Grade 4 Unit 4: Geometry and Measurement

Content Area: **Math**
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NJSLS Math

4.OA.C.5	Generate a number or shape pattern that follows a given rule. Identify apparent features of the pattern that were not explicit in the rule itself.
4.NBT.B.4	With accuracy and efficiency, add and subtract multi-digit whole numbers using the standard algorithm.
4.NF.B.3.d	Solve word problems involving addition and subtraction of fractions referring to the same whole and having like denominators, e.g., by using visual fraction models and equations to represent the problem.
4.M.A.1	Know relative sizes of measurement units within one system of units including km, m, cm, mm; kg, g; lb, oz.; l, ml; hr, min, sec. Within a single system of measurement, express measurements in a larger unit in terms of a smaller unit. Record measurement equivalents in a two-column table.
4.M.A.2	Use the four operations to solve word problems involving distances, intervals of time, liquid volumes, masses of objects, and money, including problems involving simple fractions or decimals, and problems that require expressing measurements given in a larger unit in terms of a smaller unit. Represent measurement quantities using diagrams such as number line diagrams that feature a measurement scale.
4.M.A.3	Apply the area and perimeter formulas for rectangles in real world and mathematical problems.
4.M.B.4	Recognize angles as geometric shapes that are formed wherever two rays share a common endpoint, and understand concepts of angle measurement:
4.M.B.4.a	An angle is measured with reference to a circle with its center at the common endpoint of the rays, by considering the fraction of the circular arc between the points where the two rays intersect the circle. An angle that turns through 1/360th of a circle is called a “one-degree angle,” and can be used to measure angles.
4.M.B.4.b	An angle that turns through □ one-degree angles is said to have an angle measure of □ degrees.
4.M.B.5	Measure angles in whole-number degrees using a protractor. Sketch angles of specified measure.
4.M.B.6	Recognize angle measure as additive. When an angle is decomposed into non-overlapping parts, the angle measure of the whole is the sum of the angle measures of the parts. Solve addition and subtraction problems to find unknown angles on a diagram in real world and mathematical problems, e.g., by using an equation with a symbol for the unknown angle measure.
4.DL.A.1	Create data-based questions, generate ideas based on the questions, and then refine the questions.
4.DL.A.2	Develop strategies to collect various types of data and organize data digitally.
4.DL.A.3	Understand that subsets of data can be selected and analyzed for a particular purpose.
4.DL.A.4	Analyze visualizations of a single data set, share explanations and draw conclusions that the data supports.
4.G.A.1	Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular

	and parallel lines. Identify these in two-dimensional figures.
4.G.A.2	Classify two-dimensional figures based on the presence or absence of parallel or perpendicular lines, or the presence or absence of angles of a specified size. Recognize right triangles as a category and identify right triangles.
4.G.A.3	Recognize a line of symmetry for a two-dimensional figure as a line across the figure such that the figure can be folded along the line into matching parts. Identify line-symmetric figures and draw lines of symmetry.

Unit Focus

- Solve problems involving measurement and conversion of measurements from a larger unit to a smaller unit.
- Generate and analyze patterns.
- Geometric measurement: understand concepts of angle and measure angles.
- Draw and identify lines and angles, and classify shapes by properties of their lines and angles.

Standards for Math Practice

MA.K-12.1	Make sense of problems and persevere in solving them.
MA.K-12.2	Reason abstractly and quantitatively.
MA.K-12.3	Construct viable arguments and critique the reasoning of others.
MA.K-12.4	Model with mathematics.
MA.K-12.5	Use appropriate tools strategically.
MA.K-12.6	Attend to precision.
MA.K-12.7	Look for and make use of structure.
MA.K-12.8	Look for and express regularity in repeated reasoning.

Critical Knowledge & Skills

NJSLS Math	Suggested Math Practices	Critical Knowledge and Skills

4.M.A.1 (**S**) Know relative sizes of measurement units within one system of units including km, m, cm. mm; kg, g; lb, oz.; l, ml; hr, min, sec. Within a single system of measurement, express measurements in a larger unit in terms of a smaller unit. Record measurement equivalents in a two-column table. For example, know that 1 ft is 12 times as long as 1 in. Express the length of a 4 ft snake as 48 in. Generate a conversion table for feet and inches listing the number pairs (1, 12), (2, 24), (3, 36), ...	MP.5 Use appropriate tools strategically. MP.8 Look for and express regularity in repeated reasoning.	Concepts: • Relative sizes of measurements (e.g. a kilometer is 1000 times as long as a meter and 100,000 times as long as a centimeter). Students will be able to: • Express measurements of a larger unit in terms of a smaller unit (within a single measurement system) (e.g. convert hours to minutes, kilometers to centimeters, etc). • Generate a two-column table to record measurement equivalents. Learning Goal 1: • Express measurement in a larger unit in terms of a smaller unit and record equivalent measures in a two-column table.

