

Illinois Community College Board
Adult Education & Literacy

**Illinois ABE/ASE
Mathematics
Model Curriculum
NRS Level 3**

April 2017
REVISED June 2021

Acknowledgements

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NRS Math Level 3

Low-Intermediate Basic Education (Grade Levels 4-5)

OPERATIONS AND ALGEBRAIC THINKING (OA)

3. OA.1 / 3.OA.2 / 3.OA.3 / 3.OA.4 / 3.OA.5 / 3.OA.6 / 3.OA.7 / 3.OA.8/3.OA.9

Essential Understandings:

- Flexible methods of computation involve grouping numbers in strategic ways.
- The distributive property is connected to the area model and/or partial products method of multiplication.
- Some division situations will produce a remainder, but the remainder should always be less than the divisor. If the remainder is greater than the divisor, that means at least one more can be given to each group (fair sharing) or at least one more group of the given size (the dividend) may be created. When using division to solve word problems, how the remainder is interpreted depends on the problem situation.
- Number or shape patterns are generated by following a given rule.
- The four operations (addition, subtraction, multiplication, and division) are interconnected.
- The greatest common factor (GCF) and the least common multiple (LCM) among whole numbers can be determined.
- The sum of two whole numbers between 1 and 100 can be expressed as a multiple of a sum of two whole numbers (e.g., the distributive property).
- 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 multiply and divide multi-digit numbers including: visual models (rectangular array, equations, and/or area model).
- Strategies for multiplication and division are based on place value, the properties of operations, and/or the relationship between multiplication and division (approaching problems with unknown product or quotient, group size unknown and number of groups unknown).

Essential Questions:

- How do I determine the factors of a number?
- What is the difference between a prime and composite number?
- How are multiplication and division related to each other?
- What are efficient methods for finding products and quotients, and how can place value properties aid computation?
- How are dividends, divisors, quotients, and remainders related?
- How are the four operations of addition, subtraction, multiplication and division used in multi-step word problems? (How can these operations be used to assess the reasonableness of a solution?)
- What is the difference between the GCF and LCM?
- How can the distributive property be used to express the sum of two whole numbers [e.g., $25 + 10$ as $5(5 + 2)$]?
- How can a remainder be interpreted with respect to the answer in a division word problem? (Is the solution reasonable?)
- How do parentheses, brackets, and braces affect the way expressions are simplified or evaluated?
- When are different strategies appropriate to use when multiplying and/or dividing multi-digit numbers?

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- What strategies can be used to find rules for patterns and what predictions can the pattern support?

Student will be able to:

(What does mastery look like?)

- Interpret and represent verbal statements of multiplicative comparisons as equations.
- Solve multiplicative comparison word problems, choosing the operations of division and multiplication (as distinguished from additive comparison), using pictures or variables for the unknown.
- Answer multi-step problems with whole numbers using the four operations to solve for a variable (unknown quantity) and assessing the reasonableness of the solution obtained.
- Determine 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 the sum of two whole numbers 1-100 with a common factor as a multiple of two whole numbers with no common factor.
- Identify and find all factor pairs for a whole number, recognize multiples of whole numbers, and identify a given whole number as prime or composite in the range 1-100.
- Outline a number or shape pattern, analyze and explain features of the pattern, and identify features of the pattern that are not apparent in the rule itself.
- Write numerical expressions that contain parentheses, brackets, or braces and solve expressions containing them.
- Construct basic numerical expressions with the four operations and interpret them without evaluating them.
- Write two different basic numerical patterns using two different rules.
- Create ordered pairs using corresponding terms from the number patterns, identify the relationship between the corresponding terms, and graph the ordered pairs on a coordinate plane.

Evidence for Assessing Learning

Performance Tasks:

Demonstrate mastery of objectives through the assessment of graded: homework, worksheets, quantitative (numerically graded) rubrics, quizzes, tests, and other formal assessments. Including but not limited to:

- Using teacher made worksheets-graded.
- Use teacher made quizzes/exams.
- Discuss a variety of ways to solve multistep problems.

Other Evidence:

- Question and answer sessions.
- Facilitate group work with teacher monitoring.

Building the Learning Plan

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Sample Classroom Activities and/or Lesson Plans:

- Demonstrate and practice partitioning strategies for multiplication.
- Discuss and discover invented strategies for solving multiplication and finding reasonable solutions.
- The Frayer Model (visual organizer) Demonstrate and practice.
- Artistic illustrations of different shape patterns
- Creating cue cards for various types of math problems
- Practice factoring whole numbers
- Practice using parenthesis, brackets and braces in mathematical expressions and solving expressions containing them with teacher-generated examples.

