

Mathematics Alignment Guide

Mason-Lake Tech Prep

Course: Construction Trades Technology

*** Note: If a standard is covered partially, then the part that is covered is underlined.

High School Content Expectations					
Standard	Level of Coverage		Activities Linked to this Standard	Assessment Method	Assessment Correlation
	Partial	Complete		Performance Based	Written
<u>12.3.1</u> Convert units of measurement within and between systems; explain how arithmetic operations on measurements affect units, and carry units through calculations correctly.	x		1. Students convert inches to feet, feet to inches, feet to yards, yards to feet, cubic feet to cubic yards. 2. Students round or truncate units in order to buy appropriate quantities. 3. Students carry units through inches to feet and then through feet to yards.	x	Students demonstrate proficiency on-site in the following ways: 1. students calculate quantity of concrete in pours, use tape measures to accurately measure for needed building material, 2. students buy appropriate amounts of material based on calculations.
					Daily in-class and on-site

<u>I2.4.1</u> Determine what degree of accuracy is reasonable for measurements in a given situation; express accuracy through use of significant digits, error tolerance, or percent of error; describe how errors in measurements are magnified by computation; recognize accumulated error in applied situations.	x		1. Students measure framing accuracy to an 1/8", finish trim accuracy to 1/16" and drywall accuracy to 1/4". 2. When marking measurements for cutting, students account for blade width and waste material that could contribute to errors in material length.	x		Students demonstrate proficiency on-site.	Daily in-class and on-site
<u>A1.2.9</u> Know common formulas and apply appropriately in contextual situations.		x	Students use ratio formulas for mixing concrete, drywall mud, mortar, and thin-set mud for tile.	x		Students demonstrate proficiency on-site.	3 – 8 hours per year
<u>G1.1.2</u> Solve multi-step problems and construct proofs involving corresponding angles, alternate interior angles, alternate exterior angles, and same-side (consecutive) interior angles.	x		Students measure and cut corresponding angles on a knee-wall or interior gable to floor wall. Students know that a plumb wall is perpendicular to both the floor and ceiling and that all angle types are congruent.	x		Students demonstrate competency with framing squares and speed squares.	Various aspects of this concept are applied everyday for 100 days

G1.2.2 Construct and justify arguments and solve multi-step problems involving angle measure, side length, perimeter, and area of all types of triangles.	x		1. Student use complimentary angle relationships for cutting siding, cedar trim and OSB. 2. Students use area and perimeter for estimating siding quantities. 3. Students use the Pythagorean Theorem to calculate missing side lengths of gable ends. 4. Students determine area of triangles for siding, sheeting, and drywall.	x	x	1. Students estimate, cut and install materials on school house. 2. Students demonstrate competency on mid-term exams.	Daily
G1.2.3 Know a proof of the Pythagorean Theorem and use the Pythagorean Theorem and its converse to solve multi-step problems.	x		1. Students use the Pythagorean theorem to calculate missing side lengths of gable ends. 2. The Pythagorean Theorem is used for squaring rooms, foundations and decks. 3. Students are able to use the Pythagorean Theorem (with inequalities) to justify if lines are perpendicular to established structures.	x		Students demonstrate proficiency on-site.	Varies aspects of this concept are applied everyday for 50 days
L2.4.2 Describe and explain round-off error, rounding, and truncating.	x		Students round or truncate units in order to buy appropriate quantities.	x		Students demonstrate proficiency on-site.	Various aspects of this concept are applied everyday for 18 – 20 days
A2.1.3 Represent functions in symbols, graphs, tables, diagrams, or words, and translate among representations.	x		Students use tables in code books to decipher appropriate material use and translate this information into verbal language on the site.	x		Students demonstrate proficiency on-site.	Various aspects of this concept are applied everyday for 10 days

G1.1.3 Perform and justify constructions, including midpoint of a line segment and bisector of an angle, using straightedge and compass.	x		1. Students find the center of openings during wall construction and center for interior trim using a tape measure. 2. Students use a speed square or framing square to create 45° or 90° angle wall plates and/or interior trim by bisecting angles.	x		Students demonstrate proficiency on-site while building walls and trimming windows.	Various aspects of this concept are applied everyday for 20 – 30 days
G1.1.4 Given a line and a point, construct a line through the point that is parallel to the original line using straightedge and compass; given a line and a point, construct a line through the point that is perpendicular to the original line; justify the steps of the constructions.	x		1. Students create parallel knee walls based on the original stud and the desired distance to the next stud. 2. Students find perpendicular lines to established structures when squaring the house, squaring rooms, or squaring decks.	x		Students demonstrate competency with framing squares, speed squares, plumb lines, levels, masons lines, and tape measures.	Various aspects of this concept are applied everyday for 45 days
G2.2.1 Identify or sketch a possible three-dimensional figure, given two-dimensional views. Create a two-dimensional representation of a three-dimensional figure.	x		1. Students create 3-dimensional homes based on 2-dimensional blueprints. 2. Students draw a 2-dimensional view of a wall section.	x	x	1. Students demonstrate proficiency on the site. 2. Students demonstrate proficiency by drawing 2-dimensional views on a final exam.	Students read blueprints for approximately 50 days, students spend approximately 5 hours learning how to draw 2-dimensional views

