

CAD I

Revised UBD Curriculum
Egg Harbor Township High School
Industrial Arts Technology Department

CTE



Career and Technical Education

Created By: George M. Kohut
Coordinated By: Dr. Carmelita Graham
Date: June 2016

DISTRICT MISSION STATEMENT

Our mission in the Egg Harbor Township School District is to partner with the student, family, school, and community to provide a safe learning environment that addresses rigorous and relevant 21st Century standards and best practices which will develop academic scholarship, integrity, leadership, citizenship, and the unique learning style of students, while encouraging them to develop a strong work ethic and to act responsibly in their school community and everyday society.

CAREER AND TECHNICAL EDUCATION

Mission:

New Jersey's Office of Career and Technical Education seeks to prepare students for career opportunities of the 21st century, succeed as global citizens and support healthy economic growth for New Jersey. Career and Technical Education prepares students to succeed as global citizens for career opportunities for the 21st Century and to support healthy economic growth within the state.

INTRODUCTION

The most precious resource teachers have is time. Regardless of how much time a course is scheduled for, it is never enough to accomplish all that one would like. Therefore, it is imperative that teachers utilize the time they have wisely in order to maximize the potential for all students to achieve the desired learning.

High quality educational programs are characterized by clearly stated goals for student learning, teachers who are well-informed and skilled in enabling students to reach those goals, program designs that allow for continuous growth over the span of years of instruction, and ways of measuring whether students are achieving program goals.

EGG HARBOR TOWNSHIP SCHOOL DISTRICT CURRICULUM TEMPLATE

The Egg Harbor Township School District has embraced the backward-design model as the foundation for all curriculum development for the educational program. When reviewing curriculum documents and the Egg Harbor Township curriculum template, aspects of the backward-design model will be found in the stated enduring *understandings/essential questions*, *unit assessments*, and *instructional activities*. Familiarization with backward-design is critical to working effectively with Egg Harbor Township's curriculum guides.

GUIDING PRINCIPLES: WHAT IS BACKWARD DESIGN?

WHAT IS UNDERSTANDING BY DESIGN?

"Backward design" is an increasingly common approach to planning curriculum and instruction. As its name implies, "backward design" is based on defining clear goals, providing acceptable evidence of having achieved those goals, and then working 'backward' to identify what actions need to be taken that will ensure that the gap between the current status and the desired status is closed.

Building on the concept of backward design, Grant Wiggins and Jay McTighe (2005) have developed a structured approach to planning programs, curriculum, and instructional units. Their model asks educators to state goals; identify deep understandings, pose essential questions, and specify clear evidence that goals, understandings, and core learning have been achieved.

Program based on backward design use desired results to drive decisions. With this design, there are questions to consider, such as: What should students understand, know, and be able to do? What does it look like to meet those goals? What kind of program will result in the outcomes stated? How will we know students have achieved that result? What other kinds of evidence will tell us that we have a quality program? These questions apply regardless of whether they are goals in program planning or classroom instruction.

The backward design process involves three interrelated stages for developing an entire curriculum or a single unit of instruction. The relationship from planning to curriculum design, development, and implementation hinges upon the integration of the following three stages.

Stage I: Identifying Desired Results: Enduring understandings, essential questions, knowledge and skills need to be woven into curriculum publications, documents, standards, and scope and sequence materials. Enduring understandings identify the “big ideas” that students will grapple with during the course of the unit. Essential questions provide a unifying focus for the unit and students should be able to answer more deeply and fully these questions as they proceed through the unit. Knowledge and skills are the “stuff” upon which the understandings are built.

Stage II: Determining Acceptable Evidence: Varied types of evidence are specified to ensure that students demonstrate attainment of desired results. While discrete knowledge assessments (e.g.: multiple choice, fill-in-the-blank, short answer, etc...) will be utilized during an instructional unit, the overall unit assessment is performance-based and asks students to demonstrate that they have mastered the desired understandings. These culminating (summative) assessments are authentic tasks that students would likely encounter in the real-world after they leave school. They allow students to demonstrate all that they have learned and can do. To demonstrate their understandings students can explain, interpret, apply, provide critical and insightful points of view, show empathy and/or evidence self-knowledge. Models of student performance and clearly defined criteria (i.e.: rubrics) are provided to all students in advance of starting work on the unit task.

Stage III: Designing Learning Activities: Instructional tasks, activities, and experiences are aligned with stages one and two so that the desired results are obtained based on the identified evidence or assessment tasks. Instructional activities and strategies are considered only once stages one and two have been clearly explicated. Therefore, congruence among all three stages can be ensured and teachers can make wise instructional choices.

At the curricular level, these three stages are best realized as a fusion of research, best practices, shared and sustained inquiry, consensus building, and initiative that involves all stakeholders. In this design, administrators are instructional leaders who enable the alignment between the curriculum and other key initiatives in their district or schools. These leaders demonstrate a clear purpose and direction for the curriculum within their school or district by providing support for implementation, opportunities for revision through sustained and consistent professional development, initiating action research activities, and collecting and evaluating materials to ensure alignment with the desired results. Intrinsic to the success of curriculum is to show how it aligns with the overarching goals of the district, how the document relates to district, state, or national standards, what a high quality educational program looks like, and what excellent teaching and learning looks like. Within education, success of the educational program is realized through this blend of commitment and organizational direction.

INTENT OF THE GUIDE

This guide is intended to provide teachers with course objective and possible activities, as well as assist the teacher in planning and delivering instruction in accordance with the New Jersey Core Curriculum Content Standards. The guide is not intended to restrict or limit the teacher’s resources or individual instruction techniques. It is expected that the teacher will reflectively adjust and modify instruction and units during the course of normal lessons depending on the varying needs of the class, provided such modified instruction attends to the objectives and essential questions outlined below.

Unit Name: 1a Introduction and Technology

Time Frame: 5 Periods

Author: Industrial Technology Committee

UNIT

Subject: CAD I

Country: USA

Course/Grade: CADI - Drafting/Grades 9-12

State/Group: **NJ**

School: EHT High School

UNIT SUMMARY: This Sub Unit will introduce the course and what is going to be covered. It will include all handbook rules and procedures. Discussion of Technology and its development, progress, adapting applications to public use, future and etc... will be covered.

UNIT RESOURCES

- **Teacher Material**
- **Visuals**
- **Verbal Information**
- **Updated and current internet articles**

Internet Resource Links:

- <https://www.nasa.gov/topics/technology/index.html>
- <https://www.nasa.gov/topics/technology/news/index.htm>

STAGE ONE

GOALS AND STANDARDS

- CRP2. Apply appropriate academic and technical skills.
- CRP4. Communicate clearly and effectively and with reason.
- CRP6. Demonstrate creativity and innovation.
- CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.
- CRP10. Plan education and career paths aligned to personal goals.
- CRP11. Use technology to enhance productivity.
- 9.1.12.A.3 Analyze the relationship between various careers and personal earning goals.
- 9.2.12.C.1 Review career goals and determine steps necessary for attainment.

- 9.2.12.C.2 Modify Personalized Student Learning Plans to support declared career goals.
- 9.2.12.C.3 Identify transferable career skills and design alternate career plans.
- 9.3.12.AC-DES.6 Apply the techniques and skills of modern drafting, design, engineering and construction to projects.
- 9.3.12.AC-DES.8 Apply standards, applications and restrictions pertaining to the selection and use of construction materials, components and assemblies in the project design.
- MA.9-12.G.CO.1 Know precise definitions of angle, circle, perpendicular line, parallel line, and line segment, based on the undefined notions of point, line, distance along a line, and distance around a circular arc.
- MA.9-12.G.CO.12 Make formal geometric constructions with a variety of tools and methods (compass and straightedge, string, reflective devices, paper folding, dynamic geometric software, etc.).
- TECH.8.2.12.D.3 Determine and use the appropriate resources (e.g., CNC (Computer Numerical Control) equipment, 3D printers, CAD software) in the design, development and creation of a technological product or system.
- 9.3.12.AC.6 Read, interpret and use technical drawings, documents and specifications to plan a project.
- MANU.9-12.9.4.12.M.15 Employ critical thinking skills (e.g., analyze, synthesize, and evaluate) independently and in teams to solve problems and make decisions.
- 12.9.3. MN.3 *Comply* with federal, state and local regulations to ensure worker safety and health and environmental work practices.
- 12.9.3. MN-MIR.2 Demonstrate the safe use of equipment to ensure a safe and healthy environment.
- 12.9.3. MN.4 Describe career opportunities and means to achieve those opportunities in each of the Career Pathways.
- CAEP.9.2.12.C.1 Review career goals and determine steps necessary for attainment.
- LA.11-12.CCSS.ELA-Literacy.RST.11-12.2 - [*Grade Level Standard*]
Determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing

ENDURING UNDERSTANDING

- Students will understand the history of technology and how it has changed industry.
- Students will understand how technology effects their lives and their future.

