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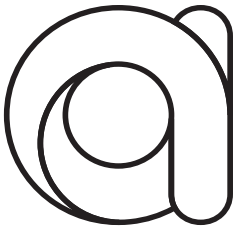

acadience® math

Assessment Manual

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Welcome to Acadience Math

Powerful Indicators for Improving Student Outcomes

Over the last two decades, general outcomes measures like Acadience Math have changed the educational landscape—providing accurate, timely benchmark and progress monitoring information to ensure students receive targeted instructional support. Acadience Math is a premier universal assessment system that has been embraced by educators across the country and used as a tool to help thousands of students reach their full academic potential.

What is Acadience Math?

Acadience Math is a universal screening and progress monitoring assessment that measures the acquisition of math skills from kindergarten through sixth grade. Acadience Math includes measures for early numeracy, computation, and problem solving. The measures function as indicators of the essential skills that every child must master in order to become proficient in mathematics. These measures are used to regularly monitor the development of math skills in order to provide timely instructional support and prevent the occurrence of later math difficulties.

By design, the Acadience Math measures are **brief, powerful indicators** of mathematical skills that:

- are **quick** and **efficient** to administer and score;
- serve as **universal screening** (or **benchmark assessment**) and **progress monitoring measures**;
- identify students in need of **intervention support**;
- evaluate the **effectiveness of interventions**; and
- support the **Response to Intervention (RtI)/multi-tiered model**.

Why use Acadience Math?

Acadience Math provides reliable and valid universal screening to find students who may be at risk for math difficulties. These measures also help identify the skills to target for instructional support. Acadience Math also provides progress monitoring measures for at-risk students while they receive additional, targeted instruction to close achievement gaps. Finally, these measures assist educators in examining the effectiveness of school-wide math supports.

The advantages of Acadience Math are that it:

- directly measures math skills that are responsive to instruction;
- is standardized;
- is thoroughly researched, reliable, and valid;
- is designed for use within a problem-solving, Outcomes-Driven Model of decision-making;
- provides research-based benchmark goals for interpreting results; and
- is efficient and economical.

Key features of Acadience Math include:

- measures that are **aligned to the Common Core State Standards in Mathematics**;
- **composite score available** at each grade and time of year;
- **user-friendly format with clear, concise directions and scoring rules**;
- **arrangement of items** to increase reliability of scores; and
- optional **response pattern analysis** with Computation and Concepts and Applications measures to facilitate targeted instruction.

This Acadience Math Assessment Manual provides:

- an overview of how Acadience Math measures align with math skills;
- general guidelines on the administration and scoring of the Acadience Math measures and how to interpret results;
- specific administration and scoring procedures for each measure; and
- Assessment Accuracy Checklists, a Sample Announcement Letter, and a Sample Results Letter.

Anyone who administers Acadience Math or uses Acadience Math scores should read this manual. The best understanding of the information in this manual will come after the reader attends training that includes practice in administering and scoring each Acadience Math measure. Training in how to interpret the data is also important for the reader who will be interpreting the test results or using those results to make group- or student-level decisions. For more information about training, see page 14.

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Acknowledgements

The program of research and development that has culminated in Acadience Math has been a collaborative effort among many dedicated contributors. The talents and efforts of thousands of individuals contributed to the successful development and completion of these measures, including Acadience Learning research scientists and staff, research colleagues from across the country, educators and school personnel, and children and parents. Throughout our program of research, these individuals provided skill, expertise, time, and unlimited energy for the research and development of Acadience Math. It is impossible to recognize all who have contributed; however, there are two people who deserve particular recognition.

Research assistant, Douglas Rice, played a large role in the Acadience Math measures. Over the years, he helped in the initial development by writing assessment questions, provided his expertise with the video editing for the different online training modules that are available for Acadience Math, and edited many of our documents.

We'd also like to acknowledge the work of Karla Wysocki, our graphic designer. Karla was instrumental in creating the look and feel for all of our documents and designing many of the wonderful graphics for our Concepts and Applications measures.

We are grateful to all who have played a role in the development of Acadience Math.

Chapter 1: **Introduction to Acadience Math**

Acadience Math is an assessment used to measure the acquisition of mathematics skills from kindergarten to sixth grade. Acadience Math includes measures for early numeracy, computation, and problem solving. The measures function as indicators of the essential skills that every child must master in order to become proficient in mathematics.

You can use Acadience Math to:

- identify students who may be at risk for mathematics difficulties (universal screener);
- help teachers identify areas to target instructional support;
- monitor at-risk students while they receive additional, targeted instruction; and
- examine the effectiveness of your school's system of instructional supports.

An Overview of the Acadience Math Measures

Acadience Math comprises seven measures.

1. ***Beginning Quantity Discrimination (BQD):*** The student is presented with a sheet that contains a series of boxes with two patterns of dots in them. The student is asked to orally name the number of dots that is the larger quantity.
2. ***Number Identification Fluency (NIF):*** The student is presented with a sheet of numbers that range from 1–99 and is asked to say each number.
3. ***Next Number Fluency (NNF):*** The student is orally provided with a number that ranges from 1–99 and asked to say the next number.
4. ***Advanced Quantity Discrimination (AQD):*** The student is presented with a sheet that contains a series of boxes with two numbers in them. The student is asked to orally name the number that is the larger quantity.
5. ***Missing Number Fluency (MNF):*** The student is presented with a sheet that contains a series of boxes that have three numbers and a blank line. The student is asked to orally name the missing number.
6. ***Computation (Comp):*** The student is presented with a worksheet that consists of computation problems that they are asked to solve. The problems are grade-level specific and may include operations of addition, subtraction, multiplication, and/or division.
7. ***Concepts and Applications (C&A):*** The student is presented with a worksheet that consists of problems that assess understanding of mathematical concepts and vocabulary and asks the students to apply that knowledge to solve problems. The problems are grade-level specific.

The Acadience Math measures were designed to be economical and efficient indicators of a student's math skills and include the following features:

- They are *standardized assessments*, which means they are administered and scored exactly the same way every time with every student. An assessment must be standardized in order to be able to compare results across students or across time or to compare student scores to a target goal.
- They include alternate forms of approximately equal difficulty so that student progress can be measured over time.
- They are brief so that students can be assessed efficiently and frequently.
- They are reliable, which means they provide a relatively stable assessment of skills across time, different forms, and different assessors.
- They are valid, which means they are measuring the essential mathematics skills they are intended to measure.
- They are sensitive to student growth over relatively short periods of time.

Acadience Math Linkage to Mathematics Research

Assessing student performance on critical math skills can help distinguish children who are on track to become successful at math from children who are likely to struggle. The Acadience Math measures are general outcome measures designed to be *indicators* of math skills. An indicator is a brief, efficient index that provides a fair degree of certainty about a larger, more complex system or process. For example, a pediatrician measures a child's height and weight as a quick and efficient indicator of that child's physical development. Similarly, each Acadience Math measure is a quick and efficient indicator of how well a child is doing in learning a particular math skill (see *Table 1.1*). As indicators, Acadience Math measures are not intended to be comprehensive, in-depth assessments of each and every component of math skills. Instead, they are designed to measure key components that are representative of that skill area, and predictive of overall math competence. General outcome measures have many advantages, including their brief, but powerful nature of focusing on key skill elements and their ease of use within an educational context (Deno, Mirkin, & Chaing, 1982).

The Acadience Math Early Numeracy measures focus on some of the foundational skills required to develop number sense. Number sense includes the ability to compare the magnitude of numbers, to understand the relative effect of arithmetical operations on numbers, and to have meaningful referents for number and quantity (NCTM, 1989). It also "refers to a child's fluidity and flexibility with numbers, the sense of what numbers mean, and an ability to perform mental mathematics and to look at the world and make comparisons" (Gersten & Chard, 1999, pp. 19–20). Although challenging to define, number sense predicts academic achievement (Berch, 2005; Gersten, Jordan, & Flojo, 2005).

The Acadience Math Computation measure focuses on basic computation skills (i.e., addition, subtraction, multiplication, and division). Computation plays a role in overall math achievement. The Acadience Math Concepts and Applications measure evaluates the ability of a child to understand and apply math concepts. The Acadience Math measures were designed to align with the *Common Core State Standards in Mathematics* (National Governors Association Center for Best Practices, Council of Chief State School Officers, 2010) and focus on grade-specific content at each grade. For more information on the alignment of Acadience Math to the Common Core State Standards, please see Appendix 1, pages 91–97.

Table 1.1 Alignment of Acadience Math Measures With Underlying Math Concepts

Underlying Concepts	Acadience Math Measures
Magnitude Comparison	Beginning Quantity Discrimination Advanced Quantity Discrimination
Subitization	Beginning Quantity Discrimination (indirectly measured)
Strategic Counting	Next Number Fluency Missing Number Fluency
Number Identification	Number Identification
Basic Computation	Computation
Understanding and Applying Math Concepts	Concepts and Applications

How Acadience Math Is Used

Benchmark Assessment

Benchmark assessment refers to testing all students within a school or grade three times per year for the purpose of identifing those who may be at risk for math difficulties. Benchmark assessment is always conducted using grade-level material. The measures administered for benchmark assessment vary by grade and time of year and include those measures that are most relevant for making instructional decisions at that time.

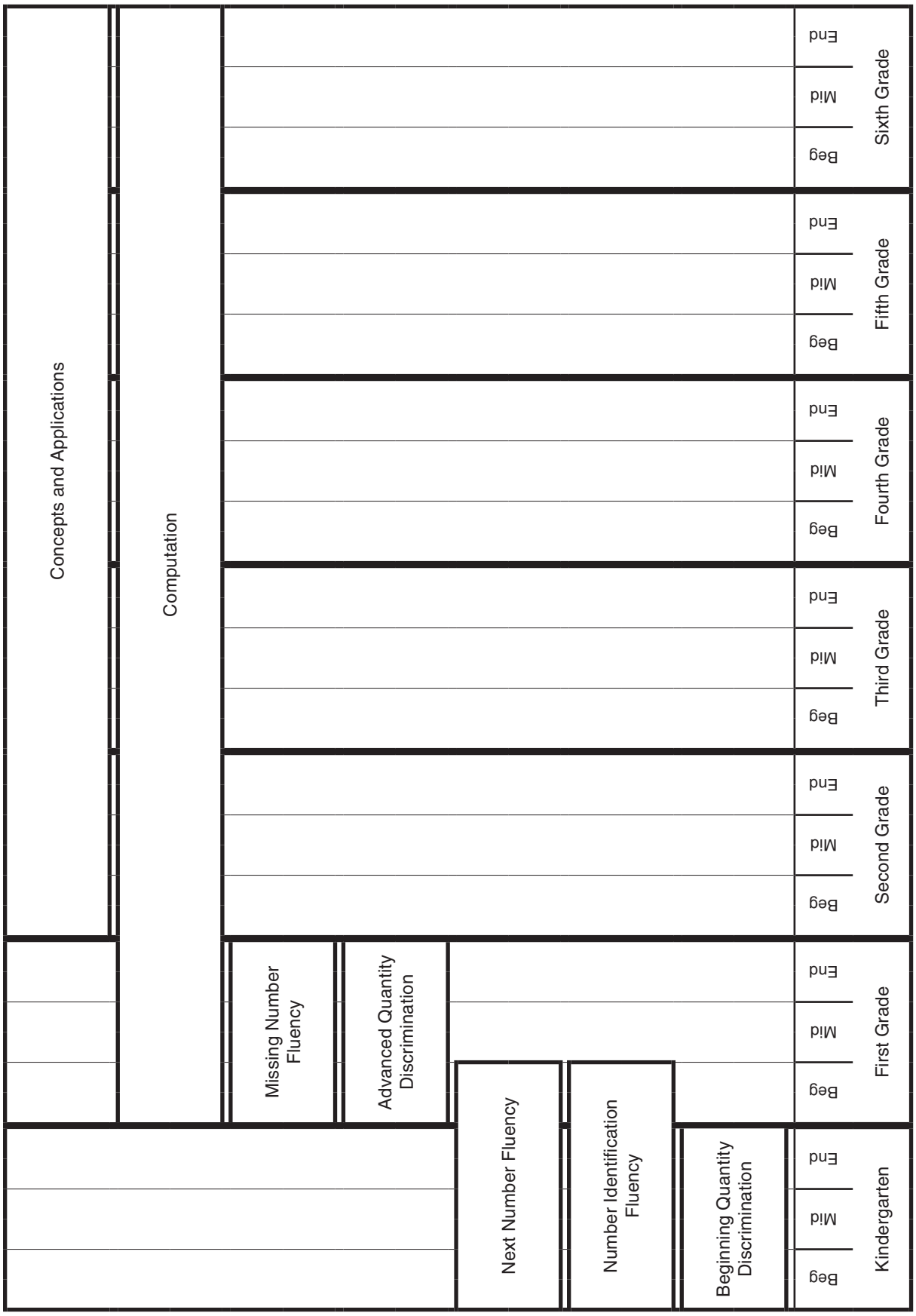
Progress Monitoring

Progress monitoring refers to testing students more frequently who may be at risk for future math difficulty on the skill areas in which they are receiving instruction, to ensure that they are making adequate progress. Progress monitoring can be conducted using grade-level or out-of-grade materials, depending on the student's needs. Decisions about the skill areas and levels to monitor are made at the individual student level.

Benchmark assessment and progress monitoring are the types of assessment necessary for use within a Response-to-Intervention (RtI) model such as the Outcomes-Driven Model. For more information on benchmark assessment and progress monitoring, see Chapter 4: Implementing Acadience Math in Your School.

The Acadience Math Benchmark Administration Timeline (see *Figure 1.1*) shows the measures that are administered at each benchmark assessment period.

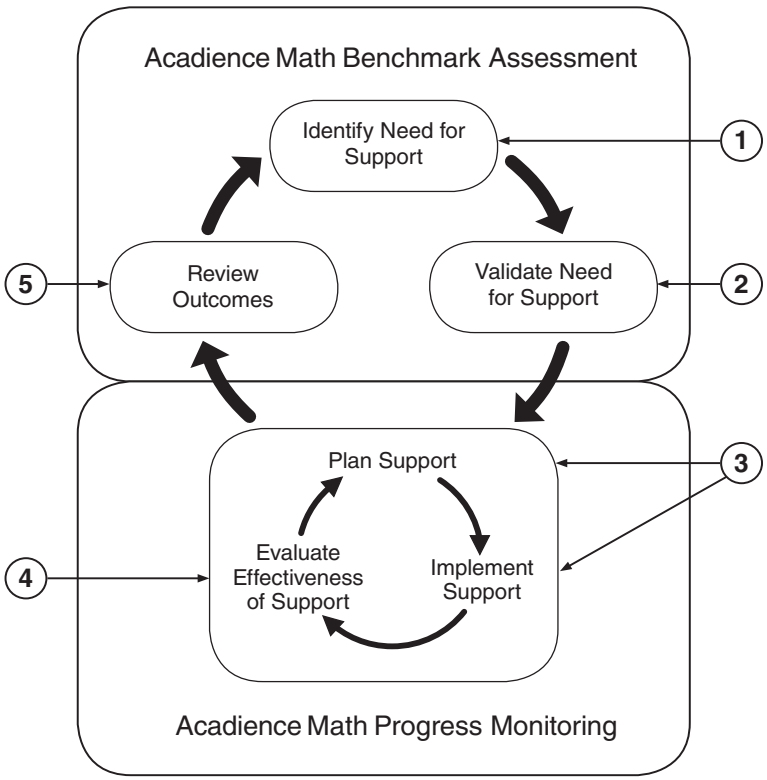
Figure 1.1 Acadience Math Benchmark Administration Timeline



Acadience Math and RtI: The Outcomes-Driven Model

The Acadience Math measures were developed to provide teachers with information they need to make decisions about instruction. The authors of Acadience Math advocate a data-based decision-making model referred to as the Outcomes-Driven Model, because the data are used to make decisions to improve student outcomes by matching the amount and type of instructional support with the needs of the individual students. *Figure 1.2* illustrates the five steps of the Outcomes-Driven Model.

Figure 1.2 The Outcomes-Driven Model



These steps repeat each semester as a student progresses through the grades. At the beginning of the semester, the first step is to identify students who may need additional support. At the end of the semester, the final step is to review outcomes, which also facilitates identifying students who need additional support for the next semester. In this manner, educators can ensure that students who are on track to become proficient in math continue to make adequate progress, and that those students who are not on track receive the support they need to become proficient in math.

Step 1: Identify need for support early. This process occurs during benchmark assessment and is also referred to as *universal screening*. The purpose is to identify those students who may need additional instructional support to achieve benchmark goals. The benchmark assessment also provides information regarding the performance of all students in the school with respect to benchmark goals. All students within a school or grade are tested on Acadience Math three times per year on grade-level material. The testing occurs at the beginning, middle, and end of the school year.

Step 2: Validate need for support. The purpose of this step is to be reasonably confident that the student needs or does not need additional instructional support. Before making individual student decisions, it is

important to consider additional information beyond the initial data obtained during benchmark testing. Teachers can always use additional assessment information and knowledge about a student to validate a score before making decisions about instructional support. If there is a discrepancy in the student's performance relative to other information available about the student, or if there is a question about the accuracy of a score, the score can be validated by retesting the student using alternate forms of the Acadience Math measures or additional diagnostic assessments as necessary.

Step 3: Plan and implement support. In general, for students who are meeting the benchmark goals, a good, research-based core classroom curriculum should meet their instructional needs, and they will continue to receive benchmark assessment three times per year to ensure they remain on track. Students who are identified as needing support are likely to require additional instruction or intervention in the skill areas where they are having difficulties.

Step 4: Evaluate and modify support as needed. Students who are receiving additional support should be progress monitored more frequently to ensure that the instructional support being provided is helping them get back on track. Students should be monitored on the measures that test the skill areas where they are having difficulties and receiving additional instructional support. Monitoring may occur once per month, once every two weeks, or as often as once per week. In general, students who need the most intensive instruction are progress monitored most frequently.

Step 5: Review outcomes. By looking at the benchmark assessment data for all students, schools can ensure that their instructional supports—both core curriculum and additional interventions—are working for all students. If a school identifies areas of instructional support that are not working as desired, the school can use the data to help make decisions on how to improve.

The use of Acadience Math within the Outcomes-Driven Model is consistent with the most recent reauthorization of the Individuals with Disabilities Education Improvement Act (IDEA), which allows the use of an RtI approach to identify children with learning disabilities. In an RtI approach to identification, early intervention is provided to students who are at risk for the development of learning difficulties. Data are gathered to determine which students are responsive to the intervention provided and which students are in need of more intensive support (Fuchs & Fuchs, 2006). The Outcomes-Driven Model described in *Figure 1.2* is based on foundational work with a problem-solving model (see Deno, 1989; Shinn, 1995; Tilly, 2008) and the initial application of the problem-solving model to early literacy skills (Kaminski & Good, 1998). The general questions addressed by a problem-solving model include: *What is the problem? Why is it happening? What should be done about it? Did it work?* (Tilly, 2008). The Outcomes-Driven Model was developed to address these questions within a prevention-oriented framework that can be applied to acquisition of math skills and ensure step-by-step progress toward outcomes that will result in established, adequate math achievement.

History and Development of Acadience Math

The Acadience Math program of research built on the measurement procedures from Curriculum-Based Measurement, or CBM (e.g., Deno & Mirkin, 1977; Deno, 1985; Deno & Fuchs, 1987), and General Outcome Measurement, or GOM (Fuchs & Deno, 1991). The Acadience Math measures were designed to be economical and efficient indicators of a student's progress toward achieving a general outcome, such as math proficiency, and to be used for both benchmark assessment and progress monitoring.

Initial research and development of the Acadience Math measures began in 2006 with general pilot studies on earlier versions of the Computation and Early Numeracy measures. Starting in 2011, the Computation measures were refined through a series of item-level studies that allowed for the revision of the problem creation rules and established optimal time limits for the measures. The Early Numeracy measures were also studied at this point in time. Measure development for Concepts and Applications and sixth grade Computation began in 2012, and the problem selection was also refined through item-level studies. Validation and reliability studies began in 2012 and were concluded in 2019. See the *Acadience Math Technical Adequacy Brief* (Gray, Warnock, Dewey, Latimer, & Wheeler, 2019; available from www.acadiencelearning.org) for a brief summary of the technical adequacy of Acadience Math. Beginning in 2012, the Acadience Math measures were provided to the public in an early release format and used by thousands of schools in 49 US states and several other countries. Acadience Math was officially released in July 2019.

What are some key features of Acadience Math?

Measures carefully developed. All of the problem creation rules for Computation and Concepts and Applications went through multiple item-level studies, and all of the Acadience Math measures went through extensive field-testing with actual students. Based on this empirical testing, the best item types were selected for inclusion in Acadience Math and then organized in such a way as to ensure that student performance was comparable. Research was also completed to determine the optimal timing. The worksheets are designed so the majority of students won't finish them within the time limit.

Materials designed for ease of use. Measures were explicitly designed and field-tested such that they can be administered and scored with ease. Wait rules, discontinue rules, and reminder prompts are embedded into the administration directions.

Empirically field-tested directions. All of the directions that are read to the student and the reminder prompts were designed and tested so that they are explicit and facilitate student understanding of the task.

Stratification. The items on the Early Numeracy, Computation, and Concepts and Applications measures are stratified to ensure equivalence of the forms and to more evenly distribute items of different difficulty. The stratification was done to increase the consistency of scores from one form to another. With stratified random sampling, items of similar difficulty appear in the same places on every form. For example, the Computation problem types were distributed by design identically on each form. For instance, the first item is always an easier item. For each form, the actual test items were then randomly selected from the appropriate category.

Response patterns analysis. The Computation and Concepts and Applications measures include an optional response pattern analysis section. This section is located within the scoring booklets for each grade level. They include the different problem types that occur on the measure that the assessor can mark to help in planning instruction.

Chapter 2: **Guidelines for Administering and Scoring Acadience Math**

The Acadience Math measures are standardized assessments, which means every *assessor*, or person who administers Acadience Math to students, should administer and score the measures the same way every time with every student. A standardized assessment allows you to compare results across students or across time, or to compare student scores to a target goal. A standardized administration also ensures that the research on the reliability and validity of the measure is applicable to the obtained scores.

This chapter describes the general guidelines for administering and scoring all of the Acadience Math measures. Each measure then has its own chapter with specific administration and scoring procedures for that measure. Since every measure works a bit differently, it is important to follow the correct rules for each measure.

Standard Features of Acadience Math Measures

The standard features of the Acadience Math measures are:

- ***Math Skill:*** The skill that the measure assesses.
- ***Administration Time:*** The length of time for which the measure is administered, after the assessor has given directions and started the stopwatch.
- ***Administration Schedule:*** The grades and times of year in which the measure is administered for benchmark assessment.
- ***Administration Directions:*** The specific procedures to follow when administering the measure, as well as the script to say to the student.
- ***When to Start the Stopwatch:*** The point at which the stopwatch should be started for the measure.
- ***Score:*** The description of the reported score.
- ***Scoring Procedures and Rules:*** Detailed marking and scoring procedures.
- ***Reminders:*** Prompts that may be given under certain circumstances. Some prompts may be given only once, others may be given as often as needed.
- ***Wait Rule:*** A rule for how long the student is allowed to hesitate *on an item* before the next item is presented or the student is directed to proceed.
- ***Discontinue Rule:*** A rule for discontinuing the measure if the student is unable to perform the task.

Some measures do not include every feature. All of the features are explained in detail in the chapter for each measure, and the beginning of each chapter includes a chart with a brief summary of main features.

Administration Guidelines

Equipment

In addition to the testing materials, each assessor will need the following tools to administer Acadience Math:

- Pen or pencil
- Clipboard
- Stopwatch or timer

The timer used for Acadience Math testing should: (a) be small enough to hold in the palm of the hand or attach to the clipboard; (b) track time accurately within one-hundredth of a second; and (c) be simple to operate. The timer may function as a stopwatch or as a countdown timer. A countdown timer should be one that makes a quiet, unobtrusive beep at the end of the countdown. A stopwatch should either be silent or make quiet, unobtrusive beeps when starting or stopping the timing.

Testing Environment

Acadience Math Early Numeracy assessments are best conducted at a small table or student desk in a relatively quiet location and at a time with minimal disruptions and noise. For example, if Acadience Math Early Numeracy assessments are being conducted in the classroom, it is best to use a corner of the classroom with partitions to minimize distractions and to conduct the assessment at a time when the other students are engaged in seatwork or similar quiet activities.

The assessor should be positioned in order to see the student's face and should sit near enough to the student to clearly hear what the student says. When using a desk or small table, the assessor and student might sit across from each other, and with a larger table the assessor and student might sit around the corner from each other. The assessor should hold the clipboard in such a way that the student cannot see what is being written.

The Acadience Math Computation and Concepts and Applications assessments are conducted in a whole-group setting. They may be administered individually to students, as well.

Timing

It is important to time each measure according to the administration and scoring procedures for that measure. Timing allows the assessor to capture not only a student's knowledge and ability with the math skills, but also the student's fluency on and confidence with the skills.

Encouragement and Reinforcement

The Acadience Math measures are standardized assessments. What the assessor can say during testing is in bold italics in the administration procedures given in this manual. No other comments or prompts should be provided to the student as part of the testing situation. In particular, the administration scripts do not allow the assessor to tell students if they are right or wrong on an item during or after the assessment; however, it is appropriate for the assessor to provide general encouragement to students between measures (for example, between the BQD and NIF measures). It is best to reinforce the student's effort with general, non-specific statements such as, "You are working really hard."

Modeling and Practice Items

Most of the Acadience Math measures begin with the assessor modeling the activity. Modeling is intended to clearly communicate to the student what is expected on the task, and must be presented exactly as it is stated in the administration procedures. After the model, most Acadience Math measures then have practice items to let students try the task, with corrective feedback to ensure they understand it. The practice items and responses must be delivered exactly as they are stated in the administration procedures. The practice items and corrective feedback are intended to ensure the student understands the nature of the task and what is expected. They are not intended to teach the skill to students who have not learned the skill.

Repeating Directions or Items

If you judge that the student did not hear or understand the directions, a practice item, or a test item, you may repeat the directions or the item. If the timer is already running, the timer should continue to run while you are repeating the item. It is your responsibility as the assessor to articulate clearly and loudly enough for the student to hear. You are also responsible for ensuring that the testing environment is not too noisy or distracting, and that the student is attending adequately to the directions and items. If the student continually asks you to repeat items even when these issues have been adequately addressed, the student's hearing may need to be evaluated.

Discontinuing an Assessment

Each of the individually administered Acadience Math measures includes a discontinue rule as discussed previously for students who are unable to perform the task. When following the discontinue rule, stop the measure and record a score of zero.

Invalidating an Assessment

If an error was made in administering or scoring a measure, and that error cannot be corrected without retesting the student, then the score should be discarded as invalid. Reassess the student as soon as possible using an alternate form of the measure from the progress monitoring materials.

If a student refuses to participate in the testing, do not record a score. Stop the assessment and try again on another day, perhaps with an assessor who is more familiar to the student.

When you are able to determine that students are not able to give their best performance at that time, then do not test them, or if testing has already begun, then stop the assessment. For example, a student may not be wearing glasses or a hearing aid, seems ill or particularly nervous, or an interruption occurs such as a fire drill or an announcement. Under these circumstances, do not record a score. Reassess the student(s) at another time using an alternate form from the progress monitoring materials.

General Scoring Guidelines

Reminders

Each measure includes specific reminder prompts. In addition to those reminders, there are two general reminders that apply to all individually administered measures that include written material (Beginning Quantity Discrimination, Number Identification Fluency, Advanced Quantity Discrimination, and Missing Number Fluency):

- If the student stops and it is not a hesitation on a specific item, say ***Keep going***. *This reminder may be used as often as needed.*
- If the student appears confused about where to go next, point. *This reminder may be used as often as needed.*

Response Patterns

It is often valuable to note the student response patterns at the end of the administration for the Early Numeracy measures or after scoring the Computation or Concepts and Applications measures. Making a note of any noticeable or recurring student response patterns provides information about how the student performed on specific items and what types of errors were made. This information may be useful for planning instruction. These notes are especially useful if the person testing the student is different from the person who will be teaching the student. This information can also be valuable when forming groups after using the Initial Grouping Worksheets found in Appendix 2, pages 98–119.

Recording and Scoring Responses

Acadience Math Early Numeracy measures are designed to be recorded and scored in real time as the student is responding. At times it will be necessary to make a quick judgment about a student's response. It is important to use your best professional judgment and move on. Audiotaping is not recommended. The amount of time required to listen to and score tapes afterward makes the assessment inefficient. Additionally, it is often more difficult to score from audiotapes than scoring live due to poor sound quality and background noise.

Acadience Math Computation and Concepts and Applications measures are designed to be scored after the group administration has occurred. It will take approximately one to two minutes per worksheet to score.

Acadience Math measures are designed so that most students will not complete a measure within the time limit. For those few students who do, simply record the score achieved. Do not prorate the scores.

The individual chapters for each measure describe how to mark and score the student responses for that measure. The following rules apply to most Acadience Math measures:

- A slash mark denotes an incorrect response.
- An "sc" written above a slashed response denotes a self-correction, and the response is counted as correct.
- When a student provides multiple responses for the same item on the Early Numeracy measures, the responses are treated as self-corrections and the student's final response is scored.

Testing Materials

Acadience Math materials are available for benchmark assessment and progress monitoring for students in kindergarten through sixth grade. These materials can be downloaded for free from Acadience Learning or purchased in pre-printed packaged kits from Voyager Sopris Learning.

Benchmark Assessment Materials

Benchmark assessment materials are organized by grade, with one set for each grade from kindergarten through sixth grade. The benchmark assessment materials include:

- ***Benchmark Assessment Scoring Booklets for Kindergarten and First Grade.*** The kindergarten and first grade benchmark assessment scoring booklets contain all the scoring forms necessary for conducting benchmark assessment at the beginning, middle, and end of the school year, except for first grade Computation worksheets, which are included in a separate booklet. In addition to the scoring forms, the booklets include the assessor directions for administering the benchmark measures. The benchmark assessment scoring booklets for kindergarten and first grade include a cover sheet on which the scores are recorded for all benchmark measures, including Computation for first grade.

- ***Early Numeracy Benchmark Student Materials.*** The student materials are those that the student needs to look at during testing. Student materials are used for BQD, NIF, AQD, and MNF, but not for NNF. NNF is orally administered.
- ***Benchmark Assessment Student Booklets for Second–Sixth Grade.*** The benchmark assessment student booklets for second through sixth grade contain an optional response pattern analysis for each form, as well as a cover sheet on which the scores are recorded for both benchmark measures.
- ***Computation and Concepts and Applications Benchmark Assessment Student Worksheets.*** The student worksheets are the stand-alone worksheets to distribute to each student who will be receiving the Computation and Concepts and Applications assessments. For each benchmark assessment, two Computation worksheets are administrated (first through sixth grade) and one Concepts and Applications worksheet is administered (second through sixth grade). Computation and Concepts and Applications benchmark assessments can be administered to an entire class at once or individually.
- ***Computation and Concepts and Applications Benchmark Assessment Administration Directions and Teacher Keys.*** Computation and Concepts and Applications directions are not included in the student booklets for second through sixth grade because the measures can be administered to a group of students at once. Separate documents are provided for the administration directions and the teacher keys. The scoring keys are used to score the Computation and Concepts and Applications worksheets after collecting them from the students.

Progress Monitoring Assessment Materials

Progress monitoring materials are alternate forms, of equivalent difficulty, of the same measures administered during benchmark assessment. Not all students will need progress monitoring. Progress monitoring materials are organized by measure, since students who need progress monitoring will typically be monitored on specific measures related to the instruction they are receiving, rather than on every measure for that grade. The progress monitoring materials include the following:

- ***Early Numeracy Progress Monitoring Scoring Booklets.*** Each Early Numeracy progress monitoring scoring booklet contains the scoring forms for 20 alternate forms of a specific Early Numeracy measure. A booklet of 20 forms is available for BQD, NIF, NNF, AQD, and MNF. In addition to the scoring forms, each progress monitoring scoring booklet includes the assessor directions for the specified measure. All progress monitoring scoring booklets include a cover sheet on which the scores are recorded and graphed.
- ***Progress Monitoring Student Materials.*** The student materials are the materials that the student needs to look at during testing. Student materials are used for BQD, NIF, ADQ, and MNF, but not for NNF. NNF is orally administered.
- ***Computation and Concepts and Applications Progress Monitoring Student Booklets.*** Progress monitoring student booklets are provided for each level for Computation and Concepts and Applications. The booklets contain an optional response pattern analysis for each form, as well as a cover sheet on which the scores are recorded and graphed. Since some students may be monitored on out-of-grade materials, the Computation and Concepts and Applications booklets specify “Levels” rather than grades.

- ***Computation and Concepts and Applications Progress Monitoring Student Worksheets.*** The student worksheets are the stand-alone worksheets to distribute to each student who will be receiving progress monitoring on the Computation and/or Concepts and Applications measures. There are 20 different progress monitoring worksheets for each grade where Computation is administered (first through sixth grade) and where Concepts and Applications is administered (second through sixth grade). Since some students may be monitored on out-of-grade materials, these are labeled with "Levels" rather than grades. Computation and Concepts and Applications progress monitoring assessments can be administered individually or to a group of students who are all being monitored on Computation and/or Concepts and Applications.
- ***Computation and Concepts and Applications Progress Monitoring Administration Directions and Scoring Keys.*** Computation and Concepts and Applications directions are not included in the Student Booklets because the measures can be administered to a group of students at once. Stand-alone documents are provided for the Computation and Concepts and Applications administration directions and teacher keys. The teacher keys are used to score the Computation and Concepts and Applications worksheets after collecting them from the students. A set of teacher keys is provided for each measure and level (e.g., Level 1 Computation, Level 3 Concepts and Applications).

Accommodations

Assessment accommodations are used for those students for whom the standard administration conditions would not produce accurate results.

Approved Accommodations for Acadience Math

Approved accommodations are those accommodations that are unlikely to change how the assessment functions. When approved accommodations are used, the scores can be reported and interpreted as official Acadience Math scores (see *Table 2.1*). Approved accommodations should be used only for students for whom the accommodations are necessary to provide an accurate assessment of student skills.

Table 2.1 Accommodations Approved for Use With Acadience Math

Approved Accommodations	Appropriate Measures
The use of student materials that have been enlarged or with larger print for students with visual impairments.	All except for NNF*
The use of colored overlays, filters, or lighting adjustments for students with visual impairments.	All except for NNF*
The use of assistive technology, such as hearing aids and assistive listening devices (ALDs), for students with hearing impairments.	All
The use of a marker or ruler to focus student attention on the materials for students who are not able to demonstrate their skills adequately without one. It is good practice to attempt the assessment first without a marker or ruler and then retest with an alternate form of the assessment using a marker or ruler if needed.	All except for NNF*

*Accommodation is not applicable to NNF as it is orally administered.

Unapproved Accommodations for Acadience Math

Unapproved accommodations are accommodations that are likely to change how the assessment functions. Scores from measures administered with unapproved accommodations ***should not*** be treated or reported as official Acadience Math scores, and cannot be compared to other Acadience Math scores or benchmark goals.

An unapproved accommodation may be used when: (a) a student cannot be tested accurately using the standardized rules or approved accommodations, but the school would still like to measure progress for that student; or (b) a student's Individualized Education Plan (IEP) requires testing with an unapproved accommodation. Scores for a student using an unapproved accommodation can be used to measure individual growth for that student.

Examples of Unapproved Accommodations

- Students with limited English proficiency may be given the directions in their primary language.
- Students whose IEPs require assessments to be given untimed may be administered the Acadience Math measures without the timing component.
- Students whose IEPs require words or items be read out loud by the assessor may be administered the Acadience Math Concepts and Applications measures with items or words being read.

Training

Acadience Math was designed to be administered by educational professionals and other school-approved personnel, provided they have received sufficient training on Acadience Math administration and scoring rules. Educational professionals and school personnel who will be interpreting Acadience Math test results or using those results to make group- or student-level decisions should receive training in how to interpret that data.

It is the responsibility of the school-based administrator or other appropriate school leader to ensure that ample time is available for assessors to be trained prior to administering Acadience Math, and the responsibility of assessors to ensure that they are adequately trained and can administer and score Acadience Math reliably, according to the standardized procedures.

Training on Acadience Math should cover the following topics:

- Foundations of Acadience Math, including the purposes, design, uses, and research
- Administration and scoring of each measure
- Framework and procedures for data-based decision-making

Practice opportunities should take place during and after the training. Scores from practice administrations should not be used to make decisions about students. When practicing with students, use materials that they will not receive during actual test administration.

In order to use scores for educational decisions, the assessor must reliably administer the measures according to the rules given in this *Assessment Manual*. An Assessment Accuracy Checklist for each Early Numeracy measure is available in Appendix 3, pages 120–125.

