Western Technical College

10804113 College Technical Math (CTM) 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 1.
Instructional Level	Associate Degree Courses
Total Credits	3
Total Hours	54

Textbooks

Elementary Technical Mathematics – with WebAssign. 12th Edition. Copyright 2019. Ewen, Dale. Publisher: Cengage Learning. **ISBN-13:** 978-1-337-63066-5. Required.

Learner Supplies

Scientific calculator - $10-20. **Vendor:** Campus Shop. Required.

Webcam. **Vendor:** Campus Shop. Required for Computer Conferencing and Online classes only.

Success Abilities

1. Cultivate Passion: Expand a Growth-Mindset
2. Live Responsibly: Develop Resilience
3. Live Responsibly: Foster Accountability

4. Refine Professionalism: Improve Critical Thinking

Course Competencies

1. Perform basic operations with real numbers.

Assessment Strategies

1.1. in an oral, written, or graphic product

Criteria

You will know you are successful 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 solve technical mathematical problems.
1.8. you express angles in radian, degree, or revolution measurement.
1.9. you apply the process for solving technical problems according to the problem-solving criteria.

Learning Objectives

1.a. Perform the arithmetic operations in proper sequence.
1.b. Simplify expressions using the laws of exponents.
1.c. Evaluate numeric expressions containing exponents.
1.d. Convert numbers between decimal notation and scientific and/or engineering notation.
1.e. Perform arithmetic operations with numbers in scientific notation.
1.f. Calculate powers and roots with numbers in scientific notation.
1.g. Express angles in radian, degree, or revolution measurement.
1.h. Show your work.
1.i. Verify solution.
1.j. Label units.

2. Solve linear equations.

Assessment Strategies

2.1. in an oral, written, or graphic product

Criteria

You will know you are successful 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 solve technical mathematical problems.
2.6. you apply the process for solving technical problems according to the problem-solving criteria.

Learning Objectives

2.a. Solve linear equations in one variable.
2.b. Rearrange a formula to solve for an indicated first-degree variable.
2.c. Represent unknown(s) with a variable and translate English phrases into equations.
2.d. Substitute given number for variables into formula or equation.
2.e. Apply skill to technical problems.
2.f. Utilize appropriate technology.
2.g. Show work in a clear and logical manner.
2.h. Verify the solution: solution is within stated range and reflects appropriate accuracy or precision.
2.i. 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

You will know you are successful 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 solve technical mathematical problems.
3.5. you apply the process for solving technical problems according to the problem-solving criteria.

Learning Objectives

3.a. Perform conversions among fractions, decimals, and percent.
3.b. Write an equation representing the problem.
3.c. Solve the equation.
3.d. Apply skill to technical problems.
3.e. Utilize appropriate technology.
3.f. Show work in a clear and logical manner.
3.g. Verify the solution: solution is within stated range and reflects appropriate accuracy or precision.
3.h. Solution is labeled with appropriate units.

4. Solve variation problems.

Assessment Strategies

4.1. in an oral, written, or graphic product

Criteria

You will know you are successful 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 solve technical mathematical problems.
4.7. you apply the process for solving technical problems according to the problem-solving criteria.

Learning Objectives

4.a. Identify the type of variation.
4.b. Write the variation equation.
4.c. Solve direct variation problems.
4.d. Solve inverse variation problems.
4.e. Solve joint and combined variation problems.
4.f. Apply skill to technical problems.
4.g. Utilize appropriate technology.
4.h. Show work in a clear and logical manner.
4.i. Verify the solution: solution is within stated range and reflects appropriate accuracy or precision.
4.j. Solution is labeled with appropriate units.

5. Graph algebraic functions.

Assessment Strategies

5.1. in an oral, written, or graphic product

Criteria

You will know you are successful when

5.1. you determine ordered pairs from a given graph.
5.2. you differentiate a function from a relation.
5.3. you use 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 solve technical mathematical problems.
5.7. you apply the process for solving technical problems according to the problem-solving criteria.

