

Integrated Math for Trades Mathematics Modules

Based off the textbook: **Mathematics for the Trades - A Guided Approach** Hal M Saunders and Robert A. Carman

<https://www.pearson.com/us/higher-education/product/Saunders-Mathematics-for-the-Trades-A-Guided-Approach-11th-Edition/9780134756967.html>

Unit 1 - [Ratio, Proportion, and Percent](#)

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Integrated Math for Trades Unit 1: Ratio, Proportion, Percent

Unit 1 Ratio, Proportion, Percent		
<p>ESTABLISHED GOALS</p> <ul style="list-style-type: none"> ● A-REI.1. Apply properties of mathematics to justify steps in solving equations in one variable. ● A-REI.3. Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters ● A-CED.1. Create equations and inequalities in one variable and use them to solve problems 	Transfer	
	<p><i>Students will be able to independently use their learning to</i></p> <ul style="list-style-type: none"> ● use ratios, proportions and percent to solve real world situations. ● represent a number as a fraction, decimal and percent ● interpret and compare ratio and rate 	
	Meaning	
	<p>UNDERSTANDINGS <i>Students will understand...</i></p> <ul style="list-style-type: none"> ● How to use ratios, proportion and percent to solve real world problems ● How to represent a number as a fraction, decimal and percent. ● How to interpret and compare ratios and rates. 	<p>ESSENTIAL QUESTIONS</p> <ul style="list-style-type: none"> ● How do I represent and/or solve real-world and mathematical problems using rates, ratios, and/or percents ● How do I represent a number as a fraction, decimal, and percent? ● How do I compare and order fractions, decimals and percents? ● How do I find the percent of a number? ● How do I interpret and compare ratios and rates? ● How do I solve unit rate problems including those involving unit pricing and constant speed?
	Acquisition	
<p><i>Students will know...</i></p> <ul style="list-style-type: none"> ● What a ratio and proportion are and how to set them up. 	<p><i>Students will be skilled at</i></p> <ul style="list-style-type: none"> ● Compare numbers using ratios ● Convert rates and ratios into simplest form ● Find an unknown value in a proportion 	

	<ul style="list-style-type: none"> • That proportions can be used to solve problems involving ratios. • Percent calculations are important part of any business, technical skills, and trades. • Percents, fractions, and decimals can be converted between each other. 	<ul style="list-style-type: none"> • Utilize proportions to solve real world trade problems • Use proportions to solve percentage problems • Apply ratios and proportions to scale drawings and direct and indirect proportions • Analyze percent problems to identify the given information and the unknown quantity
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Vocabulary

Whole numbers Estimate Prime Factors Order of Operations Improper Fraction Mixed Number Equivalent Fraction	Reciprocal Least Common Denominator (LCD) Place Value Decimal Digits rounding Average	Repeating Decimals Terminating Decimals Ratio Gear Ratio Pulley Ratio Compression Ratio Proportions
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Stage 2 - Evidence

Evaluative Criteria	Assessment Evidence
	PERFORMANCE TASK(S): Unit 1 Test Ratio, Proportion, and Percent performance tasks should include: <ul style="list-style-type: none"> • accurately use creating ratios and using ratios in real world proportion problems • accurately using percentages in real world problems • accurately converting percentages to fractions and decimals
	OTHER EVIDENCE:

Formative assessments, labs, activities

Stage 3 – Learning Plan

Labs:

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Mathematics for the Trades

- section 4.1 **Ratio and Proportion**
 - Ratio
 - Simple Equations
 - Proportions
 - Problem Solving Using Proportions
- section 4.2 **Introduction to Percent**
 - Changing Decimal Numbers to Percents
 - Changing Fractions to Percents
 - Changing Percents to Decimal Numbers
 - Changing Percents to Fractions
- section 4.3 **Percent Problems**
 - When P is Unknown
 - When R is Unknown
 - When B is Unknown
- section 4.4 **Applications of Percent Calculations**
 - Discounts
 - Sales Tax
 - Interest
 - Commission
 - Efficiency
 - Tolerances
 - Percent Change
- section 4.5 **Applications of Ratio and Proportion**
 - Scale Drawings
 - Similar Figures
 - Direct and Inverse Proportions
 - Gears and Pulleys

