U46 Curriculum
U-46 <Grade 5 >

Module 1 – Place Value and Decimal and Decimal Fractions
Domain(s): Number & Operations in Base Ten/Measurement and Data
Trimester(s): 1

Transfer: *Students will apply…*

1. Solve real-world problems involving conversions within a measurement system (e.g. converting milliliters of liquid to liters.)

Understandings: *Students will understand 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.

Multiplying by a power of 10 shifts the digits of a whole number or decimal that many places to the left. The exponent not only indicates how many places the decimal point is moving but also that you are multiplying or making the number 10 times greater, three times when you multiply by 10^3. (e,g $3.4 \times 10^3 = 3.4 \times (10 \times 10 \times 10) = 3.4 \times 1{,}000 = 3{,}400$)

Essential Question(s):

What occurs when whole numbers and decimals are multiplied or ordered by 10 or powers of 10?

Knowledge: *Students will know…*

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.

The exponent indicates how many places the decimal point is moving.

Skill: ***Students will be able to do…***

☐Model and explain that the value of a digit changes as you move to the left (10 times more) or to the right (1/10 less) using manipulatives, pictures, and/or language. (5.NBT.1)
☐Represent and model the pattern of zeros that occurs when multiplying by powers of 10. (10_3 = 10x10x10=1000) (5.NBT.2)
☐Represent and explain the patterns in the placement of the decimal point when a decimal is multiplied or divided by a power of 10. (5.NBT.2)
☐Represent and model the use of a whole number exponent to denote powers of 10. (5NBT.2)
☐ Read decimals to thousandths using number names. (5.NBT.3)
☐Write decimals to thousandths using base-ten numerals and expanded form, e.g., 347.392 = 3 x 100 + 4 x 10 + 7 x 1 + 3 (1/10) + 9 x (1/100) + 2 x (1/1000).(5.NBT.3)
☐Compare two decimals to thousandths based on meaning of the digits in each place, using >, =, and < symbols to record the results of comparisons. (5.NBT.3)
☐ Round decimals to any place. (5.NBT.4)
☐Convert measurements within the metric system to solve multi-step, real world problems. (100cm = 1 meter) (5.MD.1)
☐Use concrete models, pictorial representations, written symbols, and language to show addition, subtraction, multiplication, and division of decimals to hundredths.(5.NBT.7)

Clusters/Standards:

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.
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.
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 × 100 + 4 × 10 + 7 × 1 + 3 × (1/10) + 9 × (1/100) + 2 × (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.

Perform operations with multi-digit whole numbers and with decimals to hundredths.1

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.1 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.[2]

WIDA Standard:

English language learners communicate information, ideas and concepts necessary for academic success in the content area of Mathematics.
English language learners benefit from:

- A preview of critical vocabulary terms before instruction.
- The use of visuals to make explicit connections between the vocabulary and the content being learned.

Focus Standards for Mathematical Practice

MP.6 Attend to precision. Students express the units of the base ten system as they work with decimal operations, expressing decompositions and compositions with understanding, e.g., "9 hundredths + 4 hundredths = 13 hundredths. I can change 10 hundredths to make 1 tenth."
MP.7 Look for and make use of structure. Students explore the multiplicative patterns of the base ten system when they use place value charts and disks to highlight the relationships between adjacent places. Students also use patterns to name decimal fraction numbers in expanded, unit, and word forms.
MP.8 Look for and express regularity in repeated reasoning. Students express regularity in repeated reasoning when they look for and use whole number general methods to add and subtract decimals and when they multiply and divide decimals by whole numbers. Students also use powers of ten to explain patterns in the placement of the decimal point and generalize their knowledge of rounding whole numbers to round decimal numbers.

Student Learning Experiences / Tasks:

EngageNY
Sprints / Number Bond Dash
Problem Sets
Exit Tickets
Homeworks

Vocabulary:
Thousandths, exponents, millimeter, equation

Instructional Resources/ Assessment:

EngageNY http://www.engageny.org/sites/default/files/resource/attachments/g5-m1-full-module.pdf

Mid Module and End of Module 1 Assessment

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Module 2 – Multi-Digit Whole Number and Decimal Fraction Operations
Domain(s): Number and Base Ten/Operations and Algebraic Thinking/Measurement and Data
Trimester(s): 1

Transfer: *Students will apply…*

concepts and procedures of multiplication and division to solve real world problems.

