**RCSD**
**Mathematics Professional Development Offerings**
**2011-2012**

**General Information:**
- **Targeted audience:** Administrators, Math Teachers, Elementary Classroom Teachers, Special Education or Support Teachers in Mathematics
- **Location**: (690 St. Paul St.) 171 Martin St.
- **Maximum number of participants per institute:** 25
- **All institutes include outside assignments within in the total number of professional development hours.**

## Measurement and Data

*Grade Level: K-5*
*Professional Development hours: 15*

The concepts of measurement and data are developed as a K-5 strand in the new Common Core State Standards. Participants will engage in problem solving to deepen their own understandings of the concepts in this mathematics strand and look for connections to other strands.. As a result, participants will discuss ways to make these concepts more accessible to all of their students.

*Dates/Times: Thursday, January 5, 2012:   4:15-7:15 p.m.*
*Thursday, January 12, 2012:  4:15-7:15 p.m.*
*Thursday, January 19, 2012: 4:15-7:15 p.m.*
*Thursday, February 2, 2012: 4:15-7:15 p.m.*

## Functions and Sequences in Elementary Mathematics

Grade Level:  K-6
Professional Development hours:  15

Participants will deepen their understandings of algebra and functions in the elementary classroom by engaging in problem solving tasks. Participants will identify evidence of algebraic thinking in their mathematics instruction and develop strategies to describe algebraic patterns using multiple representations. Throughout this course, participants will focus on making algebra accessible to all children.

*Dates/Times: Tuesday, January 3, 2012:   4:15-7:15 p.m.*
*Tuesday, January 10, 2012:  4:15-7:15 p.m.*
*Tuesday, January 17, 2012: 4:15-7:15 p.m.*
*Tuesday, January 24, 2012: 4:15-7:15 p.m.*

## Geometry and its Connections to Number

*Grade Level:  K-5*
*Professional Development hours:  15*

Concepts of geometry and its relation to number concepts will be examined as a K-5 strand in the Common Core State Standards for Mathematics.  Participants will engage in problem solving to deepen their own understandings of this mathematics strand and connections to other strands.  As a result, participants will discuss how to make these concepts accessible to all learners and develop the Standards for Mathematical Practice in students.

*Dates/Times:  Thursday, February 9, 2012:   4:15-7:15 p.m.*
*              Thursday, February 16, 2012:   4:15-7:15 p.m.*
*              Thursday, March 1, 2012:  4:15-7:15 p.m.*
*              Thursday, March 8, 2012:  4:15-7:15 p.m.*

## Digging into the Statistics of the Common Core:  Part I

*Grade Level:  6-12*
*Professional Development hours:  15*

As part of the Common Core, the  study of statistics will no longer be about just calculating a mean, median or mode or interpreting a graph.  Students need to be able to use the Standards of Mathematical Practice as the collect data, explore relationships, make predictions and analyze data.  The study of statistics begins in 6th grade and continues through the high school.  The designers of the Core Curriculum wanted the students to be able to use statistics to analyze real life problems.

In this first workshop we will investigate the mathematics behind the outcomes defined in the 6th,  7th, 8th, and beginning of high school statistics from the Common Core Standards.
Those outcomes include:

6th Grade
- Understands the a set of data has a distribution that can be described by its shape, center and spread
- Recognize that measures of center and variation can each be represented by a single number
- Display numerical data in plots such as dotplots, histograms and boxplots
- Use summary statistics to analyze data (including interquartile range and mean absolute deviation)

7th Grade
- Using random sampling to draw inferences about a population
- Drawing informal comparative inferences about two populations
- Investigating chance processes and develop, use, and evaluate probability models including simulation

8th grade
- Investigating patterns of association in bivariate data.

High School

- Summarize, represent, and interpret data on a single count or measurement variable
- Summarize, represent, and interpret data on two categorical and quantitative variables
- Interpret linear models

Participants will work in cooperative groups to investigate real life problems and deepen their own understandings of statistics.  They will examine ways to help students develop the mathematical practices as well as have the opportunities to discuss ways to make these topics more accessible for all students.

