



Statewide Framework Document for: 460201

Standards may be added to this document prior to submission, but may not be removed for the framework to meet state credit equivalency requirements. Performance assessments may be developed at the local level. In order to achieve state approval, performance assessments must be submitted within this framework. **This course is eligible for 1 credit of Geometry.** The Washington State 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 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.

Residential Carpentry/Carpenter	
Course Title: Residential Carpentry/Carpenter	Total Framework Hours: 540
CIP Code: 460201 <input type="checkbox"/> Exploratory <input checked="" type="checkbox"/> Preparatory	Date Last Modified: May 4, 2015
Career Cluster: Architecture and Construction	Cluster Pathway: Construction
Eligible for Equivalent Credit in: <input checked="" type="checkbox"/> Math <input type="checkbox"/> Science	Total Number of Units: 30
Course Overview	
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.	

Unit 1: Career Planning	Total Learning Hours for Unit: 5
Unit Summary: Competencies include: <ul style="list-style-type: none"> • 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:

Performance assessments on the following topics may be developed at the local level. In order to earn approval at the state level, performance assessments must be submitted within this framework.

Students will research open positions within a variety of companies and compare/contrast their descriptions, duties, and expectations. Students will prepare responses to standard interview questions. Students will complete a comprehensive written Career Research assignment.

Leadership Alignment:

- 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 professionalism lesson *Choose Your Own Identity*.

Industry Standards and 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 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 - integrated throughout course**

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:

Performance assessments on the following topics may be developed at the local level. In order to earn approval at the state level, performance assessments must be submitted within this framework.

Students will generate a résumé and keep a portfolio of their quality work. As they research job openings within a variety of companies, they should compare and contrast their descriptions, duties, and expectations. Students will prepare responses to standard interview questions and participate in a WOIS or other career research assignment. Students will prepare a written report on career research using standard MLA format. Students will present their career research orally using media such as PowerPoint, handouts, and video.

Leadership Alignment:

- 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 professionalism lesson *I Believe in Me*.

Industry Standards and 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

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- 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.
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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 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 - integrated throughout course

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:

Performance assessments on the following topics may be developed at the local level. In order to earn approval at the state level, performance assessments must be submitted within this framework.

Students will 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:

- 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 work ethic lesson *Get it Done*.

Industry Standards and 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 Standards

Standards for Mathematical Practice (Common Core State Standards):

Practice 3: Construct viable arguments and critique the reasoning of others.

Unit 4: Teamwork and Cooperation

**Total Learning Hours for Unit:
20 - integrated throughout course.**

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:

Performance assessments on the following topics may be developed at the local level. In order to earn approval at the state level, performance assessments must be submitted within this framework.

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:

- 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 leadership lesson *The Connection*.

Industry Standards and 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: 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.

Aligned Washington State Standards

Standards for Mathematical Practice (Common Core State Standards):

Practice 3: 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 (10th and 100th, 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:

Performance assessments on the following topics may be developed at the local level. In order to earn approval at the state level, performance assessments must be submitted within this framework.

Students take written exams on math theory. 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:

- 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 planning, organizing, and management lesson *Planning to Plan*.

Industry Standards and 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.
- b. Explain the difference between standard interior wall systems and alternative interior wall systems.

Module: Ceiling and Roof Framing

Learning Objective 1

Identify the components of ceiling framing.

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

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 9

Describe how to perform a material takeoff for a roof.

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

Module: Basic Stair Layout

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.

Aligned Washington State Standards

Standards for Mathematical Practice (Common Core State Standards):

Practice 1: Make sense of problems and persevere in solving them.

Practice 2: Reason abstractly and quantitatively.

Practice 3: Construct viable arguments and critique the reasoning of others.

Practice 4: Model with mathematics.

Practice 5: Use appropriate tools strategically.

Practice 6: Attend to precision.

Practice 7: Look for and make use of structure.

Practice 8: Look for and express regularity in repeated reasoning.

Washington Mathematics Standards (Common Core State Standards):

Cluster: Extend the properties of exponents to rational exponents.

N.RN.A.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.

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

Cluster: Use properties of rational and irrational numbers.

N.RN.B.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.

Cluster: Reason quantitatively and use units to solve problems.

N.Q.A.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.

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

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

Cluster: Create equations that describe numbers or relationships.

A.CED.A.1 Create equations and inequalities in one variable and use them to solve problems.

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

A.CED.A.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.

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

Cluster: Understand solving equations as a process of reasoning and explain the reasoning.

A.REI.A.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.

