

ANCHORAGE SCHOOL DISTRICT
ANCHORAGE, ALASKA

ASD MEMORANDUM #379 (2008-2009)

June 22, 2009

TO: SCHOOL BOARD

FROM: OFFICE OF THE SUPERINTENDENT

SUBJECT: ADOPTION OF NEW MATH TEXTBOOKS AND MATERIALS
FOR MIDDLE SCHOOL MATH SUPPORT

ASD Goal: Increase student academic achievement using data to guide adoption curriculum, methods, materials, and professional development specifically designed to ensure that each group as designated by No Child left Behind makes adequate yearly progress.

RECOMMENDATION:

It is the Administration's recommendation that the School Board adopt the following math textbooks and instructional software for Middle School Math Support.

Mathematics Navigator. America's Choice. 2006.

SuccessMaker Math. Pearson Digital Learning. Pearson Education.

PERTINENT FACTS:

During the 2006-2007 school year a K-8 Math Curriculum Review committee, co-facilitated by Dr. Enid Silverstein, Executive Director of Curriculum and Instructional Support and Ruth Mount, Middle School Math Support Teacher, conducted an action research project to examine the Anchorage School District K-8 mathematics program. This phase was part of an extensive math program evaluation begun in 2005-2006. The goals of the K-8 committee were to examine the curriculum in a K-8 context, build a common knowledge base about district demographics, and study current research on instructional strategies, assessment, and how students learn. The tasks of the committee were to build a vision for the K-8 mathematics program, establish rubrics which define the district's set of non-negotiable beliefs (Attachment A), analyze data of the

Curriculum Review Survey, and use the rubrics to perform a fit-gap between the present curricula and the research findings. The committee consisted of fifty-two teachers, support staff and principals with expertise in regular and special education, bilingual, Indian Education, curriculum and standards-based assessment (Attachment B).

Two prioritized committee recommendations pertained to the Middle School Math Support class. Middle School Math Support was created as a site-specific elective course more than fifteen years ago to provide interventions to non-proficient students. However, there has never been an adopted curriculum or materials provided to support the teaching of this class. Individual schools designed the class and enrolled students based on site-based criteria. The K-8 Math Curriculum Review recommended to:

- Develop course content, standards, and expectations for the Middle School Math Support class to meet the needs of our 30 percent low performing middle school population. (Attachment C, Middle School Math Support Recommendations).
- Adopt a Math Support curriculum that has the ability to be flexible to meet individual student needs, has a high level of interest, offers a variety of activities, and includes formal and informal assessments. (Attachment C, Middle School Math Support Recommendations).

An ad hoc Math Support committee met throughout the 2008-2009 school year. The committee consisted of a core group of ten middle school math teachers, twelve auxiliary members, one Indian Ed Tutor, two Math Support teachers and two Education Technology teachers. (Attachment D, Math Support Review committee).

The committee developed a curriculum guide for the course that incorporates enduring understandings, essential questions, knowledge/performance standards from grades three through eight, performance tasks, key concepts and vocabulary, and resources. This guide will assist teachers in individualizing student coursework. (Attachment E, Math Support Curriculum Guide) Based on the research studied during this curriculum review, the committee created a list of essential components specifically for the Math Support course. These components compliment and enhance the existing rubrics. The committee identified the critical need for an effective assessment tool that will identify individual student strengths and weaknesses by mathematical strand and provide ongoing monitoring and feedback of student progress. The committee also identified the need for instructional text materials as well as an instructional software component.

In February 2009, the Educational Technology, Curriculum and Instructional Support, and Purchasing departments collaboratively created an Invitation to Submit Instructional Materials and a Request for Information on Instructional Software. Twelve programs of instructional text materials and twelve instructional software programs were submitted for review. Skills Alaska was also reviewed since it is currently available to some middle schools through a grant.

The committee used the rubrics from the K-8 Curriculum Review to evaluate all materials. After the first round some products were eliminated because they did not meet the criteria. The remaining ten vendors were invited to give online presentations followed by a question and answer session. These were:

Math that Works. CORD Communications. 2009

Math Triumphs. Glencoe McGraw-Hill. 2009

Mathematics Navigator. America's Choice. 2006.

Transitional Mathematics. SoprisWest Educational Services. 2005

ALEKS. ALEKS Corporation. 2008

MathWhizz. Whizz Education.

Odyssey Math. Compass Learning.

Skills Alaska.

SuccessMaker Math. Pearson Digital Learning, Pearson Education.

Cognitive Tutor Bridges to Algebra. Carnegie Learning.

iSucceed. Great Source. 2008

The committee rated these materials using the rubrics and discussed the positive and negative aspects of each (Appendix F). During the discussion and the final rounds of evaluation the critical factors that came to the forefront for the committee were the specific needs of students, the ability to individualize a program, and effective assessment and monitoring tools. Teachers took samples of the top two text materials, used them with students, and resubmitted their evaluations. The results of the top two text materials and two software components are included (Attachment G).

Parents from middle schools were invited by principals to review the materials. The Middle School Math Support teacher met with a few parents and they identified strengths in the proposed materials and made suggestions to involve parents for a successful implementation. The Multicultural Education Concerns Advisory Committee has been briefed on the proposed curriculum and provided with materials to preview.

