

Unit 03: CAD_CAM

Content Area: **Template**
Course(s):
Time Period: **Full Year**
Length: **FY**
Status: **Published**

Standards Alignment

New Jersey Student Learning Standards

Practice 1. Asking questions (for science) and defining problems (for engineering)

Asking questions and defining problems in 9–12 builds on K–8 experiences and progresses to formulating, refining, and evaluating empirically testable questions and design problems using models and simulations.

Ask questions to clarify and refine a model, an explanation, or an engineering problem.

MA.G-MG	Modeling with Geometry
MA.G-MG.A	Apply geometric concepts in modeling situations
MA.G-MG.A.1	Use geometric shapes, their measures, and their properties to describe objects (e.g., modeling a tree trunk or a human torso as a cylinder).
MA.G-MG.A.3	Apply geometric methods to solve design problems (e.g., designing an object or structure to satisfy physical constraints or minimize cost; working with typographic grid systems based on ratios).
AAAA.K-12.4	Pursue personal and aesthetic growth.
AAAA.K-12.4.1	Skills
AAAA.K-12.4.1.8	Use creative and artistic formats to express personal learning.

Integration of Career Readiness, Life Literacies and Key Skills

12.9.3.ST	Science, technology, engineering & mathematics
12.9.3.ST.3	Describe and follow safety, health and environmental standards related to science, technology, engineering and mathematics (STEM) workplaces.
CRP.K-12.CRP1	Act as a responsible and contributing citizen and employee.
CRP.K-12.CRP2	Apply appropriate academic and technical skills.
CRP.K-12.CRP3	Attend to personal health and financial well-being.
CRP.K-12.CRP4	Communicate clearly and effectively and with reason.
CRP.K-12.CRP5	Consider the environmental, social and economic impacts of decisions.
CRP.K-12.CRP6	Demonstrate creativity and innovation.
CRP.K-12.CRP7	Employ valid and reliable research strategies.
CRP.K-12.CRP8	Utilize critical thinking to make sense of problems and persevere in solving them.
CRP.K-12.CRP9	Model integrity, ethical leadership and effective management.
CRP.K-12.CRP10	Plan education and career paths aligned to personal goals.

CRP.K-12.CRP11

Use technology to enhance productivity.

CRP.K-12.CRP12

Work productively in teams while using cultural global competence.

Technology / Integration of Computer Science and Design Thinking

TECH.8.2.12

Technology Education, Engineering, Design, and Computational Thinking - Programming: All students will develop an understanding of the nature and impact of technology, engineering, technological design, computational thinking and the designed world as they relate to the individual, global society, and the environment.

TECH.8.2.12.D

Abilities for a Technological World: The designed world is the product of a design process that provides the means to convert resources into products and systems.

TECH.8.2.12.D.1

Design and create a prototype to solve a real world problem using a design process, identify constraints addressed during the creation of the prototype, identify trade-offs made, and present the solution for peer review.

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.

Interdisciplinary Connections: NJSLs for ELA, Social Studies, Science and/or Math Section

LA.K-12.NJSLSA.W

Writing

LA.K-12.NJSLSA.W7

Conduct short as well as more sustained research projects, utilizing an inquiry-based research process, based on focused questions, demonstrating understanding of the subject under investigation.

LA.W.9-10.7

Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.

Integration of Diversity, Equity and Inclusion; Climate Change; Informational and Media Literacy

see Crosswalks

21st Century Life and Careers

Stage I: Desired Results

Transfer/Overview/Rationale

Transfer / Overview / Rationale

Unit Rationale

The purpose of this unit...

This unit will be the foundation of 2D design. Students will learn how to properly use illustrator and the vinyl printer. This will allow students to use these skills in further units.

Meaning

Essential Questions

Essential Questions

- When is it appropriate to use programs such as Illustrator and photoshop?
- When would a designer use a raster image over a vector image?
- How do we properly set up an image to be sent to the vinyl printer?
- What are some ways to use these skills for design projects in the future?
- How do designers incorporate design principles into their products?

