#### FIFTH GRADE

ΜΑΤΗΕΜΑΤΙΟ S

## COMMON CORE STATE STANDARDS

# **5** HARM

### 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 <u>www.michigan.gov/k-12</u> 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.



www.michigan.gov/mde

(continued on next page)

#### **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**

- I. 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 5th Grade Focal Points	Common Core State Standards 5th Grade Critical Areas	
Developing an understanding of and fluency with division of whole numbers	Extending division to 2-digit divisors, integrating decimal fractions into the place value system and developing understanding of operations with decimals to hundredths, and developing fluency with whole number and decimal operation	
Developing an understanding of and fluency with addition and subtraction of fractions and decimals	Developing fluency with addition and subtraction of fractions, developing understanding of the multiplicatio of fractions and of division of fractions in limited cases (unit fractions divided by whole numbers and whole numbers divided by unit fractions)	
Analyzing properties of two-dimensional shapes, including angles		
0.0		
	Developing understanding of volume	
The standards themselves are organized by <i>Domains</i> (I Justers (groups of related standards, similar to the <i>Top</i> Cluster statement Use place value understanding	arge groups that progress across grades) and then by ics in the Grade Level Content Expectations). Domain Ten 3.NBT g and properties of operations to	
The standards themselves are organized by Domains (I Filusters (groups of related standards, similar to the Top Cluster statement Use place value understandin perform multi-digit arithmetic	arge groups that progress across grades) and then by ics in the Grade Level Content Expectations). Domain Ten 3.NBT g and properties of operations to	
The standards themselves are organized by Domains (I Clusters (groups of related standards, similar to the Top Cluster statement Use place value understandin perform multi-digit arithmeti 1. Use place value understandin 10 or 100. 2. Fluently add and subtract wit	arge groups that progress across grades) and then by ics in the Grade Level Content Expectations). Domain Ten 3.NBT g and properties of operations to c. g to round whole numbers to the nearest thin 1000 using strategies and algorithms cies of operations, and/or the relationship	

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

4th Grade	5th Grade	6th Grade
		RATIOS AND PROPORTIONAL RELATIONSHIPS (RP)
		<ul> <li>Understand ratio concepts and use ratio reasoning to solve problems.</li> </ul>
OPERATIONS AND ALGEBRAIC THINKING (OA)		EXPRESSIONS AND EQUATIONS (EE)
<ul> <li>Use the four operations with whole numbers to solve problems.</li> </ul>	<ul><li>Write and interpret numerical expressions.</li><li>Analyze patterns and relationships.</li></ul>	• Apply and extend previous understandings of arithmetic to algebraic expressions.
<ul><li>Gain familiarity with factors and multiples.</li><li>Generate and analyze patterns.</li></ul>		<ul> <li>Reason about and solve one-variable equations and inequalities.</li> </ul>
		<ul> <li>Represent and analyze quantitative relationship between dependent and independent variables.</li> </ul>
NUMBER AND OPERATIONS IN BASE TEN (NBT)		THE NUMBER SYSTEM (NS)
<ul> <li>Generalize place value understanding for multi-digit whole numbers.</li> </ul>	• Use place value understanding and properties of operations to perform multi-digit arithmetic.	• Apply and extend previous understandings of multiplication and division to divide fractions
• Use place value understanding and properties of operations to perform multi-digit arithmetic.		<ul> <li>by fractions.</li> <li>Compute fluently with multi-digit numbers and find common factors and multiples.</li> </ul>
NUMBER AND OPERATIONS—FRACTIONS (NF)		<ul> <li>Apply and extend previous understandings of numbers to the system of rational numbers.</li> </ul>
• Extend understanding of fraction equivalence and ordering.	• Develop understanding of fractions as numbers.	numbers to the system of rational numbers.
• Build fractions from unit fractions by applying and extending previous understandings of operations on whole numbers.		
<ul> <li>Understand decimal notation for fractions, and compare decimal fractions.</li> </ul>		
MEASUREMENT AND DATA (MD)		STATISTICS AND PROBABILITY (SP)
<ul> <li>Solve problems involving measurement and conversion of measurements from a larger unit to a smaller unit.</li> </ul>	<ul><li>Convert like measurement units within a given measurement system.</li><li>Represent and interpret data.</li></ul>	<ul><li>Develop understanding of statistical variability.</li><li>Summarize and describe distributions.</li></ul>
• Represent and interpret data.	Geometric measurement: understand	
• Geometric measurement: understand concepts of angle and measure angles.	concepts of volume and relate volume to multiplication and to addition.	
GEOMETRY (G)		
• Draw and identify lines and angles, and classify shapes by properties of their lines and angles.	<ul> <li>Graph points on the coordinate plane to solve real-world and mathematical problems.</li> </ul>	• Solve real-world and mathematical problems involving area, surface area, and volume.
	<ul> <li>Classify two-dimensional figures into categories based on their properties.</li> </ul>	

