ANKENY COMMUNITY SCHOOL DISTRICT
DEPARTMENT OF CURRICULUM & INSTRUCTION
Serving students and staff by providing all the necessary supports to help every student achieve

Math Curriculum Review Summary

(Revised April 2015)
Philosophy Statement

Students will gain a conceptual understanding while utilizing the mathematical practices to successfully problem solve in a way that is relevant to life-long learning.

Standards for Math Practices

The Standards for Mathematical Practices describe varieties of expertise that mathematics educators at all levels should seek to develop in their students. These practices rest on important "processes and proficiencies" with longstanding importance in mathematics education (National Governors Association Center for Best Practices, Council of Chief State School Officers, 2010).

Standards for Math Practices

Mathematically Proficient Students:

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

Ankeny Math Standards

The Iowa Core provides curriculum standards designed to improve achievement of all students, preparing them for the world of work and lifelong learning. The Iowa Core identifies essential content standards and instructional implications for core content areas.

In Ankeny, the Curriculum Leadership Team has worked to unpack the state-required standards to more clearly identify what we want Ankeny students to know, understand, and be able to do (curriculum). In addition, the Curriculum Leadership Team will further unpack these standards to determine how we will know that each student has learned it (assessment) and what we will do to ensure all students learn it (instruction).

K-12 Iowa Core Math Standards

The Iowa Core is not course-based, rather it is a student-based approach that supports high expectations of learning for all students. Ankeny has designated grade level and course-specific skills and concepts that students will master by the end of the year. This is evident in the "staircase" complexity across grades and concepts in the K-12 Iowa Core Math Standards document. Teachers have an ethical and moral responsibility to "do what it takes" to help kids learn and master grade level concepts right up to the last day of school.
Assessment Plan

The Curriculum Leadership Team will unpack Iowa Core standards to determine how we will know that each student has learned the high expectations for learning math at deep levels. The district Supporting Documents will clearly explain what teachers will need to see and hear to determine proficiency. Professional Learning Communities (PLCs) and individual teachers will develop and use high quality formative classroom assessments to collect ongoing evidence of student learning.

In addition to formative classroom assessments, district common assessments and summative assessments will be utilized to determine individual student progress and program evaluation.

Ankeny Assessment Plan

Correlating Standards, Benchmark, and Objective (SBO) Chart

The Curriculum Leadership Team develops Correlating SBO Charts. These graphic organizers are used to cluster similar standards, benchmarks, and objectives. A Summary Statement is then developed to explain this cluster. This document will guide reporting of student progress. The Correlating SBO Charts help streamline and narrow the focus for communicating purposes. Teachers and parents can use this document to fully understand the multitude of skills embedded in each summary statement.

(See Summary Statement Rubrics below)

Summary Statements

The Curriculum Leadership Team develops Summary Statements of what we expect students to know and be able to do by the end-of-the-year. These Summary Statements provide an overview of student progress. Teachers communicate with parents on a regular basis about how students are progressing towards the end-of-year expectations. The Summary Statements capture a small piece of the abundance of learning that occurs in the classroom.

(See Summary Statement Rubrics below)

Summary Statement Rubrics

The Curriculum Leadership Team develops holistic rubrics for each Summary Statement to clearly delineate beginning, making progress, meeting, and exceeding for each. The rubrics provide a guide to teachers on how to record student progress. This helps with consistency across teachers, although all reporting of student progress involves some subjectivity. Ongoing assessments are utilized to provide finer-tuned data regarding student progress.
Instruction Plan

The Curriculum Leadership Team clearly articulates what we want Ankeny students to know, understand, and be able to do. The specific instructional plan is determined at the building PLC and individual teacher level in order to meet students’ specific learning and instructional needs.

Materials Adopted

The elementary teachers represented on the Curriculum Leadership Team re-selected the Everyday Mathematics program for Kindergarten through Grade 5. The middle school teachers represented on the Curriculum Leadership Team selected Connected Math Program (CMP3), which will be used to support Grade 6 math and Pre-Algebra. The middle and high school teachers represented on the Curriculum Leadership Team selected College Preparatory Mathematics (CPM) which will be used to support Algebra, Geometry, and Algebra II. Courses above Algebra II will use the textbook agreed upon between Ankeny Community Schools and DMACC in order to meet the requirements of dual enrollment.