ESSENTIAL QUESTIONS

- How did technology develop in the USA?
- What is a good understanding of Technology?

KNOWLEDGE AND SKILLS

- Students will understand how technology advancements affects us.

STAGE TWO

PERFORMANCE TASKS

- Group Assignments – Discussions – History advancements

OTHER EVIDENCE

- Assignments
- Assessments
- Quarterly Exams
- SGO's

STAGE THREE

LEARNING PLAN

- Understand technology when working with all assignments.

Unit Name: 1b Measurement

Time Frame: 5 Periods

Author: Industrial Technology Committee

UNIT

Subject: CAD I

Country: USA

Course/Grade: CAD I - Drafting/Grades 9-12

State/Group: **NJ**

School: EHT High School

UNIT SUMMARY: The Sub Unit will explore the background of the English Measurement System. Applications and uses with fractions, decimal and etc... Emphasizes will cover concerns and problems of the Metric vs English measurement system. Different measuring instruments will be discussed and used. The students will be taught how to use a ruler or a scale and measure accurately and quickly. Note: Precise measurement will be required throughout the entire course.

UNIT RESOURCES

- Text Reference
- Teacher Material
- Visuals
- Verbal Information
- Handouts
- Exercises
- Rulers

Internet Resource Links:

- <http://www.edsebooks.com/paper/inchmetric.html>
- <https://www.interexchange.org/articles/career-training-usa/2012/05/24/imperial-vs-metric-system/>

STAGE ONE

GOALS AND STANDARDS

- CRP2. Apply appropriate academic and technical skills.
- CRP4. Communicate clearly and effectively and with reason.
- CRP6. Demonstrate creativity and innovation.

- CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.
- CRP10. Plan education and career paths aligned to personal goals.
- CRP11. Use technology to enhance productivity.
- 9.1.12.A.3 Analyze the relationship between various careers and personal earning goals.
- 9.2.12.C.1 Review career goals and determine steps necessary for attainment.
- 9.2.12.C.2 Modify Personalized Student Learning Plans to support declared career goals.
- 9.2.12.C.3 Identify transferable career skills and design alternate career plans.
- 9.3.12.AC-DES.6 Apply the techniques and skills of modern drafting, design, engineering and construction to projects.
- 9.3.12.AC-DES.8 Apply standards, applications and restrictions pertaining to the selection and use of construction materials, components and assemblies in the project design.
- MA.9-12.G.CO.1 Know precise definitions of angle, circle, perpendicular line, parallel line, and line segment, based on the undefined notions of point, line, distance along a line, and distance around a circular arc.
- MA.9-12.G.CO.12 Make formal geometric constructions with a variety of tools and methods (compass and straightedge, string, reflective devices, paper folding, dynamic geometric software, etc.).
- TECH.8.2.12.D.3 Determine and use the appropriate resources (e.g., CNC (Computer Numerical Control) equipment, 3D printers, CAD software) in the design, development and creation of a technological product or system.
- 9.3.12.AC.6 Read, interpret and use technical drawings, documents and specifications to plan a project.
- MANU.9-12.9.4.12.M.15 Employ critical thinking skills (e.g., analyze, synthesize, and evaluate) independently and in teams to solve problems and make decisions.
- 12.9.3. MN.3 *Comply* with federal, state and local regulations to ensure worker safety and health and environmental work practices.
- 12.9.3. MN-MIR.2 Demonstrate the safe use of equipment to ensure a safe and healthy environment.
- 12.9.3. MN.4 Describe career opportunities and means to achieve those opportunities in each of the Career Pathways.

- *CAEP.9.2.12.C.1* Review career goals and determine steps necessary for attainment.
- LA.11-12.CCSS.ELA-Literacy.RST.11-12.2 - [*Grade Level Standard*]
Determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing

ENDURING UNDERSTANDING

- Students will understand how to use the English system of measurement.
- Students will understand why international trade demands metric.

ESSENTIAL QUESTIONS

- What measurement system do we use in the USA?
- Why do we need Metric?
- Why do we use decimal with the English system of measurement?

KNOWLEDGE AND SKILLS

- Students will be able to measure to the nearest sixteenth of an inch.
- Students will be able to use measurement tools.

STAGE TWO

PERFORMANCE TASKS

- Measurements Exercises: inch, half, quarters, eighths, sixteenths, ruler and decimal.
- Quiz
- Using measurement accurately on all future drawings.

OTHER EVIDENCE

- Assignments
- Assessments
- Quarterly Exams
- SGO's

STAGE THREE

LEARNING PLAN - Activities

- Understand and apply measurement accurately on all drawings.
- Measurements Exercises: inch, half, quarters, eights, sixteenths, ruler and decimal.
- Quiz
- Test
- Applied to all future drawings

Unit Name: 1c Lettering

Time Frame: 2 Periods

Author: Industrial Technology Committee

UNIT

Subject: CAD I

Country: USA

Course/Grade: CADI - Drafting/Grades 9-12

State/Group: **NJ**

School: EHT High School

UNIT SUMMARY: The Sub Unit will cover the proper method and options of correct lettering on all drawings.

UNIT RESOURCES

- **Text Reference**
- **Teacher Material**
- **Visuals**
- **Verbal Information**
- **Handouts**
- **Exercises**

Internet Resource Links:

- <http://www.ucvts.tec.nj.us/cms/lib5/NJ03001805/Centricity/Domain/611/Lesson%203%20Lettering.pdf>

STAGE ONE

- **GOALS** CRP2. Apply appropriate academic and technical skills.
- CRP4. Communicate clearly and effectively and with reason.

- CRP6. Demonstrate creativity and innovation.
- CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.
- CRP10. Plan education and career paths aligned to personal goals.
- CRP11. Use technology to enhance productivity.
- 9.1.12.A.3 Analyze the relationship between various careers and personal earning goals.
- 9.2.12.C.1 Review career goals and determine steps necessary for attainment.
- 9.2.12.C.2 Modify Personalized Student Learning Plans to support declared career goals.
- 9.2.12.C.3 Identify transferable career skills and design alternate career plans.
- 9.3.12.AC-DES.6 Apply the techniques and skills of modern drafting, design, engineering and construction to projects.
- 9.3.12.AC-DES.8 Apply standards, applications and restrictions pertaining to the selection and use of construction materials, components and assemblies in the project design.
- MA.9-12.G.CO.1 Know precise definitions of angle, circle, perpendicular line, parallel line, and line segment, based on the undefined notions of point, line, distance along a line, and distance around a circular arc.
- MA.9-12.G.CO.12 Make formal geometric constructions with a variety of tools and methods (compass and straightedge, string, reflective devices, paper folding, dynamic geometric software, etc.).
- TECH.8.2.12.D.3 Determine and use the appropriate resources (e.g., CNC (Computer Numerical Control) equipment, 3D printers, CAD software) in the design, development and creation of a technological product or system.
- 9.3.12.AC.6 Read, interpret and use technical drawings, documents and specifications to plan a project.
- MANU.9-12.9.4.12.M.15 Employ critical thinking skills (e.g., analyze, synthesize, and evaluate) independently and in teams to solve problems and make decisions.
- 12.9.3. MN.3 *Comply* with federal, state and local regulations to ensure worker safety and health and environmental work practices.
- 12.9.3. MN-MIR.2 Demonstrate the safe use of equipment to ensure a safe and healthy environment.

- 12.9.3. MN.4 Describe career opportunities and means to achieve those opportunities in each of the Career Pathways.
- CAEP.9.2.12.C.1 Review career goals and determine steps necessary for attainment.
- LA.11-12.CCSS.ELA-Literacy.RST.11-12.2 - [*Grade Level Standard*]
Determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing

AND STANDARDS

ENDURING UNDERSTANDING

- Students will understand and make neat and proper lettering on all drawings.

