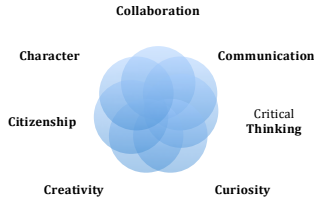
Content Area: Mathematics	Course: CAD	Grade Level: 10-12
	R14 The Seven Cs of Learning  	

Unit Titles	Length of Unit
• *The development of CAD and the impact on manufacturing* • *Types of drafting and employment opportunities* • *Design types and sketching*	2-3 weeks
• *The formal design process* • *Geometric Constructions* • *Software Introduction and practice*	3-4 weeks
• *Multi-view drawings* • *Dimensioning* • *Pictorial Drawings*	3-4weeks
• *Architectural Floor Plans*	3-4 weeks
• *Final Project*	1-2 weeks

Strands	Course Level Expectations
High School: CAD» History of CAD, Types of CAD and Employment Opportunities	• Identify several types of drafting • Locate web based career information • Identify and discuss specific points related to education, pay, working conditions and trends • Locate specific state employment information • Identify fastest growing / declining, highest paying jobs for specific education
High School: CAD» Sketching Geometric Constructions	• Draw basic 2-D Orthographic shapes • Draw complex 2-D Orthographic shapes w/ hidden lines • Draw basic 3-D Isometric shapes • Draw complex 3-D Isometric shapes w/ hidden lines • Draw basic geometric shapes • Trim/extend line segments • Trim/extend circles • Understand Cartesian coordinates • Difference between hidden lines and object lines • Edit lines to create 3-D view • Send drawing to printer/plotter • Proper use of ruler for parallel lines and proper use of triangle

Strands	Course Level Expectations
High School: CAD» Multi-View Drawings	● Understand AutoCad's viewport setup. ● Be able to produce Orthographic projects of simple geographic parts ● Use of vertical, horizontal, and profile planes and the general rules for dimensioning. ● Place views in correct order on a formal drawing. ● Be able to create simple 3-d models of basic geometric shapes ● Change software to U.S. or metric measurement. ● Differentiate between isometric, oblique, and perspective drawings. ● Be able to identify the angles involved in creating a isometric drawing. ● Understand the concept of one or more vanishing points. ● Be able to complete a drawing using two-point perspective. ● Be able to complete a simple drawing using a one point perspective. ● Be able to complete one portion of an exploded view drawing.
High School: CAD» Architectural Floor Plans	● Be able to calculate square footage of a structure. ● Create a basic first and second floor plan according to local building codes. ● Locate stairs, walls, doorways, and windows. ● Create door and window openings according to uniform sizes. ● Calculate basic cost of a structure. ● Identify sill, floor plate, stud, corner post, top plate, floor joist and ceiling joist. ● Identify balloon and conventional framing techniques. ● Identify header, king stud, jack stud and cripple stud and basic roof types. ● Identify rafter, plates, collar tie and ridge board. ● Be able to calculate rise, run, span and roof pitch and how geographic location effects roof pitch design. ● Identify tread, riser nosing and stringer of steps. ● Consult local building codes for appropriate stair sizes. ● Be able to divide rise to calculate number of steps.

Unit Title	History of CAD, Types of CAD and Employment Opportunities	**Length of Unit**	2 weeks

Inquiry Questions (Engaging & Debatable)	• What impact did CAD have on manufacturing? • What is CAD being utilized for today? • What are some employment opportunities involving?
Unit Strands & Standards	**Computer Aided Drafting and Design (CADD):** CADD.01 Demonstrate an understanding of the historical and current events related to CADD and the impact on society, CADD.01.01Develop a timeline showing important periods that have significance to CADD and explain the impact on society., CADD.01.02Evaluate current events that have relevance to process digital information., CADD.01.03Describe the development of graphic language in a digital age., CADD.01.04Explain the significance of the development Computer Aided Drafting and Design had on society., CADD.02Analyze the use of current CADD design technology.
Unit Strands & Concepts	• The development of CAD and the impact on manufacturing • Introduce students to the field of technical drawing • Types of drafting and employment opportunities • Design types and sketching
Key Vocabulary	Aeronautical, Aerospace, Drafters, Architects, Mechanical Engineers, Architectural Drafters, Civil Drafters, Computer-Aided-Design/Drafting (CAD), Technicians, Drafting, Electrical Drafters/mechanical Drafters/ Electronic Drafters/ Engineering Drawings

