

# (CTE) MATHEMATICS IN CONSTRUCTION TECHNOLOGY

## Math IV

### Unit Pacing Guide

#### Rational and Purpose:

Professional math IV is provided to enhance mathematics in high school and provide students with the math skills necessary for the current job market and/or prepare students for college entry. Curriculum that is contained within Career Technology Education (CTE) provides enhanced mathematics instruction that makes mathematics more explicit in a meaningful context and helps reinforce students' mathematics understanding both in and out of context.

#### Guidelines:

All objectives must be mastered at or above a 70% efficiency level in order to receive 1 Math credit. The content/objectives to be completed in four (4) semesters are listed below in each trade specific program. Since each program contains differing content at various stages, an independent content/objective list will be constructed for each curriculum in every course. Once a designated semester worth of content/objectives (which are listed in the following table) are accomplished, .25 credits will be earned per semester for a total of 1 math credit at the end of 2 years. Failure to complete the required semester content/objectives may result in the student being removed from the Professional Math IV program.

Competencies	Time Span (quarter/wks)	Course Objectives	Show-Me Standards and CLE Code	Vocabulary	Resources	Learning Activities & Instructional Strategies	Assessment
<b>Unit Title:</b> (Pre-knowledge) Review of all mathematic objectives for mastery to be a success in the welding program of study							
<b>Core Concept:</b> Addition and subtraction of whole numbers, multiplication and division of whole numbers, mathematical operation of addition and subtraction of decimal fractions, mathematical operation of multiplication and division of decimal fractions, addition and subtraction of fractions, multiplication and division of fractions, changing common fractions to decimal fractions, changing decimal fractions to common fractions.							
Addition and subtraction of whole numbers	1 <sup>st</sup> quarter 1 week	After completing this unit the Student will be able to calculate whole numbers through the mathematical processes of addition, subtraction,	MA1,  Goals: G, 1.10  CLEs N-1B, N-1C. M-2D	Whole numbers Real numbers Natural numbers Numbers Addend, Sum Minuend Subtrahend Difference	Worksheets of addition and subtraction problems	Paper and pencil problems and software demonstrational activities	Test of at least 10 problems in each operation to demonstrate mastery

Competencies	Time Span (quarter/wks)	Course Objectives	Show-Me Standards and CLE Code	Vocabulary	Resources	Learning Activities & Instructional Strategies	Assessment
Multiplication and division of whole numbers	1 <sup>st</sup> quarter 1 week	After completing this unit the Student will be able to calculate whole numbers through the mathematical processes of multiplication and division.	MA1,  Goals: G, 1.10  CLEs N-1B, N-1C, M-2D	Whole numbers Real numbers Natural numbers Rational numbers, Multiplicand Multiplier Product factor, Quotient divisor, Dividend	Worksheets of multiplication and division problems	Paper and pencil problems and software demonstrational activities	Test of at least 10 problems in each operation to demonstrate mastery
Reducing proper and improper fractions	1 <sup>st</sup> quarter 1 week	After completing this unit the student will be able to add & subtract proper and improper fractions	MA1  Goals: G, 3.3, 3.4  CLEs N-1B, N- 1C, N-2D, N-3E	Prime numbers Greatest common factor, Least common multiple, Rational expression, Numerator Denominator Reciprocal Equivalent	Hardcopy worksheets, video, internet and other electronic sources	Paper and pencil problems and software demonstrational activities. Peer grouping for additional support and interaction.	Test of at least 10 problems in each operation to demonstrate mastery
Add fractions With like denominators and reducing to lowest terms	1 <sup>st</sup> quarter 1 week	After completing this unit the student will be able to add rational numbers with like denominators and reduce them to lowest terms	MA 1, MA 5  Goals: G 1.6, 1.10, 3.4  CLEs N-1B, N-1C,N-2D,N- 3D,	Prime numbers Greatest common factor, Least common multiple, Rational expression, Numerator Denominator Reciprocal Equivalent	Hardcopy worksheets, video, internet and other electronic sources	Paper and pencil problems and software demonstrational activities. Peer grouping for additional support and interaction	Test of at least 10 problems in each operation to demonstrate mastery
Add fractions with unlike denominators	1 <sup>st</sup> quarter 1 week	After completing this unit the student will be able to add rational numbers with unlike denominators	MA 1, MA 5  Goals: G 3.3, 1.6, 3.4	Prime numbers Greatest common factor, Least common	Hardcopy worksheets, video, internet and other electronic sources	Paper and pencil problems and software demonstrational	Test of at least 10 problems in each operation to demonstrate

