Math Performance Standards
(Grade Level Expectations)
Grade 4

Each PSGLE includes a bolded statement called the "stem." Each stem is the same or similar across the grades for a given PSGLE and is meant to communicate the main curriculum and instructional focus of the PSGLE across the grades.

The first row of each table includes a heading that refers to the content standard, and the second row includes a heading that refers to the performance standard. (The content standard is a broad statement of what students should know; the performance standards state what students should know and be able to do at ages 5-7, 8-10, 11-14, and 15-18.) The second box includes the complete performance standards.

The coding indicates the content strand and the PSGLE number, so PSGLE [6] N-1 is content strand Numeration, and the first PSGLE for that content strand for grade 6.

Content Standard A: Mathematical facts, concepts, principles, and theories
Numeration: Understand and use numeration

Numeration Performance Standards that apply to grade 3: M1.1.1 Read, write, order, count, and model one-to-one correspondence with whole numbers to100. **M1.1.2** Use, model, and identify place value positions of 1's, 10's, and 100's. **M1.1.3** Model and explain the processes of addition and subtraction, describing the relationship between the operations. **M1.1.4** Select and use various representations of ordinal and cardinal numbers. **M1.1.5** Identify, model, and label simple fractions, describing and defining them as equal parts of a whole, a region, or a set. **M1.1.6** Identify, describe, and extend patterns inherent in the number system. Skip count by 2's 5's and 10's. Add and subtract by 10. Identify even and odd numbers. **M1.1.7** Demonstrate the commutative and identity properties of addition.

Numeration Performance Standards that apply to grades 4-6: M1.2.1 Read, write, model, order, and count with positive whole numbers to 1,000,000 and negative whole numbers. **M1.2.2** Use, model, and identify place value positions from 0.001 to 1,000,000. **M1.2.3** Model and explain the processes of multiplication and division. Describe the relationships among the four basic operations. **M1.2.4** Identify and describe different uses for the same numerical representation. **M1.2.5** Model and explain the process of adding and subtracting fractions with common denominators and decimals that represent money. **M1.2.6** Identify and describe factors and multiples including those factors and multiples common to a pair or set of numbers. **M1.2.7** Demonstrate the commutative and identity properties of multiplication.

Understanding Numbers

Grade 3	Grade 4	Grade 5	Grade 6
The student demonstrates conceptual understanding • **of whole numbers to one thousand by** **[3] N-1** reading, writing, ordering, or [counting L] (M1.1.1) **[3] N-2** modeling (base ten blocks) or identifying place value positions to thousands (M1.1.2)	**The student demonstrates conceptual understanding** • **of whole numbers to <u>ten thousands</u> by** **[4] N-1** reading, writing, ordering, or [counting L] (M1.2.1) **[4] N-2** modeling (base ten blocks) or identifying place value positions to <u>ten thousands</u> (M1.2.2)	**The student demonstrates conceptual understanding** • **of whole numbers to <u>millions</u> by** **[5] N-1** reading, writing, ordering, or [counting L] (M1.2.1) **[5] N-2** identifying place value positions from <u>tenths to millions</u> (M1.2.2)	**The student demonstrates conceptual understanding** • **of <u>fractions (proper or mixed numbers), decimals, percents (whole number), or integers</u> by** **[6] N-1** reading, writing, ordering, or [counting L] (M1.2.1) **[6] N-2** [identifying place value positions <u>from thousandths to millions L</u>] (M1.2.2)

The number in brackets indicates the grade level.

Differences between grade levels are underlined.

The coding at the end of each PSGLE indicates the performance standard the

Some PSGLEs have been identified as Local. They are for local assessment and will not be on a state assessment.

Grade Level Expectations are written for assessment purposes. The PSGLEs should be written in a way so that it is clear what is expected of classroom instruction and/or state assessment.