4.M.A.2 (S) Use the four operations to solve word problems involving distances, intervals of time, liquid volumes, masses of objects, and money, including problems involving simple fractions or decimals, and problems that require expressing measurements given in a larger unit in terms of a smaller unit. Represent measurement quantities using diagrams such as number line diagrams that feature a measurement scale.  Climate Change Example: Students may, knowing that energy and fuels are derived from natural resources and that their uses affect the climate, use the four operations to solve word problems related to the use of natural resources and involving distance, time, liquid volume, and/or the mass of objects.	MP.4 Model with mathematics. MP.5 Use appropriate tools strategically.	Concepts: • No new concepts introduced Students will be able to: • Solve word problems (using addition, subtraction and multiplication) involving distances, intervals of time, liquid volumes, masses of objects, and money, including problems involving simple fractions or decimals. • Solve word problems (using all four operations) involving whole number distances, intervals of time, liquid volumes, masses of objects, and money, including problems requiring expressing measurements given in a larger measurement unit in terms of a smaller measurement unit (conversion). • Construct diagrams (e.g. number line diagrams) to represent measurement quantities. Learning Goal 2: • Solve word problems involving simple fractions or decimals that incorporate measurement comparisons of like units (including problems that require measurements given in a larger unit in terms of a smaller unit).

4.NF.B.3d (**M**) Understand a fraction a/b with a >1 as a sum of fractions 1/b. d. Solve word problems involving addition and subtraction of fractions referring to the same whole and having like denominators, e.g., by using visual fraction models and equations to represent the problem.	MP.1 Make sense of problems and persevere in solving them. MP.2 Reason abstractly and quantitatively. MP.3 Construct viable arguments and critique the reasoning of others. MP.4 Model with mathematics. MP.5 Use appropriate tools strategically. MP.6 Attend to precision. MP.7 Look for and make use of structure.	Concepts: • No new concepts introduced. Students will be able to: • Develop visual fraction models and write equations to represent real world problems involving addition and subtraction of fractions. Learning Goal 3: • Solve word problems involving addition and subtraction of fractions having like denominators using visual fraction models and equations to represent the problem.
4.M.A.3 (**S**) Apply the area and perimeter formulas for rectangles in real world and mathematical problems. For example, find the width of a rectangular room given the area of the flooring and the length, by viewing the area formula as a multiplication equation with an unknown factor.	MP.2 Reason abstractly and quantitatively. MP.5 Use appropriate tools strategically.	Concepts: • No new concepts introduced Students will be able to: • Solve real world and mathematical problems by finding the area of rectangles using a formula. • Solve real world and mathematical problems by finding the perimeter of rectangles using a formula. Learning Goal 4: • Solve real world problems with whole numbers by finding the area and

		perimeter of rectangles using formulas.
4.OA.C.5 (**A**) Generate a number or shape pattern that follows a given rule. Identify apparent features of the pattern that were not explicit in the rule itself. For example, given the rule "Add 3" and the starting number 1, generate terms in the resulting sequence and observe that the terms appear to alternate between odd and even numbers. Explain informally why the numbers will continue to alternate in this way.	MP.8 Look for and express regularity in repeated reasoning.	Concepts: • Patterns contain features that are not explicitly stated in the rule defining the numerical pattern. Students will be able to: • Produce number patterns from a given rule. • Produce shape patterns from a given rule. • Analyze a sequence of numbers in order to identify features that are not obviously explicitly stated in the rule. • Explain the relationship between the rule and the pattern observed. Learning Goal 5: • Generate a number or shape pattern that follows a rule and identify features of the pattern that are not explicit in the rule.