Additional resources/assignments/activities:

Mathematics for the Trades - Problem Set 1

Kahn Academy - Ratios, rates, proportions, percents

<https://www.khanacademy.org/math/pre-algebra/pre-algebra-ratios-rates>

Integrated Math for Trades 2: Measurement

Stage 1 Desired Results		
<p>ESTABLISHED GOALS</p> <p>Priority Standards:</p> <ul style="list-style-type: none"> ● N-Q.1. Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret the scale and the origin in graphs and data displays. ● N-Q.2. Define appropriate quantities for the purpose of descriptive modeling. ● N-Q.3. Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. 	Transfer	
	<p><i>Students will be able to independently use their learning to.....</i></p> <ul style="list-style-type: none"> ● Use precision and accuracy of measurement. ● Apply basic units of measurement for linear, angle, temperature, weight, speed and solve problems based on these measurements. 	
	Meaning	
	<p>UNDERSTANDINGS</p> <p><i>Students will understand that...</i></p> <ol style="list-style-type: none"> 1. Precision and accuracy of measurement is an important part of technical mathematical problems. 2. There are specific units of measurement used for various technical problems. 	<p>ESSENTIAL QUESTIONS</p> <ol style="list-style-type: none"> 1. Why is precision in measurement important? 2. How do you measure an object's dimensions accurately? 3. What tools best fit a measurement situation? 4. How do you determine the best unit of measure for various measurements?

<ul style="list-style-type: none"> ● G-MG.2. Apply concepts of density based on area and volume in modeling situations. 	3. Units can be converted to other appropriate units.	
	Acquisition	
	<i>Students will know...</i> <ul style="list-style-type: none"> ● Identify and name perimeter, area, and volume formulas. ● What tools of measurement are used for linear, temperature, weight, angular, and speed. ● How to use the tools of measurement with accuracy and precision. ● Units of measurement can be converted to other units. 	<i>Students will</i> <ul style="list-style-type: none"> ● Apply formulas to applied technical problems. ● Measure dimensions of objects, temperature, weight, angular, and speed. ● Apply methods of unit conversion to problems.
Unit Vocabulary		
Precision Accuracy Inch Foot Tolerance Yard Square inch Square foot Square yard Square mile Acre Cubic inch	Ounces Pound Ton Pints Quart Gallon Barrel Caliper Vernier Caliper Protractor Vernier Protractor Vertex	Meter Micrometer Vernier micrometer Millimeter Centimeter Kilometer Gram Milligram Kilogram Metric Ton Fahrenheit Celsius

Cubic foot Cubic yard	Baseline Angle	
Stage 2 - Evidence		
Evaluative Criteria	Assessment Evidence	
	PERFORMANCE TASK(S): Unit 2 test Measurement performance task should include: <ul style="list-style-type: none">● accurately set up measurements for real-life trades situations and solve accordingly● accurately use the measurement tools for length, angles● converting from unit of measurement to another● measure using appropriate precision	
	OTHER EVIDENCE: Formative assessments, measurement labs	
Stage 3 – Learning Plan <i>Summary of Key Learning Events and Instruction</i>		

Labs:

- ruler lab - knowing how to measure to the 16th of an inch
- caliper lab
- protractor lab - knowing how to measure an angle

Mathematics for the Trades

- section 5.1 **Working with Measurement Numbers**
 - Units and significant digits
 - Precision and accuracy
 - Addition, subtraction, multiplication, and division of measurement numbers
 - Rounding products and quotients
 - Decimal equivalents
- section 5.2 **English units and unit conversion**
 - Unity fractions
 - Compound units
 - Area, volume, speed
- section 5.3 **Metric units**
 - Length, weight
 - Area, volume, speed, temperature
- section 5.4 **Direct measurements**
 - Length measurements
 - Micrometers and vernier micrometers
 - Vernier calipers
 - Protractors
 - Meters
 - Gauge blocks

