

ISTEP+ Performance Level Descriptors

Mathematics – Grade 3

Grade 3

Pass+

Pass+ students demonstrate advanced comprehension of mathematical and problem-solving skills. Students display mastery of the relationships among numbers, competently solve a variety of problems using addition and subtraction, represent the concepts of multiplication and division, and skillfully select appropriate symbols and operations to solve number relationships. Students utilize appropriate units of measure to solve problems, and they describe and compare the attributes of plane and solid shapes, while using their understanding to show relationships and solve problems. *Pass+* students synthesize and apply mathematical skills in order to solve sophisticated problems and convey their thoughts in a clear and concise manner.

Some examples of specific knowledge, skills, and abilities for Grade 3 students scoring at the *Pass+* level include:

- Model and compare fractions with the same numerators or denominators
- Use properties of operations to demonstrate the relationship between multiplication and division
- Determine unknown whole numbers in multiplication or division equations
- Create, extend, and give an appropriate rule for number patterns that use multiplication
- Determine elapsed time
- Partition shapes into parts with equal areas and express each area as a unit fraction of the whole
- Use the area formula to determine the areas of rectangles in real-world problems
- Create data displays and solve two- step problems regarding data to make predictions
- Rationalize answers and solutions by explaining why and how answers were found

Pass

Pass students demonstrate proficient mathematical and problem-solving skills. Students understand relationships among numbers, solve problems using addition and subtraction, represent the concepts of multiplication and division, and select appropriate symbols and operations to solve simple number relationships. Students describe and compare the attributes of shapes and utilize appropriate units of measure. *Pass* students experience success when solving problems, communicating ideas, and applying mathematical knowledge to new situations.

Some examples of specific knowledge, skills, and abilities for Grade 3 students scoring at the *Pass* level include:

- Represent a fraction on a number line
- Understand two fractions as equivalent and generate simple equivalent fractions

- Demonstrate knowledge of the inverse relationship between multiplication and division
- Use place value understandings to round 2- and 3-digit whole numbers
- Represent the concepts of multiplication and division using models
- Understand and use attributes of shapes to define categories, such as quadrilaterals
- Use appropriate tools and terms to identify, describe, and draw points, lines, and line segments
- Estimate and measure length to the nearest quarter-inch, weight in pounds, and temperature in degrees Celsius and Fahrenheit
- Tell time to the nearest minute
- Find area of a rectangle by modeling with square units and the perimeter of a polygon given the side lengths
- Create scaled picture graphs, scaled bar graphs, and frequency tables to represent a data set
- Use explanations to describe how answers were discovered

Did Not Pass

Did Not Pass students demonstrate a limited understanding of mathematical and problem-solving skills. Students may find it difficult to understand relationships among numbers, attempt to solve problems using addition and subtraction, and strive to select symbols to solve simple number problems. Students may struggle with describing and comparing the attributes of shapes and recognizing simple units of measure. *Did Not Pass* students find it challenging to make 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 3 students scoring at the *Did Not Pass* level include:

- Read and write numbers in words, models, standard, and expanded form
- Compare two whole numbers
- Understand a fraction as one part when the whole is in equal pieces
- Add and subtract whole numbers fluently within 1000
- Solve real-world problems involving addition and subtraction of whole numbers within 1000
- Identify and describe various solid figures
- Draw points, lines, and line segments
- Tell time in five-minute increments
- Find the value of a collection of coins and bills and solve real-world problems to determine if there is enough money to make a purchase
- Solve and check problems
- Decide whether an answer makes sense

ISTEP+ Performance Level Descriptors

Mathematics – Grade 4

Grade 4

Pass+

Pass+ students demonstrate advanced comprehension of mathematical and problem-solving skills. Students fully understand the relationships among numerical place value; solve a variety of complex problems using addition, subtraction, multiplication and division, and use and interpret mathematical symbols and properties to write and simplify difficult numerical expressions and equations. *Pass +* students skillfully describe and compare the attributes of plane and solid shapes, use their conceptual understandings to show relationships and solve problems with perimeter, area, volume, capacity, time and money. *Pass+* students synthesize and apply mathematical skills in order to solve sophisticated problems.