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

Michigan Content Expectations	Common Core State Standards	
<b>Focal Point</b> Developing an understanding of and fluency with division of whole numbers	<b>Critical Area</b> Extending division to 2-digit divisors, integrating decimal fractions into the place value system and developing understanding of operations with decimals to hundredths, and developing fluency with whole number and decimal operation	

#### COMMON CONTENT

#### 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. [Core]

**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  $5 \times 6 + 4 = 34$ ; note remainder (4) is less than divisor (5). [Extended]

**N.MR.05.03** Write mathematical statements involving division for given situations. Multiply and divide whole numbers. [Core]

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. [Core]

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

#### 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. [Extended]

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

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

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

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

**5. NBT.2** Explain patterns in the number of zeros of the product when multiplying a number by powers of 10, and explain patterns in the placement of the decimal point when a decimal is multiplied or divided by a power of 10. Use whole number exponents to denote powers of 10.

Understand the place value system

## Perform operations with multi-digit whole numbers and with decimals to hundredths

**5. NBT.5** Fluently multiply multi-digit whole numbers using the standard algorithm.

**5. NBT.6** Find whole-number quotients of whole numbers with up to four-digit dividends and two-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.

**5.NBT.7** Add, subtract, multiply, and divide decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used.

## Convert like measurement units within a given measurement system

**5. MD.I** Convert among different-sized standard measurement units within a given measurement system (e.g., convert 5 cm to 0.05 m), and use these conversions in solving multi-step real world problems.

- Make sense of problems, and persevere in solving them.
- 2. Reason abstractly and quantitatively.
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- 4. Model with mathematics.
- 5. Use appropriate tools strategically.
- 6. Attend to precision.
- 7. Look for, and make use of, structure.
- Look for, and express regularity in, repeated reasoning.

#### **Common Core State Standards**

#### **CONTENT THAT IS DIFFERENT** Content moving out of 5th grade Understand division of whole numbers 6th Grade Compute fluently with multi-digit numbers and find N.FL.05.06 Divide fluently up to a four-digit common factors and multiples number by a two-digit number. [Extended] 6. NS. 2 Fluently divide multi-digit numbers using the standard algorithm. Find prime factorizations of whole numbers 6th Grade Apply and extend previous understandings of N.MR.05.07 Find the prime factorization of arithmetic to algebraic expressions numbers from 2 through 50, express in exponential notation, e.g., $24 = 2^3 \times 3^1$ , and understand that 6. **EE.I** Write and evaluate numerical expressions every whole number greater than 1 is either prime involving whole-number exponents. or can be expressed as a product of primes. [Core] Summarize and describe distributions 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]

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 was 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 was gathered.

- I. Make sense of problems, and persevere in solving them.
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- 5. Use appropriate tools strategically.
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#### **Focal Point**

Developing an understanding of and fluency with addition and subtraction of fractions and decimals

#### **Common Core State Standards**

#### **Critical Area**

Developing fluency with addition and subtraction of fractions, developing understanding of the multiplication of fractions and of division of fractions in limited cases (unit fractions divided by whole numbers and whole numbers divided by unit fractions)

#### **COMMON CONTENT**

Understand fractions as division statements; find equivalent fractions<sup>1</sup>

**N.ME.05.10** Understand a fraction as a statement of division, e.g.,  $2 \div 3 = 2/3$ , using simple fractions and pictures to represent. [Extended]

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

#### Multiply and divide fractions

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

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

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., 3/8 + 7/10 : use 80 as the common denominator. [Core]

#### Solve applied problems with fractions

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

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

## Use equivalent fractions as a strategy to add and subtract fractions

**5.NF.I** Add and subtract fractions with unlike denominators (including mixed numbers) by replacing given fractions with equivalent fractions in such a way as to produce an equivalent sum or difference of fractions with like denominators. For example, 2/3 + 5/4 = 8/12 + 15/12 = 23/12. (In general, a/b + c/d = (ad + bc)/bd.)