Additional resources/assignments/activities:

A New Algebra: Tools, Themes, Concepts (1993) Henri Picciotto, Anita Wah

<http://www.mathedpage.org/new-algebra/new-algebra.html>

Integrated Math for Trades Math UNIT 3: Pre-Algebra

Stage 1 Desired Results		
<p>ESTABLISHED GOALS</p> <p>Priority Standards:</p> <ul style="list-style-type: none"> ● N-RN.1. Explain how the definition of the meaning of rational exponents follows from extending the properties of integer exponents to those values, allowing for a notation for radicals in terms of rational exponents. For example, we define $5^{1/3}$ to be the cube root of 5 because we want $(5^{1/3})^3 = 5(1/3)^3$ to hold, so $(5^{1/3})^3$ must equal 5. ● N-RN.2. Rewrite expressions involving radicals and rational exponents using the properties of exponents. For example: Write equivalent representations that utilize both positive and negative exponents. ● A-REI.2. Solve simple rational and radical equations in one variable, and give examples showing how extraneous solutions may arise. 	Transfer	
	<p><i>Students will be able to independently use their learning to...</i></p> <ul style="list-style-type: none"> ● evaluate number patterns and calculate accurately using signed numbers, exponents, square roots, and order of operations. 	
	Meaning	
	<p>UNDERSTANDINGS</p> <p><i>Students will understand that...</i></p> <ul style="list-style-type: none"> ● Logical patterns exist and are a regular occurrence in mathematics and in trades. ● Relationships can be described and generalizations made for mathematical situations that have numbers or objects that repeat in predictable ways. ● Rules of arithmetic and algebra can be used together with (the concept of) equivalence to transform equations and inequalities so accurate solutions can be found to solve trades problems. 	<p>ESSENTIAL QUESTIONS</p> <ul style="list-style-type: none"> ● What are some ways to represent, describe, and analyze patterns that occur in the trades? ● Why are number and algebraic patterns important as rules of operations?
	Acquisition	
<p><i>Students will know...</i></p> <ul style="list-style-type: none"> ● How to discriminate between a negative number, zero, and a positive number ● How to determine the order of a range of numbers ● The meaning of an absolute number 	<p><i>Students will be skilled at...</i></p> <ul style="list-style-type: none"> ● Ordering a group of numbers ● Perform operations on real numbers using addition, subtraction, multiplication, and division. 	

	<ul style="list-style-type: none"> Operations can be performed with negative numbers, positive numbers, exponents, and square roots using specific rules of operation 	<ul style="list-style-type: none"> Apply order of operations to real-world, trades focused problems. Apply concepts of exponents and square roots for solving practical trades problems.
Unit Vocabulary		
Signed Numbers Absolute Value	Opposites Exponential Form	Square Roots
Stage 2 - Evidence		
Evaluative Criteria	Assessment Evidence	
	PERFORMANCE TASK(S): Unit 3 test Pre Algebra performance task should include: <ul style="list-style-type: none"> accurately set up an order of operation problem for real-life trades situations and solve accordingly accurately set up and solve problems that involve absolute value situations 	
	OTHER EVIDENCE: Formative assessments, labs, quizzes	
Stage 3 – Learning Plan		
<p>Labs: Discovery Lab for adding positive and negative integers: https://ideagalaxyteacher.com/teaching-adding-integers-discovery/</p> <p>Absolute value activities and discovery lab: https://ideagalaxyteacher.com/11-absolute-value-activities/</p> <p>Mathematics for the Trades:</p> <ul style="list-style-type: none"> Section 6.1 Addition of signed numbers 		

- The Meaning of Signed Numbers
- Absolute values
- section 6.2 **Subtraction of Signed Numbers**
 - Opposites
 - Subtraction of signed numbers
- section 6.3 **Multiplication and division of signed numbers**
 - Rules for multiplication and division
- section 6.4 **Exponents and Square Roots**
 - Exponents
 - Order of operations with exponents
 - Square roots

