



Statewide Framework Document for: 460201

Residential Carpentry/Carpenter

Standards may be added to this document prior to submission but may not be removed from the framework to meet state credit equivalency requirements. Performance assessments and leadership alignment may be developed at the local level. In order to earn state approval, performance assessments must be submitted within this framework. **This course is eligible for one credit of Geometry.** Washington Mathematics Standards (Common Core State Standards) support foundational mathematical knowledge and reasoning. While it is important to develop a conceptual understanding of mathematical topics and fluency in numeracy and procedural skills, teachers should also focus on the application of mathematics to career fields to support the three (3) key shifts of CCSS. The Standards for Mathematical Practice develop mathematical habits of mind and are to be modeled and integrated throughout the course. The details about each mathematical standard can be found at [Common Core Mathematics Standards](#).

School District Name			
Course Title: Residential Carpentry/Carpenter			Total Framework Hours: 540
CIP Code: 460201	☐ Exploratory ☒ Preparatory		Date Last Modified: December 31, 2022
Career Cluster: Architecture and Construction			Cluster Pathway: Construction
Course Summary: This course prepares individuals to apply technical knowledge and skills to lay out, cut, fabricate, erect, install, and repair wooden structures and fixtures, using hand and power tools. Instruction includes technical mathematics, framing, selecting construction materials, job estimating, blueprint preparation, foundations, roughing-in, finish carpentry techniques, and applicable codes and standards.			
Eligible for Equivalent Credit in: Math			Total Number of Units: 30

Leadership Alignment: This program is a part of the CTSO SkillsUSA. Leadership and employability skills are embedding throughout the curriculum. The students have opportunities for leadership in job shadows, ambassadors, giving tours, teaching. Employability Rubric: Students are assessed on the WVTSC Employability Rubric on a weekly basis. The employability rubric contains the following: Positive Attitude and Teamwork: Works effectively with others and contributes productively as a member of the team; Professional Etiquette: Understands and uses professional behavior and language; Appearance and Hygiene: Exhibits appropriate professional appearance and hygiene; Attendance and Punctuality: Contributes to the learning environment by consistent attendance; Self and Resource Management: Appropriate use of materials, resources and time; Equipment Safety and Maintenance: Utilizes equipment efficiently and safely.

In addition, guest speakers are brought in to talk about careers, training and post-secondary education. Students are assessed by the instructor with the rubric. Manage Goals and Time: Utilize time and manage workload efficiently. Work Independently: Monitor, define, prioritize and complete tasks without direct oversight. Be Self-directed Learners: Go beyond basic mastery of skills and/or curriculum to explore and expand one's own learning and opportunities to gain expertise. Apply Technology Effectively: Apply a fundamental understanding of the ethical/legal issues surrounding the access and use of information technologies

Unit 1: Career Planning	Total Learning Hours for Unit: 5
Unit Summary: Competencies include: • Students use YouScience to identify personal strengths and career interests. • Complete, discuss, and analyze the results of personality, career interest, and aptitude assessments. • Explore the career clusters as defined by the U.S. Department of Education and summarize the career opportunities in a cluster of personal interest. • Create a personal career portfolio including academic, certification, and technical skill requirements; career opportunities; expected wages; necessary skills and aptitudes; and the impact of technology on careers of personal interest. • Determine academic/training or certification requirements for transition from one learning level to the next. Explore opportunities for earning credit/certifications in high school such as Advanced Placement®, tech prep, International Baccalaureate®, college in the high school, and military and apprenticeship opportunities. • Develop and analyze tables, charts, and graphs related to career interests and make an oral presentation regarding the career pathway of your choice. • Develop an awareness of financial aid, scholarships, and other sources of income to support postsecondary education/training and discuss the impact of effective college and career planning. • Identify how performance on assessments such as the SAT®, ACT®, ASVAB®, COMPASS®, and ACCUPLACER® affect personal academic and career goals. • Prepare a personal budget reflecting desired lifestyle, and compare and contrast at least three careers of interest in regard to salary expectations and education/training costs. • Prepare a program of study for at least one career of interest. • Apply knowledge gained from individual assessment to a set of goals and a career plan. • Develop strategies to make an effective transition from school to career. • Identify industry certification opportunities.	
Performance Assessments: • Students prepare responses to standard interview questions. • Students complete a Career Research assignment.	
Leadership Alignment: All students create an academic portfolio which includes: • The use of YouScience and other online resource to get an understanding of future options. 4.A.1 Access information efficiently (time) and effectively (sources) 4.A.2 Evaluate information critically and competently 6.A.1 Use technology as a tool to research, organize, evaluate and communicate information 8.A.1 Set goals with tangible and intangible success criteria 8.A.2 Balance tactical (short-term) and strategic (long-term) goals	
Industry Standards and/or Competencies: National Center for Construction Education and Research: Residential Carpentry Standards: Module: Orientation to the Trade Learning Objective 1 Identify the career and entrepreneurial opportunities within the carpentry trade. a. Identify the training opportunities within the carpentry trade. Learning Objective 2	

Identify the skills, responsibilities, and characteristics needed to be a successful carpenter. - Identify the skills needed to be a successful carpenter. - Identify the responsibilities of a successful carpenter. - State the personal characteristics of a successful carpenter.
Learning Objective 3 Identify the skills, responsibilities, and characteristics needed to be a successful carpenter. - Describe the program, curriculum, and SkillsUSA Championships. - State the benefits from being a SkillsUSA member. - List the seven goals of the SkillsUSA Program of Work.
Learning Objective 4 Explain the importance of safety in the construction industry, and describe the obligations of the contractor, subcontractors, and you to ensure a safe work environment. - Describe the OSHA Outreach Training Program. - Explain hazard recognition and define your role in it.
Aligned Washington State Academic Standards
Washington state standards were not identified for this unit but may be added at the local level.

Unit 2: Personal Success and Employability Skills	Total Learning Hours for Unit: 10
Unit Summary: Competencies include: - Implement effective study skills for academic success. - Develop personal goals using SMART (Specific Measurable Attainable Realistic Timely) objectives and strategies. - Use interpersonal skills to facilitate effective teamwork. - Use a problem-solving model and critical thinking skills to make informed decisions. - Use effective time management and goal-setting strategies. - Effectively use information and communication technology tools. - Identify skills that can be transferable among a variety of careers. - Create and complete appropriate documents such as an electronic portfolio, personal résumé, employment application, letter of intent, letter of recommendation, and thank-you letter. - Complete job search documents, including job applications and W-4 forms. - Demonstrate proper interview techniques in various situations.	
Performance Assessments: - Students generate a résumé and keep a portfolio of their quality work. - As students research job openings within a variety of companies, they should compare and contrast their descriptions, duties, and expectations, using YouScience.	
Leadership Alignment: Students will use YouScience and other online resources to identify their skill sets. 4.A.1 Access information efficiently (time) and effectively (sources) 4.A.2 Evaluate information critically and competently 6.A.1 Use technology as a tool to research, organize, evaluate and communicate information	

- 8.A.1 Set goals with tangible and intangible success criteria
- 8.A.2 Balance tactical (short-term) and strategic (long-term) goals

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Industry Standards and/or Competencies:

National Center for Construction Education and Research: Residential Carpentry Standards:

Module: Orientation to the Trade

Learning Objective 1

Identify the career and entrepreneurial opportunities within the carpentry trade.

- a. Identify the training opportunities within the carpentry

Learning Objective 2

Identify the skills, responsibilities, and characteristics needed to be a successful carpenter.

- a. Identify the skills needed to be a successful carpenter.
- b. Identify the responsibilities of a successful carpenter.
- c. State the personal characteristics of a successful carpenter.

Learning Objective 3

Identify the skills, responsibilities, and characteristics needed to be a successful carpenter.

- a. Describe the program, curriculum, and SkillsUSA Championships.
- b. State the benefits from being a SkillsUSA member.
- c. List the seven goals of the SkillsUSA Program of Work.

Learning Objective 4

Explain the importance of safety in the construction industry, and describe the obligations of the contractor, subcontractors, and you to ensure a safe work environment.

- a. Describe the OSHA Outreach Training Program.
- b. Explain hazard recognition and define your role in it.

Aligned Washington State Academic Standards

Washington state standards were not identified for this unit but may be added at the local level.

Unit 3: Problem Solving Using Critical Thinking, Creativity and Innovation

Total Learning Hours for Unit: 10

Unit Summary:

Competencies include:

- Employ critical thinking skills independently and in teams to solve problems and make decisions.
- Employ critical thinking and interpersonal skills to resolve conflicts.
- Identify and document workplace performance goals and monitor progress toward those goals.
- Conduct technical research to gather information necessary for decision making.
- Explain the importance and dynamics of individual and teamwork approaches to problem solving.
- Describe methods of researching and validating reliable information relevant to the problem.
- Explain strategies used to formulate ideas, proposals and solutions to problems.
- Select potential solutions based on reasoned criteria.
- Implement and evaluate solution(s).

Performance Assessments:

Students write short essays on the following topics: (1) Work ethic – List the characteristics of a good work ethic, providing examples of what a good work ethic looks like in the workplace, and evaluate your own work ethic in the classroom and/or laboratory; (2) Work communications – Provide proper use and content of e-mails, phone calls, face-to-face conversations, text messages, and social networking personal messages to communicate within the workplace; and (3) Workplace initiative and responsibility – Examine how to develop the ability to work with limited or no supervision and how an individual can take on more responsibility in the workplace.

Leadership Alignment:

- Using YouScience students will take the information compiled and will present an overview of their findings related to their skills, career and education connection.
- 4.A.1 Access information efficiently (time) and effectively (sources)
- 4.A.2 Evaluate information critically and competently
- 6.A.1 Use technology as a tool to research, organize, evaluate and communicate information
- 8.A.1 Set goals with tangible and intangible success criteria
- 8.A.2 Balance tactical (short-term) and strategic (long-term) goals
- 5.B.1 Understand and utilize the most appropriate media creation tools, characteristics and conventions
- 3.A.1 Articulate thoughts and ideas effectively using oral, written and nonverbal communication skills in a variety of forms and contexts 3.A.2 Listen effectively to decipher meaning, including knowledge, values, attitudes and intentions

Industry Standards and/or Competencies:

National Center for Construction Education and Research: Residential Carpentry Standards:

Module: Orientation to the Trade

Learning Objective 3

- Identify the skills, responsibilities, and characteristics needed to be a successful carpenter.
- a. Describe the program, curriculum, and SkillsUSA Championships.
 - b. State the benefits from being a SkillsUSA member.
 - c. List the seven goals of the SkillsUSA Program of Work.

Module: Building Materials, Fasteners, and Adhesives

Learning Objective 1

- Identify various types of building materials and describe their uses.
- a. State the uses of various types of hardwoods and softwoods.
 - b. Describe common lumber defects.
 - c. Identify the different grades of lumber and describe uses for each.
 - d. Explain how treated lumber differs from untreated lumber.
 - e. Describe how plywood is manufactured and cite common applications for plywood on a construction project.
 - f. Identify uses of hardboard.
 - g. Identify uses of particleboard.
 - h. Identify uses of high- and medium-density overlay plywood.
 - i. Describe how oriented strand board differs from particleboard and cite common applications for OSB.
 - j. Cite common applications for mineral fiberboard.
 - k. State the uses of various types of engineered lumber.
 - l. Identify applications for wood I-beams.
 - m. List advantages of glulam lumber over conventional solid lumber.

- n. Describe the composition of concrete and explain how hydration occurs.
- o. List uses of concrete masonry units for a construction project.
- p. Identify where metal framing members may be used in a structure.

Learning Objective 4

Explain how to calculate the quantities of lumber, panel, and concrete products using industry-standard methods.

- a. Calculate lumber quantities.
- b. Calculate panel quantities.
- c. Calculate the volume of concrete required for rectangular and cylindrical shapes.

Module: Introduction to Construction Drawings, Specifications, and Layout Learning Objective 2

State the purpose of written specifications.

- a. Describe how specifications are organized.
- b. Explain the importance of building codes in

construction. Learning Objective 3

Identify the methods of squaring a building.

Module: Floor Systems

Learning Objective 2

Identify the different types of framing systems.

- a. Describe the general components of a platform-framed structure.
- b. List differences between platform framing and balloon framing.
- c. Describe the characteristics of post-and-beam

framing. Learning Objective 5

Estimate the amount of material needed for a floor assembly.

- a. Describe how to estimate the amount of sill plate, sill sealer, and termite shield.
- b. Describe how to estimate the amount of beam or girder material.
- c. Describe how to estimate the amount of lumber needed for joists and joist headers.
- d. Describe how to estimate the amount of bridging required.
- e. Describe how to estimate the amount of subfloor material required.

Aligned Washington State Academic Standards

Mathematical Practices

MP3 Construct viable arguments and critique the reasoning of others.

Unit 4: Teamwork and Cooperation

Total Learning Hours for Unit: 20

Unit Summary:

Competencies include:

- Employ leadership skills to accomplish organizational goals and objectives.
- Establish and maintain effective working relationships with others in order to accomplish objectives and tasks.
- Conduct and participate in meetings to accomplish work tasks.
- Employ mentoring skills to inspire and teach others.
- Cooperate rather than compete with team members.
- Seek suggestions, opinions, and information from team members.

- Listen to and consider the ideas of team members.
- Support group decisions even if not in total agreement.
- Communicate changes or problems to team members.
- Treat everyone with respect and understanding.
- Employ mentoring skills to inspire and teach others.

Performance Assessments:

Students are placed in work groups with an assigned student foreman. Groups are assigned projects and have to determine the needs to accomplish the project, including time, materials, design, and production, and then must complete the project accordingly.

Leadership Alignment:

Using many team building exercises students will be asked to build problem solving, teamwork, trust and communication. These activities will be ran by our partners from Youth Dynamic. The activities are based on low ropes course exercises.

- 1.A.1 Use a wide range of idea creation techniques (such as brainstorming)
- 1.A.2 Create new and worthwhile ideas (both incremental and radical concepts)
- 1.A.3 Elaborate, refine, analyze and evaluate their own ideas in order to improve and maximize creative efforts
- 1.B.1 Develop, implement and communicate new ideas to others effectively
- 1.B.2 Be open and responsive to new and diverse perspectives; incorporate group input and feedback into the work
- 2.B.1 Analyze how parts of a whole interact with each other to produce overall outcomes in complex systems
- 2.D.1 Solve different kinds of non-familiar problems in both conventional and innovative ways
- 2.D.2 Identify and ask significant questions that clarify various points of view and lead to better solutions
- 3.A.1 Articulate thoughts and ideas effectively using oral, written and nonverbal communication skills in a variety of forms and contexts
- 3.A.2 Listen effectively to decipher meaning, including knowledge, values, attitudes and intentions
- 3.A.3 Use communication for a range of purposes (e.g. to inform, instruct, motivate and persuade)

Industry Standards and/or Competencies:

National Center for Construction Education and Research: Residential Carpentry Standards:

Module: Orientation to the Trade

Learning Objective 2

Identify the skills, responsibilities, and characteristics needed to be a successful carpenter.

- a. Identify the skills needed to be a successful carpenter.
- b. Identify the responsibilities of a successful carpenter.
- c. State the personal characteristics of a successful carpenter.

Learning Objective 4

Explain the importance of safety in the construction industry, and describe the obligations of the contractor, subcontractors, and you to ensure a safe work environment.

- a. Describe the OSHA Outreach Training Program.
- b. Explain hazard recognition and define your role in it.

Module: Building Materials, Fasteners, and Adhesives

Learning Objective 2

List safety precautions associated with building materials.

- a. List general safety guidelines for working with building materials.
- b. Cite safety precautions for working with wood building materials.

- c. Cite safety precautions for working with concrete building materials.
- d. Cite safety precautions for working with metal building materials.

Aligned Washington State Academic Standards

Mathematical Practices

MP3 Construct viable arguments and critique the reasoning of others.

Unit 5: Construction Math

Total Learning Hours for Unit: 45

Unit Summary:

Competencies include:

- C-1.1 Add, subtract, multiply, and divide whole numbers, with and without a calculator.
- C-1.2 Use a standard ruler and a metric ruler to measure.
- C-1.3 Add, subtract, multiply, and divide fractions.
- C-1.5 Convert decimals to percentages and percentages to decimals.
- C-1.6 Convert fractions to decimals and decimals to fractions.
- C-1.7 Recognize some of the basic shapes used in the construction industry, and apply basic geometry to measure them.
- C-1.8 Recognize and use metric units of length, weight, volume, and temperature.
- C-1.9 Measure using standards construction tools.
- C-1.10 Understand scale drawing.
- C-1.11 Demonstrate estimating principles.
- C-1.12 Understand square root and calculating square roots.
- C-1.13 Solve one variable equation.
- C-1.14 Understand area and volume of rectangles, circles and triangles.
- C-1.15 Understand the definition and usage of Pythagorean theorem.
- C-1.16 Identify steel rules and explain how it is used (10^{th} and 100^{th} , metrics, fractional scales).
- C-1.17 Understand dividers and explain its uses.
- C-1.18 Explain what the metric system is and why it is important to the trade.
- C-1.19 Calculate using metric, linear, square, volume, and weight measurements.
- C-1.20 Construct simple geometric figures.
- C-1.21 Apply mathematical formulas to solve problems.
- C-1.22 Solve linear, area, volume, and angle measurement problems.
- C-1.23 Solve percentage problems.
- C-1.24 Define and solve ratio and proportion problems.
- C-1.25 Calculate selected seam allowances.
- C-1.26 Apply standard rules and practices for solving selected field measurement problems.

Performance Assessments:

- Students complete projects that have been developed to reinforce and enhance their knowledge and ability to apply concepts of area, volume, estimation, angles, and calculations (e.g., HVAC and electrical loads).

Leadership Alignment:

Students will be put into groups to work on several material cost projects. They will be given a list of materials with a cost sheet. Groups will be assessed on how close they can get to the correct quote.

- 1.C.1 Act on creative ideas to make a tangible and useful contribution to the field in which the innovation will occur
- 2.B.1 Analyze how parts of a whole interact with each other to produce overall outcomes in complex systems
- 3.A.3 Use communication for a range of purposes (e.g. to inform, instruct, motivate and persuade)
- 3.B.1 Demonstrate ability to work effectively and respectfully with diverse teams
- 3.B.3 Assume shared responsibility for collaborative work, and value the individual contributions made by each team member
- 4.B.1 Use information accurately and creatively for the issue or problem at hand
- 8.A.3 Utilize time and manage workload efficiently

Industry Standards and/or Competencies:

National Center for Construction Education and Research: Residential Carpentry Standards:

Module: Orientation to the Trade

Learning Objective 2

Identify the skills, responsibilities, and characteristics needed to be a successful carpenter.

- a. Identify the skills needed to be a successful carpenter.
- b. Identify the responsibilities of a successful carpenter.
- c. State the personal characteristics of a successful carpenter.

Module: Building Materials, Fasteners, and Adhesives

Learning Objective 4

Explain how to calculate the quantities of lumber, panel, and concrete products using industry-standard methods.

- a. Calculate lumber quantities.
- b. Calculate panel quantities.
- c. Calculate the volume of concrete required for rectangular and cylindrical shapes.

Module: Introduction to Construction Drawings, Specifications, and

Layout Learning Objective 3

Identify the methods of squaring a building.