The committee, teachers, and parents identified the strengths of the proposed text materials as: 1) being a research-based intervention curriculum aligned with the Alaska GLEs and Anchorage Math Performance standards, 2) possessing multilevel materials to address the diverse needs of this student population, 3) providing instruction that focuses on gaps and misconceptions, and 4) embedding higher level thinking in tasks. The proposed instructional software differentiates and tailors the student interventions based on individual response patterns. The assessment components of the proposed materials have clearly identified skills and concepts and include both formative and summative assessments using a variety of forms. Assessment materials will help communicate student achievement to students and parents and are well suited for portfolios used in student-led conferences.

Professional development on the new Math Support curriculum and materials will be a major focus next year, beginning with the Cross-District inservice in August. The Curriculum and Instructional Support department is working collaboratively with the English Language Learner and Indian Education programs to identify effective models and strategies.

The Board allocated funds for the initial Math Support text materials last year. The recommended program has consumable student books that will need to be replaced each year. Funds for the instructional software component are included in the ARRA stimulus application proposal.

RG/ES/RM

Prepared by: Enid Silverstein, Executive Director, Curriculum/Instructional Support
Ruth Mount, Middle School Math Support Teacher

Approved by: Rhonda Gardner, Assistant Superintendent, Instruction

K-8 Mathematics Program
Anchorage School District

Student:

The program provides the following for the needs/rights of students:

- know the purpose of learning, including objectives, standards, goals, criteria and evaluation rubrics
- choose from a variety of strategies to explore, solve, and communicate math concepts
- engagement through a variety of activities, which may include independent projects, cooperative learning, manipulatives, technology, collaborative work, etc.
- feel connected and free to take risks
- a belief that math can be learned
- opportunities for self-monitoring and self-reflection
- make connections to real life applications
- support at individual learning levels

Teacher:

- Teacher makes meaningful connections between math and real-life.
- Teacher has high expectations for success and achievement for all students.
- Teacher uses a variety of instructional and assessment strategies (differentiated instruction, cooperative learning, exploration & learning extensions, use of manipulatives and technology, and other best teaching practices).
- Teacher clearly states classroom expectations, and content and language objectives.
- Teacher provides time for student reflection & meta-cognition.
- Teacher communicates with and is available to parents and students.
- Teacher receives appropriate and ongoing professional development & training (knowledgeable of pedagogy, content, and vertical alignment of curriculum).
- Teacher is provided adequate time and opportunity for grade-level and vertical collegial collaboration and support.

Content:

- The curriculum aligns with ASD standards, serves our diverse culture, and bridges the gap between elementary, middle and high school.
- The curriculum provides clearly stated content and language objectives and a suggested pacing guide.
- The curriculum provides options to meet the needs of a variety of students.
- The curriculum offers opportunities for students to apply their understanding to real-life situations.
- The curriculum provides opportunities for interdisciplinary connections.
- The curriculum integrates the use of technology in the classroom to develop and maintain conceptual understanding.
- The curriculum provides an online component for teachers, students, and parents.
- The curriculum provides opportunities for students to process, reflect, justify, and communicate their understanding.
- The curriculum provides opportunities for students to revisit, maintain, and apply previous knowledge.

- The curriculum supports teachers with the background knowledge for the content.
- The curriculum is designed to promote self-direction and self-monitoring.
- The curriculum will provide students with the opportunity to move conceptual understanding from concrete to abstract with the use of manipulatives.
- The curriculum provides parental support for student learning.

Assessment:

- Assessments will be aligned to ASD and Alaska GLEs.
- Evaluation criteria will be given to students prior to assessments.
- A variety of methods will be used to assess student learning.
- Formative assessment will be diagnostic and ongoing. It will provide data to guide instruction and give specific feedback to students to allow for self-adjustment.
- Benchmarks will be used to periodically check on student and class progress and trends.
- Summative assessment will incorporate performance-based projects and skills level competencies.
- Assessments will be a part of the matrix for proper student placement.

Attachment B

K-8 Math Curriculum Review Committee

Gerard Bagsby	Teacher	Clark
Tanya Beck	Teacher	Ursa Major
Tara Bivins	Teacher	Mears
Ryan Blewett	Teacher	Chester Valley
Dawn Broquet	Title I Teacher	Williwaw
Eileen Burnside	Teacher	Abbott Loop
Jyoti Chadda	Teacher	Kincaid
Jason Collins	Teacher	North Star
Dorothea Culbert	Teacher	Alpenglow
Florence Daniel	Teacher	O'Malley
Terry Dannenbring	Teacher	Romig
Ruth Dene	Principal	Muldoon
Bobbi Jo Erb	Teacher	Mirror Lake
Philip Farson	Bilingual Teacher	Willow Crest
Karla Gallagher	Teacher	Hanshew
Patty Gallego	Teacher	Central
Christine Garbe	Bilingual Teacher	ASD Education Center
Virginia Gates	Teacher	Abbott Loop
Kim Girard	Teacher	North Star
Jessica Graziano	Teacher	Clark
Cheryl Hilmes	Teacher	Chinook
Bobby Jefts	Assistant Principal	Romig
Bree Jolin	Teacher	Romig
Joan Karcz	Teacher	Wendler
Patty Kennedy	Math Support Teacher	ASD Education Center
Mike Lanzarone	Teacher	Clark
Amy Laufer	Teacher	Kasuun
Lisa Longlet	Title I Teacher	North Star
Cindy Mans	Teacher	Central
Cindy Martindale	Teacher	Williwaw
Brian McIntire	Teacher	Tyson
Kehle Middleton	Teacher	Wendler
Mary Murphy	Math Support Teacher	ASD Education Center
Brian Nelson	Teacher	Central
Katie Notis	Teacher	Mirror Lake
Jani Oviatt	Teacher	Polaris
Mary Pednault	Special Education Teacher Expert	ASD Education Center