Additional resources/assignments/activities:

Mathematics for the Trades - Problem Set 6

A New Algebra: Tools, Themes, Concepts (1993) Henri Picciotto, Anita Wah

<http://www.mathedpage.org/new-algebra/new-algebra.html>

Jeopardy Labs for Positive and Negative Numbers

<https://jeopardylabs.com/play/positive-negative-numbers-7>

Absolute Value Millionaire Game:

<http://www.math-play.com/absolutevalue-millionaire.html>

Integrated Math for Trades UNIT 4: Algebra

Stage 1 Desired Results		
ESTABLISHED GOALS <ul style="list-style-type: none"> ● A-SSE.1. Interpret expressions that represent a quantity in terms of its context.* <ul style="list-style-type: none"> a. Interpret parts of an expression, such as terms, factors, and coefficients. ● A-SSE.3. Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression. ● A-CED.1. Create equations and inequalities in one variable and use them to solve problems. ● A-CED.2. Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales. ● A-CED.4. Rearrange formulas (literal equations) to highlight a quantity of interest, using the same reasoning as in solving equations. For example, rearrange Ohm’s law $V = IR$ to highlight resistance R. 	Transfer	
	<i>Students will be able to independently use their learning to...</i> <ul style="list-style-type: none"> ● Interpret expressions that represent a quantity in terms of its context. ● Choose and produce an equivalent form of an expression ● Use scientific notation ● Solve word problems relating to real world situations 	
	Meaning	
	UNDERSTANDINGS <i>Students will understand..</i> <ul style="list-style-type: none"> ● Patterns and functional relationships can be represented and analyzed using a variety of strategies, tools, and technologies. ● Quantitative relationships can be expressed numerically in multiple ways in order to make connections and simplify calculations using a variety of strategies, tools and technologies. ● Shapes and structures can be analyzed, visualized, measured and transformed using a variety of strategies, tools, and technologies. ● Data can be analyzed to make informed decisions using a variety of strategies, tools, and technologies. 	ESSENTIAL QUESTIONS <ul style="list-style-type: none"> ● How is mathematics used to quantify, compare, represent, and model numbers? ● How do patterns and functions help us describe data and physical phenomena and solve a variety of problems? ● How are quantitative relationships represented by numbers? ● How do geometric relationships and measurements help us to solve problems and make sense of our world? ● How can collecting, organizing and displaying data help us analyze information and make reasonable and informed decisions? ● How is English translated to algebraic expressions?

	<ul style="list-style-type: none"> Translate English into algebraic expressions to solve a variety of real world situations. 	
Acquisition		
	<i>Students will know...</i> <ul style="list-style-type: none"> Adding and Subtracting Algebraic Equations Solving Simple Equations Solving Equations Involving Two Operations Solving Word Problems Multiplying and Dividing Algebraic Expressions Scientific Notation 	<i>Students will be able to ...</i> <ul style="list-style-type: none"> Add, subtract, multiply and divide algebraic equations Solve simple and two step operations Solve word problems Use scientific notation
Vocabulary		
Algebraic Expressions Formulas Combining Like Terms	Equations Solutions Two-Step Equations Multi-Step Equations	Solving Formulas Exponent Rules Scientific Notation
Stage 2 - Evidence		
Evaluative Criteria	Assessment Evidence	
	PERFORMANCE TASK(S): Unit 4 test Algebra performance task should include: <ul style="list-style-type: none"> accurately set up an equation for real-life trades situations and solve accordingly accurately set up and solve problems that involve two operations accurately translate from English to Algebra convert and use operations with Scientific Notation 	
	OTHER EVIDENCE: Formative assessments, labs, quizzes	
Stage 3 – Learning Plan		

Labs:

Mathematics for the Trades:

- section 7.1 **Algebraic Language and Formulas**
 - Multiplication
 - Parentheses
 - Division
 - Algebraic Expressions
 - Evaluating Formulas
- section 7.2: **Adding and Subtracting Algebraic Equations**
 - combining like Terms
 - Expressions with Parentheses
- section 7.3: **Solving Simple Equations**
 - Solution
 - Equivalent Equations
 - Solving Equations
- section 7.4: **Solving Equations Involving Two Operations**
 -
- section 7.5: **Solving More Equations and Formulas**
 - Parentheses in Equations
 - Variable on Both Sides
 - Solving Formulas
- section 7.6: **Solving Word Problems**
 - Translating English to Algebra
 - Translating Sentences to Equations
 - General Word Problems
- section 7.7 **Multiplying and Dividing Algebraic Expressions**
 - Multiplying Simple Factors
 - Rule for Multiplication
 - Dividing Simple Factors
 - Negative Exponents
- section 7.8 **Scientific Notation**
 - Definition of Scientific Notation

- Converting to Scientific Notation
- Converting from Scientific Notation to Decimal Form
- Multiplying and Dividing in Scientific Notation
- Calculators and Scientific Notation

Additional resources/assignments/activities:

- Mathematics for the Trades - Problem Set 7
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Integrated Math for Trades UNIT 5: Practical Plane Geometry

Stage 1 Desired Results		
<p>ESTABLISHED GOALS</p> <p>Priority Standards:</p> <ul style="list-style-type: none"> ● G-CO.1.Demonstrates understanding of key geometrical definitions, including angle, circle, perpendicular line, parallel line, line segment, and transformations in Euclidean geometry. Understand undefined notions of point, line, distance along a line, and distance around a circular arc. ● G-GMD.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). 	Transfer	
	<p><i>Students will be able to independently use their learning to...</i></p> <ul style="list-style-type: none"> ● apply geometric properties and relationships to solve real-world problems and logically use reasoning to determine the relationships (informal proofs) 	
	Meaning	
	<p>UNDERSTANDINGS</p> <p><i>Students will understand ...</i></p> <ul style="list-style-type: none"> ● Geometry is used to analyze spatial relationships and is developed by reasoning from the known to the unknown. ● A number operation can be used to find and compare the lengths of segments and the measures of angles. ● Special angle pairs can help identify geometric relationships to solve for other angles. 	<p>ESSENTIAL QUESTIONS</p> <ul style="list-style-type: none"> ● How can geometric representations and relationships apply to real world situations? ● How is the representation of lines and angles essential to the study of the physical world?

<ul style="list-style-type: none"> ● G-SRT.8. Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems. ● G-CO.9. Using methods of proof including direct, indirect, and counter examples to prove theorems about lines and angles. Theorems include: vertical angles are congruent; when a transversal crosses parallel lines, alternate interior angles are congruent and corresponding angles are congruent; points on a perpendicular bisector of a line segment are exactly those equidistant from the segment's endpoints. 	<ul style="list-style-type: none"> ● Formulas can be used to find the perimeter and area of regular and irregular shapes. ● Given information, definitions, and properties can be used to justify a solution to a problem. 	
	Acquisition	
	<p><i>Students will understand...</i></p> <ul style="list-style-type: none"> ● The types of angles formed by two lines and a transversal. ● Angle facts and classifications ● How to measure an angle (internal and external). ● The perimeter and area of a regular and irregular figures can be found using the dimensions and a formula. ● The pythagorean theorem is a common formula used for right triangles. ● The circumference and area of a circle and parts of a circle can be found using the radius or diameter of a circle. ● The areas and lengths can be calculated by recognizing figures can be separated into separate shapes to determine the formulas necessary. 	<p><i>Students will be able to...</i></p> <ul style="list-style-type: none"> ● Use special angle pairs to calculate unknown angle measures. ● Apply angle facts and definitions to calculate the measures of unknown angles. ● Calculate the perimeter and area of regular and irregular shapes and apply this to trade situations. ● Calculate an unknown side measure of a right triangle using the pythagorean theorem. ● Calculate the circumference and area of a circular figure and apply this to trade situations. ● Apply multiple formulas to calculate the area or a dimension of a figure.
Vocabulary		