Unit Title	History of CAD, Types of CAD and Employment Opportunities	Length of Unit	2 weeks

Critical Content: My students will **Know**…	Key Skills: My students will be able to **(Do)**…
• What technical drawings are. • The terminology used to describe the process of creating technical drawings. • How technical drawings are produced. • The development of CAD and their impact on manufacturing.	• Explain the training needed to become an engineer, architect, designer, or drafter. • Describe the process of obtaining employment in the technical drawing field and the qualities that employers seek. • Describe what career prospects and opportunities, including salary ranges, are available in the field of technical drawing.

Assessments:	• Formative Assessments • Performance based assessment job search • Research Project (Timeline)
Teacher Resources:	Technical Drawing 101 with AutoCAD 2017, Douglas Smith, Antonio Ramirez, Jana Schmidt, SDC Publications. AutoCAD 2017 Tutorial First Level 2D Fundamentals, Randy H. Shih, SDC Publications Autodesk: AutoCAD Architecture 2017 Fundamentals, Elise Moss, SDC Publications

Unit Title	The Formal Process & Sketching Geometric Constructions	Length of Unit	3-4 weeks

Inquiry Questions (Engaging & Debatable)	• What is an orthographic shape vs. an isometric shape? • What are the basic geometric shapes? • What is the difference between hidden lines and object lines?
Standards	**Computer Aided Drafting and Design (CADD):** CADD.02.02 Describe physical objects as geometric entities.*, CADD.02.04Describe and demonstrate the use of graphic communication skills through sketching.*(A3), CADD.02.05 Evaluate and select appropriate method of communication for a given problem.*, CADD.02.06Send and access information through a network.*(A4), CADD.02.07Express a design of an object as a 3D model.*(A5), CADD.02.08 Export and import images/files in a variety of file formats*(A6), CADD.02.09Evaluate the choice and placement of dimensions, notes and annotations clearly to communicate design intent.*(A7), CADD.02.10Revise a design and update finished drawings appropriately.* CADD.02.11Identify basic geometric elements (e.g., line, circle, rectangle, sphere, and cube)., CADD.02.12 Describe objects as geometric entities.*(A1), CADD.02.13 Describe and apply the following basic geometric concepts to building 3D models: tangent and parallel concentric.*(A10)
Unit Strands & Concepts	• Draw basic 2-D Orthographic shapes, Draw complex 2-D Orthographic shapes w/ hidden lines, Draw basic 3-D Isometric shapes, Draw complex 3-D Isometric shapes w/ hidden lines, Draw basic geometric shapes, Trim/extend line segments, Trim/extend circles, Understand Cartesian coordinates, Difference between hidden lines and object lines, Edit lines to create 3-D view, Send drawing to printer/plotter, Create parallel geometric entities, Proper use of triangle, Introduction to AutoCAD (units setup, saving drawings, etc.)
Key Vocabulary	Isometric shape, Orthographic shape, Line, Hidden line, Fillet, Trim, Extend, Pedit, Construction line, Short break line, Section line, Extension line, Leader line, Phantom line, Circle, Arc, Precision, Proportion Pictorial sketches, Oblique, One point perspective, Two point perspective, Shading: stipple, straight line, Ellipse, Spline, World space, Origin, Coordinate system

Unit Title	The Formal Process & Sketching Geometric Constructions	Length of Unit	2-3 weeks