ESSENTIAL QUESTIONS

- What is the height of our letters?
- What is the height of fractions?

KNOWLEDGE AND SKILLS

- Students will be able to letter properly on all drawings.

STAGE TWO

PERFORMANCE TASKS

- Lettering Exercise
- Letter neatly and properly on all future drawings.

OTHER EVIDENCE

- Assignments
- Assessments
- Quarterly Exams
- SGO's

STAGE THREE

LEARNING PLAN - Activities

- Learn how to letter properly on all drawings. This is taught early in the course and will improve during the course with all drawings.
- Lettering Exercise

- Future Drawings assessments.

Unit: 1d Equipment Use
Time Frame: 5 Periods

Author: Industrial Technology Committee

UNIT

Subject: CAD I Country: USA

Course/Grade: CADI - Drafting/Grades 9-12

State/Group: **NJ**

School: EHT High School

UNIT SUMMARY: The Sub Unit will cover Safety in the classroom and the proper use of Board Drafting Tools, leads, line technique and all equipment.

UNIT RESOURCES

- **Text Reference**
- **Teacher Material**
- **Visuals**
- **Verbal Information**
- **Handouts**
- **Exercises**
- **Drafting Equipment for each student**

Internet Resource Links:

- <http://www.engineersupply.com/drafting-equipment.aspx>
- <https://www.osha.gov/>

STAGE ONE

GOALS AND STANDARDS

- CRP2. Apply appropriate academic and technical skills.
- CRP4. Communicate clearly and effectively and with reason.
- CRP6. Demonstrate creativity and innovation.
- CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.
- CRP10. Plan education and career paths aligned to personal goals.
- CRP11. Use technology to enhance productivity.

- 9.1.12.A.3 Analyze the relationship between various careers and personal earning goals.
- 9.2.12.C.1 Review career goals and determine steps necessary for attainment.
- 9.2.12.C.2 Modify Personalized Student Learning Plans to support declared career goals.
- 9.2.12.C.3 Identify transferable career skills and design alternate career plans.
- 9.3.12.AC-DES.6 Apply the techniques and skills of modern drafting, design, engineering and construction to projects.
- 9.3.12.AC-DES.8 Apply standards, applications and restrictions pertaining to the selection and use of construction materials, components and assemblies in the project design.
- MA.9-12.G.CO.1 Know precise definitions of angle, circle, perpendicular line, parallel line, and line segment, based on the undefined notions of point, line, distance along a line, and distance around a circular arc.
- MA.9-12.G.CO.12 Make formal geometric constructions with a variety of tools and methods (compass and straightedge, string, reflective devices, paper folding, dynamic geometric software, etc.).
- TECH.8.2.12.D.3 Determine and use the appropriate resources (e.g., CNC (Computer Numerical Control) equipment, 3D printers, CAD software) in the design, development and creation of a technological product or system.
- 9.3.12.AC.6 Read, interpret and use technical drawings, documents and specifications to plan a project.
- MANU.9-12.9.4.12.M.15 Employ critical thinking skills (e.g., analyze, synthesize, and evaluate) independently and in teams to solve problems and make decisions.
- 12.9.3. MN.3 *Comply* with federal, state and local regulations to ensure worker safety and health and environmental work practices.
- 12.9.3. MN-MIR.2 Demonstrate the safe use of equipment to ensure a safe and healthy environment.
- 12.9.3. MN.4 Describe career opportunities and means to achieve those opportunities in each of the Career Pathways.
- CAEP.9.2.12.C.1 Review career goals and determine steps necessary for attainment.
- LA.11-12.CCSS.ELA-Literacy.RST.11-12.2 - [*Grade Level Standard*]
Determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing

ENDURING UNDERSTANDING

- Students will understand and use drafting equipment safely and properly.

ESSENTIAL QUESTIONS

- What is the height of our letters?
- What is the height of fractions?
- What is a T Square?
- What is a scale?
- What are the different instruments we use?

KNOWLEDGE AND SKILLS

- Students will be able use all equipment properly to make drawings.

STAGE TWO

PERFORMANCE TASKS

- Drawing Exercises – Lines – proper use of equipment
- Drawings – proper use of equipment

OTHER EVIDENCE

- Assignments
- Assessments
- Quarterly Exams
- SGO's

STAGE THREE

LEARNING PLAN – Activities

- Exercises:
 - Straight Lines
 - 30/60 Degree Lines
 - 45 Degree Lines

- Equipment use
- Learn how to draw using the equipment properly and safely.

Unit Name: 1e Geometrics
Time Frame: 8 Periods

Author: Industrial Technology Committee

UNIT

Subject: CAD I Country: USA

Course/Grade: CAD I - Drafting/Grades 9-12

State/Group: **NJ**

School: EHT High School

UNIT SUMMARY: The Sub Unit will cover Geometric Construction, Geometric Polygons and its applications to making drawings. Examples will be given about construction applications.

UNIT RESOURCES

- **Text Reference**
- **Teacher Material**
- **Visuals**
- **Verbal Information**
- **Handouts**
- **Exercises**
- **Drafting Equipment for each student**

Internet Resource Links:

- <http://www.tpub.com/engbas/4.htm>
- http://www.g-w.com/pdf/sampchap/9781590709030_ch06.pdf

STAGE ONE

GOALS AND STANDARDS

- CRP2. Apply appropriate academic and technical skills.
- CRP4. Communicate clearly and effectively and with reason.
- CRP6. Demonstrate creativity and innovation.
- CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.
- CRP10. Plan education and career paths aligned to personal goals.
- CRP11. Use technology to enhance productivity.

- 9.1.12.A.3 Analyze the relationship between various careers and personal earning goals.
- 9.2.12.C.1 Review career goals and determine steps necessary for attainment.
- 9.2.12.C.2 Modify Personalized Student Learning Plans to support declared career goals.
- 9.2.12.C.3 Identify transferable career skills and design alternate career plans.
- 9.3.12.AC-DES.6 Apply the techniques and skills of modern drafting, design, engineering and construction to projects.
- 9.3.12.AC-DES.8 Apply standards, applications and restrictions pertaining to the selection and use of construction materials, components and assemblies in the project design.
- MA.9-12.G.CO.1 Know precise definitions of angle, circle, perpendicular line, parallel line, and line segment, based on the undefined notions of point, line, distance along a line, and distance around a circular arc.
- MA.9-12.G.CO.12 Make formal geometric constructions with a variety of tools and methods (compass and straightedge, string, reflective devices, paper folding, dynamic geometric software, etc.).
- TECH.8.2.12.D.3 Determine and use the appropriate resources (e.g., CNC (Computer Numerical Control) equipment, 3D printers, CAD software) in the design, development and creation of a technological product or system.
- 9.3.12.AC.6 Read, interpret and use technical drawings, documents and specifications to plan a project.
- MANU.9-12.9.4.12.M.15 Employ critical thinking skills (e.g., analyze, synthesize, and evaluate) independently and in teams to solve problems and make decisions.
- 12.9.3. MN.3 *Comply* with federal, state and local regulations to ensure worker safety and health and environmental work practices.
- 12.9.3. MN-MIR.2 Demonstrate the safe use of equipment to ensure a safe and healthy environment.
- 12.9.3. MN.4 Describe career opportunities and means to achieve those opportunities in each of the Career Pathways.
- CAEP.9.2.12.C.1 Review career goals and determine steps necessary for attainment.
- LA.11-12.CCSS.ELA-Literacy.RST.11-12.2 - [Grade Level Standard]
Determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing

ENDURING UNDERSTANDING

- Students will understand and use drafting equipment safely and properly.
- Students will understand and use Geometrics for drafting.

ESSENTIAL QUESTIONS

- How do we bisect a line using equipment?
- What are Polygons?
- How do we draw a Pentagon using drawing equipment properly?
- How do we draw a Hexagon using drawing equipment properly?
- How do we draw an Octagon using drawing equipment properly?

KNOWLEDGE AND SKILLS

- Students will be able use understand Geometrics with all drawings.

STAGE TWO

PERFORMANCE TASKS

- Geometric Exercises
- Geometric Drawing Tests

OTHER EVIDENCE

- Assignments
- Assessments
- Quarterly Exams
- SGO's

STAGE THREE

LEARNING PLAN – Activities

- Exercises:
 - Bisecting
 - Triangles
 - Square
 - Pentagon
 - Hexagon

- Octagon and etc...
 -
- Drawing - Grid Method: –
 - Pig
 -
- One view drawings:
 - Gasket
 - Hex Wrench
 - Offset Link
 -
- Equipment use for geometrics
-
- Learn how to draw geometrics with the equipment properly and safely.

