

## WTCS Repository

# 10-804-116 College Technical Math 2

## Course Outcome Summary

### Course Information

**Description** Topics include: vectors; trigonometric functions and their graphs; identities; exponential and logarithmic functions and equations; radical equations; equations with rational exponents; dimension of a circle; velocity; sine and cosine graphs; complex numbers in polar and rectangular form; trigonometric equations; conic sections; and analysis of statistical data. Emphasis will be on the application of skills to technical problems.

**Total Credits** 4.00

### 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. Graph exponential and logarithmic functions

##### Assessment Strategies

1.1. in an oral, written, or graphic product

##### Criteria

*Performance will be satisfactory when you:*

- 1.1. graph exponential functions
- 1.2. graph logarithmic functions
- 1.3. relate logarithmic functions to its inverse function
- 1.4. graph functions on logarithmic or semi-logarithmic scales
- 1.5. apply skill to technical problems
- 1.6. utilize appropriate technology
- 1.7. 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)

#### 2. Solve exponential and logarithmic equations

##### Assessment Strategies

2.1. in an oral, written, or graphic product

##### Criteria

*Performance will be satisfactory when you:*

- 2.1. solve exponential equations
- 2.2. solve logarithmic equations

- 2.3. solve applied problems involving exponential or logarithmic equations, such as growth and decay
- 2.4. utilize appropriate technology
- 2.5. 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)

### **3. Perform operations with exponents and radicals**

#### **Assessment Strategies**

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

#### **Criteria**

*Performance will be satisfactory when you:*

- 3.1. evaluate an expression containing rational powers on numbers with rational roots
- 3.2. convert between rational powers and radical notation
- 3.3. simplify radical expressions

### **4. Solve equations with radicals and rational exponents**

#### **Assessment Strategies**

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

#### **Criteria**

*Performance will be satisfactory when you:*

- 4.1. convert between radical and fractional exponent form
- 4.2. solve radical equations involving one variable
- 4.3. solve equations with fractional exponents
- 4.4. verify solutions by substitution into the original equation
- 4.5. apply skill to technical problems
- 4.6. utilize appropriate technology
- 4.7. 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)

### **5. Use formulas involving radicals and exponents**

#### **Assessment Strategies**

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

#### **Criteria**

*Performance will be satisfactory when you:*

- 5.1. choose formula when appropriate
- 5.2. identify unknown value(s)
- 5.3. relate the given values to the variables in the formula formed after given values are substituted into a formula that includes radical expressions
- 5.4. transform a formula by isolating a variable which is contained in a radical expression
- 5.5. solve equations formed after given values are substituted into a formula that includes radical expressions
- 5.6. apply skill to technical problems
- 5.7. utilize appropriate technology
- 5.8. 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)

### **6. Calculate unknown dimensions as related to a circle**

#### **Assessment Strategies**

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

#### **Criteria**

*Performance will be satisfactory when you:*

- 6.1. calculate the length of a circular arc, given the radius and central angle
- 6.2. calculate the central angle and the chord depth, given the radius and chord length of a circle

- 6.3. calculate the area of a sector of a circle, given the radius and central angle
- 6.4. calculate the area of a segment of a circle, given the radius, central angle, and area of sector to which the segment belongs
- 6.5. calculate the length of a chord, given the radius and the angle between the chord and a tangent at one end of the chord
- 6.6. calculate the angle between two tangents, given the radius of a circle and the length of the segments attached to the circle
- 6.7. apply skill to technical problems
- 6.8. utilize appropriate technology
- 6.9. 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 rotational, linear, and angular velocity problems

### Assessment Strategies

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

### Criteria

*Performance will be satisfactory when you:*

- 7.1. calculate the linear velocity of a point on the circumference of a wheel, given either the diameter or radius and the angular velocity
- 7.2. calculate the angular velocity of a point on the circumference of a wheel when given either the diameter or radius and the linear velocity
- 7.3. convert between radians over time and revolutions over time
- 7.4. apply skill to technical problems
- 7.5. utilize appropriate technology
- 7.6. 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)

## 8. Perform operations with vectors

### Assessment Strategies

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

### Criteria

*Performance will be satisfactory when you:*

- 8.1. determine the resultant of two or more vectors
- 8.2. resolve vectors by components
- 8.3. apply skill to technical problems
- 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. Perform arithmetic operations using complex numbers in both polar and rectangular forms

### Assessment Strategies

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

### Criteria

*Performance will be satisfactory when you:*

- 9.1. add, subtract, multiply, and divide in rectangular form
- 9.2. multiply and divide in polar form
- 9.3. apply skill to technical problems
- 9.4. utilize appropriate technology
- 9.5. 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)

## 10. Relate complex (rectangular) notation to polar notation

### Assessment Strategies

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

### Criteria

*Performance will be satisfactory when you:*

- 10.1. convert between polar and rectangular form
- 10.2. use the quadratic equation to find non-real solutions
- 10.3. apply skill to technical problems
- 10.4. utilize appropriate technology
- 10.5. 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)

## 11. Interpret sine/cosine graphs

### Assessment Strategies

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

### Criteria

*Performance will be satisfactory when you:*

- 11.1. identify the amplitude from a sine or cosine wave graph
- 11.2. identify the phase shift
- 11.3. write the equation of a sine/cosine graph
- 11.4. label amplitude, period, phase shift, and frequency for graph
- 11.5. apply skill to technical problems
- 11.6. utilize appropriate technology
- 11.7. 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)

## 12. Graph sine/cosine waves

### Assessment Strategies

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

### Criteria

*Performance will be satisfactory when you:*

- 12.1. plot a graph of sine/cosine wave from an equation
- 12.2. plot a graph of sine/cosine wave given the amplitude, frequency, and phase shift
- 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. Solve trigonometric equations

### Assessment Strategies

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

### Criteria

*Performance will be satisfactory when you:*

- 13.1. manipulate identities
- 13.2. factor trigonometric expressions
- 13.3. write a trigonometric expression in terms of sine and cosine
- 13.4. solve trigonometric equations with multiple solutions
- 13.5. apply skill to technical problems
- 13.6. utilize appropriate technology

- 13.7. 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)

## **14. Analyze the equations of conic sections and their graphs**

### **Assessment Strategies**

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

### **Criteria**

*Performance will be satisfactory when you:*

- 14.1. determine, by inspection, whether a given second-degree equation represents a circle, ellipse, parabola, or hyperbola
- 14.2. write the equation of a circle, ellipse, parabola, or hyperbola from given information
- 14.3. construct a graph of any of the conic sections from equation(s)
- 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. Analyze data statistically**

### **Assessment Strategies**

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

### **Criteria**

*Performance will be satisfactory when you:*

- 15.1. calculate measures of central tendency
- 15.2. calculate measures of dispersion
- 15.3. construct a graph that describes data
- 15.4. interpret data in terms of statistics
- 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)