## Digging into the Statistics of the Common Core:  Part II

*Grade Level:  7-12*
*Professional Development hours:  15*

This workshop is a continuation of the Digging into the Statistics of the Common Core:  Part I.
In this workshop we will investigate the mathematics behind the outcomes defined in the high school statistics from the Common Core Standards.  Below is a description of the statistics from the Common Core that is not presently taught nor has ever been taught in the grades 9-11 Regents mathematics program.

- Summarize, represent, and interpret data on a single count or measurement variable
  - o Use statistics appropriate to the shape of the data
  - o Interpret differences in shape, center and spread in the context of the data
- Summarize, represent, and interpret data on two categorical and quantitative variables
  - o Summarize categorical data in a two-way frequency table
  - o Interpret relative frequencies in the context of the data
  - o Assess the fit of the data by plotting and analyzing residuals
- Interpret linear models
  - o Interpret the slope and the y-intercept in the context of the data
  - o Distinguish between correlation and causation
- Understand and evaluate random processes underlying statistical experiments
  - o Use statistics for making inferences about population parameters based on a random sample
  - o Decide if a given model is consistent with the results from data generated using simulation
- Make inferences and justify conclusions from sample surveys, experiments, and observational studies
  - o Use data from a sample survey to estimate population mean or proportion and develop a margin of error through the use of simulation
  - o Use data from a randomized experiment to compare two treatments; use simulations to decide if differences between parameters are significant

Participants will work in cooperative groups to investigate real life problems and deepen their own understandings of statistics.  They will examine ways to help students develop the mathematical practices as well as have the opportunities to discuss ways to make these topics more accessible for all students.

## Calculus for All:
## What Middle and High School Mathematics Supports the Development of the Concepts of Calculus?

*Grade Level:* 7-12
*Professional Development hours:* 15

So what is Calculus?  It's more than the how to of taking derivatives and finding integrals.
What are derivatives and integrals?  How are they related to ideas that are developed in 7-12 mathematics?
What are they used for?  Why are they important?

Participants will investigate answers to these questions.   They will work in groups to solve real life problems using ideas from grades 7-11 mathematics while investigating the whys behind the ideas of Calculus. Participants will deepen their own understandings of the mathematics behind Calculus and what Calculus actually is. (You don't need to know what derivatives or integrals are, nor how to find these to participate in this workshop!!)

One of the goals of the Common Core State Standards in Mathematics is to prepare our students to be college or career ready.  We need to investigate ways to make these ideas accessible to all students and ways to encourage more students to continue to study higher level mathematics.

*Dates/Times:*       *Monday, March 19, 2012:  4:15-7:15 p.m.*
                     *Thursday, March 22, 2012:  4:15-7:15 p.m.*
                     *Monday, March 26, 2012:  4:15-7:15 p.m.*
                     *Thursday, March 29, 2012:  4:15-7:15 p.m.*


## Digging Deeper into the Mathematics of the Common Core State Standards

*Grade Levels:* K-12
*Professional Development hours:* 30

The adoption of the Common Core State Standards for Mathematics in NYS does not mean simply substituting in new standards and conducting "business as usual" in our K-12 classrooms.  These national standards for mathematics include rigorous content and application of higher-order skills.  Deep learning of concepts is emphasized and students are expected to be able to apply concepts and skills to new situations.  These standards were written to represent articulated progressions of topics and performances that are developmental and connected across all levels.   In this institute participants will have opportunities to engage in mathematical experiences related to the development of number across the primary grades through high school in the Common Core.  Participants will "dig deep" into the mathematics content of the Common Core as well as engage in the Standards for Mathematical Practice.  There will also be opportunities to reflect on adoption and implementation issues of the Common Core as we consider the implications for instruction in our classrooms across grades K-12.