Unit Name: 1f Pictorial Drawings

Time Frame: 6 Periods

Author: Industrial Technology Committee

UNIT

Subject: CAD I

Country: USA

Course/Grade: CADI - Drafting/Grades 9-12

State/Group: **NJ**

School: EHT High School

UNIT SUMMARY: The Sub Unit will cover different type's pictorial drawings.

UNIT RESOURCES

Internet Resource Links:

<http://www.millwood.ednet.ns.ca/tech/ext10/drafting/pictor/>

STAGE ONE

GOALS AND STANDARDS

- CRP2. Apply appropriate academic and technical skills.
- CRP4. Communicate clearly and effectively and with reason.
- CRP6. Demonstrate creativity and innovation.

- CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.
- CRP10. Plan education and career paths aligned to personal goals.
- CRP11. Use technology to enhance productivity.
- 9.1.12.A.3 Analyze the relationship between various careers and personal earning goals.
- 9.2.12.C.1 Review career goals and determine steps necessary for attainment.
- 9.2.12.C.2 Modify Personalized Student Learning Plans to support declared career goals.
- 9.2.12.C.3 Identify transferable career skills and design alternate career plans.
- 9.3.12.AC-DES.6 Apply the techniques and skills of modern drafting, design, engineering and construction to projects.
- 9.3.12.AC-DES.8 Apply standards, applications and restrictions pertaining to the selection and use of construction materials, components and assemblies in the project design.
- MA.9-12.G.CO.1 Know precise definitions of angle, circle, perpendicular line, parallel line, and line segment, based on the undefined notions of point, line, distance along a line, and distance around a circular arc.
- MA.9-12.G.CO.12 Make formal geometric constructions with a variety of tools and methods (compass and straightedge, string, reflective devices, paper folding, dynamic geometric software, etc.).
- TECH.8.2.12.D.3 Determine and use the appropriate resources (e.g., CNC (Computer Numerical Control) equipment, 3D printers, CAD software) in the design, development and creation of a technological product or system.
- 9.3.12.AC.6 Read, interpret and use technical drawings, documents and specifications to plan a project.
- MANU.9-12.9.4.12.M.15 Employ critical thinking skills (e.g., analyze, synthesize, and evaluate) independently and in teams to solve problems and make decisions.
- 12.9.3. MN.3 *Comply* with federal, state and local regulations to ensure worker safety and health and environmental work practices.
- 12.9.3. MN-MIR.2 Demonstrate the safe use of equipment to ensure a safe and healthy environment.
- 12.9.3. MN.4 Describe career opportunities and means to achieve those opportunities in each of the Career Pathways.

- CAEP.9.2.12.C.1 Review career goals and determine steps necessary for attainment.
- LA.11-12.CCSS.ELA-Literacy.RST.11-12.2 - [*Grade Level Standard*]
Determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing

ENDURING UNDERSTANDING

- Students will understand and use drafting equipment safely and properly.

ESSENTIAL QUESTIONS

- What angled lines do we draw for and Isometric?

KNOWLEDGE AND SKILLS

- Students will be able use understand Pictorial Drawings and be able to make and understand Isometric Drawings.

STAGE TWO

PERFORMANCE TASKS

- Isometric Exercises/Drawings: Block with rectangular hole – Double Block – Non isometric lines – Different view (looking up) Equipment use for Isometric Drawings
- Equipment use for Isometric Drawings
- Learn how to draw Isometrics with the equipment properly and safely.

OTHER EVIDENCE

- Assignments

- Assessments
- Quarterly Exams
- SGO's

STAGE THREE

LEARNING PLAN – Activities

- Exercises – block with rectangular hole – non isometric lines – different view (looking up)
 - ISO (1-4)
 - ISO (2-4)
 - ISO (3-4)
 - ISO (4-4)
- Equipment use for Isometric Drawings
- Learn how to draw Isometrics with the equipment properly and safely.

Unit Name: 2 Multi View Drawing
Time Frame: 20 Periods

Author: Industrial Technology Committee

UNIT

Subject: CAD I Country: USA

Course/Grade: CADI - Drafting/Grades 9-12

State/Group: **NJ**

School: EHT High School

UNIT SUMMARY: The Unit will cover and focus on (*Orthographic Projection*) Multi-View drawings (Front, Top & Right Side).

UNIT RESOURCES

- Text Reference
- Teacher Material
- Visuals
- Verbal Information
- Handouts
- Exercises
- Drawings
- Drafting Equipment for each student

Internet Resource Links:

- <http://www.mhhe.com/engcs/drawgr/bertolinetgc/etext/chapt08.pdf>
- <http://facultad.bayamon.inter.edu/omeza/2220/multiview.pdf>
- <http://www.northernhighlands.org/cms/lib5/NJ01000179/Centricity/Domain/282/Ortho%20Dimensions%20and%20sketching.pdf>

STAGE ONE

GOALS AND STANDARDS

- CRP2. Apply appropriate academic and technical skills.
- CRP4. Communicate clearly and effectively and with reason.
- CRP6. Demonstrate creativity and innovation.

- CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.
- CRP10. Plan education and career paths aligned to personal goals.
- CRP11. Use technology to enhance productivity.
- 9.1.12.A.3 Analyze the relationship between various careers and personal earning goals.
- 9.2.12.C.1 Review career goals and determine steps necessary for attainment.
- 9.2.12.C.2 Modify Personalized Student Learning Plans to support declared career goals.
- 9.2.12.C.3 Identify transferable career skills and design alternate career plans.
- 9.3.12.AC-DES.6 Apply the techniques and skills of modern drafting, design, engineering and construction to projects.
- 9.3.12.AC-DES.8 Apply standards, applications and restrictions pertaining to the selection and use of construction materials, components and assemblies in the project design.
- MA.9-12.G.CO.1 Know precise definitions of angle, circle, perpendicular line, parallel line, and line segment, based on the undefined notions of point, line, distance along a line, and distance around a circular arc.
- MA.9-12.G.CO.12 Make formal geometric constructions with a variety of tools and methods (compass and straightedge, string, reflective devices, paper folding, dynamic geometric software, etc.).
- TECH.8.2.12.D.3 Determine and use the appropriate resources (e.g., CNC (Computer Numerical Control) equipment, 3D printers, CAD software) in the design, development and creation of a technological product or system.
- 9.3.12.AC.6 Read, interpret and use technical drawings, documents and specifications to plan a project.
- MANU.9-12.9.4.12.M.15 Employ critical thinking skills (e.g., analyze, synthesize, and evaluate) independently and in teams to solve problems and make decisions.
- 12.9.3. MN.3 *Comply* with federal, state and local regulations to ensure worker safety and health and environmental work practices.
- 12.9.3. MN-MIR.2 Demonstrate the safe use of equipment to ensure a safe and healthy environment.
- 12.9.3. MN.4 Describe career opportunities and means to achieve those opportunities in each of the Career Pathways.
- CAEP.9.2.12.C.1 Review career goals and determine steps necessary for attainment.

- LA.11-12.CCSS.ELA-Literacy.RST.11-12.2 - [*Grade Level Standard*]
Determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing

ENDURING UNDERSTANDING

- Students will understand, sketch and draw Multi-View drawings properly.
- Students will understand how to use the English system of measurement.
- Students will be able to measure to the nearest sixteenth of an inch.
- Students will be able to use measurement tools.
- What is the height of our letters?
- What is the height of fractions?
- Students will understand and use Geometrics for drafting.
- Students will understand and use drafting equipment safely and properly.
- Students will be able use understand Pictorial Drawings and be able to make and understand Isometric Drawings.

ESSENTIAL QUESTIONS

- How many views are there on any one object?
- How many views do we use?
- Why is a sketch important?
- What is the thickness of an object line?
- What is the thickness of a hidden line?
- What is the thickness of a center line?

KNOWLEDGE AND SKILLS

- Students will be able make Multi View Drawings using board drafting tools or CAD software.

STAGE TWO

PERFORMANCE TASKS

- Multi View projection Exercises and assigned Multi-View Drawings.

