FIFTH GRADE MATHEMATICS

GRADE LEVEL CONTENT EXPECTATIONS

5 MATH

v.12.05

NUMBER & OPERATIONS

ALGEBRA

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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 division of whole numbers

N.MR.05.01 Understand the meaning of division of whole numbers with and without remainders; relate division to fractions and to repeated subtraction.

N.MR.05.02 Relate division of whole numbers with remainders to the form $a = bq + r$, e.g., $34 \div 5 = 6$ r 4, so $5 \bullet 6 + 4 = 34$; note remainder (4) is less than divisor (5).

N.MR.05.03 Write mathematical statements involving division for given situations.

Multiply and divide whole numbers

N.FL.05.04 Multiply a multi-digit number by a two-digit number; recognize and be able to explain common computational errors such as not accounting for place value.

N.FL.05.05 *Solve applied problems involving multiplication and division of whole numbers.**

N.FL.05.06 Divide fluently up to a four-digit number by a two-digit number.

Find prime factorizations of whole numbers

N.MR.05.07 *Find the prime factorization of numbers from 2 through 50, express in exponential notation, e.g., $24 = 2^3 \times 3^1$, and understand that every whole number greater than 1 is either prime or can be expressed as a product of primes.**

Understand meaning of decimal fractions and percentages

N.ME.05.08 Understand the relative magnitude of ones, tenths, and hundredths and the relationship of each place value to the place to its right, e.g., one is 10 tenths, one tenth is 10 hundredths.

N.ME.05.09 Understand percentages as parts out of 100, use % notation, and express a part of a whole as a percentage.

Understand fractions as division statements; find equivalent fractions

N.ME.05.10 Understand a fraction as a statement of division, e.g., $2 \div 3 = \frac{2}{3}$, using simple fractions and pictures to represent.

N.ME.05.11 *Given two fractions, e.g., $\frac{1}{2}$ and $\frac{1}{4}$, express them as fractions with a common denominator, but not necessarily a least common denominator, e.g., $\frac{1}{2} = \frac{4}{8}$ and $\frac{3}{4} = \frac{6}{8}$; use denominators less than 12 or factors of 100.**

Multiply and divide fractions

N.ME.05.12 *Find the product of two unit fractions with small denominators using an area model.**

N.MR.05.13 *Divide a fraction by a whole number and a whole number by a fraction, using simple unit fractions.**

Add and subtract fractions using common denominators

N.FL.05.14 *Add and subtract fractions with unlike denominators through 12 and/or 100, using the common denominator that is the product of the denominators of the 2 fractions, e.g., $\frac{3}{8} + \frac{7}{10}$: use 80 as the common denominator.**

* *revised expectations in italics*

Multiply and divide by powers of ten

N.MR.05.15 Multiply a whole number by powers of 10: 0.01, 0.1, 1, 10, 100, 1,000; and identify patterns.

N.FL.05.16 Divide numbers by 10's, 100's, 1,000's using mental strategies.

N.MR.05.17 Multiply one-digit and two-digit whole numbers by decimals up to two decimal places.

Solve applied problems with fractions

N.FL.05.18 *Use mathematical statements to represent an applied situation involving addition and subtraction of fractions.**

N.MR.05.19 *Solve contextual problems that involve finding sums and differences of fractions with unlike denominators using knowledge of equivalent fractions.**

N.FL.05.20 *Solve applied problems involving fractions and decimals; include rounding of answers and checking reasonableness.**

N.MR.05.21 *Solve for the unknown in equations such as* $\frac{1}{4} + x = \frac{7}{12}$.*

Express, interpret, and use ratios; find equivalences

N.MR.05.22 Express fractions and decimals as percentages and vice versa.

N.ME.05.23 Express ratios in several ways given applied situations, e.g., 3 cups to 5 people, 3 : 5, $\frac{3}{5}$; recognize and find equivalent ratios.

MEASUREMENT

Know, and convert among, measurement units within a given system

M.UN.05.01 Recognize the equivalence of 1 liter, 1,000 ml and 1,000 cm^3 and include conversions among liters, milliliters, and cubic centimeters.

M.UN.05.02 Know the units of measure of volume: cubic centimeter, cubic meter, cubic inches, cubic feet, cubic yards, and use their abbreviations (cm^3, m^3, in^3, ft^3, yd^3).

M.UN.05.03 Compare the relative sizes of one cubic inch to one cubic foot, and one cubic centimeter to one cubic meter.

M.UN.05.04 Convert measurements of length, weight, area, volume, and time within a given system using easily manipulated numbers.

Find areas of geometric shapes using formulas

M.PS.05.05 Represent relationships between areas of rectangles, triangles, and parallelograms using models.

M.TE.05.06 Understand and know how to use the area formula of a triangle:

$A = \frac{1}{2}bh$ (where b is length of the base and h is the height), and represent using models and manipulatives.

M.TE.05.07 Understand and know how to use the area formula for a parallelogram:

$A = bh$, and represent using models and manipulatives.

Understand the concept of volume

M.TE.05.08 Build solids with unit cubes and state their volumes.

M.TE.05.09 Use filling (unit cubes or liquid), and counting or measuring to find the volume of a cube and rectangular prism.

M.PS.05.10 Solve applied problems about the volumes of rectangular prisms using multiplication and division and using the appropriate units.

* *revised expectations in italics*

GEOMETRY

Know the meaning of angles, and solve problems

G.TR.05.01 Associate an angle with a certain amount of turning; know that angles are measured in degrees; understand that 90°, 180°, 270°, and 360° are associated respectively, with $\frac{1}{4}$, $\frac{1}{2}$, and $\frac{3}{4}$, and full turns.

G.GS.05.02 Measure angles with a protractor and classify them as acute, right, obtuse, or straight.

G.GS.05.03 Identify and name angles on a straight line and vertical angles.

G.GS.05.04 Find unknown angles in problems involving angles on a straight line, angles surrounding a point, and vertical angles.

G.GS.05.05 Know that angles on a straight line add up to 180° and angles surrounding a point add up to 360°; justify informally by "surrounding" a point with angles.

G.GS.05.06 Understand why the sum of the interior angles of a triangle is 180° and the sum of the interior angles of a quadrilateral is 360°, and use these properties to solve problems.

Solve problems about geometric shapes

G.GS.05.07 Find unknown angles and sides using the properties of: triangles, including right, isosceles, and equilateral triangles; parallelograms, including rectangles and rhombuses; and trapezoids.

DATA AND PROBABILITY

Construct and interpret line graphs

D.RE.05.01 Read and interpret line graphs, and solve problems based on line graphs, e.g., distance-time graphs, and problems with two or three line graphs on same axes, comparing different data.

D.RE.05.02 Construct line graphs from tables of data; include axis labels and scale.

Find and interpret mean and mode for a given set of data

D.AN.05.03 Given a set of data, find and interpret the mean (using the concept of fair share) and mode.

D.AN.05.04 Solve multi-step problems involving means.