

COMMON CORE STATE STANDARDS

6 MATH

A Crosswalk to the Michigan Grade Level Content Expectations

Introduction

In June 2010, the Michigan State Board of Education adopted the Common Core State Standards (CCSS) as the state K-12 content standards for Mathematics and English Language Arts.

The complete CCSS standards document can be found at www.michigan.gov/k-12.

Districts are encouraged to begin this transition to instruction of the new standards as soon as possible to prepare all students for career and college. New assessments based on the Common Core State Standards will be implemented in 2014-2015. More information about Michigan's involvement in the CCSS initiative and development of common assessments can be found at www.michigan.gov/k-12 by clicking the Common Core State Standards Initiative link

The CCSS for Mathematics are divided into two sets of standards: the Standards for Mathematical Practices and the Standards for Mathematical Content. This document is intended to show the alignment of Michigan's current mathematics Grade Level Content Expectations (GLCE) to the Standards for Mathematical Content to assist with the transition to instruction and assessment based on the CCSS.

It is anticipated that this initial work will be supported by clarification documents developed at the local and state level, including documents from national organizations and other groups. This document is intended as a conversation starter for educators within and across grades. While curriculum revisions will be guided by local curriculum experts, ultimately the alignment is implemented at the classroom level. Educators will need to unfold these standards in order to compare them to current classroom practice and identify adjustments to instruction and materials that support the depth of understanding implicit in these new standards.

The crosswalk between the Grade Level Content Expectations and the Standards for Mathematical Content is organized by Michigan Focal Points/CCSS Critical Areas. There is not an attempt to show one-to-one correspondence between expectations and standards because for the most part there is none at this level. The alignment occurs when looking across focal points/critical areas and/or across GLCE topics/CCSS domains.

Mathematical Practices

The Standards for Mathematical Practice describe varieties of expertise that mathematics educators at all levels should seek to develop in their students. These standards appear in every grade level and are listed below:

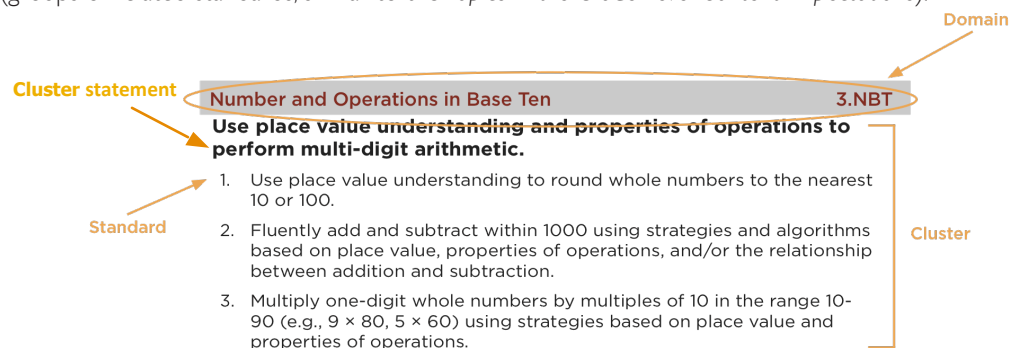
Mathematical Practices
<ol style="list-style-type: none"> 1. Make sense of problems, and persevere in solving them. 2. Reason abstractly and quantitatively. 3. Construct viable arguments, and critique the reasoning of others. 4. Model with mathematics. 5. Use appropriate tools strategically. 6. Attend to precision. 7. Look for, and make use of, structure. 8. Look for, and express regularity in, repeated reasoning.

Organization of the Common Core State Standards

Each CCSS grade level document begins with a description of the “critical areas.” These Critical Areas are parallel to the Michigan Focal Points. Below is a comparison of the Michigan Focal Points to the Critical Areas for this grade.

Michigan 6th Grade Focal Points	Common Core State Standards 6th Grade Critical Areas
Developing an understanding of operations on all rational numbers	Connecting ratio and rate to whole number multiplication and division and using concepts of ratio and rate to solve problems
Writing, interpreting, and using mathematical expressions and equations and solving linear equations	Completing understanding of division of fractions and extending the notion of number to the system of rational numbers, which includes negative numbers
Describing three-dimensional shapes and analyzing their properties, including volume and surface area	Writing, interpreting, and using expressions and equations
	Developing understanding of statistical thinking

The standards themselves are organized by *Domains* (large groups that progress across grades) and then by *Clusters* (groups of related standards, similar to the *Topics in the Grade Level Content Expectations*).