A variety of training opportunities are available from the authors of Acadience Math. Learn more at www.acadiencelearning.org.

Appropriate Use of Acadience Math

The Acadience Math measures were designed for *formative assessment*, or assessment that is used to adapt teaching to meet student needs (see *Table 2.2*). Unlike high-stakes testing, which is used for decisions that have substantial consequences for students, such as retention or placement in special education, formative assessment is considered low-stakes testing because the results are used for making modifications to instruction to enhance student learning (Kaminski & Cummings, 2007).

Table 2.2 Uses of Acadience Math

	Appropriate Uses	Inappropriate Uses
Student Level	• Identify students who may be at risk for math difficulties • Help identify areas to target instructional support • Monitor at-risk students while they receive additional, targeted instruction	• Label, track, or grade students • Make decisions regarding retention and promotion
Systems Level	• Examine the effectiveness of a school's system of instructional supports	• Evaluate teachers • Make decisions about funding • Make decisions about rewards for improved performance or sanctions for low performance

Test Security

Test items or copies of the Acadience Math assessments should never be used for student instruction or practice in the classroom or at home. Such practices compromise the validity and value of Acadience Math as a measurement tool. Having students practice the tests may result in artificially high scores, which could prevent those students from receiving the instruction they need.

Chapter 3: **Interpreting Acadience Math Data**

There are four frames of reference in providing meaning for Acadience Math scores: (a) criterion-referenced benchmark goals and cut points for risk; (b) individually referenced interpretations; (c) local norm-referenced interpretations; and (d) system-wide or national, norm-referenced interpretations. While all frames of reference provide valuable information about a student, the authors of Acadience Math generally regard the criterion-referenced information as most important, followed by the individually referenced information, and then the local norm-referenced information.

These four frames of reference can be used to interpret results on individual scores and on the Math Composite Score (MCS). The MCS is a combination of multiple Acadience Math scores and provides the best overall estimate of the student's math proficiency. For more information about the MCS as well as worksheets for calculating it, see Appendix 4, pages 126–158.

Criterion-Referenced Interpretations: Understanding Benchmark Goals and Cut Points for Risk

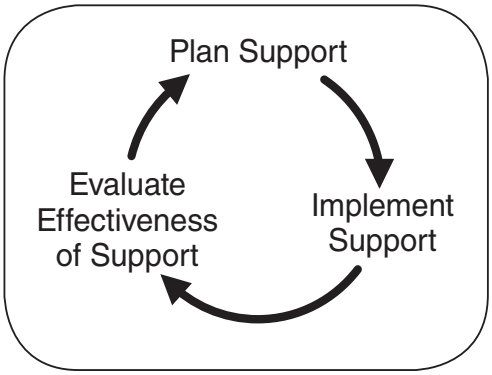
Acadience Math benchmark goals are empirically derived, criterion-referenced target scores that represent adequate math progress. A benchmark goal indicates a level of skill at which the student is likely to achieve the next Acadience Math benchmark goal or math outcome. Benchmark goals for Acadience Math are based on research that examines the predictive validity of a score on a measure at a particular point in time, compared to later Acadience Math measures and external outcome assessments. If a student achieves a benchmark goal, then the odds are in favor of that student achieving later math outcomes if the student receives research-based instruction from a core classroom curriculum.

The *cut points* for risk indicate a level of skill below which the student is unlikely to achieve subsequent math goals without receiving additional, targeted instructional support. Students with scores below the cut point for risk are identified as likely to need *intensive support.* Intensive support refers to interventions that incorporate something more or something different from the core curriculum or supplemental support. Intensive support might entail:

- delivering instruction in a smaller group;
- providing more instructional time or more practice;
- presenting smaller skill steps in the instructional hierarchy;
- providing more explicit modeling and instruction; and/or
- providing greater scaffolding.

Because students needing intensive support are likely to have individual and sometimes unique needs, their progress is monitored frequently and their intervention is modified dynamically to ensure adequate progress (see *Figure 3.1*).

Figure 3.1 Plan, Implement, and Evaluate Support Cycle from the Outcomes-Driven Model



These progress monitoring steps from the Outcomes-Driven Model (see Figure 1.2, page 5) provide an intervention feedback loop. By planning, implementing, and evaluating the effectiveness of support in an ongoing loop, the intervention can be modified dynamically to meet the student's needs.

Students are likely to need *strategic support* when their scores are between the benchmark goal and the cut point for risk. In this range, a student's future performance is harder to predict. Strategic instructional support is carefully targeted additional support in the skill areas where the student is having difficulty. These students should be monitored regularly to ensure they are making adequate progress, and should receive increased or modified support, if necessary, to achieve subsequent math goals (see *Figure 3.1*).

To gain a better understanding of what Acadience Math results mean in a local context, districts and schools can examine the linkages between the Acadience Math benchmark goals and cut points for risk and their own outcome assessments, such as state-level criterion-referenced tests. By comparing Acadience Math measures to an outcomes assessment and by calculating conditional probabilities (e.g., "80% of students at benchmark on Acadience Math Computation at the end of third grade met the Proficient level on the state criterion-referenced test"), schools can determine how the Acadience Math benchmark goals compare to their own external criteria.

A score at or above the benchmark goal indicates that the odds are in the student's favor of achieving the next goal, but it is not a guarantee. For example, if students at or above the benchmark goal have an 85% chance of meeting the next goal, that means that 15% of students in the benchmark range may not achieve that goal. Some students who achieve scores at or above the benchmark goal may still need supplemental support to achieve the next goal. It is important to attend to other indicators of risk when planning support for students, such as attendance, behavior, motivation, vocabulary and language skills, reading skills, and other related skill areas.

The Acadience Math benchmark goals and cut points for risk can be found in Appendix 4, pages 126–158.

Table 3.1 provides interpretations of student performance with respect to the benchmark goals and cut points for risk.

Table 3.1 Student Performance Interpretations

Likelihood of Meeting Later Math Goals	Benchmark Status	Benchmark Status Including Above Benchmark	What It Means
>99% 95% 90% 80% 70% 60%	**At or Above Benchmark** *overall likelihood of achieving subsequent math goals: 80% to 90%*	**Above Benchmark** *overall likelihood of achieving subsequent math goals: 90% to 99%*	For students with scores in this range, the odds of achieving subsequent math goals are very good. These students likely need effective core instruction to meet subsequent math goals. Some students may benefit from instruction on more advanced skills.
		At Benchmark *overall likelihood of achieving subsequent math goals: 70% to 85%*	For students with scores in this range, the odds are in favor of achieving subsequent math goals. The higher above the benchmark goal, the better the odds. These students likely need effective core instruction to meet subsequent math goals. Some students may require monitoring and strategic support on specific component skills as needed.
55% 50% 45% 40%	**Below Benchmark** *overall likelihood of achieving subsequent math goals: 40% to 60%*	**Below Benchmark** *overall likelihood of achieving subsequent math goals: 40% to 60%*	For students with scores in this range, the overall odds of achieving subsequent math goals are approximately even, and hard to predict. Within this range, the closer students' scores are to the benchmark goal, the better the odds; the closer students' scores are to the cut point, the lower the odds. These students likely need core instruction coupled with strategic support, targeted to their individual needs, to meet subsequent math goals. For some students whose scores are close to the benchmark goal, effective core instruction may be sufficient; students whose scores are close to the cut point may require more intensive support.
30% 20% 10% <5%	**Well Below Benchmark** *overall likelihood of achieving subsequent math goals: 10% to 20%*	**Well Below Benchmark** *overall likelihood of achieving subsequent math goals: 10% to 20%*	For students with scores in this range, the overall odds of achieving subsequent math goals are low. These students likely need intensive support in addition to effective core instruction. These students may also need support on prerequisite skills (i.e., below grade level) depending upon the grade level and how far below the benchmark their skills are.

The addition of the Above Benchmark status level has not changed the benchmark goals. A benchmark goal is still the point at which the odds are in the student's favor of meeting later math goals (approximately 60% likelihood or higher). The higher above the benchmark goal the student scores, the better the odds. For students who are already at benchmark, the Above Benchmark status level also provides a higher goal to aim for.

"Overall likelihood" refers to the approximate percentage of students within the category who achieve later goals, although the exact percentage varies by grade, year, and measure (see *Acadience Math Benchmark Goals and Composite Score Document*).

Instructional decisions should be made based on students' patterns of performance across all measures, in addition to other available information on student skills, such as diagnostic assessment or in-class work.

Individually Referenced Interpretations: Analyzing Student Growth and Progress Over Time

In addition to information on where a student is performing relative to the benchmark goals and cut points for risk, Acadience Math also allows interpretations based on where the student's skills are relative to their past performance. For example, even though a student's Computation score of 45 correct digits might be below the cut point for risk, the score of 45 might represent substantial progress compared to previous scores. For individually referenced interpretations, Acadience Math results are used to examine individual student performance over time. Evaluating student growth is essential in determining whether the student is making adequate progress toward later goals. Examining student growth (i.e., progress monitoring) is also essential in RtI models of service delivery and educational decision-making. Progress monitoring helps the teacher decide whether the instructional support the student is receiving is adequately addressing the student's needs, or whether changes should be made to that support.

Local Norm-Referenced Interpretations: Comparing Students Districtwide

Local norms allow a school or district to compare an individual student's performance to other students in the district. Local norms have the important advantage of being representative of the student's district. Another important advantage is that local norms can be updated yearly. If a district's population changes over time, local norms from the current year will continue to be representative of that population. Although local norms are representative of the district, they are not necessarily representative of the national population. If the average achievement in a given school is below the national average achievement score, all percentile ranks would be affected. For example, the score at the 40th percentile in a low-performing district may be at the 20th percentile in a high-performing district. Local normative comparisons also can be problematic when a small number of students are included. All students in the district should be included when determining local norms, but small districts may not have enough students for stable local normative comparisons.

Local norms can be valuable for a district when making decisions about providing additional support for students. Districts have the flexibility of choosing a level, based on local norms, below which students are provided with additional instructional support. Districts can make this choice based on any pertinent considerations, including financial and staff resources. If a district is able to provide support to 50% of students, students may be selected for support who are at the 50th percentile or lower on Acadience Math. If a district is able to provide additional support to only 15% of students, students can be selected who are at the 15th percentile or lower on Acadience Math. By using districtwide local norms, students with equivalent needs in different schools can be provided with support.

For norm-referenced interpretations with Acadience Math, descriptors for levels of performance are provided in *Table 3.2*. The performance descriptors are intended to describe the current level of skill for the student in comparison to other students in the district. They are not intended as statements about what the student is capable of learning with appropriate effective instruction.

Table 3.2 Levels of Performance

Percentile Ranges	**Performance Descriptors** Compared to other students in the school or district, the student's performance is:
98th percentile and above	Upper Extreme
91st to 97th percentile	Well-Above Average
76th to 90th percentile	Above Average
25th to 75th percentile	Average
9th to 24th percentile	Below Average
3rd to 8th percentile	Well-Below Average
2nd percentile and below	Lower Extreme

National Norm-Referenced Interpretations: Comparing Students in a Larger Context

National norms allow a school or district to compare a student's performance to other students. A disadvantage of national norms is that they may not be representative of the characteristics of students in a particular district. It is important for district and school leaders to obtain information about the norm sample and assess its relevance to their particular demographic prior to making decisions about students or overall district performance.

The primary value of national normative information is to provide an alternative perspective on student performance. When norms are based on a large and nationally representative sample of students, they can provide an indication of national student achievement in math. For instance, if 62 correct digits on Computation at the end of fifth grade is at the 50th percentile in local district norms, and is at the 60th percentile on national norms, then the average achievement in the district is above the national average. Similarly, at an individual student level, a student might be at the 55th percentile compared to local norms, but might be at the 5th percentile compared to national norms. In this context, the student might appear to be making adequate progress but the national normative information clarifies that the student is still of concern in a larger context. Considering local norms and national norms can provide a balanced perspective on the student's skills and needs. For information on Acadience Math national norms, see the *Acadience Math National Norms 2016–2017 Technical Report* (Gray, Wheeler, & Good, 2019) at www.acadiencelearning.org.

The Importance of Response Patterns

In addition to interpreting scores from a criterion-referenced, individually referenced, local norm-referenced, or national norm-referenced perspective, the pattern of behavior that the student displays on the assessment is also important (see *Figure 3.2*). Acadience Math measures are designed to be indicators of math skills. If the student achieves a score above the benchmark goal but does so in a way that indicates that the math skill has not been mastered, the student may still need additional support to be on track. For example, if a student reaches the benchmark goal on Computation but does so by completing only the addition problems, that student may not be as likely to reach the next goal as a student who achieves the benchmark goal by approaching the problems in the order that they are presented on the worksheet. For this reason, the Computation and Concepts

and Applications measures include an optional response pattern analysis. Teachers and other specialists who interpret Acadience Math results to provide instruction for students should review the types of responses for students in their classes. This information, in addition to the raw scores, can dramatically guide instructional strategies.

Figure 3.2 Response Pattern Analysis Example (Level 2)

Concepts and Applications / Progress Monitoring 1

Problems	Skills Assessed
1	**Work with equal groups of objects to gain foundations for multiplication:** Determine the total number of circles or squares.
2, 9	**Reason with shapes and their attributes:** 2. Determine the number of shares (varying between 2 and 4) into which a circle or rectangle is divided. 9. Identify the target shape from a group of shapes that include a triangle, quadrilateral, pentagon, hexagon, and cube.
3, 13	**Understand place value:** 3. Compare two three-digit whole numbers. 13. Determine place value by identifying the number in the ones place and tens place for a three-digit whole number.
4	**Measure and estimate lengths in standard units:** Determine the length of a line in inches.
5, 7, 12, 15	**Represent and solve problems involving addition or subtraction:** 5. Represent and solve problems with two-step addition. 7. Represent and solve problems involving one-step addition with numbers from 2 to 9. 12. Represent and solve problems involving one-step subtraction with a given formula. 15. Represent and solve problems involving two-step subtraction.
6, 14, 16	**Work with time and money:** 6. Transfer the time from a digital clock to an analog clock with times set at 5-minute increments. 14. Transfer the time from an analog clock to a digital clock with times set at 5-minute increments. 16. Add three different coin amounts together resulting in a total amount of money under $1.
8, 11	**Relate addition and subtraction to length:** 8. Determine how much shorter or longer, in inches, one object is than another. 11. Solve one-step addition problems that determine the length of two objects together.
10	**Use place value understanding and properties of operations:** Subtract/add a two-digit number from/to a three-digit number, resulting in a three-digit difference/sum.

Chapter 4: **Implementing Acadience Math in Your School**

Acadience Math assessment is conducted in two ways: benchmark assessment and progress monitoring. Benchmark assessment is the process of universally screening all students in a grade, school, or district three times per year. There are two primary purposes for conducting benchmark assessment: (a) identifying students who may not be on track to reach important math outcomes and (b) providing schoolwide indices of status and progress. Students who are identified as not being on track during benchmark assessment are likely to need additional instructional assistance to reach future benchmark goals. Progress monitoring is the more frequent, ongoing measurement of individual student growth for students who are receiving additional instructional assistance, to ensure that those students are making adequate progress.

Conducting Benchmark Assessment

When to Test

Benchmark assessment is conducted three times per school year, at the beginning, middle, and end of the school year. Recommended testing windows are shown in *Table 4.1*.

Table 4.1 Benchmark Assessment Yearly Schedule

Time of Year	***Beginning of Year Benchmark 1***	***Middle of Year Benchmark 2***	***End of Year Benchmark 3***
Recommended testing windows	Months 1 to 3 of the school year	Months 4 to 6 of the school year	Months 7 to 9 of the school year
Most frequent benchmark month	Month 1	Month 5	Month 9
Example benchmark schedule for a district with a September to June school calendar	September	January	May

Benchmark assessment can take place any time within the recommended testing windows. However, the times provided as examples are most closely aligned with the timing of the Acadience Math benchmark goals.

When a school or district schedules a time for benchmark assessment within the three-month window, all testing should occur within a two- to three-week time frame so that students have had roughly the same

amount of instructional time. When scheduling benchmark assessments, it may be helpful to use the school calendar to avoid other assessments, holidays, and important school events. There should be a roughly equal amount of time between benchmark assessments, and one to two weeks should be allowed after the start of school or a major break to give students time to adjust.

Who Administers Benchmark Assessment

Any educator who has been trained on Acadience Math administration and scoring can conduct Acadience Math benchmark assessments. This might include classroom teachers, special educators, specialists, instructional assistants, principals, related service personnel such as speech/language therapists and school psychologists, counselors, central office administrators, and librarians. It is important that the data are shared with those who teach the student regardless of who administers the testing.

Testing Approaches

Multiple approaches to conducting Acadience Math benchmark assessment are possible. Each approach has advantages and disadvantages. Selecting an approach will depend on the resources and characteristics of a particular school or district. Three common approaches are detailed below.

Within-Classroom. The within-classroom approach involves classroom teachers, and their assistants when available, conducting benchmark assessment on all of their students. Typically this approach consists of using a portion of class time each day over the designated testing window to assess students. For example, in a kindergarten classroom with 25 students, the assessment could be completed in one week by assessing 5 students per day. An advantage of this approach is that classroom teachers can participate in assessing all of their students. A disadvantage is that this approach takes time away from instruction. In addition, it may promote a within-classroom as opposed to a schoolwide approach to providing support to change math outcomes.

Schoolwide: One Day. The schoolwide approach to conducting benchmark assessment in one day involves a large team of trained assessors. In this approach, the team assesses a class at a time. If classroom teachers participate in testing their own students, a substitute teacher or assistant may cover the classroom during that block of time. Assessors may be stationed in a central location, such as the library, or may be stationed around the school in designated assessment locations. To complete the benchmark assessment in one day, the team needs to be large enough to cycle through the school. Advantages of this approach include efficient testing and minimal disruption to instruction in each classroom. Disadvantages include the need for a large team of trained assessors, the potential for disruption to special services for the day if support staff are involved, and, if needed, funding for substitute teachers and/or additional assessors.

Schoolwide: Multiple Days. The multi-day schoolwide approach uses a smaller team to cycle through all of the classrooms in a school. An advantage of this approach is that it requires a smaller assessment team. A disadvantage is that it takes longer overall to collect the benchmark data.

Time Required for Testing

The amount of time it will take to complete the benchmark assessment for each student will vary by grade and time of year. *Table 4.2* provides an estimate of the time required per student.

Table 4.2 Estimated Time Requirements for Benchmark Assessment

Grade	Time of Year and Measures	Time to Test	Total
Kindergarten	BOY, MOY, EOY: BQD, NIF, NNF	Three 1-minute tests given individually	3 minutes
First Grade	BOY: NIF, NNF, AQD, MNF, Computation	Four 1-minute tests given individually Two 2-minute tests done whole class	8 minutes
	MOY, EOY: AQD, MNF, Computation	Two 1-minute tests given individually Two 2-minute tests done whole class	6 minutes
Second Grade	BOY, MOY, EOY: Computation, Concepts and Applications	Two 2-minute tests and one 5-minute test done whole class	9 minutes
Third–Sixth Grade	BOY, MOY, EOY: Computation, Concepts and Applications	Two 3- to 6-minute tests and one 10- to 16-minute test	18–28 minutes

Note: BOY = beginning of year, MOY = middle of year, EOY = end of year. Time to test does not take into account time required for scoring the measures.

Managing Materials

The benchmark assessment will go more smoothly if the materials are prepared ahead of time. It may be helpful to assign one person in the district and at each school to manage the materials. In addition to the assessment materials listed in Chapter 2, each assessor will need a pen or pencil, stopwatch or timer, and a clipboard. Each student in grades first through sixth will also need a pencil.

It is helpful to have the scoring booklets and/or student worksheets prepared ahead of time. Labels can be printed with the student name and ID number, teacher name, school, and school year ahead of time and attached to the scoring booklets and/or student worksheets. Then the booklets can be grouped by classroom for efficient use on the day of assessment.

Ensuring Accurate Results

In order to interpret the results of testing and use that data to make decisions about instruction, it is important that the measures are administered and scored correctly. To ensure the accuracy of the data, the following steps can be taken:

- All assessors must be trained as detailed on page 14 of Chapter 2 and should practice until they can reliably administer the measures according to the rules given in this manual. Appendix 3, pages 120–125, includes Assessment Accuracy Checklists that can be used during practice to check the assessor's accuracy.
- The administration and scoring procedures detailed in this manual and/or the brief trainings should be reviewed before each benchmark period, with periodic accuracy checks for all assessors.
- Shadow-scoring is one way to be sure that each assessor is giving and scoring each Acadience Math measure according to the standardized procedures. Shadow-scoring for Early Numeracy involves two assessors working with a student at the same time. One assessor interacts with the student and administers the measures while the other is simultaneously timing and scoring,

using the Assessment Accuracy Checklists to provide constructive feedback. At the end of the assessment, the two assessors compare timing and scores. Shadow-scoring the Computation and Concepts and Applications assessments involves making a copy of an unscored student worksheet and having two assessors score the worksheet independently. A general guideline is that both assessors should be within 2 points of each other on each score. This manual serves as a reference to resolve any disagreement.

- To ensure that the scores used for decision-making are the scores that students actually received, check that the scores were calculated correctly and entered into the data management system correctly. It is recommended that approximately 10% of student booklets be rescored to check for accuracy, and that 10% of the scores on the booklets are checked against the scores entered in the system.

Establishing Rapport

An assessor who is unfamiliar to the student being tested may engage the student in a brief conversation prior to the assessment. This helps put the student at ease and provides a brief sample of language to identify articulation errors. The assessor should also make eye contact with the student during the assessment. Although the directions must be read verbatim, they should be read in a friendly tone of voice, and not a monotone. The priority is to follow standard procedures while still getting the best possible performance from the child. Be sensitive to any needs or issues that may come up for the student during the assessment.

Measures Used in Benchmark Assessment

Benchmark assessment includes a number of different measures based on the grade and time of year and is always administered using grade-level materials. For all Early Numeracy measures, scoring forms are included in the scoring booklet for that grade, and student materials are available as separate sheets. For Computation and Concepts and Applications, students fill out separate worksheets. The benchmark time periods are identified by a number and a label. Benchmark 1 is used at the beginning of the school year and is identified as Beginning; Benchmark 2 is used in the middle of the school year and is identified as Middle; and Benchmark 3 is used at the end of the school year and is identified as End. Note that for Computation, two worksheets are administered for each benchmark assessment, and the average score from the two worksheets is recorded. Using the average score from two worksheets gives the best indicator of student performance.

In most cases, the Acadience Math benchmark measures that are individually administered should be given to a student in a single sitting in the order in which they appear in the scoring booklet. If a student has difficulty focusing for the amount of time necessary to complete all measures, it may be necessary to assess the student in multiple sessions. Computation and Concepts and Applications can be administered to an entire class at once and can be given on separate days from each other.

Data Management and Reporting

After the benchmark testing is complete, the data should be organized so that educators can access and use the results easily. It is useful to collect benchmark data only if they are then used for planning instruction. The first step is to record the scores on the cover page of the scoring booklet for easy access. The next two pages show examples of how to record student information and scores on the cover pages of the benchmark scoring booklets.

Figure 4.1 Example of a First Grade Benchmark Scoring Booklet Cover Sheet

grade 1 Benchmark Assessment

acadience math

First Grade Scoring Booklet

Name: Samantha Student ID: 447523

Teacher: Quintana School: Glenoaks School Year: 19-20

	Benchmark 1	Benchmark 2	Benchmark 3
Date			
Number Identification Fluency	28		
Next Number Fluency	16		
Advanced Quantity Discrimination	18		
Missing Number Fluency	2		
Computation Form A	1		
Computation Form B	2		
Computation (Form A + Form B)/2			

Figure 4.2 Example of a Second Grade Benchmark Scoring Booklet Cover Sheet

grade 2 Benchmark Assessment

acadience math

Second Grade Student Booklet

Name: Niko Student ID: 447126

Teacher: Jackson School: Glenoaks School Year: 19-20

	Benchmark 1	Benchmark 2	Benchmark 3
Date			
Computation Form A	8		
Computation Form B	14		
Computation Average (Form A + Form B)/2	11		
Concepts and Applications	26		

The next step is to record the results in a data management system that can then summarize and report the data in way that is useful for teachers and administrators. Options include organizing results in a table or spreadsheet or using a web-based data management service that allows for entry and reporting of Acadience Math scores. An advantage of a data management service is that once the student scores are entered, reports are available immediately at the district, school, grade, classroom, and individual student level. It is important to use a system that provides results quickly and presents those results in ways that help teachers and administrators make decisions about instruction.

Acadience Data Management is available from the authors at Acadience Learning: www.acadiencelearning.net.

Conducting Progress Monitoring

Progress monitoring is done with students who are not on track with math skills at the time of the Acadience Math benchmark assessment. The purpose of progress monitoring is to provide ongoing feedback to the teacher about the effectiveness of instruction and to make timely decisions about changes to instruction so that students will meet grade-level goals. Progress monitoring involves ongoing assessment of target skills for students who are receiving instruction in those skills.

The standardized procedures for administering an Acadience Math measure apply when using Acadience Math for progress monitoring.

Identifying Students for Progress Monitoring

Students who are below the benchmark goal on one or more measures may receive progress monitoring assessment in targeted areas that are the focus of instruction or intervention. Teachers may also choose to monitor any other students about whose progress they have concerns. For example, if a student has met the benchmark goal but has highly variable performance, poor attendance, or behavioral issues, the teacher may choose to monitor that student, particularly if the student's score is just above the benchmark goal.

Selecting Acadience Math Measures for Progress Monitoring

Students should be monitored in material that matches the skill area or areas targeted for instruction. In most cases, progress monitoring will focus on one measure only, which should represent the student's instructional level of the skill area targeted for instruction. Sometimes it is appropriate to monitor a student using more than one Acadience Math measure. For example, a second-grade student might be monitored once per week with Next Number Fluency and once per month with first grade Computation as a way to track acquisition of the strategic counting skills and basic computation skills.

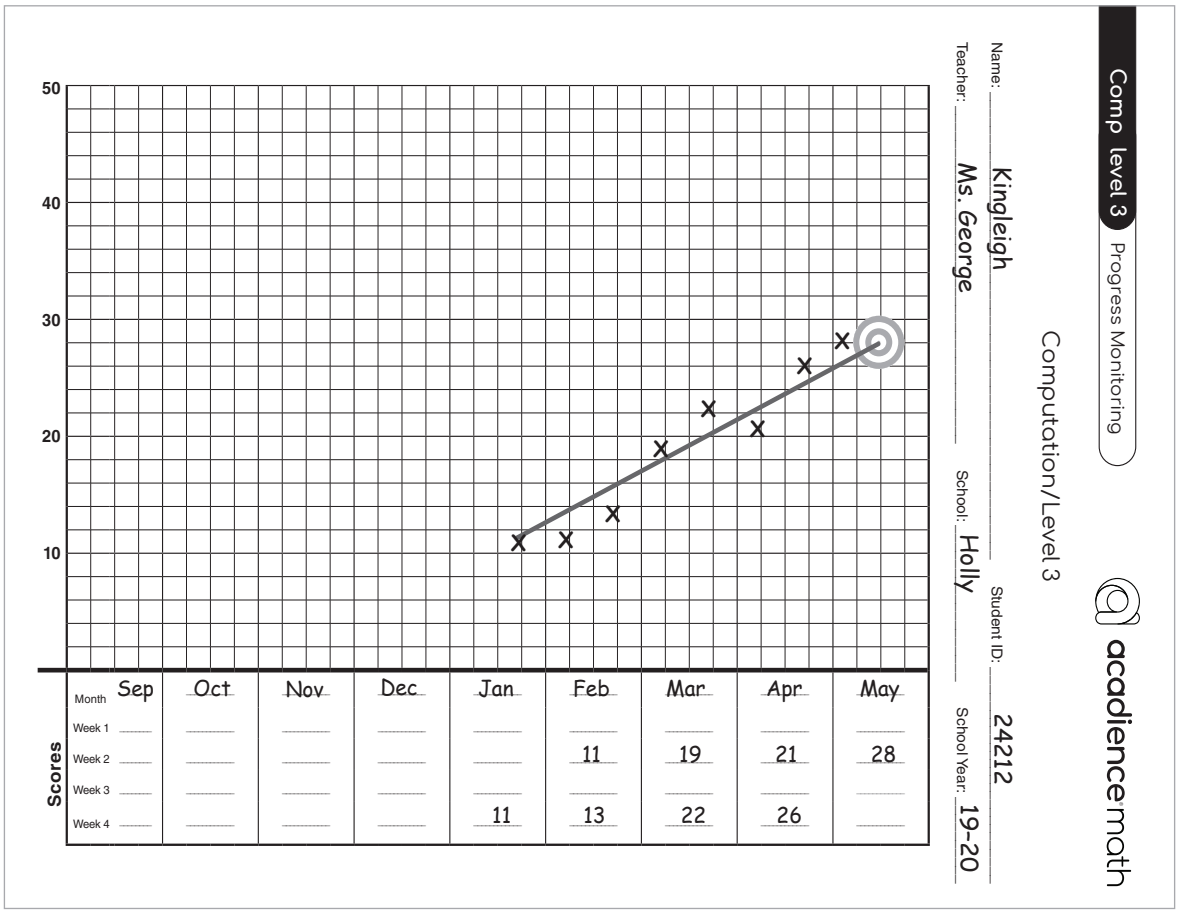
Progress monitoring forms should be administered in the order they appear in the booklet. Note that for Computation, while two worksheets are administered during benchmark assessment, a single worksheet is administered each time for progress monitoring. Educational decisions should be based on at least three test administrations.

Material selected for progress monitoring must be sensitive to growth, yet still represent an ambitious goal. The appropriate monitoring level can be identified using survey-level assessment, or "testing back" until the appropriate level is found. Material that is too difficult will not be sensitive to small changes in student skill and can result in student and teacher frustration as well as inaccurate decisions about the effectiveness of instruction. Material that is too easy will not leave enough distance between the current level of student performance and the goal, likely resulting in lowered expectations and less progress. For students who are performing below grade level, the purpose of progress monitoring is to provide information to guide instruction, with the primary goal of instruction being to improve student progress and bring the student up to grade-level performance.

Data Management and Reporting

The front cover of each progress monitoring scoring booklet includes a graph to record the scores. Progress monitoring data should be graphed and readily available to those who teach the student. An aimline should be drawn from the student's current skill level (which may be the most recent benchmark assessment score) to the goal. Progress monitoring scores can then be plotted over time and examined to determine whether they indicate that the student is making adequate progress (i.e., fall above or below the aimline). *Figure 4.3* is an example of how to record student information and scores on a progress monitoring scoring booklet cover sheet, as well as how to graph the scores and draw an aimline.

Figure 4.3 Example of a Level 3 Progress Monitoring Booklet Cover Sheet



Setting Progress Monitoring Goals

A progress monitoring goal has two components: the score to aim for and the time frame in which to reach it. When monitoring a student in grade-level materials, use the standard Acadience Math benchmark goals and the standard time frame in which they should be reached. Benchmark goals for Acadience Math can be found in Appendix 4, pages 126–158.

When monitoring a student in below-grade materials, the following steps are recommended:

Step 1: Determine the student's current level of performance.

Step 2: Determine the score to aim for based on the end-of-year goal for the level of materials being used for monitoring.

Step 3: Set the time frame so that the goal is achieved in half the time in which it would normally be achieved (e.g., moving the end-of-year benchmark goal to be achieved by the mid-year benchmark date). The intent is to establish a goal that will accelerate progress and support a student to catch up to their peers.

Step 4: Draw an aimline connecting the current performance to the goal.

When to Administer Progress Monitoring Assessment

Although progress monitoring is a helpful support to math instruction and intervention, it should be conducted so as to minimize time taken from math instruction. For example, if the decision is to monitor progress weekly for a small group of five students on Next Number Fluency, one student could be assessed on Monday for 2 minutes at the end of the intervention time. The second student could be assessed on Tuesday, and so on for the remaining students. Each student would then be monitored weekly, but only a single student per day.

Who Administers Progress Monitoring Assessment

Any educator who has been trained in Acadience Math can conduct progress monitoring. This group of educators might include classroom teachers, special educators, math specialists, instructional assistants, principals, related service personnel such as speech/language therapists and school psychologists, counselors, central office administrators, and librarians. It is important that regardless of who administers the testing, the data are shared with those who teach the student, whether in the classroom or intervention setting.

Frequency of Progress Monitoring

Students receiving progress monitoring should be monitored as frequently as needed to make timely decisions about the effectiveness of the intervention. In general, this would be approximately once per week for students receiving intensive support and once every two to four weeks for students receiving strategic support.

Making Decisions With Progress Monitoring Data

Progress monitoring data should be reviewed at regular intervals. This review can be done by a classroom teacher and/or a team of educators working with a student. In general, if three consecutive data points fall below the aimline, the team should meet and make a considered decision about maintaining or modifying the instruction. If the student's progress is not likely to result in meeting the goal, then instruction should be changed. The overarching goal is to make good decisions regarding instruction to improve student outcomes.

Communicating With Students, Parents, and School Personnel

Preparing Students for Benchmark Assessment

Before each of the three benchmark assessments, teachers may make a statement to the class about the testing and about what students can expect to experience. The goal of the statement is to inform students and put them at ease, while encouraging them to do their best. It may be helpful to introduce the adults who will participate in the assessment and announce the locations where it will take place.

Informing Parents About Math Assessment

Parents and guardians are important partners in improving math outcomes. It is good policy to communicate to parents about the assessment tools used at school. Information to communicate might include:

- an explanation of the skills that are measured by Acadience Math and why those skills are important;
- who will see the results;
- how and when parents will receive information about their child's performance;
- how the results will be used; and
- who to contact for more information.

A Sample Parent Announcement Letter is included in Appendix 5, pages 159.

Sharing Results With Parents

Following each benchmark assessment, Acadience Math results may be communicated to each student's parents or guardians. The communication might include what the expectation for adequate progress is for that grade and time of year, how the student performed relative to that expectation, and any appropriate next steps. A Sample Results Letter is included in Appendix 5, page 160. Acadience Math results also may be shared and discussed at parent-teacher conferences.

Acadience Math progress monitoring information may also be communicated to parents or guardians. When progress monitoring occurs in the context of general education support, the procedures may be discussed with parents, including the educational concerns, the instructional support that is being provided, who will be collecting progress monitoring data, and how often the data will be shared. Engaging parents as partners in working toward important math goals can be a powerful strategy for improving student outcomes. When progress monitoring is part of an evaluation for special education eligibility, appropriate informed consent procedures should be followed.

Sharing Results With School Personnel

Following each benchmark assessment, schedule time to discuss and analyze the Acadience Math data with classroom teachers and other appropriate support staff who teach those students. An efficient way to review the results is during a grade-level meeting that includes resource staff who support that grade. In addition to reviewing the results in a meeting, the data should be made readily accessible to the classroom teachers and support staff who need to use it for making ongoing decisions about instruction.

Chapter 5: **Beginning Quantity Discrimination (BQD)**

Overview

Skill	Magnitude Comparison and Subitization (indirectly)
Administration Time	1 minute
Administration Schedule	Beginning of kindergarten to end of kindergarten
Score	1 point for each correctly identified number
Wait Rule	If the student does not respond within 3 seconds on an item, provide the correct answer and mark a slash (/) through the number.
Discontinue Rule	0 points in the first four items (the first page)

What is BQD?

Beginning Quantity Discrimination is a standardized, individually administered measure of early numeracy that assesses a student's ability to discriminate between two quantities. Magnitude comparison is related to other critical areas of mathematical performance such as mental calculation and place value (Gersten et al., 2012). BQD is also an indirect measure of subitizing, the ability to instantly judge the number associated with a group of items. Subitization is thought to be an important precursor to math development. Research has found there is a significant link between subitizing ability and mathematical skills in kindergarten-aged children (Yun et al., 2011). Subitizing is also predictive of later mathematics performance (Desoete & Grégoire, 2007).

To administer BQD, the assessor presents the student with a sheet that contains a series of boxes with two patterns of dots in them and asks the student to orally name the number of dots that is the larger quantity. Since BQD assesses a student's fluency with quantity discrimination, the measure is timed. The assessor begins the stopwatch immediately after telling the student to begin and stops it at the end of 1 minute.

Materials

- Scoring booklet
- Student materials
- Stopwatch or timer
- Pencil

Administration Directions

Follow these directions exactly each time with each student. Say the words in bold italic type verbatim. Begin with the practice activities. The practice activities are designed to introduce the assessment task to the student. They are untimed and include correction procedures. The correction procedures are not used once the testing begins.

