

# Drafting I

TRADE, TECHNOLOGY, ENGINEERING, AND INDUSTRIAL EDUCATION | Career and Technical Education

IC61



**PUBLIC SCHOOLS OF NORTH CAROLINA**  
State Board of Education | Department of Public Instruction  
[www.dpi.nc.gov](http://www.dpi.nc.gov)

## Introduction

This curriculum guide for IC61 Drafting I, was developed to assist teachers in preparing students to meet the North Carolina State Board of Education’s guiding vision, “Every public school student in North Carolina will be empowered to accept academic challenges, prepared to pursue their chosen path after graduating high school, and encouraged to become lifelong learners with the capacity to engage in a globally-collaborative society.” This course is based on state and national content standards and it is rigorous and relevant. Business and industry representatives reviewed the standards and provided input on the content for this course as one that helps to prepare students for high-skill, high-wage, or in demand occupational opportunities. It also infuses technology and active learning tools throughout the curriculum to teach today’s generation of students. The [CTE Course Management System](#) includes the course standards and information, the career pathway, and equipment list. As presented in the course essential standards 1.00-4.00, an understanding of Drafting Concepts is covered including the following topics.

- 1.00 Understand fundamental concepts and trends of drafting.
- 2.00 Understand the Ideation process (big 6 in academia) (SUPPLEMENTAL).
- 3.00 Apply sketching skills and techniques for Architectural & Engineering drafting.
- 4.00 Apply CAD User Skills (with use of the following CAD software.

Aligned to the course standards and each indicator, this guide contains a culminating question, essential questions, unpacked content, resources, instructional activities and additional textbook and online resources as needed. It incorporates and enhances appropriate content outlined in the North Carolina Standard Course of Study. The proof-of-learning will be either a 100-item multiple choice post-assessment at the standard level and administered through the NC

Instructional Management System or an obtained industry credential (Autodesk Certified User-AutoCAD).

### **Culminating Question**

This question is central to the purpose of the standard. It requires students to think about the knowledge that will be learned.

### **Essential Questions**

Essential questions are used to guide students' learning and are geared toward uncovering a topic. All essential questions for this course are derived directly from the unpacked content.

### **Unpacked Content and Resources**

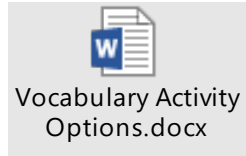
The unpacked content comes from the indicators listed on the course blueprint. Autodesk and SolidWorks provide online resources used to develop the unpacked content specific to the software provided by each PSU.

### **Instructional Activities**

Individual and group activities will be listed in the Instructional Activities section. Instructional activities reflect "best practice" as determined by highly qualified and successful teachers. The activities follow the unpacked content that is designed to build understanding of the indicator.

### **Vocabulary/Content Literacy Terminology**

There are a variety of research-based activities that effectively introduce and reinforce vocabulary for any subject. This course provides instructional flexibility to utilize any tool that achieves the intended result which is to understand and recall key terms necessary for further development of this indicator. When learning a new vocabulary, it is critical that students know how to recognize/read a word, spell the word, define it and obtain a visual clue for context. Sample activities are provided in the file below. Also provided in this guide are the Content Literacy Terminology for each Indicator.



### **Guest Speakers, Virtual Field Trips and Field Experiences**

Industry involvement is critical for a deeper student understanding of content/concepts. Educators can help participants receive the most from these visits by preparing for the visit, having participants take notes during the visit, and then reflecting on the visit. These types of activities are not limited to just one standard/indicator.

### **Additional Resources**

#### **Textbook and Online**

Autodesk and SolidWorks provide content. Additional textbooks can be selected by individual PSUs for content; however, no specific textbook was referenced for this Guide. Referenced websites are functional as of the publication date of this curriculum guide. No guarantee can be made as to the continued functionality, but a generic internet search may yield additional resources and websites.

#### **Curriculum Projects**

Incorporate hands-on projects that become the instructional method through which students acquire understanding of the content. Students may address these learning outcomes simultaneously, rather than in the sequential manner occurring in traditional courses. The learning outcomes; therefore, are not specified for coverage during a specific week of the semester but are tied to projects and can be acquired at any point. For more information on successful projects visit [AutoCAD Resource](#), [SolidWorks Resource](#) and/or the shared Moodle for this course.

#### **CTSO**

This course emphasizes Career and Technical Student Organization (CTSO) competitive events for SkillsUSA; however, these were not directly written into the Curriculum Guide. For more information on SkillsUSA visit: <https://www.skillsusa.org/>.

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Paul Heidepriem, Executive Director, North Carolina SkillsUSA  
Delores P. Ali, Program Director for CTE Curriculum  
Felicia Gray-Watson, Program Director for CTE Special Projects  
Angela LeMay, Program Director for CTE Assessment and Human Capital  
Kimberly MacDonald, Program Director for CTE Budget, Reporting and Analysis  
Marty Tobey, Program Director for CTE Regional Services  
Trey Michael, CTE State Director

<b>Course</b>	<b>IC61 Drafting I</b>			
<b>Essential Standard</b>	1.00	B2	5%	Understand fundamental concepts and trends of drafting.
<b>Indicator</b>	1.01	N/A	N/A	Understand BIM and Rapid Prototyping.
<b>Culminating Question</b> <b>Essential Questions</b>	<p><b>What are some of the major concepts and trends associated with the Drafting Career Cluster?</b></p> <ul style="list-style-type: none"> <li>• How are the major terms and concepts associated with the Drafting Career Cluster connected including BIM and rapid prototyping?</li> <li>• How are the concepts and trends related to the Drafting Career Cluster used in industry?</li> </ul>			
<b>UNPACKED CONTENT</b>				
<ul style="list-style-type: none"> <li>a. Content Literacy Terminology</li> <li>b. Define major terms associated with the Drafting Career Cluster including BIM and rapid prototyping.</li> <li>c. Understand concepts related to Drafting Career Cluster and how they apply to industry.</li> </ul>				



INSTRUCTIONAL ACTIVITIES- 1.01	
<b>A. Content Literacy Terminology</b>	
<b>Resource(s)</b>	(See 1.01.1)
<b>B. Define major terms associated with the Drafting Career Cluster including BIM and rapid prototyping.</b>	
<i>Note: Activity combines with Indicator 1.02.</i>	
<b>Activity</b>	Student Exploration-Terminology Research Project
<b>Teacher Instructions</b>	<ul style="list-style-type: none"> <li>• Provide <i>Terminology PowerPoint Presentation Project</i> instructions for independent work and research projects on indicated/identified terms. Facilitate student completion of project.</li> <li>• Facilitate a whole class or small group discussion on terminology connections.</li> </ul>
<b>Student Directions</b>	<ul style="list-style-type: none"> <li>• Research terms, provide image examples, and rearrange slides to show interconnectedness of terms.</li> <li>• Participate in class review of terminology.</li> </ul>
<b>Resource(s)</b>	 Terminology Power Point Project.pptx
<b>C. Understand concepts related to Drafting Career Cluster and how it applies to industry.</b>	
<b>Activity</b>	Independent Exploration of Topics
<b>Teacher Instructions</b>	<ul style="list-style-type: none"> <li>• Facilitate student time to explore and read about assigned concepts individually. Facilitate students watching videos, reading articles and visiting websites provided by Instructor (selected links to also be provided ahead of time).</li> <li>• Facilitate students completing <i>What Did You Learn?</i> as they explore.</li> <li>• Facilitate whole class or small group discussion after exploration. Note: This activity can also be done as a JigSaw activity with homogenous small groups “specializing” in certain topics and then returning to teach the whole class or heterogeneous groups about what was learned.</li> </ul>
<b>Student Directions</b>	<ul style="list-style-type: none"> <li>• Watch videos, read articles, and visit websites on a given topic.</li> <li>• Complete <i>What Did You Learn?</i> as you explore.</li> <li>• Participate in whole class discussion or peer teaching.</li> <li>• Understand topics and build interest in concepts.</li> </ul>
<b>Resource</b>	 What Did You Learn.docx
<b>Website Resource Examples</b>	
<b>BIM:</b> Autodesk. (2021). BIM BENEFITS What are the benefits of BIM?	<a href="https://www.autodesk.com/solutions/bim/benefits-of-bim">https://www.autodesk.com/solutions/bim/benefits-of-bim</a>


<p><b>BIM:</b> Engineering.com. (2021). BIM 101: What is Building Information Modeling?</p>	<p><a href="https://www.engineering.com/story/bim-101-what-is-building-information-modeling">https://www.engineering.com/story/bim-101-what-is-building-information-modeling</a></p>
<p><b>Rapid Prototyping:</b> AUTODESK UNIVERSITY. (2021). Rapid Prototyping 101: A Primer on Additive Manufacturing Techniques and Procedures.</p>	<p><a href="https://www.autodesk.com/autodesk-university/class/Rapid-Prototyping-101-Primer-Additive-Manufacturing-Techniques-and-Procedures-2014">https://www.autodesk.com/autodesk-university/class/Rapid-Prototyping-101-Primer-Additive-Manufacturing-Techniques-and-Procedures-2014</a></p>
<p><b>Rapid Prototyping:</b> TECH-LABS. (2021). What is Rapid Prototyping?</p>	<p><a href="https://tech-labs.com/rapid-prototyping">https://tech-labs.com/rapid-prototyping</a></p>



<b>Content Literacy Terminology- 1.01.1</b>	
ANSI	(American National Standards Institute) a private, non-profit organization that administers and coordinates the U.S. voluntary standardization and conformity assessment system.
AutoCAD	Computer-Aided Design (CAD) software that architects, engineers, and construction professionals rely on to create precise 2D and 3D drawings.
Autodesk	Umbrella company that creates 2D/3D design, engineering and entertainment software such as AutoCAD, Revit, and Inventor.
BIM (Building Information Modeling)	The process of managing building data through the creation of a 3D Building Information Model that covers, not just geometry and spatial relationships, but also geographic information and properties of building components.
Imperial System	The measuring system based on the feet & inches used in America.
ISO	(International Organization for Standardization) international standard-setting body composed of representatives from various national standards organizations that oversees the creation, promulgation and use of norms and guidelines that directly impact businesses in nearly every sector globally.
Metric System	The decimal measuring system based on the meters (10's) used in the majority of the global market.
Rapid Prototyping	Technique of construction of a mechanical part, product or assembly using 3D printing technology.


<b>Course</b>	<b>IC61 Drafting I</b>			
<b>Essential Standard</b>	1.00	B2	5%	Understand fundamental concepts and trends of drafting.
<b>Indicator</b>	1.02	N/A	N/A	Understand Industrial Design, Sustainable Design, and LEED.
<b>Culminating Question</b> <b>Essential Questions</b>	<p><b>What are some of the major concepts and trends associated with the Drafting Career Cluster?</b></p> <ul style="list-style-type: none"> <li>● How are the major terms and concepts associated with the Drafting Career Cluster connected including Industrial Design, Sustainable Design, and LEED?</li> <li>● What are some of the emerging concepts and organizations associated with sustainable design?</li> <li>● How are the concepts and trends related to the Drafting Career Cluster used in industry?</li> </ul>			
<b>UNPACKED CONTENT</b>				
<ul style="list-style-type: none"> <li>a. Content Literacy Terminology</li> <li>b. Define major terms associated with the Drafting Career Cluster including Industrial Design, Sustainable Design, and LEED.</li> <li>c. Explain concepts related to sustainable design.</li> <li>d. Understand concepts related to Drafting Career Cluster and how they apply to industry.</li> </ul>				

<b>INSTRUCTIONAL ACTIVITIES-1.02</b>	
<b>A. Content Literacy Terminology</b>	
<b>Resource(s)</b>	(See 1.02.1)
<b>B. Define major terms associated with the Drafting Career Cluster including Industrial Design, Sustainable Design, and LEED.</b>	
<i>Note: Activity combines with Indicator 1.01.</i>	
<b>Activity</b>	Student Exploration-Terminology Research Project
<b>Teacher Instructions</b>	<ul style="list-style-type: none"> <li>• Provide <i>Terminology PowerPoint Presentation Project</i> instructions for independent work and research projects on indicated/identified terms. Facilitate student completion of project.</li> <li>• Facilitate a whole class or small group discussion on terminology connections.</li> </ul>
<b>Student Directions</b>	<ul style="list-style-type: none"> <li>• Research terms, provide image examples, and rearrange slides to show interconnectedness of terms.</li> <li>• Participate in class review of terminology.</li> </ul>
<b>Resource(s)</b>	 Terminology Power Point Project.pptx
<b>C. Explain concepts related to sustainable design.</b>	
<b>Activity</b>	Student Choice Activity-Sustainability
<b>Teacher Instructions</b>	<ul style="list-style-type: none"> <li>• Provide handout/digital copy of <i>Sustainability Tic-Tac-Toe</i>. Direct students to “complete” the game by making three in a row starting from top. Encourage students to spend some time deciding the “path” to take.</li> <li>• Facilitate student progress.</li> </ul>
<b>Student Directions</b>	<ul style="list-style-type: none"> <li>• Understand multiple concepts related to sustainability by “completing” the game by making three in a row starting from top. Spend some time deciding the “path” to take before you begin.</li> </ul>
<b>Resource(s)</b>	 Sustainability Tic-Tac-Toe.pdf
<b>D. Understand BIM and how it applies to industry.</b>	
<b>Activity</b>	Independent Exploration of Topics
<b>Teacher Instructions</b>	<ul style="list-style-type: none"> <li>• Facilitate time for students to explore and read about assigned independently. Facilitate students watching videos, reading articles and visiting websites provided by Instructor (selected links to also be provided ahead of time).</li> <li>• Facilitate students completing <i>What Did You Learn?</i> as they explore.</li> <li>• Facilitate whole class or small group discussion after exploration. Note: This activity can also be done as a JigSaw activity with homogenous small groups “specializing” in certain</li> </ul>

	topics and then returning to teach the whole class or heterogeneous groups about what was learned.
<b>Student Directions</b>	<ul style="list-style-type: none"> <li>• Watch videos, read articles, and visit websites on a given topic.</li> <li>• Complete <i>What Did You Learn?</i> as you explore.</li> <li>• Understand topics and build interest in concepts by participating in class discussion or peer teaching.</li> </ul>
<b>Resource</b>	 <p>What Did You Learn.docx</p>
<b>Website Resources Examples</b>	
<b>Industrial Design:</b> AUTODESK UNIVERSITY. (2021). Rapid Prototyping 101: A Primer on Additive Manufacturing Techniques and Procedures	<a href="https://www.autodesk.com/autodesk-university/class/Rapid-Prototyping-101-Primer-Additive-Manufacturing-Techniques-and-Procedures-2014">https://www.autodesk.com/autodesk-university/class/Rapid-Prototyping-101-Primer-Additive-Manufacturing-Techniques-and-Procedures-2014</a>
<b>Industrial Design:</b> TECH-LABS. (2021). What is Rapid Prototyping?	<a href="https://tech-labs.com/rapid-prototyping">https://tech-labs.com/rapid-prototyping</a>
<b>Sustainable Design:</b> Ted. (2021). Sustainability by design.	<a href="https://www.ted.com/playlists/28/sustainability_by_design">https://www.ted.com/playlists/28/sustainability_by_design</a>
<b>Sustainable Design:</b> General Services Administration. (2021).	<a href="#">General Services Administration</a>
<b>Sustainable Design:</b> ScienceDirect. (2021).	<a href="#">Science Direct</a>
<b>Sustainable Design:</b> AUTODESK. (2021). Technology for a sustainable world.	<a href="https://www.autodesk.com/sustainability/sustainable-design-technology">https://www.autodesk.com/sustainability/sustainable-design-technology</a>
<b>LEED:</b> U.S. Green Building Council. (2021). What is LEED?	<a href="https://www.usgbc.org/help/what-leed">https://www.usgbc.org/help/what-leed</a>
<b>LEED:</b> Sustainability@BU. (2021). What is LEED?	<a href="https://www.bu.edu/sustainability/what-were-doing/green-buildings/leed/">https://www.bu.edu/sustainability/what-were-doing/green-buildings/leed/</a>

<b>Content Literacy Terminology- 1.02.1</b>	
Industrial Design	The Designer's ability to apply both art and scientific techniques to help create, and solve problems related to a product's form, use, ergonomics, development, marketability, and profitability.
LEED	(Leadership in Energy & Environmental Design) a building design program developed by the U.S. Green Building Council that provides third-party verification of green building design.
Sustainable (Environmental) Design	The Design of a building, part or product that seeks to reduce negative impacts on the environment and the health and comfort of occupants/users.

<b>Course</b>	<b>IC61 Drafting I</b>			
<b>Essential Standard</b>	1.00	B2	5%	Understand fundamental concepts and trends of drafting.
<b>Indicator</b>	1.03	N/A	N/A	Understand career options.
<b>Culminating Question</b> <b>Essential Questions</b>	<p><b>How can someone obtain a career related to Drafting?</b></p> <ul style="list-style-type: none"> <li>● What are your interests and how do they relate to the Drafting Career Cluster?</li> <li>● What skills are needed to successfully obtain a career?</li> <li>● What pathways are available to obtain a career in Drafting?</li> <li>● What skills are needed to specifically obtain a career in the Drafting cluster?</li> </ul>			
<b>UNPACKED CONTENT</b>				
<ul style="list-style-type: none"> <li>a. Content Literacy Terminology</li> <li>b. Identify personal interests and their relationship to the Drafting Career Cluster.</li> <li>c. Understand career readiness skills.</li> <li>d. Identify Pathways available to obtain a career related to Drafting.</li> <li>e. Explain the relationship between career readiness skills and how they relate to your interest in a career within the Drafting Cluster.</li> </ul>				



<b>INSTRUCTIONAL ACTIVITIES- 1.03</b>	
<b>A. Content Literacy Terminology</b>	
<b>Resource(s)</b>	(See 1.03.1)
<b>B. Identify personal interests and their relationship to the Drafting Career Cluster.</b> <b>C. Understand career readiness skills.</b> <b>D. Identify Pathways available to obtain a career related to Drafting.</b> <b>E. Explain the relationship between career readiness skills and how they relate to your interest in a career within the Drafting Cluster.</b> <i>Note: Activity includes all Unpacked Content for Indicator.</i>	
<b>Activity</b>	Career Research with Student Choice Project
<b>Teacher Instructions</b>	<ul style="list-style-type: none"> <li>● Locate/select online career assessment link to share with students ahead of time.</li> <li>● Distribute hardcopy of <i>Career Staircase</i> handout.</li> <li>● Facilitate student progress as they work.</li> <li>● Share projects with class or small groups when completed.</li> </ul>
<b>Student Directions</b>	<ul style="list-style-type: none"> <li>● Complete top box using the provided career assessment Link.</li> <li>● Gain broader discovery of career interests, a basic understanding of career readiness skills and introduction to cluster careers when completed by completing one activity from each step moving upwards.</li> </ul>
<b>Resource(s)</b>	 Career Staircase.pdf

<b>Content Literacy Terminology- 1.03.1</b>		
Architect	Create original designs that are pleasing to the eye as well as functional and meet client and code requirements. Drawings include floor plans, foundation plans, site plans, elevations, and specialty plans for electrical, plumbing, heating & air, etc. Typically, Architects and Architectural Designers have a four or five-year degree and must be licensed by the states in which they operate.	
Checker	Experienced drafter who checks drawings created by drafting technicians for accuracy and completeness and typically requires an associate degree and at least five years industrial experience, detailed knowledge of design process and drawing requirements.	
Designer	Works with engineers and drafters to turn conceptual design into usable production drawings and specifications and typically requires an associate degree and at least five years industrial experience, knowledge of design process and drawing requirements.	
Drafter Trainee	Assists with technical drawing preparation and performs support tasks and typically requires a high school diploma including drafting classes and/or apprenticeships during high school.	
Draftsman (Drafting Technician)	Prepares technical drawings with less supervision than a Junior Drafter and typically requires an associate degree in drafting technology and one year of drafting experience.	
Engineer	Has at least a four-year degree in an engineering specialty (many specialized branches), must be licensed by the states in which they operate, uses technical drawings to communicate ideas and products for manufacturing or construction.	
	Aerospace	Designs aircraft for NASA, public transportation and military. Applications and may work with sub-systems, such as electrical, mechanical, structural, etc.
	Civil	Designs structures, environmental systems, and various construction projects and may do analysis and design for materials and structural systems for buildings, aircraft, etc.
	Electrical/Electronic	Designs electric power devices, controls, mechanisms, and electrical systems, and works with power transmission, analog and digital circuits, and communications.
	Mechanical	Similar to general engineering they work from sketches or a memo that describes a new product idea to determine how or if the ideas might work. They provide accurate designs and specifications for proposed products using their creativity, ingenuity, and technical drawings.
Junior Drafter	Prepares technical drawings under direction of drafting technician or senior detailer and typically requires at least one year of high school drafting and an associate degree in drafting technology.	