ACT Standards

Perform one-operation computation with whole numbers and decimals (Range 13 – 15)		x	Students use a tape measure to add, subtract, multiple, and divide measurements.	x		Students demonstrate proficiency on-site and in class.	Daily
Solve problems in one or two steps using whole numbers (Range 13 – 15)		x	Students use a tape measure to add, subtract, multiple, and divide measurements.	x		Students demonstrate proficiency on-site and in class.	Daily
Perform common conversions (e.g., inches to feet or hours to minutes) (Range 13 – 15)		x	Students convert inches to feet, feet to inches, feet to yards, yards to feet, cubic feet to cubic yards.	x		Students demonstrate proficiency on-site and in class.	Daily
Recognize equivalent fractions and fractions in lowest terms (Range 13 – 15)		x	Students measure in $\frac{1}{8}$ " intervals and need to reduce measurements to lowest terms. For example, they need to know that $\frac{4}{8}$ " is $\frac{1}{2}$ ".	x		Students demonstrate proficiency on-site and in class.	Daily
Estimate or calculate the length of a line segment based on other lengths given on a geometric figure (Range 13 – 15)		x	Students determine the lengths of certain dimensions of rooms based on the entire length of the house and the length of adjacent rooms.	x		Students demonstrate proficiency on-site and in class.	Approximately 25 days

Solve routine one-step arithmetic problems (using whole numbers, fractions, and decimals) such as single-step percent (Range 16 – 19)		x	Students do operations with fractions, decimals (.25, .5, .75) and whole numbers when determining lengths.	x		Students demonstrate proficiency on-site and in class.	Daily
Solve some routine two-step arithmetic problems (Range 16 – 19)		x	Students do conversions from inches to feet and then from feet to yards when estimating concrete.	x	x	Students demonstrate proficiency on-site, in class, and on the mid-term.	Approximately 15 – 20 days
Read tables and graphs (Range 16 – 19)	x		Students read tables in code books.	x		Tables in code book are followed.	Approximately 5 – 10 days
Identify a digit's place value (Range 16 – 19)	x (tenths)		Students need to recognize digits in the tenths place for rounding and measuring.	x		Students demonstrate proficiency on-site and in class.	Approximately 2 – 4 days
Exhibit some knowledge of the angles associated with parallel lines (Range 16 – 19)		x	Students measure and cut corresponding angles on a knee-wall or interior to bottom-cord wall. Students have to know a plumb wall is perpendicular to both the floor and ceiling and that all angle types are congruent.	x		Students demonstrate competency with framing squares and speed squares.	Various aspects of this concept are applied everyday for 100 days

Compute the perimeter of polygons when all side lengths are given (Range 16 – 19)		x	Students determine perimeters when calculating concrete forms for the foundation, sidewalks, approaches, driveways and when calculating the amount of interior and exterior trim.	x		x	Students demonstrate proficiency on-site and in class. Students demonstrate proficiency on the midterm.	Approximately 60 days
Compute the area of rectangles when whole number dimensions are given (Range 16 – 19)		x	Students determine area of rectangles for concrete, sheeting, drywall, and siding.	x		x	Students calculate material lists. Students demonstrate proficiency on the midterm. Students demonstrate proficiency on a daily basis in class when estimating material needs.	Various aspects of this concept are applied everyday for 25 days

Comprehend the concept of length on the number line (Range 20 – 23)		x	1. To measure accurately, students start their measurements at the 1" mark on the tape measure. Students use the tape measure to determine lengths and subtract off the initial inch. 2. Students lay out wall plates with 16" on center stud lines using a tape measure. 3. Students lay out truss location with 24" on center truss lines using a tape measure.	x		Students demonstrate proficiency on-site and in class.	Approximately 25 – 30 days
Exhibit knowledge of slope (Range 20 – 23)		x	Students understand the idea of pitch and slope of a roof.	x		Students demonstrate proficiency on-site and in the classroom.	Various aspects of this concept are applied everyday for 25 days
<u>Exhibit knowledge of basic angle properties and special sums of angle measures (e.g., 90°, 180°, and 360°)</u> (Range 20 – 23)	x		1. Students use angles formed by parallel lines when making knee walls. 2. Students use angle sums of 90° when cutting interior and exterior trim.	x		Students demonstrate proficiency on-site.	Various aspects of this concept are applied everyday for 25 days

