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College Technical Math 1

Instructor:
Ronda Beck
Room 206
ronda.beck@schools.hermon.net

Course Description: This course focuses on mathematics topics relevant to a variety of trades and technical disciplines. Topics include: proportions, percentages, measurement, algebra, geometry, and trigonometry. An emphasis is placed on practical, contextual applications.

2 Semesters/ 1 Credit

Chapter 1	Review of Basic Concepts
Summary	In this unit students review basic operations of whole numbers and decimals. They explore the use of exponents, roots, and powers. Students apply their knowledge to solving problems using order of operations. Students will understand the place value system up to the thousandths place. Students will perform all operations with multi-digit whole numbers and add, subtract, and multiply decimals to hundredths. Students will interpret and evaluate numerical expressions (order of operations).

Graduation Standards: (the number of the standard is referenced in the performance indicators listed in each unit.)

● HS.M.1A Applies properties of real numbers and quantitative reasoning.

Performance Indicators Assessed in Unit	● AR.A.1 Interpret the structure of expressions. ● QR.A.3 Reason quantitatively and use units to solve problems. ● QR.A.2 Use properties of rational and irrational numbers. ● AR.A.2 Write expressions in equivalent forms to reveal information and to solve problems.

Understandings:	Students will know…	Students will be able to…
● How to calculate answers using whole numbers and decimals. ● There is an order of steps to follow when solving an equation. ● The difference between exponents, roots, and powers and	● Basic operations with whole numbers and decimals. ● The Properties of Exponents including Zero Exponent Property, Negative Exponent	● Make sense of problems and persevere in solving them. ● Reason abstractly and quantatively.

how to are calculated in an equation.	Property, and Multiplying and Dividing Exponents. ● That PEMDAS can be reversed to isolate a variable.

Chapter 2	Review of Fractions
Summary	This unit is intended to teach and reinforce the concept of a fraction and other areas related to fractions. Students will work through the basics of a fraction, as well as review equivalent fractions, improper fractions and mixed numbers, all of which are foundational to understanding operations with fractions. They will explore multiples and factors and apply this knowledge to solving problems using equivalent fractions and decimals.

Graduation Standards: (the number of the standard is referenced in the performance indicators listed in each unit.)

- HS.M.1A Applies properties of real numbers and quantitative reasoning.

Performance Indicators Assessed in Unit	● QR.A.3 Reason quantitatively and use units to solve problems. ● QR.A.2 Use properties of rational and irrational numbers. ● AR.A.2 Write expressions in equivalent forms to reveal information and to solve problems.

Understandings:	Students will know…	Students will be able to…
● How to apply the basic operations to fractions. (add, subtract, multiply, divide). ● The process of changing fractions to decimals and vice versa.	● How to find equivalent fractions. ● How to change fractions to decimals. ● How to change decimals to fractions. ● The basic operations of fractions (add, subtract, multiply, and divide).	● Make sense of problems and persevere in solving them. ● Reason abstractly and quantitatively. ● Attend to precision. ● Look for and make use of structure: Students will use their current mathematical understandings to identify patterns and structure to make sense of new learning.

Chapter 3	Percents
Summary	In this unit students review basic operations of percent and number equivalents. Students apply their knowledge to solving percentage problems incorporating percentage increase and decrease. They will apply concepts of ratios, proportions, percents, and number theory (e.g. primes, factors, and multiples) in practical and other mathematical situations. They will create, solve, and justify the solution for multistep, real-life problems including those with ratio and proportion.

Graduation Standards: (the number of the standard is referenced in the performance indicators listed in each unit.)

- HS.M.1A Applies properties of real numbers and quantitative reasoning.

Performance Indicators Assessed in Unit	• QR.A.3 Reason quantitatively and use units to solve problems. • QR.A.2 Use properties of rational and irrational numbers. • AR.A.2 Write expressions in equivalent forms to reveal information and to solve problems.

Understandings:	Students will know…	Students will be able to…
• How ratios are applied to word problems to find the correct solution. • How to calculate percentage increase and decrease. • How to calculate unit rate. • Comparison of rational numbers.	• A ratio is a comparison of two numbers. • How to cross multiply. • How to use the distributive property. • How to solve one-step and two-step equations.	• Make sense of problems and persevere in solving them. • Model with mathematics. • Look for and express regularity in repeated reasoning. • Look for and make use of structure: Students will use their current mathematical understandings to identify patterns and structure to make sense of new learning.

Chapter 4	Measurement
Summary	In this unit students review the U.S. Customary System of Measurement and the Metric System. They apply this knowledge to solving conversion problems and

measure accuracy, precision and error. Students will identify the appropriate base unit of measuring volume, length, and mass and weight. Students will identify equivalent metric measurement through conversion. They will demonstrate their understanding of the metrics base ten system.