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

Cluster: Solve equations and inequalities in one variable.

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

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

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.

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: Solve systems of equations.

A.REI.C.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.

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

A.REI.C.7 Solve a simple system consisting of a linear equation and a quadratic equation in two variables algebraically and graphically. For example, find the points of intersection between the line $y = -3x$ and the circle $x^2 + y^2 = 3$.

A.REI.C.8 Represent a system of linear equations as a single matrix equation in a vector variable.

A.REI.C.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).

Cluster: Experiment with transformations in the plane.

G.CO.A.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.

G.CO.A.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).

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

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

G.CO.A.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.

Cluster: Understand congruence in terms of rigid motions.

G.CO.B.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.

G.CO.B.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.

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

Cluster: Prove geometric theorems.

G.CO.C.9 Prove theorems about lines and angles.

G.CO.C.10 Prove theorems about triangles.

G.CO.C.11 Prove theorems about parallelograms.

Cluster: Make geometric constructions.

G.CO.D.12 Make formal geometric constructions with a variety of tools and methods (compass and straightedge, string, reflective devices, paper folding, dynamic geometric software, etc.).

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

Cluster: Understand similarity in terms of similarity transformations

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

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.

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

G.SRT.A.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.

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

Cluster: Prove theorems involving similarity.

G.SRT.B.4 Prove theorems about triangles.

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

Cluster: Define trigonometric ratios and solve problems involving right triangles

G.SRT.C.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.

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

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

Cluster: Apply trigonometry to general triangles

G.SRT.D.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.

G.SRT.D.10 Prove the Laws of Sines and Cosines and use them to solve problems.

G.SRT.D.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).

Cluster: Understand and apply theorems about circles

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

G.C.A.2 Identify and describe relationships among inscribed angles, radii, and chords.

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

G.C.A.4 Construct a tangent line from a point outside a given circle to the circle.

Cluster: Find arc lengths and areas of sectors of circles

G.C.A.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.

Cluster: Translate between the geometric description and the equation for a conic section

G.GPE.A.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.

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

G.GPE.A.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.

Cluster: Use coordinates to prove simple geometric theorems algebraically

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

G.GPE.B.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).

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

G.GPE.B.7 Use coordinates to compute perimeters of polygons and areas of triangles and rectangles, e.g., using the distance formula.

Cluster: Explain volume formulas and use them to solve problems

G.GMD.A.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.

G.GMD.A.2 Give an informal argument using Cavalieri's principle for the formulas for the volume of a sphere and other solid figures.

G.GMD.A.3 Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems.

Cluster: Visualize relationships between two-dimensional and three-dimensional objects

G.GMD.B.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.

Cluster: Apply geometric concepts in modeling situations

G.MG.A.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).

G.MG.A.2 Apply concepts of density based on area and volume in modeling situations (e.g., persons per square mile, BTUs per cubic foot).

G.MG.A.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).

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:

Performance assessments on the following topics may be developed at the local level. In order to earn approval at the state level, performance assessments must be submitted within this framework.

Beginner: Instructor demonstrates each tool. Students will 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:

- 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 teamwork lesson *Leading and Following*.

Industry Standards and 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 Standards

Standards for Mathematical Practice (Common Core State Standards):

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:

Performance assessments on the following topics may be developed at the local level. In order to earn approval at the state level, performance assessments must be submitted within this framework.

Beginning students will demonstrate proper use of tool for teacher. They must take a written and verbal test and pass with 100% prior to working in lab. Advanced students will demonstrate the use of power tools under teacher observation. Students may have to recertify. Students assist in demonstrating tools for beginning students.

Leadership Alignment:

- 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 responsibility lesson *Personal Well Being*.

Industry Standards and 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.

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 Standards

Standards for Mathematical Practice (Common Core State Standards):

Practice 5: Use appropriate tools strategically.

Practice 6: Attend to precision.

Unit 8: Blueprints, Plans and Drawings

Total Learning Hours for Unit: 60

Unit Summary:

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:

Performance assessments on the following topics may be developed at the local level. In order to earn approval at the state level, performance assessments must be submitted within this framework.

Students will learn blueprint reading and be able to correctly label a blueprint. Students will complete a writing and hands-on test covering vocabulary, interpretation of vocabulary, symbolism, scale, topography, elevation, and three different perspectives (depth, width, height, site, foundation, floor plan). 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). Students then progress to more complicated projects of their choice, as approved by teacher. (Examples include bathroom remodel, bedroom furniture, and patio furniture.)

