FOURTH GRADE MATHEMATICS

GRADE LEVEL CONTENT EXPECTATIONS

4 MATH

v.12.05

NUMBER & OPERATIONS

ALGEBRA

MEASUREMENT

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Welcome to Michigan's K-8 Grade Level Content Expectations

Purpose & Overview

In 2004, the Michigan Department of Education embraced the challenge of creating Grade Level Content Expectations in response to the federal No Child Left Behind Act of 2001. This act mandated the existence of a set of comprehensive state grade level assessments that are designed based on rigorous grade level content.

In this global economy, it is essential that Michigan students possess personal, social, occupational, civic, and quantitative literacy. Mastery of the knowledge and essential skills defined in Michigan's Grade Level Content Expectations will increase students' ability to be successful academically, contribute to the future businesses that employ them and the communities in which they choose to live.

The Grade Level Content Expectations build from the Michigan Curriculum Framework and its Teaching and Assessment Standards. Reflecting best practices and current research, they provide a set of clear and rigorous expectations for all students and provide teachers with clearly defined statements of what students should know and be able to do as they progress through school.

Why Create a 12.05 Version of the Expectations?

The Office of School Improvement is committed to creating the best possible product for educators. This commitment served as the impetus for the revision of the 6.04 edition that was previously released in June of 2004. This new version, v.12.05, refines and clarifies the original expectations, while preserving their essence and original intent. As education continues to evolve, it is important to remember that each curriculum document should be considered as a work in progress, and will continue to be refined to improve the quality.

The revision process greatly improved the continuity from one grade to the next, and better ensured coherence both in content and pedagogy. To obtain more specific details about the revisions, please refer to the addendum included in this document. The forward of the ***Across the Grades v.12.05*** companion document also clarifies the types of changes made. Educators can access the *Across the Grades* companion document by visiting the Michigan Department of Education Grade Level Content Expectations web page at www.michigan.gov/glce.

Assessment

The Grade Level Content Expectations document is intended to be a state assessment tool with the expectations written to convey expected performances by students. The Office of Assessment and Accountability was involved in the development of version 12.05 and has incorporated the changes in the construction of test and item specifications for the K-8 Michigan Education Assessment Program (MEAP) and MI-Access. This updated version will assist us in the creation of companion documents, content examples, and to guide program planners in focusing resources and energy.

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Curriculum

Using this document as a focal point in the school improvement process, schools and districts can generate conversations among stakeholders concerning current policies and practices to consider ways to improve and enhance student achievement. Together, stakeholders can use these expectations to guide curricular and instructional decisions, identify professional development needs, and assess student achievement.

Understanding the Organizational Structure

The expectations in this document are divided into strands with multiple domains within each, as shown below. The skills and content addressed in these expectations will in practice be woven together into a coherent, Mathematics curriculum. The domains in each mathematics strand are broader, more conceptual groupings. In several of the strands, the "domains" are similar to the "standards" in Principles and Standards for School Mathematics from the National Council of Teachers of Mathematics.

To allow for ease in referencing expectations, each expectation has been coded with a strand, domain, grade-level, and expectation number. For example, **M.UN.00.01** indicates:

M - Measurement strand

UN - Units & systems of measurement domain of the Measurement strand

00 - Kindergarten Expectation

01 - First Expectation in the Grade-Level view of the Measurement strand

Strand 1 Number & Operations	**Strand 2 Algebra**	**Strand 3 Measurement**	**Strand 4 Geometry**	**Strand 5 Data and Probability**
Domains				
Meaning, notation, place value, and comparisons (ME) Number relationships and meaning of operations (MR) Fluency with operations and estimation (FL)	Patterns, relations, functions, and change (PA) Representation (RP) Formulas, expressions, equations, and inequalities (RP)	Units and systems of measurement (UN) Techniques and formulas for measurement (TE) Problem solving involving measurement (PS)	Geometric shape, properties, and mathematical arguments (GS) Location and spatial relationships (LO) Spatial reasoning and geometric modeling (SR) Transformation and symmetry (TR)	Data representation (RE) Data interpretation and analysis (AN) Probability (PR)

Preparing Students for Academic Success

Within the hands of teachers, the Grade Level Content Expectations are converted into exciting and engaging learning for Michigan's students. As we use these expectations to develop units of instruction and plan instructional delivery, it is critical to keep in mind that content knowledge alone is not sufficient for academic success. Students must be able to apply knowledge in new situations, to solve problems by generating new ideas, and to make connections between what they learn in class to the world around them. The art of teaching is what makes the content of learning become a reality.