Maureen Petrunic	Teacher	Hanshew
Joel Roylance	Principal	Wendler
Lucas Saltzman	Teacher	Susitna
Sandy Schoff	Math Coordinator	ASD Education Center
George Scott	Special Education Teacher	Mears
Erin Smith	Teacher	Gruening
Sherri Stein	Special Education Teacher	Wendler
Steve Thompsom	Teacher	Goldenview
Karla Vonkennen	Teacher	Ptarmigan
Kristi Waythomas	Teacher	Central
Penny Williams	Math Support Teacher	ASD Education Center
John Wilson	Teacher	Goldenview
Kerri Wood	Indian Ed Tutor	Tyson
Laura Wrenn	Teacher	Gruening
Deborah Zahler	Special Education Teacher	Rogers Park

Middle School Math Support – Recommendations

Curriculum: There is no adopted curriculum for Math Support class!

One hundred percent of teachers surveyed used a wide range of different materials; at least 2/3 of these teachers supplemented with basic facts, math games, and manipulatives. There is a need for a formal and consistent curriculum that has a high level of interest, offers a variety of activities, and includes manipulatives. The curriculum should include formal and informal assessments.

Larson's Math is being used in about 78% of math support classes. Larson's math is currently being utilized for individualized instruction and assessment. We recommend that this technology component continue.

According to the data, teachers would like to see a basic Math Support curriculum adopted. The strength of the current math support program is the flexibility teachers have in meeting the needs of their school's population. We believe that an adopted curriculum should allow for this flexibility.

The qualitative data indicates that students are more successful in small classes, due to the teacher's ability to effectively individualize instruction. We recommend that math support classes are limited to 15 students. Math Support is a course for students who are concurrently enrolled in Math 6, Math 7 or Math 8 who need remedial math help. Instruction consists of small-group and one-on-one instruction.

Placement should be based on the following criteria:

- concurrently enrolled in Math 6, Math 7 or Math 8
- SBA Non-Proficient students
- deficits or holes in math skills and/or concepts that prevent students from performing at grade level

Teachers indicated a need for additional support for ELL students, especially with vocabulary and context comprehension.

Assessment:

The data clearly shows that teachers would like a way to assess student's strengths and weaknesses. There is a need for pre/post assessments as well as benchmark assessments to guide instruction. These assessments can also be used for the purpose of evaluating the successes of the math support program.

Teacher:

Based on the data, teachers have been able to meet their student's individual needs in math support. This flexibility should continue, but under a more consistent District framework with resources and a curriculum provided.

The data clearly shows that teachers need a curriculum and sufficient training to teach a math support class. Math support classes should be taught by math teachers. We recommend the teacher be someone who is experienced in working with the current math programs and is strong in remediation of skills.

Student:

Teachers with small math support classes felt that support classes were successful. For a student to receive individual time and attention with a math support teacher, the class size should continue to be low.

Since we do not have an adopted curriculum for math support, it is hard to find data on many of the priorities of the K-8 Program Student Needs Rubric. The curriculum should be of high interest, hands on, engaging. To best meet student needs, math support should not be a study hall. The student should know the class expectation and goals, and should understand what is required to exit this program in the future.

Middle School Math Support Curriculum Review Committee

Shirley Alexander	Indian Education	Hanshew
Gerard Bagsby	Teacher	Clark
Tasha Barnes	Teacher	Wendler
Scott Batchelder	Principal	Mirror Lake
Chris Cullings	Teacher	Gruening
Helen Dissa	Teacher	Begich
Breanna Drumm	Teacher	Romig
Terry Dunham-Bay	Teacher	Clark
Mark Elfstrom	Teacher	Romig
BobbiJo Erb	Teacher	Mirror Lake
Susan Foster	Teacher	Gruening
Patricia Gallego	Teacher	Central
Jessica Graziano	Math Support Teacher	CIS
Sven Gustafson	Principal	Romig
Kristi Grande	Teacher	Clark
Linda Griffith	Coordinator, Special Education	
Cheryl Hahnfeld	Teacher	Mears
Mike Lanzarone	Teacher	Begich
Kehle Middleton	Teacher	Wendler
Ruth Mount	Math Support Teacher	CIS
Katie Notis	Teacher	Mirror Lake
Marshall Pendleton	Teacher	Wendler
Maureen Petrunic	Teacher	Hanshew
Anna Poole	Teacher	Central
Sean Rood	Teacher	Goldenview
Sally Roys-Keogh	Teacher	Clark
Sarah Stanley	Teacher	Central
Mary Stoney	Teacher	Mears
Cessilye Williams	Principal	Clark
John Wilson	Teacher	Goldenview
Laura Wrenn	Teacher	Gruening