Graduation Standards: (the number of the standard is referenced in the performance indicators listed in each unit.)

● HS.M.1A Applies properties of real numbers and quantitative reasoning.

Performance Indicators Assessed in Unit	● QR.A.3 Reason quantitatively and use units to solve problems. ● QR.A.2 Use properties of rational and irrational numbers. ● AR.A.2 Write expressions in equivalent forms to reveal information and to solve problems.

Understandings:	Students will know…	Students will be able to…
● Specific tools are used to measure various things. ● Various objects can be measured using inches and feet. ● Standardized units or metric units can be used to measure objects in real life problems.	● How to convert measurements from the U.S. Customary System to the Metric System. ● How to calculate Metric to Metric conversions. ● How to calculate U.S. Customary to U.S. Customary conversions. ● How to calculate precision, error, and accuracy.	● Make sense of problems and persevere in solving them. ● Model with mathematics. ● Use appropriate tools strategically: Students will use math tools such as tables, diagrams, and technology to explore and deepen their understanding of concepts. ● Attend to precision: Students will use precise mathematical language and check their work for accuracy.

Chapter 5	**Signed Numbers & Powers of 10**

Summary	Students will investigate the patterns in products and quotients when multiplying or dividing by powers of 10. Students will denote powers of 10 using whole number exponents. They will explain patterns in the number of zeros in a product or quotient

when multiplying or dividing by a power of ten. Students will explain how to place the decimal point in a product or quotient when a decimal number is multiplied or divided by a power of ten. Students will use their knowledge of Powers of 10 to use scientific notation to solve real-world applications.

Graduation Standards: (the number of the standard is referenced in the performance indicators listed in each unit.)

● HS.M.1A - Applies properties of real numbers and quantitative reasoning.

Performance Indicators Assessed in Unit	● QR.A.3 Reason quantitatively and use units to solve problems. ● QR.A.2 Use properties of rational and irrational numbers. ● AR.A.2 Write expressions in equivalent forms to reveal information and to solve problems.

Understandings:	Students will know…	Students will be able to…
● Exponents can be used to represent very large or very small numbers. ● Positive and negative numbers represent different values on a number line. ● When to use scientific notation or standard form.	● How to convert from Standard Notation to Scientific Notation. ● How to convert from Scientific Notation to Standard Form. ● The powers of 10. ● The basic operations of Powers (add, subtract, multiply, and divide).	● Make sense of problems and persevere in solving them. ● Model with mathematics. ● Look for and make use of structure. ● Construct viable arguments and critique the reasoning of others: Students will explain their thinking and make sense of the thinking of others. ● Attend to precision: Students will use precise mathematical language and check their work for accuracy.

Chapter 7	Linear Equations and Inequalities
Summary	In this unit, students will learn to use equations and inequalities to model real-world situations and to solve basic linear equations and inequalities, including the following forms/techniques. Students will isolate a variable using inverse operations, combine like terms, balance variables on both sides of an equation or inequality, use the distributive property and write an equation in slope-intercept form.

Graduation Standards: (the number of the standard is referenced in the performance indicators listed in each unit.)

- HS.M.1A - Applies properties of real numbers and quantitative reasoning.

Performance Indicators Assessed in Unit	- AR.A.2 Write expressions in equivalent forms to reveal information and to solve problems. - AR.A.7 Create equations and/or inequalities that describe numbers or relationships. - AR.A.8 Understand solving equations as a process of reasoning and explain the reasoning. - AR.A.9 Solve equations and inequalities in one variable.

Understandings:	Students will know…	Students will be able to…
- There is an order of steps to follow when solving an equation. - The difference between simplifying an expression vs. solving an equation.	- How to identify constants, variables, and like terms. - How to recognize no solution and infinite solution equations. - How to isolate a variable using inverse operations. - How to combine like terms. - How to balance variables on both sides of an equation or inequality. - How to use the distributive property. - How to write an equation in slope-intercept form.	- Make sense of problems and persevere in solving them. - Looks for and expresses regularity in repeated reasoning. - Look for and make use of structure. - Reason abstractly and quantitatively: Students will think about numbers in many ways and make sense of numerical relationships as they solve problems.

Chapter 8	Formulas, Proportion and Variation
Summary	In this unit students are introduced to formulas and proportions. Students apply their knowledge to solving direct and joint variation problems, as well as inverse and combined variation problems.

Graduation Standards: (the number of the standard is referenced in the performance indicators listed in each unit.)

- HS.M.1A Applies properties of real numbers and quantitative reasoning.

Performance Indicators Assessed in Unit	- AR.A.2 Write expressions in equivalent forms to reveal information and to solve problems. - AR.A.7 Create equations and/or inequalities that describe numbers or relationships. - AR.A.8 Understand solving equations as a process of reasoning and explain the reasoning. - AR.A.9 Solve equations and inequalities in one variable.