Criteria for PSGLEs

1. The set of PSGLEs for each grade level should be reasonable to learn within a school year and still allow for learning additional state and local expectations.
2. PSGLEs should promote coherent, focused, developmentally appropriate instructions, as opposed to isolated instruction just on topics, facts, or individual skills.
3. Concepts, skills, and knowledge should be differentiated between adjacent grade levels.
4. PSGLEs should be of similar levels of specificity.
5. PSGLEs should show a continuum of learning. Success in one grade should be a good predictor of success the next year.

Note: Items differentiated with an "i.e." indicate that statewide assessment items may only be written to the content contained within the statement in the parentheses. Items differentiated with an "e.g." do not limit assessment items to that content, but indicate examples of content that may be used in statewide assessment items.

Math Performance Standards are organized into 10 content strands and are coded as follows:
N=Numeration
MEA=Measurement
E&C=Estimation and Computation
F&R=Functions and Relationships
G=Geometry
S&P=Statistics and Probability
PS=Process Skills (The Process Skills include Problem-Solving, Communication, Reasoning, and Connections.)

NOTE: All the PSGLEs for Process Skills are for local assessment. Process Skills that would be assessed on a state assessment have been embedded in PSGLEs for other content strands. For instance, a grade level expectation for the Statistics and Probability content strand for eighth grade is, “[Designing, collecting L], organizing, displaying, or explaining the classification of data in real-world problems.” That Grade Level Expectation for Statistics and Probability incorporates one of the Grade Level Expectations for Process Skills, “representing mathematical problems numerically, graphically, and/or symbolically.”

Math Performance Standards
(Grade Level Expectations)

Content Standard A: Mathematical facts, concepts, principles, and theories
Numeration: Understand and use numeration
Measurement: Select and use systems, units, and tools of measurement

Numeration Performance Standards that apply to grades 4-6: M1.2.1 Read, write, model, order, and count with positive whole numbers to 1,000,000 and negative whole numbers. **M1.2.2** Use, model, and identify place value positions from 0.001 to 1,000,000. **M1.2.3** Model and explain the processes of multiplication and division. Describe the relationships among the four basic operations. **M1.2.4** Identify and describe different uses for the same numerical representation. **M1.2.5** Model and explain the process of adding and subtracting fractions with common denominators and decimals that represent money. **M1.2.6** Identify and describe factors and multiples including those factors and multiples common to a pair or set of numbers. **M1.2.7** Demonstrate the commutative and identity properties of multiplication.
Measurement Performance Standards that apply to grades 4-6: M2.2.1 Estimate and measure weights, lengths, and temperatures to the nearest unit using the metric and standard systems. **M2.2.2** Identify and use equivalent measurements (e.g., 60 minutes = 1 hour, 7 days = 1 week). **M2.2.3** Use a variety of measuring tools; describe the attribute(s) they measure. **M2.2.4** Estimate and measure the dimensions of geometric figures. **M2.2.5** Tell time using analog and digital clocks identifying AM and PM; find elapsed time. **M2.2.6** Read, write, and use money notation, determining possible combinations of coins and bills to equal given amounts; count back change for any given situation.

Grade 4

Understanding Numbers

The student demonstrates conceptual understanding

- **of whole numbers to ten thousands by**

[4] N-1 reading, writing, ordering, or [counting L] (M1.2.1)

[4] N-2 modeling (base ten blocks) or identifying place value positions to ten thousands (M1.2.2)

[4] N-3 converting between whole numbers expressed in expanded notation and standard form (M1.2.4)

- **of fractions with denominators 2 through 12**

[4] N-4 identifying, describing with explanations, or illustrating equal parts of a whole, a region, or a set (using models) (M1.2.4)

[4] N-5 identifying, describing with explanations, or illustrating equivalent fractions or mixed numbers (M1.2.4 & M3.2.5)

Understanding Meaning of Operations

The student demonstrates conceptual understanding of mathematical operations by

[4] N-6 [using models, explanations, number lines, or real-life situations L] describing or illustrating the processes of multiplication (M1.2.3)