Plane Angle Vertex Sides Minutes Seconds Acute Angles Obtuse Angles Right Angles Straight Angles Vertical Angles Adjacent Angles	Parallel Lines Alternate Interior Angles Alternate Exterior Angles Polygons: Parallelogram Rectangle Square Triangle Trapezoid Quadrilateral Hexagons	Area of all listed Polygons Perimeter Pythagorean Theorem Special Right Triangles: 3-4-5 Right Triangle 30-60-90 Right Triangle 45-45-90 Right Triangle Hero's Formula Areas of Irregular Polygons Circles Area of Circles Area of Rings
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Stage 2 - Evidence

Evaluative Criteria	Assessment Evidence
	PERFORMANCE TASK(S): Unit 5 Test Geometry performance task should include: <ul style="list-style-type: none"> accurately set up formulas for real-life trades situations and solve accordingly accurately use the formulas for finding length, perimeter, circumference and area accurately use special angle pairs to calculate unknown angle measures
	OTHER EVIDENCE: Formative assessments, labs, quizzes

Stage 3 – Learning Plan

Summary of Key Learning Events and Instruction

Labs:

Discovery Lab for teaching area and circumference of a circle:
<https://ideagalaxyteacher.com/teaching-area-and-circumference/>

Mathematics for the Trades:

- section 8.1: **Angle Measurement**

- Labeling Angles
- Measuring Angles
- Classifying Angles
- Drawing Angles
- Angle Facts
- section 8.2: **Area and Perimeter of Polygons**
 - Polygons
 - Perimeter
 - Quadrilaterals
 - Rectangles
 - Squares
 - Parallelograms
 - Trapezoids
- section 8.3: **Triangles, Hexagons, and Irregular Polygons**
 - Types of Triangles
 - Pythagorean Theorem
 - Area of Triangle
 - Hexagons
 - Irregular Polygons
- section 8.4: **Circle**
 - Circumference
 - Parts of Circles
 - Area of Circle
 - Rings

Additional resources/assignments/activities:

- Mathematics for the Trades - Problem Set 8
- Jeopardy Lab - Angle Pairs
<https://jeopardylabs.com/play/angle-pairs-review>

- How to Teach Parallel Lines Cut By a Transversal Using Interactive Notebooks

<https://ideagalaxyteacher.com/parallel-lines-transversal-interactive-notebooks/>

Integrated Math for Trades UNIT 6: Solid Figures

Stage 1 Desired Results		
<p>ESTABLISHED GOALS</p> <ul style="list-style-type: none"> ● G-GMD.3. Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems. For example: Solve problems requiring determination of a dimension not given. ● G-GMD.4. Identify the shapes of two-dimensional cross-sections of three-dimensional objects, and identify three-dimensional objects generated by rotations of two-dimensional objects. ● G.MG.1 Use geometric shapes, their measures, and their properties to describe objects (e.g., modeling a tree trunk or a human torso as a cylinder). 	Transfer	
	<p><i>Students will be able to independently use their learning to...</i></p> <ul style="list-style-type: none"> ● Choose the correct formulas of Solid Figures to solve problems ● Solve word problems relating to real world situations 	
	Meaning	
	<p>UNDERSTANDINGS <i>Students will understand that...</i></p> <ul style="list-style-type: none"> ● Solid figures are three dimensional ● Planes are two dimensional ● Pyramids and frustums of pyramids ● Prisms ● Cones and frustums of cones 	<p>ESSENTIAL QUESTIONS</p> <ul style="list-style-type: none"> ● What is the difference between a solid figure and a plane? ● What does the Frustum of a pyramid or cone refer to? ● What is a prism?
	Acquisition	
<p><i>Students will know...</i></p> <ul style="list-style-type: none"> ● Formulas can be used to find the surface area and volume for Solid Figures ● Formulas can be used to find the frustum of pyramids and cones ● How to apply the correct formula to solve a real world situation 	<p><i>Students will be skilled at...</i></p> <ul style="list-style-type: none"> ● Solving problems based on the shape of a Solid Figure ● Identify the correct formulas based on the cross section of a figure ● Understand and apply the formulas of a Solid Figure 	
Vocabulary		
Prism Faces Altitude Surface Area	Right Prism Pyramid Right Pyramid Square Pyramid	Lateral Surface Area Frustum of Pyramids Cylinder Right Cylinders

