Goodheart-Willcox Publisher

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Goodheart-Willcox Publisher Correlation of *Architecture: Residential Drafting and Design* ©2018 to Tennessee Department of Education Standards Course: Architectural & Engineering Design I (6037)

	STANDARD	CORRELATING PAGES
	Safety	
1	Accurately read, interpret, and demonstrate adherence to safety rules, including but not limited to rules published by the Occupational Safety and Health Administration (OSHA), and state and national code requirements. Be able to distinguish between the rules and explain why certain rules apply.	55, 71, 127, 139–140, 156, 229–230
2	Identify and explain the intended use of safety equipment available in the classroom. Demonstrate how to properly inspect, use, and maintain safe operating procedures with tools and equipment. Incorporate safety procedures and complete safety test with 100 percent accuracy.	82, 127–129
	Introduction to Architecture & Engineering Design	
3	Investigate the evolution of architecture and engineering across a variety of civilizations throughout history. Identify major innovations, such as technological advances in materials or construction processes. Synthesize research from textbooks and other resources to create an annotated timeline or visual graphic illustrating significant time periods in the development of architecture and engineering.	3–29
4	Research and summarize in a clear and coherent informational artifact (e.g., a brochure, poster, fact sheet, narrative, or presentation) the influences and contributions of a selected architect or engineer. Cite resources and examples of the individual's completed work to illustrate their impact on society.	32, 49–55, 67
5	Investigate the social, economic, and environmental impact of decisions made by architects and engineers at the local, national, and global levels. Provide a detailed description of the impacts of a	40, 164, 187, 240–250, 255–269, 271–272

	specific discipline, citing links to relevant websites to illustrate the ideas presented. For example, describe how structural engineers design structural systems in buildings to protect occupants from earthquakes and tornadoes, and illustrate how the materials selected by the engineer impact the environment and economy.	
6	Research the principles of sustainable design. Examine a case study of an energy efficient building and determine whether the principles of sustainable design are illustrated in the design of the building. Assess whether the evidence presented is strong enough to support claims of sustainability, and compile a brief persuasive narrative summarizing conclusions.	21, 29, 39, 51, 255–270
Career Exploration		
7	Research the major professions in architecture and engineering, such as a civil engineer, mechanical engineer, industrial engineer, electrical engineer, engineering technician, architect, and more. Cite supporting evidence from multiple sources (such as interviews with design professionals retrieved from industry magazines). Produce a chart or other graphic detailing the aptitudes and training needed for at least three careers of interest. For example, outline the typical requirements needed to become a civil engineer, including personal aptitudes, secondary and postsecondary training, and licensing. Devise a tentative career plan to reach employment goals.	49–65, 67, 226, 303, 426
8	Compile and analyze real-time and projected labor market data from public sources such as the U.S. Bureau of Labor Statistics to investigate local and regional occupational opportunities and trends in architectural and engineering careers. Synthesize collected data to develop a graphic illustration comparing occupations by job availability, salaries, and benefits.	18, 66–68, 96
Design Process		
9	Research design processes used by architects and engineers. Drawing on multiple resources, explain the steps to the design process in a written narrative, synthesizing a range of perspectives on the	47, 114, 176, 275–300, 337

	process as practiced in a variety of architectural and engineering disciplines. Explain why it is an iterative process and always involves refinement.	
10	Evaluate an existing design created by architects and/or engineers using the design process such as a building, landscape, bridge, or product. Produce a report on the chosen design, describing how the design team likely progressed through each step of the design process citing examples from design magazines and other resources. Examples should include design constraints encountered by the design team and criteria for measuring the effectiveness of the design.	31, 46, 151, 224, 271, 302, 323, 355–356
Sketching		
11	Investigate the use of sketching in the creative design process. Drawing from resources, explain the tools and techniques used and when architects and engineers apply sketching in the design process.	69–92
12	Create freehand sketches, including rough and refined sketches, demonstrating techniques for sketching freehand lines and circles while attending to accurate proportion. Produce pictorial sketches applying shading techniques. Simulate sketching techniques used by engineers and architects on jobsites by sketching live objects to create field sketches. Utilize hand lettering techniques to neatly add notes to the sketches.	82–92, 93–94, 203, 355
13	Develop conceptual design ideas using freehand sketching. For example, for a given design problem, generate, analyze, and refine sketches to develop design solutions. Use the sketches to further develop a chosen design and create refined drawings.	82–92, 93–94, 203, 282–283, 337, 381, 390
Fundamental Technical Drawing		
14	Interpret a technical narrative to understand the steps and tools needed to create geometric constructions such as bisecting a line, angle, or arc; using lines, circles, and arcs to draw a polygon such as a pentagon or hexagon; and constructing tangent and perpendicular relationships. Use geometric terms, illustrations, and supporting texts to	72, 82–86, 116-124

