High Quality Math Instruction
Components of a Balanced Mathematics Program

• Conceptual Understanding
• Problem-Solving
• Computation/Mental Math
• Math Facts
• Explicit Vocabulary Instruction
• Common Formative Assessment
Conceptual Understanding

Concepts are the entry points to understanding mathematics, and are often the most challenging component to teach.

Often students come with inaccurate understanding of concepts, which leads to struggles in other components.
What would we observe in a quality conceptual lesson?

• Can use concrete or visual models
• Can use literature
• Can see teachers modeling with concrete or visual models
• Can see students manipulating concrete or visual representations
• Can hear students and teachers discussing mathematical ideas with appropriate terminology
Problem Solving

Problem solving involves

– Understanding which pieces of information are needed to answer questions about a given situation

– translating a situation described in words into mathematical number sentences and/or representing the situation visually

– analyzing if any calculations result in a reasonable solution to the given problem
What would we observe in a quality problem-solving lesson?

• Students creating visual models to represent the problems
• Students and teachers discussing possible methods for solving the problems
• Students and teachers analyzing results from calculations
• Calculators or addition/subtraction tables and multiplication/division tables available as resources
• Few questions, but much thought
Computation & Mental Math

• Computational skills build upon conceptual understanding.
• Computational skills also build upon prerequisite computational skills.
• Students should be encouraged to do as much computation mentally as possible.
• Backmapping recently learned skills to connect them to prior knowledge helps students to gain deeper understanding.
What would we observe in a quality computation lesson?

• Fewer problems and more discussion
• Linking computation to other standards to give a context, such as measurement, geometry or data analysis
• The use of engaging tools, such as dice, cards and dominoes, that provide visual models
• Student justification of thinking
Math Facts

From Elementary and Middle School Mathematics: Teaching Developmentally
by John Van der Walle

Fortunately, we know quite a bit about helping children develop fact mastery, and it has little to do with quantity of drill or drill techniques. Three components or steps to this end can be identified:

1. Help children develop a strong understanding of the operations and of number relationships.

2. Develop efficient strategies for fact retrieval through practice.

3. Then provide drill in the use and selection of those strategies once they have been developed.
What would we observe in quality math facts instruction?

• Preassessment to determine entry points
• Instruction with visual models
• Emphasize patterns
• Emphasize connections between addition/subtraction & multiplication/division
• Drill and practice through games
• Periodic assessment
• Partnering of students based upon appropriate levels of development
What does quality explicit Vocabulary Instruction look like?

• Using the word lists selected for academic vocabulary at each grade level helps to focus instruction on key terms.
• Introducing terms in practical context with visuals
• Utilize the vocabulary notebooks to document student understanding with linguistic and non-linguistic representations
• Utilize games for review of terms
• Emphasize student discussion and proper use of terminology in context (both written and oral)
Common Formative Assessment

• Frequency of assessments should be high so that adjustment of instruction is made when needed (minimum 2 week increments).
• Assessments should focus on key concepts, skills and vocabulary terms.
• Feedback on formative assessments should be timely and specific.
• Only summative assessments should be graded.