

Medina County Schools'

# Course of Study

For

# Math

Math Analysis (Cloverleaf)

June 2008



## STANDARD 2: Measurement

Students estimate and measure to a required degree of accuracy and precision by selecting and using appropriate units, tools and technologies.

Ohio Benchmarks Grade 12	Instructional Organization	Grade Level Indicators	Notes
<p><b>By the end of the 11-12 program:</b></p> <p>A. Explain differences among accuracy, precision and error, and describe how each of those can affect solutions in measurement situations.</p> <p>B. Apply various measurement scales to describe phenomena and solve problems.</p> <p>C. Estimate and compute areas and volume in increasingly complex problem situations.</p> <p>D. Solve problem situations involving derived measurements; e.g., density, acceleration.</p>	<p>M.2.C.MA.3 <i>Use Measurement Techniques and Tools</i></p> <p>M.2.D.MA.1 <i>Use Measurement Techniques and Tools</i></p> <p>M.2.D.MA.2</p>	<p>3. Apply informal concepts of successive approximation, upper and lower bounds, and limits in measurement situations; e.g., measurement of some quantities, such as volume of a cone, can be determined by sequences of increasingly accurate approximations.</p> <p>1. Solve problems involving derived measurements; e.g., acceleration and pressure.</p> <p>2. Use radian measures in the solution of problems involving angular velocity and acceleration.</p>	

### STANDARD 3: Geometry and Spatial Sense

Students identify, classify, compare and analyze characteristics, properties and relationships of one-, two- and three-dimensional geometric figures and objects. Students use spatial reasoning, properties of geometric objects, and transformations to analyze mathematical situations and solve problems.

Ohio Benchmarks Grade 12	Instructional Organization	Grade Level Indicators	Notes
<p><b>By the end of the 11-12 program:</b></p> <p>A. Use trigonometric relationships to verify determine solutions in problem situations.</p> <p>B. Represent transformations within a coordinate system using vectors and matrices.</p> <p><i>Note: This is an extension of the following benchmarks in grades 8 -10 for more complex figures.</i></p> <p>A. Formally define geometric figures.</p> <p>D. Use coordinate geometry to represent and examine the properties of geometric figures.</p> <p>E. Draw and construct representations of two- and three-dimensional geometric objects using a variety of tools, such as straightedge, compass and technology.</p>	<p>M.3.A.MA.2</p> <p>M.3.B.MA.1 <i>Transformations and Symmetry</i></p>	<p>2. Derive and apply the basic trigonometric identities; i.e., angle addition, angle subtraction, and double angle.</p> <p>1. Use matrices to represent translations, reflections, rotations, dilations and their compositions.</p>	

**STANDARD 3: Geometry and Spatial Sense (Cont.)**

Students identify, classify, compare and analyze characteristics, properties and relationships of one-, two- and three-dimensional geometric figures and objects. Students use spatial reasoning, properties of geometric objects, and transformations to analyze mathematical situations and solve problems.

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<p><b>By the end of the 11-12 program:</b></p> <p><i>Note: This is an extension of benchmark H in grades 11-12 in Mathematical Processes.</i></p> <p>H. Use formal mathematical language and notation to represent ideas, to demonstrate relationships within and among representation systems, and to formulate generalizations.</p>	<p>M.3.H.MA.3 <i>Visualization and Geometric Models</i></p> <p>M.3.H.MA.4</p>	<p>3. Relate graphical and algebraic representations of lines, simple curves and conic sections.</p> <p>4. Recognize and compare specific shapes and properties in multiple geometries; e.g., plane, spherical and hyperbolic.</p>	
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## STANDARD 4: Patterns, Functions and Algebra

Students use patterns, relations and functions to model, represent and analyze problem situations that involve variable quantities. Students analyze, model and solve problems using various representations such as tables, graphs and equations.