Senior Detailer	Skilled in understanding details of how things work and go together, capable of detailing complex parts and making details understandable and typically requires an associate degree and at least five years industrial experience, knowledge of drawing requirements.
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<b>Course</b>	<b>IC61 Drafting I</b>			
<b>Essential Standard</b>	2.00	B2	N/A	Understand the Ideation process (Big 6 in academia) (SUPPLEMENTAL).
<b>Culminating Question</b>  <b>Essential Question</b>	<p><b>What is the Ideation Process outlined by the big 6 in academia?</b></p> <ul style="list-style-type: none"> <li>● What are the Big 6 in academia?</li> <li>● What is the design process and the role of Ideation?</li> <li>● How are Ideation Sessions used to solve a design problem?</li> </ul>			
<b>UNPACKED CONTENT</b>				
<ul style="list-style-type: none"> <li>a. Content Literacy Terminology</li> <li>b. Understand the Big 6 in academia.</li> <li>c. Understand the design process and the role of ideation.</li> <li>d. Participate in a small-group Ideation Session.</li> </ul>				




















<b>INSTRUCTIONAL ACTIVITIES- 2.00</b>	
<b>A. Content Literacy Terminology</b>	
<b>Resource(s)</b>	<b>(See 2.00.1)</b>
<b>B. Understand the Big 6 in academia.</b>	
<b>C. Understand the design process.</b>	
<i>Note: Activity covers all Unpacked Content B &amp; C.</i>	
<b>Activity</b>	Primary Research-Big Six and Design Process
<b>Teacher Instructions</b>	<ul style="list-style-type: none"> <li>● Provide digital access to <i>Primary Research-Big Six and Design Process</i>. Facilitate students locating videos, articles and websites on the Big 6 in academia for Part One. Facilitate students writing explanations of the Big 6 steps.</li> <li>● Facilitate students as a whole class or individually watching the video on the Design Process.</li> <li>● Facilitate students sketching the Design Process on scratch paper with short explanations of each step.</li> </ul>
<b>Student Instructions</b>	<ul style="list-style-type: none"> <li>● Locate a video, article and website on the Big 6 in academia for Part One. Write your own explanations of the Big 6 steps.</li> <li>● Watch the video on the design process.</li> <li>● Sketch the design process on scratch paper with short explanations of each step.</li> </ul>
<b>Resource(s)</b>	 Primary Research-Big Six and Design Process
<b>D. Participate in a small-group Ideation Session.</b>	
<b>Activity</b>	Small-Group Session-Ideation Process
<b>Teacher Instructions</b>	<ul style="list-style-type: none"> <li>● Break students into small heterogeneous groups of 2-4. Provide a copy of <i>Small-Group Session-Ideation Process</i> to each group and large paper or white board, and smaller blank paper for each solution as needed. Facilitate students reading instructions as a group.</li> <li>● Facilitate groups selecting/defining a problem to solve and coming up with ideas to solve the problem. Each group must come up with at least 3 solutions. Groups can use large paper or white board for brainstorming.</li> <li>● Facilitate groups sketching final solutions on blank white paper.</li> <li>● Facilitate groups creating a presentation on their Ideation Session/Design Ideas and presenting to the class.</li> </ul>
<b>Student Instructions</b>	<ul style="list-style-type: none"> <li>● As a small group read the instructions.</li> <li>● Select/define a problem to solve. Use a large paper or white board for brainstorming to come up with ideas/needs to solve the problem. Each group must come up with at least 3 solutions.</li> <li>● Sketch solutions on blank paper.</li> <li>● Create a presentation on your Ideation Session/Design ideas and present to the class.</li> </ul>
<b>Resource(s)</b>	 Small-Group Session-Ideation Process














<b>Content Literacy Terminology-2.00.1</b>	
Design Process	Series of steps that guides engineering teams as we solve problems. Resource: <a href="https://www.teachengineering.org/design/designprocess">https://www.teachengineering.org/design/designprocess</a>
Ideation	The creative process of generating, developing, and communicating new ideas, where an idea is understood as a basic element of thought that can be visual, concrete, or abstract.
Information Literacy	The ability to know when there is a need for information, to be able to identify, locate, evaluate, and effectively use that information for the issue or problem at hand.
The Big Six	<ul style="list-style-type: none"> <li>● <a href="https://www.hcpss.org/f/academics/media/factsheet_big6.pdf">https://www.hcpss.org/f/academics/media/factsheet_big6.pdf</a></li> <li>● <a href="https://thebig6.org/thebig6andsuper3-2">https://thebig6.org/thebig6andsuper3-2</a></li> <li>● <a href="https://slideplayer.com/slide/9206851/">https://slideplayer.com/slide/9206851/</a></li> </ul>

<b>Course</b>	<b>IC61 Drafting I</b>			
<b>Essential Standard</b>	3.00	C3	15%	Apply sketching skills and techniques for Architectural & Engineering drafting.
<b>Indicator</b>	3.01	N/A	N/A	Apply rough sketching and lettering.
<b>Culminating Questions</b> <b>Essential Questions</b>	<p><b>What techniques are used in rough sketching? How is lettering applied in technical drawing?</b></p> <ul style="list-style-type: none"> <li>● What subjects are represented in technical drawings?</li> <li>● How are technical drawings and sketches used to represent different subjects?</li> <li>● How is line weight applied in technical drawings and sketches?</li> <li>● How does rough sketching incorporate geometric construction?</li> <li>● What is the proper technique for text and numbers to be added to technical drawings and sketches?</li> </ul>			
<b>UNPACKED CONTENT</b>				
<ul style="list-style-type: none"> <li>a. Content Literacy Terminology</li> <li>b. Understand 2 main classifications of subjects represented on technical drawings and sketches in Drafting.</li> <li>c. Identify various drawing types used in sketches.</li> <li>d. Apply various line weights used on sketches.</li> <li>e. Apply geometric constructions used in rough sketching.</li> <li>f. Apply proper technique for lettering on technical drawings and sketches.</li> </ul>				

<b>INSTRUCTIONAL ACTIVITIES- 3.01</b>	
<b>A. Content Literacy Terminology</b>	
<b>Resource(s)</b>	(See 3.01.1)
<b>B. Understand two main classifications of subjects represented on technical drawings and sketches in Drafting.</b> <i>Note: Activity combines with Indicators 3.02 &amp; 3.03.</i>	
<b>Activity</b>	Independent Discovery-technical drawing/Sketching-Subjects
<b>Teacher Instructions</b>	<ul style="list-style-type: none"> <li>• Provide student access to PowerPoint Presentation on technical drawing/sketching-subjects. Facilitate students classifying subjects in provided examples.</li> <li>• Facilitate review of presentation with the whole class or small groups after completion.</li> </ul>
<b>Student Directions</b>	<ul style="list-style-type: none"> <li>• Classify types of subjects addressed in technical drawings by progressing through presentation independently and record answers on blank paper.</li> <li>• Review answers as a whole class or small groups.</li> </ul>
<b>Resource(s)</b>	 Technical Drawing_Sketching-
<b>C. Identify various drawing types used in technical drawings and sketches.</b> <i>Note: Activity combines with Indicators 3.02 &amp; 3.03.</i>	
<b>Activity</b>	Teacher-Led Instruction & Concept Mapping-Technical Drawing/Sketching
<b>Teacher Instructions</b>	<ul style="list-style-type: none"> <li>• Provide hardcopy of <i>Technical Drawing/Sketching-Classifications-Handout</i>. Lead whole-class instruction using <i>Technical Drawing/Sketching- Classifications Presentation</i>. Facilitate students viewing examples of each type of drawing and recreating Isometric and Oblique examples on presentation handout.</li> <li>• Provide instruction for completion of the <i>Technical Drawing/Sketching- Graphic Organizer</i>. Facilitate student creating digital concept map with information on handout following instructions. <i>Note: these can be done manually or digitally.</i></li> </ul>
<b>Student Directions</b>	<ul style="list-style-type: none"> <li>• View examples of each type of drawing and recreate Isometric and Oblique examples on presentation handout.</li> <li>• Classify the major types of technical drawings/sketches used in Drafting Career Pathways by creating a digital concept map with information on handout following instructions.</li> </ul>
<b>Resource(s)</b>	 Technical Drawing_Sketching-  Technical Drawing_Sketching-  Technical Drawing_Sketching-
<b>D. Apply various line weights used on technical drawings and sketches.</b> <i>Note: Activity combines with Indicators 3.02 &amp; 3.03.</i>	
<b>Activity</b>	Teacher-led Instruction and Student Application-Line Weight

<b>Teacher Instructions</b>	<ul style="list-style-type: none"> <li>Facilitate whole-class or small group instruction and discussion on Line Weight using <i>Guided Instruction-Line Weight</i>.</li> <li>Facilitate students demonstrating different line weights by hand.</li> </ul> <p><i>Note:</i> 4.04 Extension- Complete the same type of task in AutoCAD</p>						
<b>Student Directions</b>	<ul style="list-style-type: none"> <li>Participate in whole-class or small group instruction and discussion on Line Weight following <i>Guided Instruction-Line Weight</i>.</li> <li>Produce examples of three-line weights manually.</li> </ul>						
<b>Resource(s)</b>	 <p>Guided Instruction-Line Weight.pptx</p>						
<b>E. Apply geometric constructions used in sketching.</b>							
<b>Activity</b>	Self-Paced Student Exploration-Geometric Constructions						
<b>Teacher Instructions</b>	<ul style="list-style-type: none"> <li>Provide hard copy packet/handout <i>Geometric Construction-Handout</i> to each student and digital access to each of the associated presentations. Distribute construction equipment as follows: pencil and straight edge.</li> <li>Facilitate students completing the handout with accompanying instructions at their own pace. Monitor progress.</li> <li>Facilitate student creation of drawing/self-logo on the last page of the packet to include procedures gained from previous.</li> </ul> <p><i>Note:</i> Extension activity to create all in software once completed manually</p>						
<b>Student Directions</b>	<ul style="list-style-type: none"> <li>Create a variety of geometric constructions manually by completing the handout with accompanying instructions/PowerPoints at your own pace using provided construction equipment: pencil and straight edge.</li> <li>Create drawing/self-logo on the last page of the packet to include procedures gained from previous.</li> </ul>						
<b>Resource(s)</b>	<table border="0"> <tr> <td data-bbox="594 1377 805 1503">             Geometric Construction- Hand         </td> <td data-bbox="805 1377 1016 1503">             01-Constructing a Bisector of an angle         </td> <td data-bbox="1016 1377 1227 1503">             02-Constructing a Perpendicular Bisect         </td> </tr> <tr> <td data-bbox="594 1503 805 1642">             03-Constructing a Triangle with 3 given         </td> <td data-bbox="805 1503 1016 1642">             04-Constructing an Equilateral Triangle.         </td> <td data-bbox="1016 1503 1227 1642">             05-Copying an Angle.pptm         </td> </tr> </table>	 Geometric Construction- Hand	 01-Constructing a Bisector of an angle	 02-Constructing a Perpendicular Bisect	 03-Constructing a Triangle with 3 given	 04-Constructing an Equilateral Triangle.	 05-Copying an Angle.pptm
 Geometric Construction- Hand	 01-Constructing a Bisector of an angle	 02-Constructing a Perpendicular Bisect					
 03-Constructing a Triangle with 3 given	 04-Constructing an Equilateral Triangle.	 05-Copying an Angle.pptm					







	 06- Circumscribe a Triangle or Angle.ppt  07-Inscribe an Octagon in a Circle.  08- Inscribe an Octagon in a Square  09- Divide a Line into n Equal Parts.ppt  10-Construct an Arc Tangent to an Angle  11-Constructing an Ellipse.pptx
<b>F. Apply proper technique for lettering on technical drawings and sketches.</b>	
<b>Activity</b>	Inquiry-Guided Discovery & Drill-Lettering
<b>Teacher Instructions</b>	<ul style="list-style-type: none"> <li>• Provide students with digital access to <i>Lettering Boot Camp PowerPoint Presentation</i> and associated <i>Lettering Boot Camp Leading Questions</i>.</li> <li>• Provide hard copies of Lettering Practice Sheets: <i>Lettering Practice 1, Lettering Practice 2, and Lettering Practice 3-Word Search</i>.</li> <li>• Facilitate formative feedback to students as they progress through practices.</li> <li>• Provide summative feedback.</li> </ul>
<b>Student Directions</b>	<ul style="list-style-type: none"> <li>• Present on <i>Lettering Boot Camp PowerPoint Presentation</i> device/computer and answer associated questions <i>Lettering Boot Camp Leading Questions</i>.</li> <li>• Apply proper technique for lettering on a technical drawing by displaying the importance of clarity, speed, &amp; ease by completing practice/drill applying proper lettering technique: <i>Lettering Practice 1, Lettering Practice 2, and Lettering Practice 3-Word Search</i>.</li> </ul>
<b>Resource(s)</b>	 LETTERING BOOTCAMP.ppt  Lettering Boot Camp Questions.doc  Lettering Practice 1.pdf  Lettering Practice 2.pdf  Lettering Practice 3-Wordsearch.pdf




















<b>Content Literacy Terminology- 3.01.1</b>	
2D	A drawing, sketch or images that it “flattened” to only show two dimensions.
3D	A drawing, sketch or images that shows 3 Dimensions- Height (Y), Width (X), Depth (Z).
Cabinet Oblique Sketch/Drawing	An oblique sketch or drawing in which the object has one-half true-depth or receding axis represented.
Cavalier Oblique Sketch/Drawing	An oblique sketch or drawing in which the object has true (full) depth or receding axis represented.
Contour	The outline or shape of an object/feature.
Depth	The distance from the front of an object to the back. Associated with the Z-axis.
Design (Rough) Sketching	Quick freehand drawing, typically using softer leads, that only requires a pencil and piece of paper (no equipment). They tend to have less detail, structure and restrictions than freehand or technical illustrations.
Edge	The boundary of a face.
Freehand technical sketches	Quick technical sketch/drawing that can be Multiview or pictorial sketches. This type of sketch usually includes more detail and structure than design sketches (limited equipment, such as straight edges). They also typically include some dimensions.
Guideline	Extremely light line drawn to layout lettering and then erased.
Height	The distance from the bottom of an object to the top. Associated with the Y-axis.
Isometric Sketch/Drawing	A three-dimensional sketch or drawing where the front edge of the object is on the projection plane and all width and depth dimensions are drawn at 30 degrees off horizontal.
Lettering	Text used in technical drawings that has uniformity in height, proportion, line, and spacing of letters, words, and numbers.
Line Weight	The visual lightness, darkness, or heaviness of a line within a drawing.
Multiview	A collection of single orthographically projected views of an object. Most common views included in a drawing are front, top, and right side.
Oblique Sketch/Drawing	A three-dimensional sketch or drawing where the front view of the object is on the projection plane and all depth dimensions are drawn at 45 degrees off horizontal. Arcs, holes, and irregular features are commonly placed on the front view of this type of sketch to avoid distortion.
Pencil-Sight Sketching Method	Technique for sketching in which the pencil is used to sight/measure something in order to maintain proportions.
Perspective Sketch/Drawing	A three-dimensional sketch or drawing where all lines converge at vanishing point(s). Most common are one & two-point perspectives. This is the most realistic type of pictorial, but most difficult to draw as it shows what the “naked eye” would see, but no true measurements can be taken from it.




Pictorial	A three-dimensional (containing 3 axis) sketch or drawing used to quickly explain an idea (examples: Isometric, Obliques, and Perspectives).
Sans Serif	Certain fonts that do not have any projections finishing off a stroke of a letter.
Serif	Certain fonts that have a slight projection finishing off a stroke of a letter.
Single View	One orthographic projected view showing only 2 dimensions. Typically used as a drawing for very thin objects (thickness would be included as a note).
Technical Illustration (Draft)	Drawing, using a variety of leads/line weights, requires equipment, standard measurements and a piece of paper (all equipment).
Vanishing Points	The point at which receding parallel lines viewed in perspective appear to converge.
Width	The distance from one side of an object to the other (across the front). Associated with the X-axis.

<b>Course</b>	<b>IC61 Drafting I</b>			
<b>Essential Standard</b>	3.00	C3	15%	Apply sketching skills and techniques for Architectural & Engineering drafting.
<b>Indicator</b>	3.02	N/A	N/A	Apply 2D sketching – Single and Multi-view.
<b>Culminating Question</b> <b>Essential Questions</b>	<p><b>How is 2D Sketching applied to create Single and Multiview Drawings?</b></p> <ul style="list-style-type: none"> <li>● What subjects are represented in technical drawings?</li> <li>● How are technical drawings and sketches used to represent different subjects?</li> <li>● How is line weight applied in technical drawings and sketches?</li> <li>● How are measurements taken and represented according to the different standards associated with the Drafting Career Cluster?</li> <li>● How is the appropriate industry standards drafting equipment used to create single and multiview drawings by hand?</li> <li>● How are line types applied in single and multiview drawings to represent different features/views?</li> <li>● What is the process of using orthographic projection to acquire proper views in technical drawings?</li> <li>● How is the process of sketching single and multiview drawings from provided examples applied?</li> <li>● How is the process of determining proper views and sketching single and multiview drawings applied?</li> </ul>			
<b>UNPACKED CONTENT</b>				
<ul style="list-style-type: none"> <li>a. Content Literacy Terminology</li> <li>b. Understand 2 main classifications of Subjects represented on technical drawings and sketches in Drafting.</li> <li>c. Identify various drawing types used in technical drawings.</li> <li>d. Apply various line weights used on technical drawings.</li> <li>e. Differentiate units of measure applied to technical drawings standards.</li> <li>f. Demonstrate the use of industry standard drafting equipment in single and multiview drawings.</li> <li>g. Apply appropriate line types in single and multiview drawings.</li> <li>h. Understand the process of using orthographic projection to acquire proper views in technical drawings.</li> <li>i. Apply the process of sketching single and multiview drawings from provided examples.</li> </ul>				

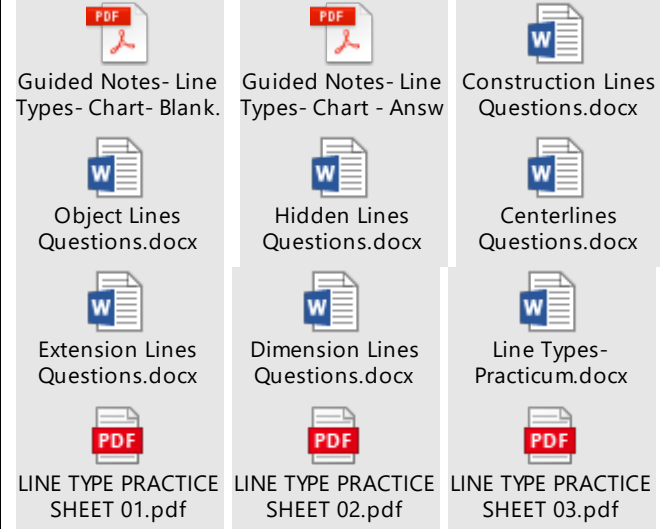
- j. Apply the process of determining proper views and sketching single and multiview drawings.