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			CLEs N-1C, N-2D, N-3D, N-3E	multiple, Rational expression, Numerator Denominator Reciprocal Equivalent		activities. Peer grouping for additional support and interaction	mastery
Add fractions With unlike denominators When neither is lowest common denominator	1 <sup>st</sup> quarter 1 week	After completing this unit the student will be able to add rational numbers with unlike denominators when neither is lowest.	MA 1, MA 5  Goals: G 3.3, 1.6, 1.10, 3.4  CLEs N-1B, N-1C, N-2D, N-3D, N-3E	Prime numbers, Greatest common factor, Least common multiple, Rational expression, Numerator Denominator Reciprocal Equivalent	Hardcopy worksheets, video, internet and other electronic sources	Paper and pencil problems and software demonstrational activities. Peer grouping for additional support and interaction	Test of at least 10 problems in each operation to demonstrate mastery
Add mixed numbers with like denominators	1 <sup>st</sup> quarter 1 week	After completing this unit the student will be able to add mixed numbers with like denominators.	MA 1, MA 5  Goals: G 1.6, 1.10, 3.4  CLEs N-1B, N- 1C,N- 2D, N- 3D,	Prime numbers, Greatest common factor, Least common multiple, Rational expression, Numerator Denominator Reciprocal Equivalent	Hardcopy worksheets, video, internet and other electronic sources	Paper and pencil problems and software demonstrational activities. Peer grouping for additional support and interaction	Test of at least 10 problems in each operation to demonstrate mastery
Add mixed numbers with unlike denominators	1 <sup>st</sup> quarter 1 week	After completing this unit the student will be able to add mixed numbers with rational numbers when neither rational number has a common denominator.	MA 1, MA 5  Goals: G 1.6, 1.10, 3.4  CLEs N-1B, N-1C,N- 2D, N- 3D	Prime numbers, Greatest common factor, Least common multiple, Rational expression, Numerator Denominator	Hardcopy worksheets, video, internet and other electronic sources	Paper and pencil problems and software demonstrational activities. Peer grouping for additional support and interaction	Test of at least 10 problems in each operation to demonstrate mastery

Competencies	Time Span (quarter/wks)	Course Objectives	Show-Me Standards and CLE Code	Vocabulary	Resources	Learning Activities & Instructional Strategies	Assessment
				Reciprocal Equivalent			
Subtracting fractions with like denominators	2 <sup>nd</sup> quarter 1 week	After completing this unit the student will be able to subtract rational numbers with like denominators.	MA 1, MA 5  Goals: G 1.6, 1.10, 3.4  CLEs N-1B, N-1C,N- 2D, N- 3D,	Prime numbers, Greatest common factor, Least common multiple, Rational expression, Numerator Denominator Reciprocal Equivalent	Hardcopy worksheets, video, internet and other electronic sources	Paper and pencil problems and software demonstrational activities. Peer grouping for additional support and interaction	Test of at least 10 problems in each operation to demonstrate mastery
Subtracting fractions with unlike denominators	2 <sup>nd</sup> quarter 1 week	After completing this unit the student will be able to subtract rational numbers with unlike denominators.	MA 1, MA 5  Goals: G 1.6, 1.10, 3.4  CLEs N-1B, N- 1C,N- 2D, N- 3D,	Prime numbers, Greatest common factor, Least common multiple, Rational expression, Numerator Denominator Reciprocal Equivalent	Hardcopy worksheets, video, internet and other electronic sources	Paper and pencil problems and software demonstrational activities. Peer grouping for additional support and interaction	Test of at least 10 problems in each operation to demonstrate mastery
Subtracting mixed numbers and reducing answers to lowest terms	2 <sup>nd</sup> quarter 1 week	After completing this unit the student will be able to subtract mixed numbers and reduce their answers to lowest terms.	MA 1, MA 5  Goals: G 1.6, 1.10, 3.4  CLEs N-1B, N- 1C,N- 2D, N- 3D,	Prime numbers, Greatest common factor, Least common multiple, Rational expression, Numerator Denominator Reciprocal Equivalent	Hardcopy worksheets, video, internet and other electronic sources	Paper and pencil problems and software demonstrational activities. Peer grouping for additional support and interaction	Test of at least 10 problems in each operation to demonstrate mastery
Subtracting fractions when borrowing is	2 <sup>nd</sup> quarter 1 week	After completing this unit the student will be able to subtract rational numbers when borrowing	MA 1, MA 5  Goals:	Prime numbers, Greatest common factor,	Hardcopy worksheets, video, internet and other	Paper and pencil problems and software	Test of at least 10 problems in each operation to