Curriculum Guide

Middle School Math Support		Course Overview		
Enduring Understandings: Mathematics helps us interact and interpret the global community		Essential Questions: <ul style="list-style-type: none"> • What mathematical understandings and skills do we need to be a literal citizen? • What mathematical understandings, concepts, and skills are essential for success in Algebra? • What knowledge and skills do students need to be successful in a core math class? 		
Pacing	Knowledge/Performance Standards	Performance Task Assessment	Key Concepts and Vocabulary	Resources
Content and skills should be taught in anticipation of skills needed as indicated by Math 6, Math 7, and Math 8 pacing guides.	Identify essential and critical Grade Level Expectations and vocabulary 3 rd -8 th Social & Emotional Standards i.e. Self Awareness, Self Management, Social Awareness, Social Management Problem Solving The student demonstrates conceptual understanding by the ability to: <ul style="list-style-type: none"> • Write and solve word problems involving multiple operations. M1.2.3; ASD 8:3.2 • Select, modify, and apply a variety of problem-solving strategies 	Ongoing formative assessments Progress monitoring of individual goals Performance tasks Summative strand assessment “Exit” criteria	<ul style="list-style-type: none"> • Numeration • Measurement • Estimation & Computation • Functions & Relationships • Geometry • Statistics & Probability • Problem Solving 	

	<p>(working backwards, drawing a picture, Venn diagrams, tables, charts, lists graphs, guess and check, extended patterns, models, etc.)</p> <ul style="list-style-type: none"> • check, extended patterns, models, etc.) • Evaluate, interpret, and justify solutions to problems using examples and counter examples. M7.3.3 • Explain and verify results of an original problem and apply what was learned to a new situation. 5PS-2 <p>Communication The student demonstrates conceptual understanding by the ability to:</p> <ul style="list-style-type: none"> • Represent mathematical problems numerically, graphically, and/or symbolically; or using appropriate vocabulary, symbols, or technology to explain, justify, and defend strategies and solutions. <p>Reasoning The student demonstrates conceptual understanding by the ability to:</p> <ul style="list-style-type: none"> • Use informal deductive and inductive reasoning in concrete contexts or stating counter examples to disprove statements; or justify and defend the validity of mathematical strategies and solutions using examples 			
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	<p>Connections The student understands and applies mathematical skills and processes across the content strands by: Applying mathematical skills and processes throughout other scholastic disciplines and real life situations (e.g., timelines) PS-5, 6:14.1</p>			
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Middle School Math Support		Numeration		
Enduring Understandings:		Essential Questions:		
Pacing	Knowledge/Performance Standards	Performance Task Assessment	Key Concepts and Vocabulary	Resources
<p>Meet students at their level of understanding numeration. Begin to move students toward confidence in their knowledge of numeration. Break down existing barriers to further math understanding of numeration. Show relevance to all strands and real life situations.</p>		<ul style="list-style-type: none"> What numeration skills are needed to be successful in real world situations involving number sense, money, conversions, fractions, decimals, percents, problem solving, measurement, rational and irrational numbers, reasoning? 		
<p>Content and skills should be taught in anticipation of skills needed as indicated by Math 6, Math 7, and Math 8 pacing guides.</p>	<p>Number Sense The student demonstrates conceptual understanding by the ability to:</p> <ul style="list-style-type: none"> Order, represent, read, write and identify place value in numbers from thousandths to millions using pictures, models, money, and words. 6N-1 & 6N-2, ASD 6:2.2 Order real numbers using $>$, $<$, $=$. 8N-1 Convert between whole and decimal numbers written in expanded notation, standard form, scientific notation and select the more appropriate form. 7N-3; 8N-2, 8N-3 Identify prime and composite numbers. 7N-8 Write the product of repeated factors in exponential form. ASD 6:3.5 Identify factors and multiples and their Least Common Multiple and Greatest Common Factor. 6N-9 Apply the rules for order of operations to rational and real numbers 8N-8; ASD 8:4.2 	<p>Formative assessment per strand</p> <p>Performance assessment</p> <ul style="list-style-type: none"> Tasks that model the distributive property using both manipulatives and symbols Activities that demonstrate student can add, subtract, multiply, and divide fractions with unlike denominators. (Methods used could include the slide method and prime factorization trees Activities that demonstrate a student's knowledge of position of numbers on a number line (esp. negatives and decimals) Consumer activities that require students to add, subtract, multiply, and divide monetary values Tasks that model equivalency between fractions, decimals, and percents using a table Activities that require students to name whole, mixed, and decimal 	<ul style="list-style-type: none"> Standard form Expanded notation Scientific notation Exponents Prime factorization Least Common Multiple Greatest Common Factor Integers Fractions Numerators Denominators Decimals Percents Mixed Numbers Improper Fractions Whole numbers Multiples 	