The table below shows the progression of the CCSS domains and clusters across the grade before, the target grade, and the following grade.

5th Grade	6th Grade	7th Grade
RATIOS AND PROPORTIONAL RELATIONSHIPS (RP)		
	<ul style="list-style-type: none"> Understand ratio concepts and use ratio reasoning to solve problems. 	<ul style="list-style-type: none"> Analyze proportional relationships and use them to solve real-world and mathematical problems.
OPERATIONS AND ALGEBRAIC THINKING (OA) EXPRESSIONS AND EQUATIONS (EE)		
<ul style="list-style-type: none"> Write and interpret numerical expressions. Analyze patterns and relationships. 	<ul style="list-style-type: none"> Apply and extend previous understandings of arithmetic to algebraic expressions. Reason about and solve one-variable equations and inequalities. Represent and analyze quantitative relationships between dependent and independent variables. 	<ul style="list-style-type: none"> Use properties of operations to generate equivalent expressions. Solve real-life and mathematical problems using numerical and algebraic expressions and equations.
NUMBER AND OPERATIONS IN BASE TEN (NBT) THE NUMBER SYSTEM (NS)		
<ul style="list-style-type: none"> Understand the place value system. Perform operations with multi-digit whole numbers and with decimals to hundredths. 	<ul style="list-style-type: none"> Apply and extend previous understandings of multiplication and division to divide fractions by fractions. Compute fluently with multi-digit numbers and find common factors and multiples. Apply and extend previous understandings of numbers to the system of rational numbers. 	<ul style="list-style-type: none"> Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers.
NUMBER AND OPERATIONS—FRACTIONS (NF)		
<ul style="list-style-type: none"> Use equivalent fractions as a strategy to add and subtract fractions. Apply and extend previous understandings of multiplication and division to multiply and divide fractions. 		
MEASUREMENT AND DATA (MD) STATISTICS AND PROBABILITY (SP)		
<ul style="list-style-type: none"> Convert like measurement units within a given measurement system. Represent and interpret data. Geometric measurement: understand concepts of volume and relate volume to multiplication and to addition. 	<ul style="list-style-type: none"> Develop understanding of statistical variability. Summarize and describe distributions. 	<ul style="list-style-type: none"> Use random sampling to draw inferences about a population. Draw informal comparative inferences about two populations. Investigate chance processes and develop, use, and evaluate probability models.
GEOMETRY (G)		
<ul style="list-style-type: none"> Graph points on the coordinate plane to solve real-world and mathematical problems. Classify two-dimensional figures into categories based on their properties. 	<ul style="list-style-type: none"> Solve real-world and mathematical problems involving area, surface area, and volume. 	<ul style="list-style-type: none"> Solve real-life and mathematical problems involving angle measure, area, surface area, and volume. Draw, construct and describe geometrical figures and describe the relationships between them.

Alignment of Michigan Content Expectations to Common Core Standards by Michigan Focal Point

Michigan Content Expectations	Common Core State Standards
Focal Point Developing an understanding of operations on all rational numbers	Critical Area Connecting ratio and rate to whole number multiplication and division and using concepts of ratio and rate to solve problems
COMMON CONTENT	

Mathematical Practices

1. Make sense of problems, and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments, and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for, and make use of, structure.
8. Look for, and express regularity in, repeated reasoning.

Add and subtract integers and rational numbers

N.FL.06.10 Add, subtract, multiply, and divide positive rational numbers fluently. [Core]

Solve decimal, percentage and rational number problems

N.FL.06.14 For applied situations, estimate the answers to calculations involving operations with rational numbers. [Core]

N.FL.06.15 Solve applied problems that use the four operations with appropriate decimal numbers. [Core]

Find equivalent ratios

N.ME.06.11 Find equivalent ratios by scaling up or scaling down. [Core]

Solve decimal, percentage, and rational number problems

N.FL.06.12 Calculate part of a number given the percentage and the number. [Core]

