

Mathcad Prime 3.0 Essentials

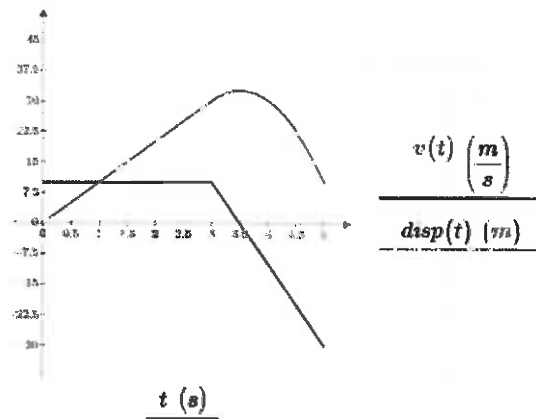
Overview

Course Code TRN-4010-T

Course Length 2 Days

In this course, you will learn the basics of Mathcad Prime. You will learn about Mathcad Prime's extensive functionality, such as opening and working with Mathcad files, navigating workspaces, defining variables and expressions, and solving equations. In addition, you will learn how to plot graphs, solve for roots, and manipulate data.

At the end of each module, you will complete a set of review questions to reinforce critical topics from that module. At the end of the course, you will complete a course assessment in Pro/FICIENCY intended to evaluate your understanding of the course as a whole.



Course Objectives

- Open and save Mathcad files
- Navigate the Mathcad workspace
- Develop Mathcad templates
- Identify and format math and text regions
- Develop and edit math expressions
- Define, evaluate, and use variables
- Assign an expression retroactively
- Define and evaluate user-defined and built-in functions
- Define, evaluate, and use range variables
- Use units in calculations
- Plot 2-D and 3-D graphs
- Solve for the roots of a function with a single independent variable
- Symbolically solve equations
- Numerically solve a system of linear and nonlinear equations
- Solve unconstrained and constrained optimization problems
- Solve ordinary differential equations
- Create a program within the Mathcad worksheet using Mathcad's programming features
- Import and export data
- Smooth, interpolate, and regress data

$$v(t) := 10 \cdot \frac{m}{s} + \left(-20 \cdot \frac{m}{s^2} \right) \cdot (t - 3 \cdot s) \cdot (t > 3 \cdot s)$$

Prerequisites

- None

Audience

- This class is intended for novice and intermediate Mathcad users. People in related roles will also benefit from taking this course.
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Agenda

Day 1

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|--------|----|----------------------------|
| Module | 1 | Getting Started |
| Module | 2 | Documenting and Formatting |
| Module | 3 | Entering and Editing Math |
| Module | 4 | Variables |
| Module | 5 | Functions |
| Module | 6 | Range Variables |
| Module | 7 | Controlling Calculations |
| Module | 8 | Vectors and Matrices |
| Module | 9 | Units |
| Module | 10 | 2-D Plotting |
| Module | 11 | Project – Day 1 |

Day 2

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|--------|----|------------------------|
| Module | 12 | 3-D Plotting |
| Module | 13 | Boolean Conditions |
| Module | 14 | Symbolics |
| Module | 15 | Solving |
| Module | 16 | Optimization |
| Module | 17 | Differential Equations |
| Module | 18 | Programming |
| Module | 19 | Data Exchange |
| Module | 20 | Data Analysis |
| Module | 21 | Project – Day 2 |

Course Content

Module 1. Getting Started

- i. Opening Mathcad
- ii. The Mathcad Workspace
- iii. Mathcad Worksheets
- iv. Saving Mathcad Files

Knowledge Check Questions

Module 2. Documenting and Formatting

- i. Text Regions
- ii. Embedding Math in a Text Region
- iii. Options for Formatting Worksheets
- iv. Understanding Mathcad Templates

Knowledge Check Questions

Module 3. Entering and Editing Math

- i. Using Operators
- ii. Entering and Evaluating a Mathematical Expression
- iii. Formatting Math Regions
- iv. Formatting Mathematical Results
- v. Implied Multiplication

Knowledge Check Questions

Module 4. Variables

- i. Defining a Variable
- ii. Numerically Evaluating a Variable
- iii. Defining a Global Variable
- iv. Assigning an Expression Retroactively
- v. Using Literal Subscripts

Knowledge Check Questions

Module 5. Functions

- i. Defining a User-Defined Function
- ii. Inserting a Built-In Function
- iii. Design of Experiments Functions
- iv. Using Deprecated Functions

Knowledge Check Questions

Module 6. Range Variables

- i. Defining a Range Variable
- ii. Using a Range Variable

Knowledge Check Questions

Module 7. Controlling Calculations

- i. Controlling Calculations
- ii. Using Calculation Options
- iii. Using Areas

Knowledge Check Questions

Module 8. Vectors and Matrices

- i. Vectors and Matrices
- ii. Defining Vectors and Matrices
- iii. Extracting Elements from an Array
- iv. Nested Arrays
- v. Using Array Operators and Functions

Knowledge Check Questions

Module 9. Units

- i. Selecting a Unit System
- ii. Using Units
- iii. Adding Units to Arrays and Range Variables
- iv. Using Angular Units
- v. Using Temperature Units

Knowledge Check Questions

Module 10. 2-D Plotting

- i. Plotting Data in 2-D
- ii. Plotting Functions in 2-D
- iii. 2-D Plot Formatting
- iv. 2-D Trace Formatting
- v. 2-D Axes Formatting
- vi. Using Units with 2-D Plots

Knowledge Check Questions

Module 11. Project – Day 1

- i. Structural Engineering Project – Day 1
- ii. Mechanical Engineering Project – Day 1

Module 12. 3-D Plotting

- i. Plotting Functions in 3-D
- ii. Formatting a 3-D Plot
- iii. Plotting Data in 3-D
- iv. Plotting Multiple Traces

Knowledge Check Questions

Module 13. Boolean Conditions

- i. Using Boolean Operators
 - ii. Writing Equations Using Boolean Operators
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- iii. Creating Conditional Statements
- iv. Using Piecewise Continuous Functions

Knowledge Check Questions

Module 14. Symbolics

- i. Symbolics
- ii. Symbolic Calculation
- iii. Symbolic Algebra

Knowledge Check Questions

Module 15. Solving

- i. Solving for Roots of Equations
- ii. Numerically Solving Systems of Linear Equations
- iii. Numerically Solving Systems of Nonlinear Equations
- iv. Symbolically Solving Systems of Equations
- v. Modifying the Convergence and Constraint Tolerance

Knowledge Check Questions

Module 16. Optimization

- i. Constrained Optimization
- ii. Unconstrained Optimization

Knowledge Check Questions

Module 17. Differential Equations

- i. Ordinary Differential Equations

Knowledge Check Questions

Module 18. Programming

- i. Creating a Program
- ii. Conditional Statements
- iii. Looping Constructs

Knowledge Check Questions

Module 19. Data Exchange

- i. Importing Data
- ii. Exporting Data
- iii. Using the Excel Component

Knowledge Check Questions

Module 20. Data Analysis

- i. Data Analysis
- ii. Smoothing Data
- iii. Interpolating Data
- iv. Regressing Data

Knowledge Check Questions

Module 21. Project – Day 2

- i. Structural Engineering Project – Day 2
 - ii. Mechanical Engineering Project – Day 2
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