<b>INSTRUCTIONAL ACTIVITIES- 3.02.1</b>	
<b>A. Content Literacy Terminology</b>	
<b>Resource(s)</b>	(See 3.02.1)
<b>B. Understand 2 main classifications of subjects represented on technical drawings and sketches in Drafting.</b> <i>Note: Activity combines with Indicators 3.01 &amp; 3.03.</i>	
<b>Activity</b>	Independent Discovery-Technical Drawing/Sketching-Subjects
<b>Teacher Instructions</b>	<ul style="list-style-type: none"> <li>• Provide student access to PowerPoint Presentation on technical drawing/sketching-subjects. Facilitate students classifying subjects in provided examples.</li> <li>• Facilitate review of presentation with the whole class or small groups after completion.</li> </ul>
<b>Student Directions</b>	<ul style="list-style-type: none"> <li>• Classify types of subjects addressed in technical drawings by progressing through presentation independently and record answers on blank paper.</li> <li>• Review answers as a whole class or small groups.</li> </ul>
<b>Resource(s)</b>	 Technical Drawing_Sketching-
<b>C. Identify various drawing types used in technical drawings and sketches.</b> <i>Note: Activity combines with Indicators 3.01 &amp; 3.03.</i>	
<b>Activity</b>	Teacher-Led Instruction & Concept Mapping-Technical Drawing/Sketching
<b>Teacher Instructions</b>	<ul style="list-style-type: none"> <li>• Provide hardcopy of <i>technical drawing/Sketching-Classifications-Handout</i>. Lead whole-class instruction using <i>Technical Drawing/Sketching- Classifications Presentation</i>. Facilitate students viewing examples of each type of drawing and recreating isometric and oblique examples on presentation handout.</li> <li>• Provide instruction for completion of the <i>Technical Drawing/Sketching- Graphic Organizer</i>. Facilitate student creating digital concept map with information on handout following instructions. Note: these can be done manually or digitally.</li> </ul>
<b>Student Directions</b>	<ul style="list-style-type: none"> <li>• View examples of each type of drawing and recreate Isometric and Oblique examples on presentation handout.</li> <li>• Classify the major types of technical drawings/sketches used in Drafting Career Pathways by creating a digital concept map with information on handout following instructions.</li> </ul>
<b>Resource(s)</b>	   Technical Drawing_Sketching- Technical Drawing_Sketching- Technical Drawing_Sketching-
<b>D. Apply various line weights used on technical drawings and sketches.</b> <i>Note: Activity combines with Indicators 3.01 &amp; 3.03 and extension for Indicator 4.04.</i>	
<b>Activity</b>	Teacher-led Instruction and Student Application- Line Weight

<b>Teacher Instructions</b>	<ul style="list-style-type: none"> <li>Facilitate whole-class or small group instruction and discussion on line weight using <i>Guided Instruction-Line Weight</i>.</li> <li>Facilitate students demonstrating different line weights by hand.</li> </ul> <p>Note: 4.04 Extension- Complete the same type of task in AutoCAD.</p>						
<b>Student Directions</b>	<ul style="list-style-type: none"> <li>Participate in whole-class or small group instruction and discussion on Line Weight following Guided Instruction-Line Weight.</li> <li>Produce examples of three-line weights manually.</li> </ul>						
<b>Resource(s)</b>	 <p>Guided Instruction-Line Weight.pptx</p>						
<p><b>E. Differentiate units of measure applied to technical drawings standards.</b>  <i>Note: Activity combines with extension from indicator 4.08.</i></p>							
<b>Activity</b>	Guided Notes & Classification-Units of Measure and Standards						
<b>Teacher Instructions</b>	<ul style="list-style-type: none"> <li>Facilitate whole-class instruction and guided notes using <i>Guided Notes/Table: Units of Measure- Standards</i> and <i>Units of Measure Notes Sheet</i>.</li> <li>Provide hard copy and scissors for <i>Units of Measure- Standards Matching Game</i>. Facilitate students cutting and classifying given units of measure. Students should have time to check answers.</li> </ul> <p><i>Additional Resource for Review: Units of Measure- Standards- Review</i></p> <p><i>Additional Activity:</i> Students can create a short presentation with examples of ANSI ARCH, ANSI MECH, ISO ARCH, and ISO MECH drawings they find online.</p> <p><i>Note:</i> 4.08 Extension- Have students create multiple dimension styles on Architectural and Mechanical drawings to represent the global market with ISO and ANSI standards.</p>						
<b>Student Directions</b>	<ul style="list-style-type: none"> <li>Complete guided notes while participating in whole class instruction.</li> <li>Classify examples of architectural and mechanical measurement standards in both ISO and ANSI by cutting out given measurements and placing them in appropriate columns.</li> <li><i>Extension:</i> Create multiple dimension styles on architectural and mechanical drawings to represent the global market with ISO and ANSI standards.</li> </ul>						
<b>Resource(s)</b>	<table border="0"> <tr> <td data-bbox="570 1612 803 1749">   Units of Measure- Standards.pptx </td> <td data-bbox="803 1612 1011 1749">   Units of Measure Notes Sheet.docx </td> <td data-bbox="1011 1612 1430 1749">   Units of Measure Notes Sheet- With A </td> </tr> <tr> <td data-bbox="570 1749 803 1879">   Units of Measure- Standards Matching </td> <td data-bbox="803 1749 1011 1879">   Units of Measure- Standards Matching </td> <td data-bbox="1011 1749 1430 1879">   Units of Measure- Standards- Review.r </td> </tr> </table>	 Units of Measure- Standards.pptx	 Units of Measure Notes Sheet.docx	 Units of Measure Notes Sheet- With A	 Units of Measure- Standards Matching	 Units of Measure- Standards Matching	 Units of Measure- Standards- Review.r
 Units of Measure- Standards.pptx	 Units of Measure Notes Sheet.docx	 Units of Measure Notes Sheet- With A					
 Units of Measure- Standards Matching	 Units of Measure- Standards Matching	 Units of Measure- Standards- Review.r					

<b>F. Demonstrate the use of industry Standard Drafting Equipment in Single and Multiview Drawings.</b>		
<b>Activity</b>	Research-based Project- Industry Standard Manual Drafting Equipment	
<b>Teacher Instructions</b>	<ul style="list-style-type: none"> <li>• Provide physical examples of available equipment with students as direct introduction.</li> <li>• Provide digital copy of <i>Drafting Equipment Project-Instructions</i>, <i>Drafting Equipment Project- Rubric</i>, and <i>Drafting Equipment Project- Blank Template</i>.</li> <li>• Facilitate students researching each piece of equipment, gathering appropriate information for the project and placing it into a blank presentation. Students should rearrange slides once finished to group equipment together as a way of making connections and internalizing content.</li> </ul> <p><i>Note:</i> Slides can be pre-arranged, amount reduced, or smaller groupings provided.</p>	
<b>Student Directions</b>	<ul style="list-style-type: none"> <li>• Identify various visual and descriptive industry standard manual drafting equipment pieces by completing a research project according to instructions provided on template. Rearrange slides once finished to group equipment together as a way of making connections and internalizing content.</li> </ul>	
<b>Resource(s)</b>	   Drafting Equipment Project- Instructions    Drafting Equipment Project- Rubric.docx    Drafting Equipment Project- Blank Templ	
<b>G. Apply appropriate line types in single and multiview drawings.</b>		
<i>Note: Activity combines with Extension for Indicator 4.04.</i>		
<b>Activity</b>	Concept Chunking in Small Groups- Line Types	
<b>Teacher Instructions</b>	<ul style="list-style-type: none"> <li>• Provide each student a hard copy of <i>Guided Notes-Line Types-Chart- Blank</i> and digital access to document/file for each line type and station.</li> <li>• Facilitate progress of students through “stations.”</li> </ul>	
	<b>Stations:</b>	
	Explore	Students watch teacher selected introduction videos to the line type and its characteristics/ uses.
	Record	Students fill characteristic/use information on the current Line Type/PDF. <i>Note:</i> This document will be used as reference material for Line Types-Practicum.
	Answer	Students' answers provided leading questions pertaining to the information they just discovered on each line type.
	Discover	Students select four image examples from the internet of the line types in real world applications and add it to the leading questions document.
	Extend	Supplemental activity introduces students to application of line types in the course software this section is available.



	<ul style="list-style-type: none"> <li>When students complete a station for each line type, break students into smaller groups or pairs to review answers to leading questions and share examples for each.</li> <li>Facilitate students completing <i>Line-Types Practicum</i>, when finished with stations. Provide hard copies of sheets, pencil and ruler to complete the practicum. Model for students in-person or through video how to complete these with proper line-weight and measurements.</li> </ul> <p>Note: 4.04 Extension-Complete the same type of Practicum in AutoCAD</p>
<b>Student Directions</b>	<ul style="list-style-type: none"> <li>Complete stations, for each line type (Construction, Object, Hidden, Center, Extension, Dimension).</li> <li>Complete the questions review and share chosen examples in pairs or small groups.</li> <li>Identify and create common line types with appropriate characteristics by completing the <i>Line-Types Practicum</i> with provided hard copies of sheets, pencil and ruler.</li> </ul>
<b>Resource(s)</b>	 <p>Guided Notes- Line Types- Chart- Blank.    Guided Notes- Line Types- Chart - Answ    Construction Lines Questions.docx</p> <p>Object Lines Questions.docx    Hidden Lines Questions.docx    Centerlines Questions.docx</p> <p>Extension Lines Questions.docx    Dimension Lines Questions.docx    Line Types- Practicum.docx</p> <p>LINE TYPE PRACTICE SHEET 01.pdf    LINE TYPE PRACTICE SHEET 02.pdf    LINE TYPE PRACTICE SHEET 03.pdf</p>
<b>H. Understand the process of using orthographic projection to acquire proper views in technical drawings.</b>	
<b>Activity</b>	Teacher-Led Instruction/Concept Attainment & Classification-Orthographic Projection and Multiview Drawings
<b>Teacher Instructions</b>	<ul style="list-style-type: none"> <li>Facilitate direct instruction using PowerPoint Presentation as whole-class or small groups: <i>Multiview Drawings and Orthographic Projection</i>.</li> <li>Provide digital or hard copy and facilitate partner or individual matching activity: <i>Multiview Matching</i>.</li> <li>Provide Extension/Additional Practice for advanced/progressed learners: <i>Advanced Multiview Practice</i>.</li> </ul>
<b>Student Directions</b>	<ul style="list-style-type: none"> <li>Conceptualize an object from multiple directions as if projected orthographically by matching provided examples.</li> </ul>





<b>Resource(s)</b>	 Multiview Drawings and Orthographic P  Advanced Multiview Practice.d  Multiview Matching.docx
<b>I. Apply the process of sketching single and multiview drawings from provided examples.</b>	
<b>Activity</b>	Student Product-Multiview Application in Manual Technical Drawing
<b>Teacher Instructions</b>	<ul style="list-style-type: none"> <li>Facilitate guided instruction on how to manually draw a basic blocked shape(s) on paper using appropriate technical drafting equipment and title block. Eventual goal is to progress to student creation following teacher indicated steps. <ul style="list-style-type: none"> <li>Example Drawings: <i>Multiview 1, Multiview 2, &amp; Multiview 3 (Advanced Independent Manual Practice- Multiview 4)</i></li> <li>Example Grading Rubric: <i>Manual Drafting Grading Rubric</i></li> </ul> </li> </ul> <p><i>Note: AutoCAD Extension- Complete Multiview drawings in AutoCAD after completing by hand.</i></p>
<b>Student Directions</b>	<ul style="list-style-type: none"> <li>Apply manual drafting techniques for basic technical multiview drawings by creating as instruction takes place and then independently.</li> </ul>
<b>Resource(s)</b>	 Multiview 1.pdf  Multiview 2.pdf  Multiview 3.pdf  Manual Drafting Grading Rubric.pdf  Advanced Independent Manu
<b>J. Apply the process of determining proper views and sketching single and multiview drawings.</b>	
<b>Activity</b>	Student Application- Multiview Application in Manual Sketching
<b>Teacher Instructions</b>	<ul style="list-style-type: none"> <li>Provide digital (or hard) copy of <i>Multiview Application in Manual Sketching</i> instructions to students on how to manually sketch a basic blocked shape(s) on paper with given graph paper, pencil, and eraser.</li> <li>Facilitate students demonstrating with title blocks on the given graph paper.</li> </ul>
<b>Student Directions</b>	<ul style="list-style-type: none"> <li>Apply manual drafting techniques for basic technical multiview sketching.</li> </ul>
<b>Resource(s)</b>	 Multiview Application in Manu





<b>Content Literacy Terminology- 3.02.1</b>	
30° /60°/ 90° Triangle	Technical drawing tool used for measuring and creating regular angles of 30° /60°/ 90°.
45°/ 45°/ 90° Triangle	Technical drawing tool used for measuring and creating regular angles of 45°/ 90°.
Architect's Scale	Tool for measuring distances and transferring measurements at a fixed ratio of length Each side is marked as a ratio of x inches-to-the-foot (typically written as x"=1'-0").
Back View	Orthographically projected view as if seen from rear consisting of width and height.
Bottom View	Orthographically projected view as if seen below above consisting of width and depth.
Center Line	Thin, dark alternating 1/8" (.125 or 2.5 mm) dashed lines with 1/16" (.0625 or 3mm) gaps and longer lines that represent the center of curved or circular features and holes. Center lines extend past objects lines by 1/8" (.125 or 3mm) and can be used as extension lines.
Compass	Technical drawing tool used for creating circles or arcs.
Construction Line	Extremely light line drawn to layout drawing and then erased or made into another type of line.
Contour	The outline or shape of an object/feature.
Depth	The distance from the front of an object to the back. Associated with the Z-axis.
Drafting Brush	Hand-held brush used to remove debris and loose graphite from a drawing while you work.
Drafting Dots or Drawing Tape	Small self-adhesive pieces of tape used to hold drawings and blueprints firmly in place while you work.
Edge	The boundary of a face.
Engineer's Scale	Tool for measuring distances and transferring measurements at a fixed ratio of length. One edge is divided into tenths of an inch, and the subsequent ones are directly marked for twentieths, thirtieths, fortieths, fiftieths, and sixteenths of an inch.
Eraser	Technical drawing tool used to remove graphite.
Erasing Shield	Technical drawing tool used to protect certain parts of a drawing when removing graphite from others.
French Curve	Technical drawing tool used to draw smooth <i>curves</i> of varying radii.
Front View	Orthographically projected view consisting of width and height. Most commonly the view that best shows the overall shape/contour of the object and most descriptive features.
Guideline	Extremely light lines used to keep consistent lettering on a drawing.
Height	The distance from the bottom of an object to the top. Associated with the Y-axis.
Hidden Line	Thin, dark continuously 1/8" (.125) dashed lines with 1/16" (.0625) gaps that represent surfaces and edges that CANNOT be seen from the outside of the object.

Horizontal Surface	Any surface parallel to the top or bottom regular isometric planes of projection.
Incline (Oblique) Surface	Any surface not parallel to any of the standard isometric cube surfaces. These surfaces always appear as foreshortened surfaces on the six, regular planes of projection.
Isometric Surface	Any surface parallel to a regular isometric plane of projection.
Left Side View	Orthographically projected profile view consisting of depth and height.
Line Weight	The visual lightness, darkness, or heaviness of a line within a drawing.
Mechanical Pencils	Pencil with a plastic or metal case and a thin replaceable lead (of various weights) that may be extended as the point is worn away.
Miter Line	Line drawn at 45 degrees and used to project depth between the horizontal (top/bottom) views to the profile (right/left) views.
Multiview	Collection of single orthographically projected views of an object. Most common views included in a drawing are Front, Top, and Right Side.
Object (Visible) Line	Thick, dark continuous lines that represent surfaces and edges that CAN be seen from the outside of the object.
Orthographic Projection	System that allows you to make two-dimensional drawings of a three-dimensional object by projecting edges of the object onto planes to form lines. The images created are considered "views". All objects have 6 standard views. "Ortho"- to throw, forward. "Graphic"- written or drawn.
Precedence of Lines	Explain that when two lines coincide (occupy the same position on the drawing) which type of line should be shown. Object > Hidden > Center.
Profile Surface	Any surface parallel to the left or right-side regular isometric planes of projection.
Projection Plane	Type of view in which graphical projections from an object intersect.
Protractor	Technical drawing tool used for measuring and creating angles.
Right-side View	Orthographically projected profile view consisting of depth and height.
Sandpaper Pad	Small booklet of sandpaper used to sharpen a lead pencil to an elliptical, chiseled, beveled, or flat tip.
Single View	One orthographic projected view showing only 2 dimensions. Typically used as a drawing for very thin objects (thickness would be included as a note).
Templates (Circle, Furniture, other)	Stencils to draw common shapes, symbols & figures.
Title Block	Boxed area around a sheet that contains general information about the drawing such as title, scale, and name of drafter/company.
Top View	Orthographically projected view as if seen from above consisting of width and depth.
T-Square or Sliding Parallel Straight Edge	Technical drawing tool used primarily as a guide for drawing horizontal lines on a drafting table; it may also guide a set square to draw vertical or diagonal lines.






Vertical Surface	Any surface parallel to the front, back or sides regular isometric planes of projection.
Width	The distance from one side of an object to the other (across the front). Associated with the X-axis.
Wooden Pencils	Pencil with lead (of various weights) that may be sharpened as the point is worn away.