[4] N-7 [using models, explanations, number lines, or real-life situations L] describing or illustrating the relationship between multiplication and addition (M1.2.3)

[4] N-8 [using models, explanations, number lines, or real-life situations L] describing or illustrating the relationship between multiplication and division (M1.2.3)

[4] N-9 [using models, explanations, number lines, or real-life situations L] describing or illustrating the process of adding or subtracting fractions with like denominators (2 to 12) (M1.2.5)

Number Theory

The student demonstrates conceptual understanding of number theory by

[4] N-10 [describing or illustrating identity property of multiplication L] (M1.2.7)

[4] N-11 [modeling (with manipulatives) and explaining commutative property of multiplication L] (M1.2.7)

[4] N-12 identifying or listing factors and multiples of a number (M1.2.6)

Measurable Attributes

The student demonstrates understanding of measurable attributes by

[4] MEA-1 [estimating length to the nearest half-inch or centimeter L] (M2.2.1)

[4] MEA-2 [estimating temperature (degree Celsius or Fahrenheit) or weight (pounds or kilograms) to the nearest unit L] (M2.2.1)

[4] MEA-3 identifying or using equivalent measures for length (inch, foot, yard: 12 inches = 1 foot, 3 feet = 1 yard, 36 inches = 1 yard; centimeter, meter: 100 centimeters = 1 meter) (M2.2.2)

[4] MEA-4 selecting an appropriate unit of metric measurement to estimate length, weight or temperature (M2.2.1)

Math Performance Standards
(Grade Level Expectations)

Content Standard A: Mathematical facts, concepts, principles, and theories
Measurement: Select and use systems, units, and tools of measurement
Estimation and Computation: Perform basic arithmetic functions, make reasoned estimates, and select and use appropriate methods or tools
Functions and Relationships: Represent, analyze, and use patterns, relations, and functions

Measurement Performance Standards that apply to grades 4-6: M2.2.1 Estimate and measure weights, lengths, and temperatures to the nearest unit using the metric and standard systems. **M2.2.2** Identify and use equivalent measurements (e.g., 60 minutes = 1 hour, 7 days = 1 week). **M2.2.3** Use a variety of measuring tools; describe the attribute(s) they measure. **M2.2.4** Estimate and measure the dimensions of geometric figures. **M2.2.5** Tell time using analog and digital clocks identifying AM and PM; find elapsed time. **M2.2.6** Read, write, and use money notation, determining possible combinations of coins and bills to equal given amounts; count back change for any given situation.
Estimation and Computation Performance Standards that apply to grades 4-6: M3.2.1 Describe and use a variety of estimation strategies including rounding to the appropriate place value, multiplying by powers of 10, and using front-end estimation to check the reasonableness of solutions. **M3.2.2** Recall and use basic multiplication and division facts orally, with paper and pencil without a calculator. **M3.2.3** Add and subtract whole numbers and fractions with common denominators to 12 and decimals, including money amounts, using models and algorithms. **M3.2.4** Multiply and divide multi-digit whole numbers by 2-digit numbers, limiting the 2-digit divisors to those that end in 0; multiply and divide decimals that represent money by whole numbers. **M3.2.5** Find equivalent fractions. Convert between fractions and mixed numbers. **M3.2.6** Develop and interpret scales and scale models.
Functions and Relationships Performance Standards that apply to grades 4-6: M4.2.1 Use patterns and their extensions to make predictions and solve problems; describe patterns found in the number system including those formed by multiples, factors, perfect squares, and powers of 10. **M4.2.2** Generate and solve simple functions by identifying and applying multiplication and division patterns. **M4.2.3** Use a calculator to find a missing item in a number sequence. **M4.2.4** Use words, lists, and tables to represent and analyze patterns. **M4.2.5** Explain the purpose of variables and use them in open sentences to express relationships and describe simple functions.