4.NBT.B.4 (**M**) With accuracy and efficiency, add and subtract multi-digit whole numbers using the standard algorithm.	MP.7 Look for and make use of structure. MP.8 Look for and express regularity in repeated reasoning.	Concepts: • No new concepts introduced. Students will be able to: • Add multi-digit whole numbers using the standard algorithm with accuracy and efficiency. • Subtract multi-digit whole numbers using the standard algorithm with accuracy and efficiency. Learning Goal 6: • Add and subtract multi-digit whole numbers using the standard algorithm with accuracy and efficiency.
4.G.A.1 (**A**) Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines. Identify these in two-dimensional figures.	MP.5 Use appropriate tools strategically. MP.7 Look for and make use of structure.	Concepts: • Identifying and differentiating between points, lines, line segments, rays, angles, perpendicular lines, and parallel lines in two-dimensional figures. Students will be able to: • Draw points, lines, line segments and rays. • Draw angles (right, acute, obtuse). • Draw perpendicular and parallel lines. • Distinguish between lines, line segments, and rays. • Identify points, lines, line segment, rays, right angles, acute angles, obtuse angles, perpendicular lines and parallel lines in two-

		dimensional figures. Learning Goal 7: • Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines and identify these in two-dimensional figures.
4.M.B.4a-b (**A**) Recognize angles as geometric shapes that are formed wherever two rays share a common endpoint, and understand concepts of angle measurement: a. An angle is measured with reference to a circle with its center at the common endpoint of the rays, by considering the fraction of the circular arc between the points where the two rays intersect the circle. An angle that turns through 1/36th of a circle is called a "one-degree angle," and can be used to measure angles. b. An angle that turns through n one-degree angles is said to have an angle measure of n degrees.	MP.2 Reason abstractly and quantitatively.	Concepts: • Angles are formed by two rays sharing a common endpoint and result from the rotation of one ray around the endpoint. • Angle Measurement: An angle that turns through n one-degree angles is said to have an angle measure of n degrees. Students will be able to: • Describe an angle as measured with reference to a circle with the center of the circle being the common endpoint of the rays. • Explain a 'one-degree angle' and its relation to a circle; a "degree" is defined as 1/360 (one degree angle) of the entire circle. Learning Goal 8: • Explain angles as

		geometric shapes formed by two rays sharing a common endpoint and explain the relationship between a one-degree angle, a circle, and angle measure.
4.M.B.5 (**A**) Measure angles in whole-number degrees using a protractor. Sketch angles of specified measure.	MP.2 Reason abstractly and quantitatively. MP.5 Use appropriate tools strategically.	Concepts: • Measuring angles in whole-number degrees. • Using a protractor. Students will be able to: • Measure angles in whole-number degrees. • Given an angle measure, sketch the angle. Learning Goal 9: • Measure angles in whole number degrees using a protractor and sketch angles of specific measures.
4.M.B.6 (**A**) Recognize angle measure as additive. When an angle is decomposed into non-overlapping parts, the angle measure of the whole is the sum of the angle measures of the parts. Solve addition and subtraction problems to find unknown angles	MP.1 Make sense of problems and persevere in solving them. MP.7 Look for and make use of structure.	Concepts: • Angle measures may be added; when an angle is decomposed into non-overlapping parts, the angle measure of the whole (original angle) is the sum

on a diagram in real world and mathematical problems, e.g., by using an equation with a symbol for the unknown angle measure.		of the angle measures of the parts. Students will be able to: • Add and subtract to find unknown angles on a diagram in real world and mathematical problems. • Write an equation with a symbol for the unknown angle measure. Learning Goal 10: • Solve addition and subtraction problems to find unknown angles on a diagram in real world and mathematical problems using a symbol for an unknown angle measure.
4.G.A.2 (**A**) Classify two-dimensional figures based on the presence or absence of parallel or perpendicular lines, or the presence or absence of angles of a specified size. Recognize right triangles as a category and identify right triangles.	MP.5 Use appropriate tools strategically. MP.7 Look for and make use of structure.	Concepts: • A trapezoid is a quadrilateral with at least one pair of parallel sides. Students will be able to: • Classify triangles based on the presence or absence of perpendicular lines and based on the presence or absence of angles of a particular size. • Classify quadrilaterals based on the presence or absence of parallel or perpendicular lines and based on the presence or absence of angles of a particular size. Learning Goal 11: • Classify two-dimensional figures based on the presence or absence of

