wireless generation®




mCLASS® Math | Diagnostic Interviews Guide

Download the latest mCLASS:Math materials at
www.mclasshome.com under the Support & Resource Center.

v 1.3

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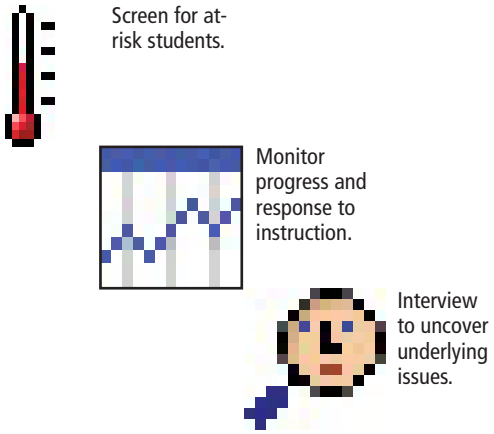
Introduction

The mCLASS®:Math program, available in both English and Spanish, is an integrated screening, progress monitoring, and diagnostic assessment system that aids in evaluating children in kindergarten through third grade to determine their understanding and application of mathematical skills and concepts.

This comprehensive assessment helps educators to identify students who may be at risk for math difficulty (Screening), to monitor student progress and response to instruction (Progress Monitoring), and to conduct investigative interviews to understand the cognitive processes underlying performance (Diagnostic Interviews). The full picture created with this depth of insight can help an assessor to identify and rectify a child's pattern of mathematical development and to teach in a way that can positively affect that development before it is too late.



The four elements of the mCLASS:Math assessment, Screening, Progress Monitoring, Diagnostic Interviews, and Activities, are being developed in stages. Guides will be updated as new features are completed. Check the Support & Resource Center at www.mclasshome.com often to download the latest user guides and other supporting materials.

The mCLASS:Math software guides assessors to

- Measure an individual child's mastery of fundamental mathematical skills
- Acquire insight into a child's mathematical thinking
- Help children overcome mathematics learning difficulties
- Think more creatively about mathematics teaching and learning
- Track critical mathematics skill development
- Conduct meaningful mathematics instruction

The mCLASS:Math assessment is used to develop reports engaged by teachers, coaches, and administrators to

- Review classroom and student data useful for gauging success in mathematics learning
- Provide assessors with time-sensitive professional development involving early mathematics learning and interviewing techniques

The mCLASS:Math System

Employing the innovative handheld-to-Web technology used for mCLASS literacy assessments, the mCLASS:Math software has been designed to make mathematics assessment more effective, helping assessors analyze data to shape instruction. Preliminary studies of mCLASS literacy assessments show that the software saves assessors time, guides assessors through complex diagnostic tools, and closes the loop between assessment and instruction.

The mCLASS:Math system has five components, all aimed at fostering successful mathematics skill development.

1. Software: Includes all tasks, instructions, and practice questions for each grade level, as well as results calculations.
2. Kit: Contains the Diagnostic Interviews Guide and Workbook, the Screening and Progress Monitoring Guide and Workbook, and an Activities Guide.
3. Synchronization: Transfers the assessment information from the handheld to the database maintained at https://www.mclasshome.com.
4. Reports: Provides Web-based class and student reports to aid in defining instructional changes.
5. Activities: Recommends exercises that are strategically connected to each child's results.

Screening and Progress Monitoring

The Screening and Progress Monitoring components work together to identify potentially at-risk students and to aid in assessing response to instruction for those students. The Screening assessment is administered during benchmark windows at the beginning, middle, and end of the school year. Progress Monitoring should happen throughout the year (at least one measure for each student every 14 days); however, frequency of administration should be higher for students with greater intervention needs.

- Screening and Progress Monitoring are designed to assess three broad categories of mathematical thinking: Quick Retrieval, Number Sense, and Written Computation
- Each measure correlates to scientifically valid standardized measures
- The six measures of Screening and Progress Monitoring are Counting, Missing Number, Next Number, Number Identification, Number Facts, and Quantity Discrimination

Screening and Progress Monitoring focus on everyday performance in the classroom.

The Screening assessment provides an apt way to identify children who may be at risk for math difficulty and who would benefit from progress monitoring and diagnostic interviewing. Six brief but effective research-based measures are administered to students individually to identify those who are struggling and to aid in grouping students for instruction.

The Progress Monitoring assessment provides a way to detect whether at-risk children are progressing at a rate that will get them back to grade level. Since this assessment is ongoing, it paints a picture of the child's mathematics skills development and, equally as important, provides support for adapting instruction toward greater achievement in this subject area.

Diagnostic Interviews

Students are assessed through a series of interviews, exercises, and stimulating conversations that measure development of mathematical concepts and fosters a child's ability to articulate knowledge of his or her own mathematical thinking. The mCLASS:Math system analyzes a child's answers and problem-solving strategies, providing assessors with recommendations for instructional activities that will help the child master the skills and concepts addressed.

The interviews are administered in a consistent manner, which is the preferred method for obtaining fair and reliable measures of child performance. The mCLASS:Math software guides the administration of standardized mathematics items appropriate to the child's grade level.

The mCLASS:Math Diagnostic Interviews is the inspiration for developing methods that guide the assessor and child to revealing underlying thinking.

- Interviews are designed to assess counting, addition, subtraction, multiplication, and written math skills.
- Each interview has multiple modules that correspond to specific mathematics principles.
- Instructional recommendations are based on each child's performance and employment of particular strategies.
- Activities are suggested for the entire class and individual children.

ACT

The ACT tab provides a list of activities customized to a child's needs. Research-based activities are suggested in the web reports at www.mclasshome.com, the handheld, and are printed in the Activities Guide available with each kit.

Research Base

The mCLASS:Math system is based on modern developmental, educational, and cognitive science research that provides an exciting new view of how children develop mathematical knowledge. The research base underlying the assessment highlights several essential features of children's mathematics learning.

- Children develop everyday mathematical knowledge outside school and use it to assimilate what is taught in school.
- Both basic skills and conceptual understanding are essential for mathematics proficiency.
- Children use a variety of strategies to solve mathematical problems.
- Limitations in memory contribute to children's mathematics difficulties.
- Children with mathematical learning difficulties often possess important intellectual strengths, such as informal strategies useful for counting.

The mCLASS:Math system provides assessors who strive to ingrain these research findings and ideas into their thinking with a new set of tools to interpret a child's answers and behavior and to develop an effective approach to instruction.

It is crucial for assessors to follow not only what their children understand, but also how they understand. Administrators should be guided by a research- and theory-based view of mathematical proficiency. Evaluations ought to measure how effectively programs promote both basic skills and deeper understanding. The development of the mCLASS:Math system brings the research findings and theories to bear on the thinking and practice of both assessors and administrators.

Background

The mCLASS:Math assessment draws upon three major schools of thought.

1. The extensive cognitive science literature of "Mathematical Thinking and Learning" (Ginsburg, Cannon, Eisenband, & Pappas, 2006) and "The Development of Children's Mathematical Thinking" (Ginsburg, Klein, & Starkey, 1998) and other supporting publications shaped the development of the mCLASS:Math program to
    - Embed key cognitive concepts
    - Include a focus on number sense, shown to be important in predicting academic achievement
    - Consider the memory limitations that seem to be an important contributor to mathematics learning problems
    - Account for strategies and back-up strategies that underlie children's arithmetic, as well as on concepts that comprise understanding of the basic operations

2. The methodology of Curriculum-Based Measures (CBM), which is the two-part screening and progress monitoring system, is a simple method of repeated measurement to advance long-range instructional goals. The mCLASS:Math assessment employs many of the tenets of CBM.
    - Administer short assessments on a frequent basis
    - Graph scores to evaluate a child's progress toward specific goals
    - Use data to make decisions about the effectiveness of instruction and to identify students who might be struggling, or who are at risk
    - Monitor progress by administering alternate forms of the measures to evaluate whether students are on track or need additional intervention to meet identified goals

3. The tradition of clinical interview, originally developed by Jean Piaget and used extensively since that time in cognitive developmental research and education, defines the kind of flexible questioning that is especially valuable for formative assessment in the classroom. The mCLASS:Math assessment uses this approach to
    - Help educators uncover underlying thinking in a way that standard tests or CBM measures cannot
    - Guide the teacher through complex questioning

Categories of Mathematical Thinking

The mCLASS:Math Screening and Progress Monitoring assessments combine three categories of mathematical thinking (Quick Retrieval, Number Sense, and Written Computation) to cover what is essential about early mathematics: their abilities to retrieve information quickly, to compute, and to comprehend the meaning of the material.

Quick Retrieval

There is widespread agreement that quick retrieval of the basic number facts, or combinations, is both important for learning mathematics and useful for a CBM task. The research shows that knowledge of number combinations predicts achievement and that children who experience difficulty with math often do poorly on number combinations. In its essence, quick retrieval means that children get the answer quickly and do not have to expend much mental energy on calculation. Quick retrieval may result from rote memory or from fluency using rapid counting or basic principles such as commutativity of addition. Currently, the mCLASS:Math assessment assesses quick retrieval through the Number Facts measure.

Number Sense

A series of items gauge a child's general ability to draw conclusions from working with numbers. Number sense involves basic "intuitions" and ideas about numbers, including concepts that make computation easier or eliminate the need for it altogether. 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. It also includes the ability to know whether certain numbers are plausible answers to certain problems; to break numbers into convenient parts that make calculation easier; or to apply basic operational rules to arithmetical equations. The mCLASS:Math assessment uses multiple indicators to evaluate number sense.

- In kindergarten, examine a child's ability to count out loud (Counting), to discern between the quantities of two sets of numbers (Quantity Discrimination), and to identify the missing number from a pattern of three numbers (Missing Number).
- In first grade, continue to administer the Quantity Discrimination and Missing Number measures, but also examine a child's ability to name the number that follows a verbally presented number (Next Number).

Written Computation

This straight-forward category involves basic reading and understanding of written mathematics, eventually leading to calculation problems. Previous research has found high alternate form reliability, test-retest reliability, and criterion validity for this kind of measure.

- In kindergarten and first grade, examine a child's ability to identify individual numbers within a set of random numbers, 1–100, with the Number Identification measure. The mCLASS:Math assessment offers early indicators of written abilities even before children begin solving written computation problems.

Results of Pilot Data Collection

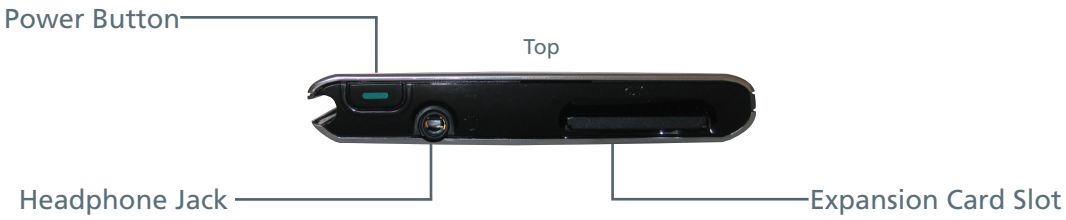
To establish the validity of the mCLASS:Math Screening and Progress Monitoring measures, pilot data was collected from 135 kindergarten and first grade students using a paper version of the measures. Assessors followed written instructions in administering the materials, which are now provided on the handheld. The mCLASS:Math research team administered the Counting, Missing Number, Number Identification, and Quantity Discrimination measures to kindergartners and Number Identification, Number Facts, Quantity Discrimination, Next Number, and Missing Number measures to first graders. Every student was also given a standardized math assessment, the Test of Early Mathematics Ability (TEMA). Using the pilot data, mCLASS:Math researchers fit several preliminary structural equation models to evaluate the strength of the relationships between Early Numeracy Proficiency, measured by each of the domains of the Screening and Progress Monitoring, and the TEMA scores, as well as the interrelationships among the mCLASS:Math measures. Initial analyses showed strong correlations between the mCLASS:Math measures and the TEMA, indicating that the measures are valid indicators of early mathematics performance. A forthcoming white paper will describe full technical results of the pilot study, and ongoing research will seek to further establish the reliability and validity of the mCLASS:Math Screening and Progress Monitoring assessments.

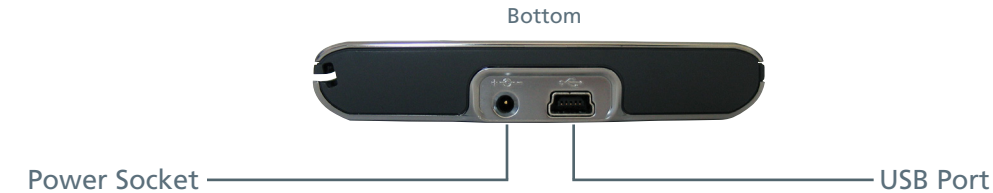
The Handheld Computer

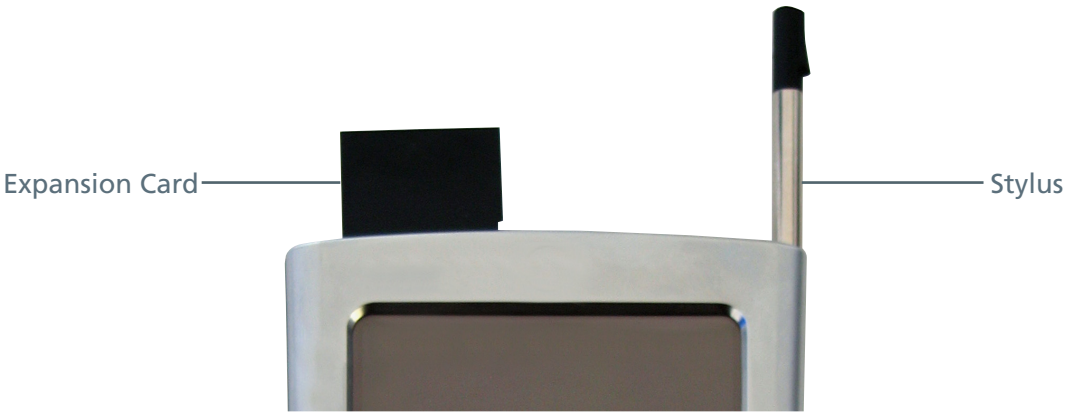
The handheld computer, or handheld, provides the mobility and function needed to utilize Wireless Generation's mCLASS® software solutions. To begin assessing students, you must first become familiar with a handheld.

Some features outlined here may differ depending on the model you are using. Explore your handheld's specific functions by taking a "Quick Tour." Tap the **Quick Tour** icon on the handheld's Main menu.

Key Features







Application Buttons

5-Way Navigator: select and scroll

Note Pad: jot notes about students

Tasks: organize to-do list

Contacts: maintain an address book

Calendar: manage schedule, set reminders

Input Area

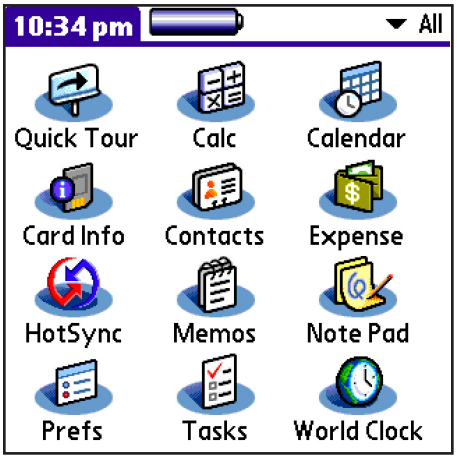
Home: access any of your applications

Star: begin sync process or view categories

Find: search feature

Writing area: write using point-sensitive strokes

Menu: open drop-down menus

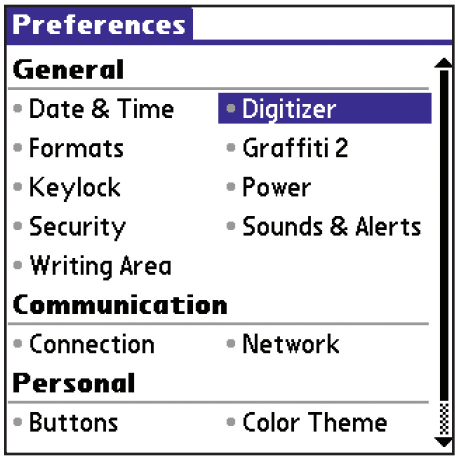


Preferences

Main Menu

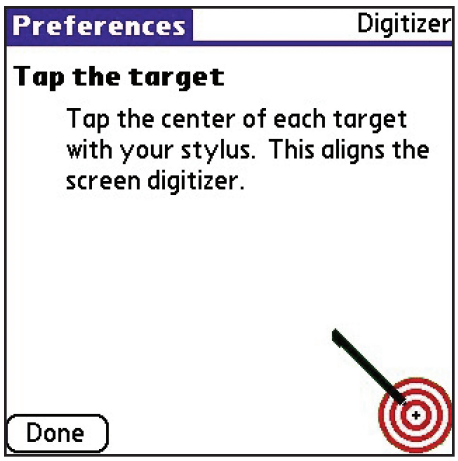
The Main menu provides access to all handheld functions.

1. Make sure that All appears on the pick list in the upper right of the Main menu by tapping the arrow and selecting that category.
2. Tap the **Prefs** icon.



Preferences Menu

Define your system preferences in this menu, including sound, date and time, writing area, and power management.

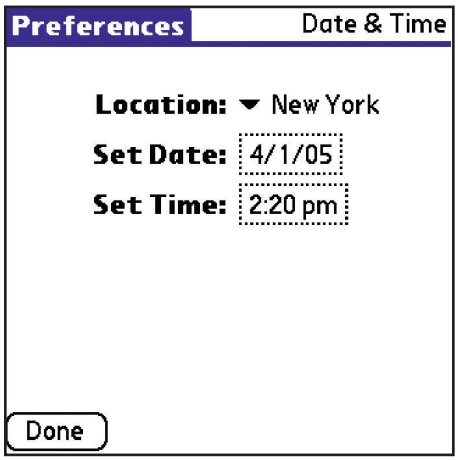


Digitizer/Touchscreen

The Digitizer and Touchscreen applications calibrate the handheld to the touch, aligning the position of the stylus to the screen's electronic touch sensors.

1. Select **Digitizer** or **Touchscreen** from the Preferences menu.
2. Hold the stylus as you would a pen.
3. Tap the center of each target on the screen until calibrated.

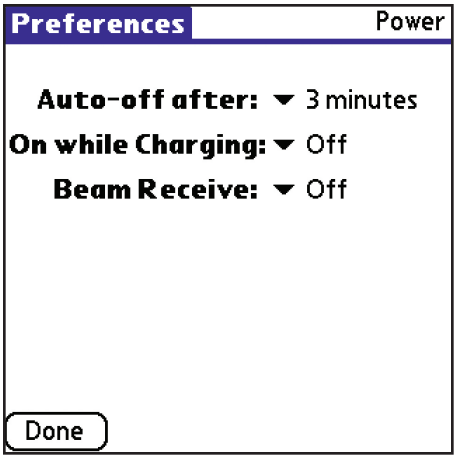
Repeat this process when the handheld doesn't respond properly to light tapping.



Date and Time

Student's assessments are time stamped for reporting purposes. Setting the correct date and time is critical for synchronization and collection of accurate data.

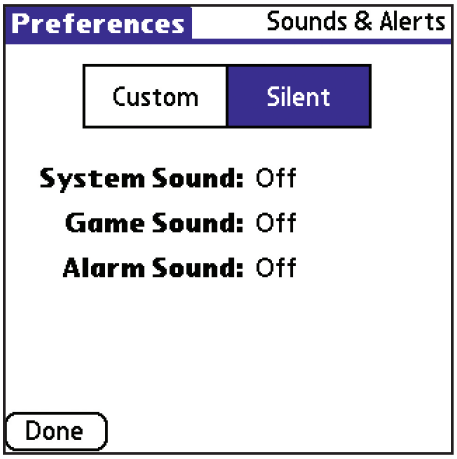
1. Tap the **Location** arrow to select your city.
2. Tap the dotted **Set Date** and **Set Time** boxes to open dialogs that guide the rest of the process.
3. Tap **Done** when finished.



Power Management

In order to conserve battery life, the handheld automatically turns off after a certain length of idle time. During assessment periods, set the handheld to turn off after 3 minutes.

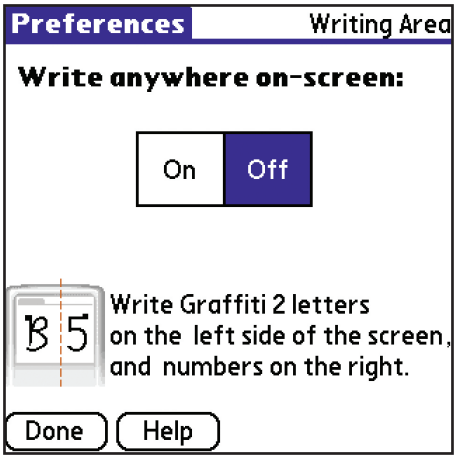
1. Tap the arrow to set **Auto-off** to 3 minutes.
2. Set **On while Charging** to Off.
3. Set **Beam Receive** to On.
4. Tap **Done** when finished.



Sounds and Alerts

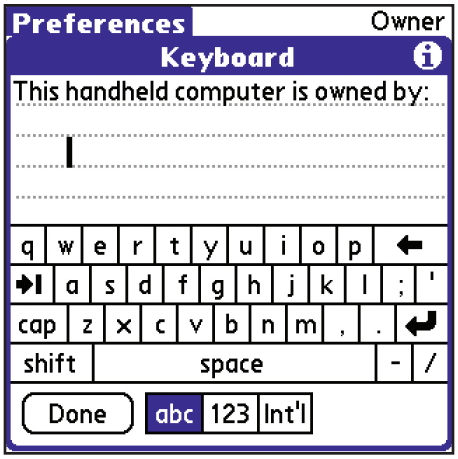
Control the level of the different types of sounds on the handheld. System sounds are sounds the handheld makes when performing system functions, such as syncing.

1. Select **Silent** to prevent sounds from interrupting an assessment.
2. Tap **Done** when finished.



Writing Area

When working with mCLASS applications it is important to have the writing area constricted by putting it in the Off mode. Writing will then be available within the input area only. Write letters on the left side of the text input area and numbers on the right side. Capital letters are made by writing between the letter and number areas.



Entering Text

Practice entering text by setting the owner of your handheld. This name may be changed, but changing the name here will not change the desktop application's user name.

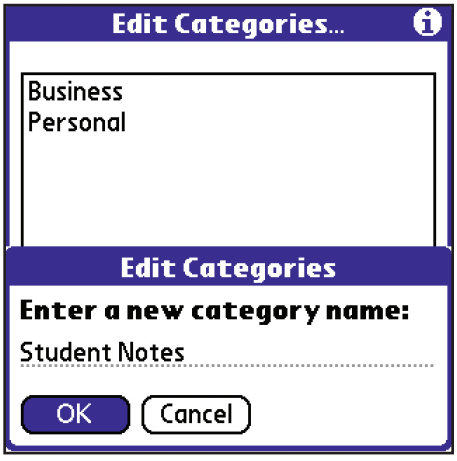
1. Once the blinking cursor appears, write directly in the input area.
2. You may also tap **ABC** within the input area to open the onscreen keyboard and type.
3. Tap **Done** when finished.

Other Features

Note Pad

The Note Pad is another useful feature both for personal and classroom purposes. Many teachers use it to record student observations throughout the school day.

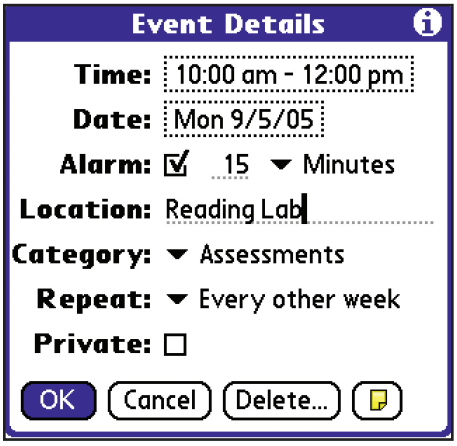
1. Tap **Note Pad** on the Main menu or press the application hard button.
2. Begin writing directly on the screen to create a new note or tap **New**.
3. Place the note in a category by choosing from the pick list in the upper right.



Categories

Categories function like a filing system for information stored on the handheld.

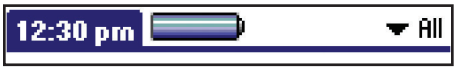
1. From the Main menu, and almost any application, choose **Edit Categories** on the Category pick list.
2. Tap **New** to create a category (e.g., Student Notes to organize observations recorded using Note Pad).
3. Tap **OK** when finished.
4. Check the application's pick list to verify that the new category appears.



Calendar

Use the calendar to plan activities ahead of time. During assessment periods it may be useful to block time for students and set alarms to help stay on schedule.

1. Tap the **Calendar** icon or press the application button.
2. Tap an empty line to plan a new event, then tap **Details**.
3. Assign values to date, time, category, and recurrence as needed.



Full power

Half power

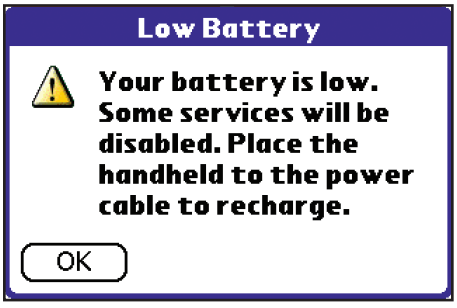
Battery charging

Battery

Power Gauge

If the battery drains, all information entered after your last sync may be lost. Frequent charging is the only way to avoid information loss unless you have a handheld with persistent memory. See your handheld's manual for more information.

- As the battery discharges, the gauge loses its color.
- When the handheld is plugged in with the power cord, a lightning bolt indicates that the battery is charging.
- Recharge the handheld or replace removable batteries as soon as the low battery warning appears.



Information Loss

If the battery has run down and assessments have been lost, recharge and sync three times. Only data synced *prior* to battery loss can be recovered.

1. Sync at an mCLASS Sync Station to restore data from the backup folder.
2. Tap **WGSync**, then enter your user name and password.
3. Sync once to install updates and again to update class data.
4. Verify that all applications and assessment data have been recovered.
5. Confirm that the date is correct.

Reset

If the handheld locks up, try resetting. Depending on the severity of the problem, different types of resets may be performed. Never use a sharp object (some styli have a reset pin under the tip).

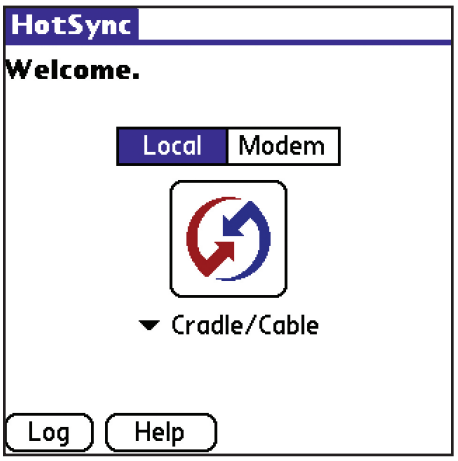
1. Soft reset: Press the **Reset** button on the back panel until the logo screen appears.
2. Warm reset: Hold the **Up** button on the five-way navigator and press the **Reset** button until the logo screen appears.
3. Hard reset: *This will delete all unsynchronized records*. Repeat step 1 while holding down the **Power** button.

Synchronization

The Process

Synchronization is the operation by which the handheld and computer exchange information. You can never sync too often, and you should sync at least once a day.

The computer must be connected to the Internet when syncing with the mCLASS server. This syncs assessment results, downloads updates, and automatically creates reports.



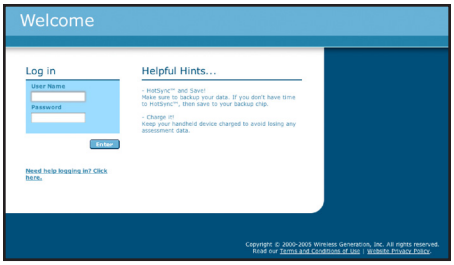
Syncing

1. Plug the sync cable into both the handheld and the computer's USB port. For some models, you will place the handheld on a cradle.
2. Tap the **Sync** button on the Main menu then on the Sync screen.
3. Log in to https://www.mclasshome.com to ensure that the current date appears beneath Sync Status on the right side of the screen.

WGSync

WGSync is the application that tells your handheld to exchange assessment information with Wireless Generation's servers.

1. Tap **WGSync** on the Main menu.
2. Verify user name and password or enter that information for the first time by tapping the boxes.
3. Tap **OK**.
4. Tap the **Home** soft button on the handheld to return to the Main menu.



Secure Web Site

Only data involving mCLASS products are synced to the secure mCLASS Home Web site. After checking the Sync Status, you may check assessment results, see "What's New" at Wireless Generation, update settings, and consult the Support & Resource Center.

The Support & Resource Center contains up-to-date user guides and helpful troubleshooting information.

Sync Troubleshooting

Handheld Not Syncing

If you are using an mCLASS Sync Station but nothing happens when you sync:

1. Verify that the sync cable is plugged into both the handheld and the computer.
2. Verify that the sync icon apears on the desktop's toolbar. If not, go to the Start menu, open Program Files, then your handheld software and select your sync manager.
3. If you still cannot sync, reboot the computer and repeat the first two steps.
4. If this issue is not resolved, contact Wireless Generation's Customer Care department by email at help@wgen.net or call (800) 823-1969, option 3, Monday-Friday 7 a.m. – 7 p.m. EST.

Assessment Results Not Synced

If your assessment results have not synced, confirm that:

1. The Sync Station computer has a live connection to the Internet
2. The mCLASS:Sync software has been installed on the computer.
3. The WGSync icon appears on the Main menu.
4. Your user name and password are entered, and that is the same user name and password you use to log in to https://www.mclasshome.com.
5. The conduit is on the list of items and set to synchronize. To check this, click the **Sync icon, then click the Custom tab.**

Classes Not Appearing on the Handheld

If your classes do not appear on the handheld after syncing, confirm the following:

1. You've synced twice after installing WGSync at an mCLASS Sync Station.
2. The user name and password on the handheld are the same as those used to log in to https://www.mclasshome.com.
3. A Class list has been created on mCLASS Home.
4. You are the teacher assigned to the class. To check this, go to the Class section of the Web site and verify that you are designated as an Owner of this class.

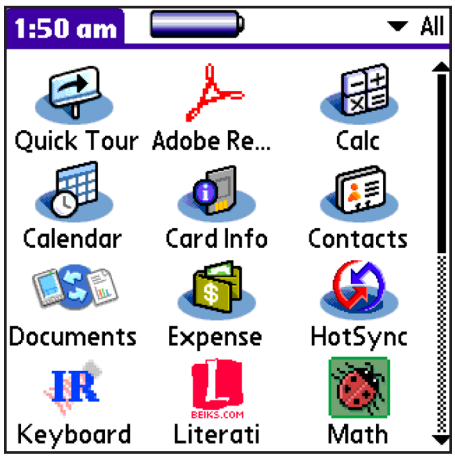
ACT (Activities)

After you have administered a Diagnostic Interview, the ACT tab provides a list of activities customized to the child's needs. The full details of each of these research-based classroom activities, including any necessary blackline masters, are printed in the Activities Guide available with the mCLASS:Math kit.

To join our community of teachers who contribute activities to this product, please email mathact@wgen.net.

Starting a New Activity

1. Turn on the handheld and select **All** from the list in the upper right of the Main menu.
2. Tap the **mCLASS:Math** icon.

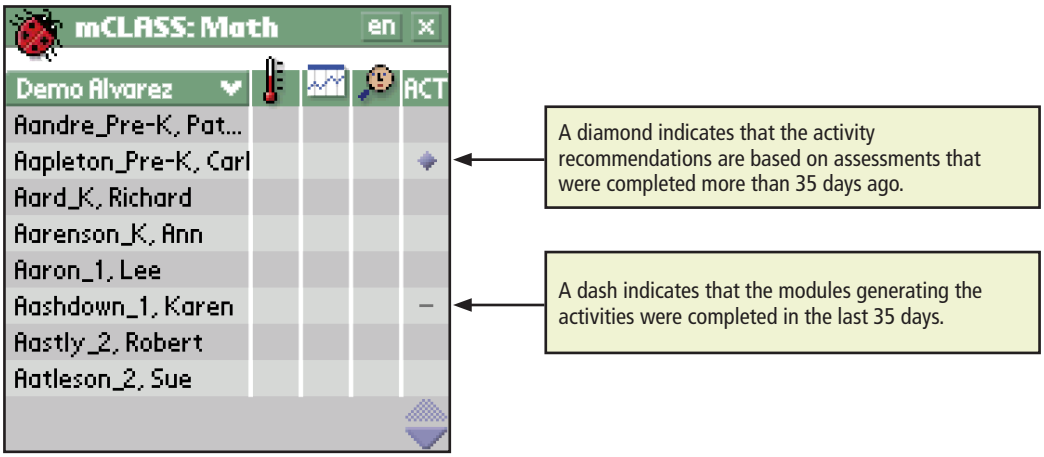


3. The mCLASS:Math Home screen appears. Select **Tap Here to Begin**.

Class List

This screen displays each class to which you have access.

- Activities will be recommended whether the Diagnostic Interviews were administered in Spanish or English.
- If you have more than one class, tap the **Class** list in the upper left to choose among them.
- Use the symbols to see if there are recommended activities for a child.



- To access the names of recommended activities, tap a child's name or the symbol corresponding to a recommendation in the ACT column.

Student Menu

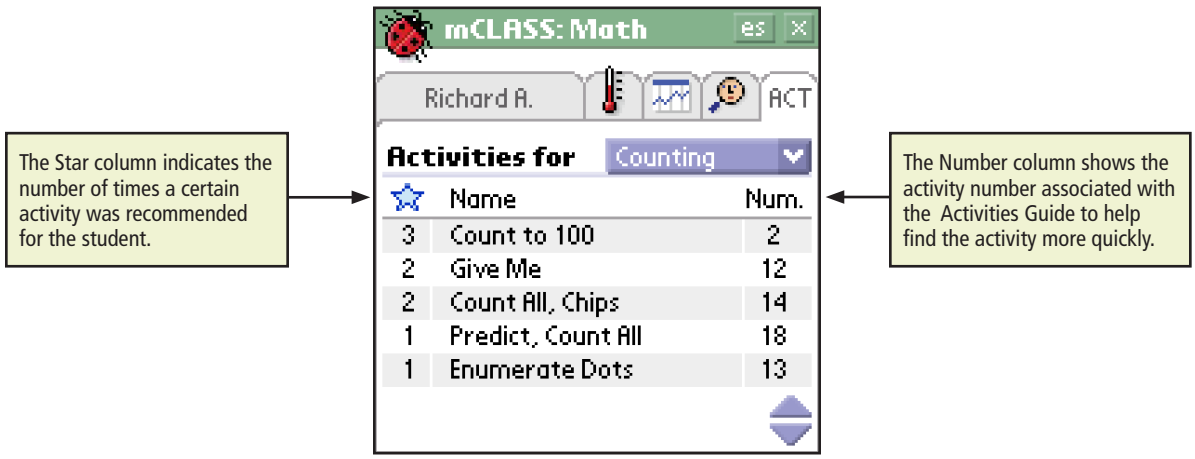
Select a child to open his or her Student Menu. This menu provides access to many different parts of the mCLASS:Math assessment, including the Global Home (represented by the child's name), Screening administration (thermometer), Progress Monitoring features (chart), Diagnostic Interviews (magnifying glass), and Activities (ACT).

ACT

The ACT (Activities) feature provides targeted activity recommendations based on particular student needs. As you administer Diagnostic Interviews, the mCLASS:Math system maps the assessment data to specific instructional activities.

Activity recommendations are generated when you complete a module (e.g., Small Numbers) within an Interview. Even paused Interviews supply recommendations.

1. Tap the ACT tab on the Student Menu or the **ACT** button on either the Results or Analysis screen.
2. Choose an interview type from the Activities list. You can find activities within a specific area (e.g., Counting), or find the overall most recommended activities by selecting **All Interviews**.
3. Activities that are highly recommended, or have the most stars, appear closer to the top of the list. These stars also appear on the Web in the Activities section.



4. Decide which activity you would like to do with the child and open the Activities Guide to that name and/or number.

Administration by Grade

Each grade may have a different set of modules for an interview. Some interviews may not be applicable because, at that grade level, the child either should have mastered the skill or is not ready to begin assessment of the skill.

Interview	Modules			
	Kindergarten	First Grade	Second Grade	Third Grade
Counting	Forward by Ones Backward by Ones How Many	Forward by Ones Backward by Ones Forward by Tens How Many		
Addition	Small Numbers Zero Principle	Small Numbers Zero Principle Order Principle Mental Calculation	Small Numbers Zero Principle Order Principle Mental Calculation	Small Numbers Zero Principle Order Principle Mental Calculation
Subtraction	Small Numbers Same Number Zero Principle	Small Numbers Same Number Zero Principle Inverse Principle Mental Calculation	Small Numbers Same Number Zero Principle Inverse Principle Mental Calculation	Small Numbers Same Number Zero Principle Inverse Principle Mental Calculation
Multiplication			Small Numbers Zero Principle Identity Principle Order Principle Mental Calculation	Small Numbers Zero Principle Identity Principle Order Principle Mental Calculation
Written		Writing Numbers Setup Problem Place Value	Writing Numbers Setup Problem Place Value Computation + Computation -	Writing Numbers Setup Problem Place Value Computation + Computation - Computation x

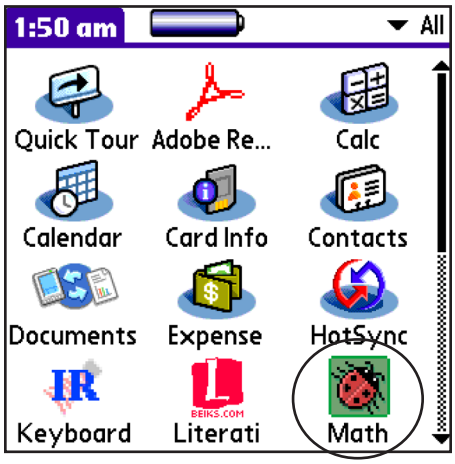
Interview Schedule

There is no set schedule for administering the mCLASS:Math interviews; however, children may feel more comfortable after developing a rapport with the assessor. You can administer interviews in any order, but the system will recommend that an interview be administered approximately every 35 days.

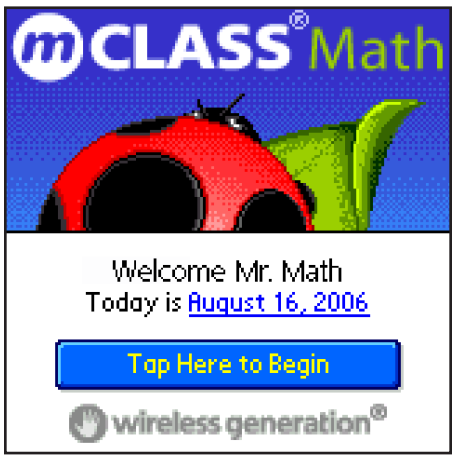
There are alternate forms of content for each interview, so assessors can administer interviews a number of times during the academic year, using different content.

Starting a New Interview

1. Turn on the handheld and select **All** from the list in the upper right of the Main menu.
2. Tap the **mCLASS:Math** icon.



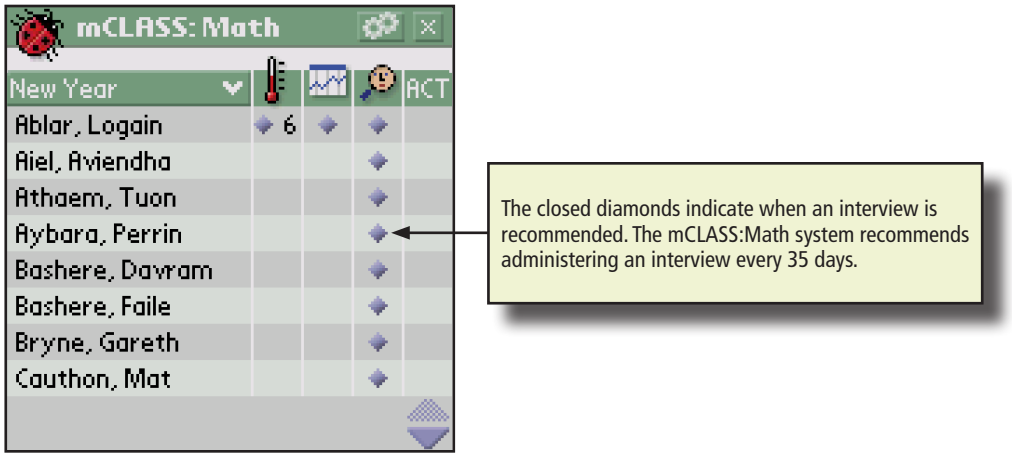
3. The mCLASS:Math Home screen appears. Select **Tap Here to Begin**



Class List

This screen displays each class to which you have access.