N.MR.06.13 Solve contextual problems involving percentages such as sales taxes and tips. [Extended]

Calculate rates

A. PA.06.01 Solve applied problems involving rates, including speed, e.g., if a car is going 50 mph, how far will it go in 3 1/2 hours? [Core]

Convert within measurement systems

M.UN.06.01 Convert between basic units of measurement within a single measurement system, e.g., square inches to square feet¹. [Extended]

Compute fluently with multi-digit numbers and find common factors and multiples

6. NS.3 Fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation.

Understand ratio concepts and use ratio reasoning to solve problems

6. RP.2. Understand the concept of a unit rate a/b associated with a ratio $a:b$ with $b \neq 0$, and use rate language in the context of a ratio relationship. For example, "This recipe has a ratio of 3 cups of flour to 4 cups of sugar, so there is $3/4$ cup of flour for each cup of sugar." "We paid \$75 for 15 hamburgers, which is a rate of \$5 per hamburger."

6. RP.3. Use ratio and rate reasoning to solve real-world and mathematical problems, e.g., by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams, or equations.

a. Make tables of equivalent ratios relating quantities with whole number measurements, find missing values in the tables, and plot the pairs of values on the coordinate plane. Use tables to compare ratios.

b. Solve unit rate problems including those involving unit pricing and constant speed. For example, if it took 7 hours to mow 4 lawns, then at that rate, how many lawns could be mowed in 35 hours? At what rate were lawns being mowed?

¹ Not previously linked to a focal point.

Michigan Content Expectations**Common Core State Standards**

c. Find a percent of a quantity as a rate per 100 (e.g., 30% of a quantity means $30/100$ times the quantity); solve problems involving finding the whole, given a part and the percent.

d. Use ratio reasoning to convert measurement units; manipulate and transform units appropriately when multiplying or dividing quantities.

CONTENT THAT IS DIFFERENT**Content moving out of 6th grade**

Add and subtract integers and rational numbers

N.MR.06.08 Understand integer subtraction as the inverse of integer addition. Understand integer division as the inverse of integer multiplication. [Extended]

N.FL.06.09 Add and multiply integers between -10 and 10; subtract and divide integers using the related facts. Use the number line and chip models for addition and subtraction. [Core]

7th Grade

Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers

7. NS.1 Apply and extend previous understandings of addition and subtraction to add and subtract rational numbers; represent addition and subtraction on a horizontal or vertical number line diagram.

7. NS.2 Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers.

Content moving into 6th grade

5th Grade

Understand division of whole numbers

N.MR.05.06 Divide fluently up to a four-digit number by a two-digit number. [Extended]

Express, interpret, and use ratios; find equivalences

N.ME.05.23 Express ratios in several ways given applied situations, e.g., 3 cups to 5 people, 3:5, 3/5; recognize and find equivalent ratios. [Extended]

Compute fluently with multi-digit numbers and find common factors and multiples

6. NS. 2 Fluently divide multi-digit numbers using the standard algorithm.

Understand ratio concepts and use ratio reasoning to solve problems

6. RP.1 Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities. For example, "The ratio of wings to beaks in the bird house at the zoo was 2:1, because for every 2 wings there was 1 beak." "For every vote candidate A received, candidate C received nearly three votes."

Mathematical Practices

1. Make sense of problems, and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments, and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for, and make use of, structure.
8. Look for, and express regularity in, repeated reasoning.

Mathematical Practices

1. Make sense of problems, and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments, and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for, and make use of, structure.
8. Look for, and express regularity in, repeated reasoning.

Michigan Content Expectations	Common Core State Standards
Focal Point Developing an understanding of operations on all rational numbers	Critical Area Completing understanding of division of fractions and extending the notion of number to the system of rational numbers, which includes negative numbers

COMMON CONTENT

Multiply and divide fractions

N.MR.06.01 Understand division of fractions as the inverse of multiplication, e.g., if $4/5 \div 2/3 = _$, then $(2/3)(_) = 4/5$, so $_ = (4/5)(3/2) = 12/10$. [Core]

N.FL.06.02 Given an applied situation involving dividing fractions, write a mathematical statement to represent the situation. [Core]

N.MR.06.03 Solve for the unknown in equations such as $1/4 \div _ = 1$, $3/4 \div _ = 1/4$, and $1/2 = 1(_)$. [Core]

