CARNEGIE LEARNING

1 Tools of Geometry

This chapter begins by addressing the building blocks of geometry which are the point, the line, and the plane. Students will construct line segments, midpoints, bisectors, angles, angle bisectors, perpendicular lines, parallel lines, polygons, and points of concurrency. A translation is a rigid motion that preserves the size and shape of segments, angles, and polygons. Students use the coordinate plane and algebra to determine the characteristics of lines, segments, and points of concurrency.

Standards: G.2A, G.2B, G.3A, G.3B, G.3C, G.4A, G.5B, G.5C, G.6D, G.9B

Lesson	Lesson Title	Lesson Subtitle	TEKS	Key Math Objectives	Key Terms
1.1	**Let's Get This Started!**	Points, Lines, Planes, Rays, and Line Segments	G.4A	• Identify and name points, lines,planes, rays, and line segments. • Use symbolic notation to describe points, lines, planes, rays, and line segments. • Describe possible intersections of lines and planes. • Identify construction tools. • Distinguish between a sketch, a drawing, and a construction.	• Point • Line • Collinear points • Plane • Compass • Straightedge • Sketch • Draw • Construct • Coplanar lines • Skew lines • Ray • Endpoint of a ray • Line segment • Endpoints of a line segment • Congruent line segments
1.2	**Let's Move!**	Translating and Constructing Line Segments	G.2B G.3A G.3B G.3C G.5B G.9B	• Apply Pythagorean triples to solve problems. • Determine the distance between two points. • Use the Pythagorean Theorem to derive the Distance Formula. • Apply the Distance Formula on the coordinate plane. • Translate a line segment on the coordinate plane. • Copy or duplicate a line segment by construction.	• Pythagorean triple • Distance Formula • Transformation • Rigid motion • Translation • Pre-image • Image • Arc CONSTRUCTIONS • Copying a lint segment • Duplicating a line segment
1.3	**Treasure Hunt**	Midpoints and Bisectors	G.2A G.2B G.5B	• Determine the midpoint of a line segment on a coordinate plane. • Use the Midpoint Formula. • Apply the Midpoint Formula on the coordinate plane. • Bisect a line segment using patty paper. • Bisect a line segment by construction. • Locate the midpoint of a line segment.	• Midpoint • Midpoint Formula • Segment bisector CONSTRUCTIONS • Bisecting a line segment

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Lesson	Lesson Title	Lesson Subtitle	TEKS	Key Math Objectives	Key Terms
1.4	**It's All About Angles**	Translating and Constructing Angles and Angle Bisectors	G.3A G.3B G.3C G.5B	• Translate an angle on the coordinate plane. • Copy or duplicate an angle by construction. • Bisect an angle by construction.	• Angle • Angle bisector CONSTRUCTIONS • Copying an angle • Duplicating an angle • Bisecting an angle
1.5	**Did You Find a Parking Space?**	Parallel and Perpendicular Lines on the Coordinate Plane	G.2B G.2C	• Derive the slope formula. • Determine whether lines are parallel. • Identify and write the equations of lines parallel to given lines. • Determine whether lines are perpendicular. • Identify and write the equations of lines perpendicular to given lines. • Identify and write the equations of horizontal and vertical lines. • Calculate the distance between a line and a point not on a line.	• Point-slope form
1.6	**Making Copies— Just as Perfect as the Original!**	Constructing Perpendicular Lines, Parallel Lines, and Polygons	G.5B G.5C	• Construct a perpendicular line to a given line. • Construct a parallel line to a given line through a point not on the line. • Construct an equilateral triangle given the length of one side of the triangle. • Construct an isosceles triangle given the length of one side of the triangle. • Construct a square given the perimeter (as the length of a given line segment). • Construct a rectangle that is not a square given the perimeter (as the length of a given line segment).	• Perpendicular bisector CONSTRUCTIONS • A perpendicular line to a given line through a point on the line • A perpendicular line to a given line through a point not on the line
1.7	**What's the Point?**	Points of Concurrency	G.5B G.5C G.6D	• Construct the incenter, circumcenter, centroid, and orthocenter. • Locate points of concurrency using algebra.	• Concurrent • Point of concurrency • Circumcenter • Incenter • Median • Centroid • Altitude • Orthocenter
Learning Individually with MATHia or Skills Practice			G.2B G.2C G.4A G.5A	In the MATHia software, students identify and write names for geometric entities. They write measure statements for segments and angles. Students solve mathematical and real• world problems involving parallel and perpendicular lines on the coordinate plane.	

CARNEGIE LEARNING

2 Introduction to Proof

This chapter focuses on the foundations of proof. Paragraph, two-column, construction, and flow chart proofs are presented. Proofs involving angles and parallel lines are completed.

