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LCAS APPENDIX B -- MATHEMATICS
Assessment Summaries, Strengths, and Limitations

The tables below offer information, observations, and recommendations regarding the purpose and implementation of specific mathematics assessments utilized at the local level (provider, school, district, supervisory union/district). This resource is included to further support supervisory unions/districts (SU/SDs) in the provision of local comprehensive assessment systems (please see the AOE's Strengthening and Streamlining Local Comprehensive Assessment Systems: Guidelines and Support for Leadership Teams for additional information) and to meet the goals of Act 173 of 2018.

This document is intended to provide a high-level overview of a sampling of assessments, including assessments known to be in use by LEAs in Vermont, to support local systems and schools in making informed decisions and investment requests. This appendix is not an exhaustive list, does not represent the full breadth and depth of information about the included assessments, and is not an endorsement of the assessments reviewed. LEAs are encouraged to evaluate assessments before purchasing or utilizing an assessment. For guidance on how to evaluate assessments, please refer to the Agency's LCAS Defining Essential Components.

Contact Information:

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Assessment Name:	Preschool, Primary and Elementary Number and Operations Assessments (Pre-KNOA, PNOA, and ENOA) *For more information contact Loree Silvis at lsilvis@cornerstonemathematics.com as there is not a website for these assessments.*
Type/Purpose/Uses:	*Type:* Diagnostic *Purpose:* To provide educators with an interview-based set of standards-aligned tasks that focus on counting and cardinality, operations and algebraic thinking, and number and operations. These are the standards that the assessment creators view as foundational knowledge that all students need to be successful in mathematics. *Uses:* In addition to being used as a diagnostic, these assessments can be used as an end-of-year summative assessment, formatively to progress monitor and determine specific interventions, and as a screener when using selected items as described in the user's manual.
Summary of Tool/ Assessment:	The Pre-KNOA, PNOA (K-2) and ENOA (gr. 3) are Vermont-Based Assessments that were created as a resource for schools, districts, and supervisory unions in 2010 and revised in 2013 to map to the Common Core State Standards in Mathematics (CCSS-M) for relevant grade levels. The grade level assessments have a primary focus on counting and cardinality (KNOA only), operations and algebraic thinking, number, and operations in base ten, and number and operations – fractions (ENOA only). Measurement and data standards are lightly assessed in the 2nd and 3rd grade levels and geometry is only addressed in only the 2nd grade assessment. The mathematical practices of reason abstractly and quantitatively, construct viable arguments and critique the reasoning of others, attend to precision, and look for and make use of structure are addressed in these assessments. At the time of their development, there was a recognized need for primary-level mathematics assessments that could be implemented at the local level to collect data about students' mathematical understanding (at that time based on the Vermont Framework of Standards and Learning Opportunities) and to inform professional development and student instruction. The assessment is interview based and can take 20-40 minutes per student. The user manual notes that teachers may administer the assessment to a full class or work through the assessment individually with students.
Evidence and/or Research	No evidence base or research on the effectiveness, validity, or reliability of this assessment could be found at the time of this publication.*
Technical Specifications:	Specifically designed training and professional development workshops are required in advance of the administration of this assessment by any professional or school who chooses to administer it.

Assessment Name:	Preschool, Primary and Elementary Number and Operations Assessments (Pre-KNOA, PNOA, and ENOA) *For more information contact Loree Silvis at lsilvis@cornerstonemathematics.com as there is not a website for these assessments.*
Strengths:	• Interview format allows students to justify their reasoning verbally, by using manipulatives, and/or by using models on some of the tasks. • Scoring protocols are included. • Strong focus on procedural fluency and computation skills.
Limitations:	• Labor and time-intensive to administer across student populations. • Not norm referenced. • Does not assess the full breadth of CCSS-M. • Addresses four of eight mathematical practices. • No psychometrics with which to judge reliability and validity. • Does not provide Quantile measures.
Recommendations(s):	If SU/SDs or schools choose to use these assessments, they should evaluate: • Whether there are sufficient staff trained or could be trained to administer the assessment for all students effectively, and • whether the time required to administer the assessment will provide the student data necessary to inform instruction, curriculum, and team decision-making. Additionally, because these assessments were designed with a focus on assessing a subset of CCSS-M that emphasize procedural fluency and computational skills, districts and/or schools seeking to assess all CCSS-M would need to supplement with assessments that address the full breadth of all Common Core standards.