N.FL.06.04 Multiply and divide any two fractions, including mixed numbers, fluently. [Core]

Apply and extend previous understandings of multiplication and division to divide fractions by fractions

6. NS.1 Interpret and compute quotients of fractions, and solve word problems involving division of fractions by fractions, e.g., by using visual fraction models and equations to represent the problem. For example, create a story context for $(2/3) \div (3/4)$ and use a visual fraction model to show the quotient; use the relationship between multiplication and division to explain that $(2/3) \div (3/4) = 8/9$ because $3/4$ of $8/9$ is $2/3$. (In general, $(a/b) \div (c/d) = ad/bc$.) How much chocolate will each person get if 3 people share $1/2$ lb of chocolate equally? How many $3/4$ -cup servings are in $2/3$ of a cup of yogurt? How wide is a rectangular strip of land with length $3/4$ mi and area $1/2$ square mi?

Reason about and solve one-variable equations and inequalities

6. EE.7 Solve real-world and mathematical problems by writing and solving equations of the form $x + p = q$ and $px = q$ for cases in which p, q and x are all nonnegative rational numbers.

Focal Point Writing, interpreting, and using mathematical expressions and equations and solving linear equations	Critical Area Writing, interpreting, and using expressions and equations
--	--

COMMON CONTENT

Use variables, write expressions and equations, and combine like terms

A.FO.06.03 Use letters, with units, to represent quantities in a variety of contexts, e.g., y lbs., k minutes, x cookies. [Core]

A.FO.06.04 Distinguish between an algebraic expression and an equation. [Core]

Apply and extend previous understandings of arithmetic to algebraic expressions

6. EE.2 Write, read, and evaluate expressions in which letters stand for numbers.

- a. Write expressions that record operations with numbers and with letters standing for numbers. For example, express the calculation "Subtract y from 5" as $5 - y$.

Michigan Content Expectations

A.FO.06.05 Use standard conventions for writing algebraic expressions, e.g., $2x + 1$ means “two times x , plus 1” and $2(x + 1)$ means “two times the quantity $(x + 1)$.” [Extended]

A.FO.06.06 Represent information given in words using algebraic expressions and equations. [Core]

A.FO.06.07 Simplify expressions of the first degree by combining like terms, and evaluate using specific values. [Extended]

Represent linear functions using tables, equations, and graphs

A.RP.06.08 Understand that relationships between quantities can be suggested by graphs and tables. [Extended]

A.PA.06.09 Solve problems involving linear functions whose input values are integers; write the equation; graph the resulting ordered pairs of integers, e.g., given c chairs, the “leg function” is $4c$; if you have 5 chairs, how many legs?; if you have 12 legs, how many chairs? [Extended]

A.RP.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. [Extended]

Solve equations

A.FO.06.11 Relate simple linear equations with integer coefficients, e.g., $3x = 8$ or $x + 5 = 10$, to particular contexts and solve. [Core]

A.FO.06.12 Understand that adding or subtracting the same number to both sides of an equation creates a new equation that has the same solution. [Core]

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. [Core]

Common Core State Standards

b. Identify parts of an expression using mathematical terms (sum, term, product, factor, quotient, coefficient); view one or more parts of an expression as a single entity. For example, describe the expression $2(8 + 7)$ as a product of two factors; view $(8 + 7)$ as both a single entity and a sum of two terms.

c. Evaluate expressions at specific values for their variables. Include expressions that arise from formulas in real-world problems. Perform arithmetic operations, including those involving whole-number exponents, in the conventional order when there are no parentheses to specify a particular order (Order of Operations). For example, use the formulas $V = s^3$ and $A = 6s^2$ to find the volume and surface area of a cube with sides of length $s = 1/2$.

6. EE.3 Apply the properties of operations to generate equivalent expressions. For example, apply the distributive property to the expression $3(2 + x)$ to produce the equivalent expression $6 + 3x$; apply the distributive property to the expression $24x + 18y$ to produce the equivalent expression $6(4x + 3y)$; apply properties of operations to $y + y + y$ to produce the equivalent expression $3y$.