Grade 4

Measurement Techniques

The student demonstrates ability to use measurement techniques using pictorial representations [or manipulatives L] in real-world contexts by

[4] MEA-5 measuring length to the nearest half-inch or [centimeter L] (M2.2.1, M2.2.3, & M2.2.4)

[4] MEA-6 telling time in 5 minute increments using analog clocks (M2.2.5)

[4] MEA-7 [counting back change from $5.00 L] (M2.2.6)

[4] MEA-8 determining possible combinations of coins and bills to given amounts (M2.2.6)

[4] MEA-9 [simulating multiple purchases and calculating the amount of change from a given bill(s) up to $50.00 L] (M2.2.6)

Estimation

The student determines reasonable answers to real-life situations, paper/pencil computations, or calculator results by

[4] E&C-1 identifying or using [a variety of L] strategies (e.g., rounding to appropriate place value, multiplying by powers of ten, using front-end estimation) to estimate the results of whole number addition or subtraction computations to 10,000, or simple multiplication or division (M3.2.1)

Computation

The student accurately solves problems (including real-world situations) involving

[4] E&C-2 [recalling basic multiplication facts, products to 100, and corresponding division facts efficiently L] (M3.2.2)

[4] E&C-3 adding or subtracting three-digit whole numbers (M3.2.3)

[4] E&C-4 multiplying two-digit numbers by single-digit numbers (M3.2.4)

[4] E&C-5 adding fractions with like denominators to 12 (M3.2.3)

Describing Patterns and Functions

The student demonstrates conceptual understanding of functions, patterns, or sequences by

[4] F&R-1 extending patterns that use addition, subtraction, multiplication, or symbols, up to 10 terms, represented by models (function machine), tables, sequences, or in problem situations (M4.2.1)

[4] F&R-2 [using rules to express the generalization of a pattern using words, lists, or tables L] (M4.2.4)

- **[4] F&R-3** [using manipulatives, including a calculator, as tools when describing, extending, or representing a number sequence L] (M4.2.1 &M4.2.3)

Math Performance Standards
(Grade Level Expectations)

Content Standard A: Mathematical facts, concepts, principles, and theories
Functions and Relationships: Represent, analyze, and use patterns, relations, and functions
Geometry: Construct, transform, and analyze geometric figures.

Functions and Relationships Performance Standards that apply to grades 4-6: M4.2.1 Use patterns and their extensions to make predictions and solve problems; describe patterns found in the number system including those formed by multiples, factors, perfect squares, and powers of 10. **M4.2.2** Generate and solve simple functions by identifying and applying multiplication and division patterns. **M4.2.3** Use a calculator to find a missing item in a number sequence. **M4.2.4** Use words, lists, and tables to represent and analyze patterns. **M4.2.5** Explain the purpose of variables and use them in open sentences to express relationships and describe simple functions.
Geometry Performance Standards that apply to grades 4-6: M5.2.1 Identify and compare various triangles and quadrilaterals according to their sides and/or angles. **M5.2.2** Compare and contrast plane and solid figures (e.g.,, circle/sphere, square/cube, triangles/pyramid) using relevant attributes, including the number of vertices, edges, and the number and shape of faces. **M5.2.3** Identify and model geometric figures that are congruent, similar, and/or symmetrical. **M5.2.4** Distinguish between area and perimeter; find both using a variety of methods including rulers, grid paper, and tiles. **M5.2.5** Identify and model transformations of geometric figures, describing the motions as slides, flips, or rotations. **M5.2.6** Locate and describe objects in terms of their position with and without compass directions; identify coordinates for a given point or locate points of given coordinates on a grid. **M5.2.7** Sketch and identify line segments, midpoints, intersections, parallel, and perpendicular lines.

