Winslow Township School District

9-12 Introduction to CAD: Computer Aided Drafting

Unit 5: Orthographic Projection & Perspective Drawing

Overview: In this unit, students will be introduced to multi-view & isometric drawings.

Overview	Standards	Unit Focus	Essential Questions
Unit 5 **Orthographic Projection & Perspective Drawing**	• **8.1.12.CS.3** • **8.1.12.DA.2** • **8.2.12.ED.2** • **8.2.12.NT.2** • **9.3.12.AC.1** • **9.3.12.AC-DES.6**	• Compare and contrast multi-view versus perspective drawings. • Students will decipher and demonstrate an understanding of the various methods for creating isometric drawings. • Students will explore the concept of orthographic projection using orthogonal lines. • Students will be able to demonstrate an understanding of the proper arrangement of a multi-view drawing.	• What is an isometric drawing? • What are the two methods used to create isometric drawings using AutoCAD? • What dimension commands and linetypes are required for isometric and multi-view drawings? • Is there a connection between the ORTHO object snap and orthogonal lines? • What are the names of the multi-views and how do they equate to architectural drawings?
Unit 5: Enduring Understandings	• An isometric drawing is a perspective drawing containing only vertical and 30 degree inclined lines. • To create isometric drawings, use either the grid method or the SNAPANG command. • DIMALIGN as opposed to DIMLINEAR is used for 3D drawings. Linetypes are the same for both 2 and 3D drawings. • The ORTHO object snap holds lines at vertical and horizontal which is the same concept used to align multi-view drawings. • Typical multi-view drawings consist of a top, front and side view which equate to plans and elevations in architectural drawings.		

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Curriculum Unit 5	Standards		Pacing	
			Days	Unit Days
Unit 5: **Orthographic Projection & Perspective Drawing**	**8.1.12.CS.3**	Compare the functions of application software, system software, and hardware.	1	23
	8.1.12.DA.2	Describe the trade-offs in how and where data is organized and stored.	1	
	8.2.12.ED.2	Create scaled engineering drawings for a new product or system and make modification to increase optimization based on feedback.	8	
	8.2.12.NT.2	Redesign an existing product to improve form or function.	4	
	9.3.12.AC.1	Use vocabulary, symbols and formulas common to architecture and construction.	5	
	9.3.12.AC-DES.6	Apply the techniques and skills of modern drafting, design, engineering and construction to projects.	2	
	Assessment, Re-teach and Extension		2	

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Unit 5 Grade 9-12		
Enduring Understanding	**Indicator #**	**Performance Expectation**
A computing system involves interaction among the user, hardware, application software, and system software.	**8.1.12.CS.3**	Compare the functions of application software, system software, and hardware.
Choices individuals make about how and where data is organized and stored affects cost, speed, reliability, accessibility, privacy, and integrity.	**8.1.12.DA.2**	Describe the trade-offs in how and where data is organized and stored.
Engineering design is a complex process in which creativity, content knowledge, research, and analysis are used to address local and global problems.	**8.2.12.ED.2**	Create scaled engineering drawings for a new product or system and make modification to increase optimization based on feedback.
Technology, product, or system redesign can be more difficult than the original design.	**8.2.12.NT.2**	Redesign an existing product to improve form or function.

	9.3.12.AC.1	Use vocabulary, symbols and formulas common to architecture and construction.
	9.3.12.AC-DES.6	Apply the techniques and skills of modern drafting, design, engineering and construction to projects.

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Unit 5 Grade 9-12	
Assessment Plan	
Teacher Created Formative Assessments • Terminology Quizzes. • Design Projects. • Tutorial exercises and packets • Pre-planning bubble diagrams **Teacher Created Summative Assessments** • End of Unit Exams. • Mid-term Exams. • Final Exams • Portfolio Review	Alternative Assessments: • Group Critiques of student work consisting of round robin style class discussions. • Conduct short research projects on construction documentation as well as master architects/engineers including analysis and reflection. • Observe online master videos and teacher created power points of CAD methods and techniques followed by round robin style group discussion. • Flash card "buzz" word review presented in a game show style.

