Wisconsin Indianhead Technical College

10804113 College Technical Mathematics 1A

Course Outcome Summary

Course Information

Description	Topics include: solving linear equations, graphing, percent, proportions, measurement systems, computational geometry, and right triangle trigonometry. Emphasis will be on the application of skills to technical problems. Successful completion of College Technical Mathematics 1A and College Technical Mathematics 1B is the equivalent of College Technical Mathematics. PREREQUISITE: Successful scores on placement test or 10834109 Pre-Algebra.
Instructional Level	Associate Degree
Total Credits	3.00
Total Hours	48.00
Prior Learning Assessments	• Challenge Exam

Course History

Revised By	Andrea Schullo (andrea.schullo)
Last Approval Date	8/25/2016

Purpose/Goals

This course outcome summary includes the competencies and criteria for College Technical Mathematics 1A (10-804-113). This course is part of the General Studies Core offered throughout the Wisconsin Technical College System (WTCS). The course competencies are consistent among the colleges and are at baccalaureate level to accommodate student success in transfer to four-year colleges.

Course Competencies

1.   Perform basic operations with real numbers
Domain   Cognitive   *Level*   Applying   *Status*   Active

Assessment Strategies
1.1.   oral, written, or graphic product

Criteria

Criteria: Performance will be satisfactory when:

1.1.   you perform the arithmetic operations in proper sequence
1.2.   you simplify expressions using the laws of exponents
1.3.   you evaluate numeric expressions containing exponents
1.4.   you convert numbers between decimal notation and scientific and/or engineering notation
1.5.   you perform arithmetic operations with numbers in scientific notation
1.6.   you calculate powers and roots with numbers in scientific notation
1.7.   you apply skill to technical problems
1.8.   you utilize appropriate technology
1.9.   you apply the process for solving technical problems according to the problem-solving criteria (i.e. show work in a clear and logical manner, verify the solution, solution is within stated range and reflects appropriate accuracy or precision, solution is labeled with appropriate units)
1.10.   you express angles in radian, degree, or revolution measurement

Learning Objectives

1.a.   Apply the order of operations to evaluate mathematical expressions
1.b.   Apply rounding rules for accuracy and precision to numerical calculations
1.c.   Simplify expressions involving exponents and radicals
1.d.   Convert numbers between decimal notation, scientific notation and engineering notation
1.e.   Perform arithmetic using scientific notation
1.f.   Convert angle measures from one unit of measure (degrees, radians, revolutions) to another
1.g.   Solve technical problems using the basic operations with real numbers

2.   Solve linear equations
Domain   Cognitive   Level   Applying   Status   Active

Assessment Strategies

2.1.   oral, written, or graphic product

Criteria

Criteria: Performance will be satisfactory when:

2.1.   you solve linear equations in one variable
2.2.   you rearrange a formula to solve for an indicated first-degree variable
2.3.   you represent unknown(s) with a variable and translate English phrases into equations
2.4.   you substitute given number for variables into formula or equation
2.5.   you apply skill to technical problems
2.6.   you utilize appropriate technology
2.7.   you apply the process for solving technical problems according to the problem-solving criteria (i.e. show work in a clear and logical manner, you verify the solution, solution is within stated range and reflects appropriate accuracy or precision, solution is labeled with appropriate units)

Learning Objectives

2.a.   Solve linear equations in one variable
2.b.   Rearrange a formula to solve for any indicated first-degree variable
2.c.   Assign a variable to an unknown quantity in an English phrase and translate that phrase into an equation
2.d.   Substitute numbers for variables in equations and formulas
2.e.   Solve technical problems using linear equations

3.   Solve problems using percent and proportion
Domain   Cognitive   Level   Applying   Status   Active

Assessment Strategies

3.1.   oral, written, or graphic product

Criteria

Criteria: Performance will be satisfactory when:

3.1.   you perform conversions among fractions, decimals, and percent
3.2.   you write an equation representing the problem
3.3.   you solve the equation
3.4.   you apply skill to technical problems

3.5.   you utilize appropriate technology
3.6.   you apply the process for solving technical problems according to the problem-solving criteria (i.e. you show work in a clear and logical manner, you verify the solution, solution is within stated range and reflects appropriate accuracy or precision, solution is labeled with appropriate units)