Technology Integration

Integrating technology into the math classroom will enhance learning and address the 21st Century Skills. A variety of technology will be utilized to support math instruction. Through the technology task force, devices have begun to reach the hands of our students and continue to reach more students each year. Along with these devices, classrooms have smart boards, iPads, calculators, and specialized software to use to ensure the math content and practice standards are being met.

With the materials adoption, E-books will be purchased for all students for anytime, anywhere accessibility. A classroom set of the textbooks will be purchased for in school use with checkout available in the media center for students as needed.

Acceleration Process

Due to the increased rigor that comes with implementing the Iowa Core, it is imperative that we do not accelerate students that would benefit from more in-depth and application-based math opportunities within their regularly scheduled math course (differentiation).

As we transition to the Iowa Core in 2014-2015, the following course sequence will be implemented:

GRADE LEVEL 5
Core: 5th grade math (typical sequence for most students)
Accelerated 1: NA (Students who do not meet the requirements for pre-algebra will have their math academic needs met within their 5th grade classroom through high quality differentiation.)
Accelerated 2: Pre-Algebra
Accelerated 3: Algebra

GRADE LEVEL 6
Core: 6th grade math (typical sequence for most students)
Accelerated 1: Pre-Algebra
Accelerated 2: Algebra I
Accelerated 3: Geometry
GRADE LEVEL 7
Core: 7th grade math (typical sequence for most students)
Accelerated 1: Algebra I
Accelerated 2: Geometry
Accelerated 3: Algebra II

GRADE LEVEL 8
Core: 8th grade math (typical sequence for most students)
Accelerated 1: Geometry
Accelerated 2: Algebra II
Accelerated 3: Trig & Pre-Calc

The Iowa Assessments and the NWEA Measure of Academic Progress (MAP) will be used to determine students that are achieving at high academic levels. Students in grades 4-6 who meet this criterion will take an additional assessment. The additional assessment is the Iowa Algebra Readiness Assessment (IARA). The IARA will indicate a student’s aptitude or readiness to learn complex algebraic concepts.

The acceleration process will primarily occur in the spring, except for students new-to-Ankeny. (New-to-Ankeny students that meet the screening requirements will take the additional assessments in the fall.)

All other students who do not qualify for acceleration must go through Ankeny’s problem solving process to demonstrate the need for subject acceleration, rather than high quality, differentiated core instruction.

Intervention Plan

Individual teachers will provide differentiated instruction for those students who need alternative strategies and additional support. All grade levels will utilize Ankeny’s problem solving process for students needing more intensive interventions.

Parent/Community

Upon board approval, new curriculum documents will be available to the public on the district website.

An overview of Connected Math Project 3 (CMP3) and a discussion of how math will look different will be presented to all middle school Parent Teacher Organizations (PTOs). In addition to these meetings, parents will be invited to attend parent math nights that will be held throughout the fall semester. These meetings will allow parents to experience an actual CMP3 lesson and to get an overview what will be taught to their children.

* Beginning with the graduation class of 2014, all students are now required to complete the sequence of Algebra I, Geometry, and Algebra II successfully. This fulfills the state requirement that all students take at least three years of mathematics at the high school level.

Course Description

Math 6
Math 6 provides students with the opportunities to increase their mental and computational skills, and the ability to think and communicate analytically, critically, and logically. The areas of study include ratios and proportional relationships, the number system, expressions and equations, geometry, and statistics and probability.

Pre-Algebra
Pre-Algebra provides a solid foundation for future study of algebra and geometry. Students will develop mathematical reasoning and problem solving skills. The areas of study include rational numbers and exponents, proportionality and linear relationships, introductions to sampling inference, and creating, comparing, and analyzing geometric figures.

Algebra I/Honors Algebra I*
Algebra I takes an applications-based approach in examining a variety of algebraic concepts and functions. The areas of study include relationships between quantities and reasoning with equations, linear and exponential relationships, descriptive statistics, expressions and equations, and quadratic functions and modeling.

Geometry/Honors Geometry*
Students enrolled in this course will be required to apply problem solving skills and conceptual understandings using prior knowledge. Geometry emphasizes the application of geometric terminology and promotes methods of logical reasoning. The areas of study include transformations, triangle congruence and similarity, measurements of two and three dimensional figures, coordinate geometry, and trigonometry.