Module: Floor Systems

Learning Objective 5

Estimate the amount of material needed for a floor assembly.

- a. Describe how to estimate the amount of sill plate, sill sealer, and termite shield.
- b. Describe how to estimate the amount of beam or girder material.
- c. Describe how to estimate the amount of lumber needed for joists and joist headers.
- d. Describe how to estimate the amount of bridging required.
- e. Describe how to estimate the amount of subfloor material required.

Module: Wall Systems

Learning Objective 5

Describe the correct procedure to estimate the materials required to frame walls.

- a. Explain how to estimate the amount of lumber required for soleplates and top plates.
- b. Describe how to estimate the number of studs required.
- c. Explain how to calculate the amount of material needed for a header.
- d. Describe how to estimate the amount of diagonal bracing

required. Learning Objective 6

Identify alternative wall systems.

a. Describe how concrete walls are constructed.

Explain the difference between standard interior wall systems and alternative interior wall systems.

Aligned Washington State Academic Standards

Mathematics: Common Core

HS.N.RN.1 Explain how the definition of the meaning of rational exponents follows from extending the properties of integer exponents to those values, allowing for a notation for radicals in terms of rational exponents.

HS.N.RN.2 Rewrite expressions involving radicals and rational exponents using the properties of exponents. Use properties of rational and irrational numbers.

HS.N.RN.3 Explain why the sum or product of two rational numbers is rational; that the sum of a rational number and an irrational number is irrational; and that the product of a nonzero rational number and an irrational number is irrational.

HS.N.Q.1 Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphHS. and data displays.

HS.N.Q.2 Define appropriate quantities for the purpose of descriptive modeling.

HS.N.Q.3 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. Cluster: Create equations that describe numbers or relationships.

HS.A.CED.1 Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear and quadratic functions, and simple rational and exponential functions.

HS.A.CED.2 Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.

HS.A.CED.3 Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or nonviable options in a modeling context.

HS.A.CED.4 Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations.

HS.A.REI.1 Explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method.

HS.A.REI.2 Solve simple rational and radical equations in one variable, and give examples showing how extraneous solutions may arise.

HS.A.REI.3 Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.

HS.A.REI.4 Solve quadratic equations in one variable.

HS.A.REI.4a Use the method of completing the square to transform any quadratic equation in x into an equation of the form $(x - p)^2 = q$ that has the same solutions. Derive the quadratic formula from this form.

HS.A.REI.4b Solve quadratic equations by inspection (e.g., for $x^2 = 49$), taking square roots, completing the square, the quadratic formula and factoring, as appropriate to the initial form of the equation. Recognize when the quadratic formula gives complex solutions and write them as $a \pm bi$ for real numbers a and b .

HS.A.REI.5 Prove that, given a system of two equations in two variables, replacing one equation by the sum of that equation and a multiple of the other produces a system with the same solutions.

HS.A.REI.6 Solve systems of linear equations exactly and approximately (e.g., with graphHS.), focusing on pairs of linear equations in two variables.

HS.A.REI.7 Solve a simple system consisting of a linear equation and a quadratic equation in two variables algebraically and graphically.

HS.A.REI.8 (+) Represent a system of linear equations as a single matrix equation in a vector variable.

HS.A.REI.9 (+) Find the inverse of a matrix if it exists and use it to solve systems of linear equations (using technology for matrices of dimension 3×3 or greater).

HS.G.CO.1 Know precise definitions of angle, circle, perpendicular line, parallel line, and line segment, based on the undefined notions of point, line, distance along a line, and distance around a circular arc.

HS.G.CO.2 Represent transformations in the plane using, e.g., transparencies and geometry software; describe transformations as functions that take points in the plane as inputs and give other points as outputs. Compare transformations that preserve distance and angle to those that do not (e.g., translation versus horizontal stretch).

HS.G.CO.3 Given a rectangle, parallelogram, trapezoid, or regular polygon, describe the rotations and reflections that carry it onto itself.

HS.G.CO.4 Develop definitions of rotations, reflections, and translations in terms of angles, circles, perpendicular lines, parallel lines, and line segments.

HS.G.CO.5 Given a geometric figure and a rotation, reflection, or translation, draw the transformed figure using, e.g., graph paper, tracing paper, or geometry software. Specify a sequence of transformations that will carry a given figure onto another.

Understand congruence in terms of rigid motions

HS.G.CO.6 Use geometric descriptions of rigid motions to transform figures and to predict the effect of a given rigid motion on a given figure; given two figures, use the definition of congruence in terms of rigid motions to decide if they are congruent.

HS.G.CO.7 Use the definition of congruence in terms of rigid motions to show that two triangles are congruent if and only if corresponding pairs of sides and corresponding pairs of angles are congruent.

HS.G.CO.8 Explain how the criteria for triangle congruence (ASA, SAS, and SSS) follow from the definition of congruence in terms of rigid motions.

HS.G.CO.9 Prove theorems about lines and angles. Theorems include: vertical angles are congruent; when a transversal crosses parallel lines, alternate interior angles are congruent and corresponding angles are congruent; points on a perpendicular bisector of a line segment are exactly those equidistant from the segment's endpoints.

HS.G.CO.10 Prove theorems about triangles. Theorems include: measures of interior angles of a triangle sum to 180° ; base angles of isosceles triangles are congruent; the segment joining midpoints of two sides of a triangle is parallel to the third side and half the length; the medians of a triangle meet at a point.

HS.G.CO.11 Prove theorems about parallelograms. Theorems include: opposite sides are congruent, opposite angles are congruent, the diagonals of a parallelogram bisect each other, and conversely, rectangles are parallelograms with congruent diagonals.

HS.G.CO.12 Make formal geometric constructions with a variety of tools and methods (compass and straightedge, string, reflective devices, paper folding, dynamic geometric software, etc.). Copying a segment; copying an angle; bisecting a segment; bisecting an angle; constructing perpendicular lines, including the perpendicular bisector of a line segment; and constructing a line parallel to a given line through a point not on the line.

HS.G.CO.13 Construct an equilateral triangle, a square, and a regular hexagon inscribed in a circle.

HS.G.SRT.1 Verify experimentally the properties of dilations given by a center and a scale factor:

HS.G.SRT.1a A dilation takes a line not passing through the center of the dilation to a parallel line, and leaves a line passing through the center unchanged.

HS.G.SRT.1b The dilation of a line segment is longer or shorter in the ratio given by the scale factor.

HS.G.SRT.2 Given two figures, use the definition of similarity in terms of similarity transformations to decide if they are similar; explain using similarity transformations the meaning of similarity for triangles as the equality of all corresponding pairs of angles and the proportionality of all corresponding pairs of sides.

HS.G.SRT.3 Use the properties of similarity transformations to establish the AA criterion for two triangles to be similar.

HS.G.SRT.4 Prove theorems about triangles. Theorems include: a line parallel to one side of a triangle divides the other two proportionally, and conversely; the Pythagorean Theorem proved using triangle similarity.

HS.G.SRT.5 Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures.

HS.G.SRT.6 Understand that by similarity, side ratios in right triangles are properties of the angles in the triangle, leading to definitions of trigonometric ratios for acute angles.

HS.G.SRT.7 Explain and use the relationship between the sine and cosine of complementary angles.

HS.G.SRT.8 Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems.*

HS.G.SRT.9 (+) Derive the formula $A = \frac{1}{2} ab \sin(C)$ for the area of a triangle by drawing an auxiliary line from a vertex perpendicular to the opposite side.

HS.G.SRT.10 (+) Prove the Laws of Sines and Cosines and use them to solve problems.

HS.G.SRT.11(+) Understand and apply the Law of Sines and the Law of Cosines to find unknown measurements in right and non-right triangles (e.g., surveying problems, resultant forces).

HS.G.C.1 Prove that all circles are similar.

HS.G.C.2 Identify and describe relationships among inscribed angles, radii, and chords. Include the relationship between central, inscribed, and circumscribed angles; inscribed angles on a diameter are right angles; the radius of a circle is perpendicular to the tangent where the radius intersects the circle.

HS.G.C.3 Construct the inscribed and circumscribed circles of a triangle, and prove properties of angles for a quadrilateral inscribed in a circle.

HS.G.C.4 (+) Construct a tangent line from a point outside a given circle to the circle.

Find arc lengthHS. and areas of sectors of circles

HS.G.C.5 Derive using similarity the fact that the length of the arc intercepted by an angle is proportional to the radius, and define the radian measure of the angle as the constant of proportionality; derive the formula for the area of a sector.

HS.G.GPE.1 Derive the equation of a circle of given center and radius using the Pythagorean Theorem; complete the square to find the center and radius of a circle given by an equation.

HS.G.GPE.2 Derive the equation of a parabola given a focus and directrix.

HS.G.GPE.3 (+) Derive the equations of ellipses and hyperbolas given the foci, using the fact that the sum or difference of distances from the foci is constant.

HS.G.GPE.4 Use coordinates to prove simple geometric theorems algebraically

HS.G.GPE.5 Prove the slope criteria for parallel and perpendicular lines and use them to solve geometric problems (e.g., find the equation of a line parallel or perpendicular to a given line that passes through a given point).

HS.G.GPE.6 Find the point on a directed line segment between two given points that partitions the segment in a given ratio.

	HS.G.GPE.7 Use coordinates to compute perimeters of polygons and areas of triangles and rectangles, e.g., using the distance formula.* HS.G.GMD.1 Give an informal argument for the formulas for the circumference of a circle, area of a circle, volume of a cylinder, pyramid, and cone. Use dissection arguments, Cavalieri's principle, and informal limit arguments. HS.G.GMD.2 (+) Give an informal argument using Cavalieri's principle for the formulas for the volume of a sphere and other solid figures. HS.G.GMD.3 Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems.* HS.G.GMD.4 Identify the shapes of two-dimensional cross-sections of three-dimensional objects, and identify three-dimensional objects generated by rotations of two-dimensional objects. HS.G.MG.1 Use geometric shapes, their measures, and their properties to describe objects (e.g., modeling a tree trunk or a human torso as a cylinder).* HS.G.MG.2 Apply concepts of density based on area and volume in modeling situations (e.g., persons per square mile, BTUs per cubic foot).* HS.G.MG.3 Apply geometric methods to solve design problems (e.g., designing an object or structure to satisfy physical constraints or minimize cost; working with typographic grid systems based on ratios).*
Mathematical Practices	MP1 Make sense of problems and persevere in solving them. MP2 Reason abstractly and quantitatively. MP3 Construct viable arguments and critique the reasoning of others. MP4 Model with mathematics. MP5 Use appropriate tools strategically. MP7 Look for and make use of structure. MP8 Look for and express regularity in repeated reasoning.

Unit 6: Hand Tools	Total Learning Hours for Unit: 20
Unit Summary: Competencies include: - C-2.1 Recognize and identify some of the basic hand tools used in the construction trade. - C-2.2 Use hand tools safely. - C-2.3 Describe the basic procedures for taking care of hand tools. - C-2.4 Identify the hand tools commonly used by carpenters and describe their uses. - C-2.5 Use hand tools in a safe and appropriate manner. - C-2.6 Demonstrate the use of hand tools including: screwdrivers, pliers (diagonal cutters, interlocking, needlenose, slip joint, locking, snap ring), combinations, pipes, torques, allens, adjustables, open-end and box end wrenches, punches, chisels, hammers, sockets, extensions, files, snips, hacksaws, and vises.	
Performance Assessments: • Beginner: Instructor demonstrates each tool. Students take a written and verbal test on safety; students demonstrate proper technique for using tool, students must pass with 100% prior to working in the lab. • Advanced: Instructor introduces trainees to hand tools that are widely used in the construction industry, such as hammers, saws, levels, pullers, vises, and clamps. Instructor Explains the specific applications of each tool and shows how to sue them properly. Instructor discusses important safety and maintenance issues related to hand tools.	
Leadership Alignment:	

- SkillsUSA Career Readiness Curriculum work ethic lesson *Get it Done*. Students will get in small groups to discuss the concept of Putting forth my best effort to meet expectations. After a short discussion each student is responsible for turning in a short paper where they describe:
Engage in meaningful work to make a contribution
Be Productive at all times of the day
Reflect and evaluate their productivity
What does it take to get the job done
21st Century Skills:
- 1.B.1 Develop, implement and communicate new ideas to others effectively
2.B.1 Analyze how parts of a whole interact with each other to produce overall outcomes in complex systems
3.A.1 Articulate thoughts and ideas effectively using oral, written and nonverbal communication skills in a variety of forms and contexts
8.A.1 Set goals with tangible and intangible success criteria

Industry Standards and/or Competencies:

National Center for Construction Education and Research: Residential Carpentry Standards:

Module: Orientation to the Trade

Learning Objective 2

Identify the skills, responsibilities, and characteristics needed to be a successful carpenter.

- Identify the skills needed to be a successful carpenter.
- Identify the responsibilities of a successful carpenter.
- State the personal characteristics of a successful carpenter.

Learning Objective 4

Explain the importance of safety in the construction industry, and describe the obligations of the contractor, subcontractors, and you to ensure a safe work environment.

- Describe the OSHA Outreach Training Program.
- Explain hazard recognition and define your role in it.

Module: Hand and Power Tools

Learning Objective 1

Identify the hand tools commonly used by carpenters.

- Describe the safe use and maintenance of levels.
- Describe the safe use and maintenance of squares.
- Describe the safe use and maintenance of planes.
- Describe the safe use and maintenance of clamps.
- Describe the safe use and maintenance of handsaws.

Aligned Washington State Academic Standards

Mathematical Practices

Practice 5: Use appropriate tools strategically.
Practice 6: Attend to precision.

Unit 7: Power Tools

Total Learning Hours for Unit: 40

Unit Summary:

Competencies include:

C-3.1 Identify power tools commonly used in the construction trades.

C-3.2 Use power tools safely.
 C-3.3 Explain how to maintain power tools properly.
 C-3.4 State the general safety rules for operating all power tools, regardless of type.
 C-3.5 State the general rules for properly maintaining all power tools, regardless of type.
 C-3.6 Identify the portable power tools commonly used by carpenters and describe their uses.
 C-3.7 Use portable power tools in a safe and appropriate manner.
 C-3.8 Identify the stationary power tools commonly used by carpenters and describe their uses.
 C-3.9 Use stationary power tools in a safe and appropriate manner.
 C-11.10 Identify portable power tools that meet green specifications.
 C-3.13 Safe Use and Maintenance of Portable Power Saws (circular and reciprocating).
 C-3.14 Safe Use of Portable Power; Drills, Drivers, and Hammer Drills.
 C-3.15 Safe Use of Stationary Tools (drilling machines, sleeves, sockets, chucks; disc and belt sander; band saw, power hacksaw; press brake, metal shears, lathe, shaper, milling and grinding machine, CNC machining center).
 C-3.16 Safe Use of Portable Power Tools (router, sanders, grinders and pneumatic tools).
 C-3.17 Identify and explain the safety procedures to be followed when using an electric soldering iron.
 C-3.18 List the type of solder to use when soldering electrical component.

Performance Assessments:

- Beginning students demonstrate proper use of tool for teacher.
- Advanced students demonstrate the use of power tools under teacher observation. Students may have to recertify. Students assist in demonstrating tools for beginning students.

Leadership Alignment:

- SkillsUSA Career Readiness Curriculum decision-making lesson *Making Informed Decisions*. Students will first get into small groups, where they will be given a prompt on a topic that needs a solution. After discussing the group will write out the agreed upon solution and share with the whole class.

21st Century Skills:

- 2.D.1 Solve different kinds of non-familiar problems in both conventional and innovative ways
 2.D.2 Identify and ask significant questions that clarify various points of view and lead to better solutions
 2.C.1 Effectively analyze and evaluate evidence, arguments, claims and beliefs
 2.C.2 Analyze and evaluate major alternative points of view
 3.B.1 Demonstrate ability to work effectively and respectfully with diverse teams
- 3.A.3 Use communication for a range of purposes (e.g. to inform, instruct, motivate and persuade)

Industry Standards and/or Competencies:

National Center for Construction Education and Research: Residential Carpentry Standards:

Module: Orientation to the Trade

Learning Objective 2

Identify the skills, responsibilities, and characteristics needed to be a successful carpenter.

- Identify the skills needed to be a successful carpenter.
- Identify the responsibilities of a successful carpenter.
- State the personal characteristics of a successful

carpenter. Learning Objective 4

Explain the importance of safety in the construction industry, and describe the obligations of the contractor, subcontractors, and you to ensure a safe work environment.

- a. Describe the OSHA Outreach Training Program.
- b. Explain hazard recognition and define your role in it.

Module: Building Materials, Fasteners, and Adhesives

Learning Objective 2

List safety precautions associated with building materials.

- a. List general safety guidelines for working with building materials.
- b. Cite safety precautions for working with wood building materials.
- c. Cite safety precautions for working with concrete building materials.
- d. Cite safety precautions for working with metal building materials.

Module: Hand and Power Tools

Learning Objective 2

Identify the power tools commonly used by carpenters.

- a. Describe the general safe use and maintenance of power tools.
- b. Describe the safe use of power saws.
- c. Describe the safe use of drill presses.
- d. Describe the safe use of routers and laminate trimmers.
- e. Describe the safe use of portable power planes.
- f. Describe the safe use of power metal shears.
- g. Describe the safe use of pneumatic and cordless nailers and staplers.

Aligned Washington State Academic Standards

Mathematical Practices

MP5 Use appropriate tools strategically.
MP6 Attend to precision.

Unit 8: Blueprints, Plans and Drawings

Total Learning Hours for Unit: 60

Competencies include:

- C-4.1 Recognize and identify basic blueprint terms, components, and symbols (isometric, geometric communication, orthographic, schematic)
- C-4.2 Relate information on blueprints to actual locations on the print.
- C-4.3 Recognize different classifications of drawings.
- C-4.4 Interpret and use drawing dimensions.
- C-4.5 Describe the types of drawings usually included in a set of plans and list the information found on each type.
- C-4.6 Identify the different types of lines used on construction drawings.
- C-4.7 Identify selected architectural symbols commonly used to represent materials on plans.
- C-4.8 Identify selected electrical, mechanical, and plumbing symbols commonly used on plans.
- C-4.9 Identify selected abbreviations commonly used on plans.
- C-4.10 Read and interpret plans, elevations, schedules, sections, and details contained in basic construction drawings.
- C-4.11 State the purpose of written specifications.
- C-4.12 Identify and describe the parts of a specification.
- C-4.13 Demonstrate or describe how to perform a quantity takeoff for materials.
- C-4.14 Identify and use drafting techniques, e.g., lines, letters, symbols.
- C-4.15 Sketch a part or idea.

C-4.16 Interpret a drawing schematic.

Performance Assessments:

- Students learn blueprint reading and be able to correctly label a blueprint.
- Students produce hand sketches and complete a series of five required projects with increasing difficulty (book shelf, foot stool, laminate board, bread board, and chess board).