Compute the area and perimeter of triangles and rectangles in simple problems (Range 20 – 23)		x	Students use perimeter and area calculations for material estimation for concrete, drywall, siding, flooring, sheeting.	x	x	Students demonstrate proficiency on-site. Students demonstrate proficiency on the mid-term exam.	Various aspects of this concept are applied everyday for 40 days
Use <u>geometric formulas</u> when all necessary information is given (Range 20 – 23)	x		Students use the Pythagorean Theorem to calculate missing side lengths of gable ends, for squaring house foundations, rooms, decks. and to justify if lines are perpendicular to established structures.	x		Students demonstrate proficiency on-site.	Various aspects of this concept are applied everyday for 50 days
Order fractions (Range 24 – 27)		x	Students know the relative size of fractions compared to other fractions. (e.g. $1/8''$ is smaller than $1/4''$ and $1/4''$ is smaller than $1/2''$ and $1/2''$ is smaller than $3/4''$.)	x		Students demonstrate proficiency on-site and in the classroom.	Approximately 90 days
Find the midpoint of a line segment (Range 24 – 27)		x	Students find the center of openings during wall construction and center for interior trimming using a tape measure.	x		Students demonstrate proficiency on-site.	Various aspects of this concept are applied everyday for 25 days
<u>Recognize Pythagorean triples</u> (Range 24 – 27)	x		Students use the 3-4-5 right triangle to square structures and to find perpendicular lines.	x		Students demonstrate proficiency on-site and in the classroom.	Various aspects of this concept are applied for 30 – 35 days

Compute the area of triangles and rectangles when one or more additional simple steps are required (Range 24 -27)		x	Students calculate areas of irregular shapes by breaking down the shape into sections and totaling the sections.	x		Students demonstrate proficiency on-site.	Various aspects of this concept are applied everyday for 15 – 20 days
<u>Interpret and use information from figures, tables, and graphs</u> (Range 28 – 32)	x		Students use information from blueprints and code tables.	x		Students demonstrate proficiency on-site.	Approximately 15 – 20 days
<u>Apply properties of 30°-60°-90°, 45°-45°-90°, similar, and congruent triangles</u> (Range 28 – 32)	x		1. Students use congruent triangles to lay out stair stringers. 2. Students use similar triangles when using a plumb line.	x		Students demonstrate proficiency on-site.	Approximately 15 – 20 days
Use the Pythagorean Theorem (Range 28 – 32)		x	1. Students use the Pythagorean Theorem to calculate missing side lengths of gable ends. 2. Students use the Pythagorean Theorem for squaring foundations, rooms and decks. 3. Students use the Pythagorean Theorem (with inequalities) to justify if lines are perpendicular to established structures.	x		Students demonstrate proficiency on-site.	Various aspects of this concept are applied everyday for 50 days

<u>Analyze and draw conclusions based on information from figures, tables, and graphs</u> (Range 33 – 36)	x		Students use information from blueprints and code tables.	x		Students demonstrate proficiency on-site.	Approximately 15 – 20 days
<u>Solve problems integrating multiple algebraic and/or geometric concepts</u> (Range 33 – 36)	x		Students use knowledge of perpendicular lines and squaring to create rectangles and then determine the area of that rectangle. Students use knowledge of parallel lines and ratios to create stair stringers.	x		Students demonstrate proficiency on-site.	Approximately 10 – 15 days
<u>Draw conclusions based on a set of conditions</u> (Range 33 – 36)		x	Students see patterns in distances between wall plates and interior gables and determine if stud spacing is accurate.	x		Students demonstrate proficiency on-site.	Approximately 5 – 8 days
<u>Solve multi-step geometry problems that involve integrating concepts, planning, visualization, and/or making connections with other content areas</u> (Range 33 – 36)		x	1. Students use knowledge of perpendicular lines and squaring to create rectangles and then determine the area of that rectangle. 2. Students use knowledge of parallel lines and ratios to create stair stringers. 3. Students see patterns in distances between wall plates and interior gables and determine if stud spacing is accurate.	x		Students demonstrate proficiency on-site and in the classroom.	Approximately 5 – 8 days

