

CONSTRUCTION TRADES

Monroe High School

February, 2007

Michigan Mathematics High School Content Expectations



The following is a list of Mathematics content identified by the CTE instructor as part of the established curriculum.

ALGEBRA 1		
HSCE Code	Expectation	Comment
L1.1.3	Explain how the properties of associativity, commutativity, and distributivity, as well as identify and inverse elements, are used in arithmetic and algebraic calculations.	
L1.1.4	Describe the reasons for the different effects of multiplication by, or exponentiation of, a positive number less than 0, a number between 0 and 1, and a number greater than 1.	
L1.2.4	Organize and summarize a data set in a table, plot, chart, or spreadsheet; find patterns in a display of data; understand and critique data displays in the media.	
L2.1.6	Recognize when exact answers aren't always possible or practical. Use appropriate algorithms to approximate solutions to equations (e.g., to approximate square roots).	
A1.1.2	Know the definitions and properties of exponents and roots and apply them in algebraic expressions.	
A1.2.8	Solve an equation involving several variables (with numerical or letter coefficients) for a designated variable. Justify steps in the solution.	
A2.4.1	Write the symbolic forms of linear functions (standard [i.e., $Ax + By = C$, where $B \neq 0$], point-slope, and slope-intercept) given appropriate information and convert between forms.	
A2.4.3	Relate the coefficients in a linear function to the slope and x- and y-intercepts of its graph.	
A3.1.3	Using the adapted general symbolic form, draw reasonable conclusions about the situation being modeled. In the example above, the exact solution is 365.698, but for this problem, an appropriate approximation is 365.	

GEOMETRY		
HSCE Code	Expectation	Comment
L1.1.6	Explain the importance of the irrational numbers $\sqrt{2}$ and $\sqrt{3}$ in basic right triangle trigonometry, the importance of π because of its role in circle relationships, and the role of e in applications such as continuously compounded interest.	
L2.1.6	Recognize when exact answers aren't always possible or practical. Use appropriate algorithms to approximate solutions to equations (e.g., to approximate square roots).	

*Revised expectations in italics

CONSTRUCTION TRADES

Monroe High School

February, 2007

Michigan Mathematics High School Content Expectations



GEOMETRY (Continued)		
L3.1.1	Convert units of measurement within and between systems; explain how arithmetic operations on measurements affect units, and carry units through calculations correctly.	
L4.3.1	Know the basic structure for the proof of an “If..., then...” statement (assuming the hypothesis and ending with the conclusion) and that proving the contrapositive is equivalent.	
G1.1.3	Perform and justify constructions, including midpoint of a line segment and bisector of an angle, using straightedge and compass.	
G1.2.3	Know a proof of the Pythagorean Theorem and use the Pythagorean Theorem and its converse to solve multistep problems.	
G1.5.1	Know and use subdivision or circumscription methods to find areas of polygons (e.g., regular octagon, nonregular pentagon).	
G1.6.1	Solve multistep problems involving circumference and area of circles.	
G2.2.1	Identify or sketch a possible three-dimensional figure, given two-dimensional views (e.g., nets, multiple views). Create a two-dimensional representation of a three-dimensional figure.	
G2.2.2	Identify or sketch cross sections of three-dimensional figures. Identify or sketch solids formed by revolving two-dimensional figures around lines.	
G2.3.5	Know and apply the theorem stating that the effect of a scale factor of k relating one two-dimensional figure to another or one three-dimensional figure to another, on the length, area, and volume of the figures is to multiply each by k , k^2 , and k^3 , respectively.	

ALGEBRA II		
HSCE Code	Expectation	Comment
L2.1.6	Recognize when exact answers aren't always possible or practical; use appropriate algorithms to approximate solutions to equations (e.g., to approximate square roots).	
L3.2.2	Describe and explain round-off error, rounding, and truncating.	
A3.1.2	Adapt the general symbolic form of a function to one that fits the specifications of a given situation by using the information to replace arbitrary constants with numbers. <i>In the example above, substitute the given values $P_0 = 300$ and $a = 1.02$ to obtain $P = 300(1.02)^t$.</i>	
A3.1.3	Using the adapted general symbolic form, draw reasonable conclusions about the situation being modeled. <i>In the example above, the exact solution is 365.698, but for this problem an appropriate approximation is 365.</i>	

