justify finding extrema and/or zeros with complete accuracy, using correct notation.	Student can demonstrate or justify finding all extrema and zeros with complete accuracy.	Student can find all extrema and zeroes in a numeric, algebraic, or graphic manner.	Student can find multiple, but not all extrema and zeroes correctly with no demonstration or justification.	Student can find one extrema or zero correctly.	Student makes no attempt or limited attempt.
1.B. Analyze functions using specific properties.	Student can demonstrate and justify analyzing functions with complete accuracy, using correct notation.	Student can demonstrate or justify analyzing all properties with complete accuracy.	Student can analyze all properties correctly in a numeric, algebraic, or graphic manner.	Student is able to analyze multiple, but not all properties correctly.	Student is able to analyze one specific property correctly.	Student makes no attempt or limited attempt.
1.C. Build functions from functions.	Student can demonstrate and justify building functions with complete accuracy, using correct notation.	Student can demonstrate or justify building functions with complete accuracy.	Student can build a function correctly in a numeric, algebraic, or graphic manner.	Student can build a function partially using the appropriate method.	Student can initiate the process of building a function.	Student makes no attempt or limited attempt.
1.D. Identify and analyze the parent functions.	Student can demonstrate and justify identifying/analyzing parent functions with complete accuracy, using correct notation.	Student can demonstrate or justify identifying/analyzing parent functions with complete accuracy.	Student can correctly identify/analyze parent functions in a numeric, algebraic, or graphic manner.	Student can identify the parent function and partially analyze.	Student can identify the parent function with no analysis.	Student makes no attempt or limited attempt.
1.E. Rigid and non-rigid transformation of quadratic, cubic, square root, and absolute value functions.	Student can demonstrate and justify multi-step tranformations of functions with complete accuracy, using correct notation.	Student can demonstrate or justify multi-step tranformations of functions with complete accuracy.	Student can correctly perform multi-step transformations of functions in a numeric, algebraic, or graphic manner.	Student can partially perform multi-step transformations of functions.	Student can perform one step transformations of functions.	Student makes no attempt or limited attempt.
1.F. Model real world situations and use regressions with the use of functions.	Student can demonstrate and justify modeling and use of regression with complete accuracy, using correct notation and proper labeling on the graphs.	Student can demonstrate or justify modeling and use of regression with complete accuracy.	Student can correctly model situations and use regression in a numeric, algebraic, or graphic manner.	Student can partially model situations and use regression.	Student can initiate the process of modeling situations and using regression.	Student makes no attempt or limited attempt.