

Math Performance Standards (Grade Level Expectations) Grade 6

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			
<p>Numeration Performance Standards that apply to grade 3: M1.1.1 Read, write, order, count, and model one-to-one correspondence with whole numbers to 100. 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 identify properties of addition.</p> <p>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 identify properties of multiplication.</p>			
Understanding Numbers			
Grade 3	Grade 4	Grade 5	Grade 6
<p>The student demonstrates conceptual understanding</p> <ul style="list-style-type: none"> • of whole numbers to one thousand by <p>[3] N-1 reading, writing, ordering, or [counting L] (M1.1.1)</p> <p>[3] N-2 modeling (base ten blocks) or identifying place value positions to thousands (M1.1.2)</p>	<p>The student demonstrates conceptual understanding</p> <ul style="list-style-type: none"> • of whole numbers to <u>ten thousands</u> by <p>[4] N-1 reading, writing, ordering, or [counting L] (M1.2.1)</p> <p>[4] N-2 modeling (base ten blocks) or identifying place value positions to <u>ten thousands</u> (M1.2.2)</p>	<p>The student demonstrates conceptual understanding</p> <ul style="list-style-type: none"> • of whole numbers to <u>millions</u> by <p>[5] N-1 reading, writing, ordering, or [counting L] (M1.2.1)</p> <p>[5] N-2 identifying place value positions from <u>tenths to millions</u> (M1.2.2)</p>	<p>The student demonstrates conceptual understanding</p> <ul style="list-style-type: none"> • of <u>fractions (proper or mixed numbers), decimals, percents (whole number), or integers</u> by <p>[6] N-1 reading, writing, ordering, or [counting L] (M1.2.1)</p> <p>[6] N-2 [identifying place value positions from <u>thousandths to millions</u>] (M1.2.2)</p>

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 6

Understanding Numbers	Understanding Meaning of Operations	Number Theory	Measurable Attributes
<p>The student demonstrates conceptual understanding</p> <ul style="list-style-type: none"> of <u>fractions (proper or mixed numbers), decimals, percents (whole number), or integers</u> by <p>[6] N-1 reading, writing, ordering, or [counting L] (M1.2.1)</p> <p>[6] N-2 [identifying place value positions from thousandths to millions L] (M1.2.2)</p> <p>[6] N-3 converting between whole numbers written in expanded notation and standard form (M1.2.4)</p> <ul style="list-style-type: none"> of <u>fractions, mixed numbers, or percents</u> by [modeling L], [identifying, describing, or illustrating] <p>[6] N-4 equal parts of a whole, a region, or a set (M1.2.4)</p> <p>[6] N-5 equivalent fractions or mixed numbers (M1.2.4 & M3.2.5)</p>	<p>The student demonstrates conceptual understanding of mathematical operations by</p> <p>[6] N-6 [using models, explanations, number lines, or real-life situations L] describing or illustrating the relationships among the four basic operations (M1.2.3)</p> <p>[6] N-7 [using models, explanations, number lines, or real-life situations L] describing or illustrating the process of adding and subtracting fractions with <u>different</u> denominators (M1.2.5)</p>	<p>The student demonstrates conceptual understanding of number theory by</p> <p>[6] N-8 describing or illustrating commutative, [<u>associative, inverse</u> L] or identity properties of addition or multiplication using models or explanations (M1.2.7)</p> <p>[6] N-9 identifying or describing factors and multiples common to a pair or set of numbers (e.g., Least Common Multiple, L.C.M., or Greatest Common Factor, G.C.F.) (M1.2.6)</p> <p>[6] N-10 [modeling (base 10 blocks) distributive property L] (M1.3.6)</p>	<p>The student demonstrates understanding of measurable attributes by</p> <p>[6] MEA-1 [estimating length to the nearest <u>eighth-inch</u> or millimeter L] (M2.2.1)</p> <p>[6] MEA-2 identifying equivalent measures <u>within systems</u></p> <p>English</p> <ul style="list-style-type: none"> length (inches, feet, yards, <u>miles</u>) weight (ounces, pounds, [<u>tons</u> L]) <u>volume</u> (<u>fluid ounces, cups, pints, quarts, gallons</u>) <p>Metric</p> <ul style="list-style-type: none"> length (millimeters, centimeters, meters, <u>kilometers</u>) <u>volume</u> (<u>milliliters, liters</u>) (M2.2.2)