Assessment Name:	aimsweb®Plus
Type/Purpose/Uses:	*Type:* • Interim Assessment • Progress Monitoring *Purpose:* This assessment builds upon brief, valid, and reliable measures of foundational skills in math by adding standards-based assessments useful for instructional planning. A user interface and immediate results help teachers to assess all students, target instruction and interventions, and maximize classroom teaching time. *Uses:* This assessment provides interim assessments (also referred to as universal benchmarks by the vendor) that can screen students to identify learning gaps in PreK-12 foundational math skills. aimsweb®Plus also has Curriculum Based Measures (CBM) that can be used as progress

Assessment Name:	aimsweb®Plus
	monitoring to provide more effective instruction and interventions. Also available from the vendor are screeners for dyslexia and behavior.
Summary of Tool/ Assessment:	This assessment system is a brief and valid tool for screening and monitoring math skills for all students in Kindergarten through Grade 8. Normative data were collected in 2013-14 on a combination of fluency measures that are sensitive to growth and new standards-based assessments of classroom skills. Once testing is complete, summary, and detailed reports for students, classrooms, and districts can be generated immediately.
Evidence and/or Research	This assessment received ratings of "convincing evidence" regarding validity for its progress monitoring in grades 2-8 according to the National Center on Intensive Intervention. More information on the validity, reliability, and fairness of these assessments can be found in the Efficacy Research Report produced by Pearson. That report is linked below along with other resources related to the evidence and/or research associated with the assessments. • aimsweb®Plus Efficacy Research Report • National Center on Intensive Intervention • National Center on Student Progress Monitoring • Review of K-12 Literacy and Math Progress Monitoring Tools published by Hanover Research
Technical Specifications:	• As this assessment is a web-based solution and includes a student portal for online test administration, awareness of system requirements is necessary to facilitate an optimum online experience. System requirements can be found here. • Text-to-Speech and other accessibility tools are available within the system. Accommodations include changes made in the test setting, timing, presentation format, or response format that minimize obstacles to perceiving or responding to test content without changing the test content itself.
Strengths:	• This assessment may be administered in a large or small group setting or to individual students. • Training time is less than one hour. • Contains 33 probes per grade: three for benchmarking all students, and an additional 30 for progress monitoring the effectiveness of interventions. • Aligned to CCSS-M. • Provides Quantile measures.
Limitations:	• Some paper/pencil versions are only available grades K-1
Recommendation(s):	This assessment system has 27 different options for testing materials. It is recommended that a school or district contact the vendor to ascertain what

Assessment Name:	aimsweb®Plus
	assessment tools might align with their needs and make informed investments based on those specific needs.

Assessment Name:	FastBridge Math Assessments
Type/Purpose/Uses:	*Type:* • Screener • Progress Monitoring *Purpose:* This assessment is an online system that provides K-12 educators with the ability to identify student baseline performance and then track progress toward proficiency over time using curriculum-based measures (when using FastBridge curriculum) and/or that are aligned with CCSS at each grade level. *Uses:* These assessments can be used individually or in concert with one another to screen, progress monitor, diagnose, and inform instruction.
Summary of Tool/ Assessment:	This math assessment combines Computer Adaptive Tests (CAT) for universal screening and Curriculum-Based Measures (CBM) for progress monitoring to deliver data to inform decision-making. Educators received reports that identify specific math skills to target and tailor instruction to support students' progress toward math proficiency.
Evidence and/or Research	This assessment is a researched-based formative assessment system that was developed by researchers at the University of Minnesota in cooperation with others from around the country. This research is ongoing. You can learn more about the research process and the research supporting the validity of the assessments HERE.
Technical Specifications:	• Accommodations are not built into the assessment but there is a list of allowable accommodations that the school may provide to students with disabilities. Details can be found HERE. • The vendor also states that other accommodations not on the provided list may be allowed if the accommodation is specifically listed on the student's IEP.
Strengths:	• Provides both computer adaptive tests and curriculum-based measures. • Reports available for student, class, school, and district levels. • Aligned to CCSS-M • Provides Quantile measures

Assessment Name:	FastBridge Math Assessments
Limitations:	• These assessments were normed without accommodations. Schools and educators should note this when Interpreting results for students who take the assessments with accommodations.
Recommendation(s):	The CAT used for universal screening measures a student's overall performance at a particular grade level covering a variety of skills. Before using any of the CBMs, it is essential to identify the skill area that needs intervention. That information can be gleaned from reports provided, the Individual Skills report can be used for the individual students, whereas the Group Skills report can be used for a class-wide summary.

