GEORGIA | PEACH STATE PATHWAYS

Career, Technical, & Agricultural Education

ACCT—ARCHITECTURAL DRAWING

PATHWAY: Architectural Drawing and Design

COURSE: Architectural Drawing and Design II

UNIT: 1-Residential Electrical Systems

INTRODUCTION

Annotation:

This unit includes lessons on understanding general codes related to electrical plans and correctly applying electrical symbols to architectural drawings.

Grade(s):

	9th
X	10th
X	11th
X	12th

Time: 25 hours

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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:

ACT-ADDII-1: Students will prepare electrical plans.

a. Understand general codes related to electrical plans.

b. Apply correct electrical symbols.

GPS Academic Standards:

SCSh9: Students will enhance reading in all curriculum areas.

MM1P4: Students will make connections among mathematical ideas and to other disciplines.

ELA9RL5: The student understands and acquires new vocabulary and uses it correctly in reading and writing.

ELE11LVI: The student participates in student-to-teacher, student-to-student, and group verbal interactions.

National / Local Standards / Industry / ISTE:

ADDA: Advanced CADD Skills

UNDERSTANDINGS & GOALS

Enduring Understandings:

Electrical systems in home design can increase the quality of life and the efficiency of the home.

Essential Questions:

- What can you do without electricity?
- How do you determine how many outlets should be in a room?
- How many different types of lighting exist in a home?
- What determines the types of lighting to use in a home?

Note: Depending on when or whether traditional (board) drafting is going to be taught in addition to CAD systems, activities may need to be supplemented or changed accordingly.

Knowledge from this Unit:

- Students will understand vocabulary related to electricity.
- Students will be able to correctly identify electrical symbols used in a home.
- Students will be able to identify electrical symbols on blueprint drawings.

Skills from this Unit:

- Students will be able to read electrical plans.
- Students will be able to draw electrical plans.

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.
_X Quizzes/Tests
__ Unit test
____ Group project
X Individual project
X Self-assessment - May include practice quizzes, games, simulations, checklists, etc.
_x 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
_x Practice quizzes/tests/games
____ Subjective assessment/Informal observations
__ Essay tests
__ Observe students working with partners
__ Observe students role playing
X Peer-assessment
__ Peer editing & commentary of products/projects/presentations using rubrics
x_ Peer editing and/or critiquing
X Dialogue and Discussion
__ Student/teacher conferences
__ Partner and small group discussions
_x_ Whole group discussions
_x_ Interaction with/feedback from community members/speakers and business partners
____ Constructed Responses
__ Chart good reading/writing/listening/speaking habits
__ Application of skills to real-life situations/scenarios
____ Post-test

Assessment(s) Title:

Test: Electrical Vocabulary

Test: Electrical Symbols

Individual Project: Have students draw a floor plan and add electrical symbols.

Assessment(s) Description/Directions:

See instructions attached to each test.

Individual Project: Choose a floor plan out of a textbook. Have students add all electrical symbols to the drawing (outlets, switches, fixtures, and panel). Include an electrical schedule with drawing.

Attachments for Assessment(s):

Test: Electrical Vocabulary & Key

Test: Electrical Symbols & Key

Self-Check Rubrics: Electrical Symbols

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.

ACT-ADDII-1: Students will prepare electrical plans.

a. Understand general codes related to electrical plans.

b. Apply correct electrical symbols.

2. Review Essential Questions.

a. What can you do without electricity?

b. How do you determine how many outlets should be in a room?

c. How many different types of lighting exist in a home?

d. What determines the types of lighting to use in a home?

