

ISTEP+ Performance Level Descriptors

Mathematics – Grade 8

Grade 8

Pass+

Pass+ students demonstrate advanced mathematical and problem-solving skills. Students solve complex multi-step problems with rational and irrational numbers, square roots, exponents, scientific notation, and the Pythagorean Theorem and demonstrate expertise in the areas of geometry, measurement, data analysis, statistics, and probability. *Pass+* students display highly developed skills with algebra concepts, including writing and solving equations, inequalities, and linear functions. *Pass+* students solve sophisticated problems, support their solutions, and generalize the results to other situations.

Some examples of specific knowledge, skills, and abilities for Grade 8 students scoring at the *Pass+* level include:

- Solve complex multi-step problems involving any/all rational numbers, square roots, scientific notation, and integer exponents
- Provide examples of linear equations with one variable with one solution, infinitely many solutions, or no solutions and transform them into an equivalent equations
- Solve problems involving slope and rate of change
- Analyze a graph that displays the functional relationship between two quantities
- Solve systems of equations
- Solve real-world problems involving the Pythagorean Theorem
- Solve problems using transformations (dilation, translations, rotations, and reflections) of objects and shapes on a coordinate plane
- Analyze and solve problems by sequencing, prioritizing, and identifying relevant information; breaking complex problems into simpler ones; using words and symbols to support solutions; using simpler problems to solve more difficult ones; drawing mathematical conclusions; and determining the reasonableness of solutions

Grade 8

Pass

Pass students demonstrate proficient mathematical and problem-solving skills. Students are capable of solving problems with rational numbers, square roots, positive exponents, scientific notation, and the Pythagorean Theorem, and they are competent in the areas of geometry, measurement, data analysis, and statistics. *Pass* students are skilled with algebra concepts, such as writing and solving equations. *Pass* students experience success when solving problems, communicating ideas, and applying mathematical knowledge to a variety of situations.

Some examples of specific knowledge, skills, and abilities for Grade 8 students scoring at the *Pass* level include:

- Solve problems involving rational numbers, scientific notation, and positive exponents

- Create terminating or repeating decimal expansions for rational numbers
- Use square root symbols to represent solutions to equations
- Solve real-world problems involving numbers expressed in scientific notation
- Solve linear equations with rational numbers
- Determine the cross-section of a 3-dimensional figure
- Understand the relationship of the independent and dependent variables that create a set of ordered pairs
- Recognize the features of slope-intercept form ($y=mx+b$) and describe the meaning of each in the context of a problem
- Represent linear functions in multiple representations (i.e., tables, equations, verbal expressions, and graphs)
- Solve real-world problems involving the volume of cones, spheres, and pyramids and the surface area of spheres
- Apply the Pythagorean Theorem to find unknown side lengths
- Solve problems with transformations (translations, rotations, and reflections) of objects and shapes
- Use the multiplication counting principal to apply to a situation with a large number of outcomes
- Describe patterns in scatter plots (i.e., clustering, outliers, positive or negative association, linear association, and nonlinear association)
- Solve problems by breaking complex problems into simpler ones, identifying relevant information, using a variety of strategies, using words and symbols to support solutions, using simpler problems to solve more difficult ones, and determining the reasonableness of solutions

Grade 8 Did Not Pass

Did Not Pass students demonstrate limited mathematical and problem-solving skills. Students may have difficulty when solving problems with rational numbers, square roots, and positive exponents, and the complexity of algebra may be an obstacle for *Did Not Pass* students. Also, math topics including geometry, measurement, data analysis, and statistics can be stumbling blocks for students. *Did Not Pass* students may have difficulty making decisions about how to approach problem-solving situations, how to communicate their ideas, and how to apply mathematical knowledge to other situations.

Some examples of specific knowledge, skills, and abilities for Grade 8 students scoring at the *Did Not Pass* level include:

- Solve basic problems involving rational numbers and positive exponents
- Define $y=mx+b$ as a linear function
- Identify lines with positive and negative slope
- Define and describe attributes of three-dimensional geometric objects
- Perform reflections and translations of objects and shapes
- Construct and interpret scatter plots for measurement data
- Represent sample spaces in organized lists, tables, and tree diagrams
- Solve problems by identifying relevant information in problems, using different strategies, making calculations, and determining the reasonableness of solutions