

**Technical Math for College and Career**

**Content Standards**

**2019**

Course Title: Technical Math for College and Career

Course/Unit Credit: 1

Course Number: 439130

Teacher Licensure: Please refer to the Course Code Management System (<https://adedata.arkansas.gov/ccms/>) for the most current licensure codes.

# Grades: 9-12

Prerequisites: Algebra I and Geometry

Technical Math for College and Career builds on previous high school math courses to extend mathematical topics and relationships. Emphasis will be placed on the application of mathematics in context and on modeling- a process that uses mathematics to represent, analyze, make predictions, or otherwise provide insight into real-world situations. Students will collect, organize, describe, and use quantitative data and draw inferences from real-world data. Students will represent and process their reasoning and conclusions numerically, graphically, symbolically, and verbally. Technical Math for College and Career will help students develop mathematical proficiency needed for future course work and in careers including strategic competence (ability to formulate, represent, and solve mathematical problems) and adaptive reasoning (capacity for logical thought, reflection, explanation, and justification). Students will be expected to use technology, including graphing calculators, computers, or data-gathering tools throughout the course. Technical Math for College and Career is a third or fourth year math course and does not require Arkansas Department of Education Division of Elementary and Secondary Education course approval.

Notes:

1. Teacher notes offer clarification of the standards.
2. All items in a bulleted list must be taught.

Technical Math for College and Career

**Strand Content Standard**

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| Numerical & Proportional Reasoning |  |
|  | 1. Students will use number sense and proportional reasoning in real-world scenarios to make and communicate decisions in order to draw conclusions. |
| Mathematical Processes and Models |  |
|  | 2. Students will use mathematical processes and models to acquire, demonstrate, and communicate mathematical understanding in real-world scenarios.  |
| Algebraic Relationships |  |
|  | 3. Students will use mathematical concepts of algebra to explain linear and non-linear applications in real-world scenarios. |
| Measurement |  |
|  | 4. Students will apply measurement and use measurement tools in real-world scenarios. |
| Geometry |  |
|  | 5. Students will apply geometric concepts to real-world scenarios. |

Strand: Numerical and Proportional Reasoning

 Content Standard: 1. Students will use number sense and proportional reasoning in real-world scenarios to make and communicate decisions in order to draw conclusions.

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| NPR.1.TM.1 | Use estimation to identify the most reasonable mathematical solution |
| NPR.1.TM.2 | Use estimation and precision in real-world scenarios * know when
* know how (e.g., use benchmarks for estimating)
* know why
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| NPR.1.TM.3 | Solve real world-problems and interpret results involving calculations with percentages, decimals, and fractions * conversions (e.g., percent to fraction or decimal, fraction to decimal or percent, decimal to fraction or percent)
* percent change
* percent of quantities
 |
| NPR.1.TM.4 | Recognize, set up, and solve proportions from real-world scenarios |
| NPR.1.TM.5 | Utilize real-world scenarios requiring interpretation and comparison of various representations of rates, ratios, and proportions including scale drawings |
| NPR.1.TM.6 | Compare magnitudes of numbers in context in different forms (e.g., place value, Richter scale, scientific notation, powers of 10)  |
| NPR.1.TM.7 | Use dimensional analysis to solve problems involving multiple units of measurement (e.g., convert between and within the metric system and the U.S. customary system, determine miles per gallon, appropriate dosages of medicine) |

Strand: Mathematical Processes and Models

Content Standard: 2. Students will use mathematical processes and models to acquire, demonstrate, and communicate mathematical understanding in real-world scenarios.

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| MPM.2.TM.1 | Apply mathematics to problems arising in everyday life, workplace, and society |
| MPM.2.TM.2 | Use mathematical processes with algebraic formulas (e.g., literal equations), numerical techniques, and graphs to solve real-world scenarios |
| MPM.2.TM.3 | Create mathematical models and use problem-solving skills, independently and as a collaborative team, for real-world scenarios to* analyze given information or data
* identify patterns or relationships
* formulate a plan or strategy
* estimate solutions
* determine a solution
* justify a solution and its reasonableness
* describe limitations
* identify how results are affected by changing parameters(e.g., cost of materials, cost of labor, work time required to improve the overall cost of a project)
* suggest improvements
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| MPM.2.TM.4 | Select appropriate tools (e.g., real objects, manipulatives, paper and pencil, technology) and techniques (e.g., mental math, estimation, number sense) to solve problems |
| MPM.2.TM.5 | Demonstrate effective use of resources (e.g., faculty, other students, reference materials, industry resources, the internet) |
| MPM.2.TM.6 | Use precise mathematical language and multiple representations (e.g., symbols, diagrams, graphs, written language) to communicate, independently and as a collaborative team, written or orally (e.g., reports, presentations, demonstrations), mathematical ideas or solutions to real-world scenarios |