Leadership Alignment:

- SkillsUSA Career Readiness Curriculum teamwork lesson *Leading and Following*. Using this lesson as a guide students will take part in a team building exercise- Walking the Plank. Small groups will work together to bridge a gap using certain materials, not all of the are useful.
21st Century Skills:

7.A.1 Adapt to varied roles, jobs responsibilities, schedules and contexts

7.A.2 Work effectively in a climate of ambiguity and changing priorities

4.A.1 Access information efficiently (time) and effectively (sources)

2.D.1 Solve different kinds of non-familiar problems in both conventional and innovative ways

2.B.1 Analyze how parts of a whole interact with each other to produce overall outcomes in complex systems

1.B.4 View failure as an opportunity to learn; understand that creativity and innovation is a long-term, cyclical process of small successes and frequent mistakes

Industry Standards and/or Competencies:

National Center for Construction Education and Research: Residential Carpentry Standards:

Module: Orientation to the Trade

Learning Objective 2

Identify the skills, responsibilities, and characteristics needed to be a successful carpenter.

- a. Identify the skills needed to be a successful carpenter.
- b. Identify the responsibilities of a successful carpenter.
- c. State the personal characteristics of a successful carpenter.

Module: Building Materials, Fasteners, and Adhesives

Learning Objective 1

Identify various types of building materials and describe their uses.

- a. State the uses of various types of hardwoods and softwoods.
- b. Describe common lumber defects.
- c. Identify the different grades of lumber and describe uses for each.
- d. Explain how treated lumber differs from untreated lumber.
- e. Describe how plywood is manufactured and cite common applications for plywood on a construction project.
- f. Identify uses of hardboard.
- g. Identify uses of particleboard.
- h. Identify uses of high- and medium-density overlay plywood.
- i. Describe how oriented strand board differs from particleboard and cite common applications for OSB.
- j. Cite common applications for mineral fiberboard.
- k. State the uses of various types of engineered lumber.
- l. Identify applications for wood I-beams.
- m. List advantages of glulam lumber over conventional solid lumber.

- n. Describe the composition of concrete and explain how hydration occurs.
- o. List uses of concrete masonry units for a construction project.
- p. Identify where metal framing members may be used in a structure.

Learning Objective 4

Explain how to calculate the quantities of lumber, panel, and concrete products using industry-standard methods.

- a. Calculate lumber quantities.
- b. Calculate panel quantities.
- c. Calculate the volume of concrete required for rectangular and cylindrical shapes.

Learning Objective 5

Describe the fasteners, anchors, and adhesives used in construction and explain their uses.

- a. Identify various types of nails and cite uses for each.
- b. Identify applications for staples.
- c. Identify various types of screws and cite uses for each.
- d. Describe uses for hammer-driven pins and studs.
- e. Identify various types of bolts and cite uses for each.
- f. Identify various types of mechanical anchors and cite uses for each.
- g. Identify various types of bolt anchors and explain how each is installed.
- h. Identify various types of screw anchors and cite uses for each.
- i. Identify various types of hollow-wall anchors and cite uses for each.
- j. List the types of glues and adhesives used in construction.

Module: Introduction to Construction Drawings, Specifications, and Layout

Learning Objective 1

Describe the types of drawings usually included in a set of plans and describe the information found on each type.

- a. Identify the different types of lines used on construction drawings.
- b. Identify selected architectural symbols commonly used to represent materials on plans.
- c. Identify selected electrical, mechanical, and plumbing symbols commonly used on plans.
- d. Identify selected abbreviations commonly used on plans.
- e. Describe the methods of dimensioning construction drawings.
- f. List the various types of construction drawings and describe each.

Learning Objective 2

State the purpose of written specifications.

- a. Describe how specifications are organized.
- b. Explain the importance of building codes in construction.

Module: Floor Systems Learning

Objective 1

Read and interpret specifications and drawings to determine floor system requirements.

- a. Explain the importance of specifications.
- b. List items commonly shown on architectural drawings.
- c. Describe information typically shown on structural drawings.
- d. Explain the importance of referencing mechanical, electrical, and plumbing plans.
- e. Describe the proper procedure for reading a set of prints.

Learning Objective 2

Identify the different types of framing systems.

- a. Describe the general components of a platform-framed structure.
- b. List differences between platform framing and balloon framing.
- c. Describe the characteristics of post-and-beam framing.

Learning Objective 4

Describe the construction methods for floor systems, and identify floor system materials.

- a. Describe how to check that a foundation is square.
- b. Name the methods used to lay out and fasten sill plates to the foundation.
- c. Describe the proper procedure for installing a beam or girder.
- d. Describe how to lay out sill plates and girders for floor joists.
- e. Describe how to lay out and install floor joists for partitions and floor openings.
- f. Identify different types of bridging and describe how to properly install each type.
- g. Describe how to properly install subfloor.
- h. Explain how to install joists for projections or cantilevered

floors. Learning Objective 5

Estimate the amount of material needed for a floor assembly.

- a. Describe how to estimate the amount of sill plate, sill sealer, and termite shield.
- b. Describe how to estimate the amount of beam or girder material.
- c. Describe how to estimate the amount of lumber needed for joists and joist headers.
- d. Describe how to estimate the amount of bridging required.
- e. Describe how to estimate the amount of subfloor material required.

Module: Wall Systems

Learning Objective 5

Describe the correct procedure to estimate the materials required to frame walls.

- a. Explain how to estimate the amount of lumber required for soleplates and top plates.
- b. Describe how to estimate the number of studs required.
- c. Explain how to calculate the amount of material needed for a header.
- d. Describe how to estimate the amount of diagonal bracing required.

Module: Ceiling and Roof Framing

Learning Objective 9

Describe how to perform a material takeoff for a roof.

- a. Determine the materials needed for a gable roof.

Aligned Washington State Academic Standards

Mathematics: Common Core

HS.N.RN.1 Explain how the definition of the meaning of rational exponents follows from extending the properties of integer exponents to those values, allowing for a notation for radicals in terms of rational exponents.

HS.N.RN.2 Rewrite expressions involving radicals and rational exponents using the properties of exponents.

Use properties of rational and irrational numbers.

HS.N.Q.1 Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.

HS.N.Q.2 Define appropriate quantities for the purpose of descriptive modeling.

HS.N.Q.3 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.

HS.A.CED.1 Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear and quadratic functions, and simple rational and exponential functions.

HS.A.CED.2 Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.

HS.A.CED.3 Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or nonviable options in a modeling context.

HS.A.CED.4 Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations.

HS.A.REI.3 Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.

HS.A.REI.4 Solve quadratic equations in one variable.

HS.A.REI.4a Use the method of completing the square to transform any quadratic equation in x into an equation of the form $(x - p)^2 = q$ that has the same solutions. Derive the quadratic formula from this form.

HS.A.REI.4b Solve quadratic equations by inspection (e.g., for $x^2 = 49$), taking square roots, completing the square, the quadratic formula and factoring, as appropriate to the initial form of the equation. Recognize when the quadratic formula gives complex solutions and write them as $a \pm bi$ for real numbers a and b .

Cluster: Experiment with transformations in the plane.

HS.G.CO.1 Know precise definitions of angle, circle, perpendicular line, parallel line, and line segment, based on the undefined notions of point, line, distance along a line, and distance around a circular arc.

HS.G.CO.2 Represent transformations in the plane using, e.g., transparencies and geometry software; describe transformations as functions that take points in the plane as inputs and give other points as outputs. Compare transformations that preserve distance and angle to those that do not (e.g., translation versus horizontal stretch).

HS.G.CO.3 Given a rectangle, parallelogram, trapezoid, or regular polygon, describe the rotations and reflections that carry it onto itself.

HS.G.CO.4 Develop definitions of rotations, reflections, and translations in terms of angles, circles, perpendicular lines, parallel lines, and line segments.

HS.G.CO.5 Given a geometric figure and a rotation, reflection, or translation, draw the transformed figure using, e.g., graph paper, tracing paper, or geometry software. Specify a sequence of transformations that will carry a given figure onto another.

HS.G.CO.12 Make formal geometric constructions with a variety of tools and methods (compass and straightedge, string, reflective devices, paper folding, dynamic geometric software, etc.). Copying a segment; copying an angle; bisecting a segment; bisecting an angle; constructing perpendicular lines, including the perpendicular bisector of a line segment; and constructing a line parallel to a given line through a point not on the line.

HS.G.CO.13 Construct an equilateral triangle, a square, and a regular hexagon inscribed in a circle.

HS.G.SRT.9 (+) Derive the formula $A = \frac{1}{2} ab \sin(C)$ for the area of a triangle by drawing an auxiliary line from a vertex perpendicular to the opposite side.

HS.G.SRT.10 (+) Prove the Laws of Sines and Cosines and use them to solve problems.

	HS.G.SRT.11(+) Understand and apply the Law of Sines and the Law of Cosines to find unknown measurements in right and non-right triangles (e.g., surveying problems, resultant forces). HS.G.C.1 Prove that all circles are similar. HS.G.C.2 Identify and describe relationships among inscribed angles, radii, and chords. Include the relationship between central, inscribed, and circumscribed angles; inscribed angles on a diameter are right angles; the radius of a circle is perpendicular to the tangent where the radius intersects the circle. HS.G.C.3 Construct the inscribed and circumscribed circles of a triangle, and prove properties of angles for a quadrilateral inscribed in a circle. HS.G.C.4 (+) Construct a tangent line from a point outside a given circle to the circle. Find arc lengthHS. and areas of sectors of circles HS.G.GPE.4 Use coordinates to prove simple geometric theorems algebraically HS.G.GPE.5 Prove the slope criteria for parallel and perpendicular lines and use them to solve geometric problems (e.g., find the equation of a line parallel or perpendicular to a given line that passes through a given point). HS.G.GPE.6 Find the point on a directed line segment between two given points that partitions the segment in a given ratio. HS.G.GPE.7 Use coordinates to compute perimeters of polygons and areas of triangles and rectangles, e.g., using the distance formula.* HS.G.MG.1 Use geometric shapes, their measures, and their properties to describe objects (e.g., modeling a tree trunk or a human torso as a cylinder).* HS.G.MG.2 Apply concepts of density based on area and volume in modeling situations (e.g., persons per square mile, BTUs per cubic foot).* HS.G.MG.3 Apply geometric methods to solve design problems (e.g., designing an object or structure to satisfy physical constraints or minimize cost; working with typographic grid systems based on ratios).*
Mathematical Practices	MP1 Make sense of problems and persevere in solving them. MP2 Reason abstractly and quantitatively. MP3 Construct viable arguments and critique the reasoning of others. MP4 Model with mathematics. MP5 Use appropriate tools strategically. MP6 Attend to precision. MP7 Look for and make use of structure. MP8 Look for and express regularity in repeated reasoning.

Unit 9: Wood Building Materials, Fasteners and Adhesives	Total Learning Hours for Unit: 40
Unit Summary: Competencies include: C-6.1 Wood Materials/Dimensional Lumber (Types, Uses, Properties, Defects, Grades, Specifications, Measurement, and Basic Joinery Operations). C-6.2 Wood Products/Engineered Lumber (Types, Uses, Properties, and Specifications). C-6.3 Fastening Systems (Nails, Screws, Bolts and Anchors, Steel Connectors, and Adhesives). C-6.4 Concrete (Uses, Placement, Properties and Composition, and Reinforcements). C-6.5 Exterior Finish Materials (Properties and Types of; Siding, Roofing, and Window/Door Products). C-6.7 Interior Finish Materials; GWB and Fasteners, Interior Doors and Hardware, Cabinets, Trim and Moldings (Type, Uses, Specifications).	

- C-6.8 Exterior Finish Materials; Metal Roofing, Concrete Siding (Types, Uses, Properties).
- C-6.10 Explain the terms commonly used in discussing wood and lumber.
- C-6.11 State the uses of various types of hardwoods and softwoods.
- C-6.12 Identify various types of imperfections that are found in lumber.
- C-6.13 Explain how lumber is graded.
- C-6.14 Interpret grade markings on lumber and plywood.
- C-6.15 Explain how plywood is manufactured, graded, and used.
- C-6.16 Identify various types of building boards and identify their uses.
- C-6.17 Identify the uses of and safety precautions associated with pressure-treated and fire-retardant lumber.
- C-6.18 Describe the proper method of caring for lumber and wood building materials at the job site.
- C-6.19 State the uses of various types of engineered lumber.
- C-6.20 Calculate the quantities of lumber and wood products using industry-standard methods.
- C-6.21 List the basic nail and staple types and their uses.
- C-6.22 List the basic types of screws and their uses.
- C-6.23 Identify the different types of anchors and their uses.
- C-6.24 Describe the common types of adhesives used in construction work and explain their uses.
- C-6.25 Explain the difference in green grading of materials.
- C-6.26 Identify some of the new green products.
- C-6.27 Identify the SCS (Scientific Certification Systems) label and explain its purpose.
- C-6.28 Identify the FSC (Forest Stewardship Council) label and explain its purpose.

Performance Assessments:

- Project progress and completion: Students complete projects that demonstrate the correct use of a variety of woods, glues, nails and angles. This will incorporate the following concepts and materials: framing, finishing, walls, subfloors, stair versus roof construction, fasteners (pre-glued, coated and uncoated nails), hard wood, soft wood, deciphering lumber codes, waste materials, and reused materials.

Leadership Alignment:

- SkillsUSA Career Readiness Curriculum responsibility lesson *Personal Well Being*. Using the lesson as a guide students will pair-up and look up online legal and ethical obligations related to the industry. Students will present one item and share how the issue and how it should be handled.
21st Century Skills:

2.C.3 Synthesize and make connections between information and arguments

3.A.1 Articulate thoughts and ideas effectively using oral, written and nonverbal communication skills in a variety of forms and contexts

3.B.3 Assume shared responsibility for collaborative work, and value the individual contributions made by each team member

4.B.1 Use information accurately and creatively for the issue or problem at hand

4.B.3 Apply a fundamental understanding of the ethical/legal issues surrounding the access and use of information

●

Industry Standards and/or Competencies:

Module: Building Materials, Fasteners, and Adhesives

Learning Objective 1

Identify various types of building materials and describe their uses.

a. State the uses of various types of hardwoods and softwoods.

b. Describe common lumber defects.

c. Identify the different grades of lumber and describe uses for each.

d. Explain how treated lumber differs from untreated lumber.

- e. Describe how plywood is manufactured and cite common applications for plywood on a construction project.
- f. Identify uses of hardboard.
- g. Identify uses of particleboard.
- h. Identify uses of high- and medium-density overlay plywood.
- i. Describe how oriented strand board differs from particleboard and cite common applications for OSB.
- j. Cite common applications for mineral fiberboard.
- k. State the uses of various types of engineered lumber.
- l. Identify applications for wood I-beams.
- m. List advantages of glulam lumber over conventional solid lumber.
- n. Describe the composition of concrete and explain how hydration occurs.
- o. List uses of concrete masonry units for a construction project.
- p. Identify where metal framing members may be used in a structure.

Learning Objective 2

List safety precautions associated with building materials.

- a. List general safety guidelines for working with building materials.
- b. Cite safety precautions for working with wood building materials.
- c. Cite safety precautions for working with concrete building materials.
- d. Cite safety precautions for working with metal building materials.

Learning Objective 3

Describe the proper method of handling and storing building materials.

- a. List basic material-handling guidelines.
- b. Describe how to handle and store wood building materials.
- c. Describe how to handle and store concrete building materials.
- d. Describe how to handle and store metal building materials.

Learning Objective 4

Explain how to calculate the quantities of lumber, panel, and concrete products using industry-standard methods.

- a. Calculate lumber quantities.
- b. Calculate panel quantities.
- c. Calculate the volume of concrete required for rectangular and cylindrical shapes.

Learning Objective 5

Describe the fasteners, anchors, and adhesives used in construction and explain their uses.

- a. Identify various types of nails and cite uses for each.
- b. Identify applications for staples.
- c. Identify various types of screws and cite uses for each.
- d. Describe uses for hammer-driven pins and studs.
- e. Identify various types of bolts and cite uses for each.
- f. Identify various types of mechanical anchors and cite uses for each.
- g. Identify various types of bolt anchors and explain how each is installed.
- h. Identify various types of screw anchors and cite uses for each.
- i. Identify various types of hollow-wall anchors and cite uses for each.
- j. List the types of glues and adhesives used in construction.

Mathematics: Common Core	HS.G.MG.1 Use geometric shapes, their measures, and their properties to describe objects (e.g., modeling a tree trunk or a human torso as a cylinder).* HS.G.MG.2 Apply concepts of density based on area and volume in modeling situations (e.g., persons per square mile, BTUs per cubic foot).* HS.G.MG.3 Apply geometric methods to solve design problems (e.g., designing an object or structure to satisfy physical constraints or minimize cost; working with typographic grid systems based on ratios).*
Mathematical Practices	MP6 Attend to precision.

Unit 10: Concrete and Reinforcing Materials	Total Learning Hours for Unit: 15
Unit Summary: Competencies include: C-7.1 Introduction to various types of cement and describe their uses.	
Performance Assessments: Students conduct research on the types of concrete and what characteristics exists for each type and present their findings to the class.	
Leadership Alignment: - SkillsUSA Career Readiness Curriculum planning, organizing, and management lesson <i>Managing a Plan</i>. Using this Lesson students will form small groups and create a script/layout on a 3 part video game. Students will have one session to write out the concept and sketch the idea. 21st Century skills 3.B.1 Demonstrate ability to work effectively and respectfully with diverse teams 3.B.2 Exercise flexibility and willingness to be helpful in making necessary compromises to accomplish a common goal 3.B.3 Assume shared responsibility for collaborative work, and value the individual contributions made by each team member 4.B.2 Manage the flow of information from a wide variety of sources 8.A. Manage goals and time 7.A.1 Adapt to varied roles, jobs responsibilities, schedules and contexts	
Industry Standards and/or Competencies: National Center for Construction Education and Research: Residential Carpentry Standards: Module: Building Materials, Fasteners, and Adhesives Learning Objective 2 List safety precautions associated with building materials. - List general safety guidelines for working with building materials. - Cite safety precautions for working with wood building materials. - Cite safety precautions for working with concrete building materials. - Cite safety precautions for working with metal building materials. Learning Objective 5 Describe the fasteners, anchors, and adhesives used in construction and explain their uses. - Identify various types of nails and cite uses for each. - Identify applications for staples. - Identify various types of screws and cite uses for each. - Describe uses for hammer-driven pins and studs. - Identify various types of bolts and cite uses for each.	

- f. Identify various types of mechanical anchors and cite uses for each.
- g. Identify various types of bolt anchors and explain how each is installed.
- h. Identify various types of screw anchors and cite uses for each.
- i. Identify various types of hollow-wall anchors and cite uses for each.
- j. List the types of glues and adhesives used in construction.

Aligned Washington State Academic Standards

Mathematics: Common Core	HS.G.GMD.1 Give an informal argument for the formulas for the circumference of a circle, area of a circle, volume of a cylinder, pyramid, and cone. Use dissection arguments, Cavalieri's principle, and informal limit arguments. HS.G.GMD.2 (+) Give an informal argument using Cavalieri's principle for the formulas for the volume of a sphere and other solid figures. HS.G.GMD.3 Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems.* HS.G.GMD.4 Identify the shapes of two-dimensional cross-sections of three-dimensional objects, and identify three-dimensional objects generated by rotations of two-dimensional objects. HS.G.MG.1 Use geometric shapes, their measures, and their properties to describe objects (e.g., modeling a tree trunk or a human torso as a cylinder).* HS.G.MG.2 Apply concepts of density based on area and volume in modeling situations (e.g., persons per square mile, BTUs per cubic foot).* HS.G.MG.3 Apply geometric methods to solve design problems (e.g., designing an object or structure to satisfy physical constraints or minimize cost; working with typographic grid systems based on ratios).*
Mathematical Practices	MP1 Make sense of problems and persevere in solving them. MP2 Reason abstractly and quantitatively. MP4 Model with mathematics. MP6 Attend to precision.