<b>Course</b>	<b>IC61 Drafting I</b>			
<b>Essential Standard</b>	3.00	C3	15%	Apply sketching skills and techniques for Architectural & Engineering drafting.
<b>Indicator</b>	3.03	N/A	N/A	Apply 3D sketching – Pictorials.
<b>Culminating Question</b> <b>Essential Questions</b>	<p><b>How is 3D Sketching applied to create pictorial drawings?</b></p> <ul style="list-style-type: none"> <li>● What subjects are represented in pictorial drawings?</li> <li>● How are technical drawings and sketches used to represent different subjects by various drawing types?</li> <li>● How is line weight applied in pictorial drawings and rough sketches?</li> <li>● How are oblique and isometric drawings different for the same subject?</li> <li>● What techniques are used to create isometric pictorials?</li> <li>● What techniques are used to create oblique pictorials?</li> <li>● What are the concepts associated with perspective drawings?</li> </ul>			
<b>UNPACKED CONTENT</b>				
<ul style="list-style-type: none"> <li>a. Content Literacy Terminology</li> <li>b. Understand 2 main classifications of subjects represented on pictorial drawings in Drafting.</li> <li>c. Identify various drawing types used in pictorial drawings- isometric, oblique, and perspective.</li> <li>d. Apply various line weights used on pictorial drawings.</li> <li>e. Determine the correct oblique and isometric drawings for a subject.</li> <li>f. Apply techniques for creating oblique pictorials.</li> <li>g. Understand the concepts related to perspective pictorials.</li> </ul>				

<b>INSTRUCTIONAL ACTIVITIES</b>	
<b>A. Content Literacy Terminology- 3.03</b>	
<b>Resource(s)</b>	<b>(See 3.03.1)</b>
<b>B. Understand 2 main classifications of subjects represented on technical drawings and sketches in Drafting</b>	
<i>Note: Activity combines with Indicators 3.01 &amp; 3.02.</i>	
<b>Activity</b>	Independent Discovery-Technical Drawing/Sketching-Subjects
<b>Teacher Instructions</b>	<ul style="list-style-type: none"> <li>• Provide student access to PowerPoint Presentation on technical drawing/sketching-subjects. Facilitate students classifying subjects in provided examples.</li> <li>• Facilitate review of presentation with the whole class or small groups after completion.</li> </ul>
<b>Student Directions</b>	<ul style="list-style-type: none"> <li>• Classify types of subjects addressed in technical drawings by progressing through presentation independently and record answers on blank paper.</li> <li>• Review answers as a whole class or small groups.</li> </ul>
<b>Resource(s)</b>	 Technical Drawing_Sketching-
<b>C. Identify various drawing types used in technical drawings and sketches.</b>	
<i>Note: Activity combines with Indicators 3.01 &amp; 3.02.</i>	
<b>Activity</b>	Teacher-Led Instruction & Concept Mapping-Technical Drawing/Sketching
<b>Teacher Instructions</b>	<ul style="list-style-type: none"> <li>• Provide hardcopy of <i>technical drawing/Sketching-Classifications-Handout</i>. Lead whole-class instruction using <i>technical drawing/Sketching- Classifications Presentation</i>. Facilitate students viewing examples of each type of drawing and recreating Isometric and Oblique examples on presentation handout.</li> <li>• Provide instruction for completion of the <i>technical drawing/Sketching- Graphic Organizer</i>. Facilitate student creating digital concept map with information on handout following instructions. <i>Note: these can be done manually or digitally.</i></li> </ul>
<b>Student Directions</b>	<ul style="list-style-type: none"> <li>• View examples of each type of drawing and recreate Isometric and Oblique examples on presentation handout.</li> <li>• Classify the major types of technical drawings/sketches used in Drafting Career Pathways by creating a digital concept map with information on handout following instructions.</li> </ul>
<b>Resource(s)</b>	 Technical Drawing_Sketching-  Technical Drawing_Sketching-  Technical Drawing_Sketching-
<b>D. Apply various line weights used on technical drawings and rough sketches.</b>	
<i>Note: Activity combines with Indicators 3.01 &amp; 3.02.</i>	
<b>Activity</b>	Teacher-led Instruction and Student Application-Line Weight

<b>Teacher Instructions</b>	<ul style="list-style-type: none"> <li>Facilitate whole-class or small group instruction and discussion on line weight using <i>Guided Instruction-Line Weight</i>.</li> <li>Facilitate students demonstrating different line weights by hand.</li> </ul> <p>Note: 4.04 Extension- Complete the same type of task in AutoCAD.</p>
<b>Student Directions</b>	<ul style="list-style-type: none"> <li>Participate in whole-class or small group instruction and discussion on Line Weight following Guided Instruction-Line Weight.</li> <li>Produce examples of three-line weights manually.</li> </ul>
<b>Resource(s)</b>	 <p>Guided Instruction-Line Weight.pptx</p>
<b>E. Determine the correct oblique and isometric drawings for a subject.</b>	
<b>Activity</b>	Peer/Partner Learning- Isometric and Oblique
<b>Teacher Instructions</b>	<ul style="list-style-type: none"> <li>Place students in pairs and give every student a hard copy of <i>Isometric &amp; Oblique Practice, Isometric Graphing Paper, Oblique Graphing Paper</i>, and scrap paper. Facilitate students selecting objects to create on graph paper and provide assistance to individuals with visualization as needed. Encourage students to use scrap paper to sketch if they are struggling with an object.</li> <li>Facilitate students (in pairs or independently) modeling blocks on a digital platform (if available).</li> </ul>
<b>Student Directions</b>	<ul style="list-style-type: none"> <li>Select objects to create on graph paper. Ask for assistance with visualization as needed and/or use scrap paper to sketch if struggling with an object.</li> <li>In pairs or independently, model blocks on a digital platform (if available) to apply oblique and isometric visualization to a variety of objects.</li> </ul>
<b>Resource(s)</b>	  
Digital Platform Examples:	<p>Isometric Graphing Paper.pdf    Isometric and Oblique Practice.docx    Oblique Graphing Paper.pdf</p>
<b>Sample Website Resource(s) for 3D Modeling</b>	
National Council of Teachers of Mathematics. (2021). Isometric Drawing Tool.	<a href="https://illuminations.nctm.org/Activity.aspx?id=4182">https://illuminations.nctm.org/Activity.aspx?id=4182</a>
SketchUp. (2021). Try SketchUp.	<a href="https://www.sketchup.com/">https://www.sketchup.com/</a>
<b>F. Apply techniques for creating isometric pictorials.</b>	
<b>Activity</b>	Student Application-Isometric Application in Manual Sketching
<b>Teacher Instructions</b>	<ul style="list-style-type: none"> <li>Provide digital copy of <i>Isometric Application in Manual Sketching</i> instructions to students on how to manually sketch basic blocked shapes on paper with given graph paper, pencil, and eraser.</li> </ul>






	<ul style="list-style-type: none"> <li>Facilitate students creating Isometric on the given Isometric Graphing Paper.</li> </ul>
<b>Student Directions</b>	<ul style="list-style-type: none"> <li>Apply manual drafting techniques for basic isometric sketching by creating Isometric drawings on given Isometric Graphing Paper.</li> </ul>
<b>Resource(s)</b>	 Isometric Application in Manu  Isometric Graphing Paper.pdf
<b>G. Apply techniques for creating oblique pictorials.</b>	
<b>Activity</b>	Student Application- Oblique Application in Manual Sketching
<b>Teacher Instructions</b>	<ul style="list-style-type: none"> <li>Provide digital copy of <i>Oblique Application in Manual Sketching</i> instructions to students on how to manually sketch basic blocked shapes on paper with given graph paper, pencil, and eraser.</li> <li>Facilitate students creating oblique on the given oblique graphing paper.</li> </ul>
<b>Student Directions</b>	<ul style="list-style-type: none"> <li>Apply manual drafting techniques for basic oblique sketching by creating oblique drawings on the given oblique graphing paper.</li> </ul>
<b>Resource(s)</b>	 Oblique Application in Manu  Oblique Graphing Paper.pdf
<b>H. Understand the concepts related to perspective pictorials.</b>	
<i>Note: Possible additional cross-curricular peer teaching.</i>	
<b>Activity</b>	Individual Discovery and Inquiry-Perspectives
<b>Teacher Instructions</b>	<ul style="list-style-type: none"> <li>Provide students access to digital copy of <i>Perspective Drawing- How To</i>.</li> <li>Facilitate students selecting and viewing exploratory videos on concepts linking to cross-curriculum: Art.</li> </ul>
<b>Student Directions</b>	<ul style="list-style-type: none"> <li>Select and view exploratory videos on concepts (Perspective Pictorials) linking to cross-curriculum: Art.</li> <li>Define basic perspective drawings and conceptualize what a vanishing point does when added to a perspective drawing.</li> </ul>
<b>Resource(s)</b>	 Perspective Drawing- How To.d

<b>Content Literacy Terminology- 3.03.1</b>	
3D	Drawing, sketch or images that show 3 Dimensions- Height (Y), Width (X), Depth (Z).
Cabinet Oblique Sketch/Drawing	Oblique sketch or drawing in which the object has one-half true-depth or receding axis represented.
Cavalier Oblique Sketch/Drawing	Oblique sketch or drawing in which the object has true (full) depth or receding axis represented.
Contour	The outline or shape of an object/feature.
Depth	The distance from the front of an object to the back. Associated with the Z-axis.
Edge	The boundary of a face.
Height	The distance from the bottom of an object to the top. Associated with the Y-axis.
Horizontal Surface	Any surface parallel to the top or bottom regular isometric planes of projection.
Incline (Oblique) Surface	Any surface not parallel to any of the standard isometric cube surfaces. These surfaces always appear as foreshortened surfaces on the six, regular planes of projection.
Isometric Sketch/Drawing	Three-dimensional sketch or drawing where the front edge of the object is on the projection plane and all width and depth dimensions are drawn at 30 degrees off horizontal.
Isometric Surface	Any surface parallel to a regular isometric plane of projection.
Oblique Sketch/Drawing	Three-dimensional sketch or drawing where the front view of the object is on the projection plane and all depth dimensions are drawn at 45 degrees off horizontal. Arcs, holes, and irregular features are commonly placed on the front view of this type of sketch to avoid distortion.
Perspective Sketch/Drawing	Three-dimensional sketch or drawing where all lines converge at vanishing point(s). Most common are one & two-point perspectives. This is the most realistic type of pictorial, but most difficult to draw as it shows what the “naked eye” would see, but no true measurements can be taken from it.
Pictorial	Three-dimensional (containing 3 axis) sketch or drawing used to quickly explain an idea (examples: Isometric, Obliques, and Perspectives).
Profile Surface	Any surface parallel to the left or right-side regular isometric planes of projection.
Projection Plane	Type of view in which graphical projections from an object intersect.
Title Block	Boxed area around a sheet that contains general information about the drawing such as title, scale, and name of drafter/company.
Vanishing Points	The point at which receding parallel lines viewed in perspective appear to converge.
Vertical Surface	Any surface parallel to the front, back or sides regular isometric planes of projection.

Width	The distance from one side of an object to the other (across the front). Associated with the X-axis.
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<b>Course</b>	<b>IC61 Drafting I</b>			
<b>Essential Standard</b>	4.00	C3	80%	Apply CAD User Skills (with use of the following CAD software).
<b>Indicator</b>	4.01	N/A	N/A	Apply procedures for working with the User Interface (navigation tools).
<b>Culminating Question</b>  <b>Essential Questions</b>	<p><b>How does the User Interface and Navigation function within the software (AutoCAD)?</b></p> <ul style="list-style-type: none"> <li>● What is the User Interface and how does it affect use of the software program?</li> <li>● How can the mouse (hardware) help quickly navigate in the software?</li> <li>● What are the major Zoom commands available in the software?</li> <li>● How does navigation around the User Interface, Model Space, and Paper Space (Layouts) function in the software?</li> </ul>			
<b>UNPACKED CONTENT</b>				
<ul style="list-style-type: none"> <li>a. Content Literacy Terminology</li> <li>b. Identify the major parts of the AutoCAD User Interface.</li> <li>c. Apply quick navigation commands using a mouse.</li> <li>d. Understand the major Zoom commands available in AutoCAD.</li> <li>e. Apply navigation procedures.</li> </ul>				

<b>INSTRUCTIONAL ACTIVITIES- 4.01</b>	
<b>A. Content Literacy Terms</b>	
<b>Resource(s)</b>	<b>(See 4.01.1)</b>
<b>B. Identify the major parts of the AutoCAD User Interface.</b>	
<b>Activity</b>	Labeling/ Identifying-User Interface
<b>Teacher Instructions</b>	<ul style="list-style-type: none"> <li>● Provide a hard copy of the handout <i>Activity-User Interface</i>.</li> <li>● Facilitate students matching numbers at bottom to parts of User Interface by labeling each arrow.</li> <li>● Facilitate checking answers as whole-class, small groups, pairs or individually.</li> </ul>
<b>Student Directions</b>	<ul style="list-style-type: none"> <li>● Identify the main parts of the User Interface by matching numbers at bottom of handout to parts of User Interface by labeling each arrow.</li> </ul>
<b>Resource(s)</b>	 Activity- User Interface.pdf
<b>C. Apply quick navigation commands using a mouse.</b>	
<b>Activity</b>	Teacher-Led Kinesthetic Instruction-Mouse Navigation
<b>Teacher Instructions</b>	<ul style="list-style-type: none"> <li>● Facilitate students opening software and direct instruction of mouse parts and functions with students using <i>Teacher-Led Kinesthetic Instruction-Mouse Navigation</i> PowerPoint Presentation.</li> <li>● Facilitate students practicing with mouse controls by creating a simple drawing, using a provided file containing simple drawings and/or using a software provided sample file.</li> </ul>
<b>Student Directions</b>	<ul style="list-style-type: none"> <li>● Open software and participate in instruction on mouse parts and functions.</li> <li>● Understand the mouse function and navigation by practicing with mouse controls by creating a simple drawing, using a provided file containing simple drawings and/or using a software provided sample file.</li> </ul>
<b>Resource(s)</b>	 Teacher-Led Kinesthetic Instructi
<b>D. Understand the major Zoom commands available in AutoCAD.</b>	
<b>Activity</b>	Linking Prior Knowledge and Outside Experience-Zoom Commands
<b>Teacher Instructions</b>	<ul style="list-style-type: none"> <li>● Facilitate short discussion on the word “Zoom” and where students may have heard it before.</li> <li>● Provide digital or hardcopy of <i>Linking Prior Knowledge and Outside Experiences- Zoom Commands</i> to students. Whole-class instruction should happen for the top portion of the document in reviewing the definition and linking prior knowledge.</li> <li>● Facilitate students using their phones to open camera application or Google Maps.</li> </ul>

	<ul style="list-style-type: none"> <li>● Provide instructions for completing the table in pairs or individually.</li> <li>● Facilitate students completing the follow-up questions independently when finished with the table. Students will need to handwrite or compile definitions if they have hardcopy (not digital).</li> </ul>
<b>Student Directions</b>	<ul style="list-style-type: none"> <li>● Participate in a short discussion on the word “Zoom.”</li> <li>● Open the camera application on your phone or Google Maps.</li> <li>● Complete the table in pairs or individually.</li> <li>● Demonstrate a basic understanding of the terms associated with Zoom commands in AutoCAD by answering the follow-up questions on your own.</li> </ul>
<b>Resource(s)</b>	 <p>Linking Prior Knowledge and Out</p>
<b>E. Apply navigation procedures.</b>	
<b>Activity</b>	Software Tutorials
<b>Teacher Instructions</b>	<ul style="list-style-type: none"> <li>● Facilitate students completing video or written tutorial session(s) which align with the current version being used in PSU.</li> <li>● Students should create multiple projects which require navigation procedures.</li> </ul>
<b>Student Instructions</b>	<ul style="list-style-type: none"> <li>● Complete video or written tutorial session(s).</li> <li>● Create multiple projects which require navigation procedures.</li> </ul>
<b>Resource(s)</b>	<a href="#">AutoCAD Resource</a>






<b>Content Literacy Terminology- 4.01.1</b>	
Application Menu	Windows-based user interface element for accessing various tools to create, open and publish files when you click the Applications button in the upper-left corner of the application window.
Buttons	Graphical control element that provides the user a simple way to trigger a command/tool/setting.
Command Line	User Interface text area element located, by default, across the bottom of the workspace reserved for keyboard input, prompts, and messages.
Cross Selection	Selection function that will highlight objects in a window or lasso by clicking and dragging that are touching the green window (drag left).
Crosshairs	Type of cursor consisting of two lines that intersect.
Cursor	An indicator used to show the current position for user interaction that will respond to input from a keyboard or mouse.
Direct Selection	Selection function that highlights objects individual as clicked upon (hold shift key for direct deselection).
Draw Commands	CAD commands/tools that create entities within a project.
Grid	CAD feature/setting that displays a uniform pattern of dots on the CAD screen.
InfoCenter	User Interface element that consists of a set of tools, by default, on the right side of the title bar that enable you to access product-related information sources.
Lasso Selection	Selection function that will highlight objects in a free-form shape by clicking and dragging.
Layout Tabs	User interface element tabs that, by default, are located at the bottom left of the workspace and allow switching between model and layout spaces.
Limits	CAD feature/setting that defines the size of your working space.
Minimize, Maximize, & Close	User interface elements located, by default, as buttons on the right side of any Title Bar.
Model Space	One of the two main environments in AutoCAD. Preferred environment to house 2D or 3D geometry.
Modify Commands	CAD commands/tools that change existing entities within a project.
Navigation Toolbar	User Interface element that, by default, floats over and along one of the sides of the current drawing area where navigation tools can be easily accessed.
Origin	The point where coordinate axes intersect. For example, the origin of a Cartesian coordinate system is where the X, Y, and Z axes meet at 0,0,0.
Palette	Windows-specific, user interface element that can be either docked, anchored, or floating in the drawing area. Dockable windows include the Command Line, Status Bar, Properties Palette, and such.
Pan	Navigation command that allows a user to view a different portion of the drawing space without changing the magnification. This command can be quickly accessed by holding down the mouse wheel. The cursor appears as a hand when in this command.




Paper (Layout) Space	One of the two main environments in AutoCAD. The 2D environment in which you create layout viewports and place title blocks for plotting. Multiple layouts can be created for each drawing/project.
Quick Access Toolbar	User interface element that displays frequently used Application tools, by default, in the top left of the screen.
Ribbon Menu	User Interface element that, by default, shows as a panel located across the top of your workspace composed of a series of tabs, which are organized into panels that contain many of the tools and controls available in toolbars.
Ribbon Panel	User interface element that organizes tools into logical groupings on the Ribbon Menu and contains buttons and controls, related to a task.
Ribbon Tab	User Interface element that contains groups of multiple ribbon panels, each belonging to one workflow.
Right-Click Menu	User interface element that is visible when the right mouse button is clicked (tools that appear can change depending on other parameters such as if you have already started a command and where the cursor is on the screen).
Single Selection	Selection function that will highlight/unhighlight objects by manually clicking on them and/or holding shift.
Status Bar	User interface element located, by default, at the bottom of the workspace which displays the cursor location, drawing tools, and tools that affect your drawing environment (i.e., grid, snap, polar tracking, and object snap).
Toolbar	User Interface element that contains icons that represent commands.
UCS	(User Coordinate System) a moveable Cartesian coordinate system that establishes the XY work plane, horizontal and vertical directions, axes of rotation, and other useful geometric references.
User Interface	The means by which the user and a computer system interact, in particular, the use of input devices and software.
View Cube	Navigation interface component that, by default, is located as a persistent, clickable and draggable cube used to switch between standard and isometric views of your current drawing area.
Window Selection	Selection function that will highlight objects in a window or lasso by clicking and dragging that are completely inside the blue window (drag right).
Workspace	Sets of user interface components, such as ribbon tabs and panels, toolbars, palettes, and menu bars, that are grouped and organized so that you can work in a custom, task-oriented drawing environment.
Zoom	CAD command/tool that increases or decreases the magnification of the view in the current viewport/drawing space. This command can be quickly accessed by spinning the mouse wheel.
ZoomAll	Zoom command that views anything that has been drawn. This command can be quickly accessed by double clicking the mouse wheel.
ZoomCenter	Zoom command which displays a view defined by a center point and a magnification value or a height. A smaller value for the height




	increases the magnification. A larger value decreases the magnification.
ZoomDynamic	Zoom command which pans and zooms using a rectangular view box. The view box represents a view, which can shrink or enlarge and move around the drawing.
ZoomExtents	Zoom command which displays the maximum extents of all objects.
ZoomObject	Zoom command which displays one or more selected objects as large as possible and in the center of the view.
ZoomPrevious	Zoom command which remembers the last five zoomed views.
ZoomWindow	Zoom command which allows the user to zoom/enlarge to a specifically selected window (part) of the drawing.