Standards: G.4A, G.4B,G.4C, G.4D, G.5A, G.5B, G.6A

Lesson	Lesson Title	Lesson Subtitle	TEKS	Key Math Objectives	Key Terms
2.1	**A Little Dash of Logic**	Foundations for Proof	G.4B G.4C	• Define inductive and deductive reasoning. • Identify methods of reasoning. • Compare and contrast methods of reasoning. • Create examples using inductive and deductive reasoning. • Identify the hypothesis and conclusion of a conditional statement. • Explore the truth values of conditional statements. • Use a truth table.	• Induction • Deduction • Counterexample • Conditional statement • Propositional form • Propositional variables • Hypothesis • Conclusion • Truth value • Truth table
2.2	**And Now From a New Angle**	Special Angles and Postulates	G.4A G.4D	• Calculate the complement and supplement of an angle. • Classify adjacent angles, linear pairs, and vertical angles. • Differentiate between postulates and theorems. • Differentiate between *Euclidean and non-Euclidean geometries.	• Supplementary angles • Complementary angles • Adjacent angles • Linear pairs • Vertical angles • Postulate • Theorem • Euclidean geometry • Linear Pair Postulate • Segment Addition Postulate • Angle Addition Postulate
2.3	**Forms of Proof**	Paragraph Proof, Two-Column Proof, Construction Proof, and Flow Chart Proof	G.4A G.5B G.6A	• Use the addition and subtraction properties of equality. • Use the reflexive, substitution, and transitive properties. • Write a paragraph proof. • Complete a two-column proof. • Perform a construction proof. • Complete a flow chart proof.	• Additional Property of Equality • Subtraction Property of Equality • Reflexive Property • Substitution Property • Transitive Property • Flow chart proof • Two• column proof • Paragraph proof • Construction proof • Right Angle Congruence Theorem • Congruent Supplement Theorem • Congruent Complement Theorem • Vertical Angle Theorem

Lesson	Lesson Title	Lesson Subtitle	TEKS	Key Math Objectives	Key Terms
2.4	**What's Your Proof?**	Angle Postulates and Theorems	G.4A G.5A G.6A	• Use the Corresponding Angle Postulate. • Prove the Alternate Interior Angle Theorem. • Prove the Alternate Exterior Angle Theorem. • Prove the Same• Side Interior Angle Theorem. • Prove the Same• Side Exterior Angle Theorem.	• Corresponding Angle Postulate • Conjecture • Alternate Interior Angle Theorem • Alternate Exterior Angle Theorem • Same• Side Interior Angle Theorem • Same• Side Exterior Angle Theorem
2.5	**A Reversed Condition**	Parallel Line Converse Theorems	G.4A G.4B G.5A G.5B G.6A	• Write and prove parallel line converse conjectures.	• Converse • Corresponding Angle Converse Postulate • Alternate Interior Angle Converse Theorem • Alternate Exterior Angle Converse Theorem • Same• Side Interior Angle Converse Theorem • Same• Side Exterior Angle Converse Theorem
Learning Individually with MATHia or Skills Practice			G.5A G.6A	In the MATHia software, students calculate angle measures and justify their reasoning. They use flowchart proofs and two-column proofs to prove various line and angle theorems. They use theorems to solve mathematical problems related to geometric figures.	

CARNEGIE LEARNING

3 Perimeter and Area of Geometric Figures on the Coordinate Plane

In this chapter, students investigate strategies for determining the perimeters and areas of rectangles, triangles, non-rectangular parallelograms, trapezoids, and composite plane figures on the coordinate plane. Students also explore the effects of proportional and non-proportional changes to the dimensions of a plane figure on its perimeter and area.

Standards: G.2A, G.2B, G.3B, G.10B, G.11B

Lesson	Lesson Title	Lesson Subtitle	TEKS	Key Math Objectives	Key Terms
3.1	**Transforming to a New Level!**	Using Transformations to Determine Area	G.3B	• Determine the areas of squares on a coordinate plane. • Connect transformations of geometric figures with number sense and operations. • Determine the areas of rectangles using transformations.	
3.2	**Looking at Something Familiar in a New Way**	Area and Perimeter of Triangles on the Coordinate Plane	G.3B G.10B	• Determine the perimeter of triangles on the coordinate plane. • Determine the area of triangles on the coordinate plane. • Determine and describe how proportional and non-proportional changes in the linear dimensions of a triangle affect its perimeter and area. • Explore the effects that doubling the area has on the properties of a triangle.	
3.3	**Grasshoppers Everywhere!**	Area and Perimeter of Parallelograms on the Coordinate Plane	G.3B	• Determine the perimeter of parallelograms on a coordinate plane. • Determine the area of parallelograms on a coordinate plane. • Determine and describe how proportional and non-proportional changes in the linear dimensions of a parallelogram affect its perimeter and area. • Explore the effects that doubling the area has on the properties of a parallelogram.	
3.4	**Leavin' On a Jet Plane**	Area and Perimeter of Trapezoids on the Coordinate Plane	G.3B	• Determine the perimeter and area of trapezoids and hexagons on a coordinate plane. • Determine the perimeter of composite figures on the coordinate plane.	• Bases of a trapezoid • Legs of a trapezoid
3.5	**Composite Figures on the Coordinate Plane**	Area and Perimeter of Composite Figures on the Coordinate Plane	G.3B G.11B	• Determine the perimeters and areas of composite figures on a coordinate plane. • Connect transformations of geometric figures with number sense and operations. • Determine perimeters and areas of composite figures using transformations.	• Composite figures
Learning Individually with MATHia or Skills Practice			G.2A G.2B G.11B	In the MATHia software, students use the Distance Formula to solve mathematical problems on the coordinate plane. They partition line segments on the coordinate plane into different ratios.	

CARNEGIE LEARNING

4 Three-Dimensional Figures

This chapter focuses on three• dimensional figures. The first two lessons address rotating and stacking two• dimensional figures to created three• dimensional solids. Cavalieri's principle is presented and is used to derive the formulas for a volume of a cone, pyramid, and sphere. The chapter culminates with the topics of cross sections and diagonals in three dimensions.