- If you have more than one class, tap the **Class** list in the upper left to choose among them.
- Use the symbols to guide your choice of which child to interview.

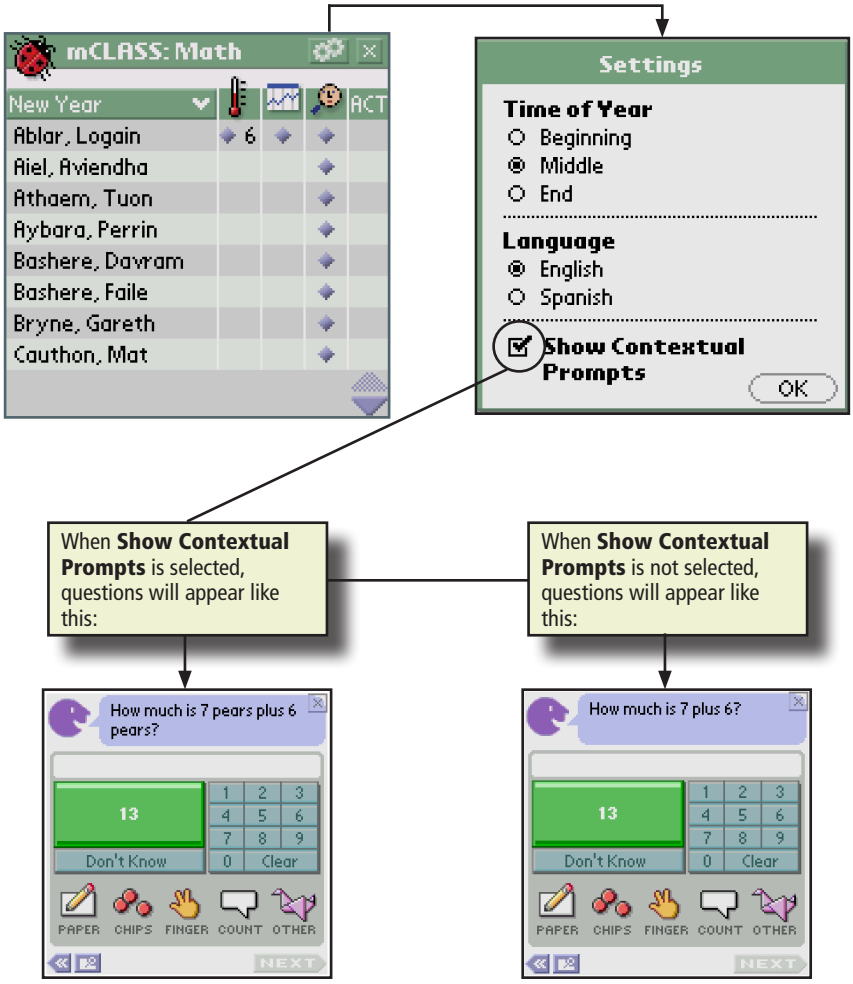


- To assess, tap a child's name or the diamond corresponding to a recommendation in the Diagnostic Interviews column.
  - Note: An open diamond indicates that an interview has been started, but not completed with the student in the last 35 days.
  - A dash in place of an open or closed diamond indicates that at least one interview has been administered to the student

Settings

On the class page, tap the gear icon to choose the appropriate Time of Tear, Language, and Contextual Prompts settings.

- Under **Time of Year**, tap either **Beginning**, **Middle**, or **End**, based on when the interview is being administered. **Time of Year** applies only to Screening and Progress Monitoring measures; the setting defaults to the current date displayed on the handheld, and therefore will rarely need to be changed manually.
- Choose one of two languages by tapping **English** or **Spanish**. Only words spoken to or by the child appear in Spanish; all navigational elements and instructions to the assessor remain in English.
- Selecting **Show Contextual Prompts** will alter the way Diagnostic Interview questions are presented to the student by providing specific examples. As you can see, below, "How much is 7 plus 6?" becomes "How much is 7 pears plus 6 pears?" (specific contextual language examples will vary).



Student Menu

Select a child to open his or her Student Menu. This menu provides access to many different parts of the mCLASS:Math assessment, including the Global Home (represented by the child's name), Screening administration (thermometer), Progress Monitoring features (chart), Diagnostic Interviews (magnifying glass), and Activities (ACT).

Diagnostic Interviews

The Select Interview list displays only those interviews that can be administered to the chosen child. The History section shows each interview the child completed, when it was completed, and its associated profile.

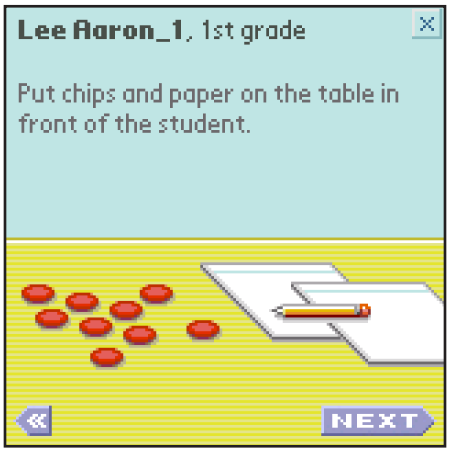
1. Choose an interview type from the Select Interview list.
2. Tap **Start** to begin the interview.

Common Features

Each interview has a number of screens that guide you through administration and others to help you capture more detailed information.

Setup Screen

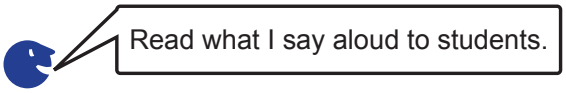
This screen appears before beginning administration of a new or a resumed interview. It guides you through placement of the materials in preparation for the interview.



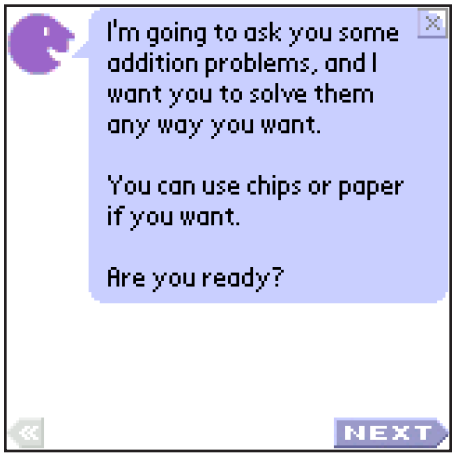
Tap **Next** to proceed to the Instructions screen.

Instructions Screen

A series of scripted instructions guide you through administration of the assessment. These Instructions screens may contain interactive practice questions and/or specific prompts to be read to the child, as shown by the Mr. Say icon. If you have chosen to administer in Spanish, the prompts appear in Spanish.



When you are certain that both you and the child understand the instructions, tap **Start** to assess.



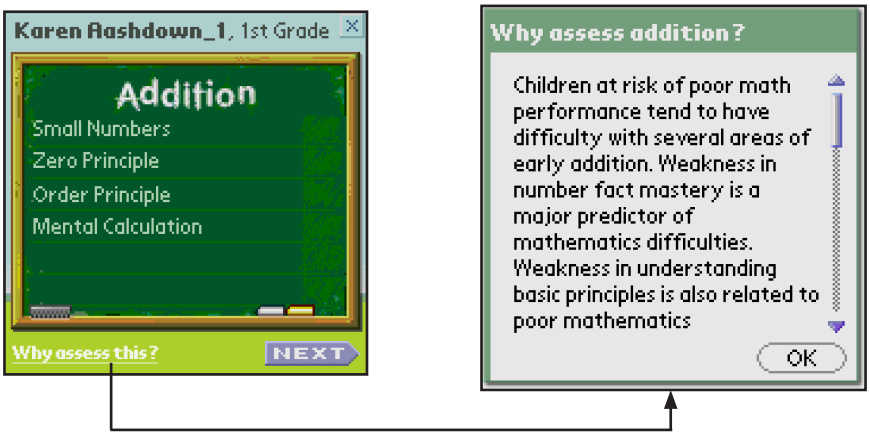
Interview Progress Screen

When starting or resuming an interview from the Student Menu, the Interview Progress screen provides information about the completion status of modules within the selected interview.

Strategies

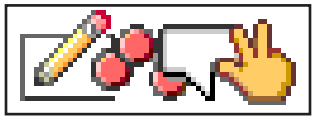
Most interviews in mCLASS:Math involve recording strategies and principles that children apply when solving problems. The system shows which strategies and details are applicable for each interview. To refer to the icons and definitions of each strategy, principle, or detail according to interview type, see the Icon Glossary at the back of this guide.

1. Before beginning the interview, you can tap **Why Assess This?** to see detailed reasons for performing each assessment.



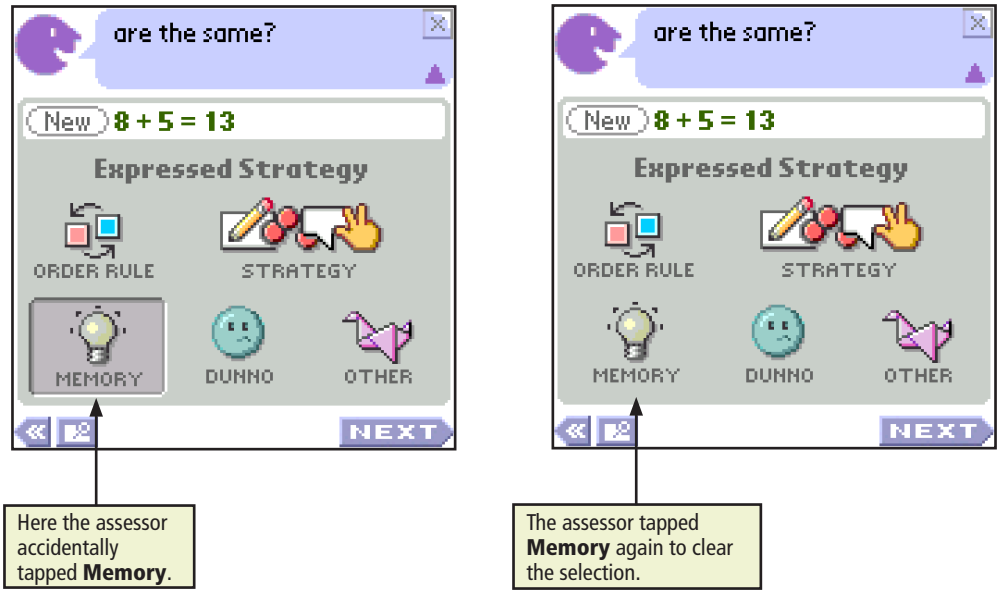
As you interview each child, it is important to record the strategies that you observe the child employing. Recording strategies will become more important the more proficient you become in using the mCLASS:Math system. In the beginning, don't spend too much time figuring out in what detailed way a child used a strategy. For instance, if a child counts down using his or her fingers, recording that the child used fingers at all is the most crucial information to capture.

The mCLASS:Math system is designed to help better understand what children are thinking, so the program leads you to opening a dialogue. So, more importantly, you will also record the strategies the child tells you that he or she used. Sometimes you may even ask the child hypothetical strategy questions about other ways in which he or she could have solved the problem.



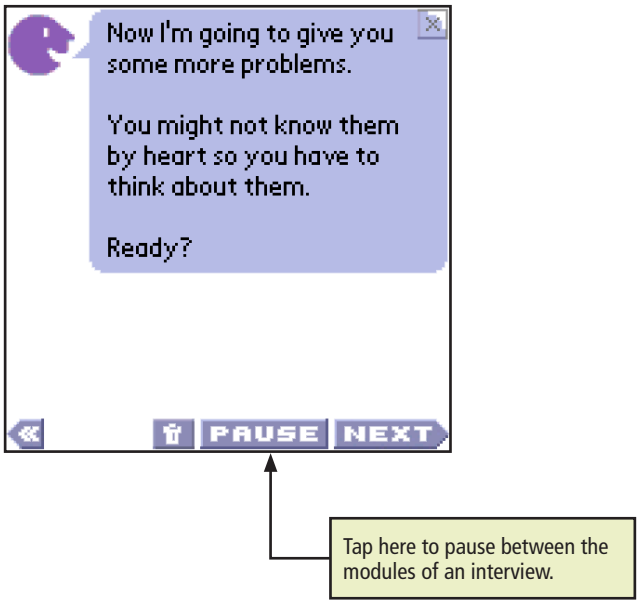
Some strategies can be broken down, or described in more detail. In such a case, a Details box pops up. Details are used to narrow the scope of the strategy when, for example, a child uses paper as part of his or her strategy for solving a problem. The details clarify how exactly paper was used: Did the child draw pictures or icons or write out the problem?

If you accidentally tap a strategy the child didn't use, tap it again to undo the record.



Pausing

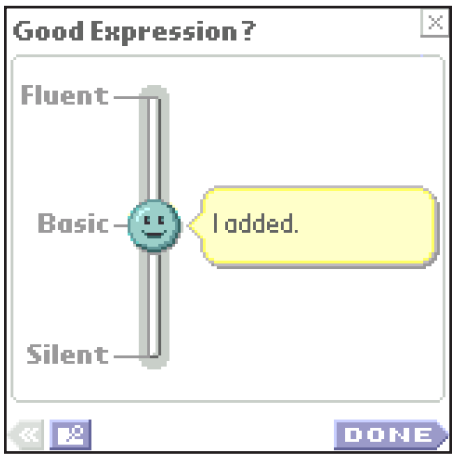
An interview can only be paused between modules. A **Pause** button appears when an interview module is complete. You may choose to pause for any number of reasons.



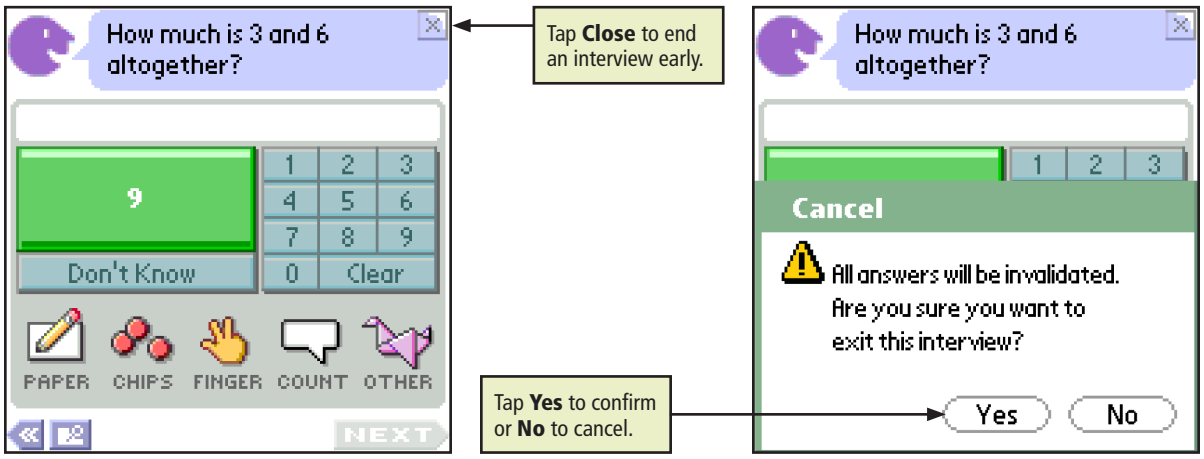
The assessor who paused the interview is the only person who can complete the interview for the child. A different assessor may, however, begin an entirely new session of the same interview type. Either way, only the most recent, completed interview will be considered the official result.

Ending

A **Done** button appears when the child has completed all required modules in an interview.



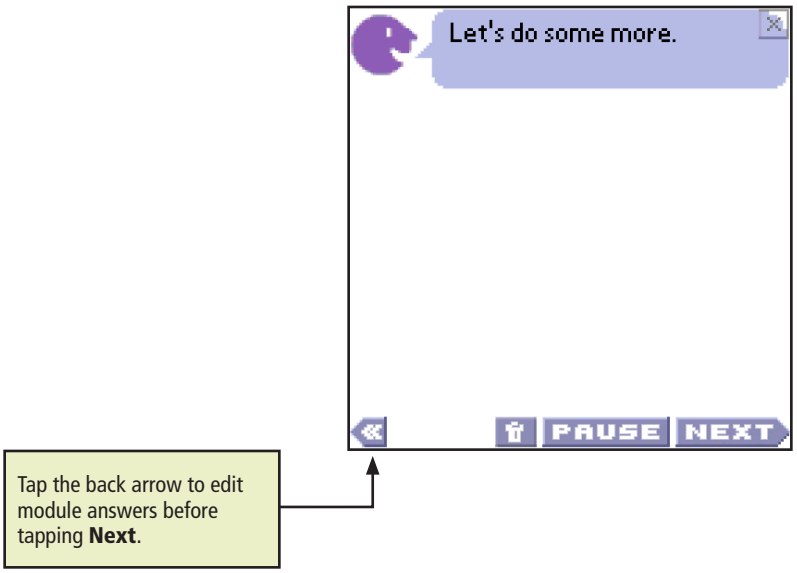
If you choose to exit an incomplete interview, any answers for unfinished modules will be discarded.



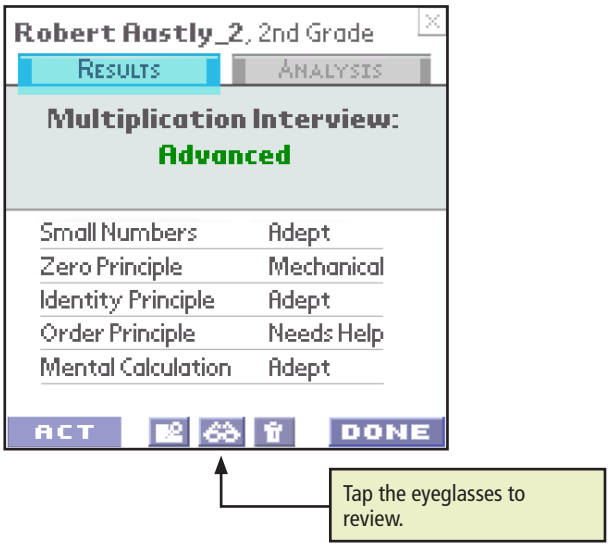
If you do not wish to end an interview before it is completed, tap **No** on the Cancel confirmation box.

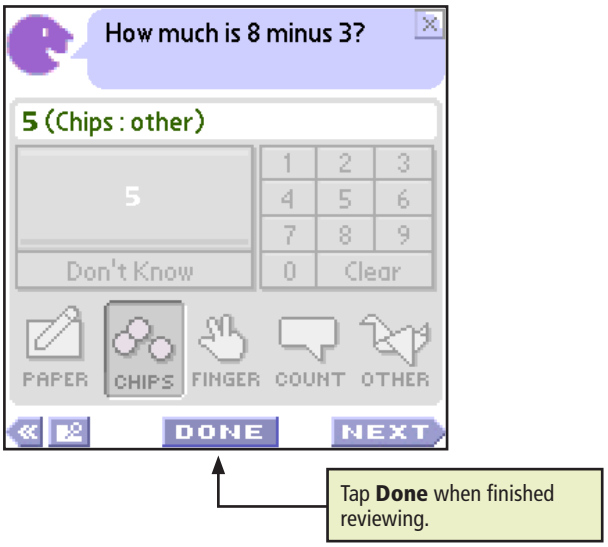
Editing

You may edit a module only *before* proceeding to the next module and only if that edit will not alter the flow of the interview's administration.



You can never edit an interview. You can, however, examine the answers and strategies by tapping **Review**, represented by the eyeglasses.

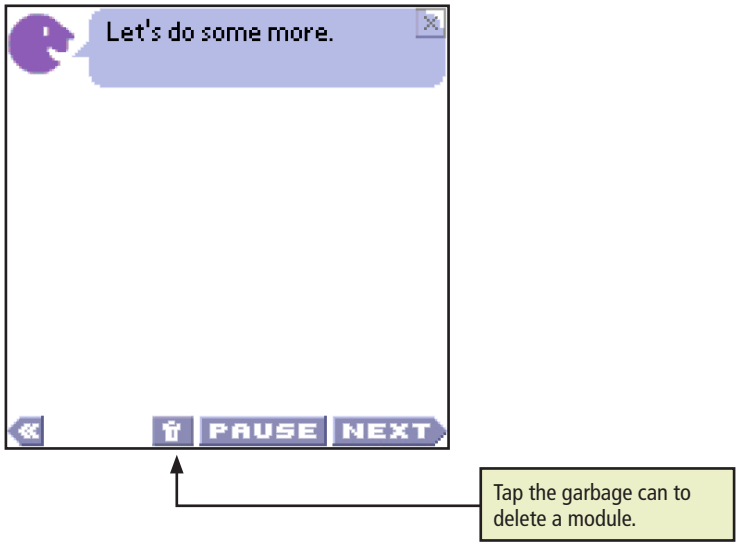




To maintain the completeness of the branching rules, you may find that you cannot edit some parts of the Counting interview.

Deleting

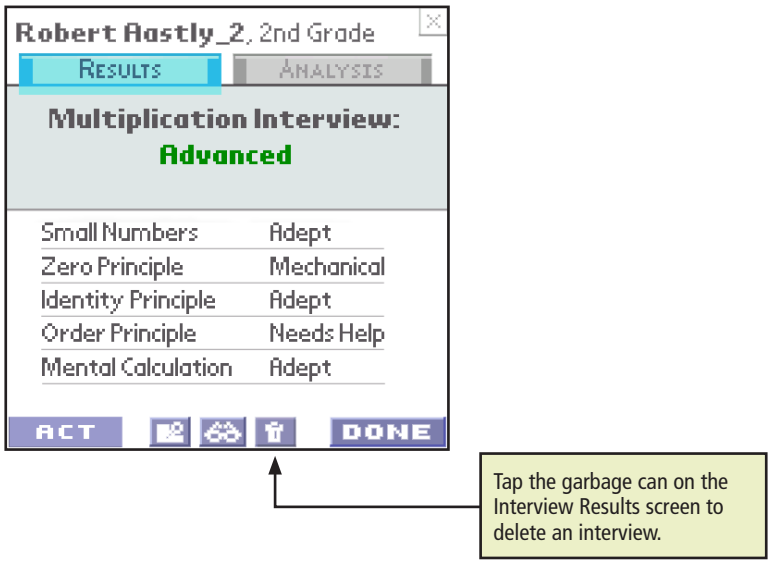
Once you have completed a module, on the same screen from which you can pause, you may delete the last module. Tap **Delete**, represented by a trash can, to do so.



Once an entire interview is complete, it cannot be edited, only deleted. Furthermore, it can be deleted only by the assessor who administered the interview.

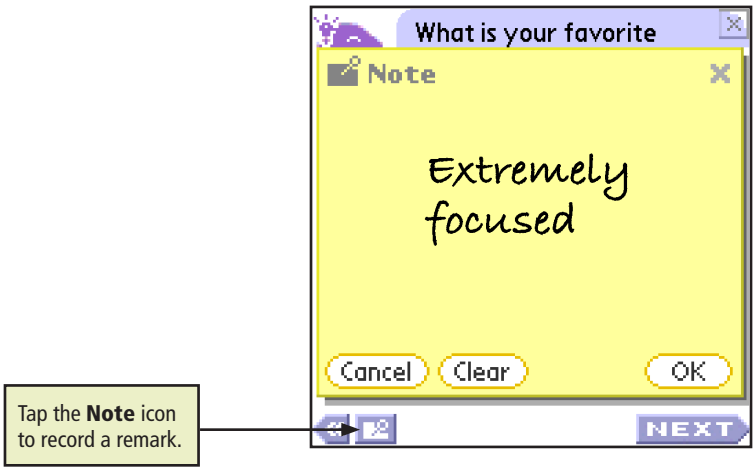
An interview should always be invalidated, or deleted, when an interruption or mistake occurs that undermines the validity of the overall score. Examples include

- Intercom announcements
- Fire drills
- Scoring errors that can't easily be corrected



Notes

Record notes by freehand writing an observation for each item, module, interview result, Imagination question, and Expression by tapping the **Note** icon in the lower left.



Imagination Question

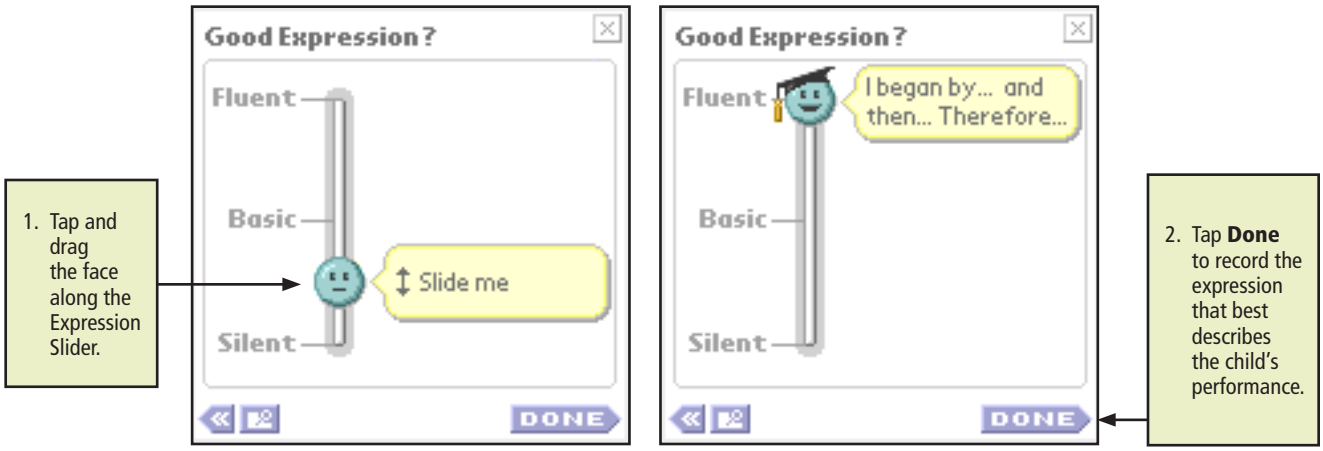
The Imagination Question has no effect on the child's scores but is meant to encourage him or her to think creatively about math. The question is nonstandard and very general, providing plenty of room to answer by thinking. You do not need to record an answer, but you may by tapping the **Note** icon in the lower left.

Expression Slider

The Expression Slider appears after all the modules are completed. Each interview defines an evaluation somewhat differently, as conveyed in the speech bubble.

Creating a record of the child's expression will help to understand his or her attitude and aptitude toward the operations in particular and toward math in general.

Tap and drag the face to Silent, Basic, or Fluent depending on how fluidly the child can articulate knowledge of the functioning of his or her own mind mathematical thinking.

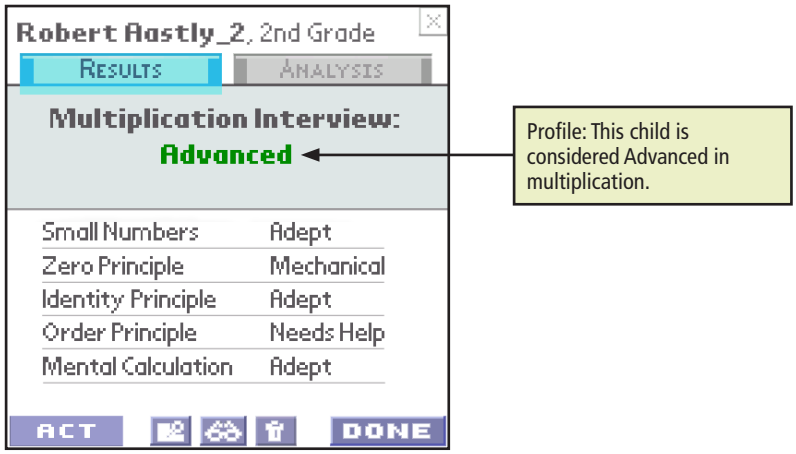


Interview Results Screen

Interview results are only visible to those users with the appropriate access privileges. (If you believe you should have access to a result but do not, contact your technology coordinator or the Wireless Generation Customer Care center.) You can review the results on the handheld at any time after completion.

Profiles

It is important to understand how the different pieces of the child's knowledge fit together; in particular, the child's memory of facts, use of procedures, and understanding of mathematical ideas. For each interview, the mCLASS:Math assessment assigns children into one of four profiles that are general ways of thinking about mathematics learning.

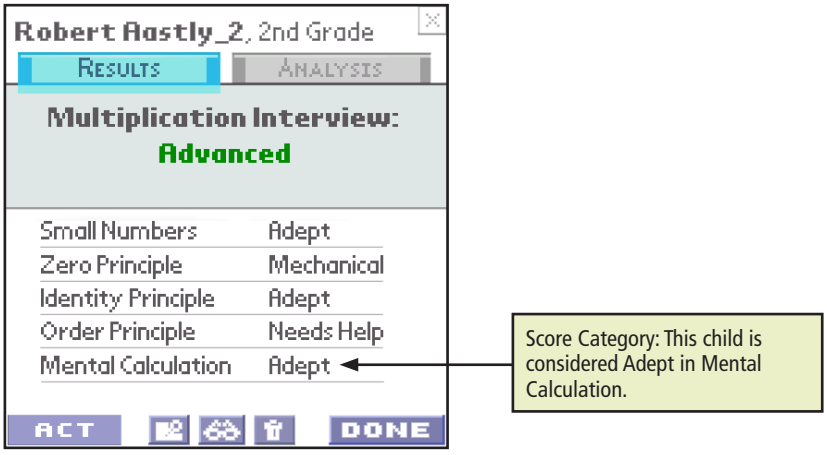


Profile	Description
Advanced 	Advanced children are skilled in procedures, remember what is necessary, and truly understand what they are doing. This, of course, is what we aim for: children who have mastery over facts and procedures, but also understand basic mathematical ideas.
Competent 	Competent children are making progress and perform reasonably well, but make mistakes in spite of understanding many of the basic ideas and having good strategies available. The mistakes these children make tend to conceal their sound underlying knowledge. We need to understand that those not doing so well may in fact understand a great deal.
Rote 	Rote children recall facts and execute procedures well, but do not understand what they are doing. These children seem to be performing at a high level, as measured by their knowledge of the facts and successful computation, but are really not grasping the underlying mathematical ideas.
Struggling 	Struggling children seem to have neither skill nor understanding. Much must be done to help them. One way to approach this is to search for the rudiments of strategies that these children possess. With mCLASS:Math, we will attempt to reach children who have hidden competence, to help them find and express it.

Score Category

Similarly, for individual modules of an interview, the detailed scores are used to calculate a score category that describes the child's performance in that module.

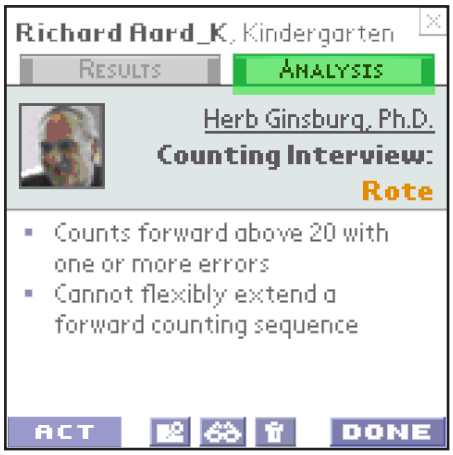
While the categories exact meanings differ according to the module, they can also be defined in a general way. For specific interpretations of the score categories for a particular interview see the Administration and Scoring chapter of this guide.



Score Category	Description
Expert	The child provides correct answers from memory, based on mastery of the foundational knowledge necessary to produce that answer. Only applicable for third grade children in addition and subtraction.
Adept	The child provides correct answers using appropriate strategies.
Practicing	The child uses an appropriate strategy but provides incorrect answers.
Mechanical	The child answers accurately but does not understand the principle behind the problem.
Rote	The child answers accurately but does not appear to use appropriate strategies.
Needs Help	The child answers incorrectly or not at all and does not use problem-solving strategies.

Analysis

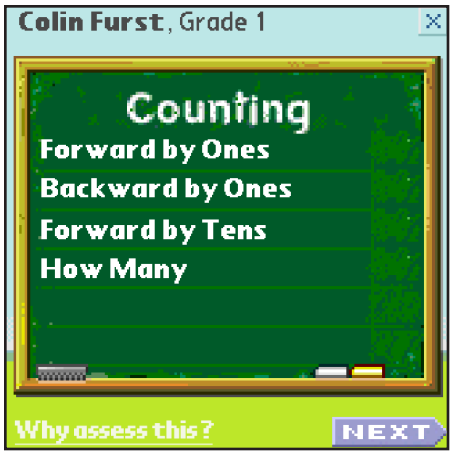
Similarly, once an interview is complete, the system provides an in-depth description of the child's profile.



If you administer multiple Diagnostic Interviews of the same type, the analysis provided will always pertain to the most recent results.

Detail Reports for each interview are also generated online. For information on accessing and navigating these reports, please refer to the **Accessing Interview Detail Reports** section of this guide.

Counting



The Counting interview, for kindergarten and first grade children, gauges a child's fluidity with counting words; development skills and understanding of the problem-solving methods employed to count forward and backward (by ones and tens); and enumeration, the ability to recognize the number of objects in a group.

The interview also determines specific methodological errors, providing more inquisitive questions that help children re-examine their answer. When the child completes a module in Counting, the assessor asks him or her to recognize and correct any errors.

There are four modules that help to reveal a child's mathematical knowledge of counting.

1. Forward by Ones
2. Backward by Ones
3. Forward by Tens
4. How Many

Purpose

A good deal of early mathematics, especially the calculations underlying addition and subtraction, depend on counting — the ability to say the counting words, and to count forward, backward, and by decades.

During early education, children throughout the world build solid mathematics foundations by memorizing words that in their native language represent the numbers one through ten. Next, they learn that the numbers from 11 to 19 are irregular. Finally, children discover that numbers 20 to 100 should not simply be remembered, but can also be generated by a simple set of rules. For example, given the decade word thirty, which is a derivative of three, children need only add the words one, two, three … nine, etc., in order, and then produce the next decade word, forty — a simple derivative of four — and so on until reaching 99. Research shows that some counting errors indicate a child's inventive attempt to use rules to generate spoken numbers. For example, the child who says "twenty-nine, twenty-ten" is not simply wrong, but is instead attempting to use a sensible rule to produce an unknown number word. Research also shows that weakness in counting can interfere with early addition and subtraction.

Enumeration is using counting words to answer "how many," the cardinal value of a set of objects. Accurate enumeration depends on a number of important mathematical principles, or ideas. The child must know that anything can be counted, regardless of shape or size or arrangement; that objects must be counted once and only once; that each number word should be paired with an object once and only once; that the last number word indicates the cardinal value of the set as a whole. Enumeration is important in laying the foundation for successful addition and subtraction involving concrete objects. The child who cannot accurately enumerate two sets is at a disadvantage in learning addition and subtraction.

Interview Profiles

Profiles represent different levels of understanding at each grade level. Each child is assigned one of four kinds of profiles for the Counting interview: Advanced, Competent, Rote, or Struggling.

Kindergarten

- Advanced
  - The child has developed crucial counting and enumerating skills.
  - The child has mastered and possibly exceeded the benchmark for forward and backward counting for his or her age.
  - The child can flexibly count forward from any number within his or her mastery range.
  - If the child does make a mistake, he or she is often able to correct it with minimal guidance.
  - The child uses sensible counting strategies to enumerate small and large sets of objects.

- Competent
  - The child is making strides, showing effort, and catching on. Reward him or her for their efforts and continue to help develop these skills.
  - The child may not have met expectations but is able to correct his or her errors with minimal guidance.
  - The child can flexibly extend a counting sequence using familiar numbers.
  - The child may be able to count backward.
  - The child uses sensible counting strategies to enumerate small and large sets of objects even though he or she may not always provide accurate answers.

- Rote
  - The child cannot correct his or her errors, even with guidance.
  - The child cannot flexibly start a counting sequence with a number other than 1.
  - The child may be able to count backward.
  - The child may use strategies to enumerate sets of objects, but may or may not use it with understanding.

- Struggling
  - This child needs a good deal of help.
  - The child seems to lack basic counting skills that are crucial for future success.

First Grade

- Advanced
  - The child has mastered and possibly exceeded forward, backward, and decade counting benchmarks for his or her age.
  - The child can flexibly count forward and by decades from any number.
  - The child is able to correct errors with minimal guidance.
  - The child uses sensible counting strategies to enumerate small and large sets of objects.

- Competent
  - The child may not have reached his or her forward counting benchmark, but is able to correct mistakes with minimal guidance.
  - The child can flexibly extend a forward or decade counting sequence with familiar numbers.
  - The child may count backward from 20, but definitely counts backward from 10.
  - The child may count by decades and/or recognize and correct decade errors.
  - The child uses sensible counting strategies to enumerate small and large sets of objects.
  - His or her use of strategies is not always accurate, but they could work if the child were more careful and checked his or her work.

- Rote
  - The child is unable to correct his or her answers, even with guidance.
  - The child must start a counting sequence with the number 1.
  - The child may be able to count by decades.
  - The child may be able to count backward from 10, but not from 20.
  - The child may use sensible counting strategies to enumerate sets of objects, and may or may not use it with understanding.

- Struggling
  - This child needs a good deal of help.
  - The child may have difficulty identifying counting patterns.
  - The child may use an appropriate strategy for enumerating sets of objects, but may not always be accurate.
  - The child seems to lack basic counting skills that are crucial for future success.

Scoring

Minor Errors

Minor errors are to be expected, but a child may not be developing counting skills at a good pace if he or she displays too many of these types of errors.

- Incorrect Number: Providing an incorrect number
- Decade: Demonstrating a rule-governed mistake, such as saying "...nine, ten, ten-one, ten-two"
- Skip: Omitting one number
- Repeat: Saying the same number more than once
- Reverse (by ones): Switching the order of two numbers while counting forward or backward by ones, such as saying "...7, 9, 8"

Major Errors

- Chaos: Selecting numbers at random, as in "...9, 10, 28, 36"
- Don't Know: Either verbally or behaviorally admitting inability to complete a counting sequence
- Reverse (by tens): Switching the order of two numbers while counting forward by tens, such as saying "...30, 50, 40, 60"

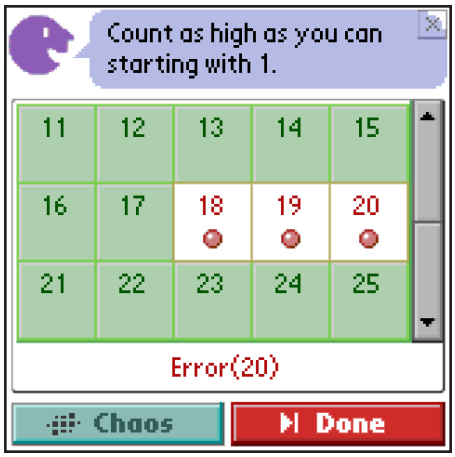
Completing Counting Modules

The Counting modules are considered complete if the child does any one of the following:

- Reaches the last item.
- Makes one major error.
- Makes more minor errors than allowable, as shown in the table.

Module	Kindergarten	First Grade
Forward by Ones	3 errors	3 errors
Forward by Tens	N/A	2 errors
Backward by Ones	2 errors	2 errors

When this happens, the **Done** button turns red and you must tap it to end the module.