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Resources	Activities
Textbooks: Kicklighter & Thomas, *Architecture: Residential Drafting & Design*, Goodheart- Wilcox, 12th edition. French & Helsel, *Mechanical Drawing: Board and CAD Techniques, Student Edition*, McGraw-Hill Education, 13th edition. Brower, *Architectural Drafting Assignments Using AutoCAD*, Cengage Learning, 1st Edition. Ramsey/Sleeper, American Institute of Architects, *Architectural Graphic Standards*, Wiley; 12th student edition Finkelstein, *AutoCAD Bible*, Wiley; 2005 **Digital Imaging Software:** ○ AutoDesk: AutoCAD **Other Software:** • G Suite (Classroom, Forms, Docs, Sheets) • Microsoft Office (Word, Power Point) • Internet Browsers (Chrome, Safari) • PC Browsers (Finder, Explorer) • Diversity, Equity & Inclusion Educational Resources https://www.nj.gov/education/standards/dei/	• The teacher will demonstrate and discuss various methods in which isometric drawings can be created. Students will create isometric drawings by hand and electronically. • Students will select a wood block, measure it and then draw it both as a multi-view and as an isometric drawing. • Students will complete a series of packets containing exercises for creating both multi-view and isometric drawings, both by hand and electronically. • Students will create and maintain a "Command Notebook" listing new commands used in each project. It lists the command, its function and how to access it through the user interface. • Students are to complete tutorial "packets" demonstrating basic software tools and functions. A portion of these tutorials have students draw a "Georgian Style" house including the floor plan as well as parts of the exterior elevation. • Students will manually draw 2D and 3D geometric constructions. • Students will demonstrate an understanding of drawing horizontal, vertical and inclined lines through a multi-page document. • Students will complete a tutorial packet demonstrating their understanding of drawing donuts, points and ellipsis as well as using the array command. • Students will draw a scaled plan view drawing of a regulation baseball field based on a skewed perspective drawing from the Architectural Graphic Standards text. The drawing will be drawn in three phases: pitcher's mound, catcher's box and remaining bases including the outfield. • Students will design, draw and plot a wall unit used in a family entertainment area. • Students will sketch, survey and then draw a floor plan and elevation of their home bedroom. • Students will sketch, survey and then draw a floor plan and elevation of their Home kitchen.

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Instructional Best Practices and Exemplars	
1. Identifying similarities and differences	6. Cooperative learning
2. Summarizing and note taking	7. Setting objectives and providing feedback
3. Reinforcing effort and providing recognition	8. Generating and testing hypotheses
4. Homework and practice	9. Cues, questions, and advance organizers
5. Nonlinguistic representations	10. Manage response rates

9.1 Personal Financial Literacy, 9.2 Career Awareness, Exploration, Preparation and Training, 9.3 21st Century Life and Careers & 9.4 Life Literacies and Key Skills

9.2.12.CAP.3
Investigate how continuing education contributes to one's career and personal growth.
9.2.12.CAP.4
Evaluate different careers and develop various plans (e.g., costs of public, private, training schools) and timetables for achieving them, including educational/training requirements, costs, loans, and debt repayment.
9.2.12.CAP.6
Identify transferable skills in career choices and design alternative career plans based on those skills
9.2.12.CAP.10
Identify strategies for reducing overall costs of postsecondary education (e.g., tuition assistance, loans, grants, scholarships, and student loans).
9.3.12.AR.6
Evaluate technological advancements and tools that are essential to occupations within the Arts, A/V Technology & Communications Career Cluster.
9.3.12.AR-VIS.1
Describe the history and evolution of the visual arts and its role in and impact on society.
9.3.12.AC.1
Use vocabulary, symbols and formulas common to architecture and construction
9.3.12.AC-DES.6
Apply the techniques and skills of modern drafting, design, engineering and construction to projects.
9.4.12.CI.1
Demonstrate the ability to reflect, analyze, and use creative skills and ideas (e.g., 1.1.12prof.CR3a).
9.4.12.CT.1
Identify problem-solving strategies used in the development of an innovative product or practice (e.g., 1.1.12acc.C1b, 2.2.12.PF.3).
9.4.12.DC.1
Explain the beneficial and harmful effects that intellectual property laws can have on the creation and sharing of content (e.g., 6.1.12.CivicsPR.16.a).
9.4.12.DC.4

Explain the privacy concerns related to the collection of data (e.g., cookies) and generation of data through automated processes that may not be evident to users (e.g., 8.1.12.NI.3).
9.4.12.IML.1
Compare search browsers and recognize features that allow for filtering of information.
9.4.12.TL.1
Assess digital tools based on features such as accessibility options, capacities, and utility for accomplishing a specified task (e.g., W.11-12.6.).