Standards: G.2B, G.10A, G.10B, G.11A, G.11C, G.11D

Lesson	Lesson Title	Lesson Subtitle	TEKS	Key Math Objectives	Key Terms
4.1	**Whirlygigs for Sale!**	Rotating Two-Dimensional Figures through Space	G.10A	• Apply rotations to two-dimensional plane figures to create three-dimensional solids. • Describe three-dimensional solids formed by rotations of plane figures through space.	• Disc
4.2	**Cakes and Pancakes**	Translating and Stacking Two-Dimensional Figures	G.11C G.11D	• Apply translations for two• dimensional plane figures to create three• dimensional solids. • Describe three• dimensional solids formed by translations of plane figures through space. • Build three• dimensional solids by stacking congruent or similar two• dimensional plane figures.	• Isometric paper • Right triangular prism • Oblique triangular prism • Right rectangular prism • Oblique rectangular prism • Right cylinder • Oblique cylinder
4.3	**Cavalieri's Principles**	Applications of Cavalieri's Principles	G.11D	• Explore Cavalieri's Principle for two-dimensional figures (area). • Explore Cavalieri's Principle for three-dimensional objects (volume).	• Cavalieri's Principle
4.4	**Spin to Win**	Volume of Cones and Pyramids	G.11C G.11D	• Rotate two-dimensional plane figures to generate three-dimensional figures. • Give an informal argument for the volume of cones and pyramids.	
4.5	**Spheres a la Archimedes**	Volume of a Sphere	G.11C G.11D	• Derive the formula for the volume of a sphere	• Sphere • Radius of a sphere • Diameter of a sphere • Great circle of a sphere • Hemisphere • Annulus

CARNEGIE LEARNING

Lesson	Lesson Title	Lesson Subtitle	TEKS	Key Math Objectives	Key Terms
4.6	**Surface Area**	Total and Lateral Surface Area	G.11A G.11C	• Apply formulas for the total surface area of prisms, pyramids, cones, cylinders, and spheres to solve problems. • Apply the formulas for the lateral surface area of prisms, pyramids, cones, and spheres to solve problems. • Apply the formula for the area of regular polygons to solve problems.	• Lateral face • Lateral surface area • Total surface area • Apothem
4.7	**Turn Up the . . .**	Using Surface Area and Volume Formulas	G.10A G.10B G.11C G.11D	• Apply the volume formulas for a pyramid, a cylinder, a cone, and a sphere to solve problems. • Apply surface area formulas to solve problems involving composite figures. • Determine and describe how proportional and non-proportional changes in the linear dimensions of a shape affect its surface area and volume.	• Composite figure
4.8	**Tree Rings**	Cross• Sections	G.10A	• Determine the shapes of cross sections. • Determine the shapes of the intersections of solids and planes.	
4.9	**Two Dimensions Meet Three Dimensions**	Diagonals in Three Dimensions	G.2B	• Use the Pythagorean Theorem to determine the length of a diagonal of a solid. • Use a formula to determine the length of a diagonal of a rectangular solid given the lengths of three perpendicular edges. • Use a formula to determine the length of a diagonal of a rectangular solid given the diagonal measurements of three perpendicular sides.	
Learning Individually with MATHia or Skills Practice			G.10A G.11D	In the MATHia software, students visualize cross• sections of three• dimensional shapes and analyze solid figures built by rotating or translating plane figures. They determine the volume of cylinders, pyramids, cones, and spheres.	

CARNEGIE LEARNING

5 Properties of Triangles

This chapter focuses on properties of triangles, beginning with classifying triangles on the coordinate plane. Theorems involving angles and side lengths of triangles are presented. The last two lessons discuss properties and theorems of 45º• 45º• 90º triangles and 30º• 60º• 90º triangles..

Standards: G.2B, G.5D, G.6D, G.7A, G.9B

Lesson	Lesson Title	Lesson Subtitle	TEKS	Key Math Objectives	Key Terms
5.1	**Name That Triangle**	Classifying Triangles on the Coordinate Plane	G.2B	• Determine the coordinates of a third vertex of a triangle, given the coordinates of two vertices and a description of the triangle. • Classify a triangle given the locations of its vertices on a coordinate plane.	
5.2	**Inside Out**	Triangle Sum, Exterior Angle, and Exterior Inequality Theorems	G.6D	• Prove the Triangle Sum Theorem. • Explore the relationship between the interior angle measures and the side lengths of a triangle. • Identify the remote interior angles of a triangle. • Identify the exterior angle of a triangle. • Explore the relationship between the exterior angle measures and two remote interior angles of a triangle. • Prove the Exterior Angle Theorem. • Prove the Exterior Angle Inequality Theorem.	• Triangle Sum Theorem • Remote interior angles of a triangle • Exterior Angle Theorem • Exterior Angle Inequality Theorem
5.3	**Trade Routes and Pasta Anyone?**	The Triangle Inequality Theorem	G.5D	• Explore the relationship between the side lengths of a triangle and the measures of its interior angles. • Prove the Triangle Inequality Theorem.	• Triangle Inequality Theorem
5.4	**Stamps Around the World**	Properties of a 45°-45°-90° Triangle	G.7A G.9B	• Use the Pythagorean Theorem to explore the relationship between the side lengths of a triangle and the measures of its interior angles. • Prove the 45°- 45°- 90° Triangle Theorem.	• 45°- 45°- 90° Triangle Theorem
5.5	**More Stamps, Really?**	Properties of a 30°-60°- 90° Triangle	G.9B	• Use the Pythagorean Theorem to explore the relationship between the side lengths of a triangle and the measures of its interior angles. • Prove the 30°- 60°- 90° Triangle Theorem.	• 30°- 60°- 90° Triangle Theorem
Learning Individually with MATHia or Skills Practice			G.9B	In the MATHia software, students use the relationships between the side lengths of the special right triangles to solve for unknown side lengths.	

CARNEGIE LEARNING

6 Similarity Through Transformations

This chapter addresses similar triangles and establishes similar triangle theorems as well as theorems about proportionality. The chapter leads student exploration of the conditions for triangle similarity and opportunities for applications of similar triangles.

