Geometry
Digital Curriculum Planning Guide
First Six Weeks

Each Digital CPG includes two TEKS SEs Bundles addressing selected student expectations taught during the six week grading period. The two bundles which are included in the Digital CPGs are not inclusive of all the student expectations listed within a six weeks grading period on the Six Weeks Curriculum Map and the Curriculum Calendar Map.

Texas Essential Knowledge and Skills and Student Expectations Bundle (TEKS SEs Bundle): Constructions
G.1 Mathematical process standards. The student uses mathematical processes to acquire and demonstrate mathematical understanding. The student is expected to:
(A) apply mathematics to problems arising in everyday life, society, and the workplace.
(B) use a problem-solving model that incorporates analyzing given information, formulating a plan or strategy, determining a solution, justifying the solution, and evaluating the problem-solving process and the reasonableness of the solution.
(C) select tools, including real objects, manipulatives, paper and pencil, and technology as appropriate, and techniques, including mental math, estimation, and number sense as appropriate, to solve problems.
(F) analyze mathematical relationships to connect and communicate mathematical ideas.
G.5 Logical argument and constructions. The student uses constructions to validate conjectures about geometric figures. The student is expected to:
(B) construct congruent segments, congruent angles, a segment bisector, an angle bisector, perpendicular lines, the perpendicular bisector of a line segment, and a line parallel to a given line through a point not on a line using a compass and a straightedge.
(C) use the constructions of congruent segments, congruent angles, angle bisectors, and perpendicular bisectors to make conjectures about geometric relationships.

The sample **Lesson Objective** (LO), **Purposeful Aligned Instruction** (PAI), **Multiple Response Strategies** (MRS), and **Demonstration of Learning** (DOL) that appear below address the student expectation displayed in blue from the TEKS SEs bundle and are intended to be completed in one 45-60 minute class period.

Sample Lesson Objective	Sample Purposeful Aligned Instruction	Sample Multiple Response Strategies	Sample Demonstration of Learning
Students will make constructions to explore attributes of geometric figures and make conjectures about geometric relationships.	Prior to showing the video Basic Geometric Constructions, let students know that they will have to recall all seven constructions demonstrated in the video. After the MRS whiteboard activity that follows the video, have students in groups of three to four rotate to the seven different stations giving them five minutes per station. Station 1: Copying a Segment Video, Copying a Line Segment Task; Station 2:- Copying an Angle Video, Copying an Angle Task; Station 3: Make Parallel Lines Video, Make Parallel Lines Task; Station 4: Bisecting an Angle Video and Bisecting an Angle Task; Station 5: Perpendicular Bisectors Video and Perpendicular Bisectors Task; Station 6: A Perpendicular through a Point not on a Line Video, A Perpendicular through a Point not on the Line Task; Station 7: A Perpendicular through a Point on the Line Video, A Perpendicular through a Point on the Line Task. Stressing appropriate academic vocabulary, lead discussion of reasons construction techniques are effective with respect to attributes of the figures and their relationships.	**Whiteboard:** After the "Basic Geometric Constructions" video, have students provide a response to the prompt: *Using appropriate academic vocabulary, write down all seven of the geometric constructions made during this video.* **Table Talk**: In groups of two to four, students discuss the prompt: *Using your knowledge of copying segments and angles, discuss how you would copy a triangle.*	Given the Copying a Triangle Task, the student will complete the task with at least 80% accuracy and write a justification for the construction.

