Arkansas CTE

Drafting and Design: Grades 9, 10, 11, 12

Adopted 2006

Practicing Safety

1.1 Define terminology related to practicing safety

1. Use terms appropriately in context 1.1.1

1.2 Outline general safety procedures applicable to the work environment

1. Apply general guidelines for safe handling of drafting tools, equipment, and furniture 1.2.1
2. Adhere to safety precautions regarding electrical equipment used in drafting 1.2.2
3. Prepare an outline of drafting classroom safety guidelines 1.2.3
4. Prepare a school emergency exit plan 1.2.4

1.3 Explain how to adjust drafting equipment for maximum comfort and usability

1. Apply adjustments on a drafting desk or computer-aided drafting workstation for comfort and usability 1.3.1
2. Explain procedures for making comfort and usability adjustments to a drafting desk or computer-aided drafting workstation 1.3.2

1.4 Describe ergonomic considerations for drafting

1. Describe comfort, fatigue, and health-related considerations for using drafting and computer-aided drafting equipment (keyboard position, chair position, screen position, lighting levels, and position of arms, wrists, and hands) 1.4.1

Preparing for a Career in Drafting

2.1 Define terminology related to preparing for a career in drafting

1. Use terms appropriately in context 2.1.1

2.2 List career options in drafting

1. Distinguish positive and negative aspects for career options in architectural drafting for an architect, architectural drafter, model maker, teacher, and technical illustrator 2.2.1
2. Describe career options in technical drafting for a mechanical engineer, industrial designer, model maker, teacher, technical illustrator, and tool designer 2.2.2

2.3 Identify educational experiences and personal traits that benefit a drafter

1. Develop a high school career action plan in drafting with several career options 2.3.1
2. Research requirements of a community college program in drafting 2.3.2
3. Research requirements of a college major in engineering 2.3.3
4. Explore interest in various occupational areas utilizing drafters 2.3.4

Using Mathematics in Drafting

3.1 Define terminology related to mathematics in drafting

1. Use terms appropriately in context 3.1.1

3.2 Describe procedures for performing mathematical conversions within a measurement system

1. Show how to convert inches to feet and feet to inches 3.2.1
2. Convert centimeters to millimeters and millimeters to centimeters 3.2.2
3. Convert cubic feet to cubic yards and cubic yards to cubic feet 3.2.3

3.3 Identify basic mathematical operations used in drafting

1. Apply the principles of addition, subtraction, multiplication, and division involving whole numbers, fractions, mixed numbers, and decimals 3.3.1
2. Convert common fractions to decimal fractions and decimal fractions to common fractions 3.3.2
3. Show how to measure distances using a rule and a scale 3.3.3
4. Use and draw common geometric shapes used daily in drafting 3.3.4

3.4 Explain mathematical calculations involving practical geometry and trigonometry

1. Apply practical geometry and trigonometry principles using the Pythagorean Theorem (3-4-5 Triangle) 3.4.1
2. Use mathematical formulas to calculate area 3.4.2
3. Use mathematical formulas to calculate volume 3.4.3
4. List practical applications of the Pythagorean Theorem (3-4-5 Triangle) 3.4.4

3.5 Identify material quantities used in drafting

1. Use approximate dimensions to determine how many cubic yards of concrete are needed for wall footings or other construction features 3.5.1
2. Use approximate dimensions to determine quantities of lumber needed for floor framing and wall framing 3.5.2
3. Use approximate dimensions to determine quantities of wall and floor coverings needed to complete a project 3.5.3

Orientation to Drafting and Design

4.1 Define terminology related to drafting and design

1. Use terms appropriately in context 4.1.1

4.2 Identify traditional drafting equipment and tools

1. Show how to use traditional drafting equipment and tools 4.2.1
2. Apply techniques for the use of traditional drafting equipment and tools 4.2.2

4.3 Describe types of architectural and technical drawings

1. Use components of architectural drawings 4.3.1
2. Apply components of technical drawings 4.3.2
3. Determine uses for various types of architectural drawings 4.3.3
4. Demonstrate uses for various types of technical drawings 4.3.4

4.4 Outline techniques of drawing to scale

1. Draw objects to a scale of full size, larger than full size, and smaller than full size 4.4.1
2. Use the architect's scale, engineer's scale, mechanical drafter's scale, and metric scale to measure and lay out drawings or sketches 4.4.2

4.5 Discuss methods for preparing architectural and technical sketches

1. Apply techniques for developing freehand field sketches 4.5.1
2. Show techniques for developing sketches using traditional drafting equipment and tools 4.5.2
3. Compile sketches of geometric shapes 4.5.3