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 6

Measurement Techniques	Estimation	Computation	Describing Patterns and Functions
<p>The student uses measurement techniques by</p> <p>[6] MEA-3 using a scaled ruler to an eighth of an inch or millimeter on a map or drawing (M2.2.1 & M2.2.3)</p> <p>[6] MEA-4 calculating elapsed time (minutes, hours) (M2.2.5)</p> <p>[6] MEA-5 solving real-world problems involving elapsed time between U.S. time zones (including Alaska Standard time) (M2.2.5)</p> <p>[6] MEA-6 converting and using equivalent measurements within the same system (M2.2.2)</p> <p>[6] MEA-7 measuring length to the nearest <u>1/8 of an inch</u> or nearest <u>millimeter</u> (M2.2.1)</p>	<p>The student determines reasonable answers to real-life situations, paper/pencil computations, or calculator results by</p> <p>[6] E&C-1 identifying or using [a variety of L] strategies (e.g., truncating, rounding to compatible numbers) to estimate the results of addition, subtraction or multiplication from <u>thousandths to millions</u> or simple division (M3.2.1)</p>	<p>The student accurately solves problems (including real-world situations) involving</p> <p>[6] E&C-2 [recalling basic addition, subtraction, multiplication, and division facts efficiently L] (M3.2.2)</p> <p>[6] E&C-3 adding or subtracting whole numbers, fractions with unlike denominators to 12, or decimals to the <u>hundredths place</u> (M3.2.3)</p> <p>[6] E&C-4 multiplying whole numbers by two- or three-digit numbers, dividing <u>three-digit numbers</u> by one or <u>two-digit numbers</u>, or <u>multiplying or dividing decimals that represent money by whole numbers, or multiplying or dividing proper fractions</u> (M3.2.4)</p> <p>[6] E & C-5 [developing or interpreting scale models (scale factors such as 1 in. = 1 ft.) L] (M3.2.6)</p>	<p>The student demonstrates conceptual understanding of functions, patterns, or sequences by</p> <p>[6] F&R-1 extending patterns (<u>found in the number system, formed by multiples, factors, perfect squares up to 100, powers of ten</u>), up to 10 terms, represented in tables, sequences, or in problem situations (M4.2.1)</p> <p>[6] F&R-2 using rules to express the generalization of a <u>pattern</u> using words, lists, or tables, <u>with or without variables</u> (M4.2.4)</p> <p>[6] F&R-3 identifying or <u>applying multiplication or division patterns</u> to find missing values in a function (M4.2.2)</p> <p>[6] F&R-4 [using manipulatives, including a calculator, as tools when describing, extending, or representing a number sequence L] (M4.2.1 & M 4.2.3)</p>

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, 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.

Grade 6

Modeling and Solving Equations and Inequalities	Geometric Relationships	Similarity, Congruence, Symmetry, and Transformation of Shapes	Perimeter, Area, Volume, and Surface Area
<p>The student demonstrates algebraic thinking by</p> <p>[6] F&R-5 solving for an unknown represented by a letter, (addition, subtraction, multiplication, or division) (e.g., $3 \cdot n = 15$, $n - 5 = 12$) (M4.2.5)</p>	<p>The student demonstrates an understanding of geometric relationships by</p> <p>[6] G-1 using the attributes and properties (sides and angles) of regular polygons to identify, classify, or compare regular or irregular polygons (M5.2.1)</p> <p>[6] G-2 identifying, comparing or describing attributes and properties of circles (radius, and diameter) (M5.2.2)</p> <p>[6] G-3 using the attributes and properties of prisms (vertices, length and alignment of edges, shape and number of bases, shape of faces) to [model L], identify, compare, or describe triangular or rectangular prisms (M5.2.2)</p> <p>[6] G-4 identifying a 3-dimensional shape from the 2-dimensional drawing of the shape (M5.2.2)</p>	<p>The student demonstrates conceptual understanding of similarity, congruence, symmetry, or transformations of shapes by</p> <p>[6] G-5 identifying, creating, or drawing geometric figures that are congruent, similar, or symmetrical (M5.2.3)</p> <p>[6] G-6 [drawing or describing the results of transformations of polygons such as slides, turns, or flips L] (M5.2.5)</p>	<p>The student solves problems (including real-world situations) by using perimeter, area, or volume by</p> <p>[6] G-7 estimating or determining area or perimeter of polygons (parallelograms, trapezoids, triangles) using a key, ruler, or given measures (M5.2.4)</p> <p>[6] G-8 [estimating the area and circumference of a circle using a grid or manipulatives and comparing the relationship of the diameter to the circumference (π) L] (M5.2.4 & M5.3.4)</p> <p>[6] G-9 [estimating or determining the volume of a right rectangular prism using manipulatives and formulas (e.g., cereal box, sand box, planter) L] (M5.3.4)</p>