Understandings:	Students will know…	Students will be able to…
- Proportions can be used to represent and solve real-world problems. - Formulas can be applied to solve real-world problems. - The difference between and direct and inverse proportions and when they are applied.	- How to set up a proportion. - How to cross multiply. - How to use the distributive property. - How to solve one-step and two-step equations.	- Make sense of problems and persevere in solving them. - Looks for and expresses regularity in repeated reasoning. - Look for and make use of structure. - Reason abstractly and quantitatively: Students will think about numbers in many ways and make sense of numerical relationships as they solve problems.

Chapter 9	Linear Equations, Functions and Inequalities in Two Variables
Summary	Students create, interpret, and graph inequalities. Students will continue to describe how variables are related within a given situation, and will create two related

	function rules that each model a distinct relationship in the situation. Graphs, tables of values, and function rules are each used to determine the solution.

Graduation Standards: (the number of the standard is referenced in the performance indicators listed in each unit.)

- HS.M.1A Applies properties of real numbers and quantitative reasoning.
- HS.M.2.A Solves polynomial, rational, radical, and transcendental equations & systems of equations.

Performance Indicators Assessed in Unit	- AR.A.2 Write expressions in equivalent forms to reveal information and to solve problems. - AR.A.7 Create equations and/or inequalities that describe numbers or relationships. - AR.A.8 Understand solving equations as a process of reasoning and explain the reasoning. - AR.A.9 Solve equations and inequalities in one variable.

Understandings:	**Students will know…**	**Students will be able to…**
- Variables are related to each other. - Differences in the types of slopes. - How to convert equations to different forms and when those forms are useful. - Explanations and justifications to solutions of linear inequalities. - Identifications and justifications of solutions for various real-world problems.	- How to plot points on a coordinate plane. - How to find the x- and y-intercepts of a linear equation. - How to find the slope from two points. - How to graph linear equations by completing tables. - How to write and graph an equation in slope-intercept form. - How to graph linear inequalities and determine solutions. - How to use the point-slope form of an equation. - How to change an equation to different forms. - How to identify parallel and perpendicular lines.	- Make sense of problems and persevere in solving them. - Looks for and expresses regularity in repeated reasoning. - Look for and make use of structure. - Reason abstractly and quantitatively: Students will think about numbers in many ways and make sense of numerical relationships as they solve problems. - Look for and express regularity in repeated reasoning: Students will look for patterns and rules to help create general methods and shortcuts that can be

		applied to similar mathematical problems.

Chapter 17	**Geometry**	
Summary	Students are introduced to lines, angles, polygons, circles, radians, volume and surface area. Students will learn the basics of Geometry. The students will first learn what the building blocks to Geometry are which are lines, points, and planes and how they make up shapes, and angles. Students will practice using known formulas for finding the perimeter and area of polygons. Students will calculate the perimeter and area of compound figures formed by combining polygons with three and four sides.	

Graduation Standards: (the number of the standard is referenced in the performance indicators listed in each unit.)

- HS.M.3.A Applies properties of similarity and congruence.
- S.M.3B Analyzes features of 2-D and 3-D shapes.

Performance Indicators Assessed in Unit	- GR.A.1 Experiment with transformations in the plane. - GR.A.2 Understand congruence in terms of rigid motions. - GR.A.9 Understand and apply theorems about circles. - GR.A.13 Explain volume formulas and use them to solve problems. - GR.A.15 Apply geometric concepts in modeling situations. ★

Understandings:	**Students will know…**	**Students will be able to…**
- By looking at shapes, they can identify where the lines, points, and planes are on them. - Students will be able to identity each line segment on a more complex shape without repeating the line segment. - The relationship between perimeter and circumference. - The differences between circumference and area and how they apply to real problems.	- How to identify points, vertices, rays, lines, line segments. - How to classify angles according to size. - How to convert angles measures between decimal degrees and degrees, minutes, and seconds. - How to find the perimeter and area of a polygon using the appropriate formula.	- Use appropriate tools strategically: Students will use math tools such as tables, diagrams, and technology to explore and deepen their understanding of concepts. - Model with mathematics: Students will use representations

● How to identify the sector of a circle. ● The difference between volume and surface area and how they apply to real problems.	● How to find the circumference and area of a circle using the appropriate formula. ● How to find the arc length of a sector. ● How to find the area of a sector or segment. ● How to find the volume and surface area of three-dimensional objects.

to show their thinking in a variety of ways.
● Use appropriate tools strategically: Students will use math tools such as tables, diagrams, and technology to explore and deepen their understanding of concepts.

Chapter 18	**Triangles**
Summary	Students are introduced to the Pythagorean Theorem, inscribed and circumference of regular polygons and circles, distance and midpoints.

Graduation Standards: (the number of the standard is referenced in the performance indicators listed in each unit.)