OTHER EVIDENCE

- Assignments

- Assessments
- Quarterly Exams
- SGO's

STAGE THREE

LEARNING PLAN – Activities

- Projection Exercises:
 - PR. EX. A
 - PR. EX. B
- Drawings:
 - Stop
 - Dovetail Slide
 - Cradle Block
 - Slide, Pivot Arm
 - Cam Bracket
 - Horizontal Guide
 - Adjustable Fork
 - Bearing Plate
 - Base Bracket
 - Guide
- Sketches for all Drawings - Develop an understanding how to think and visualize a drawing - then make a sketch to work by.

Unit Name: 3 Dimensioning
Time Frame: 8 Periods

Author: Industrial Technology Committee

UNIT

Subject: CAD I Country: USA

Course/Grade: CADI - Drafting/Grades 9-12

State/Group: **NJ**

School: EHT High School

UNIT SUMMARY: The Unit will cover Dimensioning of Multi View drawings with board drawings and CAD Drawings.

UNIT RESOURCES

- **Text Reference**
- **Teacher Material**
- **Visuals**
- **Verbal Information**
- **Handouts**
- **Exercises**
- **Drawings**
- **Drafting Equipment for each student**

Internet Resource Links:

- <http://www.northernhighlands.org/cms/lib5/NJ01000179/Centricity/Domain/282/Ortho%20Dimensions%20and%20sketching.pdf>
- http://engineering.pages.tcnj.edu/files/2012/02/dimensioning_and_tolerancing.pdf

STAGE ONE

GOALS AND STANDARDS

- CRP2. Apply appropriate academic and technical skills.
- CRP4. Communicate clearly and effectively and with reason.
- CRP6. Demonstrate creativity and innovation.
- CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.
- CRP10. Plan education and career paths aligned to personal goals.
- CRP11. Use technology to enhance productivity.

- 9.1.12.A.3 Analyze the relationship between various careers and personal earning goals.
- 9.2.12.C.1 Review career goals and determine steps necessary for attainment.
- 9.2.12.C.2 Modify Personalized Student Learning Plans to support declared career goals.
- 9.2.12.C.3 Identify transferable career skills and design alternate career plans.
- 9.3.12.AC-DES.6 Apply the techniques and skills of modern drafting, design, engineering and construction to projects.
- 9.3.12.AC-DES.8 Apply standards, applications and restrictions pertaining to the selection and use of construction materials, components and assemblies in the project design.
- MA.9-12.G.CO.1 Know precise definitions of angle, circle, perpendicular line, parallel line, and line segment, based on the undefined notions of point, line, distance along a line, and distance around a circular arc.
- MA.9-12.G.CO.12 Make formal geometric constructions with a variety of tools and methods (compass and straightedge, string, reflective devices, paper folding, dynamic geometric software, etc.).
- TECH.8.2.12.D.3 Determine and use the appropriate resources (e.g., CNC (Computer Numerical Control) equipment, 3D printers, CAD software) in the design, development and creation of a technological product or system.
- 9.3.12.AC.6 Read, interpret and use technical drawings, documents and specifications to plan a project.
- MANU.9-12.9.4.12.M.15 Employ critical thinking skills (e.g., analyze, synthesize, and evaluate) independently and in teams to solve problems and make decisions.
- 12.9.3. MN.3 *Comply* with federal, state and local regulations to ensure worker safety and health and environmental work practices.
- 12.9.3. MN-MIR.2 Demonstrate the safe use of equipment to ensure a safe and healthy environment.
- 12.9.3. MN.4 Describe career opportunities and means to achieve those opportunities in each of the Career Pathways.
- CAEP.9.2.12.C.1 Review career goals and determine steps necessary for attainment.
- LA.11-12.CCSS.ELA-Literacy.RST.11-12.2 - [Grade Level Standard]
Determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing

ENDURING UNDERSTANDING

- Students will understand dimensioning and tolerances, and determine the proper amount and location of dimensions on all Multi- View drawings.
- Students will understand, sketch and draw Multi-View drawings properly.
- Students will understand how to use the English system of measurement.
- Students will be able to measure to the nearest sixteenth of an inch.
- Students will be able to use measurement tools.
- What is the height of our letters?
- What is the height of fractions?
- Students will understand and use Geometrics for drafting.
- Students will understand and use drafting equipment safely and properly.
- Students will be able use understand Pictorial Drawings and be able to make and understand Isometric Drawings.

ESSENTIAL QUESTIONS

- *What completes a drawing?*
- *How many dimensions are needed for a circle?*
- *How many dimensions are needed for an angle?*
- *On a series of cuts, why do we let one dimension blank and then an overall?*

KNOWLEDGE AND SKILLS

- Students will be able use understand and dimension all assigned Multi-View Drawings.
- Students will be able to dimension on all Board Drawing assignments and CAD Drawing assignments.

STAGE TWO

PERFORMANCE TASKS

- Dimensioning Exercises A thru D
- Dimension assigned multi-view drawings

OTHER EVIDENCE

- Assignments
- Assessments
- Quarterly Exams
- SGO's

STAGE THREE

LEARNING PLAN – Activities

- Dimension Exercises:
 - DIM A
 - Dim B
 - DIM C
 - DIM D
- Missing Views and Dimension Exercise.
- Drawings:
 - Slide
 - Pin Guide
 - Cutter Holder Shoe
 - Actuator Base
 - Truion Block
 - Side Cap
 - GM Hood latch

Unit Name: 4 Auto CAD Drawing
Time Frame: 20 Periods

Author: Industrial Technology Committee

UNIT

Subject: CAD I Country: USA

Course/Grade: CADI - Drafting/Grades 9-12

State/Group: **NJ**

School: EHT High School

UNIT SUMMARY: The Unit will cover the transition of Board Drawing to CAD Drawing. All techniques, applications and process are now done applying knowledge of Board Drawing to utilize CAD Drawing.

UNIT RESOURCES

- **Text Reference**
- **Teacher Material**
- **Visuals**
- **Verbal Information**
- **Handouts**
- **Exercises**
- **Drawings**
- **Computer and Auto CAD Software for each student**
- **Printers**

Internet Resource Links:

- <http://www.autodesk.com/products/autocad-lt/overview>

STAGE ONE

GOALS AND STANDARDS

- CRP2. Apply appropriate academic and technical skills.
- CRP4. Communicate clearly and effectively and with reason.
- CRP6. Demonstrate creativity and innovation.
- CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.
- CRP10. Plan education and career paths aligned to personal goals.
- CRP11. Use technology to enhance productivity.

- 9.1.12.A.3 Analyze the relationship between various careers and personal earning goals.
- 9.2.12.C.1 Review career goals and determine steps necessary for attainment.
- 9.2.12.C.2 Modify Personalized Student Learning Plans to support declared career goals.
- 9.2.12.C.3 Identify transferable career skills and design alternate career plans.
- 9.3.12.AC-DES.6 Apply the techniques and skills of modern drafting, design, engineering and construction to projects.
- 9.3.12.AC-DES.8 Apply standards, applications and restrictions pertaining to the selection and use of construction materials, components and assemblies in the project design.
- MA.9-12.G.CO.1 Know precise definitions of angle, circle, perpendicular line, parallel line, and line segment, based on the undefined notions of point, line, distance along a line, and distance around a circular arc.
- MA.9-12.G.CO.12 Make formal geometric constructions with a variety of tools and methods (compass and straightedge, string, reflective devices, paper folding, dynamic geometric software, etc.).
- TECH.8.2.12.D.3 Determine and use the appropriate resources (e.g., CNC (Computer Numerical Control) equipment, 3D printers, CAD software) in the design, development and creation of a technological product or system.
- 9.3.12.AC.6 Read, interpret and use technical drawings, documents and specifications to plan a project.
- MANU.9-12.9.4.12.M.15 Employ critical thinking skills (e.g., analyze, synthesize, and evaluate) independently and in teams to solve problems and make decisions.
- 12.9.3. MN.3 *Comply* with federal, state and local regulations to ensure worker safety and health and environmental work practices.
- 12.9.3. MN-MIR.2 Demonstrate the safe use of equipment to ensure a safe and healthy environment.
- 12.9.3. MN.4 Describe career opportunities and means to achieve those opportunities in each of the Career Pathways.
- CAEP.9.2.12.C.1 Review career goals and determine steps necessary for attainment.
- LA.11-12.CCSS.ELA-Literacy.RST.11-12.2 - [Grade Level Standard]
Determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing

ENDURING UNDERSTANDING

- Understand, plan, sketch and draw Multi-View drawings properly using Auto CAD.
- Students will understand dimensioning and tolerances, and determine the proper amount and location of dimensions on all Multi- View drawings.
- Students will understand, sketch and draw Multi-View drawings properly.
- Students will understand how to use the English system of measurement.
- Students will be able to measure to the nearest sixteenth of an inch.
- Students will be able to use measurement tools.
- What is the height of our letters?
- What is the height of fractions?
- Students will understand and use Geometrics for drafting.
- Students will understand and use drafting equipment safely and properly.
- Students will be able use understand Pictorial Drawings and be able to make and understand Isometric Drawings.