Example: The parking garage has 4,224 parked on 6 levels, each of which have a blue, a green, a yellow and a red section. If each section has the same amount of cars, how many cars are in each section?

Understandings: *Students will understand 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.
- Multiplying by a power of 10 shifts the digits of a whole number or decimal that many places to the left. The exponent not only indicates how many places the decimal point is moving but also that you are multiplying or making the number 10 times greater, three times when you multiply by $10_{3.}$ (e,g $3.4 \times 10_3 = 3.4 \times (10 \times 10 \times 10) = 3.4 \times 1.000 = 3{,}400$)
- Parentheses, brackets, and braces are used to guide the order of operations when simplifying expressions.
- A standard algorithm is used to fluently multiply multi-digit whole numbers.
- A variety of different strategies can be used to divide multi-digit numbers, *visual models (rectangular array, equations, and/or area model) and strategies based on place value, the properties of operations, and/or the relationship between multiplication and division.*

Essential Question(s):

- How do parentheses, brackets, and braces affect the way you simplify expressions?
- How do you multiply multi-digit numbers using a standard algorithm?
- How do you choose different division strategies to divide multi-digit numbers?

Knowledge: *Students will know…*

How to illustrate and explain division (up to 4-digit whole numbers by up to 2-digit whole numbers) calculations by using a visual model (rectangular array, equations, and/or area model) (5.NBT.6).

Clusters/Standards:

Write and interpret numerical expressions.

5.OA.1 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. *nd 7, then 2 × (8 + 7). Recognize that 3 × (18932 + 921) is three times as large as 18932 + 921, without having to calculate the indicated sum or product.*

Understand the place value system.1

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.
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 power of 10.

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.[2]

Convert like measurement units within a given measurement system.

5.MD.1 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.

WIDA Standard:

English language learners communicate information, ideas and concepts necessary for academic success in the content area of Mathematics.
English language learners benefit from:

- A preview of critical vocabulary terms before instruction.
- The use of visuals to make explicit connections between the vocabulary and the content being learned.

Focus Standards for Mathematical Practice

MP.1 Make sense of problems and persevere in solving them. Students make sense of problems when they use number disks and area models to conceptualize and solve multiplication and division problems.

MP.2 Reason abstractly and quantitatively. Students make sense of quantities and their relationships when they use both mental strategies and the standard algorithms to multiply and divide multi-digit whole numbers. Student also "decontextualize" when they represent problems symbolically and "contextualize" when they consider the value of the units used and understand the meaning of the quantities as they compute.

MP.7 Look for and make use of structure. Students apply the *times 10, 100, 1,000* and the *divide by 10* patterns of the base ten system to mental strategies and the multiplication and division algorithms as they multiply and divide whole numbers and decimals

MP.8 Look for and express regularity in repeated reasoning. Students express the regularity they notice in repeated reasoning when they apply the partial quotients algorithm to divide two-, three-, and four-digit dividends by two-digit divisors. Students also check the reasonableness of the intermediate results of their division algorithms as they solve multi-digit division word problems.

Student Learning Experiences / Tasks:

EngageNY
Sprints / Number Bond Dash
Problem Sets
Exit Tickets
Homework

Vocabulary: Decimal fraction, multiplier, parentheses

Instructional Resources:

EngageNY http://www.engageny.org/sites/default/files/resource/attachments/g5-m2-full-module.pdf

Mid Module and End of Module Assessment Module 2

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Module 3 – Addition and Subtraction of Fractions
Domain(s): Number & Operations-Fractions
Trimester(s): 2

Transfer: *Students will apply…*

Students will apply concepts and procedures of adding and subtracting fractions,

Example: When adding 5/6 + 3/8, Jacob writes 40/48 + 18/48. Show why 5/6 + 3/8 and 40/48 + 18/48 are equivalent. Write two more addition problems that are equivalent.

Understandings: *Students will understand that…*

- Benchmark fractions and other strategies aid in estimating the reasonableness of results of operations with fractions.
- The use of area models, fraction strips, and number lines, are effective strategies to model sums and differences.
- Equivalent fractions are critical when adding and subtracting fractions with unlike denominators.
- Fractions are division models.
- Use your knowledge of fractions and equivalence of fractions to develop algorithms for adding and subtracting fractions.