Unit 11: Site Layout One – Distance Measurement and Leveling

Total Learning Hours for Unit: 20

Unit Summary:

Competencies include:

- C-8.1 Describe the major responsibilities of the carpenter relative to site layout.
- C-8.2 Convert measurements stated in feet and inches to equivalent measurements stated in decimal feet, and vice versa.
- C-8.3 Use and properly maintain tools and equipment associated with taping.
- C-8.4 Use taping and/or chaining equipment and procedures to make distance measurements and perform site layout tasks.
- C-8.5 Determine approximate distances by pacing.
- C-8.6 Recognize, use, and properly care for tools and equipment associated with differential leveling.
- C-8.7 Use a builder's level or transit and differential leveling procedures to determine site and building elevations.
- C-8.8 Use a laser level to determine site and building elevations.
- C-8.9 Use a laser level to determine a form elevation in relation to an established elevation.
- C-8.10 Record site layout data and information in field notes using accepted practices.
- C-8.11 Check and/or establish 90° angles using the 3/4/5 rule. Check and/or establish square using corner to corner measurement.
- C-8.12 Site Layout Geometry and Location of: Elevations, Property Lines, Setbacks and Squaring of Building Lines (Use of Specifications, Plot Plans, Tools & Calculations to find; Hub Locations, Batter Boards and String Locations, and Final Building and Lot Corners).

C-8.13 Site Excavation using; Picks, Shovels, Rakes and Wheel Barrows.
 C-8.14 Footings, Pier Forms (Measure, Cut, Assemble, Locate, Stabilize and Brace).
 C-8.15 Reinforcement of and Placement of Concrete (Sizing of Rebar, Placing of Horizontal Rebar, Mixing of Concrete, Placement and Finishing of Concrete).
 C-8.16 Foundation Types, Methods and Systems (Estimate Concrete Volume).
 C-8.17 Seismic Hold Downs and Foundation Hardware (Types, Uses, Specifications).
 C-8.18 Site Layout (Use of Datum Points and Elevations, Use of Survey Instruments to Locate Hubs/Points and Slopes).
 C-8.19 Blue Print Reading (Decipher Information to Locate Structures and Benchmarks).
 C-8.20 Specialty Forming Systems and Hardware, (System Types, Panel Layout and Assembly).
 C-8.21 Concrete Block (Types, Properties, Layout Cutting and Placement, Material Estimation).
 C-8.22 Concrete Finish (Tools, Types, Techniques).

Performance Assessments:

- Students learn and demonstrate how to shoot grade.
- Students use a laser level to shoot grade for a footing of a house.
- Students caulk and square different shapes.
- Finally, students set up string lines and batter boards for a foundation using a 3-4-5 triangle.

Leadership Alignment:

- SkillsUSA Career Readiness Curriculum communications lesson *Message is Clear*. Using this lesson, students will play a game of telephone. In a large circle. Every student will have the opportunity to start the phrase. The Phrase has to be relevant to the vocabulary in this unit. Student whispers the phrase or word one time, in the hopes that by the end it is the same phrase or word. Teacher then correlates how import clear communication is.
- 21st Century Skills:

3.A.5 Communicate effectively in diverse environments (including multi-lingual)

3.A.2 Listen effectively to decipher meaning, including knowledge, values, attitudes and intentions

1.B.1 Develop, implement and communicate new ideas to others effectively

Industry Standards and/or Competencies:

National Center for Construction Education and Research: Residential Carpentry Standards:

Module: Introduction to Construction Drawings, Specifications, and Layout

Learning Objective 3

Identify the methods of squaring a building.

Aligned Washington State Academic Standards

Mathematics: Common Core

HS.N.Q.1 Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphHS. and data displays.
 HS.N.Q.2 Define appropriate quantities for the purpose of descriptive modeling.
 HS.N.Q.3 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.
 HS.A.CED.1 Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear and quadratic functions, and simple rational and exponential functions.
 HS.A.CED.2 Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.

HS.A.CED.3 Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or nonviable options in a modeling context.

HS.A.CED.4 Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations.

HS.A.REI.3 Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.

HS.A.REI.4 Solve quadratic equations in one variable.

HS.A.REI.4a Use the method of completing the square to transform any quadratic equation in x into an equation of the form $(x - p)^2 = q$ that has the same solutions. Derive the quadratic formula from this form.

HS.A.REI.4b Solve quadratic equations by inspection (e.g., for $x^2 = 49$), taking square roots, completing the square, the quadratic formula and factoring, as appropriate to the initial form of the equation. Recognize when the quadratic formula gives complex solutions and write them as $a \pm bi$ for real numbers a and b .

HS.G.CO.1 Know precise definitions of angle, circle, perpendicular line, parallel line, and line segment, based on the undefined notions of point, line, distance along a line, and distance around a circular arc.

HS.G.CO.2 Represent transformations in the plane using, e.g., transparencies and geometry software; describe transformations as functions that take points in the plane as inputs and give other points as outputs. Compare transformations that preserve distance and angle to those that do not (e.g., translation versus horizontal stretch).

HS.G.CO.3 Given a rectangle, parallelogram, trapezoid, or regular polygon, describe the rotations and reflections that carry it onto itself.

HS.G.CO.4 Develop definitions of rotations, reflections, and translations in terms of angles, circles, perpendicular lines, parallel lines, and line segments.

HS.G.CO.12 Make formal geometric constructions with a variety of tools and methods (compass and straightedge, string, reflective devices, paper folding, dynamic geometric software, etc.). Copying a segment; copying an angle; bisecting a segment; bisecting an angle; constructing perpendicular lines, including the perpendicular bisector of a line segment; and constructing a line parallel to a given line through a point not on the line.

HS.G.CO.13 Construct an equilateral triangle, a square, and a regular hexagon inscribed in a circle.

HS.G.SRT.6 Understand that by similarity, side ratios in right triangles are properties of the angles in the triangle, leading to definitions of trigonometric ratios for acute angles.

HS.G.SRT.7 Explain and use the relationship between the sine and cosine of complementary angles.

HS.G.SRT.8 Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems.*

HS.G.SRT.9 (+) Derive the formula $A = \frac{1}{2} ab \sin(C)$ for the area of a triangle by drawing an auxiliary line from a vertex perpendicular to the opposite side.

HS.G.SRT.10 (+) Prove the Laws of Sines and Cosines and use them to solve problems.

HS.G.SRT.11(+) Understand and apply the Law of Sines and the Law of Cosines to find unknown measurements in right and non-right triangles (e.g., surveying problems, resultant forces).

HS.G.C.1 Prove that all circles are similar.

HS.G.C.2 Identify and describe relationships among inscribed angles, radii, and chords. Include the relationship between central, inscribed, and circumscribed angles; inscribed angles on a diameter are right angles; the radius of a circle is perpendicular to the tangent where the radius intersects the circle.

HS.G.C.3 Construct the inscribed and circumscribed circles of a triangle, and prove properties of angles for a quadrilateral inscribed in a circle.

	HS.G.C.4 (+) Construct a tangent line from a point outside a given circle to the circle. HS.G.GPE.4 Use coordinates to prove simple geometric theorems algebraically HS.G.GPE.5 Prove the slope criteria for parallel and perpendicular lines and use them to solve geometric problems (e.g., find the equation of a line parallel or perpendicular to a given line that passes through a given point). HS.G.GPE.6 Find the point on a directed line segment between two given points that partitions the segment in a given ratio. HS.G.GPE.7 Use coordinates to compute perimeters of polygons and areas of triangles and rectangles, e.g., using the distance formula.* HS.G.CMD.1 Give an informal argument for the formulas for the circumference of a circle, area of a circle, volume of a cylinder, pyramid, and cone. Use dissection arguments, Cavalieri's principle, and informal limit arguments. HS.G.CMD.2 (+) Give an informal argument using Cavalieri's principle for the formulas for the volume of a sphere and other solid figures. HS.G.CMD.3 Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems.* HS.G.CMD.4 Identify the shapes of two-dimensional cross-sections of three-dimensional objects, and identify three-dimensional objects generated by rotations of two-dimensional objects. HS.G.MG.1 Use geometric shapes, their measures, and their properties to describe objects (e.g., modeling a tree trunk or a human torso as a cylinder).* HS.G.MG.2 Apply concepts of density based on area and volume in modeling situations (e.g., persons per square mile, BTUs per cubic foot).* HS.G.MG.3 Apply geometric methods to solve design problems (e.g., designing an object or structure to satisfy physical constraints or minimize cost; working with typographic grid systems based on ratios).*
Mathematical Practices	MP1 Make sense of problems and persevere in solving them. MP2 Reason abstractly and quantitatively. MP4 Model with mathematics. MP5 Use appropriate tools strategically. MP6 Attend to precision. MP7 Look for and make use of structure.

Unit 12: Foundations	Total Learning Hours for Unit: 15
Unit Summary: Competencies include: C-9.1 Identify various kinds of footings, including: • Continuous or spread • Stepped • Pier C-9.2 Identify the parts of footing forms and explain their purpose. C-9.3 Identify the parts of pier forms and explain their purpose. C-9.4 Demonstrate the ability to lay out and construct selected footing forms, including: • Continuous footing	

- Pier footing
- T foundations

C-9.5 Strip a pier footing form and prepare it for erection at another location.

C-9.6 Identify types of concrete structures that require the construction of edge forms:

- Slabs with or without a foundation
- Parking lots
- Driveways and streets
- Sidewalks
- Approaches
- Curbs
- Gutters

C-9.7 Identify the parts of edge forms and explain their purpose.

C-9.8 Place concrete into footing and stem-wall forms.

C-9.9 Explain the purpose of a screed and identify the different types of screeds.

C-9.10 Demonstrate the ability to set screeds on grade.

C-9.11 Demonstrate use of screed to level concrete.

C-9.12 EFCO Form erection.

C-9.13 EZ Decking.

C-9.14 Demonstrate the ability to construct and disassemble edge forms for:

- A slab-on-grade with an existing foundation.
- A slab-on-grade with an integral foundation.

C-9.15 Explain the benefits of ICF (Integrate Concrete Form).

Performance Assessments:

- Students produce a simple drawing and identify above terms and produce a PowerPoint presentation to class that includes all the competencies listed above.

Leadership Alignment:

- SkillsUSA Career Readiness Curriculum self-motivation lesson *Attitude is Everything* and the leadership lesson *The Connection*. Students will use this lesson to connect two concepts. Taking one concept from unit 10 and one from unit 11, students will individually write up how one connects to the other. Students will present a 2 minute explanation to the class:
- 21st century Skills:

8.C.4 Reflect critically on past experiences in order to inform future progress

10.B.1.e Present oneself professionally and with proper etiquette

4.A.2 Evaluate information critically and competently

3.A.3 Use communication for a range of purposes (e.g. to inform, instruct, motivate and persuade)

Industry Standards and/or Competencies:

National Center for Construction Education and Research: Residential Carpentry Standards:

Module: Building Materials, Fasteners, and adhesives

Learning Objective 5

Describe the fasteners, anchors, and adhesives used in construction and explain their uses.

- a. Identify various types of nails and cite uses for each.
- b. Identify applications for staples.
- c. Identify various types of screws and cite uses for each.
- d. Describe uses for hammer-driven pins and studs.
- e. Identify various types of bolts and cite uses for each.
- f. Identify various types of mechanical anchors and cite uses for each.
- g. Identify various types of bolt anchors and explain how each is installed.
- h. Identify various types of screw anchors and cite uses for each.
- i. Identify various types of hollow-wall anchors and cite uses for each.
- j. List the types of glues and adhesives used in construction.

Module: Introduction to Construction Drawings, Specifications, and Layout

Learning Objective 3

Identify the methods of squaring a building.

Module: Floor Systems

Learning Objective 1

Read and interpret specifications and drawings to determine floor system requirements.

- a. Explain the importance of specifications.
- b. List items commonly shown on architectural drawings.
- c. Describe information typically shown on structural drawings.
- d. Explain the importance of referencing mechanical, electrical, and plumbing plans.
- e. Describe the proper procedure for reading a set of prints.

Learning Objective 4

Describe the construction methods for floor systems, and identify floor system materials.

- a. Describe how to check that a foundation is square.
- b. Name the methods used to lay out and fasten sill plates to the foundation.
- c. Describe the proper procedure for installing a beam or girder.
- d. Describe how to lay out sill plates and girders for floor joists.
- e. Describe how to lay out and install floor joists for partitions and floor openings.
- f. Identify different types of bridging and describe how to properly install each type.
- g. Describe how to properly install subfloor.
- h. Explain how to install joists for projections or cantilevered floors.

Module: Wall Systems

Learning Objective 6

Identify alternative wall systems.

- a. Describe how concrete walls are constructed.
- b. Explain the difference between standard interior wall systems and alternative interior wall systems.

Mathematics: Common Core

HS.N.Q.1 Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.

HS.N.Q.2 Define appropriate quantities for the purpose of descriptive modeling.

HS.N.Q.3 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.

HS.A.REI.3 Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.

HS.A.REI.4 Solve quadratic equations in one variable.

HS.A.REI.4a Use the method of completing the square to transform any quadratic equation in x into an equation of the form $(x - p)^2 = q$ that has the same solutions. Derive the quadratic formula from this form.

HS.A.REI.4b Solve quadratic equations by inspection (e.g., for $x^2 = 49$), taking square roots, completing the square, the quadratic formula and factoring, as appropriate to the initial form of the equation. Recognize when the quadratic formula gives complex solutions and write them as $a \pm bi$ for real numbers a and b .

HS.G.CO.1 Know precise definitions of angle, circle, perpendicular line, parallel line, and line segment, based on the undefined notions of point, line, distance along a line, and distance around a circular arc.

HS.G.CO.2 Represent transformations in the plane using, e.g., transparencies and geometry software; describe transformations as functions that take points in the plane as inputs and give other points as outputs. Compare transformations that preserve distance and angle to those that do not (e.g., translation versus horizontal stretch).

HS.G.CO.3 Given a rectangle, parallelogram, trapezoid, or regular polygon, describe the rotations and reflections that carry it onto itself.

HS.G.CO.4 Develop definitions of rotations, reflections, and translations in terms of angles, circles, perpendicular lines, parallel lines, and line segments.

HS.G.CO.5 Given a geometric figure and a rotation, reflection, or translation, draw the transformed figure using, e.g., graph paper, tracing paper, or geometry software. Specify a sequence of transformations that will carry a given figure onto another.

HS.G.CO.12 Make formal geometric constructions with a variety of tools and methods (compass and straightedge, string, reflective devices, paper folding, dynamic geometric software, etc.). Copying a segment; copying an angle; bisecting a segment; bisecting an angle; constructing perpendicular lines, including the perpendicular bisector of a line segment; and constructing a line parallel to a given line through a point not on the line.

HS.G.CO.13 Construct an equilateral triangle, a square, and a regular hexagon inscribed in a circle.

HS.G.C.1 Prove that all circles are similar.

HS.G.C.2 Identify and describe relationships among inscribed angles, radii, and chords. Include the relationship between central, inscribed, and circumscribed angles; inscribed angles on a diameter are right angles; the radius of a circle is perpendicular to the tangent where the radius intersects the circle.

HS.G.C.3 Construct the inscribed and circumscribed circles of a triangle, and prove properties of angles for a quadrilateral inscribed in a circle.

HS.G.C.4 (+) Construct a tangent line from a point outside a given circle to the circle.

Find arc length and areas of sectors of circles

HS.G.GPE.4 Use coordinates to prove simple geometric theorems algebraically

HS.G.GPE.5 Prove the slope criteria for parallel and perpendicular lines and use them to solve geometric problems (e.g., find the equation of a line parallel or perpendicular to a given line that passes through a given point).

	HS.G.GPE.6 Find the point on a directed line segment between two given points that partitions the segment in a given ratio. HS.G.GPE.7 Use coordinates to compute perimeters of polygons and areas of triangles and rectangles, e.g., using the distance formula.* HS.G.GMD.1 Give an informal argument for the formulas for the circumference of a circle, area of a circle, volume of a cylinder, pyramid, and cone. Use dissection arguments, Cavalieri's principle, and informal limit arguments. HS.G.GMD.2 (+) Give an informal argument using Cavalieri's principle for the formulas for the volume of a sphere and other solid figures. HS.G.GMD.3 Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems.* HS.G.GMD.4 Identify the shapes of two-dimensional cross-sections of three-dimensional objects, and identify three-dimensional objects generated by rotations of two-dimensional objects. HS.G.MG.1 Use geometric shapes, their measures, and their properties to describe objects (e.g., modeling a tree trunk or a human torso as a cylinder).* HS.G.MG.2 Apply concepts of density based on area and volume in modeling situations (e.g., persons per square mile, BTUs per cubic foot).* HS.G.MG.3 Apply geometric methods to solve design problems (e.g., designing an object or structure to satisfy physical constraints or minimize cost; working with topographic grid systems based on ratios).*
Mathematical Practices	MP1 Make sense of problems and persevere in solving them. MP2 Reason abstractly and quantitatively. MP4 Model with mathematics. MP5 Use appropriate tools strategically. MP6 Attend to precision.

Unit 13: Floor Systems	Total Learning Hours for Unit: 15
Unit Summary: Competencies include: - C-10.1 Identify the different types of framing systems. - C-10.2 Read and understand drawings and specifications to determine floor system requirements. - C-10.3 Identify floor and sill framing and support members. - C-10.4 Name the methods used to fasten sills to the foundation. - C-10.5 Given specific floor load and span data, select the proper girder/beam size from a list of available girders/beams. - C-10.6 List and recognize different types of floor joists. - C-10.7 Given specific floor load and span data, select the proper joist size from a list of available joists. - C-10.8 List and recognize different types of bridging. - C-10.9 List and recognize different types of flooring materials. - C-10.10 Explain the purposes of subflooring and underlayment. - C-10.11 Match selected fasteners used in floor framing to their correct uses. - C-10.12 Estimate the amount of material needed to frame a floor assembly. • Estimate the cost of material to frame a floor assembly. - C-10.13 Demonstrate the ability to:	

- Lay out and construct a floor assembly.
- Install bridging.
- Install joists for a cantilever floor.

C-10.14 Install a single floor system using tongue-and-groove plywood/OSB panels.

C-10.15 Sill Construction (Layout Geometry and Methods, Attachment Systems, Materials, and Installation).

C-10.16 Post/Columns, Girders/Beams, Cripple Walls (Layout, Types of and Estimation of Materials, Attachment Hardware, installation).

C-10.17 Joist (Types, Layouts, Specifications, Attachment Hardware, Installation).

C-10.18 Bridging and Blocking (Uses, Types, and Installation).

C-10.19 Sub-floor (Types, Estimation, Layout, Installation, and Fastening Methods).

C-10.20 Sill Construction, Balloon and Platform (Types, Layout, Estimation, Installation).

C-10.21 Engineered Joist (Types, Uses, Loads and Spans Specifications, Material Estimation, Installation Methods).

C-10.22 Steel Attachment Systems (Types, Uses, Load Specifications, Installation).

