GEORGIA | PEACH STATE PATHWAYS

Career, Technical, & Agricultural Education

ENGINEERING & TECHNOLOGY

COURSE: Foundations of Engineering and Technology

UNIT: 8: Technical Design

INTRODUCTION

Annotation: Briefly describe the unit topics, tasks, methods, etc.

Students will demonstrate the fundamentals of technical sketching to express basic design elements. Students will present a technical design using computer generated visuals.

Grade(s):

X	9th
X	10th
X	11th
X	12th

Time:

- Student Learning & Guided Practice 14 Days
- Culminating Activity-5 Days
- Assessment-1 Day

Author:

Gillespie

Additional Author(s):

Students with Disabilities:

For students with disabilities, the instructor should refer to the student's IEP to be sure that the accommodations specified are being provided. Instructors should also familiarize themselves with the provisions of Behavior Intervention Plans that may be part of a student's IEP. Frequent consultation with a student's special education instructor will be beneficial in providing appropriate differentiation.

FOCUS STANDARDS

GPS Focus Standards: Please list the standard and elements covered.

ENGR-FET-1d – Participate in hands-on activities related to multiple engineering and technology pathways.
ENGR-FET-5 – Students will describe the essential systems and processes involved with invention, innovation, and entrepreneurship.
ENGR-FET-6 – Students will use visual and verbal communication to express basic design elements.
ENGR-STEM-6 – Students will enhance reading by developing vocabulary and comprehension skills associated with text materials, problem descriptions, and laboratory activities associated with engineering and technology education.
CTAE-FS-3 Communications – Learners use various communication skills in expressing and interpreting information
CTAE-FS-5 Information Technology Applications – Learners use multiple information technology devices to access, organize, process, transmit, and communicate information

GPS Academic Standards:

ELAALRC2. The student participates in discussions related to curricular learning in all subject areas.
ELAALRC3. The student acquires new vocabulary in each content area and uses it correctly.
ELAALRC4. The student establishes a context for information acquired by reading across subject areas.
MM3P3. Students will communicate mathematically.
MM3P4. Students will make connections among mathematical ideas and to other disciplines.
MM3P5. Students will represent mathematics in multiple ways.
SCSh3. Students will identify and investigate problems scientifically.
SCSh4. Students use tools and instruments for observing, measuring and manipulating scientific equipment and materials.
SCSh5. Students will demonstrate the computation and estimation skills necessary for analyzing datat and developing reasonable scientific explanations.
SCSh8. Students will understand important features of the process of scientific inquiry.

National / Local Standards / Industry / ISTE:

UNDERSTANDINGS & GOALS

Enduring Understandings:

Student will be able to use visual communication to express basic design elements.

Essential Questions:

1. What are the fundamentals of technical sketching?
2. What tools are used for drafting?
3. What are multi-view drawings?
4. What is the importance of single-stroke gothic alphabet?
5. What is CAD and what is its importance in the field of engineering?

Knowledge from this Unit: Factual information.

1. Students will know the basics of how to put an engineering drawing on paper.
2. Students will be familiar with the Computer Automated Drawing or CAD.
3. Students will know the correct vocabulary to use in CAD.

Skills from this Unit: Performance.

1. Students will be able to identify the different tools needed for engineer drawing.
2. Students will be able to distinguish between the different structures of drawing on the CAD system.
3. Students will identify the correct language to use in the engineer drawing field.

ASSESSMENT(S)

Assessment Method Type: Select one or more of the following. Please consider the type(s) of differentiated instruction you will be using in the classroom.

____ Pre-test
X Objective assessment - multiple-choice, true- false, etc.
__ Quizzes/Tests
_X_ Unit test
X Group project
X Individual project
____ Self-assessment - May include practice quizzes, games, simulations, checklists, etc.
__ Self-check rubrics
__ Self-check during writing/planning process
__ Journal reflections on concepts, personal experiences and impact on one's life
__ Reflect on evaluations of work from teachers, business partners, and competition judges
__ Academic prompts
__ Practice quizzes/tests
X Subjective assessment/Informal observations
__ Essay tests
_X_ Observe students working with partners
__ Observe students role playing
____ Peer-assessment
__ Peer editing & commentary of products/projects/presentations using rubrics
__ Peer editing and/or critiquing
X Dialogue and Discussion
__ Student/teacher conferences
__ Partner and small group discussions
_X_ Whole group discussions
__ Interaction with/feedback from community members/speakers and business partners
X Constructed Responses
__ Chart good reading/writing/listening/speaking habits
_X_ Application of skills to real-life situations/scenarios
X Post-test

Assessment(s) Title:

Projects, tests, and class work

Assessment(s) Description/Directions:

- Projects: Culminating Activity
- Tests: Unit test. Teacher may check for progress throughout unit.
- Class work: Students will complete guided practice, collaborative assignments, & hands-on projects.