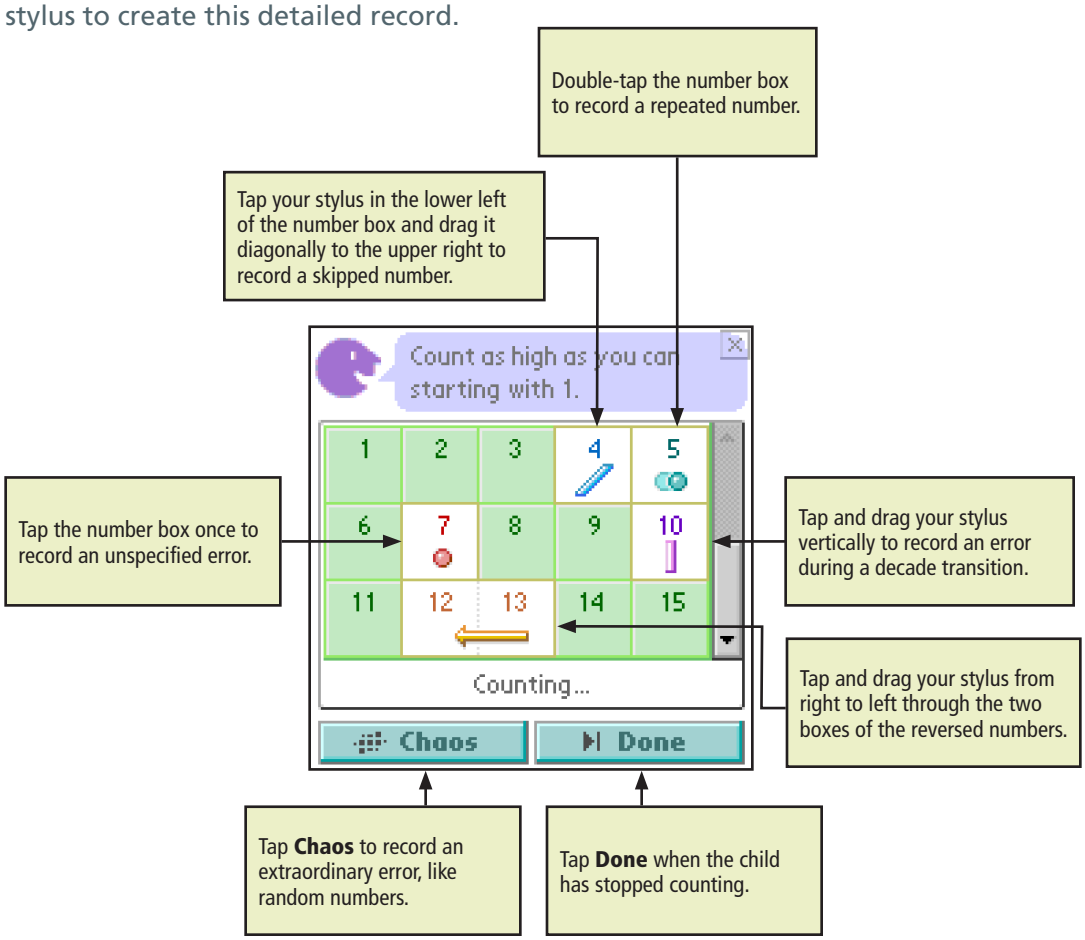


- Demonstrates any one major error.

Recording Errors

At first, give yourself time to become familiar with how to record specific errors like skips, repeats, and reversals. In the meantime, the most beneficial information to record is that the child made an error period. Later, while knowing that a child made any error at all will provide some insight, it is important to record the exact type of error he or she presents. With specific information, you can later plan activities for that skill area.

Use your stylus to create this detailed record.



Forward by Ones

Kindergarten	First	Second	Third

Counting is the most fundamental concept of math. By the end of kindergarten, children should be able to count forward to 43, crossing a few decade transitions. By the end of first grade, children should be able to count to 103. This module evaluates a child's ability to count consecutively, beginning with one or another number. Children who count to 10 without mistakes, also count beginning midsequence to evaluate his or her counting dexterity.

Coupling learning with physical activity may excite the child who has lost enthusiasm for math. So when a child counts less than five, we play the Jumping Game.

Materials

None

Scoring Rules

Articulation/Dialect Issues: The child is not penalized for imperfect pronunciation due to dialect, articulation, or second language interference.

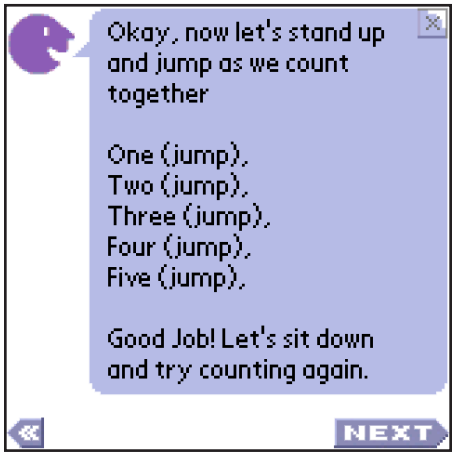
Reversals and Skips: If you first record a skip that is actually a reversal, tap and drag the stylus right to left over the reversed numbers; the record of the skipped number will automatically change to a reversal.

Self-Corrections: Credit an answer that has been self-corrected in a reasonable amount of time by tapping the number a second time. Be aware that tapping too quickly will record a repetition error.

Administration

1. Follow the prompts displayed on the screen, reading all Mr. Say screens aloud to the child.
2. Immediately after instructing the child to begin counting, tap **Start**, then tap **Next**.
3. As the child counts, record any errors.

4. If the child cannot count above five, mCLASS:Math guides you to play the Jumping Game. This physical activity is intended to get the child excited about counting.



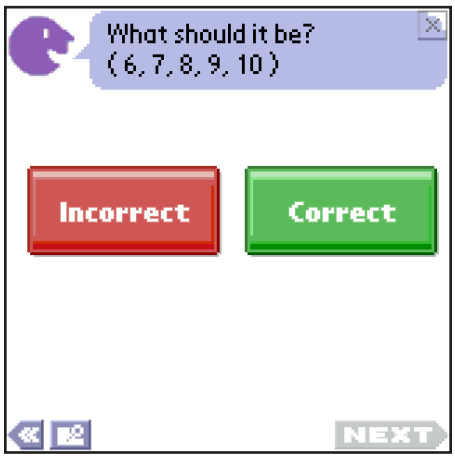
- After the Jumping Game, begin with step 1 again.

5. Tap **Done** when the child is done counting or has exceeded the number of allowable errors. The system chooses the most logical last number the child may have said correctly. If you agree with that number, tap **Next**; if you disagree, tap a different number, then tap **Next**.

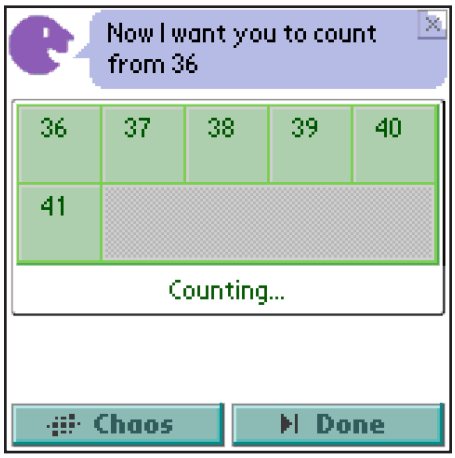
- Tap the last number the child said correctly, then tap **Next**.

6. To explore the child's thinking, record whether he or she is able to self-correct mistakes.
   a. Tap **Yes** or **No**, then tap **Next**.

b. Tap **Correct** or **Incorrect**, then tap **Next**.



7. If the child counted to 11 or higher, you will be prompted to ask him or her to count again beginning with a number other than one. This "running start" further evaluates the child's counting flexibility. If the child did not reach 11 the first time, skip to step 6.



8. After completing all items, tap **Next** to continue to Backward by Ones.

Score Categories

According to the child's performance and strategy use, he or she is assigned a score category of Adept, Practicing, Mechanical, or Needs Help. The categories are an indicator of how the child is developing the skills necessary for counting forward.

- Adept: The child counts forward and can flexibly extend a counting sequence that begins with a number other than one.
- Practicing: The child exhibits counting fluency up to a specified number as evidenced by his or her ability to correct all errors and extend a counting sequence within that range that begins with a number other than one; however, the highest number counted does not meet expectations for his or her age group.
- Mechanical: The child meets expectations for his or her age group but is unable to correct errors and/or continue a counting sequence that begins with a number other than one.
- Needs Help: The child may have memory issues and/or difficulty understanding the rules governing a forward counting sequence.

Backward by Ones

Kindergarten	First	Second	Third

Counting backward is definitely harder than counting forward, that's why it can really show with just how much fluidity a child can count. Once he or she can count backward well, the steps to solving subtraction problems aren't too hard to take.

In kindergarten, children should be able to count from nine to one. In first grade, children should be able to count from 20 to 1.

Materials

None

Scoring Rules

Articulation/Dialect Issues: The child is not penalized for imperfect pronunciation due to dialect, articulation, or second language interference.

Multiple Strategies: Record all strategies that a child employs. No one strategy is correct.

Reversals and Skips: If you first record a skip that is actually a reversal, tap and drag the stylus right to left over the reversed numbers; the record of the skipped number automatically changes to a reversal.

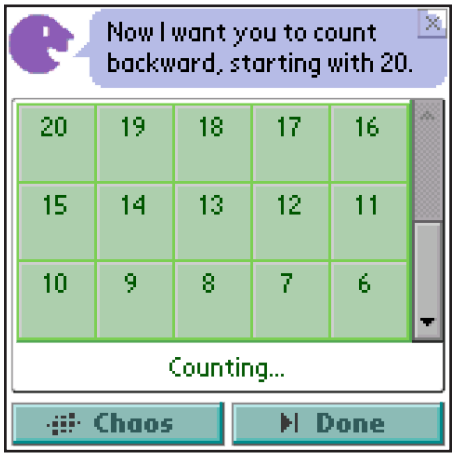
Self-Corrections: Credit an answer that either the child has self-corrected in a reasonable amount of time or that you have incorrectly tapped by tapping the button a second time.

Wrong Direction: If the child begins counting forward, tell him or her to start over by counting backward. You may provide this prompt only once.

Administration

1. Follow the prompts displayed on the screen, reading all Mr. Say screens aloud to the child.
2. Immediately after instructing the child to count backward, tap **Start**, then tap **Next**.
3. As the child counts, record any errors. The expectations are different for kindergartners than first graders.
   a. Kindergartners count backward from nine.

b. First graders count backward from 20. If the child stops before reaching 10, tap **Done** and the system prompts you to have him or her start again, counting backward from nine.



4. Tap **Done** when the child is done counting or has exceeded the number of allowable errors. The system chooses the most logical last number the child may have said correctly. If you agree with that number, tap **Next**; if you disagree, tap a different number, then tap **Next**.
5. After completing all items, tap **Next** to continue to Forward by Tens.

Score Categories

According to the child's performance and use of strategies, he or she is assigned a score category of Adept, Practicing, or Needs Help. The categories are an indicator of how the child is developing the skills necessary for counting backward.

Kindergarten

- Adept: The child counts both forward and backward.
- Needs Help: The child may have memory issues and/or difficulty understanding the rules governing a backward counting sequence.

First Grade

- Adept: The child counts both forward and backward.
- Practicing: The child counts backward at the kindergarten level.
- Needs Help: The child may have memory issues and/or difficulty understanding the rules governing a backward counting sequence.

Forward by Tens

Kindergarten	First	Second	Third

Learning to count by tens helps children solve problems not only faster, but smarter. Instead of counting every single unit, a child who can count by tens also shows that he or she has an understanding of place value.

Children in first grade should be able to count forward by tens up to 100.

Materials

None

Scoring Rules

Articulation/Dialect Issues: The child is not penalized for imperfect pronunciation due to dialect, articulation, or second language interference.

Self-Corrections: Credit an answer that either the child has self-corrected in a reasonable amount of time or that you have incorrectly tapped by tapping the button a second time.

Reversals and Skips: If you first record a skip that is actually a reversal, tap and drag the stylus right to left over the reversed numbers; the record of the skipped number automatically changes to a reversal.

Administration

1. Follow the prompts displayed on the screen, reading all Mr. Say screens aloud to the child.
2. Immediately after instructing the child to count, tap **Start**, then tap **Next**.

3. As the child counts, record any errors.
4. Tap **Done** when the child is done counting or has exceeded the number of allowable errors. The system chooses the most logical last number the child may have said correctly. If you agree with that number, tap **Next**; if you disagree, tap a different number, then tap **Next**.

5. To explore the child's thinking, recording whether he or she is able to self-correct mistakes.
6. If the child counted to 40 or higher, the system will prompt to have him or her count again beginning with a number other than one. This "running start" further evaluates the child's counting flexibility. If the child did not reach 40 the first time, skip to step 7.

7. After completing all items, tap **Next** to continue to How Many.

Score Categories

According to the child's performance and use of strategies, he or she is assigned a score category of Adept, Practicing, Mechanical, or Needs Help. The categories are an indicator of how the child is developing the skills necessary for counting by tens.

- Adept: The child counts using basic skills.
- Practicing: The child exhibits counting fluency up to a specified number as evidenced by his or her ability to correct all errors and extend a counting sequence within that range that begins with a number other than one; however, the highest number counted does not meet expectations for his or her age group.
- Mechanical: The child meets expectations for his or her age group but is unable to correct errors and/or continue a counting sequence that begins with a number other than 10.
- Needs Help: The child may have memory issues and/or difficulty understanding the rules governing a forward counting sequence.

How Many

Kindergarten	First	Second	Third

Counting objects is a fundamental skill and concept that children must develop to understand mathematics. For example, if there are four chips, children must know that each chip represents a single unit, that together the chips represent a set that has an abstract property of "fourness," all of which can be described by a number word, "four." Successfully applying these concepts is a precursor to all mathematical operations.

Materials

Chips

Scoring Rules

Articulation/Dialect Issues: The child is not penalized for imperfect pronunciation due to dialect, articulation, or second language interference.

Multiple Strategies: Record all strategies that a child employs. No one strategy is correct.

Self-Corrections: Credit an answer that either the child has self-corrected in a reasonable amount of time or that you have incorrectly tapped by tapping the button a second time.

Strategies and Details

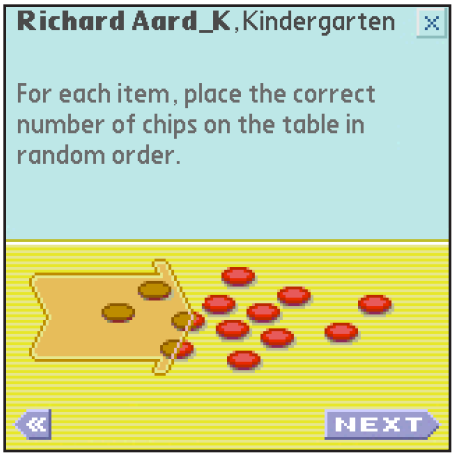
There is only one kind of strategy to record for How Many: those you see firsthand (observed strategies). There are also no details required for the strategies of this module.

See the Icon Glossary in the back of this manual for more information.

Observed Strategies
Group
Push
Count
Point
Other

Administration

1. Follow the prompts displayed on the screen, including placing the paper and the chips on a table in front of the child, then tap **Next**.



2. Tap the **Correct Answer** button if the child answers correctly. The answer appears in green on the screen.

- If the child says a different number, tap his or her number on the keypad to the right. The answer appears in red on the screen.

- If the child says "I don't know," tap **Don't Know**.

3. As the child counts, record the strategies you can observe.

4. Clear the chips from the table after each question the child answers.
5. After completing all items, tap **Next** to continue to the Expression slider and Imagination question.

Score Categories

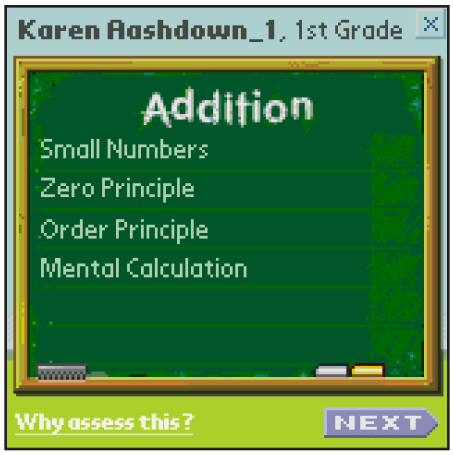
According to the child's performance and use of strategies, he or she is assigned a score category of Adept, Practicing, Mechanical, or Needs Help. The categories are an indicator of how the child's counting skills are developing.

- Adept: The child applies a developmentally appropriate strategy for enumerating objects.
- Practicing: The child appears to perform poorly, but uses age-appropriate strategies to enumerate objects in a set. He or she is developing skills counting and enumerating but poorly executes efficient problem-solving strategies, perhaps due to lack of focus.
- Mechanical: The child appears to perform well but may be unable to apply age-appropriate strategies when encountering large sets of objects. The child may lack knowledge of the basic counting strategies used to enumerate sets. In rare instances, the child may get a correct answer through luck or a badly applied strategy.
- Needs Help: The child may have difficulty understanding fundamental skills such as counting and concepts like magnitude comparison.

Addition

The Addition interview uncovers a child's ability to add using different principles and strategies. There are four modules that help to reveal a child's mathematical knowledge of addition.

1. Small Numbers (K-3)
2. Zero Principle (K-3)
3. Order Principle (1-3)
4. Mental Calculation (1-3)



Purpose

Before school, children all around the world begin to develop informal methods for addition. At first, children deal with concrete problems, as when they encounter two collections of objects and attempt to determine how many there are altogether by counting all of the elements. By kindergarten, children can be expected to solve simple verbal problems involving number combinations. Thus, many kindergartners can use effective strategies and principles to solve problems like "How much is two and three altogether?" For example, a child may solve the problem by mentally counting the members of both sets (e.g., "One, two, and then three, four, five"). Young children also spontaneously develop useful addition principles. For example, preschoolers usually know that "adding makes more," meaning the addition sum must be larger than the larger of the two addends, at least when zero is not involved.

It is important for teachers to assess these informal strategies and principles for several reasons. One is that the informal strategies can serve as useful backups to check answers to number combination problems. The child who cannot remember the answer to 2 + 4 can then use an informal strategy to figure out the answer. When not sure of the answer, the child can use the strategy or the principle to check it.

Mastery of number combinations (recalling them quickly and accurately from memory) plays a central role in early mathematics education. Mastery is useful, especially when the child encounters challenging problems involving large numbers. In adding numbers like 987 + 789, the child should have the "facts" (i.e., 7 + 9, etc.) available so that he or she can focus on the more challenging processes of regrouping, or carrying.

Besides achieving mastery of the facts, children also need to understand basic mathematical ideas such as the role of zero (adding zero to any number yields that number, leaving it unchanged) and commutativity (the order of the numbers does not affect the result). Understanding the ideas facilitates computation, establishing the structure for more advanced mathematical study.

Children gradually develop informal mental calculation methods for solving larger addition problems. At first, children simplify unfamiliar number combinations by converting them into problems involving the addition of 10. For example, faced with the new problem 9 + 6, the child converts the 9 to 10, takes away the extra 1 from the 6, and then solves the easier problem, 10 + 5. By second grade, children can simplify even larger problems by decomposing, or partitioning, them into the addition of tens and ones. Thus, the child solves a problem like 24 + 15 by converting it into the easier problems 20 + 10 and 4 + 5. It is important for the teacher to realize that this is the exact method employed by the standard algorithm, except that, unlike the child, the algorithm always begins by adding units, not 10 or even multiples of 10.

Children at risk of school failure tend to have difficulty with several areas of early addition. Weakness in number fact mastery is a major predictor of mathematics difficulties. Weakness in understanding basic principles is also related to poor mathematics achievement. Children at risk of school failure tend to use immature strategies for solving mathematics problems. For example, confronted with a problem like 3 + 2, they tend to count the members of both sets (i.e., "one, two, three, four, five") rather than count on from the larger number (i.e., "three, and then four, five"), a more economical and efficient strategy.

In brief, assessment of children's accuracy, strategies, and principles allows us to identify not only weaknesses that predict poor mathematics achievement but also strengths that lay the foundation for prescribed instructional approaches.

Interview Profiles

Profiles represent different levels of understanding at each grade level. Each child is assigned one of four kinds of profiles for the Counting interview: Advanced, Competent, Rote, or Struggling.

Kindergarten

- Advanced
  - The child can calculate effectively and appropriately, demonstrating a basic understanding of addition. He or she may even have easily retrieved number facts from memory.
  - The child does not get bogged down in the details and mechanics of calculation.
  - The child has abstracted at least one important pattern, namely that zero makes no difference and/or that the order of numbers is irrelevant.

- Competent
  - The child is making strides, showing effort, and catching on. Reward him or her for their efforts and continue to help develop these skills.
  - The child knows and uses sensible strategies to solve addition problems.
  - The child may employ or express the zero principle or order principle.
  - The child may focus too heavily on executing strategies, lessening time spent carefully studying sums and discovering patterns and their underlying principles.

- Rote
  - The child may not be forming meaningful connections, so he or she lacks alternate methods when memory fails.
  - The child provides correct answers, but his or her actual grasp of the principles may be shallow.
  - May employ or express the zero and/or order principles, but likely lacks appreciation for their underlying concepts.

- Struggling
  - This child is off to a bad start and needs a good deal of help.
  - The child seems to lack basic number and addition skills.
  - May employ or express zero and/or commutativity principles.

First Grade

- Advanced
  - The child uses sensible strategies or derived facts to solve small addition problems.
  - The child may remember some small number combinations.
  - The child has a deep understanding of mathematical principles. Even if the child does not know the answer, he or she has the means to figure it out.
  - The child abstracts important patterns like commutativity from the numbers he or she encounters.
  - The child also developed the rudiments of mental calculation, such as using a 10 embedded within a larger number of an addition task. For example, he or she may recognize that 12 + 5 can be solved as 10 + 2 + 5, though results aren't always accurate.

- Competent
  - The child has an understanding of mathematical principles. The child uses sensible strategies like Counting On or Derived Facts to solve small number problems.
  - The child's use of strategies is not always accurate, but could work with more attentiveness and results evaluation.
  - The child may have memorized some number facts.
  - The child has mastered either the zero or order principle for both small and large numbers.
  - The child may experience difficulty with mental calculation. He or she may be just beginning to understand the role of 10 in larger problems.

- Rote
  - This child may at first appear competent because he or she quickly gets correct answers to small number problems.
  - The child may not be forming meaningful connections, so he or she lacks alternate methods when memory fails.
  - This child may answer some questions correctly, but his or her grasp of the principles is likely shallow.
  - The child may even employ Using 10 mental calculation strategy, but may or may not appreciate the underlying concepts.

- Struggling
  - This child is off to a bad start and needs a good deal of help.
  - The child may have mastered at least one principle (zero or commutativity) for both small and large numbers.
  - The child seems to lack basic number and addition skills.

Second Grade

- Advanced
  - The child uses and articulates sensible and effective strategies.
  - The child quickly recalls some small number facts.
  - The child has an abstract understanding of both the zero and order principles. He or she can apply the zero principle to numbers of virtually any size, and can generalize commutativity to addition problems that he or she has not computed (or could not compute).
  - The child appreciates the using tens in two ways. One is to convert addends to 10 and another number when doing so simplifies mental calculation. Another is to facilitate mental calculation by dividing two-digit numbers into two components, the tens and the ones, to be more easily added on a mental level.

- Competent
  - The child has some sensible strategies that can help him or her compute and make sense of small number combinations.
  - The child may have begun memorizing the results.
  - The child has a grasp of the zero and order principles for both small and large numbers.
  - The child may be developing (although imperfectly) strategies for dealing with rather large numbers in mental calculation, that is the power of 10 and the Base 10 system.

- Rote
  - The child has memorized these number combinations and does not have good strategies to solve these types of problems when encountering difficulty.
  - Even if the child is able to use sensible strategies to solve these problems, he or she may not wish to do so because Counting On may seem "babyish."
  - When given larger problems for mental calculation, he or she may attempt to convert them to written problems, imagining numerals in his or her head and then trying to add them.
  - The child may even use the Base 10 strategy to solve mental calculation problems, but may or may not truly understand.
  - The child can say what a principle is, but cannot actually apply it to a problem.
  - Alternatively, instead of using the principle to avoid unnecessary calculation, the child may perform the calculations, presumably because that is what the "good child" is supposed to do.

- Struggling
  - The child still experiences difficulty with small number sums.
  - The child may lack strategies for calculation. He or she may possess primitive strategies but deploy them in an ineffective manner or may try but fail to commit sums to memory.
  - The child may employ or express zero and/or order principles but is struggling so much with the small numbers that he or she barely has the time or the opportunity to learn the principles.
  - The strategies required for mental calculation are beyond the child's abilities. Even if developed, the child could not execute them effectively because of his or her lack of proficiency with small number combinations.

Third Grade

- Advanced
  - The child shows mastery, with effortless, quick recall of some small number facts.
  - The child uses and articulates sensible, effective strategies.
  - The child has an understanding of two basic principles, the zero and order principles.
  - The child's understanding is abstract, applying the zero principle to numbers of virtually any size and generalizing commutativity to addition problems that he or she has not computed (or could not compute).
  - The child is acquiring skills for employing the Base 10 system in the service of mental calculation. The child converts addends to 10 and another number when doing so simplifies mental calculation. The child divides two-digit numbers into two components, the tens and the ones, each of which can easily be added mentally.

- Competent
  - The child mastered most of the number facts and uses sensible strategies to compute and make sense of the small number combinations.
  - The child has a grasp on the zero and order principles and is able to generalize these principles.
  - The child is developing — perhaps imperfectly —strategies for dealing with rather large numbers in mental calculation. He or she is beginning to exploit the power of 10 and the Base 10 system.

- Rote
  - The child has memorized these number combinations and does not have good strategies to solve these types of problems when encountering difficulty.
  - Even if the child is able to use sensible strategies to solve these problems, he or she may not wish to do so because Counting On may seem "babyish."
  - When given larger problems for mental calculation, he or she may attempt to convert them to written problems, imagining numerals in his or her head and then trying to add them.
  - The child may even use the Base 10 strategy to solve mental calculation problems, but may not truly understand.
  - The child can say what a principle is, but cannot actually apply it to a problem.

- Struggling
  - The child still experiences difficulty with small number sums.
  - The child may lack strategies for calculation.
  - He or she may possess primitive strategies but deploys them in an ineffective manner. Also, he or she may try but fail to commit sums to memory.
  - The child may employ or express one principle, either zero or order, but may be struggling so much with the small numbers that he or she barely has the time or the opportunity to learn the principles.
  - The child has difficulty with the strategies required for mental calculation. Even when employing the Making tens or Using Tens strategies, he or she cannot execute them effectively because of his or her lack of proficiency with small number combinations.

Small Numbers

Kindergarten	First	Second	Third

The Small Numbers module assesses whether a child understands how to combine one-digit numbers to create a sum.

Materials

- Chips
- Paper and pencil

Scoring Rules

Articulation/Dialect Issues: The child is not penalized for imperfect pronunciation due to dialect, articulation, or second language interference.

Fifteen-Second Prompt: If the child hesitates an additional five seconds following the 10-second prompt, Mr. Say will appear.

- For kindergartners, say, "Use the chips or your fingers. How much is *x* and *y* altogether?"
- For first through third graders, say, "You can use the chips or your fingers if you want. How much is *x* and *y* altogether?"

Multiple Strategies: Record all strategies that a child employs. No one strategy is correct.

Self-Corrections: Credit an answer that either the child has self-corrected in a reasonable amount of time or that you have incorrectly tapped by tapping the button a second time.

Ten-Second Prompt: If the child doesn't answer within 10 seconds, Mr. Say will appear.

- While recording an observed strategy, prompt the child by saying "How much is *x* and *y* altogether?"
- While recording an expressed strategy, prompt the child by saying "Tell me what you were thinking to figure out the answer.

Strategies and Details

There are three kinds of strategies to record for Small Numbers. There are strategies you see firsthand (observed strategies), those that the child says he or she used (expressed strategies), and strategies the child recognizes that he or she could have used to solve the problem (alternate strategies).

Some strategies have details and some even have slips. Details define the exact behavior the child exhibited or expressed while using a strategy. Slips are erroneous actions the child may recognize having done despite using an appropriate strategy. These are uncovered when talking with the child about the strategy he or she used.

See the Icon Glossary in the back of this guide for more detailed information.

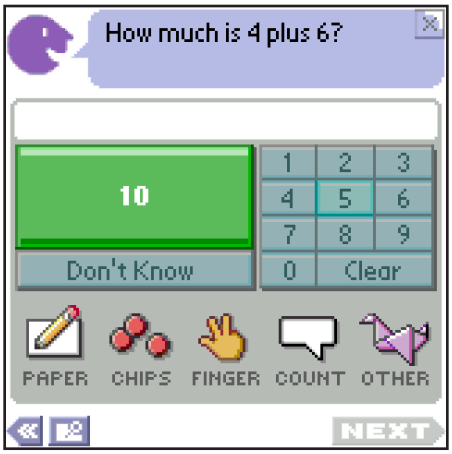
Observed Strategies	Observed Details
Paper	Symbolic Iconic Picture Other
Chips	Count On Count All Other
Fingers	Count On Count All Other
Count	Count On Count All Other
Other	Guess Imaging Unusual

Expressed and Alternate Strategies	Expressed and Alternate Details	Expressed and Alternate Slips
Paper	Symbolic Iconic Picture Other	
Chips	Count On Count All	Double Count Skipped Other
Fingers	Count On Count All	Double Count Skipped Other

Expressed and Alternate Strategies	Expressed and Alternate Details	Expressed and Alternate Slips
Count	Count On Count All	Double Count Skipped Other
Memory		
Derived Facts		
Dunno		
Other	Guess Imaging Unusual Restate Estimate	

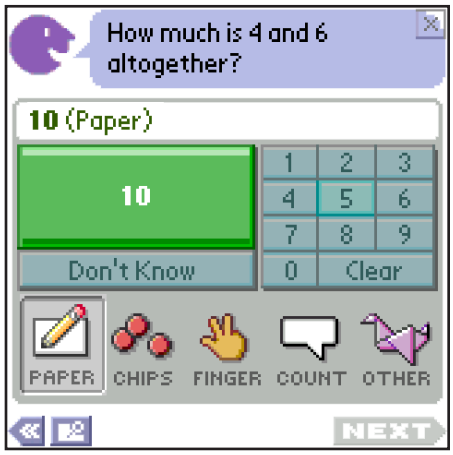
Administration

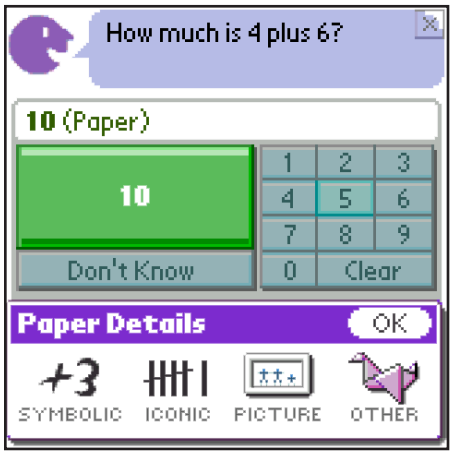
1. Verify that you have all necessary materials for the module, then tap **Next**.
2. Follow the prompts displayed on the screen, reading all Mr. Say screens aloud to the child.
3. Immediately after asking the child the first question, tap **Start**.
4. Tap the **Correct Answer** button if the child answers correctly.



- If the child says a different number, tap his or her number on the keypad to the right.
- If the child says "I don't know," tap **Don't Know**.

5. Tap the strategy you observed the child employing, and details where appropriate, then tap **OK**.





6. Tap **Next**.
7. After you ask, "How did you know that?" the child should try to tell you how he or she arrived at the given answer.
   - Select the strategy the child explains, and details where appropriate.
   - Sometimes the child may provide a new answer; in that case tap **New** and record the new answer on the keypad, then tap **OK**. Record the new Expressed Strategy and appropriate details, then tap **Next**.

8. On the Alternate Strategy screen, repeat step 7.

9. After completing all items, continue to Zero Principle.

Score Categories

According to the child's performance and strategy use, he or she is assigned a score category of Expert (third grade only), Adept, Practicing, Rote, or Needs Help. The categories are an indicator of how the child is developing the skills necessary for adding small numbers.

- Expert (third grade only): The child who answers correctly by drawing on memorized facts built upon successful use of problem-solving strategies.
- Adept: The child either counts, enumerates, and employs successful strategies for solving addition problems or has memorized all small number addition combinations and is able to generate an alternate problem-solving strategy.
- Practicing: The child appears to perform poorly but has knowledge of and uses age-appropriate strategies. He or she is developing counting and enumerating skills, but poorly executes efficient problem-solving strategies, perhaps due to lack of focus.
- Rote: The child appears to perform well but may lack knowledge of the basic counting strategies used to solve these addition problems. He or she usually gets the right answer by memory, but in rare instances, the child may get a right answer through luck or a badly applied strategy.
- Needs Help: The child may have difficulty understanding fundamental skills and concepts such as counting, enumerating, and understanding magnitude comparison.

Zero Principle

Kindergarten	First	Second	Third

The zero principle is the rule that zero, when added to any number, will not change the value of that number.

Materials

- Chips
- Paper and pencil

Scoring Rules

Articulation/Dialect Issues: The child is not penalized for imperfect pronunciation due to dialect, articulation, or second language interference.

Multiple Strategies: Record all strategies that a child employs. No one strategy is correct.

Self-Corrections: Credit an answer that either the child has self-corrected in a reasonable amount of time or that you have incorrectly tapped by tapping the button a second time.

Ten-Second Prompt: If the child doesn't answer within 10 seconds, Mr. Say will appear.

- While recording an observed strategy, prompt the child by saying "How much is *x* and *y* altogether?"
- While recording an expressed strategy, prompt the child by saying "Tell me what you were thinking to figure out the answer."

Strategies and Details

There are two kinds of strategies to record for the Zero Principle. There are strategies you see firsthand (observed strategies) and those that the child says he or she used (expressed strategies).

The strategies in this module do not require details.

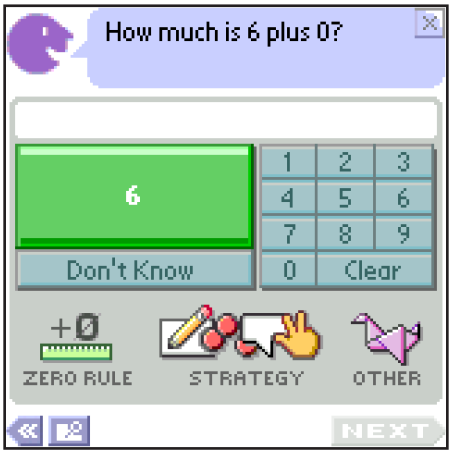
See the Icon Glossary in the back of this guide for more detailed information.

Observed Strategies
Zero Principle
Strategy
Other

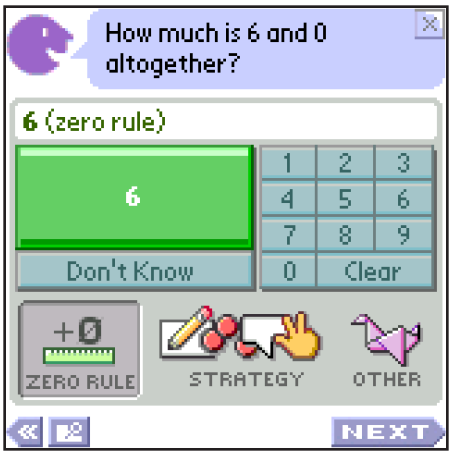
Expressed Strategies
Zero Principle
Strategy
Memory
Dunno
Other

Administration

1. Verify that you have all necessary materials for the module, then tap **Next**.
2. Follow the prompts displayed on the screen, reading all Mr. Say screens aloud to the child, then tap **Next**.
3. Immediately after asking the child the first question, tap **Start**.
4. Tap the **Correct Answer** button if the child answers correctly.
   - If the child says a different number, tap his or her number on the keypad to the right.
   - If the child says "I don't know," tap **Don't Know**.

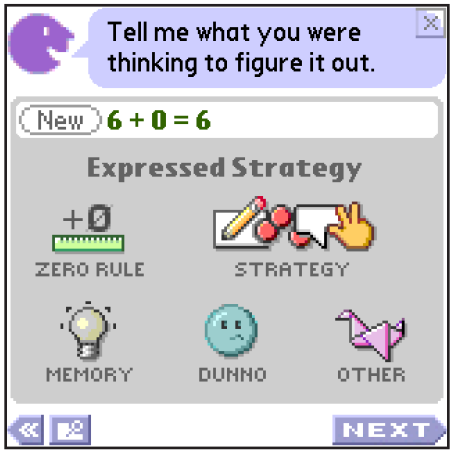


5. Tap the strategy you observed the child employing, then tap **OK**. If he or she expresses application of the principle, mark it as an observed strategy and the system skips to the next item or module.



6. Tap **Next**.

7. After you ask, "How did you know that?" the child should try to tell you how he or she arrived at the given answer and the system skips to the next item or module.



   - Select the strategy the child explains, and details where appropriate.
   - If the child provides a new answer, tap **New** and record the new answer on the keypad, then tap **OK**. Record the new Expressed Strategy and appropriate details, then tap **OK**.

8. Tap **Next**.
9. After completing all items, continue to Order Principle.

Score Categories

According to the child's performance and strategy use, he or she is assigned a Score Category of Adept, Mechanical, or Needs Help. The categories are an indicator of how the child is developing the skills necessary for understanding and applying the zero principle.

Kindergarten

- Adept: The child understands and applies the zero principle with familiar numbers but may not generalize.
- Mechanical: The child lacks an understanding of the zero principle and executes an addition strategy as opposed to applying the principle.
- Needs Help: The child lacks an understanding of the zero principle, misinterprets the principle, or, though unlikely, calculates and generates an incorrect answer.

First Through Third Grade

- Adept: The child understands, applies, and generalizes the zero principle and can express the principle at least once.
- Mechanical: The child lacks an understanding of the zero principle and executes an addition strategy as opposed to applying the principle.
- Needs Help: The child lacks an understanding of the zero principle, misinterprets the principle, or, though unlikely, calculates and generates an incorrect answer.

Order Principle

Kindergarten	First	Second	Third

The order principle states that, in an addition problem, the order of the numbers never affect the sum. For example, if $a + b = z$, then $b + a = z$.

Materials

- Chips
- Paper and pencil

Scoring Rules

Articulation/Dialect Issues: The child is not penalized for imperfect pronunciation due to dialect, articulation, or second language interference.

Multiple Strategies: Record all strategies that a child employs. No one strategy is correct.

Self-Corrections: Credit an answer that either the child has self-corrected in a reasonable amount of time or that you have incorrectly tapped by tapping the button a second time.

Ten-Second Prompt: If the child doesn't answer within 10 seconds, Mr. Say will appear.

- While recording an observed strategy, prompt the child by saying "How much is *x* and *y* altogether?"
- While recording an expressed strategy, prompt the child by saying "Tell me what you were thinking to figure out the answer."

Strategies and Details

There are two kinds of strategies to record for the Order Principle. There are strategies you see firsthand (observed strategies) and those that the child says he or she used (expressed strategies).

See the Icon Glossary in the back of this guide for more detailed information.

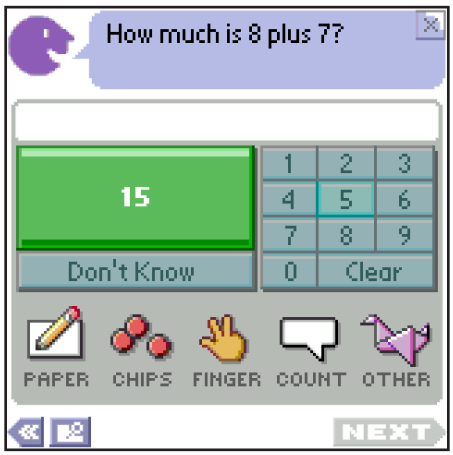
Observed Strategies	Observed Details
Paper	Symbolic Iconic Picture Other
Chips	Count On Count All Other

Observed Strategies	Observed Details
Fingers	Count On Count All Other
Count	Count On Count All Other
Other	Guess Imaging Unusual
Order Principle	
Strategy	

Expressed Strategies
Order Principle
Strategy
Memory
Dunno
Other

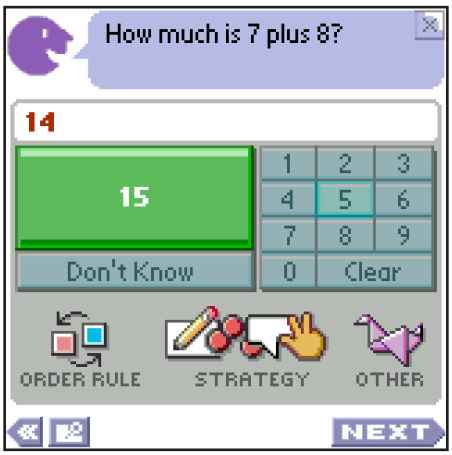
Administration

1. Verify that you have all necessary materials for the module, then tap **Next**.
2. Follow the prompts displayed on the screen, reading all Mr. Say screens aloud to the child, then tap **Next**.
3. Immediately after asking the child the first question, tap **Start**.
4. Tap the **Correct Answer** button if the child answers correctly.