Standards: G.2B, G.3B, G.5A, G.6D, G.7A, G.7B, G.8A, G.8B, G.9B

Lesson	Lesson Title	Lesson Subtitle	TEKS	Key Math Objectives	Key Terms
6.1	**Big and Small**	Dilating Triangles to Create Similar Triangles	G.3B G.7A	• Prove that triangles are similar using geometric theorems. • Prove that triangles are similar using transformations. • Determine the image of a given two-dimensional figure under a composition of dilations.	• Similar triangles
6.2	**Similar Triangles or Not?**	Similar Triangle Theorems	G.7B	• Use constructions to explore similar triangle theorems. • Explore the Angle-Angle (AA) Similarity Theorem. • Explore the Side-Side-Side (SSS) Similarity Theorem. • Explore the Side-Angle-Side (SAS) Similarity Theorem.	• Angle-Angle Similarity Theorem • Side-Side-Side Similarity Theorem • Included angle • Included side • Side-Angle-Side Similarity Theorem
6.3	**Keep It In Proportion**	Theorems About Proportionality	G.2B G.5A G.8A	• Prove the Angle Bisector/Proportional Side Theorem. • Prove the Triangle Proportionality Theorem. • Prove the Converse of the Triangle Proportionality Theorem. • Prove the Proportional Segments Theorem associated with parallel lines. • Prove the Triangle Midsegment Theorem.	• Angle Bisector/Proportional Side Theorem • Triangle Proportionality Theorem • Converse of the Triangle Proportionality Theorem • Proportional Segments Theorem • Triangle Midsegment Theorem
6.4	**Geometric Mean**	More Similar Triangles	G.8B	• Explore the relationships created when an altitude is drawn to the hypotenuse of a right triangle. • Prove the Right Triangle/Altitude Similarity Theorem. • Use the geometric mean to solve for unknown lengths.	• Right Triangle/Altitude Similarity Theorem • Geometric mean • Right Triangle Altitude/Hypotenuse Theorem • Right Triangle Altitude/Leg Theorem
6.5	**Proving the Pythagorean Theorem**	Proving the Pythagorean Theorem and the Converse of the Pythagorean Theorem	G.6D	• Prove the Pythagorean Theorem using similar triangles. • Prove the Converse of the Pythagorean Theorem using algebraic reasoning.	
6.6	**Indirect Measurement**	Application of Similar Triangles	G.8A	• Identify similar triangles to calculate indirect measurements. • Use proportions to solve for unknown measurements.	• Indirect measurement

Lesson	Lesson Title	Lesson Subtitle	TEKS	Key Math Objectives	Key Terms
Learning Individually with MATHia or Skills Practice			G.7B G.8A G.9B	In the MATHia software, students identify similar figures and determine corresponding parts of given similar figures. They calculate the corresponding parts of similar triangles, both in and out of context. Students use similarity theorems to prove triangle theorems	

CARNEGIE LEARNING

7 Congruence Through Transformations

This chapter focuses on proving triangle congruence theorems and using the theorems to determine whether triangles are congruent.

Standards: G.2B, G.3A, G.3B, G.3C, G.3D, G.4C, G.5A, G.5B, G.5C, G.6A, G.6B,

Lesson	Lesson Title	Lesson Subtitle	TEKS	Key Math Objectives	Key Terms
7.1	**Slide, Flip, Turn: The Latest Dance Craze?**	Translating, Rotating, and Reflecting Geometric Figures	G.3A G.3B G.3C G.3D	• Translate geometric figures on a coordinate plane. • Rotate geometric figures on a coordinate plane. • Reflect geometric figures on a coordinate plane. • Determine reflectional and rotational symmetry of figures. • Determine images and pre-images of figures under a composition of transformations.	• Reflectional symmetry • Rotational symmetry
7.2	**All the Same to You**	Congruent Triangles	G.3A G.6C	• Identify corresponding sides and corresponding angles of congruent triangles. • Explore the relationship between corresponding sides of congruent triangles. • Explore the relationship between corresponding angles of congruent triangles. • Write congruence statements for congruent triangles. • Identify and use rigid motion to create new images.	
7.3	**Side-Side-Side**	Side-Side-Side Congruence Theorem	G.2B G.3A G.5A G.5B G.5C G.6B	• Explore the Side-Side-Side Congruence Theorem through constructions. • Explore the Side-Side-Side Congruence Theorem on the coordinate plane. • Prove the Side-Side-Side Congruence Theorem	• Side-Side-Side Congruence Theorem
7.4	**Side-Angle-Side**	Side-Angle-Side Congruence Theorem	G.2B G.3A G.5A G.5B G.5C G.6B	• Explore Side-Angle-Side Congruence Theorem using constructions. • Explore Side-Angle-Side Congruence Theorem on the coordinate plane. • Prove the Side-Angle-Side Congruence Theorem.	• Side-Angle-Side Congruent Theorem
7.5	**You Shouldn't Make Assumptions**	Angle-Side-Angle Congruence Theorem	G.2B G.3A G.5A G.5B G.5C G.6B	• Explore the Angle-Side-Angle Congruence Theorem using constructions. • Explore the Angle-Side-Angle Congruence Theorem on the coordinate plane. • Prove the Angle-Side-Angle Congruence Theorem.	• Angle-Side-Angle Congruence Theorem

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Lesson	Lesson Title	Lesson Subtitle	TEKS	Key Math Objectives	Key Terms
7.6	**Ahhhhh . . . We're Sorry We Didn't Include You**	Angle-Angle-Side Congruence Theorem	G.2B G.3A G.5A G.5B G.5C G.6B	• Explore Angle-Angle-Side Congruence Theorem using constructions. • Explore Angle-Angle-Side Congruence Theorem on the coordinate plane. • Prove the Angle-Angle-Side Congruence Theorem.	• Angle-Angle-Side Congruence Theorem
7.7	**Congruent Triangles in Action**	Using Congruent Triangles	G.4C G.5B G.6A G.6B	• Prove that the points on a perpendicular bisector of a line segment are equidistant to the endpoints of the line segment. • Show that AAA for congruent triangles does not work. • Show that SSA for congruent triangles does not work. • Use the congruence theorems to determine triangle congruency.	
Learning Individually with MATHia or Skills Practice			G.3A G.3B G.3C G.3D G.6B G.6C	In the MATHia software, students apply the definitions of rigid motion transformations and dilations to identify transformations that carry figures onto other figures or onto themselves. They write and identify triangle congruence statements. Students match pairs of triangles to the theorem by which they are proven congruent. They use congruence theorems to determine triangle congruency.	

