### Omaha Public Schools Effective Best Practices in Mathematics

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<tr>
<th>Best Practice</th>
<th>Description</th>
<th>Effect on Student Learning and Achievement</th>
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| **Daily Cumulative Review**             | Daily cumulative review at some point in every lesson is one of the most effective strategies for fostering mastery and retention of critical skills. Students need 5 to 7 exposures to a new concept before that concept will move into long-term memory, and 22 to 27 practices with a new skill before that skill becomes automatic.  
- Math Bell-work*  
- Spiral Review Problems*  
- Exit Tickets*  
- Written Summary  
- Brain Breaks  
- Daily Math Routines*  
- Instructional Resources through Acuity* |  
- Activates prior knowledge  
- Moves knowledge from short-term to long-term memory  
- Informs students and teachers whether or not there is mastery of key concepts  
- Keeps skills and understanding fresh  
- Reinforces previously taught material  
- Gives students a chance to clarify understandings  
- Provides teacher an opportunity to re-teach  
- Gives extra time to process the concept  
- Helps in recognizing the connections between various mathematical ideas |
| **Multiple Representations of Mathematical Entities** | Multiple representations, such as models, drawings, diagrams, number lines, tables, and graphs, support the visualization of skills and concepts.  
- Number lines*  
- Tables*  
- Graphs*  
- Pictorial Representations*  
- Manipulatives  
- Word Wall (with representation)  
- Kinesthetic Activities  
- Graphic Organizer  
- Area Models*  
- Bar Models*  
- Words  
- Photographs |  
- Allows for understanding through at least one method  
- Provides different ways to examine a problem  
- Helps students make sense of abstract concepts  
- Helps students see there are many ways to interpret information  
- The brain can more easily recall information when it is stored in multiple parts of the brain: nonlinguistic content is stored in a different part of the brain than linguistic content, thus giving the brain two ways of remembering content, and enhancing the brain’s ability to recall the information  
- Gives extra time to process the concept  
- Concrete experiences allow learners to discover misconceptions and correct them |

*Explanation in Appendix  

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| Alternative Approaches   | Alternative approaches teach that mathematics is a sense-making process for understanding “Why?” and NOT a subject with just one right procedure to get to the correct answer.  
  - Inquiry  
  - Compare/Contrast Strategies  
  - Argumentative Discourse*  
  - Think-alouds  
  - Math Talk*  
  - Allow students to select strategy | • Different methods allow students to make sense in their own way  
  • Valuing alternative approaches enriches instruction and provides new levels of access to mathematical understanding  
  • Gives students a variety of strategies to solve problems  
  • Allows extra time to process the concept  
  • Use of multiple strategies allows students to revise their collection of strategies and retain those that are most appropriate for each situation |
| Number Sense             | Number sense establishes a comfort with numbers, including estimation, mental math, numerical equivalents, a sense of order and magnitude, and a well-developed understanding of place value. Number sense is taught and reinforced in every math problem.  
  - Mental math  
  - Estimation  
  - Place value  
  - Sense of order  
  - Equivalence  
  - Manipulatives  
  - Models  
  - Number lines* | • Promotes flexible thinking and reasoning  
  • Facilitates problem-solving  
  • Enables recognition of unreasonable answers  
  • Allows for composing and decomposing numbers in different ways  
  • Highlights connections among operations  
  • Makes mental math easier  
  • Enables students to make reasonable estimations  
  • Derived fact strategies improve recall and provide fallback mechanisms for students |

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| Language-Rich Classroom | Mathematics is a language, and as such must be encountered orally and in writing, emphasizing academic vocabulary, terminology, explanations, and solutions.  
  - Interactive Word Wall  
  - Math Talk*  
  - Think-alouds by teacher and students  
  - Math Journals  
  - Marzano’s 6-step vocabulary  
  - Think-ink-pair-share  
  - Summary writing  
  - Note-making  
  - Quick writes  
  - Cooperative strategies  
  - Justify reasoning  
  - Math literature | • Higher-level conversation about text motivates reading  
• Higher-level thinking transforms knowledge, rather than reproducing it  
• Increased interaction with peers, parents, and teachers exposes students to more viewpoints that help them gain perspective on their own ideas  
• Social interaction stimulates children to think through their own ideas and to approach objectivity  
• Discussion helps students organize and consolidate their thinking, communicate coherently and clearly, analyze and evaluate the thinking and strategies of others, and use the language of mathematics  
• Acts as a formative assessment to drive targeted instruction  
• Use of math terminology in math talk and writing takes students from progressing to proficient  
• Like all languages mathematics must be encountered orally and in writing  
• Math terms become internalized when used again and again in context and linked to more familiar words  
• Students who think about their own thinking are better able to comprehend a process  
• Students come to understand the steps in a process by watching and listening to others (including teachers) think out loud  
• Students understand what goes on in the mind of teacher or reader  
• Writing provides an additional exposure and opportunity to recall content and reflect on new learning, which enhances retention |
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| Mathematics Embedded in Real-World Contexts | Effective mathematics instruction embeds the content in contexts that connect the mathematics to real-world situations relevant to the students.  
  - Non-fiction text  
  - Photographs  
  - Research  
  - Cross-curricular connections (i.e., social studies, science, physical education, family consumer sciences)  
  - Project-based learning  
  - Life skills  
  - Careers  
  - Data from current events  
  - Sports  
  - Authentic coursework | - Students understand and retain knowledge best when they have applied it to a practical setting relevant to their own point(s) of reference  
  - Activities that build on established knowledge and skills and more than one sense cause memory pathways to become more easily accessed and cross-referenced for future use  
  - Real-world problems establish a purpose for computation practice and fluency | |
| Formative Assessment                  | Formative assessment provides evidence of student achievement to inform instructional planning and to adapt what happens in classrooms to meet student needs.  
  - Quick Writes  
  - Exit Tickets  
  - White Boards  
  - SummaryWrites  
  - Mid-Chapter Check Point  
  - Verbal Checks  
  - Red, Yellow, Green Cups, Cards, Chips  
  - Peer/Self Assessments  
  - Four Corners  
  - Think-Pair-Share  
  - Appointment Clock | - Informal checks-for-understanding allow students time to process the information, and provide teachers with valuable information about re-teaching, re-grouping or moving forward  
  - Formative assessment provides teachers and students with information that helps students’ achievement of intended learning goals  
  - Provides opportunities for descriptive feedback |
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<td>Deliberate and Detailed Planning</td>
<td>Effective mathematics instruction requires careful planning that provides coherence for the content, tasks, questioning, and assessments.</td>
<td>• Intentional-use planning fosters students’ ability to think, reason, and problem-solve</td>
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<tr>
<td></td>
<td>• COW (Curriculum On the Wall)</td>
<td>• Facilitates differentiation</td>
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<td>• Vertical Alignment</td>
<td>• Explicit and systematic instruction significantly improves proficiency in word-problem-solving and operations, across grade levels and diverse student populations.</td>
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<td>• Gradual Release</td>
<td>• Allows for consideration of likely errors and misconceptions, and for planning of strategies to address them</td>
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<td>• A+ OPS lesson plans</td>
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<td>• Co-planning with co-teacher</td>
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<td>• Plans for involvement of paras</td>
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<td>• Careful selection and preplanning of meaningful problems</td>
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<td>• Plan for misconceptions</td>
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<td>• Plan for higher-level questions</td>
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<td>• Plan for teaching vocabulary</td>
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<td></td>
<td>• Connect concepts from previous units/courses to current unit</td>
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Sources:


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