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 6

Position and Direction	Construction	Analysis and Central Tendency	Probability
<p>The student demonstrates understanding of position and direction by</p> <p>[6] G-10 graphing a vertical or horizontal line segment (given whole number coordinates for its end points) on a coordinate grid or identifying its length or midpoint (e.g., using a map to trace a route and calculate distance) (M5.2.6 & M5.2.7)</p>	<p>The student demonstrates a conceptual understanding of geometric drawings or constructions by</p> <p>[6] G-11 [drawing or measuring quadrilaterals with given dimensions or angles L] (M5.3.7)</p>	<p>The student demonstrates an ability to analyze data (comparing, explaining, interpreting, evaluating; or drawing or justifying conclusions) by</p> <p>[6] S&P-2 using information from a variety of displays (tables, bar graphs, line graphs, <u>circle graphs</u>, or Venn diagrams) (M6.2.2)</p> <p>[6] S&P-3 using <u>mean</u>, median, mode, or range (M6.2.3)</p>	<p>The student demonstrates a conceptual understanding of probability and counting techniques by</p> <p>[6] S&P-4 [<u>analyzing whether a game is mathematically fair or unfair</u> by explaining the probability of all possible outcomes L] (M6.2.4)</p> <p>[6] S&P-5 solving or identifying solutions to problems involving <u>possible combinations</u> (e.g., if ice cream sundaes come in 3 flavors with 2 possible toppings, how many different sundaes can be made using only one flavor of ice cream with one topping?) (M6.2.5)</p>
	<p>Data Display</p> <p>The student demonstrates an ability to classify and organize data by</p> <p>[6] S&P-1 [designing an investigation and collecting L], organizing, or displaying, using appropriate scale for <u>data displays</u> (tables, bar graphs, <u>line graphs</u>, or <u>circle graphs</u>), data in real-world problems (e.g., social studies, friends, or school), <u>with whole numbers up to 100</u> (M6.2.1 & M6.2.2)</p>		

Math Performance Standards (Grade Level Expectations)

<p>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</p>			
<p>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.</p>			
Grade 6			
<p>Problem Solving: Understand and be able to select and use a variety of problem-solving strategies</p>	<p>Communication: Form and use appropriate methods to define and explain mathematical relationships</p>	<p>Reasoning: Use logic and reason to solve mathematical problems</p>	<p>Connections: Apply mathematical concepts and processes to situations within and outside of school.</p>
<p>The student demonstrates an ability to problem solve by</p> <p>[6] PS-1 selecting, <u>modifying</u>, and applying appropriate problem solving strategies (e.g., graphing, <u>Venn diagrams</u>, tables, lists, <u>working backwards</u>, guess and check, or extend a pattern) and verifying results (M7.3.2)</p> <p>[6] PS-2 evaluating and interpreting solutions to problems (M7.3.3)</p>	<p>The student communicates his or her mathematical thinking by</p> <p>[6] PS-3 representing problems using mathematical language including concrete, pictorial, and/or symbolic representation; or using appropriate vocabulary, symbols, and technology to explain mathematical solutions (M8.2.1, M8.2.2, & M8.2.3)</p>	<p>The student demonstrates an ability to use logic and reason by</p> <p>[6] PS-4 <u>using informal deductive reasoning</u> in concrete contexts; or justifying answers and mathematical strategies using examples (M9.3.1 & M9.3.3)</p>	<p>The student understands and applies mathematical skills and processes across the content strands by</p> <p>[6] PS-5 using real-world contexts such as social studies, friends, school and community (M10.2.1, M10.2.2, & M10.3.2)</p>