Architectural Design 1

Exam Information	Description
Exam number **631** **Items** **39** **National Career Cluster** **Architecture & Construction Science, Technology, Engineering & Mathematics** **Certification available** **Yes**	The Architectural Design 1 industry certification exam assesses proficiency in 2D or 3D Computer-Aided Design (CAD) software to draw a small residential home with an emphasis on blueprint reading.

Exam Blueprint and Performance Skills

Standard	Percentage of exam score
1. Career Opportunities	2%
2. Mathematics, Measuring Conventions, and Scale	12%
3. Residential Construction Documents	18%
4. Architectural Sketching	16%
5. CAD/BIM Software	28%
6. Wall Section Components	24%

*Includes performance skill evaluation

Standard 1 - Career Opportunities

Careers in Architecture, Engineering, and Construction (AEC).

Objective 1 Understand the responsibilities associated with different positions within the AEC industry.

1. Architect
2. Engineer
3. Designer: Architectural, Interior, etc
4. Drafter/CAD Operator.
5. Contractor: General, Concrete, Framing, Plumbing, Roofing, etc.
6. Building inspector/official
7. Loan/mortgage officer

Objective 2 Understand the education, training, and certification needed for each of the occupations in Standard 1.

1. Traditional college/university
2. Apprenticeship
3. Trade school

Objective 3 Identify skills needed for successful AFC careers.

Optional: Standard performance evaluations on the final page of this document

Standard 2 - Mathematics, Measuring Conventions, and Scale

Origins of Law-Candidates will analyze the relationship between ethics and the law and explain the origin of today's law.

Objective 1 Perform basic arithmetic functions using fractions and decimals.

1. Add
2. Subtract
3. Multiply
4. Divide

Objective 2 Convert between fractions and decimals.

Objective 3 Convert between and within metric and imperial measurements.

Objective 4 Make and record basic measurements using the following tools.

1. Ruler
2. Measuring Tape
3. Architect Scale
4. Engineering Scale

Objective 5 Commonly used Industry calculations:

1. Area
    a. Square footage of a house
2. Material Estimation
    a. Research cost per square foot in your local area.
3. Acerage
    a. Acre = 43,560 ft2
4. Stairs
    a. Rise (individual and total)
    b. Run (individual and total)

Optional: Standard performance evaluations on the final page of this document

Standard 3 - Residential Construction Documents

Reading and Interpreting Residential Construction Documents.

Objective 1 Understand the following aspects of residential construction drawings/plans:

1. General Notes and Labels
2. Title Block a. Format b. Necessary Info
3. Alphabet of Lines
4. Scale
5. Dimensions
6. Commonly used symbols/icons
    a. Floor plans
        i. Doors
        ii. Windows
        iii. Bathroom Fixtures 1.
            1. Toilet/Water Closet
            2. Bathtub
            3. Sink/Lavatory/Vanity
            4. Shower

iv. Appliances
1. Refrigerator
2. Stove/Oven/Range/Cooktop
3. Dishwasher
4. Washing Machine
5. Dryer

b. Electrical/ mechanical plans
i. Switch(s)
ii. Duplex 110v receptacle outlet
iii. GFCI Outlet
iv. 220V Outlet
v. Ceiling mounted light Smoke Detector
vii. CO2 Detector
viii. Water heater
ix. Furnace
x. Others as needed

Objective 2 Read and interpret residential home drawings that include:

1. General notes
2. Site plan
3. Foundation
4. Floor plans
5. Elevation drawings
6. Electrical plans
7. Building cross and wall sections
8. Stair details

Optional: Standard performance evaluations on the final page of this document

Standard 4 - Architectural Sketching

Architectural Sketching.

Objective 1 Proper sketching techniques.

1. Create freehand sketches using paper, pencil, and an eraser (without the benefit of a straight edge, compass, or template) which is neat, clear, and smudge-free.
2. Demonstrate the use of lines as they are drawn according to the alphabet of lines. Understand and use accepted dimensioning practices for sketches.

Standard 5 - CAD/BIM Software

Architectural Planning using CAD/BIM software.