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necessary		is necessary.	G 1.6, 1.10, 3.4  CLEs N-1B, N-1C, N-2D, N-3D,	Least common multiple, Rational expression, Numerator Denominator Reciprocal Equivalent	electronic sources	demonstrational activities. Peer grouping for additional support and interaction	demonstrate mastery
Multiplying fractions	2 <sup>nd</sup> quarter 1 week	After completing this unit the student will be able to multiply rational numbers.	MA 1, MA 5  Goals: G 1.6, 1.10, 3.4  CLEs N-1B, N-1C, N-2D, N-3D,	Prime numbers, Greatest common factor, Least common multiple, Rational expression, Numerator Denominator Reciprocal Equivalent	Hardcopy worksheets, video, internet and other electronic sources	Paper and pencil problems and software demonstrational activities. Peer grouping for additional support and interaction	Test of at least 10 problems in each operation to demonstrate mastery
Multiplying fractions and whole numbers	2 <sup>nd</sup> quarter 1 week	After completing this unit the student will be able to multiply rational numbers and whole numbers.	MA 1, MA 5  Goals: G 1.6, 1.10, 3.4  CLEs N-1B, N-1C, N-2D, N-3D,	Prime numbers, Greatest common factor, Least common multiple, Rational expression, Numerator Denominator Reciprocal Equivalent	Hardcopy worksheets, video, internet and other electronic sources	Paper and pencil problems and software demonstrational activities. Peer grouping for additional support and interaction	Test of at least 10 problems in each operation to demonstrate mastery
Dividing fractions	2 <sup>nd</sup> quarter 1 week	After completing this unit the student will be able to divide rational numbers.	MA 1, MA 5  Goals: G 1.6, 1.10, 3.4  CLEs N-1B, N-	Prime numbers, Greatest common factor, Least common multiple, Rational expression, Numerator	Hardcopy worksheets, video, internet and other electronic sources	Paper and pencil problems and software demonstrational activities. Peer grouping for additional support and interaction	Test of at least 10 problems in each operation to demonstrate mastery

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			1C,N- 2D, N-3D,	Denominator Reciprocal Equivalent			
Changing common fractions to decimal fractions and decimal fractions to common fractions	2 <sup>nd</sup> quarter 1 weeks	After completing this unit the student will be able to Change common fractions to decimal fractions and decimal fractions to common fractions.	MA 1, MA 5  Goals: G 3.3, 1.6, 1.10, 3.4  CLEs N-1B, N-1C, M-2D, M-3D, M-3E	Prime numbers, Greatest common factor, Least common multiple, Rational expression, Numerator Reciprocal Equivalent	Hardcopy worksheets, video, internet and other electronic sources	Paper and pencil problems and software demonstrational activities. Peer grouping for additional support and interaction	Test of at least 10 problems in each operation to demonstrate mastery
Addition, subtraction, multiplication and divisions of decimals to recognize and collect data from Tables and Charts and use this data to perform more advanced Calculations.	2 <sup>nd</sup> quarter 1 week	After completing this unit the student will be able to add, subtract, multiply and divide decimal fractions.	MA 1, MA 5  Goals: G 3.3, 1.6, 1.10, 3.4  CLEs N-1B, N-1C, M-2D, M-3D, M-3E	Prime numbers, Greatest common factor, Least common multiple, Rational expression, Numerator Reciprocal Equivalent	Hardcopy worksheets, video, internet and other electronic sources	Paper and pencil problems and software demonstrational activities. Peer grouping for additional support and interaction	Test of at least 10 problems in each operation to demonstrate mastery