Essential Question(s):

- What is a reasonable estimate for the answer?
- How do operations with fractions relate to operations with whole numbers?
- What do equivalent fractions represent and why are they useful when solving equations with fractions?
- What models or pictures could aid in understanding a mathematical or real-world problem and the relationships among the quantities?
- What models or pictures can be used when solving a mathematical or real-world problem to help decide which operation to use?

Knowledge: *Students will know…*

- Students will be able to add and subtract fractions and represent them with a visual model.
- Students will be able to recognize and manipulate equivalent fractions.

- Students will be able to rename fractions to find common denominators.

Skill: *Students will be able to do…*

- Add fractions with unlike denominators) by replacing given fractions with equivalent fractions. (5.NF.1)
- Add mixed numbers with unlike denominators) by replacing given fractions with equivalent fractions. (5.NF.1)
- Subtract fractions with unlike denominators by replacing given fractions with equivalent fractions. (5.NF.1)
- Subtract mixed numbers with unlike denominators by replacing given fractions with equivalent fractions (5.NF.1)
- Solve word problems involving addition of fractions referring to the same whole, including cases of unlike denominators using visual fraction models and/or equations. (5.NF.2)
- Solve word problems involving subtraction of fractions referring to the same whole, including cases of unlike denominators using visual fraction models and/or equations. (5.NF.2)
- Use benchmark fractions and number sense to estimate mentally and assess reasonableness of answers. (5.NF.2)
- Interpret a fraction as division of the numerator by the denominator. (5.NF.3)
- Solve word problems involving whole numbers leading to answers in the form of fractions or mixed numbers using visual fraction models or equations. (5.NF.3)
- Convert measurements within the metric system to solve multi-step, real world problems. (100cm = 1 meter) (5.MD.1)
- Make a number line to display a data set of measurements in fractions of a unit (1/2, ¼, 1/8) (5.MD.2)
- Use addition and subtraction of fractions to solve problems involving information presented in various formats. (5.MD.2)

Clusters/Standards:

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

5.NF.1 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.*

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English language learners benefit from:

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- The use of visuals to make explicit connections between the vocabulary and the content being learned.

Focus Standards for Mathematical Practice

MP.2 Reason abstractly and quantitatively. Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships: the ability to *decontextualize*—to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to *contextualize*, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.

MP.3 Construct viable arguments and critique the reasoning of others. Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in argument—explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments can make sense and be correct, even though they are not generalized or made formal until later grades. Later, students learn to determine domains to which an argument applies. Students at all grade levels can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.

MP.4 Model with mathematics. Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts, and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.

MP.5 Use appropriate tools strategically. Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software. Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. For example, mathematically proficient high school students analyze graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. Mathematically proficient students at various grade levels are able to identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are able to use technological tools to explore and deepen their

understanding of concepts.

MP.6 Attend to precision. Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions.

MP.7 Look for and make use of structure. Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see 7×8 equals the well remembered $7 \times 5 + 7 \times 3$, in preparation for learning about the distributive property. In the expression $x^2 + 9x + 14$, older students can see the 14 as 2×7 and the 9 as $2 + 7$. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see $5 – 3(x – y)^2$ as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers x and y.

Student Learning Experiences / Tasks:

EngageNY
Sprints / Number Bond Dash
Problem Sets
Exit Tickets
Homework

Vocabulary:
Benchmark fraction, unlike denominators, like denominators

Instructional Resources/Assessment:

EngageNY http://www.engageny.org/sites/default/files/resource/attachments/g5-m3-full-module.pdf

Mid Module and End of Module Assessment Module 3

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Module 4 – Multiplication and Division of Fractions and Decimal Fractions
Domain(s): Number & Operations-Fractions/Operations and Algebraic Thinking/Numbers and Operations in Base Ten/Measurement and Data
Trimester(s): 2

Transfer: *Students will apply…*

Students will apply concepts and procedures of multiplying and dividing fractions.

Example: Mrs. Herron's class is working on a class project. They will be making rice dishes as part of their project for open house. If every ***four*** classmates share a 9-pound bag of rice to be used for cooking, how many pounds of rice will each student receive?