Leadership Alignment:

- 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 planning, organizing, and management lesson *Managing a Plan*.

Industry Standards and 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.

Module: Building Materials, Fasteners, and Adhesives

Learning Objective 1

Identify various types of building materials and describe their uses.

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

Standards for Mathematical Practice (Common Core State Standards):

Practice 1: Make sense of problems and persevere in solving them.

Practice 2: Reason abstractly and quantitatively.

Practice 3: Construct viable arguments and critique the reasoning of others.

Practice 4: Model with mathematics.

Practice 5: Use appropriate tools strategically.

Practice 6: Attend to precision.

Practice 7: Look for and make use of structure.

Practice 8: Look for and express regularity in repeated reasoning.

Washington Mathematics Standards (Common Core State Standards):

Cluster: Extend the properties of exponents to rational exponents.

- N.RN.A.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.

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

Cluster: Reason quantitatively and use units to solve problems.

N.Q.A.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.

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

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

Cluster: Create equations that describe numbers or relationships.

A.CED.A.1 Create equations and inequalities in one variable and use them to solve problems.

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

A.CED.A.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.

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

Cluster: Solve equations and inequalities in one variable.

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

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

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.

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.

G.CO.A.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.

G.CO.A.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).

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

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

G.CO.A.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.

Cluster: Make geometric constructions.

G.CO.D.12 Make formal geometric constructions with a variety of tools and methods (compass and straightedge, string, reflective devices, paper folding, dynamic geometric software, etc.).

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

Cluster: Apply trigonometry to general triangles.

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

G.SRT.D.10 Prove the Laws of Sines and Cosines and use them to solve problems.

G.SRT.D.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).

Cluster: Understand and apply theorems about circles.

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

G.C.A.2 Identify and describe relationships among inscribed angles, radii, and chords.

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

G.C.A.4 Construct a tangent line from a point outside a given circle to the circle.

Cluster: Use coordinates to prove simple geometric theorems algebraically.

- G.GPE.B.4 Use coordinates to prove simple geometric theorems algebraically.
- G.GPE.B.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).
- G.GPE.B.6 Find the point on a directed line segment between two given points that partitions the segment in a given ratio.
- G.GPE.B.7 Use coordinates to compute perimeters of polygons and areas of triangles and rectangles, e.g., using the distance formula.

Cluster: Apply geometric concepts in modeling situations.

- G.MG.A.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).
- G.MG.A.2 Apply concepts of density based on area and volume in modeling situations (e.g., persons per square mile, BTUs per cubic foot).
- G.MG.A.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).

Washington English Language Arts Standards (Common Core State Standards) - Science and Technology Literacy Standards (Grades 11-12):

RST.11-12.4 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11-12 texts and topics.

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:

Performance assessments on the following topics may be developed at the local level. In order to earn approval at the state level, performance assessments must be submitted within this framework.

Project progress and completion: Students will 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:

- 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 teamwork lesson *Leading and Following* and communication lesson *Putting your Best Communication Forward?*

Industry Standards and 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 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.

Aligned Washington State Standards

Standards for Mathematical Practice (Common Core State Standards):

Practice 6: Attend to precision.

Washington Mathematics Standards (Common Core State Standards):

Cluster: Apply geometric concepts in modeling situations.

- G.MG.A.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).
- G.MG.A.2 Apply concepts of density based on area and volume in modeling situations (e.g., persons per square mile, BTUs per cubic foot).
- G.MG.A.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).

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:

Performance assessments on the following topics may be developed at the local level. In order to earn approval at the state level, performance assessments must be submitted within this framework.

Students will conduct research on the types of concrete and what characteristics exist for each type and present their findings to the class.

Leadership Alignment:

- 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 self-motivation lesson *Attitude is Everything*.

Industry Standards and 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.

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.

Aligned Washington State Standards**Standards for Mathematical Practice (Common Core State Standards):**

Practice 1: Make sense of problems and persevere in solving them.

Practice 2: Reason abstractly and quantitatively.

Practice 4: Model with mathematics.

Practice 6: Attend to precision.

Washington Mathematics Standards (Common Core State Standards):

Cluster: Explain volume formulas and use them to solve problems.

- G.GMD.A.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.
- G.GMD.A.2 Give an informal argument using Cavalieri's principle for the formulas for the volume of a sphere and other solid figures.
- G.GMD.A.3 Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems.

Cluster: Visualize relationships between two-dimensional and three-dimensional objects.

- G.GMD.B.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.

Cluster: Apply geometric concepts in modeling situations.