		parallel or perpendicular lines, or the presence or absence of angles of a particular size; recognize right angles as a category, and identify right, acute, obtuse, equilateral, isosceles, and scalene triangles.
4.G.A.3 (A) Recognize a line of symmetry for a two-dimensional figure as a line across the figure such that the figure can be folded along the line into matching parts. Identify line-symmetric figures and draw lines of symmetry.	MP.5 Use appropriate tools strategically. MP.7 Look for and make use of structure.	Concepts: • Symmetry. • Matching parts. • Folding along a line. Students will be able to: • Identify and explain what a line of symmetry is in a two-dimensional figure. • Fold a figure along a line in order to create matching parts. • Identify figures having lines of symmetry. • Draw lines of symmetry. Learning Goal 12: • Draw lines of symmetry and identify line-symmetric figures.
4.DL.A.1 (A) Create data-based questions, generate ideas based on the questions, and then refine the questions.	MP.4 Model with mathematics. MP.5 Use appropriate tools strategically. MP.6 Attend to precision.	Concepts: • Importance of using data to drive inquiry and problem-solving. Students will be able to: • Create data-based questions. • Generate ideas based on

		the questions. • Refine the questions to improve clarity and effectiveness. Learning Goal 13: • Create data-based questions, generate ideas based on the questions, and then refine the questions.
4.DL.A.2 (**A**) Develop strategies to collect various types of data and organize data digitally.	MP.4 Model with mathematics. MP.5 Use appropriate tools strategically. MP.6 Attend to precision.	Concepts: • Data collection methods. • Types of data. • Using digital tools for organization. Students will be able to: • Develop strategies to collect data. • Use digital tools to organize data. Learning Goal 14: • Develop strategies to collect data through surveys, observations, and research and use spreadsheets or databases to organize and manage collected data effectively.
4.DL.A.3 (**A**) Understand that subsets of data can be selected and analyzed for a particular purpose.	MP.4 Model with mathematics. MP.5 Use appropriate tools strategically. MP.6 Attend to precision.	Concepts: • Data can be separated into subsets based on different features. Students will be able to: • Recognize different subsets of data within a larger set.

		• Choose relevant data subsets for a specific purpose. • Explain why specific subsets of data are chosen for analysis. Learning Goal 15: • Explain how subsets of data can be chosen and examined for a specific reason or goal, using practical examples and simple data sets relevant to their daily experiences.
4.DL.A.4 (A) Analyze visualizations of a single data set, share explanations and draw conclusions that the data supports.	MP.4 Model with mathematics. MP.5 Use appropriate tools strategically. MP.6 Attend to precision.	Concepts: • Analyzing visual representations of data. • Drawing conclusions from data. Students will be able to: • Analyze different types of visualizations (e.g., graphs, charts, tables). • Communicate explanations of what the visualizations represent. • Draw conclusions about the data presented in the visualizations. Learning Goal 16: • Read graphs, charts, or other visual representations of data, interpret the information presented, explain their interpretations to others, and make conclusions based on the data shown.

School/District Formative Assessment Plan

- Topic 13-1 through 13-7 Quick Check (found in Savvas Realize)
- Topic 14-1 through 14-4 Quick Check (found in Savvas Realize)
- Topic 15-1 through 15-6 Quick Check (found in Savvas Realize)
- Topic 16-1 through 16-6 Quick Check (found in Savvas Realize)

School/District Summative Assessment Plan

- Topic 13 Assessment
- Topic 14 Assessment
- Topic 15 Assessment
- Topic 16 Assessment

Benchmark & Alternative Assessments

- STAR Renaissance
- LinkIt Benchmarks
- Performance Task (found in Savvas Realize)

Focus Mathematical Concepts

Pre-requisite skills

- Estimate liquid volumes and masses of objects using standard units of grams (g), kilograms (kg), and liters (l) (3.M.A.2).
- Multiply and divide within 100 using strategies such as the relationship between multiplication and division, or properties of operations (working towards accuracy and efficiency) (3.OA.C.7).
- Solve simple two-step word problems using the four operations (3.OA.D.8).