**5.NF.2** Solve word problems involving addition and subtraction of fractions referring to the same whole, including cases of unlike denominators, e.g., by using visual fraction models or equations to represent the problem. Use benchmark fractions and number sense of fractions to estimate mentally and assess the reasonableness of answers. For example, recognize an incorrect result 2/5 + 1/2 = 3/7 by observing that 3/7 < 1/2.

#### Apply and extend previous understandings of multiplication and division to multiply and divide fractions

**5. NF.3** Interpret a fraction as division of the numerator by the denominator  $(a/b = a \div b)$ . Solve word problems involving division of whole numbers leading to answers in the form of fractions or mixed numbers, e.g., by using visual fraction models or equations to represent the problem. For example, interpret 3/4 as the result of dividing 3 by 4, noting that 3/4 multiplied by 4 equals 3 and that when 3 wholes are shared equally among 4 people each person has a share of size 3/4. If 9 people want to share a 50-pound sack of rice equally by weight, how many pounds of rice should each person get? Between what two whole numbers does your answer lie?

#### <sup>1</sup> This topic was not linked to this focal point previously.

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#### **Common Core State Standards**

#### **COMMON CONTENT**

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

**N.MR.05.21** Solve for the unknown in equations such as 1/4 + x = 7/12. [Extended]

#### Construct and interpret line graphs<sup>2</sup>

**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. [Extended]

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

**5. NF.4** Apply and extend previous understandings of multiplication to multiply a fraction or whole number by a fraction.

b. Find the area of a rectangle with fractional side lengths by tiling it with unit squares of the appropriate unit fraction side lengths, and show that the area is the same as would be found by multiplying the side lengths. Multiply fractional side lengths to find areas of rectangles, and represent fraction products as rectangular areas.

**5. NF.6** Solve real world problems involving multiplication of fractions and mixed numbers, e.g., by using visual fraction models or equations to represent the problem.

**5. NF.7** Apply and extend previous understandings of division to divide unit fractions by whole numbers and whole numbers by unit fractions.

a. Interpret division of a unit fraction by a non-zero whole number, and compute such quotients. For example, create a story context for  $(1/3) \div 4$  and use a visual fraction model to show the quotient. Use the relationship between multiplication and division to explain that  $(1/3) \div 4 = 1/12$  because  $(1/12) \times 4 = 1/3$ .

b. Interpret division of a whole number by a unit fraction, and compute such quotients. For example, create a story context for  $4 \div (1/5)$  and use a visual fraction model to show the quotient. Use the relationship between multiplication and division to explain that  $4 \div (1/5) = 20$  because  $20 \times (1/5) = 4$ .

c. Solve real-world problems involving division of unit fractions by non-zero whole numbers and division of whole numbers by unit fractions, e.g., by using visual fraction models and equations to represent the problem. For example, how much chocolate will each person get if 3 people share 1/2 lb of chocolate equally? How many 1/3-cup servings are in 2 cups of raisins?

#### Represent and interpret data

**5. MD.2** Make a line plot to display a data set of measurements in fractions of a unit (1/2, 1/4, 1/8). Use operations on fractions for this grade to solve problems involving information presented in line plots. For example, given different measurements of liquid in identical beakers, find the amount of liquid each beaker would contain if the total amount in all the beakers were redistributed equally.

#### Mathematical Practices

- Make sense of problems, and persevere in solving them.
- 2. Reason abstractly and quantitatively.
- 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.
- Look for, and express regularity in, repeated reasoning.

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<sup>&</sup>lt;sup>2</sup>This topic was not linked to this focal point previously.

[Not explicit in GLCE]

**Common Core State Standards** 

#### **CONTENT THAT IS DIFFERENT**

#### **Content moving into 5th grade**

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

5. NF.4 Apply and extend previous understandings of multiplication to multiply a fraction or whole number by a fraction.

a. Interpret the product  $(a/b) \times q$  as a part of a partition of q into b equal parts; equivalently, as the result of a sequence of operations  $a \times q \div b$ . For example, use a visual fraction model to show  $(2/3) \times 4 = 8/3$ , and create a story context for this equation. Do the same with  $(2/3) \times (4/5) =$ 8/15. (In general, (*a*/*b*) × (*c*/*d*) = *ac*/*bd*.)

5. NF.5 Interpret multiplication as scaling (resizing) by:

a. Comparing the size of a product to the size of one factor on the basis of the size of the other factor, without performing the indicated multiplication.

b. Explaining why multiplying a given number by a fraction greater than 1 results in a product greater than the given number (recognizing multiplication by whole numbers greater than 1 as a familiar case); explaining why multiplying a given number by a fraction less than 1 results in a product smaller than the given number; and relating the principle of fraction equivalence *a/b*  $= (n \times a) / (n \times b)$  to the effect of multiplying a/bby I.