Practice Items

1. Place the Beginning Quantity Discrimination scoring sheet on the clipboard and position it so that the student cannot see what you record.
2. Show the student the Beginning Quantity Discrimination Practice Sheet. Say these directions to the student:

▶ ***We are going to look at boxes that have dots in them. Some boxes have more dots. We are going to say the number of dots that is more. This is 4 dots*** (point to the box that has 4 dots) ***and this is 8 dots*** (point to the box that has 8 dots)***. 8 is more.***

Practice item #1) ***Your turn. This is 4 dots*** (point to the box that has 4 dots) ***and this is 2 dots*** (point to the box that has 2 dots)***. Which one is more? Say the number of dots.***

Correct response	***Very good, 4 is more.***			(Present practice item #2.)
Incorrect response Student does not respond within 3 seconds or responds incorrectly	***4 is more*** (touch box with 4 dots)***. Your turn. Which one is more?*** (Wait for a response.)	*Correct response*	***Good.***	(Present practice item #2.)
		Incorrect response	***4 is more.***	(Present practice item #2.)

▶ Practice item #2) ***Let's try another. Which one is more*** (touch box with 3 and box with 5)***? Remember to say the number that is more.***

Correct response	***Very good, 5 is more.***			(Present practice item #3.)
Incorrect response Student does not respond within 3 seconds or responds incorrectly	***5 is more*** (touch box with 5 dots)***. Your turn. Which one is more?*** (Wait for a response.)	*Correct response*	***Good.***	(Present practice item #3.)
		Incorrect response	***5 is more.***	(Present practice item #3.)

▶ Practice item #3) ***Let's try another.*** (Point to the next problem and wait up to 3 seconds for the student to respond.) If the student does not respond, say ***Which one is more?***

Correct response	***Very good. 10 is more.***			(Begin testing.)
Incorrect response Student does not respond within 3 seconds or responds incorrectly	***10 is more. Your turn. Which one is more?*** (Wait for a response.)	*Correct response*	***Good.***	(Begin testing.)
		Incorrect response	***10 is more.***	(Begin testing.)

▶ Begin testing. ***Now you will see more boxes with dots*** (place student sheet in front of the student)***. Start here*** (sweep finger under first set of boxes) ***and then go down*** (point to next set of boxes)***. You tell me which one is more. Remember to say the number. Put your finger under the first set of boxes*** (point to the first set of boxes)***. Ready, begin.***

Administration and Scoring Procedures

1. Start your stopwatch after telling the student to begin.
2. Follow along on the Beginning Quantity Discrimination scoring sheet.
3. Score the student's response as correct by leaving the item blank if the student correctly names the larger number.
4. Score the student's response as incorrect by drawing a slash (/) through the item if the student states any number other than the correct answer, skips an item, or does not respond within 3 seconds.
5. If the student self-corrects within 3 seconds, write "sc" over the item that had been previously slashed. Count that item as correct.
6. If the student completes the first sheet before the end of the 1 minute, provide the next sheet. If the student finishes all the sheets before the end of the 1 minute, say ***Stop*** and place a bracket after the last item. Stop your stopwatch and calculate the student's score.
7. At the end of 1 minute, say ***Stop*** and place a bracket ( ]) after the last item completed. Stop your stopwatch and calculate the student's score.
8. Record the total number of correct responses in the space provided on the scoring sheet.

Discontinue Rule

If a student misses the first 4 items (entire first page), discontinue the test and record a score of 0.

Wait Rule

If the student hesitates for 3 seconds on any item, score the item as incorrect by drawing a slash (/), and provide the answer. If providing the answer does not prompt the student to continue, say ***Keep going.***

Reminders

These reminders may be used as often as needed:

- If the student points to the box, say ***Say the number.***
- If the student stops and it is not a hesitation on a specific item, say ***Keep going.***
- If the student appears confused about where to go next, point.

Examples of Scoring Rules

Scoring Rule 1: Leave Correct Items Blank

Score the student's response as correct by leaving the item blank if the student correctly names the larger number.

Student response 5... 6... 10... 8... 3... 8... 10... 6...

	Sheet 1	Sheet 2
	5	3
	6	8
	10	10
	8	6
How to score	4	4

Scoring Rule 2: Slash Incorrect Items

Score the student's response as incorrect by drawing a slash (/) through the item if the student states any number other than the correct answer, skips an item, or hesitates with an answer after 3 seconds.

Student response 5... 7... 10... 3... 4... 8... 2... 6...

	Sheet 1	Sheet 2
	5	~~3~~
	~~7~~	8
	10	~~4~~
	~~3~~	6
How to score	2	2

Student response 5... (skips item) 10... 8... 3... 8... (skips item) 6...

	Sheet 1	Sheet 2
	5	3
	~~7~~	8
	10	~~4~~
	8	6
How to score	3	3

Student response 5... (3 seconds)... (assessor says, "6")... 10... 8... 3... 8... (3 seconds)... (assessor says, "10")... 6...

	Sheet 1	Sheet 2
	5	3
	~~7~~	8
	10	~~4~~
	8	6
How to score	3	3

Scoring Rule 3: Self-Corrections

If the student self-corrects within 3 seconds, write "sc" over the item that had been previously slashed. Count that item as correct.

Student response 5... 8... I mean 6... 10... 8... 3... 8... 2... I mean 10... 6...

	Sheet 1	Sheet 2
	5	3
	sc ~~8~~	8
	10	sc ~~10~~
	8	6
How to score	4	4

Model BQD Scoring Sheet

The following is an example of a completed scoring sheet. The scoring rules and scoring calculation are shown. This scoring sheet serves as a model and can be used during training and practice to support accurate administration and scoring of Acadience Math.

Beginning Quantity Discrimination

Sheet 1	Sheet 2	Sheet 3	Sheet 4	Sheet 5	Sheet 6	Sheet 7	Sheet 8
5	3	5	5	3	3	3	5
~~8~~	sc ~~8~~	8	8	9	7	7	7
~~10~~	~~10~~	10	7	7	9	10	9
~~8~~	~~8~~]	6	10	10	8	9	10
1	2						

Total Score: 3

Chapter 6: **Number Identification Fluency (NIF)**

Overview

Skill	Number Identification
Administration Time	1 minute
Administration Schedule	Beginning of kindergarten to beginning of first grade
Score	1 point for each correctly identified number
Wait Rule	If the student does not respond within 3 seconds on an item, provide the correct answer and mark a slash (/) through the number.
Discontinue Rule	0 points in the first five items (the first line)

What is NIF?

Number Identification Fluency is a standardized, individually administered measure of early numeracy that assesses a student's ability to orally identify the numerals 1 through 99. Number recognition is essential for later math skills.

To administer NIF, the assessor presents a student sheet of numbers that ranges from 1–99 and asks the student to orally name each number. Since NIF assesses a student's fluency in identifying numbers, the measure is timed. The assessor begins the stopwatch immediately after telling the student to begin and stops it at the end of 1 minute.

Materials

- Scoring booklet
- Student materials
- Stopwatch or timer
- Pencil

Administration Directions

Follow these directions exactly each time with each student. Say the words in bold italic type verbatim. Begin with the practice activities. The practice activities are designed to introduce the assessment task to the student. They are untimed and include correction procedures. The correction procedures are not used once the testing begins.

Practice Items

1. Place the Number Identification Fluency scoring sheet on the clipboard and position it so that the student cannot see what you record.
2. Show the student the Number Identification Fluency Practice Sheet with the numbers 5, 3, and 2. Say these directions to the student:

► ***Look at these numbers. I'm going to point and say the name of the numbers. Listen to me: 5, 3, 2*** (point to the numbers)***. Your turn. Point and say the name of these numbers.***

Correct response	***Very good saying the name of those numbers.***			► (Begin testing.)
Incorrect response	***Watch me point and say the name of these numbers: 5, 3, 2.*** (Point to and say the name of the numbers.) ***Your turn. Point and say the name of these numbers. Put your finger here to start.*** (Touch 5.)	*Correct response*	***Good.***	► (Begin testing.)
		Incorrect response	***Let's say the names of these numbers together as you touch them: 5, 3, 2.***	► (Begin testing.)

► Begin testing. ***Now I will show you some more numbers*** (place student sheet in front of the student)***. Start here*** (point to the first number at the top of the page)***. Go this way*** (sweep your finger across the first two rows of numbers) ***and say the name of each number. Put your finger under the first number*** (point)***. Ready, begin.***

Administration and Scoring Procedures

1. Start your stopwatch after telling the student to begin.
2. Follow along on the Number Identification Fluency scoring sheet.
3. Score the student's response as correct by leaving the item blank if the student correctly names the number.
4. Score the student's response as incorrect by drawing a slash (/) through the item if the student states any number other than the correct answer, skips an item, or does not respond within 3 seconds.
5. If the student self-corrects within 3 seconds, write "sc" over the number that had been previously slashed. Count that item as correct.
6. If the student identifies all of the numbers on the first sheet before the end of 1 minute, provide the second sheet. If the student completes both sheets before the end of 1 minute, say ***Stop*** and place a bracket ( ]) after the last item. Stop your stopwatch and calculate the student's score.
7. At the end of 1 minute, say ***Stop*** and place a bracket ( ]) after the last number read. Stop your stopwatch and calculate the student's score.
8. Record the total number of correct responses in the space provided on the scoring sheet.

Discontinue Rule

If a student misses the first 5 items (the entire first row), discontinue the test and record a score of 0.

Wait Rule

If the student hesitates for 3 seconds on any item, score the item as incorrect by drawing a slash (/), and provide the answer. If providing the answer does not prompt the student to continue, say ***Keep going.***

Reminders

These reminders may only be provided once:

- If the student does not go left to right, say ***Go this way*** (sweep your finger across the row)***.***
- If the student appears confused about the task, say ***Remember to tell me the name of the number.***

These reminders may be used as often as needed:

- If the student stops and it is not a hesitation on a specific item, say ***Keep going.***
- If the student appears confused about where to go next, point.

Examples of Scoring Rules

Scoring Rule 1: Leave Correct Items Blank

Score the student's response as correct by leaving the item blank if the student correctly names the number.

Student response 1... 3... 22... 6... 15… 36... 56... 4... 2... 33…

How to score

Number Identification

Sheet 1

1	3	22	6	15	5
36	56	4	2	33	5

Scoring Rule 2: Slash Incorrect Items

Score the student's response as incorrect by drawing a slash (/) through the item if the student states any number other than the correct answer, skips an item, or hesitates with an answer after 3 seconds.

Student response 1... 8... two two... 6... 15… 36... (skips item)... 4... 2... 33…

How to score

Number Identification

Sheet 1

1	~~8~~	~~two~~	6	15	3
36	~~56~~	4	2	33	4

Student response 1... 3... (3 seconds)... (assessor says, "22")... 6... 15... 36... (3 seconds)... (assessor says, "56")... 4... 2... 33...

How to score

Number Identification

Sheet 1

1	3	~~22~~	6	15	4
36	~~56~~	4	2	33	4

Scoring Rule 3: Self-Corrections

If the student self-corrects within 3 seconds, write "sc" over the item that had been previously slashed. Count that item as correct.

Student response 1... 3... two two... I mean 22... 6... 15... 36... six-five... I mean 56... 4... 2... 33...

How to score

Number Identification

Sheet 1

1	3	sc ~~22~~	6	15	5
36	sc ~~56~~	4	2	33	5

Model NIF Scoring Sheet

The following is an example of a completed scoring sheet. The scoring rules and scoring calculation are shown. This scoring sheet serves as a model and can be used during training and practice to support accurate administration and scoring of Acadience Math.

Number Identification

Sheet 1

~~1~~	3	22	6	~~15~~	3
36	56	~~4~~	2	33	4
7	sc ~~42~~	8	~~86~~]	13	3
38	19	93	14	23	
5	48	16	10	17	
29	12	44	11	20	

Total Score: 10

Chapter 7: **Next Number Fluency (NNF)**

Overview

Skill	Counting (extending the counting sequence)
Administration Time	1 minute
Administration Schedule	Beginning of kindergarten to beginning of first grade
Score	1 point for each correct number
Wait Rule	If the student does not respond within 3 seconds on an item, mark a slash (/) through the number.
Discontinue Rule	0 points in the first five items (the first line)

What is NNF?

Next Number Fluency is a standardized, individually administered measure of early numeracy that assesses a student's ability to extend the counting sequence. Strategic counting is the knowledge of counting principles and skill in counting (Gersten et al., 2012). It is a fundamental skill that leads to mathematical proficiency and understanding (Siegler & Robinson, 1982). It also allows for flexibility in mental computing.

To administer NNF, the assessor provides a number that ranges from 1–99 and asks the student to say the next number. Since NNF assesses a student's fluency in identifying numbers, the measure is timed. The assessor begins the stopwatch immediately after providing the first test item and stops at the end of 1 minute.

Materials

- Scoring booklet
- Stopwatch or timer
- Pencil

No student materials are needed. This measure is administered orally.

Administration Directions

Follow these directions exactly each time with each student. Say the words in bold italic type verbatim. Begin with the practice activities. The practice activities are designed to introduce the assessment task to the student. They are untimed and include correction procedures. The correction procedures are not used once the testing begins.

Practice Items

1. Place the Next Number Fluency scoring sheet on the clipboard and position it so that the student cannot see what you record.
2. Say these directions to the student:

▶ ***Listen, I'm going to say a number and you're going to tell me what number comes next. So, if I say 3, you would say 4. Let's try one together.***

Practice item #1) ***7... what number comes next?***

Correct response	***Very good, the next number after 7 is 8.***			▶ (Present practice item #2.)
Incorrect response Student does not respond within 3 seconds or responds incorrectly	***The next number after 7 is 8. Your turn. 7... what number comes next?*** (Wait for a response.)	*Correct response*	***Good.***	▶ (Present practice item #2.)
		Incorrect response	***The next number after 7 is 8.***	▶ (Present practice item #2.)

▶ Practice item #2) ***Let's try another number. 2... what number comes next?***

Correct response	***Very good, the next number after 2 is 3.***			▶ (Present practice item #3.)
Incorrect response Student does not respond within 3 seconds or responds incorrectly	***The next number after 2 is 3. Your turn. 2... what number comes next?*** (Wait for a response.)	*Correct response*	***Good.***	▶ (Present practice item #3.)
		Incorrect response	***The next number after 2 is 3.***	▶ (Present practice item #3.)

▶ Practice item #3) ***Let's try another number... 5...*** (Wait up to 3 seconds for the student to respond.) If the student does not respond, ask ***5... what number comes next?***

Correct response	***Very good, the next number after 5 is 6.***			▶ (Begin testing.)
Incorrect response Student does not respond within 3 seconds or responds incorrectly	***The next number after 5 is 6. Your turn. 5... what number comes next?*** (Wait for a response.)	*Correct response*	***Good.***	▶ (Begin testing.)
		Incorrect response	***The next number after 5 is 6.***	▶ (Begin testing.)

▶ Begin testing. ***Now I am going to say more numbers. You tell me what number comes next.*** (Say the first number in the list.)

Administration and Scoring Procedures

1. Start your stopwatch immediately after you provide the first test item.
2. Score the student's response as correct by leaving it blank if the student correctly says the number that comes next.
3. Score a student's response as incorrect by drawing a slash (/) through the item if the student states any number other than the correct answer or does not respond within 3 seconds.
4. If the student self-corrects within 3 seconds, write "sc" over the number that had been previously slashed. Count that item as correct.
5. At the end of 1 minute, say ***Stop*** and place a bracket ( ]) after the last response. Stop your stopwatch and calculate the student's score.
6. Record the total number of correct responses in the space provided on the scoring sheet.

Discontinue Rule

If a student misses the first 5 items, discontinue the test and record a score of 0.

Wait Rule

If the student does not respond within 3 seconds on an item, mark a slash (/) through the number, and say the next item.

Reminders

This reminder may be given as often as needed:

- ***Remember to tell me the next number after ____.***

Examples of Scoring Rules

Scoring Rule 1: Leave Correct Items Blank

Score the student's response as correct by leaving the item blank if the student correctly names the next number.

	Assessor's Numbers	3... 8... 33... 5... 15...	***Student Response***	4... 9... 34... 6... 16...		
How to score	**Next Number Fluency**					
	3 (4)	**8** (9)	**33** (34)	**5** (6)	**15** (16)	5
	37 (38)	**70** (71)	**10** (11)	**40** (41)	**11** (12)	_____

Scoring Rule 2: Slash Incorrect Items

Score the student's response as incorrect by drawing a slash (/) through the item if the student states any number other than the correct answer, or hesitates with an answer after 3 seconds.

	Assessor's Numbers	Student Response
	3...	4...
	8...	9...
	33...	36...
	5...	6...
	15...	16...

How to score

Next Number Fluency

3 (4)	**8** (9)	**33** (34)	**5** (6)	**15** (16)	4
37 (38)	**70** (71)	**10** (11)	**40** (41)	**11** (12)	

Scoring Rule 3: Self-Corrections

If the student self-corrects within 3 seconds, write "sc" over the item that had been previously slashed. Count that item as correct.

	Assessor's Numbers	Student Response
	3...	4...
	8...	9...
	33...	36...I mean 34
	5...	6...
	15...	16...

How to score

Next Number Fluency

3 (4)	**8** (9)	sc **33** (34)	**5** (6)	**15** (16)	5
37 (38)	**70** (71)	**10** (11)	**40** (41)	**11** (12)	

Model NNF Scoring Sheet

The following is an example of a completed scoring sheet. The scoring rules and scoring calculation are shown. This scoring sheet serves as a model and can be used during training and practice to support accurate administration and scoring of Acadience Math.

Next Number Fluency

11 (12)	**6** (7)	**27** (28)	**19** (20)	**5** (6)	4
33 (34)	**55** (56)	**14** (15)	**47** (48)	**9** (10)	4
18 (19)	**25** (26)	**12** (13)]	**72** (73)	**20** (21)	3
28 (29)	**3** (4)	**85** (86)	**8** (9)	**26** (27)	
7 (8)	**39** (40)	**16** (17)	**10** (11)	**2** (3)	
40 (41)	**4** (5)	**38** (39)	**17** (18)	**1** (2)	

Total Score: 11

Chapter 8: **Advanced Quantity Discrimination (AQD)**

Overview

Skill	Magnitude Comparison
Administration Time	1 minute
Administration Schedule	Beginning of first grade to end of first grade
Score	1 point for each correct number
Wait Rule	If the student does not respond within 3 seconds on an item, provide the correct answer and mark a slash (/) through the number.
Discontinue Rule	0 points in the first six items

What is AQD?

Advanced Quantity Discrimination is a standardized, individually administered measure of early numeracy that assesses a student's ability to discriminate between two quantities. Magnitude comparison is related to other critical areas of mathematical performance such as mental calculation and place value (Gersten et al., 2012). AQD is a more advanced measure of magnitude comparison skills than BQD.

To administer AQD, the assessor presents the student with a sheet that contains a series of boxes with two numbers in them and asks the student to orally name the number that is the larger quantity. Since AQD assesses a student's fluency with quantity discrimination, the measure is timed. The assessor begins the stopwatch immediately after telling the student to begin and stops it at the end of 1 minute.

Materials

- Scoring booklet
- Student materials
- Stopwatch or timer
- Pencil

Administration Directions

Follow these directions exactly each time with each student. Say the words in bold italic type verbatim. Begin with the practice activities. The practice activities are designed to introduce the assessment task to the student. They are untimed and include correction procedures. The correction procedures are not used once the testing begins.

Practice Items

1. Place the Advanced Quantity Discrimination scoring sheet on the clipboard and position it so that the student cannot see what you record.
2. Show the student the Advanced Quantity Discrimination Practice Sheet. Say these directions to the student:

▶ ***We are going to look at boxes that have two numbers in them and you are going to tell me which number is more. This is 14*** (point to number) ***and this is 22*** (point to number)***. 22 is more*** (point to number)***.***

Practice item #1) ***Your turn. This is 56*** (point to number) ***and this is 48*** (point to number)***. Which one is more?***

Correct response	***Very good, 56 is more.***			(Present practice item #2.)
Incorrect response Student does not respond within 3 seconds or responds incorrectly	***56 is more. Your turn. Which one is more?*** (Wait for a response.)	*Correct response*	***Good.***	(Present practice item #2.)
		Incorrect response	***56 is more.***	(Present practice item #2.)

▶ Practice item #2) ***Your turn. Which one is more?*** (Point to the example.)

Correct response	***Very good, 37 is more.***			(Present practice item #3.)
Incorrect response Student does not respond within 3 seconds or responds incorrectly	***37 is more. Your turn. Which one is more?*** (Wait for a response.)	*Correct response*	***Good.***	(Present practice item #3.)
		Incorrect response	***37 is more.***	(Present practice item #3.)

▶ Practice item #3) ***Let's try another.*** (Point to the next problem and wait up to 3 seconds for the student to respond.) If the student does not respond, say ***Which one is more?***

Correct response	***Very good. 75 is more.***			(Begin testing.)
Incorrect response Student does not respond within 3 seconds or responds incorrectly	***75 is more. Your turn. Which one is more?*** (Wait for a response.)	*Correct response*	***Good.***	(Begin testing.)
		Incorrect response	***75 is more.***	(Begin testing.)

▶ Begin testing. ***Now you will see more boxes with two numbers in them*** (place student sheet in front of the student)***. Start here*** (point to the first box of problems at the top of the page)***. Go this way*** (sweep your finger across the first two rows of boxes) ***and tell me which number is more. Put your finger under the first box*** (point)***. Ready, begin.***

Administration and Scoring Procedures

1. Start your stopwatch after telling the student to begin.
2. Follow along on the Advanced Quantity Discrimination scoring sheet.
3. Score the student's response as correct by leaving the item blank if the student correctly names the larger number.
4. Score the student's response as incorrect by drawing a slash (/) through the item if the student states any number other than the correct answer, skips an item, or does not respond within 3 seconds.
5. If the student self-corrects within 3 seconds, write "sc" over the number that had been previously slashed. Count that item as correct.
6. If the student completes the sheet(s) before the end of 1 minute, say ***Stop*** and place a bracket after the last item. Stop your stopwatch and calculate the student's score.
7. At the end of 1 minute, say ***Stop*** and place a bracket (**]**) after the last problem completed. Stop your stopwatch and calculate the student's score.
8. Record the total number of correct responses in the space provided on the scoring sheet.

Discontinue Rule

If a student misses the first 6 items, discontinue the test and record a score of 0.

Wait Rule

If the student hesitates for 3 seconds on any item, score the item as incorrect by drawing a slash (/), and provide the answer. If providing the answer does not prompt the student to continue, say ***Keep going.***

Reminders

These reminders may only be provided once:

- If the student does not go left to right, say ***Go this way*** (sweep your finger across the row)***.***
- If the student says all the names of all the numbers in each box, say ***Just tell me which one is more.***
- If the student appears confused about the task, say ***Remember to tell me which one is more.***
- If the student just points to a number, say ***What's the number?***

These reminders may be used as often as needed:

- If the student stops and it is not a hesitation on a specific item, say ***Keep going.***
- If the student appears confused about where to go next, point.

Examples of Scoring Rules

Scoring Rule 1: Leave Correct Items Blank

Score the student's response as correct by leaving the item blank if the student correctly names the larger number.

Student response 23... 69... 93... 37... 38... 97... 39... 71... 88... 42...
43... 66... 55... 41... 33... 76... 4... 85... 99... 26...

How to score

Advanced Quantity Discrimination

Sheet 1	23	69	93	37	38	97	39	71	88	42	10
Sheet 2	43	66	55	41	33	76	4	85	99	26	10

Scoring Rule 2: Slash Incorrect Items

Score the student's response as incorrect by drawing a slash (/) through the item if the student states any number other than the correct answer or hesitates with an answer after 3 seconds.

Student response 23... 69... 93... 37... 38... (skip)... 39... 71... 88... 42...
43... (skip)... 55... 41... (skip)... 76... 4... 85... 99... 26...

How to score

Advanced Quantity Discrimination

Sheet 1	23	69	93	37	38	~~97~~	39	71	88	42	9
Sheet 2	43	~~66~~	55	41	~~33~~	76	4	85	99	26	8

Student response 23... 69... 93... 37... 38... (3 seconds)... (assessor says, "97")...
39... 71... 88... 42...
43... (3 seconds)... (assessor says, "66")... 55... 41... (skip)...
76... 4... 85... 99... 26...

How to score

Advanced Quantity Discrimination

Sheet 1	23	69	93	37	38	~~97~~	39	71	88	42	9
Sheet 2	43	~~66~~	55	41	~~33~~	76	4	85	99	26	8

Scoring Rule 3: Self-Corrections

If the student self-corrects within 3 seconds, write "sc" over the item that had been previously slashed. Count that item as correct.

Student response 23... 69... 93... 37... 38... 97... 39... 17... I mean 71... 88... 42...
43... 66... 55... four-one... I mean 41... 33... 76... 4... 85... 99...
26...

How to score

Advanced Quantity Discrimination

Sheet 1	23	69	93	37	38	97	39	sc ~~71~~	88	42	10
Sheet 2	43	66	55	sc ~~41~~	33	76	4	85	99	26	10

Model AQD Scoring Sheet

The following is an example of a completed scoring sheet. The scoring rules and scoring calculation are shown. This scoring sheet serves as a model and can be used during training and practice to support accurate administration and scoring of Acadience Math.

Advanced Quantity Discrimination

Sheet 1	23	~~69~~	~~98~~	~~27~~	~~38~~	~~97~~	39	~~71~~	~~88~~	42	3
Sheet 2	43	~~66~~	~~58~~	~~41~~	33	~~76~~	4	~~85~~]	99	26	3
Sheet 3	23	66	84	27	38	72	49	80	74	33	
Sheet 4	48	61	98	26	43	79	48	75	81	11	

Total Score: 6

Chapter 9: **Missing Number Fluency (MNF)**

Overview

Skill	Strategic Counting (extending the counting sequence–counting by 1s, 5s, 10s)
Administration Time	1 minute
Administration Schedule	Beginning of first grade to end of first grade
Score	1 point for each correct number
Wait Rule	If the student does not respond within 5 seconds on an item, provide the correct answer and mark a slash (/) through the number.
Discontinue Rule	0 points in the first six items

What is MNF?

Missing Number Fluency is a standardized, individually administered measure of early numeracy that assesses a student's ability to extend a counting sequence—counting by 1s, 5s, and 10s. Strategic counting is the knowledge of counting principles and skill in counting (Gersten et al., 2012). It is a fundamental skill that leads to mathematical proficiency and understanding (Siegler & Robinson, 1982). It also allows for flexibility in mental computing. MNF is a more advanced measure of strategic counting skills than NNF.

To administer MNF, the assessor presents the student with a sheet containing a series of boxes that have three numbers and a blank line and asks the student to orally name the missing number. Since MNF assesses a student's fluency with the counting sequence counting by 1s, 5s, and 10s, the measure is timed. The assessor begins the stopwatch immediately after telling the student to begin and stops it at the end of 1 minute.

Materials

- Scoring booklet
- Student materials
- Stopwatch or timer
- Pencil

Administration Directions

Follow these directions exactly each time with each student. Say the words in bold italic type verbatim. Begin with the practice activities. The practice activities are designed to introduce the assessment task to the student. They are untimed and include correction procedures. The correction procedures are not used once the testing begins.

Practice Items

1. Place the Missing Number Fluency scoring sheet on the clipboard and position it so that the student cannot see what you record.
2. Show the student the Missing Number Fluency Practice Sheet. Say these directions to the student:

► ***We are going to look at boxes that have three numbers and a blank and you are going to tell me the missing number. Watch*** (point to the numbers and the blank)***: 15, blank, 17, 18. The missing number is 16. Watch: 15, 16, 17, 18.*** (Present practice item #1.)

Practice item #1) ***Your turn. Look at these numbers. Tell me the missing number.*** (Point to practice item #1.)

Correct response	***Very good, the missing number is 42.***			(Present practice item #2.)
Incorrect response Student does not respond within 5 seconds or responds incorrectly	***The missing number is 42. Watch: 41, 42, 43, 44*** (point as you say the numbers)***. Your turn. Tell me the missing number.*** (Wait for a response.)	*Correct response*	***Good.***	(Present practice item #2.)
		Incorrect response	***The missing number is 42.***	(Present practice item #2.)

► Practice item #2) ***Let's try another. Look at these numbers. Tell me the missing number.*** (Point to practice item #2.)

Correct response	***Very good, the missing number is 35.***			(Present practice item #3.)
Incorrect response Student does not respond within 5 seconds or responds incorrectly	***The missing number is 35. Watch: 30, 35, 40, 45*** (point as you say the numbers)***. Your turn. Tell me the missing number.*** (Wait for a response.)	*Correct response*	***Good.***	(Present practice item #3.)
		Incorrect response	***The missing number is 35.***	(Present practice item #3.)

► Practice item #3) ***Let's try another.*** (Point to the next problem and wait up to 3 seconds for the student to respond.) If the student does not respond, say ***Tell me the missing number.***

Correct response	***Very good, the number that is missing is 50.***			(Begin testing.)
Incorrect response Student does not respond within 5 seconds or responds incorrectly	***The missing number is 50. Watch: 30, 40, 50, 60*** (point as you say the numbers)***. Your turn. Tell me the missing number.*** (Wait for a response.)	*Correct response*	***Good.***	(Begin testing.)
		Incorrect response	***The missing number is 50.***	(Begin testing.)

► Begin testing. ***I would like you to tell me the missing number*** (place student sheet in front of the student)***. Start here*** (point to the first box of number sets at the top of the page)***. Go this way*** (sweep your finger across the first two rows of number sets) ***and say the missing number. Put your finger under the first box*** (point)***. Ready, begin.***

Administration and Scoring Procedures

1. Start your stopwatch after telling the student to begin.
2. Follow along on the Missing Number Fluency scoring sheet.
3. Score the student's response as correct by leaving the item blank if the student correctly names the missing number.
4. Score the student's response as incorrect by drawing a slash (/) through the item if the student states an incorrect number, skips an item, or does not respond within 5 seconds.
5. If the student self-corrects within 5 seconds, write "sc" over the number that had been previously slashed. Count that item as correct.
6. If the student completes the sheet(s) before the end of 1 minute, say ***Stop*** and place a bracket after the last item. Stop your stopwatch and calculate the student's score.
7. At the end of 1 minute, say ***Stop*** and place a bracket (**]**) after the last number read. Stop your stopwatch and calculate the student's score.
8. Record the total number of correct responses in the space provided on the scoring sheet.

Discontinue Rule

If a student misses the first 6 items, discontinue the test and record a score of 0.

Wait Rule

If the student hesitates for 5 seconds on any item, score the item as incorrect by drawing a slash (/), and provide the answer. If providing the answer does not prompt the student to continue, say ***Keep going.***

Reminders

These reminders may only be provided once:

- If the student does not go left to right, say ***Go this way*** (sweep your finger across the row)***.***
- If the student says all the names of all the numbers in each box, say ***Just tell me the name of the missing number.***
- If the student appears confused about the task, say ***Remember to tell me the missing number.***

These reminders may be used as often as needed:

- If the student stops and it is not a hesitation on a specific item, say ***Keep going.***
- If the student appears confused about where to go next, point.

Examples of Scoring Rules

Scoring Rule 1: Leave Correct Items Blank

Score the student's response as correct by leaving the item blank if the student correctly names the missing number.

Student response 13... 40... 50... 53... 20... 20... 17... 19... 65... 34... 22... 80... 50...

How to score

Missing Number Fluency

Sheet 1	13	40	50	53	20	20	17	19	65	34	10
Sheet 2	22	80	50]	70	14	20	7	57	55	62	3
Sheet 3	10	50	75	58	13	35	19	83	80	70	

Total Score: 13

Scoring Rule 2: Slash Incorrect Items

Score the student's response as incorrect by drawing a slash (/) through the item if the student states any number other than the correct answer or hesitates with an answer after 5 seconds.

Student response 13... 31... 50... 53... 20... 20... 17... 10... 65... 34... 22... 80... five-zero... 70

How to score

Missing Number Fluency

Sheet 1	13	~~40~~	50	53	20	20	17	~~19~~	65	34	8
Sheet 2	22	80	~~50~~	70]	14	20	7	57	55	62	3
Sheet 3	10	50	75	58	13	35	19	83	80	70	

Total Score: 11

Student response 13... (skip)... 50... 53... 20... 20... 17... (skip)... 65... 34… 22... 80... 50

How to score

Missing Number Fluency

Sheet 1	13	~~40~~	50	53	20	20	17	~~19~~	65	34	8
Sheet 2	22	80	50]	70	14	20	7	57	55	62	3
Sheet 3	10	50	75	58	13	35	19	83	80	70	

Total Score: 11

Student response 13... 40... 50... 53... 20... 20... 17... (5 seconds)... (assessor says, "19")... 65... 34... 22... (5 seconds)... (assessor says, "80")... 50... 70...14... 20

How to score

Missing Number Fluency

Sheet 1	13	40	50	53	20	20	17	~~19~~	65	34	9
Sheet 2	22	~~80~~	50	70	14	20]	7	57	55	62	5
Sheet 3	10	50	75	58	13	35	19	83	80	70	

Total Score: 14

Scoring Rule 3: Self-Corrections

If the student self-corrects within 5 seconds, write "sc" over the item that had been previously slashed. Count that item as correct.

Student response 13... 40... 50... 53... 20... 20... 17... 20... I mean 19... 65... 34... 22... 71... I mean 80... 50... 70...14... 20

How to score

Missing Number Fluency

Sheet 1	13	40	50	53	20	20	17	sc ~~19~~	65	34	10
Sheet 2	22	sc ~~80~~	50	70	14	20]	7	57	55	62	6
Sheet 3	10	50	75	58	13	35	19	83	80	70	_____

Total Score: 16

Model MNF Scoring Sheet

The following is an example of a completed scoring sheet. The scoring rules and scoring calculation are shown. This scoring sheet serves as a model and can be used during training and practice to support accurate administration and scoring of Acadience Math.

Missing Number Fluency

Sheet 1	13	~~40~~	~~50~~	~~53~~	~~20~~	20	~~17~~	19	~~65~~	~~34~~]	3
Sheet 2	22	80	50	70	14	20	7	57	55	62	_____
Sheet 3	10	50	75	58	13	35	19	83	80	70	_____

Total Score: 3

Chapter 10: **Computation**

Overview

Skill	Basic Computation
Administration Time	2, 3, 5, or 6 minutes per worksheet depending on grade
Administration Schedule	Beginning of first grade to end of sixth grade
Score	Correct digits in final answer
Wait Rule	No wait rule
Discontinue Rule	No discontinue rule

What is Computation?

Computation is a standardized measure designed to assess students' progress in the basic skills of math computation. It can be administered individually or to groups. Students write their answers to basic computation problems under standardized conditions and time limits, which are dependent on grade level.

To administer Computation, the assessor must have a copy of the standardized directions given in this document and one copy of the student worksheet for each student. To score Computation, the assessor must have a copy of the corresponding teacher key.

Materials

- Student worksheet(s) for each student.
  - 2 worksheets for a benchmark assessment
  - 1 worksheet for a progress monitoring assessment
- Teacher key
- Stopwatch or timer
- Pencils for students

Administration Directions

1. Provide each student with a pencil and a student worksheet. Hand out the worksheets face-down to each student. As you are handing out the worksheets, say ***I am going to hand out a math worksheet. Please leave the paper face-down and wait for further instructions.***
2. OPTIONAL: Use the following instructions if the worksheets have not been labeled with student names. If you have already labeled the worksheets with student names, then you can skip this step. The purpose of this step is to prevent the students from taking time to write their name during the timed test administration. Say ***Leave the paper face-down, but write your name on the back.***
3. Read the following specific directions to the student(s). Indicate the correct number of minutes based on the grade level of the worksheet you are administering.

   We're going to do a math worksheet that will take _____ minutes (see table below)***.***

Grade	Time Limit Per Worksheet
Grade 1	2 minutes
Grade 2	2 minutes
Grade 3	3 minutes
Grade 4	5 minutes
Grade 5	6 minutes
Grade 6	6 minutes

   There will be several types of math problems. Look at each problem carefully before you answer it. When I say "begin," turn the page over and start with the first problem. Continue working across the page before going on to the next row. Try to solve each problem. If you cannot solve a problem, skip it and go on to the next one. If you reach the end of the page, stop and put your pencil down. Are there any questions?
4. Say ***Begin*** and start your stopwatch.
5. Monitor students and use reminders as needed.
6. At the end of the time limit (see table above), say ***Stop, and put your pencils down.***
7. Collect all the Computation worksheets.

During benchmark assessment, two worksheets are administered to the student(s). Administer the second worksheet immediately after the first. When administering the second worksheet, use the following shortened directions:

8. As you are handing out the second worksheet, say ***I am going to hand out a second math worksheet. Please leave the paper face-down (***optional: ***and write your name on the back). When I say "begin," turn the page over and start with the first problem.***
9. Say ***Begin*** and start your stopwatch.
10. Monitor students and use reminders as needed.
11. At the end of the time limit (see table above), say ***Stop, and put your pencils down.***
12. Collect all the Computation worksheets.