Example: Mrs. Smith is planning a field trip to the zoo. 2/3 of her students want to see the Wild Cats exhibit first. Of those who want to see the Wild Cats, 3/5 prefer the lions. What fraction of the class prefers to see the lions first when they arrive at the zoo?

Example: A bakery orders sugar in a bulk package that contains 20 cups of sugar. If a recipe for cookies calls for ¼ c. of sugar per batch, how many batches can be made with the bulk package of sugar?

Understandings: *Students will understand that…*

- Benchmark fractions and other strategies aid in estimating the reasonableness of results of operations with fractions.
- The use of area models, fraction strips, and number lines, are effective strategies to model products, and quotients.
- Fractions are division models.
- Multiplication can be interpreted as scaling/resizing(multiplying a given number by a fraction greater than 1 results in a product greater than the given number and multiplying a given number by a fraction less than 1 results in a product smaller than the given number).
- Use your knowledge of fractions and equivalence of fractions to develop algorithms for multiplying,and dividing fractions.

Essential Question(s):

- What is a reasonable estimate for the answer?
- How do operations with fractions relate to operations with whole numbers?
- What do equivalent fractions represent and why are they useful when solving equations with fractions?
- What models or pictures could aid in understanding a mathematical or real-world problem and the relationships among the quantities?
- What models or pictures can be used when solving a mathematical or real-world problem to help decide which operation to use?
- What are the effects of multiplying by quantities greater than 1 compared to the effects of multiplying by quantities less than 1?

Knowledge: *Students will know…*

- How to multiply and divide fractions and represent them with a visual model.
- How to recognize and manipulate equivalent fractions.
- How to calculate area for a rectangle with fractional sides.

Skill: *Students will be able to do…*

- Use benchmark fractions and number sense to estimate mentally and assess reasonableness of answers. (5.NF.2)
- Interpret a fraction as division of the numerator by the denominator. (5.NF.3)
- Solve word problems involving division of whole numbers leading to answers in the form of fractions or mixed numbers using visual fraction models or equations. (5.NF.3)
- Multiply a fraction by a whole number. (5.NF.4)
- Use visual fraction models and/or language to interpret multiplication of a fraction by a whole number as multiplying the numerator by the whole and dividing by the denominator. (5.NF.4)
- Multiply a fraction by a fraction. (5.NF.4)
- Use visual fraction models and/or language to interpret multiplication of fractions as multiplying numerators and multiplying denominators. (5.NF.4)
- 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. (5.NF.4)

- Multiply fractional side lengths to find areas of rectangles, and represent fraction products as rectangular areas. (5.NF.4)
- Use language and visuals to explain how multiplication of fractions represents scaling (resizing). (5.NF.5)
- Compare 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 using visuals, real-life situations and/or language. (5.NF.5)
- Explain why multiplying a number by a fraction less than 1, results in a smaller product using visuals, equations, language and real-life examples (5.NF.5)
- Explain why multiplying a number by a fraction equal to 1, results in the same product using visuals, equations, language and real-life examples (5.NF.5)
- Explain why multiplying a number by a fraction greater than 1, results in a larger product using visuals, equations, language and real-life examples (5.NF.5)
- Solve real world problems involving multiplication of fractions using visual fraction models and equations. (5.NF.6)
- Solve real world problems involving multiplication of mixed numbers using visual fraction models and equations. (5.NF.6)
- Divide a unit fraction by a non-zero whole number using manipulatives, pictures, equations, real life examples and language. (5.NF.7)
- Divide a non-zero whole number by a unit fraction using manipulatives, pictures, equations, real life examples and language. (5.NF.7)
- Solve real world problems involving division of a unit fraction by a non-zero whole number and division of a non-zero whole number by a unit fraction using visual models and equations to represent the problem. (5.NF.7)
- Convert measurements within the metric system to solve multi-step, real world problems. (100cm = 1 meter) (5.MD.1)
- Make a line plot to display a data set of measurements in

fractions of a unit (1/2, ¼, 1/8) (5.MD.2)
- Use multiplication and division of fractions to solve problems involving information presented in line plots. (5.MD.2)

Clusters/Standards:

Write and interpret numerical expressions.

5.OA.1 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 × (8 + 7). Recognize that 3 × (18932 + 921) is three times as large as 18932 + 921, without having to calculate the indicated sum or product.*

Perform operations with multi-digit whole numbers and with decimals to hundredths.[88]

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.