- G.MG.A.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).
- G.MG.A.2 Apply concepts of density based on area and volume in modeling situations (e.g., persons per square mile, BTUs per cubic foot).
- G.MG.A.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).

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:

Performance assessments on the following topics may be developed at the local level. In order to earn approval at the state level, performance assessments must be submitted within this framework.

Students learn and demonstrate how to shoot grade. Students create a story pole. 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:

- 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 teamwork lesson *Cooperation, Get the Job Done*.

Industry Standards and 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 Standards**Standards for Mathematical Practice (Common Core State Standards):**

Practice 1: Make sense of problems and persevere in solving them.

Practice 2: Reason abstractly and quantitatively.

Practice 4: Model with mathematics.

Practice 5: Use appropriate tools strategically.

Practice 6: Attend to precision.

Practice 7: Look for and make use of structure.

Washington Mathematics Standards (Common Core State Standards):

Cluster: Reason quantitatively and use units to solve problems.

N.Q.A.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.

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

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

Cluster: Create equations that describe numbers or relationships.

A.CED.A.1 Create equations and inequalities in one variable and use them to solve problems.

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

A.CED.A.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.

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

Cluster: Solve equations and inequalities in one variable.

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

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

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.

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.

G.CO.A.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.

G.CO.A.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).

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

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

G.CO.A.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.

Cluster: Make geometric constructions.

G.CO.D.12 Make formal geometric constructions with a variety of tools and methods (compass and straightedge, string, reflective devices, paper folding, dynamic geometric software, etc.).

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

Cluster: Define trigonometric ratios and solve problems involving right triangles.

G.SRT.C.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.

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

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

Cluster: Apply trigonometry to general triangles.

G.SRT.D.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.

G.SRT.D.10 Prove the Laws of Sines and Cosines and use them to solve problems.

G.SRT.D.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).

Cluster: Understand and apply theorems about circles.

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

G.C.A.2 Identify and describe relationships among inscribed angles, radii, and chords.

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

G.C.A.4 Construct a tangent line from a point outside a given circle to the circle.

Cluster: Use coordinates to prove simple geometric theorems algebraically.

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

G.GPE.B.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).

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

G.GPE.B.7 Use coordinates to compute perimeters of polygons and areas of triangles and rectangles, e.g., using the distance formula.

Cluster: Explain volume formulas and use them to solve problems.

G.GMD.A.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.

G.GMD.A.2 Give an informal argument using Cavalieri's principle for the formulas for the volume of a sphere and other solid figures.

G.GMD.A.3 Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems.

Cluster: Visualize relationships between two-dimensional and three-dimensional objects.

G.GMD.B.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.

Cluster: Apply geometric concepts in modeling situations.

G.MG.A.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).

G.MG.A.2 Apply concepts of density based on area and volume in modeling situations (e.g., persons per square mile, BTUs per cubic foot).

G.MG.A.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).

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:

Performance assessments on the following topics may be developed at the local level. In order to earn approval at the state level, performance assessments must be submitted within this framework.

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

Leadership Alignment:

- 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 teamwork lesson *Capitalizing on Strengths*.

Industry Standards and 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.

Aligned Washington State Standards

Standards for Mathematical Practice (Common Core State Standards):

Practice 1: Make sense of problems and persevere in solving them.

Practice 2: Reason abstractly and quantitatively.

Practice 4: Model with mathematics.

Practice 5: Use appropriate tools strategically.

Practice 6: Attend to precision.

Washington Mathematics Standards (Common Core State Standards):

Cluster: Reason quantitatively and use units to solve problems.

N.Q.A.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.

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

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

Cluster: Solve equations and inequalities in one variable.

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

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

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.

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.

G.CO.A.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.

G.CO.A.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).

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

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

Cluster: Make geometric constructions.

G.CO.D.12 Make formal geometric constructions with a variety of tools and methods (compass and straightedge, string, reflective devices, paper folding, dynamic geometric software, etc.).

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

Cluster: Understand and apply theorems about circles.

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

G.C.A.2 Identify and describe relationships among inscribed angles, radii, and chords.

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

G.C.A.4 Construct a tangent line from a point outside a given circle to the circle.

Cluster: Use coordinates to prove simple geometric theorems algebraically.

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

G.GPE.B.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).

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

G.GPE.B.7 Use coordinates to compute perimeters of polygons and areas of triangles and rectangles, e.g., using the distance formula.

Cluster: Explain volume formulas and use them to solve problems.

G.GMD.A.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.

G.GMD.A.2 Give an informal argument using Cavalieri's principle for the formulas for the volume of a sphere and other solid figures.