- Represent two-step word problems using equations with a letter standing for the unknown quantity (3.OA.D.8).
- Fractions are numbers and can be found or represented on the number line (3.NF.A.2).
- Represent and recognize a fraction 1/b on a number line diagram by defining the interval from 0 to 1 as the whole and partitioning it into b equal parts and that the endpoint of the part based at 0 locates the number 1/b on the number line (3.NF.A.2).
- Represent and recognize a fraction a/b on a number line diagram by marking off a lengths 1/b from 0 and that its endpoint locates the number a/b on the number line (3.NF.A.2).
- Represent a word problem with drawings and equations using a symbol for the unknown (2.OA.A.1).
- Solve one and two-step addition and subtraction word problems within 20 involving situations of adding to, taking from, putting together, taking apart, and comparing (2.OA.A.1).
- Determine the unknown whole number in a multiplication or division equation relating three whole numbers (3.OA.A.4).
- Solve real world and mathematical problems involving perimeters of polygons, including finding the perimeter given the side lengths (3.M.C.6).
- Solve real world and mathematical problems involving perimeters of polygons, including finding unknown side lengths when given the perimeter (3.M.C.6).
- Identify arithmetic patterns, including patterns in the addition table or multiplication table, and explain them using properties of operations (3.OA.D.9).
- Add within 1000 with accuracy and efficiency using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction (3.NBT.A.2).
- Subtract within 1000 with accuracy and efficiency using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction (3.NBT.A.2).

Common Misconceptions

- Students confuse numbers on a protractor because the math tool has a double set of numbers.
- Students should use the benchmark 90 degrees or right angle when measuring obtuse and acute angles.

Number Fluency

- 4.NBT.B.4 Add and subtract within 1,000,000.

District/School Tasks

- Pick A Project (found in Savvas Realize)
- Performance Tasks (found in Savvas Realize)

District/School Primary, Supplemental and Intervention Resources

- Envisions by Savvas (P)
- STAR Renaissance (S)
- Freckle Math (S)
- Connecting Math Concepts (I)
- Corrective Math (I)

Instructional Best Practices/Open Educational Resources

Illustrative Mathematics

Desmos

Numeracy Tasks

Building Thinking Classrooms Tasks

Open Middle Math Tasks

Resources from Dr. Eric Milou

Career Readiness, Life Literacies & Key Skills

9.1.5.CR.1	Compare various ways to give back and relate them to your strengths, interests, and other personal factors.
9.2.5.CAP.3	Identify qualifications needed to pursue traditional and non-traditional careers and occupations.
9.2.5.CAP.4	Explain the reasons why some jobs and careers require specific training, skills, and certification (e.g., life guards, child care, medicine, education) and examples of these

	requirements.
9.4.5.CT.1	Identify and gather relevant data that will aid in the problem-solving process (e.g., 2.1.5.EH.4, 4-ESS3-1, 6.3.5.CivicsPD.2).
9.4.5.CT.3	Describe how digital tools and technology may be used to solve problems.
9.4.5.CT.4	Apply critical thinking and problem-solving strategies to different types of problems such as personal, academic, community and global (e.g., 6.1.5.CivicsCM.3).
9.4.5.IML.2	Create a visual representation to organize information about a problem or issue (e.g., 4.MD.B.4, 8.1.5.DA.3).
9.4.5.IML.3	Represent the same data in multiple visual formats in order to tell a story about the data.
9.4.5.TL.2	Sort and filter data in a spreadsheet to analyze findings.

Computer Science & Design Thinking

8.1.5.DA.1	Collect, organize, and display data in order to highlight relationships or support a claim.
8.1.5.DA.2	Compare the amount of storage space required for different types of data.
8.1.5.DA.3	Organize and present collected data visually to communicate insights gained from different views of the data.
8.1.5.DA.4	Organize and present climate change data visually to highlight relationships or support a claim.
8.1.5.DA.5	Propose cause and effect relationships, predict outcomes, or communicate ideas using data.

Interdisciplinary Connections

4-PS4-1	Develop a model of waves to describe patterns in terms of amplitude and wavelength and that waves can cause objects to move.
RI.MF.4.6	Use evidence to show how graphics and visuals (e.g., illustrations, charts, graphs, diagrams, timelines, animations) support central ideas.
W.AW.4.1	Write opinion pieces on topics or texts, supporting a point of view with reasons and information.
4-PS4-2	Develop a model to describe that light reflecting from objects and entering the eye allows objects to be seen.
W.WR.4.5	Conduct short research projects that use multiple reference sources (print and non-print) and build knowledge through investigation of different aspects of a topic.
W.SE.4.6	Gather relevant information from multiple print and digital sources; take notes, prioritize and categorize information; provide a list of sources.
4-LS1-1	Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.
SL.UM.4.5	Add audio recordings and visual displays to presentations when appropriate to enhance the development of main ideas or themes.
4-ESS1-1	Identify evidence from patterns in rock formations and fossils in rock layers to support an explanation for changes in a landscape over time.
4-ESS2-1	Make observations and/or measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation.

4-ESS2-2 Analyze and interpret data from maps to describe patterns of Earth’s features.