Reason about and solve one-variable equations and inequalities

6. EE.6 Use variables to represent numbers and write expressions when solving a real-world or mathematical problem; understand that a variable can represent an unknown number, or, depending on the purpose at hand, any number in a specified set.

6. EE.7. Solve real-world and mathematical problems by writing and solving equations of the form $x + p = q$ and $px = q$ for cases in which p, q and x are all nonnegative rational numbers.

Mathematical Practices

1. Make sense of problems, and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments, and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for, and make use of, structure.
8. Look for, and express regularity in, repeated reasoning.

Michigan Content Expectations

A.FO.06.14 Solve equations of the form $ax + b = c$, e.g., $3x + 8 = 15$ by hand for positive integer coefficients less than 20, use calculators otherwise, and interpret the results. [Extended]

Common Core State Standards

Represent and analyze quantitative relationships between dependent and independent variables

6.EE.9 Use variables to represent two quantities in a real-world problem that change in relationship to one another; write an equation to express one quantity, thought of as the dependent variable, in terms of the other quantity, thought of as the independent variable. Analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation. For example, in a problem involving motion at constant speed, list and graph ordered pairs of distances and times, and write the equation $d = 65t$ to represent the relationship between distance and time.

Mathematical Practices

1. Make sense of problems, and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments, and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for, and make use of, structure.
8. Look for, and express regularity in, repeated reasoning.

CONTENT THAT IS DIFFERENT

Content moving into 6th grade

[Not explicit in Grade Level Content Expectations]

Apply and extend previous understandings of arithmetic to algebraic expressions

6. EE.4 Identify when two expressions are equivalent (i.e., when the two expressions name the same number regardless of which value is substituted into them). For example, the expressions $y + y + y$ and $3y$ are equivalent because they name the same number regardless of which number y stands for.

Reason about and solve one-variable equations and inequalities.

6. EE.5 Understand solving an equation or inequality as a process of answering a question: which values from a specified set, if any, make the equation or inequality true? Use substitution to determine whether a given number in a specified set makes an equation or inequality true.

6. EE.8 Write an inequality of the form $x > c$ or $x < c$ to represent a constraint or condition in a real-world or mathematical problem. Recognize that inequalities of the form $x > c$ or $x < c$ have infinitely many solutions; represent solutions of such inequalities on number line diagrams.

Michigan Content Expectations	Common Core State Standards
Focal Point Describing three-dimensional shapes and analyzing their properties, including volume and surface area	
COMMON CONTENT	

Find volume and surface area

M.PS.06.02 Draw patterns (of faces) for a cube and rectangular prism that, when cut, will cover the solid exactly (nets). [Core]

M.TE.06.03 Compute the volume and surface area of cubes and rectangular prisms given the lengths of their sides, using formulas. [Core]

Solve real-world and mathematical problems involving area, surface area, and volume

6. G.2 Find the volume of a right rectangular prism with fractional edge lengths by packing it with unit cubes of the appropriate unit fraction edge lengths, and show that the volume is the same as would be found by multiplying the edge lengths of the prism. Apply the formulas $V = lwh$ and $V = bh$ to find volumes of right rectangular prisms with fractional edge lengths in the context of solving real-world and mathematical problems.

6. G.4 Represent three-dimensional figures using nets made up of rectangles and triangles, and use the nets to find the surface area of these figures. Apply these techniques in the context of solving real-world and mathematical problems.

Mathematical Practices

1. Make sense of problems, and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments, and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for, and make use of, structure.
8. Look for, and express regularity in, repeated reasoning.

CONTENT THAT IS DIFFERENT

Content moving into 6th grade

8th Grade

Solve problems about geometric figures

G.SR.08.04 Find area and perimeter of complex figures by sub-dividing them into basic shapes (quadrilaterals, triangles, circles).

Solve real-world and mathematical problems involving area, surface area, and volume

6. G.1 Find area of right triangles, other triangles, special quadrilaterals, and polygons by composing into rectangles or decomposing into triangles and other shapes; apply these techniques in the context of solving real-world and mathematical problems.

High School

Solve real-world and mathematical problems involving area, surface area, and volume

6. G.3 Draw polygons in the coordinate plane given coordinates for the vertices; use coordinates to find the length of a side joining points with the same first coordinate or the same second coordinate. Apply these techniques in the context of solving real-world and mathematical problems.