CARNEGIE LEARNING

8 Using Congruence Theorems

This chapter covers triangle congruence, including right triangle and isosceles triangle congruence theorems. Lessons provide opportunities for students to explore the congruence of corresponding parts of congruent triangles as well as continuing work with proof, introducing indirect proof, or proof by contradiction. Throughout, students apply congruence theorems to solve problems.

Standards: G.2B, G.3B, G.4D, G.5A, G.5B, G.5C, G.5D, G.6A, G.6B, G.6C, G.6D

Lesson	Lesson Title	Lesson Subtitle	TEKS	Key Math Objectives	Key Terms
8.1	**Time to Get Right**	Right Triangle Congruence Theorem	G.2B G.3B G.5A G.5B G.5C G.6B G.6C	• Prove the Hypotenuse-Leg Congruence Theorem using a two-column proof and construction. • Prove the Leg-Leg, Hypotenuse-Angle, and Leg-Angle Congruence Theorems by relating them to general triangle congruence theorems. • Apply right triangle congruence theorems.	• Hypotenuse-Leg (HL) Congruence Theorem • Leg-Leg (LL) Congruence Theorem • Hypotenuse-Angle (HA) Congruence Theorem • Leg-Angle (LA) Congruence Theorem
8.2	**CPCTC**	Corresponding Parts of Congruent Triangles Are Congruent	G.6D	• Identify corresponding parts of congruent triangles. • Use corresponding parts of congruent triangles are congruent to prove angles and segments are congruent. • Use corresponding parts of congruent triangles are congruent to prove the Isosceles Triangle Base Angle Theorem. • Use corresponding parts of congruent triangles are congruent or prove the Isosceles Triangle Base Angle Converse Theorem. • Apply corresponding parts of congruent triangles.	• Corresponding parts of congruent triangles are congruent (CPCTC) • Isosceles Triangle Base Angle Theorem • Isosceles Triangle Base Angle Converse Theorem
8.3	**Congruence Theorems in Action**	Isosceles Triangle Theorems	G.2B G.5B G.6A G.6D	• Prove the Isosceles Triangle Base Theorem. • Prove the Isosceles Triangle Vertex Angle Theorem. • Prove the Isosceles Triangle Perpendicular Bisector Theorem. • Prove the Isosceles Triangle Altitude to Congruent Sides Theorem. • Prove the Isosceles Triangle Angle Bisector to Congruent Side Theorem.	• Vertex angle • Isosceles Triangle Base Theorem • Isosceles Triangle Vertex Angle Theorem • Isosceles Triangle Perpendicular Bisector Theorem • Isosceles Triangle Altitude to Congruent Sides Theorem • Isosceles Triangle Angle Bisector to Congruent Sides Theorem
8.4	**Making Some Assumptions**	Inverse, Contrapositive, Direct Proof, and Indirect Proof	G.4D G.5D	• Write the inverse and contrapositive of a conditional statement. • Differentiate between direct and indirect proof. • Use indirect proof.	• Inverse • Contrapositive • Direct proof • Indirect proof or proof by contradiction • Hinge Theorem • Hinge Converse Theorem
Learning Individually with MATHia or Skills Practice			G.6D	In the MATHia software, students apply previously proved theorems to prove other geometric relationships in triangles.	

CARNEGIE LEARNING

9 Trigonometry

This chapter introduces students to trigonometric ratios using right triangles. Lessons provide opportunities for students to discover and analyze these ratios and solve application problems using them. Students also explore the reciprocals of the basic trigonometric ratios sine, cosine, and tangent, along with their inverses to determine unknown angle measures. Deriving the Law of Sines and the Law of Cosines extends students' understanding of trigonometry to apply to all triangles.

Standards: G.7B, G.9A

Lesson	Lesson Title	Lesson Subtitle	TEKS	Key Math Objectives	Key Terms
9.1	**Three Angles Measure**	Introduction to Trigonometry	G.7B G.9A	• Explore trigonometric ratios as measurement conversions. • Analyze the properties of similar right triangles.	• Reference angle • Opposite side • Adjacent side
9.2	**The Tangent Ratio**	Tangent Ratio, Cotangent Ratio, and Inverse Tangent	G.9A	• Use the tangent ratio in a right triangle to solve for unknown side lengths. • Use the cotangent ratio in a right triangle to solve for unknown side lengths. • Relate the tangent ratio to the cotangent ratio. • Use the inverse tangent in a right triangle to solve for unknown angle measures.	• Rationalizing the denominator • Tangent (tan) • Cotangent (cot) • Inverse tangent
9.3	**The Sine Ratio**	Sine Ratio, Cosecant Ratio, and Inverse Sine	G.9A	• Use the sine ratio in a right triangle to solve for unknown side lengths. • Use the cosecant ratio in a right triangle to solve for unknown side lengths. • Relate the sine ratio to the cosecant ratio. • Use the inverse sine in a right triangle to solve for unknown angle measures.	• Sine (sin) • Cosecant (csc) • Inverse sine
9.4	**The Cosine Ratio**	Cosine Ratio, Secant Ratio, and Inverse Cosine	G.9A	• Use the cosine ratio in a right triangle to solve for unknown side lengths. • Use the secant ratio in a right triangle to solve for unknown side lengths. • Relate the cosine ratio to the secant ratio. • Use the inverse cosine in a right triangle to solve for unknown angle measures.	• Cosine (cos) • Secant (sec) • Inverse cosine
9.5	**We Complement Each Other!**	Complement Angle Relationships	G.9A	• Explore complement angle relationships in a right triangle. • Solve problems using complement angle relationships.	