Apply and extend previous understandings of multiplication and division to multiply and divide fractions.[89]

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?*

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 parts 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) × 4 = 8/3, and create a story context for this equation. Do the same with (2/3) × (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/b by 1.

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. (Students able to multiply fractions in general can develop strategies to divide fractions in general, by reasoning about the relationship between

multiplication and division. But division of a fraction by a fraction is not a requirement at this grade.)
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) ÷ 4, and use a visual fraction model to show the quotient. Use the relationship between multiplication and division to explain that (1/3) ÷ 4 = 1/12 because (1/12) × 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 ÷ (1/5), and use a visual fraction model to show the quotient. Use the relationship between multiplication and division to explain that 4 ÷ (1/5) = 20 because 20 × (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?*

Convert like measurement units within a given measurement system.[90]
5.MD.1 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.
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.*

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English language learners benefit from:

- A preview of critical vocabulary terms before instruction.
- The use of visuals to make explicit connections between the vocabulary and the content being learned.

Focus Standards for Mathematical Practice

MP.2 Reason abstractly and quantitatively. Students reason abstractly and quantitatively as they interpret the size of a product in relation to the size of a factor, interpret terms in a multiplication sentence as a quantity and a scaling factor and then create a coherent representation of the problem at hand while attending to the meaning of the quantities.
MP.4 Model with mathematics. Students model with mathematics as they solve word problems involving multiplication and division of fractions and decimals and identify important quantities in a practical situation and map their relationships using diagrams. Students use a line plot to model measurement data and interpret their results in the context of the situation, reflect on whether results make sense, and possibly improve the model if it has not served its purpose.
MP.5 Use appropriate tools strategically. Students use rulers to measure objects to the 1/2, 1/4 and 1/8 inch increments recognizing both the insight to be gained and the limitations of this tool as they learn that the actual object may not match the mathematical model precisely.

Student Learning Experiences / Tasks:

EngageNY
Sprints / Number Bond Dash
Problem Sets
Exit Tickets
Homework

Vocabulary:
Decimal divisor, simplify

Instructional Resources:

EngageNY http://www.engageny.org/sites/default/files/resource/attachments/g5-m4-full-module.pdf

Mid Module and End of Module Assessment Module 4

U46 Curriculum
U-46 <Grade 5 >

Module 5 – Addition and Multiplication with Volume and Area
Domain(s): Number & Operations-Fractions/Measurement and Data/Geometry
Trimester(s): 3

Transfer: *Students will apply…*

Solving real**-**world problems involving volume (e.g. given the dimensions, determining the volume of concrete needed to build a step)

A sample of questions that might be posed to students include:

- A parallelogram has 4 sides with both sets of opposite sides parallel. What types of quadrilaterals are parallelograms?
- Regular polygons have all of their sides and angles congruent. Name or draw some regular polygons.
- All rectangles have 4 right angles. Squares have 4 right angles so they are also rectangles. Is this true or false? Explain.
- A trapezoid has 2 sides parallel so it must be a parallelogram. Is this true or false? Explain.

Understandings: *Students will understand that…*

- Measurement problems can be solved by using appropriate tools.
- Volume of three-dimensional figures is measured in cubic units.
- Volume is additive.
- Multiple rectangular prisms can have the same volume.
- Volume can be found by repeatedly adding the area of the base or by multiplying all three dimensions.
- Volume can be used to solve a variety of real life problems.
- Two-dimensional geometric figures are composed of various parts that are described with precise vocabulary.
- Two-dimensional geometric figures can be classified based upon their properties.

Essential Question(s):

What is volume and how is it used in real life?
How does the area of rectangles relate to the volume of rectangular prisms?
Why is it important to use precise language and mathematical tools in the study of 2-dimensional and 3-dimensional figures?
How can describing, classifying and comparing properties of 2-dimesional shapes be useful in solving problems in our 3-dimensional world?