Assessment Name:	i-Ready Diagnostic
Type/Purpose/Uses:	*Type:* Diagnostic *Purpose:* This assessment provides teachers with information about students' strengths and needs in basic mathematics skills. *Uses:* Although this assessment was primarily designed as a diagnostic assessment it can be used as a universal screener to identify students' strengths and needs down to the level of discrete sub-skills. The assessment can be given multiple times throughout the school year to provide progress monitoring in relation to expected goals and CCSS-M.
Summary of Tool/ Assessment:	This assessment is a computer adaptive diagnostic assessment that is designed to provide teachers with information regarding the student's current skill level and next steps for instruction and/or intervention. Reports can be generated at the district, school, or student level that show where a student is along their path to proficiency of individual Common Core standards that contains steps for reteaching or introducing concepts. Reports can also be created to assist the teacher in creating groups for differentiating the content based upon readiness levels indicated by the assessment. The included *Tools for Instruction* provides resources to target intervention in the identified areas of need.
Evidence and/or Research	This assessment has received high ratings from the National Center on Intensive Intervention, an affiliate of the American Institutes for Research (AIR), in the categories of academic screening, progress monitoring, and intervention. For a full description of the results in the three categories listed above, visit the NCII Tools Overview. Additional links to associated research for i-Ready products can be found on the i-Ready Research and Efficacy page.

Assessment Name:	i-Ready Diagnostic
Technical Specifications:	• Most browsers support the use of this assessment system; however, Chrome is the recommended browser. Windows, MacOS, and Chromebook devices can all be supported by this assessment; hybrid tablets and touch-screen devices all vary and cannot be listed as approved devices. For complete system requirements, click here. • Universal accessibility features (defined here) are available to all students and do not require an educator to enable these features. However, there are some processes and tools that are designed specifically for students with IEPs or 504 plans that stipulate the use of the accommodations and are educator enabled.
Strengths:	• Reports are available at student, class, school, and district levels. • Aligned to CCSS-M. • Provides Quantile measures. • Universal accessibility features such as
Limitations:	• Not able to view actual test items that a student gets right or wrong.
Recommendation(s):	For SU/SDs and schools who use this assessment as a screener or for progress monitoring, please be aware that the i-Ready Personalized instruction uses insights from the assessment to create a personalized path of online lessons. Details related to this tool can be found at i-Ready Personalized Instruction.

Assessment Name:	Measures of Academic Progress (MAP) Growth
Type/Purpose/Users:	*Type:* Screener *Purpose:* This assessment is a computer adaptive assessment that measures students' achievement and growth in K-12 math that allows educators to understand how K–12 students are performing and to inform instructional strategies. *Uses:* This assessment is used as a universal screener and can be used up to three times per year with normed results for Fall, Winter, and Spring that provide information about the relative standing of an individual student compared to their peers.
Summary of Tool/ Assessment:	This computer adaptive assessment, for grades K-12, measures a student's math skills in the areas of number and operations, operations and algebraic thinking, geometry and measure, and data, statistics, and probability and can measure growth over time when administered three times per year (fall, winter, and spring). Administration time is less than 60 minutes for most students or groups.

Assessment Name:	Measures of Academic Progress (MAP) Growth
	Individual student results can be used in conjunction with the MAP Growth Accelerator to create a personalized learning path that is differentiated based upon readiness level. Student reports provide subject-specific learning goals to help students track their progress and empower them to take ownership of their learning with the guidance of their teachers.
Evidence and/or Research	NWEA has a research division that analyzes the results of these assessments on an on-going basis and reviews current research in educational pedagogy to inform improvement efforts. Further details on the test developers research and practices can be found at NWEA Research. The National Center on Intensive Interventions rated these assessments as having "convincing evidence" in both validity and reliability. Links are provided below to NCII and other sources providing supporting research. • Regional Education Laboratory Program • National Center on Intensive Intervention
Technical Specifications:	Student technology requirements depend on where your student is testing (at school or remotely) and on your school's policy requirements (secure testing or browser-only testing). More information on system requirements can be found HERE. • **Secure testing:** Recommended when testing at school (for remote testing, use browser only). With proper setup, NWEA tools will prevent students from accessing other websites. Upon request, NWEA can activate a requirement for all students to use secure testing. • **Browser-only testing:** Testing with a standard browser such as Google Chrome™ is possible, but students can access outside resources during testing. As a result, you risk compromising your assessment. Universal and designated accommodations and accessibility features can be found HERE
Strengths:	• Measures instructional readiness and student growth. • Compares and predicts student achievement and growth over time via research-based normative and growth information. • Creates and reinforces data-informed instructional practices. • Aligned to CCSS-M. • Provides Quantile measures.
Limitations:	• See technical specifications above.
Recommendation(s):	For SU/SDs and schools who use MAP Growth, please be aware that the MAP Growth Accelerator can be used to create personalized learning paths for individual students in grades 3-8. Details related to this tool and associated resources can be found at MAP Growth Accelerator.