Learning Objectives
3.a.   Determine if a proportion is true or false
3.b.   Solve proportions for unknown values
3.c.   Identify problems which can be solved with proportions
3.d.   Use proportions to solve technical problems
3.e.   Perform conversions among fractions, decimals, and percent
3.f.   Identify problems which can be solved with the portion formula
3.g.   Solve percent problems for unknown values using the portion formula, portion = base x rate

4.   Solve variation problems
Domain   *Cognitive*   ***Level***   *Applying*   ***Status***   *Active*

Assessment Strategies
4.1.   oral, written, or graphic product

Criteria

Criteria: Performance will be satisfactory when:
4.1.   you identify the type of variation
4.2.   you write the variation equation
4.3.   you solve direct variation problems
4.4.   you solve inverse variation problems
4.5.   you solve joint and combined variation problems
4.6.   you apply skill to technical problems
4.7.   you utilize appropriate technology
4.8.   you apply the process for solving technical problems according to the problem-solving criteria (i.e. you show work in a clear and logical manner, you verify the solution, solution is within stated range and reflects appropriate accuracy or precision, solution is labeled with appropriate units)

Learning Objectives
4.a.   Describe the types of mathematical variation: direct, inverse, joint and combined
4.b.   Identify variation in a technical problem as direct, inverse, joint or combined
4.c.   Write an equation to represent a given type of variation
4.d.   Use variation (direct, inverse, joint and combined) to solve technical problems

5.   Graph algebraic functions
Domain   *Cognitive*   ***Level***   *Applying*   ***Status***   *Active*

Assessment Strategies
5.1.   oral, written, or graphic product

Criteria

Criteria: Performance will be satisfactory when:
5.1.   you determine ordered pairs from a given graph
5.2.   you differentiate a function from a relation
5.3.   you utilize function notation
5.4.   you identify range and domain of a given function
5.5.   you graph linear and quadratic functions on the Cartesian plane
5.6.   you apply skill to technical problems
5.7.   you utilize appropriate technology
5.8.   you apply the process for solving technical problems according to the problem-solving criteria (i.e. you show work in a clear and logical manner, you verify the solution, solution is within stated range and reflects appropriate accuracy or precision, solution is labeled with appropriate units)

Learning Objectives
5.a.   Create a graph by plotting a set of ordered pairs
5.b.   Identify a set of ordered pairs from a graph

5.c.   Determine whether a relation is a function
5.d.   Represent functions using words, equations, tables or graphs
5.e.   Identify the domain (input) and range (output) of a given function
5.f.   Use function notation to identify function inputs and outputs
5.g.   Graph linear functions on a Cartesian coordinate plane
5.h.   Graph quadratic functions on a Cartesian coordinate plane
5.i.   Use a graphing calculator or graphing software to graph functions
5.j.   Use functions to solve technical problems

6.   Relate the equation of a line to its graph
Domain   Cognitive   Level   Applying   Status   Active

Assessment Strategies
6.1.   oral, written, or graphic product

Criteria

Criteria: Performance will be satisfactory when:
6.1.   you calculate the distance between two points
6.2.   you calculate the slope of a line given two points on the line
6.3.   you determine the slope of a line parallel to a given line
6.4.   you determine the slope of a line perpendicular to a given line
6.5.   you write the equation of a line using the slope-intercept form, the point-slope form, or the two-point form
6.6.   you apply skill to technical problems
6.7.   you utilize appropriate technology
6.8.   you apply the process for solving technical problems according to the problem-solving criteria (i.e. you show work in a clear and logical manner, you verify the solution, solution is within stated range and reflects appropriate accuracy or precision, solution is labeled with appropriate units)

Learning Objectives
6.a.   Calculate the distance between two points
6.b.   Graph a line given its equation
6.c.   Find the equation of a line given its graph
6.d.   Calculate the slope of a line given two points on the line
6.e.   Determine the slope of a line parallel to a given line
6.f.   Determine the slope of a line perpendicular to a given line
6.g.   Write the equation of a line using the slope-intercept form, point-slope form, or the two-point form
6.h.   Solve technical problems using the equation of a line or its graph