	<p>Fractions, Decimals, and Percents: The student demonstrates conceptual understanding by the ability to:</p> <ul style="list-style-type: none"> • Describe simple fractions using explanations and/or illustrations of equivalent representation. 6N-4, 6N-5, ASD 6:2.2 • Simplify fractions. 7N-4 • Identify, describe, or illustrate equal parts of a whole, region, set, equivalent fractions, and mixed numbers and benchmark percents such as 10%, 25%, 50%, 75%, 100%. 5N-4, 5N-5; ASD 5:2.4, ASD 6:2.2) • Convert between mixed numbers, fractions, decimals, and percents and select the most appropriate form. 7N-4, ASD 7:2.2 • Describe the process for all operations involving decimals and fractions with like and unlike denominators. 7N-5 <p>Concepts of Operations The student demonstrates conceptual understanding by the ability to:</p> <ul style="list-style-type: none"> • Model addition, subtraction, multiplication, and division 6N-6 • Describe or demonstrate that division is related to multiplication, repeated subtraction, or equal sharing (fact families). 5N-6; ASD 5:3.5, ASD 5.2.9 • Use inverse operations and the property of zero and one to solve problems with 	<p>numbers using correct terminology (e.g. naming dollar amounts)</p>	<ul style="list-style-type: none"> • Order of Operations • Equivalent • Set • Region • Prime number • Composite number • Equality symbols (e.g., <, >, =) • Counter examples • Product • Factors • Sum • Divisor • Dividend • Quotient • Difference • Inverse Operation • Variable • Rational Number • Irrational Number • Real Numbers • Distributive Property • Commutative Property • Associative Property • Identity Property of Addition and Multiplication 	
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	<p>variables and rational numbers. 8N-7; ASD 8:3.6</p> <ul style="list-style-type: none"> • Use manipulatives, diagrams, symbols, and words to describe addition, subtraction, multiplication and division of integers. ASD 8:3.3 • Identify and use commutative, associative, or identity properties of addition or multiplication. 6N-8 • Model the distributive property. 6N-10 <p>Money The student demonstrates conceptual understanding by the ability to:</p> <ul style="list-style-type: none"> • Identify coins, their value, or the value of a set of coins (count bills and coins to \$100). 3MEA-5, ASD 3:2.13 • Use decimal notation for monetary values. ASD 3:2.8 • Count back change and show combinations of coins and bills up to \$100. 5MEA-6, 5MEA-7 			
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Middle School Math Support		Measurement		
Enduring Understandings: We use a plethora of measuring systems to organize and add standardized structure to everyday lives.		Essential Questions: <ul style="list-style-type: none"> • How do we use linear measures? • What are the mathematical concepts required to understand measuring systems? • How are metric prefixes used in measuring systems and how do they help organize the measuring system? • Why do we need to know how to calculate time zones? 		
Pacing	Knowledge/Performance Standards	Performance Task Assessment	Key Concepts and Vocabulary	Resources
Content and skills should be taught in anticipation of skills needed as indicated by Math 6, Math 7, and Math 8 pacing guides.	<ul style="list-style-type: none"> • Estimating to the nearest 1/16 of an inch or millimeter, volume to the nearest cubic centimeter or milliliter or angle to the nearest 30 degrees. MEA-1, M2.3.1 • Identifying, converting, or using equivalent English or metric systems MEA 2. M2.3.2 • Measure length, weight/mass, area, and volume using the appropriate tool in metric and in standard units. (7:6.1) • Calculate the perimeter and area of a rectangle. • Solving real world problems involving elapsed time between world time zones. MEA-6 M2.3.5 • Measure Temperature (nearest 5 degrees) or weight (nearest half lb. or kg) using appropriate tools. MEA 2 and MEA 4 	Formative assessment per strand Performance assessment <ul style="list-style-type: none"> • Measuring to 1/16 of an inch or millimeter. M2.3.1 • Measuring a given angle using a protractor to the nearest ± 2 degrees M2.3.1 • Write and solve rate problems. 7:6.7 • Convert between days, weeks, months. • Calculate elapsed time Summative Strand Assessment	<ul style="list-style-type: none"> • Milli • Centi • Deci • Kilo • Meter • Liter • Gram • Inch • Mile • Feet • Yards • Convert • Fahrenheit • Celsius • Degrees 	

Middle School Math Support		Estimation and Computation		
Enduring Understandings: Estimation and Computation are essential to function effectively as a consumer in everyday life.		Essential Questions: <ul style="list-style-type: none"> • How does estimation prepare students with real world skills? • What computation skills are necessary to have success in every day life? • Why do we need to know how to estimate? 		
Pacing	Knowledge/Performance Standards	Performance Task Assessment	Key Concepts and Vocabulary	Resources
Content and skills should be taught in anticipation of skills needed as indicated by Math 6, Math 7, and Math 8 pacing guides.	<ul style="list-style-type: none"> • Recall or use a strategy to complete basic addition, subtraction, multiplication (products to 144), and division facts efficiently [6]E&C-2 • Find a quotient using a two-digit divisor [6]E&C-4, 6:4.3 • Find sums, differences, products and quotients of whole numbers, fractions, decimals (including money[5] E&C-3), integers and mixed numbers.[6] E&C-3&4, 6:4.3 • Convert values between fractions, mixed numbers, decimals and percents 6:2.5, 6:4.5 • Check the reasonableness of results of all operations.[6] E&C-1, 6:1.7 • Find the percent of a number. 6:4.3 • Round numbers to estimate the answer to a problem [4]E & C-1 M3.2.1 • Explain to what place it is reasonable to round given data from thousandths to millions ASD 6:6.1 • Estimate numbers in multiples of 10 to a million [4] E&C-1; M3.2.1, ASD 4:1.1 • Estimate lengths, weights, area and volumes, and angle measures [6]MEA-1, 6:1.2(capacity & temperature using the appropriate metric, standard, and non-standard units MEA-4,M2.2.1; ASD 4:1.4) 	Formative assessments per strand Performance assessments: <ul style="list-style-type: none"> • Tasks that model different strategies to complete various operations (using manipulatives, memory devices, and alternative algorithms) • Activities in which students estimate distance, weight, volume, temperature and angle measure (such as estimation golf, jelly bean counts, etc.) • Real-world estimation tasks such as purchasing (using sale prices, price per unit, etc.) • Tasks that model equivalency between fractions, decimals, and percents using a table • Tasks that ask students to predict characteristics of a large population from a 	<ul style="list-style-type: none"> • place value • estimate • compute • solve • equivalent • product • divisor • quotient • sum • difference • nearest • numerator • denominator • integers • round • front-end estimation • truncating • compatible numbers • factors 	