The implementation of the 21st Century skills and standards for students of the Winslow Township District is infused in an interdisciplinary format in a variety of curriculum areas that include, English language Arts, Mathematics, School Guidance, Social Studies, Technology, Visual and Performing Arts, Science, Physical Education and Health, and World Language.
Additional opportunities to address 9.1, 9.2 & 9.4:
Philadelphia Mint
https://www.usmint.gov/learn/kids/resources/educational-standards
Different ways to teach Financial Literacy.
https://www.makeuseof.com/tag/10-interactive-financial-websites-teach-kids-money-management-skills/

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Modifications for Special Education/504
Students with special needs: The students' needs will be addressed on an individual and grade level using a variety of modalities. Accommodations will be made for those students who need extra time to complete assignment. Support staff will be available to aid students related to IEP specifications. 504 accommodations will also be attended to by all instructional leaders. Physical expectations and modifications, alternative assessments, and scaffolding strategies will be used to support this learning. The use of Universal Design for Learning (UDL) will be considered for all students as teaching strategies are considered. • Small group instruction and demonstration • Electronic, printed and verbal instruction • One-on-one demonstration • Leveled informational texts and videos via online • Modeling and guided practice • Read directions aloud • Repeat, rephrase and clarify directions • Extended time as needed • Break down assignments into smaller units • Provide shortened assignments • Modify testing format • Preferential seating • Graphic organizers • Study guides, study aids and re-teaching as needed

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Modifications for At-Risk Students
Formative and summative data will be used to monitor student success. At first signs of failure, student work will be reviewed to determine support. This may include parent consultation, basic skills review and differentiation strategies. With considerations to UDL, time may be a factor in overcoming developmental considerations. More time will be made available with a certified instructor to aid students in reaching the standards. • Contact parents, guidance & child study if students are in danger of failing. • Provide an assignment sheet with step-by-step instructions as well as specifications for each project. • Provide design templates. • Provide study guides. • Provide extended time for written assessments. • Extended time as needed • Read directions aloud • Assist with organization • Use of computer to create, edit and store student work. • Emphasize/highlight key concepts • Recognize success • Provide timelines for work completion • Break down multi-step tasks into smaller chunks • Provide copy of class notes and graphic organizer

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English Language Learners	Modifications for Gifted Students
All WIDA Can Do Descriptors can be found at this link: https://wida.wisc.edu/teach/can-do/descriptors ☐ Grades 9-12 WIDA Can Do Descriptors: ☐ Listening ☐ Speaking ☐ Reading ☐ Writing ☐ Oral Language Students will be provided with accommodations and modifications that may include: • Relate to and identify commonalities in Architectural & Engineering studies in student's home country • Use sentence/paragraph frames to assist with writing reports. • Work with a partner to develop and understand written and design projects • Provide extended time for written responses. • Assist with organization • Use of computer for quick translation • Emphasize/highlight key concepts • Teacher Modeling • Peer Modeling • Label Classroom Materials - Word Walls	Students excelling in mastery of standards will be challenged with complex, high level challenges related to the topic. • Raise levels of intellectual demands • Require higher order thinking, communication, and leadership skills • Differentiate content, process, or product according to student's readiness, interests, and/or learning styles • Provide higher level texts • Expand use of open-ended, abstract questions • Critical and creative thinking activities that provide an emphasis on research and in-depth study • Enrichment Activities/Project-Based Learning/ Independent Study Additional Strategies may be located at the links: ❖ Gifted Programming Standards ❖ Webb's Depth of Knowledge Levels and/or Revised Bloom's Taxonomy ❖ REVISED Bloom's Taxonomy Action Verbs

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Interdisciplinary Connections
ELA **NJSLSA.SL1** Prepare for and participate effectively in a range of conversations and collaborations with diverse partners, building on others' ideas and expressing their own clearly and persuasively. **NJSLSA.SL2** Integrate and evaluate information presented in diverse media and formats, including visually, quantitatively, and orally. **NJSLSA.R7.** Integrate and evaluate content presented in diverse media and formats, including visually and quantitatively, as well as in words. **NJSLSA.R10.** Read and comprehend complex literary and informational texts independently and proficiently with scaffolding as needed. **NJSLSA.W4.** Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience **RI.9-10.1** Accurately cite strong and thorough textual evidence, (e.g., via discussion, written response, etc.) and make relevant connections, to support analysis of what the text says explicitly as well as inferentially, including determining where the text leaves matters uncertain. **RI.9-10.2** Determine a central idea of a text and analyze how it is developed and refined by specific details; provide an objective summary of the text. **W.9-10.6** Use technology, including the Internet, to produce, share, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically. **SL.9-10.5** Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance findings, reasoning, and evidence and to add interest. **SL.9-10.6** Adapt speech to a variety of contexts and tasks, demonstrating command of formal English. **RI.11-12.1** Accurately cite strong and thorough textual evidence, (e.g., via discussion, written response, etc.), to support analysis of what the text says explicitly as well as inferentially, including determining where the text leaves matters uncertain. **RI.11-12.2** Determine two or more central ideas of a text, and analyze their development and how they interact to provide a complex analysis; provide an objective summary of the text.