*Dates/Times: Thursday, February 9, 2012:   4:15-7:15 p.m.*
           *Thursday, February 16, 2012:   4:15-7:15 p.m.*
           *Tuesday, Wednesday, and Thursday,*
               *February 21-23, 2012:  8:30 a.m.-3:30 p.m. with lunch on your own*
           *Thursday, March 1, 2012:  4:15-7:15 p.m.*

## Helping Students Develop Number Sense

*Grades: K-3*
*Professional Development Hours: 15*

A major focus of the Common Core State Standards is number for K-5.  Using the ideas from Jessica Shumway's Number Sense Routines (2011), this professional development opportunity will assist teachers (K-3) in helping their students develop strong number sense. Students with strong number sense understand numbers, ways to represent numbers, relationships among numbers, and number systems. They make reasonable estimates, compute fluently, use reasoning strategies (e.g., relate operations, such as addition and subtraction, to each other), and use visual models based on
their number sense to solve problems. Teachers will gain a deeper understanding of the underlying math that students learn as they develop number sense.

*Dates/Times:*      *Thursday, November 17, 2012:  4:15-7:15 p.m.*
                    *Tuesday, November 29, 2012:  4:15-7:15 p.m.*
                    *Thursday, December 1, 2012:  4:15-7:15 p.m.*
                    *Tuesday, December 6, 2012:  4:15-7:15 p.m.*


## Fostering Algebraic Thinking:  Part II—Asking Questions of Students

*Grade Level: 5 - 10*
*Professional Development Hours: 15*

This institute uses the second module from the Fostering Algebraic Thinking Toolkit professional development program written by Mark Driscoll, and is intended to help teachers use questions to foster students' algebraic thinking. Participants will engage in three kinds of activities: (1) Engaging as learners with mathematics problems that elicit different aspects of algebraic thinking; (2) Developing class plans for using these mathematics problems with students; and, (3) Observing another teacher's class as students work on the mathematics problems, followed by discussion of the observation.  The goal of the 4 sessions is for participants to become more conscious of and deliberate about the intentions behind the questions they ask their students.

*Dates/Times:*  *Monday, January 30, 2012: 4:15-7:15 p.m.*
                *Tuesday, January 31, 2012:  4:15-7:15 p.m.*
                *Monday, February 6, 2012: 4:15-7:15 p.m.*
                *Monday, February 13, 2012: 4:15-7:15 p.m.*


## Deepening Understanding of Rational Number Operations – Part I

*Grade Level:  K-6*
*Professional Development hours:  15*

Participants will deepen their own understanding of the rational number operations, addition and multiplication, as they experience and reflect on pedagogical strategies to increase their students' understandings of these operations.  Participants will investigate strategies for addition and multiplication of both fractions and decimals.  This institute will focus on helping participants make new mathematical connections in their understanding of rational number operations.

*Dates/Times:  Saturday, January 7, 2012:     8:30 – 11:30 a.m.*
               *Saturday, January 21, 2012:  8:30 – 11:30 a.m.*
               *Saturday, January 28, 2012:  8:30 – 11:30 a.m.*
               *Saturday, February 4, 2012:  8:30 – 11:30 a.m.*

## Deepening Understanding of Rational Number Operations – Part II

*Grade Level:  K-6*
*Professional Development hours:  15*

Participants will deepen their own understanding of the rational number operation, division, as they experience and reflect on pedagogical strategies to increase their students' understandings of these operations. Participants will investigate strategies for division for both fractions and decimals.  This institute will focus on helping participants make new mathematical connections in their understanding of rational number operations.

*Dates/Times:  Saturday, March 3, 2012:     8:30 – 11:30 a.m.*
*Saturday, March 10, 2012:  8:30 – 11:30 a.m.*
*Saturday, March 17, 2012:  8:30 – 11:30 a.m.*
*Saturday, March 31, 2012:  8:30 – 11:30 a.m.*