Through the collaborative efforts of Michigan educators and creation of professional learning communities, we can enable our young people to attain the highest standards, and thereby open doors for them to have fulfilling and successful lives.

NUMBER AND OPERATIONS

Understand and use number notation and place value

N.ME.04.01 Read and write numbers to 1,000,000; relate them to the quantities they represent; compare and order.

N.ME.04.02 Compose and decompose numbers using place value to 1,000,000's, e.g., 25,068 is 2 ten thousands, 5 thousands, 0 hundreds, 6 tens, and 8 ones.

N.ME.04.03 Understand the magnitude of numbers up to 1,000,000; recognize the place values of numbers and the relationship of each place value to the place to its right, e.g., 1,000 is 10 hundreds.

Use factors and multiples

N.ME.04.04 *Find all factors of any whole number through 50, list factor pairs, and determine if a one-digit number is a factor of a given whole number.**

N.ME.04.05 *List the first ten multiples of a given one-digit whole number; determine if a whole number is a multiple of a given one-digit whole number.**

N.MR.04.06 Know that some numbers including 2, 3, 5, 7, and 11 have exactly two factors (1 and the number itself) and are called prime numbers.

N.MR.04.07 *Use factors and multiples to compose and decompose whole numbers.**

Add and subtract whole numbers

N.FL.04.08 Add and subtract whole numbers fluently.

Multiply and divide whole numbers

N.ME.04.09 Multiply two-digit numbers by 2, 3, 4, and 5 using the distributive property, e.g., $21 \times 3 = (1 + 20) \times 3 = (1 \times 3) + (20 \times 3) = 3 + 60 = 63$.

N.FL.04.10 Multiply fluently any whole number by a one-digit number and a three-digit number by a two-digit number; for a two-digit by one-digit multiplication use distributive property to develop meaning for the algorithm.

N.FL.04.11 Divide numbers up to four-digits by one-digit numbers and by 10.

N.FL.04.12 *Find the value of the unknowns in equations such as $a \div 10 = 25$; $125 \div b = 25$.**

N.MR.04.13 Use the relationship between multiplication and division to simplify computations and check results.

N.MR.04.14 *Solve contextual problems involving whole number multiplication and division.**

Read, interpret and compare decimal fractions

N.ME.04.15 Read and interpret decimals up to two decimal places; relate to money and place value decomposition.

N.ME.04.16 Know that terminating decimals represents fractions whose denominators are 10, 10×10, $10 \times 10 \times 10$, etc., e.g., powers of 10.

N.ME.04.17 Locate tenths and hundredths on a number line.

N.ME.04.18 Read, write, interpret, and compare decimals up to two decimal places.

N.MR.04.19 Write tenths and hundredths in decimal and fraction forms, and know the decimal equivalents for halves and fourths.

** revised expectations in italics*

Understand fractions

N.ME.04.20 Understand fractions as parts of a set of objects.

N.MR.04.21 Explain why equivalent fractions are equal, using models such as fraction strips or the number line for fractions with denominators of 12 or less, or equal to 100.

N.MR.04.22 *Locate fractions with denominators of 12 or less on the number line; include mixed numbers.**

N.MR.04.23 Understand the relationships among halves, fourths, and eighths and among thirds, sixths, and twelfths.

N.ME.04.24 *Know that fractions of the form $\frac{m}{n}$ where m is greater than n, are greater than 1 and are called improper fractions; locate improper fractions on the number line.**

N.MR.04.25 Write improper fractions as mixed numbers, and understand that a mixed number represents the number of "wholes" and the part of a whole remaining, e.g., $\frac{5}{4} = 1 + \frac{1}{4} = 1\frac{1}{4}$.

N.MR.04.26 Compare and order up to three fractions with denominators 2, 4, and 8, and 3, 6, and 12, including improper fractions and mixed numbers.