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<p><b>Unit Title:</b> (Current Knowledge) Module # I How to measure, calculate perimeters of various shapes, study the parts of a triangle, learn Pythagorean's theorem, and formulate various construction geometries.</p> <p><b>Core Concepts:</b> Students will learn: How to accurately interpret different measurements using different scales and units of measure; Calculate various perimeters: Differentiate between the different parts of a triangle; How to develop geometric constructions.</p>							
<p><b>Comp. # 1</b></p> <p>To learn how to measure with various measuring instrumentations and devices</p>	<p>3<sup>rd</sup> quarter 2 weeks</p>	<p>After completing this unit the student will be able to interpret, evaluate, and understand how different increments are used on several measuring devices.</p>	<p>MA 1, MA 2, MA 5 G 1.10, 2.7, 4.8 CLEs M-2D, M-2E</p>	<p>Accuracy Resolution Precision Uncertainty Systematic error Random error Traceability Non-Linearity Error</p>	<p>Dividers/compass Protractors Rulers Meter sticks Yard sticks Angle finder Architect Rule Elmo Projector</p>	<p>Classroom demonstration of how to use various measuring devices</p> <p>Lecture on how to interpret various scales and units of measure using an Elmo Zoom overhead projector</p> <p>The students will be given guided practice on how to complete a table of all ratios, scales, actual size, and smallest calibrations found on an architect rule.</p> <p>The students will complete an extensive assignment on scale interpretation and actual measuring practices</p>	<p>There will be a written test on measuring and accuracy.</p>

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<p><b><u>Comp.# 2</u></b></p> <p>To calculate the perimeter of a square, rectangle, circle, and other polygons</p>	3 <sup>rd</sup> quarter 1 week	After completing this unit the student will be able to calculate the perimeter around specified polygons	<p>MA 2</p> <p>G 3.1, 3.3, 3.5</p> <p>CLEs G- 1A, G-4A, G-4B, M 1B, M-2B</p>	<p>Square</p> <p>Rectangle</p> <p>Triangle</p> <p>Perimeter</p> <p>Hypotenuse</p> <p>Isosceles triangle</p> <p>Polygon</p> <p>Area</p> <p>Pythagorean's Theorem</p> <p>Theory of similar triangles</p> <p>Equilateral triangle</p>	Worksheet encountering mathematical relationships of perimeter on squares, triangles, and rectangles.	<p>Short lecture using cardboard models</p> <p>Students will measure the perimeter of several wooden objects</p> <p>Worksheets handed out for guided practice.</p>	<p>The students will be asked to measure the perimeter of several objects displayed in the shop.</p> <p>They will then be given a written test</p>
<p><b><u>Comp. # 3</u></b></p> <p>To study the parts of a triangle and how Pythagorean's theorem is used to find the hypotenuse of a right triangle</p>	3 <sup>rd</sup> quarter 2 weeks	After completing this unit the student will understand angles and angle measurements, the difference between 30,60, and 90 degree angles, how to calculate the sides of a triangle using the 3-4-5 method, use a framing square to evaluate triangles, and use Pythagorean's theorem to calculate unknown sides of a right triangle.	<p>MA-1, MA-2, MA-5. 1.10</p> <p>Goals: G-3.4, G-2.3, G-2.7.</p> <p>CLEs N-1B, N-3D, G-1A, G-4B, M-1B, M-2D</p>	<p>Trigonometry</p> <p>Angles</p> <p>Degrees</p> <p>Minutes</p> <p>Seconds</p> <p>Functions</p> <p>Acute Angles</p> <p>Trigonometric-ratios</p> <p>Degrees</p> <p>Reference-Triangles</p>	<p>Scientific Calculators</p> <p>Detailed Lesson Plan</p> <p>Work sheets</p>	<p>Short lecture</p> <p>Hand out worksheets for guided practice</p> <p>Assign math problems to check for understanding</p>	<p>Written test with job related examples of math word problems and scenarios</p> <p>A test demonstrating various applications of applying two framing squares and/or Pythagorean's theorem to find the unknown sides of several triangular situations.</p>

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<p><b>Comp. # 4</b></p> <p>To study construction geometry in reference to degree measurements of angles, triangles, circles, and rectangles</p>	3 <sup>rd</sup> quarter 2 weeks	After completing this unit the student will be able to understand and use the concepts of angles, rectangles, circles, and triangles, as they are referenced to construction jobs and construction job-sites.	<p>MA-1, MA-2, MA-5.</p> <p>Goals: G-3.4, G-2.3, G-2.7.</p> <p>CLEs N-1B, N-3D, G-1A, G-4B, M-2D</p>	<p>Diagonal Diameter Digit Bisect Acute angle Obtuse angle Cubic Perimeter Pi Radius Right angle Scalene triangle Circumference</p>	<p>Scientific Calculators</p> <p>Detailed Lesson Plan from construction technology curriculum</p> <p>Work sheets</p> <p>Protractor</p> <p>Compass</p>	<p>Short lecture</p> <p>Hand out worksheets for guided practice</p> <p>Assign math problems to check for understanding</p>	<p>Paper and pencil test to demonstrate mastery of construction geometry concepts</p>