G.GMD.A.3 Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems.

Cluster: Visualize relationships between two-dimensional and three-dimensional objects

G.GMD.B.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.

Cluster: Apply geometric concepts in modeling situations

G.MG.A.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).

G.MG.A.2 Apply concepts of density based on area and volume in modeling situations (e.g., persons per square mile, BTUs per cubic foot).

G.MG.A.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).

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:

Performance assessments on the following topics may be developed at the local level. In order to earn approval at the state level, performance assessments must be submitted within this framework.

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

Leadership Alignment:

- 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 multicultural sensitivity and awareness lesson *Fostering Diversity*.

Industry Standards and 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 Standards

Standards for Mathematical Practice (Common Core State Standards):

Practice 1: Make sense of problems and persevere in solving them.

Practice 4: Model with mathematics.

Practice 5: Use appropriate tools strategically.

Practice 6: Attend to precision.

Practice 8: Look for and express regularity in repeated reasoning.

Washington Mathematics Standards (Common Core State Standards):

Cluster: Reason quantitatively and use units to solve problems.

N.Q.A.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.

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

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

Cluster: Create equations that describe numbers or relationships.

A.CED.A.1 Create equations and inequalities in one variable and use them to solve problems.

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

A.CED.A.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.

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

Cluster: Solve equations and inequalities in one variable.

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

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

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.

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.

G.CO.A.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.

G.CO.A.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).

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

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

G.CO.A.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.

Cluster: Make geometric constructions.

G.CO.D.12 Make formal geometric constructions with a variety of tools and methods (compass and straightedge, string, reflective devices, paper folding, dynamic geometric software, etc.).

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

Cluster: Apply trigonometry to general triangles.

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

G.SRT.D.10 Prove the Laws of Sines and Cosines and use them to solve problems.

G.SRT.D.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).

Cluster: Apply geometric concepts in modeling situations.

G.MG.A.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).

G.MG.A.2 Apply concepts of density based on area and volume in modeling situations (e.g., persons per square mile, BTUs per cubic foot).

G.MG.A.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).

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 assembles, 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:

Performance assessments on the following topics may be developed at the local level. In order to earn approval at the state level, performance assessments must be submitted within this framework.

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

Leadership Alignment:

- 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 leadership lesson *Opening the Door*.

Industry Standards and 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 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.

Module: Wall Systems

Learning Objective 1

Identify the components of a wall system.

- a. Identify methods used to construct corner posts.
- b. Describe how to frame partition intersections.
- c. Explain the purpose of headers and describe how they are constructed.
- d. 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.

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

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

- 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 1

Identify the components of ceiling framing.

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

Aligned Washington State Standards

Standards for Mathematical Practice (Common Core State Standards):

Practice 1: Make sense of problems and persevere in solving them.

Practice 4: Model with mathematics.

Practice 5: Use appropriate tools strategically.

Practice 6: Attend to precision.

Practice 8: Look for and express regularity in repeated reasoning.

Washington Mathematics Standards (Common Core State Standards):

Cluster: Reason quantitatively and use units to solve problems.

N.Q.A.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.

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

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

Cluster: Solve equations and inequalities in one variable.

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

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

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.

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.

G.CO.A.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.

G.CO.A.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).

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

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

G.CO.A.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.

Cluster: Make geometric constructions.

G.CO.D.12 Make formal geometric constructions with a variety of tools and methods (compass and straightedge, string, reflective devices, paper folding, dynamic geometric software, etc.).

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

Cluster: Apply geometric concepts in modeling situations.

G.MG.A.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).

G.MG.A.2 Apply concepts of density based on area and volume in modeling situations (e.g., persons per square mile, BTUs per cubic foot).

G.MG.A.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).

Unit 15: Roof Framing

Total Learning Hours for Unit: 15

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:

Performance assessments on the following topics may be developed at the local level. In order to earn approval at the state level, performance assessments must be submitted within this framework.

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

Leadership Alignment:

- 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 responsibility lesson *You Can Count On Me*.

Industry Standards and 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 Standards

Standards for Mathematical Practice (Common Core State Standards):

Practice 1: Make sense of problems and persevere in solving them.

Practice 4: Model with mathematics.

Practice 5: Use appropriate tools strategically.

Practice 6: Attend to precision.

Practice 8: Look for and express regularity in repeated reasoning.

Washington Mathematics Standards (Common Core State Standards):

Cluster: Reason quantitatively and use units to solve problems.

N.Q.A.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.