Assessment Name:	Number Sense Screener (NSS)
Type/Purpose/Uses:	***Type:*** Screener ***Purpose:*** This assessment screens for early numerical competency in Grades K–1 and identifies students at risk for later math struggles. ***Uses****:* This assessment is used to identify young children who might face math-related challenges early on, preventing these difficulties from escalating. By predicting math achievement up to third grade, NSS allows for timely intervention and targeted support to prevent students from falling behind.
Summary of Tool/ Assessment:	This assessment is a screening tool for number sense that identifies children who may face math difficulties. It is given at least three times spanning K-1 years: twice in kindergarten (fall and spring) and once in first grade (fall). This screener evaluates counting skills, number recognition, number comparisons, nonverbal calculation, story problems, and number combinations. For more information, view the NSS Fast Facts.
Evidence and/or Research	To review the test publisher's User Manual and their reporting on the assessment's reliability and validity please see Reliability and Validity of the Number Sense Screener. No independent review of the evidence base or research on the effectiveness, validity, or reliability of this assessment could be found at the time of this publication*.
Technical Specifications:	• 1:1 administration • Interview-based (User guide details test administration) • Recommended 15-minute administration with 5 minutes for hand-scoring
Strengths:	• Can be administered by a variety of professionals, including teachers, learning specialists, and school psychologists.
Limitations:	• Only measures number sense • Limited to K-1 • Does not provide Quantile measures • Requires capacity to administer 1:1 with no/low distractions
Recommendation(s):	This assessment is hand scored and data is collected on a chart. Schools or districts employing the screener should record these data electronically to support team-based decision-making and to inform Early Warning Systems and other web-based data tools. This assessment has applications for a limited grade span and assesses number sense only. For SU/SDs and schools serving a larger grade span, they may want to consider pairing with other assessments or evaluating

Assessment Name:	Number Sense Screener (NSS)
	overall investment in an assessment program that can address the full breadth of CCSS standards.

Assessment Name:	Ongoing Assessment Project (OGAP)
Type/Purpose/Uses:	***Type:*** Formative Assessments ***Purpose:*** This assessment practice is to support quick, formative assessments to monitor student proficiency along a learning progression. ***Uses:*** Can be used across grade levels, on a daily basis, to inform instruction, assess student learning over time, and support and evaluate the efficacy of a local curriculum.
Summary of Tool/ Assessment:	OGAP is described as a formative assessment system for grades K-8 that was developed with the intent to provide a "systematic and intentional approach" based on research about how students learn mathematics. This system is also characterized as a professional development intervention that trains teachers to use challenging math tasks organized in a progression of learning goals that develop multiplicative and rational number reasoning. Teachers then gather and analyze information using research-based frameworks to better understand student thinking in mathematics.
Evidence and/or Research	For information on available research related to this assessment, please see Research Report for OGAP.
Technical Specifications:	The system involves using proprietary materials on OGAP knowledge and the OGAP framework of learning progressions. This assessment system provides users with the training to: • Understand the learning progressions related to multiplicative reasoning, fractions, and proportions; • Gather evidence about pre-existing knowledge through the use of a pre-assessment; • Analyze the pre-assessment to guide unit planning; and Implement a continuous and intentional system of instruction, probing with instructionally embedded questions, and analysis of evidence in student work to make timely instructional modifications.
Strengths:	• Includes professional development focused on understanding research and using the research and learning progressions to understand evidence in student work (including classroom discussion) to make instructional decisions.

Assessment Name:	Ongoing Assessment Project (OGAP)
	• Provides tools and resources (e.g., item banks and learning progressions) to help teachers gather formative evidence of student thinking and make instructional decisions. • Professional development and item bank are aligned with the CCSS-M • Supports a school wide formative assessment system in mathematics grades 3 – 7 that involves about 80% of the mathematics at these grade levels. • Provides a structure for sustaining OGAP over time.
Limitations:	• Available only for fractions, multiplicative reasoning, and proportionality. • Extensive professional development required for implementation. • Does not provide Quantile measures.
Recommendation(s):	If an SU/SD or school decides that this assessment system is a good fit for their professional learning needs, realizing that it is intended to supplement existing mathematics curriculum in the areas of multiplicative reasoning, fractions, and proportionality, they must be prepared to enter into a whole-school commitment in regard to training and implementation. Ongoing professional development requires teachers to work in small groups to examine student work with the support of coaches and teacher leaders.