Objective 1 CAD/BIM Software

1. Navigating a CAD software interface.
2. Proper use of wall, room, door, and window types, common floor materials, and construction
3. Terminology
4. Proper placement of components including kitchen, bathroom, and laundry features.
    a. Kitchen types
        i. Corridor (Galley, Hallway)
        ii.One Wall iii. L-shape
        iv. U-shape
        v. Island
        vi. Peninsula
    b. Bathroom types
        i. Half Bath (Powder Room)
        ii. ¾ Bath
        iii. Full Bath
5. Use of lines as they are drawn according to the alphabet of lines.
6. Fully dimension the plan.
7. Use of leaders and notes using the correct text height and text style.
8. Placement and use of title block information.
9. Placement and use of general and specific notes.

Objective 2 Drawing a Foundation Plan

1. Understand the different types of foundations.
    a. Slab on grade
    b. Crawl space
    c. Basement

Objective 3 Drawing Elevation plans

1. Proper dimensioning
2. Proper Annotations
3. Material Symbols

a. Masonry
b. Log
c. Siding
d. Roofing

Objective 4 Drawing a Roof plan.

1. Identify roof types
    a. Gable
    b. Gambrel
    c. Shed
    d. Hip
    e. Dutch hip
    f. Flat
2. Pitch
3. Slope
4. Common roofing materials
    a. Asphalt shingles
    b. Metal
    c. Slate
    d. Tile
5. Construction terminology
    a. Rafter
    b. Valley
    c. Ridge
    d. Truss
        i. Chord
        ii. Web
    e. Eave
    f. Soffit
    g. Fascia
    h. Drip edge

Objective 5 Drawing a Site plan.

1. The Building
    a. Dimensions
        i. Size
        ii. Location
2. Property boundaries
    a. Property description
3. North Arrow
4. Utilities
5. Easements and Setbacks
6. Flat work
    a. Sidewalk
    b. Driveway
    c. Curb
    d. Gutter

Standard 6 - Wall Section Components

Identify the components of a typical wall section.

Objective 1 Identify the components of the following building systems:

1. Foundation
    a. Footings
    b. Stem walls
    c. Slab
    d. Porch cap
    e. J bar
    f. Rebar
    g. Anchor bolt
2. Engineered Floor
    a. Sill plate
    b. Floor joists
    c. Sub-floor
    d. Rim Joist
3. Exterior walls
    a. Exterior & interior materials
    b. Insulation
    c. Doors
    d. Windows
4. Interior walls
    a. Partition
    b. Plumbing
    c. Bearing
5. Framing
    a. Top plate
        i. Single
        ii. Double
    b. Sole plate
    c. Treated Sill plate
    d. Header
    e. Stud
    f. Sheathing
    g. Fire Blocking

Performance Skills Evaluation
Exam name: Architectural Design 1

Candidate Name: _____

Performance assessments may be completed and evaluated any time before the certification is issued. The following performance skills can be used in connection with the associated standards and exam. The evaluator will function as the subject matter expert to determine if the candidate meets the skills requirements with a Yes/No for passing.

Standard 1 – Career Opportunities • Candidates can create a personal plan to become an Architect, Engineering, or contractor in your state.	**Pass:**
Standard 2 – Mathematics, Measuring Conventions, and Scale • Candidate can accurately measure to 1/16” and to a millimeter. • Candidate can add, subtract, multiply, divide, and convert in fractions and decimal units. • Candidate can convert between and within metric and imperial units. • Candidate can calculate common industry measurements (Standard 2 Objective 5)	**Pass:**
Standard 3 – Residential Construction Documents • Candidate can read and understand residential construction drawings used in the AEC industry.	**Pass:**
Standard 4 – Architectural Sketching • Candidate can sketch a proportional drawing to convey a general layout.	
Standard 5 – CAD/BIM software • Candidate can reproduce a floor plan. • Candidate can reproduce a site plan. • Candidate can reproduce an elevation. • Candidate can reproduce a foundation plan.	**Pass:**
Standard 6 – Wall Section Components • Candidate can identify the individual components of a wall section.	**Pass:**

Evaluator Name: _____

Date: _____