Grade 4

Describing Patterns and Functions

The student demonstrates conceptual understanding of functions, patterns, or sequences by

[4] F&R-1 extending patterns that use addition, subtraction, multiplication, or symbols, up to 10 terms, represented by models (function machines), tables, sequences, or in problem situations (M4.2.1)

[4] F&R-2 using rules to express the generalization of a pattern using words, lists, or tables (L) (M4.2.4)

[4] F&R-3 using manipulatives, including a calculator, as tools when describing, extending, or representing a number sequence (L) (M4.2.1 & M4.2.3

Modeling and Solving Equations and Inequalities

The student demonstrates algebraic thinking by

[4] F&R-4 using an open number sentence (addition, subtraction or multiplication) to solve for an unknown represented by a box or circle (e.g., 9 • = 36, • 8=56, 3 • 6=) (M4.2.5)

Geometric Relationships

The student demonstrates an understanding of geometric relationships by

[4] G-1 using the attributes and properties of angles to identify and compare triangles (acute, right, or obtuse) and regular polygons (M5.2.1)

[4] G-2 using the attributes and properties of solid figures (edges, vertices, or the number or shape of faces) to [model **L**], identify, compare, or describe solid figures (cubes, cylinders, rectangular prisms, or spheres) (e.g., cans, dice, boxes, balls) (M5.2.2)

Similarity, Congruence, Symmetry, and Transformation of Shapes

The student demonstrates conceptual understanding of similarity, congruence, symmetry, or transformations of shapes by

[4] G-3 identifying or drawing all lines of symmetry to identify figures that are symmetrical (M5.2.3)

[4] G-4 identifying shapes that are congruent (M5.2.3)

[4] G-5 illustrating or identifying the results of transformations (turns) of polygons by continuing a given pattern (M5.2.5)

Perimeter, Area, Volume, and Surface Area

The student solves problems using perimeter or area by

[4] G-6 estimating or determining area or perimeter of rectangles, squares and irregular shapes on grids with a key or ruler (M5.2.4)

Math Performance Standards
(Grade Level Expectations)

Content Standard A: Mathematical facts, concepts, principles, and theories.
Geometry: Construct, transform, and analyze geometric figures.
Statistics and Probability: Formulate questions, gather and interpret data, and make predictions

Geometry Performance Standards that apply to grades 4-6: M5.2.1 Identify and compare various triangles and quadrilaterals according to their sides and/or angles. **M5.2.2** Compare and contrast plane and solid figures (e.g.,, circle/sphere, square/cube, triangle/pyramid) using relevant attributes, including the number of vertices, edges, and the number and shape of faces. **M5.2.3** Identify and model geometric figures that are congruent, similar, and/or symmetrical. **M5.2.4** Distinguish between area and perimeter; find both using a variety of methods including rulers, grid paper, and tiles. **M5.2.5** Identify and model transformations of geometric figures, describing the motions as slides, flips, or rotations. **M5.2.6** Locate and describe objects in terms of their position with and without compass directions; identify coordinates for a given point or locate points of given coordinates on a grid. **M5.2.7** Sketch and identify line segments, midpoints, intersections, parallel, and perpendicular lines.
Statistics and Probability Performance Standards that apply to grades 4-6: M6.2.1 Collect, organize, and display data creating a variety of visual displays including tables, charts, and line graphs. **M6.2.2** Present the data using a variety of appropriate representations and explain the meaning of the data. **M6.2.3** Describe and interpret a data set using mean, median, mode, and range. **M6.2.4** Estimate whether a game is mathematically fair or unfair; analyze and present probability data using simple fractions. **M6.2.5** Conduct simple probability experiments using concrete materials and represent the results using fractions and probability.