● HS.M.3.A Applies properties of similarity and congruence.

Performance Indicators Assessed in Unit	● GR.A.1 Experiment with transformations in the plane. ● GR.A.2 Understand congruence in terms of rigid motions. ● GR.A.4 Make geometric constructions. ● GR.A.6 Prove theorems involving similarity using a variety of ways of writing proofs, showing validity of underlying reasoning.

Understandings:	**Students will know…**	**Students will be able to…**
● Triangles are the basis for all other polygons, so understanding their properties will help to understand all other Geometry concepts. ● There are multiple ways to prove triangles are congruent to each other. ● There are minimum	● How to classify triangles ● How to apply the triangle sum theorem, exterior angle theorem ● Methods to determine congruence. ● How to apply the properties of isosceles and equilateral triangles.	● Model with mathematics: Students will use representations to show their thinking in a variety of ways. ● Use appropriate tools strategically: Students will use math tools such

requirements for proving that triangles must be congruent.	- How to apply triangle inequality theorem, inequalities in triangles, special segments of triangles. - How to use ratios and proportions to solve problems. - Identify similar polygons. - Method to determine similarity. - Prove that triangles are similar. - Use similar triangles to solve problems. - Prove triangles congruent. - Solve problems using the Pythagorean Theorem and its converse. - How to solve special right triangles. - Use right triangle trig to solve triangles. - How to solve problems of elevation and depression.	as tables, diagrams, and technology to explore and deepen their understanding of concepts. ● Look for and make use of structure: Students will use their current mathematical understandings to identify patterns and structure to make sense of new learning.

Chapter 19	**Right-Triangle Trigonometry**	
Summary	Students expand their understanding of similar triangles to develop an understanding of the trigonometric ratios. Students apply their understanding of the trigonometric ratios and the Pythagorean Theorem to solve problems in which right triangles can be found. Students apply similarity in right triangles to understand right triangle trigonometry, with particular attention to special right triangles and the Pythagorean Theorem.	

Graduation Standards: (the number of the standard is referenced in the performance indicators listed in each unit.)

● HS.M.3.A Applies properties of similarity and congruence.

Performance Indicators Assessed in Unit	● GR.A.6 Prove theorems involving similarity using a variety of ways of writing proofs, showing validity of underlying reasoning. ● GR.A.7 Define trigonometric ratios and solve problems involving right triangles. ● GR.A.8 (+) Apply trigonometry to general triangles.

Understandings:	Students will know…	Students will be able to…
● There is a relationship between sine and cosine of two base angles in a right triangle. ● You can find any trigonometric ratios in a right triangle given at least two of its sides. ● How to find a trigonometric ratio in a right triangle given another trigonometric ratio.	● Label sides and angles of right triangles. ● Find unknown angle measures in right triangles using sine, cosine and tangent ratios. ● Interpret and solve real-life and applied problems using right triangle trigonometry. ● Draw a figure for a question and use it to find an unknown angle in a right triangle.	● Model with mathematics: Students will use representations to show their thinking in a variety of ways. ● Use appropriate tools strategically: Students will use math tools such as tables, diagrams, and technology to explore and deepen their understanding of concepts. ● Look for and make use of structure: Students will use their current mathematical understandings to identify patterns and structure to make sense of new learning. ● Attend to precision: Students will use precise mathematical language and check their work for accuracy.

Final Grade

You will receive 2 separate grades for this course: EMCC grade and HHS grade.

EMCC Grade: Minimum score of 60 = Passing.
70% of Grade = Average of 4 Exams; 30% of Grade = Average of Formative work.

HHS Grade: Minimum score of 70 = Passing. 70% of Grade = Average of 4 Exams and Quizzes; 30% of Grade = Average of Formative work.

Summative Assessments Retake

- Summative assessments will be 70% of the grade.
- Students have the opportunity to retake summative assessments.
- The student must submit a retake form to the teacher within five (5) school days of the date that the summative assessment score is reported to the student.
- The highest score a student can receive on a retake or late assessment is a 75.
- The score achieved on a retake will replace the current score (even if the score is lower).
- If a student is making up a test from an absence, that assessment will be graded up to 100.

Finals
- An end of course Final Exam will be conducted, making up 10% of the students overall grade.

Make-up Work

Upon their return to school from an absence, it is the student's responsibility to secure make-up work from their teacher. The due date of the missed work will be one additional class period for each day of absence from that class or at the discretion of the teacher.

Grading of Formative Assessments

- Formative assessments will count as 30% of the grade.
- Formative assessments may be scored on either a 0 - 100 scale or a 0 - 4 scale.
- The 0 - 4 scale will be represented in Power School as 4 = 100, 3 = 87, 2 = 77, and 1 = 67.
- The method of scoring of formative assessments will be determined by assignment.