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Lesson	Lesson Title	Lesson Subtitle	TEKS	Key Math Objectives	Key Terms
9.6	**Time to Derive!**	Deriving the Triangle Area Formula, the Law of Sines, and the Law of Cosines	G.9A	• Derive the formula for the area of a triangle using the sine function. • Derive the Law of Sines. • Derive the Law of Cosines	• Law of Sines • Law of Cosines
Learning Individually with MATHia or Skills Practice			G.9A	In the MATHia software, students use trigonometric ratios and triangle theorems to solve contextual and abstract problems. They relate the sines and cosines of complementary angles.	

CARNEGIE LEARNING

10 Properties of Quadrilaterals

This chapter focuses on properties of squares, rectangles, parallelograms, rhombi, kites, and trapezoids. The sum of interior and exterior angles of polygons is also included.

Standards: G.2B, G.2C, G.4B, G.5A, G.5B, G.6B, G.6E

Lesson	Lesson Title	Lesson Subtitle	TEKS	Key Math Objectives	Key Terms
10.1	**Squares and Rectangles**	Properties of Squares and Rectangles	G.5A G.5B G.6B	• Prove the Perpendicular/Parallel Line Theorem. • Construct a square and a rectangle • Determine the properties of a square and rectangle. • Prove the properties of a square and a rectangle. • Solve problems using the properties of a square and a rectangle.	• Perpendicular/Parallel Line Theorem
10.2	**Parallelograms and Rhombi**	Properties of Parallelograms and Rhombi	G.2B G.5A G.5B G.6B	• Construct a parallelogram. • Construct a rhombus. • Prove the properties of a parallelogram. • Prove the properties of a rhombus. • Solve problems using the properties of a parallelogram and a rhombus. • Use the Distance Formula to verify lines are parallel.	• Parallelogram/Congruent-Parallel Side Theorem
10.3	**Kites and Trapezoids**	Properties of Kites and Trapezoids	G.2B G.4B G.5B G.6B	• Prove the Parallelogram/Congruent• Parallel Side Theorem. • Construct a kite and a trapezoid. • Determine the properties of a kite and a trapezoid. • Prove the properties of a kites and trapezoids. • Solve problems using the properties of kites and trapezoids. • Use the midpoint formula to verify lines are perpendicular.	• Base angles of a trapezoid • Isosceles trapezoid • Biconditional statement • Midsegment • Trapezoid Midsegment Theorem
10.4	**Interior Angles of a Polygon**	Sum of the Interior Angle Measures of a Polygon	G.5A	• Write the formula for the sum of the measures of the interior angles of any polygon. • Calculate the sum of the measures of the interior angles of any polygon, given the number of sides. • Calculate the number of sides of a polygon, given the sum of the measures of the interior angles. • Write a formula for the measure of each interior angle of any regular polygon. • Calculate the measure of an interior angle of a regular polygon, given the number of sides. • Calculate the number of sides of a regular polygon, given the sum of the measures of the interior angles.	• Interior angle of a polygon

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Lesson	Lesson Title	Lesson Subtitle	TEKS	Key Math Objectives	Key Terms
10.5	**Exterior and Interior Angle Measurement Interactions**	Sum of the Exterior Angle Measures of a Polygon	G.5A G.5B	• Write the formula for the sum of the exterior angles of any polygon. • Calculate the sum of the exterior angles of any polygon, given the number of sides. • Write a formula for the measure of each exterior angle of any regular polygon. • Calculate the measure of an exterior angle of a regular polygon, given the number of sides. • Calculate the number of sides of a regular polygon, given measures of each exterior angle.	• Exterior angle of a polygon
10.6	**Quadrilateral Family**	Categorizing Quadrilaterals Based on Their Properties	G.5B	• List the properties of various quadrilaterals. • Categorize quadrilaterals based upon their properties. • Construct quadrilaterals given a diagonal.	
10.7	**Name That Quadrilateral**	Classifying Quadrilaterals on the Coordinate Plane	G.2B G.2C G.6E	• Determine the coordinates of the fourth vertex, given the coordinates of three vertices and a description of the quadrilateral. • Classify a quadrilateral given the location of its vertices on a coordinate plane.	
Learning Individually with MATHia or Skills Practice			G.6E	In the MATHia software, students use the properties of parallelograms to determine congruent and parallel sides or angles. They calculate unknown measurements of parallelograms using their properties. Students prove theorems about parallelograms.	

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11 Circles

This chapter reviews information about circles, and then focuses on angles and arcs related to a circle, chords, and tangents. Several theorems related to circles are proven throughout the chapter.