Grade 4

Position and Direction

The student demonstrates understanding of position and direction by

[4] G-7 [describing the relative location of places or objects on a map using compass directions of north, south, east or west L] (M5.2.6)

Construction

The student demonstrates a conceptual understanding of geometric drawings or constructions by

[4] G-8 [identifying or drawing parallel or intersecting line segments L] (M5.2.7)

Data Display

The student demonstrates an ability to classify and organize data by

[4] S&P-1 [designing an investigation and collecting **L**], organizing or displaying, using appropriate scale, data in real-world problems (e.g., social studies, friends, or school), using bar graphs, tables, charts, or diagrams with whole numbers up to 25 (M6.2.1 & M6.2.2)

Analysis and Central Tendency

The student demonstrates an ability to analyze data (comparing, explaining, interpreting, evaluating or drawing or justifying conclusions by

[4] S&P-2 using information from a variety of displays (tables, bar graphs, or Venn diagrams*)* (M6.2.2)

[4] S&P-3 using mode or range with up to 5 pieces of data with a value of 10 or less each (M6.2.3)

Probability

The student demonstrates a conceptual understanding of probability and counting techniques by

[4] S&P-4 predicting or explaining the probability of all possible outcomes in a simple experiment (e.g., spinners, dice, coins) (M6.2.4)

[4] S&P-5 determining possible combinations in a given situation involving up to 3 items (e.g., how many ways can you choose two fruits out of a basket containing oranges and bananas? –three ways: two bananas; one orange and one banana; and two oranges) (M6.2.5)

Math Performance Standards
(Grade Level Expectations)

Content Standards B, C, D, and E: Process skills and abilities
Applying conceptual knowledge and skills as designated in all strands of Content Standard A by problem solving, communicating, reasoning, and making connections

Problem-Solving Performance Standards that apply to grades 4-6: M7.2.1 Read and summarize a problem, using mathematical terms and symbols. **M7.2.2** Select and apply a variety of strategies including making a table, chart or list, drawing pictures, making a model, and comparing with previous experience to solve problems. **M7.2.3** Explain and verify results of the original problem and apply what was learned to new situations.
Communication Performance Standards that apply to grades 4-6: M8.2.1 Use the mathematical vocabulary appropriate to the problem. **M8.2.2** Represent mathematical and practical situations using concrete, pictorial, and symbolic representation. **M8.2.3** Organize and communicate mathematical problem solving strategies and solutions to problems.
Reasoning Performance Standards that apply to grades 4-6: M9.2.1 Draw logical conclusions about mathematical situations. **M9.2.2** Given a rule or generalization, determine whether the example fits. **M9.2.3** Justify answers and mathematical strategies as reasonable.
Connections Performance Standards that apply to grades 4-6: M10.2.1 Apply mathematical processes to social studies. **M10.2.2** Apply mathematical skills and processes to situations with friends and school.

Grade 4

Problem Solving: Understand and be able to select and use a variety of problem-solving strategies	**Communication:** Form and use appropriate methods to define and explain mathematical relationships	**Reasoning:** Use logic and reason to solve mathematical problems	**Connections:** Apply mathematical concepts and processes to situations within and outside of school.
The student demonstrates an ability to problem solve by **[4] PS-1** selecting and applying appropriate strategy (e.g., lists, guess and check; extended patterns) to solve a variety of problems (M7.2.2) **[4] PS-2** explaining and verifying results of an original problem and applying what was learned to new situations (M7.2.3)	**The student communicates his or her mathematical thinking by** **[4] PS-3** representing problems using mathematical language including concrete, pictorial, and/or symbolic representation; or by organizing and communicating mathematical problem-solving strategies and solutions to problems (M8.2.1, M8.2.2, & M8.2.3)	**The student demonstrates an ability to use logic and reason by** **[4] PS-4** drawing conclusions about mathematical problems (given a rule or generalization, determine whether the example fits) or justifying answers and mathematical strategies (M9.2.1, M9.2.2, & M9.2.3)	**The student understands and applies mathematical skills and processes across the content strands by** **[4] PS-5** using real-world contexts such as social studies, friends, and school (M10.2.1 & M10.2.2)