Michigan Content Expectations	Common Core State Standards
	Critical Area Developing understanding of statistical thinking

COMMON CONTENT

None

CONTENT THAT IS DIFFERENT

Content moving into 6th grade

Mathematical Practices

1. Make sense of problems, and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments, and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for, and make use of, structure.
8. Look for, and express regularity in, repeated reasoning.

4th Grade

Represent and solve problems for given data

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

5th Grade

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. [Core]

D.AN.05.04 Solve multi-step problems involving means. [Extended]

7th Grade

Represent and interpret data

D.RE.07.01 Represent and interpret data using circle graphs, stem and leaf plots, histograms, and box-and-whisker plots, and select appropriate representation to address specific questions. [Core]

Compute statistics about data sets

D.AN.07.04 Find and interpret the median, quartiles, and interquartile range of a given set of data. [Extended]

8th Grade

Draw, explain, and justify conclusions based on data

D.AN.08.01 Determine which measure of central tendency (mean, median, mode) best represents a data set, e.g., salaries, home prices, for answering certain questions; justify the choice made.

Develop understanding of statistical variability

6. SP.1 Recognize a statistical question as one that anticipates variability in the data related to the question and accounts for it in the answers. *For example, "How old am I?" is not a statistical question, but "How old are the students in my school?" is a statistical question because one anticipates variability in students' ages.*

6. SP.2 Understand that a set of data collected to answer a statistical question has a distribution which can be described by its center, spread, and overall shape.

6. SP.3 Recognize that a measure of center for a numerical data set summarizes all of its values with a single number, while a measure of variation describes how its values vary with a single number.

Summarize and describe distributions

6. SP.4 Display numerical data in plots on a number line, including dot plots, histograms, and box plots.

6.SP.5 Summarize numerical data sets in relation to their context, such as by:

- a. Reporting the number of observations.
- b. Describing the nature of the attribute under investigation, including how it was measured and its units of measurement.
- c. Giving quantitative measures of center (median and/or mean) and variability (interquartile range and/or mean absolute deviation), as well as describing any overall pattern and any striking deviations from the overall pattern with reference to the context in which the data were gathered.
- d. Relating the choice of measures of center and variability to the shape of the data distribution and the context in which the data were gathered.

Michigan Content Expectations

Represent rational numbers as fractions or decimals²

N.ME.06.05 Order rational numbers and place them on the number line. [Extended]

N.ME.06.06 Represent rational numbers as fractions or terminating decimals when possible, and translate between these representations. [Extended]

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 . [Extended]

Understand rational numbers and their location on the number line

N.ME.06.17 Locate negative rational numbers (including integers) on the number line; know that numbers and their negatives add to 0 , and are on opposite sides and at equal distance from 0 on a number line. [Extended]

N.ME.06.18 Understand that rational numbers are quotients of integers (non zero denominators), e.g., a rational number is either a fraction or a negative fraction. [Extended]

N.ME.06.19 Understand that 0 is an integer that is neither negative nor positive. [Extended]

N.ME.06.20 Know that the absolute value of a number is the value of the number ignoring the sign; or is the distance of the number from 0 . [Extended]

Understand the coordinate plane

A.RP.06.02 Plot ordered pairs of integers and use ordered pairs of integers to identify points in all four quadrants of the coordinate plane. [Extended]

Common Core State Standards

Apply and extend previous understandings of numbers to the system of rational numbers

6. NS.5 Understand that positive and negative numbers are used together to describe quantities having opposite directions or values (e.g., temperature above/below zero, elevation above/below sea level, debits/credits, positive/negative electric charge); use positive and negative numbers to represent quantities in real-world contexts, explaining the meaning of 0 in each situation.

6. NS.6 Understand a rational number as a point on the number line. Extend number line diagrams and coordinate axes familiar from previous grades to represent points on the line and in the plane with negative number coordinates.

a. Recognize opposite signs of numbers as indicating locations on opposite sides of 0 on the number line; recognize that the opposite of the opposite of a number is the number itself, e.g., $-(-3) = 3$, and that 0 is its own opposite.

b. Understand signs of numbers in ordered pairs as indicating locations in quadrants of the coordinate plane; recognize that when two ordered pairs differ only by signs, the locations of the points are related by reflections across one or both axes.

c. Find and position integers and other rational numbers on a horizontal or vertical number line diagram; find and position pairs of integers and other rational numbers on a coordinate plane.