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

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

Cluster: Solve equations and inequalities in one variable.

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

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

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.

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

G.CO.A.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.

G.CO.A.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).

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

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

G.CO.A.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.

Cluster: Make geometric constructions.

G.CO.D.12 Make formal geometric constructions with a variety of tools and methods (compass and straightedge, string, reflective devices, paper folding, dynamic geometric software, etc.).

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

Cluster: Apply trigonometry to general triangles.

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

G.SRT.D.10 Prove the Laws of Sines and Cosines and use them to solve problems.

G.SRT.D.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).

Cluster: Use coordinates to prove simple geometric theorems algebraically.

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

G.GPE.B.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).

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

G.GPE.B.7 Use coordinates to compute perimeters of polygons and areas of triangles and rectangles, e.g., using the distance formula.

Cluster: Apply geometric concepts in modeling situations.

G.MG.A.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).

G.MG.A.2 Apply concepts of density based on area and volume in modeling situations (e.g., persons per square mile, BTUs per cubic foot).

G.MG.A.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).

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:

Performance assessments on the following topics may be developed at the local level. In order to earn approval at the state level, performance assessments must be submitted within this framework.

Students will demonstrate awareness through group discussion and classroom participation. Students will be able to match types of windows and installation by reading blueprint or drawing.

Leadership Alignment:

- 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 integrity lesson *Accepts Responsibility*.

Industry Standards and 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 Standards

Standards for Mathematical Practice (Common Core State Standards):

Practice 1: Make sense of problems and persevere in solving them.

Practice 4: Model with mathematics.

Practice 5: Use appropriate tools strategically.

Practice 6: Attend to precision.

Washington Mathematics Standards (Common Core State Standards):

Cluster: Reason quantitatively and use units to solve problems.

N.Q.A.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.

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

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

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:

Performance assessments on the following topics may be developed at the local level. In order to earn approval at the state level, performance assessments must be submitted within this framework.

Students will complete the model from previous assignments. Students will research and identify the appropriate siding for a given scenario. Students will complete the model and present the model to the CRT 1-2 students detailing the research and design process, rationale for choices, and conclusions.

Leadership Alignment:

- 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 integrity lesson *To Be or Not to Be*.

Industry Standards and 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 Standards**Washington Mathematics Standards (Common Core State Standards):**

Cluster: Reason quantitatively and use units to solve problems.

N.Q.A.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.

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

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

Unit 18: Roofing Applications	Total Learning Hours for Unit: 10
<p>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.</p>	
<p>Performance Assessments: <i>Performance assessments on the following topics may be developed at the local level. In order to earn approval at the state level, performance assessments must be submitted within this framework.</i></p> <p>Students will use the model from previous assignments. Students will research and identify the appropriate roofing for a given scenario. Students will complete the model and then present the model to the CRT 1-2 students with a detailed explanation outlining the process, choices, rationale, and conclusions.</p>	
<p>Leadership Alignment:</p> <ul style="list-style-type: none"> • 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. <p>One possible activity is the SkillsUSA Career Readiness Curriculum Service Orientation <i>Be All You Can Be</i>.</p>	
<p><i>Industry Standards and Competencies</i></p>	
<p>National Center for Construction Education and Research: Residential Carpentry Standards: Module: Building Materials, Fasteners, and Adhesives Learning Objective 1</p> <p>Identify various types of building materials and describe their uses.</p> <ol style="list-style-type: none"> 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: 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 Standards

Standards for Mathematical Practice (Common Core State Standards):

Practice 2: Reason abstractly and quantitatively.

Practice 4: Model with mathematics.

Practice 5: Use appropriate tools strategically.

Practice 6: Attend to precision.

Washington Mathematics Standards (Common Core State Standards):

Cluster: Reason quantitatively and use units to solve problems.

N.Q.A.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.

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

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

Unit 19: Thermal and Moisture Protection

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:

Performance assessments on the following topics may be developed at the local level. In order to earn approval at the state level, performance assessments must be submitted within this framework.

Students research and review the Washington Code of Standards and present findings (house wrap, proper ventilation, visqueen).

Leadership Alignment:

- 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 adaptability/flexibility lesson *Bouncing Back*.

Industry Standards and 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 Standards

Standards for Mathematical Practice (Common Core State Standards):

- Practice 1: Make sense of problems and persevere in solving them.
- Practice 4: Model with mathematics.
- Practice 5: Use appropriate tools strategically.
- Practice 6: Attend to precision.

Washington Mathematics Standards (Common Core State Standards):

Cluster: Reason quantitatively and use units to solve problems.