Learning Objectives

5.a. Determine ordered pairs from a given graph.
5.b. You differentiate a function from a relation.
5.c. You utilize function notation.
5.d. Identify range and domain of a given function.
5.e. Graph linear and quadratic functions on the Cartesian plane.
5.f. Apply skill to technical problems.
5.g. Utilize appropriate technology.
5.h. Show work in a clear and logical manner.
5.i. Verify the solution: solution is within stated range and reflects appropriate accuracy or precision.
5.j. Solution is labeled with appropriate units.

6. Relate the equation of a line to its graph.

Assessment Strategies

6.1. in an oral, written, or graphic product

Criteria

You will know you are successful 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 solve technical mathematical problems.
6.7. you apply the process for solving technical problems according to the problem-solving criteria.

Learning Objectives

6.a. Calculate the distance between two points.
6.b. Calculate the slope of a line given two points on the line.
6.c. Determine the slope of a line parallel to a given line.
6.d. Determine the slope of a line perpendicular to a given line.
6.e. Write the equation of a line using the slope-intercept form, the point-slope form, or the two-point form.
6.f. Apply skill to technical problems.
6.g. Utilize appropriate technology.
6.h. Show work in a clear and logical manner.
6.i. Verify the solution: solution is within stated range and reflects appropriate accuracy or precision.
6.j. Solution is labeled with appropriate units.

7. Convert units of measure.

Assessment Strategies

7.1. in an oral, written, or graphic product

Criteria

You will know you are successful 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 solve technical mathematical problems.
7.5. you apply the process for solving technical problems according to the problem-solving criteria.

Learning Objectives

7.a. Convert within SI (metric).
7.b. Convert within USCS (United States Customary System).
7.c. Convert between USCS and SI units.
7.d. Apply skill to technical problems.
7.e. Utilize appropriate technology.
7.f. Show work in a clear and logical manner.
7.g. Verify the solution: solution is within stated range and reflects appropriate accuracy or precision.

7.h. Solution is labeled with appropriate units.

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

Assessment Strategies

8.1. in an oral, written, or graphic product

Criteria

You will know you are successful 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 solve technical mathematical problems.
8.5. you apply the process for solving technical problems according to the problem-solving criteria.

Learning Objectives

8.a. Calculate the measure of the specified angle(s) of polygons.
8.b. Calculate the circumference, perimeter, and area of plane figures including composite figures.
8.c. Calculate a specified side of similar polygons.
8.d. Apply skill to technical problems.
8.e. Utilize appropriate technology.
8.f. Show work in a clear and logical manner.
8.g. Verify the solution: solution is within stated range and reflects appropriate accuracy or precision.
8.h. Solution is labeled with appropriate units.

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

Assessment Strategies

9.1. in an oral, written, or graphic product

Criteria

You will know you are successful 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 solve technical mathematical problems.
9.6. you apply the process for solving technical problems according to the problem-solving criteria.

Learning Objectives

9.a. Calculate the surface area of solids.
9.b. Calculate the volume of solids.
9.c. Identify the density of a given material.
9.d. Calculate the weight/mass of a solid or liquid.
9.e. Apply skill to technical problems.
9.f. Utilize appropriate technology.
9.g. Show work in a clear and logical manner.
9.h. Verify the solution: solution is within stated range and reflects appropriate accuracy or precision.
9.i. Solution is labeled with appropriate units.

10. Solve right triangles.

Assessment Strategies

10.1. in an oral, written, or graphic product

Criteria

You will know you are successful 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 apply the process for solving technical problems according to the problem-solving criteria.

Learning Objectives

10.a. Apply the angle-sum principle to compute the third angle of a triangle.
10.b. Apply the Pythagorean Theorem to compute a side of a right triangle.
10.c. Apply sine, cosine, and tangent ratios to compute sides and/or angles of right triangles.
10.d. Apply skill to technical problems such as vectors.
10.e. Utilize appropriate technology.
10.f. Show work in a clear and logical manner.
10.g. Verify the solution: solution is within stated range and reflects appropriate accuracy or precision.
10.h. Solution is labeled with appropriate units.