<b>Course</b>	<b>IC61 Drafting I</b>			
<b>Essential Standard</b>	4.00	C3	80%	Apply CAD User Skills (with use of the following CAD software).
<b>Indicator</b>	4.02	N/A	N/A	Apply procedures for creating drawings and reviewing geometric shapes.
<b>Culminating Question</b>  <b>Essential Questions</b>	<p><b>How are drawings created within the software (AutoCAD)?</b></p> <ul style="list-style-type: none"> <li>● What basic geometric terms are important to understand in relation to Drafting?</li> <li>● What are the differences among the types of quadrilaterals?</li> <li>● What are the differences between inscribe and circumscribe when related to regular polygons?</li> <li>● How is inscribe or circumscribe used to create regular polygons?</li> <li>● What are some common drawing commands in AutoCAD?</li> <li>● How are drawings commands used to create in the software?</li> </ul>			
<b>UNPACKED CONTENT</b>				
<ul style="list-style-type: none"> <li>a. Content Literacy Terminology</li> <li>b. Understand geometric terms which relate to Drafting.</li> <li>c. Compare the differences among types of quadrilaterals.</li> <li>d. Compare the difference between inscribe and circumscribe.</li> <li>e. Demonstrate understanding of difference between inscribe and circumscribe.</li> <li>f. Identify common drawing commands in software.</li> <li>g. Apply procedures for creating drawings.</li> </ul>				

<b>INSTRUCTIONAL ACTIVITIES- 4.02</b>	
<b>A. Content Literacy Terms</b>	
<b>Resource(s)</b>	<b>(See 4.02.1)</b>
<b>B. Understand geometric terms which relate to Drafting.</b>	
<b>Activity</b>	Self-Assessment Driven Review/Project-Geometric Terminology
<b>Teacher Instructions</b>	<ul style="list-style-type: none"> <li>• Provide a digital copy of <i>Geometric Terms Review-Student Led</i> and <i>Geometric Terms Review-Presentation</i>.</li> <li>• Facilitate students creating the described table independently paper or digitally. Facilitate students self-assessing/assigning terms to each column as they progress (self-paced) through the PowerPoint Presentation.</li> <li>• Assist students selecting twenty total terms to highlight in the project. Students should select terms from the first 2 columns before choosing from 3rd.</li> <li>• Provide students with digital copy of <i>Geometric Terms Review-Project</i>. Facilitate students creating a slide presentation (or similar type of presentation using an online resource for a slideshow maker) of their previously selected terms (20 total).</li> </ul>
<b>Student Directions</b>	<ul style="list-style-type: none"> <li>• Create the described table on your paper or digitally. Complete self-assessment and assign terms to each column as you progress (self-paced) through the PowerPoint Presentation.</li> <li>• Select twenty total terms to highlight in the project using your table. Select terms from the first 2 columns before choosing from 3rd.</li> <li>• Demonstrate an understanding of common geometric terms associated with Drafting by creating a slide presentation (or similar type of presentation using an online resource for a slideshow maker) of your previously selected terms (20 total).</li> </ul>
<b>Resource(s)</b>	<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">             Geometric Terms Review- Presentation         </div> <div style="text-align: center;">             Geometric Terms Review- Student Lec         </div> <div style="text-align: center;">             Geometric Terms Review- Project.doc         </div> </div>
<b>C. Discern the differences between types of quadrilaterals.</b>	
<b>Activity</b>	Concept Clarification-Guided Notes/Practice Questions-Quadrilaterals
<b>Teacher Instructions</b>	<ul style="list-style-type: none"> <li>• Provide students with a hard copy of <i>Making Sense of 4 sided Polygons-Review</i>. Facilitate whole-class, small-group or individual guided instruction and note taking.</li> </ul>
<b>Student Directions</b>	<ul style="list-style-type: none"> <li>• Discern the difference between quadrilaterals by completing the guided notes while following the PowerPoint Presentation on four-sided polygons.</li> </ul>
<b>Resource(s)</b>	<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">             Making Sense of 4 sided Polygons- Rev         </div> <div style="text-align: center;">             Making Sense of 4 sided Polygons- Rev         </div> </div>
<b>D. Discern the difference between inscribe and circumscribe.</b>	

<b>Activity</b>	Concept Clarification-Guided Notes/Practice Questions-Inscribe/Circumscribe
<b>Teacher Instructions</b>	<ul style="list-style-type: none"> <li>Provide students with a hard copy of <i>Inscribe vs Circumscribe-Review</i>. Facilitate whole-class, small-group or individual guided instruction and note taking.</li> </ul>
<b>Student Directions</b>	<ul style="list-style-type: none"> <li>Discern the difference between “inscribe” and “circumscribe” by completing the guided notes while following the PowerPoint Presentation on four-sided polygons.</li> </ul>
<b>Resource(s)</b>	 Inscribe vs Circumscribe- Review  Inscribe vs Circumscribe- Review
<b>E. Demonstrate the difference between inscribe and circumscribe.</b>	
<b>Activity</b>	Kinesthetic Student Exploration of Terms-Inscribe/Circumscribe
<b>Teacher Instructions</b>	<ul style="list-style-type: none"> <li>Break students into groups of 4-5. Each group should be provided ample space on concrete and chalk. Call out “inscribe” or “circumscribe” and a type of regular polygon. Facilitate students creating with their bodies the polygon and use chalk to draw a circle to inscribe or circumscribe the polygon.</li> </ul> <p><i>Alternate Task:</i> Break students into pairs or individuals (each getting chalk) and have students draw the requested inscribe/circumscribe regular polygon.</p> <p><i>Extension:</i> Have students return to the classroom and construct each of the examples in AutoCAD.</p>
<b>Student Directions</b>	<ul style="list-style-type: none"> <li>Demonstrate a deeper understanding of the difficult concepts, inscribe/circumscribe, by creating the given polygon with your bodies and use chalk to draw a circle to inscribe or circumscribe the polygon as instructed.</li> </ul>
<b>Resource(s)</b>	 Group Activity-Inscribe vs. Circumscribe
<b>F. Understand common drawing commands in software.</b>	
<i>Note: Activity combines with Indicator 4.11.</i>	
<b>Activity</b>	Student-Led Research-Common Commands
<b>Teacher Instructions</b>	<ul style="list-style-type: none"> <li>Provide each student a hard copy of <i>Common AutoCAD Drawing Commands to Remember</i>.</li> <li>Facilitate students using the software program and the internet to complete the table.</li> <li>Facilitate whole-class, small group or individual review after work is completed by students and corrections to table.</li> </ul>
<b>Student Directions</b>	<ul style="list-style-type: none"> <li>Demonstrate an understanding of common drawing commands used in AutoCAD by completing the table (you may use the internet and/or the software).</li> <li>Participate in the review and make corrections to your table as needed.</li> </ul>

<b>Resource(s)</b>	 Common AutoCAD Drawing Commands
<b>G. Apply procedures for creating drawings.</b>	
<b>Activity</b>	Software Tutorials
<b>Teacher Instructions</b>	<ul style="list-style-type: none"> <li>● Facilitate students completing video or written tutorial session(s) which align with the current version being used in PSU.</li> <li>● Students should create multiple projects which require procedures for creating drawings.</li> </ul>
<b>Student Instructions</b>	<ul style="list-style-type: none"> <li>● Complete video or written tutorial session(s).</li> <li>● Create multiple projects which require procedures for creating drawings.</li> </ul>
<b>Resource(s)</b>	<a href="#">AutoCAD Resource</a>

<b>Content Literacy Terminology- 4.02.1</b>	
30/60/90 Triangle	Special right triangle in which all sides are of different length and angles measure 30-degrees, 60-degrees, and 90-degrees.
45/45/90 Triangle	Special right triangle in which 2 sides are of equal length and angles measure 45-degrees, 45-degrees, and 90-degrees.
Absolute Coordinates	Coordinate values measured relative to the coordinate system's origin point (0,0,0) (X, Y, Z).
Absolute Entry Method	(X, Y) Absolute Cartesian coordinates specify a point's exact distance from the origin point of the coordinate system, which is represented as (0,0).
Acute Angle	An angle measuring less than 90-degrees.
Alias	Shortcut for a command entered at the Command prompt. For example, C is an alias for CIRCLE and Z is an alias for ZOOM.
Angle	The space (measured in degrees) between two intersecting lines or surfaces.
Arc	Part of the circumference of a circle or other curve.
Arc Length	The measure of the distance along the curved line making up the arc.
Arc Tool	CAD drawing command/tool that creates an arc with the default option of specifying the following: start, end, radius.
Backup File	File type automatically created every time a file is manually saved, always one version older than the currently saved drawing (.bak).
Bisect	Dividing two or more entities into two equal parts.
Chord	Line segment that joins two points on the circumference of a circle.
Circle	Closed figure whose boundary consists of points equidistant from a fixed point.
Circle Tool	CAD drawing command/tool that creates a circle with the default option of specifying the following: center point, radius.
Circumference	The distance around the outside/edge of a circle.
Circumscribe	To draw (a polygon) around a circle such that its sides/flats are tangent to the circle.
Collinear	Set of points lying on a single line.
Concave	Having an outline or surface that curves inward like the interior of a circle, angle or sphere.
Concentric	Two or more circles of different sizes that share the same center point.
Cone	Solid object which tapers from a circular or roughly circular base to a point.
Construction Line Tool	CAD drawing command/tool that creates a never-ending straight line off of a selected point and angle in both directions.
Convex	Having an outline or surface that curves outward like the exterior of a circle, angle or sphere.
Coplanar	Set of points lying on the same plane.
Cube	An equally sized six-sided closed solid.
Cylinder	Closed solid that has two parallel, circular bases connected by a curved surface; an extruded circle.



Default	Predefined, assumed value for a program input, setting, or parameter. Default values and options for commands are denoted by angle brackets (<>).
Diameter	The distance from the outer edge to outer edge of a circle through its center.
Direct Distance Entry Method	Shorthand relative coordinate entry method that locates the next point (whenever prompted) at a specified distance in the direction of your cursor.
Drawing File	Standard file type that includes the AutoCAD-based vector graphics for a project/drawing (.dwg).
Dynamic Input	User Interface setting located on the status bar that displays a command interface near the cursor, which you can use to enter commands and specify options and values.
Ellipse	Plane curve such that the sums of the distances of each point in its periphery from two fixed points, the foci, are equal.
Equilateral Triangle	Three-sided figure in which all sides and angles are of equal length.
Erase Tool	CAD drawing command/tool that deletes any selected entities.
Geometry	The branch of mathematics concerned with the properties and relations of points, lines, surfaces, solids, and higher dimensional analogs. In CAD it refers to all graphical objects such as lines, circles, arcs, polylines, and dimensions.
Hexagon	Six-sided polygon.
Hypotenuse	The longest side of a triangle.
Inscribe	To draw (a polygon) within a circle such that its vertices are tangent to the circle.
Irregular Polygon	Closed figure with any number of sides (not at equal length).
Isometric Ellipse	The isometric projection of a circle.
Isosceles Triangle	Three-sided figure in which 2 sides and opposite angles are of equal lengths.
Line	The path between two points (straight or curved).
Line Tool	CAD drawing command/tool that connects two points with a straight-line segment.
Major Axis	The longer axis of an ellipse.
Minor Axis	The shorter axis of an ellipse.
Node	Type of CAD object snap that locates point objects, dimension definition points, and text origin points.
Obtuse Angle	An angle measuring more than 90-degrees.
Octagon	An eight-sided polygon.
Parallel	Two entities that are at a consistent distance from each other from end to end.
Parallelogram	Four-sided polygon with parallel opposite sides.
Pentagon	Five-sided polygon.
Perpendicular	Two or more lines (or planes) that are at 90-degrees to each other.
Plane	An imaginary flat surface that has no thickness.
Point	A location in 3D space specified by X, Y, and Z coordinate values. An object consisting of a single coordinate location.

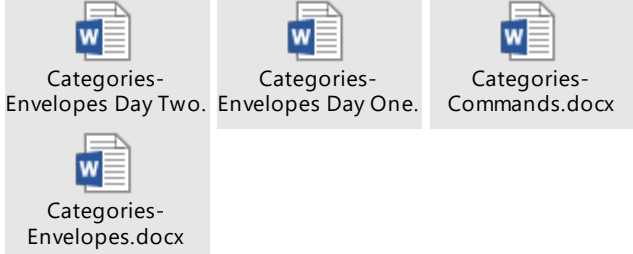
Polar Entry Method	(@Distance<Angle) Polar coordinates specify a point's exact location by a distance and angle from the last point that was entered. The distance is always positive, and the angle is measured from the positive X axis.
Polygon Tool	CAD drawing command/tool creates a polygon with a given number of sides either inscribed or circumscribed to a certain radius.
Polyline Tool	CAD drawing command/tool creates a series of lines and arcs as a single entity and specifies width.
Pyramid	Polyhedron formed by connecting a polygonal base and a point.
Quadrant	Four even sections of a circle created when it is divided by 2 perpendicular lines.
Quadrilateral	Four-sided polygon
Radius	The distance from the outer edge of a circle to its center.
Ray	Part of a line that has a fixed starting point but no end point.
Ray Tool	CAD drawing command/tool that creates a never-ending straight line off of a selected point and angle in one direction.
Rectangle	Four-sided polygon with opposite sides of equal length and four 90-degree angles.
Rectangular Prism	Closed solid that has two parallel rectangular bases connected by flat surfaces, an extruded rectangle.
Reflex Angle	An angle measuring more than 180-degrees.
Regenerate	CAD command/tool used to refresh screen or update the objects in the drawing area by recomputing the screen coordinates from the database.
Regular Polygon	Closed figure in which all the sides and angles are of equal measure.
Relative Entry Method	(@X, Y) Relative Cartesian coordinates specify a point's exact distance from the last point that was entered.
Rhombus	A four-sided polygon with parallel opposite sides & all sides of equal length.
Right Angle	An angle measuring exactly 90-degrees.
Right Triangle	A triangle with one angle measuring 90-degrees.
Scalene Triangle	A three-sided figure in which all sides and angles are of different lengths.
Shortcut Keys	Keys and key combinations that start commands.
Shortcut Menu	A User Interface component menu displayed at your cursor location when you right-click your pointing device. The shortcut menu and the options it provides depend on the pointer location and other conditions, such as whether an object is selected, or a command is in progress.
Sketch Tool	CAD drawing command/tool allows drawing "freehand."
Solid	Objects that occupy 3-dimensional space. Their surfaces are called faces. Faces meet at edges and edges meet at vertices. Some examples of solid shapes: Cone, Cuboid, Sphere, Cylinder, Cube.
Sphere	Round, solid figure with every point on its surface equidistant from its center; a revolved circle.



Spline Tool	CAD drawing command/tool creates a smooth, curved line with multiple curves.
Square	A four-sided polygon with all sides of equal length and four 90-degree angles.
Straight Angle	An angle measuring 180-degrees (a straight line).
Surface	A flat or non-flat element created from curved or straight lines. The face of a solid.
Tangent	Two or more entities that touch each other at only one point.
Texture	The feel, appearance, or consistency of a surface.
Torus	A solid formed by rotating a circle around a line/axis that lies in the same plane but does not intersect it.
Trapezoid	A four-sided polygon with one set of parallel opposite sides.
Triangle	A closed figure with three sides.
Triangular Prism	A closed solid that has two parallel triangles bases connected by flat surfaces: an extruded triangle.
Vertex	A point where 2 or more lines intersect to form an angle.

<b>Course</b>	<b>IC61 Drafting I</b>			
<b>Essential Standard</b>	4.00	C3	80%	Apply CAD User Skills (with use of the following CAD software).
<b>Indicator</b>	4.03	N/A	N/A	Apply procedures for manipulating objects including, grips, object selection, and drawing aids.
<b>Culminating Question</b> <b>Essential Questions</b>	<p><b>How are modifying commands and techniques used to alter in the software (AutoCAD)?</b></p> <ul style="list-style-type: none"> <li>● How are objects selected and deselected in the software?</li> <li>● What are some common modifying commands in AutoCAD?</li> <li>● How are common modifying commands applied in the software?</li> <li>● How do drawing aids affect application of the software?</li> <li>● How does grip editing work in the software?</li> <li>● How are modifying commands and techniques used to alter in the software?</li> </ul>			
<b>UNPACKED CONTENT</b>				
<ul style="list-style-type: none"> <li>a. Content Literacy Terminology</li> <li>b. Demonstrate multiple ways to select and deselect objects in software.</li> <li>c. Identify common modifying commands in software.</li> <li>d. Understand common modifying commands in software.</li> <li>e. Understand drawing aids.</li> <li>f. Understand grip editing.</li> <li>g. Apply procedures for manipulating drawings.</li> </ul>				


<b>INSTRUCTIONAL ACTIVITIES- 4.03</b>	
<b>A. Content Literacy Terms</b>	
<b>Resource(s)</b>	<b>(See 4.03.1)</b>
<b>B. Demonstrate multiple ways to select and deselect objects in software.</b>	
<b>Activity</b>	Independent Training-Selection Process
<b>Teacher Instructions</b>	<ul style="list-style-type: none"> <li>● Provide students with a digital copy of <i>Training-Selection Process-Instructions and Leading Questions</i>.</li> <li>● Facilitate students opening a software file. Have students create a simple drawing, provide a file containing a simple drawing, and/or use a provided sample file from the software.</li> <li>● Facilitate students completing each type of selection.</li> <li>● Facilitate students answering leading questions associated with selection processes.</li> <li>● Facilitate formative assessment of answers.</li> </ul>
<b>Student Directions</b>	<ul style="list-style-type: none"> <li>● Open the provided software file or create a simple drawing.</li> <li>● Demonstrate multiple selection processes in AutoCAD by completing each type of selection.</li> <li>● Answer leading questions associated with selection processes.</li> </ul>
<b>Resource(s)</b>	 Training- Selection Process- Instruction:
<b>C. Identify common modifying commands in software.</b>	
<b>Activity</b>	Student-Led Research-Common Modifying Commands (combines with Indicator 4.05)
<b>Teacher Instructions</b>	<ul style="list-style-type: none"> <li>● Provide each student a hard copy of <i>Common AutoCAD Modifying Commands to Remember</i>.</li> <li>● Facilitate students using the software program and the internet to complete the table.</li> <li>● Facilitate whole-class, small group or individual review after work is completed by students and corrections to table.</li> </ul>
<b>Student Directions</b>	<ul style="list-style-type: none"> <li>● Demonstrate an understanding of common modifying commands used in AutoCAD by completing the table (you may use the internet and/or the software).</li> <li>● Participate in the review and make corrections to your table as needed.</li> </ul>
<b>Resource(s)</b>	 Common AutoCAD Modifying Commans
<b>D. Understand common modifying commands in software.</b>	
<i>Note: Activity combines with Indicator 4.05.</i>	
<b>Activity</b>	Categorizing Concepts & Self-Assessment-Commands
<b>Teacher Instructions</b>	<i>Note: Students must have general application experience before completing this activity (can be used as review/revisit).</i> <ul style="list-style-type: none"> <li>● Day One: Provide hard copy of <i>Categories-Envelopes Day One</i>. Students will draw, plot and build envelopes. Teacher</li> </ul>

