Correlation of

Exploring Drafting, 14e: **Walker, Mathis, and Scribner**

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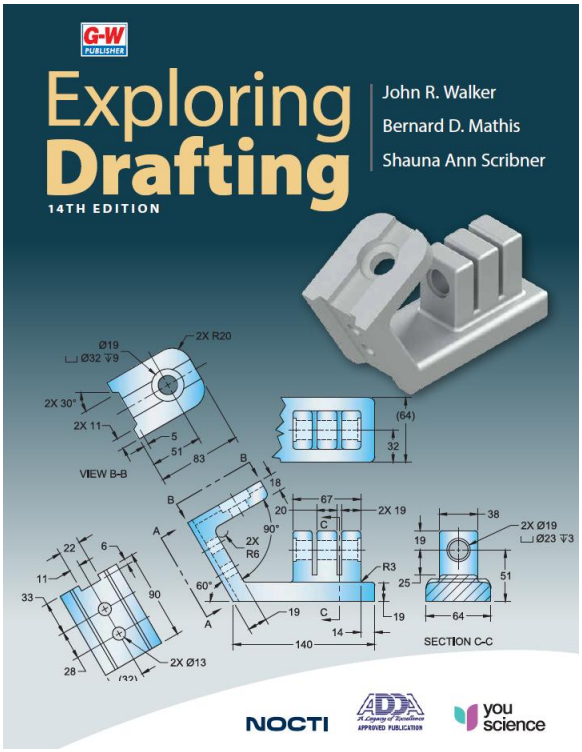
to

YouScience® Industry Certification: Mechanical Design I

Goodheart-Willcox is pleased to partner with YouScience® by correlating *Exploring Drafting* to their Mechanical Design I standards. YouScience® Industry Certifications, part of the YouScience® Brightpath academic and career guidance platform, offer students entry- to mid-level certifications that act as tangible proof of their skills and knowledge.

The correlation chart below lists the Standards, Objectives, and Indicators for the Mechanical Design I exam in the left column. Corresponding content from *Exploring Drafting* that can be used by a student to help achieve the standard, objective, or indicator is listed in the right column.

For more information about YouScience®, including a complete listing of their Industry Certifications, please visit https://www.youscience.com/certifications/.



Standards / Objectives / Indicators	Textbook Pages
Standard 1: Engineering & Design Careers	
Objective 1. Explore the design aspect of the following career areas:	
Industrial Designer: Industrial designers combine art, business, and engineering to develop the concepts for manufactured products. (U.S Bureau of Labor Statistics)	pgs. 13–14 pg. 434
Mechanical Engineering: Mechanical engineers design, develop, build, and test mechanical and thermal sensors and devices. (U.S. Bureau of Labor Statistics)	pg.232

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Standards / Objectives / Indicators	Textbook Pages
Manufacturing/Industrial Engineering: Industrial engineers devise efficient systems that integrate workers, machines, materials, information, and energy to make a product or provide a service. (U.S. Bureau of Labor Statistics)	pgs. 15–16
Technician	pgs. 12–13 pg. 67
Objective 2. Understand the education and training needed for each of the occupations discussed in Objective 1.	pg. 3 pgs. 10–23 pg. 232
Objective 3. Identify which post-secondary institutions, local and statewide, offer certificates and degrees related to engineering, drafting, and design.	pg. 3 pg.223 pg. 371
Standard 2: Sketching and the Engineering Design Process	
Objective 1. Engineering Design Process	
1. Identify and define the design problem.	pg. 29 pg. 437
2. Brainstorm solutions	pg. 29 pgs. 434–437 pgs. 437–440
3. Create models and build a prototype.	pg. 439 pg. 447
4. Test the prototype.	pg. 446 pgs. 447–451 pg. 409
5. Redesign and optimize.	pgs. 434–437 pgs. 437–440
Objective 2. Create accurately proportioned sketches using correct drawing conventions.	pgs. 26–40 pg. 31
1. Demonstrate understanding of dimensioning practices and apply them to technical or design sketches.	pgs. 26–27 pgs. 255–256 pgs. 257–260
2. Create freehand sketches using paper, pencil, and an eraser which is neat, clear, and smudge-free.	pgs. 54–59 pgs. 61–63 pgs. 82–83

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Standards / Objectives / Indicators	Textbook Pages
3. Create drawings or sketches with isometric, orthogonal, sections, and assembly views.	pgs. 159–163 pgs. 222–240
4. Understand and demonstrate the proper use of the alphabet of lines.	pgs. 26–31 pgs. 74–77
5. Create letters and numerals that conform to an industry-accepted style including size, spacing, pitch, and all other common factors as specified in current industry standards.	pgs. 124–130 pgs. 130–131
6. Create notes that are neat and legible.	pg. 17 pgs. 126–128
Standard 3: Mathematics, Measuring Conventions, and Scale	
Objective 1. Perform basic arithmetic functions using fractions and decimals.	
1: Add	pg. 76
2: Subtract	pg. 76
3: Multiply	pg. 76
4: Divide	pg. 76
Objective 2. Convert between fractions and decimals.	pg. 65 pg. 76 pg. 546
Objective 3. Convert between and within metric and imperial units.	pg. 544 pg. 545
Objective 4. Make and record basic measurements.	
1: Understand and demonstrate the conversion of actual lengths to common technical drawing scales.	pgs. 64–66
2: Accurately set the drawing scale using CAD software when creating a drawing.	pgs. 148–150 pg. 155 pgs. 159–163
3: Record measurements using Cartesian and polar coordinates, as well as absolute and relative distances.	pgs. 145–147
4: Can accurately measure to 1/16” using a ruler or tape measure.	pg. 65
5: Can accurately measure to a millimeter using a ruler or tape measure.	pg. 65
Standard 4: Orthographic Views	
Objective 1. Drawing orthographic projections.	