Add and subtract fractions

N.MR.04.27 *Add and subtract fractions less than 1 with denominators through 12 and/or 100, in cases where the denominators are equal or when one denominator is a multiple of the other,* e.g., $\frac{1}{12} + \frac{5}{12} = \frac{6}{12}$; $\frac{1}{6} + \frac{5}{12} = \frac{7}{12}$; $\frac{3}{10} - \frac{23}{100} = \frac{7}{100}$. *

N.MR.04.28 *Solve contextual problems involving sums and differences for fractions where one denominator is a multiple of the other (denominators 2 through 12, and 100).**

N.MR.04.29 *Find the value of an unknown in equations such as* $\frac{1}{8} + x = \frac{5}{8}$ or $\frac{3}{4} - y = \frac{1}{2}$.*

Multiply fractions by whole numbers

N.MR.04.30 Multiply fractions by whole numbers, using repeated addition and area or array models.

Add and subtract decimal fractions

N.MR.04.31 *For problems that use addition and subtraction of decimals through hundredths, represent with mathematical statements and solve.**

N.FL.04.32 *Add and subtract decimals through hundredths.**

Multiply and divide decimal fractions

N.FL.04.33 Multiply and divide decimals up to two decimal places by a one-digit whole number where the result is a terminating decimal, e.g., $0.42 \div 3 = 0.14$, but not $5 \div 3 = 1.\overline{6}$.

Estimate

N.FL.04.34 Estimate the answers to calculations involving addition, subtraction, or multiplication.

N.FL.04.35 Know when approximation is appropriate and use it to check the reasonableness of answers; be familiar with common place-value errors in calculations.

N.FL.04.36 Make appropriate estimations and calculations fluently with whole numbers using mental math strategies.

** revised expectations in italics*

MEASUREMENT

Measure using common tools and appropriate units

M.UN.04.01 Measure using common tools and select appropriate units of measure.

M.PS.04.02 Give answers to a reasonable degree of precision in the context of a given problem.

M.UN.04.03 Measure and compare integer temperatures in degrees.

M.TE.04.04 Measure surface area of cubes and rectangular prisms by covering and counting area of the faces.

Convert measurement units

M.TE.04.05 Carry out the following conversions from one unit of measure to a larger or smaller unit of measure: meters to centimeters, kilograms to grams, liters to milliliters, hours to minutes, minutes to seconds, years to months, weeks to days, feet to inches, ounces to pounds (using numbers that involve only simple calculations).

Use perimeter and area formulas

M.TE.04.06 Know and understand the formulas for perimeter and area of a square and a rectangle; calculate the perimeters and areas of these shapes and combinations of these shapes using the formulas.

M.TE.04.07 Find one dimension of a rectangle given the other dimension and its perimeter or area.

M.TE.04.08 Find the side of a square given its perimeter or area.

M.PS.04.09 Solve contextual problems about perimeter and area of squares and rectangles in compound shapes.

Understand right angles

M.TE.04.10 Identify right angles and compare angles to right angles.

Problem-solving

M.PS.04.11 Solve contextual problems about surface area.

GEOMETRY

Understand perpendicular, parallel, and intersecting lines

G.GS.04.01 Identify and draw perpendicular, parallel, and intersecting lines using a ruler and a tool or object with a square (90°) corner.

Identify basic geometric shapes and their components, and solve problems

G.GS.04.02 Identify basic geometric shapes including isosceles, equilateral, and right triangles, and use their properties to solve problems.

G.SR.04.03 Identify and count the faces, edges, and vertices of basic three-dimensional geometric solids including cubes, rectangular prisms, and pyramids; describe the shape of their faces.

GEOMETRY

Recognize symmetry and transformations

G.TR.04.04 Recognize plane figures that have line symmetry.

G.TR.04.05 Recognize rigid motion transformations (flips, slides, turns) of a two-dimensional object.

DATA AND PROBABILITY

Represent and solve problems for given data

D.RE.04.01 Construct tables and bar graphs from given data.

D.RE.04.02 Order a given set of data, find the median, and specify the range of values.

D.RE.04.03 Solve problems using data presented in tables and bar graphs, e.g., compare data represented in two bar graphs and read bar graphs showing two data sets.