4.6 Identify freehand lettering techniques

1. Construct large and small uppercase letters and numbers using the American National Standards Institute (ANSI) recommended Single-Stroke Gothic Alphabet 4.6.1
2. Compose typical notes found on architectural and technical drawings, using freehand lettering techniques 4.6.2

4.7 Label methods of geometric construction used for architectural and technical drafting

1. Use geometric construction techniques for creating lines, arcs, and angles 4.7.1
2. Bisect lines, arcs, and angles using geometric construction 4.7.2
3. Construct parallel and perpendicular lines using geometric construction 4.7.3
4. Construct angles and triangles using geometric construction 4.7.4
5. Construct tangent lines and arcs using geometric construction 4.7.5
6. Construct regular and irregular polygons using geometric construction 4.7.6
7. Create representations of ellipses using geometric construction 4.7.7

Performing Computer-Aided Drafting Operations

5.1 Define terminology related to computer-aided drafting operations

1. Use terms appropriately in context 5.1.1

5.2 Identify components of a computer-aided drafting system

1. Use basic components of a computer-aided drafting system, including a CPU, monitor, keyboard, mouse, digitizer, plotter, printer, and software 5.2.1
2. Apply common features of computer-aided drafting software programs 5.2.2
3. Navigate computer-aided drafting system command menus 5.2.3

5.3 Outline how to perform fundamental computer skills

1. Show how to open and close software applications 5.3.1
2. Show how to manage files (i.e., saving, backing up, organizing) 5.3.2
3. Perform monitor and mouse configuration and setup 5.3.3
4. Demonstrate ability to perform basic word processing (compose, cut, copy, paste, print) 5.3.4

5.4 Describe the use of computer-aided drafting drawing commands on technical drawings

1. Use computer-aided drafting drawing commands to construct lines, circles, arcs, polylines, polygons, ellipses, rectangles, text, and hatch patterns 5.4.1
2. Create blocks or symbols using computer-aided drafting commands 5.4.2
3. Insert various symbols in computer-aided drafting drawings 5.4.3

5.5 Outline how to use computer-aided drafting file commands correctly

1. Use computer-aided drafting file commands to create new files and folders 5.5.1
2. Use computer-aided drafting file commands to save, save as, plot, import, export, open, close, and exit a drawing file 5.5.2

5.6 Describe how to plot computer-aided drawings

1. Apply techniques for scaling drawings using a computer-aided drafting system 5.6.1
2. Show how to plot computer-aided drafting drawings to various scales 5.6.2
3. Set and modify plot settings for a computer-aided drafting file 5.6.3
4. Show how to plot computer-aided drafting drawings having single and multiple view ports 5.6.4

Performing Technical Drafting Operations

6.1 Define terminology related to technical drafting operations

1. Use terms appropriately in context 6.1.1

6.2 Identify reference materials for technical drawings

1. Demonstrate use of a table of contents, indexes, cross-references, etc., in technical reference materials 6.2.1
2. Show how to reference information for technical drawings using Internet resources 6.2.2

6.3 Label line conventions on technical drawings

1. Show common line symbols used on technical drawings 6.3.1
2. Apply common line symbols to technical drawings 6.3.2
3. Describe uses for special line symbols on technical drawings 6.3.3
4. Apply various special line symbols to technical drawings 6.3.4

6.4 Describe drafting standards used to prepare technical drawings

1. Relate the purpose for drawing standards 6.4.1
2. Show how to use ANSI and ISO standards to prepare technical drawings 6.4.2
3. Demonstrate an ability to prepare technical drawings according to ANSI and ISO standards 6.4.3

Drafting with Orthographic Views

7.1 Define terminology related to drafting with orthographic views

1. Use terms appropriately in context 7.1.1

7.2 Outline steps to apply orthographic projection techniques

1. Apply techniques to develop object views, using orthographic projection 7.2.1
2. Relate types of drawings that use orthographic projection 7.2.2
3. Explain techniques for transferring the location of drawing features between views, using orthographic projection 7.2.3

7.3 Describe how to prepare single and multiview drawings using orthographic projection

1. Develop single-view orthographic projections of simple objects with appropriate line precedence and positioning of views, circles, arcs, and angular features 7.3.1
2. Discuss characteristics of multiview drawings 7.3.2
3. Develop multiview orthographic projections of simple objects, including front, top, right-side, left-side, bottom, and rear views 7.3.3