Volume Rectangular Prism Triangular Prism Trapezoidal Prism	Triangular Pyramid or Tetrahedron	Cones Frustum of Cones Sphere
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Stage 2 - Evidence

Evaluative Criteria	Assessment Evidence
	PERFORMANCE TASK(S): Unit 6 Test Solid Figures performance task should include: <ul style="list-style-type: none"> ● accurately set up formulas for real-life trades situations and solve accordingly ● accurately use the formulas for finding surface area and volume of Solid Figures ● accurately use formulas for finding the Frustum of a Pyramid and Cone
	OTHER EVIDENCE: Formative assessments, labs, quizzes

Stage 3 – Learning Plan

Labs:

Mathematics for the Trades:

- section 9.1: **Prisms**
 - Surface Area and Volume
 - Volume Conversion
- section 9.2: **Pyramids and Frustums of Pyramids**
 - Pyramids
 - Frustum of a Pyramids
- section 9.3: **Cylinders and Spheres**
 - Cylinders
 - Spheres
- section 9.4: **Cones and Frustums of Cones**
 - Cones
 - Frustums of Cones

Additional resources/assignments/activities:

Mathematics for the Trades - Problem Set 9

Integrated Math for Trades Unit 7 - Triangle Trigonometry

Stage 1 Desired Results		
<p>ESTABLISHED GOALS</p> <ul style="list-style-type: none"> ● G.SRT.6 Understand that by similarity, side ratios in right triangles are properties of the angles in the triangle, leading to definitions of trigonometric ratios for acute angles. ● G-SRT.7 Explain and use the relationship between the sine and cosine of complementary angles. ● G.SRT.8 Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems. <p><u>Optional</u></p> <ul style="list-style-type: none"> ● G-SRT.10 Laws of Sines and Cosines and use them to solve problems. 	Transfer	
	<p><i>Students will be able to independently use their learning to...</i></p> <ul style="list-style-type: none"> ● set up Trigonometric ratios and use them to solve problems 	
	Meaning	
	<p>UNDERSTANDINGS <i>Students will understand that...</i></p> <ul style="list-style-type: none"> ● How to use Trigonometric ratios to find unknown sides and angles ● How to use the Pythagorean Theorem 	<p>ESSENTIAL QUESTIONS</p> <ul style="list-style-type: none"> ● How do you find the sine, cosine, and tangent ratios for an acute angle of a right triangle? ● What can you say about the side lengths and the trigonometric ratios associated with special right triangles? ● How do you find an unknown angle measure in a right triangle using trigonometric ratios? ● How can you use the sine ratio to find a formula for the area of a triangle? <p><u>Optional</u></p> <ul style="list-style-type: none"> ● What is the Law of Sines, and how do you use it to solve problems? ● What is the Law of Cosines, and how do you use it to solve problems?
	Acquisition	
<p><i>Students will know...</i></p>		
<p><i>Students will be skilled at...</i></p>		

	<ul style="list-style-type: none"> • that trigonometry ratios are used to find an unknown side or angle • Special angle pairs can help identify geometric relationships to solve for other angles. 	<ul style="list-style-type: none"> • Solving trigonometric ratios • Identify the correct formulas based on the drawing of a triangle • Understand and apply the formulas of a special right triangles
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Vocabulary

Trigonometry Radian Measure Sectors Average Linear Speed Average Angular Speed Pythagorean Theorem	Special Right Triangles: 3-4-5 Right Triangle 30-60-90 Right Triangle 45-45-90 Right Triangle	Trigonometry Ratios: Sine Cosine Tangent Inverse Trigonometric Functions Law of Sines Law of Cosines
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Stage 2 - Evidence