Knowledge: *Students will know…*

- That volume of three-dimensional figures is measured in cubic units.
- The cubic unit can be written with an exponent (e.g., in^3, m^3)
- The formula for volume and when and how to use it.
- Understand that attributes belonging to a category of two-dimensional figures also belong to all subcategories of that category. (5.G.4)

Skill: *Students will be able to do…*

- Define volume as the measurement of the space inside a solid three-dimensional figure. (5.MD.3)
- Identify and describe unit cubes as representing 1 cubic unit of volume, and how they are used to measure volume of three-dimensional shapes. (5.MD.3)
- Model how a solid figure is packed with unit without gaps or overlaps to measure volume. (5.MD.3)
- Use the term "cubic units" to describe units of volume measurement. (5.MD.3)
- Measure volumes by counting cubes first with manipulatives and then by pictures using cubic cm., cubic in., cubic ft., and improvised units. (5.MD.4)
- Find the volume of a right rectangular prism with whole-number side lengths by packing it with unit cubes. (5.MD.5)
- Identify two-dimensional shapes that can be classified into more than one category based on their attributes. (5.G.3)
- Explain why figures belong in a category or multiple categories. (5.G.3)
- Classify two-dimensional figures in a hierarchy based on properties (5.G.4)

Clusters/Standards:

Apply and extend previous understandings of multiplication and division to multiply and divide fractions.[91]

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.

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 1 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 threefold whole-number products as volumes, e.g., to represent the associative property of multiplication.
b. Apply the formulas $V = l \times w \times h$ and $V = b \times h$ 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.
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.
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

Focus Standards for Mathematical Practice

MP.1 Make sense of problems and persevere in solving them. Students work toward a solid understanding of volume through the design and construction of a three-dimensional sculpture within given parameters.
MP.2 Reason abstractly and quantitatively. Students make sense of quantities and their relationships when they analyze a geometric shape or real life scenario and identify, represent, and manipulate the relevant measurements. Students decontextualize when they represent geometric figures symbolically and apply formulas.
MP.3 Construct viable arguments and critique the reasoning of others. Students analyze shapes, draw conclusions, and recognize and use counter-examples as they classify two-dimensional figures in a hierarchy based on properties.
MP.4 Model with mathematics. Students model with mathematics as they make connections between addition and multiplication as applied to volume and area. They represent the area and volume of geometric figures with equations, and vice versa, and represent fraction products with rectangular areas. Students apply concepts of volume and area and their knowledge of fractions to design a sculpture based on given mathematical parameters. Through their work analyzing and classifying two-dimensional shapes, students draw conclusions about their relationships and continuously see how mathematical concepts can be modeled geometrically.
MP.6 Attend to precision. Mathematically proficient students try to communicate precisely with others. They endeavor to use clear definitions in discussion with others and in their own reasoning. Students state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school, they have learned to examine claims and make explicit use of definitions.
MP.7 Look for and make use of structure. Students discern patterns and structures as they apply additive and multiplicative reasoning to determine

volumes. They relate multiplying two of the dimensions of a rectangular prism to determining how many cubic units would be in each layer of the prism and relate the third dimension to determining how many layers there are in the prism. This understanding supports students in seeing why volume can be computed as the product of three length measurements or as the product of one area by one length measurement. In addition, recognizing that volume is additive allows students to find the total volume of solid figures composed of more than one non-overlapping right rectangular prism.

WIDA Standard:
English language learners communicate information, ideas and concepts necessary for academic success in the content area of Mathematics.
English language learners benefit from:

- A preview of critical vocabulary terms before instruction.
- The use of visuals to make explicit connections between the vocabulary and the content being learned.

Student Learning Experiences / Tasks:

EngageNY
Sprints / Number Bond Dash
Problem Sets
Exit Tickets
Homework

Vocabulary:
Base, bisect, cubic units, height, hierarchy, unit cube, volume of a solid, angle, area, attribute, cube, degree measure of an angle, face, kite, parallel lines, parallelogram, perpendicular, perpendicular bisector, plane, polygon, quadrilateral, rectangle, rectangular prism, rhombus, right angle, right rectangular prism, solid figure, square units, three dimensional figures, trapezoid, two dimensional figures.

Instructional Resources/ Assessment:

EngageNY http://www.engageny.org/sites/default/files/resource/attachments/g5-m5-full-module.pdf

Mid Module and End of Module Assessment for Module 5

U46 Curriculum
U-46 <5th Grade >

Module 6 – Problem Solving with the Coordinate Plane
Domain(s): Geometry/Operations and Algebraic Thinking
Trimester(s): 3

Transfer: *Students will apply…*

Students will represent and solve real world situations and mathematical problems by graphing points in the coordinate plane.
Example: Chad can wrap two presents every hour. Create a graph that shows the relationship between the amount of time Chad spends wrapping presen and how many he wraps. Use the graph to determine how many presents Chad will have wrapped in 5 hours.