Algebra II/Honors Algebra II*
This course is a continuation of Algebra I. Many topics of elementary algebra will be reviewed and studied more in depth. The areas of study include types of functions, inequalities, factoring, solving equations, and simplifying expressions.

Trigonometry/Pre-Calculus
There are two themes explored throughout this course. The first semester students will be studying Trigonometry. Areas of study include periodic functions and right triangle problems, applications of trigonometric and circular functions, trigonometric functions properties, identities, parametric functions, and the exploration of vectors.

The second semester students will be studying Pre-Calculus. The goal of this semester is to review and enhance many of the topics students learned in Algebra II and to apply them more conceptually. The areas of study include rational functions, sequences and series, math induction, concept of a limit, and differential calculus.

* Honors courses have the same standards but are taken before the typical grade level.
**AP Calculus AB**
AP Calculus is a college freshman level course offered as part of the Honors Program at the high school level. This course is intended for students who have a thorough knowledge of algebra, axiomatic geometry, Trigonometry, equations and their graphs, lines, conic sections, and elementary functions. The areas of study include review of elementary functions, limit theory, differential calculus and applications of the derivative, integral calculus and applications of integration, series and sequence, and elementary differential equations.

**Calculus 2**
Calculus 2 is a college level course offered at the high school level. This course is intended for students who have completed AP Calculus AB. The areas of study addressed include, but are not limited to, applications of integration, integration techniques, L'Hopital's rule, improper integrals, infinite sequences, series, Taylor and Maclaurin series, the calculus of plane curves, parametric equations and polar equations.

**AP Statistics**
AP Statistics is a college freshman level course offered as part of the Honors Program at Ankeny High School. The purpose of the AP Statistics course is to introduce students to the major concepts and tools for collecting, analyzing, and drawing conclusions from data.

**Applied Math**
A course in elementary mathematical skills for technicians is a requirement for several vocational technical programs at DMACC including, but not limited to, Automotive Technology, Information Technology Network Administrator (ITNA), and Integrated Manufacturing Technology. The areas of study include fundamental operations with whole numbers, fractions, decimals and signed numbers, percents, geometric figures and basic constructions, area and volume formulas, English/Metric systems, measurements, and the interpretation of graphs and charts.

**Discrete Math**
Discrete math is a year-long course in practical mathematics. It is a math class for students who are not planning on majoring in mathematics or science. The areas of study include set operations, methods of counting, probability, systems of linear equations, matrices geometric linear programming, and an introduction to Markov Chains.

**Mathematics of Financial Literacy**
This is a one semester course that is offered to students that have passed Algebra 2. It will allow the students who wish to continue to learn and apply mathematical concepts that are used on a daily basis in the real world. It will focus on an understanding of how the math is used in everyday situations that include investments, insurance, annuities, mortgages, and many others. The students will acquire the knowledge base and confidence that they will need when encountering decisions like financing college education and purchasing a car or home. An additional goal would be for the students to learn how a strong mathematical sense can allow you to understand how debt works and can accumulate and hopefully enable them to learn to live a debt free life.

**Computer Science Principles**
This class provides students with a firm foundation in problem solving methods and the development of structured programming skills. Programming concepts discussed include but are not limited to: structured design, object oriented design, data types, decision structures, control structures, modularity, writing methods, looping, arrays, and an introduction to data files. There is a strong emphasis on efficient design
and refinement. Students will have hands on practice by completing lab exercises and creating their own program by the end of the semester.

**Introduction to C#**
This course is devoted to learning Visual C# using the Microsoft Visual Studio IDE. Students will be exposed to a GUI programming development environment and object-oriented programming. Standard programming logic involving data types, control structures, methods, looping structures, arrays, and data files will be studied. Students will design and test several programs.

**C++ Programming**
This class is focused on using C++ to apply the concepts from Computer Science Principles. Students will write several programs throughout the semester. Object oriented design, methods, and classes will be emphasized. An introduction to vectors and data files will also be covered.

**AP Computer Science A (JAVA)**
Java is by far the most popular computer language for developing web applications. Topics include but are not limited to: developing applications in an IDE, data types, GUI interfaces, one dimensional arrays, control structures, iteration and recursion, sorting and searching algorithms, object oriented design using classes, polymorphism, inheritance and the required AP labs. In each unit students will be assigned 3 or 4 programming projects. Time management will be a key to success in this class.