7.   Convert units of measure
Domain   Cognitive   Level   Applying   Status   Active

Assessment Strategies
7.1.   oral, written, or graphic product

Criteria

Performance will be satisfactory when:
7.1.   you convert within SI (metric)
7.2.   you convert within USCS (United States Customary System)
7.3.   you convert between USCS and SI units
7.4.   you apply skill to technical problems
7.5.   you utilize appropriate technology
7.6.   you apply the process for solving technical problems according to the problem-solving criteria (i.e. you show work in a clear and logical manner, you verify the solution, solution is within stated range and reflects appropriate accuracy or precision, solution is labeled with appropriate units)

Learning Objectives
7.a.   Use dimensional analysis to convert from one unit of measure to another
7.b.   Convert within the metric system
7.c.   Convert within the U.S. customary system
7.d.   Convert between the U.S. customary system and the metric system
7.e.   Solve technical problems by converting from one unit of measure to another

8.   **Compute angle measures, length of sides, perimeter, and area of plane geometric figures**
      Domain   *Cognitive*   *Level*   *Applying*   *Status*   *Active*

      Assessment Strategies
      8.1.   oral, written, or graphic product

      Criteria

      Performance will be satisfactory when:
      8.1.   you calculate the measure of the specified angle(s) of polygons
      8.2.   you calculate the circumference, perimeter, and area of plane figures including composite figures
      8.3.   you calculate a specified side of similar polygons
      8.4.   you apply skill to technical problems
      8.5.   you utilize appropriate technology
      8.6.   you apply the process for solving technical problems according to the problem-solving criteria (i.e. you show work in a clear and logical manner, you verify the solution, solution is within stated range and reflects appropriate accuracy or precision, solution is labeled with appropriate units)

      Learning Objectives
      8.a.   Apply principles of geometry to find the measure of specified angles within a polygon
      8.b.   Calculate the circumference and area of circles
      8.c.   Calculate the perimeter and area of plane figures
      8.d.   Calculate the area of composite figures
      8.e.   Apply principles of similarity to find missing parts of similar polygons
      8.f.   Solve technical problems using principles of geometry

9.   **Calculate surface area, volume, and weight/mass**
      Domain   *Cognitive*   *Level*   *Applying*   *Status*   *Active*

      Assessment Strategies
      9.1.   oral, written, or graphic product

      Criteria

      Performance will be satisfactory when:
      9.1.   you calculate the surface area of solids
      9.2.   you calculate the volume of solids
      9.3.   you identify the density of a given material
      9.4.   you calculate the weight/mass of a solid or liquid
      9.5.   you apply skill to technical problems
      9.6.   you utilize appropriate technology
      9.7.   you apply the process for solving technical problems according to the problem-solving criteria (i.e. you show work in a clear and logical manner, you verify the solution, solution is within stated range and reflects appropriate accuracy or precision, solution is labeled with appropriate units)

      Learning Objectives
      9.a.   Calculate the surface area of geometric solids
      9.b.   Calculate the volume of geometric solids
      9.c.   Calculate the density of a given material
      9.d.   Calculate the weight/mass of a geometric solid
      9.e.   Solve technical problems using surface area, volume, density and weight/mass

10.   **Solve right triangles**
      Domain   *Cognitive*   *Level*   *Applying*   *Status*   *Active*

      Assessment Strategies
      10.1.   oral, written, or graphic product

      Criteria

      Performance will be satisfactory when:
      10.1.   you use the angle-sum principle to compute the third angle of a triangle

10.2.   you use the Pythagorean Theorem to compute a side of a right triangle

10.3.   you use sine, cosine, and tangent ratios to compute sides and/or angles of right triangles

10.4.   you apply skill to technical problems such as vectors

10.5.   you utilize appropriate technology

10.6.   you apply the process for solving technical problems according to the problem-solving criteria (i.e. you show work in a clear and logical manner, you verify the solution, solution is within stated range and reflects appropriate accuracy or precision, solution is labeled with appropriate units)

Learning Objectives

10.a.   Use the angle sum principle to compute a missing angle of a triangle

10.b.   Use the Pythagorean Theorem to determine a missing side of a right triangle

10.c.   Use the trigonometric ratios to compute sides and/or angle of right triangles

10.d.   Solve technical problems using the trigonometric ratios