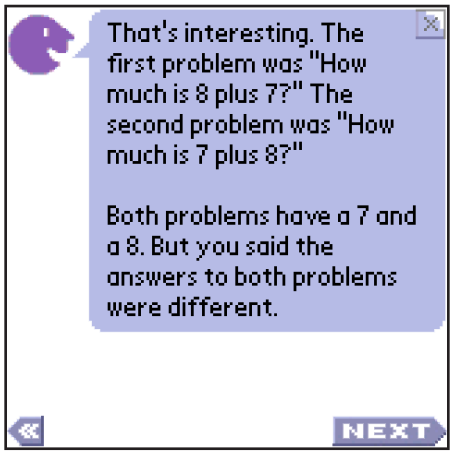
- If the child says a different number, tap his or her new answer on the keypad to the right.
- If the child says "I don't know," tap **Don't Know**.

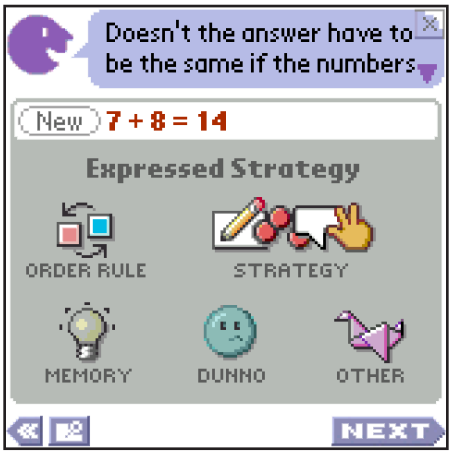
5. Tap the strategy the child employed, and details where appropriate, then tap **OK**.
6. Tap **Next**.
7. The system prompts you to ask the child the question again, in reverse order. Tap the **Correct Answer** button if the child answers correctly.
   - If the child says a different number, tap his or her new answer on the keypad to the right.



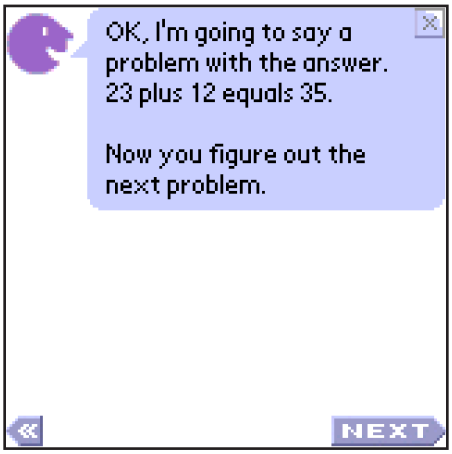
   - If the child says "I don't know," tap **Don't Know**.

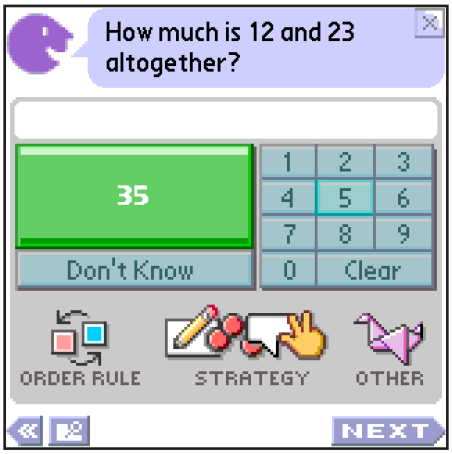
8. If the child did provided two different answers for the two questions, follow the prompts on the screen to delve into the child's understanding of the order principle.





9. Ask the child the final, more difficult question by providing the answer first.





10. After you ask, "How did you know that?" the child should try to tell you how he or she arrived at the given answer. Select the strategy the child explains, then tap **Next**. If the child provides a new answer, tap **New** and record the answer by tapping the numbers on the keypad.
11. After completing all items, continue to Mental Calculation.

Score Categories

According to the child's performance and strategy use, he or she is assigned a Score Category of Adept, Practicing, Mechanical, or Needs Help. The categories are an indicator of how the child is developing the skills necessary for understanding and applying the order principle.

First Grade

- Adept: The child understands and applies the commutativity principle with familiar numbers but may not generalize.
- Practicing: The child understands and applies the commutativity principle with familiar numbers but may not generalize. He or she also poorly executes addition strategy when determining the initial sum.
- Mechanical: The child lacks an understanding of the commutativity principle and executes an addition strategy as opposed to applying the principle.
- Needs Help: The child lacks an understanding of the commutativity principle and poorly executes problem-solving strategies.

Second and Third Grade

- Adept: The child understands, applies, and generalizes the commutativity principle.
- Practicing: The child understands, applies, and generalizes the commutativity principle but poorly executes an addition strategy when determining the initial sum.
- Mechanical: The child lacks an understanding of the commutativity principle and executes an addition strategy as opposed to applying the principle.
- Needs Help: The child lacks an understanding of the commutativity principle and poorly executes problem-solving strategies.

Mental Calculation

Kindergarten	First	Second	Third

This exercise reveals a child's ability to add one- and two-digit numbers together, without using manipulatives. The child should rely on knowledge of tens to answer these challenging addition problems. Children who are able to successfully apply the Base 10 concepts solve problems more efficiently by reducing the need for computation.

Materials

None

Scoring Rules

Articulation/Dialect Issues: The child is not penalized for imperfect pronunciation due to dialect, articulation, or second language interference.

Multiple Strategies: Record all strategies that a child employs. No one strategy is correct.

Self-Corrections: Credit an answer that either the child has self-corrected in a reasonable amount of time or that you have incorrectly tapped by tapping the button a second time.

Ten-Second Prompt: If the child doesn't answer within 10 seconds, Mr. Say will appear.

- While recording an observed strategy, prompt the child by saying "You have to think about it. How much is *x* and *y* altogether?"
- While recording an expressed strategy, prompt the child by saying "Tell me what you were thinking to figure out the answer."

Strategies and Details

There are two kinds of strategies to record for Mental Calculation in Addition. There are strategies you see firsthand (observed strategies) and those that the child says he or she used (expressed strategies).

Some strategies have details and some even have slips. Details define the exact behavior the child exhibited or expressed while using a strategy. Slips are erroneous actions the child may recognize having done despite using an appropriate strategy. These are uncovered when talking with the child about the strategy he or she used.

See the Icon Glossary in the back of this guide for more detailed information.

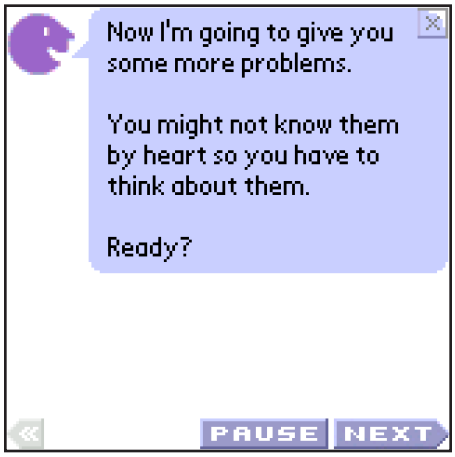
Observed Strategies	Observed Details
Fingers	Count On Count All Other
Count	Count On Count All Other
Imagining Writing	
Other	Guess Imaging Unusual

Expressed Strategies	Expressed Details	Expressed Slips
Uses tens		
Fingers	Count On Count All	Double Count Skipped Other
Count	Count On Count All	Double Count Skipped Other
Imagining Writing		
Memory		
Derived Facts		
Dunno		
Other	Guess Imaging Unusual Restate Estimate	

Administration

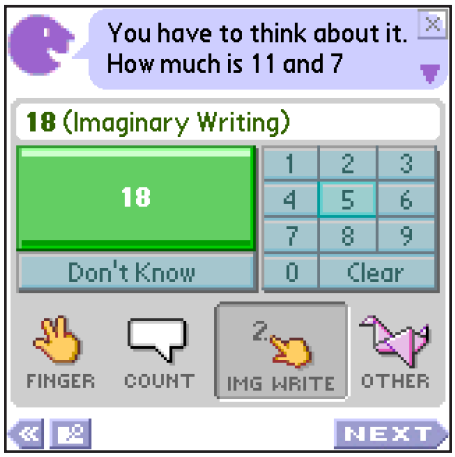
1. Remove any and all manipulatives from the area, then tap **Next**.

2. Follow the prompts displayed on the screen, reading all Mr. Say screens aloud to the child, then tap **Next**.



3. Immediately after asking the child the question, tap **Start**.
4. Tap the **Correct Answer** button if the child answers correctly.
   - If the child says a different number, tap his or her number on the keypad to the right.
   - If the child says "I don't know," tap **Don't Know**.
5. Tap the strategy the child employed, and details where appropriate, then tap **OK**.

6. Tap **Next**.



7. After you ask "How did you know that?" the child should try to tell you how he or she arrived at the given answer.

   - Select the strategy the child explains, and details where appropriate, then tap **OK**.
   - If the child provides a new answer, tap **New** and record the new answer on the keypad, then tap **OK**. Record the new Expressed Strategy and appropriate details, then tap **OK**.

8. Tap **Next**.
9. After completing the first items, the system prompts you to ask children in the highest score category two more items at the next highest grade level. These items are not used for scoring, but to further explore the child's mathematical abilities.
10. After completing all items, tap **Next** to continue to the Expression slider and Imagination question.

Score Categories

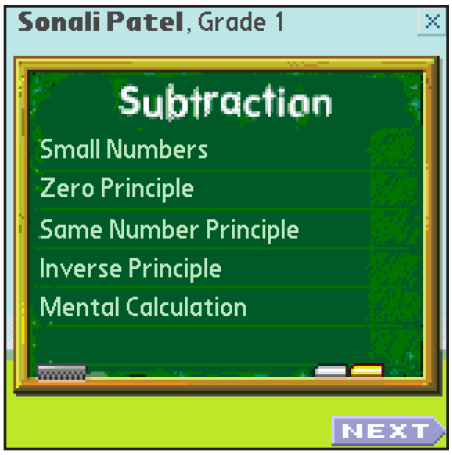
According to the child's performance and strategy use, he or she is assigned a Score Category of Adept, Practicing, Mechanical, or Needs Help. The categories are an indicator of how the child is developing the skills necessary for understanding and applying the Base 10 principle.

- Adept: The child applies advanced problem-solving strategies.
- Practicing: The child appears to perform poorly but mentally calculates by Using Tens, an advanced addition strategy.
- Mechanical: The child appears to perform well but relies on advanced counting strategies and/or Derived Facts to solve mental calculation problems as opposed to Using Tens.
- Needs Help: The child may have difficulty because of inefficient or inappropriate strategy use for his or her age.

Subtraction

The Subtraction interview uncovers a child's ability to subtract using different principles and strategies. There are five modules that help to reveal a child's mathematical knowledge of subtraction.

1. Small Numbers (K-3)
2. Zero Principle (K-3)
3. Same Number Principle (K-3)
4. Inverse Principle (1-3)
5. Mental Calculation (1-3)



Purpose

As is the case with addition, children all around the world begin to develop informal methods for subtraction. At first, children deal with concrete problems, as when they encounter a collection of objects and attempt to determine how many are left after some objects have been removed or "taken away." Initially, they do this simply by counting the remainder, what has been "left over." By kindergarten, children can be expected to solve simple verbal problems involving number combinations. Thus, many kindergartners can use effective strategies and principles to solve problems like "How much is 5 take away 3?" For example, a child may solve the problem by mentally counting backward, saying, "Five, four, three, so the answer is two." Young children also spontaneously develop useful subtraction principles. For example, preschoolers usually know that "subtracting makes less." They know, for example, that the result of subtraction must be smaller than the larger number in the problem (i.e., the minuend).

It is important for teachers to assess these informal strategies and principles for several reasons. One is that an informal strategy can serve as a useful backup for evaluating answers to number combination problems. The child who cannot remember the answer to 5 – 3 can use the strategy to figure out the answer. When not sure of the answer, the child can use the strategy or the principle to check it.

Mastery of number combinations (recalling them quickly and accurately from memory) plays a central role in early mathematics education. Mastery is useful, especially when the child encounters challenging problems involving large numbers. In subtracting numbers like 538 – 476, the child should have the "facts" (i.e., 8 – 6, etc.) available for immediate retrieval so that he or she can focus on the more challenging processes of regrouping, or borrowing.

Besides achieving mastery of the facts, children also need to understand basic mathematical ideas such as negation (any number subtracted by itself results in zero) and inverse (if a + b = c, then c – a = b). Understanding the ideas facilitates computation and lays the foundation for more advanced mathematical study.

Children gradually develop informal mental calculation methods for solving larger subtraction problems. At first, children simplify unfamiliar number combinations by converting them into problems involving 10. For example, given 13 – 9, the child adds 1 to the 9 to get 10, then subtracts 10 from 13 to get 3, and finally adds 1 to the 3 to get the answer 4. By second grade, children can simplify even larger problems by decomposing (partitioning) them into the subtraction of tens and

ones. Thus, a child solves a problem like 26 – 12 by converting it into the easier problems 20 – 10 and 6 – 2. It is important for the teacher to realize that this is exactly the method employed by the standard algorithm, except that, unlike the child, the algorithm always begins by subtracting units, not tens or even multiples of 10.

Children at risk of school failure tend to have difficulty with several areas of early subtraction. Weakness in number fact mastery is a major predictor of mathematics difficulties. Weakness in understanding basic principles is also related to poor mathematics achievement. Children at risk of school failure tend to use immature strategies for solving mathematics problems. For example, they tend to count backward rather than decompose numbers into tens and ones.

In brief, assessment of children's accuracy, strategies, and principles allows us to identify not only weaknesses that predict poor mathematics achievement but also strengths that lay the foundations for prescribed instructional approaches.

Interview Profiles

Profiles represent different levels of understanding at each grade level. Each child is assigned one of four kinds of profiles for the Counting interview: Advanced, Competent, Rote, or Struggling.

Kindergarten

- Advanced
  - The child can calculate effectively and appropriately, demonstrating a basic understanding of subtraction. The child may have mastered subtraction in the sense that he or she can easily retrieve number facts from memory.
  - The child does not get bogged down in the details and mechanics of calculation.
  - The child has abstracted at least one important pattern, namely that zero makes no difference or any number subtracted from itself is zero.

- Competent
  - The child is making strides, showing effort, and catching on. Reward him or her for their efforts and continue to help develop these skills.
  - The child knows that there are sensible ways to solve subtraction problems and uses strategies that can work when applied carefully.
  - The child may employ or express the zero and/or same number principles.
  - The child is so focused on execution of the strategies that he or she barely has time to carefully study the differences produced or to discover underlying patterns like the same number principle.

- Rote
  - The child readily provides correct answers and may employ or express zero and/or same number principles but does not grasp the underlying principles.
  - The child may not be forming meaningful connections, so he or she lacks alternate methods when memory fails.

- Struggling
  - This child is off to a bad start and needs a good deal of help.
  - The child seems to lack basic number and subtraction skills.
  - The child may employ or express zero and/or same number principles.

First Grade

- Advanced
  - The child uses sensible strategies or Derived Facts to solve small subtraction problems.
  - The child may remember some or all of the number facts.
  - The child has the means to figure out a problem even if he or she doesn't know the answer.
  - The child can abstract important patterns (zero, same number, and/or inverse) from the numbers he or she encounters.
  - The child is beginning to develop the rudiments of mental calculation, such as employing the Using Tens strategy, but may not achieve accurate results.

- Competent
  - Math makes sense to this child. He or she employs sensible strategies such as counting down from the larger number to solve small number problems.
  - The use of strategies may not always be accurate, but could work if he or she were more careful and evaluated the work.
  - The child may have memorized some number facts.
  - The child has mastered at least one principle for both small and large numbers.
  - Mental calculation may be difficult, but he or she is beginning to understand the Using Tens strategy.

- Rote
  - The child has memorized these number combinations and does not have good strategies to solve these types of problems when encountering difficulty.
  - Mathematics is not actually meaningful to this child if he or she lacks a strategy when memory fails.
  - The child may have mastered at least one of the three appropriate principles (zero, same number, or inverse) for both small and large numbers.
  - The child may employ the Using Tens strategy, and may or may not use it with understanding.

- Struggling
  - This child is off to a bad start and needs a good deal of help.
  - The child seems to lack basic number and subtraction skills
  - May have mastered at least one principle (zero, same number, or inverse) for both small and large numbers.

Second Grade

- Advanced
  - The child uses and articulates sensible and effective strategies.
  - The child exhibits mastery by quickly recalling small number facts.
  - The child has an understanding of three basic principles: zero, same number, and inverse. He or she can also apply the principles to numbers of virtually any size.
  - The child is beginning to appreciate the power of tens in two ways. One is to convert numbers to 10 and some other number when doing so simplifies mental calculation. Another is to facilitate mental calculation by dividing two-digit numbers into two components, the tens and the ones, each of which can be subtracted on a mental level.

- Competent
  - The child employs sensible strategies that help him or her compute and make sense of the small number combinations.
  - The child has a grasp on at least two of the three principles (zero, same number, and/or inverse) for both small and large numbers.
  - The child is developing — perhaps imperfectly — strategies for dealing with rather large numbers during mental calculation. He or she is beginning to exploit the power of 10 and the Base 10 system.

- Rote
  - The child has memorized these number combinations and does not have good strategies to solve these types of problems when encountering difficulty.
  - The child may be able to use sensible strategies to solve these problems, but chooses not to because Counting Up or Down may seem "babyish."
  - When given larger mental calculation problems, the child may attempt to convert them to written problems by imagining numerals in his or her head and then trying to subtract them.
  - The child may employ Using Tens during mental calculation, and may or may not use it with understanding.
  - The child can say what a principle is, but cannot actually apply it to a problem.
  - Instead of using the principle to avoid unnecessary calculation, he or she performs the calculations, presumably because that is what the "good child" is supposed to do.

- Struggling
  - The child still experiences difficulty with small number differences.
  - The child may lack strategies for calculation, possess primitive strategies but deploy them ineffectively, or try but fail to commit differences to memory.
  - The child may have mastered the principles (zero, same number, and/or inverse) for both small and large numbers. The child is struggling so much with the small numbers, however, that he or she barely has the time or the opportunity to learn the principles.
  - If the child had mental calculation strategies, he or she could not execute them effectively because of lack of proficiency with small number combinations.

Third Grade

- Advanced
  - The child exhibits mastery by quickly recalling small number facts.
  - The child uses and articulates sensible and effective strategies.
  - The child has an understanding of each of the three basic principles: zero, same number, and inverse.
  - The child can apply the principles to numbers of virtually any size.
  - The child is beginning to appreciate the power of tens in two ways. One is to convert numbers to 10 and some other number when doing so simplifies mental calculation. Another is to facilitate mental calculation by dividing two-digit numbers into two components, the tens and the ones, each of which can be subtracted on a mental level.

- Competent
  - The child has mastered most of the number facts and uses sensible strategies to compute and make sense of small number combinations.
  - The child understands at least two of the three principles (zero, same number, and/or inverse).
  - The child is developing strategies for dealing with rather large numbers in mental calculation. He or she is beginning to exploit the power of 10 and the Base 10 system, although not always achieving accurate results.

- Rote
  - The child has memorized these number combinations and does not have good strategies to solve these types of problems when encountering difficulty.
  - The child may be able to use sensible strategies to solve these problems, but chooses not to because Counting Up or Down may seem "babyish."
  - When given larger mental calculation problems, the child may attempt to convert them to written problems by imagining numerals in his or her head and then subtracting them.
  - The child may employ Using Tens during mental calculation, and may or may not use it with understanding.
  - The child can say what a principle is, but cannot actually apply it to a problem.

    - Instead of using the principle to avoid unnecessary calculation, he or she performs the calculations, presumably because that is what the "good child" is supposed to do.

- Struggling
    - The child still experiences difficulty with small number differences.
    - The child may lack strategies for calculation, possess primitive strategies but deploy them ineffectively, or try but fail to commit differences to memory.
    - The child may have mastered the principles (zero, same number, and/or inverse) for both small and large numbers. He or she is struggling so much with the small numbers, however, that he or she barely has the time or the opportunity to learn the principles.
    - If the child had mental calculation strategies, he or she could not execute them effectively because of lack of proficiency with small number combinations.

Small Numbers

Kindergarten	First	Second	Third

The Small Numbers module assesses whether a child understands how to find the difference using one-digit numbers.

Materials

- Chips
- Paper and pencil

Scoring Rules

Articulation/Dialect Issues: The child is not penalized for imperfect pronunciation due to dialect, articulation, or second language interference.

Fifteen-Second Prompt: If the child hesitates an additional five seconds following the 10-second prompt, Mr. Say will appear.

- For kindergartners, say, "Use the chips or your fingers. How much is *x* and *y* altogether?"
- For first through third graders, say, "You can use the chips or your fingers if you want. How much is *x* and *y* altogether?"

Multiple Strategies: Record all strategies that a child employs. No one strategy is correct.

Self-Corrections: Credit an answer that either the child has self-corrected in a reasonable amount of time or that you have incorrectly tapped by tapping the button a second time.

Ten-Second Prompt: If the child doesn't answer within 10 seconds, Mr. Say will appear.

- While recording an observed strategy, prompt the child by saying "How much is *x* take away *y*?"
- While recording an expressed strategy, prompt the child by saying "Tell me what you were thinking to figure out the answer."

Strategies and Details

There are three kinds of strategies to record for Small Numbers. There are strategies you see firsthand (observed strategies), those that the child says he or she used (expressed strategies), and strategies the child recognizes that he or she could have used to solve the problem (alternate strategies).

Some strategies have details and some even have slips. Details define the exact behavior the child exhibited or expressed while using a strategy. Slips are erroneous actions the child may recognize having done despite using an appropriate strategy. These are uncovered when talking with the child about the strategy he or she used.

See the Icon Glossary in the back of this guide for more detailed information.

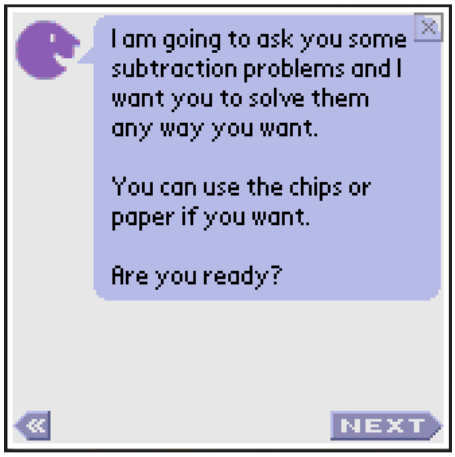
Observed Strategies	Observed Details
Paper	Symbolic Iconic Picture Other
Chips	Count Up Count Down Split Other
Fingers	Count Up Count Down Split Other
Count	Count Up Count Down Other
Other	Guess Imaging Unusual

Expressed and Alternate Strategies	Expressed and Alternate Details
Paper	Symbolic Iconic Picture Other
Chips	Count Up Count Down Split Other

Expressed and Alternate Strategies	Expressed and Alternate Details
Fingers	Count Up Count Down Split Other
Count	Count Up Count Down Other
Memory	
Derived Facts	
Dunno	
Other	Guess Imaging Unusual Restate Estimate

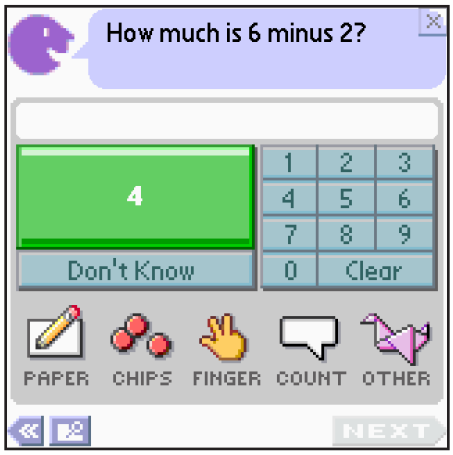
Administration

1. Verify that you have all necessary materials for the module, then tap **Next**.
2. Follow the prompts displayed on the screen, reading all Mr. Say screens aloud to the child, then tap **Next**.



3. Immediately after asking the child the first question, tap **Start**.

4. Tap the **Correct Answer** button if the child answers correctly.



- If the child says a different number, tap his or her number on the keypad to the right.
- If the child says "I don't know," tap **Don't Know**.

5. Tap the strategy you observed the child employing, and details where appropriate, then tap **OK**.
6. Tap **Next**.
7. After you ask, "How did you know that?" the child should try to tell you how he or she arrived at the given answer.

- Select the strategy the child explains, and details where appropriate.
- Sometimes the child may provide a new answer; in that case tap **New** and record the new answer on the keypad, then tap **OK**. The system will prompt you to ask for an expressed strategy for the new answer. Again record observed strategies and appropriate details and tap **Next**.

8. On the Alternate Strategy screen, repeat step 7.

9. After completing all items, continue to Zero Principle.

Score Categories

According to the child's performance and strategy use, he or she is assigned a score category of Expert (third grade only), Adept, Practicing, Rote, or Needs Help. The categories are an indicator of how the child is developing the skills necessary for subtracting small numbers.

First Grade

- Adept: The child comprehends forward and backward counting and/or has developed successful strategies for solving subtraction problems. Alternatively, the child may also have memorized all small number subtraction facts *and* is able to generate an alternate problem-solving strategy.
- Practicing: The child appears to perform poorly but has knowledge of and uses age-appropriate strategies while solving these subtraction problems. He or she is developing skills in forward and backward counting but poorly executes efficient problem-solving strategies, perhaps due to lack of focus.
- Rote: The child appears to perform well but lacks knowledge of the basic counting strategies used to solve challenging problems. In rare instances, the child may get a right answer through luck or a badly applied strategy.
- Needs Help: The child may have difficulty with fundamental skills and concepts such as forward and backward counting, understanding magnitude comparison, and/or executing strategies correctly or efficiently.

Second and Third Grade

- Expert (third grade only): The child who answers correctly by drawing on memorized facts built upon successful use of problem-solving strategies.
- Adept: The child either applies advanced problem-solving strategies or may have memorized all small number subtraction facts *and* is able to generate an alternate problem solving strategy.
- Practicing: The child appears to perform poorly but has knowledge of and uses basic or advanced age-appropriate strategies while solving these subtraction problems.

- Rote: The child appears to perform well but lacks knowledge of the basic counting strategies used to solve challenging problems. In rare instances, the child may get a right answer through luck or a badly applied strategy.
- Needs Help: The child may have difficulty because of inefficient or inappropriate strategy use for his or her age and/or may be guessing.

Zero Principle

Kindergarten	First	Second	Third

The zero principle is the rule that zero, when taken away from any number, will not change the value of that number.

Materials

- Chips
- Paper and pencil

Scoring Rules

Articulation/Dialect Issues: The child is not penalized for imperfect pronunciation due to dialect, articulation, or second language interference.

Self-Corrections: Credit an answer that either the child has self-corrected in a reasonable amount of time or that you have incorrectly tapped by tapping the button a second time.

Ten-Second Prompt: If the child doesn't answer within 10 seconds, Mr. Say will appear.

- While recording an observed strategy, prompt the child by saying "How much is *x* take away *y*?"
- While recording an expressed strategy, prompt the child by saying "Tell me what you were thinking to figure out the answer."

Strategies and Details

There are two kinds of strategies to record for the Zero Principle. There are strategies you see firsthand (observed strategies) and those that the child says he or she used (expressed strategies).

The strategies in this module do not require details.

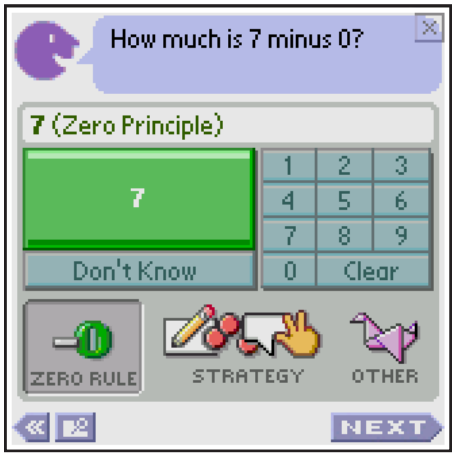
See the Icon Glossary in the back of this guide for more detailed information.

Observed Strategies
Zero Principle
Strategy
Other

Expressed Strategies
Zero Principle
Strategy
Memory
Dunno
Other

Administration

1. Verify that you have all necessary materials for the module, then tap **Next**.
2. Follow the prompts displayed on the screen, reading all Mr. Say screens aloud to the child, then tap **Next**.
3. Immediately after asking the child the question, tap **Start**.
4. Tap the **Correct Answer** button if the child answers correctly.
   - If the child says a different number, tap his or her number on the keypad to the right.
   - If the child says "I don't know," tap **Don't Know**.
5. Tap the strategy you observed the child employing and applicable details, then tap **OK**. If he or she expresses application of the principle, mark it as an observed strategy and the system skips to the next item or module.



6. Tap **Next**.
7. After you ask, "How did you know that?" the child should try to tell you how he or she arrived at the given answer.

   - Select the strategy the child explains, and details where appropriate then tap **OK**.
   - Sometimes the child may provide a new answer; in that case tap **New** and record the new answer on the keypad, then tap **OK**. Record the new Expressed Strategy and appropriate details, then tap **Next**.
8. After completing all items, continue to Same Number Principle.

Score Categories

According to the child's performance and strategy use, he or she is assigned a Score Category of Adept, Mechanical, or Needs Help. The categories are an indicator of how the child is developing the skills necessary for understanding and applying the zero rule.

First Grade

- Adept: The child understands, applies, and generalizes the zero principle and expresses the principle at least once.
- Mechanical: The child lacks an understanding of the zero principle and executes a subtraction strategy as opposed to applying the principle.
- Needs Help: The child lacks an understanding of the zero principle, misinterprets the principle, or, though unlikely, calculates and generates an incorrect answer.

Second and Third Grade

- Adept: The child understands, applies, and generalizes the zero principle.
- Mechanical: The child lacks an understanding of the zero principle and executes a subtraction strategy as opposed to applying the principle.
- Needs Help: The child lacks an understanding of the zero principle, misinterprets the principle, or, though unlikely, calculates and generates an incorrect answer.

Same Number Principle

Kindergarten	First	Second	Third

The same number principle is the principle that anytime you subtract a number from itself the result is still zero.

Materials

- Chips
- Paper and pencil

Scoring Rules

Articulation/Dialect Issues: The child is not penalized for imperfect pronunciation due to dialect, articulation, or second language interference.

Multiple Strategies: Record all strategies that a child employs. No one strategy is correct.

Self-Corrections: Credit an answer that either the child has self-corrected in a reasonable amount of time or that you have incorrectly tapped by tapping the button a second time.

Ten-Second Prompt: If the child doesn't answer within 10 seconds, Mr. Say will appear.

- While recording an observed strategy, prompt the child by saying "How much is *x* take away *y*?"
- While recording an expressed strategy, prompt the child by saying "Tell me what you were thinking to figure out the answer."

Strategies and Details

There are two kinds of strategies to record for the Same Number Principle. There are strategies you see firsthand (observed strategies) and those that the child says he or she used (expressed strategies).

The strategies in this module do not require details.

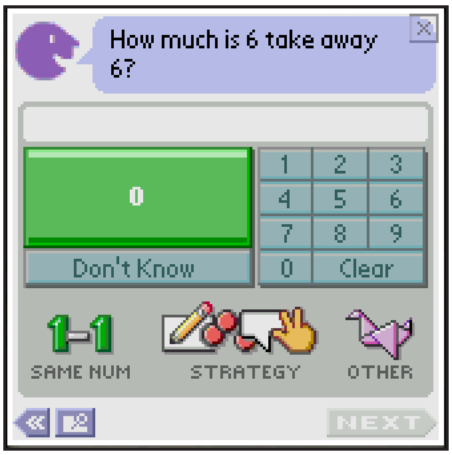
See the Icon Glossary in the back of this guide for more detailed information.

Observed Strategies
Same Number Principle
Strategy
Other

Expressed Strategies
Same Number Principle
Strategy
Memory
Dunno
Other

Administration

1. Verify that you have all necessary materials for the module, then tap **Next**.
2. Follow the prompts displayed on the screen, reading all Mr. Say screens aloud to the child, then tap **Next**.
3. Immediately after asking the child the question, tap **Start**.



4. Tap the **Correct Answer** button if the child answers correctly.
   - If the child says a different number, tap his or her number on the keypad to the right.
   - If the child says "I don't know," tap **Don't Know**.
5. Tap the strategy you observed the child employing, and details where appropriate, then tap **OK**. If he or she expresses application of the principle, mark it as an observed strategy and the system skips to the next item or module.
6. Tap **Next**.
7. After you ask "How did you know that?" the child should try to tell you how he or she arrived at the given answer.
   - Select the strategy the child explains, and details where appropriate.

   - If the child provides a new answer, tap **New** and record the new answer on the keypad, then tap **OK**. Record the new Expressed Strategy and appropriate details, then tap **Next**.
8. After completing all items, continue to the Inverse Principle.

Score Categories

According to the child's performance and strategy use, he or she is assigned a Score Category of Adept, Mechanical, or Needs Help. The categories are an indicator of how the child is developing the skills necessary for understanding and applying the zero rule.

First Grade

- Adept: The child understands, applies, and generalizes the negation principle and expresses the principle at least once.
- Mechanical: The child lacks an understanding of the negation principle and executes subtraction strategy as opposed to applying the principle.
- Needs Help: The child lacks an understanding of the zero principle, misinterprets the principle, or, though unlikely, calculates and generates an incorrect answer.

Second and Third Grade

- Adept: The child understands, applies, and generalizes the negation principle.
- Mechanical: The child lacks an understanding of the negation principle and executes subtraction strategy as opposed to applying the principle.
- Needs Help: The child lacks an understanding of the zero principle, misinterprets the principle, or, though unlikely, calculates and generates an incorrect answer.

Inverse Principle

Kindergarten	First	Second	Third

The inverse principle states that addition negates subtraction and vice versa. By exploring the inverse principle you are building upon the child's knowledge of addition to begin a well-seeded understanding of a more challenging operation, subtraction.

Materials

- Chips
- Paper and pencil

Scoring Rules

Articulation/Dialect Issues: The child is not penalized for imperfect pronunciation due to dialect, articulation, or second language interference.

Multiple Strategies: Record all strategies that a child employs. No one strategy is correct.

Self-Corrections: Credit an answer that either the child has self-corrected in a reasonable amount of time or that you have incorrectly tapped by tapping the button a second time.

Ten-Second Prompt: If the child doesn't answer within 10 seconds, Mr. Say will appear.

- While recording an observed strategy, prompt the child by saying "How much is *a* and *b* altogether?"
- While recording an expressed strategy, prompt the child by saying "Tell me what you were thinking to figure out the answer."

Strategies and Details

There are two kinds of strategies to record for the Inverse Principle. There are strategies you see firsthand (observed strategies) and those that the child says he or she used (expressed strategies).

The strategies in this module do not require details.

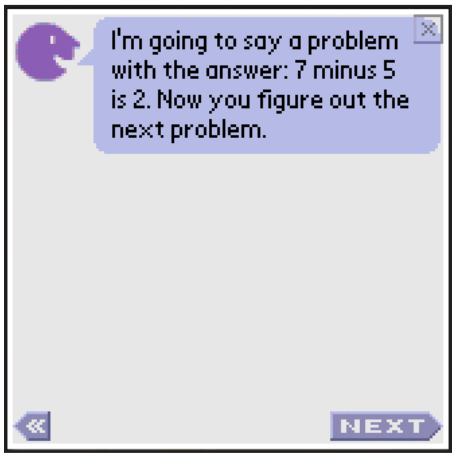
See the Icon Glossary in the back of this guide for more detailed information.

Observed Strategies
Inverse Principle
Strategy
Other

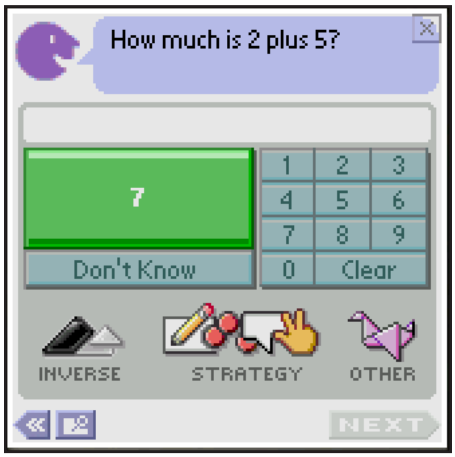
Expressed Strategies
Inverse Principle
Strategy
Memory
Dunno
Other

Administration

1. Verify that you have all necessary materials for the module, then tap **Next**.
2. Follow the prompts displayed on the screen, reading all Mr. Say screens aloud to the child, then tap **Next**.



3. Immediately after asking the child the question, tap **Start**.



4. Tap the **Correct Answer** button if the child answers correctly.
   - If the child says a different number, tap his or her number on the keypad to the right.
   - If the child says "I don't know," tap **Don't Know**.
5. Tap the strategy you observed the child employing and details where appropriate, then tap **OK**. If he or she expresses application of the principle, mark it as an observed strategy and the system skips to the next item or module.
6. Tap **Next**.

7. After you ask "How did you know that?" the child should try to tell you how he or she arrived at the given answer.

- Select the strategy the child explains, and details where appropriate.
- If the child provides a new answer, tap **New** and record the new answer on the keypad, then tap **OK**. Record the new Expressed Strategy and appropriate details, then tap **Next**.

8. After completing all items, continue to Mental Calculation.

Score Categories

According to the child's performance and strategy use, he or she is assigned a Score Category of Adept, Mechanical, or Needs Help. The categories are an indicator of how the child is developing the skills necessary for understanding and applying the zero rule.

- Adept: Understands and applies the inverse principle with familiar numbers but may not generalize.
- Mechanical: The child lacks an understanding of the inverse principle and executes an addition strategy as opposed to applying the principle.
- Needs Help: The child lacks an understanding of the inverse principle and poorly executes problem-solving strategies.

Mental Calculation

Kindergarten	First	Second	Third

This exercise reveals a child's ability to subtract one- and two-digit numbers from each other, without using manipulatives. The child should rely on knowledge of tens to answer these challenging subtraction problems. Children who are able to successfully apply the Base 10 concept solve problems more efficiently by reducing the need for computation.

Materials

None

Scoring Rules

Articulation/Dialect Issues: The child is not penalized for imperfect pronunciation due to dialect, articulation, or second language interference.

Multiple Strategies: Record all strategies that a child employs. No one strategy is correct.

Self-Corrections: Credit an answer that either the child has self-corrected in a reasonable amount of time or that you have incorrectly tapped by tapping the button a second time.

Ten-Second Prompt: If the child doesn't answer within 10 seconds, Mr. Say will appear.

- While recording an observed strategy, prompt the child by saying "You have to think about it. How much is *x* take away *y*?"
- While recording an expressed strategy, prompt the child by saying "Tell me what you were thinking to figure out the answer."

Strategies and Details

There are two kinds of strategies to record for Mental Calculation in Subtraction. There are strategies you see firsthand (observed strategies) and those that the child says he or she used (expressed strategies).

See the Icon Glossary in the back of this guide for more detailed information.

Observed Strategies	Observed Details
Fingers	Count Up Count Down Other
Count	Count Up Count Down Other
Imagining Writing	

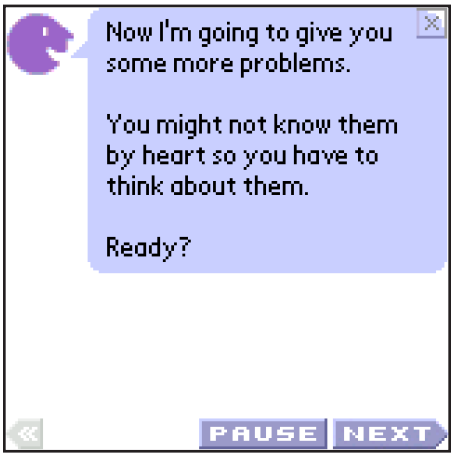
Observed Strategies	Observed Details
Other	Guess Imaging Unusual

Expressed Strategies	Expressed Details
Uses tens	
Fingers	Count Up Count Down Other
Count	Count Up Count Down Other
Imagining Writing	
Memory	
Derived Facts	
Dunno	
Other	Guess Imaging Unusual Restate Estimate

Administration

1. Remove any and all manipulatives from the area.

2. Follow the prompts displayed on the screen, reading all Mr. Say screens aloud to the child, then tap **Next**.



3. Immediately after asking the child the question, tap **Start**.
4. Tap the **Correct Answer** button if the child answers correctly.