	<ul style="list-style-type: none"> • Estimate large distances, times, populations or objects based on small samples ASD 5:1.3 • Estimate the circumference and area of a circle using a grid or manipulative. [5] G-7; ASD 5:6.2,5:6.3 	<p>small sample set</p> <ul style="list-style-type: none"> • Pair and share activities that demonstrate knowledge of finding the percent of a number <p>Summative strand assessment</p>		
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Middle School Math Support		Geometry		
Pacing	Knowledge/Performance Standards	Performance Task Assessment	Key Concepts and Vocabulary	Resources
Content and skills should be taught in anticipation of skills needed as indicated by Math 6, Math 7, and Math 8 pacing guides.	<ul style="list-style-type: none"> • Create and extend patterns (F&R 1, 6:9.1) • Recognize and use rules/formulas to generalize patterns (F&R 2, 6:9.4) • Find the nth term of a pattern (F&R 1, 7:9.4) • Interpret graphs and tables • Analyze data to make predictions (5:10.2) • Translate words into symbols (6:10.7) • Use manipulatives to solve problems (F&R 4, 6:10.1) • Use order of operations to simplify expressions and solve equations (6:10.6) • combine like terms to simplify expressions (F&R-5, 7:10.7) • Substitute values for variables (F&R 3, 7:10.2) • Use inverse operations to solve equations and check the solutions (F&R 6) • Solve up to 2-step linear equations and inequalities (F&R 6, 8:10.2 & 8:10.3) • Use properties: commutative, associative, distributive, identity 0 & 1 	<p>Formative assessment per strand</p> <p>Performance assessments like the Improvement Project</p> <ul style="list-style-type: none"> • Data collection and organization • Representation of data in tables and graphs • Make predictions • Data summary <p>Games</p> <ul style="list-style-type: none"> • Magic Calculator <p>Summative Strand Assessment</p>	<ul style="list-style-type: none"> • pattern • manipulative • graph • table • function • sequence • prediction • patterns in area and perimeter • coordinate grid • variable: dependent and independent • inequality • ordered pair • linear equation • slope • grouping symbols • exponents • formula • expression • coefficient • equation 	

<p>Enduring Understandings: Mathematics is a multi-faceted area of study with many domains in which students must understand and apply skills and concepts to demonstrate proficiency.</p>		<p>Essential Questions:</p> <ul style="list-style-type: none"> • What are techniques students use to show understanding of geometric relationships? • Can students understand the vocabulary necessary to comprehend geometric concepts? 		
Pacing	Knowledge/Performance Standards	Performance Task Assessment	Key Concepts and Vocabulary	Resources
<p>Content and skills should be taught in anticipation of skills needed as indicated by Math 6, Math 7, and Math 8 pacing guides.</p>	<p>Using the attributes and properties of regular polygons:</p> <ul style="list-style-type: none"> • Identify, classify, and compare polygons and polyhedra G-1,8:5.1 <p>Using proportionality to solve real-world problems involving similar shapes</p> <ul style="list-style-type: none"> • Model and apply the Pythagorean Theorem G- 4, M5.3.3 <p>Determine the geometric properties of shapes</p> <ul style="list-style-type: none"> • Determine the volume of cubes and rectangular prisms G-5, M.5.3.4 • Determine the surface area of rectangular prisms G-6,M.5.3.4 • Determine the circumference and area of a circle G-7, M.5.3.4 <p>Problems with similarity</p> <ul style="list-style-type: none"> • Using a scale factor to solve problems involving similar shapes G-3, M5.3.3 • Identify and draw geometric figures that are congruent, similar, or symmetrical. 	<p>Formative assessment per strand</p> <p>Performance assessment</p> <ul style="list-style-type: none"> • Find the sum of the angles of any polygon. • Label parallel and perpendicular lines • Draw lines of symmetry in regular polygons • Find the perimeter, circumferences, and area of circles and polygons, and verify the solution using a different method. 7:6.5 • Use scale drawings and maps to identify and describe congruent and similar figures. 7:4.5 <p>Summative Strand Assessment</p>	<ul style="list-style-type: none"> • Vertices • Area • Pi=3.14 • Surface Area • Perimeter • Volume • Bases • Edges • Faces • Pyramids (Rectangular and triangular) • Scalene • Isosceles • Equilateral • Quadrilateral • Parallelograms • Trapezoids • Rhombi • Cubes • Cylinders • Cones • Spheres • Parallel • Perpendicular • Acute • Obtuse • Right angle (90) 	