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<p><b>Unit Title:</b> (Current Knowledge) Module # II Area of polygons, measurements in board feet, surface area of irregular shapes, and volume of irregular shapes and complex containers.</p> <p><b>Core Concepts:</b> Students will investigate: The area of squares, circles, parallelograms and trapezoids; The measurements of board feet; The surface area of irregular shapes; and apply the concept of volume to cubes, rectangular structures, cylinders, and complex containers.</p>							
<p><b>Comp. # 1</b></p> <p>To study the area of squares, circles, parallelograms, trapezoids,</p>	4 <sup>th</sup> quarter 2 weeks	After completing this unit the student will be able to demonstrate their ability to figure the correct surface area of triangles, trapezoids, circular figures, squares and rectangles to compose multi area objects.	<p>MA 1, MA 5</p> <p>G 1.10, 3.4, 3.6,</p> <p>CLEs N-1B, G-1B, G-4B G-3C, M-2B</p>	<p>Rectangle</p> <p>Square</p> <p>Polygon</p> <p>Face</p> <p>Surface area</p> <p>Standard units of measure</p> <p>Perimeter</p> <p>Area</p> <p>Square units</p> <p>Parallelogram</p> <p>Trapezoid</p> <p>Isosceles</p> <p>Equilateral</p> <p>Right Triangle</p> <p>Perpendicular</p>	<p>Pencil</p> <p>Paper</p> <p>Scientific Calculator</p> <p>Short lecture</p> <p>Hand out worksheets for guided practice</p> <p>Assign math problems to check for understanding</p>	<p>Short lecture</p> <p>The students will measure items in the room that correspond to the appropriate polygonal shape desired for the lesson.</p> <p>Worksheet of problems reflecting construction practices</p>	<p>Paper and pencil quiz calculating Surface area on problems patterned after real construction project scenarios</p>
<p><b>Comp. # 2</b></p> <p>To investigate the measurement of board feet</p>	4 <sup>th</sup> quarter 2 weeks	Be able to demonstrate a working knowledge of calculating board feet and its application in the trade of construction technology.	<p>MA-1, MA-2</p> <p>Goals:</p> <p>G-1.10, G-3. 4. G-4.1</p> <p>CLEs N-1B, N-3D, N-3E, G-4B</p>	<p>Board foot</p> <p>Thickness</p> <p>Width</p> <p>Length</p> <p>Foot</p> <p>Inch</p> <p>Spare foot</p>	<p>Pencil</p> <p>Paper</p> <p>Scientific Calculator</p> <p>Several boards to measure and figure board feet available.</p>	<p>Show a power point presentation explaining how to figure board feet.</p> <p>Have students complete the problems on the last slide of the pp presentation.</p> <p>Go through the 7-element Math-in-CTE lesson plan Complete Cost calculations</p>	<p>The students will be given a cost calculations worksheet to complete.</p>

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<p><b>Comp. # 3</b></p> <p>To study the surface area of irregular shapes</p>	4 <sup>th</sup> quarter 2 weeks	After completing this unit the student will be able divide a figure into smaller sections, find the area of each of the smaller sections, Add the areas of the sections to obtain the total area or extend the lines to form a simple geometric figure, find the area of the larger figure, find the areas of the extra sections.	<p>MA 1, MA 2, MA 5</p> <p>Goals: G- 1.10, 2.3, 3.4, 4.1, 4.6.</p> <p>CLEs N-1B, N-3D, G-1A, G-4A, G-4B, M-2B, M-2D</p>	<p>Surface measurement Area</p> <p>Abutment</p> <p>Lower grade line</p> <p>Upper grade line</p> <p>Retaining wall</p> <p>Foot</p> <p>Square foot</p>	<p>Scientific-Calculator</p> <p>Illustrations on Worksheets</p> <p>Architect ruler</p> <p>Paper/Pencil</p>	<p>Short in class lecture with illustrations drawn on the board</p> <p>In class math problems with worksheet illustrations</p>	The students will be given a written test to check for mastery of all concepts reviewed in this lesson plan
<p><b>Comp. # 4</b></p> <p>To study the volume of cubes, rectangular structures, cylinders, and complex containers</p>	4 <sup>th</sup> quarter 3 weeks	After completing this unit the student will be able to successfully compute the volume of rectangular containers, convert cubic measurements from one unit to another, and apply these calculations to real world applications found on the job site.	<p>MA 1, MA 5</p> <p>G 1.10, 3.4, 3.6</p> <p>CLEs N-1B, G-1B, G-4B G-3C, M-2C</p>	<p>Hexahedron – 6-sided cube</p> <p>Volume</p> <p>Cubes</p> <p>Rectangular solids</p> <p>Cubic inches, feet, yard, millimeters, and centimeters.</p> <p>Cross-section</p> <p>Similar figures (figures of the same shape but not necessarily the same size.)</p>	<p>The students will be asked to bring in one 3-dimensional object of their choice.</p> <p>Worksheets containing volume problems</p>	<p>The students will complete several volume problems in class.</p> <p>The students will be asked to perform measurements calculation on their object they brought to class.</p>	<p>The students will complete several volume problems in class.</p> <p>The students will be asked to perform measurements calculation on their object they brought to class.</p>

