

Math Assessment

Numbers
Advanced Mathematics

Math components

- ◆ Content
- ◆ Operations
- ◆ Applications
- ◆ Problem-solving
- ◆ Consumer skills

Spinelli, 2002

Piaget

- ◆ Classification - study of relationships
 - Likenesses & differences
- ◆ Ordering
- ◆ One-to-one correspondence
- ◆ Conservation
 - Quantity of an object or number of objects in a set remain constant regardless of spatial arrangement

Content

- ◆ Understanding of numeration
- ◆ Number facts
- ◆ Number concepts
- ◆ Counting skills
- ◆ Math vocabulary
- ◆ Classification
- ◆ Seriation
- ◆ Conservation
- ◆ Reversibility
- ◆ Spatial representation
- ◆ Number relationships
- ◆ Place value
- ◆ Fractions
- ◆ Algebra
- ◆ Geometry
- ◆ Proportions
- ◆ Statistics

Operations

- ◆ Counting
- ◆ Computation of addition, subtraction, multiplication
- ◆ Division of whole numbers, fractions, & decimals
- ◆ Estimating
- ◆ Rounding
- ◆ Mental calculation
- ◆ Reasoning skills
- ◆ Calculator usage

Applications

- ◆ Measurement
 - Metric
 - Linear
 - Liquid
 - Weight
 - Temperature
 - Time
 - Money
 - Distance
 - Quantity
 - Area
 - Speed
- ◆ Study skills
 - Graphs
 - Charts
 - Statistics
 - Maps

Problem-solving

- ◆ Ability to determine how to solve a given problem (frequently a word problem)
- ◆ Ability to perform necessary operation(s) to determine correct answer

Consumer skills

- ◆ Budgeting
- ◆ Salary
- ◆ Net pay
- ◆ Benefits
- ◆ Taxes
- ◆ Purchases
- ◆ Cash
- ◆ Checks
- ◆ Credit cards
- ◆ Debit cards
- ◆ Loans
- ◆ Home and auto expenses
- ◆ Leisure costs

Hierarchy of math skills

- ◆ Basic
- ◆ Concrete skills and concepts
- ◆ Complex and abstract relationships and generalizations

Simple number concepts

- ◆ Recognition of numbers & symbols

Basic number relationships

- ◆ Sequencing
- ◆ Succession
- ◆ 1 to 1 correspondence

Primary generalizations

- ◆ Sorting
- ◆ Grouping
- ◆ Equivalent set relationships
- ◆ Seriation
- ◆ Estimating

Basic math concepts

- ◆ Number
- ◆ Shape
- ◆ Size
- ◆ Weight
- ◆ Time

More complex relationships

- ◆ Number operations
- ◆ Equivalence relationships & inequalities
- ◆ Cause and effect

More complex generalizations

- ◆ Applied mathematics
- ◆ Probability
- ◆ Statistics
- ◆ Graphs
- ◆ Geometry

Major shift in math assessment

- ◆ Assessing what students know and how they think about math
- ◆ Having assessment as an integral part of teaching
- ◆ Focusing on a broad range of math tasks & taking holistic view of math
- ◆ Developing problem situations that require application of number of math ideas

- ◆ Using multiple assessment techniques including written, oral, & demonstration
- ◆ Using calculators, computers, & manipulatives in assessment
- ◆ Evaluating the program by systematically collecting information on outcomes, curriculum, & instruction
- ◆ Using standardized achievement tests as only one of many indicators of program outcomes

Assessment considerations

- ◆ Math errors
 - Computation
 - Problem solving
- ◆ Determining level of understanding
 - Concrete
 - Semi concrete
 - Abstract
- ◆ Determining mastery learning

Formal math assessment

- ◆ Achievement tests
- ◆ Diagnostic tests
- ◆ Criterion-referenced tests

Informal math assessment

- ◆ CBM
- ◆ Teacher constructed tests
- ◆ Diagnostic math interviews

Diagnostic math interviews

- ◆ Parent - teacher interview
- ◆ Record review
 - Cumulative file
 - Confidential file
 - Health record

Cumulative file

- ◆ Do standardized test results indicate long-term deficits in math?
- ◆ Can a pattern of above- or below-average performance be traced in any math skill areas?
- ◆ Do report card grades in math indicate a history of below-average functioning in math?
- ◆ Are grade or test scores low overall or specifically in math?

- ◆ Do narrative reports indicate any areas of strength or weakness in math skills?
- ◆ Is there a record of remedial math instruction? If so, how long (in what grades) were these services provided? What was the result of the remedial instruction?
- ◆ Can a correlation be made between attendance problems and math skill deficits?

Confidential file

- ◆ Do the psychological or achievement test results indicate math skill deficits?
- ◆ Do the team reports suggest student has a specific LD? If so, is the disability in math? Is the reading disability affecting the ability to read and follow math directions and word problems?

Health record

- ◆ Do records indicate student has visual acuity problems? Auditory acuity problems?
- ◆ Is there a history of medical, general health, or nutritional problems that may affect student's performance
- ◆ Is the student taking any medication that might affect school performance or behavior?
- ◆ Is there a report or record of attention problems or hyperactivity, specifically ADHD?

Work Sample Analysis

- ◆ Class assignments
- ◆ Board work
- ◆ Math worksheets
- ◆ Workbook pages
- ◆ Math textbook problems copied and calculated
- ◆ A performance activity both in process & culmination of activity, homework, & video or audio productions
- ◆ Check range of equations as well as word problems

Observation

- ◆ While working on math tasks
- ◆ During math instructional lessons
- ◆ While working independently on math assignment
- ◆ While involved in cooperative activity in small group
- ◆ During large group math instruction

Student interviews

- ◆ Ask student how to explain how they would do specific task
- ◆ Let student demonstrate through pantomime or with manipulatives
- ◆ Ask student to verbally explain how they make judgments, justify, & evaluate solutions to problems