ESSENTIAL QUESTIONS

- How do we set up the size of the paper on Auto CAD?
- What are layers?
- How do we plot?
- How do we make lines thicker?
- How do we draw a fillet with Auto CAD?
- How do we control line thickness on Auto CAD?
- How do we set up and dimension a multi-view drawing with Auto CAD?
- Why do we use array?

KNOWLEDGE AND SKILLS

- Students will be able use understand and dimension all assigned Multi-View Drawings using Auto CAD.
- Students will be able to dimension all Multi-View Drawing assignments using Auto CAD.

STAGE TWO

PERFORMANCE TASKS

- Draw Practice Exercise using AUTO CAD
- Draw and dimension all assigned drawings using Auto CAD.

OTHER EVIDENCE

- Assignments
- Assessments
- Quarterly Exams
- SGO's

STAGE THREE

LEARNING PLAN – Activities

- Draw Practice Drawing
- Draw One View Drawings using Auto CAD:
 - Gasket
 - Hex Wrench
 - Offset Link.
- Drawings:
 - Slide
 - Starting Catch
 - Pin Guide
 - Cutter Holder Shoe
 - Actuator Base
 - Truion Block
 - Side Cap
 - GM Hood Latch

Unit Name: 5 Sectioning
Time Frame: 10 Periods

Author: Industrial Technology Committee

UNIT

Subject: CAD I Country: USA

Course/Grade: CADI - Drafting/Grades 9-12

State/Group: **NJ**

School: EHT High School

UNIT SUMMARY: The Unit will cover the different types of sectioning used in drafting to make views simpler when looking at interior parts.

UNIT RESOURCES

- **Text Reference**
- **Teacher Material**
- **Visuals**
- **Verbal Information**
- **Handouts**
- **Drawings**
- **Computer and Auto CAD Software for each student**
- **Printers**

Internet Resources Links:

- http://www.engineeringessentials.com/ege/sec/sec_page1.htm

STAGE ONE

GOALS AND STANDARDS

- CRP2. Apply appropriate academic and technical skills.
- CRP4. Communicate clearly and effectively and with reason.
- CRP6. Demonstrate creativity and innovation.
- CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.
- CRP10. Plan education and career paths aligned to personal goals.
- CRP11. Use technology to enhance productivity.

- 9.1.12.A.3 Analyze the relationship between various careers and personal earning goals.
- 9.2.12.C.1 Review career goals and determine steps necessary for attainment.
- 9.2.12.C.2 Modify Personalized Student Learning Plans to support declared career goals.
- 9.2.12.C.3 Identify transferable career skills and design alternate career plans.
- 9.3.12.AC-DES.6 Apply the techniques and skills of modern drafting, design, engineering and construction to projects.
- 9.3.12.AC-DES.8 Apply standards, applications and restrictions pertaining to the selection and use of construction materials, components and assemblies in the project design.
- MA.9-12.G.CO.1 Know precise definitions of angle, circle, perpendicular line, parallel line, and line segment, based on the undefined notions of point, line, distance along a line, and distance around a circular arc.
- MA.9-12.G.CO.12 Make formal geometric constructions with a variety of tools and methods (compass and straightedge, string, reflective devices, paper folding, dynamic geometric software, etc.).
- TECH.8.2.12.D.3 Determine and use the appropriate resources (e.g., CNC (Computer Numerical Control) equipment, 3D printers, CAD software) in the design, development and creation of a technological product or system.
- 9.3.12.AC.6 Read, interpret and use technical drawings, documents and specifications to plan a project.
- MANU.9-12.9.4.12.M.15 Employ critical thinking skills (e.g., analyze, synthesize, and evaluate) independently and in teams to solve problems and make decisions.
- 12.9.3. MN.3 *Comply* with federal, state and local regulations to ensure worker safety and health and environmental work practices.
- 12.9.3. MN-MIR.2 Demonstrate the safe use of equipment to ensure a safe and healthy environment.
- 12.9.3. MN.4 Describe career opportunities and means to achieve those opportunities in each of the Career Pathways.
- CAEP.9.2.12.C.1 Review career goals and determine steps necessary for attainment.
- LA.11-12.CCSS.ELA-Literacy.RST.11-12.2 - [Grade Level Standard]
Determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing

ENDURING UNDERSTANDING

- Understand, plan, sketch, section and draw Multi-View drawings properly using Auto CAD.
- Understand, plan, sketch and draw Multi-View drawings properly using Auto CAD.
- Students will understand dimensioning and tolerances, and determine the proper amount and location of dimensions on all Multi- View drawings.
- Students will understand, sketch and draw Multi-View drawings properly.
- Students will understand how to use the English system of measurement.
- Students will be able to measure to the nearest sixteenth of an inch.
- Students will be able to use measurement tools.
- What is the height of our letters?
- What is the height of fractions?
- Students will understand and use Geometrics for drafting.
- Students will understand and use drafting equipment safely and properly.
- Students will be able use understand Pictorial Drawings and be able to make and understand Isometric Drawings.

ESSENTIAL QUESTIONS

- Why do we use sectioning?
- What is a Full Section?
- What is a Cutting Plane Line?
- What does a Section Line represent?
- What is an Offset Section?
- What is a Half Section?

KNOWLEDGE AND SKILLS

- The students will be able to understand and utilize sectioning when needed for drawings.
- The students will be able to utilize Auto CAD properly in making sectional Drawings.

STAGE TWO

PERFORMANCE TASKS

- Draw and dimension all assigned sectional drawings using Auto CAD.

OTHER EVIDENCE

- Assignments
- Assessments
- Quarterly Exams
- SGO's

STAGE THREE

LEARNING PLAN – Activities

- Drawings:
 - Full Section
 - Half Section
 - Offset Section
 - Half Section – Idler Pulley
 - Half Section – Rest
 - Half Section – Flange
 - Half Section – Cylinder Hub

Unit Name: 6 Threads and Fasteners

Time Frame: 5 Periods

Author: Industrial Technology Committee

UNIT

Subject: CAD I

Country: USA

Course/Grade: CAD I - Drafting/Grades 9-12

State/Group: **NJ**

School: EHT High School

UNIT SUMMARY: The Unit will cover history of Threads and Fasteners. The English system of measurement will be used. Specific standardized thread notes will be incorporated with all representations.

- **UNIT RESOURCES Text Reference**
- **Teacher Material**
- **Visuals**
- **Verbal Information**
- **Handouts**
- **Exercises**

Internet Resource Links:

- http://www.engineeringessentials.com/ege/fast/fast_page0.htm
- <https://www.boltdepot.com/fastener-information/identifying-fasteners.aspx>

STAGE ONE

GOALS AND STANDARDS

- CRP2. Apply appropriate academic and technical skills.
- CRP4. Communicate clearly and effectively and with reason.
- CRP6. Demonstrate creativity and innovation.
- CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.
- CRP10. Plan education and career paths aligned to personal goals.
- CRP11. Use technology to enhance productivity.
- 9.1.12.A.3 Analyze the relationship between various careers and personal earning goals.
- 9.2.12.C.1 Review career goals and determine steps necessary for attainment.
- 9.2.12.C.2 Modify Personalized Student Learning Plans to support declared career goals.
- 9.2.12.C.3 Identify transferable career skills and design alternate career plans.
- 9.3.12.AC-DES.6 Apply the techniques and skills of modern drafting, design, engineering and construction to projects.
- 9.3.12.AC-DES.8 Apply standards, applications and restrictions pertaining to the selection and use of construction materials, components and assemblies in the project design.
- MA.9-12.G.CO.1 Know precise definitions of angle, circle, perpendicular line, parallel line, and line segment, based on the undefined notions of point, line, distance along a line, and distance around a circular arc.
- MA.9-12.G.CO.12 Make formal geometric constructions with a variety of tools and methods (compass and straightedge, string, reflective devices, paper folding, dynamic geometric software, etc.).
- TECH.8.2.12.D.3 Determine and use the appropriate resources (e.g., CNC (Computer Numerical Control) equipment, 3D printers, CAD software) in the design, development and creation of a technological product or system.
- 9.3.12.AC.6 Read, interpret and use technical drawings, documents and specifications to plan a

project.