Enduring Understanding/Indicators of Understanding

Enduring Understanding/Indicators of Understanding

- Illustrator and photoshop are used for various designs in our society. They are often used to design signs, advertisements, logo designs, and photography editing.
- Vector design is often seen in logo design, sticker design, and various advertising. A designer or a photographer will use raster images when working with pixels such as editing photos.
- Knowing how to use illustrator and the vinyl printer can improve the quality and aesthetics of design projects. It allows the designer to customize their products as well as add features that couldn't be done other wise.
- The vinyl printer only reads vector images. In order for an image to be cut it needs to have the proper cut contour lines on the image, this tells the printer what to cut.

- The design principles improve the look and design of our products. They can make our images cleaner and user friendly.

Acquisition (Student Learning Objectives)

Knowledge

Knowledge

Students will know...

- Difference between raster/vector images and how they are used in the design industry.
- The difference between illustrator and photoshop, and when it is appropriate to use each program.
- How CAD programs and machines are used and benefit the design world.
- Understand how various design principles are incorporated in design.
 - How design principles benefit our overall designs.
 - How to create proper scaling and measurements on illustrator.

Skills

Skills

Student will be skilled at ...

- Apply CAD/CAM skills when creating design solutions.
- Design a product using a CAD/CAM program and design principles.
- Use accurate scaling when designing on illustrator.
- Safely and accurately use tools to process materials in generating a solution to a problem.
- Effectively setup design documents to be sent to the vinyl printer.
- Develop an understanding of raster and vector images and identify when it is appropriate to use each when designing.
- Properly include design principles into designs.

Stage 3: Learning Plan

Resource and Mentor Texts

Resources and Mentor Texts

- CAD Software/Machine: Adobe Illustrator, Vinyl Printer
- Computers, projector
- Materials: Adhesive Vinyl,
- Tools and Machines: scroll saw, table saw, drill press, hand tools, bandsaw.
- <https://www.smashingmagazine.com/2009/08/vital-tips-for-effective-logo-design/>
- <http://ndesign-studio.com/tutorials/halloween-pumpkin>
- <http://design.tutsplus.com/tutorials/the-basics-of-clipping-paths-and-opacity-masks--vector-2799>

Formative Assessment Strategies

Formative Assessment Strategies

- Exit ticket.
- Twitter board.
- Teacher lead questions and discussion.
- Design tutorials.
- Logo Sketches.
- Peer feedback.
- What is technology worksheet.
- Scale model.
- What did we learn chart.
- KWL chart.

[Adobe Illustrator.docx](#)
[Design Principles.doc](#)

Learning Activities/Unit of Study

Learning Activities/Unit of Study

- **Do Now-** take out materials from the previous day, log on to computers and open up documents, small activity to recap the day before.
- **Review** - recap on material that has been covered (questions, discussion, whiteboard)
- **Lecture** on design principles.
- **Demos-** the teacher will lead step by step demos on illustrator where the students
- **Students** will work in teams to complete a design project.
- **Students** will review illustrator skills through tutorials and demos.
- **Student led instruction**
- **Thumbs up/down/sideways** - quick formative assessment to gauge students level of understanding.

- Student presentations- students will present their ideas to the class to receive feedback from their classmates.
- Feedback meetings- students will meet with teacher at the conclusion of each step in order to get the teachers approval before moving forward.
- Open lab days- students will work on design projects or assignments(students/teams may be at different steps of the project).
- Students will work on step by step design tutorials.
- Testing and evaluation- students along with the teacher will test student projects and evaluate the projects success.

[Eng Notebook.pdf](#)

[Geometric Kermit the Frog.docx](#)

[Pumpkin-Gonzalez.docx](#)

[ClockTutorialInstructions2 \(1\).docx](#)

Modifications and/or Accommodations

Suggested Modifications (ELL, Sp. Ed, Gifted, At-risk of Failure)

English Language Learners

Native language support: The teacher provides auditory or written content to students in their native language.