	<p>can provide file with envelopes drawn already (<i>Categories-Envelopes</i>)</p> <ul style="list-style-type: none"> <li>Day Two: Provide students digital access to <i>Categories-Envelopes Day Two</i>, scissors and a hard copy of <i>Categories-Commands</i>. Facilitate students cutting out each command and self-assessing on the back. Facilitate students placing each command in the corresponding category envelope. Students can check their envelopes in pairs when finished.</li> <li>Collect envelopes after activity and assess concepts/commands students are struggling with by referring to self-ranking on the backs of cards.</li> </ul> <p><i>Note:</i> Activity can also be used for introduction to Pattern Development (concept from post-requisites Engineering II and Engineering III).</p>
<b>Student Directions</b>	<ul style="list-style-type: none"> <li>Day One: Draw, plot and build envelopes.</li> <li>Day Two: Cut out each command and self-assess on the back. Classify common commands by then placing each command in the corresponding category envelope. Check your envelopes in pairs when finished.</li> </ul>
<b>Resource(s)</b>	 <p>Categories-Envelopes Day Two. Categories-Envelopes Day One. Categories-Commands.docx Categories-Envelopes.docx</p>
<b>E. Understand drawing aids.</b>	
<b>Activity</b>	Software Tutorials
<b>Teacher Instructions</b>	Facilitate the use of, or creation of, a video tutorial session(s) which align with current version being used in PSU.
<b>Resource(s)</b>	<a href="#">AutoCAD Resource</a>
<b>E. Understand grip editing.</b>	
<b>Activity</b>	Software Tutorials
<b>Teacher Instructions</b>	<ul style="list-style-type: none"> <li>Facilitate students completing video or written tutorial session(s) which align with the current version being used in PSU.</li> </ul>
<b>Student Instructions</b>	<ul style="list-style-type: none"> <li>Complete video or written tutorial session(s).</li> </ul>
<b>Resource(s)</b>	<a href="#">AutoCAD Resource</a>
<b>F. Apply procedures for manipulating drawings.</b>	
<b>Activity</b>	Software Tutorials
<b>Teacher Instructions</b>	<ul style="list-style-type: none"> <li>Facilitate students completing video or written tutorial session(s) which align with the current version being used in PSU.</li> <li>Students should create multiple projects which require manipulating drawings.</li> </ul>
<b>Student Instructions</b>	<ul style="list-style-type: none"> <li>Complete video or written tutorial session(s).</li> <li>Create multiple projects which require procedures for manipulating drawings.</li> </ul>





































<b>Resource(s)</b>	<a href="#">AutoCAD Resource</a>
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<b>Content Literacy Terminology- 4.03.1</b>	
Acquired Point	An intermediate location used as a reference when you use the tracking or object snap tracking methods of locating a point.
Base Point	In the context of editing grips, the grip which changes to a solid color when selected to specify the focus of the subsequent editing operation. A point for relative distance and angle when copying, moving, and rotating objects. The insertion base point of the current drawing (BASE). The insertion base point for a block definition (BLOCK).
Copy Tool	CAD modifying command/tool that creates duplications of selected objects at a specified distance and direction.
Explode Tool	CAD modifying command that disassembles a complex object, such as a block, dimension, solid, or polyline, into simpler objects.
Grip	Small squares and triangles that appear on objects that you select. After selecting the grip, you can edit the object by clicking or right clicking the grip instead of entering commands.
Mirror Tool	CAD modifying command that creates a symmetrical copy of selected geometry about a determined line.
Move Tool	CAD modifying command/tool that moves vertices of 2D solids that lie inside a specified window and leaves those outside unchanged.
Object Snap	CAD precision feature/setting that specifies commonly needed point locations on an object when creating or editing objects. Examples: Midpoint, Center, Intersection, Quadrant, Perpendicular, Node.
Object Snap Tracking	CAD precision feature/setting that helps align new points with existing locations in a drawing.
Ortho Snap	CAD precision feature/setting that automatically draws straight lines horizontally or vertically unless another angle is manually entered.
Polar Snap	CAD precision feature/setting used to snap to incremental distances along the polar tracking alignment path.
Polar Tracking	CAD precision feature/setting that displays temporary alignment paths defined by user-specified polar angles.
Rotate Tool	CAD modifying command/tool that rotates selected objects about a specified base point.
Scale Tool	CAD modifying command/tool that enlarges or reduces selected objects proportionally in the X, Y, and Z directions.
Snap (Grid)	CAD feature/setting adjusts the amount that the crosshairs, ""jump"" when you move the mouse.

<b>Course</b>	<b>IC61 Drafting I</b>			
<b>Essential Standard</b>	4.00	C3	80%	Apply CAD User Skills (with use of the following CAD software).
<b>Indicator</b>	4.04	N/A	N/A	Apply procedures for working with the drawing organization, inquiry commands, and layers.
<b>Culminating Question</b> <b>Essential Questions</b>	<p><b>How are modifying commands and techniques used to alter in the software (AutoCAD)?</b></p> <ul style="list-style-type: none"> <li>● How is line weight used in drawing representation/organization in the software?</li> <li>● How are line types used in drawing representation/organization in the software?</li> <li>● What procedures/practices are used to organize drawing components in the software?</li> <li>● How are inquiry commands used to find information in the software?</li> <li>● How are layers used in the software?</li> </ul>			
<b>UNPACKED CONTENT</b>				
<ul style="list-style-type: none"> <li>a. Content Literacy Terminology</li> <li>b. Understand line weight as it applies to drawing organization.</li> <li>c. Understand line types as they apply to drawing organization.</li> <li>d. Understand purpose and procedures for drawing organization in the software.</li> <li>e. Apply inquiry commands in the software.</li> <li>f. Apply procedures for using layers in the software.</li> </ul>				

<b>INSTRUCTIONAL ACTIVITIES- 4.04</b>	
<b>A. Content Literacy Terms</b>	
<b>Resource(s)</b>	(See 4.04.1)
<b>B. Understand line weight as it applies to drawing organization.</b> <i>Note: Activity combines with Extension from Indicators 3.02 &amp; 3.03.</i>	
<b>Activity</b>	Teacher-led Instruction and Student Application-Line Weight
<b>Teacher Instructions</b>	<ul style="list-style-type: none"> <li>Facilitate whole-class or small group instruction and discussion on line weight using <i>Guided Instruction-Line Weight</i>.</li> <li>Facilitate students demonstrating different line weights by hand.</li> </ul> <i>Note: 4.04 Extension- Complete the same type of task in AutoCAD</i>
<b>Student Directions</b>	<ul style="list-style-type: none"> <li>Participate in whole-class or small group instruction and discussion on line weight.</li> <li>Produce examples of three-line weights manually and in AutoCAD.</li> </ul>
<b>Resource(s)</b>	 Guided Instruction-Line Weight.pptx
<b>C. Understand line types as they apply to drawing organization.</b> <i>Note: Activity combines with Extension from Indicator 3.02.</i>	
<b>Activity</b>	Concept Chunking in Small Groups-Line Types
<b>Teacher Instructions</b>	<ul style="list-style-type: none"> <li>Provide each student a hard copy of <i>Guided Notes-Line Types-Chart- Blank</i> and digital access to document/file for each Line Type and Stations.</li> <li>Facilitate progress of students through “stations.”</li> </ul>
<b>Stations:</b>	
Explore	Students watch teacher selected introduction videos to the line type and its characteristics/ uses.
Record	Students fill characteristic/use information on the current Line Type/PDF. <i>Note: This document will be used as reference material for Line Types-Practicum.</i>
Answer	Students' answers provided leading questions pertaining to the information they just discovered on each line type.
Discover	Students select four image examples from the internet of the line types in real world applications and add it to the leading questions document
Extend	Supplemental activity introduces students to application of line types in the course software this section is available.





	<ul style="list-style-type: none"> <li>When students complete a station for each line type, break students into smaller groups or pairs to review answers to leading questions and share examples for each.</li> <li>Facilitate students completing <i>Line-Types Practicum</i>, when finished with stations. Provide hard copies of sheets, pencil and ruler to complete the Practicum. Model for students in-person or through video how to complete these with proper line-weight and measurements.</li> </ul> <p><i>Note:</i> 4.04 Extension-Complete the same type of Practicum in AutoCAD</p>												
<b>Student Directions</b>	<ul style="list-style-type: none"> <li>Complete stations, for each Line Type (Construction, Object, Hidden, Center, Extension, Dimension).</li> <li>Complete the questions review and share chosen examples in pairs or small groups.</li> <li>Identify and create common line types with appropriate characteristics by completing the <i>Line-Types Practicum</i> with provided hard copies of sheets, pencil and ruler.</li> </ul>												
<b>Resource(s)</b>	<table border="0"> <tr> <td> Guided Notes- Line Types- Chart- Blank.</td> <td> Guided Notes- Line Types- Chart - Answ</td> <td> Construction Lines Questions.docx</td> </tr> <tr> <td> Object Lines Questions.docx</td> <td> Hidden Lines Questions.docx</td> <td> Centerlines Questions.docx</td> </tr> <tr> <td> Extension Lines Questions.docx</td> <td> Dimension Lines Questions.docx</td> <td> Line Types- Practicum.docx</td> </tr> <tr> <td> LINE TYPE PRACTICE SHEET 01.pdf</td> <td> LINE TYPE PRACTICE SHEET 02.pdf</td> <td> LINE TYPE PRACTICE SHEET 03.pdf</td> </tr> </table>	 Guided Notes- Line Types- Chart- Blank.	 Guided Notes- Line Types- Chart - Answ	 Construction Lines Questions.docx	 Object Lines Questions.docx	 Hidden Lines Questions.docx	 Centerlines Questions.docx	 Extension Lines Questions.docx	 Dimension Lines Questions.docx	 Line Types- Practicum.docx	 LINE TYPE PRACTICE SHEET 01.pdf	 LINE TYPE PRACTICE SHEET 02.pdf	 LINE TYPE PRACTICE SHEET 03.pdf
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 LINE TYPE PRACTICE SHEET 01.pdf	 LINE TYPE PRACTICE SHEET 02.pdf	 LINE TYPE PRACTICE SHEET 03.pdf											
<b>D. Understand purpose and procedures for drawing organization in the software.</b>													
<b>Activity</b>	Software Tutorials												
<b>Teacher Instructions</b>	<ul style="list-style-type: none"> <li>Facilitate students completing video or written tutorial session(s) which align with the current version being used in PSU.</li> <li>Students should create multiple projects which require drawing organization in the software.</li> </ul>												
<b>Student Instructions</b>	<ul style="list-style-type: none"> <li>Complete video or written tutorial session(s).</li> <li>Create multiple projects which require drawing organization in the software.</li> </ul>												
<b>Resource(s)</b>	<a href="#">AutoCAD Resource</a>												
<b>C. Apply inquiry commands in the software.</b>													
<b>Activity</b>	Independent Training- Inquiry Commands												
<b>Teacher Instructions</b>	<ul style="list-style-type: none"> <li>Provide students with a digital copy of <i>Training-Inquiry Commands- Instructions and Leading Questions</i>.</li> <li>Facilitate students opening a software file. Have students create a simple drawing, provide a file containing a simple</li> </ul>												

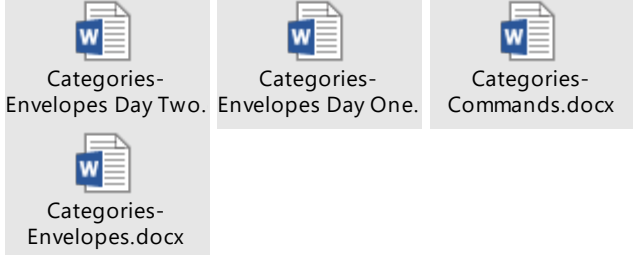
	<p>drawing, and/or use a provided sample file from the software.</p> <ul style="list-style-type: none"> <li>● Facilitate students completing each type of inquiry command. Facilitate students answering leading questions associated with inquiry commands.</li> <li>● Facilitate formative assessment of answers.</li> </ul>
<b>Student Directions</b>	<ul style="list-style-type: none"> <li>● Open the provided software file or create a simple drawing .</li> <li>● Demonstrate multiple inquiry commands in AutoCAD by completing each type.</li> <li>● Answer leading questions associated with inquiry commands.</li> </ul>
<b>Resource(s)</b>	 <p>Training- Inquiry Commands- Instruct</p>
<b>F. Apply procedures for using layers in the software.</b>	
<b>Activity</b>	Software Tutorials
<b>Teacher Instructions</b>	<ul style="list-style-type: none"> <li>● Facilitate students completing video or written tutorial session(s) which align with the current version being used in PSU.</li> <li>● Students should create multiple projects which require layers.</li> </ul>
<b>Student Instructions</b>	<ul style="list-style-type: none"> <li>● Complete video or written tutorial session(s).</li> <li>● Create multiple projects which require layers.</li> </ul>
<b>Resource(s)</b>	<a href="#">AutoCAD Resource</a>

<b>Content Literacy Terminology- 4.04.1</b>	
Area Tool	CAD inquiry command/tool that calculates the area and perimeter of objects or of defined areas.
ByLayer	A special object property used to specify that the object inherits the color or linetype associated with its layer.
Center Line	Thin, dark alternating 1/8" (.125 or 2.5 mm) dashed lines with 1/16" (.0625 or 3mm) gaps and longer lines that represent the center of curved or circular features and holes. Center lines extend past objects lines by 1/8" (.125 or 3mm) and can be used as extension lines.
Construction Line	Extremely light line drawn to layout drawing and then erased or made into another type of line.
Distance Tool	CAD command/tool that provides the length of an object but does not place a dimension line on the drawing.
Freeze Layer	A setting that suppresses the display of objects on selected layers. Objects on frozen layers are released from AutoCAD's memory. Freezing layers shortens regenerating time.
Guideline	Extremely light lines used to keep consistent lettering on a drawing.
Hidden Line	Thin, dark continuously 1/8" (.125) dashed lines with 1/16" (.0625) gaps that represent surfaces and edges that CANNOT be seen from the outside of the object.
Inquiry Commands	CAD commands/tools that provide information about objects in your drawing which include commands such as Area, Perimeter, and Distance.
Layer	A logical grouping of data that are like transparent acetate overlays on a drawing. You can view layers individually or in combination.
Layer Properties	Drawing management that associates visibility, color, and weight options of objects on a specific layer.
Line Weight	The visual lightness, darkness, or heaviness of a line within a drawing.
LineType Scale	CAD drawing setting that changes the scale factor of linetypes for all objects in a drawing.
LineTypes	How a line or curve is displayed in regards to breaks.
Lineweight	A width value that can be assigned to all graphical objects (thickness of a line).
Lock Layer	A setting that makes it so none of the objects on that layer can be modified until you unlock the layer.
Match Properties Tool	CAD command/tool that copies layer properties from one object to another.
Measure Tool	CAD command/tool that gives the length of objects, the angle and distance between objects, and the radius of circles and arcs but does not place a dimension line on the drawing.
Object (Visible) Line	Thick, dark continuous lines that represent surfaces and edges that CAN be seen from the outside of the object.
Precedence of Lines	Explain that when two lines coincide (occupy the same position on the drawing) which type of line should be shown. Object > Hidden > Center.

Quick Properties	A display option in a drawing space that provides a limited amount of property information next to the cursor when an object is selected.
Title Block	A boxed area around a sheet that contains general information about the drawing such as title, scale, and name of drafter/company.
Turn-Off Layer	A setting that suppresses the display of objects on selected layers where objects in that layer are not released from AutoCAD's memory. Turning-off layers does nothing to shorten regenerating time.

<b>Course</b>	<b>IC61 Drafting I</b>			
<b>Essential Standard</b>	4.00	C3	80%	Apply CAD User Skills (with use of the following CAD software).
<b>Indicator</b>	4.05	N/A	N/A	Apply procedures for altering objects.
<b>Culminating Question</b> <b>Essential Questions</b>	<p><b>How are objects altered in the software (AutoCAD)?</b></p> <ul style="list-style-type: none"> <li>● What are the common modifying commands used in the software?</li> <li>● What are the differences in the common modifying commands in the software?</li> <li>● When are common modifying commands used in the software?</li> <li>● What is grip editing?</li> <li>● How are common modifying commands used in the software?</li> </ul>			
<b>UNPACKED CONTENT</b>				
<ul style="list-style-type: none"> <li>a. Content Literacy Terminology</li> <li>b. Identify common modifying commands in software.</li> <li>c. Differentiate between common modifying commands in the software.</li> <li>d. Understand common modifying commands in software.</li> <li>e. Understand grip editing.</li> <li>f. Apply procedures for altering drawings.</li> </ul>				


<b>INSTRUCTIONAL ACTIVITIES- 4.05</b>	
<b>A. Content Literacy Terms</b>	
<b>Resource(s)</b>	<b>(See 4.05.1)</b>
<b>B. Identify common modifying commands in software.</b>	
<i>Note: Activity combines with Indicator 4.03.</i>	
<b>Activity</b>	Student-Led Research-Common Modifying Commands
<b>Teacher Instructions</b>	<ul style="list-style-type: none"> <li>● Provide each student a hard copy of <i>Common AutoCAD Modifying Commands to Remember</i>.</li> <li>● Facilitate students using the software program and the internet to complete the table.</li> <li>● Facilitate whole-class, small group or individual review after work is completed by students and corrections to table.</li> </ul>
<b>Student Directions</b>	<ul style="list-style-type: none"> <li>● Demonstrate an understanding of common modifying commands used in AutoCAD by completing the table (you may use the internet and/or the software).</li> <li>● Participate in the review and make corrections to your table as needed.</li> </ul>
<b>Resource(s)</b>	 Common AutoCAD Drawing Commands
<b>C. Differentiate between common modifying commands in the software.</b>	
<b>Activity</b>	Concept Mapping-Modifying Commands
<b>Teacher Instructions</b>	<ul style="list-style-type: none"> <li>● Provide a hard copy of <i>Making Sense of Modifying Commands</i>.</li> <li>● Facilitate students completing a concept map for each of the modifying commands included.</li> <li>● Facilitate whole-class, small-group, or individual review of material using completed concept maps.</li> </ul>
<b>Student Directions</b>	<ul style="list-style-type: none"> <li>● Demonstrate a deeper understanding of the basic modifying commands by completing a concept map for each of the modifying commands.</li> <li>● Participate in review of modifying commands using your concept maps.</li> </ul>
<b>Resource(s)</b>	 Making Sense of Modify Commands.p
<b>D. Understand common modifying commands in software.</b>	
<i>Note: Activity combines with Indicator 4.03.</i>	
<b>Activity</b>	Categorizing Concepts & Self-Assessment-Commands
<b>Teacher Instructions</b>	<i>Note: Students must have general application experience before completing this activity (can be used as review/revisit).</i> <ul style="list-style-type: none"> <li>● Day One: Provide hard copy of <i>Categories-Envelopes Day One</i>. Students will draw, plot and build envelopes. Provide a file with envelopes drawn already (<i>Categories-Envelopes</i>) if needed.</li> <li>● Day Two: Provide students digital access to <i>Categories-Envelopes Day Two</i>, scissors and a hard copy of <i>Categories-Commands</i>. Facilitate students cutting out each</li> </ul>