Critical Content: My students will **Know**…	Key Skills: My students will be able to **(Do)**…
• Difference between hidden lines and object lines. • How to draw a complex 3-D Isometric shape with proper markings and labels.. • Properly setup a drawing area on AutoCAD\ • How to effectively use the GRID and SNAP options. • How to create geometric entities such as: lines, circles, arcs, ellipses, and splines. • Create parallel geometric entities	• Draw basic 2-D Orthographic shapes • Draw complex 2-D Orthographic shapes w/ hidden lines • Draw basic 3-D Isometric shapes • Draw complex 3-D Isometric shapes w/ hidden lines • Draw basic geometric shapes • Trim/extend line segments • Trim/extend circles • Difference between hidden lines and object lines • Send drawing to printer/plotter

Assessments:	• Formative Assessments and Drawings • Summative and or Performance Task
Teacher Resources:	Technical Drawing 101 with AutoCAD 2017, Douglas Smith, Anotnio Ramirez, Jana Schmidt, SDC Publications. AutoCAD 2017 Tutorial First Level 2D Fundamentals, Randy H. Shih, SDC Publications Autodesk: AutoCAD Architecture 2017 Fundamentals, Elise Moss, SDC Publications

Unit Title	*Multiview Drawings & 3-D models*	Length of Unit	3-4 weeks

Inquiry Questions (Engaging & Debatable)	• How many and which views are necessary for presenting a drawing? • What types of objects can be printed with a 3-D printer
Standards	**Computer Aided Drafting and Design (CADD):** CADD.05.10 Place and edit text and fonts.*(E24), Explain and demonstrate the process for creating orthographic, isometric, section views, and auxiliary view.*, CADD.05.1 Place and edit dimensions.*(E26), CADD.05.13 Generate a 2-D multi-view drawing.*(E27), CADD.05.14Generate a pictorial drawing.*(E28), CADD.05.15Scale and print hard copy of an output device.*(E29) CADD.05.16 Explain the use and need for scaled drawings.*(E30), CADD.06 Demonstrate use and application of alternate view applications and functions., CADD.06.01 Identify the function of alternate views., CADD.06.02 Demonstrate the use of cutting planes to clarify hidden features of an object., CADD.06.03 Create and edit construction planes through reference geometry.*(G35) CADD.06.04 Generate/modify geometric components on construction planes.* CADD.06.05Create a 2-D drawing from a 3-D model.*(G34), CADD.06.06 Create a 3-D model from a 2-D drawing.*(G35), CADD.07 Create assemblies and views in 3-D format., CADD.07.01 Create an assembly in 3-D geometry.*(F31), CADD.07.02 Create an exploded view of a 3-D assembly.*(F32), CADD.08 Explain and Utilize the concepts of sketching and the sketching process used in preliminary design and development., CADD.08.01 Produce proportional two- and three-dimensional sketches and designs., CADD.08.02 Use sketching techniques as they apply to a variety of objects., CADD.08.03 Use freehand graphic communication skills to represent conceptual ideas, analysis, and design concepts., CADD.08.04 Explain the purpose of sketching and how it applies to design.
Unit Strands & Concepts	• Setting up viewport on AutoCAD, Be able to produce Orthographic projects of simple geographic parts, Place views in correct order on a formal drawing, Types of axonometric projection, Appropriate isometric sections, Pictorial drawings, Cavalier, normal and cabinet oblique drawings, One-point and two-point perspective drawings, Create simple 3-D models of basic geometric shapes, Introduction to the 3-D printer
Key Vocabulary	Pictorial Drawing, One point perspective, Two point perspective, Cavalier drawing, Normal drawing, Cabinet oblique drawing, Axonometric projection