3. Identify and review the unit vocabulary.

Ampere	Circuit	Circuit Breaker
Conductor	Conduit	Connectors
Convenience Outlet	Electrical Wiring	Electricity

Fuse	Lighting Outlet	Switching
Ohm	Receptacle	Service Drop
Service Entrance	Service Panel	Voltage
Watt		

4. Identify and review electrical symbols.

Single-pole switch	Dimmer switch	Three-way switch
Four-way switch	Weatherproof switch	Ceiling outlet fixture
Wall-mounted light fixture	Recessed light fixture	Ceiling fan
Fluorescent light	Telephone jack	Chime
Push button	Bell	Duplex receptacle outlet
Split-wire outlet	Floor outlet	Exhaust fan
Smoke detector	Lighting distribution panel	Thermostat
Junction box	220-volt outlet receptacle	
Ground fault interrupted weatherproof duplex outlet		

4. Interest approach – Mental set

Ask students to explain why electricity is important in their lives.

How would it affect you if the power went out in your house?

Lesson 1: ELECTRICAL SYSTEMS: BASIC VOCABULARY

Discussion

1. Identify the standards.
2. Review essential questions.
3. Ask students what are parts of an electrical system in their house? List on board and categorize into different areas, i.e. outlets, switches, dimmers, GFIs, weatherproof outlets, phone outlets, doorbells, electrical panel, and lights. Show electrical symbols for each category. Sketch electrical symbols for the components.
4. Invite a representative from the power company or an electrician to speak.
5. Have students take notes on guest speaker's presentation, especially noting vocabulary terms used.
6. Have students write paragraphs about what they learned from the speaker's presentation.
7. Classroom discussion on unit vocabulary (electrical terms); Why are these terms important?
8. Give quiz on unit vocabulary (electrical terms).

Lesson 2: ELECTRICAL SYMBOLS

1. Classroom discussion on electrical symbols and where they are used
2. Play game on Electrical and Plumbing Symbols.

3. Worksheet for reading electrical symbols on blueprints (Get a blueprint of an electrical plan. Have students go over plan and tell how many of each, types, etc.).
4. Have students trace the connections between switches and fixtures on a drawing.
5. Give quiz on electrical symbols.

Lesson 3: DRAWING ELECTRICAL SYMBOLS ON FLOOR PLAN

1. Classroom discussion on planning lighting requirements for a house
2. Plan and draw electrical systems for a floor plan using the proper symbols. Include an electrical schedule with drawing.

Attachments for Learning Experiences:

- Electrical Vocabulary & Definitions
- Test: Electrical Vocabulary & Key
- Electrical Symbols Sheet
- Test: Electrical Symbols & Key
- Self-Check Rubrics: Electrical Symbols
- Blueprint Symbols for Electrical and Plumbing (Jeopardy format): www.cefga.org

Notes & Reflections:

Check for understanding frequently. Review electrical vocabulary and symbols, as needed.

Students will not only be able to identify the symbols, but will also be able to apply these in designing an electrical plan for any house. Students should also know the purpose of an electrical plan.

Student should also know that an electrical plan is a guide for the electrician, who is a licensed professional and must follow the current electrical codes as adopted by the county and/or state.

Students will critique each others' drawings to make sure that the symbols are being drawn and added correctly.

The amount of time needed for activities is determined by whether the students are doing traditional (board) drafting or using a CAD system. The instructor should choose the appropriate instruction to support either board or CAD drafting.

CULMINATING PERFORMANCE TASK (Optional)

Culminating Unit Performance Task Title:

Floor plan with electrical symbols

Culminating Unit Performance Task Description/Directions/Differentiated Instruction:

Students will draw and dimension a floor plan with all electrical symbols. Include an electrical schedule with drawing. A floor plan with instructions for adding electrical symbols is to be provided by instructor.

Attachments for Culminating Performance Task: Please list.

None

UNIT RESOURCES

Web Resources:

http://www.cefga.org/ConstructionResources.htm

http://www.archblocks.com/electrical_preview.htm#electricaloutlets

Attachment(s):

Materials & Equipment:

Depending on the medium used, you may need the following:

- Basic drafting tools, plus electrical template
- CAD software

What 21st Century Technology was used in this unit:

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