



Overview

This analysis explores the average score in standardized math tests, with the focus being the L2 and L3 levels.

As shown in the graph, no grade of test takers surpassed the 90% accuracy level.

There is a significant rise in performance between PK/K and Grade 1, after which there is a decline in the average score.

A slight increment is observed between Grade 3 and Grade 5, but from Grade 5 onward, the average score in math standardized tests slightly declines, then plateaus between Grade 6 and Graade 8, before significantly declining onward.

Each standardized test has questions with tags for the knowledge skill being tested. Some questions test more than one knowledge skill, but most have a single tag. This analysis uses the single-tag standardized test questions.

The tables below summarize the most frequently recurring tags associated with incorrect answers in the math standardized tests. The top tag represents the skill students struggle with the most. The tables are organized by grades in L2 and L3, with accompanying analyses highlighting common patterns in knowledge gaps across these grade levels.

Top math skill gaps for Grade 5

skill_name
Complete a table for a two-variable relationship
Classify triangles
Divide unit fractions and whole numbers: word problems
Prime and composite numbers
Describe relationships among quadrilaterals
Describe the coordinate plane
Round decimals
Graph patterns using rules
Evaluate numerical expressions with parentheses
Add, subtract, multiply, and divide decimals: word problems
Interpret stem-and-leaf plots
Compare decimal numbers
Subtract fractions with unlike denominators using models
Volume of rectangular prisms made of unit cubes

Findings: Key Gaps

Grade 5: Word problems, shape classification, fraction operations, decimals, data interpretation.

Grade 6: Inequalities: word problems, angle measurement, area of trapezoids, mean/median/mode, percent problems.

Grade 7: Two-step inequalities, circles: word problems, volume of pyramids, similar figures, area of compound figures.

Grade 8: Functions, Pythagorean theorem: word problems, volume of cylinders, mean absolute deviation, surface area of 3D shapes.

- **Word problems** remain a consistent challenge, as students struggle to convert real-world scenarios into mathematical expressions for accurate problem-solving.
- **Shape-related operations** (e.g., classifying shapes, calculating area, volume, angles, and applying the Pythagorean Theorem) consistently challenge students, with complexity increasing across grades.
- **Data interpretation** (e.g., graphs, box plots, and central tendency measures) highlights gaps in understanding visual and statistical information.
- **Algebraic reasoning** grows increasingly difficult, especially with inequalities, proportional relationships, functions, and translating between equations and graphs.
- **Fractions, decimals, and percentages** frequently present challenges, particularly in real-world applications.

Top math skill gaps for Grade 6

skill_name
Box plots
Find missing angles in triangles
Area of trapezoids
Calculate mean, median, mode, and range
Identify independent and dependent variables in tables and graphs
Write and graph inequalities: word problems
Debit cards and credit cards
Interpret charts and graphs to find mean, median, mode, and range
Which word problem matches the one-step equation?
Graph inequalities on number lines
Classify rational numbers using a diagram
Multiply using the distributive property
Interpret line plots
One-step inequalities: word problems

Top math skill gaps for Grade 7

skill_name
Circles: word problems
Volume of pyramids
Solve two-step inequalities
Side lengths and angle measures of similar figures
Circumference of circles
Probability of compound events
Volume of cubes and prisms
Area of circles
Area of compound figures with triangles
Surface area of cubes and prisms
Graph solutions to two-step inequalities
Percent of a number: tax, discount, and more
Convert between customary and metric systems
Use collected data to find probabilities and make predictions

Analysis:

Across Grades 5 to 8, students show consistent struggles with applying math concepts in word problems, geometry, fractions, decimals, and data interpretation, pointing to gaps in higher-order cognitive skills.

The challenges with word problems indicate difficulties in “Application” and “Analysis” (Bloom's Taxonomy), as students often fail to translate real-world scenarios into mathematical expressions. Geometry-related issues reflect gaps in “Comprehension” and “Application,” requiring spatial reasoning, visualization, and manipulation of shapes, which are fundamental for higher-level problem-solving.

Struggles with fractions and decimals highlight deficiencies in foundational arithmetic skills, preventing progression to more complex operations and indicating a lack of “Knowledge” and “Application” (Bloom's). Problems with graphing and data interpretation suggest difficulties in “Analysis” and “Evaluation,” key components of Bloom's, as students have trouble making sense of visual data.

Finally, issues with functions, proportional relationships, and multi-step problems reflect underdeveloped “Synthesis” and “Evaluation” skills, needed to connect abstract concepts. The recurring gaps across these areas align with learning science theories, which emphasize the importance of building on prior knowledge, practicing procedural fluency, and engaging in active problem-solving to move from basic recall to deeper understanding.

Top math skill gaps for Grade 8

skill_name
Identify functions
Simple interest
Identify functions: graphs
Volume of cylinders
Pythagorean theorem: word problems
Volume of cones
Surface area of cylinders
Calculate mean absolute deviation
Find the distance between two points
Surface area of cubes, prisms, and pyramids
Convert between standard and scientific notation
Graph proportional relationships and find the slope
Volume of spheres
Write a linear equation from a graph

Conclusion: Action Points

1. Guides should use real-world scenarios as much as possible during coaching sessions in order to attune students to thinking mathematically through word problems e.g. instead of solving for 4-2 directly, let them give an example of 4 fruits, with 2 being taken away, and the student should then think about the remainder. This approach to coaching should be employed across all the grades.

2. Close guidance is needed to help understand how students apply formulas to shapes, with the focus being on firstly, whether they know these shapes, secondly, if they know the corresponding shape formulas, and lastly, whether they understand what each variable in these formulas represents.

3. A further review on algebraic content is needed to help pinpoint what might be causing the observed gaps.