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<p><b>Unit Title:</b> (Current Knowledge) Module # III Weight in English and Metric system measurements, percentages in reference to income, taxes, profit, loss, material, labor and overhead, mathematics of surveying, and the partition of land.</p> <p><b>Core Concepts:</b> Student will be able to: Differentiate weight in terms of the English or metric system; Calculate percentages in reference to income, taxes, profit, loss, material, labor and overhead; Know how to divide land into townships, sections, and acres; Understand how land is divided into townships, sections, and acres.</p>							
<p><b>Comp. # 1</b></p> <p>To study weight in English and Metric system measurements</p>	5 <sup>th</sup> quarter 2 weeks	After completing this unit the student will be able to solve problems involving weight measured in the English and metric systems and determine if loads are safe and within safe bearing capacities.	MA 1, MA 2, MA 5  G 1.10, 4.1  CLEs N-3D, N-3E, G 4B	Mass Weight Gravity Measure Cubic measure Quantity Gravitational pull Grams Push, lifted, pulled Pounds Kilograms	Charts that show Equivalent units of measure in reference to weights concerning materials being used as example problems  Scientific calculator  Paper and pencil	Pass out lesson plan with associated problems to work  Students will measure several items with an English and metric scale and prove they are correct by utilizing a conversion factor.	Written test to demonstrate students knowledge of measuring weight
<p><b>Comp. # 2</b></p> <p>To investigate the relevance of percentages in reference to income, taxes, profit, loss, material, labor, and overhead (Pie Charts)</p>	5 <sup>th</sup> quarter 2 weeks	After completing this unit the student will be able to calculate simple interest and percentages, principal, rate of interest, and compound interest, and discounts.	MA 1, MA 5  G 1.10, 2.3, 3.4, 3.6  CLEs N-1B, N-3B, G-1B	Percent Cost Profit Principal Rate Time Interest Rate of interest Compound interest Discount	Lesson plans on  1. Percent and percentages  2. Interest  3. Discounts  Calculator  Paper and pencil	The math instructor will go through the lesson plans and help the students with some of the problems in the lesson plans	There will be a written test to check for comprehension levels
<p><b>Comp. # 3</b></p> <p>To understand</p>	5 <sup>th</sup> quarter 2 weeks	After completing this unit the student will know the concepts of azimuth and bearing in reference to	MA-1, MA-2, MA-4	Azimuth bearing Survey	Lesson plan on Comp. # 3	The instructor will pass out lesson plan which will include a	Written test to prove successful comprehension of

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the terms of Azimuth, bearing, degrees, minutes, and seconds in reference to land surveying		all directions starting at 0° do north. The students will also know what degree measurements are and how to convert degrees into minutes and seconds.	Goals: G-1.7, 1.10, 2.3, 3.5, 4.6  CLEs N-1B, 3D, 3E, G-2A	Degrees Minutes Seconds	Paper and pencil  Scientific calculator	life-like scenario of an older person explaining to a younger person how to survey by using math instead of using computer programs.  There will be a guided practice assignment for students to complete.	azimuth and measuring decimal degrees.  Review problems will be assigned for students to convert azimuth readings into bearing measurements, bearing measurements into azimuth readings.
<b>Comp. # 4</b>  To study the area of land and how land is divided into townships, sections, and acres	5 <sup>th</sup> quarter 3 weeks	After completing this unit the student will be able to understand how the geometric use area is applied to land as it is divided into smaller square increments and assigned the definitions of townships, sections and acres.	MA-1, MA-2, MA-4, MA-5  Goals: G-1.4, 1.8, 1-10, G-2.3,  CLEs N-1B, 1C, 3D, 3E, G-1.B, G.2A, 4B, M-2D.	Azimuth Bearing Parallelogram Setback Township Section Acres Range Miles	Lesson plan  Handout of a pictorial representation of how land is divided into smaller units of area Measurement  Scientific calculators	Lecture about the history of the homestead act and how land is divided and by what measuring amounts  Hand out a lesson plan that explains the objective list of this competency	Written test demonstrating the student's comprehension of area in reference to land.