Ohio Benchmarks Grade 12	Instructional Organization	Grade Level Indicators	Notes
<p><b>By the end of the 11-12 program:</b></p> <p>A. Analyze functions by investigating rates of change, intercepts, zeros, asymptotes, and local and global behavior.</p>	<p>M.4.A.MA.1 <i>Use Patterns, Relations and Functions</i></p> <p>M.4.A.MA.2</p> <p>M.4.A.MA.3 <i>Use Patterns, Relations and Functions</i></p> <p>M.4.A.MA.4</p> <p>M.4.A.MA.6</p> <p>M.4.A.MA.7 <i>Use Algebraic Expressions</i></p> <p>M.4.A.MA.9</p>	<ol style="list-style-type: none"> <li>1. Analyze the behavior of arithmetic and geometric sequences and series as the number of terms increases.</li> <li>2. Translate between the numeric and symbolic form of a sequence or series.</li> <li>3. Describe and compare the characteristics of transcendental and periodic functions; e.g., general shape, number of roots, domain and range, asymptotic behavior, extrema, local and global behavior.</li> <li>4. Represent the inverse of a transcendental function symbolically.</li> <li>6. Make arguments about mathematical properties using mathematical induction.</li> <li>7. Make mathematical arguments using the concepts of limit.</li> <li>9. Translate freely between polar and Cartesian coordinate systems.</li> </ol>	



## STANDARD 5: Data Analysis and Probability

Students use patterns, relations and functions to model, represent and analyze problem situations that involve variable quantities. Students analyze, model and solve problems using various representations such as tables, graphs and equations.

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<p><b>By the end of the 11-12 program:</b></p> <p>A. Create and analyze tabular and graphical displays of data using appropriate tools, including spreadsheets and graphing calculators.</p> <p>B. Use descriptive statistics to analyze and summarize data, including measures of center, dispersion, correlation and variability.</p> <p>C. Design and perform a statistical experiment, simulation or study; collect and interpret data; and use descriptive statistics to communicate and support predictions and conclusions.</p>			
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**STANDARD 5: Data Analysis and Probability (Cont.)**

Students use patterns, relations and functions to model, represent and analyze problem situations that involve variable quantities. Students analyze, model and solve problems using various representations such as tables, graphs and equations.

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<p><b>By the end of the 11-12 program:</b></p> <p>D. Connect statistical techniques to applications in workplace and consumer situations.</p>			
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## STANDARD 6: Mathematical Processes

Students use mathematical processes and knowledge to solve problems. Students apply problem-solving and decision-making techniques, and communicate mathematical ideas.

Ohio Benchmarks Grade 12	Instructional Organization	Grade Level Indicators	Notes
<p><b>By the end of the 11-12 program:</b></p> <p>A. Construct algorithms for multi-step and non-routine problems.</p> <p>B. Construct logical verifications or counter-examples to test conjectures and to justify or refute algorithms and solutions to problems.</p> <p>C. Assess the adequacy and reliability of information available to solve a problem.</p> <p>D. Select and use various types of reasoning and methods of proof.</p> <p>E. Evaluate a mathematical argument and use reasoning and logic to judge its validity.</p> <p>F. Present complete and convincing arguments and justifications, using inductive and deductive reasoning, adapted to be effective for various audiences.</p>	<p>M.6.A.MA</p> <p>M.6.B.MA</p> <p>M.6.C.MA</p> <p>M.6.D.MA</p> <p>M.6.E.MA</p> <p>M.6.F.MA</p>	<p>Note: Mathematical processes are used within all of the content standards and should be incorporated within the instruction and assessment of the benchmarks and grade-level indicators.</p>	

**STANDARD 6: Mathematical Processes (Cont.)**

Students use mathematical processes and knowledge to solve problems. Students apply problem-solving and decision-making techniques, and communicate mathematical ideas.

Ohio Benchmarks Grade 12	Instructional Organization	Grade Level Indicators	Notes
<p><b>By the end of the 11-12 program:</b></p> <p>G. Understand the difference between a statement that is verified by mathematical proof, such as a theorem, and one that is verified empirically using examples or data.</p> <p>H. Use formal mathematical language and notation to represent ideas, to demonstrate relationships within and among representation systems, and to formulate generalizations.</p> <p>I. Communicate mathematical ideas orally and in writing with a clear purpose and appropriate for a specific audience.</p> <p>J. Apply mathematical modeling to workplace and consumer situations, including problem formulation, identification of a mathematical model, interpretation of solution within the model, and validation to original problem situation.</p>	<p>M.6.G.MA</p> <p>M.6.H.MA</p> <p>M.6.I.MA</p> <p>M.6.J.MA</p>		