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Instructional Considerations	Model Lessons	Instructional Resources	Virtual Support for Teachers
Possible Interventions Youtube: Basic Geometric Constructions :-) Khan Academy A Motivation to Study Euclidean Geometry Language and Notation of Basic Geometry Lines, Line Segments, and Rays **Possible Extensions** Constructing a Perpendicular Bisector using a Compass and Straight-Edge Constructing a Line Perpendicular to a Line Segment Bisecting an Angle *(All Khan Academy content is available for free at* www.khanacademy.org) Youtube: TI-Nspire Constructing an Angle Copying Angles with Capri Jr. - TI-Nspire	**Youtube:** Basic Geometric Constructions **Dallas ISD:** GP_Segments, IP_Segments Mathopenref: Constructions For Sample PAI lesson: Station 1: Copying a Segment Video, Copying a Line Segment Task Station 2:- Copying an Angle Video, Copying an Angle Task Station 3: Make Parallel Lines Video, Make Parallel Lines Task Station 4: Bisecting an Angle Video and Bisecting an Angle Task Station 5: Perpendicular Bisectors Video and Perpendicular Bisectors Task Station 6: A Perpendicular through a Point not on a Line Video, A Perpendicular through a Point not on the Line Task Station 7: A Perpendicular through a Point on the Line Video, A Perpendicular through a Point on the Line Task	**District Resources** Texas Geometry - Student Edition McGraw-Hill ● Chapter 1: Pages.16, 39, 40, 55 ● Chapter 5: Page 323 **Texas Education Agency Resources** STAAR Geometry E.O.C. 2013 Released Test Question: Item 39 **Supplemental Resources** Whistleralley Geometry Construction Reference Teaching Geometry According to Euclid	**Instructional Strategies Support** Youtube Basic Geometric Constructions Basic Geometric Constructions using an Interactive Whiteboard **Content Background Information** OnlineMathLearning Basic Geometric Constructions MathIsFun Constructions DJoyce-Clark University Euclid Book I DJoyce-Clark University Euclid's Geometry Applet

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Texas Essential Knowledge and Skills and Student Expectations Bundle (TEKS SEs Bundle): Proving Lines are Parallel

G.1 Mathematical process standards. The student uses mathematical processes to acquire and demonstrate mathematical understanding. The student is expected to:

(A) apply mathematics to problems arising in everyday life, society, and the workplace.

(B) use a problem-solving model that incorporates analyzing given information, formulating a plan or strategy, determining a solution, justifying the solution, and evaluating the problem-solving process and the reasonableness of the solution.

(D) communicate mathematical ideas, reasoning, and their implications using multiple representations, including symbols, diagrams, graphs, and language as appropriate.

(E) create and use representations to organize, record, and communicate mathematical ideas.

(G) display, explain, and justify mathematical ideas and arguments using precise mathematical language in written or oral communication.

G.4 Logical argument and constructions. The student uses the process skills with deductive reasoning to understand geometric relationships. The student is expected to:

(A) distinguish between undefined terms, definitions, postulates, conjectures, and theorems.

(B) identify and determine the validity of the converse, inverse, and contrapositive of a conditional statement and recognize the connection between a biconditional statement and a true conditional statement with a true converse.

(C) verify that a conjecture is false using a counterexample.

G.6 Proof and congruence. The student uses the process skills with deductive reasoning to prove and apply theorems by using a variety of methods such as coordinate, transformational, and axiomatic and formats such as two-column, paragraph, and flow chart. The student is expected to:

(A) verify theorems about angles formed by the intersection of lines and line segments, including vertical angles, and angles formed by parallel lines cut by a transversal and prove equidistance between the endpoints of a segment and points on its perpendicular bisector and apply these relationships to solve problems.

The sample **Lesson Objective** (LO), **Purposeful Aligned Instruction** (PAI), **Multiple Response Strategies** (MRS), and **Demonstration of Learning** (DOL) that appear below address the student expectation displayed in blue from the TEKS SEs bundle and are intended to be completed in one 45-60 minute class period.

Sample Lesson Objective	Sample Purposeful Aligned Instruction	Sample Multiple Response Strategies	Sample Demonstration of Learning

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Students will make determine the validity of the converse, inverse, and contrapositive of a conditional statement.	Students will examine constructions and form six conjectures (postulates) about angles and lines. Students will write conjectures as conditional statements. Conjecture 1, Conjecture 2, Conjecture 3, Conjecture 4, Conjecture 5, and Conjecture 6 Students describe observed patterns and the reasoning that lead to their conjectures. As an extension, encourage students to construct an example of their conjectures.	**Think-Pair-Share:** Students will think about the prompt and then Pair and Share: *How do you demonstrate that two lines are parallel?* **Response Ticket**: Students will provide examples of adjacent angles and supplementary angles that are not linear pairs.	Given 3 conditional statements, the student will determine the converse, inverse, and contrapositive of each statement with 100% accuracy.

