

WTCS Repository

10-804-115 College Technical Mathematics 1

Course Outcome Summary

Course Information

Description Topics include: solving linear, quadratic, and rational equations; graphing; formula rearrangement; solving systems of equations; percent; proportions; measurement systems; computational geometry; right and oblique triangle trigonometry; and operations on polynomials. Emphasis will be on the application of skills to technical problems. This course is the equivalent of successful completion of College Technical Mathematics 1A and College Technical Mathematics 1B.

Total Credits 5.00

Pre/Corequisites

Prerequisite Each Wisconsin Technical College determines the General Education course prerequisites used by their academic institution. If prerequisites for a course are determined to be appropriate, the final Course Outcome Summary must identify the prerequisites approved for use by the individual Technical College.

Course Competencies

1. Perform basic operations with real numbers

Assessment Strategies

1.1. in an oral, written, or graphic product

Criteria

Performance will be satisfactory when you:

- 1.1. perform the arithmetic operations in proper sequence
- 1.2. simplify expressions using the laws of exponents
- 1.3. evaluate numeric expressions containing exponents
- 1.4. convert numbers between decimal notation and scientific and/or engineering notation.
- 1.5. perform arithmetic operations with numbers in scientific notation
- 1.6. calculate powers and roots with numbers in scientific notation
- 1.7. express angles in radian, degree, or revolution measurement
- 1.8. apply skill to technical problems
- 1.9. utilize appropriate technology
- 1.10. 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)

2. Solve linear equations

Assessment Strategies

2.1. in an oral, written, or graphic product

Criteria

Performance will be satisfactory when you:

- 2.1. solve linear equations in one variable
- 2.2. rearrange a formula to solve for an indicated first-degree variable
- 2.3. represent unknown(s) with a variable and translate English phrases into equations
- 2.4. substitute given number for variables into formula or equation
- 2.5. apply skill to technical problems
- 2.6. utilize appropriate technology
- 2.7. 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)

3. Solve problems using percent and proportion

Assessment Strategies

- 3.1. in an oral, written, or graphic product

Criteria

Performance will be satisfactory when you:

- 3.1. perform conversions among fractions, decimals, and percent
- 3.2. write an equation representing the problem
- 3.3. solve the equation
- 3.4. apply skill to technical problems
- 3.5. utilize appropriate technology
- 3.6. 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)

4. Solve variation problems

Assessment Strategies

- 4.1. in an oral, written, or graphic product

Criteria

Performance will be satisfactory when you:

- 4.1. identify the type of variation
- 4.2. write the variation equation
- 4.3. solve direct variation problems
- 4.4. solve inverse variation problems
- 4.5. solve joint and combined variation problems
- 4.6. apply skill to technical problems
- 4.7. utilize appropriate technology
- 4.8. 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)

5. Perform operations on polynomials

Assessment Strategies

- 5.1. in an oral, written, or graphic product

Criteria

Performance will be satisfactory when you:

- 5.1. add, subtract, multiply, and divide polynomials
- 5.2. utilize appropriate technology
- 5.3. 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)

6. Factor algebraic expressions

Assessment Strategies

- 6.1. in an oral, written, or graphic product

Criteria

Performance will be satisfactory when you:

- 6.1. factor using the greatest common factor
- 6.2. factor binomials and trinomials
- 6.3. apply skill to technical problems
- 6.4. utilize appropriate technology
- 6.5. 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)

7. Solve quadratic equations over the set of real numbers

Assessment Strategies

- 7.1. in an oral, written, or graphic product

Criteria

Performance will be satisfactory when you:

- 7.1. identify coefficients of a quadratic equation in standard form
- 7.2. select appropriate method for solving second degree equations
- 7.3. generate the equation which satisfies the conditions of the problem
- 7.4. solve second degree equation using the selected method
- 7.5. select relevant solution(s)
- 7.6. apply skill to technical problems
- 7.7. utilize appropriate technology
- 7.8. 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)

8. Perform operations with rational expressions

Assessment Strategies

- 8.1. in an oral, written, or graphic product

Criteria

Performance will be satisfactory when you:

