



Western Technical College

31804334 Manufacturing Math 1

Course Outcome Summary

Course Information

Description	Essential math skills for entry level manufacturing careers. Topics covered include addition, subtraction, multiplication, and division of fractions and decimals; English (customary) - metric conversion; and hands-on applications involving measurement and tolerances. Prerequisite: Passing score on skills assessment.
Instructional Level	Technical Diploma Courses
Total Credits	1
Total Hours	36

Textbooks

Mathematics for Machine Technology – with MindTap. 8th Edition. Copyright 2020. Smith, Robert D. Publisher: Cengage Learning. **ISBN-13**: 978-1-337-79837-2. Required.

Learner Supplies

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

Six-inch steel rule - \$3.00. **Vendor**: Campus Shop. Required.

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. **Calculate with fractions and decimals.**

Criteria

Criteria - Performance will be satisfactory when:

- 1.1. learner adds, subtracts, multiplies, and divides fractional values.
- 1.2. learner does arithmetical computation involving decimals with at least 70% accuracy.
- 1.3. learner will apply the order of operations rule to do exercises.

Learning Objectives

- 1.a. Perform several arithmetic operations in application problems involving fractions and decimals.
- 1.b. Apply the order of operations rule to computational exercises.
- 1.c. Convert numbers from fractional form to decimal form.
- 1.d. Convert numbers from decimal form to fractional form.
- 1.e. Solve nearest fractional part applications.
- 1.f. Round decimal values to a particular accuracy.
- 1.g. Choose the operations for solving application problems.

2. Use the correct measuring instrument to do measurements and calculations.

Criteria

Criteria - Performance will be satisfactory when:

- 2.1. learner does linear measurement in both English and Metric units.
- 2.2. learner uses a vernier caliper to do measurements.
- 2.3. learner uses a height gauge to do vertical measurements.
- 2.4. learner uses gauge block tables to compute heights needed to set heights for machining purposes.

Learning Objectives

- 2.a. Measure various segments with a ruler in both English and Metric units.
- 2.b. Measure the height of objects using a height gauge.
- 2.c. Perform measurements using a vernier caliper with at least 70% accuracy.
- 2.d. Determine the minimum number of gauge blocks needed to give a desired dimension.

3. Demonstrate the use of measurement systems and other measurement topics.

Criteria

Criteria - Performance will be satisfactory when:

- 3.1. learner sets up intersystem conversions between English units and Metric units using the unity fraction method.
- 3.2. learner converts units of measure within the English system.
- 3.3. learner uses the Pythagorean Theorem to solve applications.
- 3.4. learner computes the degree of precision and the greatest possible error.
- 3.5. learner uses tolerance and clearance in applications.

Learning Objectives

- 3.a. Apply the concept of unity fractions to do conversions between measurement systems.
- 3.b. Convert one unit of measure to another using the English system.
- 3.c. Compute necessary conversions within application problems.
- 3.d. From any given measurement find the degree of precision, the smallest acceptable measure, and the largest acceptable measure.
- 3.e. Calculate the length of any missing side in a right triangle.
- 3.f. Using unilateral tolerances calculate the minimum and maximum clearances formatting parts.
- 3.g. Change unilateral tolerances to bilateral tolerances.
- 3.h. Round decimal values to the accuracy indicated by the problem.
- 3.i. Choose the operations for solving application problems.

4. Compute the solution to applications involving proportions.

Criteria

Criteria - Performance will be satisfactory when:

- 4.1. learner will solve a worksheet, dealing with proportions, with at least 70% accuracy.
- 4.2. learner will apply proportion solving skills to applications involving direct variation.
- 4.3. learner will apply proportion solving skills to applications involving inverse variation.

Learning Objectives

- 4.a. Solve proportions with like and unlike units.
- 4.b. Solve application problems, dealing with proportions, in small groups.

- 4.c. Solve any direct variation exercise.
- 4.d. Translate English phrases into direct variation problems.
- 4.e. Apply direct proportion solving techniques to solve technical problems involving scale drawings or tapers.
- 4.f. Solve inverse variation applications.
- 4.g. Translate English phrases into the inverse variation form.
- 4.h. Apply inverse proportion solving skills to solve technical problems involving gears, pulleys, or levers.

5. Apply proportion solving techniques to gear ratios for gear trains.

Criteria

Criteria - Performance will be satisfactory when:

- 5.1. learner calculates the gear ratio for gear trains at the 60% level of accuracy.
- 5.2. learner computes the gear ratio for trains according to manufactures specifications.
- 5.3. learner will solve a worksheet, dealing with proportions, with at least 70% accuracy.
- 5.4. learner will apply proportion solving skills to applications involving direct variation.
- 5.5. learner will apply proportion solving skills to applications involving inverse variation.

Learning Objectives

- 5.a. Convert gear ratios to unity ratios.
- 5.b. Find the unity gear ratio for multiple gear trains.
- 5.c. Calibrate the gear ratio for various gear trains gathered from the machine shop (GROUP WORK).