   - If the child says a different number, tap his or her number on the keypad to the right.
   - If the child says "I don't know," tap **Don't Know**.
5. Tap the strategy the child employed, and details where appropriate, then tap **OK**.
6. Tap **Next**.

7. After you ask "How did you know that?" the child should try to tell you how he or she arrived at the given answer.
   - Select the strategy the child explains, and details where appropriate, then tap **OK**.

   - If the child provides a new answer, tap **New** and record the new answer on the keypad, then tap **OK**. Record the new Expressed Strategy and appropriate details, then tap **OK**.
8. Tap **Next**.
9. After completing the first items, the system prompts you to ask children in the highest score category two more items at the next highest grade level. These items are not used for scoring, but to further explore the child's mathematical abilities.
10. After completing all items, tap **Next** to continue to the Expression slider and Imagination question.

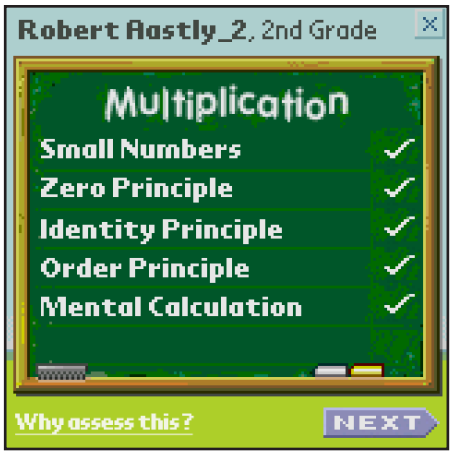
Score Categories

According to the child's performance and strategy use, he or she is assigned a Score Category of Adept, Practicing, Mechanical, or Needs Help. The categories are an indicator of how the child is developing the skills necessary for understanding and applying the Base 10 principle.

- Adept: The child applies advanced problem solving-strategies.
- Practicing: The child appears to perform poorly but mentally calculates using advanced subtraction strategy.
- Mechanical: The child appears to perform well but relies on advanced counting strategies and/or Derived Facts to solve mental calculation problems as opposed to Using Tens.
- Needs Help: The child may have difficulty because of inefficient or inappropriate strategy use for his or her age.

Multiplication

The Multiplication interview probes a child's ability to multiply using different principles and strategies. There are five modules that help to reveal a child's mathematical knowledge of multiplication. This interview is appropriate for children in second and third grade.



1. Small Numbers
2. Zero Principle
3. Identity Principle
4. Order Principle
5. Mental Calculation

Purpose

Children also develop informal methods for multiplication. Prior to formal instruction, experiences in producing groups comprised of the same number of objects can provide a basis for understanding core multiplication ideas of multiplication. For example, in giving two pieces of candy to each of three children at a party, the child gives two pieces to each friend and then counts each roll one by one to determine the total, which is equivalent to the product of 3 x 2.

In school, children learn to master multiplication "facts," small multiplication combinations. They need to know, for example, that 3 x 2 is 6. Many children approach this task by first using various strategies and principles to calculate the answers. For example, a second grader may solve the problem by skip counting, saying, "Two, four, six." He or she may use Derived Facts (saying, "I know that 2 x 2 is 4, so 2 more is 6") the principle of commutativity (saying, "I know that 2 x 3 is 6, so I know that 3 x 2 must also be 6 because the order doesn't make a difference"). Of course, the goal is for children to retrieve known number combinations from memory or derive them from principles and to employ strategies as useful backups and methods for self-evaluation.

Mastery of small multiplication number combinations (that is, recalling them quickly and accurately from memory) plays a central role in early mathematics education. Mastery is useful, especially when the child encounters challenging problems involving large numbers. For example, if solving 64 x 39, the child should have the "facts" (i.e., 4 x 9 = 36) on his or her mental fingertips, and is then able to concentrate instead on the rather elaborate calculation algorithm for multiplication.

Besides achieving mastery of the facts, children also need to understand basic mathematical ideas such as the role of zero (anything multiplied by zero is zero), identity (any number times one is that number) and commutativity (the order of the numbers does not affect the result). Understanding these fundamental principles is key to successful mathematical performance and sets the stage for learning algebraic ideas later in life.

Children gradually develop informal mental calculation methods for larger multiplication problems. At first, children may use some combination of adding and counting while mentally tracking the number of groups specified by the multiplier. For example, as the child solves 2 x 12, he or she whispers, "1, 2, … 11, 12. That's one group … 13, 14, … 23, 24. That's two groups. So the answer is 24." In third grade, children begin to simplify even larger multiplication problems by decomposing (partitioning) them into tens and ones. For example, as a child solves 23 x 3, he or she says, "20 x 3 is 60. 3 x 4 is 12. 60 + 12 is 72. So the answer is 72."

Children at risk of school failure tend to have difficulty with small number combinations, mental calculation, and basic mathematical ideas, and they tend to use immature strategies for solving problems. For example, they tend to count the members of each set rather than skip count, saying, "Two, four, six…", which is a more economical and efficient strategy.

In brief, assessment of children's accuracy, strategies, and principles allows us to identify not only weaknesses that predict poor mathematics achievement but also strengths that lay the foundation for prescribed instructional approaches.

Interview Profiles

Profiles represent different levels of understanding at each grade level. Each child is assigned one of four kinds of profiles for the Multiplication interview: Advanced, Competent, Rote, or Struggling.

Second Grade

- Advanced
  - The child exhibits mastery by quickly recalling small number facts.
  - The child uses and articulates sensible and effective strategies.
  - The child has an understanding of at least one of the three basic principles: zero, same number, and order.
  - The child's understanding of the principles is abstract. He or she can apply the zero principle to numbers of virtually any size; he or she can generalize the identity and order principles to multiply problems not computed (or could not compute).
  - The child is beginning to appreciate the power of tens. The child divides two-digit numbers into two components, the tens and the ones, each of which can be multiplied on a mental level.

- Competent
  - The child uses sensible strategies that help him or her compute and make sense of the small number combinations.
  - The child may have already memorized some of the products.
  - The child has a grasp on at least one of the three principles (zero, identity, and/or commutativity) for both small and large numbers.
  - The child is developing — perhaps imperfectly — strategies for dealing with rather large numbers during mental calculation. He or she is beginning to exploit the power of ten and the Base 10 system, but may not achieve accurate results.

- Rote
  - The child has memorized these number combinations and does not have good strategies to solve these types of problems when encountering difficulty.
  - The child may be able to use sensible strategies to solve these problems, but chooses not to because Repeated Addition may seem "babyish."
  - When given larger problems for mental calculation, the child may attempt to convert them to written problems, imagining numerals in his or her head and then multiplying them.
  - The child may even use knowledge of the Base 10 system to solve mental calculation problems, and may or may not use it with understanding.
  - The child can say what a principle is, but cannot actually apply it to a problem.
  - Instead of using the principles to avoid unnecessary calculation, he or she performs the calculations, presumably because that is what the "good child" is supposed to do.

- Struggling
  - The child still experiences difficulty with small number products.
  - The child may lack strategies for calculation, possess primitive strategies but deploy them ineffectively, or try but fail to commit differences to memory.
  - The child may have mastered the principles (zero, same number, and/or inverse) for both small and large numbers. The child is struggling so much with the small numbers, however, that he or she barely has the time or the opportunity to learn the principles.
  - If the child used mental calculation strategies, he or she could not execute them effectively because of lack of proficiency with small number combinations.

Third Grade

- Advanced
  - The child exhibits mastery by quickly recalling small number facts.
  - The child uses and articulates sensible and effective strategies.
  - The child has an understanding of three basic principles: zero, identity, and order principles.
  - The child's understanding of the principles is abstract: he or she can apply the zero principle to numbers of virtually any size and can generalize identity and order to multiplication problems he or she has not even computed (or could not compute).
  - The child appreciates the power of tens. He or she divides two-digit numbers into two components, the tens and the ones, each of which can easily be multiplied on a mental level.

- Competent
  - The child has some sensible strategies that help him or her compute and make sense of the small number combinations.
  - The child has a grasp on and is able to generalize at least two of the three principles (zero, identity, and/or commutativity).

  - The child is developing strategies — perhaps imperfectly — for dealing with rather large numbers during mental calculation.
  - The child is beginning to exploit the power of 10 and the Base 10 system, but may not always achieve accurate results.

- Rote
  - The child has memorized these number combinations and does not have good strategies to solve these types of problems when encountering difficulty.
  - The child may be able to use sensible strategies to solve these problems, but chooses not to because Repeated Addition may seem "babyish."
  - When given larger problems for mental calculation, the child may attempt to convert them to written problems, imagining numerals in his or her head and then multiplying them.
  - The child may even use knowledge of the Base 10 system to solve mental calculation problems, and may or may not use it with understanding.

- Struggling
  - The child still experiences difficulty with small number products.
  - The child may lack strategies for calculation, possess primitive strategies but deploy them in ineffectively, or try but fail to commit results to memory.
  - The child may have mastered the principles (zero, same number, and/or inverse) for both small and large numbers. The child is struggling so much with the small numbers, however, that he or she barely has the time or the opportunity to learn the principles.
  - If the child used mental calculation strategies, he or she could not execute them effectively because of lack of proficiency with small number combinations.

Small Numbers

Kindergarten	First	Second	Third

The Small Numbers module assesses whether a child understands how to multiply one-digit numbers.

Materials

Paper and pencil

Scoring Rules

Articulation/Dialect Issues: The child is not penalized for imperfect pronunciation due to dialect, articulation, or second language interference.

Fifteen-Second Prompt: If the child hesitates an additional five seconds following the 10-second prompt, Mr. Say will appear. Prompt the child by saying, "You can use the paper and pencil if you want. How much is *a* times *b*?"

Multiple Strategies: Record all strategies that a child employs. No one strategy is correct.

Self-Corrections: Credit an answer that either the child has self-corrected in a reasonable amount of time or that you have incorrectly tapped by tapping the button a second time.

Ten-Second Prompt: If the child doesn't answer within 10 seconds, Mr. Say will appear.

- While recording an observed strategy, prompt the child by saying "You can solve it any way you want. How much is *a* times *b*?"
- While recording an expressed strategy, prompt the child by saying "Tell me what you were thinking to figure out the answer."

Strategies and Details

There are three kinds of strategies to record for Small Numbers. There are strategies you see firsthand (observed strategies), those that the child says he or she used (expressed strategies), and strategies the child recognizes that he or she could have used to solve the problem (alternate strategies).

Some strategies have details and some even have slips. Details define the exact behavior the child exhibited or expressed while using a strategy. Slips are erroneous actions the child may recognize having done despite using an appropriate strategy. These are uncovered when talking with the child about the strategy he or she used.

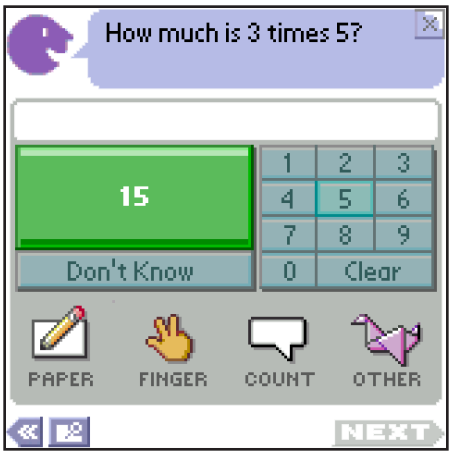
See the Icon Glossary in the back of this guide for more detailed information.

Observed Strategies	Observed Details
Paper	Symbolic Iconic Picture Other
Fingers	Count All Skip Count Repeated Addition Other
Count	Count All Skip Count Repeated Addition Other
Other	Guess Imaging Unusual

Expressed and Alternate Strategies	Expressed and Alternate Details
Paper	Symbolic Iconic Picture Other
Fingers	Count All Skip Count Repeated Addition Other
Count	Count All Skip Count Repeated Addition Other
Memory	
Derived Facts	
Dunno	
Other	Guess Imaging Unusual Restate Estimate

Administration

1. Verify that you have all necessary materials for the module, then tap **Next**.
2. Follow the prompts displayed on the screen, reading all Mr. Say screens aloud to the child, then tap **Next**.
3. Immediately after asking the child the question, tap **Start**.



4. Tap the **Correct Answer** button if the child answers correctly.
   - If the child says a different number, tap his or her number on the keypad to the right.
   - If the child says "I don't know," tap **Don't Know**.
5. Tap the strategy you observed the child employing, and details where appropriate, then tap **OK**.
6. Tap **Next**.
7. After you ask, "How did you know that?" the child should try to tell you how he or she arrived at the given answer.

   - Select the strategy the child explains, and details where appropriate, then tap **OK**.
   - Sometimes the child may provide a new answer; in that case tap **New** and record the new answer on the keypad, then tap **OK**. Record the new Expressed Strategy and appropriate details, then tap **OK**.
8. Tap **Next**.

9. On the Alternate Strategy screen, repeat step 7.

10. After completing all the items, continue to Zero Principle.

Score Categories

According to the child's performance and strategy use, he or she is assigned a status of Adept, Practicing, Rote, or Needs Help. The categories are an indicator of how the child is developing the skills necessary for multiplying small numbers.

- Adept: The child uses successful strategies for solving these multiplication problems or may have memorized all small number multiplication facts *and* is able to generate an alternate problem solving strategy.
- Practicing: The child appears to perform poorly but has knowledge of and uses age-appropriate strategies while solving these multiplication problems. However, he or she poorly executes efficient problem-solving strategies, perhaps due to lack of focus.
- Rote: The child appears to perform well but may have only memorized multiplication combinations, lacking knowledge of the basic counting strategies used to solve these problems. In rare instances, the child may get a right answer through luck or a badly applied strategy.
- Needs Help: The child may have difficulty because of inefficient or inappropriate strategy use for his or her age.

Zero Principle

Kindergarten	First	Second	Third

The zero principle is the rule that any number multiplied by zero results in zero.

Materials

Paper and pencil

Scoring Rules

Articulation/Dialect Issues: The child is not penalized for imperfect pronunciation due to dialect, articulation, or second language interference.

Multiple Strategies: Record all strategies that a child employs. No one strategy is correct.

Self-Corrections: Credit an answer that either the child has self-corrected in a reasonable amount of time or that you have incorrectly tapped by tapping the button a second time.

Ten-Second Prompt: If the child doesn't answer within 10 seconds, Mr. Say will appear.

- While recording an observed strategy, prompt the child by saying "How much is *a* times *b*?"
- While recording an expressed strategy, prompt the child by saying "Tell me what you were thinking to figure out the answer."

Strategies and Details

There are two kinds of strategies to record for the Zero Principle. There are strategies you see firsthand (observed strategies) and those that the child says he or she used (expressed strategies).

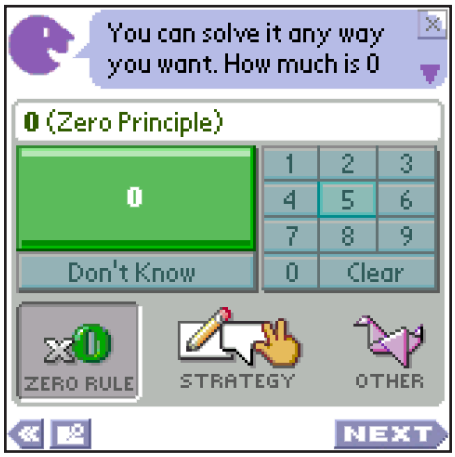
The strategies in this module do not require details. See the Icon Glossary for more information.

Observed Strategies
Zero Principle
Strategy
Other

Expressed Strategies
Zero Principle
Strategy
Memory
Dunno
Other

Administration

1. Verify that you have all necessary materials for the module, then tap **Next**.
2. Follow the prompts displayed on the screen, reading all Mr. Say screens aloud to the child, then tap **Next**.
3. Immediately after asking the child the question, tap **Start**.
4. Tap the **Correct Answer** button if the child answers correctly.
   - If the child says a different number, tap his or her number on the keypad to the right.
   - If the child says "I don't know," tap **Don't Know**.
5. Tap the strategy you observed the child employing. If he or she expresses application of the principle, mark it as an observed strategy and the system skips to the next item or module.



6. Tap **Next**.
7. After you ask, "How did you know that?" the child should try to tell you how he or she arrived at the given answer. Select the strategy the child explains, then tap **Next**. If the child provides a new answer, tap **New** and record that answer by tapping the numbers on the keypad.

8. After completing all items, continue to Identity Principle.

Score Categories

According to the child's performance and strategy use, he or she is assigned a Score Category of Adept, Mechanical, or Needs Help. The categories are an indicator of how the child is developing the skills necessary for understanding and applying the zero principle.

- Adept: The child understands, applies, and generalizes the zero principle.
- Mechanical: The child lacks an understanding of the zero principle but correctly executes a multiplication strategy as opposed to applying the principle.
- Needs Help: The child lacks an understanding of the zero principle, misinterprets the principle, or, though unlikely, calculates and generates an incorrect answer.

Identity Principle

Kindergarten	First	Second	Third

The identity principle states that a number multiplied by one retains its identity by remaining the same.

Materials

Paper and pencil

Scoring Rules

Articulation/Dialect Issues: The child is not penalized for imperfect pronunciation due to dialect, articulation, or second language interference.

Multiple Strategies: Record all strategies that a child employs. No one strategy is correct.

Self-Corrections: Credit an answer that either the child has self-corrected in a reasonable amount of time or that you have incorrectly tapped by tapping the button a second time.

Ten-Second Prompt: If the child doesn't answer within 10 seconds, Mr. Say will appear.

- While recording an observed strategy, prompt the child by saying "How much is *a* times *b*?"
- While recording an expressed strategy, prompt the child by saying "Tell me what you were thinking to figure out the answer."

Strategies and Details

There are two kinds of strategies to record for the Identity Principle. There are strategies you see firsthand (observed strategies) and those that the child says he or she used (expressed strategies).

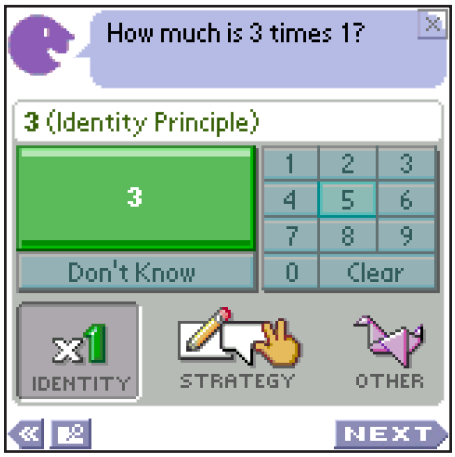
The strategies in this module do not require details. See the Icon Glossary for more information.

Observed Strategies
Identity Principle
Strategy
Other

Expressed Strategies
Identity Principle
Strategy
Memory
Dunno
Other

Administration

1. Verify that you have all necessary materials for the module, then tap **Next**.
2. Follow the prompts displayed on the screen, reading all Mr. Say screens aloud to the child, then tap **Next**.
3. Immediately after asking the child the question, tap **Start**.
4. Tap the **Correct Answer** button if the child answers correctly.
   - If the child says a different number, tap his or her number on the keypad to the right.
   - If the child says "I don't know," tap **Don't Know**.
5. Tap the strategy you observed the child employing. If he or she expresses application of the principle, mark it as an observed strategy and the system skips to the next item or module.



6. Tap **Next**.
7. After you ask, "How did you know that?" the child should try to tell you how he or she arrived at the given answer.

   - Select the strategy the child explains, then tap **Next**.
   - Sometimes the child may provide a new answer; in that case tap **New** and record the new answer on the keypad, then tap **OK**. Record the new Expressed Strategy, then tap **Next**.
8. After completing all items, continue to Order Principle.

Score Categories

According to the child's performance and strategy use, he or she is assigned a Score Category of Adept, Mechanical, or Needs Help. The categories are an indicator of how the child is developing the skills necessary for understanding and applying the identity principle.

- Adept: The child understands, applies, and generalizes the zero principle.
- Mechanical: The child lacks an understanding of the zero principle but correctly executes a multiplication strategy as opposed to applying the principle.
- Needs Help: The child lacks an understanding of the zero principle, misinterprets the principle, or, though unlikely, calculates and generates an incorrect answer.

Order Principle

Kindergarten	First	Second	Third

The order principle states that the order of numbers within a problem does not affect the product. For example, if *a* x *b* = *z*, then *b* x *a* = *z*.

Materials

Paper and pencil

Scoring Rules

Articulation/Dialect Issues: The child is not penalized for imperfect pronunciation due to dialect, articulation, or second language interference.

Multiple Strategies: Record all strategies that a child employs. No one strategy is correct.

Self-Corrections: Credit an answer that either the child has self-corrected in a reasonable amount of time or that you have incorrectly tapped by tapping the button a second time.

Ten-Second Prompt: If the child doesn't answer within 10 seconds, Mr. Say will appear.

- While recording an observed strategy, prompt the child by saying "How much is *a* times *b*?"
- While recording an expressed strategy, prompt the child by saying "Tell me what you were thinking to figure out the answer."

Strategies and Details

There are two kinds of strategies to record for the Order Principle. There are strategies you see firsthand (observed strategies) and those that the child says he or she used (expressed strategies).

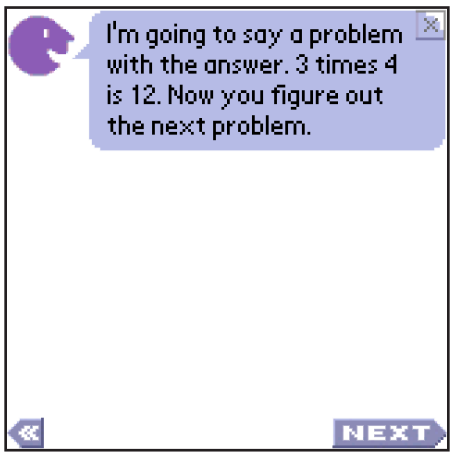
The strategies in this module do not require details. See the Icon Glossary for more information.

Observed Strategies
Order Principle
Strategy
Other

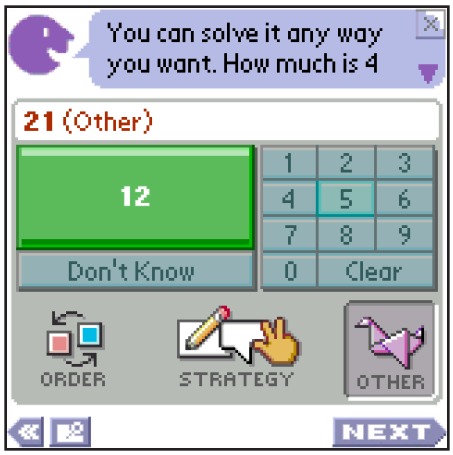
Expressed Strategies
Order Principle
Strategy
Memory
Dunno
Other

Administration

1. Verify that you have all necessary materials for the module, then tap **Next**.
2. Follow the prompts displayed on the screen, reading all Mr. Say screens aloud to the child, then tap **Next**.



3. Immediately after asking the child the question, tap **Start**.
4. Tap the **Correct Answer** button if the child answers correctly.
   - If the child says a different number, tap his or her number on the keypad to the right.
   - If the child says "I don't know," tap **Don't Know**.
5. Tap the strategy you observed the child employing, then tap **Next**. If he or she expresses application of the principle, mark it as an observed strategy and the system skips to the next item or module.



6. Tap **Next**.

7. After you ask, "How did you know that?" the child should try to tell you how he or she arrived at the given answer.
   - Select the strategy the child explains, then tap **Next**.

   - Sometimes the child may provide a new answer; in that case tap **New** and record the new answer on the keypad, then tap **OK**. Record the new Expressed Strategy, then tap **Next**.
8. After completing all items, continue to Mental Calculation.

Score Categories

According to the child's performance and strategy use, he or she is assigned a Score Category of Adept, Mechanical, or Needs Help. The categories are an indicator of how the child is developing the skills necessary for understanding and applying the order principle.

- Adept: The child understands, applies, and generalizes the commutativity principle.
- Mechanical: The child lacks an understanding of the commutativity principle but correctly executes a multiplication strategy as opposed to applying the principle.
- Needs Help: The child lacks an understanding of the zero principle, misinterprets the principle, or, though unlikely, calculates and generates an incorrect answer.

Mental Calculation

Kindergarten	First	Second	Third

This interview reveals a child's ability to multiply one- and two-digit numbers from each other, without the use of manipulatives. The child should rely on knowledge of tens to answer these challenging multiplication problems. Children who are able to successfully apply the Base 10 concept solve problems more efficiently by reducing the need for computation.

Materials

None

Scoring Rules

Articulation/Dialect Issues: The child is not penalized for imperfect pronunciation due to dialect, articulation, or second language interference.

Multiple Strategies: Record all strategies that a child employs. No one strategy is correct.

Self-Corrections: Credit an answer that either the child has self-corrected in a reasonable amount of time or that you have incorrectly tapped by tapping the button a second time.

Ten-Second Prompt: If the child doesn't answer within 10 seconds, Mr. Say will appear.

- While recording an observed strategy, prompt the child by saying "You have to think about it. How much is *a* times *b*?"
- While recording an expressed strategy, prompt the child by saying "Tell me what you were thinking to figure out the answer."

Strategies and Details

There are two kinds of strategies to record for Mental Calculation in Subtraction. There are strategies you see firsthand (observed strategies) and those that the child says he or she used (expressed strategies).

See the Icon Glossary for more detailed information.

Observed Strategies	Observed Details
Fingers	Count All Skip Count Repeated Addition Other

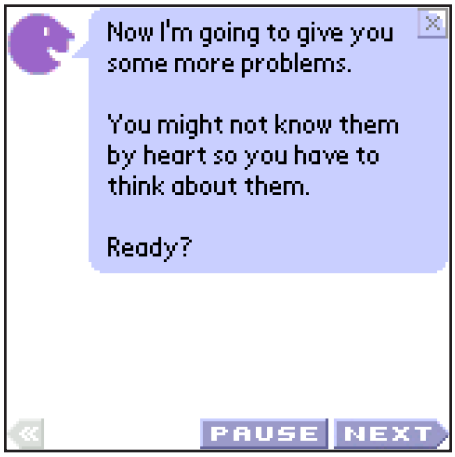
Observed Strategies	Observed Details
Count	Count All Skip Count Repeated Addition Other
Imagining Writing	
Other	Guess Imaging Unusual

Expressed Strategies	Expressed Details
Uses tens	
Fingers	Count All Skip Count Repeated Addition Other
Count	Count All Skip Count Repeated Addition Other
Imagining Writing	
Memory	
Derived Facts	
Dunno	
Other	Guess Imaging Unusual Restate Estimate

Administration

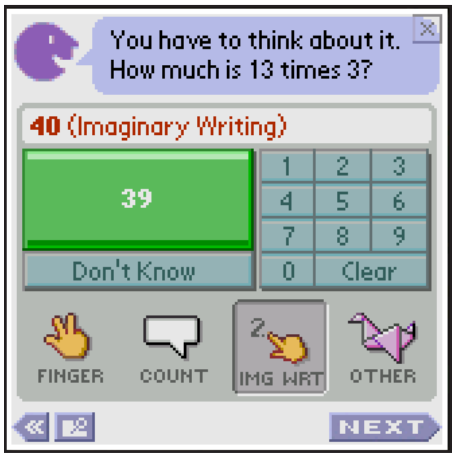
1. Remove any and all manipulatives from the area, then tap **Next**.

2. Follow the prompts displayed on the screen, reading all Mr. Say screens aloud to the child, then tap **Next**.



3. Immediately after asking the child the question, tap **Start**.

4. Tap the **Correct Answer** button if the child answers correctly.
   - If the child says a different number tap his or her number on the keypad to the right.



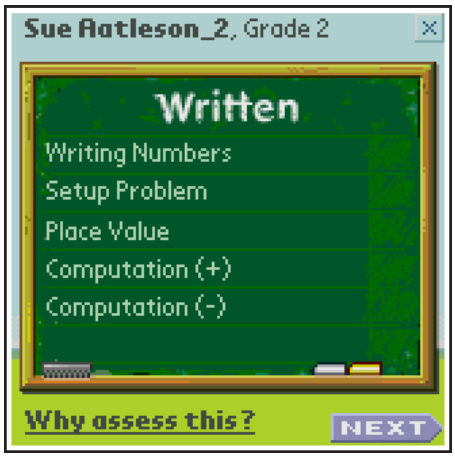
   - If the child says "I don't know," tap **Don't Know**.
5. Tap the strategy the child employed, and details where appropriate, then tap **OK**.
6. Tap **Next**.
7. After you ask "How did you know that?" the child should try to tell you how he or she arrived at the given answer.
   - Select the strategy the child explains, and details where appropriate.
   - If the child provides a new answer, tap **New** and record the new answer on the keypad, then tap **OK**. Record the new Expressed Strategy and appropriate details, then tap **OK**.
8. Tap **Next**.
9. After completing all items, tap **Next** to continue to the Expression slider and Imagination question.

Score Categories

According to the child's performance and strategy use, he or she is assigned a Score Category of Adept, Practicing, Mechanical, or Needs Help. The categories are an indicator of how the child is developing the skills necessary for understanding and applying the Base 10 principle.

- Adept: The child applies advanced problem solving-strategies.
- Practicing: The child appears to perform poorly but mentally calculates by simplifying the problem by Using Tens, an advanced multiplication strategy.
- Mechanical: The child appears to perform well but relies on advanced counting strategies and/or Derived Facts to solve mental calculation problems as opposed to Using Tens.
- Needs Help: The child may have difficulty because of inefficient or inappropriate strategy use for his or her age.

Written



The Written interview, for first through third grade children, explores a child's skills and understanding of the fundamental concepts and procedures underlying written mathematics. Specifically, this interview analyzes a child's ability to write numbers correctly and to set up, solve, and explain the procedures for addition, subtraction, and multiplication problems.

This interview also detects systematic errors that children may think rational, but actually reveal specific misconceptions about the written algorithms.

There are six modules that help to reveal a child's written mathematical knowledge.

1. Writing Numbers (1–3)
2. Setup Problem (1–3)
3. Place Value (1–3)
4. Computation + (2–3)
5. Computation – (2–3)
6. Computation x (3)

Purpose

Children are exposed to conventional symbols like numbers on houses or board games in their everyday environments; however, they are not expected to use these symbols to write numbers, set up problems, and/or represent basic arithmetic operations prior to formal instruction. During the primary years, children typically master the use of basic numerals with little difficulty. For example, most kindergartners can write all single-digit numerals and first graders easily set up addition and subtraction problems involving odd numbers of digits. Yet some children show weakness in these areas: they may forget how to write numerals, may employ sloppy writing, or may flip the orientation of individual digits. Some children may also misalign the numbers when setting up addition or subtraction problems involving uneven numbers of digits, especially at the outset, when they are unfamiliar with such problems. Since correct writing of numerals and proper alignment underlie all written calculation operations, early identification and remediation of these difficulties are crucial for successful mathematical achievement.

As numbers become larger, weakness in place value concepts may hinder performance. For example, some children write numbers as they sound, such as writing 203 instead of 23. Successful reading and writing of numerals containing two or more digits requires an understanding of the relationship among the various digits. That is, children must be able to view multi-digit numbers as composites of ones, tens, hundreds, and thousands.

Place value understanding is also essential for computation involving larger numbers. Weakness in place value understanding may result in difficulties regrouping in addition, subtraction, and multiplication. For example, a child struggling with place value concepts may fail to understand the

need for regrouping and therefore may perform the following calculation:

```
 23
+19
 32
```

or the child struggling with place value ideas may write

```
 23
+19
 312
```

Both of these examples may be considered to have resulted from "buggy" rules. In the first case, throwing away the one, and in the second, writing all numbers added below the line. Early identification and remediation of place value understanding and systematic calculation errors are fundamental to successful mathematics achievement.

Interview Profiles

Profiles represent different levels of understanding at each grade level. Each child is assigned one of four kinds of profiles for the Written Interview: Advanced, Competent, Rote, or Struggling.

First Grade

- Advanced
  - The child may accurately write single- and double-digit numerals.
  - The child may properly align numbers when setting up addition and subtraction problems.
  - The child recognizes the place value of each digit in a double-digit numeral.
  - The child views double-digit numerals as composites of tens and ones.

- Competent
  - The child is able to write single-digit numerals, but may make mistakes.
  - The child may not remember, act hastily, or reverse individual digits.
  - The child may write double-digit numerals as they sound.
  - The child only needs a bit of practice and encouragement to evaluate his or her work.
  - The child properly aligns numbers when setting up addition and subtraction problems, but is sometimes hasty.
  - The child recognizes the place value of each digit in a double-digit numeral.
  - The child views double-digit numerals as composites of tens and ones.

- Rote
  - The child may accurately write single- and double-digit numerals.
  - The child may properly align numbers when setting up addition and subtraction problems.
  - The child has difficulty recognizing the place value of each digit in a two-digit numeral (i.e., identifying tens and ones).

- Struggling
  - The child may have difficulty accurately representing single- or double-digit numerals.
  - The child may not properly align numbers when setting up addition and subtraction problems.
  - The child has difficulty recognizing the place value of each digit in a double-digit numeral.

Second Grade

- Advanced
  - The child accurately writes three-digit numerals.
  - The child properly aligns numbers when setting up addition and subtraction problems.
  - The child recognizes the place value of each digit in a three-digit numeral (i.e., identifies hundreds, tens, and ones).
  - The child accurately solves addition and subtraction problems and shows evidence of carrying and borrowing.

- Competent
  - The child is able to write single-digit numerals, but may make mistakes.
  - The child may not remember, act hastily, or reverse individual digits.
  - The child may write three-digit numerals as they sound.
  - The child only needs a bit of practice and encouragement to evaluate his or her work.
  - The child aligns numbers when setting up addition and subtraction problems, but is sometimes hasty.
  - The child recognizes the place value of each digit in a double-digit numeral, showing that he or she views three-digit numerals as composites of hundreds, tens, and ones, but may be careless.
  - The child displays evidence of correct procedures at least once in addition and subtraction, but may not achieve accurate results.

- Rote
  - The child may accurately write three-digit numerals.
  - The child may properly align numbers when setting up addition and subtraction problems.
  - The child may recognize the place value of each digit in a three-digit numeral (i.e., identifies hundreds, tens, and ones); however, he or she may also have memorized the various positions and not actually understand place value.
  - The child may show evidence of carrying and borrowing at least once per operation.

- Struggling
  - The child may be able to write some single-, double-, and three-digit numerals.
  - The child may properly align numbers when setting up addition and subtraction problems.
  - The child has trouble recognizing the place value of each digit in two- and three-digit numerals (i.e., hundreds, tens, and ones).
  - The child may show evidence of carrying and borrowing when solving addition and subtraction problems, but does not achieve accurate results.

Third Grade

- Advanced
  - The child accurately writes four-digit numerals.
  - The child properly aligns numbers when setting up addition, subtraction, and multiplication problems.
  - The child easily recognizes the place value of each digit in a four-digit numeral (i.e., identifies thousands, hundreds, tens, and ones).
  - The child accurately solves addition and subtraction problems, and shows evidence of carrying and borrowing.
  - The child may have difficulty with multiplication problems.

- Competent
  - The child is able to write single-digit numerals, but may make mistakes.
  - The child may not remember, act hastily, or reverse individual digits.
  - The child may write three-digit numerals as they sound.
  - The child only needs a bit of practice and encouragement to evaluate his or her work.
  - The child aligns numbers when setting up addition, subtraction, and/or multiplication problems, but is sometimes hasty.
  - The child recognizes the place value of each digit in a four-digit numeral, viewing the numeral as a composite of thousands, hundreds, tens, and ones, but may make mistakes.
  - The child displays evidence of correct procedures at least once during addition, subtraction, and/or multiplication, but may not achieve accurate results.

- Rote
  - The child may accurately write four-digit numerals.
  - The child may properly align numbers when setting up addition, subtraction, and multiplication problems.
  - The child may recognize the place value of each digit in a four-digit numeral (i.e., identifies thousands, hundreds, tens, and ones); however, he or she may also have memorized the various positions and does not actually grasp place value concepts.
  - The child shows evidence of carrying and borrowing at least once during addition, subtraction, and/or multiplication problems.

- Struggling
  - The child may be able to write some one-, two-, three-, and four-digit numerals.
  - The child may properly align numbers when setting up addition, subtraction, and multiplication problems.
  - The child has trouble recognizing the place value of each digit in three- and four-digit numerals (i.e., thousands, hundreds, tens, and ones).
  - The child may show evidence of carrying and borrowing when solving addition, subtraction, or multiplication problems, but does not achieve accurate results.

Writing Numbers

Kindergarten	First	Second	Third

Translating spoken numbers into correctly written numerals is an important step in written mathematics. Children who have mastered this piece will write the correct numerals (e.g., 7 for seven) and put them in the correct order (e.g., 23 for twenty-three).

Materials

Paper and pencil

Scoring Rules

Commas: Commas are not scored. If a child uses a comma when writing a number, incorrectly or correctly, record that information in the notes for that item or Interview.

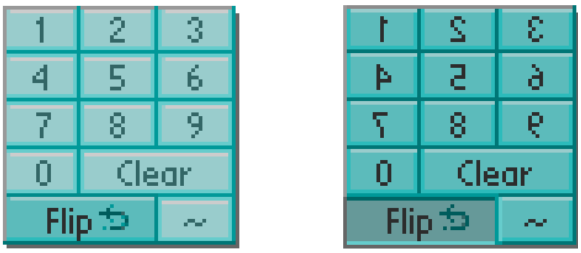
Flipped Digit: A digit is considered "flipped," and therefore incorrect, when the child writes a numeral in the incorrect orientation; that may be upside down, backward, horizontally, etc.

Multiple Errors: A child may make multiple errors on the same item without affecting the final score.

Error Types

An item is considered correct only if there are no errors. In aiming to calculate the most accurate score possible, there are multiple errors and error types that can be recorded.

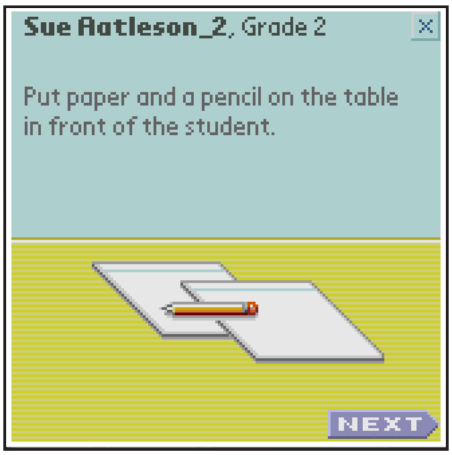
- Single-digit Errors
  - Flipped Digit: To record a Flipped Digit, tap **Flip** on the numeric keypad and tap the flipped digit.



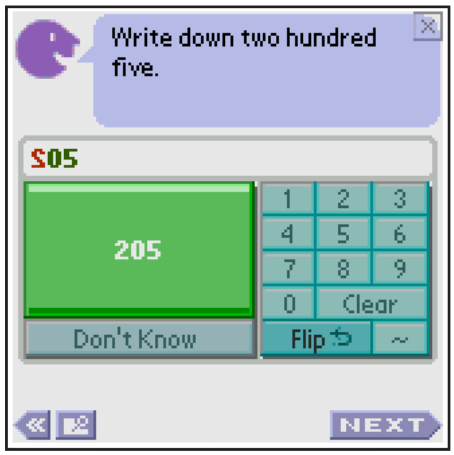
  - Wrong Digit: If the child writes an incorrect digit, tap the number on the numeric keypad.
  - Illegible or Other Digit: If a digit is not recognizable and/or includes an operation symbol, such as + or x, tap ~, which looks like a tilde.
- Multiple-digit Errors
  - Reversal: If the child swaps the places of consecutive numbers, tap the numbers the child writes. For example, if the number is 23 and the child writes 32, enter 32.
  - Phonetic Representation: If the child writes the number the way it sounds, tap the numbers the child writes. For example, if the number is 567, the child writes 500607 and you record 500607.