- 8.1. add, subtract, multiply, and divide rational expressions
- 8.2. apply skill to an applied technical problem
- 8.3. simplify complex fractions
- 8.4. utilize appropriate technology
- 8.5. 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)

9. Solve rational equations

Assessment Strategies

- 9.1. in an oral, written, or graphic product

Criteria

Performance will be satisfactory when you:

- 9.1. apply multiplication property to clear all denominators
- 9.2. solve equations
- 9.3. identify extraneous solutions
- 9.4. apply skill to technical problems

- 9.5. utilize appropriate technology
- 9.6. 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)

10. Graph algebraic functions

Assessment Strategies

- 10.1. in an oral, written, or graphic product

Criteria

Performance will be satisfactory when you:

- 10.1. determine ordered pairs from a given graph
- 10.2. differentiate a function from a relation
- 10.3. utilize function notation
- 10.4. identify range and domain of a given function
- 10.5. graph linear and quadratic functions on the Cartesian plane
- 10.6. apply skill to technical problems
- 10.7. utilize appropriate technology
- 10.8. 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)

11. Relate the equation of a line to its graph

Assessment Strategies

- 11.1. in an oral, written, or graphic product

Criteria

Performance will be satisfactory when you:

- 11.1. calculate the distance between two points
- 11.2. calculate the slope of a line given two points on the line
- 11.3. determine the slope of a line parallel to a given line
- 11.4. determine the slope of a line perpendicular to a given line
- 11.5. write the equation of a line using the slope-intercept form, the point-slope form, or the two-point form
- 11.6. apply skill to technical problems
- 11.7. utilize appropriate technology
- 11.8. 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)

12. Solve systems of equations

Assessment Strategies

- 12.1. in an oral, written, or graphic product

Criteria

Performance will be satisfactory when you:

- 12.1. solve systems of two and three equations or formulas
- 12.2. check all solutions in the system
- 12.3. apply skill to technical problems
- 12.4. utilize appropriate technology
- 12.5. 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)

13. Convert units of measure

Assessment Strategies

- 13.1. in an oral, written, or graphic product

Criteria

Performance will be satisfactory when you:

- 13.1. convert within SI (metric)
- 13.2. convert within USCS (United States Customary System)
- 13.3. convert between USCS and SI units
- 13.4. apply skill to technical problems
- 13.5. utilize appropriate technology
- 13.6. 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)

14. Compute angle measures, length of sides, perimeter, and area of plane geometric figures

Assessment Strategies

- 14.1. in an oral, written, or graphic product

Criteria

Performance will be satisfactory when you:

- 14.1. calculate the measure of the specified angle(s) of polygons
- 14.2. calculate the circumference, perimeter, and area of plane figures including composite figures
- 14.3. calculate a specified side of similar polygons
- 14.4. apply skill to technical problems
- 14.5. utilize appropriate technology
- 14.6. 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)

15. Calculate surface area, volume, and weight/mass

Assessment Strategies

- 15.1. in an oral, written, or graphic product

Criteria

Performance will be satisfactory when you:

- 15.1. calculate the surface area of solids
- 15.2. calculate the volume of solids
- 15.3. you identify the density of a given material
- 15.4. calculate the weight/mass of a solid or liquid
- 15.5. apply skill to technical problems
- 15.6. utilize appropriate technology
- 15.7. 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)

16. Solve right triangles

Assessment Strategies

- 16.1. in an oral, written, or graphic product

Criteria

Performance will be satisfactory when you:

- 16.1. use the angle-sum principle to compute the third angle of a triangle
- 16.2. use the Pythagorean Theorem to compute a side of a right triangle
- 16.3. use sine, cosine, and tangent ratios to compute sides and/or angles of right triangles
- 16.4. apply skill to technical problems such as vectors
- 16.5. utilize appropriate technology
- 16.6. 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)

17. Solve oblique triangles

Assessment Strategies

17.1. in an oral, written, or graphic product

Criteria

Performance will be satisfactory when you:

- 17.1. use the Law of Cosines, Law of Sines, and right triangle methods when appropriate
- 17.2. relate angle in standard position to its reference angle
- 17.3. apply skill to technical problems such as vectors
- 17.4. utilize appropriate technology
- 17.5. 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)