Reminders

These reminders may be used as often as needed:

- If the student is not attempting the problems in order or is skipping them without trying to solve them, say ***Try to solve each problem***.
- If a student stops working before the test is done, say ***Keep doing the best work you can.***
- If a student asks you to help with the task, say ***Just do your best.***

Scoring Procedures

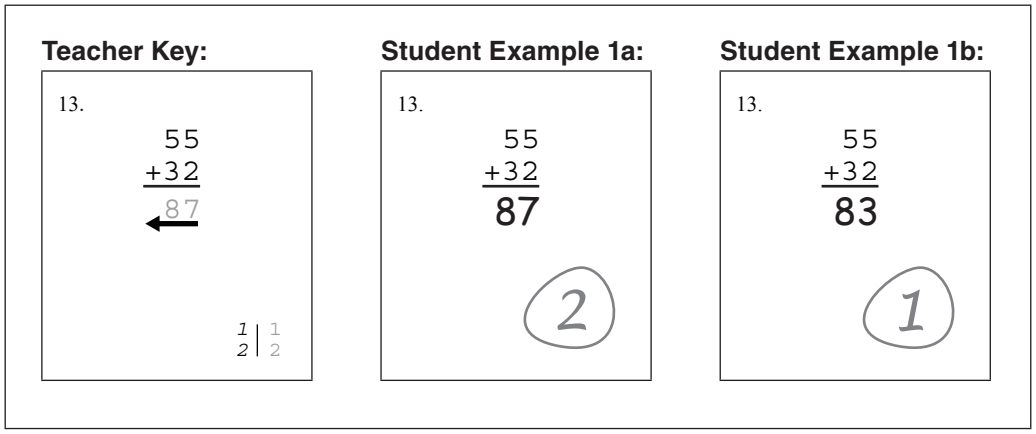
1. When scoring a Computation form, you will need a copy of the teacher key for that form.
2. There are 16–25 problems on a form, each in individual boxes. In the lower-right portion of the box, you will find a small legend that describes how to score the problem based on the number of correct digits in the answer.
3. All scoring should be done on the student worksheet, not the teacher key.
4. For each problem that was completed or attempted, write down the number of points the student received for the problem. To make it clear which marks are yours, either use a pen, place your marks in a consistent location, or circle your marks.
5. Add the total points possible in each row and note that number in the right margin by each row. Add the row totals together to get the student's total score, and record that score on the top of the page in the space provided.
6. The final score for the computation probe during a benchmark assessment is the average score from the two student worksheets. For example, with the scores of 27 and 35, the final score will be 31. If the average score has a decimal in it, round up.
7. The final score for a progress monitoring assessment is the score from the one student worksheet.

Determining the number of points the student receives on each problem:

- On the teacher key, each problem includes a small chart in the lower right corner that displays the points possible for that problem. The left-hand column of the chart represents the number of digits that the student got correct in the answer. The right-hand column displays the number of points the student receives.
- The arrow under the correct answer represents the direction to score the problem (right to left for addition, subtraction, and multiplication; left to right for division).
- For addition, subtraction, and other simple problems, the number of points possible is the same as the number of digits in the correct answer, so the student receives 1 point per correct digit. Beginning in the fourth grade testing materials, the more complicated multiplication, division, and fraction problems require more steps to complete, and are therefore worth more points.
- The digits eligible for receiving points are the digits in the answer that are displayed on the teacher key, excluding the remainder symbol for division problems (though the remainder itself is eligible for receiving points).

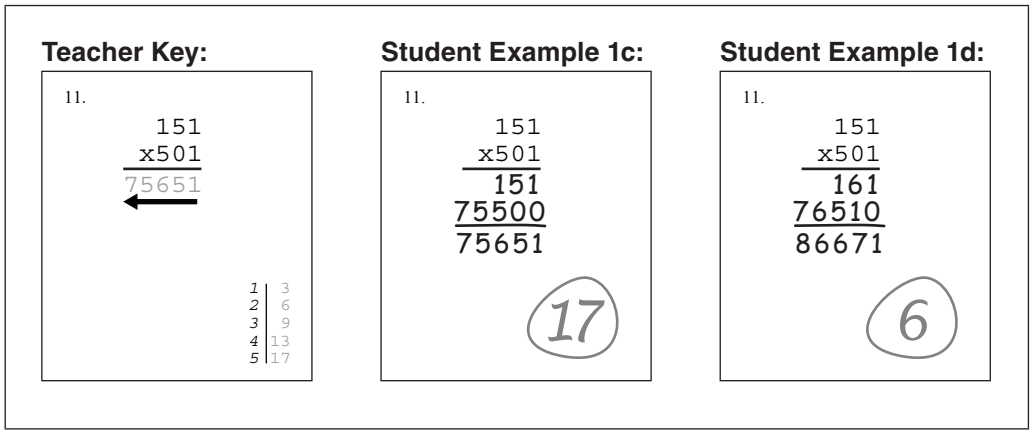
- **Correct digits:** The correct digits are counted as the total number of digits in the answer that are correct. They must be scored referring to the scoring direction arrow on the teacher key (right to left for addition, subtraction, and multiplication; left to right for division). The student must have the final answer completely correct in order to receive the maximum points for the problem. Which specific digits are correct does not matter for the purpose of determining the number of points to assign unless the student would otherwise receive full credit for a problem with an incorrect answer (e.g., in a 3-digit answer, getting the 1st and 3rd digits correct results in the same number of points as getting the 1st and 2nd digits correct).

For example:



Example 1a: The correct answer is 87, which is two digits worth a total of 2 points. The student responded with an answer of 87, the 7 and 8 are considered correct digits when scored in the direction as indicated by the teacher key. The student received two digits correct, which is worth 2 points.

Example 1b: The student responded with an answer of 83, the 8 is considered a correct digit when scored in the direction as indicated by the teacher key. The student received one digit correct, which is worth 1 point.

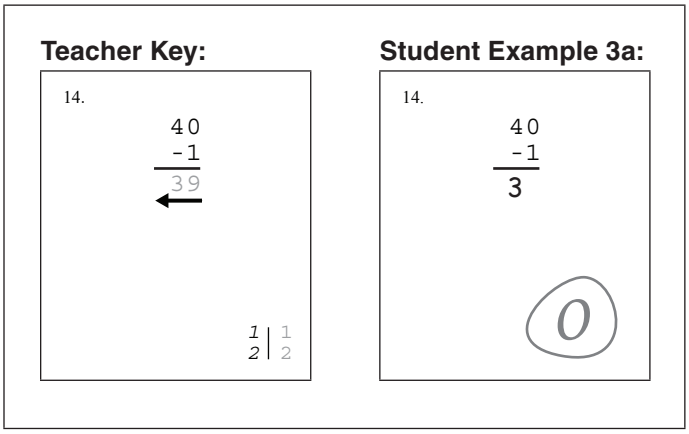


Example 1c: The correct answer is 75,651, which is five digits worth a total of 17 points. The student responded with an answer of 75,651, the 1, 5, 6, 5, and 7 are correct digits when scored in the direction as indicated by the teacher key. The student received five digits correct, which is worth 17 points.

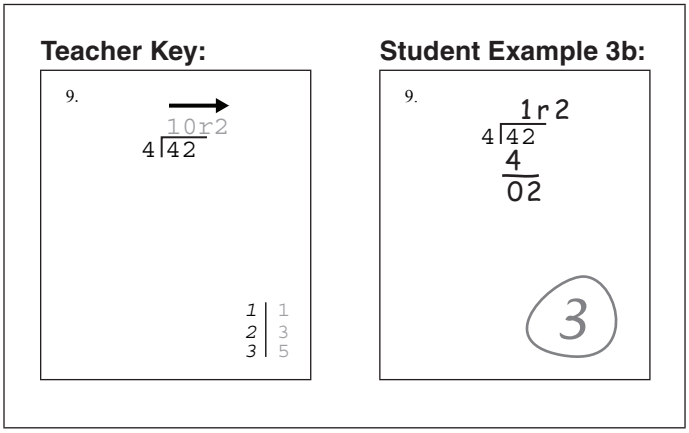
Example 1d: The student responded with an answer of 86,671, the 1 and 6 are correct digits when scored in the direction as indicated by the teacher key. The student received two digits correct, which is worth 6 points.

2. **Reversed (Backwards) Digits:** Credit is given for a digit written in reverse (backwards), provided that it is apparent which digit the student meant to write, that the value of the digit is correct, and that the digit is correct when scored in the direction indicated by the teacher key. This rule applies only to writing a digit backwards, and not to reversing the locations of two or more digits.
3. **Scoring Direction:** When determining whether a digit is counted as a correct digit, score from the direction in which the problem is traditionally solved. For addition, subtraction, multiplication, and fractions, score from right to left. When scoring fractions, the numerator, denominator, and whole number are evaluated separately. For division, score from left to right. The arrows on the teacher key will guide the correct scoring direction.

For example:



Example 3a: The correct answer is 39, which is two digits worth a total of 2 points. The student responded with an answer of 3, there are zero correct digits when scored in the direction as indicated by the teacher key. The student received zero digits correct, which is worth 0 points.



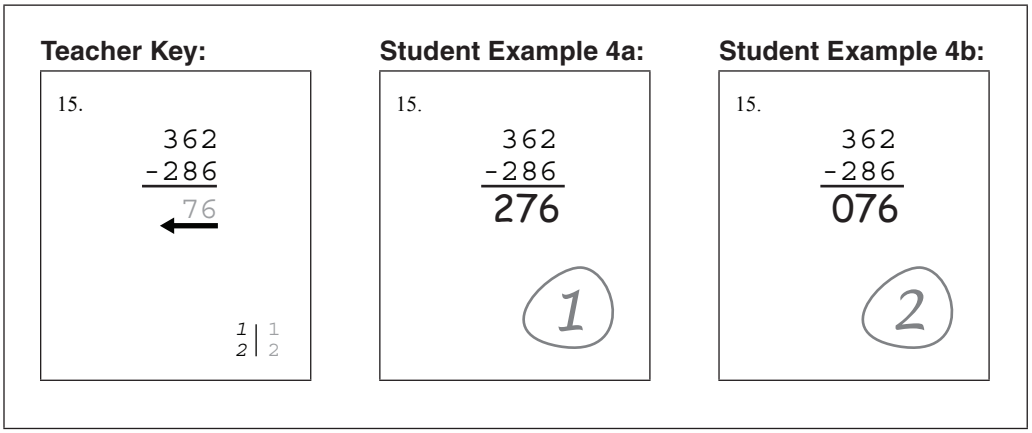
Example 3b: The correct answer is 10 r2, which is three digits worth a total of 5 points. The student responded with an answer of 1r2, the 1 and 2 are considered correct digits when scored in the direction as indicated by the teacher key. The 1 counts as a correct digit, even though spatially it should have been written above the 4 instead of the 2 in the dividend, based on the direction that the problem is scored. The student received two digits correct, which is worth 3 points.

4. **Extra Digits and Markings:** Each point possible for a problem is linked to a correct digit scored in the direction as indicated by the arrow on the teacher key. If the student responds with the correct digits, then the student earns those points. The student must have the final answer completely correct in order to receive the maximum points for the problem.

   The student does not get penalized for additional markings unless those markings make the final answer to the problem incorrect. An extra digit in the answer is only ignored if it is a leading zero. If the extra digit is anything other than a leading zero and the student would have otherwise received maximum points for the problem, it is penalized since the final answer is not correct.

   Addition, Subtraction, and Multiplication. Extra digits to the left of the answer are not counted or penalized if they are a leading zero. Any other additional digits to the left of the answer, when students would have otherwise received full credit for the correct digits, would be penalized since the final answer is not correct. The total correct digits would be reduced by 1 correct digit.

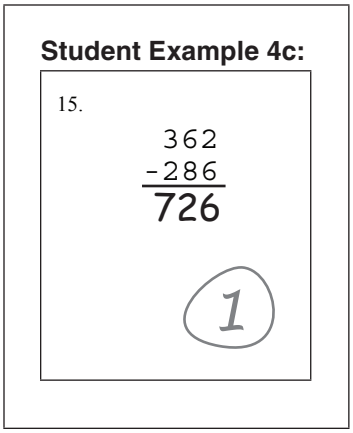
   For example:



Example 4a: The correct answer is 76, which is two digits worth a total of 2 points. The student responded with an answer of 276, the 6 and 7 are correct digits when scored in the direction as indicated by the teacher key. The student also responded with an additional leading digit of 2. While the answer would have otherwise received full credit for the correct digits, the final answer is not correct. Therefore, the correct digits were penalized by one correct digit and the student received credit for one digit correct, which is worth 1 point.

Example 4b: The student responded with an answer of 076, the 6 and 7 are correct digits when scored in the direction as indicated by the teacher key, and the leading zero is ignored. The student received two digits correct, which is worth 2 points.

Student Example 4c:

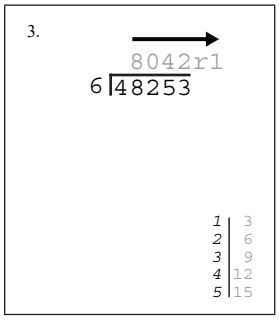


Example 4c: The student responded with an answer of 726, the 6 is a correct digit when scored in the direction as indicated by the teacher key. The student also responded with an additional leading digit of 7. The answer would not have otherwise received full credit for the correct digits, so the additional digit is not penalized. The student received one digit correct, which is worth 1 point.

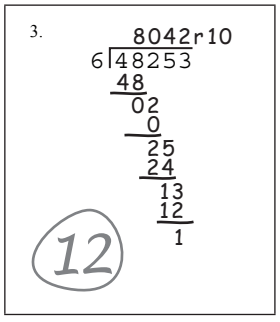
Division. Assign correct digits by looking at the student's answer from left to right. Any other additional digits to the right of the answer or to the right of the remainder, when students would otherwise receive full credit for the correct digits, would be penalized since the final answer is not correct. The total correct digits would be reduced by one correct digit. For division, a leading zero in front of the quotient should be ignored when determining which digits to compare to the answer on the scoring key.

For example:

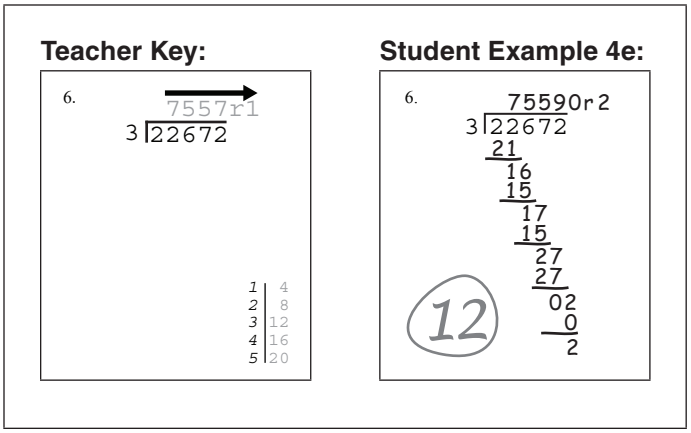
Teacher Key:



Student Example 4d:

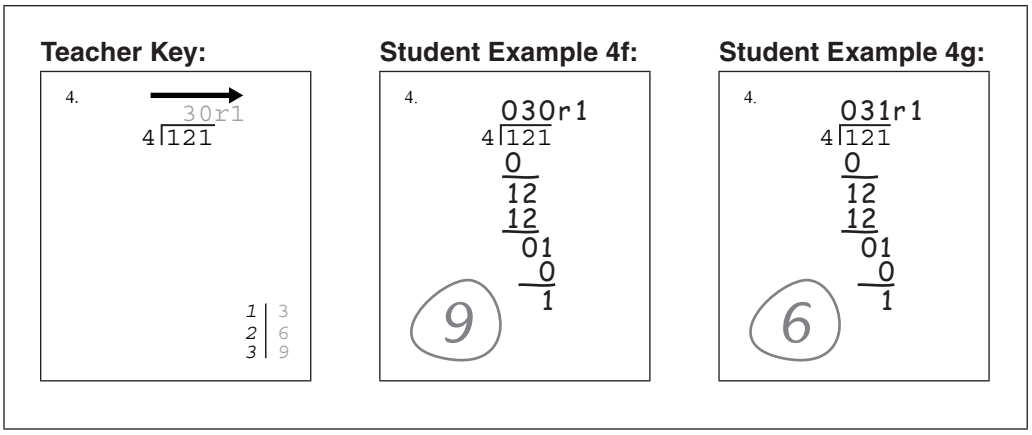


Example 4d: The correct answer is 8,042 r1, which is five digits worth a total of 15 points. The student responded with an answer of 8,042 r10, the 8, 0, 4, 2, and r 1 are correct digits when scored in the direction as indicated by the teacher key. The student also responded with an additional digit of 0 after the remainder. While the answer would have otherwise received full credit for the correct digits, the final answer is not correct. Therefore, the correct digits were penalized by one correct digit and the student received credit for four digits correct, which is worth 12 points.



Example 4e: The correct answer is 7,557 r1, which is five digits worth a total of 20 points. The student responded with an answer of 75,590 r2, the 7, 5, and 5 are correct digits when scored in the direction as indicated by the teacher key. The student also responded with an additional digit of 0 in the quotient. The answer would not have otherwise received full credit for the correct digits, so the additional digit is not penalized. The student received three digits correct, which is worth 12 points.

For example:



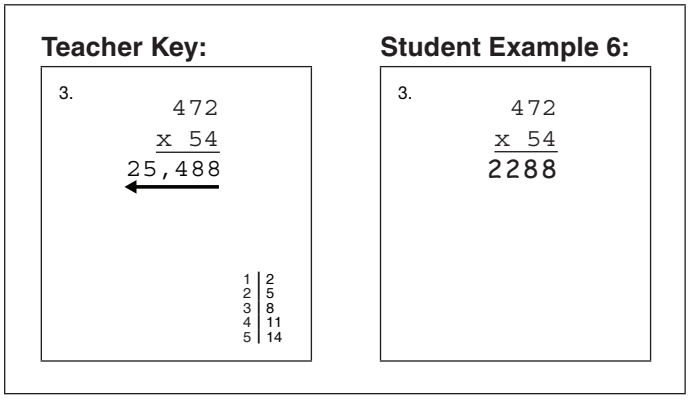
Example 4f: The correct answer is 30 r1, which is three digits worth a total of 9 points. The student responded with an answer of 030 r1, the 3, 0, and r1 are correct digits when scored in the direction as indicated by the teacher key and the leading zero is ignored. The student received three digits correct, which is worth 9 points.

Example 4g: The student responded with an answer of 031 r1, the 3 and r1 are correct digits when scored in the direction as indicated by the teacher key and the leading zero is ignored. The student received two digits correct, which is worth 6 points.

5. **Erased Digits:** Erased or partially erased digits should be counted for points if they are legible and correct.

6. **Multiplication Single-Line Answers:** If a single line of work is shown for a multiplication problem, use your best judgment to determine whether that line is the first calculation of the procedure or the student's final answer, and score it according to that judgment.

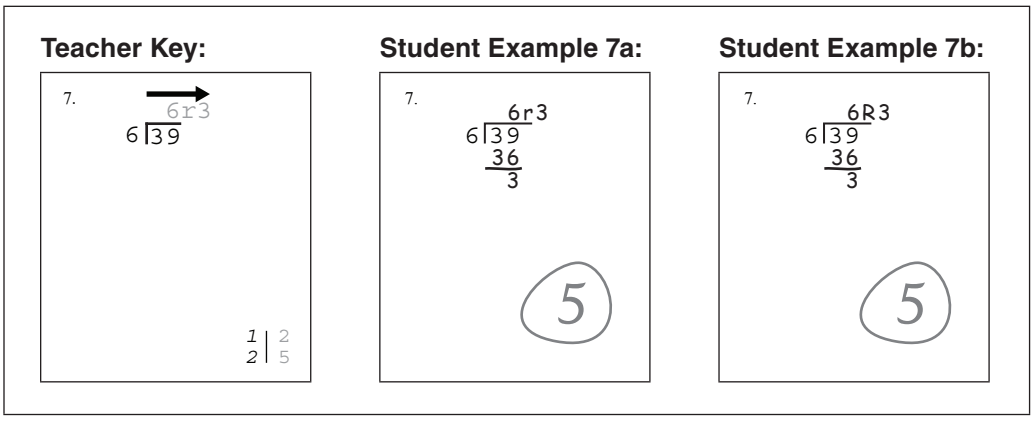
For example:



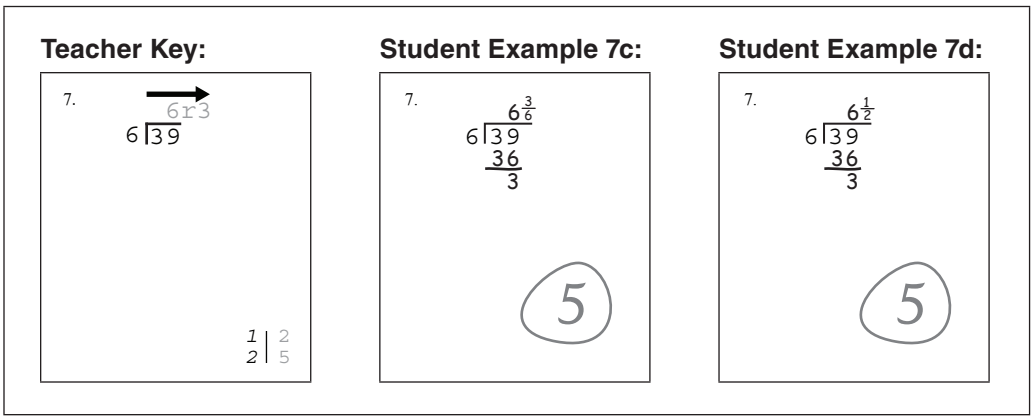
Example 6: Based on teacher judgment, the answer in this example was deemed student work and not a final answer because it appeared that the student was attempting to multiply 472 by 4.

7. **Remainders:** A student receives credit for a remainder whether it is written with an "r" or "R", or written as a fraction or decimal.

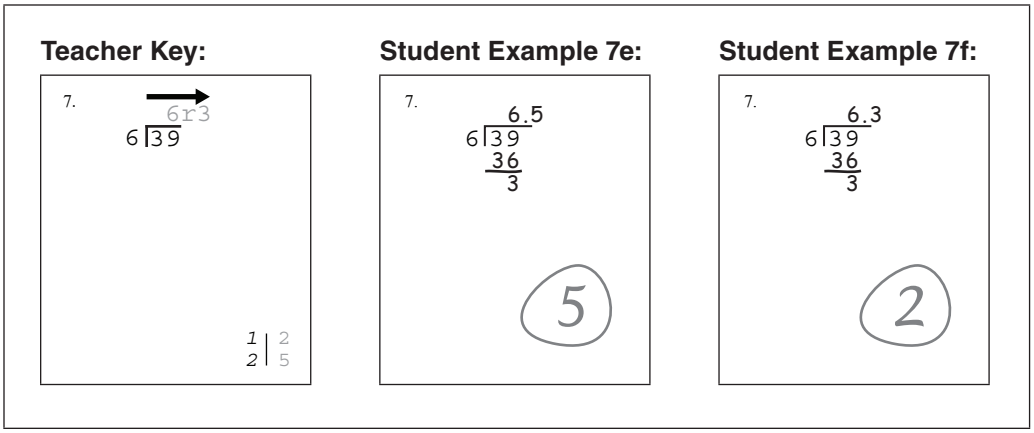
For example:



Examples 7a and 7b: The remainder can be written as "r" or "R".



Examples 7c and 7d: When it is written as a fraction, the possible points the student can receive for that remainder are the same number of points the student would have received if it had been written with an "r" instead of a fraction.

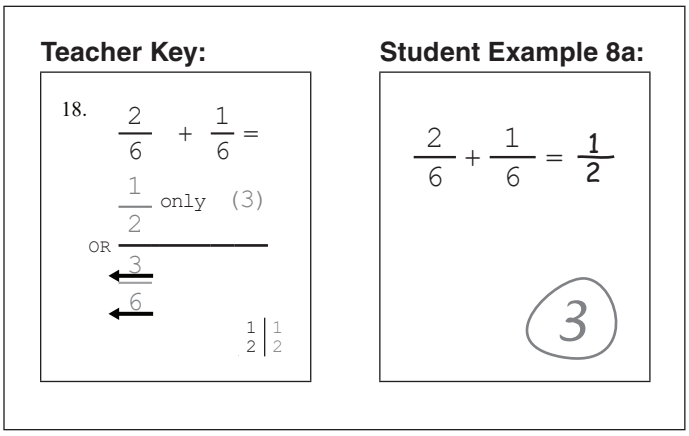


Examples 7e and 7f: If the remainder is written as a decimal, the value of the remainder after the decimal point must be equivalent to the fractional value of the remainder to be considered correct, and it is only eligible for the number of digits correct that would have normally been available for that problem (e.g., a remainder of 1/6 still only counts as 1 digit correct, even if written as .166667).

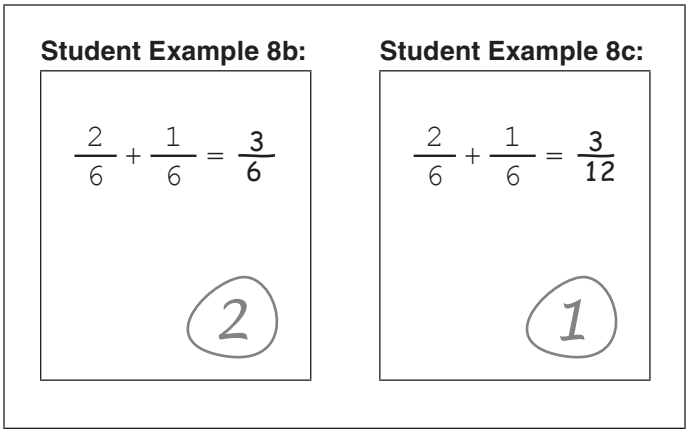
8. **Fractions:** When scoring fractions, the numerator, denominator, and whole number are evaluated separately. First determine the correct digits in the whole number (if applicable), then the numerator, and then the denominator.

Only. If the teacher key contains multiple correct answers and the top answer has an "only" by it, then the answer has to be exact to get that number of points. This is used to award an additional point if the student correctly reduced the answer. If the student's answer does not match exactly to the answer, then look at the bottom answer below the line where differential scoring is given and determine the number of points the answer should receive.

For example:



Example 8a: The student responded with an answer of 1/2. The student received 3 points for the "only" answer because the student reduced the fraction correctly and it matches the "only" answer exactly.

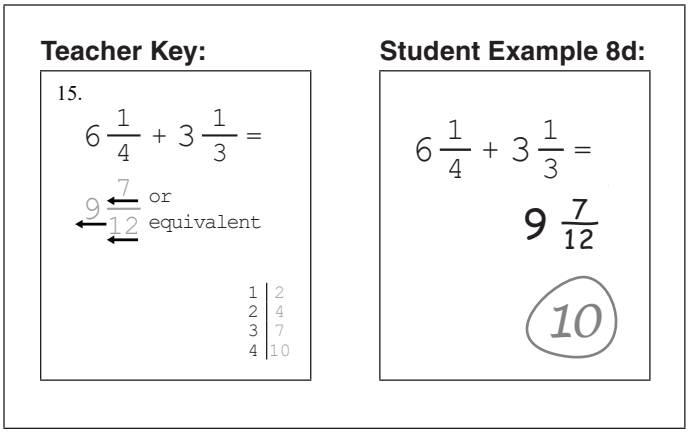


Example 8b: The correct answer without reducing the fraction is 3/6, which is two digits worth a total of 2 points. The student did not respond with the "only" answer of 1/2 and instead responded with an answer of 3/6, and the numerator of 3 is a correct digit and the denominator of 6 is a correct digit when scored in the direction as indicated by the teacher key. The student received two digits correct, which is worth 2 points.

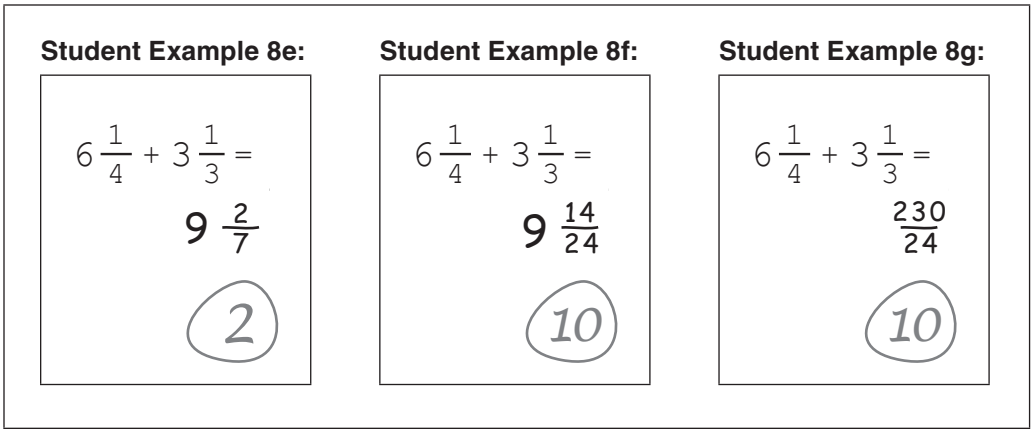
Example 8c: The student did not respond with the "only" answer of 1/2 and instead responded with an answer of 3/12, the numerator of 3 is a correct digit and the denominator does not have any correct digits when scored in the direction as indicated by the teacher key. The student received one digit correct, which is worth 1 point.

Or Equivalent. If the student provides a response other than what is written on the teacher key, is correct, and makes sense within the context of the problem, give credit for the problem. For example, a student can receive credit for a fraction problem if the student correctly uses a different denominator than the least common denominator.

For example:



Example 8d: The correct answer is 9 7/12, which is four digits worth a total of 10 points. The student responded with an answer of 9 7/12, the whole number of 9 is a correct digit, the numerator of 7 is a correct digit and the denominator has the correct digit of 2 and 1 when scored in the direction as indicated by the teacher key. The student received four digits correct, which is worth 10 points.



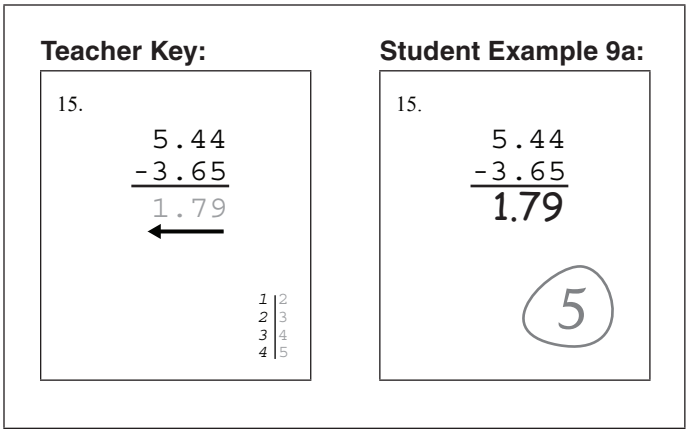
Example 8e: The student responded with an answer of 9 2/7. The whole number of 9 is a correct digit, the numerator does not have a correct digit and the denominator does not have a correct digit when scored in the direction as indicated by the teacher key. The student received one digit correct, which is worth 2 points.

Example 8f and 8g: The students responded with answers of 9 14/24 (8f) and 230/24 (8g). The students did not pick the least common denominator for these answers and in 8g left the fraction as an improper fraction. However, the notation "or equivalent" is present on the teacher key. Since the students answered the problems correctly, they are eligible for the maximum number of points possible. The students received the maximum points possible, 10 points, for the problems.

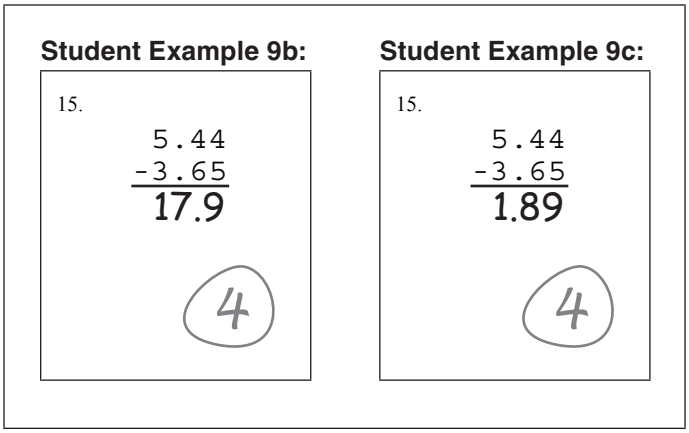
9. **Decimals:**

   a. When scoring problems with decimals, first look for the correct digits as indicated by the direction on the teacher key, ignoring the decimal. Then look to see if the decimal is in the correct place. The decimal is worth 1 point as a correct digit.

For example:



Example 9a: The correct answer is 1.79, which is four digits with the decimal counting as a digit and is worth a total of 5 points. The student responded with an answer of 1.79, the 9, 7, and 1 are correct digits when scored in the direction as indicated by the teacher key. The decimal is a correct digit because it is in the correct place. The student received four digits correct, which is worth 5 points.



Example 9b: The student responded with an answer of 17.9, the 9, 7, and 1 are correct digits when scored in the direction as indicated by the teacher key. The decimal is not a correct digit because it is not in the correct place. The student received three digits correct, which is worth 4 points.

Example 9c: The student responded with an answer of 1.89, the 9 and 1 are correct digits when scored in the direction as indicated by the teacher key. The decimal is a correct digit because it is in the correct place. The student received three digits correct, which is worth 4 points.

Response Pattern Analysis (Optional)

The response pattern analysis recording form is found in the benchmark and progress monitoring student booklets. It contains a chart that describes the problems that appear on each worksheet. The chart can be used to analyze the student response patterns.

To use the chart, make the following marks. Use different color ink or another way of indicating Form A and Form B for a benchmarking time period.

1. If the student got the problem correct, circle the problem number on the chart.
2. If the student got the problem incorrect or partially incorrect, mark an X over the problem number on the chart.
3. If the student did not reach the problem or skipped the problem, leave the problem number blank.
4. If the last problem that the student attempted on the sheet was not completed, leave it blank. If the student left other problems partially done, mark an X over those numbers.
5. Any response patterns that cannot be tracked with the chart can still be written in as notes.

Example 1 (Grade 2):

Computation / Benchmark 1

Problems	Skills Assessed
(1)	Add two one-digit numbers, excluding 0 and 1.
6	Subtract a one-digit number from a one-digit number excluding 0 and 1 in the subtrahend.
11	Subtract a one-digit number from a two-digit number of 18 or less, resulting in a difference of 9 or less, with renaming.
(2), (13)	Add a two-digit and a one-digit number, without renaming, resulting in a sum of 99 or less.
(7), 15, 19	Add two two-digit numbers, without renaming, resulting in a sum of 99 or less.
(9), 16	Add a two-digit and a one-digit number, with renaming, resulting in a sum of 99 or less.
(4), (12) 18	Add two two-digit numbers, with renaming, resulting in a sum of 99 or less.
(5)	Add four two-digit numbers, with renaming, resulting in a sum of 99 or less.
10, 17	Subtract a one- or two-digit number from a two-digit number, without renaming.
3, 14	Subtract a one-digit number from a two-digit number of 20 or more, with renaming.
8, 20	Subtract a two-digit number from a two-digit number of 20 or more, with renaming.

Example 1: In this example, the student correctly answered the addition problems, but skipped the subtraction and multiplication problems.

Example 2 (Grade 2):

Computation / Benchmark 1

Problems	Skills Assessed
(1)	Add two one-digit numbers, excluding 0 and 1.
~~6~~	Subtract a one-digit number from a one-digit number excluding 0 and 1 in the subtrahend.
~~11~~	Subtract a one-digit number from a two-digit number of 18 or less, resulting in a difference of 9 or less, with renaming.
(2), (13)	Add a two-digit and a one-digit number, without renaming, resulting in a sum of 99 or less.
(7), 15, 19	Add two two-digit numbers, without renaming, resulting in a sum of 99 or less.
(9), 16	Add a two-digit and a one-digit number, with renaming, resulting in a sum of 99 or less.
(4), (12) 18	Add two two-digit numbers, with renaming, resulting in a sum of 99 or less.
(5)	Add four two-digit numbers, with renaming, resulting in a sum of 99 or less.
~~10~~, 17	Subtract a one- or two-digit number from a two-digit number, without renaming.
~~3~~, 14	Subtract a one-digit number from a two-digit number of 20 or more, with renaming.
~~8~~, 20	Subtract a two-digit number from a two-digit number of 20 or more, with renaming.

Example 2: In this example, the student correctly answered the addition problems, but answered each of the subtraction problems incorrectly.