Administration

1. Verify that you have all necessary materials for the module, then tap **Next**.



2. Follow the prompts displayed on the screen, reading all Mr. Say screens aloud to the child, then tap **Next**.
3. Read the item to the child and give him or her enough time to write the number.
4. After the child writes the number:
   a. Tap the **Correct Answer** button if the child wrote the numerals correctly.
   b. If the child writes the incorrect numerals, tap those numbers into the keypad. All digits in the correct place will be green; incorrect digit(s) in the incorrect place will be red.



   c. If the child writes a numeral in any orientation other than the correct one, tap **Flip** on the numeric keypad, then enter the flipped digit.
   d. If the child says "I don't know," tap **Don't Know**.
5. After completing all the items, tap **Next** to continue to Setup Problem.

Score Categories

According to the child's performance and strategy use, he or she is assigned a Score Category of Adept, Practicing, or Needs Help. The categories are an indicator of how the child is developing the skills necessary for understanding how to write numbers.

First Grade

- Adept: The child has mastered writing two-digit numerals.
- Practicing: The child may have difficulty remembering how to write individual numerals, writing sloppily, reversing individual digits, or writing numbers as they sound (e.g., 203 instead of 23).
- Needs Help: The child may have difficulty remembering how to write the individual numerals.

Second Grade

- Adept: The child has mastered writing two- and three-digit numerals.
- Practicing: The child may have difficulty remembering how to write individual numerals, writing sloppily, reversing individual digits, or writing numbers as they sound (e.g., 2003 instead of 203).
- Needs Help: The child may have difficulty related to writing one- and two-digit numerals.

Third Grade

- Adept: The child has mastered writing two-, three-, and four-digit numerals.
- Practicing: The child may have difficulty remembering how to write individual numerals, writing sloppily, reversing individual digits, or writing numbers as they sound (e.g., 2000304 instead of 2034).
- Needs Help: The child may have difficulty writing one-, two-, and three-digit numerals.

Setup Problem

Kindergarten	First	Second	Third

Proper setup and alignment of written addition, subtraction, and multiplication problems is critical to executing the algorithm and obtaining the appropriate answer. For example, you have to add the ones together, subtract the tens from the tens column, and cross-multiply appropriately. It's also important to know which written symbol (i.e., +, -, x) corresponds to which operation. Correctly setting up a problem also shows some understanding of place value.

Children are not required to execute the problem, only to write it down.

An item is considered correct if alignment, both numbers, and the operation symbols are correct. In aiming to calculate the most accurate score possible, there are specific errors that can be recorded for each. The child must show the ability to

- Identify numbers by getting both items correct
- Align properly by lining each number vertically in the correct column for its place, without errors
- Label the operation by writing the correct operation symbol

Children in Grades 1–2 set up two addition problems and two subtraction problems.

Children in Grade 3 set up two addition problems, two subtraction problems, and two multiplication problems.

Materials

Paper and pencil

Scoring Rules

Commas: Commas are not scored. If a child uses a comma when writing a number, incorrectly or correctly, record that information in the notes for that item or Interview.

Error Types

Alignment Error Types:

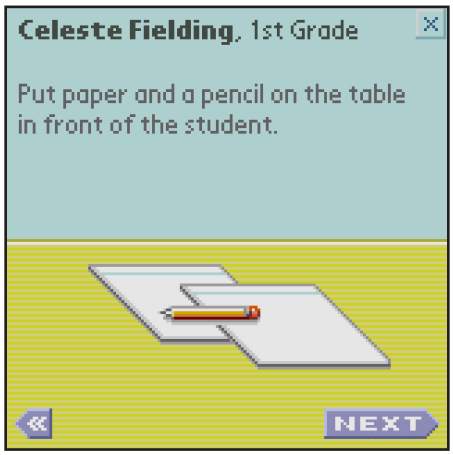
	Left	Child aligns the numbers on the top and bottom to the left instead of the right.
	Horizontal	Child writes the item out horizontally, all on one line.
	Sloppy	Child writes the item out sloppily, so digits do not line up correctly.
	Other	Child makes any other alignment errors.

Numbers Error Types: Though the child may exhibit any of the errors that can be recorded in the Writing Numbers module, numbers are either recorded as correct or incorrect in Setup Problem.

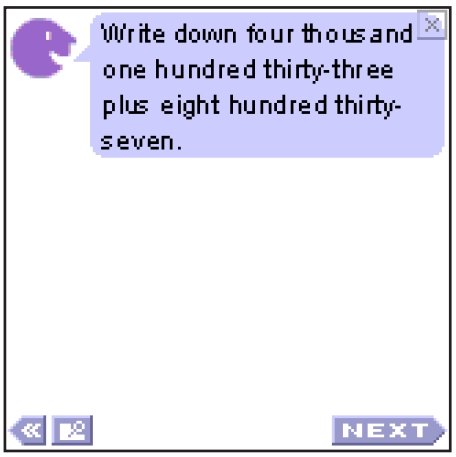
Operation Error Types: Child writes the incorrect operation or no operation at all.

Administration

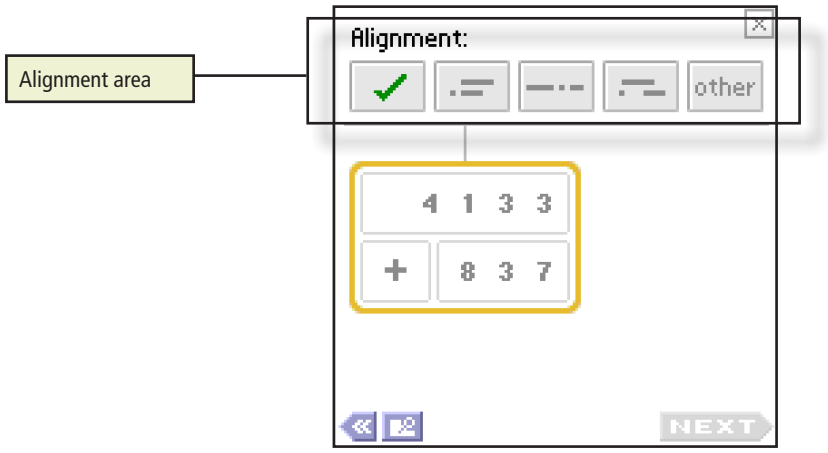
1. Verify that you have all necessary materials for the module, then tap **Next**.



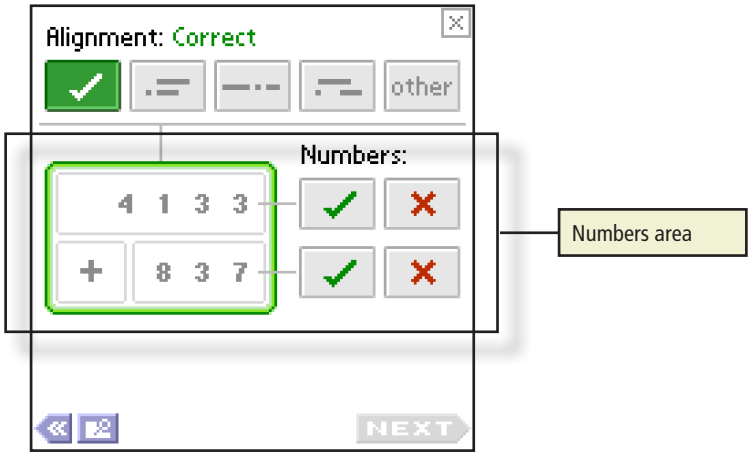
2. Follow the prompts displayed on the screen, reading all Mr. Say screens aloud to the child, then tap **Next**.
3. Read the item to the child and allow enough time for him or her to write the problem, then tap **Next**.



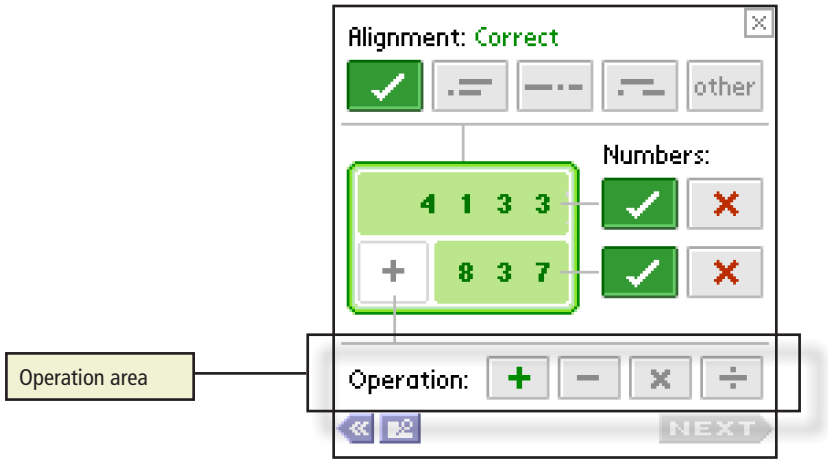
4. After the child writes the problem, tap the button on the screen that most adequately describes how he or she aligned the problem. If the child aligned the item correctly, tap **Correct** in the Alignment area.



5. When the Numbers area opens, tap **Correct** or **Incorrect** to score the accuracy with which the child wrote out each numeral in the problem.



6. When the Operation area opens, tap the button corresponding to the operation the child used.



7. After completing all the items, tap **Next** to continue to Place Value.

Score Categories

According to the child's performance and strategy use, he or she is assigned a Score Category of Adept, Practicing, or Needs Help. The categories are an indicator of how the child is developing the skills necessary for setting up problems.

First Grade

- Adept: The child has mastered properly aligning and correctly writing numbers when setting up addition and subtraction problems. He or she also understands the necessity of an operational sign and a line underneath the last number in a vertically aligned problem.
- Practicing: The child may misalign numbers when setting up problems, perhaps related to unfamiliarity with problems involving odd numbers of digits.
- Needs Help: The child may have difficulty writing one-, two-, and three-digit numerals, misaligning, and/or may be lacking place value knowledge.

Second Grade

- Adept: The child has mastered properly aligning and correctly writing numbers when setting up addition and subtraction problems. He or she also understands the necessity of an operational sign and a line underneath the last number in a vertically aligned problem.
- Practicing: The child may misalign numbers when setting up problems, perhaps related to unfamiliarity with problems involving odd numbers of digits.
- Needs Help: The child may have difficulty writing one-, two-, and three-digit numerals, misaligning, and/or may be lacking place value knowledge.

Third Grade

- Adept: The child has mastered properly aligning and correctly writing numbers when setting up addition, subtraction, and multiplication problems. He or she also understands the necessity of an operational sign and a line underneath the last number in a vertically aligned problem.
- Practicing: The child may misalign numbers when setting up problems, perhaps related to unfamiliarity with problems involving odd numbers of digits.
- Needs Help: The child may have difficulty writing one-, two-, and three-digit numerals, misaligning, and/or may be lacking place value knowledge.

Place Value

Kindergarten	First	Second	Third

Place value concepts are at the heart of mathematics, representing numbers with a few written symbols. Children who have a strong understanding of place value can explain what specific digits represent in the context of a written numeral (e.g., the 2 in 5,024).

The Place Value module includes commas for readability. Commas are not used for scoring in this or any other module, and will not appear in any other module.

Children must first identify a number before deciding its place value.

Materials

Place Value items from Workbook

Scoring Rules

Backup Item: For Grades 2 and 3, if the child answers the follow-up item incorrectly, administer the backup item.

Commas: Commas are not scored. If a child uses a comma when writing a number, incorrectly or correctly, record that information in the notes for that item or Interview.

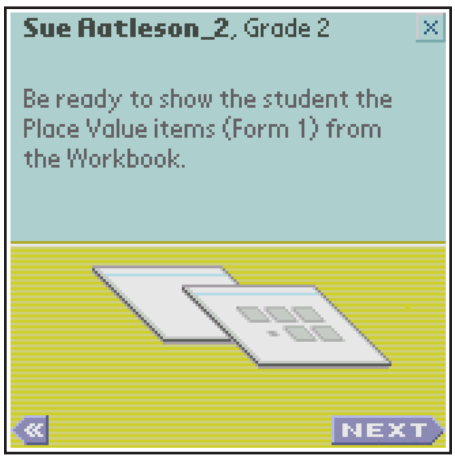
Number Identification: When identifying the number, the child must say the number correctly and not just name the individual digits. For example, if the number is 523, the child must say "five hundred twenty-three." If the child says "five two three" or "five twenty-three" the number is incorrect.

Place Value Follow-Up: If the child is unable to identify the units or the place value of any digit, ask him or her to identify how many units there are of each place value. If the child is able to answer the follow-up item correctly, he or she receives credit for the item.

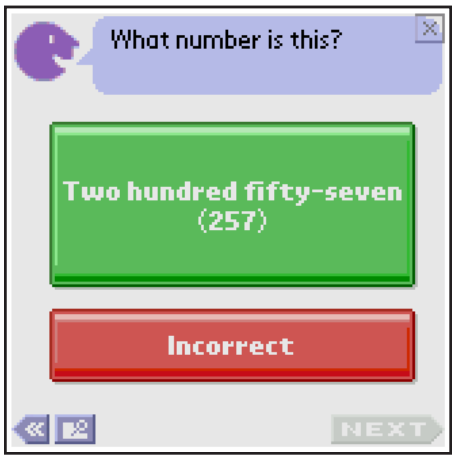
Wrong Number: If the child is unable to identify the number being used in the place value problem, tell him or her the number. This is not scored; rather, it is an introduction to the problem to ensure that the child knows the numbers being assessed.

Administration

1. Verify that you have all necessary materials for the module, then tap **Next**.

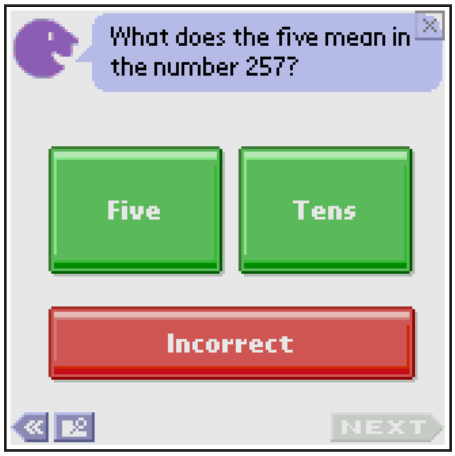


2. Follow the prompts displayed on the screen, reading all Mr. Say screens aloud to the child, then tap **Next**.
3. Show the child the number in the Workbook and ask him or her to identify the number. Tap the **Correct Answer** button if the child answers correctly and the **Incorrect** button if he or she does not.



4. Tap **Next** to continue.
5. If the child is unable to correctly identify the number, follow the prompts on the handheld that say, "Actually, the way we say this number is … "
6. Tap **Next** to continue to the place value part of this module.

7. Following along with the prompts on the handheld, for each digit in the number, point to the corresponding digit in the Workbook and ask the child the place value question. Tap the appropriate **Correct** buttons if the child is able to identify the name of the digit and/or the place value of the digit. If the child is unable to identify neither the value nor the place value, tap **Incorrect**.



8. Following along with the prompts on the handheld, if the child does not answer correctly for all digits, for each digit in the number, ask the child the follow-up place value question. Do *not* point to the digits for the follow-up place value question.
9. After completing all items, tap **Next** to continue to Computation or the Expression slider and Imagination question, depending on the child's grade.

Score Categories

According to the child's performance and strategy use, he or she is assigned a Score Category of Adept, Practicing (grades 2 and 3 only), or Needs Help. The categories are an indicator of how the child is developing place value skills.

First Grade

- Adept: The child identifies the place value of numerals up to and including two digits and is able to view these double-digit numerals as composites of tens and ones.
- Needs Help: The child's difficulty may be related to undeveloped counting and/or place value concepts.

Second Grade

- Adept: The child identifies place value of numerals up to and including three digits and is able to view these numerals as composites of hundreds, tens, and ones.
- Practicing: The child identifies place value of numerals up to two digits and is able to view these double-digit numerals as composites of tens and ones.
- Needs Help: The child may have difficulty related to undeveloped counting skills and/or place value concepts.

Third Grade

- Adept: The child identifies place value of numerals up to and including four digits and is able to view these numerals as composites of thousands, hundreds, tens, and ones.
- Practicing: The child identifies place value of numerals up to two or three digits and is able to view these numerals as composites of hundreds, tens, and ones.
- Needs Help: The child may have difficulty related to undeveloped counting skills and/or place value concepts.

Computation

Solving written problems often involves completing several steps correctly and in sequence. Children are taught to keep track of these steps using notations for carrying and borrowing from one place value to another. Children who understand the principles behind carrying and borrowing are able to explain what the notations mean; those who do not may execute the set of steps they are taught. Children with greater conceptual understanding are more likely to catch their own errors and tackle larger problems.

As children learn procedures for solving written problems, they often produce specific systematic errors during execution. These errors may seem perfectly rational to the child who has learned incorrectly or has misapplied the steps for solving problems. These "bugs" produce incorrect answers leading an assessor to believe the child is not developing computation skills. See the Icon Glossary in the back of this guide for more detailed descriptions of bugs.

The problems in the Computation modules of the Written interview are designed to diagnose these kinds of specific errors, or bugs. There are three kinds of Computation modules: addition, subtraction, and multiplication.

In second grade, if a child is unable to correctly compute the two-digit plus two-digit addition problem, you will be prompted to administer an additional two-digit plus one-digit addition problem.

In third grade, if a child correctly computes the three-digit plus three-digit addition problem that requires one carried number, you will be prompted to administer a three-digit plus three-digit addition problem that requires two carried numbers. If he or she is unable to correctly compute the three-digit plus three-digit addition problem that requires one carried number, you will be prompted to administer a two-digit plus two-digit addition problem.

Computation +

Kindergarten	First	Second	Third

Materials

Copies of Computation worksheets from Workbook

Paper and pencil

Scoring Rules

Commas: Commas are not scored. If a child uses a comma when writing a number, incorrectly or correctly, record that information in the notes for that item or Interview.

Correct Procedure: For all items, assessor will evaluate if the child exhibited evidence of the correct use of the correct carry/borrow procedures either on the initial item or when asked "How did you do that?"

Flipped Digit: If a child writes a numeral in the incorrect orientation, that may be upside down, backward, horizontally, etc., it is still considered a correct answer. To record a Flipped Digit, tap **Flip** on the numeric keypad and tap the flipped digit.

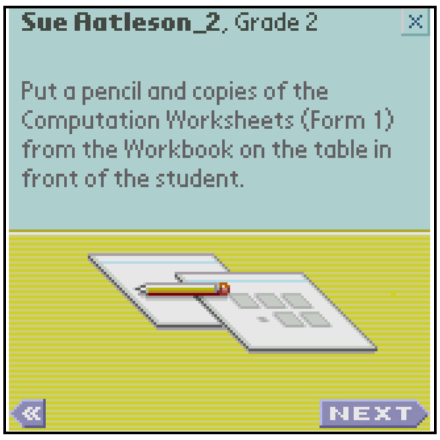
Multiple Errors: A child may make multiple errors on the same item without affecting the final score.

System-Identified Bugs: For all incorrect items, mCLASS:Math deciphers whether the incorrect answer is in fact a bug. A bug is an incorrect answer that corresponds to a specific procedural mistake. System-Identified Bugs appear at the top of the screen.

User-Identified Bugs: In cases where the system is unable to identify a bug, tap the buttons on the screen to enter any observed or expressed bug behavior. User-Identified Bugs appear in the Answer Bar.

Administration

1. Verify that you have all necessary materials for the module, then tap **Next**.

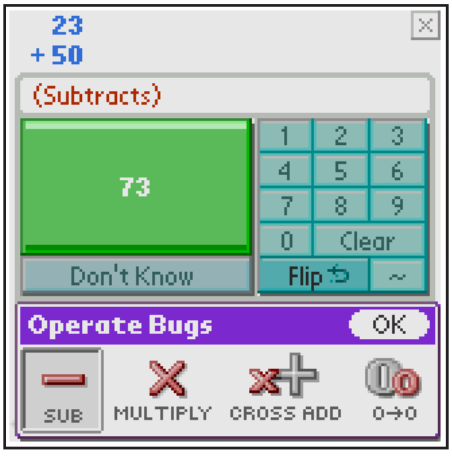


2. Follow the prompts displayed on the screen, reading all Mr. Say screens aloud to the child, then tap **Next**.
3. Using the copies of the Computation worksheets from the Workbook, show the child the item

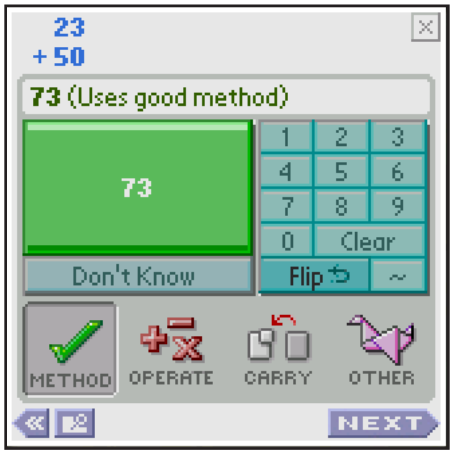
corresponding to Mr. Say, then tap **Next**.

4. Record as much information as you can while the child is computing the answer.
   a. If the child shows use of correct carrying procedures (where appropriate), tap **Method**.

   b. If, instead, the child exhibits any identifiable bugs, tap the buttons at the bottom of the screen to record the specific bug observed. For example, if you see that the child is subtracting instead of adding, tap **Operate**. The Operate Bugs pop-up opens to help narrow the identification of the particular kind of operation bug the child exhibited. Your bug identification will appear in the Answer Bar in red. Tap **OK**.



5. After the child computes the answer:
   a. Tap the **Correct Answer** button if the child wrote the correct number.



   b. If the child writes a different number, tap that number into the keypad; all digits in the correct place will be green. All incorrect digits or digits in the incorrect place will be red. If the child's answer is a result of a bug that the system can identify (and you have not already identified), the bug will appear at the top of the screen.

   c. If the child says "I don't know," tap **Don't Know** and you will be prompted to administer the next item or module.

6. Tap **Next**.

7. After you ask, "How did you do that?" the child should try to tell you how he or she arrived at the given answer.

   a. If the child explains use of the correct procedure, tap **Method**.

   b. If the child provides a new answer, tap **New**. Then enter the new answer into the numeric keypad.

   c. If the child explains use of a method that is actually a bug, tap the corresponding Bug button, then tap **OK**.

   d. If the child says "I don't know," tap **Dunno**.

8. After completing all items, tap **Next** to continue to Computation (-).

Score Categories

According to the child's performance and strategy use, he or she is assigned a Score Category of Adept, Mechanical, Practicing, or Needs Help. The categories are an indicator of how the child is developing the skills necessary for understanding how to write numbers.

Adept

The child accurately solves written addition problems. He or she may also display an understanding of the underlying Base 10 and place value concepts related to carrying as the algorithm is executed.

Mechanical

The child executes correct procedures (i.e., correct alignment, where to start, where to write the sums, and how to carry) while problem solving.

Practicing

The child appears to perform poorly but solves addition problems using appropriate strategies (i.e., algorithm or partitioning).

Needs Help

The child's difficulty may be related to undeveloped skills for solving addition problems.

Computation –

Kindergarten	First	Second	Third

In second grade, if a child is unable to correctly compute the two-digit minus two-digit subtraction problem, administer an additional two-digit minus one-digit subtraction problem.

In third grade, if a child correctly computes the three-digit minus three-digit subtraction problem that requires one borrowed number, administer a three-digit minus three-digit subtraction problem that requires two borrowed numbers. If he or she is unable to correctly compute the three-digit minus three-digit subtraction problem that requires one borrowed number, administer a two-digit minus two-digit subtraction problem.

Materials

Copies of Computation worksheets from Workbook

Paper and pencil

Scoring Rules

Commas: Commas are not scored. If a child uses a comma when writing a number, incorrectly or correctly, record that information in the notes for that item or Interview.

Correct Procedure: For all items, assessor will evaluate if the child exhibited evidence of the correct use of the correct carry/borrow procedures either on the initial item or when asked "How did you do that?"

Flipped Digit: If a child writes a numeral in the incorrect orientation, that may be upside down, backward, horizontally, etc., it is still considered a correct answer. To record a Flipped Digit, tap **Flip** on the numeric keypad and tap the flipped digit.

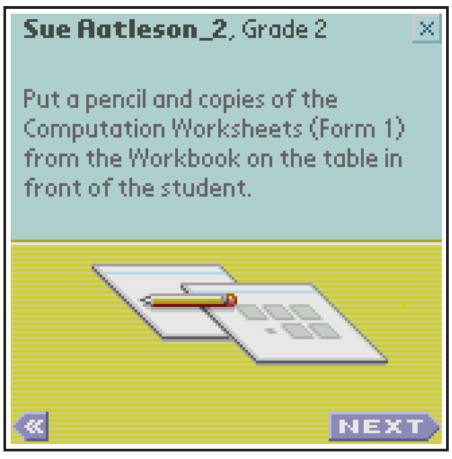
Multiple Errors: A child may make multiple errors on the same item without affecting the final score.

System-Identified Bugs: For all incorrect items, mCLASS:Math deciphers whether the incorrect answer is in fact a bug. A bug is an incorrect answer that corresponds to a specific procedural mistake.

User-Identified Bugs: In cases where the system is unable to identify a bug, tap the buttons on the screen to enter any observed or expressed bug behavior.

Administration

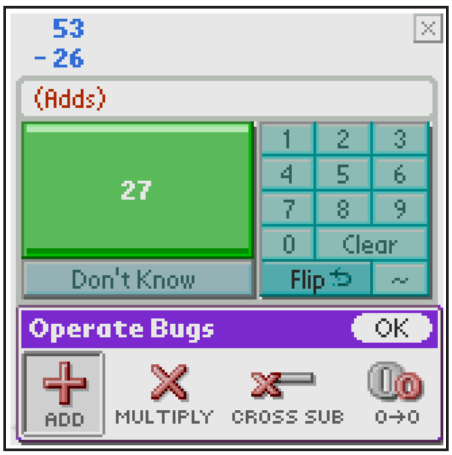
1. Verify that you have all necessary materials for the module, then tap **Next**.



2. Follow the prompts displayed on the screen, reading all Mr. Say screens aloud to the child, then tap **Next**.
3. Using the copies of the Computation worksheets from the Workbook, show the child the item corresponding to Mr. Say, then tap **Next**.

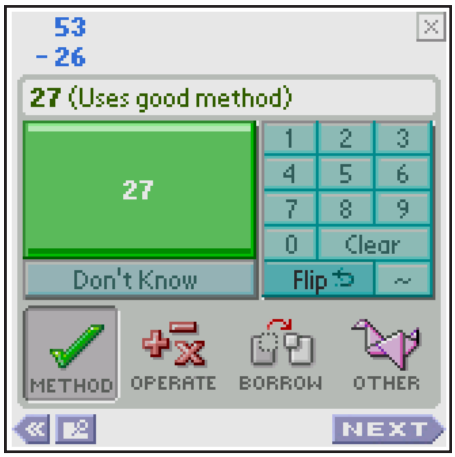
4. Record as much information as you can while the child is computing the answer.
   a. If the child shows use of correct carrying procedures (where appropriate), tap **Method**.

b. If, instead, the child exhibits any identifiable bugs, tap the buttons at the bottom of the screen to record the specific bug observed. For example, if you see that the child is adding instead of subtracting, tap **Operate**. The Operate Bugs pop-up opens to help narrow the identification of the particular kind of operation bug the child exhibited. Your bug identification will appear in the Answer Bar in red. Tap **OK**.



5. After the child computes the answer:

a. Tap the **Correct Answer** button if the child answers correctly.



b. If the child writes a different number, tap that number into the keypad; all digits in the correct place will be green. All incorrect digits or digits in the incorrect place will be red. If the child's answer is a result of a bug that the system can identify (and you have not already identified), the bug will appear at the top of the screen.

c. If the child says "I don't know," tap **Don't Know** and you will be prompted to administer the next item or module.

6. Tap **Next**.

7. After you ask, "How did you do that?" the child should try to tell you how he or she arrived at the given answer.

a. If the child explains use of the correct procedure, tap **Method**.

b. If the child provides a new answer, tap **New**. Then enter the new answer into the numeric keypad.

c. If the child explains use of a method that is actually a bug, tap the corresponding Bug button, then tap **OK**.

d. If the child says "I don't know," tap **Dunno**.

8. After completing all items, tap **Next** to continue to Computation (x) or the Expression slider and Imagination question, depending on the child's grade.

Score Categories

According to the child's performance and strategy use, he or she is assigned a Score Category of Adept, Mechanical, Practicing, or Needs Help. The categories are an indicator of how the child is developing the skills necessary for understanding how to write numbers.

Adept

The child accurately solves written subtraction problems. The child may also display an understanding of the underlying Base 10 and place value concepts related to borrowing as the algorithm is executed.

Mechanical

The child executes correct procedures (correct alignment, where to start, where to write the differences, and how to borrow) while problem solving.

Practicing

The child appears to perform poorly but solves subtraction problems using appropriate strategies (i.e., algorithm or partitioning).

Needs Help

The child may have difficulty related to undeveloped skills for solving subtraction problems.

Computation x

Kindergarten	First	Second	Third

Materials

Copies of Computation worksheets from Workbook

Paper and pencil

Scoring Rules

Commas: Commas are not scored. If a child uses a comma when writing a number, incorrectly or correctly, record that information in the notes for that item or Interview.

Correct Procedure: For all items, assessor will evaluate if the child exhibited evidence of the correct use of the correct carry/borrow procedures either on the initial item or when asked "How did you do that?"

Flipped Digit: If a child writes a numeral in the incorrect orientation, that may be upside down, backward, horizontally, etc., it is still considered a correct answer. To record a Flipped Digit, tap **Flip** on the numeric keypad and tap the flipped digit.

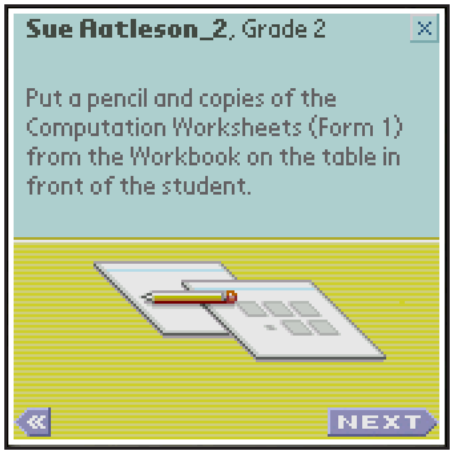
Multiple Errors: A child may make multiple errors on the same item without affecting the final score.

System-Identified Bugs: For all incorrect items, mCLASS:Math deciphers whether the incorrect answer is in fact a bug. A bug is an incorrect answer that corresponds to a specific procedural mistake.

User-Identified Bugs: In cases where the system is unable to identify a bug, tap the buttons on the screen to enter any observed or expressed bug behavior.

Administration

1. Verify that you have all necessary materials for the module, then tap **Next**.



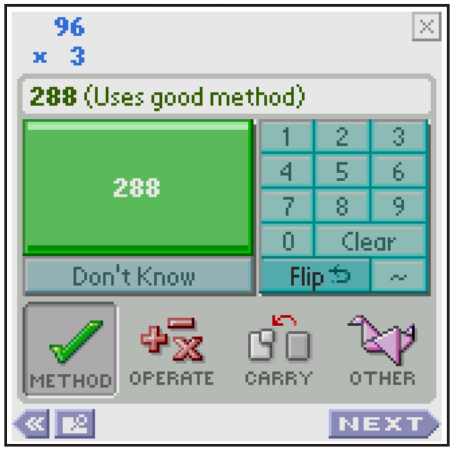
2. Follow the prompts displayed on the screen, reading all Mr. Say screens aloud to the child, then tap **Next**.

3. Using the copies of the Computation worksheets from the Workbook, show the child the item corresponding to Mr. Say, then tap **Next**.

4. Record as much information as possible while the child is computing the answer.
   a. If the child shows use of correct carrying procedures (where appropriate), tap **Method**.

   b. If, instead, the child exhibits any identifiable bugs, tap the corresponding buttons at the bottom of the screen to record the specific bug observed. For example, if you see that the child is subtracting instead of adding, tap **Operate**. The Operate Bugs pop-up opens to help narrow the identification of the particular kind of operation bug the child exhibited. Your bug identification will appear in the Answer Bar in red. Tap **OK**.

5. After the child computes the answer:
   a. Tap the **Correct Answer** button if the child answers correctly.



   b. If the child writes a different number, tap that number into the keypad; all digits in the correct place will be green. All incorrect digits or digits in the incorrect place will be red. If the child's answer is a result of a bug that the system can identify, the bug will appear at the top of the screen.

   c. If the child says "I don't know," tap **Don't Know** and you will be prompted to administer the next item or module.

6. Tap **Next**.

7. After you ask, "How did you do that?" the child should try to tell you how he or she arrived at the given answer.

   a. If the child explains use of the correct procedure, tap **Method**.

   b. If the child provides a new answer, tap **New**. Then enter the new answer into the numeric keypad.

   c. If the child explains use of a method that is actually a bug, tap the corresponding Bug button, then tap **OK**.

   d. If the child says "I don't know," tap **Dunno**.

8. After completing all items, tap **Next** to continue to the Expression slider and Imagination question.

Score Categories

According to the child's performance and strategy use, he or she is assigned a Score Category of Adept, Mechanical, Practicing, or Needs Help. The categories are an indicator of how the child is developing the skills necessary for understanding how to write numbers.

Adept

The child accurately solves written multiplication problems. The child may also display understanding of the underlying Base 10 and place value concepts related to carrying while problem solving.

Mechanical

The child executes correct procedures (correct alignment, where to start, where to write the product, and how to carry) while problem solving.

Practicing

The child appears to perform poorly but solves multiplication problems using appropriate strategies (i.e., algorithm or partitioning).

Needs Help

The child may have difficulty related to undeveloped skills for solving multiplication problems.

The mCLASS Web Site

The secure mCLASS Home Web site provides password-protected access to class and student reports of assessments conducted on the handheld. Results can only be viewed over the Internet, not edited or deleted.

Results for your students only appear on the mCLASS Web site when you have

- Used your handheld to conduct interviews and record the results
- Performed a synchronization with your handheld at a designated mCLASS Sync Station

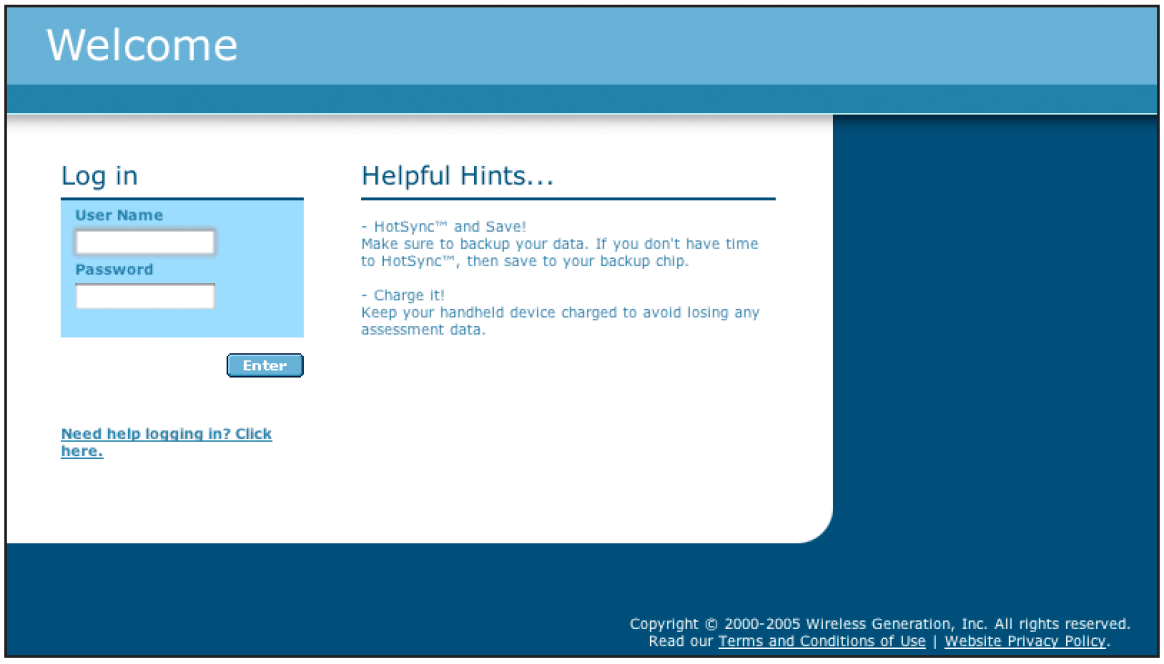
Through the mCLASS Home Web site you can also find helpful interpretations of a child's interviews as well as instructional recommendations and activities.

Types of Reports

- The Class Reports show each of your students' most recent interview results for each interview type assessed. In addition, the class report provides recommendations of activities that can be used with the entire class, based on the scores of all the students in the class.
- The Student Report provides information on all the interviews you have conducted for the selected student, plus information about the student's overall progress. This report also provides detailed information about what the student's profile really means and what steps to take to help the child further develop.

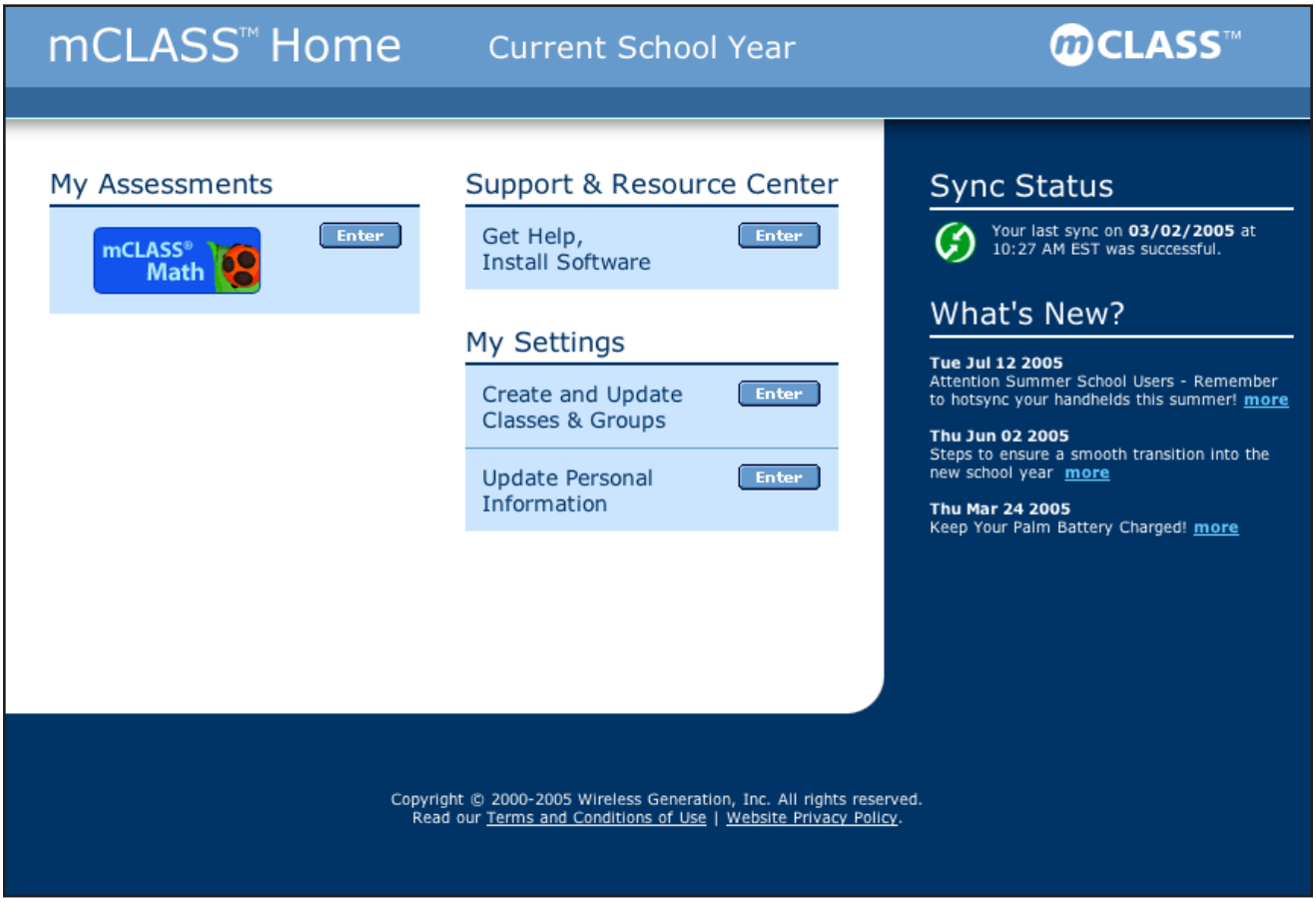
Logging In

1. To access the Web reports, locate any computer with an Internet connection. This does not have to be one of the designated Sync Stations in your school.
2. Open your Web browser and go to https://www.mclasshome.com.
3. At the Welcome page, type your assigned user name and password, then click **Enter**.