	<p>command and self-assessing on the back. Facilitate students placing each command in the corresponding category envelope. Students can check their envelopes in pairs when finished.</p> <ul style="list-style-type: none"> <li>Collect envelopes after activity and assess concepts/commands students are struggling with by referring to self-ranking on the backs of cards.</li> </ul> <p><i>Note:</i> Activity can also be used for introduction to Pattern Development (concept from post-requisites Engineering II and Engineering III)</p>
<b>Student Directions</b>	<ul style="list-style-type: none"> <li>Day One: Draw, plot and build envelopes.</li> <li>Day Two: Cut out each command and self-assess on the back. Classify common commands by then placing each command in the corresponding category envelope. Check your envelopes in pairs when finished.</li> </ul>
<b>Resource(s)</b>	 <p>Categories-Envelopes Day Two. Categories-Envelopes Day One. Categories-Commands.docx Categories-Envelopes.docx</p>
<b>E. Understand grip editing.</b>	
<b>Activity</b>	Software Tutorials
<b>Teacher Instructions</b>	<ul style="list-style-type: none"> <li>Facilitate students completing video or written tutorial session(s) which align with the current version being used in PSU.</li> <li>Students should create multiple projects which require grip editing.</li> </ul>
<b>Student Directions</b>	<ul style="list-style-type: none"> <li>Complete video or written tutorial session(s).</li> <li>Create multiple projects which require grip editing.</li> </ul>
<b>Resource(s)</b>	<a href="#">AutoCAD Resource</a>
<b>F. Apply procedures for altering drawings.</b>	
<b>Activity</b>	Software Tutorials
<b>Teacher Instructions</b>	<ul style="list-style-type: none"> <li>Facilitate students completing video or written tutorial session(s) which align with the current version being used in PSU.</li> <li>Students should create multiple projects which require altering objects.</li> </ul>
<b>Student Directions</b>	<ul style="list-style-type: none"> <li>Complete video or written tutorial session(s).</li> <li>Create multiple projects which require altering objects.</li> </ul>
<b>Resource(s)</b>	<a href="#">AutoCAD Resource</a>

<b>Content Literacy Terminology- 4.05.1</b>	
Array Tool	CAD modify command/tool used to create multiple copies of objects in a pattern (linear, radial, or path).
Break Tool	CAD modify command/tool that breaks a line into two or more independent lines.
Chamfer Tool	CAD modify command/tool that applies an angled corner to two intersecting lines.
Divide Tool	CAD modify command/tool used to place evenly spaced point objects or blocks along the length or perimeter of an object.
Erase Tool	CAD modify command/tool removes objects from your drawing that are not wanted there.
Extend Tool	CAD modify command/tool that allows lines to be lengthened to a specified line or object.
Fillet Tool	CAD modify command/tool that applies a rounded corner of a certain radius to two intersecting lines.
Grips	Small squares and triangles that appear on objects that you select. After selecting the grip, you can edit the object by clicking or right clicking the grip instead of entering commands.
Join Tool	CAD modify command/tool that combines multiple objects, like lines/arcs, into one.
Offset Tool	CAD modify command/tool that creates a parallel copy of selected geometry.
Scale Tool	CAD modify command/tool that enlarges or reduces selected objects proportionally in the X, Y, and Z directions.
Stretch Tool	CAD modify command/tool that lengthens selected objects crossed by a selection window or highlighted grips.
Trim Tool	CAD modify command/tool that allows lines to be shortened to a specified line or object.




<b>Course</b>	<b>IC61 Drafting I</b>			
<b>Essential Standard</b>	4.00	C3	80%	Apply CAD User Skills (with use of the following CAD software).
<b>Indicator</b>	4.06	N/A	N/A	Apply procedures for working with layouts, templates, viewports.
<b>Culminating Question</b> <b>Essential Questions</b>	<p><b>How are procedures for working with layouts, templates and viewports used in the software (AutoCAD)?</b></p> <ul style="list-style-type: none"> <li>• What are the procedures for working with layouts, templates, and viewports in the software?</li> <li>• What are the procedures for working with layouts, templates, and viewports?</li> </ul>			
<b>UNPACKED CONTENT</b>				
<ul style="list-style-type: none"> <li>a. Content Literacy Terminology</li> <li>b. Understand procedures for working with layouts, templates, and viewports.</li> <li>c. Apply procedures for working with layouts, templates, and viewports.</li> </ul>				

<b>INSTRUCTIONAL ACTIVITIES- 4.06</b>	
<b>A. Content Literacy Terms</b>	
<b>Resource(s)</b>	<b>(See 4.06.1)</b>
<b>B. Understand procedures for working with layouts, templates, and viewports.</b>	
<b>Activity</b>	Student Choice-Tutorial Creation-Layouts, Viewports & Templates
<b>Teacher Instructions</b>	<p><i>Note:</i> This activity should be completed after students have an understanding of Indicator. Activity can be applied to other Indicators with revision of concepts covered.</p> <ul style="list-style-type: none"> <li>• Provide digital copy of instructions with rubric (<i>Student Choice-Tutorial Creation-Layouts, Viewports &amp; Templates</i>) to students. Assist student selection of appropriate topics.</li> <li>• Facilitate students selecting, organizing for (developing outline/storyboard), and recording a tutorial on objective specific concepts.</li> <li>• Upload student tutorial recordings to accessible folders for each topic (i.e. Shared Google Folders). Facilitate student viewing of 1-3 videos on each topic and leave/send peer comments with positive constructive criticism.</li> </ul>
<b>Student Directions</b>	<ul style="list-style-type: none"> <li>• Demonstrate knowledge of indicator by selecting topic, organizing for presentation (storyboard or outline), and recording a tutorial. Your tutorial will be shared with your peers.</li> <li>• View 1-3 videos on each topic and leave/send peer comments with positive constructive criticism.</li> </ul>
<b>Resource(s)</b>	 <p>Student Choice-Tutorial Creation.doc</p>
<b>C. Apply procedures for working with layouts, templates, and viewports.</b>	
<b>Activity</b>	Software Tutorials
<b>Teacher Instructions</b>	<ul style="list-style-type: none"> <li>• Facilitate students completing video or written tutorial session(s) which align with the current version being used in PSU.</li> <li>• Students should create multiple projects which require using procedures for working with layouts, templates and viewports.</li> </ul>
<b>Student Directions</b>	<ul style="list-style-type: none"> <li>• Complete video or written tutorial session(s).</li> <li>• Create multiple projects which require using procedures for working with layouts, templates and viewports.</li> </ul>
<b>Resource(s)</b>	<a href="#">AutoCAD Resource</a>







<b>Content Literacy Terminology- 4.06.1</b>	
Drawing Template	A drawing file (.dwt) with pre-established settings for new drawings such as <i>acad.dwt</i> , <i>acadlt.dwt</i> , <i>acadiso.dwt</i> , or <i>acadltiso.dwt</i> . Any drawing file can be saved as a DWT file.
Layout	The 2D environment in which you create layout viewports and place title blocks for plotting. Multiple layouts can be created for each drawing.
Layout Viewport	A feature that creates an object in paper space that displays views from model space.
Model Space	One of the two primary spaces in which objects reside. Typically, a geometric model is created in model space. A layout of specific views and annotations of this model is displayed on a layout in paper space. (MSPACE).
Model Viewport	A feature that splits the drawing area into one or more adjacent rectangular viewing areas.
Paper Space	One of two primary spaces in which objects reside. Paper space is used for creating a finished layout for printing or plotting, in contrast to drafting or designing. You design your model using the Model tab. (PSPACE) See also <i>model space</i> and <i>viewport</i> .
Tilemode	A system variable that controls whether viewports can be created as movable, resizable objects, called <i>layout viewports</i> , or as non-overlapping display elements that appear side-by-side, called <i>model viewports</i> .
View	A graphical representation of a model from a specific location (viewpoint) in space. (3DORBIT, VPOINT, DVIEW, VIEW).
Viewport	A bounded area that displays some portion of the model space of a drawing. The TILEMODE system variable determines the type of viewport created. When TILEMODE is off (0), viewports are objects that can be moved and resized on a layout. (MVIEW) When TILEMODE is on (1), the entire drawing area is divided into non-overlapping model viewports. (VPORTS) See also <i>TILEMODE</i> , <i>view</i> , and <i>viewport</i> .
Viewport Configuration	A named collection of model viewports that can be saved and restored. (VPORTS).

<b>Course</b>	<b>IC61 Drafting I</b>			
<b>Essential Standard</b>	4.00	C3	80%	Apply CAD User Skills (with use of the following CAD software).
<b>Indicator</b>	4.07	N/A	N/A	Apply procedures for annotating the drawing and adding text.
<b>Culminating Question</b> <b>Essential Questions</b>	<p><b>How are procedures for annotating the drawing and adding text used in the software (AutoCAD)?</b></p> <ul style="list-style-type: none"> <li>● What are common symbols and abbreviations used on technical drawings?</li> <li>● What are the procedures for annotating drawings and adding text?</li> </ul>			
<b>UNPACKED CONTENT</b>				
<ul style="list-style-type: none"> <li>a. Content Literacy Terminology</li> <li>b. Understand common symbols and abbreviations used on technical drawings.</li> <li>c. Apply procedures for annotating drawings and adding text.</li> </ul>				



<b>INSTRUCTIONAL ACTIVITIES- 4.07</b>	
<b>A. Content Literacy Terms</b>	
<b>Resource(s)</b>	(See 4.07.1)
<b>B. Understand common symbols and abbreviations used on technical drawings.</b>	
<b>Activity</b>	Identify Industry Standards-Symbols and Abbreviations
<b>Teacher Instructions</b>	<ul style="list-style-type: none"> <li>• Provide digital (or hardcopy) of <i>Activity-Symbols and Abbreviations-Technical Drawings</i>.</li> <li>• Facilitate students working in pairs, or individually, to complete the assignment by researching each concept online.</li> <li>• Facilitate students creating a presentation on the symbols/abbreviations and real examples of technical drawings which contain each.</li> </ul>
<b>Student Directions</b>	<ul style="list-style-type: none"> <li>• Complete the assignment by researching each symbol and abbreviation online.</li> <li>• Identify common symbols used on technical drawings by creating a presentation on the symbols/abbreviations with real examples of technical drawings which contain each.</li> </ul>
<b>Resource(s)</b>	 Activity- Symbols and Abbreviations-
<b>C. Apply procedures for annotating drawings and adding text.</b>	
<b>Activity</b>	Software Tutorials
<b>Teacher Instructions</b>	<ul style="list-style-type: none"> <li>• Facilitate students completing video or written tutorial session(s) which align with the current version being used in PSU.</li> <li>• Students should create multiple projects which require annotating drawings and adding text.</li> </ul>
<b>Student Directions</b>	<ul style="list-style-type: none"> <li>• Complete video or written tutorial session(s).</li> <li>• Create multiple projects which require annotating drawings and adding text.</li> </ul>
<b>Resource(s)</b>	<a href="#">AutoCAD Resource</a>

<b>Content Literacy Terminology- 4.07.1</b>	
Annotate	To add text, dimensions, tolerances, symbols, notes, and other types of explanatory symbols or objects.
Annotation Scale	A setting that is saved with model space, layout viewports, and model views. When you create annotative objects, they are scaled based on the current annotation scale setting and automatically displayed in a view at the correct size.
Annotative	An object property that is assigned to objects that are used to annotate drawings. This property automates the process of scaling annotations in layout viewports and in model space. Annotative objects are defined at a paper height.
Cell	The smallest available table selection.
Cell Boundary	The four grid lines surrounding a table cell. An adjacent cell selection can be surrounded with a cell boundary.
Column (Table)	A vertically adjacent table cell selection spanning the height of the table. A single column is one cell in width.
Font	A character set, made up of letters, numbers, punctuation marks, and symbols of a distinctive proportion and design.
Merge (Table)	In tables, an adjacent cell selection that has been combined into a single cell.
Multileader Tool	CAD annotation command/tool that creates annotations that can have multiple leader lines.
Multiline Text Tool	CAD annotation command/tool that allows text to be created within a specified boundary.
Row (Table)	A horizontally adjacent table cell selection spanning the width of the table.
Single Line Text Tool	CAD annotation command/tool that creates one or more lines of text, where each text line is an independent object that you can relocate, reformat, or otherwise modify.
Symbol	A representation of an item commonly used in drawings.
Table Tool	CAD annotation command that creates a rectangular array of cells that contain annotation, primarily text but also blocks.
Text Style	A named, saved collection of settings that determines the appearance of text characters—for example, stretched, compressed, oblique, mirrored, or set in a vertical column.
Text Style Manager	CAD dialogue box that creates, modifies, or sets named <i>text styles</i> .

<b>Course</b>	<b>IC61 Drafting I</b>			
<b>Essential Standard</b>	4.00	C3	80%	Apply CAD User Skills (with use of the following CAD software).
<b>Indicator</b>	4.08	N/A	N/A	Apply procedures for dimensioning.
<b>Culminating Question</b> <b>Essential Questions</b>	<p><b>How are procedures for dimensioning used in the software (AutoCAD)?</b></p> <ul style="list-style-type: none"> <li>● How are measurements taken and represented on technical drawings?</li> <li>● What dimension guidelines are followed by industry on technical drawings?</li> <li>● How does the application of dimension guidelines affect a technical drawing?</li> <li>● How are dimension guidelines applied to technical drawings?</li> <li>● What are the procedures for dimensioning in the software?</li> </ul>			
<b>UNPACKED CONTENT</b>				
<ul style="list-style-type: none"> <li>a. Content Literacy Terminology</li> <li>b. Understand standard units of measure on technical drawings.</li> <li>c. Understand dimension guidelines.</li> <li>d. Evaluate drawings for dimension guidelines.</li> <li>e. Apply dimension guidelines to technical drawings.</li> <li>f. Apply procedures for dimensioning.</li> </ul>				

<b>INSTRUCTIONAL ACTIVITIES- 4.08</b>	
<b>A. Content Literacy Terms</b>	
<b>Resource(s)</b>	<b>(See 4.08.1)</b>
<b>B. Understand standard units of measure on technical drawings.</b>	
<i>Note: Activity combines with extension from indicator 3.02.</i>	
<b>Activity</b>	Guided Notes & Classification-Units of Measure and Standards
<b>Teacher Instructions</b>	<ul style="list-style-type: none"> <li>Facilitate whole-class instruction and guided notes using <i>Guided Notes/Table: Units of Measure- Standards</i> and <i>Units of Measure Notes Sheet</i>.</li> <li>Provide hard copy and scissors for <i>Units of Measure- Standards Matching Game</i>. Facilitate students cutting and classifying given units of measure. Students should have time to check answers.</li> </ul> <p><i>Additional Resource for Review: Units of Measure- Standards- Review</i></p> <p><i>Additional Activity:</i> Students can create a short presentation with examples of ANSI ARCH, ANSI MECH, ISO ARCH, and ISO MECH drawings they find online.</p> <p><i>Note:</i> 4.08 Extension- Have students create multiple dimension styles on architectural and mechanical drawings to represent the global market with ISO and ANSI standards.</p>
<b>Student Directions</b>	<ul style="list-style-type: none"> <li>Complete Guided Notes while participating in whole class instruction.</li> <li>Classify examples of architectural and mechanical measurement standards in both ISO and ANSI by cutting out given measurements and placing them in appropriate columns.</li> <li><i>Extension:</i> Create multiple dimension styles on architectural and mechanical drawings to represent the global market with ISO and ANSI standards.</li> </ul>
<b>Resource(s)</b>	<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">             Units of Measure- Standards.pptx         </div> <div style="text-align: center;">             Units of Measure Notes Sheet.docx         </div> <div style="text-align: center;">             Units of Measure Notes Sheet- With A         </div> </div> <div style="display: flex; justify-content: space-around; align-items: center; margin-top: 10px;"> <div style="text-align: center;">             Units of Measure- Standards Matching         </div> <div style="text-align: center;">             Units of Measure- Standards Matching         </div> <div style="text-align: center;">             Units of Measure- Standards- Review.p         </div> </div>
<b>C. Understand dimension guidelines.</b>	
<b>Activity</b>	Guided Concept Mapping Notes-Dimension Guidelines
<b>Teacher Instructions</b>	<ul style="list-style-type: none"> <li>Facilitate whole-class instruction and guided notes using <i>Making Sense of Dimensions- Guided Notes</i>. and <i>Making Sense of Dimensions Presentation</i>.</li> <li>Complete summary questions as a whole-class, in small groups or in pairs.</li> </ul> <p><i>Extension Activity:</i> Students can choose one of three activities to complete as an extension activity.</p>



<b>Student Directions</b>	<ul style="list-style-type: none"> <li>Understand major dimensioning guidelines to follow on technical drawings by participating in whole-class instruction and guided notes.</li> <li>Complete summary questions as a whole-class, in small groups or in pairs.</li> </ul>
<b>Resource(s)</b>	 Making Sense of Dimensions- Guided  Making Sense of Dimensions Present:

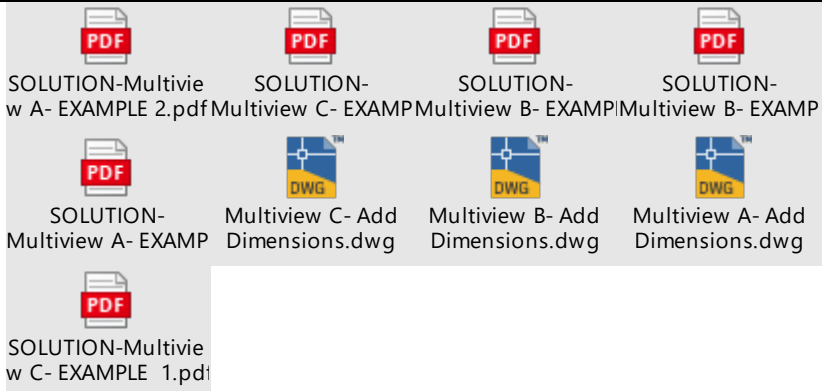
**D. Evaluate drawings for dimension guidelines.**

<b>Activity</b>	Small Group Drawing Review-Dimension Guidelines
<b>Teacher Instructions</b>	<p><i>Note:</i> Activity should follow introduction to Dimension Guidelines.</p> <ul style="list-style-type: none"> <li>Split students into heterogeneous groups of 3-4.</li> <li>Provide each group a hard copy of <i>Small Group Drawing Review- Dimensions</i> and hard copies (or digital if students have access/ability to mark corrections digitally) of <i>Small Group Drawing Review-Dimensions Example-A through G</i>.</li> <li>Facilitate groups identifying which dimension guideline(s) are “broken” on each drawing.</li> </ul>
<b>Student Directions</b>	<ul style="list-style-type: none"> <li>Analyze and demonstrate technical drawing dimension placement by identifying which dimension guideline(s) are “broken” on each drawing in small groups.</li> </ul>