### 8. Look for, and in, repeated reasoning.

## **Focal Point**

Analyzing properties of two-dimensional shapes, including angles

#### **COMMON CONTENT**

None

- I. 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.

# express regularity

#### **Common Core State Standards**

#### CONTENT THAT IS DIFFERENT

#### Content moving out of 5th grade

#### Find areas of geometric shapes using formulas

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

**M.TE.05.06** Understand and know how to use the area formula of a triangle: A = (1/2) bh (where *b* is length of the base and *h* is the height), and represent using models and manipulatives. [Core]

**M.TE.05.07** Understand and know how to use the area formula for a parallelogram: A = bh, and represent using models and manipulatives. [Core]

#### 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 1/4, 1/2, and 3/4, and full turns. [Extended]

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

**G.GS.05.03** Identify and name angles on a straight line and vertical angles. [Extended]

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

**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. [Core]

#### 7th Grade

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

**7. G.6** Solve real-world and mathematical problems involving area, volume and surface area of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms.

#### 4th Grade

Geometric measurement: understand concepts of angle and measure angles

**4. MD.5** Recognize angles as geometric shapes that are formed wherever two rays share a common endpoint, and understand concepts of angle measurement:

a. An angle is measured with reference to a circle with its center at the common endpoint of the rays, by considering the fraction of the circular arc between the points where the two rays intersect the circle. An angle that turns through 1/360 of a circle is called a "one-degree angle," and can be used to measure angles.

b. An angle that turns through n one-degree angles is said to have an angle measure of n degrees.

**4. MD.6** Measure angles in whole-number degrees using a protractor. Sketch angles of specified measure.

**4. MD.7** Recognize angle measure as additive. When an angle is decomposed into non-overlapping parts, the angle measure of the whole is the sum of the angle measures of the parts. Solve addition and subtraction problems to find unknown angles on a diagram in real world and mathematical problems, e.g., by using an equation with a symbol for the unknown angle measure.

- Make sense of problems, and persevere in solving them.
- 2. Reason abstractly and quantitatively.
- Construct viable arguments, and critique the reasoning of others.
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#### Know the meaning of angles, and solve problems

**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. [Core]

**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. [Core]

#### **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.

#### **Content moving into 5th grade**

## Graph points on the coordinate plane to solve real-world and mathematical problems

**5. G.I** Use a pair of perpendicular number lines, called axes, to define a coordinate system, with the intersection of the lines (the origin) arranged to coincide with the 0 on each line and a given point in the plane located by using an ordered pair of numbers, called its coordinates. Understand that the first number indicates how far to travel from the origin in the direction of one axis, and the second number indicates how far to travel in the direction of the second axis, with the convention that the names of the two axes and the coordinates correspond (e.g., *x*-axis and *x*-coordinate, *y*-axis and *y*-coordinate).

**5. G.2** Represent real world and mathematical problems by graphing points in the first quadrant of the coordinate plane, and interpret coordinate values of points in the context of the situation.

## Classify two-dimensional figures into categories based on their properties

**5. G.3** Understand that attributes belonging to a category of two-dimensional figures also belong to all subcategories of that category. For example, all rectangles have four right angles and squares are rectangles, so all squares have four right angles.

**5. G.4** Classify two-dimensional figures in a hierarchy based on properties.

#### Mathematical Practices

- Make sense of problems, and persevere in solving them.
- 2. Reason abstractly and quantitatively.
- Construct viable arguments, and critique the reasoning of others.
- 4. Model with mathematics.
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[Not explicit in GLCE]

#### **Common Core State Standards**

#### Critical Area

Developing understanding of volume

#### COMMON CONTENT

Know, and convert among, measurement units within a given system<sup>3</sup>

**M.UN.05.01** Recognize the equivalence of 1 liter, 1,000 ml and 1,000 cm<sup>3</sup> and include conversions among liters, milliliters, and cubic centimeters. [Extended]

**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<sup>3</sup>, m<sup>3</sup>, in<sup>3</sup>, ft<sup>3</sup>, yd<sup>3</sup>). [Extended]

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

#### Understand the concept of volume

**M.TE.05.08** Build solids with unit cubes and state their volumes. [NASL]

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

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

Geometric measurement: understand concepts of volume and relate volume to multiplication and to addition

**5. MD.3** Recognize volume as an attribute of solid figures and understand concepts of volume measurement.

a. A cube with side length I unit, called a "unit cube," is said to have "one cubic unit" of volume, and can be used to measure volume.

b. A solid figure which can be packed without gaps or overlaps using n unit cubes is said to have a volume of n cubic units.