**Introduction to Engineering & Design (PLTW)**
This course parallels the entry level engineering courses offered at many universities. Using the design process of Project Lead The Way (PLTW), project solutions are developed, analyzed and communicated using 3D solid modeling CADD software and AutoDesk Inventor. Engineering notebooks are completed and an electronic portfolio is assembled as the class progresses. Ten units utilize both individual and group work as the PLTW curriculum is followed and all students interested in design or engineering will benefit greatly from this course.

**Principles of Engineering (PLTW)**
In this course students will explore technology systems and engineering processes to find out how math, science, and technology help people; learn about aerodynamics, astronautics, space-life sciences, and systems engineering through hands-on engineering problems and projects; apply biological and engineering concepts related to biomechanics, genetic engineering, and forensics; and work together to research, design, and construct solutions to engineering problems through teams of students, guided by community mentors.

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**Professional Learning Support**
A concerted effort has been made to make clear connections between district, building, PLC, and individual teacher (classroom) professional learning. This alignment and layered approach to adult learning is highlighted on all teachers’ Iowa Teaching Professional Development Plans (ITPDP). In order to truly impact student learning in classrooms, the district’s professional learning plan aims to meet teacher learning needs in a variety of ways.
1. Multi-layered Professional Learning

District-level Professional Learning:
- The District provides the overall district goals and big picture focus areas for teacher learning and student achievement.

Building Level Professional Learning:
- Each building has the autonomy to analyze building data to determine building goals and specific needs for professional learning. This autonomy within a tight/loose framework allows for differentiated professional learning based on teacher and student needs.

Professional Learning Community (PLC):
- Teacher collaborative teams based on grade level/department examine more specific student data to determine just-in-time instructional support needed at the classroom level.

Individual Teacher:
- Every teacher analyzes the above layers of student data and reflects on their individual learning needs to develop a professional learning plan that will help them grow professionally. Ankeny’s Professional Growth Model utilizes the use of the Danielson rubrics to fine-tune growth goals.

2. TLC Plan Alignment & Improvements to Professional Learning based on Leadership Roles

District-level Professional Learning:
- District level curriculum coordinators oversee and support professional learning to ensure an aligned and comprehensive professional learning plan designed to meet teacher learning needs in various ways.
- The Curriculum Leadership Team (CLT) provides more in-depth and just-in-time support for classroom teachers as new curriculum is rolled out in the buildings.

Building Level Professional Learning:
- Instructional Coaches provide direct support and modeling for classroom teachers.
- The Instructional Leadership Team (ILT) analyze data, develop, deliver, implement, and monitor professional learning in the building.

Professional Learning Community (PLC):
- Collaborative teams work together interdependently to achieve the common goal of impacting classroom instruction in ways that will lead to improved student results.
- Additional PLC time is allotted during the curriculum implementation year to provide more in-depth learning and support for teachers as they learn new curriculum and accompanying instructional implications.

Individual Teacher:
- Instructional coaches and new teacher mentors are available for individual coaching, co-teaching, and modeling. Ankeny Academy: Teacher leaders at all levels develop coursework designed specifically around district, building, and individual goals, thus allowing teachers to improve practice while obtaining license renewal and/or graduate credits.

Ankeny’s professional learning plan allows the district to build the capacity to help individual teachers and PLCs meet the goals they have identified as part of their ITPDPs by assisting teachers in accessing professional learning targeted to their needs. After participating in learning opportunities, teacher leaders will be available to assist with the implementation in classrooms, reflection on implementation, and data analysis that will guide decision-making regarding future learning opportunities.
The professional learning layers identified above require a diligent focus on and implementation of the Iowa Professional Development Model. The following key components are utilized to ensure professional learning is targeted to individual teacher, PLC, and building learning needs: (1) Collecting and analyzing student data; (2) Setting specific goals for improvement; (3) Selecting professional learning content targeted to goals; (4) Designing appropriate and relevant professional learning, collaboration, and implementation; (5) Collecting ongoing action research and data (formative assessment); (6) Conducting annual program evaluation (summative assessment). This process must occur at all levels to ensure comprehensive school improvement.