Standards: G.3C, G.4B, G.5A, G.5B, G.5C, G.6A, G.6E, G.12A, G.12B

Lesson	Lesson Title	Lesson Subtitle	TEKS	Key Math Objectives	Key Terms
11.1	**Riding a Ferris Wheel**	Introduction to Circles	G.3C	• Review the definition of line segments related to a circle such as chord, secant, and tangent. • Review the definitions of points related to a circle such as center and point of tangency. • Review the definitions of angles related to a circle such as central angle and inscribed angle. • Review the definitions of arcs related to a circle such as major arc, minor arc, and semicircle. • Prove all circles are similar using rigid motion.	• Center of a circle • Radius • Chord • Diameter • Secant of a circle • Tangent of a circle • Point of tangency • Central angle • Inscribed angle • Arc • Major arc • Minor arc • Semicircle
11.2	**Take the Wheel**	Central Angles, Inscribed Angles, and Intercepted Arcs	G.5A G.12A	• Determine the measure of various arcs. • Use the Arc Addition Postulate. • Determine the measure of central angles and inscribed angles. • Prove the Inscribed Angle theorem. • Prove the Parallel Lines – Congruent Arcs Theorem.	• Degree measure of an arc • Adjacent arcs • Arc Addition Postulate • Intercepted arc • Inscribed Angle Theorem • Parallel Lines• Congruent Arc Theorem
11.3	**Manhole Covers**	Measuring Angles Inside and Outside of Circles	G.5A G.6A G.12A	• Determine the measures of angles formed by two chords. • Determine the measure of angles formed by two secants. • Determine the measure of angles formed by a tangent and a secant. • Determine the measure of the angles formed by two tangents. • Prove the Interior Angles of a Circle Theorem. • Prove the Exterior Angles of a Circle Theorem. • Prove the Tangent to a Circle Theorem.	• Interior Angles of a Circle Theorem • Exterior Angles of a Circle Theorem • Tangent to a Circle Theorem
11.4	**Color Theory**	Chords	G.4B G.5A G.5B G.5C	• Determine the relationships between a chord and a diameter of a circle. • Determine the relationships between congruent chords and their minor arcs. • Prove the Diameter • Chord Theorem. • Prove the Equidistant Chord Theorem. • Prove the Equidistant Chord Converse Theorem. • Prove the Congruent Chord• Congruent Arc Theorem. • Prove the Congruent Chord• Congruent Arc Converse Theorem. • Prove the Segment• Chord Theorem.	• Diameter• Chord Theorem • Equidistant Chord Theorem • Equidistant Chord Converse Theorem • Congruent Chord• Congruent Arc Theorem • Congruent Chord • Congruent Arc • Converse Theorem • Segments of a chord • Segment• Chord Theorem

Lesson	Lesson Title	Lesson Subtitle	TEKS	Key Math Objectives	Key Terms
11.5	**Solar Eclipses**	Tangents and Secants	G.5A G.5B G.12A	• Determine the relationship between a tangent line and a radius. • Determine the relationship between congruent tangent segments. • Prove the Tangent Segment Theorem. • Prove the Secant Segment Theorem. • Prove the Secant Tangent Theorem.	• Tangent segment • Tangent Segment Theorem • Secant segment • External secant segment • Secant Segment Theorem • Secant Tangent Theorem
Learning Individually with MATHia or Skills Practice			G.6E G.12A G.12B	In the MATHia software, students identify parts of a circle. They use circles to answer questions about the properties of quadrilaterals, including the measures of angles of inscribed quadrilaterals. Students calculate the measures or arcs and angles in circles.	

12 Arcs and Sectors of Circles

This chapter explores inscribed and circumscribed polygons as well as circles. Students determine relationships between central angles, arcs, arc lengths, areas of parts of circles, as well as linear velocity and angular velocity.

Standards: G.5A, G.12A, G.12B, G.12C, G.12D

Lesson	Lesson Title	Lesson Subtitle	TEKS	Key Math Objectives	Key Terms
12.1	**Replacement for a Carpenter's Square**	Inscribed and Circumscribed Triangles and Quadrilaterals	G.5A	• Inscribe a triangle in a circle. • Explore properties of a triangle inscribed in a circle. • Circumscribe a triangle about a circle. • Inscribe a quadrilateral in a circle. • Explore properties of a quadrilateral inscribed in a circle. • Circumscribe a quadrilateral about a circle. • Prove the Inscribed Right Triangle-Diameter Theorem. • Prove the Inscribed Right Triangle-Diameter Converse Theorem. • Prove the Inscribed Quadrilateral-Opposite Angles Theorem.	• Inscribed polygon • Inscribed Right Triangle-Diameter Theorem • Inscribed Right Triangle-Diameter Converse Theorem • Circumscribed polygon • Inscribed Quadrilateral-Opposite Angles Theorem
12.2	**Gears**	Arc Lengths	G.12B G.12D	• Distinguish between arc measure and arc length. • Use a formula to solve for arc length in degree measures. • Distinguish between degree measure and radian measure. • Use a formula to solve for arc length in radian measures.	• Arc length • Radian
12.3	**Playing Darts**	Sectors and Segments of a Circle	G.12C	• Determine the area of sectors of a circle. • Derive the formula for the area of a sector. • Determine the area of segments of a circle.	• Concentric circles • Sector of a circle • Segment of a circle
12.4	**Circle K. Excellent!**	Circle Problems	G.12B G.12C	• Use formulas associated with circles to solve problems. • Use theorems associated with circles to solve problems. • Use angular velocity and linear velocity to solve problems.	• Linear velocity • Angular velocity
Learning Individually with MATHia or Skills Practice			G.12A G.12C G.12D	In the MATHia software, students calculate arc length and relate arc length to a circle's radius. They calculate the area of a sector.	

13 Circles and Parabolas

This chapter explores circles, polygons, and parabolas on the coordinate plane. Key characteristics are used to write equations for these geometric figures.