- MANU.9-12.9.4.12.M.15 Employ critical thinking skills (e.g., analyze, synthesize, and evaluate) independently and in teams to solve problems and make decisions.
- 12.9.3. MN.3 *Comply* with federal, state and local regulations to ensure worker safety and health and environmental work practices.
- 12.9.3. MN-MIR.2 Demonstrate the safe use of equipment to ensure a safe and healthy environment.
- 12.9.3. MN.4 Describe career opportunities and means to achieve those opportunities in each of the Career Pathways.
- CAEP.9.2.12.C.1 Review career goals and determine steps necessary for attainment.
- LA.11-12.CCSS.ELA-Literacy.RST.11-12.2 - [*Grade Level Standard*]
Determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing

ENDURING UNDERSTANDING

- Understand and utilize the English System of Screw Threads and Fasteners.
- Acknowledge the Metric System of Screw Threads and Fasteners.
- Understand, plan, sketch, section and draw Multi-View drawings properly using Auto CAD.
- Understand, plan, sketch and draw Multi-View drawings properly using Auto CAD.
- Students will understand dimensioning and tolerances, and determine the proper amount and location of dimensions on all Multi- View drawings.
- Students will understand, sketch and draw Multi-View drawings properly.
- Students will understand how to use the English system of measurement.
- Students will be able to measure to the nearest sixteenth of an inch.
- Students will be able to use measurement tools.
- What is the height of our letters?
- What is the height of fractions?
- Students will understand and use Geometrics for drafting.
- Students will understand and use drafting equipment safely and properly.
- Students will be able use understand Pictorial Drawings and be able to make and understand Isometric Drawings.

ESSENTIAL QUESTIONS

- *What type of thread do we use in the USA?*
- *Who is William Sellers?*
- *What does UNF mean?*
- *What is a Cap Screw?*
- *What is a Machine Screw?*
- *What is pitch?*

- *How do we determine the number of threads per inch?*

KNOWLEDGE AND SKILLS

- The student will understand the background history of threads and fasteners in the USA.
- The students will be able to understand and utilize the English System of Threads and Fasteners.
- The students will be able to utilize charts and data to make Auto CAD Drawings with proper specks.

STAGE TWO

PERFORMANCE TASKS

- Draw and speck all screw thread and fasteners properly when needed using Auto CAD.

OTHER EVIDENCE

- Assignments
- Assessments
- Quarterly Exams
- SGO's

STAGE THREE

LEARNING PLAN – Activities

- Tests:
 - History
 - Thread Notes
 - Thread and Fasteners ID

Unit Name: 7 General Assembly Drawing
Time Frame: 20 Periods

Author: Industrial Technology Committee

UNIT

Subject: CAD I Country: USA

Course/Grade: CAD I - Drafting/Grades 9-12

State/Group: **NJ**

School: EHT High School

UNIT SUMMARY: The Unit will cover General Assembly Drawings. General Assembly drawing consist of the following: (1) The Assembly Drawing, which shows how the parts are put together. (2) The Detail Drawings. (3) Parts List. Note: Everything that has been cover so far now is applied to the General Assembly Drawings. These drawings are utilized industry.

UNIT RESOURCES

- **Text Reference**
- **Teacher Material**
- **Visuals**
- **Verbal Information**
- **Handouts**
- **Drawings**
- **Computer and Auto CAD Software for each student**
- **Printers**

Internet Resource Links:

- <http://drafting101.com/articles/article.php?id=137>
- http://metal.brightcookie.com/2_draw/draw_t1/htm/draw1_2_2.htm

STAGE ONE

GOALS AND STANDARDS

- CRP2. Apply appropriate academic and technical skills.
- CRP4. Communicate clearly and effectively and with reason.
- CRP6. Demonstrate creativity and innovation.
- CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.
- CRP10. Plan education and career paths aligned to personal goals.
- CRP11. Use technology to enhance productivity.

- 9.1.12.A.3 Analyze the relationship between various careers and personal earning goals.
- 9.2.12.C.1 Review career goals and determine steps necessary for attainment.
- 9.2.12.C.2 Modify Personalized Student Learning Plans to support declared career goals.
- 9.2.12.C.3 Identify transferable career skills and design alternate career plans.
- 9.3.12.AC-DES.6 Apply the techniques and skills of modern drafting, design, engineering and construction to projects.
- 9.3.12.AC-DES.8 Apply standards, applications and restrictions pertaining to the selection and use of construction materials, components and assemblies in the project design.
- MA.9-12.G.CO.1 Know precise definitions of angle, circle, perpendicular line, parallel line, and line segment, based on the undefined notions of point, line, distance along a line, and distance around a circular arc.
- MA.9-12.G.CO.12 Make formal geometric constructions with a variety of tools and methods (compass and straightedge, string, reflective devices, paper folding, dynamic geometric software, etc.).
- TECH.8.2.12.D.3 Determine and use the appropriate resources (e.g., CNC (Computer Numerical Control) equipment, 3D printers, CAD software) in the design, development and creation of a technological product or system.
- 9.3.12.AC.6 Read, interpret and use technical drawings, documents and specifications to plan a project.
- MANU.9-12.9.4.12.M.15 Employ critical thinking skills (e.g., analyze, synthesize, and evaluate) independently and in teams to solve problems and make decisions.
- 12.9.3. MN.3 *Comply* with federal, state and local regulations to ensure worker safety and health and environmental work practices.
- 12.9.3. MN-MIR.2 Demonstrate the safe use of equipment to ensure a safe and healthy environment.
- 12.9.3. MN.4 Describe career opportunities and means to achieve those opportunities in each of the Career Pathways.
- CAEP.9.2.12.C.1 Review career goals and determine steps necessary for attainment.
- LA.11-12.CCSS.ELA-Literacy.RST.11-12.2 - [Grade Level Standard]
Determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing

ENDURING UNDERSTANDING

- Understand, plan, sketch, section, and draw General Assembly *Drawings* properly using Auto CAD.
- Understand and utilize the English System of Screw Threads and Fasteners.
- Acknowledge the Metric System of Screw Threads and Fasteners.
- Understand, plan, sketch, section and draw Multi-View drawings properly using Auto CAD.
- Understand, plan, sketch and draw Multi-View drawings properly using Auto CAD.
- Students will understand dimensioning and tolerances, and determine the proper amount and location of dimensions on all Multi- View drawings.
- Students will understand, sketch and draw Multi-View drawings properly.
- Students will understand how to use the English system of measurement.
- Students will be able to measure to the nearest sixteenth of an inch.
- Students will be able to use measurement tools.
- What is the height of our letters?
- What is the height of fractions?
- Students will understand and use Geometrics for drafting.
- Students will understand and use drafting equipment safely and properly.
- Students will be able use understand Pictorial Drawings and be able to make and understand Isometric Drawings.

ESSENTIAL QUESTIONS

- *What is included in a General Assembly drawing?*
- *How many view are on an assembly drawing?*
- *What is the purpose of a Parts List?*
- *What drawing has the dimensions?*

KNOWLEDGE AND SKILLS

- The student will understand all the various drawings and technical information covered previously.
- The student will be able to apply the skill of using Auto CAD to make a General Assembly Drawing.
- The student will be able to sketch, plan and organize a General Assembly Drawing.

STAGE TWO

PERFORMANCE TASKS

- Draw General Assembly Drawings using Auto CAD.

OTHER EVIDENCE

- Assignments
- Assessments
- Quarterly Exams
- SGO's

STAGE THREE

LEARNING PLAN – Activities

- Drawings:
 - C-Clamp
 - Marking Gage
 - Depth Gage

Unit Name: 8 3D Drawing and Printing

Time Frame: 20 Periods

Author: Industrial Technology Committee

UNIT

Subject: CAD I

Country: USA

Course/Grade: CAD I - Drafting/Grades 9-12

State/Group: **NJ**

School: EHT High School

UNIT SUMMARY: The Unit will cover 3D Drawing and Printing. The 3D Drawing will be first introduced using Tinker CAD then Auto CAD. After completing various drawings, the students will be able switch their 3D drawing to a STL file to be used for 3D Printing. The course will utilize the Mojo 3D printer.