- N.Q.A.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.
- N.Q.A.2 Define appropriate quantities for the purpose of descriptive modeling.
- N.Q.A.3 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.

Unit 20: Stairs	Total Learning Hours for Unit: 10
<p>Unit Summary: Competencies include:</p> <ul style="list-style-type: none"> 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:

Performance assessments on the following topics may be developed at the local level. In order to earn approval at the state level, performance assessments must be submitted within this framework.

CRT 1-2 students will demonstrate awareness through group discussion and classroom participation. CRT 3-4 students will research and identify the appropriate stairs for a given scenario. Students will complete the model and then present the model to the CRT 1-2 students with a detailed explanation outlining the thought process, choices, rationale for choices, and conclusions.

Leadership Alignment:

- 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 responsibility lesson *You Can Count on Me*.

Industry Standards and 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 Standards

Standards for Mathematical Practice (Common Core State Standards):

Practice 1: Make sense of problems and persevere in solving them.

Practice 2: Reason abstractly and quantitatively.

Practice 4: Model with mathematics.

Practice 5: Use appropriate tools strategically.

Practice 6: Attend to precision.

Washington Mathematics Standards (Common Core State Standards):

Cluster: Reason quantitatively and use units to solve problems.

N.Q.A.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.

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

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

Cluster: Solve equations and inequalities in one variable.

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

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

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.

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.

G.CO.A.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.

G.CO.A.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).

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

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

G.CO.A.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.

Cluster: Apply trigonometry to general triangles.

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

G.SRT.D.10 Prove the Laws of Sines and Cosines and use them to solve problems.

G.SRT.D.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).

Cluster: Use coordinates to prove simple geometric theorems algebraically.

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

G.GPE.B.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).

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

G.GPE.B.7 Use coordinates to compute perimeters of polygons and areas of triangles and rectangles, e.g., using the distance formula.

Cluster: Apply geometric concepts in modeling situations.

G.MG.A.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).

G.MG.A.2 Apply concepts of density based on area and volume in modeling situations (e.g., persons per square mile, BTUs per cubic foot).

G.MG.A.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).

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:

Performance assessments on the following topics may be developed at the local level. In order to earn approval at the state level, performance assessments must be submitted within this framework.

Students hang a door to manufacturer's specifications. They will 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:

- 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 multicultural sensitivity and awareness lesson *Fostering Diversity*.

Industry Standards and 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.

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 Standards

Standards for Mathematical Practice (Common Core State Standards):

Practice 5: Use appropriate tools strategically.

Practice 6: Attend to precision.

Washington Mathematics Standards (Common Core State Standards):

Cluster: Reason quantitatively and use units to solve problems.

- N.Q.A.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.
- N.Q.A.2 Define appropriate quantities for the purpose of descriptive modeling.
- N.Q.A.3 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.

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:

Performance assessments on the following topics may be developed at the local level. In order to earn approval at the state level, performance assessments must be submitted within this framework.

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

Leadership Alignment:

- 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 self-motivated lesson *Showing Initiative*.

Industry Standards and 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.

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 Standards

Standards for Mathematical Practice (Common Core State Standards):

Practice 5: Use appropriate tools strategically.

Practice 6: Attend to precision.

Practice 8: Look for and express regularity in repeated reasoning.

Washington Mathematics Standards (Common Core State Standards):

Cluster: Reason quantitatively and use units to solve problems.

N.Q.A.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.

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

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

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:

Performance assessments on the following topics may be developed at the local level. In order to earn approval at the state level, performance assessments must be submitted within this framework.

Beginning students complete a research assignment that is integrated into the career research unit. Advanced students will complete a career research topic that the teacher assigns, presenting their findings to the CRT 1-2 students. Additionally, students will have the opportunity to attend local career days including, but not limited to, SmartMap, Career Construction Day, Pre-Apprenticeship workshops, MAGIC camp, and nontraditional career days at the local community college.

Leadership Alignment:

- 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 integrity lesson *Accepts Responsibility*.

Industry Standards and 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 Standards

Washington state standards were not identified for this unit but may be added at the 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:

Performance assessments on the following topics may be developed at the local level. In order to earn approval at the state level, performance assessments must be submitted within this framework.

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

Leadership Alignment:

- 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 professional development lesson *Taking Action on Professional Growth*.

Industry Standards and Competencies

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

Aligned Washington State Standards

Washington state standards were not identified for this unit but may be added at the 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:

Performance assessments on the following topics may be developed at the local level. In order to earn approval at the state level, performance assessments must be submitted within this framework.