**5.MD.4** Measure volumes by counting unit cubes, using cubic cm, cubic in, cubic ft, and improvised units.

**5. MD.5** Relate volume to the operations of multiplication and addition and solve real world and mathematical problems involving volume.

a. Find the volume of a right rectangular prism with whole-number side lengths by packing it with unit cubes, and show that the volume is the same as would be found by multiplying the edge lengths, equivalently by multiplying the height by the area of the base. Represent three-fold wholenumber products as volumes, e.g., to represent the associative property of multiplication.

b. Apply the formulas V = (l)(w)(h) and V = (b)(h)for rectangular prisms to find volumes of right rectangular prisms with whole-number edge lengths in the context of solving real world and mathematical problems.

- Make sense of problems, and persevere in solving them.
- 2. Reason abstractly and quantitatively.
- Construct viable arguments, and critique the reasoning of others.
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<sup>&</sup>lt;sup>3</sup>Topic originally was linked to division focal point.

**Common Core State Standards** 

#### **CONTENT THAT IS DIFFERENT**

#### Content moving into 5th grade

[Not explicit in GLCE]

Geometric measurement: understand concepts of volume and relate volume to multiplication and to addition

**5. MD.5** Relate volume to the operations of multiplication and addition and solve real world and mathematical problems involving volume.

c. Recognize volume as additive. Find volumes of solid figures composed of two non-overlapping right rectangular prisms by adding the volumes of the non-overlapping parts, applying this technique to solve real world problems.

#### Connections

#### **COMMON CONTENT**

## 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. [Extended]

#### Understand the place value system

**5. NBT.1** Recognize that in a multi-digit number, a digit in one place represents 10 times as much as it represents in the place to its right and 1/10 of what it represents in the place to its left.

#### Understand the place value system

**5. NBT.3** Read, write, and compare decimals to thousandths.

a. Read and write decimals to thousandths using base-ten numerals, number names, and expanded form, e.g.,  $347.392 = 3 \times 100 + 4 \times 10 + 7 \times 1 + 3 \times (1/10) + 9 \times (1/100) + 2 \times (1/1000)$ .

b. Compare two decimals to thousandths based on meanings of the digits in each place, using >, =, and < symbols to record the results of comparisons.

**5. NBT.4** Use place value understanding to round decimals to any place.

- Make sense of problems, and persevere in solving them.
- 2. Reason abstractly and quantitatively.
- 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.
- Look for, and express regularity in, repeated reasoning.

#### **Common Core State Standards**

#### CONTENT THAT IS DIFFERENT

#### Content moving out of 5th grade

Understand meaning of decimal fractions and percentages

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

#### Express, interpret, and use ratios; find equivalences

**N.MR.05.22** Express fractions and decimals as percentages and vice versa. [Extended]

**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]

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 I beak." "For every vote candidate A received, candidate C received nearly three votes."

Understand ratio concepts and use ratio reasoning to solve problems

**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.

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.

#### Content moving into 5th grade

#### Connections

#### Write and interpret numerical expressions

**5. OA.I** Use parentheses, brackets, or braces in numerical expressions, and evaluate expressions with these symbols.

**5. OA.2** Write simple expressions that record calculations with numbers, and interpret numerical expressions without evaluating them. For example, express the calculation "add 8 and 7, then multiply by 2" as  $2 \times (8 + 7)$ . Recognize that  $3 \times (18932 + 921)$  is three times as large as 18932 + 921, without having to calculate the indicated sum or product.

#### Mathematical Practices

- Make sense of problems, and persevere in solving them.
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#### 6th Grade 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.

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

**A.FO.06.04** Distinguish between an algebraic expression and an equation.

**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)."

Represent linear functions using tables, equations, and graphs

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

#### **Common Core State Standards**

#### Analyze patterns and relationships

**5. OA.3** Generate two numerical patterns using two given rules. Identify apparent relationships between corresponding terms. Form ordered pairs consisting of corresponding terms from the two patterns, and graph the ordered pairs on a coordinate plane. For example, given the rule "Add 3" and the starting number 0, and given the rule "Add 6" and the starting number 0, generate terms in the resulting sequences, and observe that the terms in one sequence are twice the corresponding terms in the other sequence. Explain informally why this is so.

- Make sense of problems, and persevere in solving them.
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