Adjusted Speech: The teacher changes speech patterns to increase student comprehension. This could include facing the students, paraphrasing, clearly indicating the most important ideas, and speaking more slowly.

Visuals: The teacher uses graphics, pictures, visuals, and manipulatives. This helps ELL students better understand and comprehend the subjects at hand.

Front-Loading Vocabulary: The teacher front loads vocabulary. This means providing students with a list of important vocabulary words they will need to know for a book, lesson, etc. prior to the lesson being taught. Including pictures to go with the vocabulary words is also very beneficial for the students.

Special Education Students

Chunking: The teacher presents information in a way that makes it easy for students to understand and remember. Chunking is based on the presumption that our working memory is easily overloaded by excessive detail. The best way to deliver information is to organize it into meaningful units. Because students with special needs get overloaded easily, chunking is an effective strategy to use with them.

Checking for Understanding: It is important to constantly check for understanding, especially for students who have accommodations. Teachers want to make sure students understand the

concepts being covered in a way that makes sense to them.

Extra time: The teacher provides students with special needs extra time to complete work or answer questions. It is important to give students enough time to process their thoughts.

Oral Reading: The teacher will read work orally to students. Class work such as tests and literature circles may need to be read aloud to the student.

Timers: The teacher will use timers as an instructional tool. The use of timers is beneficial for students who have trouble completing tasks. Timers can be helpful so the student is aware of how much time they have to complete an assignment.

Students with 504 Plans

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Gifted & Talented Strategies

Extensions/Enrichments: Teachers will provide gifted and talented students with extension/enrichment projects. Students will be challenged to further their understanding, to apply acquired knowledge, and/or to produce something in reference to acquired knowledge.

Modify/Change Activities: Teachers will monitor and modify activities to accommodate those students who need to be challenged further. Additional reading, problem-solving, writing, or project work is necessary for those students who are ready to move on at a rate more accelerated than their peers. In this way, G & T students are provided the same opportunity for support as special needs students.

Students at Risk of School Failure

Directions or Instructions: Make sure directions and/or instructions are given in limited numbers. Give directions/instructions verbally and in simple written format. Ask students to repeat the instructions or directions to ensure understanding occurs. Check back with the student to ensure

he/she hasn't forgotten.

Peer Support: Peers can help build confidence in other students by assisting in peer learning. Many teachers use the 'ask 3 before me' approach. This is fine, however, a student at risk may have to have a specific student or two to ask. Set this up for the student so he/she knows who to ask for clarification before going to you.

Alternate or Modified Assignments: Always ask yourself, "How can I modify this assignment to ensure the students at risk are able to complete it?" Sometimes you'll simplify the task, reduce the length of the assignment or allow for a different mode of delivery. For instance, many students may hand something in, the at-risk student may jot notes and give you the information verbally. Or, it just may be that you will need to assign an alternate assignment.

Increase One to One Time: When other students are working, always touch base with your students at risk and find out if they're on track or needing some additional support. A few minutes here and there will go a long way to intervene as the need presents itself.

Contracts: It helps to have a working contract between you and your students at risk. This helps prioritize the tasks that need to be done and ensure completion happens. Each day write down what needs to be completed, as the tasks are done, provide a checkmark or happy face. The goal of using contracts is to eventually have the student come to you for completion sign-offs.

Hands On: As much as possible, think in concrete terms and provide hands-on tasks. This means a child doing math may require a calculator or counters. The child may need to tape record comprehension activities instead of writing them. A child may have to listen to a story being read instead of reading it him/herself.

Tests/Assessments: Tests can be done orally if need be. Break tests down in smaller increments by having a portion of the test in the morning, another portion after lunch and the final part the next day.

Seating: Seat students near a helping peer or with quick access to the teacher. Those with hearing or sight issues need to be close to the instruction which often means near the front.