Students will complete computer research on a given topic, write a summary, and present their findings to the class.

Leadership Alignment:

- 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 service orientation lesson *Everyone is a Customer*.

Industry Standards and Competencies

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

Aligned Washington State Standards

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

Unit 26: Best Practices for Construction and Landscaping	Total Learning Hours for Unit: 25
<p>Unit Summary: Competencies include:</p> <ul style="list-style-type: none"> 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. 	
<p>Performance Assessments: <i>Performance assessments on the following topics may be developed at the local level. In order to earn approval at the state level, performance assessments must be submitted within this framework.</i></p> <p>Students will complete a written assignment and vocabulary test. Students will be given situations (scenarios) for construction/landscaping to examine and determine best practices. Students will be required to use resources such as Google maps in order to identify raw land for a development. Students should be able to draft a plan that includes best practices for landscaping a residential and/or commercial property.</p>	
<p>Leadership Alignment:</p> <ul style="list-style-type: none"> • 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. <p>One possible activity is the SkillsUSA Career Readiness Curriculum professional development lesson <i>Investing in Yourself</i>.</p>	
<p><i>Industry Standards and Competencies</i></p>	
<p>Industry standards were not identified for this unit but may be added at the local level.</p>	
<p><i>Aligned Washington State Standards</i></p>	
<p>Washington state standards were not identified for this unit but may be added at the local level.</p>	

Unit 27: Water and Wastewater Best Practices	Total Learning Hours for Unit: 5
<p>Unit Summary: Competencies include:</p> <ul style="list-style-type: none"> 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:

Performance assessments on the following topics may be developed at the local level. In order to earn approval at the state level, performance assessments must be submitted within this framework.

With a variety of fixtures relevant to the industry, students will need to identify the pros and cons of products as it relates to water and wastewater practices.

Leadership Alignment:

- 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 communication lesson *Message is Clear*.

Industry Standards and Competencies

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

Aligned Washington State Standards

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

Unit 28: Materials and Waste Best Practices	Total Learning Hours for Unit: 25
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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:

Performance assessments on the following topics may be developed at the local level. In order to earn approval at the state level, performance assessments must be submitted within this framework.

Project progress and completion: Concepts will be reinforced with several projects throughout the year. Students will do projects where they “purchase” a product in bulk and then use the overages in other products throughout the year. They will understand the concepts of maximizing profit, stockpiling materials, purchasing power, and efficiency. Students will 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:

- 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 *Making Informed Decisions*.

Industry Standards and 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.

Aligned Washington State Standards

Washington state standards were not identified for this unit but may be added at the 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:

Performance assessments on the following topics may be developed at the local level. In order to earn approval at the state level, performance assessments must be submitted within this framework.

The instructor will conduct day-to-day observations of students using proper ergonomic considerations at their workstations. Students will know where to locate the MSDS information. Students will demonstrate safety knowledge daily through proper use of safety tools of the trade. Students will take a written and verbal

test on safety and must pass with 100% prior to working in lab. Students will use the SafeSchool training modules for enhancement.

Leadership Alignment:

- 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 self-motivated lesson *Growing my Career*.

Industry Standards and 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 Standards

Standards for Mathematical Practice (Common Core State Standards):

Practice 3: Construct viable arguments and critique the reasoning of others.

Unit 30: Basic Communication Skills	Total Learning Hours for Unit: 5 - integrated throughout course
<p>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.</p>	
<p>Performance Assessments: <i>Performance assessments on the following topics may be developed at the local level. In order to earn approval at the state level, performance assessments must be submitted within this framework.</i></p> <p>Advanced students are assigned the role of shop foreman. Students hold weekly safety meetings with the foreman where they will convey safety information to the students. Each foreman is assigned a group, to whom they demo and teach a machine (identifying its parts and giving basic safety rules that apply to the machine).</p> <p>Advanced students work with the community on contracted projects. They must be able to listen to the client, interpret the client's order, document any changes during the build, and explain the order in detail to the workers. They will use technology to communicate with customers, when appropriate. The students are introduced to the client and then must demonstrate beginning business practices including how to be professional, how to prepare for a presentation, and how to communicate progress.</p>	
<p>Leadership Alignment:</p> <ul style="list-style-type: none"> • 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 adaptability/flexibility lesson *Get Out of the Box*.

Industry Standards and 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 Standards

Standards for Mathematical Practice (Common Core State Standards):

Practice 3: Construct viable arguments and critique the reasoning of others.

21st Century Skills

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