Evaluative Criteria	Assessment Evidence
<type here>	PERFORMANCE TASK(S): Unit 7 Test Trigonometry performance task should include: <ul style="list-style-type: none"> • accurately set up a drawing and equation for real-life trades situations and solve accordingly • accurately use the formulas for finding missing sides and angles • accurately use special angle pairs to calculate unknown angle measures
<type here>	OTHER EVIDENCE: Formative assessments, labs, quizzes

Stage 3 – Learning Plan

Labs:

Mathematics for the Trades:

- section 10.1: **Angles and Triangles**
 - Angle Measurement
 - Radian Measure
 - Sectors
 - Linear and Angular Speed
 - Right Triangles
 - Pythagorean Theorem
 - Special Right Triangles
- section 10.2: **Trigonometric Ratios**
 - Sine Ratio
 - Cosine Ratio
 - Tangent Ratio
 - Finding Values of Trigonometric Functions
 - Angles in Degrees and Minutes
- section 10.3: **Solving Right Triangles**
 -
- section 10.4: **Oblique Triangles**
 - Oblique Triangles
 - Law of Sines
 - Law of Cosines

Additional resources/assignments/activities:

Mathematics for the Trades - Problem Set 10

Integrated Math for Trades Unit 8 - Advanced Algebra

Stage 1 Desired Results		
<p>ESTABLISHED GOALS</p> <p>N.CN.7</p> <ul style="list-style-type: none"> ● A-REI.4. Solve quadratic equations in one variable. ● A-REI.5. Show 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.6. Solve systems of linear equations exactly and approximately, e.g., with graphs or algebraically, focusing on pairs of linear equations in two variables. ● A-CED.3. Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or nonviable options in a modeling context. For example, represent inequalities describing cost constraints in various situations. 	Transfer	
	<p><i>Students will be able to independently use their learning to...</i></p> <ul style="list-style-type: none"> ● Solve quadratic equations in one variable ● To solve a system of equation using the most efficient method 	
	Meaning	
	<p>UNDERSTANDINGS</p> <p><i>Students will understand that...</i></p> <ul style="list-style-type: none"> ● Quadratics can be written in multiple equivalent ways. ● The most efficient method for solving a system of equations. 	<p>ESSENTIAL QUESTIONS</p> <ul style="list-style-type: none"> ● Why is it advantageous to use and solve quadratics algebraically for real world problems? ● How do I find an exact or approximate solution to systems of linear equations? ● How does representing functions graphically help you solve a system of equations? ● How does writing equivalent equations help you solve a system of equations?
	Acquisition	
<p><i>Students will know...</i></p> <ul style="list-style-type: none"> ● How to represent functions graphically to solve a system of equations. ● How to write equivalent equations to solve a system of equations. ● How to write equivalent equations to solve real world problems. 	<p><i>Students will be skilled at...</i></p> <ul style="list-style-type: none"> ● Writing equivalent equations ● Graphing to solve equations 	
Vocabulary		
Systems of Equations	Substitution	Quadratic Equations

Solution Equivalent Equations	Dependent Inconsistent Elimination	Standard Form Quadratic Formula
Stage 2 - Evidence		
Evaluative Criteria	Assessment Evidence	
	PERFORMANCE TASK(S): Unit 8 Test Advanced Algebra performance task should include: <ul style="list-style-type: none">• accurately set up two equations for real-life trades situations and solve accordingly• accurately use substitution and elimination to solve a system• accurately use Quadratic Formula to solve any system	
	OTHER EVIDENCE: Formative assessments, labs, quizzes	
Stage 3 – Learning Plan		
Labs:		
Mathematics for the Trades:		
<ul style="list-style-type: none">• section 11.1: Systems of Equations<ul style="list-style-type: none">○ Solution by Substitution○ Dependent and Inconsistent Systems○ Solution by Elimination○ Multiplication with the Elimination Method○ Multiplying Both Equations• section 11.2: Quadratic Equations<ul style="list-style-type: none">○ Standard Form○ Solutions to Quadratic Equations○ Quadratic Formula		
Additional resources/assignments/activities:		
Mathematics for the Trades - Problem Set 11		

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