Pacing	Knowledge/Performance Standards	Performance Task Assessment	Key Concepts and Vocabulary	Resources
			<ul style="list-style-type: none"> • Rays • Lines • circumference • congruent • Line segment • Ordered pair • midpoint • Translation • Reflection • Similar • symmetrical • Rotation • Horizontal • Vertical • Diameter • radius 	

Middle School Math Support		Statistics and Probability		
Enduring Understandings:		Essential Questions:		
To be proficient in statistics and probability standards		<ul style="list-style-type: none"> • When should one use the various measures of central tendency? • How does one count outcomes and determine probability? • How does one explain and evaluate data from tables, charts, and graphs? 		
Pacing	Knowledge/Performance Standards	Performance Task Assessment	Key Concepts and Vocabulary	Resources
Content and skills should be taught in anticipation of skills needed as indicated by Math 6, Math 7, and Math 8 pacing guides.	<p>The student will do the following:</p> <ul style="list-style-type: none"> • Compute the probability of chance and expected outcomes. 6:8.3 (expressing answers as fraction, decimals and percents) • Solve or identify solutions to problems involving possible combinations. [6]S&P-5 • Collect and organize a set of data to construct charts, tables, or graphs (Venn diagrams, bar graphs, circle graphs, line graphs). [6]S&P-1, 6:7.2 • Determine or justify a choice of mean, median, or mode as the best representation of data for a practical situation M6.3.3 7:7.1 7:7.2 • Explaining and evaluating data from tables, charts, and graphs to determine validity and predict an outcome. [6]S&P-2, 6:7.4 • Use appropriate mathematical language (vocabulary, symbols) and technology to explain strategies used to solve a problem involving multiple operations. [6]PS-3, 6:12.1 • Applying mathematical skills and processes 	<p>Formative assessment per strand</p> <p>Performance assessment</p> <ul style="list-style-type: none"> • Problems using spinners, dice, and coins • Tasks using tally marks and frequency charts for collecting data • Peer teaching using mathematical terms • Activities where students organize data in tables and graphs. Such as: Live circle chart • Problems where students find measures of central tendency and choose which is the most appropriate 	<ul style="list-style-type: none"> • Central tendency • Mean • Mode • Range • Median • Bar graph • Circle graph • Line graph • Percent • Ratio • Combinations • Outcomes • Theoretical probability • Experimental Probability • Ratio colons • Ratio fraction 	

	<p>throughout other scholastic disciplines and real life situations [6]PS-5, 6:14.1</p>	<ul style="list-style-type: none"> • Problems where students find probability of events. <p>Summative Strand Assessment</p>	<p>bars</p>	
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**Math That Works. CORD Communications. 2009
Text Based Support**

Positive Aspects

- Lab activities
- Variety of activities
- Kid friendly activities
- Lessons have good organization
- Interdisciplinary lessons
- Games
- Not traditional
- Good supplementary material

Negative Aspects

- Difficult to navigate
- Poorly organized
- High text
- No student book
- Not individualized
- Lots of extra resources
- Lab time intensive
- No assessment
- No remediation
- High reading level

**Math Triumphs. Glencoe McGraw-Hill:
Text Based Support**

Positive Aspects

- It covers objectives well
- It is user friendly-color, layout, design, no clutter
- Step by step practice
- Parent Friendly
- Same format as testing
- Easy to find problems to match concepts
- Data driven decisions
- Diagnostic shows exactly what to focus on
- Student errors show if student was guessing or not
- ELL strategies
- Students may move out
- Aligns with curriculum
- Heavy vocab
- See it/Do it/Say it/Write it

Negative Aspects

- No self reflection or monitoring
- Lacking in cooperative learning
- Lacking in technology
- Doesn't address diversity
- No pacing-not needed except if you are only math support
- No assessment for projects

Mathematics Navigator, America's Choice. 2006
Text Based Support

Positive Aspects	Negative Aspects
<ul style="list-style-type: none"> • Multilevel materials for beginners • Variety of strategies and activities • Learning Progression flows smoothly • Formatting of the curriculum • Teaching from the misconception • Good Assessment tells what the misconception is for each student • Extra secret website • Higher Level thinking 45 minutes • Structured expectations • 9 years of curriculum 	<ul style="list-style-type: none"> • No technology • Individualized instruction • Parent Component • Lots of reading/text • Consumable workbooks • Socratic method difficult with 15-20 students at different levels

**Transitional Mathematics. SoprisWest Educational Services.
2005
Text Based Support**

Positive Aspects

- Computation practice
Different strategies
- Workbook kid-friendly
- Students could
theoretically learn
from the book
- Easy to progress
- New technology (maybe)
- Really fine points of
adding
- Could be individualized
- Every lesson has core
skill and other content

Negative Aspects

- Weak on manipulatives
- Paper-based
- No technology
- Weak placement test
- Long lessons
- ? on dual topic found in
journal
- can't be used as a
"support" as opposed to
a stand alone
- does not have all
components of curriculum
guide in one year
program
- Tier III intervention