The references listed under **Instructional Considerations, Model Lessons, Instructional Resources** and **Virtual Support for Teachers** address all of the student expectations in the TEKS SE bundle listed above. Each bundle addresses only selected student expectations taught during the six week period. The two bundles included in this document are not inclusive of all the student expectations that are listed for the first six weeks of school on the Six Weeks Curriculum Map and the Curriculum Calendar Map.

Instructional Considerations	Model Lessons	Instructional Resources	Virtual Support for Teachers
Teacher Notes Rubric Lesson Guide Converse, Inverse, and Contrapositive Statements Geometry Logic Statements Angle Properties, Postulates and Theorems Points Lines and Planes Segment Congruence Describing What You See Angle Basics Angle Congruence	Logic & Conditional Statement Activity **Dallas ISD** Conjecture 1 Conjecture 2 Conjecture 3 Conjecture 4 Conjecture 5 Conjecture 6 **Project Share** Using Constructions to Explore Attributes **Key Curriculum** YouTube-Brightstorm: Postulate, Axiom,	**District Resources** Texas Geometry- Student Edition McGraw-Hill ● Chapter 2: Pages 107-116; 151-159 ● Chapter 3: Pages 180-186; 207-214 **Texas Education Agency Resources** Geometry Released EOC 2013: Item 36 **Supplemental Resources** University of Minnesota Conjectures in Geometry Key Curriculum	**Instructional Strategies Support** BrightStorm Point, Line, and Plane YouTube Shortest Distance Conjecture Khan Academy Vertical, Adjacent, and Linearly Paired Angles *(All Khan Academy content is available for free at www.khanacademy.org)* **Content Background Information** Youtube Postulates and Conjectures

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Angle Relationships Transversals_Angles **Possible Interventions** How Do I write converse, inverse and contrapositive statements? Converse, Inverse & Contrapositive Online Math Learning Basic Geometry Concepts **Possible Extensions** YouTube Shortest Distance Conjecture OnlineMathLearning Naming and Measuring Activities Ambleweb Using a Protractor	Conjecture 7 Exercises Relating Algebraic and Geometric Properties Inductive Reasoning Examples Conjectures about Angles **Pearson** Using Inductive Reasoning - Video Conditional Statements - Video Constructing Perpendicular - Video Constructing a Congruent Angle - Video Constructing Special Quadrilateral - Video Proving Lines Parallel - Video	Conjectures - Discovery Geometry Michael Serra UT-Dana Center G.2B	Inductive Arguments - 1st four (4) minutes Conditional, converse, inverse, contrapositive, biconditional Online Math Learning Geometry "Building Blocks"

LEGEND **What do the following terms mean on this Digital CPG?**	**Definition / examples of the above terms:**
Lesson Objective	**Characteristics of a good LO:** ● answers the question: What are students supposed to learn? ● tied to a standard or skill needed to accomplish the standard ● follows the mapped curriculum ● understandable to parents and students ● specific ● students can demonstrate that they have learned the objective in one class period

Purposeful Aligned Instruction	**Purposeful**
	Instructional activities are relevant and challenging
	Every aspect of the class is tied to learning
	Time is managed to enhance the learning
	Alignment
	Guaranteed and viable curriculum
	Effective lesson objectives and demonstration of learning (DOL)
	Instructional activities are aligned to the objective and assessments

Multiple Response Strategies	Teachers are encouraged to use multiple response strategies during instruction time. The use of multiple response strategies will enhance the level of student engagement, thus increasing student performance in the classroom. Please refer to the following list for examples:
	   • Response Card
	   • Whip-Around
	   • Modified Whip-Around
	   • Think-Pair-Share
	   • Table Talk
	   • Quick Response
	   • Oral/Choral/Response (not yelling out answer)
	   • Whiteboards
	   • Clicker Systems
	   • SmartBoards

Demonstration of Learning	A Demonstration of Learning (DOL) is an activity or product through which a student demonstrates that he/she has learned the lesson objective. DOLs fall into two categories: 1) those that require the student to demonstrate what he/she has learned in one or two class periods within a subject area, and 2) those that assess more complex objectives or assess multiple learning objectives.
	Characteristics of a good DOL:
	   • tied directly to the lesson objective and the guaranteed curriculum
	   • can usually be accomplished in five to ten minutes

	- requires each student to demonstrate what they have learned over the last class period or two in a subject area - varies from day to day - its understandable to students and parents - designed before the lesson is conducted