#### PETERS TOWNSHIP SCHOOL DISTRICT

### CORE BODY OF KNOWLEDGE (CBK)

## **ALGEBRA I FOUNDATIONS**

#### GRADE 9

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**

This course is a study of the language, concepts, and techniques of Algebra that will prepare students to approach and solve problems following a logical succession of steps. This course is the foundation for high school mathematics courses. Topics include simplifying expressions, evaluating and solving equations and inequalities, and graphing linear and quadratic functions and relations. Real world applications are presented within the course content and a functional approach is emphasized. The pacing of this course is slower than the academic level to allow for more remediation and review as well as one-to-one help within the classroom. Students will have more hands-on practice within the classroom so that they can receive immediate feedback. 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. FOUNDATIONS FOR ALGEBRA

- Combine like terms
- add, subtract, multiply and divide real numbers
- simplify expressions using order of operations
- solve real-world application problems
- evaluate algebraic expressions
- graph ordered pairs

## 2. EQUATIONS

- solving linear equations using multi-step process
- solving problems involving rates, ratios, and proportions that include applications
- solve real-world application problems

## 3. INEQUALITIES

- solve inequalities
- graph the solutions to inequalities
- solve real-world application problems

## 4. FUNCTIONS

- write and graph relations and functions
- graph the solutions to equations
- make scatter plots and trend lines to make predictions
- solve real-world application problems

## 5. LINEAR FUNCTIONS

- graph linear functions
- use and apply the slope formula, distance formula, and midpoint formula
- show the slope-intercept and point –slope form of a line
- identify and graph parallel and perpendicular lines
- solve real-world application problems

### 6. EXPONENTS AND POLYNOMIALS

- Simplify and evaluate expressions containing zero, integer, and rational exponents
- Translate between regular notation and scientific notation
- Use multiplication and division properties of exponents to evaluate and simplify expressions
- Combine polynomials by adding, subtracting and multiplying
- Solve real-world application problems

## 7. FACTORING POLYNOMIALS

- Factor the greatest common factor from a polynomial
- Factor trinomials of the form  $x^2 + bx + c$  and  $ax^2 + bx + c$
- Factor perfect square trinomials and the difference of two perfect squares
- Choose an appropriate method for factoring a polynomial
- Solve real-world problems that involve factoring

## 8. QUADRATIC FUNCTIONS AND EQUATIONS

- Identify quadratic functions and determine whether they have a minimum or a maximum
- Graph a quadratic function and give its domain and range
- Find the zeros of a quadratic function from its graph
- Find the axis of symmetry and the vertex of a parabola
- Graph a quadratic function
- Solve quadratic equations by graphing, factoring, using square roots, and using the quadratic formula

# 9. DATA ANALYSIS AND PROBABILITY

- Organize data in tables and graphs
- Create stem-and-leaf plots, frequency tables and histograms
- Describe the central tendency of a data set
- Create and interpret box-and-whisker plots
- Determine the experimental probability of an event
- Use experimental probability to make predictions
- Determine the theoretical probability of an event
- Find the probability of independent events and dependent events
- Solve problems involving permutations and combinations

## **10. EXPONENTIAL AND RADICAL FUNCTIONS**

- Identify exponential and square root functions
- Find the domain and range of exponential and square root functions
- Add, subtract, multiply and divide radical expressions
- Solve simple exponential and radical equations

### MATERIALS (and Supplemental materials used in course):

• Algebra 1 (Burger, Chard, Kennedy, Leinwand, Renfro, Roby, Waits): Holt McDougal, Copyright 2011, Orlando, Florida, ISBN 978-0-030-99574-3

Revised September 2014