ALEKS: ALEKS Corporation. 2008
Technology Based Support

Positive Aspects

- Pre-Assessment determines what you learn and practice
Pie Chart shows skill level K-12 Continuum
- Remediation and acceleration
Reporting looks good!
Informative
- Component for students in grade 6-8 that need help in content covered in grades 3-6
- Technology responds to student response
- patterns
- Web-based can be used at home
- Customize for each
- Regular assessment (every lessons)
- Online quiz
- Grades/assessments
- Subscriptions
- Low band math
- ``What you can do``

Negative Aspects

- Less Visually Appealing
- No games (no pizzazz)
- No manipulatives
- Must get it right
- Essential Math Course not aligned to GLEs
- Lack of audio

**Math Whizz. Whizz Education.
Technology Based Support**

Positive Aspects

- Assessment leads to student learning path
- opportunity to see teacher reports
- Hints
- Some sound
- Dictionary
- Tutorial
- Worksheets
- Website Tutor
- Progress report
- Objectives
- Interactive Whiteboard
- Tools
- Mixed concepts: Strength and areas to work on
- Assessment per lesson
- Strategies and Tools given if incorrect answers
- Challenge other students

Negative Aspects

- No
- The room custom can not be locked down
- Not yet aligned to AK GLEs

**Odyssey Math. Compass Learning
Technology Based Support**

Positive Aspects

- Reinforce answer
- Visual Representation
- Pretest guides
instruction Engaging:
colorful, upbeat
- Areas that need more
clarification
- Parent log-in
- Wait
- Assessment guides
individual learning plan
- Reports, including GLEs

Negative Aspects

- Boomerang in the head
Distracting Graphics
Progressed quickly
- multiple choice-goes on
anyways

**Skills Alaska
Technology Based Support**

Positive Aspects

- Aligns to Alaska Standards
- Good Assessment
- Go into Specific strands and find questions
- Can select can select and individualize for students

Negative Aspects

- Two components are separated
- Tutor and Assessment
- Hard to jump back and forth between components
- Only assessment
- Teacher intensive

SuccessMaker Math. Pearson Digital Learning. Pearson
Education
Technology Based Support

Positive Aspects

- Aligns well
- Monitors for the teacher
- Places appropriately for each student
- Visually engaging
- Tutor launches automatically-teacher is also notified
- Idiot Proof for teachers
- Ultimate individualize
- Felt happy as a student playing it

Negative Aspects

- Few to no real life applications
- Animations are below grade level
- Not online, server based program
- No parent component
- Weak on problem solving

Neutral

- Mixed Presentation
- 15 minutes per day
- Can student see how they are progressing?

Cognitive Tutor Bridges to Algebra. Carnegie Learning
Technology and Text Based Support

Positive Aspects

- 40% Technology/ 60%Text
- Good Activities
- Monitoring
- Good Glossary
- Cooperative
- User-friendly great layout for text component
- Good Assessment
- Relies on formative assessment
- Various forms of test practice
- Well aligned with state, district NCTM, text
- Homework helper for Alternative Approach
- Assessment
- Individualized and no pacing
- Lessons
- Manipulatives
- Short answer
- Hints
- Progress bar
- Dings progress if too many errors or hints
- Real-world problems
- High Expectations
- HS remediation

Negative Aspects

- Not overly attractive
- Parental Support
- May be a little high, no place value, etc.
- Boring
- No sound
- Doesn't tell you what to do with manipulatives
- Very wordy
- Not for insecure readers
- Too many words
- Scary
- Not individualized
- No jumping around
- No review
- Can't bypass manipulatives

iSucceed. Great Source
Technology and Text Based Support

Positive Aspects

- Teacher friendly
- Individualized on the computer
- Walks teacher through the steps
- Visual models for math support
- Word Walls
- Games
- Worksheets on disk
- Hands on Manipulative Work
- Tutorial-Problem Solve-Set Achievement
- Pre-test and Post-test
- Set grade levels
- Applications
- Worksheets
- Interactive
- Visual Appealing
- Teacher familiarity
- Scripted Lessons

Negative Aspects

- Not individualized without computer
- Not connected to real life
- Many parts- may be hard for teachers
- Preparation/planning intensive
- No objectives, standards for students to see
- Difficult to track student use and progress of materials
- No games in problems
- Slow moving
- Repetitive instruction (drill and practice)
- Can't exit a question set
- Not an artificial intelligence

Math Text Survey 2007: Results

The curriculum materials were reviewed using the standards in the student, teacher, content, and assessment rubrics developed by the K-8 Mathematics Curriculum Review committee.

Rating Scale

4 Exceeds standard

3 Meets standard

2 Partially meets standard

1 Does not meet standard

NA Not applicable

Table 1: Teachers' Mean Responses to Instructional Materials Evaluation

Text Materials	Student	Teacher	Content	Assessment
Navigator	3.65	3.31	3.58	3.50
Triumphs	3.06	3.09	2.91	2.71

Table 2: Teachers' Mean Responses to Instructional Software Evaluation

Technology	Student	Teacher	Content	Assessment
MathWhizz	3.50	2.88	3.13	2.88
SuccessMaker	3.42	3.21	3.33	3.67