C-10.23 Blue Print Reading (Decipher Information from Blue Prints to Layout Floor Openings, Member Locations and Loading).

Performance Assessments:

- Students produce a simple layout drawing and identify terms of floor system.

Leadership Alignment:

Construction trades students have an opportunity to show their skills and knowledge through practical local competition. Students demonstrate and are evaluated based off criteria laid out by SkillsUSA.

1.B.4 View failure as an opportunity to learn; understand that creativity and innovation is a long-term, cyclical process of small successes and frequent mistakes

2.2.B.1 Analyze how parts of a whole interact with each other to produce overall outcomes in complex systems.A.1 Use various types of reasoning (inductive, deductive, etc.) as appropriate to the situation

2.C.5 Reflect critically on learning experiences and processes

4.A.2 Evaluate information critically and competently

4.B.1 Use information accurately and creatively for the issue or problem at hand

Industry Standards and/or Competencies:

National Center for Construction Education and Research: Residential Carpentry Standards:

Module: Building Materials, Fasteners, and Adhesives Learning Objective 1

Identify various types of building materials and describe their uses.

a. State the uses of various types of hardwoods and softwoods.

b. Describe common lumber defects.

c. Identify the different grades of lumber and describe uses for each.

d. Explain how treated lumber differs from untreated lumber.

e. Describe how plywood is manufactured and cite common applications for plywood on a construction project.

f. Identify uses of hardboard.

g. Identify uses of particleboard.

h. Identify uses of high- and medium-density overlay plywood.

i. Describe how oriented strand board differs from particleboard and cite common applications for OSB.

j. Cite common applications for mineral fiberboard.

k. State the uses of various types of engineered lumber.

l. Identify applications for wood I-beams.

m. List advantages of glulam lumber over conventional solid lumber.

- n. Describe the composition of concrete and explain how hydration occurs.
- o. List uses of concrete masonry units for a construction project.
- p. Identify where metal framing members may be used in a structure.

Learning Objective 2

List safety precautions associated with building materials.

- a. List general safety guidelines for working with building materials.
- b. Cite safety precautions for working with wood building materials.
- c. Cite safety precautions for working with concrete building materials.
- d. Cite safety precautions for working with metal building materials.

Learning Objective 5

Describe the fasteners, anchors, and adhesives used in construction and explain their uses.

- a. Identify various types of nails and cite uses for each.
- b. Identify applications for staples.
- c. Identify various types of screws and cite uses for each.
- d. Describe uses for hammer-driven pins and studs.
- e. Identify various types of bolts and cite uses for each.
- f. Identify various types of mechanical anchors and cite uses for each.
- g. Identify various types of bolt anchors and explain how each is installed.
- h. Identify various types of screw anchors and cite uses for each.
- i. Identify various types of hollow-wall anchors and cite uses for each.
- j. List the types of glues and adhesives used in construction.

Module: Introduction to Construction Drawings, Specifications, and Layout

Learning Objective 3

Identify the methods of squaring a building.

Module: Floor Systems Learning

Objective 1

Read and interpret specifications and drawings to determine floor system requirements.

- a. Explain the importance of specifications.
- b. List items commonly shown on architectural drawings.
- c. Describe information typically shown on structural drawings.
- d. Explain the importance of referencing mechanical, electrical, and plumbing plans.
- e. Describe the proper procedure for reading a set of prints.

Learning Objective 2

Identify the different types of framing systems.

- a. Describe the general components of a platform-framed structure.
- b. List differences between platform framing and balloon framing.
- c. Describe the characteristics of post-and-beam framing.

Learning Objective 3

Identify floor system components.

- a. Define sill plate and describe its role in floor framing.
- b. List and recognize different types of beams and girders and supports.
- c. List and recognize different types of floor joists.

- d. List and recognize different types of bridging.
- e. Explain the purposes of subfloor and underlayment.

Learning Objective 4

Describe the construction methods for floor systems, and identify floor system materials.

- a. Describe how to check that a foundation is square.
- b. Name the methods used to lay out and fasten sill plates to the foundation.
- c. Describe the proper procedure for installing a beam or girder.
- d. Describe how to lay out sill plates and girders for floor joists.
- e. Describe how to lay out and install floor joists for partitions and floor openings.
- f. Identify different types of bridging and describe how to properly install each type.
- g. Describe how to properly install subfloor.
- h. Explain how to install joists for projections or cantilevered floors.

Learning Objective 5

Estimate the amount of material needed for a floor assembly.

- a. Describe how to estimate the amount of sill plate, sill sealer, and termite shield.
- b. Describe how to estimate the amount of beam or girder material.
- c. Describe how to estimate the amount of lumber needed for joists and joist headers.
- d. Describe how to estimate the amount of bridging required.
- e. Describe how to estimate the amount of subfloor material required.

Learning Objective 6

Identify some common alternative floor systems.

Aligned Washington State Academic Standards

Mathematics: Common Core

HS.N.Q.1 Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.

HS.N.Q.2 Define appropriate quantities for the purpose of descriptive modeling.

HS.N.Q.3 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.

HS.A.CED.1 Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear and quadratic functions, and simple rational and exponential functions.

HS.A.CED.2 Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.

HS.A.CED.3 Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or nonviable options in a modeling context.

HS.A.CED.4 Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations.

HS.A.REI.3 Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.

HS.A.REI.4 Solve quadratic equations in one variable.

HS.A.REI.4a Use the method of completing the square to transform any quadratic equation in x into an equation of the form $(x - p)^2 = q$ that has the same solutions. Derive the quadratic formula from this form.

HS.A.REI.4b Solve quadratic equations by inspection (e.g., for $x^2 = 49$), taking square roots, completing the square, the quadratic formula and factoring, as appropriate to the initial form of the equation. Recognize when the quadratic formula gives complex solutions and write them as $a \pm bi$ for real numbers a and b .

	HS.G.CO.1 Know precise definitions of angle, circle, perpendicular line, parallel line, and line segment, based on the undefined notions of point, line, distance along a line, and distance around a circular arc. HS.G.CO.2 Represent transformations in the plane using, e.g., transparencies and geometry software; describe transformations as functions that take points in the plane as inputs and give other points as outputs. Compare transformations that preserve distance and angle to those that do not (e.g., translation versus horizontal stretch). HS.G.CO.3 Given a rectangle, parallelogram, trapezoid, or regular polygon, describe the rotations and reflections that carry it onto itself. HS.G.CO.4 Develop definitions of rotations, reflections, and translations in terms of angles, circles, perpendicular lines, parallel lines, and line segments. HS.G.CO.5 Given a geometric figure and a rotation, reflection, or translation, draw the transformed figure using, e.g., graph paper, tracing paper, or geometry software. Specify a sequence of transformations that will carry a given figure onto another. HS.G.CO.12 Make formal geometric constructions with a variety of tools and methods (compass and straightedge, string, reflective devices, paper folding, dynamic geometric software, etc.). Copying a segment; copying an angle; bisecting a segment; bisecting an angle; constructing perpendicular lines, including the perpendicular bisector of a line segment; and constructing a line parallel to a given line through a point not on the line. HS.G.CO.13 Construct an equilateral triangle, a square, and a regular hexagon inscribed in a circle. HS.G.SRT.9 (+) Derive the formula $A = \frac{1}{2} ab \sin(C)$ for the area of a triangle by drawing an auxiliary line from a vertex perpendicular to the opposite side. HS.G.SRT.10 (+) Prove the Laws of Sines and Cosines and use them to solve problems. HS.G.SRT.11(+) Understand and apply the Law of Sines and the Law of Cosines to find unknown measurements in right and non-right triangles (e.g., surveying problems, resultant forces). HS.G.MG.1 Use geometric shapes, their measures, and their properties to describe objects (e.g., modeling a tree trunk or a human torso as a cylinder).* HS.G.MG.2 Apply concepts of density based on area and volume in modeling situations (e.g., persons per square mile, BTUs per cubic foot).* HS.G.MG.3 Apply geometric methods to solve design problems (e.g., designing an object or structure to satisfy physical constraints or minimize cost; working with typographic grid systems based on ratios).*
Mathematical Practices	MP1 Make sense of problems and persevere in solving them. MP4 Model with mathematics. MP5 Use appropriate tools strategically. MP6 Attend to precision. MP8 Look for and express regularity in repeated reasoning.

Unit 14: Wall and Ceiling Framing	Total Learning Hours for Unit: 15
Unit Summary: Competencies include: - C-11.1 Identify the components of a wall and ceiling layout. - C-11.2 Describe the procedure for laying out a wood frame wall, including plates, corner posts, door and window openings, partition Ts, bracing, and firestops.	

- C-11.3 Describe the correct procedure for assembling and erecting an exterior wall.
- C-11.4 Describe the common materials and methods used for installing sheathing on walls.
- C-11.5 Layout assemblies, erect, and brace exterior walls for a frame building.
- C-11.6 Describe wall framing techniques used in masonry construction.
- C-11.7 Explain the use of metal studs in wall framing.
- C-11.8 Describe the correct procedure for laying out a ceiling.
- C-11.9 Cut and install ceiling joists on a wood frame building.
- C-11.10 Estimate the materials required to frame walls and ceilings.
- C-11.11 Explain the benefits of SIP (Structural Integrated Panels).
- C-11.12 Identify framing techniques that meet thermal performance.
- C-11.13 Explain OVE (Optimal Value Engineered) framing techniques.
- C-11.14 Wall Members Horizontal and Vertical (Terminology, Structural Purpose, Uses, Material Estimation, Assembly).
- C-11.15 Types of Walls, Bearing, Non-Bearing Interior Partitions and Exterior (Structural and Non-Structural Purposes).
- C-11.16 Plate Layout (Abbreviations and Techniques).
- C-11.17 Wall Assembly (Tools and Techniques for Attachment of Wall Parts).
- C-11.18 Squaring, Bracing, and Erection of Wood Framed Walls (Tools and Techniques).
- C-11.19 Plumb and Line, and Temporary Bracing (Tools Techniques).
- C-11.20 Sheathing (Types and Purposes, and Installation Techniques).
- C-11.21 Steel Wall Framing (Terminology, Uses, and Installation Techniques).
- C-11.22 Blue Print Reading and Wall Layout (Interpret Information from Plans to Chalked Lines on Sub-floor).
- C-11.23 Balloon Framing (Terminology and Techniques).
- C-11.24 Sheer Walls (Purpose, Attachment Systems and Techniques).

Performance Assessments:

- Students develop a layout and build a model. Students will use correct vocabulary while presenting design to the class (CRT 1-2).

Leadership Alignment:

- SkillsUSA Career Readiness Curriculum multicultural sensitivity and awareness lesson *Fostering Diversity*. After going over this lesson students will be asked to share one fact and/or family tradition. This typically leads to fun discussions and promotes oneness.
- 21st Century Skills:

12.A.1 Using 21st century skills to understand and address global issues

12.A.2 Learning from and working collaboratively with individuals representing diverse cultures, religions and lifestyles in a spirit of mutual respect and open dialogue in personal, work and community contexts

12.A.3 Understanding the local and global implications of civic decisions

9.B.1 Respect cultural differences and work effectively with people from a range of social and cultural backgrounds

9.B.2 Respond open-mindedly to different ideas and values

9.B.3 Leverage social and cultural differences to create new ideas and increase both innovation and quality of work

Industry Standards and/or Competencies:

Module: Building Materials, Fasteners, and Adhesives

Learning Objective 1

Identify various types of building materials and describe their uses.

- a. State the uses of various types of hardwoods and softwoods.

- b. Describe common lumber defects.
- c. Identify the different grades of lumber and describe uses for each.
- d. Explain how treated lumber differs from untreated lumber.
- e. Describe how plywood is manufactured and cite common applications for plywood on a construction project.
- f. Identify uses of hardboard.
- g. Identify uses of particleboard.
- h. Identify uses of high- and medium-density overlay plywood.
- i. Describe how oriented strand board differs from particleboard and cite common applications for OSB.
- j. Cite common applications for mineral fiberboard.
- k. State the uses of various types of engineered lumber.
- l. Identify applications for wood I-beams.
- m. List advantages of glulam lumber over conventional solid lumber.
- n. Describe the composition of concrete and explain how hydration occurs.
- o. List uses of concrete masonry units for a construction project.
- p. Identify where metal framing members may be used in a structure.

Learning Objective 2

List safety precautions associated with building materials.

- a. List general safety guidelines for working with building materials.
- b. Cite safety precautions for working with wood building materials.
- c. Cite safety precautions for working with concrete building materials.
- d. Cite safety precautions for working with metal building materials.

Learning Objective 5

Describe the fasteners, anchors, and adhesives used in construction and explain their uses.

- a. Identify various types of nails and cite uses for each.
- b. Identify applications for staples.
- c. Identify various types of screws and cite uses for each.
- d. Describe uses for hammer-driven pins and studs.
- e. Identify various types of bolts and cite uses for each.
- f. Identify various types of mechanical anchors and cite uses for each.
- g. Identify various types of bolt anchors and explain how each is installed.
- h. Identify various types of screw anchors and cite uses for each.
- i. Identify various types of hollow-wall anchors and cite uses for each.
- j. List the types of glues and adhesives used in construction.

Module: Introduction to Construction Drawings, Specifications, and Layout

Learning Objective 3

Identify the methods of squaring a building.

Module: Floor Systems Learning

Objective 2

Identify the different types of framing systems.

- a. Describe the general components of a platform-framed structure.
- b. List differences between platform framing and balloon framing.
- c. Describe the characteristics of post-and-beam framing.

Learning Objective 3

Identify floor system components.

- Define sill plate and describe its role in floor framing.
- List and recognize different types of beams and girders and supports.
- List and recognize different types of floor joists.
- List and recognize different types of bridging.

Module: Wall Systems

Learning Objective 1

Identify the components of a wall system.

- Identify methods used to construct corner posts.
- Describe how to frame partition intersections.
- Explain the purpose of headers and describe how they are constructed.
- Describe how metal-framed walls are constructed.

Learning Objective 2

Describe the procedure for laying out a wood frame wall, including plates, corner posts, door and window openings, partition Ts, bracing, and fire-stops.

- Describe how to properly lay out a wood frame wall.
- Explain how to lay out wall openings.

Learning Objective 3

Describe the correct procedure to assemble, erect, and brace exterior walls for a frame building.

- List the steps involved in assembling a wall.
- Identify where fire stops are to be installed and explain how they are installed.
- List the four steps involved in erecting a wall.

Learning Objective 4

Describe wall framing techniques used in masonry construction.

Learning Objective 5

Describe the correct procedure to estimate the materials required to frame walls.

- Explain how to estimate the amount of lumber required for soleplates and top plates.
- Describe how to estimate the number of studs required.
- Explain how to calculate the amount of material needed for a header.
- Describe how to estimate the amount of diagonal bracing required.

Module: Ceiling and Roof Framing

Learning Objective 1

Identify the components of ceiling framing.

- Describe the correct procedure for laying out ceiling joists.
- Describe how to cut and install ceiling joists on a wood frame building.
- Describe how to estimate the number of ceiling joists required for a building.

Aligned Washington State Academic Standards

Mathematics: Common Core

HS.N.Q.1 Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.

	HS.N.Q.2 Define appropriate quantities for the purpose of descriptive modeling. HS.N.Q.3 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. HS.A.REI.3 Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters. HS.A.REI.4 Solve quadratic equations in one variable. HS.A.REI.4a Use the method of completing the square to transform any quadratic equation in x into an equation of the form $(x - p)^2 = q$ that has the same solutions. Derive the quadratic formula from this form. HS.A.REI.4b Solve quadratic equations by inspection (e.g., for $x^2 = 49$), taking square roots, completing the square, the quadratic formula and factoring, as appropriate to the initial form of the equation. Recognize when the quadratic formula gives complex solutions and write them as $a \pm bi$ for real numbers a and b. HS.G.CO.1 Know precise definitions of angle, circle, perpendicular line, parallel line, and line segment, based on the undefined notions of point, line, distance along a line, and distance around a circular arc. HS.G.CO.2 Represent transformations in the plane using, e.g., transparencies and geometry software; describe transformations as functions that take points in the plane as inputs and give other points as outputs. Compare transformations that preserve distance and angle to those that do not (e.g., translation versus horizontal stretch). HS.G.CO.3 Given a rectangle, parallelogram, trapezoid, or regular polygon, describe the rotations and reflections that carry it onto itself. HS.G.CO.4 Develop definitions of rotations, reflections, and translations in terms of angles, circles, perpendicular lines, parallel lines, and line segments. HS.G.CO.5 Given a geometric figure and a rotation, reflection, or translation, draw the transformed figure using, e.g., graph paper, tracing paper, or geometry software. Specify a sequence of transformations that will carry a given figure onto another. HS.G.CO.12 Make formal geometric constructions with a variety of tools and methods (compass and straightedge, string, reflective devices, paper folding, dynamic geometric software, etc.). Copying a segment; copying an angle; bisecting a segment; bisecting an angle; constructing perpendicular lines, including the perpendicular bisector of a line segment; and constructing a line parallel to a given line through a point not on the line. HS.G.CO.13 Construct an equilateral triangle, a square, and a regular hexagon inscribed in a circle. HS.G.MG.1 Use geometric shapes, their measures, and their properties to describe objects (e.g., modeling a tree trunk or a human torso as a cylinder).* HS.G.MG.2 Apply concepts of density based on area and volume in modeling situations (e.g., persons per square mile, BTUs per cubic foot).* HS.G.MG.3 Apply geometric methods to solve design problems (e.g., designing an object or structure to satisfy physical constraints or minimize cost; working with typographic grid systems based on ratios).*
Mathematical Practices	MP1 Make sense of problems and persevere in solving them. MP4 Model with mathematics. MP5 Use appropriate tools strategically. MP6 Attend to precision. MP8 Look for and express regularity in repeated reasoning.

Unit Summary:

Competencies include:

- C-12.1 Understand the terms associated with roof framing.
- C-12.2 Identify the roof framing members used in gable and hip roofs.
- C-12.3 Identify the methods used to calculate the length of a rafter.
- C-12.4 Identify the various types of trusses used in roof framing.
- C-12.5 Use a rafter framing square, speed square, and calculator in laying out a roof.
- C-12.6 Identify various types of sheathing used in roof construction.
- C-12.7 Frame a gable roof with vent openings.
- C-12.8 Frame a roof opening.
- C-12.9 Construct a frame roof, including hips, valleys, commons, jack rafters, and sheathing.
- C-12.10 Erect a gable roof using trusses.
- C-12.11 Estimate the materials used in framing and sheathing a roof.
- C-12.12 Explain the benefits of the Raised Heel Truss and Extended Eaves.
- C-12.13 Basic Roof Types, Shapes, Structural Requirements, and Theory (Purposes, Uses, Terminology, Geometric Concepts and Slope Formulas).
- C-12.14 Gable and Shed Roofs (Tools, Uses, Terminology, Geometric Concepts, Layout Techniques and Installation Techniques).
- C-12.15 Gable and Shed Roofs (Tools, Uses, Terminology, Geometric Concepts, Layout Techniques and Installation Techniques).
- C-12.16 Hip Roof and Intersecting Roofs (Tools, Uses, Terminology, Layout and Installation Techniques, Safety procedures, Geometric Concepts and Slope Formulas).
- C-12.17 Trusses and Manufactured Roof Members, and Roof Sheathing (Purpose, Uses, Terminology, and Structural Concepts and Loads).