Chapter 11: **Concepts and Applications (C&A)**

Overview

Skill	Understanding math concepts and vocabulary, and applying that knowledge to solving problems
Administration Time	5, 10, 12, 14, or 16 minutes per worksheet depending on grade
Administration Schedule	Beginning of second grade to end of sixth grade
Score	Correct digits in final answer, exact answer points per box, exact answer points per line, or exact answer points per segment
Wait Rule	No wait rule
Discontinue Rule	No discontinue rule

What is Concepts and Applications?

Concepts and Applications is a standardized measure designed to assess students' progress in the basic skills of understanding mathematical concepts and vocabulary and applying that knowledge to solve mathematical problems. It can be administered individually or to groups. Students write their answers to problems under standardized conditions and time limits, which are dependent on grade level.

To administer Concepts and Applications, the assessor must have a copy of the standardized directions and the student worksheet for each student. To score Concepts and Applications, the assessor must have a copy of the corresponding teacher key.

Materials

- Student worksheet
- Teacher key
- Stopwatch or timer
- Pencils for students

Administration Directions

1. Provide each student with a pencil and a student worksheet. Hand out the worksheets face-down to each student. As you are handing out the worksheets, say ***I am going to hand out a math worksheet. Please leave the paper face-down and wait for further instructions.***
2. OPTIONAL: Use the following instructions if the worksheets have not been labeled with student names. If you have already labeled the worksheets with student names, then you can skip this step. The purpose of this step is to prevent the students from taking time to write their name during the timed test administration. Say ***Leave the paper face-down, but write your name on the back.***
3. Read the following specific directions to the student(s). Indicate the correct number of minutes based on the grade level of the worksheet you are administering.

   We're going to do a math worksheet that will take _____ minutes (see table below)***.***

Grade	Time Limit per Worksheet
Grade 2	**5** minutes
Grade 3	**12** minutes
Grade 4	**10** minutes
Grade 5	**14** minutes
Grade 6	**16** minutes

   There will be several types of math problems. Look at each problem carefully before you answer it. Some problems may have multiple parts. When I say "begin," turn the page over and start with the first problem. Try to solve each problem. If you cannot solve a problem, skip it and go on to the next one. If you reach the end of the page, go on to the next page. If you reach the end of the packet, stop and put your pencil down. Are there any questions?
4. Say ***Begin*** and start your stopwatch.
5. Monitor students and use reminders as needed.
6. At the end of the time limit (see table above), say ***Stop, and put your pencils down.***
7. Collect all the Concepts and Applications worksheets.

Reminders

These reminders may be used as often as needed:

- If the student is not attempting the problems in order or is skipping them without trying to solve them, say ***Try to solve each problem.***
- If a student stops working before the test is done, say ***Keep doing the best work you can.***
- If a student asks you to provide a word or for help with the task, say ***Just do your best.***
- Words and test items cannot be read to the student when doing a standardized administration.

Scoring Procedures

1. When scoring a Concepts and Applications form, you will need a copy of the teacher key for that form.
2. There are 16–20 problems on a form, each in individual sections. In the lower-right portion of the box, you will find a small legend that describes how to score the problem. The scoring is either based on the number of correct digits in the answer or the exact answer, depending on the type of problem.
3. All scoring should be done on the student worksheet, not the teacher key.
4. For each problem that was completed or attempted, write down the number of points the student received for the problem. To make it clear which marks are yours, either use a pen, place your marks in a consistent location, or circle your marks.
5. Add the total points possible in each page and note that number in the margin. Add the page totals together to get the student's total score, and record that score on the top of the page in the space provided.
6. The final score is the total score from the one student worksheet.

Determining the number of points the student receives on each problem:

- On the teacher key, each problem includes a small chart in the lower right corner that displays the points possible for that problem. The left-hand column of the chart represents the number of digits that the student got correct in the answer or the number of lines, segments, or boxes for exact answer problems. The right-hand column displays the number of points the student receives. There may be multiple components for each problem.
- The digits eligible for receiving points are the digits in the answer that are displayed on the teacher key. There are four main rules for determining points.

1. **Correct digits**: The correct digits are counted as the total number of digits in the answer that are correct. They must be scored referring to the scoring direction arrow on the teacher key. The student must have the final answer completely correct in order to receive the maximum points for the problem. Which specific digits are correct does not matter for the purpose of determining the number of points to assign unless the student would otherwise receive full credit for a problem with an incorrect answer (e.g., in a 3-digit answer, getting the 1st and 3rd digits correct results in the same number of points as getting the 1st and 2nd digits correct). The rules for correct digits for Concepts and Applications are the same as the rules for Computation. Please refer to the Computation examples for additional scoring guidance. For addition, subtraction, and multiplication, score the digits from right to left. For division, score the digits from left to right. For digital time, score digits from left to right on both slides of the colon.

For example:

Teacher Key:

18. There is a picture on the wall. What is the perimeter of the picture?
90 inches.

correct digits 1 | 5
2 | 10

Student Example 1:

18. There is a picture on the wall. What is the perimeter of the picture?
92 inches.

5

Example 1: The correct answer is 90, which is two digits worth a total of 10 points. The student responded with an answer of 92, the 9 is a correct digit when scored in the direction as indicated by the teacher key. The student received one digit correct, which is worth 5 points.

2. **Exact answer–points per line:** Each line in the problem is assigned points. The student answer must be correct on a line in order to receive points. If there are multiple lines in a problem, it is possible for a student to receive partial credit. For example, a student may have a correct answer on two out of three lines. Each number on the left represents the number of lines in a specific problems and the corresponding number on the right is the number of points.

For example:

Teacher Key:

2. How many shares is the rectangle divided into? ____3____ shares.

exact answer,
points per line 1 | 1

Student Example 2a:

2. How many shares is the rectangle divided into? ____3____ shares.

1

Example 2a: The student correctly responded with the answer of 3 and received 1 point.

Student Example 2b:

2. How many shares is the rectangle divided into? ____4____ shares.

0

Example 2b: The student did not provide the correct answer and received 0 points.

3. **Exact answer–points per box:** Each box in the problem is assigned points. The student answer must be correct in a box in order to get points. If there are multiple boxes in a problem, it is possible for a student to receive partial credit. For example, the student may have a correct answer in two out of three boxes. Each number on the left represents the number of boxes in a specific problem and the corresponding number on the right is the number of points.

For example:

Teacher Key:

5. Compare the fraction in Box 1 with the fraction in Box 2. Fill in the blank with > (greater than), = (equal to), or < (less than):

Box 1	>, =, <	Box 2
$\frac{3}{4}$	>	$\frac{2}{4}$
$\frac{3}{8}$	<	$\frac{7}{8}$

exact answer, points per box $\begin{array}{c|c} 1 & 2 \\ 2 & 4 \end{array}$

Student Example 3a:

5. Compare the fraction in Box 1 with the fraction in Box 2. Fill in the blank with > (greater than), = (equal to), or < (less than):

Box 1	>, =, <	Box 2
$\frac{3}{4}$	>	$\frac{2}{4}$
$\frac{3}{8}$	<	$\frac{7}{8}$

4

Example 3a: The student provided correct responses in both boxes and received 4 points for the problem.

Student Example 3b:

5. Compare the fraction in Box 1 with the fraction in Box 2. Fill in the blank with > (greater than), = (equal to), or < (less than):

Box 1	>, =, <	Box 2
$\frac{3}{4}$	>	$\frac{2}{4}$
$\frac{3}{8}$	>	$\frac{7}{8}$

2

Example 3b: The student provided a correct response to the first comparison in the first box, but did not provided a correct response to the second comparison in the second box. The student received 2 points for the problem.

Student Example 3c:

5. Compare the fraction in Box 1 with the fraction in Box 2. Fill in the blank with > (greater than), = (equal to), or < (less than):

Box 1	>, =, <	Box 2
$\frac{3}{4}$	<	$\frac{2}{4}$
$\frac{3}{8}$	>	$\frac{7}{8}$

0

Example 3c: The student did not provide any of the correct answers and did not receive any points for the problem.

4. **Exact answer–points per segment:** Each segment in the problem is assigned points. The student answer must be correct for a particular segment in order to get points. The numbers on the left represent the number of segments in a specific problem and the corresponding number on the right is the number of points. The description of what the segment(s) are can be located in the parenthesis.

For example:

Teacher Key:

12. Draw two line segments that are parallel:

exact answer,
points per segment
(line segments and parallel)

1	1
2	2

Student Example 4a:

12. Draw two line segments that are parallel:

2

Example 4a: The student provided two line segments that were parallel. The student received 2 points for the problem; 1 point for drawing two line segments and 1 point for drawing the line segments parallel.

Student Example 4b:

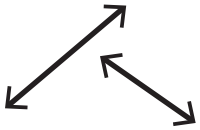
12. Draw two line segments that are parallel:

1

Example 4b: The student provided two line segments, but did not provide line segments that were parallel. The student received 1 point for the problem because two line segments were drawn.

Student Example 4c:

12. Draw two line segments that are parallel:

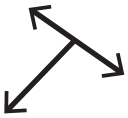


0

Example 4c: The student provided two lines that were perpendicular. The student received 0 points for the problem.

Student Example 4d:

12. Draw two line segments that are parallel:



0

Example 4d: The student provided one ray and one line that were perpendicular. The student received 0 points for the problem.

Teacher Key:

13. Write the following in expanded form: **43,797**

40,000 + 3,000 + 700 + 90 + 7

exact answer, 1 | 1
points per segment 2 | 2
(each part of the expanded form) 3 | 3
4 | 4
5 | 5

Student Example 4e:

13. Write the following in expanded form: **43,797**

40,000 + 3,000 + 700 + 90 + 7

5

Example 4e: The five correct segments are 40,000, 3,000, 700, 90, and 1 and they are worth a total of 5 points. The student responded with an answer that included the segments 40,000, 3,000, 700, 90, and 1. The student received five segments correct, which is worth 5 points.

Student Example 4f:

13. Write the following in expanded form: **43,797**

4,000 + 3,000 + 700 + 97

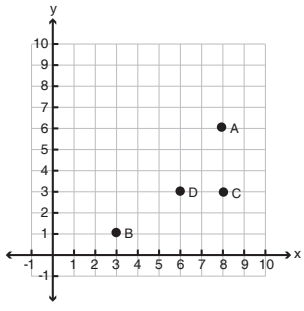
2

Example 4f: The student responded with an answer that included the segments 4,000, 3,000, 700, 97. The student received two segments correct, the 3,000 and 700, which is worth 2 points.

Teacher Key:

2. **Plot** the following ordered pairs on the coordinate plane and **label each pair** with the correct letter.

A. (8, 6)
B. (3, 1)
C. (8, 3)
D. (6, 3)



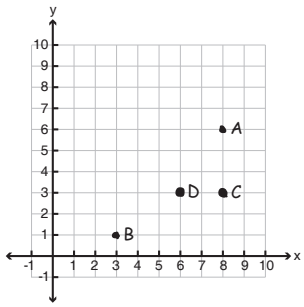
exact answer, 1 | 1
points per segment 2 | 2
(correctly plotted points) 3 | 3
4 | 4

Please note that the pairs must be plotted and labeled correctly in order to receive credit.

Student Example 4g:

2. **Plot** the following ordered pairs on the coordinate plane and **label each pair** with the correct letter.

A. (8, 6)
B. (3, 1)
C. (8, 3)
D. (6, 3)



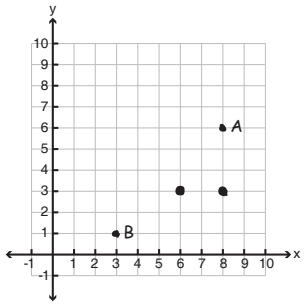
4

Example 4g: The student plotted and labeled all four pairs correctly. The student received 4 points for the problem.

Student Example 4h:

2. **Plot** the following ordered pairs on the coordinate plane and **label each pair** with the correct letter.

A. (8, 6)
B. (3, 1)
C. (8, 3)
D. (6, 3)



2

Example 4h: The student plotted and labeled two ordered pairs correctly, but did not label two additional ordered pairs. The student received 2 points for the problem for the ordered pairs that were plotted and labeled correctly.

5. **Or equivalent:** If the student provides a response other than what is written on the scoring sheet and it is correct and makes sense within the context of the problem, give credit for the problem.

Teacher Key:

3. List three numbers that are multiples of 4:

8 12 16 or equivalent

exact answer, 1 | 2
points per line 2 | 4
3 | 6

Student Example 5:

3. List three numbers that are multiples of 4:

4 8 16 or equivalent

6

Example 5: The student provided a multiple of four that is not written on the teacher key. Since it is correct and makes sense in the context of the problem, the student received 6 points for the problem.

6. **Erased Digits:** Erased or partially erased answers should be counted for points if they are legible and correct.

Response Pattern Analysis (Optional)

The response pattern analysis recording form is found in the benchmark and progress monitoring student booklets. It contains a chart that describes the problems that appear on each worksheet. The chart can be used to analyze the student response patterns. To use the chart, make the following marks. Red ink is recommended, to make it easy to distinguish the markings.

1. If the student got the problem correct, circle the problem number on the chart.
2. If the student got the problem incorrect or partially incorrect, mark an X over the problem number on the chart.
3. If the student did not reach the problem or skipped the problem, leave the problem number blank. If the last problem that the student attempted on the sheet was not completed, leave it blank.
4. If the student left other problems partially done, mark an X over those numbers.
5. Any response patterns that cannot be tracked with the chart can still be written in as notes.

Fourth Grade Example:

Concepts and Applications / Progress Monitoring 1

Problems	Skills Assessed
1, 7, 12	**Draw and identify lines and angles, and classify shapes by properties of their lines and angles:** 1. Determine whether a drawn line is a line of symmetry for a given shape. 7. Identify acute, obtuse, and right angles of a given shape. 12. Draw lines, line segments, or rays that are parallel or perpendicular.
2, 8, 13	**Generalize place value understanding for multi-digit whole numbers:** 2. Compare two three-digit whole numbers. 8. Round four-digit whole numbers to the nearest 10, nearest 100, and nearest 1000. 13. Write a five-digit number in expanded form.
3, 17	**Gain familiarity with factors and multiples:** 3. Determine three multiples for a given number. 17. Determine if given numbers are prime or composite numbers.
4, 9, 14	**Use the four operations with whole numbers to solve problems:** 4. Solve two-step problems with double-digit addition and subtraction. 9. Divide whole numbers to solve problems. 14. Solve problems involving time and conversion of time from hours to minutes.
5, 15	**Understand decimal notation for fractions and compare decimal fractions:** 5. Compare decimals to the hundredths place. 15. Determine the decimal notation for a fraction.
6, 11, 16, 20	**Solve problems involving measurement and conversion of measurements from a larger unit to a smaller unit:** 6. Solve problems involving time and conversion of time from hours to minutes. 11. Convert measurements from larger to smaller units. 16. Solve subtraction problems involving money. 20. Determine the length or width of an object when given the area and the length or width.
10	**Extend understanding of fraction equivalence and ordering:** Compare fractions with unlike denominators.
18	**Build fractions from unit fractions by applying and extending previous understanding of operations on whole numbers:** Solve problems involving multiplication of a fraction with a whole number.
19	**Represent and interpret data:** Determine the difference in length between two objects with the answer containing a fraction.

Chapter 12: **Design Specifications and Technical Adequacy Summary**

This chapter provides descriptive information, an overview of the design specifications, and a summary of the technical adequacy for each of the Acadience Math measures. More detailed information about each of these topics is provided at www.acadiencelearning.org.

Descriptive Information and Design Specifications

Acadience Math is a set of measures used to assess mathematics skills for students from kindergarten through sixth grade. By design, the Acadience Math measures serve as indicators of selected mathematics skills that every child must master to become proficient at math. They are designed to be an efficient, cost-effective tool used to help make decisions about math instruction, to help teachers provide support early, and to prevent the occurrence of later math difficulties. The following Acadience Math measures are available for both universal screening and progress monitoring:

Underlying Concepts	Acadience Math Measures
Magnitude Comparison	Beginning Quantity Discrimination Advanced Quantity Discrimination
Subitization	Beginning Quantity Discrimination (indirectly)
Strategic Counting	Next Number Fluency Missing Number Fluency
Number Identification	Number Identification Fluency
Basic Computation	Computation
Understanding and Applying Math Concepts	Concepts and Applications

Note: Information from Table 1.1 in Chapter 1 of this manual.

Acadience Math benchmark testing (universal screening) is conducted three times per year (beginning, middle, and end). Progress monitoring materials, for more frequent assessment, are available for all measures. Twenty (20) alternate forms are available for each measure, with 20 Computation and 20 Concepts and Applications forms available for each applicable grade level. The Math Composite Score (MCS) is also calculated for each benchmark assessment but not for progress monitoring. Descriptions and design specifications for each measure and the MCS are provided below. For additional information, please see www.acadiencelearning.org.

Beginning Quantity Discrimination (BQD): BQD is a brief, individually administered measure of a student's fluency in magnitude comparison. It is also an indirect measure of perceptual subitization, as the quantity of dots for some of the items extends beyond the perceptual subitization range. Using standardized directions, the assessor presents the student with a sheet showing a series of boxes, each of which contains a pattern

of dots. For each set of boxes, the student is asked to orally name the number of dots that is the larger quantity. The score that is recorded is the total number of correctly identified numbers.

There are four sets of boxes per sheet, organized in four rows. Both boxes in the first set the student encounters contain one to five dots. For the second and fourth sets, one box contains one to five dots and the other box contains six to 10 dots. The third set of boxes both contain six to 10 dots. Each probe for BQD is stratified in the same manner to ensure that all of the forms are approximately equivalent in difficulty. All of the numbers were randomly generated according to the design specifications of the measure. In instances where a correct answer was repeated on a page of a probe, the number was excluded and the next randomly generated number was used.

As with all of the Early Numeracy measures, three practice items are included to ensure that students understand the task and to maximize the performance of young students who may not have had any prior exposure to instruction for the skills being measured. The practice items provide support, including modeling and leading the correct response. With each practice item, the amount of support is decreased so that by the third practice item, students are expected to complete the task as they would during the assessment. By design, the boxes for the first practice item both contain one to five dots. The second practice item has one box with one to five and another box with six to 10. The boxes for the third practice item both contain six to 10 dots. This allows students to practice all of the different types of items that are included on the assessment.

Number Identification Fluency (NIF): NIF is a brief, individually administered measure of a student's fluency in number identification. The purpose of NIF is to measure students' mastery of number identification skills. Using standardized directions, the assessor presents a student with a sheet of numbers and asks the student to orally name each number. The score that is recorded is the total number of correctly identified numbers.

There are 30 numbers per sheet, arranged in six rows and five columns. Since this measure is given in both kindergarten and first grade, the numbers were sampled from a range of 1–99. In the first row, four out of the five numbers range from 1–20 and one number ranges 21–50. This was intentional so that the majority of numbers encountered in the first line by kindergarten students being assessed at the beginning of the year would be less than 20. On subsequent lines, the numbers range from 1–20, 21–50, and 51–99. Of the 30 numbers on each sheet, 18 are from 1–20, nine are from 21–50, and three are from 51–99. Each probe for NIF is stratified in the same manner to ensure that all of the forms are approximately equivalent in difficulty. All of the numbers were randomly generated according to the design specifications of the measure. Numbers were only able to appear once on each page. If a duplicate number was generated, that number was excluded and the next random number was populated on the page.

As with all of the Early Numeracy measures, three practice items are included to ensure that students understand the task and to maximize the performance of young students who may not have had any prior exposure to instruction for the skill being measured. The practice activity provides support, including modeling and leading the correct response. Note that for the NIF, the three practice items are in a series so that students don't name each separately. All of the practice items are single-digit numbers.

Next Number Fluency (NNF): NNF is a brief, individually administered measure of a student's fluency with strategic counting. Specifically, the measure assesses a student's ability to extend the counting sequence, starting from a number greater than 1. Using standardized directions, the assessor orally provides a number ranging from 1–99 and asks the student to say the next number. Since the measure is orally presented, there are no student-facing materials. The score that is recorded is the total number of correctly provided numbers.

There are 30 items per NNF probe. The stratification rules for NNF are the same as for NIF, discussed above, and each probe is stratified in the same manner to ensure that all of the forms are approximately equivalent in difficulty. Since this measure is administered in both kindergarten and first grade, the numbers were sampled from a range of 1–99. All of the numbers were randomly generated according to the design specifications of the measure. Numbers were only able to appear once on the probe. If a duplicate number was generated, that number was excluded and the next random number was populated.

As with all of the Early Numeracy measures, three practice items are included to ensure that students understand the task and to maximize the performance of young students who may not have had any prior exposure to instruction for the skill(s) being measured. For each practice item, the assessor provides a single-digit number ranging from 2–7 and asks the student to name the next number. The practice items provide support, including modeling and leading the correct response. With each practice item, the amount of support is decreased so that by the third practice item, students are expected to complete the task as they would during the assessment.

Advanced Quantity Discrimination (AQD): AQD is a brief, individually administered measure of a student's fluency in magnitude comparison. AQD is a more advanced measure of magnitude comparison skills than BQD. The assessor presents the student with a sheet showing a series of boxes, each of which contains two numbers, and asks the student to orally name the number that is the larger quantity. The score that is recorded is the total number of correctly identified numbers.

There are ten boxes per sheet, organized in five rows and two columns. The AQD measure was designed to include three possible combinations of comparisons: (a) both numbers range from 1–50, (b) one number ranges 1–50 and the other ranges from 51–99, or (c) both numbers range 51–99. Each probe of AQD is stratified in the same manner to ensure that all of the forms are approximately equivalent in difficulty. For example, the numbers in the first box both range 1–50, and the second box contains one number from 1–50 and one number from 51–99. All of the numbers were randomly generated according to the design specifications of the measure.

As with all of the Early Numeracy measures, three practice items are included to ensure that students understand the task and to maximize the performance of young students who may not have had any prior exposure to instruction on the skill being measured. The practice items provide support, including modeling and leading the correct response. With each practice item, the amount of support is decreased so that by the third practice item, students are expected to complete the task as they would during the assessment. By design, the first practice item includes one number ranging from 1–50 and one from 51–99. The second practice item has both numbers from 1–50, and the third practice item has both numbers from 51–99. This intentionally allows students to practice all of the different types of items that are included on the assessment.

Missing Number Fluency (MNF): MNF is a brief, individually administered measure of a student's fluency with strategic counting. Using standardized directions, the assessor presents the student with a sheet containing a series of boxes containing a sequence of four numbers. Three of the numbers are provided, while a fourth number (always in the second or third position of the sequence) is missing and indicated by a blank line. The student is asked to orally name the missing number. The recorded score is the total number of correctly provided numbers.

There are 10 sequences per sheet, organized in five rows and two columns. The sequence of numbers increases by 1s, 5s, or 10s. Five of the sequences increase by 1s, three sequences increase by 5s, and two sequences increase by 10s. Three of the sequences that increase by 1s and one of the sequences that increase by 5s begin with a number ranging from 1–30. The beginning number was randomly generated according to the

design specifications of the measure. To further control for alternate-form reliability, the blank line for the missing number was fixed in either the second or the third position of each sequence. Each probe for MNF is stratified in the same manner to ensure that all of the forms are approximately equivalent in difficulty. For example, the first sequence on each probe will always (a) increase by 1s, (b) begin with a number ranging from 1– 30, and (c) be missing the second number. The second sequence on each probe will always (a) increase by 10s and (b) be missing the third number. The third sequence will always (a) increase by 5s, (b) begin with a number ranging from 35–80, and (c) be missing the third number.

As with all of the Early Numeracy measures, three practice items are included to ensure that students understand the task and to maximize the performance of young students who may not have had any prior exposure to instruction for the skill being measured. The practice items provide support, including modeling and leading the correct response. With each practice item, the amount of support is decreased so that by the third practice item, students are expected to complete the task as they would during the assessment. By design, the first practice item increases by 1s, the second practice item increases by 5s, and the third practice item by 10s. This intentionally allows students to practice all of the different types of items that are included on the assessment.

Computation: Computation is a standardized measure of basic computation skills. Computation was designed to assess basic computation skills from the domains of operations and algebraic thinking, numbers and operations in base ten, numbers operations with fractions, and the number system. Depending on grade level, Computation assesses addition, subtraction, multiplication, and division skills. In later grades, problems also include fractions and decimals within the four operations. A variety of problem types are included on the Computation worksheets, and each problem includes a set range of numbers that were randomly generated for each problem. A hierarchy of computational skills organized by difficulty were derived from pilot study data and used in conjunction with the Common Core State Standards in Mathematics to determine the final set of problems on the worksheets. An untimed item-level study was also conducted to further refine the problem creation rules and establish the optimal timing for the measure at each grade. The problems are stratified so they appear in the same place on each of the worksheets. Descriptions of each problem type can be found in Appendix 6 and the student booklets.

Computation can be given to a whole class at the same time, to a small group of students, or to individual students. For the benchmark assessment, students are asked using standardized directions to complete two different, but equivalent, worksheets in a set period of time. When being assessed for progress monitoring, students are asked to complete one worksheet. The time allowed varies by grade level. The scores that are recorded are the total number of points earned on the worksheets. The points earned are determined by examining the correct digits in the final answer of a problem. For addition, subtraction, and other simple problems, the number of points possible is the same as the number of digits in the correct answer, so the student receives 1 point per correct digit. Differential scoring begins in fourth grade and allows for each correct digit to be worth more than 1 point depending on the problem type. The final score during benchmark assessment is the average score from the two administered worksheets. The final score for a progress monitoring assessment is the score from the one administered worksheet. Additional analysis of the response patterns can be completed using the student booklets to provide instructionally relevant information about how the student approaches solving the problems.

Concepts and Applications: Concepts and Applications is a standardized measure designed to assess the ability of students to understand and apply the mathematical concept presented in the question. Depending on the grade level, Concepts and Applications assesses the student's ability to apply concepts in the domain areas of operations and algebraic thinking, number and operations in base ten, number and operations with

fractions, measurement and data, geometry, the number system, expressions and equations, and statistics and probability. The computational component of Concepts and Applications was intentionally kept easier. For this reason, Concepts and Applications should be administered in conjunction with Computation. Both measures, along with the MCS (discussed below), provide a more complete picture of math proficiency.

The Concepts and Applications questions were written with set criteria for each question. Design specifications included the (a) range of numbers to select from when randomly generating the numbers used in each problem, (b) types of situations that would be appropriate for each question type, (c) type of response required for each question, and (d) wording used in each question. For many of the problems, an attempt was made to control the readability of the question in order to lessen the impact of reading skill on the assessment. The Acadience Learning Passage Revision Utility/Passage Difficulty Index was used for this process, which is software that identifies the target word length, number of rare words, and sentence length for a passage and provides guidance when a passage is outside of the target ranges. However, the Passage Difficulty Index was designed for longer pieces of text than the one- to two-sentence word problems used in Concepts and Applications and was only used to provide an approximate readability level. Math-specific vocabulary, numbers, and names within problems were excluded and temporary placeholder words were inserted before the problems were run through the Passage Difficulty Index. The goal was for word problems to be approximately two grade levels below the target grade level in third through sixth grade and one grade level below the target grade level in second grade. The problems went through two untimed item-level studies in order to refine the questions, determine the approximate difficulty level of each of the problems, and establish the final time limits for the measure at each grade. By design, the problems are stratified so they appear in the same place on each of the worksheets, and the domains that each problem draws from are arranged so students have an opportunity to encounter at least one problem type from each domain during the time allotted.

Concepts and Application can be given to a whole class at the same time, to a small group of students, or to individual students. Using standardized directions, students are asked to complete one worksheet. The timing of the measure varies by grade level. The score that is recorded is the total number of points earned on the worksheet. The points earned are determined by adding up (a) the correct digits in the final answer of each problem or (b) the exact answer in the answer box, line, or segment, depending on the problem type. Additional analysis of the response patterns can be completed using the student booklets to provide instructionally relevant information about how the student approaches solving the problems.

Math Composite Score (MCS): The Math Composite Score (MCS) is a combination of multiple Acadience Math scores that provides the best overall estimate of the student's math proficiency for the student's grade level and time of year.

The specific Acadience Math measures that are used to calculate the MCS vary by grade and time of year. As a result, the MCS is not comparable across different grades and does not provide a direct measure of growth across grades. Since the formula used to generate the MCS may change across the year in certain grades, the MCS is also not comparable across different times of year and should not be used as an indicator of growth within a grade. However, because the logic and procedures used to establish benchmark goals are consistent across grades and times of year, the percent of students at different benchmark status levels can be compared, even though the mean scores are not comparable. Additional details regarding the MCS are provided at www.acadiencelearning.org.

As we constructed the MCS, we were guided in equal parts by science (empirical evidence and research) and theory. Theory and science guided our decisions about which measures to include, how to structure and compute scores, and how to guide interpretations.

The MCS is formed by combining the Acadience Math measures that correlate highly with later outcomes for each grade and time of year and then weighting each measure to contribute approximately equally. The MCS is highly correlated with specific math outcomes and generalizes to a broad range of math outcomes. The MCS represents a large, rich, and broad sample of math behavior. It combines information from across the Acadience Math measures administered at a given time. As such, educators do not need to determine which scores are most important or how to integrate the information. The beauty of the MCS is that it allows for an easy and meaningful integration of information. The MCS conveys that all aspects of math skills are critical—a student whose MCS is At or Above Benchmark is on track to meeting future goals and important mathematics outcomes.

Technical Adequacy Summary

Reliability

This section provides a summary of the reliability of Acadience Math. Reliability refers to the relative stability with which a test measures the same skills across minor differences in conditions. Three types of reliability have been gathered for Acadience Math: inter-rater, test-retest, and alternate-form.

Inter-rater reliability indicates the extent to which results for a measure generalize across assessors. Two methods were used for evaluating inter-rater reliability. For the Early Numeracy measures (i.e., BQD, NIF, NNF, AQD, and MNF), students were administered the measures and were scored simultaneously by two assessors (i.e., "shadow-scoring"). The two scores were then correlated. For the Computation and C&A measures, photocopies were made of unscored student worksheets. The two copies (original and photocopy) were then scored separately and independently by two Acadience Learning research assistants, and the two scores were correlated.

Test-retest reliability is an index of score stability, or the degree to which results from student testing are replicated, when the same test form is administered twice within a short interval. Students were administered the same test form within an approximate two-week time period, and the two scores were correlated. During benchmark assessment, students complete two Computation worksheets. Thus, for Computation, two worksheets were administered at each testing session. For test-retest reliability, students completed the same set of worksheets at both sessions (i.e., Worksheets A and B at time one, Worksheets A and B again at time two). The score for each worksheet was calculated, and the two scores from each session were averaged to calculate a Total Score (i.e., Total Score at time one, Total Score at time two).

Alternate-form reliability indicates the extent to which test results generalize to different test forms. Students were tested with two different (i.e., alternate), but equivalent, forms of the same measure within a two-week time period, and the scores were correlated. For Computation, students completed an alternate, but equivalent, set of two worksheets at both testing sessions (i.e., Worksheets A and B at time one, Worksheets C and D at time two). The score for each worksheet was calculated, and the two scores from each session were averaged to calculate a Total Score (i.e., Total Score at time one, Total Score at time two).

Reliability results for Acadience Math are reported in *Table 12.1.* All coefficients suggest the measures are appropriate for the screening and progress monitoring decisions for which they are designed. As research on Acadience Math continues, updated technical information on the measures will be posted to www.acadiencelearning.org.

Table 12.1 Summary of Reliability of Acadience Math

Acadience Math Measure	Grade						
	K	1	2	3	4	5	6
Beginning Quantity Discrimination							
Inter-rater	.99	--	--	--	--	--	--
Test-retest	.76	--	--	--	--	--	--
Alternate-form	.63	--	--	--	--	--	--
Number Identification Fluency							
Inter-rater	.99	.99	--	--	--	--	--
Test-retest	.93	.94	--	--	--	--	--
Alternate-form	.88	.90	--	--	--	--	--
Next Number Fluency							
Inter-rater	.99	.99	--	--	--	--	--
Test-retest	.76	.81	--	--	--	--	--
Alternate-form	.80	.66	--	--	--	--	--
Advanced Quantity Discrimination							
Inter-rater	--	.99	--	--	--	--	--
Test-retest	--	.86	--	--	--	--	--
Alternate-form	--	.88	--	--	--	--	--
Missing Number Fluency							
Inter-rater	--	.99	--	--	--	--	--
Test-retest	--	.87	--	--	--	--	--
Alternate-form	--	.82	--	--	--	--	--
Computation							
Inter-rater	--	.99	.99	.98	.99	.99	.99
Two-week test-retest	--	.73	.66	.81	.87	.76	.80
Total Score test-retest	--	.81	.77	.86	.90	.81	.84
Two-worksheet alternate-form	--	.79	.75	.86	.89	.75	.83
Two-week alternate-form	--	.59	.69	.82	.83	.60	.74
Total Score alternate-form	--	.67	.78	.88	.87	.73	.81
Concepts and Applications							
Inter-rater	--	--	.99	1.00	.99	.99	.99
Test-retest	--	--	.75	.75	.85	.75	.72
Alternate-form	--	--	.74	.79	.87	.78	.88

Note: Two-week test-retest = the median of the correlations between A x A and B x B. Total Score test-retest = the correlation of the Total Score from the two testing sessions. Two-worksheet alternate-form = the median of the correlations between A x B and C x D. Two-week alternate-form reliability = the median of the correlations between A x C, A x D, B x C, and B x D. Total Score alternate-form reliability = the correlation of the Total Score from the two testing sessions. Dashes indicate the measure is not administered at the specified grade level.

Validity

This section provides a summary of the validity evidence gathered on Acadience Math. Criterion-related validity is the extent to which performance on a criterion measure can be estimated from performance on an assessment (Salvia, Ysseldyke, & Bolt, 2007). A test is valid if it accurately measures what it is supposed to measure. Evidence of validity is presented as a correlation between the assessment and the criterion. Concurrent validity estimates how well student performance on the assessment is related to performance on the criterion when both measures are given at about the same time. Predictive validity estimates how well student performance on the assessment predicts performance on the criterion at a later time.

The GMADE (Williams, 2004) was used as the criterion for kindergarten and first grade, and the SAT10 Total Math Score (Pearson, 2003) was used as the criterion for second through sixth grade. Because the criteria measures were administered at the end of the school year, concurrent validity is the correlation between the end-of-year Acadience Math measures and the criterion. Predictive validity is the correlation between the Acadience Math measures earlier in the year and the criterion. Both the correlations between the beginning-of-year and middle-of-year Acadience Math scores and the end-of-year criterion score could be considered predictive, so the larger of the two was chosen to report.

The criterion-related validity results for Acadience Math are presented in *Table 12.2*. All coefficients suggest moderate to strong relations between the Acadience Math measures and the criterion measures (e.g., SAT10 Total Math Score). As research on Acadience Math continues, updated technical information on the measures will be posted to www.acadiencelearning.org.

Table 12.2 Summary of Validity of Acadience Math

	Grade						
Acadience Math Measure	K	1	2	3	4	5	6
Beginning Quantity Discrimination							
Predictive	.39	--	--	--	--	--	--
Concurrent	.45	--	--	--	--	--	--
Number Identification Fluency							
Predictive	.29	.59	--	--	--	--	--
Concurrent	.38	NA	--	--	--	--	--
Next Number Fluency							
Predictive	.36	.55	--	--	--	--	--
Concurrent	.31	NA	--	--	--	--	--
Advanced Quantity Discrimination							
Predictive	--	.64	--	--	--	--	--
Concurrent	--	.65	--	--	--	--	--
Missing Number Fluency							
Predictive	--	.58	--	--	--	--	--
Concurrent	--	.55	--	--	--	--	--
Computation							
Predictive	--	.45	.72	.72	.71	.73	.84
Concurrent	--	.55	.68	.69	.72	.76	.82
Concepts and Applications							
Predictive	--	--	.79	.74	.81	.81	.87
Concurrent	--	--	.84	.83	.76	.81	.84
Math Composite Score							
Predictive	.40	.63	.80	.81	.81	.81	.86
Concurrent	.46	.65	.83	.81	.77	.83	.87

Note: NA indicates the measure is not administered at the time of year necessary for calculating the specified type of validity (e.g., NIF is not administered at the end of first grade, thus concurrent validity could not be calculated). Dashes indicate the measure is not administered at the specified grade level.

Appendices

Appendix 1: How Acadience Math Relates to the Common Core State Standards in Mathematics

Acadience Math draws problem types from the Common Core State Standards for Mathematics. However, Acadience Math is a General Outcome Measure (GOM) and not intended to measure every skill on the Standards. For further information on the Common Core State Standards for Mathematics, visit http://www.corestandards.org/Math/.