Strand: Algebraic Relationships

Content Standard: 3. Students will use mathematical concepts of algebra to explain linear and non-linear applications in real-world scenarios.

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| AR.3.TM.1 | Analyze and apply rate of change in terms of real-world scenarios (e.g., rise and run of stair stringers, roof pitch) |
| AR.3.TM.2 | Use concepts of systems of equations and inequalities (e.g., tables, graphs, matrix operations, pictorial representations, or algebraic properties) to model and solve real-world scenarios (e.g., compare ‘best deal opportunities’ with profit and expenses in businesses) |
| AR.3.TM.3 | Use linear programming with or without the use of technology to* maximize or minimize (optimize) linear objective function in real-world scenarios
* determine the reasonableness of solutions
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| AR.3.TM.4 | Collect and organize data, independently and as a collaborative team, to create appropriate graphical representations (e.g., scatterplots, histograms, box plots, circle graphs) of real-world scenarios* interpret graphical representations
* make predictions and decisions based on representations
* analyze results based on representations
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| AR.3.TM.5 | Create, interpret, and analyze best-fit models of linear, exponential, and quadratic functions to solve real-world scenarios* interpret the constants, coefficients, and bases in the context of the data
* check the model for best fit and use the model, where appropriate, to draw conclusions or make predictions
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Strand: Measurement

 Content Standard: 4. Students will apply measurement and use measurement tools in real-world scenarios.

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| M.4.TM.1 | Convert between and within the metric system and the U.S. customary system in real-world scenarios  |
| M.4.TM.2 | Apply accurate readings of both metric and the U.S. customary measuring devices to a problem situation  |
| M.4.TM.3 | Select and use appropriate measuring devices (e.g., rulers, tape measures, calipers, gauges) and understand the limitations of such devices (e.g., flat surfaces, curved surfaces) for real-world scenarios |
| M.4.TM.4 | Determine and use appropriate unit labels (e.g., length, distance, area, surface area, volume, weight, voltage, resistance, pressure, density) for real-world scenarios |

Strand: Geometry

 Content Standard: 5. Students will apply geometric concepts to real-world scenarios.

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| G.5.TM.1 | Identify various geometric figures in order to identify what formulas are needed to solve situational problems (e.g., decompose and rearrange geometric figures) |
| G.5.TM.2 | Compute measurements of geometric figures such as area, surface area (including area of sectors), volume, perimeter, and circumference (including arc length) for real-world scenarios |
| G.5.TM.3 | Use trigonometric ratios (e.g., sine, cosine, tangent) to calculate angles and lengths of sides in real-world scenarios |
| G.5.TM.4 | Analyze how changing dimensions will affect the perimeter, circumference, area, surface area, or volume in real-world scenarios |
| G.5.TM.5 | Determine the role angles play in a situational problem (e.g., structural strength and stability, angle straps for lifting, angles used to cut hair) |
| G.5.TM.6 | Apply right-triangle relationships using Pythagorean Theorem, special right triangles, and trigonometry in real-world scenarios (e.g., roof construction, building the frame of a car, calculating machined parts) |
| G.5.TM.7 | Draw and interpret with or without the use of technology * auxiliary views
* orthographic views
* isometric views

(e.g., house plans, engineering drawings, fashion design) |
| G.5.TM.8 | Use cross-sections of three-dimensional shapes to relate to two-dimensional figures  |
| G.5.TM.9 | Describe the transformation of polygons in the coordinate plane as they relate to real-world scenarios (e.g., cookie cutting, fabric cutting, machine dies)* translation
* reflection
* rotation
* dilation
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