Some examples of specific knowledge, skills, and abilities for Grade 4 students scoring at the *Pass+* level include:

- Determine all factor pairs for whole numbers
- Express conversions of mixed numbers and improper fractions in simplest form.
- Add and subtract mixed numbers with common denominators in real-world problems
- Display understanding of commutative, associative, and distributive properties
- Use a rule to describe a relationship between two variables
- Understand that an angle is measured with reference to a circle
- Finding area and perimeter of complex shapes, including missing dimensions by decomposing the shape
- Interpret data displayed in line plots to solve problems involving addition and subtraction of fractions
- Analyze problems by identifying, telling the relevance of, sequencing and prioritizing information
- Rationalize answers and solutions by explaining why and how and conveying their thoughts in a clear and concise manner

Pass

Pass students demonstrate proficient mathematical and problem-solving skills. Students understand the relationships among numerical place value; solve problems using addition, subtraction, multiplication and division. *Pass* students describe and compare the attributes of plane and solid shapes, demonstrate their understanding to show relationships and solve problems, and they display an understanding of perimeter, area, volume, capacity, time and money. Students demonstrate the ability to organize, represent and interpret data, and clearly communicate and represent their outcomes. *Pass* students experience success when solving problems, communicating ideas, and applying mathematical knowledge to new situations.

Some examples of specific knowledge, skills, and abilities for Grade 4 students scoring at the *Pass* level include:

- Express whole numbers as fractions and mixed numbers as improper fractions
- Compare two fractions with different numerators and different denominators
- Round to the nearest whole number
- Compare decimals to the nearest hundredths
- Multiply and divide with remainders up to four-digits by a one-digit whole number
- Add and subtract fractions with common denominators
- Identify, describe, and draw rays, angles, and perpendicular and parallel lines
- Use the four operations to solve real-world problems involving distances, intervals of time, volumes, masses of objects, and money
- Apply area and perimeter formulas to solve real-world problems
- Measure angles in whole-number degrees using appropriate tools
- Represent information in data tables, line plots, and bar graphs
- Measure length to the nearest eighth-inch and millimeter
- Apply strategies from simpler problems to solve harder problems
- Use explanations to describe how answers were discovered

Did Not Pass

Did Not Pass students demonstrate a limited understanding of mathematical and problem-solving skills. Students attempt to understand the relationships among numerical place value, strive to solve simple problems using addition, subtraction, multiplication and division, and may find it difficult to use and interpret variables, mathematical symbols, and properties to write and simplify numerical expressions and sentences. *Did Not Pass* students struggle to describe and compare the attributes of plane and solid shapes and they display a basic understanding of perimeter, area, time and money. Students may find organizing and interpreting data, along with communicating their outcomes, complicated. *Did Not Pass* students find it challenging to make 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 4 students scoring at the *Did Not Pass* level include:

- Read and write numbers using words, models, standard form, and expanded form
- Compare two whole numbers up to one million
- Solve real-world problems involving addition and subtraction
- Identify, describe, and draw two dimensional shapes using the appropriate tools
- Recognize and draw lines of symmetry
- Measure length to the nearest quarter-inch
- Decide whether an answer is reasonable/makes sense

ISTEP+ Performance Level Descriptors

Mathematics – Grade 5

Grade 5

Pass+

Pass+ students demonstrate advanced mathematical and problem-solving skills. Students display advanced skills when computing whole numbers, decimals, and fractions, and they are capable of understanding and interpreting the relationship between digits and their place value. *Pass+* students solve more complex problems involving addition, subtraction, multiplication, and division of whole numbers, fractions, and decimals. *Pass+* students expertly perform operations using variables in a variety of expressions and plot the results and skillfully use coordinate grids to represent points and to graph lines. Students display expertise in identifying, describing, and classifying properties of polygons, and they understand and compute the area and volume of complex objects. Students also demonstrate a highly-developed skill of collecting, displaying, analyzing, comparing, and interpreting data sets. *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 5 students scoring at the *Pass+* level include:

- Divide unit fractions by non-zero whole numbers and whole numbers by unit fractions
- Add, subtract, multiply, and divide decimals, mixed numbers, and fractions with unlike denominators with the ability to describe the strategy and explain the reasoning
- Interpret coordinate values of points in the context of real-world situations
- Define and use up to two variables to write linear expressions
- Classify polygons in a hierarchy based on properties
- Find the total volume of two non-overlapping solid figures
- Decide upon and apply various methods in solving problems using a variety of checking methods to validate the correctness of answers
- Analyze problems by identifying important relationships, sequencing and prioritizing information, observing patterns, and using correct mathematical terms to justify answers

Pass

Pass students demonstrate proficient mathematical and problem-solving skills. Students compute with whole numbers, decimals, and fractions, and they understand the process of evaluating expressions. *Pass* students solve problems involving addition, subtraction, multiplication, and division of whole numbers, fractions, and decimals, perform operations using variables in simple expressions and plot the results, and use coordinate grids to represent points and to graph lines. Students are able to identify and classify properties of polygons, and they understand and compute the perimeter, area, and volume of simple objects. In addition, students collect, display,

analyze, compare, and interpret data sets. *Pass* students experience success when solving problems, communicating ideas, and applying mathematical knowledge to a variety of other situations.

Some examples of specific knowledge, skills, and abilities for Grade 5 students scoring at the *Pass* level include:

- Identify and order positive fractions, mixed numbers, and decimals on a number line
- Evaluate expressions with parentheses or brackets requiring the use of algebraic properties
- Add, subtract, multiply, and divide whole numbers, decimals, and fractions (with like or unlike denominators without regrouping) to solve real-world problems
- Identify and classify polygons based on angle measures and sides
- Develop and use formulas to solve problems involving perimeter and area
- Apply volume formulas to find the volumes of right rectangular prisms
- Understand and use measures of central tendency to describe data
- Make accurate calculations while solving problems and describe how to find the solution to a problem

Did Not Pass

Did Not Pass students demonstrate a limited understanding of mathematical and problem-solving skills. Students may find it difficult to compute with whole numbers, decimals, and fractions, and they struggle with understanding, interpreting, and modeling percents. *Did Not Pass* students strive to solve problems involving addition, subtraction, multiplication, and division of whole numbers, fractions, and decimals, wrestle with the use of variables in simple expressions, and may find it difficult to use two-dimensional coordinate grids to represent points and to graph lines. Students may be able to identify, describe, and draw triangles and circles, but struggle with their properties, and they understand and compute the volume of simple objects using models. In addition, they may find it difficult to collect, display, analyze, compare, and interpret data sets. *Did Not Pass* students find it challenging to make 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 5 students scoring at the *Did Not Pass* level include:

- Round and compare whole numbers and decimals
- Solve real-world problems involving multiplication and division of whole numbers
- Add and subtract fractions with like denominators
- Understand the relationship between radius and diameter
- Find the volume of a prism by packing it with unit cubes
- Interpret data and formulate questions that can be addressed with data
- Use strategies and results from simpler problems to answer more difficult problems and decide what information is not needed to solve a problem

ISTEP+ Performance Level Descriptors Mathematics – Grade 6

Grade 6 Pass+

Pass+ students demonstrate advanced mathematical and problem-solving skills. Students solve complex problems with integers, fractions, and decimals, and demonstrate expertise in the areas of computation, geometry, measurement, data analysis, and statistics. *Pass+* students display highly developed skills with algebra concepts and functions, including writing and solving equations and inequalities. *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 6 students scoring at the *Pass+* level include:

- Solve complex problems involving any/all of the following: integers, fractions, decimals, money, ratios, proportions, and percents
- Use methods of greatest common factors and least common multiples to express the distributive property with two whole numbers
- Understand and use a unit rate to model real-world problems
- Apply and justify each step in the order of operations to evaluate complex numerical expressions
- Solve problems with integers by graphing points with rational number coordinates on a coordinate plane in all four quadrants
- Represent and analyze two quantities in a proportional relationship in real-world problems
- Summarize numerical data sets and create graphical representations to describe the overall pattern in the given data
- 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 reasonableness of solutions

Grade 6 Pass

Pass students demonstrate proficient mathematical and problem-solving skills. Students are capable of solving problems with integers, fractions, and decimals, and they are competent in the areas of computation, 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 6 students scoring at the *Pass* level include:

- Use positive and negative numbers to represent and compare quantities in real-world contexts
- Find and interpret the absolute value of real-world numbers
- Convert and compare common fractions, decimals, and percents
- Use ratios to model relative sizes between two quantities
- Write and solve equations and inequalities
- Convert between English and metric measurement systems
- Graph points with rational numbers on a coordinate plane in all four quadrants
- Use nets to compute the surface area of prisms
- Find the area of complex shapes composed of rectangles, parallelograms, triangles, and trapezoids
- Select and interpret graphical representations of numerical data
- Create statistical questions and create graphical representations to interpret the data
- Solve problems by breaking complex problems into simpler ones, making calculations in word problems, and determining reasonableness of solutions

Grade 6 Did Not Pass

Did Not Pass students demonstrate limited mathematical and problem-solving skills. Students may have difficulty when solving problems with integers, fractions, and decimals, and the complexity of algebra may be an obstacle for *Did Not Pass* students. Also, math topics including computation, 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 6 students scoring at the *Did Not Pass* level include:

- Understand opposite signs of numbers indicating locations on opposite sides of 0 on a number line
- Compare and order rational numbers on a number line
- Identify prime and composite numbers
- Divide multi-digit whole numbers
- Solve real-world problems with positive fractions and decimals
- Evaluate basic numerical expressions
- Know the sum of the interior angles of any triangle and quadrilateral
- Find the area of complex shapes composed of rectangles
- Make calculations when solving basic word problems

ISTEP+ Performance Level Descriptors

Mathematics – Grade 7

Grade 7

Pass+

Pass+ students demonstrate advanced mathematical and problem-solving skills. Students solve complex multi-step problems with integers, fractions, decimals, ratios, percents, and square roots, and demonstrate expertise in the areas of geometry, measurement, data analysis, and statistics. *Pass+* students display highly developed skills with algebra concepts, including writing and solving equations and inequalities, as well as using coordinate planes to represent proportional relationships and unit rates. *Pass+* students solve sophisticated problems, support their solutions, and apply the results to other situations.

Some examples of specific knowledge, skills, and abilities for Grade 7 students scoring at the *Pass+* level include:

- Solve complex multi-step problems involving any/all of the following: integers, decimals, fractions, ratios, unit rates, square roots, percents, and proportional relationships
- Determine the relationship between area and circumference of a circle and understand their formulas
- Find surface area of right rectangular prisms and cylinders using nets
- Organize, analyze, and interpret data in multiple representations, and approximate the probability of a chance event
- Develop probability models
- 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 7

Pass

Pass students demonstrate proficient mathematical and problem-solving skills. Students are capable of solving problems with integers, fractions, decimals, ratios, percents, and square roots, 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 7 students scoring at the *Pass* level include:

- Find the prime factorization of whole numbers
- Identify, compare, and order rational and irrational numbers
- Compute and solve real-world problems with rational numbers
- Apply the properties of operations to create equivalent linear expressions
- Solve inequalities
- Identify slopes of lines and graph a line based on its slope and one point
- Identify real-world situations that involve proportional relationships
- Draw triangles with given conditions
- Solve real-world problems involving scale drawings
- Find the volume of right rectangular prisms and cylinders
- Interpret, use, and calculate measures of central tendency and measures of spread for numerical data
- Determine how data added to a data set may affect the mean and/or median
- Understand the probability of a chance event
- Solve problems by breaking complex problems into simpler ones, making calculations in word problems, using words and symbols to support solutions, and determining the reasonableness of solutions

Grade 7

Did Not Pass

Did Not Pass students demonstrate limited mathematical and problem-solving skills. Students may have difficulty when solving problems with fractions, percents, and square roots, 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 7 students scoring at the *Did Not Pass* level include:

- Understand the inverse relationship between squaring and square roots
- Understand and work with the additive inverse of a number
- Solve equations
- Solve problems that involve vertical, adjacent, complementary, and supplementary angles
- Use data from a random sample to draw inferences about a population
- Determine the validity of statistics when gathering information about a population
- Identify important information and make calculations when solving basic word problems

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