Accessing mCLASS:Math

After signing in, you will see a home page for the mCLASS products to which you have access.



If you have forgotten your password, click the **Need help logging in?** link. If you experience issues, contact your school's technology department or contact Wireless Generation's Customer Care at (800) 823-1969 and select option 3.

To view the mCLASS:Math results for your classes, click the **Enter** button next to the mCLASS:Math logo in the My Assessments section.

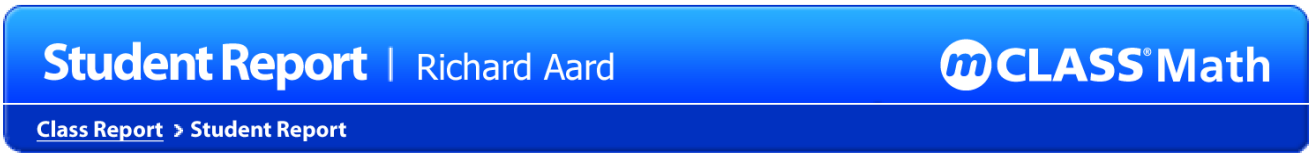
Navigating mCLASS:Math Web Reports

Every Web report has navigational features that will help you to find and view class, student, and measure information.

The Banner

The banner displays the name of the report you are viewing. On Class Reports, the banner also will show the name of the class; on Student and Measure Detail Reports, the banner also will show the child's name.

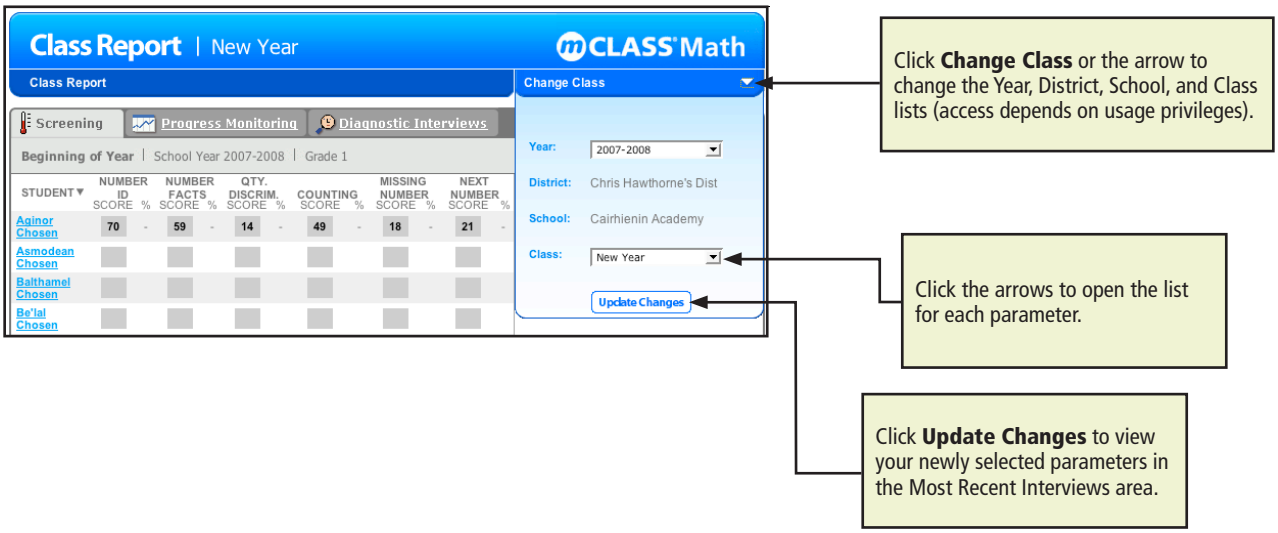
In addition, the banner contains a navigation bar that shows the path you took to arrive at the report you are viewing.



If you click an underlined report name, you will be taken to that report. The last name in the series will not be underlined, as that is the report you are currently viewing.

Changing the Class

According to your access privileges, you can define which district's, school's, and class' results you view.



Report Tabs

Report tabs allow you to switch between the various viewing options that exist. The three tabs correspond to three of the components of the mCLASS:Math assessment: Screening, Progress Monitoring, and Diagnostic Interviews.

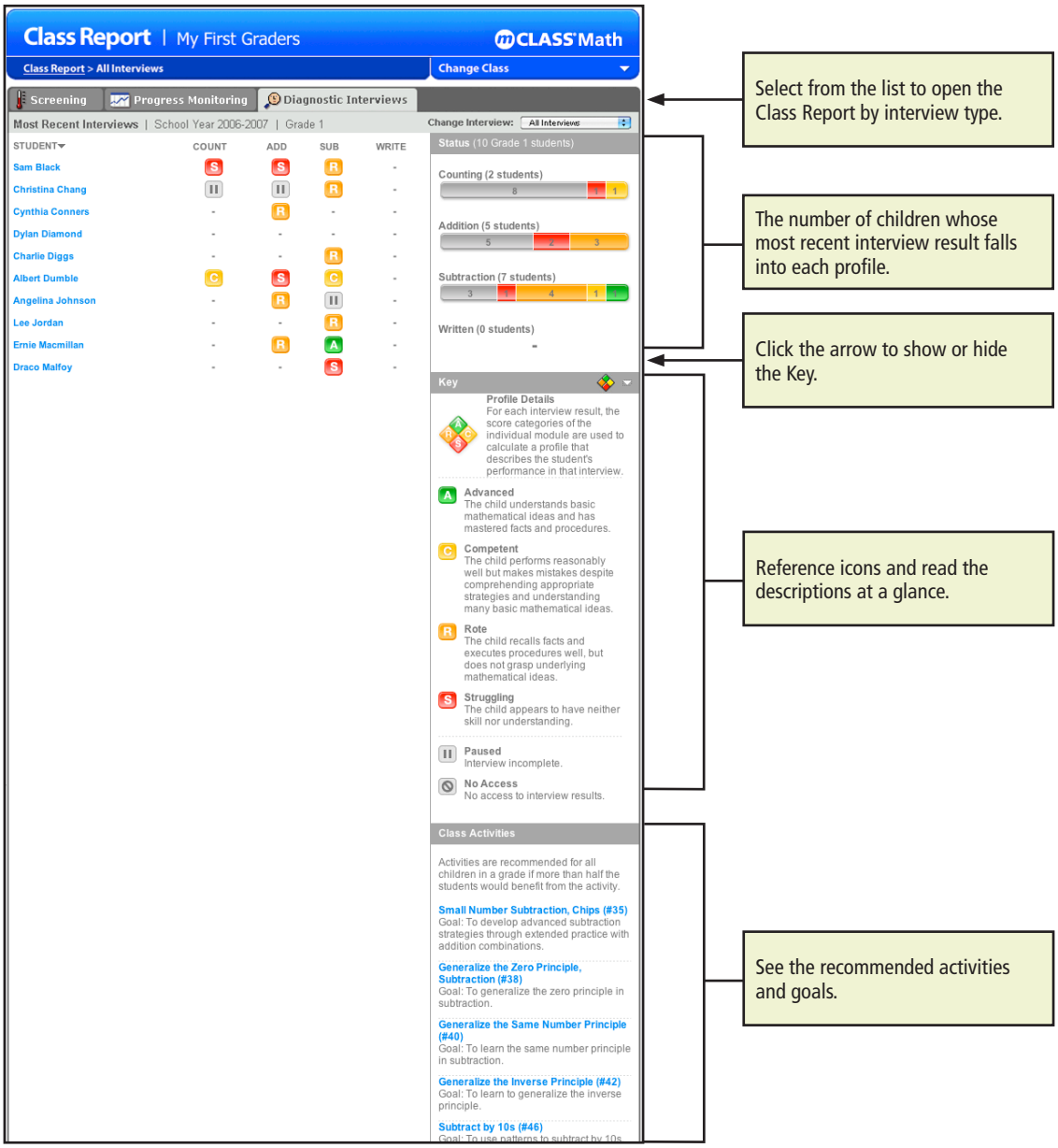
Each tab's reports provides different ways of filtering information to support rich data analysis that can be used to support classroom instructional changes.

Class Report

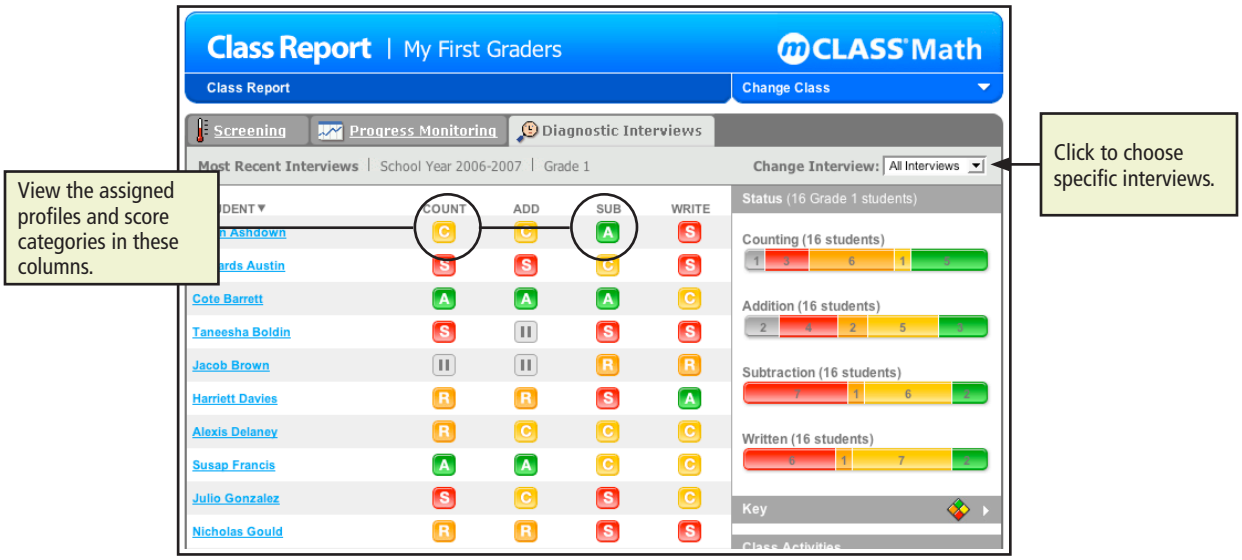
The Class Report displays the profile of the most recent interview of each type for all children.

On the right side of the Class Reports, there is a status grid, key, and activities.

- Status shows the number of children whose most recent interview result falls into each profile, indicated by color. The gray area contains the number of children who have not begun a module for the referenced interviews. You can use this information to quickly gauge how well your class has performed on its most recent round of interviews.
- Reference the Key as a reminder of what the profile name (or Score Category if examining a Class Report by Interview) represents concerning the child's mathematics understanding.
- When at least half of the students in your class would benefit from an activity, it is recommended for the entire class.

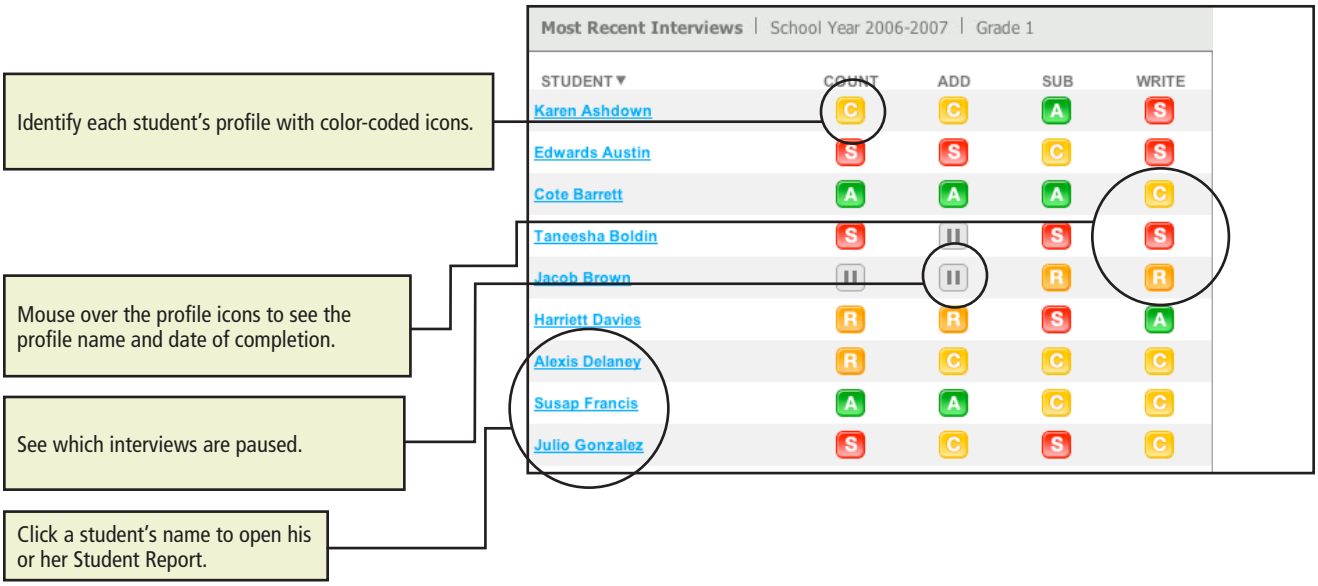


You can choose to view all interviews or a single interview. The default is to show all interviews. If, for instance, you plan to teach addition a certain day, you can look at the Class Report by the Addition interview and see which type of activities are recommended.



Most Recent Interviews

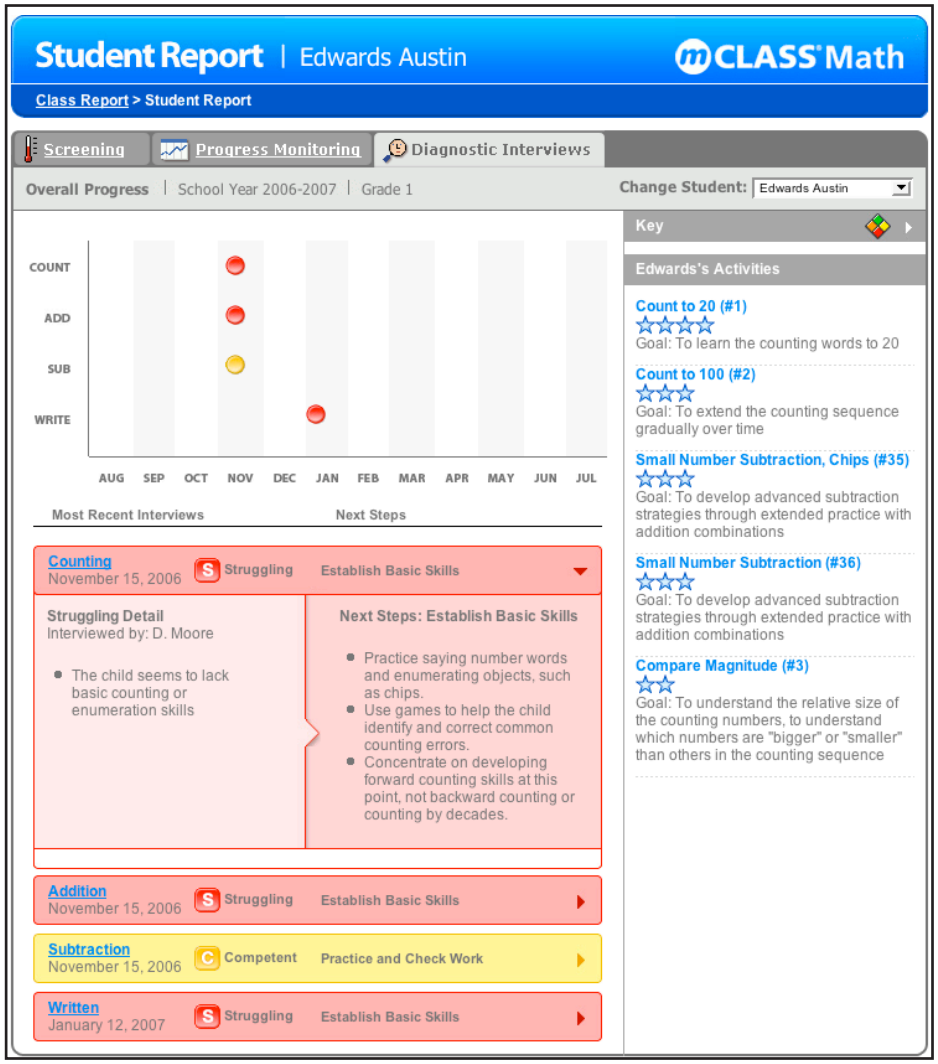
In the Most Recent Interviews section you can get a sense of where each student stands with respect to the mCLASS:Math Diagnostic Interviews.



Student Report

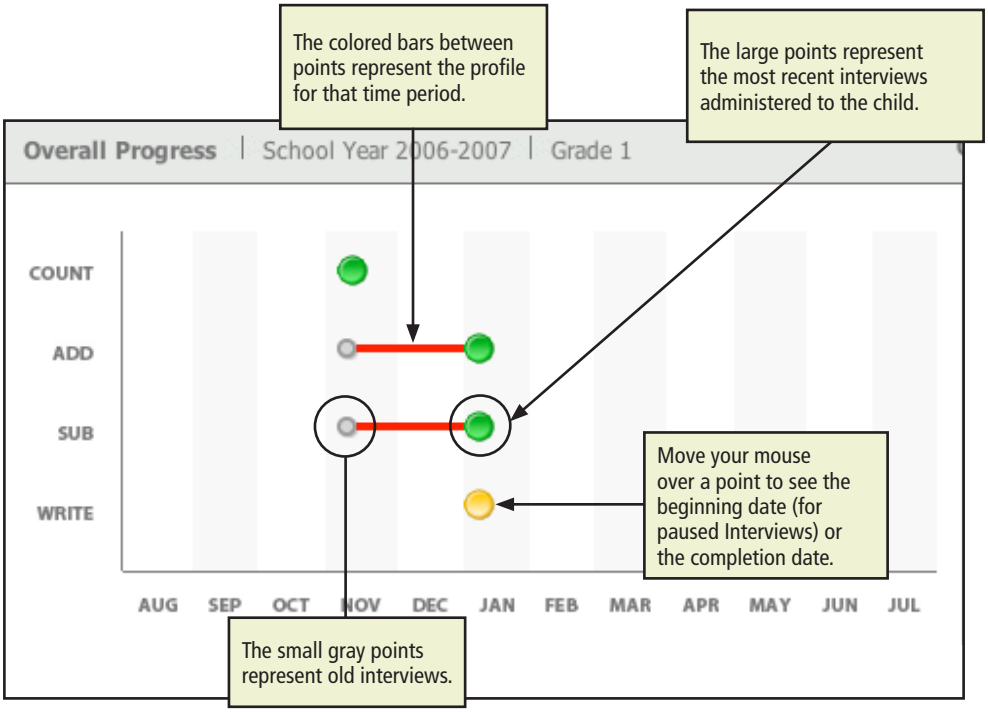
The Student Report is available by clicking a student name from the Class Report.

- The Overall Progress chart shows all the interviews a child has begun or completed.
- Reference the Profile Key as a reminder of what the profile name represents concerning the child's mathematics understanding.
- Activities are recommended based on the child's performance the most recently administered interviews. It only displays the five most valuable activities, those which are recommended most often for this child, across all interviews.
- The Most Recent Interviews section lists results for each module the selected child completed, including the date completed, the score category, and next steps to take to help the child cultivate mathematics skills.



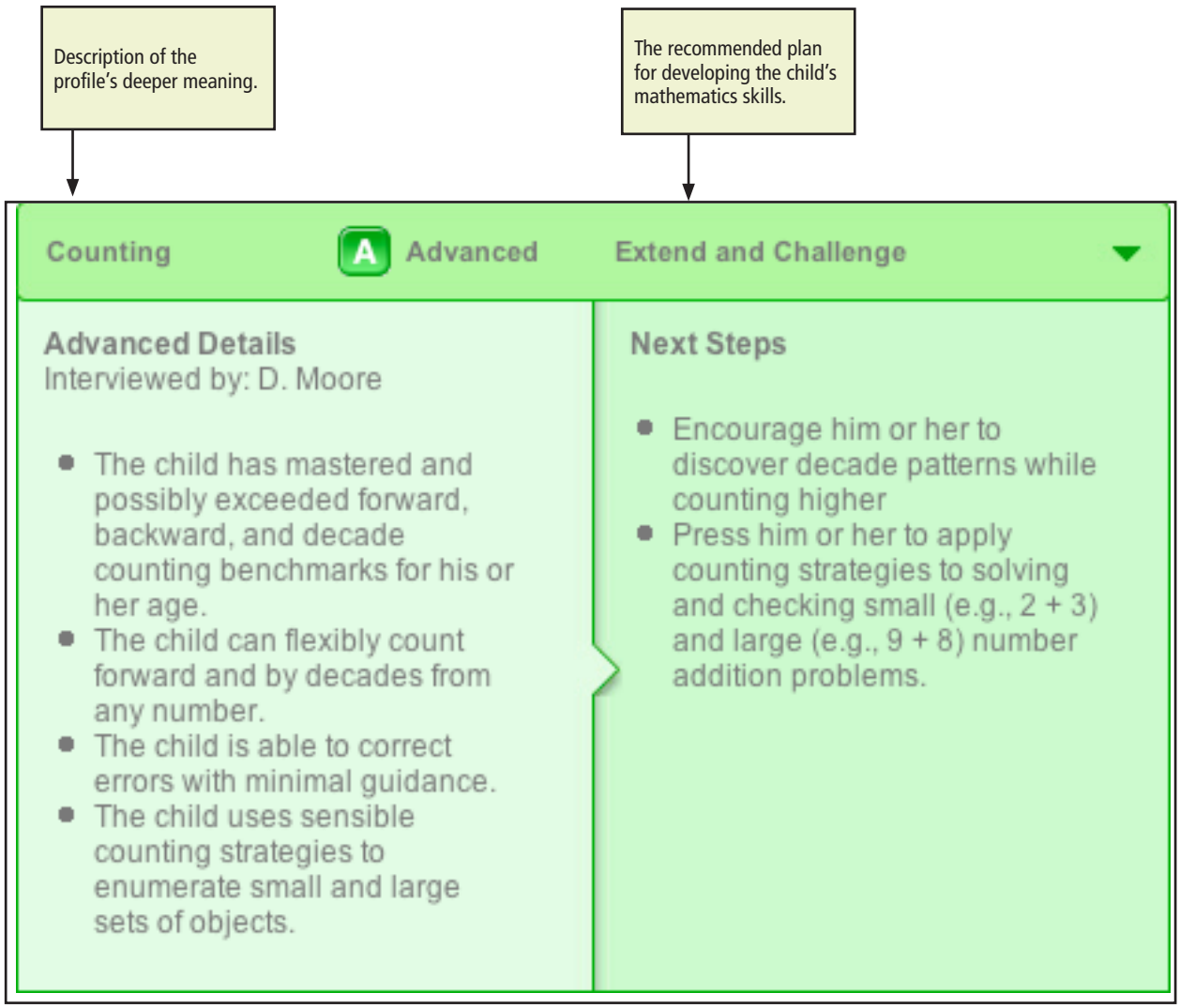
Overall Progress

Look at the Overall Progress to get a sense of how the child has been developing throughout the school year.



Most Recent Interviews and Next Steps

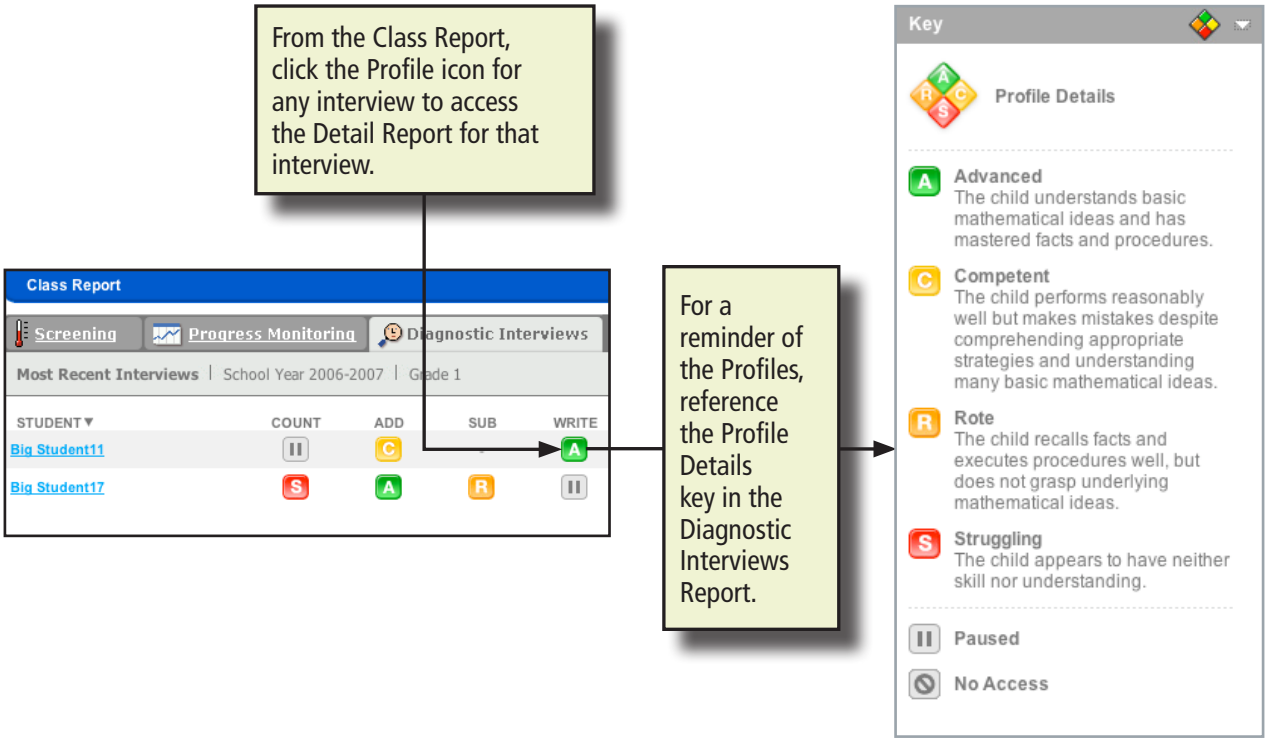
In the Most Recent Interviews section of the Student Report, you can view details regarding the kinds of behaviors and actions that surround the child's profile for the most recent interview. When you click the arrow on the right of the Interview, its section expands to display two columns: a description of what the profile represents and the next steps to take to develop the child's abilities. In the Previous Interviews section, you can also see what profile the child had been assigned in the past for that Interview.



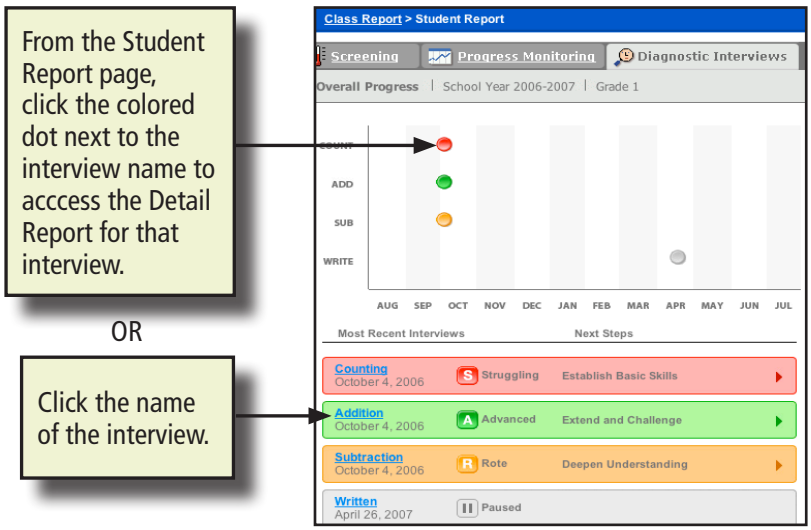
Accessing Interview Detail Reports

You can access an Interview Detail Report two ways:

- From the Class Report page, select the **Diagnostic Interviews** tab, then click the Profile icon for the desired interview.



- You can also access the Interview Detail Reports through the Student Report page. Click the colored dot representing the interview name on the school year timeline, or click any of the Interview names highlighted in the Most Recent Interviews section.



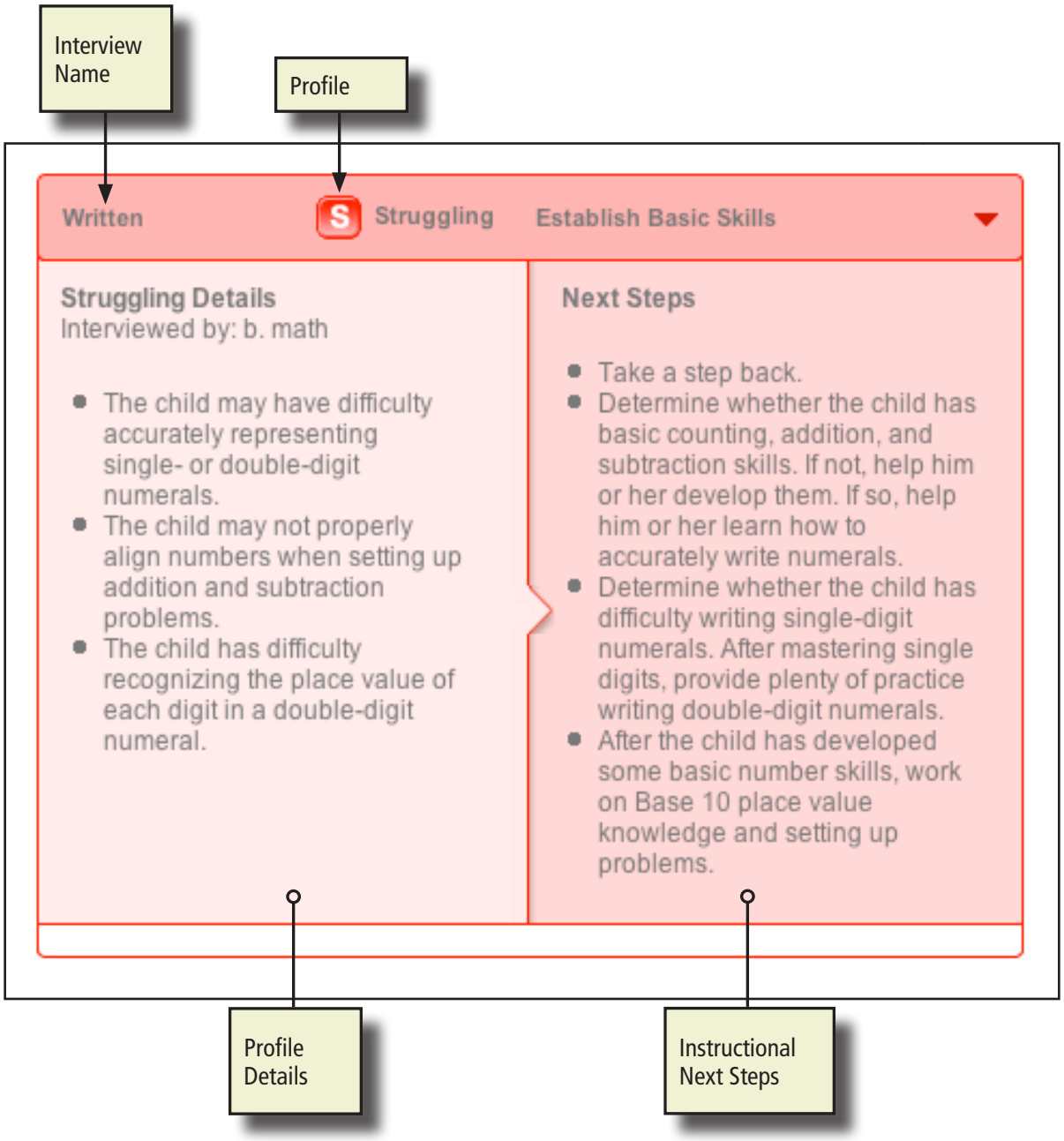
Interview Detail Report

The Interview Detail Report shows a student's assessment information at a glance. The student's overall Score Category for the entire interview is presented, along with the specific Interview Details for each module, grouped below. Other information noted during or generated by the interview, such as recommended Activities, Notes, and Expression, are also listed.

Interview Profile

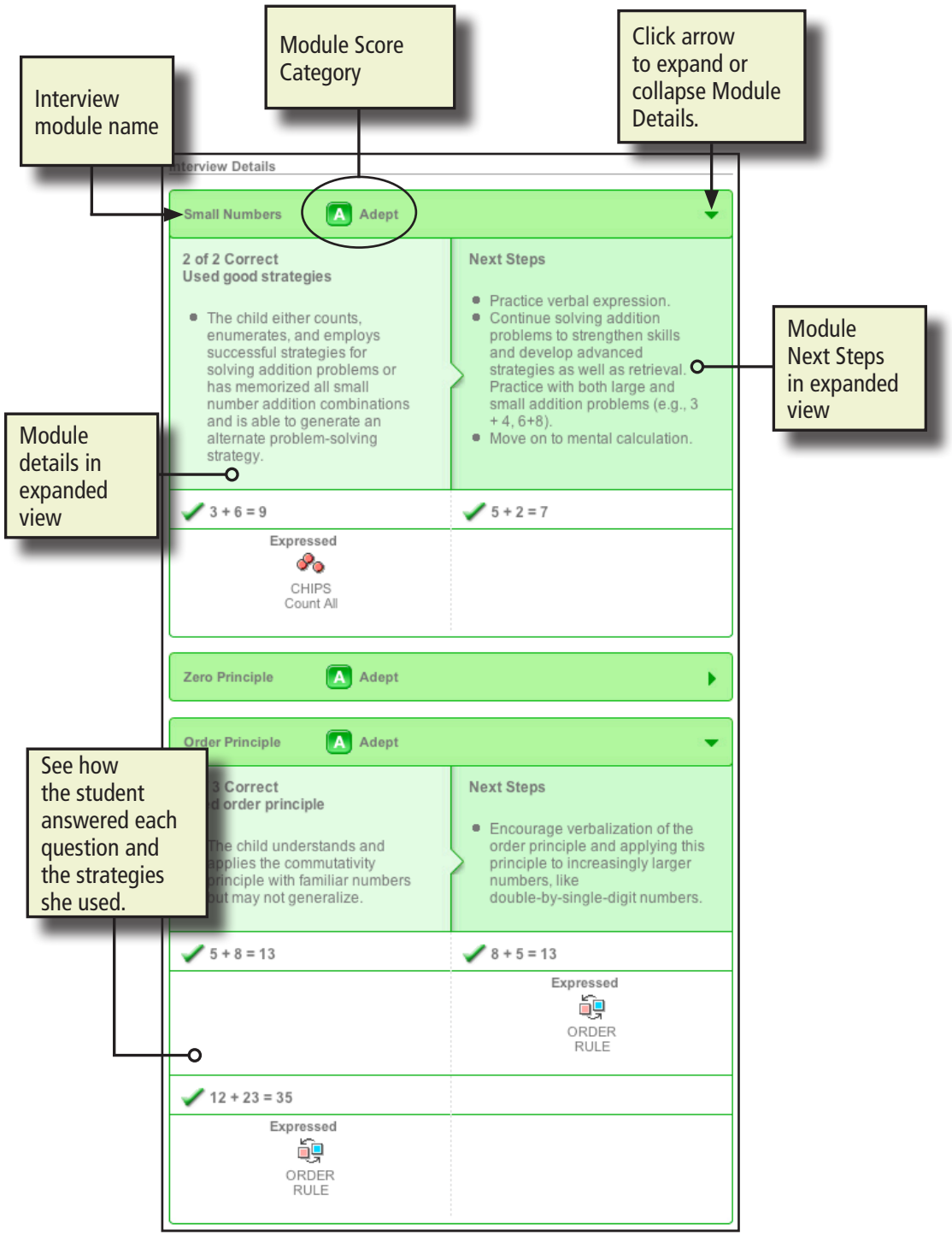
The profile displays the net results of the combined Interview subsections, or modules.

- The Interview profile notes the name of the interviewer, as well as Score Category details, which summarize the results of the interview into an overall diagnostic profile.
- Next Steps recommend instructional strategies to address any weaknesses and build up existing strengths



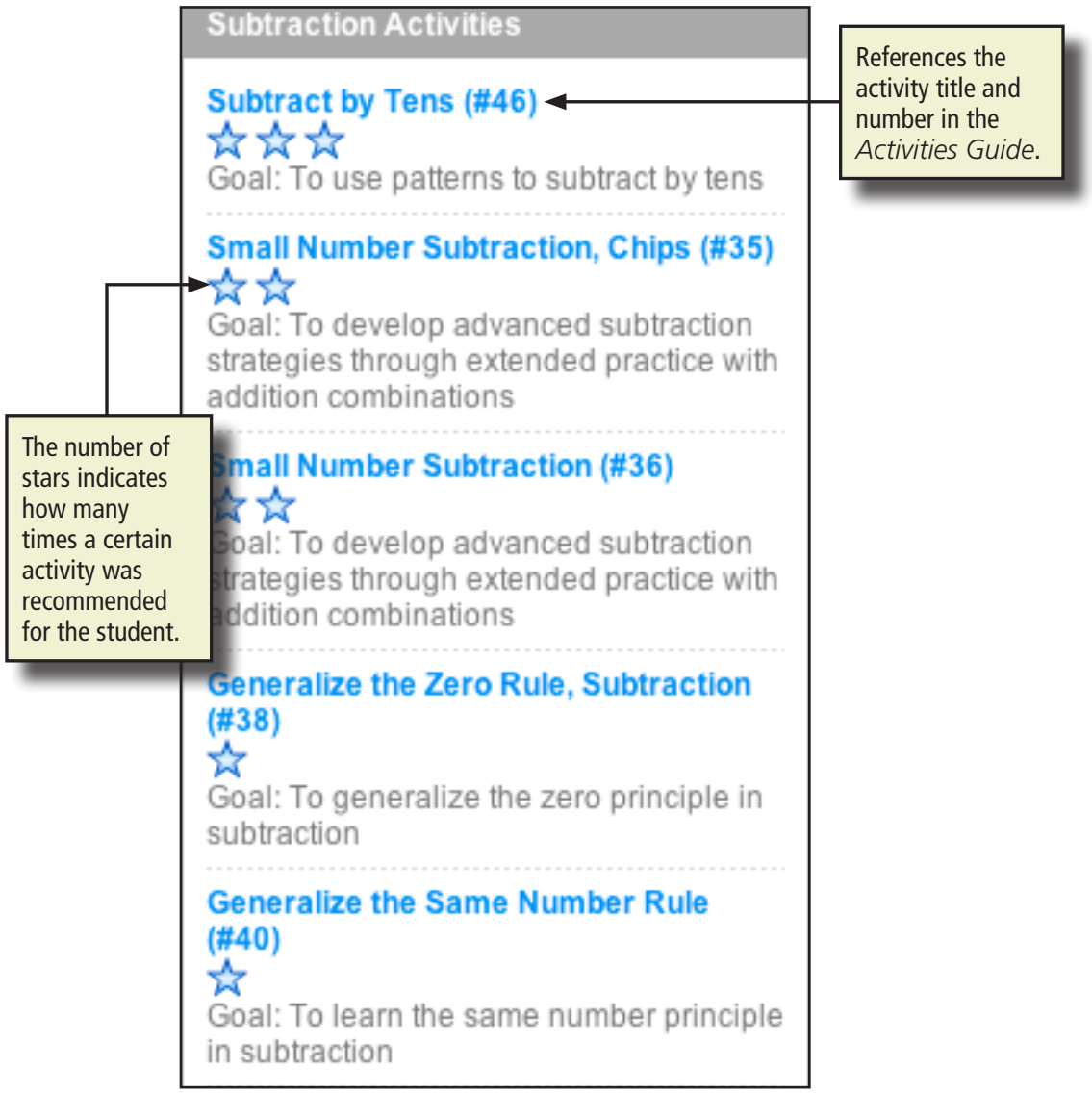
Interview Details

The Interview Details sections display each interview module. In this example, the Addition interview consists of four modules: Small Numbers, Zero Principle, Order Principle, and Mental Calculation. Each is assigned a Score Category and recommended Next Steps based on the student's responses and recorded strategies. The Interview Details reflect the same level of input recorded during the Interview: the number of correct answers per module are listed, along with specific answers given, and, where applicable, strategies recorded on the handheld for each response.