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Standards / Objectives / Indicators	Textbook Pages
1: Apply correct 2D geometric construction techniques.	pgs. 31–40
2: Drawing elements are accurate and drawn to scale.	pgs. 64–66 pgs. 224–230
3: Draw on the correct plane.	pgs. 230–231
4: The top, front, and side views are used unless otherwise required using orthographic projection. a. Minimum number of views necessary.	pgs. 233–235
5: All views are properly aligned and use third-angle projection.	pgs. 225–230
6: Appropriate lines and surfaces are located on each view.	pgs. 231–232 pgs. 235–236
Objective 2. Understand common terminology associated with drafting and design.	
1: Axis	pgs. 31–40
2: Concentric	pg. 164
3: Diameter	pgs. 31–40
4: Coordinate	pgs. 142–143
5: Fillet	pgs. 153–154
6: Vertical	pgs. 31–40
7: Horizontal	pgs. 31–40
8: Orthographic view	pgs. 224–230
9: Parallel	pg. 164
10: Perpendicular	pgs. 312–314
11: Plane	pg. 30
12: Radius	pgs. 31–40
13: Round	pgs. 153–154
14: Sketch	pgs. 31–40
15: Tangent	pg. 38
16: Third angle projection	pgs. 225–230
Standard 5: Line Types	

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Standards / Objectives / Indicators	Textbook Pages
Objective 1. Know common line thicknesses: **1:** Thick -0.7mm **2:** Medium - 0.5mm **3:** Thin - 0.35mm **4:** Thinnest - 0.25mm	pgs. 74–77
Objective 2. Understand the Alphabet of lines.	pgs. 26–31 pgs. 74–77
1: Object line	pg. 27 pg. 75
2: Hidden line	pg. 28 pg. 75
3: Cutting Plane line	pg. 30 pg. 76
4: Center line	pg. 29 pg. 76
5: Dimension line	pg. 28 pg. 76
6: Extension line	pg. 29 pg. 76
7: Leader line	pg. 29
8: Border line	pg. 27 pg. 75
9: Phantom line	pg. 31 pg. 77
10: Section line	pg.76
11: Construction line	pg. 27
Objective 3. Understand Line Thickness Applications:	
1: Thick Lines a. Object/visible line b. Cutting plane line	pgs. 74–77
2: Medium Lines a. Hidden line	pgs. 74–77

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Standards / Objectives / Indicators	Textbook Pages
3: Thin Lines a. Center line b. Section line c. Dimension line d. Leader line e. Extension line f. Phantom line	pgs. 74–77 pgs. 255–256
Standard 6: Dimensioning	
Objective 1. Know proper location for dimensions.	pgs. 255–256 pgs. 257–260
1: Locate dimensions on the profile view and between views.	pgs. 224–230 pgs. 257–260
2: Apply appropriate spacing between the object and the first dimension.	pgs. 255–256
3: Apply uniform spacing between dimension lines.	pg. 255 pgs. 255–256
4: Use correct dimension line terminators such as arrowheads, ticks, and dots.	pgs. 255–256 pg. 257
Objective 2. Compare Baseline vs. Chain dimensioning.	pg. 259 pgs. 275–276
Objective 3. Understand leaders and notes.	pgs. 255–256 pgs. 352–353
1: Understand and correctly form callouts for thru holes, countersinks, counterbores, and spotfaces.	pgs. 261–266
2: Demonstrate correct dimensioning for fillets, and rounds.	pgs. 153–154
3: Understand and correctly form callouts for threaded holes.	pg. 299 pgs. 372–378
4: Use appropriate angles for leaders.	pg. 29 pgs. 255–256 pg. 256 pg. 265
Standard 7: CAD Software	
Objective 1. Know how to do the following file operations:	

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Standards / Objectives / Indicators	Textbook Pages
1: Save	pgs. 143–145 pgs. 156–158
2: Open	pgs. 143–145 pgs. 156–158
3: Rename	pgs. 148–150
4: Move	pgs. 148–150
Objective 2. Create technical drawings using design software features.	pgs. 143–144 pgs. 152–154
1: Create a new drawing setup to support both English and metric drawing standards. Create drawing setups for different sizes of drawing sheets.	pgs. 148–150
2: Use and control accuracy enhancement tools.	pg. 148 pg. 155
3: Using snap, grid and positioning methods.	pg. 146
4: Analyze drawings using the software features.	pg. 155 pgs. 158–159
5. X,Y coordinates, area, distance, perimeter, etc.	pgs. 145–148 pg. 155
Objective 3. Prepare and understand proper title blocks.	pgs. 352–353
Objective 4. Add correct annotation to drawings.	
1: Use the correct text height. a. 1/8" (.125") b. 3mm	pg. 128
2: Use accepted industry standards for letters and numerals.	pgs. 126–128 pgs. 127–128
3: Understand the placement and use of general notes.	pg. 352 pg. 353
Objective 5. Plot/print drawings with correct line widths and line types.	pg. 148

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