Dimensioning Technical Drawings

8.1 Define terminology related to dimensioning technical drawings

1. Use terms appropriately in context 8.1.1

8.2 Describe how to dimension multiview drawings

1. Show how to apply methods for the placement of dimensions using the unidirectional and aligned dimensioning systems on multiview drawings 8.2.1
2. Use the standards for applying dimensions to various features of a multiview drawing 8.2.2
3. Apply dimensions and notes to multiview drawings, including units of measurement, arrowheads, and leaders 8.2.3
4. Prepare and dimension multiview drawings of objects with machined surfaces, using appropriate positioning of views, line precedence, circles, arcs, fillets, and rounds 8.2.4
5. Develop an understanding of standards for applying datumline dimensions to various features of a multiview drawing 8.2.5

Drafting with Pictorial Views

9.1 Define terminology related to drafting with pictorial views

1. Use terms appropriately in context 9.1.1

9.2 Describe characteristics of pictorial drawings

1. Depict the general characteristics of pictorial (axonometric) drawings, isometric drawings, oblique drawings, and perspective drawings 9.2.1

9.3 Outline how to apply techniques to develop isometric drawings

1. Use techniques to develop isometric drawings of simple objects 9.3.1
2. Prepare isometric drawings of simple cubic and cylindrical objects 9.3.2

9.4 State how to apply techniques to develop oblique drawings

1. Describe techniques to develop oblique drawings of simple objects 9.4.1
2. Prepare general oblique drawings 9.4.2
3. Prepare cavalier oblique drawings 9.4.3
4. Prepare cabinet oblique drawings 9.4.4

9.5 State how to dimension isometric drawings

1. Apply methods for the placement of dimensions, using the unidirectional dimensioning system on isometric drawings `9.5.1`
2. Apply dimensions and notes to isometric drawings, including units of measurement, arrowheads, and leaders `9.5.2`
3. Develop an understanding of standards for applying dimensions to various features of an isometric drawing `9.5.3`
4. Prepare a dimension isometric drawing of objects, using appropriate positioning of view, line precedence, circles, and arcs `9.5.4`
5. Use standards to apply datum dimensioning to various features of an isometric drawing `9.5.5`

9.6 Describe types of notes used on technical drawings

1. Apply general notes to multiview drawings `9.6.1`
2. Prepare general notes for an isometric drawing `9.6.2`
3. Apply general notes to working drawings `9.6.3`

Performing Architectural Drafting Operations

10.1 Define terminology related to performing architectural drafting operations

1. Use terms appropriately in context `10.1.1`

10.2 Describe how to apply line conventions used on architectural drawings

1. Depict common line symbols used on architectural drawings `10.2.1`
2. Use special line symbols on architectural drawings `10.2.2`
3. Apply common line symbols to architectural drawings `10.2.3`
4. Apply various special line symbols to architectural drawings `10.2.4`

10.3 Identify the use of symbols on architectural drawings

1. Demonstrate how architectural symbols are used to communicate information for construction of a building `10.3.1`
2. Demonstrate techniques to create and place various architectural symbols on drawings `10.3.2`
3. Discuss types of symbols typically found on architectural drawings `10.3.3`
4. Research architectural symbols used on drawings `10.3.4`

10.4 Identify dimensioning on architectural drawings

1. Locate dimensioning systems on architectural drawings `10.4.1`
2. Show how notes are used to indicate location and size of construction components on architectural drawings `10.4.2`
3. Use standards to apply dimensions and notes to various architectural features on construction drawings `10.4.3`
4. Depict abbreviations used with dimensions on architectural drawings `10.4.4`
5. Note procedures and line types used for placement of dimension lines, notes, and leaders on architectural drawings `10.4.5`

Preparing Floor Plan Drawings

11.1 Define terminology related to preparing floor plan drawings

1. Use terms appropriately in context `11.1.1`

11.2 Explain how to develop a floor plan

1. Construct a list of building considerations for construction based on consumer desires and needs, including budget, family size and lifestyle, foot-traffic patterns, and kitchen functionality requirements `11.2.1`
2. Prepare a sketch of a floor plan, illustrating walls, windows, doors, kitchen and bathroom cabinets, major appliances, plumbing fixtures, etc., based on design considerations `11.2.2`
3. Use standards to apply various symbols for architectural features of a floor plan `11.2.3`
4. Develop an understanding of standards for placing dimensions on a floor plan drawing `11.2.4`

11.3 Describe how to prepare a floor plan drawing

1. Show how to draw lines and symbols representing various building features for a floor plan, including interior and exterior walls, windows, doors, kitchen and bathroom cabinets, major appliances, plumbing fixtures, and HVAC equipment `11.3.1`
2. Apply correct location dimensions and notes for building features on a floor plan of a residential structure `11.3.2`
3. Apply correct dimensions and notes for kitchen and bathroom cabinets and other millwork on a floor plan `11.3.3`
4. Place room names and general notes on a floor plan `11.3.4`
5. Discuss considerations for locating stairs on a floor plan for a multistory structure `11.3.5`