Acadience Math Measures Linkage to Common Core State Standards in Mathematics

Kindergarten

Common Core Domain		***Acadience Math Measure***
Counting and Cardinality	Know number names and the count sequence	Next Number Fluency
	Count to tell the number of objects	Beginning Quantity Discrimination
	Compare Numbers	Beginning Quantity Discrimination
Operations and Algebraic Thinking	Understand addition as putting together and adding to; understand subtraction as taking apart and taking from	
Number and Operations in Base Ten	Work with numbers 11–19 to gain foundations for place value	
Measurement and Data	Describe and compare measurable attributes	Beginning Quantity Discrimination
	Classify objects and count the number of objects in each category	Beginning Quantity Discrimination
Geometry	Identify and describe shapes	
	Analyze, compare, create, and compose shapes	

Acadience Math Measures Linkage to Common Core State Standards in Mathematics

First Grade

Common Core Domain		***Acadience Math Measure***
Operations and Algebraic Thinking	Represent and solve problems involving addition and subtraction	
	Understand and apply properties of operations and the relationship between addition and subtraction	Computation
	Add and subtract within 20	Computation
	Work with addition and subtraction equations	
Number and Operations in Base Ten	Extend the counting sequence	Next Number Fluency, Number Identification
	Understand place value	Advanced Quantity Discrimination
	Use place value understanding and properties of operations to add and subtract	Computation Missing Number Fluency
Measurement and Data	Measure lengths indirectly and by iterating length units	
	Tell and write time	
	Represent and interpret data	
Geometry	Reason with shapes and their attributes	

Acadience Math Measures Linkage to Common Core State Standards in Mathematics

Second Grade

Common Core Domain		***Acadience Math Measure***
Operations and Algebraic Thinking	Represent and solve problems involving addition and subtraction	Concepts and Applications
	Add and subtract within 20	Computation
	Work with equal groups of objects to gain foundations for multiplication	Concepts and Applications
Number and Operations in Base Ten	Understand place value	Concepts and Applications
	Use place value understanding and properties of operations to add and subtract	Computation
Measurement and Data	Measure and estimate lengths in standard units	Concepts and Applications
	Relate addition and subtraction to length	Concepts and Applications
	Work with time and money	Concepts and Applications
	Represent and interpret data	
Geometry	Reason with shapes and their attributes	Concepts and Applications

Acadience Math Measures Linkage to Common Core State Standards in Mathematics

Third Grade

Common Core Domain		***Acadience Math Measure***
Operations and Algebraic Thinking	Represent and solve problems involving multiplication and division	Concepts and Applications
	Understand properties of multiplication and the relationship between multiplication and division	Computation Concepts and Applications
	Multiply and divide within 100	Computation
	Solve problems involving the four operations, and identify and explain patterns in arithmetic	Concepts and Applications
Number and Operations in Base Ten	Use place value understanding and properties of operations to perform multi-digit arithmetic	Computation Concepts and Applications
Number and Operations–Fractions	Develop understanding of fractions as numbers	Concepts and Applications
Measurement and Data	Solve problems involving measurement and estimation of intervals of time, liquid volumes, and masses of objects	Concepts and Applications
	Represent and interpret data	Concepts and Applications
	Geometric measurement: understand concepts of area and relate area to multiplication and to addition	Concepts and Applications
	Geometric measurement: recognize perimeter as an attribute of plane figures and distinguish between linear and area measures	Concepts and Applications
Geometry	Reason with shapes and their attributes	Concepts and Applications

Acadience Math Measures Linkage to Common Core State Standards in Mathematics

Fourth Grade

Common Core Domain		***Acadience Math Measure***
Operations and Algebraic Thinking	Use the four operations with whole numbers to solve problems	Concepts and Applications
	Gain familiarity with factors and multiples	Concepts and Applications
	Generate and analyze patterns	
Number and Operations in Base Ten	Generalize place value understanding for multi-digit whole numbers	Concepts and Applications
	Use place value understanding and properties of operations to perform multi-digit arithmetic	Computation
Number and Operations–Fractions	Extend understanding of fraction equivalence and ordering	Concepts and Applications
	Build fractions from unit fractions by applying and extending previous understandings of operations on whole numbers	Computation Concepts and Applications
	Understand decimal notation for fractions, and compare decimal fractions	Concepts and Applications
Measurement and Data	Solve problems involving measurement and conversion of measurements from a larger unit to a smaller unit	Concepts and Applications
	Represent and interpret data	Concepts and Applications
	Geometric measurement: understand concepts of angle and measure angles	
Geometry	Draw and identify lines and angles, and classify shapes by properties of their lines and angles	Concepts and Applications

Acadience Math Measures Linkage to Common Core State Standards in Mathematics

Fifth Grade

Common Core Domain		***Acadience Math Measure***
Operations and Algebraic Thinking	Write and interpret numerical expressions	Concepts and Applications
	Analyze patterns and relationships	Concepts and Applications
Number and Operations in Base Ten	Understand the place value system	Concepts and Applications
	Perform operations with multi-digit whole numbers and with decimals to hundredths	Computation Concepts and Applications
Number and Operations–Fractions	Use equivalent fractions as a strategy to add and subtract fractions	Computation Concepts and Applications
	Apply and extend previous understandings of multiplication and division to multiply and divide fractions	Concepts and Applications
Measurement and Data	Convert like measurement units within a given measurement system	Concepts and Applications
	Represent and interpret data	
	Geometric measurement: understand concepts of volume and relate volume to multiplication and to addition	Concepts and Applications
Geometry	Graph points on the coordinate plane to solve real-world and mathematical problems	Concepts and Applications
	Classify two-dimensional figures into categories based on their properties	Concepts and Applications

Acadience Math Measures Linkage to Common Core State Standards in Mathematics

Sixth Grade

Common Core Domain		***Acadience Math Measure***
Ratios and Proportional Relationships	Understand ratio concepts and use ratio reasoning to solve problems	Concepts and Applications
The Number System	Apply and extend previous understandings of multiplication and division to divide fractions by fractions	
	Compute fluently with multi-digit numbers and find common factors and multiples	Computation Concepts and Applications
	Apply and extend previous understandings of numbers to the system of rational numbers	Concepts and Applications
Expressions and Equations	Apply and extend previous understandings of arithmetic to algebraic expressions	Concepts and Applications
	Reason about and solve one-variable equations and inequalities	Concepts and Applications
	Represent and analyze quantitative relationships between dependent and independent variables	Concepts and Applications
Geometry	Solve real-world and mathematical problems involving area, surface area, and volume	Concepts and Applications
Statistics and Probability	Develop understanding of statistical variability	Concepts and Applications
	Summarize and describe distributions	Concepts and Applications

Appendix 2: Acadience Math Initial Grouping Suggestions

Initial Grouping Suggestions

The groupings provided by these worksheets are considered *initial suggestions* because the teacher must further revise these groupings based on other information about students' skill levels, available resources, and magnitude of student need.

Three Levels of Instructional Support

The following three levels of instructional support are identified for individual Acadience Math scores as well as the overall Math Composite Score:

- *At or Above Benchmark:* Likely to Need Core Support – Student's scores are at or above the benchmark for their grade and time of year; students performing at this level are likely to need effective core instruction to reach subsequent goals.
  - Generally 80%–90% probability of reaching subsequent important math goals.
  - Provide generally effective core curriculum and instruction focused on the core components of mathematics.
- *Below Benchmark:* Likely to Need Strategic Support – Student's scores are below the benchmark for their grade and time of year; students performing at this level are likely to need additional targeted intervention and support to reach subsequent goals.
  - Generally 40%–60% probability of reaching subsequent important math goals.
  - Provide extra practice; adaptations of core curriculum; small group instruction with supplementary program.
- *Well Below Benchmark:* Likely to Need Intensive Support – Student's scores are well below the benchmark for their grade and time of year; students performing at this level are likely to need substantial additional intervention and support to reach subsequent goals.
  - Generally 10%–20% probability of reaching subsequent important math goals.
  - Provide focused, explicit instruction with supplementary intensive curriculum; small group/individual instruction.

Validating Need for Support

Within the Outcomes-Driven Model, an important step is validating need for support. At this step, ask, "Are we confident that the identified students need support?" If there is any doubt in making the decision regarding whether a student is on track or not with respect to a core component, additional information should be obtained. The goal is to be reasonably confident in the decision that the student is on track or not. Additional information may be obtained by retesting with alternate forms of the corresponding Acadience Math measure, by administering a brief diagnostic assessment, or by considering other assessment and performance information available on the student.

Core Components of Math Skills

It is important to analyze and use all of the information available on a student's skills. These initial instructional grouping worksheets provide an initial focus on the two most salient core component areas at each assessment time. Once the initial grouping worksheets are completed it is important to investigate student's response patterns to aid in instructional grouping.

Schoolwide, Systems-Level Considerations

If a large number of students fall in any of the instructional grouping recommendations other than Group 1, consider supplementing the system of core instruction to address the corresponding skill areas.

K Kindergarten Beginning of Year Initial Grouping Suggestions

Group 1: Likely to need core support

Magnitude Comparison & Subitization	At or Above Benchmark (5 or more on BQD)
Strategic Counting	At or Above Benchmark (5 or more on NNF)

Name	BQD 5+	NNF 5+

Group 2: Additional support on strategic counting

Magnitude Comparison & Subitization	At or Above Benchmark (5 or more on BQD)
Strategic Counting	Below or Well Below Benchmark (Less than 5 on NNF)

Name	BQD 5+	NNF 0–4

Group 3: Additional support on magnitude comparison and possibly on subitization

Magnitude Comparison & Subitization	Below or Well Below Benchmark (Less than 5 on BQD)
Strategic Counting	At or Above Benchmark (5 or more on NNF)

Name	BQD 0–4	NNF 5+

Group 4: Additional support on strategic counting, magnitude comparison, and possibly subitization

Magnitude Comparison & Subitization	Below or Well Below Benchmark (Less than 5 on BQD)
Strategic Counting	Below or Well Below Benchmark (Less than 5 on NNF)

Name	BQD 0–4	NNF 0–4

Note: Check other Early Numeracy measures

K Kindergarten Middle of Year Initial Grouping Suggestions

Group 1: Likely to need core support

Number Identification	At or Above Benchmark (14 or more on NIF)
Strategic Counting	At or Above Benchmark (11 or more on NNF)

Name	NIF 14+	NNF 11+

Group 2: Additional support on strategic counting

Number Identification	At or Above Benchmark (14 or more on NIF)
Strategic Counting	Below or Well Below Benchmark (Less than 11 on NNF)

Name	NIF 14+	NNF 0–10

Group 3: Additional support on number identification

Number Identification	Below or Well Below Benchmark (Less than 14 on NIF)
Strategic Counting	At or Above Benchmark (11 or more on NNF)

Name	NIF 0–13	NNF 11+

Group 4: Additional support on number identification and on strategic counting (Check BQD)

Number Identification	Below or Well Below Benchmark (Less than 14 on NIF)
Strategic Counting	Below or Well Below Benchmark (Less than 11 on NNF)

Name	NIF 0–13	NNF 0–10

Note: Check other Early Numeracy measures

K Kindergarten End of Year Initial Grouping Suggestions

Group 1: Likely to need core support

Number Identification	At or Above Benchmark (25 or more on NIF)
Strategic Counting	At or Above Benchmark (14 or more on NNF)

Name	NIF 25+	NNF 14+

Group 2: Additional support on strategic counting

Number Identification	At or Above Benchmark (25 or more on NIF)
Strategic Counting	Below or Well Below Benchmark (Less than 14 on NNF)

Name	NIF 25+	NNF 0–13

Group 3: Additional support on number identification

Number Identification	Below or Well Below Benchmark (Less than 25 on NIF)
Strategic Counting	At or Above Benchmark (14 or more on NNF)

Name	NIF 0–24	NNF 14+

Group 4: Additional support on number identification and on strategic counting (Check BQD)

Number Identification	Below or Well Below Benchmark (Less than 25 on NIF)
Strategic Counting	Below or Well Below Benchmark (Less than 14 on NNF)

Name	NIF 0–24	NNF 0–13

Note: Check other Early Numeracy measures

1 Grade 1 Beginning of Year Initial Grouping Suggestions

Group 1: Likely to need core support

Strategic Counting	At or Above Benchmark (12 or more on NNF)
Magnitude Comparison	At or Above Benchmark (10 or more on AQD)

Name	NNF 12+	AQD 10+

Group 2: Additional support on magnitude comparison

Strategic Counting	At or Above Benchmark (12 or more on NNF)
Magnitude Comparison	Below or Well Below Benchmark (Less than 10 on AQD)

Name	NNF 12+	AQD 0–9

Group 3: Additional support on strategic counting

Strategic Counting	Below or Well Below Benchmark (Less than 12 on NNF)
Magnitude Comparison	At or Above Benchmark (10 or more on AQD)

Name	NNF 0–11	AQD 10+

Group 4: Additional support on strategic counting and on magnitude comparison

Strategic Counting	Below or Well Below Benchmark (Less than 12 on NNF)
Magnitude Comparison	Below or Well Below Benchmark (Less than 10 on AQD)

Name	NNF 0–11	AQD 0–9

Note: Check other Early Numeracy measures and Computation measure

1 Grade 1 Middle of Year Initial Grouping Suggestions

Group 1: Likely to need core support

Magnitude Comparison	At or Above Benchmark (19 or more on AQD)
Computation	At or Above Benchmark (11 or more on Comp)

Name	AQD 19+	Comp 11+

Group 2: Additional support on computation

Magnitude Comparison	At or Above Benchmark (19 or more on AQD)
Computation	Below or Well Below Benchmark (Less than 11 on Comp)

Name	AQD 19+	Comp 0–10

Group 3: Additional support on magnitude comparison

Magnitude Comparison	Below or Well Below Benchmark (Less than 19 on AQD)
Computation	At or Above Benchmark (11 or more on Comp)

Name	AQD 0–18	Comp 11+

Group 4: Additional support on magnitude comparison and on computation

Magnitude Comparison	Below or Well Below Benchmark (Less than 19 on AQD)
Computation	Below or Well Below Benchmark (Less than 11 on Comp)

Name	AQD 0–18	Comp 0–10

Note: Check other Early Numeracy measures

1 Grade 1 End of Year Initial Grouping Suggestions

Group 1: Likely to need core support

Strategic Counting	At or Above Benchmark (10 or more on MNF)
Computation	At or Above Benchmark (17 or more on Comp)

Name	MNF 10+	Comp 17+

Group 2: Additional support on computation

Strategic Counting	At or Above Benchmark (10 or more on MNF)
Computation	Below or Well Below Benchmark (Less than 17 on Comp)

Name	MNF 10+	Comp 0–16

Group 3: Additional support on strategic counting

Strategic Counting	Below or Well Below Benchmark (Less than 10 on MNF)
Computation	At or Above Benchmark (17 or more on Comp)

Name	MNF 0–9	Comp 17+

Group 4: Additional support on strategic counting and on computation

Strategic Counting	Below or Well Below Benchmark (Less than 10 on MNF)
Computation	Below or Well Below Benchmark (Less than 17 on Comp)

Name	MNF 0–9	Comp 0–16

Note: Check other Early Numeracy measures

2 *Grade 2 Beginning of Year Initial Grouping Suggestions*

Group 1: Likely to need core support	
Computation	At or Above Benchmark (6 or more on Comp)
Math concepts, vocabulary, and problem solving	At or Above Benchmark (14 or more on C&A)

Name	Comp 6+	C&A 14+

Group 2: Additional support on math concepts, vocabulary, and problem solving	
Computation	At or Above Benchmark (6 or more on Comp)
Math concepts, vocabulary, and problem solving	Below or Well Below Benchmark (Less than 14 on C&A)

Name	Comp 6+	C&A 0–13

Group 3: Additional support on computation	
Computation	Below or Well Below Benchmark (Less than 6 on Comp)
Math concepts, vocabulary, and problem solving	At or Above Benchmark (14 or more on C&A)

Name	Comp 0–5	C&A 14+

Group 4: Additional support on computation and on math concepts, vocabulary, and problem solving	
Computation	Below or Well Below Benchmark (Less than 6 on Comp)
Math concepts, vocabulary, and problem solving	Below or Well Below Benchmark (Less than 14 on C&A)

Name	Comp 0–5	C&A 0–13

2 Grade 2 Middle of Year Initial Grouping Suggestions

Group 1: Likely to need core support	
Computation	At or Above Benchmark (11 or more on Comp)
Math concepts, vocabulary, and problem solving	At or Above Benchmark (24 or more on C&A)

Name	Comp 11+	C&A 24+

Group 2: Additional support on math concepts, vocabulary, and problem solving	
Computation	At or Above Benchmark (11 or more on Comp)
Math concepts, vocabulary, and problem solving	Below or Well Below Benchmark (Less than 24 on C&A)

Name	Comp 11+	C&A 0–23

Group 3: Additional support on computation	
Computation	Below or Well Below Benchmark (Less than 11 on Comp)
Math concepts, vocabulary, and problem solving	At or Above Benchmark (24 or more on C&A)

Name	Comp 0–10	C&A 24+

Group 4: Additional support on computation and on math concepts, vocabulary, and problem solving	
Computation	Below or Well Below Benchmark (Less than 11 on Comp)
Math concepts, vocabulary, and problem solving	Below or Well Below Benchmark (Less than 24 on C&A)

Name	Comp 0–10	C&A 0–23

2 *Grade 2 End of Year Initial Grouping Suggestions*

Group 1: Likely to need core support	
Computation	At or Above Benchmark (15 or more on Comp)
Math concepts, vocabulary, and problem solving	At or Above Benchmark (35 or more on C&A)

Name	Comp 15+	C&A 35+

Group 2: Additional support on math concepts, vocabulary, and problem solving	
Computation	At or Above Benchmark (15 or more on Comp)
Math concepts, vocabulary, and problem solving	Below or Well Below Benchmark (Less than 35 on C&A)

Name	Comp 15+	C&A 0–34

Group 3: Additional support on computation	
Computation	Below or Well Below Benchmark (Less than 15 on Comp)
Math concepts, vocabulary, and problem solving	At or Above Benchmark (35 or more on C&A)

Name	Comp 0–14	C&A 35+

Group 4: Additional support on computation and on math concepts, vocabulary, and problem solving	
Computation	Below or Well Below Benchmark (Less than 15 on Comp)
Math concepts, vocabulary, and problem solving	Below or Well Below Benchmark (Less than 35 on C&A)

Name	Comp 0–14	C&A 0–34

3 Grade 3 Beginning of Year Initial Grouping Suggestions

Group 1: Likely to need core support

Computation	At or Above Benchmark (13 or more on Comp)
Math concepts, vocabulary, and problem solving	At or Above Benchmark (23 or more on C&A)

Name	Comp 13+	C&A 23+

Group 2: Additional support on math concepts, vocabulary, and problem solving

Computation	At or Above Benchmark (13 or more on Comp)
Math concepts, vocabulary, and problem solving	Below or Well Below Benchmark (Less than 23 on C&A)

Name	Comp 13+	C&A 0–22

Group 3: Additional support on computation

Computation	Below or Well Below Benchmark (Less than 13 on Comp)
Math concepts, vocabulary, and problem solving	At or Above Benchmark (23 or more on C&A)

Name	Comp 0–12	C&A 23+

Group 4: Additional support on computation and on math concepts, vocabulary, and problem solving

Computation	Below or Well Below Benchmark (Less than 13 on Comp)
Math concepts, vocabulary, and problem solving	Below or Well Below Benchmark (Less than 23 on C&A)

Name	Comp 0–12	C&A 0–22

3 Grade 3 Middle of Year Initial Grouping Suggestions

Group 1: Likely to need core support

Computation	At or Above Benchmark (22 or more on Comp)
Math concepts, vocabulary, and problem solving	At or Above Benchmark (40 or more on C&A)

Name	Comp 22+	C&A 40+

Group 2: Additional support on math concepts, vocabulary, and problem solving

Computation	At or Above Benchmark (22 or more on Comp)
Math concepts, vocabulary, and problem solving	Below or Well Below Benchmark (Less than 40 on C&A)

Name	Comp 22+	C&A 0–39

Group 3: Additional support on computation

Computation	Below or Well Below Benchmark (Less than 22 on Comp)
Math concepts, vocabulary, and problem solving	At or Above Benchmark (40 or more on C&A)

Name	Comp 0–21	C&A 40+

Group 4: Additional support on computation and on math concepts, vocabulary, and problem solving

Computation	Below or Well Below Benchmark (Less than 22 on Comp)
Math concepts, vocabulary, and problem solving	Below or Well Below Benchmark (Less than 40 on C&A)

Name	Comp 0–21	C&A 0–39

3 Grade 3 End of Year Initial Grouping Suggestions

Group 1: Likely to need core support

Computation	At or Above Benchmark (29 or more on Comp)
Math concepts, vocabulary, and problem solving	At or Above Benchmark (47 or more on C&A)

Name	Comp 29+	C&A 47+

Group 2: Additional support on math concepts, vocabulary, and problem solving

Computation	At or Above Benchmark (29 or more on Comp)
Math concepts, vocabulary, and problem solving	Below or Well Below Benchmark (Less than 47 on C&A)

Name	Comp 29+	C&A 0–46

Group 3: Additional support on computation

Computation	Below or Well Below Benchmark (Less than 29 on Comp)
Math concepts, vocabulary, and problem solving	At or Above Benchmark (47 or more on C&A)

Name	Comp 0–28	C&A 47+

Group 4: Additional support on computation and on math concepts, vocabulary, and problem solving

Computation	Below or Well Below Benchmark (Less than 29 on Comp)
Math concepts, vocabulary, and problem solving	Below or Well Below Benchmark (Less than 47 on C&A)

Name	Comp 0–28	C&A 0–46

4 Grade 4 Beginning of Year Initial Grouping Suggestions

Group 1: Likely to need core support	
Computation	At or Above Benchmark (17 or more on Comp)
Math concepts, vocabulary, and problem solving	At or Above Benchmark (34 or more on C&A)

Name	Comp 17+	C&A 34+

Group 2: Additional support on math concepts, vocabulary, and problem solving	
Computation	At or Above Benchmark (17 or more on Comp)
Math concepts, vocabulary, and problem solving	Below or Well Below Benchmark (Less than 34 on C&A)

Name	Comp 17+	C&A 0–33

Group 3: Additional support on computation	
Computation	Below or Well Below Benchmark (Less than 17 on Comp)
Math concepts, vocabulary, and problem solving	At or Above Benchmark (34 or more on C&A)

Name	Comp 0–16	C&A 34+

Group 4: Additional support on computation and on math concepts, vocabulary, and problem solving	
Computation	Below or Well Below Benchmark (Less than 17 on Comp)
Math concepts, vocabulary, and problem solving	Below or Well Below Benchmark (Less than 34 on C&A)

Name	Comp 0–16	C&A 0–33

4 Grade 4 Middle of Year Initial Grouping Suggestions

Group 1: Likely to need core support	
Computation	At or Above Benchmark (31 or more on Comp)
Math concepts, vocabulary, and problem solving	At or Above Benchmark (49 or more on C&A)

Name	Comp 31+	C&A 49+

Group 2: Additional support on math concepts, vocabulary, and problem solving	
Computation	At or Above Benchmark (31 or more on Comp)
Math concepts, vocabulary, and problem solving	Below or Well Below Benchmark (Less than 49 on C&A)

Name	Comp 31+	C&A 0–48

Group 3: Additional support on computation	
Computation	Below or Well Below Benchmark (Less than 31 on Comp)
Math concepts, vocabulary, and problem solving	At or Above Benchmark (49 or more on C&A)

Name	Comp 0–30	C&A 49+

Group 4: Additional support on computation and on math concepts, vocabulary, and problem solving	
Computation	Below or Well Below Benchmark (Less than 31 on Comp)
Math concepts, vocabulary, and problem solving	Below or Well Below Benchmark (Less than 49 on C&A)

Name	Comp 0–30	C&A 0–48

4 Grade 4 End of Year Initial Grouping Suggestions

Group 1: Likely to need core support

Computation	At or Above Benchmark (46 or more on Comp)
Math concepts, vocabulary, and problem solving	At or Above Benchmark (71 or more on C&A)

Name	Comp 46+	C&A 71+

Group 2: Additional support on math concepts, vocabulary, and problem solving

Computation	At or Above Benchmark (46 or more on Comp)
Math concepts, vocabulary, and problem solving	Below or Well Below Benchmark (Less than 71 on C&A)

Name	Comp 46+	C&A 0–70

Group 3: Additional support on computation

Computation	Below or Well Below Benchmark (Less than 46 on Comp)
Math concepts, vocabulary, and problem solving	At or Above Benchmark (71 or more on C&A)

Name	Comp 0–45	C&A 71+

Group 4: Additional support on computation and on math concepts, vocabulary, and problem solving

Computation	Below or Well Below Benchmark (Less than 46 on Comp)
Math concepts, vocabulary, and problem solving	Below or Well Below Benchmark (Less than 71 on C&A)

Name	Comp 0–45	C&A 0–70

5 Grade 5 Beginning of Year Initial Grouping Suggestions

Group 1: Likely to need core support

Computation	At or Above Benchmark (27 or more on Comp)
Math concepts, vocabulary, and problem solving	At or Above Benchmark (25 or more on C&A)

Name	Comp 27+	C&A 25+

Group 2: Additional support on math concepts, vocabulary, and problem solving

Computation	At or Above Benchmark (27 or more on Comp)
Math concepts, vocabulary, and problem solving	Below or Well Below Benchmark (Less than 25 on C&A)

Name	Comp 27+	C&A 0–24

Group 3: Additional support on computation

Computation	Below or Well Below Benchmark (Less than 27 on Comp)
Math concepts, vocabulary, and problem solving	At or Above Benchmark (25 or more on C&A)

Name	Comp 0–26	C&A 25+

Group 4: Additional support on computation and on math concepts, vocabulary, and problem solving

Computation	Below or Well Below Benchmark (Less than 27 on Comp)
Math concepts, vocabulary, and problem solving	Below or Well Below Benchmark (Less than 25 on C&A)

Name	Comp 0–26	C&A 0–24

5 Grade 5 Middle of Year Initial Grouping Suggestions

Group 1: Likely to need core support

Computation	At or Above Benchmark (52 or more on Comp)
Math concepts, vocabulary, and problem solving	At or Above Benchmark (42 or more on C&A)

Name	Comp 52+	C&A 42+

Group 2: Additional support on math concepts, vocabulary, and problem solving

Computation	At or Above Benchmark (52 or more on Comp)
Math concepts, vocabulary, and problem solving	Below or Well Below Benchmark (Less than 42 on C&A)

Name	Comp 52+	C&A 0–41

Group 3: Additional support on computation

Computation	Below or Well Below Benchmark (Less than 52 on Comp)
Math concepts, vocabulary, and problem solving	At or Above Benchmark (42 or more on C&A)

Name	Comp 0–51	C&A 42+

Group 4: Additional support on computation and on math concepts, vocabulary, and problem solving

Computation	Below or Well Below Benchmark (Less than 52 on Comp)
Math concepts, vocabulary, and problem solving	Below or Well Below Benchmark (Less than 42 on C&A)

Name	Comp 0–51	C&A 0–41

5 Grade 5 End of Year Initial Grouping Suggestions

Group 1: Likely to need core support

Computation	At or Above Benchmark (56 or more on Comp)
Math concepts, vocabulary, and problem solving	At or Above Benchmark (62 or more on C&A)

Name	Comp 56+	C&A 62+

Group 2: Additional support on math concepts, vocabulary, and problem solving

Computation	At or Above Benchmark (56 or more on Comp)
Math concepts, vocabulary, and problem solving	Below or Well Below Benchmark (Less than 62 on C&A)

Name	Comp 56+	C&A 0–61

Group 3: Additional support on computation

Computation	Below or Well Below Benchmark (Less than 56 on Comp)
Math concepts, vocabulary, and problem solving	At or Above Benchmark (62 or more on C&A)

Name	Comp 0–55	C&A 62+

Group 4: Additional support on computation and on math concepts, vocabulary, and problem solving

Computation	Below or Well Below Benchmark (Less than 56 on Comp)
Math concepts, vocabulary, and problem solving	Below or Well Below Benchmark (Less than 62 on C&A)

Name	Comp 0–55	C&A 0–61

6 Grade 6 Beginning of Year Initial Grouping Suggestions

Group 1: Likely to need core support

Computation	At or Above Benchmark (39 or more on Comp)
Math concepts, vocabulary, and problem solving	At or Above Benchmark (30 or more on C&A)

Name	Comp 39+	C&A 30+

Group 2: Additional support on math concepts, vocabulary, and problem solving

Computation	At or Above Benchmark (39 or more on Comp)
Math concepts, vocabulary, and problem solving	Below or Well Below Benchmark (Less than 30 on C&A)

Name	Comp 39+	C&A 0–29

Group 3: Additional support on computation

Computation	Below or Well Below Benchmark (Less than 39 on Comp)
Math concepts, vocabulary, and problem solving	At or Above Benchmark (30 or more on C&A)

Name	Comp 0–38	C&A 30+

Group 4: Additional support on computation and on math concepts, vocabulary, and problem solving

Computation	Below or Well Below Benchmark (Less than 39 on Comp)
Math concepts, vocabulary, and problem solving	Below or Well Below Benchmark (Less than 30 on C&A)

Name	Comp 0–38	C&A 0–29

6 Grade 6 Middle of Year Initial Grouping Suggestions

Group 1: Likely to need core support	
Computation	At or Above Benchmark (54 or more on Comp)
Math concepts, vocabulary, and problem solving	At or Above Benchmark (46 or more on C&A)

Name	Comp 54+	C&A 46+

Group 2: Additional support on math concepts, vocabulary, and problem solving	
Computation	At or Above Benchmark (54 or more on Comp)
Math concepts, vocabulary, and problem solving	Below or Well Below Benchmark (Less than 46 on C&A)

Name	Comp 54+	C&A 0–45

Group 3: Additional support on computation	
Computation	Below or Well Below Benchmark (Less than 54 on Comp)
Math concepts, vocabulary, and problem solving	At or Above Benchmark (46 or more on C&A)

Name	Comp 0–53	C&A 46+

Group 4: Additional support on computation and on math concepts, vocabulary, and problem solving	
Computation	Below or Well Below Benchmark (Less than 54 on Comp)
Math concepts, vocabulary, and problem solving	Below or Well Below Benchmark (Less than 46 on C&A)

Name	Comp 0–53	C&A 0–45

6 Grade 6 End of Year Initial Grouping Suggestions

Group 1: Likely to need core support

Computation	At or Above Benchmark (66 or more on Comp)
Math concepts, vocabulary, and problem solving	At or Above Benchmark (67 or more on C&A)

Name	Comp 66+	C&A 67+

Group 2: Additional support on math concepts, vocabulary, and problem solving

Computation	At or Above Benchmark (66 or more on Comp)
Math concepts, vocabulary, and problem solving	Below or Well Below Benchmark (Less than 67 on C&A)

Name	Comp 66+	C&A 0–66

Group 3: Additional support on computation

Computation	Below or Well Below Benchmark (Less than 66 on Comp)
Math concepts, vocabulary, and problem solving	At or Above Benchmark (67 or more on C&A)

Name	Comp 0–65	C&A 67+

Group 4: Additional support on computation and on math concepts, vocabulary, and problem solving

Computation	Below or Well Below Benchmark (Less than 66 on Comp)
Math concepts, vocabulary, and problem solving	Below or Well Below Benchmark (Less than 67 on C&A)

Name	Comp 0–65	C&A 0–66

Appendix 3: Assessment Accuracy Checklists

These checklists are designed to be a tool for training and for conducting reliability checks on Acadience Math assessors. They should be used to provide feedback for Acadience Math assessors about their accuracy and consistency with standardized administration and scoring procedures. Additional information about conducting reliability checks can be found in *Chapter 4: Implementing Acadience Math in Your School.*

Acadience® Math

Beginning Quantity Discrimination Assessment Accuracy Checklist

Consistently	Needs practice	Does the assessor:
☐	☐	1. Position materials so that student cannot see what is being recorded?
☐	☐	2. Present the student materials correctly?
☐	☐	3. State the standardized directions exactly as written?
☐	☐	4. Start the timer after saying ***Begin***?
☐	☐	5. Use reminder procedures correctly and appropriately?
☐	☐	6. Slash the item if the student does not respond within 3 seconds on any item and give the correct answer?
☐	☐	7. Write "sc" above the slashed item if the student self-corrects within 3 seconds?
☐	☐	8. Score student responses correctly according to the scoring rules?
☐	☐	9. Discontinue if the student gets a score of zero on the first four items?
☐	☐	10. Stop at the end of 1 minute?
☐	☐	11. Correctly add the number of correct items?
☐	☐	12. Transfer the score correctly from the scoring page to the cover page of the scoring booklet?

Acadience® Math

Number Identification Fluency Assessment Accuracy Checklist

Consistently	Needs practice	Does the assessor:
☐	☐	1. Position materials so that student cannot see what is being recorded?
☐	☐	2. Present the student materials correctly?
☐	☐	3. State the standardized directions exactly as written?
☐	☐	4. Start the timer after saying ***Begin***?
☐	☐	5. Use reminder procedures correctly and appropriately?
☐	☐	6. Slash the item if the student does not respond within 3 seconds on any item and give the correct answer?
☐	☐	7. Write "sc" above the slashed item if the student self-corrects within 3 seconds?
☐	☐	8. Score student responses correctly according to the scoring rules?
☐	☐	9. Discontinue if the student gets a score of zero on the first five items?
☐	☐	10. Stop at the end of 1 minute?
☐	☐	11. Correctly add the number of correct items?
☐	☐	12. Transfer the score correctly from the scoring page to the cover page of the scoring booklet?

Acadience® Math

Next Number Fluency Assessment Accuracy Checklist

Consistently	Needs practice	Does the assessor:
☐	☐	1. Position materials so that student cannot see what is being recorded?
☐	☐	2. Present the student materials correctly?
☐	☐	3. State the standardized directions exactly as written?
☐	☐	4. Use reminder procedures correctly and appropriately?
☐	☐	5. Slash the item if the student does not respond within 3 seconds on any item and give the correct answer?
☐	☐	6. Write “sc” above the slashed item if the student self-corrects within 3 seconds?
☐	☐	7. Score student responses correctly according to the scoring rules?
☐	☐	8. Discontinue if the student gets a score of zero on the first five items?
☐	☐	9. Stop at the end of 1 minute?
☐	☐	10. Correctly add the number of correct items?
☐	☐	11. Transfer the score correctly from the scoring page to the cover page of the scoring booklet?

Acadience® Math

Advanced Quantity Discrimination Assessment Accuracy Checklist

Consistently	Needs practice	Does the assessor:
☐	☐	1. Position materials so that student cannot see what is being recorded?
☐	☐	2. Present the student materials correctly?
☐	☐	3. State the standardized directions exactly as written?
☐	☐	4. Start the timer after saying ***Begin***?
☐	☐	5. Use reminder procedures correctly and appropriately?
☐	☐	6. Slash the item if the student does not respond within 3 seconds on any item and give the correct answer?
☐	☐	7. Write "sc" above the slashed item if the student self-corrects within 3 seconds?
☐	☐	8. Score student responses correctly according to the scoring rules?
☐	☐	9. Discontinue if the student gets a score of zero on the first six items?
☐	☐	10. Stop at the end of 1 minute?
☐	☐	11. Correctly add the number of correct items?
☐	☐	12. Transfer the score correctly from the scoring page to the cover page of the scoring booklet?

Acadience® Math

Missing Number Fluency Assessment Accuracy Checklist

Consistently	Needs practice	Does the assessor:
☐	☐	1. Position materials so that student cannot see what is being recorded?
☐	☐	2. Present the student materials correctly?
☐	☐	3. State the standardized directions exactly as written?
☐	☐	4. Start the timer after saying ***Begin***?
☐	☐	5. Use reminder procedures correctly and appropriately?
☐	☐	6. Slash the item if the student does not respond within 5 seconds on any item and give the correct answer?
☐	☐	7. Write "sc" above the slashed item if the student self-corrects within 5 seconds?
☐	☐	8. Score student responses correctly according to the scoring rules?
☐	☐	9. Discontinue if the student gets a score of zero on the first six items?
☐	☐	10. Stop at the end of 1 minute?
☐	☐	11. Correctly add the number of correct items?
☐	☐	12. Transfer the score correctly from the scoring page to the cover page of the scoring booklet?

Appendix 4: Acadience Math Benchmark Goals and Composite Score

Acadience Math provides two types of scores at each benchmark assessment period: (a) a raw score for each individual measure and (b) a composite score (the Math Composite Score). Each of the scores is interpreted relative to benchmark goals and cut points for risk to determine if a student's score is at or above the benchmark, below the benchmark, or below the cut point for risk (well below the benchmark).

Benchmark Goals and Cut Points for Risk

Acadience Math benchmark goals are empirically derived, criterion-referenced target scores that represent adequate math skills for a particular grade and time of year. Benchmark goals and cut points for risk are provided for the Math Composite Score as well as for individual Acadience Math measures.

A *benchmark goal* indicates a level of skill at which students are likely to achieve the next Acadience Math benchmark goal or math outcome. Thus, for students who achieve a benchmark goal, the odds are in their favor of achieving later math outcomes if they receive effective core math instruction.