Activities

The Activities list is generated by the results of each module of the interview. The mCLASS system analyzes student response patterns and recommends reinforcement activities. While all the activities are viewable on the handheld, only the top five recommended activities appear in the Interview Detail Report. These support exercises are appropriate for individual or small-group instruction.



This glossary contains every possible strategy, principle, and detail for each interview.

Counting

Only the How Many module requires a record of strategies; however, there are no details. Also, these strategies are observable only, you will never record expressed strategies.

 COUNT	Verbally counting in sequence without the use of visual or physical cues
 GROUP	Placing objects into smaller groups
 OTHER	Exhibiting some other observable behavior
 POINT	Touching or pointing without moving the object
 PUSH	After or while counting, moving objects to the side

Addition

 CHIPS	Representing parts of the problem with chips, even when he or she is also verbalizing
 COUNT	Verbally counting in sequence without the use of visual or physical cues
 COUNT ALL	Counting each addend then counting out the sum
 COUNT ON	Counting from the larger addend
 DERIVED	Verbalizing a known number fact to solve the problem
 DBL COUNT	Repeating the same number

Addition cont'd.

 ESTIMATE	Producing an approximate, rather than exact answer
 FINGER	Representing some part of the problem using fingers, even when he or she is also verbalizing
 GUESS	Forming an answer based on little or no information
 ICONIC	Drawing distinct marks
 IMG WRITE	Imaginary writing
 IMAGING	Providing visual clues of thought process without use of manipulatives
 MEMORY	Immediately recognizing previously learned material
 DUNNO	Articulating that he or she does not know the answer
 ORDER RULE	Verbalizing use of the rule that states that $a + b = b + a$
 OTHER	Any other expressed or observed behavior
 PAPER	Working through the problem on paper
 PICTURE	Drawing pictures
 RESTATE	Repeating the problem or saying it in another way
 SKIPPED	Missing a number

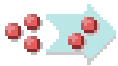
Addition cont'd.

 STRATEGY	Using any one of the Paper, Chips, Counting, or Fingers strategies
 SYMBOLIC	Writing numerals
 UNUSUAL	Responding with an answer unrelated to math
 USES 10	Verbalizing use of multiples of 10
 ZERO RULE	Verbalizing use of the rule that adding zero to a number does not change the number

Subtraction

 CHIPS	Representing parts of the problem with chips, even when he or she is also verbalizing
 COUNT	Verbally counting in sequence without the use of visual or physical cues
 CNT DWN	Counting down from the larger number
 CNT UP	Counting up from the smaller number
 DERIVED	Verbalizing a known number fact to solve the problem
 ESTIMATE	Producing an approximate, rather than exact answer
 FINGER	Representing some part of the problem using fingers, even when he or she is also verbalizing
 GUESS	Forming an answer based on little or no information

Subtraction cont'd.

 ICONIC	Drawing distinct marks
 IMG WRITE	Imaginary writing
 IMAGING	Providing visual clues of thought process without use of manipulatives
 INVERSE	Verbalizing use of the rule that addition negates subtraction and vice versa
 MEMORY	Immediately recognizing previously learned material
 DUNNO	Articulating that he or she does not know the answer
 OTHER	Any other expressed or observed behavior
 PAPER	Working through the problem on paper
 PICTURE	Drawing pictures
 RESTATE	Repeating the problem or saying it in another way
 SAME NUM	Verbalizing use of the rule that any number subtracted from itself equals zero
 SPLIT	Starting with larger number, subtracts smaller number and counts remaining
 STRATEGY	Using any one of the Paper, Chips, Counting, or Fingers strategies
 SYMBOLIC	Writing numerals
 UNUSUAL	Responding with an answer unrelated to math

	Verbalizing use of multiples of 10
	Verbalizing use of the rule that subtracting zero from a number does not change the number

Multiplication

	Verbally counting in sequence without the use of visual or physical cues
	Counting and/or adding while mentally tracking the groups
	Verbalizing a known number fact to solve the problem
	Producing an approximate, rather than exact answer
	Forming an answer based on little or no information
	Drawing distinct marks
	Verbalizing use of the rule that any number multiplied by one, remains the same
	Imaginary writing
	Providing visual clues of thought process without use of manipulatives
	Immediately recognizing previously learned material
	Articulating that he or she does not know the answer
	Verbalizing use of the rule that states that $a \times b = b \times a$

Multiplication cont'd.

 OTHER	Any other expressed or observed behavior
 PAPER	Working through the problem on paper
 PICTURE	Drawing pictures
 RPT ADD	Adding the multiplicand the number of times indicated by the multiplier
 RESTATE	Repeating the problem or saying it in another way
 SKIP CNT	Skip counting by either the multiplicand or multiplier
 STRATEGY	Using any one of the Paper, Chips, Counting, or Fingers strategies
 SYMBOLIC	Writing numerals
 UNUSUAL	Responding with an answer unrelated to math
 USES 10	Verbalizing use of multiples of 10
 ZERO RULE	Verbalizing use of the rule that multiplying any number by zero results in zero

Written: Computation

Addition

 SUB	Subtracts instead of adding
 MULTIPLY	Multiplies instead of adding

Addition, cont'd.

	Follows procedures of multiplication while adding the numbers
	Applies the multiplication zero rule when adding, and always answers zero
	Fails to carry a digit
	Carries the incorrect digit
	Ignores the carried number
	Adds individual digits together
	Executes the problem from left to right instead of right to left
	Recognizes previously learned material

Subtraction

	Adds instead of subtracting
	Multiplies instead of subtracting
	Follows procedures of multiplication while subtracting the numbers
	Applies the multiplication zero rule when subtracting, and always answers zero
	When subtracting a larger digit from a smaller digit, instead of borrowing, the child answers zero

Subtraction, cont'd.

	Borrows for both digits from the hundreds place when solving double-borrow items
	Adds individual digits together
	Executes the problem from left to right instead of right to left
	Recognizes previously learned material

Multiplication

	Subtracts instead of multiplying
	Adds instead of multiplying
	Applies the addition or subtraction zero rule and produces answers the same as the original number
	Fails to carry a digit
	Carries the incorrect digit
	Ignores the carried number
	Adds the carried number to the first digit and then multiplies instead of adding the carried number to the product of both digits
	Adds individual digits together
	Provides visual clues of thought process, without use of manipulatives
	Recognizes previously learned material

Certain requirements must be met for a child to be assigned a score category for a module. Those requirements vary by grade and according to the different parts of the module.

Counting

Forward by Ones

Kindergarten			
SCORE CATEGORY	**HIGHEST NUMBER SUCCESSFULLY COUNTED**	**IF APPLICABLE, THE CHILD RECOGNIZED AND CORRECTED ALL ERRORS (E.G. "IS IT OKAY TO SAY...")**	**CHILD WAS ABLE TO COUNT BEGINNING MIDSEQUENCE (E.G., COUNT FROM 26)**
Adept	42 or higher	Yes	Yes
Rote	42 or higher	No	No
	42 or higher	Yes	No
	42 or higher	No	Yes
	20–41	No	No
	20–41	Yes	No
	20–41	No	Yes
Practicing	20–41	Yes	Yes
Needs Help	0–19	Yes	Yes
	0–19	Yes	No
	0–19	No	Yes
	0–19	No	No

First Grade			
SCORE CATEGORY	**HIGHEST NUMBER IN RANGE**	**IF APPLICABLE, THE CHILD RECOGNIZED AND CORRECTED ALL ERRORS**	**CHILD WAS ABLE TO COUNT BEGINNING MIDSEQUENCE**
Adept	100 or higher	Yes	Yes
Rote	100 or higher	No	No
	100 or higher	Yes	No
	100 or higher	No	Yes
	43–99	No	No
	43–99	Yes	No
	43–99	No	Yes
Practicing	43–99	Yes	Yes
Needs Help	0–42	N/A	N/A

Backward by Ones

SCORE CATEGORY	KINDERGARTEN	FIRST GRADE
Adept	Counted down to 1	Began at 20 and counted down to 1
Practicing	N/A	Began at 9 and counted down to 1
Needs Help	Did not count down to 1	Did not count down to 1

Forward by Tens

SCORE CATEGORY	HIGHEST NUMBER IN RANGE	IF APPLICABLE, THE CHILD RECOGNIZED AND CORRECTED ALL ERRORS	CHILD WAS ABLE TO COUNT BEGINNING MIDSEQUENCE
Adept	100 or higher	Yes	Yes
Rote	100 or higher	No	No
	100 or higher	Yes	No
	100 or higher	No	Yes
	40–90	No	No
	40–90	Yes	No
	40–90	No	Yes
Practicing	40–90	Yes	Yes
Needs Help	0–30	N/A	N/A

How Many

The accuracy benchmark in How Many is when a child answers 3 of the 4 items correctly. The strategy benchmark is met when he or she uses at least one of the Count, Point, Group, or Push strategies on 1 of the 4 items.

SCORE CATEGORY	ACCURACY BENCHMARK	STRATEGY BENCHMARK
Adept	Yes	Yes
Practicing	No	Yes
Mechanical	Yes	No
Needs Help	No	No

Addition

Small Numbers

The goal of Small Numbers is to determine if students can solve problems accurately, and that they use reliable strategies for solving them. For example, as a kindergartner, using your fingers to add is an adequate strategy, but a second grade student should have developed enough to rely on other strategies. Part of the Small Numbers Score Category requirements is that the child use good strategies.

GRADE	ACCEPTABLE OBSERVED	ACCEPTABLE EXPRESSED	ACCEPTABLE ALTERNATE
Kindergarten and first	Paper Count Chips Fingers	Derived Facts Paper Count Chips Fingers	Derived Facts Paper Count Chips Fingers
Second and third	Paper Count Chips	Derived Facts Paper Count Chips	Derived Facts Paper Count Chips

SCORE CATEGORY	BOTH ITEMS CORRECT	USED AN ACCEPTABLE STRATEGY	NO OBSERVED; MEMORY, DUNNO, OR OTHER EXPRESSED; ONE ACCEPTABLE ALTERNATE
Expert (grade 3 only)	Yes	Yes	Yes
Adept	Yes	Yes	No
Practicing	No	Yes	N/A
Rote	Yes	No	N/A
Needs Help	No	No	N/A

Zero Principle

The goal of Zero Principle is that a student accurately solves addition problems involving zero, and that the student can generalize the principle when solving problems outside her range of familiar numbers.

GRADE	ACCURACY BENCHMARK	STRATEGY BENCHMARK
Kindergarten	1 or more items correct	Observed or Expressed = Zero Principle on at least 1 item
First	Both items correct	Observed or Expressed = Zero Principle on at least 1 item
Second and third	Both items correct	Observed or Expressed = Zero Principle on both items

SCORE CATEGORY	ACCURACY BENCHMARK	STRATEGY BENCHMARK
Adept	Yes	Yes
Practicing	No	Yes
Mechanical	Yes	No
Needs Help	No	No

Order Principle

The goal of the Order Principle is for students to answer questions accurately and demonstrate the ability to recognize the role of 10s. Note that only the first two items factor into the scoring.

GRADE	ACCURACY BENCHMARK	STRATEGY BENCHMARK
First	Both items correct	Observed or Expressed = Order Principle on at least 1 item
Second and third	Both items correct	Observed or Expressed = Order Principle on both items

SCORE CATEGORY	ACCURACY BENCHMARK	STRATEGY BENCHMARK
Adept	Yes	Yes
Practicing	No	Yes
Mechanical	Yes	No
Needs Help	No	No

Mental Calculation

There are also benchmarks for Mental Calculation upon which the Score Categories are based.

GRADE	ACCURACY BENCHMARK	STRATEGY BENCHMARK
First	First two items correct	On at least 1 of first 2 items: Expressed = Uses 10s
Second and third	First two items correct	On first 2 items: Expressed = Uses 10s

SCORE CATEGORY	ACCURACY BENCHMARK (FIRST 2 ITEMS ONLY)	STRATEGY BENCHMARK (FIRST 2 ITEMS ONLY)
Adept	Yes	Yes
Practicing	No	Yes
Mechanical	Yes	No
Needs Help	No	No

Subtraction

Small Numbers

The goal of Small Numbers is to determine if students can solve problems accurately and that they use reliable strategies for solving them. For example, while it is acceptable for a kindergarten student to subtract using her fingers, a second grade student should have developed enough to use other strategies. Part of the Small Numbers Score Category requirements is that the child use good strategies.

GRADE	ACCEPTABLE OBSERVED	ACCEPTABLE EXPRESSED	ACCEPTABLE ALTERNATE
Kindergarten and first	Paper Count Chips Fingers	Derived Facts Paper Count Chips Fingers	Derived Facts Paper Count Chips Fingers
Second and third	Paper Count Chips	Derived Facts Paper Count Chips	Derived Facts Paper Count Chips

SCORE CATEGORY	BOTH ITEMS CORRECT	USED AN ACCEPTABLE STRATEGY	NO OBSERVED; MEMORY, DUNNO, OR OTHER EXPRESSED; ONE ACCEPTABLE ALTERNATE
Expert (grade 3 only)	Yes	Yes	Yes
Adept	Yes	Yes	No
Practicing	No	Yes	N/A
Rote	Yes	No	N/A
Needs Help	No	No	N/A

Zero, Order, Same Number, and Inverse Principles

There are also benchmarks for all the Principle modules upon which the Score Categories are based.

GRADE	ACCURACY BENCHMARK	STRATEGY BENCHMARK
Kindergarten	1 or more items correct	Observed or Expressed = Principle on at least one item
First	Both items correct	Observed or Expressed = Principle on at least one item
Second and third	Both items correct	Observed or Expressed = Principle on both items

SCORE CATEGORY	ACCURACY BENCHMARK	STRATEGY BENCHMARK
Adept	Yes	Yes
Practicing	No	Yes
Mechanical	Yes	No
Needs Help	No	No

Mental Calculation

There are also benchmarks for Mental Calculation upon which the Score Categories are based.

GRADE	ACCURACY BENCHMARK	STRATEGY BENCHMARK
First	First two items correct	On at least 1 of first 2 items: Expressed = Uses 10s
Second and third	First two items correct	On first 2 items: Expressed = Uses 10s

SCORE CATEGORY	ACCURACY BENCHMARK (FIRST 2 ITEMS ONLY)	STRATEGY BENCHMARK (FIRST 2 ITEMS ONLY)
Adept	Yes	Yes
Practicing	No	Yes
Mechanical	Yes	No
Needs Help	No	No

Multiplication

Small Numbers

Unlike in Addition and Subtraction, acceptable strategies do not vary by grade but are the same for both second and third grade.

ACCEPTABLE OBSERVED	ACCEPTABLE EXPRESSED	ACCEPTABLE ALTERNATE
Paper Fingers Count	Paper Fingers Count Derived Facts	Paper Fingers Count Derived Facts

SCORE CATEGORY	BOTH ITEMS CORRECT	USED AN ACCEPTABLE STRATEGY
Adept	Yes	Yes
Practicing	No	Yes
Rote	Yes	No
Needs Help	No	No

Zero and Identity Principles

There are also benchmarks for the Zero and Identity Principles upon which the Score Categories are based.

GRADE	ACCURACY BENCHMARK	STRATEGY BENCHMARK
Second	Both items correct	Observed or Expressed = Principle on at least one item
Third	Both items correct	Observed or Expressed = Principle on both items

SCORE CATEGORY	ACCURACY BENCHMARK	STRATEGY BENCHMARK
Adept	Yes	Yes
Practicing	No	Yes
Mechanical	Yes	No
Needs Help	No	No

Order Principle

There are also benchmarks for Order Principle upon which the Score Categories are based.

GRADE	ACCURACY BENCHMARK	STRATEGY BENCHMARK
Second	Both items correct	Observed or Expressed = Principle on at least one item
Third	Both items correct	Observed or Expressed = Principle on both items

SCORE CATEGORY	ACCURACY BENCHMARK	STRATEGY BENCHMARK
Adept	Yes	Yes
Practicing	No	Yes
Mechanical	Yes	No
Needs Help	No	No

Mental Calculation

There are also benchmarks for Mental Calculation upon which the Score Categories are based.

GRADE	ACCURACY BENCHMARK	STRATEGY BENCHMARK
Second	Both items correct	Expressed = Uses 10s on at least one item
Third	Both items correct	Expressed = Uses 10s on both items

SCORE CATEGORY	ACCURACY BENCHMARK (FIRST 2 ITEMS ONLY)	STRATEGY BENCHMARK (FIRST 2 ITEMS ONLY)
Adept	Yes	Yes
Practicing	No	Yes
Mechanical	Yes	No
Needs Help	No	No

Written

Writing Numbers

SCORE CATEGORY	ACCURACY BENCHMARK
Adept	Both items correct
Practicing	One item correct
Needs Help	Both items correct

Setup Problem

The accuracy benchmark has three parts: numbers, alignment, and operation. An item is considered correct if the criterion for each part is met.

1. Numbers: Both numbers correct
2. Alignment: Each number is lined up vertically in the correct column
3. Operation: Child uses the correct symbol

SCORE CATEGORY	FIRST AND SECOND GRADE	THIRD GRADE
Adept	All items correct	All items correct
Practicing	At least two items correct	At least three items correct
Needs Help	One or less items correct	Two or less items correct

Place Value

During the number identification portion of the Place Value module, identification of the number is correct if the child is able to accurately read the number without errors. Place Value is correct if the student is able to either correctly identify all appropriate units and place values for all digits when initially asked or correctly identify all appropriate units on the follow-up question.

SCORE CATEGORY	FIRST GRADE	SECOND AND THIRD GRADE
Adept	Item correct	Item correct
Practicing	N/A	Item correct and backup item correct
Needs Help	Item incorrect	Item correct and backup item correct

Computation

Second graders are assigned a score category for Addition and Subtraction Computation. Third graders are assigned a score category for Addition, Subtraction, and Multiplication Computation.

Children must not only provide the correct answers but show use of a good method to have produced that answer. Note that the expectation is not tied to any particular method or algorithm; rather, that the student uses a reliable method to solve computation problems.

Second Grade

SCORE CATEGORY	ALL ITEMS CORRECT	CORRECT PROCEDURE
Adept	Yes	Yes
Mechanical	Yes	No
Practicing	No	Yes
Needs Help	No	No

Third Grade

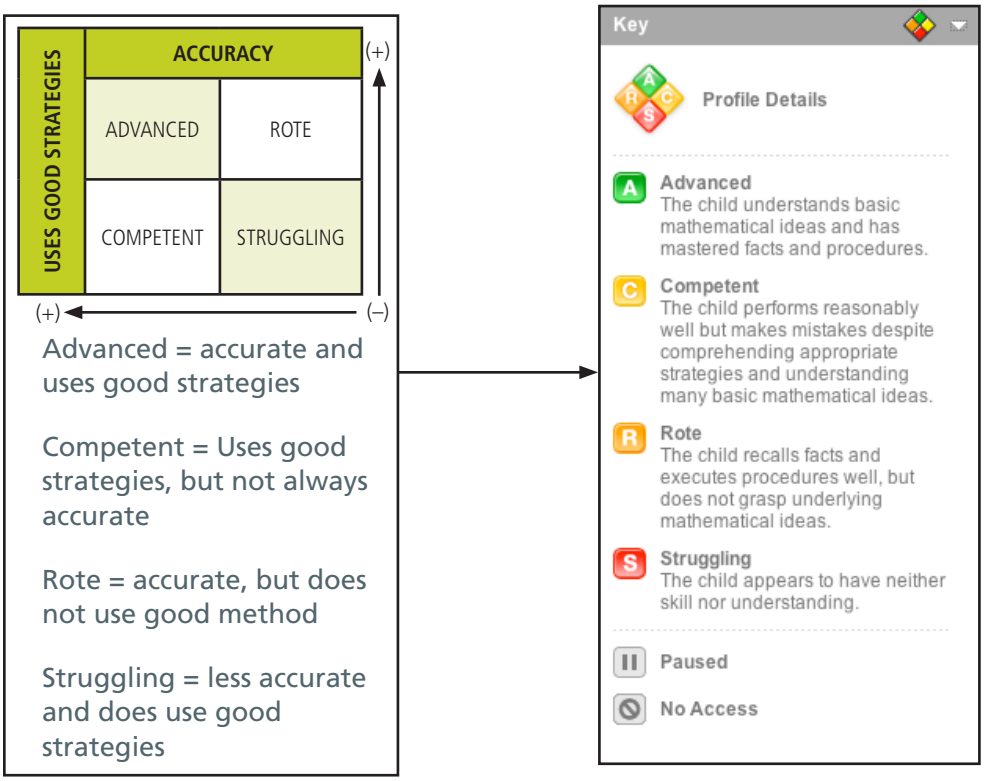
SCORE CATEGORY	ALL ITEMS CORRECT	CORRECT PROCEDURE
Adept	Yes	Yes
Mechanical	Yes	No
Practicing	No	Yes
Needs Help	No	No

Interview Profiles – Overview

Similar to the way in which certain requirements must be met for each score category, different combinations of score categories across the modules will yield the different Interview Profiles.

At the most basic level, Interview Profiles are an indicator to a student's accuracy and fluency in a given area, as illustrated below.

A written description of each Interview Profile is available in the drop-down key on the main screen of the online Interview Detail Report, shown below, and a more detailed description, broken down by grade, can be found at the beginning of each Interview subsection in the Administration & Scoring Section of this guide (the Administration & Scoring section begins on page 44).

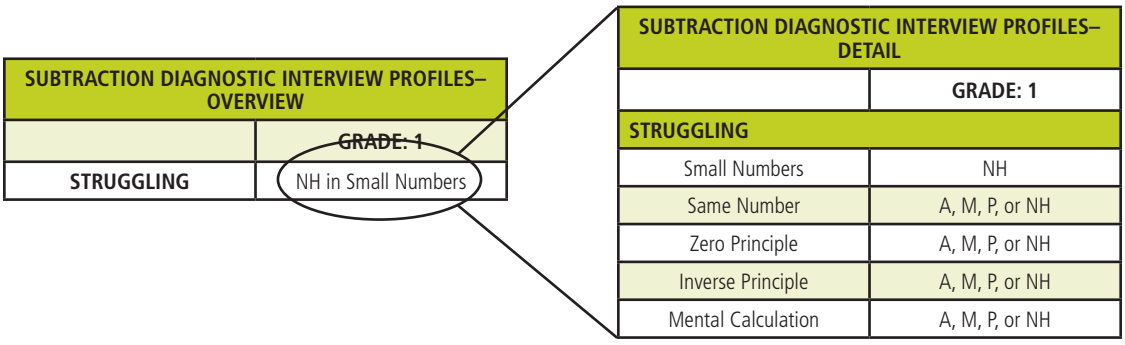


In determining an Interview Profile, the results of certain modules are considered more indicative of a child's mastery of the subject matter than others. You can see examples of this in the Interview Profile overviews, below. To score an Interview Profile of Struggling in Grade 1 Subtraction, for example, you can see from the overview that the student must score Needs Help (NH) in the Small Numbers Module.

SUBTRACTION DIAGNOSTIC INTERVIEW PROFILES–OVERVIEW				
	GRADE: K	**GRADE: 1**	**GRADE: 2**	**GRADE: 3**
ADVANCED	A in Small Numbers and one principle	A in Small Numbers, Mental Calculation, and two principles	A in all modules	A in all modules
COMPETENT	A or P in Small Numbers	A, P, or M in Small Numbers	A or P in Small Numbers; A, M, P, or NH in Mental Calculation	A or P in Small Numbers; A, M, or P in Mental Calculation
ROTE	R in Small Numbers	R in Small Numbers	R in Small Numbers	R in Small Numbers
STRUGGLING	NH in Small Numbers	NH in Small Numbers	NH in Small Numbers	NH in Small Numbers or Mental Calculation and does not score A in two principles

A = Adept, P = Practicing, M = Mechanical, R = Rote, NH = Needs Help

The Diagnostic Interview Profile details, shown below, right, list every possible score category per module that can still lead to an Interview Profile of Struggling. As you can see, the student can arrive at an Interview Profile of Struggling via many different permutations of score categories across modules; however, in every case, the student will have scored Needs Help in the Small Numbers module, which makes Small Numbers the critical skill for the Subtraction Interview. To refer to the Diagnostic Intervew Profile Details, see the grids beginning on page 201.



SUBTRACTION DIAGNOSTIC INTERVIEW PROFILES–OVERVIEW	
	~~GRADE: 1~~
STRUGGLING	NH in Small Numbers

SUBTRACTION DIAGNOSTIC INTERVIEW PROFILES–DETAIL	
	GRADE: 1
STRUGGLING	
Small Numbers	NH
Same Number	A, M, P, or NH
Zero Principle	A, M, P, or NH
Inverse Principle	A, M, P, or NH
Mental Calculation	A, M, P, or NH

Counting Diagnostic Interview Profile – Overview

For a detailed written explanation of each score category per grade for the Counting interview, please see page 45 in the Administration & Scoring section of this guide.

	GRADE: K	GRADE: 1	GRADE: 2	GRADE: 3
ADVANCED	A in Forward by 1s, Count Backwards, A or M in How Many?	A in Count by Ones, Count by 10s, Count Backwards, A or M in How Many?	NOT ASSESSED IN GRADE 2	NOT ASSESSED IN GRADE 3
COMPETENT	A or P in Count by Ones, NH in How Many?	A or P in Count by Ones, NH in How Many		
ROTE	Rote in Count by Ones, NH in How Many?	R in Count by Ones, NH in How Many?		
STRUGGLING	NH in How Many? or Count by Ones	NH in Count by Ones or How Many?		

Addition Diagnostic Interview Profile – Overview

For a detailed written explanation of each score category per grade for the Addition interview, please see page 61 in the Administration & Scoring section of this guide.

	GRADE: K	GRADE: 1	GRADE: 2	GRADE: 3
ADVANCED	A in Small Numbers and Zero Principle	A in Small Numbers, Mental Calculation, and one principle	A in Small Numbers, Mental Calculation, and both Principles	A in Small Numbers, Mental Calculation, and both principles
COMPETENT	A or P in Small Numbers	A or P in Small Numbers	A or P in Small Numbers; A, M, or P in Mental Calculation	A or P in Small Numbers; A, M, or P in Mental Calculation
ROTE	R in Small Numbers	R in Small Numbers	R in Small Numbers	Rote in Small Numbers
STRUGGLING	NH in Small Numbers	NH in Small Numbers	NH in Small Numbers or Mental Calculation and does not score A in two principles	NH in Small Numbers or Mental Calculation and does not score A in two principles

Subtraction Diagnostic Interview Profile – Overview

For a detailed written explanation of each score category per grade for the Subtraction interview, please see page 86 in the Administration & Scoring section of this guide.

	GRADE: K	GRADE: 1	GRADE: 2	GRADE: 3
ADVANCED	A in Small Numbers and Zero Principle	A in Small Numbers, Mental Calculation, and one principle	A in Small Numbers, Mental Calculation, and both Principles	A in Small Numbers, Mental Calculation, and both principles
COMPETENT	A or P in Small Numbers	A or P in Small Numbers	A or P in Small Numbers; A, M, or P in Mental Calculation	A or P in Small Numbers; A, M, or P in Mental Calculation
ROTE	R in Small Numbers	R in Small Numbers	R in Small Numbers	Rote in Small Numbers
STRUGGLING	NH in Small Numbers	NH in Small Numbers	NH in Small Numbers or Mental Calculation and does not score A in two principles	NH in Small Numbers or Mental Calculation and does not score A in two principles

Multiplication Diagnostic Interview Profile – Overview

For a detailed written explanation of each score category per grade for the Multiplication interview, please see page 111 in the Administration & Scoring section of this guide.

MULTIPLICATION DIAGNOSTIC INTERVIEW PROFILES–OVERVIEW				
	GRADE: K	**GRADE: 1**	**GRADE: 2**	**GRADE: 3**
ADVANCED	NOT ASSESSED IN K	NOT ASSESSED IN GRADE 1	A in Small Numbers, Mental Calculation, and one principle	A in Small Numbers, Mental Calculation, and all three Principles
COMPETENT			A, M, or P in Small Numbers and Mental Calculation	A, M, or P in Small Numbers and Mental Calculation
ROTE			R in Small Numbers	R in Small Numbers
STRUGGLING			NH in Small Numbers	NH in Small Numbers or Mental Calculation and has not scored A in any principle

Written Diagnostic Interview Profile – Overview

For a detailed written explanation of each score category per grade for the Written interview, please see page 131 in the Administration & Scoring section of this guide.

WRITTEN DIAGNOSTIC INTERVIEW PROFILES–OVERVIEW				
	GRADE: K	**GRADE: 1**	**GRADE: 2**	**GRADE: 3**
ADVANCED	NOT ASSESSED IN K	A in Write a Number, Set Up a Problem, and Place Value	A in Write a Number, Set Up a Problem, Place Value, Comp (+), and Comp (–)	A in Write a Number, Set Up a Problem, Place Value, Comp (+), Comp (–), and scores higher than NH in Comp (x)
COMPETENT		A in Place Value	A or P in Place Value, Comp (+), Comp (–), and either: A or P in two skill areas or, if NH in any one skill area, must score at least P in remaining skill areas–cannot score M in any skill area	A or P in two computations and A or P in one skill area; if NH in any one skill area, must score at least P in remaining areas–cannot score M in any skill area
ROTE		NH only in Place Value and A or P in both Write a Number and Set Up a Problem	M in Place Value, Comp (+), or Comp (–) and either A or P in two skill areas or, if NH in any one skill area, must score at least P in remaining skill areas	M in one computation and either A, P, or M in two skill areas or, if NH in one skill area, must score at least M in remaining skill areas
STRUGGLING		NH in two skill areas	NH in at least two of the following: Place Value, Comp (+), and Comp (–)	NH in two of three computations

Interview Profile – Detail

Counting Diagnostic Interview Profile – Detail

	GRADE: K	GRADE: 1	GRADE: 2	GRADE: 3
ADVANCED				
Forward by 1s	A	A	NOT ASSESSED IN GRADE 2	NOT ASSESSED IN GRADE 3
Backward by 1s	A	A		
Forward by 10s	NOT ASSESSED IN K	A		
How Many?	A	A		
COMPETENT				
Forward by 1s	A or P	A or P	NOT ASSESSED IN GRADE 2	NOT ASSESSED IN GRADE 3
Backward by 1s	A, M, P, or NH	A, P, or NH		
Forward by 10s	NOT ASSESSED IN K	A, R, P, or NH		
How Many?	A or P	A or P		
ROTE				
Forward by 1s	R or P	R or P	NOT ASSESSED IN GRADE 2	NOT ASSESSED IN GRADE 3
Backward by 1s	A, P, or NH	A, P, or NH		
Forward by 10s	NOT ASSESSED IN K	A or P		
How Many?	A, P, or M	A, P, or M		
STRUGGLING				
Forward by 1s	A, R, P, or NH	A, R, P, or NH	NOT ASSESSED IN GRADE 2	NOT ASSESSED IN GRADE 3
Backward by 1s	A, P, or NH	A, P, or NH		
Forward by 10s	NOT ASSESSED IN K	A, R, P, or NH		
How Many?	A, M, P, or NH	A, M, P, or NH		

Addition Diagnostic Interview Profile – Detail

	GRADE: K	GRADE: 1	GRADE: 2	GRADE: 3
ADVANCED				
Small Numbers	A	A	A	A
Zero Principle	A	A in 1 of 2 principles	A	A
Order Principle	NOT ASSESSED IN K		A	A
Mental Calculation		A	A	A
COMPETENT				
Small Numbers	A or P	A or P	A or P	A or P
Zero Principle	A, M, P, or NH	A in 1 of 2 principles	A in 0, 1, or 2 principles	A in 0, 1, or 2 principles
Order Principle	NOT ASSESSED IN K			
Mental Calculation		A, M, P, or NH	A, M, P, or NH	A, M, P, or NH
ROTE				
Small Numbers	R	R	R	R
Zero Principle	A, M, P, or NH	A in 0, 1, or 2 principles	A in 0, 1, or 2 principles	A in 0, 1, or 2 principles
Order Principle	NOT ASSESSED IN K			
Mental Calculation		A, M, P, or NH	A, M, P, or NH	A, M, P, or NH
STRUGGLING				
Small Numbers	NH	NH	NH	NH
Zero Principle	A, M, P, or NH	A in 0, 1, or 2 principles	A in 0, 1, or 2 principles	A in 0, 1, or 2 principles
Order Principle	NOT ASSESSED IN K			
Mental Calculation		A, M, P, or NH	A, M, P, or NH	A, M, P, or NH

Subtraction Diagnostic Interview Profile – Detail

	GRADE: K	GRADE: 1	GRADE: 2	GRADE: 3
ADVANCED				
Small Numbers	A	A	A	A
Same Number	A in 1 of principles	A in two of three principles	A	A
Zero Principle			A	A
Inverse Principle	NOT ASSESSED IN K		A	A
Mental Calculation		A	A	A
COMPETENT				
Small Numbers	A, P, or R	A, P, or R	A or P	A or P
Same Number	A, P, M, or NH	A, M, P, or NH	A, M, P, or NH	A, M, P, or NH
Zero Principle	A, P, M, or NH	A, M, P, or NH	A, M, P, or NH	A, M, P, or NH
Inverse Principle	NOT ASSESSED IN K	A, M, P, or NH	A, M, P, or NH	A, M, or P
Mental Calculation		A, M, P, or NH	A, M, P, or NH	A, M, or P
ROTE				
Small Numbers	R	R	R	R
Same Number	A, M, P, or NH	A, M, P, or NH	A, M, P, or NH	A, M, P, or NH
Zero Principle	A, M, P, or NH	A, M, P, or NH	A, M, P, or NH	A, M, P, or NH
Inverse Principle	NOT ASSESSED IN K	A, M, P, or NH	A, M, P, or NH	A, M, P, or NH
Mental Calculation		A, M, P, or NH	A, M, P, or NH	A, M, P, or NH
STRUGGLING				
Small Numbers	NH	NH	NH	NH
Same Number	A, M, P, or NH	A, M, P, or NH	A, M, P, or NH	NH
Zero Principle	A, M, P, or NH	A, M, P, or NH	A, M, P, or NH	NH
Inverse Principle	NOT ASSESSED IN K	A, M, P, or NH	A, M, P, or NH	NH
Mental Calculation		A, M, P, or NH	A, M, P, or NH	NH

Multiplication Interview Profile – Detail

<table>
<tr><th></th><th>GRADE: K</th><th>GRADE: 1</th><th>GRADE: 2</th><th>GRADE: 3</th></tr>
<tr><td colspan="5">ADVANCED</td></tr>
<tr><td>Small Numbers</td><td rowspan="5">NOT ASSESSED IN K</td><td rowspan="5">NOT ASSESSED IN GRADE 1</td><td>A</td><td>A</td></tr>
<tr><td>Same Number</td><td rowspan="3">A in 1 of 3 principles</td><td>A</td></tr>
<tr><td>Zero Rule</td><td>A</td></tr>
<tr><td>Inverse Principal</td><td>A</td></tr>
<tr><td>Mental Calculation</td><td>A</td><td>A</td></tr>
<tr><td colspan="5">COMPETENT</td></tr>
<tr><td>Small Numbers</td><td rowspan="5">NOT ASSESSED IN K</td><td rowspan="5">NOT ASSESSED IN GRADE 1</td><td>A or P</td><td>A or P</td></tr>
<tr><td>Same Number</td><td rowspan="3">A in 0, 1, 2, or 3 principles</td><td rowspan="3">A in 0, 1, 2, or 3 principles</td></tr>
<tr><td>Zero Rule</td></tr>
<tr><td>Inverse Principal</td></tr>
<tr><td>Mental Calculation</td><td>A, M, P, or NH</td><td>A, M, P, or NH</td></tr>
<tr><td colspan="5">ROTE</td></tr>
<tr><td>Small Numbers</td><td rowspan="5">NOT ASSESSED IN K</td><td rowspan="5">NOT ASSESSED IN GRADE 1</td><td>R</td><td>R</td></tr>
<tr><td>Same Number</td><td rowspan="3">A in 0, 1, 2, or 3 principles</td><td rowspan="3">A in 0, 1, 2, or 3 principles</td></tr>
<tr><td>Zero Rule</td></tr>
<tr><td>Inverse Principal</td></tr>
<tr><td>Mental Calculation</td><td>A, M, P, or NH</td><td>A, M, P, or NH</td></tr>
<tr><td colspan="5">STRUGGLING</td></tr>
<tr><td>Small Numbers</td><td rowspan="5">NOT ASSESSED IN K</td><td rowspan="5">NOT ASSESSED IN GRADE 1</td><td>NH</td><td>A, P, R, or NH</td></tr>
<tr><td>Same Number</td><td rowspan="3">A in 0, 1, 2, or 3 principles</td><td rowspan="3">A in 0, 1, 2, or 3 principles</td></tr>
<tr><td>Zero Rule</td></tr>
<tr><td>Inverse Principal</td></tr>
<tr><td>Mental Calculation</td><td>A, P, M, or NH</td><td>A, P, M, or NH</td></tr>
</table>

Written Interview Profile – Detail

	GRADE: K	GRADE: 1	GRADE: 2	GRADE: 3
ADVANCED				
Writing Numbers	NOT ASSESSED IN K	A	A	A
Setup Problem		A	A	A
Place Value		A	A	A
Computation +		NOT ASSESSED IN GRADE 1	A	A
Computation –			A	A
Computation X			NA IN GRADE 2	A
COMPETENT				
Writing Numbers	NOT ASSESSED IN K	P or NH	A, P, or NH	A, P, or NH
Setup Problem		P or NH	A, M, or P	A, M, or P
Place Value		Adept	A, M, or P	A, M, or P
Computation +		NOT ASSESSED IN GRADE 1	A, M, or P	A, M, or P
Computation –			A, M, or P	A, M, or P
Computation X			NA IN GRADE 2	A, M, or P
ROTE				
Writing Numbers	NOT ASSESSED IN K	A or P	A, P, or NH	A, P, or NH
Setup Problem		A or P	A, P, or NH	A, P, or NH
Place Value		NH	A, P, or NH	A, P, or NH
Computation +		NOT ASSESSED IN GRADE 1	A, M, or P	A, M, or P
Computation –			A, M, or P	A, M, or P
Computation X			NA IN GRADE 2	A, M, or P
STRUGGLING				
Writing Numbers	NOT ASSESSED IN K	A, P, or NH	A, P, or NH	A, P, or NH
Setup Problem		A, P, or NH	A, P, or NH	A, P, or NH
Place Value		A or NH	A, P, or NH	A, P, or NH
Computation +		NOT ASSESSED IN GRADE 1	A, P, M, or NH	A, P, M, or NH
Computation –			A, P, M, or NH	A, P, M, or NH
Computation X			NA IN GRADE 2	A, P, M, or NH

VISUAL ITEMS

Grade: 1 Form: 1

26

Grade: 1 Form: 2

27

Grade: 1 Form: 3

23

Grade: 2 Form: 1

257

39

Grade: 2 Form: 2

367

59

Grade: 2 Form: 3

249

53

Grade: 3 Form: 1

5,024

736

Grade: 3 Form: 2

3,079

625

Grade: 3 Form: 3

4,036

694

WORKSHEETS

Form: 1

23 + 50	68 + 6
48 + 37	281 + 143
387 + 265	

Form: 2

49 + 30	58 + 7
38 + 24	374 + 261
589 + 243	

Form: 3

24 + 40	69 + 7
37 + 29	494 + 352
485 + 347	

Form: 1

50 – 39	85 – 3
53 – 26	382 – 215
622 – 174	

Form: 2

70 – 45	97 – 5
81 – 58	472 – 137
813 – 256	

Form: 3

60 – 29	76 – 4
43 – 27	329 – 164
523 – 184	

Form: 1

96 x 3	560 x 4

Form: 2

76 x 4	460 x 3

Form: 3

86 x 3	470 x 3

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