

# Math Counts: Issues That Matter

A PROFESSIONAL SERIES, VOLUME 1

## ASSESSMENT



*“Assessment and instruction are inextricably linked.”*

Assessment is an integral part of mathematics instruction. Assessment is used to evaluate the mathematics learned by students and to inform the instruction methods of teachers. In the classroom, assessment is used to evaluate student progress in comprehension and mastery of grade-level goals in mathematics. It also serves as a method of accountability that supervisors use to appraise teacher performance. Finding appropriate and efficient methods of assessment to gauge mathematics learning and teaching is a challenge for today's teachers and supervisors. Assessment and instruction, therefore, are inextricably linked.

Both ongoing and summative assessments are essential to monitor, enhance, and evaluate mathematics instruction. Ongoing classroom assessment provides continuous feedback on student progress for students, teachers, and parents, while summative assessments measure mastery of standardized milestones (*New York City Performance Standards*).



*“An effective mathematics program provides follow-up activities to bridge the gaps in student prerequisite knowledge.”*

### Preassessment

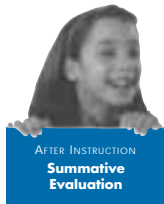
For assessment to be effective, it must occur before, during, and after instruction. Preassessment serves a twofold purpose in the classroom. First, it gives teachers the opportunity to verify that students have the background skills needed to move forward in their mathematical learning. An effective mathematics program provides follow-up activities to bridge the gaps in student prerequisite knowledge, so students can then be successful in upcoming instruction. Second,

teachers may use preassessment in conjunction with summative assessment, using preassessment to record starting knowledge and summative assessment to note the culmination of instruction. Appropriate preassessment encourages student learning, and does not reach too far forward into unknown content, and therefore frustrate students. Preassessment should be designed to assess proficiency in the skills needed to proceed to new content, and not the new content itself.

## When do I use the various types of assessment?



BEFORE INSTRUCTION  
**Preassessment**



AFTER INSTRUCTION  
**Summative Evaluation**



DURING INSTRUCTION

**Monitor Daily Progress**

Guided Instruction  
Practice/Maintenance



## Post Assessment

*“An ideal way to implement daily assessment is to have one key question that goes to the heart of the concept that students can respond to individually.”*

## Daily Assessment

Assessment used to monitor daily progress through the development of each concept is called formative assessment. Effective formative assessment methods should be used on a daily basis to aid teachers in adjusting instruction and to appraise student progress. After each brief formative assessment, teachers should consider if they need to reteach the concept for fuller understanding or to proceed to the next concept. It is essential that these daily formative assessments not interfere with instruction time and are implemented as a natural extension of instruction. An ideal way to implement

daily assessment is to have one key question that goes to the heart of the concept that students can respond to individually. Appropriate formative assessment must focus on the specific nature of the current content taught; it should be designed to quickly assess proficiency in the content of that day's instruction. Often, in mathematics programs, daily assessment is either weak or missing altogether. Programs that provide strong opportunities for daily assessment—that aid teachers in guiding instruction—increase the success of mathematics students (*Principles and Standards for School Mathematics*).

Post-assessment, or summative evaluation, assesses the progress students have made based on a specific body of content. Summative evaluations are also often used as a means of accountability by judging the effectiveness of teachers. Summative evaluations may occur after several related skills have been taught, after the instruction of new content skills and procedures is complete, or as an overall review of all previously taught mathematics content. Summative evaluations that occur after several interconnected skills are taught gives teachers the opportunity to assess student understanding of that cluster of skills. As with formative assessment, teachers need to closely examine the results and evaluate student progress to determine whether to proceed with a new set of skills or reteach the previous set of skills.

Summative evaluations, based on all of the mathematics content students have been taught, help students maintain mastery of previously taught skills.

## Assessment Formats

A variety of assessment formats is necessary to adequately assess student understanding of mathematics. Various considerations, such as what needs to be assessed, who needs the assessment information, and how the information from the assessment is to be used determine the format of the assessment. Students who are exposed to a variety of test formats gain a familiarity with all types of tests and are prepared for a variety of test formats, therefore gaining a significant advantage.

**Multiple Choice Test:** Multiple choice tests present a question and four or five choices of possible answers with only one of the choices being the correct answer. This format is often found on standardized tests because it is easy to score. Unfortunately, students cannot show their work on these tests, so it becomes difficult for a teacher to pinpoint a specific error.

**Student-Constructed Response Test [Free Response]:** Free response tests require students to write out the answer while showing the procedures

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used to solve the problem. In most cases, this format requires students to show their work, which enables teachers to understand student thinking and pinpoint answers. Such tests may be scored using a rubric, allowing partial credit for proper work.

**Timed Test:** Timed assessment options test speed and accuracy as the prime criteria for evaluating student progress. Timed tests play an essential role in checking for student understanding, especially of basic skills. If students are not able to accurately answer questions quickly, then their understanding of the skill is superficial and it will not provide a basis for further learning (*Mathematics Framework for California Public Schools*).

**Student Writing:** Student writing enables teachers to get a better grasp of

student communication skills and a deeper insight into student attitudes toward mathematics and the learning process.

**Performance Assessment:** Performance assessments in mathematics involves presenting students with a mathematical task, project, or investigation and then observing, interviewing, and looking at the processes and results to assess student understanding.

**Portfolio:** A portfolio is a showcase for student work displaying various assignments and projects that serves as a representative collection of student work. Portfolios are meant to demonstrate strengths of students, show growth over time, and promote self-assessment. Portfolios can accommodate a variety of learning styles to provide universal access to all students.

### What items belong in portfolios?

- work that addresses a specific body of content
- materials that assist in assessing growth over time
- ongoing self-assessment, in which the student describes how well he or she has performed

**Observations:** Students may be observed as they work alone or with others. In mathematics, an informal report about the student's abilities in mathematics and disposition toward mathematics may be made; observations should not, however, be used as the sole method of assessing student's understanding of mathematics.

**Interviews:** Students may be formally or informally interviewed. Casual questions may occur that can expand understanding. In a more formal interview, specific questions can be designed and used to diagnose or pinpoint a specific problem.



## What type of assessment is most appropriate?

Test Format	Preassessment	Monitor Daily Progress	Summative Evaluation	Short Answer	Comprehensive
Multiple Choice	•		•	•	•
Free Response	•		•		•
Student Writing		•			
Performance Assessment			•		•
Portfolio			•	•	•
Observations		•			
Interview		•			

It is imperative that assessment be seen as an integral part of instruction to provide a window to student thinking and a compass for instruction (Cooney, Badger, and Wilson). Assessment is the key to ensuring that all students are exposed to a program that allows them

to learn and progress in their mathematical learning. To best evaluate students and inform instruction, assessment must be appropriately and efficiently integrated into instruction. For assessment to be an effective tool in the classroom, teachers must carefully con-

sider the results of assessments to note problem areas for specific students, modify teaching strategies, or progress as planned. In summary, well-implemented assessment serves as a safety net to catch any student before he or she is left behind.

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