PETERS TOWNSHIP SCHOOL DISTRICT

CORE BODY OF KNOWLEDGE (CBK)

PRE-CALCULUS HONORS

GRADE 9-12

For each of the sections that follow, students may be required to understand, apply, analyze, evaluate or create the particular concepts being taught.

COURSE DESCRIPTION

In addition to a careful study of the topics taught in Pre-calculus Academic (functions: inverse, polynomial, rational, exponential, logarithmic, and trigonometric), systems of equations and inequalities, sequences and series, lines in the plane, conic sections, polar coordinates, and limits will be studied in-depth. The pace of this course will be accelerated commensurate with the ability of the class. Technology will be used where appropriate. It is required that the student purchase his/her own graphing calculator.

STUDY SKILLS

- Students will take notes during class discussions and maintain notes and assignments in an organized binder/notebook
- Students will complete assigned problem sets and readings in accordance with deadlines
- Students will work individually and in peer groups as a means to learn and develop problem solving skills relevant to the course and life
- Students will collect, analyze and reflect on data collected during group work to obtain a deeper understanding of content discussed in class and covered in problem sets

MAJOR UNIT THEMES

1. FUNCTIONS AND GRAPHS

- Graph functions and inverse functions
- Analyze functions and their respective inverses (if they exist)

2. POLYNOMIAL FUNCTIONS

- Locate zeros of a function algebraically and graphically
- Divide polynomials using synthetic and long division
- Use rational zero test
- Determine the complex zeros and apply fundamental theorem of algebra

3. RATIONAL FUNCTIONS

• Interpret and analyze equations of rational functions both algebraically and graphically

4. PARTIAL FRACTIONS

• Divide a fractional expression into equivalent parts

5. EXPONENTIAL FUNCTIONS

• Graph, solve and apply properties of exponentials

6. LOGARITHMIC FUNCTIONS

• Graph, solve and apply properties of logarithmic functions

7. TRIGONOMETRY

• THE UNIT CIRCLE

- Interpret angles in both radian and degree measures
- Define trigonometric functions in terms of the Unit Circle
- Define and apply basic trigonometric terms

• GRAPHS

• Graph all six trigonometric functions with changes in amplitude, period, phase shift, and vertical shift

• INVERSE TRIGONOMETRIC FUNCTIONS

- Identify domain and range
- Graph using inverse trigonometric functions
- Determine inverse trig values

• ANALYTICAL TRIGONOMETRY

- Verify trigonometric identities
- Solve trigonometric equations
- o Apply formulas to solving trigonometric equations

• APPLICATIONS OF TRIGONOMETRY

- Apply Law of Sines and Cosines to triangles
- Apply trigonometric form of complex numbers to finding roots and powers of complex numbers

8. VECTORS

- Demonstrate component forms of vectors
- Apply operations of vectors to problem-solving situations

9. MATRICES AND DETERMINANTS

• MATRICES

- o Define and write Row-Echelon Form and Reduced Row-Echelon Form
- Solve systems using Gaussian elimination
- Apply operations of matrices

• DETERMINANTS

- Define and find the determinant of a matrix
- Apply properties of determinants
- Use Cramers Rule to solve systems of equations

10. SEQUENCES AND SERIES

• SEQUENCES AND SERIES

- o Identify and interpret arithmetic and geometric sequence
- Determine the sum of arithmetic and geometric series
- Determine terms of a sequence
- Apply concepts to real-life situations

• MATHEMATICAL INDUCTION

• Prove and apply the principal of mathematical induction

• **BINOMIAL THEOREM**

• Expand binomials by application of binomial theorem

11. CONIC SECTIONS

- Find vertex, focus, center, directrix, eccentricity, and axis as appropriate to the conic section
- Graph circles, ellipses, hyperbolas, and parabolas

12. POLAR EQUATIONS

- Convert from rectangular to polar and polar to rectangular
- Graph polar equations: limacon, cardoid, rose curves, lemniscates, spirals, circles
- Write the polar equation of conic sections

13. PARAMETRIC EQUATIONS

• Interpret and apply parametric equations

14. LIMITS

- Define limits
- Apply properties of limits
- Evaluate limits analytically, numerically, and graphically
- Identify limits that do not exist
- Interpret continuity at a point analytically and graphically
- Define and apply the Intermediate Value Theorem
- Justify vertical and horizontal asymptotes with limits

15. TECHNOLOGY

• GRAPHING CALCULATORS

• Calculate zeros, maximum values, minimum values, points of intersection, solutions, models of best fit, and other concepts appropriate with the curriculum

MATERIALS

PRECALCULUS WITH LIMITS – A Graphing Approach 4th Edition by Larson, Hostetler, Edwards Houghman Mifflin

National Math + Science Initiative Modules

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