Attachments for Assessment(s): Please list.

- Drafting Boot Camp
- Drafting Class
- Parking Lot Design
- Kellogg Drafting Project

LEARNING EXPERIENCES

Instructional planning: Include lessons, activities and other learning experiences in this section with a brief description of the activities to ensure student acquisition of the knowledge and skills addressed in the standards. Complete the sequence of instruction for each lesson/task in the unit.

Sequence of Instruction

1. Identify the Standards. Standards should be posted in the classroom for each lesson.

ENGR-FET-1d – Participate in hands-on activities related to multiple engineering and technology pathways.
ENGR-FET-5 – Students will describe the essential systems and processes involved with invention, innovation, and entrepreneurship.
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2. Review Essential Questions.

1. What are the fundamentals of technical sketching?
2. What tools are used for drafting?
3. What are multi-view drawings?
4. What is the importance of single-stroke gothic alphabet?
5. What is CAD and what is its importance in the field of engineering?

3. Identify and review the unit vocabulary.

Drafting
CAD
CAD Plotters

Construction lines
Guide lines
Dimension lines
Extension lines
Center lines
Cutting plane line
Section line
ANSI
Phantom line

4. Assessment Activity.

Day 1

- Introduce Drafting *(PowerPoint)*
- Brainstorm for uses of drafting in everyday items
- Pass out Drafting Module handouts

Day 2

- Alphabet of Lines *(PowerPoint)*
  - Student Practice drawing lines
- Sheet Layouts *(PowerPoint)*
  - Students draw layouts

Day 3

- Sketching *(PowerPoint)*
- Lines, angles, rectangles
- Student practice

Day 4

- Sketching *(PowerPoint)*
- Arcs, circles, multi-sided shapes
- Student practice

Day 5

- Scale *(PowerPoint)*
- Student practice

Day 6

- Lettering *(PowerPoint)*
- Lettering Exercises

Day 7

- Drafting Tools *(PowerPoint)*
- Practice drawing different shapes with tools
- Drawing with Tools Handout

Day 8

- Drafting Tools *(PowerPoint)*
- Complete Drawing with Tools handout

Day 9

- Introduce Multi-View Drawings *(PowerPoint)*
- Glass Box
- Dragster Blanks with different views labeled—students draw

Day 10

- Multi-View Practice Handouts

Day 11

- Multi-View Practice Handouts

Day 12

- Multi-View Practice Handouts

Day 13

- Multi-View Practice with manipulatives

Day 14

- Dimensioning *(PowerPoint)*
- Student practice

Day 15

- CAD introduction
- Computer-Aided Manufacturing and Computer Integrated Manufacturing – introduce terminology and integrate into culminating activity if appropriate
- Culminating Activity—Possible Choices
    - Peg Game Design
    - Parking Lot Design
    - Drafting Class Design
    - Cereal Drafting Project

Day 16-18

- Culminating Activity

Day 19

- Culminating Activity DUE

Day 20

- Unit Test *(you may choose for culminating activity to be final assessment)*

Attachments for Learning Experiences: Please list.

- Peg Game Design
- Parking Lot Design
- Drafting Class Design
- Cereal Drafting Project

Notes & Reflections: May include notes to the teacher, pre-requisite knowledge & skills, suggestions, etc.

There are several activities you could use here. Choose one from the list or create your own project.

Teachers please take note: Students must be able to have access to CAD software to complete this unit.

CULMINATING PERFORMANCE TASK (Optional)

Culminating Unit Performance Task Title:

Teacher's Choice-see note above

Culminating Unit Performance Task Description/Directions/Differentiated Instruction:

Attachments for Culminating Performance Task: Please list.

UNIT RESOURCES

Web Resources:

Attachment(s): Supplemental files not listed in assessment, learning experiences, and performance task.

Materials & Equipment:

CAD software, computer access, handouts, powerpoint viewer, various drafting tools for students to use, drafting paper

What 21st Century Technology was used in this unit:

X	Slide Show Software	X	Graphing Software		Audio File(s)
X	Interactive Whiteboard	X	Calculator	X	Graphic Organizer
	Student Response System		Desktop Publishing	X	Image File(s)
	Web Design Software		Blog		Video
	Animation Software		Wiki		Electronic Game or Puzzle Maker
	Email		Website		