Apply and extend previous understandings of numbers to the system of rational numbers

6. NS.7 Understand ordering and absolute value of rational numbers.

a. Interpret statements of inequality as statements about the relative position of two numbers on a number line diagram. For example, interpret $-3 > -7$ as a statement that -3 is located to the right of -7 on a number line oriented from left to right.

Mathematical Practices

1. Make sense of problems, and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments, and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for, and make use of, structure.
8. Look for, and express regularity in, repeated reasoning.

² Previously linked to a focal point.

Michigan Content Expectations

Common Core State Standards

Mathematical Practices

1. Make sense of problems, and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments, and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for, and make use of, structure.
8. Look for, and express regularity in, repeated reasoning.

b. Write, interpret, and explain statements of order for rational numbers in real-world contexts. For example, write $-3^{\circ}\text{C} > -7^{\circ}\text{C}$ to express the fact that -3°C is warmer than -7°C .

c. Understand the absolute value of a rational number as its distance from 0 on the number line; interpret absolute value as magnitude for a positive or negative quantity in a real-world situation. For example, for an account balance of -30 dollars, write $|-30| = 30$ to describe the size of the debt in dollars.

d. Distinguish comparisons of absolute value from statements about order. For example, recognize that an account balance less than -30 dollars represent a debt greater than 30 dollars.

6. NS.8. Solve real-world and mathematical problems by graphing points in all four quadrants of the coordinate plane. Include use of coordinates and absolute value to find distances between points with the same first coordinate or the same second coordinate.

Connections

COMMON CONTENT

None

CONTENT THAT IS DIFFERENT

Content moving out of 6th grade

Use exponents

N.ME.06.16 Understand and use integer exponents, excluding powers of negative bases; express numbers in scientific notation. [Extended]

8th Grade

Work with radicals and integer exponents

8. EE.1 Know and apply the properties of integer exponents to generate equivalent numerical expressions. For example, $3^2 \times 3^{(-5)} = 3^{(-3)} = 1/(3^3) = 1/27$.

8. EE.3 Use numbers expressed in the form of a single digit times an integer power of 10 to estimate very large or very small quantities, and to express how many times as much one is than the other. For example, estimate the population of the United States as 3×10^8 and the population of the world as 7×10^9 , and determine that the world population is more than 20 times larger.

Michigan Content Expectations

Understand and apply basic properties

G.GS.06.01 Understand and apply basic properties of lines, angles, and triangles, including:

- triangle inequality,
- relationships of vertical angles, complementary angles, supplementary angles,
- congruence of corresponding and alternate interior angles when parallel lines are cut by a transversal, and that such congruencies imply parallel lines,
- locate interior and exterior angles of any triangle, and use the property that an exterior angle of a triangle is equal to the sum of the remote (opposite) interior angles,
- know that the sum of the exterior angles of a convex polygon is 360° . [Extended]

Understand the concept of congruence and basic transformations

G.GS.06.02 Understand that for polygons, congruence means corresponding sides and angles have equal measures. [Extended]

Understand the concept of congruence and basic transformations

G.TR.06.03 Understand the basic rigid motions in the plane (reflections, rotations, translations), relate these to congruence, and apply them to solve problems. [Extended]

G.TR.06.04 Understand and use simple compositions of basic rigid transformations, e.g., a translation followed by a reflection. [Extended]

Common Core State Standards

7th Grade

Solve real-life and mathematical problems involving angle measure, area, surface area, and volume

7. G.5 Use facts about supplementary, complementary, vertical, and adjacent angles in a multi-step problem to write and solve simple equations for an unknown angle in a figure.

8th Grade

Understand congruence and similarity using physical models, transparencies, or geometry software

8. G.1 Verify experimentally the properties of rotations, reflections, and translations:

- a. Lines are taken to lines, and line segments to line segments of the same length.
- b. Angles are taken to angles of the same measure.
- c. Parallel lines are taken to parallel lines.