Performance Assessments:

- Students develop a layout and build a model. Student will use correct vocabulary while presenting design to the class (CRT 1-2).

Leadership Alignment:

- SkillsUSA Career Readiness Curriculum responsibility lesson *You Can Count On Me*. Using the lesson, students will need to work together in small groups to create a more complex game. Students will choose or will be given different jobs that emulate the entire process of building a game. Students will work out the thought of pulling their own weight.
- 21st Century Skills:

1.B.1 Develop, implement and communicate new ideas to others effectively

1.B.2 Be open and responsive to new and diverse perspectives; incorporate group input and feedback into the work

1.B.3 Demonstrate originality and inventiveness in work and understand the real world limits to adopting new ideas

1.B.4 View failure as an opportunity to learn; understand that creativity and innovation is a long-term, cyclical process of small successes and frequent mistakes

2.B.1 Analyze how parts of a whole interact with each other to produce overall outcomes in complex systems

3.A.1 Articulate thoughts and ideas effectively using oral, written and nonverbal communication skills in a variety of forms and contexts

3.A.2 Listen effectively to decipher meaning, including knowledge, values, attitudes and intentions

3.A.3 Use communication for a range of purposes (e.g. to inform, instruct, motivate and persuade)

3.A.4 Utilize multiple media and technologies, and know how to judge their effectiveness a priori as well as assess their impact

3.A.5 Communicate effectively in diverse environments (including multi-lingual)

3.B.1 Demonstrate ability to work effectively and respectfully with diverse teams

3.B.2 Exercise flexibility and willingness to be helpful in making necessary compromises to accomplish a common goal

3.B.3 Assume shared responsibility for collaborative work, and value the individual contributions made by each team member

Industry Standards and/or Competencies:

National Center for Construction Education and Research: Residential Carpentry Standards:

Module: Building Materials, Fasteners, and Adhesives

Learning Objective 1

Identify various types of building materials and describe their uses.

- a. State the uses of various types of hardwoods and softwoods.
- b. Describe common lumber defects.
- c. Identify the different grades of lumber and describe uses for each.
- d. Explain how treated lumber differs from untreated lumber.
- e. Describe how plywood is manufactured and cite common applications for plywood on a construction project.
- f. Identify uses of hardboard.
- g. Identify uses of particleboard.
- h. Identify uses of high- and medium-density overlay plywood.
- i. Describe how oriented strand board differs from particleboard and cite common applications for OSB.
- j. Cite common applications for mineral fiberboard.
- k. State the uses of various types of engineered lumber.
- l. Identify applications for wood I-beams.
- m. List advantages of glulam lumber over conventional solid lumber.
- n. Describe the composition of concrete and explain how hydration occurs.
- o. List uses of concrete masonry units for a construction project.
- p. Identify where metal framing members may be used in a structure.

Learning Objective 2

List safety precautions associated with building materials.

- a. List general safety guidelines for working with building materials.
- b. Cite safety precautions for working with wood building materials.
- c. Cite safety precautions for working with concrete building materials.
- d. Cite safety precautions for working with metal building materials.

Learning Objective 5

Describe the fasteners, anchors, and adhesives used in construction and explain their uses.

- a. Identify various types of nails and cite uses for each.
- b. Identify applications for staples.
- c. Identify various types of screws and cite uses for each.
- d. Describe uses for hammer-driven pins and studs.
- e. Identify various types of bolts and cite uses for each.
- f. Identify various types of mechanical anchors and cite uses for each.
- g. Identify various types of bolt anchors and explain how each is installed.
- h. Identify various types of screw anchors and cite uses for each.
- i. Identify various types of hollow-wall anchors and cite uses for each.
- j. List the types of glues and adhesives used in construction.

Module: Ceiling and Roof Framing Learning

Objective 2

Identify common types of roofs used in residential construction.

Learning Objective 3

Identify the components and define the terms associated with roof framing.

- a. Identify the two types of dormers.
- b. Describe how to use a framing square and a Speed Square™ for roof framing.

Learning Objective 4

Describe the methods used to lay out a common rafter.

- a. Explain how to lay out rafter locations.
- b. Describe how to determine the length of a common rafter.
- c. Explain the correct procedure for laying out and cutting a common rafter.

Learning Objective 5

Describe how to erect a gable roof.

- a. Describe how to install rafters.

Learning Objective 6

Describe how to frame a basic gable end wall.

- a. Describe how to frame a gable overhang.
- b. Explain how to frame an opening in a roof.

Learning Objective 7

Recognize the use of trusses in basic roof framing.

- a. Identify the various types and components of trusses.
- b. Identify the basics of truss installation.
- c. Identify the basics of truss bracing.

Learning Objective 8

Describe the basics of roof sheathing installation.

Aligned Washington State Academic Standards

Mathematics: Common Core

HS.N.Q.1 Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.

HS.N.Q.2 Define appropriate quantities for the purpose of descriptive modeling.

HS.N.Q.3 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.

HS.A.REI.3 Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.

HS.A.REI.4 Solve quadratic equations in one variable.

HS.A.REI.4a Use the method of completing the square to transform any quadratic equation in x into an equation of the form $(x - p)^2 = q$ that has the same solutions. Derive the quadratic formula from this form.

HS.A.REI.4b Solve quadratic equations by inspection (e.g., for $x^2 = 49$), taking square roots, completing the square, the quadratic formula and factoring, as appropriate to the initial form of the equation. Recognize when the quadratic formula gives complex solutions and write them as $a \pm bi$ for real numbers a and b .

HS.G.CO.1 Know precise definitions of angle, circle, perpendicular line, parallel line, and line segment, based on the undefined notions of point, line, distance along a line, and distance around a circular arc.

	HS.G.CO.2 Represent transformations in the plane using, e.g., transparencies and geometry software; describe transformations as functions that take points in the plane as inputs and give other points as outputs. Compare transformations that preserve distance and angle to those that do not (e.g., translation versus horizontal stretch). HS.G.CO.3 Given a rectangle, parallelogram, trapezoid, or regular polygon, describe the rotations and reflections that carry it onto itself. HS.G.CO.4 Develop definitions of rotations, reflections, and translations in terms of angles, circles, perpendicular lines, parallel lines, and line segments. HS.G.CO.5 Given a geometric figure and a rotation, reflection, or translation, draw the transformed figure using, e.g., graph paper, tracing paper, or geometry software. Specify a sequence of transformations that will carry a given figure onto another. HS.G.CO.12 Make formal geometric constructions with a variety of tools and methods (compass and straightedge, string, reflective devices, paper folding, dynamic geometric software, etc.). Copying a segment; copying an angle; bisecting a segment; bisecting an angle; constructing perpendicular lines, including the perpendicular bisector of a line segment; and constructing a line parallel to a given line through a point not on the line. HS.G.CO.13 Construct an equilateral triangle, a square, and a regular hexagon inscribed in a circle. HS.G.SRT.9 (+) Derive the formula $A = \frac{1}{2} ab \sin(C)$ for the area of a triangle by drawing an auxiliary line from a vertex perpendicular to the opposite side. HS.G.SRT.10 (+) Prove the Laws of Sines and Cosines and use them to solve problems. HS.G.SRT.11(+) Understand and apply the Law of Sines and the Law of Cosines to find unknown measurements in right and non-right triangles (e.g., surveying problems, resultant forces). HS.G.GPE.4 Use coordinates to prove simple geometric theorems algebraically HS.G.GPE.5 Prove the slope criteria for parallel and perpendicular lines and use them to solve geometric problems (e.g., find the equation of a line parallel or perpendicular to a given line that passes through a given point). HS.G.GPE.6 Find the point on a directed line segment between two given points that partitions the segment in a given ratio. HS.G.GPE.7 Use coordinates to compute perimeters of polygons and areas of triangles and rectangles, e.g., using the distance formula.* HS.G.MG.1 Use geometric shapes, their measures, and their properties to describe objects (e.g., modeling a tree trunk or a human torso as a cylinder).* HS.G.MG.2 Apply concepts of density based on area and volume in modeling situations (e.g., persons per square mile, BTUs per cubic foot).* HS.G.MG.3 Apply geometric methods to solve design problems (e.g., designing an object or structure to satisfy physical constraints or minimize cost; working with typographic grid systems based on ratios).*
Mathematical Practices	MP1 Make sense of problems and persevere in solving them. MP4 Model with mathematics. MP5 Use appropriate tools strategically. MP6 Attend to precision. MP8 Look for and express regularity in repeated reasoning.

Unit 16: Windows and Exterior Doors	Total Learning Hours for Unit: 5
Unit Summary: Competencies include: - C-15.1 Identify various types of fixed, sliding, and swinging windows. - C-15.2 Identify the parts of a window installation. - C-15.3 State the requirements for a proper window installation. - C-15.4 Install a pre-hung window. - C-15.5 Identify the common types of skylights and roof windows. - C-15.7 Identify the common types of exterior doors and explain how they are constructed. - C-15.8 Identify the parts of a door installation. - C-15.9 Identify the types of thresholds used with exterior doors. - C-15.10 Install a pre-hung exterior door with weather-stripping. - C-15.11 Identify the various types of locksets used on exterior doors and explain how they are installed. - C-15.12 Explain the correct installation procedure for a rollup garage door. - C-15.13 Install a lockset. - C-15.14 Describe the procedure for properly installing a skylight. - C-15.15 Install a threshold on a concrete floor. - C-15.16 Identify and explain R values U Values for green construction. - C-15.17 Identify the various efficiencies of windows (wood, vinyl, aluminum).	
Performance Assessments: ● Students demonstrate awareness through group discussion and classroom participation. ● Students match types of windows and installation by reading blueprint or drawing.	
Leadership Alignment: Students will have the opportunity to demonstrate their skills through a program competition that will lead to an area SkillsUSA Competition. This will prepare students for SkillsUSA State. 1.B.4 View failure as an opportunity to learn; understand that creativity and innovation is a long-term, cyclical process of small successes and frequent mistakes 2.2.B.1 Analyze how parts of a whole interact with each other to produce overall outcomes in complex systems.A.1 Use various types of reasoning (inductive, deductive, etc.) as appropriate to the situation 2.C.5 Reflect critically on learning experiences and processes 4.A.2 Evaluate information critically and competently 4.B.1 Use information accurately and creatively for the issue or problem at hand 7.A.2 Work effectively in a climate of ambiguity and changing priorities	
Industry Standards and/or Competencies: National Center for Construction Education and Research: Residential Carpentry Standards: Module: Building Materials, Fasteners, and Adhesives Learning Objective 1 Identify various types of building materials and describe their uses. a. State the uses of various types of hardwoods and softwoods. b. Describe common lumber defects. c. Identify the different grades of lumber and describe uses for each. d. Explain how treated lumber differs from untreated lumber.	

- e. Describe how plywood is manufactured and cite common applications for plywood on a construction project.
- f. Identify uses of hardboard.
- g. Identify uses of particleboard.
- h. Identify uses of high- and medium-density overlay plywood.
- i. Describe how oriented strand board differs from particleboard and cite common applications for OSB.
- j. Cite common applications for mineral fiberboard.
- k. State the uses of various types of engineered lumber.
- l. Identify applications for wood I-beams.
- m. List advantages of glulam lumber over conventional solid lumber.
- n. Describe the composition of concrete and explain how hydration occurs.
- o. List uses of concrete masonry units for a construction project.
- p. Identify where metal framing members may be used in a structure.

Learning Objective 2

List safety precautions associated with building materials.

- a. List general safety guidelines for working with building materials.
- b. Cite safety precautions for working with wood building materials.
- c. Cite safety precautions for working with concrete building materials.
- d. Cite safety precautions for working with metal building materials.

Module: Introduction to Building Envelope Systems

Learning Objective 2

State the requirements for a proper window installation.

- a. Explain when jamb extensions are used.
- b. Identify common considerations when framing in glass blocks.

Learning Objective 3

State the requirements for a proper door installation.

- a. Identify the differences between residential and commercial doors.

Aligned Washington State Academic Standards

Mathematics: Common Core	HS.N.Q.1 Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. HS.N.Q.2 Define appropriate quantities for the purpose of descriptive modeling. HS.N.Q.3 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.
Mathematical Practices	MP1 Make sense of problems and persevere in solving them. MP4 Model with mathematics. MP5 Use appropriate tools strategically. MP6 Attend to precision.

Unit 17: Exterior Finish

Total Learning Hours for Unit: 5

Unit Summary:

Competencies include:

- C-16.1 Describe the purpose of wall insulation and flashing.

C-16.2 Demonstrate lap and panel siding estimating methods.

C-16.3 Describe the types and applications of common wood siding:

- Beveled
- Tongue-and-groove
- Shiplap
- Board-and-batten
- Shake or shingle
- Plywood
- Hardboard and particleboard
- Concrete siding

C-16.4 Install selected types of wood siding.

C-16.5 Describe fiber-cement siding and its uses.

C-16.6 Demonstrate the installation of fiber-cement siding.

C-16.7 Describe the types and applications of special exterior finish systems.

C-16.8 Types, Applications, and Safety Procedures for Common Roofing Products (Underlayment Products, Composition/3-Tab, Wood Shake and Shingle, Roll and Membrane, Metal and Tile).

C-16.9 Layout and Installation Techniques of Common Roofing Products (Shingle and Metal).

C-16.10 Types, Layout and Applications, Installation Techniques, of Common Horizontal Siding (Beveled, Tongue-Grove, Board-Batten, Lap and Rabbeted).

C-16.11 Roofing Material Estimation.

C-16.12 Siding Material Estimation.

C-16.13 Layout, Preparation, and Installation Techniques for Exterior Doors and Windows.

C-16.14 Explain the benefits of house wrap.

C-16.15 Install house wrap.

Performance Assessments:

- Students research and identify the appropriate siding for a given scenario.

Leadership Alignment:

- SkillsUSA Career Readiness Curriculum integrity lesson *Accept Responsibility*. Using this lesson, we will invite in a couple of our advisory members to share their experiences. Success and failures. The overall conversation will be about owning all of it.

21st Century Skills:

7.B.1 Incorporate feedback effectively

7.B.2 Deal positively with praise, setbacks and criticism

7.B.3 Understand, negotiate and balance diverse views and beliefs to reach workable solutions, particularly in multi-cultural environments

8.C.2 Demonstrate initiative to advance skill levels towards a professional level

8.C.3 Demonstrate commitment to learning as a lifelong process

8.C.4 Reflect critically on past experiences in order to inform future progress

9.A.2 Conduct themselves in a respectable, professional manner

Industry Standards and/or Competencies:

National Center for Construction Education and Research: Residential Carpentry Standards:

Module: Building Materials, Fasteners, and Adhesives

Learning Objective 1

Identify various types of building materials and describe their uses.

- a. State the uses of various types of hardwoods and softwoods.
- b. Describe common lumber defects.
- c. Identify the different grades of lumber and describe uses for each.
- d. Explain how treated lumber differs from untreated lumber.
- e. Describe how plywood is manufactured and cite common applications for plywood on a construction project.
- f. Identify uses of hardboard.
- g. Identify uses of particleboard.
- h. Identify uses of high- and medium-density overlay plywood.
- i. Describe how oriented strand board differs from particleboard and cite common applications for OSB.
- j. Cite common applications for mineral fiberboard.
- k. State the uses of various types of engineered lumber.
- l. Identify applications for wood I-beams.
- m. List advantages of glulam lumber over conventional solid lumber.
- n. Describe the composition of concrete and explain how hydration occurs.
- o. List uses of concrete masonry units for a construction project.
- p. Identify where metal framing members may be used in a structure.

Learning Objective 2

List safety precautions associated with building materials.

- a. List general safety guidelines for working with building materials.
- b. Cite safety precautions for working with wood building materials.
- c. Cite safety precautions for working with concrete building materials.
- d. Cite safety precautions for working with metal building materials.

Aligned Washington State Academic Standards

Mathematics: Common Core	HS.N.Q.1 Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. HS.N.Q.2 Define appropriate quantities for the purpose of descriptive modeling. HS.N.Q.3 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.
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Unit 18: Roofing Applications

Total Learning Hours for Unit: 10

Unit Summary:

Competencies include:

- C-17.1 Identify the materials and methods used in roofing.
- C-17.2 Explain the safety requirements for roof jobs.
- C-17.12 Explain the benefits of and identify green related roofing products

Performance Assessments:

- Students research and identify the appropriate roofing for a given scenario.

Leadership Alignment:

- SkillsUSA Career Readiness Curriculum multicultural sensitivity and awareness lesson *Fostering Diversity*. After going over this lesson students will be asked to share one fact and/or family tradition. This typically leads to fun discussions and promotes oneness.

21st Century Skills:

12.A.1 Using 21st century skills to understand and address global issues

12.A.2 Learning from and working collaboratively with individuals representing diverse cultures, religions and lifestyles in a spirit of mutual respect and open dialogue in personal, work and community contexts

12.A.3 Understanding the local and global implications of civic decisions

9.B.1 Respect cultural differences and work effectively with people from a range of social and cultural backgrounds

9.B.2 Respond open-mindedly to different ideas and values

9.B.3 Leverage social and cultural differences to create new ideas and increase both innovation and quality of work

Leverage social and cultural differences to create new ideas and increase both innovation and quality of work

Industry Standards and/or Competencies:**National Center for Construction Education and Research: Residential Carpentry Standards:**

Module: Building Materials, Fasteners, and Adhesives Learning Objective 1

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- l. Identify applications for wood I-beams.
- m. List advantages of glulam lumber over conventional solid lumber.
- n. Describe the composition of concrete and explain how hydration occurs.
- o. List uses of concrete masonry units for a construction project.
- p. Identify where metal framing members may be used in a structure.

Learning Objective 2

List safety precautions associated with building materials.

- a. List general safety guidelines for working with building materials.
- b. Cite safety precautions for working with wood building materials.
- c. Cite safety precautions for working with concrete building materials.
- d. Cite safety precautions for working with metal building materials.

Module: Ceiling and Roof Framing

Learning Objective 2

Identify common types of roofs used in residential construction.

Learning Objective 3

Identify the components and define the terms associated with roof framing.

- a. Identify the two types of dormers.
- b. Describe how to use a framing square and a Speed Square™ for roof framing.

Learning Objective 4

Describe the methods used to lay out a common rafter.

- a. Explain how to lay out rafter locations.
- b. Describe how to determine the length of a common rafter.
- c. Explain the correct procedure for laying out and cutting a common rafter.

Learning Objective 5

Describe how to erect a gable roof.

- a. Describe how to install rafters.

Learning Objective 6

Describe how to frame a basic gable end wall.

- a. Describe how to frame a gable overhang.
- b. Explain how to frame an opening in a roof.

Learning Objective 7

Recognize the use of trusses in basic roof framing.

- a. Identify the various types and components of trusses.
- b. Identify the basics of truss installation.
- c. Identify the basics of truss

bracing. Learning Objective 8

Describe the basics of roof sheathing installation.

Learning Objective 9

Describe how to perform a material takeoff for a roof.

- a. Determine the materials needed for a gable roof.