Competencies	Time Span (quarter/wks)	Course Objectives	Show-Me Standards and CLE Code	Vocabulary	Resources	Learning Activities & Instructional Strategies	Assessment
<p><b>Unit Title:</b> (Current Knowledge) Module # IV Stair and step constructions, rafter and truss constructions, electrical wiring, trigonometric functions.</p> <p><b>Core Concepts:</b> The Student will be able to: Design and build a set of steps and relate the experience to rise, run, and slope; Design rafters and trusses; Calculate volts, amps, watts, and ohms; Manipulate trigonometric functions.</p>							
<p><b>Comp. # 1</b></p> <p>To utilize the concepts of rise, run, and slope while constructing stair steps.</p>	<p>6<sup>th</sup> quarter 2 weeks</p>	<p>After completing this unit the student will be able to Create a set of stairs so the rise and run will meet the International Residential Code (IRS) to accommodate a given set of conditions such as a basement floor to 1<sup>st</sup> level floor.</p>	<p>MA1, MA 2</p> <p>Goals: G-1.2, 1.4, 1.7, 1.10, 2.4, 2.7, 3.2, 4.5, 4.7</p> <p>CLEs N-1A, 3-D, A-1C, G-4A, 4B, M-2D</p>	<p>Tread Riser Step Headroom Layout Handrail Studs Elevation Ergonomics Human motion Rise Run Slope y-intercept <math>y = mx + b</math></p>	<p>International Residential Stair Codes</p> <p>Lumber for a real to life assembly of a set of steps</p> <p>Architectural Drafting and Design Text</p> <p>Framing square</p>	<p>Instructor will do a demonstration of a wall structure and go from 1<sup>st</sup> floor to basement.</p> <p>Student will consult the (IRS) to consider and calculate all acceptable rise heights and tread lengths. A comparison will be made to make students aware of rise, run, slope and y-intercept</p>	<p>Students will take a paper and pencil test designed from information taught in the lesson.</p> <p>Students will draw a specified set of steps according to (IRS) Codes.</p>

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<p><b><u>Comp. # 2</u></b></p> <p>To utilize the concepts of rise, run, and slope while making rafter and truss constructions.</p>	6 <sup>th</sup> quarter 2 weeks	After completing this unit the student will be able to build rafters and a set of trusses and know how to figure the rise and run of this application.	<p>MA1, MA 2</p> <p>Goals: G-1.2, 1.4, 1.7, 1.10, 2.4, 2.7, 3.2, 4.5, 4.7</p> <p>CLEs N-1A, 3-D, A-1C, G-4A, 4B, M-2D</p>	<p>Rise Run Slope Truss Beam Rafters Plumb bob Level Gable ends Hip rafters Valley rafters Jack rafters Pitch Span Total rise Rise per foot of run</p>	<p>Framing square</p> <p>Lumber for a real to life assembly of a set of steps</p> <p>Architectural Drafting and Design Text</p>	<p>Instructor will do a demonstration how to lay out a rafter</p> <p>A comparison will be made to make students aware of rise, run, slope and y-intercept</p> <p>There will be handouts that illustrate how to complete mathematical problems when encountering rafter applications</p>	<p>Students will take a paper and pencil test designed from information taught in the lesson.</p> <p>Students will complete a test to calculate pitch when given total rise and span, calculate total rise when given pitch span and rise per ft of run, and find rise per foot of run when given span and total rise</p>
<p><b><u>Comp. # 3</u></b></p> <p>To have a general knowledge of electrical wiring and how to calculate volts, amps, watts and ohms using Ohm's Law.</p>	6 <sup>th</sup> quarter 2 weeks	After completing this unit the student will have a general understanding of where electrical energy originates and how such energy changes forms. The student will be able to recognize electrical symbols on a blueprint, calculate total voltage, current, ohms, and watts using an ohm's power wheel. The student will also be able to calculate available current vs. maximum rating of current breaker source, compare total amperage used by devices, appliances, and air	<p>MA 1, MA 5</p> <p>Goals: G-1.10, 2.3, 2.7, 3.4, 3.8</p> <p>CLEs N-1A, 1C, 3D, 3E, M-2D, D-1C</p>	<p>Volts Ohms Current Resistance Watts Gauge of wire Voltage drop Schematics Blueprints Kilowatts Ohm's Law Conductance Outlets Fixtures</p>	<p>Calculator</p> <p>Worksheets</p> <p>Board examples</p> <p>Lesson plan on Ohm's Law</p> <p>Blueprints of rooms to be wired</p>	<p>Introduce the lesson by explaining how energy changes form from mineral (stored) energy, through a process of transformations until it becomes electrical energy.</p> <p>Class lecture explaining Ohm's</p>	<p>Written test containing problems similar to the ones worked in class</p> <p>Students will be asked to wire a room estimate the size of their entry cable, breaker box, and monthly bill in kilowatts</p>