Conversely, the *cut points for risk* indicate a level of skill below which students are unlikely to achieve subsequent math goals without receiving additional, targeted instructional support. For students who have scores below the cut point for risk, the probability of achieving later math goals is low unless intensive support is provided.

The Acadience Math benchmark goals and cut points for risk provide three primary benchmark status levels that describe students' performance: (a) At or Above Benchmark, (b) Below Benchmark, and (c) Well Below Benchmark. These levels are based on the overall likelihood of achieving specified goals on subsequent Acadience Math assessments or external measures of math achievement.

At or Above Benchmark. For students who score at or above the benchmark goal, the overall likelihood of achieving subsequent math goals is approximately 80% to 90%. These students are likely to need effective core instruction to meet subsequent math goals. Within this range, the likelihood of achieving subsequent goals is lower for students whose scores are right at the benchmark goal and increases as scores increase above the benchmark.

To assist in setting ambitious goals for students, the At or Above Benchmark level is subdivided into *At Benchmark* and *Above Benchmark* levels.

At Benchmark. In the At Benchmark range, the overall likelihood of achieving subsequent math goals is 70% to 85%. Some of these students, especially those with scores near the benchmark, may require monitoring and/or strategic support on specific component skills.

Above Benchmark. In the Above Benchmark range, the overall likelihood of achieving subsequent math goals is 90% to 99%. While all students with scores in this range will likely benefit from core support, some students with scores in this range may benefit from instruction on more advanced skills.

Below Benchmark. Between the benchmark goal and cut point for risk is a range of scores where students' future performance is more difficult to predict. For students with scores in this range, the overall likelihood of achieving subsequent math goals is approximately 40% to 60%. These students are likely to need strategic support to ensure their achievement of future goals. Strategic support generally consists of carefully targeted supplemental support in specific skill areas in which students are having difficulty. To ensure that the greatest number of students achieve later math success, it is best for students with scores in this range to be monitored regularly to ensure that they are making adequate progress and to receive increased or modified support if necessary to achieve subsequent math goals.

Well Below Benchmark. For students who score below the cut point for risk, the overall likelihood of achieving subsequent math goals is low, approximately 10% to 20%. These students are identified as likely to need intensive support. Intensive support refers to interventions that incorporate something more or something different from the core curriculum or supplemental support.

Development of Benchmark Goals

The benchmark goals and cut points for risk summarized in this document are based on research that examined the predictive probability of a score on an Acadience Math measure at a particular point in time, compared to later Acadience Math measures and external measures of math proficiency and achievement. Two outcome criteria were used to develop and evaluate the benchmark goals and cut points for risk: (a) the Stanford Achievement Test Series, Tenth Edition–Total Math score (SAT10; Pearson, 2003) and (b) scores from Acadience Math measures administered at subsequent benchmark assessment time points. The 40th percentile on the SAT10 assessment was used as an indicator that the students had adequate math skills for their grade. When the Acadience Math measures were used as a criterion, goals were based on the prediction of subsequent benchmark status. For instance, the middle-of-year benchmark goals were based on the prediction of end-of-year benchmark status.

Benchmark goals and cut points for risk were determined by finding the scores on Acadience Math measures that corresponded to the above goals in two data sets. One sample utilized the SAT10 Total Math score as the criterion of interest, and the other sample utilized performance on later Acadience Math measures as the criterion. Data in the first sample were collected in a study conducted during the 2017–2018 school year. Participating students were administered Acadience Math during all three benchmark periods (fall or beginning of year, winter or middle of year, and spring or end of year) in addition to the SAT10 at the end of the school year. Participants in this study were 537 students across grades 2–6 from five schools in four states. The study included both students who were struggling in mathematics and those who were typically achieving. The data in the second sample were exported from Acadience Data Management and included 542,407 students from 2,321 schools, within 49 states, across grades K–6. The sample also included 22 schools outside of the United States, which accounted for less than 1% of the data. Data were collected and entered into Acadience Data Management by school personnel at three benchmark assessment time points (i.e., beginning of year, middle of year, and end of year) from the beginning of the 2015–2016 school to the middle of the 2018–2019 school year. Data were exported from Acadience Data Management in March 2019.

This research represents a validation of two earlier studies from the 2012–2013 and 2014–2015 school years that determined the preliminary benchmark goals. Two outcome criteria were utilized in these studies: (a) the Group Mathematics Assessment and Diagnostic Evaluation total raw score (GMADE; Williams, 2004) and (b) scores from the Acadience Math measures administered at subsequent benchmark assessment time points.

Additional information about the studies will be included in the *Acadience Math Technical Manual*, which will be available in the future.

Math Composite Score

The Math Composite Score is a combination of multiple Acadience Math scores and provides the best overall estimate of students' math skills. Acadience Data Management will calculate the Math Composite Score for you, provided that all required measures necessary for calculating it have been administered. To calculate the Math Composite Score yourself, see the *Math Composite Score Worksheets* at the end of this document.

Benchmark goals and cut points for risk for the Math Composite Score are based on the same logic and procedures as the benchmark goals for the individual Acadience Math measures. However, because the Math Composite Score provides the best overall estimate of a student's skills, it should generally be interpreted first. If a student earns a Math Composite Score that is at or above the benchmark goal, the odds are in the student's favor of reaching later important math outcomes. Some students who score At or Above Benchmark on the

Math Composite Score may still need additional support in a math skill, as indicated by a Below Benchmark score on an individual Acadience Math measure (i.e., Beginning Quantity Discrimination, Number Identification Fluency, Next Number Fluency, Advanced Quantity Discrimination, Missing Number Fluency, Computation, or Concepts and Applications). This potential need for additional support is especially true for a student whose Math Composite Score is close to the benchmark goal.

The Acadience Math measures that are used to calculate the Math Composite Score vary by grade and time of year. As such, the Math Composite Score is not comparable across different grades and does not provide a direct measure of growth across grades. The Math Composite Score is also not comparable across different times of year and should not be used as an indicator of growth within a grade. However, because the logic and procedures used to establish benchmark goals are consistent across grades and times of year, the percent of students at different benchmark status levels can be compared, even though the mean scores are not comparable.

References

Pearson. (2003). Stanford Achievement Test Series, Tenth Edition (SAT10). San Antonio, TX.

Williams, K. T. (2004). Group Math Assessment and Diagnostic Evaluation (GMADE). New York: Pearson.

Kindergarten Benchmark Goals and Cut Points for Risk

Acadience Math Measure	Benchmark Status	Likely Need for Support	Beginning of Year	Middle of Year	End of Year
Math Composite Score	Above Benchmark	Likely to Need Core Support[a]	33 +	89 +	110 +
	At Benchmark	**Likely to Need Core Support**[b]	**24** – 32	**72** – 88	**92** – 109
	Below Benchmark	Likely to Need Strategic Support	*13* – 23	*49* – 71	*67* – 91
	Well Below Benchmark	Likely to Need Intensive Support	0 – 12	0 – 48	0 – 66
Beginning Quantity Discrimination (BQD)	Above Benchmark	Likely to Need Core Support[a]	6 +	10 +	16 +
	At Benchmark	**Likely to Need Core Support**[b]	**5**	**7** – 9	**13** – 15
	Below Benchmark	Likely to Need Strategic Support	*2* – 4	*4* – 6	*9* – 12
	Well Below Benchmark	Likely to Need Intensive Support	0 – 1	0 – 3	0 – 8
Number Identification Fluency (NIF)	Above Benchmark	Likely to Need Core Support[a]	9 +	21 +	34 +
	At Benchmark	**Likely to Need Core Support**[b]	**6** – 8	**14** – 20	**25** – 33
	Below Benchmark	Likely to Need Strategic Support	*4* – 5	*8* – 13	*14* – 24
	Well Below Benchmark	Likely to Need Intensive Support	0 – 3	0 – 7	0 – 13
Next Number Fluency (NNF)	Above Benchmark	Likely to Need Core Support[a]	7 +	13 +	16 +
	At Benchmark	**Likely to Need Core Support**[b]	**5** – 6	**11** – 12	**14** – 15
	Below Benchmark	Likely to Need Strategic Support	*2* – 4	*7* – 10	*10* – 13
	Well Below Benchmark	Likely to Need Intensive Support	0 – 1	0 – 6	0 – 9

The benchmark goal is the number that is **bold**. The cut point for risk is the number that is *italicized*.

[a] Some students may benefit from instruction on more advanced skills.

[b] Some students may require monitoring and strategic support on component skills.

First Grade Benchmark Goals and Cut Points for Risk

Acadience Math Measure	Benchmark Status	Likely Need for Support	Beginning of Year	Middle of Year	End of Year
Math Composite Score	Above Benchmark	Likely to Need Core Support[a]	148 +	53 +	68 +
	At Benchmark	**Likely to Need Core Support**[b]	**124** – 147	**46** – 52	**59** – 67
	Below Benchmark	Likely to Need Strategic Support	*81* – 123	*33* – 45	*44* – 58
	Well Below Benchmark	Likely to Need Intensive Support	0 – 80	0 – 32	0 – 43
Number Identification Fluency (NIF)	Above Benchmark	Likely to Need Core Support[a]	33 +	–	–
	At Benchmark	**Likely to Need Core Support**[b]	**27** – 32	–	–
	Below Benchmark	Likely to Need Strategic Support	*16* – 26	–	–
	Well Below Benchmark	Likely to Need Intensive Support	0 – 15	–	–
Next Number Fluency (NNF)	Above Benchmark	Likely to Need Core Support[a]	14 +	–	–
	At Benchmark	**Likely to Need Core Support**[b]	**12** – 13	–	–
	Below Benchmark	Likely to Need Strategic Support	*9* – 11	–	–
	Well Below Benchmark	Likely to Need Intensive Support	0 – 8	–	–
Advanced Quantity Discrimination (AQD)	Above Benchmark	Likely to Need Core Support[a]	13 +	22 +	25 +
	At Benchmark	**Likely to Need Core Support**[b]	**10** – 12	**19** – 21	**22** – 24
	Below Benchmark	Likely to Need Strategic Support	*6* – 9	*14* – 18	*17* – 21
	Well Below Benchmark	Likely to Need Intensive Support	0 – 5	0 – 13	0 – 16
Missing Number Fluency (MNF)	Above Benchmark	Likely to Need Core Support[a]	6 +	9 +	12 +
	At Benchmark	**Likely to Need Core Support**[b]	**4** – 5	**8**	**10** – 11
	Below Benchmark	Likely to Need Strategic Support	*2* – 3	*6* – 7	*8* – 9
	Well Below Benchmark	Likely to Need Intensive Support	0 – 1	0 – 5	0 – 7
Computation (Comp)	Above Benchmark	Likely to Need Core Support[a]	6 +	14 +	20 +
	At Benchmark	**Likely to Need Core Support**[b]	**5**	**11** – 13	**17** – 19
	Below Benchmark	Likely to Need Strategic Support	*3* – 4	*7* – 10	*11* – 16
	Well Below Benchmark	Likely to Need Intensive Support	0 – 2	0 – 6	0 – 10

The benchmark goal is the number that is **bold**. The cut point for risk is the number that is *italicized*.

[a] Some students may benefit from instruction on more advanced skills.

[b] Some students may require monitoring and strategic support on component skills.

Second Grade Benchmark Goals and Cut Points for Risk

Acadience Math Measure	Benchmark Status	Likely Need for Support	Beginning of Year	Middle of Year	End of Year
Math Composite Score	Above Benchmark	Likely to Need Core Support[a]	32 +	57 +	86 +
	At Benchmark	**Likely to Need Core Support**[b]	**24** – 31	**46** – 56	**66** – 85
	Below Benchmark	Likely to Need Strategic Support	*16* – 23	*30* – 45	*48* – 65
	Well Below Benchmark	Likely to Need Intensive Support	0 – 15	0 – 29	0 – 47
Computation (Comp)	Above Benchmark	Likely to Need Core Support[a]	8 +	14 +	19 +
	At Benchmark	**Likely to Need Core Support**[b]	**6** – 7	**11** – 13	**15** – 18
	Below Benchmark	Likely to Need Strategic Support	*3* – 5	*8* – 10	*10* – 14
	Well Below Benchmark	Likely to Need Intensive Support	0 – 2	0 – 7	0 – 9
Concepts and Applications (C&A)	Above Benchmark	Likely to Need Core Support[a]	18 +	31 +	47 +
	At Benchmark	**Likely to Need Core Support**[b]	**14** – 17	**24** – 30	**35** – 46
	Below Benchmark	Likely to Need Strategic Support	*8* – 13	*15* – 23	*23* – 34
	Well Below Benchmark	Likely to Need Intensive Support	0 – 7	0 – 14	0 – 22

The benchmark goal is the number that is **bold**. The cut point for risk is the number that is *italicized*.

[a] Some students may benefit from instruction on more advanced skills.

[b] Some students may require monitoring and strategic support on component skills.

Third Grade Benchmark Goals and Cut Points for Risk

Acadience Math Measure	Benchmark Status	Likely Need for Support	Beginning of Year	Middle of Year	End of Year
Math Composite Score	Above Benchmark	Likely to Need Core Support[a]	56 +	99 +	126 +
	At Benchmark	**Likely to Need Core Support**[b]	**49** – 55	**83** – 98	**101** – 125
	Below Benchmark	Likely to Need Strategic Support	*33* – 48	*57* – 82	*74* – 100
	Well Below Benchmark	Likely to Need Intensive Support	0 – 32	0 – 56	0 – 73
Computation (Comp)	Above Benchmark	Likely to Need Core Support[a]	15 +	25 +	35 +
	At Benchmark	**Likely to Need Core Support**[b]	**13** – 14	**22** – 24	**29** – 34
	Below Benchmark	Likely to Need Strategic Support	*9* – 12	*16* – 21	*21* – 28
	Well Below Benchmark	Likely to Need Intensive Support	0 – 8	0 – 15	0 – 20
Concepts and Applications (C&A)	Above Benchmark	Likely to Need Core Support[a]	28 +	50 +	59 +
	At Benchmark	**Likely to Need Core Support**[b]	**23** – 27	**40** – 49	**47** – 58
	Below Benchmark	Likely to Need Strategic Support	*13* – 22	*24* – 39	*32* – 46
	Well Below Benchmark	Likely to Need Intensive Support	0 – 12	0 – 23	0 – 31

The benchmark goal is the number that is **bold**. The cut point for risk is the number that is *italicized*.

[a] Some students may benefit from instruction on more advanced skills.

[b] Some students may require monitoring and strategic support on component skills.

Fourth Grade Benchmark Goals and Cut Points for Risk

Acadience Math Measure	Benchmark Status	Likely Need for Support	Beginning of Year	Middle of Year	End of Year
Math Composite Score	Above Benchmark	Likely to Need Core Support[a]	84 +	101 +	150 +
	At Benchmark	**Likely to Need Core Support**[b]	**70** – 83	**83** – 100	**117** – 149
	Below Benchmark	Likely to Need Strategic Support	*47* – 69	*55* – 82	*81* – 116
	Well Below Benchmark	Likely to Need Intensive Support	0 – 46	0 – 54	0 – 80
Computation (Comp)	Above Benchmark	Likely to Need Core Support[a]	21 +	39 +	58 +
	At Benchmark	**Likely to Need Core Support**[b]	**17** – 20	**31** – 38	**46** – 57
	Below Benchmark	Likely to Need Strategic Support	*12* – 16	*21* – 30	*33* – 45
	Well Below Benchmark	Likely to Need Intensive Support	0 – 11	0 – 20	0 – 32
Concepts and Applications (C&A)	Above Benchmark	Likely to Need Core Support[a]	44 +	63 +	93 +
	At Benchmark	**Likely to Need Core Support**[b]	**34** – 43	**49** – 62	**71** – 92
	Below Benchmark	Likely to Need Strategic Support	*21* – 33	*30* – 48	*46* – 70
	Well Below Benchmark	Likely to Need Intensive Support	0 – 20	0 – 29	0 – 45

The benchmark goal is the number that is **bold**. The cut point for risk is the number that is *italicized*.

[a] Some students may benefit from instruction on more advanced skills.

[b] Some students may require monitoring and strategic support on component skills.

Fifth Grade Benchmark Goals and Cut Points for Risk

Acadience Math Measure	Benchmark Status	Likely Need for Support	Beginning of Year	Middle of Year	End of Year
Math Composite Score	Above Benchmark	Likely to Need Core Support[a]	65 +	118 +	149 +
	At Benchmark	**Likely to Need Core Support**[b]	**53** – 64	**93** – 117	**116** – 148
	Below Benchmark	Likely to Need Strategic Support	*35* – 52	*63* – 92	*79* – 115
	Well Below Benchmark	Likely to Need Intensive Support	0 – 34	0 – 62	0 – 78
Computation (Comp)	Above Benchmark	Likely to Need Core Support[a]	32 +	66 +	70 +
	At Benchmark	**Likely to Need Core Support**[b]	**27** – 31	**52** – 65	**56** – 69
	Below Benchmark	Likely to Need Strategic Support	*18* – 26	*31* – 51	*38* – 55
	Well Below Benchmark	Likely to Need Intensive Support	0 – 17	0 – 30	0 – 37
Concepts and Applications (C&A)	Above Benchmark	Likely to Need Core Support[a]	33 +	53 +	81 +
	At Benchmark	**Likely to Need Core Support**[b]	**25** – 32	**42** – 52	**62** – 80
	Below Benchmark	Likely to Need Strategic Support	*15* – 24	*26* – 41	*40* – 61
	Well Below Benchmark	Likely to Need Intensive Support	0 – 14	0 – 25	0 – 39

The benchmark goal is the number that is **bold**. The cut point for risk is the number that is *italicized*.

[a] Some students may benefit from instruction on more advanced skills.

[b] Some students may require monitoring and strategic support on component skills.

Sixth Grade Benchmark Goals and Cut Points for Risk

Acadience Math Measure	Benchmark Status	Likely Need for Support	Beginning of Year	Middle of Year	End of Year
Math Composite Score	Above Benchmark	Likely to Need Core Support[a]	85 +	125 +	159 +
	At Benchmark	**Likely to Need Core Support**[b]	**73** – 84	**104** – 124	**132** – 158
	Below Benchmark	Likely to Need Strategic Support	*46* – 72	*72* – 103	*94* – 131
	Well Below Benchmark	Likely to Need Intensive Support	0 – 45	0 – 71	0 – 93
Computation (Comp)	Above Benchmark	Likely to Need Core Support[a]	46 +	66 +	77 +
	At Benchmark	**Likely to Need Core Support**[b]	**39** – 45	**54** – 65	**66** – 76
	Below Benchmark	Likely to Need Strategic Support	*28* – 38	*37* – 53	*47* – 65
	Well Below Benchmark	Likely to Need Intensive Support	0 – 27	0 – 36	0 – 46
Concepts and Applications (C&A)	Above Benchmark	Likely to Need Core Support[a]	38 +	60 +	82 +
	At Benchmark	**Likely to Need Core Support**[b]	**30** – 37	**46** – 59	**67** – 81
	Below Benchmark	Likely to Need Strategic Support	*18* – 29	*30* – 45	*49* – 66
	Well Below Benchmark	Likely to Need Intensive Support	0 – 17	0 – 29	0 – 48

The benchmark goal is the number that is **bold**. The cut point for risk is the number that is *italicized*.

[a] Some students may benefit from instruction on more advanced skills.

[b] Some students may require monitoring and strategic support on component skills.

Kindergarten Percentage of Students Who Meet Later Outcomes on the Math Composite Score Based on Benchmark Status on Individual Acadience Math Measures

Acadience Math Measure	Benchmark Status	Percent of students **At or Above** Benchmark on **middle-of-year** Math Composite Score based on beginning-of-year status	Percent of students **Above** Benchmark on **middle-of-year** Math Composite Score based on beginning-of-year status	Percent of students **At or Above** Benchmark on **end-of-year** Math Composite Score based on middle-of-year status	Percent of students **Above** Benchmark on **end-of-year** Math Composite Score based on middle-of-year status
Math Composite Score	**At or Above Benchmark**	83%	65%	85%	66%
	Above Benchmark	91%	76%	94%	79%
	At Benchmark	63%	36%	64%	32%
	Below Benchmark	41%	20%	35%	14%
	Well Below Benchmark	17%	8%	10%	3%
Beginning Quantity Discrimination (BQD)	**At or Above Benchmark**	79%	62%	75%	56%
	Above Benchmark	91%	70%	85%	67%
	At Benchmark	59%	39%	54%	31%
	Below Benchmark	48%	29%	35%	18%
	Well Below Benchmark	26%	14%	17%	7%
Number Identification Fluency (NIF)	**At or Above Benchmark**	80%	63%	83%	64%
	Above Benchmark	91%	77%	90%	79%
	At Benchmark	58%	39%	62%	34%
	Below Benchmark	46%	24%	38%	18%
	Well Below Benchmark	19%	8%	15%	6%
Next Number Fluency (NNF)	**At or Above Benchmark**	83%	66%	81%	63%
	Above Benchmark	86%	72%	89%	67%
	At Benchmark	68%	44%	65%	39%
	Below Benchmark	47%	27%	43%	22%
	Well Below Benchmark	22%	11%	15%	6%

Note: This table shows the percent of students that are on track on the Math Composite Score at the middle and end of the year based on the student's Acadience Math measure score at the beginning and middle of the year. N = 81,484 students who had Acadience Math data for the 2015–2016, 2016–2017, 2017–2018, and/or 2018–2019 school years. Data exported from Acadience Data Management.

First Grade Percentage of Students Who Meet Later Outcomes on the Math Composite Score Based on Benchmark Status on Individual Acadience Math Measures

Acadience Math Measure	Benchmark Status	Percent of students **At or Above** Benchmark on **middle-of-year** Math Composite Score based on beginning-of-year status	Percent of students **Above** Benchmark on **middle-of-year** Math Composite Score based on beginning-of-year status	Percent of students **At or Above** Benchmark on **end-of-year** Math Composite Score based on middle-of-year status	Percent of students **Above** Benchmark on **end-of-year** Math Composite Score based on middle-of-year status
Math Composite Score	**At or Above Benchmark**	85%	69%	86%	69%
	Above Benchmark	94%	79%	93%	81%
	At Benchmark	63%	39%	65%	35%
	Below Benchmark	35%	18%	33%	14%
	Well Below Benchmark	9%	4%	6%	2%
Number Identification Fluency (NIF)	**At or Above Benchmark**	82%	67%	–	–
	Above Benchmark	88%	76%	–	–
	At Benchmark	63%	41%	–	–
	Below Benchmark	38%	21%	–	–
	Well Below Benchmark	12%	5%	–	–
Next Number Fluency (NNF)	**At or Above Benchmark**	76%	61%	–	–
	Above Benchmark	81%	68%	–	–
	At Benchmark	58%	39%	–	–
	Below Benchmark	41%	25%	–	–
	Well Below Benchmark	19%	10%	–	–
Advanced Quantity Discrimination (AQD)	**At or Above Benchmark**	81%	66%	82%	66%
	Above Benchmark	91%	77%	92%	79%
	At Benchmark	59%	37%	61%	36%
	Below Benchmark	35%	18%	36%	16%
	Well Below Benchmark	11%	5%	10%	4%
Missing Number Fluency (MNF)	**At or Above Benchmark**	76%	61%	81%	65%
	Above Benchmark	86%	78%	88%	74%
	At Benchmark	60%	40%	59%	36%
	Below Benchmark	33%	18%	43%	23%
	Well Below Benchmark	12%	6%	16%	7%
Computation (Comp)	**At or Above Benchmark**	77%	63%	80%	64%
	Above Benchmark	81%	66%	85%	73%
	At Benchmark	59%	40%	61%	39%
	Below Benchmark	43%	27%	40%	21%
	Well Below Benchmark	23%	13%	15%	7%

Note: This table shows the percent of students that are on track on the Math Composite Score at the middle and end of the year based on the student's Acadience Math measure score at the beginning and middle of the year. N = 79,450 students who had Acadience Math data for the 2015–2016, 2016–2017, 2017–2018, and/or 2018–2019 school years. Data exported from Acadience Data Management.

Second Grade Percentage of Students Who Meet Later Outcomes on the Math Composite Score Based on Benchmark Status on Individual Acadience Math Measures

Acadience Math Measure	Benchmark Status	Percent of students **At or Above** Benchmark on **middle-of-year** Math Composite Score based on beginning-of-year status	Percent of students **Above** Benchmark on **middle-of-year** Math Composite Score based on beginning-of-year status	Percent of students **At or Above** Benchmark on **end-of-year** Math Composite Score based on middle-of-year status	Percent of students **Above** Benchmark on **end-of-year** Math Composite Score based on middle-of-year status
Math Composite Score	**At or Above Benchmark**	80%	63%	87%	64%
	Above Benchmark	88%	75%	94%	76%
	At Benchmark	61%	41%	69%	33%
	Below Benchmark	39%	20%	41%	14%
	Well Below Benchmark	16%	7%	10%	2%
Computation (Comp)	**At or Above Benchmark**	77%	61%	84%	62%
	Above Benchmark	85%	68%	92%	77%
	At Benchmark	62%	42%	69%	37%
	Below Benchmark	37%	20%	47%	20%
	Well Below Benchmark	12%	5%	20%	6%
Concepts and Applications (C&A)	**At or Above Benchmark**	80%	64%	85%	63%
	Above Benchmark	85%	71%	91%	73%
	At Benchmark	64%	42%	67%	38%
	Below Benchmark	46%	27%	46%	20%
	Well Below Benchmark	25%	12%	18%	6%

Note: This table shows the percent of students that are on track on the Math Composite Score at the middle and end of the year based on the student's Acadience Math measure score at the beginning and middle of the year. N = 77,644 students who had Acadience Math data for the 2015–2016, 2016–2017, 2017–2018, and/or 2018–2019 school years. Data exported from Acadience Data Management.

Third Grade Percentage of Students Who Meet Later Outcomes on the Math Composite Score Based on Benchmark Status on Individual Acadience Math Measures

Acadience Math Measure	Benchmark Status	Percent of students **At or Above** Benchmark on **middle-of-year** Math Composite Score based on beginning-of-year status	Percent of students **Above** Benchmark on **middle-of-year** Math Composite Score based on beginning-of-year status	Percent of students **At or Above** Benchmark on **end-of-year** Math Composite Score based on middle-of-year status	Percent of students **Above** Benchmark on **end-of-year** Math Composite Score based on middle-of-year status
Math Composite Score	**At or Above Benchmark**	84%	70%	89%	70%
	Above Benchmark	89%	77%	95%	81%
	At Benchmark	62%	41%	70%	34%
	Below Benchmark	42%	24%	39%	13%
	Well Below Benchmark	15%	7%	9%	2%
Computation (Comp)	**At or Above Benchmark**	79%	65%	87%	68%
	Above Benchmark	84%	71%	91%	76%
	At Benchmark	59%	43%	67%	36%
	Below Benchmark	46%	29%	45%	19%
	Well Below Benchmark	25%	14%	14%	4%
Concepts and Applications (C&A)	**At or Above Benchmark**	82%	69%	87%	68%
	Above Benchmark	87%	75%	92%	76%
	At Benchmark	62%	38%	69%	39%
	Below Benchmark	44%	26%	44%	19%
	Well Below Benchmark	19%	9%	14%	4%

Note: This table shows the percent of students that are on track on the Math Composite Score at the middle and end of the year based on the student's Acadience Math measure score at the beginning and middle of the year. N = 59,615 students who had Acadience Math data for the 2015–2016, 2016–2017, 2017–2018, and/or 2018–2019 school years. Data exported from Acadience Data Management.

Fourth Grade Percentage of Students Who Meet Later Outcomes on the Math Composite Score Based on Benchmark Status on Individual Acadience Math Measures

Acadience Math Measure	Benchmark Status	Percent of students **At or Above** Benchmark on **middle-of-year** Math Composite Score based on beginning-of-year status	Percent of students **Above** Benchmark on **middle-of-year** Math Composite Score based on beginning-of-year status	Percent of students **At or Above** Benchmark on **end-of-year** Math Composite Score based on middle-of-year status	Percent of students **Above** Benchmark on **end-of-year** Math Composite Score based on middle-of-year status
Math Composite Score	**At or Above Benchmark**	85%	71%	91%	70%
	Above Benchmark	91%	80%	96%	81%
	At Benchmark	64%	41%	75%	34%
	Below Benchmark	37%	19%	44%	13%
	Well Below Benchmark	11%	4%	8%	1%
Computation (Comp)	**At or Above Benchmark**	78%	64%	86%	66%
	Above Benchmark	85%	73%	91%	75%
	At Benchmark	61%	43%	68%	36%
	Below Benchmark	43%	26%	47%	18%
	Well Below Benchmark	19%	10%	18%	4%
Concepts and Applications (C&A)	**At or Above Benchmark**	83%	67%	90%	68%
	Above Benchmark	91%	78%	95%	78%
	At Benchmark	61%	38%	74%	39%
	Below Benchmark	38%	19%	46%	17%
	Well Below Benchmark	14%	6%	12%	3%

Note: This table shows the percent of students that are on track on the Math Composite Score at the middle and end of the year based on the student's Acadience Math measure score at the beginning and middle of the year. N = 56,121 students who had Acadience Math data for the 2015–2016, 2016–2017, 2017–2018, and/or 2018–2019 school years. Data exported from Acadience Data Management.

Fifth Grade Percentage of Students Who Meet Later Outcomes on the Math Composite Score Based on Benchmark Status on Individual Acadience Math Measures

Acadience Math Measure	Benchmark Status	Percent of students **At or Above** Benchmark on **middle-of-year** Math Composite Score based on beginning-of-year status	Percent of students **Above** Benchmark on **middle-of-year** Math Composite Score based on beginning-of-year status	Percent of students **At or Above** Benchmark on **end-of-year** Math Composite Score based on middle-of-year status	Percent of students **Above** Benchmark on **end-of-year** Math Composite Score based on middle-of-year status
Math Composite Score	**At or Above Benchmark**	87%	69%	90%	68%
	Above Benchmark	92%	78%	96%	81%
	At Benchmark	70%	43%	74%	37%
	Below Benchmark	46%	23%	43%	14%
	Well Below Benchmark	16%	6%	10%	2%
Computation (Comp)	**At or Above Benchmark**	84%	67%	87%	66%
	Above Benchmark	89%	74%	94%	77%
	At Benchmark	66%	43%	73%	39%
	Below Benchmark	51%	29%	44%	18%
	Well Below Benchmark	25%	12%	12%	3%
Concepts and Applications (C&A)	**At or Above Benchmark**	83%	65%	88%	68%
	Above Benchmark	89%	74%	93%	77%
	At Benchmark	66%	42%	72%	40%
	Below Benchmark	46%	24%	50%	22%
	Well Below Benchmark	22%	10%	18%	5%

Note: This table shows the percent of students that are on track on the Math Composite Score at the middle and end of the year based on the student's Acadience Math measure score at the beginning and middle of the year. N = 47,139 students who had Acadience Math data for the 2015–2016, 2016–2017, 2017–2018, and/or 2018–2019 school years. Data exported from Acadience Data Management.

Sixth Grade Percentage of Students Who Meet Later Outcomes on the Math Composite Score Based on Benchmark Status on Individual Acadience Math Measures

Acadience Math Measure	Benchmark Status	Percent of students **At or Above** Benchmark on **middle-of-year** Math Composite Score based on beginning-of-year status	Percent of students **Above** Benchmark on **middle-of-year** Math Composite Score based on beginning-of-year status	Percent of students **At or Above** Benchmark on **end-of-year** Math Composite Score based on middle-of-year status	Percent of students **Above** Benchmark on **end-of-year** Math Composite Score based on middle-of-year status
Math Composite Score	**At or Above Benchmark**	87%	71%	88%	70%
	Above Benchmark	93%	80%	96%	83%
	At Benchmark	64%	39%	69%	35%
	Below Benchmark	39%	18%	35%	11%
	Well Below Benchmark	9%	3%	5%	1%
Computation (Comp)	**At or Above Benchmark**	83%	66%	85%	66%
	Above Benchmark	88%	74%	92%	77%
	At Benchmark	67%	40%	65%	36%
	Below Benchmark	41%	21%	36%	17%
	Well Below Benchmark	18%	9%	10%	3%
Concepts and Applications (C&A)	**At or Above Benchmark**	82%	66%	84%	66%
	Above Benchmark	89%	75%	92%	78%
	At Benchmark	62%	39%	67%	39%
	Below Benchmark	42%	21%	38%	17%
	Well Below Benchmark	14%	6%	11%	4%

Note: This table shows the percent of students that are on track on the Math Composite Score at the middle and end of the year based on the student's Acadience Math measure score at the beginning and middle of the year. N = 17,061 students who had Acadience Math data for the 2015–2016, 2016–2017, 2017–2018, and/or 2018–2019 school years. Data exported from Acadience Data Management.

Kindergarten Percentage of Students Who Meet Later Outcomes on the GMADE Total Math Score Based on Benchmark Status on Individual Acadience Math Measures

Acadience Math Measure	Benchmark Status	Percent of students showing adequate skill on GMADE Total Math Score based on beginning-of-year status	Percent of students showing adequate skill on GMADE Total Math Score based on middle-of-year status	Percent of students showing adequate skill on GMADE Total Math Score based on end-of-year status
Math Composite Score	**At or Above Benchmark**	80%	79%	80%
	Below Benchmark	53%	66%	76%
	Well Below Benchmark	12%	31%	37%
Beginning Quantity Discrimination (BQD)	**At or Above Benchmark**	78%	85%	87%
	Below Benchmark	63%	75%	67%
	Well Below Benchmark	13%	30%	37%
Number Identification Fluency (NIF)	**At or Above Benchmark**	79%	80%	80%
	Below Benchmark	67%	69%	74%
	Well Below Benchmark	27%	39%	34%
Next Number Fluency (NNF)	**At or Above Benchmark**	81%	76%	74%
	Below Benchmark	55%	61%	68%
	Well Below Benchmark	21%	38%	57%

Note: This table shows the likelihood of being on track on the GMADE assessment administered at the end of the year, based on the student's individual beginning-, middle-, and end-of-year Acadience Math measure benchmark status. The 40th percentile for the GMADE assessment was used to indicate whether the student was on track. N = 156 students. Due to insufficient sample size, At Benchmark and Above Benchmark were kept as one category. The GMADE data was collected during the 2012–2013 school year.

First Grade Percentage of Students Who Meet Later Outcomes on the GMADE Total Math Score Based on Benchmark Status on Individual Acadience Math Measures

Acadience Math Measure	Benchmark Status	Percent of students showing adequate skill on GMADE Total Math Score based on beginning-of-year status	Percent of students showing adequate skill on GMADE Total Math Score based on middle-of-year status	Percent of students showing adequate skill on GMADE Total Math Score based on end-of-year status
Math Composite Score	At Benchmark	82%	87%	86%
	Below Benchmark	50%	52%	53%
	Well Below Benchmark	28%	22%	29%
Number Identification Fluency (NIF)	At Benchmark	82%	–	–
	Below Benchmark	42%	–	–
	Well Below Benchmark	33%	–	–
Next Number Fluency (NNF)	At Benchmark	86%	–	–
	Below Benchmark	49%	–	–
	Well Below Benchmark	29%	–	–
Missing Number Fluency (MNF)	At Benchmark	78%	91%	79%
	Below Benchmark	37%	45%	64%
	Well Below Benchmark	12%	37%	28%
Advanced Quantity Discrimination (AQD)	At Benchmark	77%	80%	85%
	Below Benchmark	48%	53%	54%
	Well Below Benchmark	33%	21%	24%
Computation (Comp)	At Benchmark	70%	78%	85%
	Below Benchmark	57%	63%	68%
	Well Below Benchmark	32%	35%	21%

Note: This table shows the likelihood of being on track on the GMADE assessment administered at the end of the year, based on the student's individual beginning-, middle-, and end-of-year Acadience Math measure benchmark status. The 40th percentile for the GMADE assessment was used to indicate whether the student was on track. N = 154 students. Due to insufficient sample size, At Benchmark and Above Benchmark were kept as one category. The GMADE data was collected during the 2012–2013 school year.

Second Grade Percentage of Students Who Meet Later Outcomes on the SAT10 Total Math Score Based on Benchmark Status on Individual Acadience Math Measures

Acadience Math Measure	Benchmark Status	Percent of students showing adequate skill on SAT10 Total Math Score based on beginning-of-year status	Percent of students showing adequate skill on SAT10 Total Math Score based on middle-of-year status	Percent of students showing adequate skill on SAT10 Total Math Score based on end-of-year status
Math Composite Score	**At or Above Benchmark**	88%	89%	90%
	Below Benchmark	55%	41%	53%
	Well Below Benchmark	14%	10%	14%
Computation (Comp)	**At or Above Benchmark**	86%	90%	90%
	Below Benchmark	53%	44%	57%
	Well Below Benchmark	18%	16%	25%
Concepts and Applications (C&A)	**At or Above Benchmark**	93%	88%	92%
	Below Benchmark	47%	47%	33%
	Well Below Benchmark	25%	13%	5%

Note: This table shows the likelihood of being on track on the SAT10 Total Math Score administered at the end of the year, based on the student's individual beginning-, middle-, and end-of-year Acadience Math measure benchmark status. The 40th percentile for the SAT10 assessment was used to indicate whether the student was on track. N = 132 students. Due to insufficient sample size, At Benchmark and Above Benchmark were kept as one category.