Understandings: *Students will understand that…*

- In a coordinate plane, 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.
- The coordinate plane can be used to model and compare numerical patterns.

Essential Question(s):

- What is the purpose of a coordinate plane?
- How can graphing points on the coordinate plane help to solve real world and mathematical problems?

Knowledge: *Students will know…*

- The necessary terminology for working with the coordinate plane (e.g. first quadrant, points, lines, etc).
- Which axis is the x-axis and which is the y-axis?
- Which is the x-coordinate and which is the y-coordinate?

Skill: *Students will be able to do…*

- Generate two numerical patterns using two given rules. (5.OA.3)
- Identify numerical relationships between corresponding terms in 2 different expressions. (5.OA.3)
- Form ordered pairs from the two patterns. (5.OA.3)
- Graph the ordered pairs on the coordinate plane. (5.OA.3)

- Graph on the coordinate plane. (5.G.1)
- Identify, describe and explain the relationship between the names of the components of the coordinate plane including origin, x- and y- axis and x- and y- coordinates. (5.G.1)
- Explain how to plot points on the coordinate plane. (5.G.1)
- Graph points from a real-life situation, oral/written language or a written expression on the coordinate plane. (5.G.2)
- Explain the relationship or value of the plotted points in the context of the situation. (5.G.2)
- Interpret simple numerical expressions and generate simple expressions from them.. (5.OA.2)

Clusters/Standards:

Standard(s):

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 × (8 + 7). Recognize that 3 × (18932 + 921) is three times as large as 18932 + 921, without having to calculate the indicated sum or product.*

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.*

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

5.G.1 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.

Focus Standards for Mathematical Practice

MP.1 Make sense of problems and persevere in solving them. Students make sense of problems as they use tape diagrams and other models, persevering to solve complex, multi-step word problems. Students check their work and monitor their own progress, assessing their approach and its validity within the given context and altering their method when necessary.

MP.2 Reason abstractly and quantitatively. Students reason abstractly and quantitatively as they interpret the steepness and orientation of a line given by the points of a number pattern. Students attend to the meaning of the values in an ordered pair and reason about how they can be manipulated in order to create parallel, perpendicular, or intersecting lines.

MP.3 Construct viable arguments and critique the reasoning of others. As students construct a coordinate system on a plane, they generate

explanations about the best place to create a second line of coordinates. They analyze lines and the coordinate pairs that comprise them, then draw conclusions and construct arguments about their positioning on the coordinate plane. Students also critique the reasoning of others and construct viable arguments as they analyze classmates' solutions to lengthy, multi-step word problems.

MP.6 Attend to precision. Mathematically proficient students try to communicate precisely to others. They endeavor to use clear definitions in discussion with others and in their own reasoning. These students state the meaning of the symbols they choose, including using the equal sign, consistently and appropriately. They are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. The students calculate accurately and efficiently, expressing numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school, they have learned to examine claims and make explicit use of definitions.

MP.7 Look for and make use of structure. Students identify and create patterns in coordinate pairs and make predictions about their effect on the lines that connect them. Students also recognize patterns in sets of coordinate pairs and use those patterns to explain why a line is parallel or perpendicular to an axis. They use operational rules to generate coordinate pairs and, conversely, generalize observed patterns within coordinate pairs as rules.

WIDA Standard:

English language learners communicate information, ideas and concepts necessary for academic success in the content area of Mathematics.

English language learners benefit from:

- A preview of critical vocabulary terms before instruction.
- The use of visuals to make explicit connections between the vocabulary and the content being learned.

Student Learning Experiences / Tasks:

EngageNY
Sprints / Number Bond Dash
Problem Sets
Exit Tickets
Homework

Vocabulary:
Axis, coordinate, coordinate air, coordinate plane, ordered pair, origin, quadrant

Instructional Resources/Assessment:

EngageNY http://www.engageny.org/sites/default/files/resource/attachments/g5-m6-full-module.pdf

Mid Module and End of Module Assessment for Module 6