<b>Resource(s)</b>	 Small Group Drawing Review- Di  Small Group Drawing Review- Di  Small Group Drawing Review- Di  Small Group Drawing Review- Di  Small Group Drawing Review- Di  Small Group Drawing Review- Di  Small Group Drawing Review- Di  Small Group Drawing Review- Di  Small Group Drawing Review- Di
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**E. Apply dimension guidelines to technical drawings.**


<b>Activity</b>	Individual Practice and Peer Review-Dimension Placement
<b>Teacher Instructions</b>	<p><i>Note:</i> Activity should follow introduction to Dimension Guidelines.</p> <ul style="list-style-type: none"> <li>Provide students drawing files or have students draw them in AutoCAD first (<i>Multiview A, B &amp; C-Add Dimensions</i>). Hardcopy versus creation can be used for differentiation as well. Facilitate students following guidelines and fully dimensioning each example.</li> <li>Provide each student a red pen for revisions. Facilitate students plotting drawings and giving hard copies to peers for review. All students should review drawings and have their own review.</li> <li>Facilitate students revising peer edited drawings in AutoCAD.</li> </ul>

	<ul style="list-style-type: none"> <li>Provide digital access to “solutions” (<i>SOLUTION-Multiview A- EXAMPLE 1 &amp; 2; SOLUTION-Multiview B-EXAMPLE 1 &amp; 2; SOLUTION-Multiview C-EXAMPLE 1 &amp; 2</i>) and facilitate students checking their own work. Allow time for students to ask questions and defend drawings/placement as these are not the ONLY solutions.</li> </ul>
<b>Student Directions</b>	<ul style="list-style-type: none"> <li>Follow guidelines and fully dimension each multiview example.</li> <li>Plot drawings and give hard copies to peers for review. You will review other’s drawings as well.</li> <li>Revise drawings in AutoCAD.</li> <li>Evaluate and analyze technical drawing dimension placement by checking your individual work using provided solutions. You may ask questions and defend drawings/placement as these are not the ONLY solutions.</li> </ul>
<b>Resource(s)</b>	 <p>SOLUTION-Multiview A- EXAMPLE 2.pdf</p> <p>SOLUTION-Multiview C- EXAMP</p> <p>SOLUTION-Multiview B- EXAMP</p> <p>SOLUTION-Multiview B- EXAMP</p> <p>SOLUTION-Multiview A- EXAMP</p> <p>Multiview C- Add Dimensions.dwg</p> <p>Multiview B- Add Dimensions.dwg</p> <p>Multiview A- Add Dimensions.dwg</p> <p>SOLUTION-Multiview C- EXAMPLE 1.pdf</p>
<b>F. Apply procedures for dimensioning drawings in the software.</b>	
<b>Activity</b>	Software Tutorials
<b>Teacher Instructions</b>	<ul style="list-style-type: none"> <li>Facilitate students completing video or written tutorial session(s) which align with the current version being used in PSU.</li> <li>Students should create multiple projects requiring dimensioning drawings in the software.</li> </ul>
<b>Student Directions</b>	<ul style="list-style-type: none"> <li>Complete video or written tutorial session(s).</li> <li>Create multiple projects requiring dimensioning drawings in the software.</li> </ul>
<b>Resource(s)</b>	<a href="#">AutoCAD Resource</a>

<b>Content Literacy Terminology- 4.08.1</b>	
Adjacent	Next to, or adjoining to, something else.
Aligned Dimension Tool	CAD dimension command/tool creates dimensions aligned to non-isometric lines.
Angular Dimension Tool	CAD dimension command/tool creates angled dimensions.
ANSI Architectural Dimension Standards	Set of dimensioning standards (units, placements, measurement, etc.) followed in the Architectural realm for construction drawings using the imperial system.
ANSI Mechanical Dimension Standards	Set of dimensioning standards (units, placements, measurement, etc.) followed in the Engineering realm for technical drawings using the imperial system.
Architectural Tic	Small dash that serves as a termination point of a dimension line in an Architectural drawing.
Arrowhead	Small triangular shape that serves as a termination point of a dimension line (Mechanical or ISO drawings) or leader. They have a standard length of .125 (1/8") and a length to width ratio of arrowheads is 3:1 (0.1256944444444444).
Associative Dimension	A dimension that automatically adjusts its size and value when the associated geometry is modified.
Center Mark	Equal length t-shape that serves as a dimensioning reference to centers of holes and axes of symmetry that are 1/8" (.125 or 2.5mm).
Continue Dimension Tool	CAD dimension command/tool used to make a ""CHAIN"" or series of adjacent linear dimensions in one operation.
Diameter Dimension Tool	CAD dimension command/tool that creates a leader, diameter symbol, and size of a circular feature/hole in one operation.
Dim Style Manager	CAD dialogue box that creates, modifies, or sets named dimension styles.
Dimension Line	Thin & dark, continuous lines that run between extension lines. They are at least 3/8" (.375) away from the object and stacked there after every 1/4" (.25) away from each other.
Dimension Style Tool	CAD command/tool that modifies DIMENSION properties such as lines and arrows, text, fit, and primary units.
Extension Line	Thin & dark, continuous lines that extend out past the feature being measured. They have a 1/16" (.0625 or 1.5mm) gap between the object and where the line begins and extend 1/8" (.125 or 3mm) past the last dimension line.
ISO Dimension Standards	Set of dimensioning standards (units, placements, measurement, etc.) for technical (and construction) drawings using the metric system.
Leader Tool	CAD dimension command/tool that a thin, solid line extending from a note and terminates with an arrowhead.
Linear Dimension Tool	CAD dimension command/tool creates horizontal and vertical dimensions.
Linear Dimensioning	Preferred ANSI MECH dimensioning standard in which dimension annotations rotated to only be read from the bottom edge of the drawing sheet.
Location Dimension	Label the location of each geometric feature within an object or view.

Radius Dimension Tool	CAD dimension command/tool that creates a leader, radius symbol, and size of an arc in one operation.
Size Dimension	Dimensions which label the length of the overall width, height, and depth of an object.
Unidirectional Dimensioning	Preferred ANSI ARCH and ISO dimensioning standard in which dimension annotations are rotated to align with what they are labeling.
Unit of Measure	CAD setting for a drawing/project that determines what each unit in your drawing represents (i.e., inches or millimeters).





<b>Course</b>	<b>IC61 Drafting I</b>			
<b>Essential Standard</b>	4.00	C3	80%	Apply CAD User Skills (with use of the following CAD software).
<b>Indicator</b>	4.09	N/A	N/A	Apply procedures for hatching objects/ enhancements.
<b>Culminating Question</b> <b>Essential Questions</b>	<p><b>How are procedures for hatching objects and enhancements used in the software (AutoCAD)?</b></p> <ul style="list-style-type: none"> <li>● What are common hatch patterns used in industry?</li> <li>● What are the procedures for annotating hatching objects/ enhancements in the software?</li> </ul>			
<b>UNPACKED CONTENT</b>				
<ul style="list-style-type: none"> <li>a. Content Literacy Terminology</li> <li>b. Identify common hatch patterns used in industry.</li> <li>c. Apply procedures for hatching objects/ enhancements.</li> </ul>				

<b>INSTRUCTIONAL ACTIVITIES- 4.09</b>	
<b>A. Content Literacy Terms</b>	
<b>Resource(s)</b>	<b>(See 4.09.1)</b>
<b>B. Identify common hatch patterns used in industry.</b>	
<b>Activity</b>	Concept Exploration-Hatch Command
<b>Teacher Instructions</b>	<ul style="list-style-type: none"> <li>• Provide students digital access to <i>Hatch It Activity</i>.</li> <li>• Facilitate students answering questions in activity and gathering examples of common patterns.</li> <li>• Facilitate students creating a drawing using the HATCH command.</li> </ul>
<b>Student Directions</b>	<ul style="list-style-type: none"> <li>• Identify common hatch patterns by answering questions in activity and gathering examples of common patterns.</li> <li>• Create an AutoCAD drawing with various patterns using the HATCH command.</li> </ul>
<b>Resource(s)</b>	 Hatch It Activity.docx
<b>C. Apply procedures for hatching objects/ enhancements.</b>	
<b>Activity</b>	Software Tutorials
<b>Teacher Instructions</b>	<ul style="list-style-type: none"> <li>• Facilitate students completing video or written tutorial session(s) which align with the current version being used in PSU.</li> <li>• Students should create multiple projects requiring hatching objects/enhancements.</li> </ul>
<b>Student Directions</b>	<ul style="list-style-type: none"> <li>• Complete video or written tutorial session(s).</li> <li>• Create multiple projects requiring hatching objects/enhancements.</li> </ul>
<b>Resource(s)</b>	<a href="#">AutoCAD Resource</a>

<b>Content Literacy Terminology- 4.09.1</b>	
Associative Hatching	Hatching that conforms to its bounding objects such that modifying the bounding objects automatically adjusts the hatch.
Bounded Area	A closed area that consists of a single object such as a circle or closed polyline, or of multiple, coplanar objects that overlap. Bounded areas are used to create objects such as hatches.
Fill Tool	CAD command/tool that solidly fills an area established by boundaries.
Gradient Tool	CAD command/tool that fills an area established by boundaries with a range of position-dependent colors.
Hatch Tool	CAD command/tool that fills an area established by boundaries with a pattern.
Island	An enclosed area within another enclosed area. Islands may be detected as part of the process of creating hatches, polylines, and regions.
Section View	A projected view that shows the hidden interior details as though the drawing view it was projected from was sliced through.
Transparency	A value that defines how much light passes through an object.


<b>Course</b>	<b>IC61 Drafting I</b>			
<b>Essential Standard</b>	4.00	C3	80%	Apply CAD User Skills (with use of the following CAD software).
<b>Indicator</b>	4.10	N/A	N/A	Apply procedures for working with reusable content/blocks.
<b>Culminating Question</b> <b>Essential Questions</b>	<p><b>How are procedures for working with reusable content/blocks used in the software (AutoCAD)?</b></p> <ul style="list-style-type: none"> <li>● What are blocks and reusable content used in industry?</li> <li>● What are the procedures for creating reusable content/blocks in the software?</li> </ul>			
<b>UNPACKED CONTENT</b>				
<ul style="list-style-type: none"> <li>a. Content Literacy Terminology</li> <li>b. Apply procedures for working with reusable content/blocks.</li> <li>c. Apply procedures for creating reusable content/blocks.</li> </ul>				



<b>INSTRUCTIONAL ACTIVITIES- 4.10</b>	
<b>A. Content Literacy Terms</b>	
<b>Resource(s)</b>	<b>(See 4.10.1)</b>
<b>B. Apply procedures for working with reusable content/blocks.</b>	
<b>Activity</b>	industry Application Simulation-Blocks
<b>Teacher Instructions</b>	<ul style="list-style-type: none"> <li>• Provide digital access (or hardcopy) of <i>ARCH Block Activity- Instructions</i>. Provide drawing files or have students produce drawings in AutoCAD (<i>ARCH Blocks</i> and <i>ARCH Floor Plan- One Bedroom</i>). Hardcopy versus creation can be used for higher level learner differentiation and even extended by giving hard copy of <i>ARCH Floor Plan- One Bedroom- Handout</i> and an architect's scale to measure then create.</li> <li>• Facilitate students creating block files and then placing them appropriately in the floor plan file.</li> </ul> <p>Note: Activity also provides opportunity for discussion on basics of floor plan symbols (concept from post-requisites Architecture II and Architecture III).</p>
<b>Student Directions</b>	<ul style="list-style-type: none"> <li>• Create and apply blocks in a floor plan.</li> </ul>
<b>Resource(s)</b>	<div style="text-align: center;">     </div> <p style="text-align: center;"> ARCH Floor Plan- One Bedroom Apart    ARCH Blocks.dwg    ARCH Block Activity- Instructions.docx    ARCH Floor Plan- One Bedroom.dwg </p>
<b>C. Apply procedures for creating reusable content/blocks.</b>	
<b>Activity</b>	Software Tutorials
<b>Teacher Instructions</b>	<ul style="list-style-type: none"> <li>• Facilitate students completing video or written tutorial session(s) which align with the current version being used in PSU.</li> <li>• Students should create multiple projects requiring reusable content/blocks.</li> </ul>
<b>Student Directions</b>	<ul style="list-style-type: none"> <li>• Complete video or written tutorial session(s).</li> <li>• Create multiple projects requiring reusable content/blocks.</li> </ul>
<b>Resource(s)</b>	<a href="#">AutoCAD Resource</a>


<b>Content Literacy Terminology- 4.10.1</b>	
Block	A generic term for one or more objects that are combined to create a single object.
Block Definition	The name, base point, and set of objects that are combined and stored in the block definition table of a drawing.
Block Reference	A compound object that is inserted in a drawing and displays the data stored in a block definition.
ByBlock	A special object property used to specify that the object inherits the color or linetype of any block containing it.
Design Center	A User Interface element that organizes access to drawings, blocks, hatches, and other drawing content.
Insertion Point	The point (base point) where a block will be placed off of, in a drawing.

<b>Course</b>	<b>IC61 Drafting I</b>			
<b>Essential Standard</b>	4.00	C3	80%	Apply CAD User Skills (with use of the following CAD software).
<b>Indicator</b>	4.11	N/A	N/A	Apply procedures for creating additional drawing objects, including polylines, splines, and ellipses.
<b>Culminating Question</b> <b>Essential Questions</b>	<p><b>How are procedures creating additional drawing objects, including polylines, splines, and ellipses used in the software (AutoCAD)?</b></p> <ul style="list-style-type: none"> <li>• What are some additional drawing commands in AutoCAD?</li> <li>• What are the procedures for creating additional drawing objects, including polylines, splines, and ellipses in the software?</li> </ul>			
<b>UNPACKED CONTENT</b>				
<ul style="list-style-type: none"> <li>a. Content Literacy Terminology</li> <li>b. Understand additional drawing commands in software.</li> <li>c. Apply procedures for creating additional drawing objects, including polylines, splines, and ellipses.</li> </ul>				

<b>INSTRUCTIONAL ACTIVITIES- 4.11</b>	
<b>A. Content Literacy Terms</b>	
<b>Resource(s)</b>	<b>(See 4.11.1)</b>
<b>B. Understand common drawing commands in software.</b>	
<i>Note: Activity combines with Indicator 4.02.</i>	
<b>Activity</b>	Student-Led Research-Common Commands
<b>Teacher Instructions</b>	<ul style="list-style-type: none"> <li>● Provide each student a hard copy of <i>Common AutoCAD Drawing Commands to Remember</i>.</li> <li>● Facilitate students using the software program and the internet to complete the table.</li> <li>● Facilitate whole-class, small group or individual review after work is completed by students and corrections to table.</li> </ul>
<b>Student Directions</b>	<ul style="list-style-type: none"> <li>● Demonstrate an understanding of common drawing commands used in AutoCAD by completing the table (you may use the internet and/or the software).</li> <li>● Participate in the review and make corrections to your table as needed.</li> </ul>
<b>Resource(s)</b>	 Common AutoCAD Drawing Commands
<b>C. Apply procedures for creating additional drawing objects, including polylines, splines, and ellipses.</b>	
<b>Activity</b>	Software Tutorials
<b>Teacher Instructions</b>	<ul style="list-style-type: none"> <li>● Facilitate students completing video or written tutorial session(s) which align with the current version being used in PSU.</li> <li>● Students should create multiple projects requiring the creation of additional drawing objects, including polylines, splines, and ellipses.</li> </ul>
<b>Student Directions</b>	<ul style="list-style-type: none"> <li>● Complete video or written tutorial session(s).</li> <li>● Create multiple projects requiring the creation of additional drawing objects, including polylines, splines, and ellipses..</li> </ul>
<b>Resource(s)</b>	<a href="#">AutoCAD Resource</a>

<b>Content Literacy Terminology- 4.11.1</b>	
Ellipse Tool	CAD drawing command/tool that creates an ellipse.
Major Axis	The longest diameter of an ellipse.
Minor Axis	The shortest diameter of an ellipse.
Polyline Tool	CAD drawing command/tool that creates an object composed of one or more connected line segments or circular arcs treated as a single object.
Spline Tool	CAD drawing command/tool that creates a smooth curve that either passes through or near a given set of points.

<b>Course</b>	<b>IC61 Drafting I</b>			
<b>Essential Standard</b>	4.00	C3	80%	Apply CAD User Skills (with use of the following CAD software).
<b>Indicator</b>	4.12	N/A	N/A	Apply procedures for plotting the drawing.
<b>Culminating Question</b> <b>Essential Questions</b>	<p><b>How are procedures for plotting a drawing used in the software (AutoCAD)?</b></p> <ul style="list-style-type: none"> <li>● What are the industry standard sheet sizes for technical drawings?</li> <li>● What are the procedures for plotting from the software?</li> </ul>			
<b>UNPACKED CONTENT</b>				
<ul style="list-style-type: none"> <li>a. Content Literacy Terminology</li> <li>b. Understand industry standard sheet sizes.</li> <li>c. Apply procedures for plotting the drawing.</li> </ul>				

<b>INSTRUCTIONAL ACTIVITIES- 4.12</b>	
<b>A. Content Literacy Terms</b>	
<b>Resource(s)</b>	<b>(See 4.12.1)</b>
<b>B. Understand industry standard sheet sizes.</b>	
<b>Activity</b>	Independent Research and Inquiry Questions-Sheet Sizes
<b>Teacher Instructions</b>	<ul style="list-style-type: none"> <li>• Provide hard or digital copy of <i>Sheet Sizes- Activity</i>.</li> <li>• Facilitate students reading introductions to each standard set, completing tables, and finding examples showing measurements online.</li> <li>• Facilitate students answering follow-up inquiry questions as whole-class, small-groups, pairs, or individually.</li> <li>• Facilitate formative review of information.</li> </ul>
<b>Student Directions</b>	<ul style="list-style-type: none"> <li>• Differentiate between standard sheet sets by reading introductions to each standard set, completing the tables, and finding examples showing measurements online.</li> <li>• Answer follow-up inquiry questions as whole-class, small-groups, pairs, or individually.</li> <li>• Participate in review of information.</li> </ul>
<b>Resource(s)</b>	 Sheet Sizes Activity.docx
<b>C. Apply procedures for plotting the drawing.</b>	
<b>Activity</b>	Software Tutorials
<b>Teacher Instructions</b>	<ul style="list-style-type: none"> <li>• Facilitate students completing video or written tutorial session(s) which align with the current version being used in PSU.</li> <li>• Students should create multiple projects requiring various drawing outputs and plots.</li> </ul>
<b>Student Directions</b>	<ul style="list-style-type: none"> <li>• Complete video or written tutorial session(s).</li> <li>• Create multiple projects requiring various drawing outputs and plots.</li> </ul>
<b>Resource(s)</b>	<a href="#">AutoCAD Resource</a>

<b>Content Literacy Terminology- 4.12.1</b>	
Layout	The 2D environment in which you create layout viewports and place title blocks for plotting. Multiple layouts can be created for each drawing
Plot	To print.
Plot Style	An object property that specifies a set of overrides for color, dithering, gray scale, pen assignments, screening, linetype, lineweight, endstyles, jointstyles, and fill styles. Plot styles are applied at plot time
Scale	Certain amount in which a drawing shows real objects with accurate sizes reduced or enlarged.
Sheet	A layout selected from a drawing file and assigned to a sheet set.
Sheet Set	An organized and named collection of sheets from several drawing files.