UNIT RESOURCES

- **Text Reference**
- **Teacher Material**
- **Visuals**
- **Verbal Information**
- **Examples**
- **Drawings**
- **Tinker CAD**
- **Computer and Auto CAD Software for each student**
- **3D MojoPrinter**

Internet Resource Links:

- <https://www.tinkercad.com/>
- <http://www.stratasys.com/3d-printers/idea-series/mojo>

STAGE ONE

GOALS AND STANDARDS

- CRP2. Apply appropriate academic and technical skills.
- CRP4. Communicate clearly and effectively and with reason.
- CRP6. Demonstrate creativity and innovation.
- CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.
- CRP10. Plan education and career paths aligned to personal goals.

- CRP11. Use technology to enhance productivity.
- 9.1.12.A.3 Analyze the relationship between various careers and personal earning goals.
- 9.2.12.C.1 Review career goals and determine steps necessary for attainment.
- 9.2.12.C.2 Modify Personalized Student Learning Plans to support declared career goals.
- 9.2.12.C.3 Identify transferable career skills and design alternate career plans.
- 9.3.12.AC-DES.6 Apply the techniques and skills of modern drafting, design, engineering and construction to projects.
- 9.3.12.AC-DES.8 Apply standards, applications and restrictions pertaining to the selection and use of construction materials, components and assemblies in the project design.
- MA.9-12.G.CO.1 Know precise definitions of angle, circle, perpendicular line, parallel line, and line segment, based on the undefined notions of point, line, distance along a line, and distance around a circular arc.
- MA.9-12.G.CO.12 Make formal geometric constructions with a variety of tools and methods (compass and straightedge, string, reflective devices, paper folding, dynamic geometric software, etc.).
- TECH.8.2.12.D.3 Determine and use the appropriate resources (e.g., CNC (Computer Numerical Control) equipment, 3D printers, CAD software) in the design, development and creation of a technological product or system.
- 9.3.12.AC.6 Read, interpret and use technical drawings, documents and specifications to plan a project.
- MANU.9-12.9.4.12.M.15 Employ critical thinking skills (e.g., analyze, synthesize, and evaluate) independently and in teams to solve problems and make decisions.
- 12.9.3. MN.3 *Comply* with federal, state and local regulations to ensure worker safety and health and environmental work practices.
- 12.9.3. MN-MIR.2 Demonstrate the safe use of equipment to ensure a safe and healthy environment.
- 12.9.3. MN.4 Describe career opportunities and means to achieve those opportunities in each of the Career Pathways.
- CAEP.9.2.12.C.1 Review career goals and determine steps necessary for attainment.
- LA.11-12.CCSS.ELA-Literacy.RST.11-12.2 - [*Grade Level Standard*]
Determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing

ENDURING UNDERSTANDING

- Understand and draw 3D Drawings using Tinker CAD and Auto CAD.
- Understand how to convert their 3D Drawing to a STL file to be used to print on the 3D Mojo printer.
- Understand, plan, sketch, section, and draw General Assembly *Drawings* properly using Auto CAD.
- Understand and utilize the English System of Screw Threads and Fasteners.
- Acknowledge the Metric System of Screw Threads and Fasteners.
- Understand, plan, sketch, section and draw Multi-View drawings properly using Auto CAD.
- Understand, plan, sketch and draw Multi-View drawings properly using Auto CAD.
- Students will understand dimensioning and tolerances, and determine the proper amount and location of dimensions on all Multi- View drawings.
- Students will understand, sketch and draw Multi-View drawings properly.
- Students will understand how to use the English system of measurement.
- Students will be able to measure to the nearest sixteenth of an inch.
- Students will be able to use measurement tools.
- What is the height of our letters?
- What is the height of fractions?
- Students will understand and use Geometrics for drafting.
- Students will understand and use drafting equipment safely and properly.
- Students will be able use understand Pictorial Drawings and be able to make and understand Isometric Drawings.

ESSENTIAL QUESTIONS

- *How is a 3D drawing different from a 2D Drawing?*
- *How do you start a 3D drawing?*
- *How do you make a fillet on a 3D Drawing?*
- *How do you change the units on Tinker CAD?*

KNOWLEDGE AND SKILLS

- The student will be able to apply their Auto CAD and drawing skills to make 3D drawings.

STAGE TWO

PERFORMANCE TASKS

- Draw 3D Drawings using various software's.

OTHER EVIDENCE

- Assignments
- Assessments
- Quarterly Exams
- SGO's

LEARNING PLAN – Activities

- Drawings and optional 3D Mojo Printing:
 - Various assigned Drawings
 - C-Clamp
 - Car Design
 - Train
 - Student desired designs

Curriculum Resources - Differentiated Instruction

Special Education Interventions in General Education

Visual Supports

Extended time to complete tests and assignments

Graphic Organizers

Mnemonic tricks to improve memory

Study guides

Use agenda book for assignments

Provide a posted daily schedule

Use of classroom behavior management system

Use prompts and model directions

Use task analysis to break down activities and lessons into each individual step needed to complete the task

Use concrete examples to teach concepts

Have student repeat/rephrase written directions

Heterogeneous grouping

Resources:

Do to Learn:

<http://www.do2learn.com/>

Sen Teacher:

<http://www.senteacher.org/>

Intervention Central:

<http://www.interventioncentral.org/>

Learning Ally:

<https://www.learningally.org/>

English Language Learners Interventions in Regular Education

Resources:

FABRIC - Learning Paradigm for ELLs (NJDOE)

www.nj.gov/education/bilingual/pd/fabric/fabric.pdf

Guide to Teaching ELL Students

<http://www.colorincolorado.org/new-teaching-ells>

Edutopia - Supporting English Language Learners

<https://www.edutopia.org/blog/strategies-and-resources-supporting-ell-todd-finley>

Reading Rockets

<http://www.readingrockets.org/reading-topics/english-language-learners>

Gifted and Talented Interventions in Regular Education

Resources:

Who are Gifted and Talented Students

<http://www.npr.org/sections/ed/2015/09/28/443193523/who-are-the-gifted-and-talented-and-what-do-they-need>

Hoagies Gifted Education Page

<http://www.hoagiesgifted.org/programs.htm>

21st Century Learning

Resources:

Partnership for 21st Century Learning

<http://www.p21.org/>

Career Ready Practices (NJDOE)

<http://www.nj.gov/education/cte/hl/CRP.pdf>

Curriculum Resources - Differentiated Instruction

Special Education Interventions in General Education

Visual Supports

Extended time to complete tests and assignments

Graphic Organizers

Mnemonic tricks to improve memory

Study guides

Use agenda book for assignments

Provide a posted daily schedule

Use of classroom behavior management system

Use prompts and model directions

Use task analysis to break down activities and lessons into each individual step needed to complete the task

Use concrete examples to teach concepts

Have student repeat/rephrase written directions

Heterogeneous grouping

Resources:

Do to Learn:

<http://www.do2learn.com/>

Sen Teacher:

<http://www.senteacher.org/>

Intervention Central:

<http://www.interventioncentral.org/>

Learning Ally:

<https://www.learningally.org/>

English Language Learners Interventions in Regular Education

Resources:

FABRIC - Learning Paradigm for ELLs (NJDOE)

www.nj.gov/education/bilingual/pd/fabric/fabric.pdf

Guide to Teaching ELL Students

<http://www.colorincolorado.org/new-teaching-ells>

Edutopia - Supporting English Language Learners

<https://www.edutopia.org/blog/strategies-and-resources-supporting-ell-todd-finley>

Reading Rockets

<http://www.readingrockets.org/reading-topics/english-language-learners>

Gifted and Talented Interventions in Regular Education

Resources:

Who are Gifted and Talented Students

<http://www.npr.org/sections/ed/2015/09/28/443193523/who-are-the-gifted-and-talented-and-what-do-they-need>

Hoagies Gifted Education Page

<http://www.hoagiesgifted.org/programs.htm>

21st Century Learning

Resources:

Partnership for 21st Century Learning

<http://www.p21.org/>

Career Ready Practices (NJDOE)

<http://www.nj.gov/education/cte/hl/CRP.pdf>