Preparing Building Elevations

12.1 Define terminology related to preparing building elevations

1. Use terms appropriately in context `12.1.1`

12.2 Describe how to develop building elevation drawings

1. Use characteristics of various architectural styles, site considerations, and desired roof design to draw sketches of exterior building elevations 12.2.1
2. Determine consumer needs and tastes in selection of exterior finish materials 12.2.2
3. Consult wall sections, floor plan, and foundation plan to determine grade line, exterior details, heights of finished floor and ceiling, roof slope, window and door appearances, etc. 12.2.3

12.3 Describe how to prepare building elevation drawings

1. Show how to project horizontal dimensions of exterior walls, windows, doors, and other elements from a floor plan 12.3.1
2. Note how to project heights of grade lines, depth and thickness of footings, window and door heights, eave lines, and roof height from wall section drawings 12.3.2
3. Demonstrate how to add architectural details for windows, doors, railings, gables, and other exterior features to an elevation drawing 12.3.3
4. Demonstrate how to add dimensions, symbols, and notes identifying the elevation, floor and ceiling levels, roof slope, grade lines, etc., to elevation drawings 12.3.4

Career and Technical Student Organizations (SkillsUSA/HOSA)

13.1 Define terminology related to student organizations

1. Use terms appropriately in context 13.1.1

13.2 Outline a self-assessment, and identify individual learning styles

1. Show individual strengths 13.2.1
2. Show areas in need of improvement 13.2.2

13.3 Describe self-motivation techniques, and establish short-term goals

1. Prepare a list of short-term goals 13.3.1
2. Discuss ways to change or improve lifestyle, appearance, and behavior 13.3.2

13.4 Give examples of individual time-management skills

1. Prepare and maintain a time journal 13.4.1
2. Outline ways to improve time-management skills 13.4.2

13.5 Predict future occupations

1. Research the Internet to explore career opportunities in specified fields of study 13.5.1
2. Prepare a presentation on a specified career area 13.5.2

13.6 Identify the customer

1. Differentiate between external and internal customers `13.6.1`
2. Identify factors that contribute to poor customer relationships `13.6.2`

13.7 Identify the benefits of doing a community service project

1. Outline ways to become involved in the community `13.7.1`
2. Develop a community service project `13.7.2`

13.8 Describe effective communication with others

1. Note personal barriers to listening `13.8.1`
2. Relate a personal plan to overcome barriers to listening `13.8.2`

13.9 Give locations for a shadowing activity

1. Summarize and relate an experience of job shadowing `13.9.1`

13.10 Identify the components of an employment portfolio

1. Present parts of a portfolio `13.10.1`
2. Compile a personal employment portfolio for an interview `13.10.2`

13.11 List proficiency in program competencies

1. Construct an interpersonal competency assessment `13.11.1`

13.12 Describe how to measure/modify short-term goals

1. Discuss how to pursue short-term goals `13.12.1`

13.13 Identify stress sources

1. Prepare a list of personal stress sources `13.13.1`
2. Outline techniques to cope with individual sources of stress `13.13.2`

13.14 Identify characteristics of a positive image

1. List behaviors and traits that lead to a positive image `13.14.1`
2. Note behaviors and traits that lead to a negative image `13.14.2`

13.15 Describe how team skills can be applied to a group project

1. Form a team to develop a class project `13.15.1`

13.16 Outline how to observe and critique a meeting

1. Attend a formal meeting held in the community `13.16.1`
2. Prepare a critique of the meeting attended `13.16.2`

13.17 List business meeting skills

1. Relate the basic rules required to ensure an orderly, business-like meeting 13.17.1
2. Demonstrate through role-playing appropriate meeting skills 13.17.2

13.18 Outline a survey of employment opportunities

1. Compile information on a particular employment opportunity of interest 13.18.1
2. Perform an Internet search of a specific career area 13.18.2

13.19 Select a professional journal for review, and develop a three- to five-minute presentation

1. Prepare a presentation on the content, purpose, and distribution of a particular professional journal 13.19.1

13.20 Identify customer expectations

1. List customer expectations 13.20.1
2. Discover the consequences of unmet customer expectations 13.20.2

13.21 List parts of a job application

1. Prepare a job application from various businesses in the community 13.21.1
2. Demonstrate a mock job interview 13.21.2

13.22 Outline your employment portfolio

1. Construct a personal employment portfolio 13.22.1

13.23 Identify supervisory and management roles in an organization

1. Prepare an organizational chart 13.23.1
2. Outline the responsibilities of managers and supervisors 13.23.2

13.24 Outline safety issues

1. Research safety issues in a given career area 13.24.1