Aligned Washington State Academic Standards

Mathematics: Common Core	HS.N.Q.1 Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. HS.N.Q.2 Define appropriate quantities for the purpose of descriptive modeling. HS.N.Q.3 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.
Mathematical Practices	MP2 Reason abstractly and quantitatively. MP4 Model with mathematics. MP5 Use appropriate tools strategically. MP6 Attend to precision.

Unit 19: Thermal and Moisture

Total Learning Hours for Unit: 10

Unit Summary:

Competencies include:

- C-18.1 Describe the requirements for insulation.
- C-18.2 Describe the characteristics of various types of insulation material.
- C-18.3 Calculate the required amounts of insulation for a structure.

- C-18.4 Describe the requirements for moisture control and ventilation.
- C-18.5 Describe various methods of waterproofing.
- C-18.6 Describe air infiltration control requirements.
- C-18.7 Identify green thermal and moisture barrier products.

Performance Assessments:

Leadership Alignment:

Based on lectures and content related to program and industry careers students will work in small groups to analyze similarities and differences between classroom knowledge and their practical experiences.

4.A.1 Access information efficiently (time) and effectively (sources)

4.A.2 Evaluate information critically and competently

3.B.1 Demonstrate ability to work effectively and respectfully with diverse teams

3.B.2 Exercise flexibility and willingness to be helpful in making necessary compromises to accomplish a common goal

3.B.3 Assume shared responsibility for collaborative work, and value the individual contributions made by each team member

12.D.1 Obtaining, interpreting and understanding basic health information and services and using such information and services in ways that enhance health

12.D.2 Understanding preventive physical and mental health measures, including proper diet, nutrition, exercise, risk avoidance and stress reduction

12.D.3 Using available information to make appropriate health-related decisions

12.D.4 Establishing and monitoring personal and family health goals

12.D.5 Understanding national and international public health and safety issues

Industry Standards and/or Competencies:

National Center for Construction Education and Research: Residential Carpentry Standards:

Module: Building Materials, Fasteners, and Adhesives

Learning Objective 1

Identify various types of building materials and describe their uses.

- a. State the uses of various types of hardwoods and softwoods.
- b. Describe common lumber defects.
- c. Identify the different grades of lumber and describe uses for each.
- d. Explain how treated lumber differs from untreated lumber.
- e. Describe how plywood is manufactured and cite common applications for plywood on a construction project.
- f. Identify uses of hardboard.
- g. Identify uses of particleboard.
- h. Identify uses of high- and medium-density overlay plywood.
- i. Describe how oriented strand board differs from particleboard and cite common applications for OSB.
- j. Cite common applications for mineral fiberboard.
- k. State the uses of various types of engineered lumber.
- l. Identify applications for wood I-beams.
- m. List advantages of glulam lumber over conventional solid lumber.
- n. Describe the composition of concrete and explain how hydration occurs.
- o. List uses of concrete masonry units for a construction project.

p. Identify where metal framing members may be used in a structure.

Learning Objective 2

List safety precautions associated with building materials.

- a. List general safety guidelines for working with building materials.
- b. Cite safety precautions for working with wood building materials.
- c. Cite safety precautions for working with concrete building materials.
- d. Cite safety precautions for working with metal building materials.

Module: Introduction to Building Envelope Systems

Learning Objective 1

Identify the components of the building envelope.

- a. Describe various ways that air infiltration can be minimized or prevented.
- b. Identify various types of fixed, sliding, and swinging windows.
- c. Identify the common types of exterior doors and explain how they are constructed.

Aligned Washington State Academic Standards

Mathematics: Common Core	HS.N.Q.1 Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. HS.N.Q.2 Define appropriate quantities for the purpose of descriptive modeling. HS.N.Q.3 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.
Mathematical Practices	MP1 Make sense of problems and persevere in solving them. MP4 Model with mathematics. MP5 Use appropriate tools strategically. MP6 Attend to precision.

Unit 20: Stairs

Total Learning Hours for Unit: 10

Unit Summary:

Competencies include:

- C-19.1 Identify the various types of stairs.
- C-19.2 Identify the various parts of stairs.
- C-19.3 Identify the materials used in the construction of stairs.
- C-19.4 Interpret construction drawings of stairs.
- C-19.5 Explain the methods of constructing various types of stairs.
- C-19.6 Understand the various terms and definitions relating to stairs.
- C-19.7 Layout and cut stringers.
- C-19.8 Determine the number and sizes of risers and treads required for a stairway.
- C-19.9 Build a small stair unit with a handrail.
- C-19.10 Stairway Types, Parts, Terminology, Applications/Arrangements and Components.
- C-19.11 Stairway Geometry (Rise and Run Calculations and Stringer Layout and Adjustments).
- C-19.12 Stairway General Rules and Code Requirements.
- C-19.13 Stringers, Risers and Treads (Assembly and Installation Methods and Techniques).
- C-19.14 Stairway Geometry (Layout and Calculations, Stringer Adjustments for Open and Closed).

C-19.15 Material Estimation for Stairways and Railing Systems.
C-19.16 Stairway Railing Installation Methods and Techniques

Performance Assessments:

- CRT 1-2 students demonstrate awareness through group discussion and classroom participation.
- CRT 3-4 students research and identify the appropriate stairs for a given scenario.

Leadership Alignment:

1.A Think Creatively Student Outcome: The student will be involved in activities that require applying theory, problem-solving, and using critical and creative thinking skills while understanding outcomes of related decisions. In groups of two students will be given house elevations and they will then need to diagram and layout stairs based on code.

- 2.A.1 Use various types of reasoning (inductive, deductive, etc.) as appropriate to the situation
- 2.C.3 Synthesize and make connections between information and arguments
- 3.A.5 Communicate effectively in diverse environments (including multi-lingual)
- 3.B.3 Assume shared responsibility for collaborative work, and value the individual contributions made by each team member
- 3.B.1 Demonstrate ability to work effectively and respectfully with diverse teams
- 4.B.3 Apply a fundamental understanding of the ethical/legal issues surrounding the access and use of information

Industry Standards and/or Competencies:

National Center for Construction Education and Research: Residential Carpentry Standards:

Module: Building Materials, Fasteners, and Adhesives

Learning Objective 1

- Identify various types of building materials and describe their uses.
- a. State the uses of various types of hardwoods and softwoods.
 - b. Describe common lumber defects.
 - c. Identify the different grades of lumber and describe uses for each.
 - d. Explain how treated lumber differs from untreated lumber.
 - e. Describe how plywood is manufactured and cite common applications for plywood on a construction project.
 - f. Identify uses of hardboard.
 - g. Identify uses of particleboard.
 - h. Identify uses of high- and medium-density overlay plywood.
 - i. Describe how oriented strand board differs from particleboard and cite common applications for OSB.
 - j. Cite common applications for mineral fiberboard.
 - k. State the uses of various types of engineered lumber.
 - l. Identify applications for wood I-beams.
 - m. List advantages of glulam lumber over conventional solid lumber.
 - n. Describe the composition of concrete and explain how hydration occurs.
 - o. List uses of concrete masonry units for a construction project.
 - p. Identify where metal framing members may be used in a structure.

Learning Objective 2

- List safety precautions associated with building materials.
- a. List general safety guidelines for working with building materials.

- b. Cite safety precautions for working with wood building materials.
- c. Cite safety precautions for working with concrete building materials.
- d. Cite safety precautions for working with metal building materials.

Module: Basic Stair Layout

Learning Objective 1

Identify the types of stairways.

- a. Identify how residential and commercial stairways differ.

Learning Objective 2

Identify the various components associated with stairs.

Learning Objective 3

Identify terms associated with stair framing.

- a. Define headroom.
- b. Define stringer and explain when more than two stringers are used.
- c. Define treads and risers and explain the importance of uniform tread depths and riser heights.
- d. List the minimum stairway width requirements for residential and commercial structures.
- e. Describe the difference between handrails and guards.
- f. Identify situations that carpenters may be confronted with when framing stairwells.

Learning Objective 4

Describe the procedure used to determine the total rise, number and size of risers, and number and size of treads required for a stairway.

- a. Explain how to calculate the riser height, tread depth, and total run for a stairway.
- b. Describe how to calculate stairwell opening sizes.

Learning Objective 5

Describe the procedure to lay out and cut stringers, risers, and treads.

- a. Explain how to lay out and cut a stringer.
- b. Describe how to properly reinforce a stringer.
- c. Summarize how concrete stairways are formed.

Aligned Washington State Academic Standards

Mathematics: Common Core	HS.N.Q.1 Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. HS.N.Q.2 Define appropriate quantities for the purpose of descriptive modeling. HS.N.Q.3 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. HS.A.REI.3 Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters. HS.A.REI.4 Solve quadratic equations in one variable. HS.A.REI.4a Use the method of completing the square to transform any quadratic equation in x into an equation of the form $(x - p)^2 = q$ that has the same solutions. Derive the quadratic formula from this form. HS.A.REI.4b Solve quadratic equations by inspection (e.g., for $x^2 = 49$), taking square roots, completing the square, the quadratic formula and factoring, as appropriate to the initial form of the equation. Recognize when the quadratic formula gives complex solutions and write them as $a \pm bi$ for real numbers a and b. HS.G.CO.1 Know precise definitions of angle, circle, perpendicular line, parallel line, and line segment, based on the undefined notions of point, line, distance along a line, and distance around a circular arc.
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	HS.G.CO.2 Represent transformations in the plane using, e.g., transparencies and geometry software; describe transformations as functions that take points in the plane as inputs and give other points as outputs. Compare transformations that preserve distance and angle to those that do not (e.g., translation versus horizontal stretch). HS.G.CO.3 Given a rectangle, parallelogram, trapezoid, or regular polygon, describe the rotations and reflections that carry it onto itself. HS.G.CO.4 Develop definitions of rotations, reflections, and translations in terms of angles, circles, perpendicular lines, parallel lines, and line segments. HS.G.CO.5 Given a geometric figure and a rotation, reflection, or translation, draw the transformed figure using, e.g., graph paper, tracing paper, or geometry software. Specify a sequence of transformations that will carry a given figure onto another. HS.G.SRT.9 (+) Derive the formula $A = \frac{1}{2} ab \sin(C)$ for the area of a triangle by drawing an auxiliary line from a vertex perpendicular to the opposite side. HS.G.SRT.10 (+) Prove the Laws of Sines and Cosines and use them to solve problems. HS.G.SRT.11(+) Understand and apply the Law of Sines and the Law of Cosines to find unknown measurements in right and non-right triangles (e.g., surveying problems, resultant forces). HS.G.GPE.4 Use coordinates to prove simple geometric theorems algebraically HS.G.GPE.5 Prove the slope criteria for parallel and perpendicular lines and use them to solve geometric problems (e.g., find the equation of a line parallel or perpendicular to a given line that passes through a given point). HS.G.GPE.6 Find the point on a directed line segment between two given points that partitions the segment in a given ratio. HS.G.GPE.7 Use coordinates to compute perimeters of polygons and areas of triangles and rectangles, e.g., using the distance formula.* HS.G.MG.1 Use geometric shapes, their measures, and their properties to describe objects (e.g., modeling a tree trunk or a human torso as a cylinder).* HS.G.MG.2 Apply concepts of density based on area and volume in modeling situations (e.g., persons per square mile, BTUs per cubic foot).* HS.G.MG.3 Apply geometric methods to solve design problems (e.g., designing an object or structure to satisfy physical constraints or minimize cost; working with typographic grid systems based on ratios).*
Mathematical Practices	MP1 Make sense of problems and persevere in solving them. MP2 Reason abstractly and quantitatively. MP4 Model with mathematics. MP5 Use appropriate tools strategically. MP6 Attend to precision.

Unit 21: Interior Finish Doors	Total Learning Hours for Unit: 15
Unit Summary: Competencies include: C-21.1 Identify various types of door jambs and frames and demonstrate the installation procedures for placing selected door jambs and frames in different types of interior partitions. C-21.2 Identify different types of interior doors.	

C-21.3 Identify different types of interior door hardware and demonstrate the installation procedures for selected types.
C-21.4 Demonstrate the correct and safe use of the hand tools described in this module.
C-21.5 Demonstrate the correct and safe use of the power tools described in this module.
C-21.6 List and identify specific items included on a typical door schedule.
C-21.7 Demonstrate the procedure for placing and hanging a selected door.

Performance Assessments:

- Students hang a door to manufacturer's specifications. Students need to accurately cut a door handle, install a handle, and ensure it hits on the striker point and that the hinges are routed correctly.

Leadership Alignment:

SkillsUSA Career Essentials Foundations covers a lesson of Service Orientation, meeting the needs of internal and external customers. Students will learn about: Acknowledge customers, and be present with the interaction. Stay focused and customer-oriented while at work. Demonstrate respect and courtesy to customers at all times. Know and implement company's service policy. Handle difficult situations with tact and self-restraint.

Know when to involve supervisor in a customer-service situation

21st Century Skills:

- 3.A.1 Articulate thoughts and ideas effectively using oral, written and nonverbal communication skills in a variety of forms and contexts
- 3.A.3 Use communication for a range of purposes (e.g. to inform, instruct, motivate and persuade)
- 3.A.5 Communicate effectively in diverse environments (including multi-lingual)
- 7.B.1 Incorporate feedback effectively
- 7.B.2 Deal positively with praise, setbacks and criticism
- 7.B.3 Understand, negotiate and balance diverse views and beliefs to reach workable solutions, particularly in multi-cultural environments
- 8.C.2 Demonstrate initiative to advance skill levels towards a professional level
- 8.C.3 Demonstrate commitment to learning as a lifelong process
- 8.C.4 Reflect critically on past experiences in order to inform future progress
- 9.A.2 Conduct themselves in a respectable, professional manner

Industry Standards and/or Competencies:

Module: Building Materials, Fasteners, and Adhesives

Learning Objective 1

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- a. State the uses of various types of hardwoods and softwoods.
- b. Describe common lumber defects.
- c. Identify the different grades of lumber and describe uses for each.
- d. Explain how treated lumber differs from untreated lumber.
- e. Describe how plywood is manufactured and cite common applications for plywood on a construction project.
- f. Identify uses of hardboard.
- g. Identify uses of particleboard.
- h. Identify uses of high- and medium-density overlay plywood.
- i. Describe how oriented strand board differs from particleboard and cite common applications for OSB.

- j. Cite common applications for mineral fiberboard.
- k. State the uses of various types of engineered lumber.
- l. Identify applications for wood I-beams.
- m. List advantages of glulam lumber over conventional solid lumber.
- n. Describe the composition of concrete and explain how hydration occurs.
- o. List uses of concrete masonry units for a construction project.
- p. Identify where metal framing members may be used in a structure.

Module: Introduction to Building Envelope Systems

Learning Objective 3

State the requirements for a proper door installation.

- a. Identify the differences between residential and commercial doors.

Aligned Washington State Academic Standards

Mathematics: Common Core	HS.N.Q.1 Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphHS. and data displays. HS.N.Q.2 Define appropriate quantities for the purpose of descriptive modeling. HS.N.Q.3 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.
Mathematical Practices	MP5 Use appropriate tools strategically. MP6 Attend to precision.

Unit 22: Interior finish Window, Door, Floor, and Ceiling Trim

Total Learning Hours for Unit: 20

Unit Summary:

Competencies include:

- C-22.1 Identify the different types of standard moldings and describe their uses.
- C-22.2 Make square and miter cuts using a miter box or power miter saw.
- C-22.3 Make coped joint cuts using a coping saw.
- C-22.4 Select and properly use fasteners to install trim.
- C-22.5 Install interior trim, including:
 - Door trim
 - Window trim
 - Base trim
- C-22.6 Estimate the quantities of different trim materials required for selected rooms.
- C-22.7 Wall and Ceiling GWB (Material and Fastener Specifications, Terminologies, Safety, Tools, Installation Methods and Techniques).
- C-22.8 Wall and Ceiling Finish GWB (Material Uses, Terminologies, Tools, Methods and Techniques).
- C-22.9 Final GWB Treatments; Textures and Paint (Terminology, Material Types, Tools, Installation Methods and Techniques, Safety MSDS / PPE).
- C-22.10 Wall and Ceiling Treatments; Plywood, Hardboard, T&G, Laminate, Tile, and Acoustic Tile (Types, Terminologies, Methods).
- C-22.11 Doors and Hardware (Types, Terminologies, and Installation Techniques).
- C-22.12 Cabinet and Countertop Installation (Types, Terminologies, and Installation Techniques).
- C-22.13 Interior Trim and Moldings (Types, Applications, Terminologies, and Installation Techniques).
- C-22.14 Finish Flooring (Types, Applications, Terminologies, Installation Techniques).
- C-22.15 Decipher Blue Prints; Finish schedules, Detail Plans, Elevations and Section Views (Terminologies, Methods).

Performance Assessments:

- Students complete interior window and door trim. Students make back cuts for interior crown and baseboard corners.

Leadership Alignment:

3.B Working in small groups students will be given a house plan and will need to work to create a window package that meets a given budget and correct window specs.

2.A.1 Use various types of reasoning (inductive, deductive, etc.) as appropriate to the situation

2.C.3 Synthesize and make connections between information and arguments

3.A.5 Communicate effectively in diverse environments (including multi-lingual)

3.B.3 Assume shared responsibility for collaborative work, and value the individual contributions made by each team member

3.B.1 Demonstrate ability to work effectively and respectfully with diverse teams

5.B.1 Understand and utilize the most appropriate media creation tools, characteristics and conventions

6.A.1 Use technology as a tool to research, organize, evaluate and communicate information

Industry Standards and/or Competencies:

Module: Building Materials, Fasteners, and Adhesives

Learning Objective 1

Identify various types of building materials and describe their uses.

a. State the uses of various types of hardwoods and softwoods.

b. Describe common lumber defects.

c. Identify the different grades of lumber and describe uses for each.

d. Explain how treated lumber differs from untreated lumber.

e. Describe how plywood is manufactured and cite common applications for plywood on a construction project.

f. Identify uses of hardboard.

g. Identify uses of particleboard.

h. Identify uses of high- and medium-density overlay plywood.

i. Describe how oriented strand board differs from particleboard and cite common applications for OSB.

j. Cite common applications for mineral fiberboard.

k. State the uses of various types of engineered lumber.

l. Identify applications for wood I-beams.

m. List advantages of glulam lumber over conventional solid lumber.

n. Describe the composition of concrete and explain how hydration occurs.

o. List uses of concrete masonry units for a construction project.

p. Identify where metal framing members may be used in a structure.

Module: Introduction to Building Envelope Systems

Learning Objective 3

State the requirements for a proper door installation.

a. Identify the differences between residential and commercial doors.

Learning Objective 4

Identify the various types of locksets used on exterior doors and explain how they are installed.

Aligned Washington State Academic Standards

Mathematics: Common Core	HS.N.Q.1 Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphHS. and data displays. HS.N.Q.2 Define appropriate quantities for the purpose of descriptive modeling. HS.N.Q.3 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.
Mathematical Practices	MP5 Use appropriate tools strategically. MP6 Attend to precision. MP8 Look for and express regularity in repeated reasoning.