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		conditioning units to total available amperage of breaker box, use information of calculations to determine what size of entry cable to use, and estimate a dwelling's monthly utility bill by kilowatt usage.		Switches		law and how to do electrical calculation  Complete wiring diagram of some basic blueprints	
<b>Comp. # 4</b>  To have a general knowledge of how to operate trigonometric functions	6 <sup>th</sup> quarter 3 weeks	After completing this unit the student will be able to make a distinction between the trigonometric ratios of sine, cosine, secant, cosecant, tangent and cotangent and know the proper application of each one and apply Pythagorean's theorem to any right triangle to find unknown sides and angles.	MA-1, MA-2, MA- 4, MA-5  Goals: G-1.6, G-1.8, G-1.10, G-3. 4. G-4.1  CLEs N-1B, N-3D, N-3E, A-1B, A-1C, G-1A, G-4B, and M-2D.	Ratio Proportions Hypotenuse Right triangle Sine Cosine Tangent Secant Cosecant Cotangent Pythagorean's theorem	Pencil Paper  Scientific Calculator  Blank table or Spreadsheet  Lesson plan explaining trigonometric functions	The class will analyze several different triangles ranging from 30 to 90 degrees and fill in a table of all ratios of sides. The class will then use a scientific calculator to find trigonometric ratios of all angles. The class will discover that the functions on the calculator are only ratios of the sides of a triangle. The class will then do problems using Pyth. Theor.	A test will be given to check for student's understanding of how to solve right triangles by hand and by using the trigonometric functions on a scientific calculator.

Competencies	Time Span (quarter/wks)	Course Objectives	Show-Me Standards and CLE Code	Vocabulary	Resources	Learning Activities & Instructional Strategies	Assessment
<b>Unit Title:</b> (Post Knowledge) Higher education/career prep project							
<b>Core Concept:</b> To unite in a project with at least one other program to utilize mathematical concepts learned in previous mathematics curriculum to provide evidential proof of mastery.							
To conduct a project designed and prepared by a joint effort between Program Instructor and Math instructor to demonstrate mastery of previously learned competencies and to demonstrate mastery of applicable Concepts of mathematics.	4 <sup>th</sup> Semester	After completing this unit the student will be able to unite with fellow students to complete a real world situational workplace endeavor or task.	MA 1, MA 2, MA 3, MA 4, MA 5. G 1.1, 1.2, 1.4, 1.8, 1.10, 2.1, 2.2, 2.3, 2.7, 3.1, 3.2, 3.3, 3.5, 3.6, 3.7, 3.8, 4.1, 4.4, 4.5, 4.6, 4.7. CLEs N-1B, N-1C, N-3D, N-3E, G-1A, G-1B, G-2A, G- 4B, M- 2C, M- 2D,	determine, compare agree, support, prove, influence, estimate, choose decide justify, appraise, interpret, build disprove, test, compile, invent, solve, perceive, influence, plan, conclude, defend, evaluate, predict, measure, rate, design, select prioritize explain, criteria, assess value deduct. construct, and theorize.	All material and resources available from the Cass Career Center	Project jointly agreed upon by trade specific instructor, CCC administration, and core resource teachers.	Assessment will be designed and designated at the beginning of each project.