Compute the area of composite geometric figures when planning or visualization is required (Range 33 – 36)	x (squares, circles, and rectangles)		To cut circular areas from drywall and soffit, students create a square. Using properties of diagonals, they find the center of the inscribed circle. Then, students use the radius of the circle to cut a perfect circle from the drywall.	x		Students demonstrate proficiency on-site.	Approximately 20 days
---	---	--	---	---	--	---	-----------------------

WorkKeys Standards

Solve problems that require a single type of mathematics operation (addition, subtraction, multiplication, and division) using whole numbers (Level 3)		x	Daily use of tape measure to add, subtract, multiple, and divide measurements.	x	Students demonstrate proficiency on-site and in class.	Daily
<u>Change numbers from one form to another using whole numbers, fractions, decimals, or percentages</u> (Level 3)	x		Students convert forms of numbers when measuring and estimating materials used in the building process.	x	Students demonstrate proficiency on-site.	Daily
Solve problems that require one or two operations (Level 4)		x	Students use a tape measure to add, subtract, multiple, and divide measurements.	x	Students demonstrate proficiency on-site and in class.	Daily
<u>Add commonly known fractions, decimals, or percentages</u> (e.g., 1/2, .75, 25%) (Level 4)	x		Students add fractions and decimals (.25, .5, .75) when determining lengths.	x	Students demonstrate proficiency on-site and in class.	Daily

Add up to three fractions that share a common denominator (Level 4)		x	Students add fractions of an inch.	x		Students demonstrate proficiency on-site.	Daily
Multiply a mixed number by a whole number or decimal (Level 4)		x	Students multiply when determining material needs and when calculating volumes of concrete.	x	x	Students demonstrate proficiency on-site and on mid-term exam.	Various aspects of this concept are applied everyday for 30 days
<u>Put the information in the right order before performing calculations</u> (Level 4)	x		To calculate to volume for concrete, students need to get all units consistent first.	x	x	Students demonstrate proficiency on-site and on mid-term exam.	Approximately 8 – 10 days
Decide what information, calculations, or unit conversions to use to solve the problem (Level 5)		x	Students find the correct dimensions and do the proper conversions for calculating cement amounts and other material needs.	x	x	Students demonstrate proficiency on-site and in class.	Various aspects of this concept are applied everyday for 15 days
Look up a formula and <u>perform single-step conversions within</u> or between systems of <u>measurement</u> (Level 5)	x		Students convert inches to feet, feet to inches, feet to yards, yards to feet, cubic feet to cubic yards.	x	x	Students demonstrate proficiency on-site and in classroom.	Daily in class and on-site
Calculate using mixed units (e.g., 3.5 hours and 4 hours 30 minutes) (Level 5)		x	Students perform calculations using mixed numbers when adding, subtracting, multiplying or dividing material lengths.	x	x	Students demonstrate proficiency on-site.	Daily

Calculate perimeters and areas of basic shapes (rectangles and circles) (Level 5)		x	Students use perimeter and area calculations for material estimation for concrete, drywall, siding, flooring and sheeting.	x	x	Students demonstrate proficiency on-site. Students demonstrate proficiency on the mid-term exam.	Various aspects of this concept are applied everyday for 40 days
Use <u>fractions</u> , negative numbers, <u>ratios</u> , percentages, or <u>mixed numbers</u> (Level 6)	x		1. Students use fractions in measuring and calculating volumes. 2. Students use ratios to determine stair stringers and mortar mixes. 3. Students perform calculations using mixed numbers when adding, subtracting, multiplying or dividing material lengths.	x		Students demonstrate proficiency on-site.	Various aspects of this concept are applied everyday for 60 days
Find areas of basic shapes when it may be necessary to rearrange the formula, convert units of measurement in the calculations, or use the result in further calculations (Level 6)		x	Students find areas of geometric shapes for concrete, roofing material, OSB, siding, and flooring. Many of these calculations may require conversion between inches, feet, and yards. For example, when roofing, students use the result their area calculations to determine how many bundles of shingles to purchase.	x	x	Students demonstrate proficiency on-site, in class, and on the final exam.	Various aspects of this concept are applied everyday for 60 days

Find the volume of rectangular solids (Level 6)		x	Students calculate the volume needed for concrete.	x		Students demonstrate proficiency on-site and in class.	Various aspects of this concept are applied everyday for 10 days
---	--	---	--	---	--	--	--

Grading on performance-based assessments is based on the quality and quantity of the work students do in class. Often students are required to do the task until they are able to complete it accurately (mastery learning).

*** *Note: If a standard is covered partially, then the part that is covered is underlined.*