Unit 23: Orientation to the Trades	Total Learning Hours for Unit: 5
Unit Summary: Competencies include: - C-24.1 Describe the history of the carpentry trade. - C-24.2 Identify the stages of progress within the carpentry trade. - C-24.3 Identify the responsibilities of a person working in the construction industry. - C-24.4 State the personal characteristics of a professional. - C-24.5 Explain the importance of safety in the construction industry. - C-24.6 Introduction to the Green Environment. - C-24.7 Relationship between human activities and the Green Environment. - C-24.8 Things you can do to make a difference. - C-24.9 Explain and identify the guidelines and goals of Green Built Systems (LEED, Energy Star).	
Performance Assessments: ● Beginning students complete a research assignment that is integrated into the career research unit. ● Advanced students complete a career research topic that the teacher assigns, presenting their findings to the CRT 1-2 students.	
Leadership Alignment Using <i>SkillsUSA Career Essentials Foundations lessons</i> students will understand the Job Specific Skills needed in Construction Trades. The instructor will guide the lesson and share the unique knowledge needed and the skills required. Items to be discussed: Know the job roles and responsibilities. Perform my job confidently. Seek ways to improve my job performance. Follow personnel manual policies. Perform responsibilities without direct supervision. Teach others job specific tasks. Be open to coaching and feedback. 7.B.1 Incorporate feedback effectively 7.B.2 Deal positively with praise, setbacks and criticism 7.B.3 Understand, negotiate and balance diverse views and beliefs to reach workable solutions, particularly in multi-cultural environments 8.C.2 Demonstrate initiative to advance skill levels towards a professional level 8.C.3 Demonstrate commitment to learning as a lifelong process 8.C.4 Reflect critically on past experiences in order to inform future progress 9.A.2 Conduct themselves in a respectable, professional manner	
Industry Standards and/or Competencies: National Center for Construction Education and Research: Residential Carpentry Standards:	

Module: Orientation to the Trade

Learning Objective 1

Identify the career and entrepreneurial opportunities within the carpentry trade.

- a. Identify the training opportunities within the carpentry trade.

Learning Objective 3

Identify the skills, responsibilities, and characteristics needed to be a successful carpenter.

- a. Describe the program, curriculum, and SkillsUSA Championships.
- b. State the benefits from being a SkillsUSA member.
- c. List the seven goals of the SkillsUSA Program of Work.

Learning Objective 4

Explain the importance of safety in the construction industry, and describe the obligations of the contractor, subcontractors, and you to ensure a safe work environment.

- a. Describe the OSHA Outreach Training Program.
- b. Explain hazard recognition and define your role in it.

Aligned Washington State Academic Standards: Washington state standards were not identified for this unit but may be added at a local level.

Unit 24: Applying for an Apprenticeship Program

Total Learning Hours for Unit: 10

Unit Summary:

Competencies include:

- C-25.1 How to locate training centers.
- C-25.2 Filling out the application.
- C-25.3 Collection of needed information.
- C-25.4 Interview techniques and dress.
- C-25.5 Portfolio requirements.

Performance Assessments:

- Students complete an application for an apprenticeship program of their choice and present the pros and cons of their decision to the class.

Leadership Alignment:

Using the information that has been gathered from YouScience, students will walk through the SkillsUSA lesson Professional Development to be intentional in their learning experience to enhance their career path. Specifically, students will develop a career plan (5th year plan). Assess current skill sets and determine areas for growth. Use professional and personal mentors. Seek professional and personal growth opportunities. Find applications of new learning. Stay current with workplace-related resources. Seek new responsibilities to gain additional skill sets.

21st Century Skills:

- 1.B.4 View failure as an opportunity to learn; understand that creativity and innovation is a long-term, cyclical process of small successes and frequent mistakes
- 2.C.5 Reflect critically on learning experiences and processes
- 4.A.2 Evaluate information critically and competently
- 7.B.1 Incorporate feedback effectively
- 7.B.2 Deal positively with praise, setbacks and criticism
- 7.B.3 Understand, negotiate and balance diverse views and beliefs to reach workable solutions, particularly in multi-cultural environments

8.C.2 Demonstrate initiative to advance skill levels towards a professional level
8.C.3 Demonstrate commitment to learning as a lifelong process
8.C.4 Reflect critically on past experiences in order to inform future progress
9.A.2 Conduct themselves in a respectable, professional manner
Industry Standards and/or Competencies: Industry standards were not identified for this unit but may be added at the local level.
Aligned Washington State Academic Standards
Washington state standards were not identified for this unit but may be added at a local level.

Unit 25: Orientation to Green Sustainability and You	Total Learning Hours for Unit: 5
Unit Summary: Competencies include: - C-26.1 Your role in the Green in the Green Environment the nature of change. - C-26.2 Changes in a manmade environment. - C-26.3 Relationship between human activities and the green environment. - C-26.4 The average American household–manufacturing, transportation, use and disposal of the products we use in daily living. - C-26.5 The impacts of the products you use – harvesting, extraction, manufacturing and transportation of products used. - C-26.6 Your carbon footprint and global climate change – the transfer of carbon between earth and atmosphere as it relates to the greenhouse effect. - C-26.7 Students will demonstrate methods for reducing energy use. - C-26.8 Rejecting, reducing, reusing and recycling materials. - C-26.9 Finding better energy sources – wind turbines, hydropower, photovoltaic, geothermal.	
Performance Assessments: Students complete computer research on a given topic, write a summary, and present their findings to the class.	
Leadership Alignment: Each student will complete a short project on green materials and/or practices. The focus will be on how this material or practice has a smaller footprint on the world than the normal practice or material. Students will share what the material or practice is and then why the product is used. 21 st Century Skills: 9.B.1 Respect cultural differences and work effectively with people from a range of social and cultural backgrounds. 9.B.2 Respond open-mindedly to different ideas and values 11.A.3 Inspire others to reach their very best via example and selflessness 11.B.1 Act responsibly with the interests of the larger community in mind	
Industry Standards and/or Competencies: Industry standards were not identified for this unit but may be added at the local level.	
Aligned Washington State Academic Standards	
Washington state standards were not identified for this unit but may be added at a local level.	

Unit 26: Best Practices for Construction and Landscaping	Total Learning Hours for Unit: 25
Unit Summary:	

Competencies include: C-27.1 Apply understanding of volatile organic compounds (VOCs). C-27.2 Apply understanding of chlorofluorocarbons (CFCs). C-27.3 Apply understanding of facility life cycle. C-27.4 Site selection utilizing best green practices for building location. C-27.5 Apply understanding of building orientation to site. C-27.6 Sustainable landscaping in both hardscape and softscape applications.	
Performance Assessments: - Students to be given situations (scenarios) for construction/landscaping to examine and determine best practices. - Students to draft a plan that includes best practices for landscaping a residential and/or commercial property.	
Leadership Alignment: Leadership Alignment: - SkillsUSA Career Readiness Curriculum integrity lesson <i>thoughtfulness</i>. Using this lesson, we will invite in a couple of our advisory members to share their experiences on putting others first. The conversation will be selfishness vs. others. 21st Century Skills: 3.B.1 Demonstrate ability to work effectively and respectfully with diverse teams 7.B.1 Incorporate feedback effectively 7.B.2 Deal positively with praise, setbacks and criticism 7.B.3 Understand, negotiate and balance diverse views and beliefs to reach workable solutions, particularly in multi-cultural environments 8.C.2 Demonstrate initiative to advance skill levels towards a professional level 8.C.3 Demonstrate commitment to learning as a lifelong process 8.C.4 Reflect critically on past experiences in order to inform future progress 9.A.2 Conduct themselves in a respectable, professional manner 11.B.1 Act responsibly with the interests of the larger community in mind	
Industry Standards and/or Competencies: Industry standards were not identified for this unit but may be added at the local level.	
Aligned Washington State Academic Standards	
Washington state standards were not identified for this unit but may be added at a local level.	

Unit 27: Water and Wastewater Best Practices	Total Learning Hours for Unit: 5
Unit Summary: Competencies include: C-28.1 Understand and apply methods of reducing water usage. C-28.2 Reducing water flow in showers and sinks to increase the efficiency of water use. C-28.3 Finding alternative sources of water. C-28.4 Finding alternative sinks for wastewater including storm water, gray water, and brake water	
Performance Assessments: With a variety of fixtures relevant to the industry, students to identify the pros and cons of products as it relates to water and wastewater practices.	
Leadership Alignment:	

- SkillsUSA Career Readiness Curriculum decision-making lesson *Making Decisions when they are not Popular*. Students will first get into small groups, where they will be given a prompt on a topic that needs a solution. After discussing the group will write out the agreed upon solution as well as have laid out the reasons why others may not like it, but a rational of why the decision was made.

21st Century Skills:

- 2.D.1 Solve different kinds of non-familiar problems in both conventional and innovative ways
- 2.D.2 Identify and ask significant questions that clarify various points of view and lead to better solutions
- 2.C.1 Effectively analyze and evaluate evidence, arguments, claims and beliefs
- 2.C.2 Analyze and evaluate major alternative points of view
- 3.B.1 Demonstrate ability to work effectively and respectfully with diverse teams
- 3.A.3 Use communication for a range of purposes (e.g. to inform, instruct, motivate and persuade)
- 11.A.1 Use interpersonal and problem-solving skills to influence and guide others toward a goal
- 11.B.1 Act responsibly with the interests of the larger community in mind

Industry Standards and/or Competencies:

National Center for Construction Education and Research: Residential Carpentry Standards:

Module: Building Materials, Fasteners, and Adhesives

Learning Objective 2

List safety precautions associated with building materials.

- a. List general safety guidelines for working with building materials.
- b. Cite safety precautions for working with wood building materials.
- c. Cite safety precautions for working with concrete building materials.
- d. Cite safety precautions for working with metal building materials.

Aligned Washington State Academic Standards

Washington state standards were not identified for this unit but may be added at a local level.

Unit 28: Materials and Waste Best Practices

Total Learning Hours for Unit: 25

Unit Summary:

Competencies include:

- C-29.1 Eliminating the unnecessary use of materials.
- C-29.2 Using and recycling plastic lumber.
- C-29.3 Pollution prevention.
- C-29.4 Using materials more effectively, getting more benefit from the materials you use.
- C-29.5 Students will understand the benefit of using insulating concrete forms.
- C-29.6 Finding better sources of materials: rapidly renewable materials, bio-based materials, sustainably harvested.
- C-29.7 Apply understanding of the benefits of using FSC Certification/Certified wood products.

Performance Assessments:

- Project progress and completion: Concepts to be reinforced with several projects throughout the year.
- Students participate in a materials and waste competition where they will be given x number of board of feet and then develop products and measure the waste.

Leadership Alignment

Students will have the opportunity to demonstrate their skills through a program competition that will lead to an area SkillsUSA Competition. This will prepare students for SkillsUSA State.

1.B.4 View failure as an opportunity to learn; understand that creativity and innovation is a long-term, cyclical process of small successes and frequent mistakes 2.2.B.1 Analyze how parts of a whole interact with each other to produce overall outcomes in complex systems.A.1 Use various types of reasoning (inductive, deductive, etc.) as appropriate to the situation 2.C.5 Reflect critically on learning experiences and processes 4.A.2 Evaluate information critically and competently 4.B.1 Use information accurately and creatively for the issue or problem at hand 7.A.2 Work effectively in a climate of ambiguity and changing priorities	
Industry Standards and/or Competencies: National Center for Construction Education and Research: Residential Carpentry Standards: - Leadership activities should include 21st Century Skills embedded in curriculum and instruction for this unit of instruction. Include leadership skills that are being taught and assessed within the class for all students. - The event, activity, or project and the associated 21st Century Skill should be clearly articulated. - Example: Students will demonstrate the ability to communicate clearly through their group project presentation. One possible activity is the SkillsUSA Career Readiness Curriculum decision-making lesson <i>Making Informed Decisions</i>.	
Aligned Washington State Academic Standards	
Washington state standards were not identified for this unit but may be added at a local level.	
Unit 29: Basic Safety	Total Learning Hours for Unit: 40 – integrated daily
Unit Summary: Competencies include: - C-30.1 Explain the role that safety plays in the construction crafts. - C-30.2 Describe the meaning of job-site safety. - C-30.3 Describe the characteristics of a competent person and a qualified person. - C-30.4 Demonstrate the use and care of appropriate personal protective equipment (PPE). - C-30.5 Properly don and remove personal protective equipment (safety goggles, hard hat, and personal fall protection). - C-30.6 Follow the safety procedures required for lifting heavy objects. - C-30.7 Explain the importance of hazard communications (HazCom) and material safety data sheets (MSDSs). - C-30.8 Describe fire prevention and firefighting techniques. - C-30.9 Define safe work procedures to use around electrical hazards. - C-30.10 Explain appropriate safety precautions to take around common job site hazards. - C-30.11 Use safe work habits and techniques.	
Performance Assessments: - Students know where to locate the MSDS information. - Students demonstrate safety knowledge daily through proper use of safety tools of the trade.	
Leadership Alignment: Using <i>SkillsUSA Career Essentials Foundations lessons</i> students will understand the Safety and Health conversation throughout all industries. The instructor will guide the lesson and share the why safety and health in the workplace is so important. Items to be discussed: Follow safety procedures related to clothing and access. Maintaining a clean working environment. Identifying hazards. Use tools and equipment correctly. Stay current with safety guidelines.	
7.B.1 Incorporate feedback effectively	

7.B.2 Deal positively with praise, setbacks and criticism

7.B.3 Understand, negotiate and balance diverse views and beliefs to reach workable solutions, particularly in multi-cultural environments

8.C.2 Demonstrate initiative to advance skill levels towards a professional level

8.C.3 Demonstrate commitment to learning as a lifelong process

8.C.4 Reflect critically on past experiences in order to inform future progress

9.A.2 Conduct themselves in a respectable, professional manner

Industry Standards and/or Competencies:

National Center for Construction Education and Research: Residential Carpentry Standards:

Module: Orientation to the Trade

Learning Objective 2

Identify the skills, responsibilities, and characteristics needed to be a successful carpenter.

- a. Identify the skills needed to be a successful carpenter.
- b. Identify the responsibilities of a successful carpenter.
- c. State the personal characteristics of a successful carpenter.

Learning Objective 4

Explain the importance of safety in the construction industry, and describe the obligations of the contractor, subcontractors, and you to ensure a safe work environment.

- a. Describe the OSHA Outreach Training Program.
- b. Explain hazard recognition and define your role in it.

Module: Building Materials, Fasteners, and Adhesives

Learning Objective 2

List safety precautions associated with building materials.

- a. List general safety guidelines for working with building materials.
- b. Cite safety precautions for working with wood building materials.
- c. Cite safety precautions for working with concrete building materials.
- d. Cite safety precautions for working with metal building materials.

Learning Objective 3

Describe the proper method of handling and storing building materials.

- a. List basic material-handling guidelines.
- b. Describe how to handle and store wood building materials.
- c. Describe how to handle and store concrete building materials.
- d. Describe how to handle and store metal building materials.

Module: Hand and Power Tools

Learning Objective 1

Identify the hand tools commonly used by carpenters.

- a. Describe the safe use and maintenance of levels.
- b. Describe the safe use and maintenance of squares.
- c. Describe the safe use and maintenance of planes.
- d. Describe the safe use and maintenance of clamps.
- e. Describe the safe use and maintenance of hand saws.

Learning Objective 2

Identify the power tools commonly used by carpenters.

- a. Describe the general safe use and maintenance of power tools.
- b. Describe the safe use of power saws.
- c. Describe the safe use of drill presses.
- d. Describe the safe use of routers and laminate trimmers.
- e. Describe the safe use of portable power planes.
- f. Describe the safe use of power metal shears.
- g. Describe the safe use of pneumatic and cordless nailers and staplers.

Module: Introduction to Construction Drawings, Specifications, and Layout

Learning Objective 2

State the purpose of written specifications.

- a. Describe how specifications are organized.
- b. Explain the importance of building codes in construction.

Aligned Washington State Academic Standards

Mathematical Practices

MP3 Construct viable arguments and critique the reasoning of others.

Unit 30: Basic Communication Skills

Total Learning Hours for Unit: 5

Unit Summary:

Competencies include:

- C-31.1 Demonstrate the ability to interpret information and instructions presented in both written and verbal form.
- C-31.2 Demonstrate the ability to communicate effectively in on-the-job situations using written and verbal skills.

Performance Assessments:

- Advanced students are assigned the role of shop foreman.

Leadership Alignment:

Students will have the opportunity to demonstrate their skills through a program competition that will lead to an area SkillsUSA Competition. This will prepare students for SkillsUSA State.

- 1.B.4 View failure as an opportunity to learn; understand that creativity and innovation is a long-term, cyclical process of small successes and frequent mistakes
- 2.2.B.1 Analyze how parts of a whole interact with each other to produce overall outcomes in complex systems.A.1 Use various types of reasoning (inductive, deductive, etc.) as appropriate to the situation
- 2.C.5 Reflect critically on learning experiences and processes
- 4.A.2 Evaluate information critically and competently
- 4.B.1 Use information accurately and creatively for the issue or problem at hand
- 7.A.2 Work effectively in a climate of ambiguity and changing priorities

Industry Standards and/or Competencies:

National Center for Construction Education and Research: Residential Carpentry Standards:

Module: Orientation to the Trade

Learning Objective 1 Identify the

career and entrepreneurial opportunities within the carpentry trade.

- a. Identify the training opportunities within the carpentry trade.

- Learning Objective 2
Identify the skills, responsibilities, and characteristics needed to be a successful carpenter.
- a. Identify the skills needed to be a successful carpenter.
 - b. Identify the responsibilities of a successful carpenter.
 - c. State the personal characteristics of a successful carpenter.
- Learning Objective 3
Identify the skills, responsibilities, and characteristics needed to be a successful carpenter.
- a. Describe the program, curriculum, and SkillsUSA Championships.
 - b. State the benefits from being a SkillsUSA member.
 - c. List the seven goals of the SkillsUSA Program of Work.
- Learning Objective 4
Explain the importance of safety in the construction industry, and describe the obligations of the contractor, subcontractors, and you to ensure a safe work environment.
- a. Describe the OSHA Outreach Training Program.
 - b. Explain hazard recognition and define your role in it.

Aligned Washington State Academic Standards	
Mathematical Practices	MP3 Construct viable arguments and critique the reasoning of others.

The 21st Century Skills should be taught and assessed throughout the course. This table should be included at the end of this document.

21 st Century Skills		
Check those that students will demonstrate in this course:		
LEARNING & INNOVATION Creativity and Innovation ☒ Think Creatively ☒ Work Creatively with Others ☒ Implement Innovations Critical Thinking and Problem Solving ☒ Reason Effectively ☒ Use Systems Thinking ☒ Make Judgments and Decisions ☒ Solve Problems Communication and Collaboration ☒ Communicate Clearly ☒ Collaborate with Others	INFORMATION, MEDIA & TECHNOLOGY SKILLS Information Literacy ☒ Access and /evaluate Information ☒ Use and Manage Information Media Literacy ☒ Analyze Media ☒ Create Media Products Information, Communications and Technology (ICT Literacy) ☒ Apply Technology Effectively	LIFE & CAREER SKILLS Flexibility and Adaptability ☒ Adapt to Change ☒ Be Flexible Initiative and Self-Direction ☒ Manage Goals and Time ☒ Work Independently ☒ Be Self-Directed Learners Social and Cross-Cultural ☒ Interact Effectively with Others ☒ Work Effectively in Diverse Teams Productivity and Accountability ☒ Manage Projects ☒ Produce Results Leadership and Responsibility ☒ Guide and Lead Others ☒ Be Responsible to Others