Standards: G.2B, G.12E

Lesson	Lesson Title	Lesson Subtitle	TEKS	Key Math Objectives	Key Terms
13.1	**The Coordinate Plane**	Circles and Polygons on the Coordinate Plane	G.2B	• Apply theorems to circles in a coordinate plane. • Classify polygons on the coordinate plane. • Use midpoints to determine characteristics of polygons. • Distinguish between showing something is true under certain conditions, and proving it is always true.	
13.2	**Bring On the Algebra**	Derive the Equation for a Circle	G.12E	• Use the Pythagorean Theorem to derive the equation of a circle given the center and radius. • Distinguish between the equation of a circle written in general form and the equation of a circle written in standard form (center-radius form). • Complete the square to determine the center and radius of a circle.	
13.3	**Is That a Point on the Circle?**	Determining Points on a Circle	G.2B	• Use the Pythagorean Theorem to determine if a point lies on a circle on the coordinate plane given the circle's center at the origin, the radius of the circle, and the coordinates of the point. • Use the Pythagorean Theorem to determine if a point lies on a circle on the coordinate plane given the circle's center not at the origin, the radius of the circle, and the coordinates of the point. • Use rigid motion to transform a circle about the coordinate plane to determine if a point lies on a circle's image given the pre-image's center, radius, and the coordinates of the point. • Determine the coordinate of a point that lies on a circle given the location of the center point and the radius of the circle. • Use the Pythagorean Theorem to determine the coordinates of a point that lies on a circle.	
Learning Individually with MATHia or Skills Practice			G.12E	In the MATHia software, students write the equation of a circle on the coordinate plane in standard form. They use the equation of a circle in standard form to identify the radius and center.	

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14 Probability

This chapter investigates compound probability with an emphasis toward modeling and analyzing sample spaces to determine rules for calculating probabilities in different situations. Students explore various probability models and calculate compound probabilities with independent and dependent events in a variety of problem situations. Students use technology to run experimental probability simulations.

Standards: G.13C, G.13D, G.13E

Lesson	Lesson Title	Lesson Subtitle	TEKS	Key Math Objectives	Key Terms
14.1	**These Are a Few of My Favorite Things**	Modeling Probability	G.13C	• List the sample space for situations involving probability. • Construct a probability model for a situation. • Differentiate between uniform and non• uniform probability models.	• Outcome • Sample space • Event • Probability • Probability model • Uniform probability model • Complement of an event • Non• uniform probability model
14.2	**It's in the Cards**	Compound Sample Spaces	G.13C G.13E	• Develop a rule to determine the total number of outcomes in a sample space without listing each event. • Classify events as independent or dependent. • Use the Counting Principle to calculate the size of sample spaces.	• Tree diagram • Organized list • Set • Element • Disjoint sets • Intersecting sets • Independent events • Dependent events • Counting Principle
14.3	**And?**	Compound Probability with And	G.13C G.13E	• Determine the probability of two or more independent events. • Determine the probability of two or more dependent events.	• Compound event • Rule of Compound Probability involving and
14.4	**Or?**	Compound Probability with Or	G.13E	• Determine the probability of one or another independent events. • Determine the probability of one or another dependent events.	• Addition Rule for Probability
14.5	**And, Or, and More!**	Calculating Compound Probability	G.13C G.13E	• Calculate compound probabilities with and without replacement.	

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Lesson	Lesson Title	Lesson Subtitle	TEKS	Key Math Objectives	Key Terms
14.6	**Do You Have a Better Chance of Winning the Lottery or Getting Struck by Lightning?**	Investigate Magnitude through Theoretical Probability and Experimental Probability	G.13E	• Simulate events using the random number generator on a graphing calculator. • Compare experimental and theoretical probability.	• Simulation • Theoretical probability • Experimental probability
Learning Individually with MATHia or Skills Practice			G.13C G.13D	In the MATHia software, students determine whether or not given events are independent. They calculate compound probabilities.	

CARNEGIE LEARNING

15 More Probability and Counting

This chapter addresses more compound probability concepts and more counting strategies. Compound probability concepts are presented using two-way frequency tables, conditional probability, and independent trials. The counting strategies include permutations, permutations with repetition, circular permutations, and combinations. The last lesson focuses on geometric probability and expected value.

Standards: 7.6A, 7.6B, 7.6C, 7.6D, 7.6I

Lesson	Lesson Title / Subtitle	Lesson Subtitle	TEKS	Key Math Objectives	Key Terms
15.1	**Left, Left, Left, Right, Left**	Compound Probability for Data Displayed in Two-Way Tables	G.13C	• Determine probabilities of compound events for data displayed in two-way tables. • Determine relative frequencies of events.	• Two-way table • Frequency table • Two-way frequency table • Contingency table • Categorical data • Qualitative data • Relative frequency • Two-way relative frequency table
15.2	**It All Depends**	Conditional Probability	G.13D G.13E	• Use conditional probability to determine the probability of an event given that another event has occurred. • Use conditional probability to determine whether or not events are independent.	• Conditional probability
15.3	**Counting**	Permutations and Combinations	G.13A	• Use permutations to calculate the size of sample spaces. • Use combinations to calculate the size of sample spaces. • Use permutations to calculate probabilities. • Use combinations to calculate probabilities. • Calculate permutations with repeated elements. • Calculate circular permutations.	• Factorial • Permutation • Circular permutation • Combination
15.4	**Trials**	Independent Trials	G.13A G.13E	• Calculate the probability of two trials of two independent events. • Calculate the probability of multiple trials of two independent events. • Determine the formula for calculating the probability of multiple trials of independent events.	
15.5	**To Spin or Not to Spin**	Expected Value	G.13B	• Determine geometric probability. • Calculate the expected value of an event.	• Geometric probability • Expected value
Learning Individually with MATHia or Skills Practice			G.13D	In the MATHia software, students use two• way frequency tables to determine probabilities, including conditional and compound probabilities, and check for independence of events.	