Unit Title	*Multiview Drawings and 3-D models*	**Length of Unit**	2-3 Weeks

Critical Content: **My students will Know…**	**Key Skills:** **My students will be able to (Do)…**
• How to create simple 3-D model of basic geometric shapes. • How to change software to U.S. or metric measurement. • How to use vertical, horizontal, and profile planes. • The differences in the three types of axonometric projection. • How to select appropriate isometric sections. • How to identify and describe various types of pictorial drawings. • The capabilities of the 3-D printer and how it works.	• Generate a 2-D multi-view drawing. • Produce an orthographic projects of simple geographic parts. • Create their own basic 3-D model. • Print their model using the 3-D printer. • Make cavalier, normal and cabinet oblique drawings. • Create one-point and two-point perspective drawings. • Manipulate 3D models in AutoCAD to achieve isometric, oblique, and perspective views.

Assessments:	• Formative Assessments/Drawings • Summative Assessments • Printed Project
Teacher Resources:	Technical Drawing 101 with AutoCAD 2017, Douglas Smith, Anotnio Ramirez, Jana Schmidt, SDC Publications. AutoCAD 2017 Tutorial First Level 2D Fundamentals, Randy H. Shih, SDC Publications Autodesk: AutoCAD Architecture 2017 Fundamentals, Elise Moss, SDC Publications

Unit Title	Introduction to Architectural Design	Length of Unit	2-3 weeks

Inquiry Questions (Engaging & Debatable)	• How has architectural design been impacted by CADD technology? • How can I utilize computer technology to design functional and aesthetic buildings and spaces? • What tools are there is a CAD program to help me test concepts and modify designs?
Standards	**Essential Skills and Knowledge** EKS.03 Demonstrate mathematics knowledge and skills required to pursue the full range of post-secondary education and career opportunities., EKS.03.01, EKS.03.02 EKS.05 Employ critical thinking skills independently and in teams to solve problems and make decisions (e.g., analyze, synthesize and evaluate)., EKS.05.02, EKS.05.03, EKS.05.04, EKS.05.05, EKS.05.07 EKS.08 Identify and demonstrate positive work behaviors and personal qualities needed to be employable. **Computer Aided Drafting and Design (CADD)** CADD.02 Analyze the use of current CADD design technology., CADD.02.01 through .12 **Architecture Technology** ARCH.06.01Identify, research, develop and explain architectural and construction plans, drawings, diagrams and specifications., ARCH.06.02Draw and sketch by hand to communicate ideas effectively., ARCH.06.03Utilize CADD software to produce technical drawings and architectural proposals., ARCH.07 Employ appropriate media to communicate concepts and design., ARCH.07.01Convey information using multi-dimensional drawings., ARCH.07.02Create effective working drawings, and presentation drawing., ARCH.07.03Employ basic model building techniques. ARCH.08 Maintain a portfolio to document knowledge, skills and experience in architecture.
Unit Strands & Concepts	• Create a floor plan, Create new multiline styles, Create new layers, Pre-selection of objects, Controlling Layer Visibility, Moving objects to a different layer
Key Vocabulary	Chamfer, Multiline, Layers, Limits, Mline, Medit

Unit Title	Introduction to Architectural Design	Length of Unit	2-3 weeks

Critical Content: My students will **Know**…	Key Skills: My students will be able to **(Do)**…
• How floor plans and elevation drawings are planned and prepared. • Describe architectural working drawings and their importance to the field of architecture.	• Use AutoCAD to create a floor plan for a small house. • Use AutoCAD to place blocks of electrical and plumbing symbols into the floor plan. • Use AutoCAD to create elevation drawings for a small house.

Assessments:	• Formative Assessments • Summative Assessment
Teacher Resources:	Technical Drawing 101 with AutoCAD 2017, Douglas Smith, Anotnio Ramirez, Jana Schmidt, SDC Publications. AutoCAD 2017 Tutorial First Level 2D Fundamentals, Randy H. Shih, SDC Publications Autodesk: AutoCAD Architecture 2017 Fundamentals, Elise Moss, SDC Publications