*Revised expectations in italics

CONSTRUCTION TRADES

Monroe High School

February, 2007

Michigan Mathematics High School Content Expectations



OTHER MATH		
GLCE Code	Expectation	Comment
A.RP. 06.02	Plot ordering pairs of integers and use ordered pairs of integers to identify points of all four quadrants of the coordinate plane.	
A.FO. 06.03	Use letters, with units, to represent quantities in a variety of contexts, e.g., y lbs., k minutes, x cookies.	
A.FO. 06.10	Represent simple relationships between quantities using verbal descriptions, formulas or equations, tables, and graphs, e.g., perimeter-side relationship for a square, distance-time graphs, and conversions such as feet to inches.	
A.F.O. 06.11	Relate simple linear equations with integer coefficients, e.g., $3x = 8$ or $x + 5 = 10$, to particular contexts and solve.*	
A.FO. 06.12	Understand that adding or subtracting the same number to both sides of a equation creates a new equation that has the same solution.	
A.FO. 06.13	Understand that multiplying or dividing both sides of an equation by the same non-zero number creates a new equation that has the same solutions.	
M.UN. 06.01	Convert between basic units of measurement within a single measurement system, e.g., square inches to square feet.	
M.TE. 06.03	Compute the volume and surface area of cubes and rectangular prisms given the lengths of their sides, using formulas.	
N.MR. 06.01	Understand division of fractions as the inverse of multiplication, e.g., if $4/5 \div 2/3 = \square$, the $2/3 \cdot \square = 4/5$ so $\square = 4/5 \cdot 3/2 = 12/10$.	
N.MR. 06.03	Solve for the unknown in equations such as $1/4 \div \square = 1$, $3/4 \div \square = 1/4$, and $1/2 = 1 \cdot \square$.	
N.FL. 06.04	Multiply and divide any two fractions, including mixed numbers, fluently.	
N.ME. 06.07	Understand that a fraction or a negative fraction is a quotient of two integers, e.g., $-8/3$ is -8 divided by 3 .	
N.ME. 06.11	Find equivalent ratios by scaling up or scaling down.	
N.FL. 06.12	Calculate part of a number given the percentage and the number.	
N.MR. 06.13	<i>Solve contextual problems involving percentages such as sale taxes and tips.*</i>	
N.FL. 06.15	Solved applied problems that use the four operations with appropriate decimal numbers.	
N.ME. 06.16	<i>Understand and use integer exponents, excluding powers of negative bases, express numbers in scientific notation.*</i>	
A.PA. 07.01	<i>Recognize when information given in a table, graph, or formula suggests a directly proportional or linear relationship.*</i>	

*Revised expectations in italics

CONSTRUCTION TRADES

Monroe High School

February, 2007

Michigan Mathematics High School Content Expectations



OTHER MATH (Continued)		
A.PA. 07.03	<i>Given a directly proportional or other linear situation, graph and interpret the slope and intercept (s) in terms of the original situation; evaluate $y - mx + b$ for specific x values, e.g., weight vs. volume of water, base cost plus cost per unit.*</i>	
A.AP. 07.04	For directly proportional or linear situations, solve applied problems using graphs and equations, e.g., the heights and volume of a container with uniform cross-section; height of water in a tank being filled at a constant rate; degrees Celsius and degrees Fahrenheit; distance and time under constant speed.	
A.PA. 07.05	<i>Recognize and use directly proportional relationships of the form $y = mx$, and distinguish from linear relationships of the form $y = mx + b$, b non-zero; understand that in a directly proportional relationship between two quantities one quantity is a constant multiple of the other quantity.*</i>	
A.PA. 07.06	Calculate the slope from the graph of a linear function as the ratio or “rise/run” for a pair of points on the graph, and express the answer as a fraction and a decimal; understand that linear functions have slope that is a constant rate of change.	
A.PA. 07.07	Represent linear functions in the form $y = x+b$, $y = mx$, and $y = mx + b$, and graph, interpreting slope and y-intercept.	
A.FO. 07.08	Find and interpret the x and/or y intercepts of a linear equation or function. Know that the solution to a linear equation of the form $ax + b = 0$ corresponds to the point at which the graph of $y = ax + b$ crosses the x axis.*	
A.PA. 07.11	Understand and use basic properties of real numbers; additive and multiplicative identities, additive and multiplicative inverses, commutatively, associatively, and the distributive property of multiplication over addition.	
N.MR. 07.02	<i>Solve problems involving derived quantities such as density, velocity, and weighted averages.*</i>	
N.FL. 07.03	Calculate rates of change including speed.	
N.MR. 07.04	Convert ratio quantities between different systems of units, such as feet per second to miles per hour.	
N.MR. 07.06	Understand the concept of square root and cube root, and estimate using calculators.	
N.FL. 07.07	Solve problems involving operations with integers	
N.FL. 07.08	<i>Add, subtract, multiply, and divide positive and negative rational numbers fluently.*</i>	
N.FL. 07.09	Estimate results of computations with rational numbers.	
G.SR. 07.01	Use a ruler and other tools to draw squares, rectangles, triangles, and parallelograms with specified dimensions.	
D.AN. 07.02	Create and interpret scatter plots and find line of best fits; use an estimated line of best fit to answer questions about the data.	

*Revised expectations in italics

CONSTRUCTION TRADES

Monroe High School

February, 2007

Michigan Mathematics High School Content Expectations



OTHER MATH (Continued)		
N.ME. 08.01	Understand the meaning of a square root of a number and its connection to the square whose area is the number; understand the meaning of a cube root and its connection to the volume of a cube.	
N.FL. 08.05	Estimate and solve problems with square roots and cube roots using calculators.	
N.MR. 08.07	Understand percent increase and percent decrease in both sum and product form, e.g., 3% increase of a quantity x is $x + .03x = 1.03x$.	
N.MR. 08.08	Solve problems involving percent increases and decreases.	
N.FL. 08.09	Solve problems involving compounded interest or multiple discounts.	
A.PA. 08.03	Recognize basic functions in problem context, e.g., area of a circle is πr^2 , volume of a sphere is $\frac{4}{3} \pi r^3$, and represent them using tables, graphs, and formulas.	
G.GS. 08.01	Understand at least one proof of the Pythagorean Theorem; use the Pythagorean Theorem and its converse to solve applied problems including perimeter; area, and volume problems.	
G.SR. 08.03	Understand the definition of a circle; know and use the formulas for circumference and area of a circle to solve problems.	
G.SR. 08.04	Find area and perimeter of complex figures by sub-dividing them into basic shapes (quadrilaterals, triangles, circles).	
G.SR. 08.05	Solve applied problems involving areas of triangles, quadrilaterals, and circles.	
G.SR. 08.07	Understand the concept of surface area, and find the surface area of prisms, cones, spheres, pyramids, and cylinders.	