Third Grade Percentage of Students Who Meet Later Outcomes on the SAT10 Total Math Score Based on Benchmark Status on Individual Acadience Math Measures

Acadience Math Measure	Benchmark Status	Percent of students showing adequate skill on SAT10 Total Math Score based on beginning-of-year status	Percent of students showing adequate skill on SAT10 Total Math Score based on middle-of-year status	Percent of students showing adequate skill on SAT10 Total Math Score based on end-of-year status
Math Composite Score	**At or Above Benchmark**	85%	86%	83%
	Below Benchmark	57%	40%	40%
	Well Below Benchmark	10%	15%	14%
Computation (Comp)	**At or Above Benchmark**	77%	78%	81%
	Below Benchmark	38%	62%	44%
	Well Below Benchmark	19%	21%	26%
Concepts and Applications (C&A)	**At or Above Benchmark**	83%	78%	87%
	Below Benchmark	47%	36%	45%
	Well Below Benchmark	17%	6%	10%

Note: This table shows the likelihood of being on track on the SAT10 Total Math Score administered at the end of the year, based on the student's individual beginning-, middle-, and end-of-year Acadience Math measure benchmark status. The 40th percentile for the SAT10 assessment was used to indicate whether the student was on track. N = 114 students. Due to insufficient sample size, At Benchmark and Above Benchmark were kept as one category.

Fourth Grade Percentage of Students Who Meet Later Outcomes on the SAT10 Total Math Score Based on Benchmark Status on Individual Acadience Math Measures

Acadience Math Measure	Benchmark Status	Percent of students showing adequate skill on SAT10 Total Math Score based on beginning-of-year status	Percent of students showing adequate skill on SAT10 Total Math Score based on middle-of-year status	Percent of students showing adequate skill on SAT10 Total Math Score based on end-of-year status
Math Composite Score	**At or Above Benchmark**	92%	84%	82%
	Below Benchmark	50%	50%	60%
	Well Below Benchmark	6%	7%	13%
Computation (Comp)	**At or Above Benchmark**	91%	81%	81%
	Below Benchmark	42%	33%	43%
	Well Below Benchmark	24%	0%	14%
Concepts and Applications (C&A)	**At or Above Benchmark**	88%	81%	83%
	Below Benchmark	42%	57%	64%
	Well Below Benchmark	13%	7%	13%

Note: This table shows the likelihood of being on track on the SAT10 Total Math Score administered at the end of the year, based on the student's individual beginning-, middle-, and end-of-year Acadience Math measure benchmark status. The 40th percentile for the SAT10 assessment was used to indicate whether the student was on track. N = 70 students. Due to insufficient sample size, At Benchmark and Above Benchmark were kept as one category.

Fifth Grade Percentage of Students Who Meet Later Outcomes on the SAT10 Total Math Score Based on Benchmark Status on Individual Acadience Math Measures

Acadience Math Measure	Benchmark Status	Percent of students showing adequate skill on SAT10 Total Math Score based on beginning-of-year status	Percent of students showing adequate skill on SAT10 Total Math Score based on middle-of-year status	Percent of students showing adequate skill on SAT10 Total Math Score based on end-of-year status
Math Composite Score	**At or Above Benchmark**	85%	81%	82%
	Below Benchmark	46%	40%	50%
	Well Below Benchmark	26%	7%	3%
Computation (Comp)	**At or Above Benchmark**	81%	77%	77%
	Below Benchmark	43%	50%	54%
	Well Below Benchmark	21%	13%	8%
Concepts and Applications (C&A)	**At or Above Benchmark**	85%	87%	83%
	Below Benchmark	50%	48%	45%
	Well Below Benchmark	23%	10%	7%

Note: This table shows the likelihood of being on track on the SAT10 Total Math Score administered at the end of the year, based on the student's individual beginning-, middle-, and end-of-year Acadience Math measure benchmark status. The 40th percentile for the SAT10 assessment was used to indicate whether the student was on track. N = 123 students. Due to insufficient sample size, At Benchmark and Above Benchmark were kept as one category.

Sixth Grade Percentage of Students Who Meet Later Outcomes on the SAT10 Total Math Score Based on Benchmark Status on Individual Acadience Math Measures

Acadience Math Measure	Benchmark Status	Percent of students showing adequate skill on SAT10 Total Math Score based on beginning-of-year status	Percent of students showing adequate skill on SAT10 Total Math Score based on middle-of-year status	Percent of students showing adequate skill on SAT10 Total Math Score based on end-of-year status
Math Composite Score	**At or Above Benchmark**	94%	93%	89%
	Below Benchmark	44%	33%	36%
	Well Below Benchmark	26%	13%	0%
Computation (Comp)	**At or Above Benchmark**	88%	85%	85%
	Below Benchmark	17%	36%	46%
	Well Below Benchmark	32%	15%	8%
Concepts and Applications (C&A)	**At or Above Benchmark**	91%	84%	93%
	Below Benchmark	53%	62%	32%
	Well Below Benchmark	22%	12%	0%

Note: This table shows the likelihood of being on track on the SAT10 Total Math Score administered at the end of the year, based on the student's individual beginning-, middle-, and end-of-year Acadience Math measure benchmark status. The 40th percentile for the SAT10 assessment was used to indicate whether the student was on track. N = 74 students. Due to insufficient sample size, At Benchmark and Above Benchmark were kept as one category.

Percentage of Students Who Met Outcomes at the Beginning of the Following Year

Acadience Math Measure	End-of-Year Benchmark Status	Likelihood of Being on Track on Math Composite Score at Beginning of Following Year					
		K	1	2	3	4	5
Math Composite Score	At or Above Benchmark	86%	81%	85%	85%	84%	81%
	Below Benchmark	38%	41%	48%	39%	37%	35%
	Well Below Benchmark	9%	13%	17%	11%	10%	9%
Beginning Quantity Discrimination (BQD)	At or Above Benchmark	79%					
	Below Benchmark	49%					
	Well Below Benchmark	25%					
Number Identification Fluency (NIF)	At or Above Benchmark	87%					
	Below Benchmark	36%					
	Well Below Benchmark	8%					
Next Number Fluency (NNF)	At or Above Benchmark	81%					
	Below Benchmark	51%					
	Well Below Benchmark	19%					
Advanced Quantity Discrimination (AQD)	At or Above Benchmark		80%				
	Below Benchmark		49%				
	Well Below Benchmark		20%				
Missing Number Fluency (MNF)	At or Above Benchmark		78%				
	Below Benchmark		46%				
	Well Below Benchmark		20%				
Computation (Comp)	At or Above Benchmark		82%	83%	83%	83%	83%
	Below Benchmark		49%	48%	45%	43%	39%
	Well Below Benchmark		20%	19%	16%	17%	12%
Concepts and Applications (C&A)	At or Above Benchmark			82%	85%	82%	80%
	Below Benchmark			46%	46%	41%	42%
	Well Below Benchmark			19%	16%	15%	15%

Note: This table shows the percent of students that are on track on the Math Composite Score at the beginning of the following school year based on their end-of-year benchmark status. Sample sizes for cross-year cohorts as follows. End of kindergarten to beginning of first grade: 54,402, end of first grade to beginning of second grade: 54,137, end of second grade to beginning of third grade: 44,401, end of third grade to beginning of fourth grade: 40,411, end of fourth grade to beginning of fifth grade: 34,929, and end of fifth grade to beginning of sixth grade: 11,785. Acadience Math data were exported from Acadience Data Management for the 2015–2016, 2016–2017, 2017–2018, and/or 2018–2019 school years.

Percentile Ranks of Benchmark Goals and Cut Points by Grade at Beginning of Year

Acadience Math Measure	Benchmark Status	K	1	2	3	4	5	6
Math Composite Score	Benchmark Goal	45	47	41	49	47	47	48
	Cut Point for Risk	23	23	22	24	22	24	20
Beginning Quantity Discrimination (BQD)	Benchmark Goal	52						
	Cut Point for Risk	24						
Number Identification Fluency (NIF)	Benchmark Goal	46	47					
	Cut Point for Risk	27	24					
Next Number Fluency (NNF)	Benchmark Goal	52	47					
	Cut Point for Risk	28	27					
Advanced Quantity Discrimination (AQD)	Benchmark Goal		45					
	Cut Point for Risk		24					
Missing Number Fluency (MNF)	Benchmark Goal		45					
	Cut Point for Risk		21					
Computation (Comp)	Benchmark Goal		54	45	50	45	50	47
	Cut Point for Risk		30	14	26	22	26	24
Concepts and Applications (C&A)	Benchmark Goal			48	50	47	46	45
	Cut Point for Risk			26	25	26	24	22

Note: This table shows the percentile ranks of benchmark goals and cut points by grade at the beginning of the year based on the 2016–2017 Acadience Math National Norms.

Percentile Ranks of Benchmark Goals and Cut Points by Grade at Middle of Year

Acadience Math Measure	Benchmark Status	K	1	2	3	4	5	6
Math Composite Score	Benchmark Goal	43	47	44	46	46	43	44
	Cut Point for Risk	21	22	20	23	24	23	22
Beginning Quantity Discrimination (BQD)	Benchmark Goal	36						
	Cut Point for Risk	14						
Number Identification Fluency (NIF)	Benchmark Goal	43						
	Cut Point for Risk	22						
Next Number Fluency (NNF)	Benchmark Goal	47						
	Cut Point for Risk	23						
Advanced Quantity Discrimination (AQD)	Benchmark Goal		45					
	Cut Point for Risk		24					
Missing Number Fluency (MNF)	Benchmark Goal		51					
	Cut Point for Risk		30					
Computation (Comp)	Benchmark Goal		48	47	48	45	43	43
	Cut Point for Risk		24	27	25	24	20	21
Concepts and Applications (C&A)	Benchmark Goal			46	46	46	46	43
	Cut Point for Risk			23	23	25	24	23

Note: This table shows the percentile ranks of benchmark goals and cut points by grade at the middle of the year based on the 2016–2017 Acadience Math National Norms.

Percentile Ranks of Benchmark Goals and Cut Points by Grade at End of Year

Acadience Math Measure	Benchmark Status	K	1	2	3	4	5	6
Math Composite Score	Benchmark Goal	43	46	40	42	40	40	43
	Cut Point for Risk	21	22	21	22	19	20	22
Beginning Quantity Discrimination (BQD)	Benchmark Goal	47						
	Cut Point for Risk	22						
Number Identification Fluency (NIF)	Benchmark Goal	42						
	Cut Point for Risk	22						
Next Number Fluency (NNF)	Benchmark Goal	49						
	Cut Point for Risk	23						
Advanced Quantity Discrimination (AQD)	Benchmark Goal		47					
	Cut Point for Risk		25					
Missing Number Fluency (MNF)	Benchmark Goal		46					
	Cut Point for Risk		29					
Computation (Comp)	Benchmark Goal		50	42	45	43	42	45
	Cut Point for Risk		24	18	23	22	22	24
Concepts and Applications (C&A)	Benchmark Goal			41	45	40	42	45
	Cut Point for Risk			20	26	21	21	27

Note: This table shows the percentile ranks of benchmark goals and cut points by grade at the end of the year based on the 2016–2017 Acadience Math National Norms.

K Kindergarten Acadience Math Composite Score Worksheet

The Math Composite Score is used to interpret student results for Acadience Math. Acadience Data Management will calculate the composite score for you. You can also use this worksheet to calculate the composite score.

Name: _____ **Class:** _____

Beginning of Year Benchmark

BQD Score = _____ x 2 = _____

+ NIF Score = _____

+ NNF Score = _____ x 2 = _____

Math Composite Score (2 x BQD + NIF + 2 x NNF) = ☐

Do not calculate the Composite Score if any of the values are missing.

Middle of Year Benchmark

BQD Score = _____ x 3 = _____

+ NIF Score = _____

+ NNF Score = _____ x 3 = _____

Math Composite Score (3 x BQD + NIF + 3 x NNF) = ☐

Do not calculate the Composite Score if any of the values are missing.

End of Year Benchmark

BQD Score = _____ x 2 = _____

+ NIF Score = _____

+ NNF Score = _____ x 3 = _____

Math Composite Score (2 x BQD + NIF + 3 x NNF) = ☐

Do not calculate the Composite Score if any of the values are missing.

1 *First Grade Acadience Math Composite Score Worksheet*

The Math Composite Score is used to interpret student results for Acadience Math. Acadience Data Management will calculate the composite score for you. You can also use this worksheet to calculate the composite score.

Name: _____ **Class:** _____

Beginning of Year Benchmark

NIF Score = _____

+ NNF Score = _____ x 3 = _____

+ AQD Score = _____ x 2 = _____

+ MNF Score = _____ x 5 = _____

+ Comp Score = _____ x 4 = _____

Math Composite Score (NIF + 3 x NNF + 2 x AQD + 5 x MNF + 4 x Comp) = _____

Do not calculate the Composite Score if any of the values are missing.

Middle of Year Benchmark

AQD Score = _____

+ MNF Score = _____ x 2 = _____

+ Comp Score = _____

Math Composite Score (AQD + 2 x MNF + Comp) = _____

Do not calculate the Composite Score if any of the values are missing.

End of Year Benchmark

AQD Score = _____

+ MNF Score = _____ x 2 = _____

+ Comp Score = _____

Math Composite Score (AQD + 2 x MNF + Comp) = _____

Do not calculate the Composite Score if any of the values are missing.

2 Second Grade Acadience Math Composite Score Worksheet

The Math Composite Score is used to interpret student results for Acadience Math. Acadience Data Management will calculate the composite score for you. You can also use this worksheet to calculate the composite score.

Name: _____ **Class:** _____

Beginning of Year Benchmark

Comp Score = _____ x 2 = _____

+ C&A Score = _____

Math Composite Score (C&A + 2 x Comp) = _____

Do not calculate the Composite Score if any of the values are missing.

Middle of Year Benchmark

Comp Score = _____ x 2 = _____

+ C&A Score = _____

Math Composite Score (C&A + 2 x Comp) = _____

Do not calculate the Composite Score if any of the values are missing.

End of Year Benchmark

Comp Score = _____ x 2 = _____

+ C&A Score = _____

Math Composite Score (C&A + 2 x Comp) = _____

Do not calculate the Composite Score if any of the values are missing.

3 *Third Grade Acadience Math Composite Score Worksheet*

The Math Composite Score is used to interpret student results for Acadience Math. Acadience Data Management will calculate the composite score for you. You can also use this worksheet to calculate the composite score.

Name: _____ **Class:** _____

Beginning of Year Benchmark

Comp Score = _____ x 2 = _____

+ C&A Score = _____

Math Composite Score (C&A + 2 x Comp) = ☐

Do not calculate the Composite Score if any of the values are missing.

Middle of Year Benchmark

Comp Score = _____ x 2 = _____

+ C&A Score = _____

Math Composite Score (C&A + 2 x Comp) = ☐

Do not calculate the Composite Score if any of the values are missing.

End of Year Benchmark

Comp Score = _____ x 2 = _____

+ C&A Score = _____

Math Composite Score (C&A + 2 x Comp) = ☐

Do not calculate the Composite Score if any of the values are missing.

4 Fourth Grade Acadience Math Composite Score Worksheet

The Math Composite Score is used to interpret student results for Acadience Math. Acadience Data Management will calculate the composite score for you. You can also use this worksheet to calculate the composite score.

Name: _____ **Class:** _____

Beginning of Year Benchmark

Comp Score = _____ x 2 = _____

+ C&A Score = _____

Math Composite Score (C&A + 2 x Comp) = _____

Do not calculate the Composite Score if any of the values are missing.

Middle of Year Benchmark

Comp Score = _____

+ C&A Score = _____

Math Composite Score (C&A + Comp) = _____

Do not calculate the Composite Score if any of the values are missing.

End of Year Benchmark

Comp Score = _____

+ C&A Score = _____

Math Composite Score (C&A + Comp) = _____

Do not calculate the Composite Score if any of the values are missing.

5 *Fifth Grade Acadience Math Composite Score Worksheet*

The Math Composite Score is used to interpret student results for Acadience Math. Acadience Data Management will calculate the composite score for you. You can also use this worksheet to calculate the composite score.

Name: _____ **Class:** _____

Beginning of Year Benchmark

Comp Score = _____

+ C&A Score = _____

Math Composite Score (C&A + Comp) = ☐

Do not calculate the Composite Score if any of the values are missing.

Middle of Year Benchmark

Comp Score = _____

+ C&A Score = _____

Math Composite Score (C&A + Comp) = ☐

Do not calculate the Composite Score if any of the values are missing.

End of Year Benchmark

Comp Score = _____

+ C&A Score = _____

Math Composite Score (C&A + Comp) = ☐

Do not calculate the Composite Score if any of the values are missing.

6 *Sixth Grade Acadience Math Composite Score Worksheet*

The Math Composite Score is used to interpret student results for Acadience Math. Acadience Data Management will calculate the composite score for you. You can also use this worksheet to calculate the composite score.

Name: _____ **Class:** _____

Beginning of Year Benchmark

Comp Score = _____

+ C&A Score = _____

Math Composite Score (C&A + Comp) = ☐

Do not calculate the Composite Score if any of the values are missing.

Middle of Year Benchmark

Comp Score = _____

+ C&A Score = _____

Math Composite Score (C&A + Comp) = ☐

Do not calculate the Composite Score if any of the values are missing.

End of Year Benchmark

Comp Score = _____

+ C&A Score = _____

Math Composite Score (C&A + Comp) = ☐

Do not calculate the Composite Score if any of the values are missing.

Appendix 5: Sample Announcement and Results Letters

The sample announcement and results letters in this appendix are discussed in *Chapter 4: Implementing Acadience Math in Your School.*

Sample Announcement Letter for Acadience® Math

The following is a sample letter that can be used to introduce parents and guardians to Acadience Math testing.

This is only an example, and each school is encouraged to provide accurate and understandable information to parents and guardians in a manner appropriate to the school community.

Dear Parents and/or Guardians,

The teachers and administrators at our school are committed to helping your child become successful at mathematics. As part of this commitment, our school has chosen to use an assessment called Acadience Math to help us examine how your child is doing in learning important mathematics skills.

Acadience Math assesses skills that are necessary for learning mathematics and is made up of short assessments. Each assessment focuses on a different mathematics skill(s) and which assessment is given depends on the grade of your child.

Acadience Math is used only as an indicator of mathematics proficiency. Much like using a thermometer to take a child's temperature as an indicator of overall health, each assessment is an indicator of how well a child is doing in learning a particular mathematics skill. The scores tell us whether a child is likely to be "on track" for learning mathematics or whether a child may need some additional help in learning important mathematics skills. Your child's teacher will use the information to better help your child. For example, results from an Acadience Math test may tell us that we need to spend more time teaching your child how to perform basic mathematics computation.

Acadience Math is used to identify children who may need extra help to become good mathematicians and to check up on those children while they are receiving extra help to make sure they are making progress. Acadience Math may also be used to make decisions about how well our school's overall mathematics program is working for every child. Acadience Math will not be used to grade your child. We are working hard at school to make sure that every child is on target for success, and we thank you for your efforts at home.

Sincerely,

(name)

Sample Results Letter for Acadience® Math

The following is a sample letter that can be used to discuss Acadience Math results with parents and guardians. Each school is encouraged to provide accurate and understandable information to parents and guardians in a manner appropriate to its school community.

Dear Parents of (insert student name):

All students in our school are assessed three times during the school year using Acadience Math. The purpose of this assessment is to monitor your child's development in mathematics, to identify students needing additional help, and to guide the teacher's classroom instruction.

The Acadience Math measures given in kindergarten are described below:

Acadience Math Measure	Skill Area(s)	Types of Activities
Beginning Quantity Discrimination	• Quantity Discrimination • Indirectly Subitizing (associating patterns with numbers without counting)	Saying the number of dots that is the larger of two sets of dots.
Number Identification Fluency	Number Identification	Saying the written numbers on a page.
Next Number Fluency	Strategic Counting	Saying the number that comes next after a given number.

The Acadience Math measures given in first grade are described below:

Acadience Math Measure	Skill Area(s)	Types of Activities
Number Identification Fluency (fall only)	Number Identification	Saying the written numbers on a page.
Next Number Fluency (fall only)	Strategic Counting	Saying the number that comes next after a given number.
Advanced Quantity Discrimination	Quantity Discrimination	Saying which number is the larger of two numbers.
Missing Number Fluency	Strategic Counting	Saying the missing number from a series of numbers.
Computation	Computation	Solving basic computation problems.

The Acadience Math measures given in second through sixth grade are described below:

Acadience Math Measure	Skill Area(s)	Types of Activities
Computation	Computation	Solving basic computation problems.
Concepts and Applications	Understanding and applying math concepts and vocabulary.	Solving problems involving measurement and data, geometry, fractions, decimals, and other types of word problems.

In the last several weeks, we have assessed all students to check their mathematics progress. Teachers will use this information, along with classroom information, to determine any areas in which students need additional instruction.

Your child's results are provided on the next page.

The Math Composite Score is a combination of multiple Acadience Math scores and provides the best overall estimate of a student's mathematics proficiency. The scores used to calculate the Composite Score vary by grade and time of year. This means the Composite Score should only be compared to the goal for that time of the school year and not to goals or Composite Scores at other times of the year.

Please note that the goal number listed next to your child's score indicates the minimum target for students at the beginning, middle, and end of the school year. Scores at or above the goal indicate that the student is on track for meeting future mathematics outcomes with the instruction that is currently being provided. Scores below the goal indicate that the student is currently not on track to meet future mathematics outcomes and may need additional support to catch up.

Students who score at or above the Composite Score goal may still need additional instruction in one or more skill areas, as indicated by a score below the goal on one of the Acadience Math measures.

If you have any questions concerning your child's Acadience Math scores, please contact your child's teacher or me.

Sincerely,

(principal's name)

Appendix 6: Acadience Math Scope and Sequence

Acadience Math–Kindergarten Early Numeracy

Measure	Description
Beginning Quantity Discrimination	BQD assesses a student's ability to discriminate between two quantities. The student says the number of the larger set of dots. The sets of dots range from 1 to 10. It is also an indirect measure of subitizing, the ability to instantly judge the number associated with a group of items.
Next Number Fluency	NNF assesses a student's ability to extend the counting sequence. The examiner says a number, begins the stopwatch immediately after prompting with the first number, and continues providing the student with random numbers ranging from 1 to 99, for 1 minute. The student is to say the number that comes after the number provided by the examiner.
Number Identification Fluency	NIF assesses a student's ability to orally identify numerals ranging from 1 to 99.

Acadience Math–First Grade Early Numeracy

Measure	Description
Next Number Fluency	NNF assesses a student's ability to extend the counting sequence. The examiner says a number, begins the stopwatch immediately after prompting with the first number, and continues providing the student with random numbers ranging from 1 to 99, for 1 minute. The student is to say the number that comes after the number provided by the examiner.
Number Identification Fluency	NIF assesses a student's ability to orally identify numerals ranging from 1 to 99.
Advanced Quantity Discrimination	AQD assesses a student's ability to discriminate between two given quantities by stating the larger of the two numbers. The quantities range from 1 to 99.
Missing Number Fluency	MNF assesses a student's ability to extend a counting sequence—counting by 1s, 5s, and 10s by having the student state the missing number out of a sequence of four numbers.

Acadience Math–First Grade Computation

Problem #	Problem Description
1, 11	Add 0 or 1 to a one-digit number.
2, 15, 20, 22	Add two one-digit numbers, excluding 0 and 1.
3, 13	Subtract a one-digit number from a two-digit number of 19 or less, resulting in a difference of 11 or more, without renaming.
4, 10, 21, 24	Subtract a one-digit number from a one-digit number, excluding 0 and 1 in the subtrahend.
5, 17	Subtract a one-digit number from a two-digit number of 18 or less, resulting in a difference of 9 or less, with renaming.
6, 18	Subtract 0 or 1 from a one-digit number.
7, 12	Add a two-digit and a one-digit number, with renaming, resulting in a sum of 20.
8, 14	Subtract a one-digit number from 20, with renaming.
9, 16, 19, 23	Add a two-digit and a one-digit number, without renaming, resulting in a sum of 19 or less.

Acadience Math–Second Grade Computation

Problem #	Problem Description
1	Add two one-digit numbers, excluding 0 and 1.
2, 13	Add a two-digit and a one-digit number, without renaming, resulting in a sum of 99 or less.
3, 14	Subtract a one-digit number from a two-digit number of 20 or more, with renaming.
4, 12, 18	Add two two-digit numbers, with renaming, resulting in a sum of 99 or less.
5	Add four two-digit numbers, with renaming, resulting in a sum of 99 or less.
6	Subtract a one-digit number from a one-digit number excluding 0 and 1 in the subtrahend.
7, 15, 19	Add two two-digit numbers, without renaming, resulting in a sum of 99 or less.
8, 20	Subtract a two-digit number from a two-digit number of 20 or more, with renaming.
9, 16	Add a two-digit and a one-digit number, with renaming, resulting in a sum of 99 or less.
10, 17	Subtract a one- or two-digit number from a two-digit number, without renaming.
11	Subtract a one-digit number from a two-digit number of 18 or less, resulting in a difference of 9 or less, with renaming.

Acadience Math–Second Grade Concepts and Applications

Problem #	Problem Description
1	Determine the total number of circles and squares.
2	Determine the number of shares (varying between 2 and 4) into which a circle or rectangle is divided.
3	Compare two three-digit whole numbers.
4	Determine the length of a line in inches.
5	Represent and solve problems with two-step addition.
6	Transfer the time from a digital clock to an analog clock with times set at 5-minute increments.
7	Represent and solve problems involving one-step addition with numbers from 2 to 9.
8	Determine how much shorter or longer, in inches, one object is than another.
9	Identify the target shape from a group of shapes that include a triangle, quadrilateral, pentagon, hexagon, and cube.
10	Subtract/add a two-digit number from/to a three-digit number, resulting in a three-digit difference/sum.
11	Solve one-step addition problems that determine the length of two objects together.
12	Represent and solve problems involving one-step subtraction with a given formula.
13	Determine place value by identifying the number in the ones place and tens place for a three-digit whole number.
14	Transfer the time from an analog clock to a digital clock with times set at 5-minute increments.
15	Represent and solve problems involving two-step subtraction.
16	Add three different coin amounts together, resulting in a total amount of money under $1.

Acadience Math–Third Grade Computation

Problem #	Problem Description
1	Add two two-digit numbers, without renaming, resulting in a sum of 99 or less.
2	Add two two- or three-digit numbers, without renaming, resulting in a sum of 999 or less.
3	Multiply a one-digit number by a one-digit number, resulting in a product of 51 or more.
4	Multiply a one-digit number by 0 or 1.
5, 22	Multiply a one-digit number by a two-digit number, without renaming, resulting in a product of 99 or less.
6	Multiply a one-digit number by a two-digit number, with renaming, resulting in a product of 99 or less.
7, 20	Multiply a one-digit number by a one-digit number, resulting in a product from 21 to 50.
8	Subtract a two- or three-digit number from a three-digit number, without renaming.
9, 24	Divide a one-digit dividend by a one-digit divisor, resulting in a quotient and no remainder.
10	Subtract a one- or two-digit number from a two-digit number, without renaming.
11	Add two two-digit numbers, with renaming, resulting in a sum of 99 or less.
12, 19	Divide a two-digit dividend by a one-digit divisor, resulting in a quotient and no remainder.
13, 25	Multiply a one-digit number by a one-digit number, resulting in a product of 20 or less.
14, 21	Add two two- or three-digit numbers, with renaming, resulting in a sum of 999 or less.
15	Multiply a one-digit number by a two-digit multiple of 10.
16, 23	Subtract a two- or three-digit number from a three-digit number, with renaming.
17	Subtract a two-digit number from a two-digit number of 20 or more, with renaming.
18	Multiply a one-digit number by itself.

Acadience Math–Third Grade Concepts and Applications

Problem #	Problem Description
1	Transfer the time from an analog clock to a digital clock.
2	Determine the fraction of shaded parts in a given shape.
3	Round three-digit whole numbers to the nearest 10 and nearest 100.
4	Represent and solve problems involving one-step multiplication with a given formula.
5	Compare sets of fractions with like denominators.
6	Solve one-step single-digit addition problems that involve measurements of liquid volumes or object masses.
7	Represent and solve problems involving one-step multiplication with numbers from 2 to 9.
8	Write the fraction for the whole number.
9	Use graphical information to solve a one-step addition or subtraction problem.
10	Represent and solve problems involving one-step division with a single-digit divisor and a double-digit dividend.
11	Determine where a fraction with a denominator of one is located on a number line.
12	Add or subtract one double-digit and one single-digit amount involving measurement of liquid volumes or object masses.
13	Solve two-step problems involving addition and/or subtraction.
14	Determine the area of a rectangle.
15	Solve problems involving the distributive property with a provided formula.
16	Solve problems involving measurement of intervals of time.
17	Solve problems involving the associative property with a provided formula.
18	Determine the perimeter of a polygon when all sides but one are given.
19	Solve two-step problems involving multiplication and addition.
20	Determine the area of a rectangular object.

Acadience Math–Fourth Grade Computation

Problem #	Problem Description
1	Add two two- or three-digit numbers, without renaming, resulting in a sum of 999 or less.
2, 24	Add two four-digit numbers, with renaming.
3, 16	Add or subtract two mixed numbers with common denominators. Denominators must be 2, 3, 4, 5, or 10.
4	Multiply a one-digit number by a one-digit number, resulting in a product of 51 or more.
5, 20	Divide a three-digit dividend by a one-digit divisor, where the divisor does not evenly go into the first one or two digits of the dividend, resulting in a quotient and a remainder.
6	Subtract a two- or three-digit number from a three-digit number, without renaming.
7, 18	Add or subtract two fractions with common denominators. Denominators must be 6, 8, or 12.
8, 23	Subtract a three-digit number from a four-digit number, with renaming.
9, 25	Multiply a two-digit number by a two-digit number, without renaming.
10	Add or subtract two mixed numbers with common denominators. Denominators must be 6, 8, or 12.
11, 21	Divide a three-digit dividend by a one-digit divisor, where the divisor goes evenly into the first one or two digits of the dividend, resulting in a quotient and a remainder.
12	Divide a two-digit dividend by a one-digit divisor, resulting in a quotient and no remainder.
13, 22	Multiply a two-digit number by a two-digit number.
14, 17	Add or subtract two fractions with common denominators. Denominators must be 2, 3, 4, 5, or 10.
15, 19	Multiply a one-digit number by a three-digit number, with renaming.

Acadience Math–Fourth Grade Concepts and Applications

Problem #	Problem Description
1	Determine whether a drawn line is a line of symmetry for a given shape.
2	Compare two three-digit whole numbers.
3	Determine three multiples for a given number.
4	Solve two-step problems with double-digit addition and subtraction.
5	Compare decimals to the hundredths place.
6	Solve problems involving time and conversion of time from hours to minutes.
7	Identify acute, obtuse, and right angles of a given shape.
8	Round four-digit whole numbers to the nearest 10, nearest 100, and nearest 1000.
9	Divide whole numbers to solve problems.
10	Compare fractions with unlike denominators.
11	Convert measurements from larger to smaller units.
12	Draw lines, line segments, or rays that are parallel or perpendicular.
13	Write a five-digit number in expanded form.
14	Solve problems involving time and conversion of time from hours to minutes.
15	Determine the decimal notation for a fraction.
16	Solve subtraction problems involving money.
17	Determine if given numbers are prime or composite numbers.
18	Solve problems involving multiplication of a fraction with a whole number.
19	Determine the difference in length between two objects with the answer containing a fraction.
20	Determine the length or width of an object when given the area and length or width.

Acadience Math–Fifth Grade Computation

Problem #	Problem Description
1	Add two four-digit numbers, with renaming.
2, 14	Multiply a two-digit number by a three-digit number, without renaming.
3, 15	Add or subtract two mixed numbers with unlike denominators.
4, 16	Multiply a two-digit number by a three-digit number.
5	Divide a four-digit dividend by a two-digit divisor, where the divisor does not go evenly into the first two or three digits of the dividend, resulting in a quotient and no remainder.
6	Divide a three-digit dividend by a one-digit divisor, where the divisor goes evenly into the first one or two digits of the dividend, resulting in a quotient and a remainder.
7	Add or subtract two mixed numbers with common denominators. Denominators must be 2, 3, 4, 5, or 10.
8	Add or subtract two fractions with common denominators. Denominators must be 2, 3, 4, 5, or 10.
9	Subtract a three-digit number from a four-digit number, with renaming.
10	Multiply a one-digit number by a three-digit number, with renaming.
11	Divide a three-digit dividend by a two-digit divisor, resulting in a quotient and no remainder.
12	Add or subtract two fractions with unlike denominators.
13	Divide a four-digit dividend by a two-digit divisor, where the divisor goes evenly into the first two or three digits of the dividend, resulting in a quotient and no remainder.

Acadience Math–Fifth Grade Concepts and Applications

Problem #	Problem Description
1	Compare decimals to the thousandths place.
2	Plot and label ordered pairs.
3	Interpret and solve numerical expressions.
4	Convert like measurement units within a given measurement system and a provided conversion rate to solve a multi-step addition problem.
5	Solve problems involving the addition of fractions with unlike denominators.
6	Round decimals to the nearest tenth, hundredth, and thousandth.
7	Determine an ordered pair by graphing points on a coordinate plane to solve real-world and mathematical problems.
8	Complete a ratio table, plot the points on a coordinate plane, and make a line graph that represents the data.
9	Determine the volume of an object.
10	Multiply two fractions with unlike denominators.
11	Solve a two-step problem that deals with addition and subtraction of money.
12	Determine the order of operations of a given numerical expression.
13	Determine the volume of an object.
14	Solve a one-step problem that results in a decimal.
15	Write numerical expressions when given written directions.
16	Divide a fraction by a whole number.

Acadience Math–Sixth Grade Computation

Problem #	Problem Description
1	Add two decimals to the tenths place, without renaming.
2	Subtract two decimals to the hundredths place, without renaming.
3	Multiply a two-digit number by a three-digit number.
4	Divide a four-digit dividend by a two-digit divisor, where the divisor goes evenly into the first two or three digits of the dividend, resulting in a quotient and no remainder.
5	Add or subtract two mixed numbers with unlike denominators.
6	Add two decimals to the hundredths place, with renaming.
7	Subtract two decimals the hundredths place, with renaming.
8	Multiply two decimals to the tenths place, without renaming.
9	Divide a three-digit dividend by a decimal to the tenths place, resulting in a quotient and no remainder.
10	Add two decimals to the hundredths place, with renaming.
11	Multiply a single digit by one decimal to the tenths place, with renaming.
12	Divide a four-digit dividend by a two-digit divisor, where the divisor does not go evenly into the first two or three digits of the dividend, resulting in a quotient and no remainder.
13	Multiply a decimal to the tenths place by a decimal to the hundredths place.
14	Divide a decimal to the hundredths place by a decimal to the tenths place, resulting in a quotient and no remainder.
15	Subtract two decimals to the hundredths place, with renaming.
16	Divide a decimal to the hundredths place by a decimal to the tenths place, where the divisor goes evenly into the first two or three digits of the dividend, resulting in a quotient and no remainder.

Acadience Math–Sixth Grade Concepts and Applications

Problem #	Problem Description
1	Determine the ratio of the first set of items to the second set of items.
2	Determine the mean and median of a set of numbers.
3	Describe the quadrants where ordered pairs are located.
4	Write algebraic expressions.
5	Determine the volume of an object and how many smaller objects that would fit inside it.
6	Solve two-step problems involving multiplication and division.
7	Label positive and negative numbers on a number line.
8	Determine if a number substitution makes an inequality true or false.
9	Complete a ratio table.
10	Given three vertices, determine a fourth vertex that would form a rectangle, and plot all vertices on a graph.
11	Complete a ratio table, write an equation that illustrates the relationship from the ratio table, and make a bar graph that represents the data.
12	Determine the rate of an object when given the amount and the price.
13	Determine the range, median, and maximum number of the data from a box plot.
14	Solve problems of absolute value.
15	Determine the squared or cubed value of a single-digit whole number.
16	Determine the surface area of a cube or pyramid.
17	Solve a problem that has a constant.
18	Determine the greatest common factor of two double-digit numbers.
19	Write an equation based on given problem information.
20	Write an inequality based on given problem information.

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