	describe the steps of creating a geometric construction with accuracy.	
15	Create accurate manual single-view scale drawings of advancing complexity, incorporating symbols, notes, and dimensions, using appropriate layout within title blocks, drawing composition (including line weight and line type), geometric construction techniques, and lettering techniques. For example, create a drawing of a metal plate at half scale using an engineer's scale and other tools. After more practice, create a floor plan of the classroom at quarter scale using an architect's scale and other tools.	82–86, 94, 108–111, 143–146, 182–183, 337–348, 355
16	Interpret and apply dimensioning rules to accurately label dimensions on drawings including arranging dimensions, using various dimension styles (such as aligned and angular), and avoiding redundancy. Drawing on evidence from textbooks and industry standards (such as the American National Standards Institute and the American Society of Mechanical Engineers), create an infographic an engineer or architect could use as a guide to appropriately employ basic dimensioning rules.	71, 88, 107, 122, 332–337, 343–348
17	Create accurate multi-view scale drawings of objects of advancing complexity using orthographic projection. Incorporate symbols, notes, dimensions, and different types of lines (such as hidden lines to show internal or hidden features). Demonstrate procedures to establish a principle view of an object and project from an existing view to create additional views.	70–72, 86–89, 144–146, 573–577
18	Building on the knowledge of a single view and multi-view drawing, create simple isometric drawings, properly using lines, labels, and dimensioning techniques.	124–126, 629–630
19	Define the differences in technique among freehand sketching, manual drafting, and computer-aided drafting (CAD). Describe the skills required for each and how each type is used in industry, citing specific examples. Create a visual display with accompanying text comparing and contrasting at least two techniques.	86, 95, 97–129, 131, 337–348, 390

20	Interpret instructional material to use CAD software to create simple two-dimensional drawings, accurately incorporating symbols, dimensioning, and line types. Instructional material may include textbooks, manuals, websites, video tutorials, and more. Perform basic operations such as creating files, saving files, opening files, storing files, and printing. Set up the drawing environment by inserting title blocks, applying settings (ortho, snap, etc.), and assigning line weights, line types, and colors.	97–129, 131, 343–348
21	Demonstrate the ability to refine drawings based on critique from peers, instructors, and self-evaluation. Drawing on evidence from textbooks and other resources, evaluate the effectiveness of a drawing based on industry standards for technical drawing. Interpret and incorporate feedback when refining drawings.	182–184, 202–203, 343–348, 355–357, 455
Measurement & Math		
22	Apply mathematics concepts to create drawings and solve design problems in this course, distinguishing which principles apply to a given design problem. Concepts should include, but are not limited to: a. Determining and applying the equivalence between fractions and decimals. For example, convert a decimal to a fraction to prepare a unit for measurement on a fractional scale to the precision of 1/16 of an inch. b. Working with units such as feet, inches, meters, centimeters, and millimeters, and determining appropriate units for a given construction task. For example, convert a dimension from centimeters to inches. c. Calculating perimeter, area, volume, and surface areas of objects employing related geometric terminology. d. Performing proportionate reasoning to estimate quantities, such as determining the appropriate scale for a drawing and a given sheet size.	75–77, 121, 224, 336–337, 404, 446–448, 599, 865–867

	e. Using basic rules of right triangles, such as the Pythagorean Theorem, to find missing lengths.	
23	Use customary and metric measurement systems to complete accurate field measurements. Determine the appropriate units and record accurate measurements of lengths and angles using proper tools. Tools should include, but are not limited to: fractional rule, metric rule, measuring tape, architect's scale, engineer's scale, dial caliper, and protractor.	72–78, 429, 455
24	Use field measurements to create a drawing, accurately representing the true layout. For example, create a scale drawing of a simple mechanical device by taking field measurements of the device, determining the appropriate scale, and using an engineer's scale to accurately draw the device.	93–94, 183, 396
Design Project		
25	Use the design process to create a solution for a given design problem, selecting and creating appropriate drawings to explain the solution, including sketches and multiple views of two-dimensional scale drawings. Prepare an informative narrative to explain how each step of the design process was followed to complete the project. Emphasize the key characteristics of the design which make it an appropriate solution for the given constraints.	46, 151, 182–183, 202–203, 224, 252, 282–286, 343–348, 573–577
Portfolio		
26	Compile important artifacts to create a portfolio connecting personal career preparation to concepts learned in this course, including written descriptions of drawing types and learning outcomes. Continually review and revise documents, using technology as needed.	60, 62, 335, 357