8. G.2 Understand that a two-dimensional figure is congruent to another if the second can be obtained from the first by a sequence of rotations, reflections, and translations; given two congruent figures, describe a sequence that exhibits the congruence between them.

8. G.5 Use informal arguments to establish facts about the angle sum and exterior angle of triangles, about the angles created when parallel lines are cut by a transversal, and the angle-angle criterion for similarity of triangles. For example, arrange three copies of the same triangle so that the three angles appear to form a line, and give an argument in terms of transversals why this is so.

Mathematical Practices

1. Make sense of problems, and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments, and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for, and make use of, structure.
8. Look for, and express regularity in, repeated reasoning.

Mathematical Practices

1. Make sense of problems, and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments, and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for, and make use of, structure.
8. Look for, and express regularity in, repeated reasoning.

Michigan Content Expectations

Construct geometric shapes

G.SR.06.05 Use paper folding to perform basic geometric constructions of perpendicular lines, midpoints of line segments and angle bisectors; justify informally. [NASL]

Understand the concept of probability and solve problems

D.PR.06.01 Express probabilities as fractions, decimals, or percentages between 0 and 1; know that 0 probability means an event will not occur and that probability 1 means an event will occur. [Extended]

D.PR.06.02 Compute probabilities of events from simple experiments with equally likely outcomes, e.g., tossing dice, flipping coins, spinning spinners, by listing all possibilities and finding the fraction that meets given conditions. [Extended]

Common Core State Standards

High School

Make geometric constructions

9-12.G.CO.12 Make formal geometric constructions with a variety of tools and methods (compass and straightedge, string, reflective devices, paper folding, dynamic geometric software, etc.). Copying a segment; copying an angle; bisecting a segment; bisecting an angle; constructing perpendicular lines, including the perpendicular bisector of a line segment; and constructing a line parallel to a given line through a point not on the line.

7th Grade

Investigate chance processes and develop, use, and evaluate probability models

7.SP.5 Understand that the probability of a chance event is a number between 0 and 1 that expresses the likelihood of the event occurring. Larger numbers indicate greater likelihood. A probability near 0 indicates an unlikely event, a probability around $1/2$ indicates an event that is neither unlikely nor likely, and a probability near 1 indicates a likely event.

7.SP.7 Develop a probability model and use it to find probabilities of events. Compare probabilities from a model to observed frequencies; if the agreement is not good, explain possible sources of the discrepancy.

- a. Develop a uniform probability model by assigning equal probability to all outcomes, and use the model to determine probabilities of events. For example, if a student is selected at random from a class, find the probability that Jane will be selected and the probability that a girl will be selected.

Michigan Content Expectations**Common Core State Standards****Content moving into 6th grade***5th Grade**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. [Core]

Apply and extend previous understandings of arithmetic to algebraic expressions

6. EE.1 Write and evaluate numerical expressions involving whole-number exponents.

*4th Grade**Use factors and multiples*

N.MR.04.07 Use factors and multiples to compose and decompose whole numbers. [Core]

Compute fluently with multi-digit numbers and find common factors and multiples

6. NS.4 Find the greatest common factor of two whole numbers less than or equal to 100 and the least common multiple of two whole numbers less than or equal to 12. Use the distributive property to express a sum of two whole numbers 1–100 with a common factor as a multiple of a sum of two whole numbers with no common factor. For example, express $36 + 8$ as $4(9 + 2)$.

Mathematical Practices

1. Make sense of problems, and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments, and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for, and make use of, structure.
8. Look for, and express regularity in, repeated reasoning.



Michigan State Board of Education

John C. Austin, President
Ann Arbor

Cassandra E. Ulbrich, Vice President
Rochester Hills

Nancy Danhof, Secretary
East Lansing

Marianne Yared McGuire, Treasurer
Detroit

Kathleen N. Straus
Bloomfield Township

Dr. Richard Zeile
Detroit

Eileen Weiser
Ann Arbor

Daniel Varner
Detroit

Governor Rick Snyder
Ex Officio

Michael P. Flanagan, Chairman
Superintendent of Public Instruction
Ex Officio

MDE Staff

Sally Vaughn, Ph.D.
Deputy Superintendent and Chief Academic Officer

Linda Forward, Director
Office of Education Improvement and Innovation