Assessment Name:	Renaissance STAR Math
Type/Purpose/Uses:	*Type:* • Screening • Progress Monitoring *Purpose:* This assessment provides brief tests that give teachers personalized data about each student's learning. *Uses:* This assessment offers a snapshot of students' current skill levels. Color-coded displays and adjustable at-risk criteria are used to present data. Educators can track changes, monitor growth, and establish benchmarks for decision-making.
Summary of Tool/ Assessment:	This assessment is a computer-adaptive assessment that measures general math achievement for students in Grades 1 through 12. It evaluates performance across 32 domains and hundreds of skills with the difficulty of questions adjusted based on the individual's performance and takes about 20 minutes to complete.
Evidence and/or Research	This assessment received "convincing evidence" ratings in 10 of the NCII's progress monitoring categories. However, evidence at improving student

Assessment Name:	Renaissance STAR Math
	performance was only "partially convincing." To review the full research, visit National Center on Intensive Intervention Other reviews found on this assessment includes: • A Review of Progress Monitoring Tools published by Renaissance, and • Review of K-12 Literacy and Math Progress Monitoring Tools published by Hanover Research
Technical Specifications:	This assessment provides the following accommodations: • **Response Masking:** Allows students to cross off incorrect answers. • **Accessibility icon:** Includes color contrast to allow students to choose the color set to increase readability and reduce fatigue. Font size, combined with the zoom features, provides a test that is up to 400 percent larger than the default size. • **Calculator:** Is enabled for all Star Math items. • **Line Reader:** Helps to block text surrounding the line being read. For detailed information about the features above, please refer to the Star Accessibility and Accommodations video.
Strengths:	• Can be administered to individuals or groups of students. • Offers several accommodations for students with disabilities through the accessibility options built into a computer's operating system. • Aligned to CCSS-M. • Provides Quantile measures.
Limitations:	• Only multiple-choice question type (See Sample Items from Star Math)
Recommendation(s):	This program recommends administering this assessment two to five times a year for most purposes, and more frequently for progress monitoring. SU/SDs and schools using this program should be aware that when administering this assessment, it assesses across all content domains every time versus targeting specific domains.

Assessment Name:	System to Enhance Educational Performance (iSTEEP)
Type/Purpose/Uses:	*Type:* • Benchmark • Screener • Diagnostic • Progress Monitoring *Purpose:* The purpose of iSTEEP is to provide a comprehensive assessment system that can be used to determine whether students are progressing toward desired proficiency levels and to provide intervention to accelerate skills of those not meeting desired levels.

Assessment Name:	System to Enhance Educational Performance (iSTEEP)
	Uses: iSTEEP can be used to assess which students are improving and which students need additional instruction. An adaptive diagnostic, iSkill, helps to provide a specific prescription for meeting the needs of a student.
Summary of Tool/ Assessment:	This assessment program offers benchmarking assessments, screening assessments, adaptive diagnostic assessment, progress monitoring assessments, and data management system and was developed and is recommended by the company to be used together to provide a single comprehensive assessment system.
Evidence and/or Research	Research has been collected and summarized by iSTEEP on their model overall and on its individual components. That research can be found on the iSTEEP website HERE. For additional research and reviews on the STEEP model see below: • A Multi-Year Evaluation of the Effects of a Response to Intervention (RTI) Model on Identification of Children for Special Education • Review of K-12 Literacy and Math Progress Monitoring Tools produced by Hanover Research
Technical Specifications:	All assessments require a computer for either computerized assessment or online scoring. The computer conducts the assessments by timing, scoring, and entering the results automatically into a database that is then accessed through a dashboard. According to NCII review, standard accommodations for students with disabilities are included.
Strengths:	• Assesses Common Core skills at each grade level • Paper/pencil or tablets/iPad/computer accessible • E-learning coursework for professional learning available
Limitations:	• For school or district-wide use only. • Does not provide Quantile measures.
Recommendation(s):	When using this product as a universal screener, please be aware that it will be difficult to make any predictions of student performance on statewide summative assessments because it does not report Quantile measures.

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