Learning Activities:

(Interventions for students who are not progressing, instructional strategies, differentiated instruction, re-teaching options)

- One-to-one intervention
- Peer tutoring
- Think out loud (demonstrate how to think about a problem)
- Additional practice with concepts and procedures in different contexts
- Universal Design for Learning protocols such as additional time, modified lesson for disabilities (i.e., enlarged print, drills, flashcards and games)

List of Instructional Materials:

- Algebra Tiles
- Grid paper
- Math blocks
- Area models, such as rectangles filled with base-ten pieces
- Flash cards
- Pictorial representations
- Teacher-generated worksheets

List of Technology Resources:

- Khan Academy— <http://khanacademy.org>
- Cool Math – www.coolmath.com/
- CK-12 - <https://flexbooks.ck12.org/pages/adult-education/#adult-basic-education>

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Expressions and Equations (EE)

3.EE.1 / 3.EE.2 / 3.EE.3 / 3.EE.4 / 3.EE.5 / 3.EE.6 / 3.EE.7 / 3.EE.8 / 3.EE.9

Essential Understandings:

- Properties of operations are used to determine if expressions are equivalent.
- Substitution is used to determine whether a given number in a set makes an equation or inequality true.
- Variables may be used to represent a specific number, or, in some situations, to represent all numbers in a specified set.
- When one expression has a different value than a related expression, an inequality provides a way to show that relationship between the expressions: the value of one expression is greater than (or greater than or equal to) the value of the other expression instead of being equal.
- Solutions of inequalities can be represented on a number line.
- Variables in algebraic equations can be expressed in graphs to represent numbers and generalize mathematical problems in real-world situations.

Essential Questions:

- How do we determine if a variable is independent or dependent in an expression or equation?
- How are variables defined and used?
- How does the structure of equations and/or inequalities help us solve equations and/or inequalities?
- How does the substitution process help in solving problems?
- Why are variables used in equations?
- What might a variable represent in a given situation?
- How are inequalities represented and solved?
- How can the order of operations be applied to evaluating expressions, and solving from one-step to multi-step equations?
- What are some possible real-life situations to which there may be more than one solution?
- How do we express a relationship mathematically?
- How do we determine the value of an unknown quantity?

Student will be able to:

- Apply and extend previous knowledge of arithmetic to write and evaluate numerical expression with whole-number exponents.
- Demonstrate understanding of algebraic expressions by writing, reading, and evaluating expressions with variables (e.g., express the calculation “subtract y from 5” as $5 - y$).
- Demonstrate understanding of algebraic expressions involving variables by identifying parts of an expression using mathematical terms, viewing one or more parts of an expression as a single entity.
- Demonstrate understanding of algebraic expressions involving variables by evaluating expressions at specific values for their variables, including expressions that arise from formulas in real-world problems.
- Demonstrate understanding of algebraic expressions involving variables by performing arithmetic operations, including those involving whole-number

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exponents, in conventional order when there are no parentheses to specify a particular order (order of operations).

- Generate equivalent expressions by applying properties of operations.
- Compare two expressions and determine if they are equivalent (e.g., $y + y + y = 3y$).
- Solve equations and inequalities by answering the question, “Which values from a specified set make this true?” and by using substitution to determine if an equation or inequality is true.
- Utilize variables to write expressions when solving real-world and mathematical problems, understanding that variables represent an unknown number or number in a specified set.
- Solve equations in real-world and mathematical contexts of the form $x + p = q$ and $px = q$ for cases in which p , q and x are all non-negative rational numbers.
- Represent a constraint in a real-world or mathematical problem by writing an inequality in the form $x < a$ or $x > a$, recognize that inequalities in such a form have an infinite number of solutions, and graph solutions for such inequalities.
- Write, read, and evaluate expressions involving variables by representing and simplifying quantitative relationships between dependent and independent variables, analyze the relationship between the dependent and independent variables using graphs and tables, and relate findings to the equation.

Performance Tasks:

- Demonstrate mastery of objectives through the assessment of graded: homework, worksheets, quantitative (numerically graded) rubrics, quizzes, tests, and other formal assessments. Including but not limited to:
- Teacher-generated assignments and quizzes such as use substitution to determine monthly car payments based on a four-year plan (See class activities)
- Text: Steck-Vaughn and Contemporary’s Unit Reviews and/or exercises as quizzes and chapter tests.
- Chapter/unit reviews/tests from core texts such as New Readers Press Math Sense

Other Evidence

- Monitor math journal entries
- Monitor group work
- Monitor independent work

Building the Learning Plan

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Sample Classroom Activities and/or Lesson Plans:

- Use pictures to write a numerical expression
- Match word cards to parts of a numerical expression
- Use counters and an empty box to represent a variable, create an equation
- Practice solving equations and simplifying expressions
- Estimate weekly wages based on commission
- Use substitution to determine monthly car payments based on a three-year plan
- Follow one shipping company's business for one day. Track the time and distance using $d=rt$.

Learning Activities:

(Interventions for students who are not progressing, instructional strategies, differentiated instruction, re-teaching options)

- Interactive technology: Study Stack, websites as assigned
- One-to-one intervention
- Peer tutoring
- Provide students with a typed set of notes from their classmates
- Provide support around math specific and general vocabulary
- Think out loud (demonstrate how to think about a problem)
- Additional practice with concepts and procedures in different contexts
- Universal Design for Learning protocols such as additional time, modified lesson for disabilities (i.e., enlarged print, drills, flashcards and games)

List of Instructional Materials:

- Calculators
- Newspaper articles and advertisements
- Multiplication boxes
- Counters
- Fictional budgets and financial records

List of Technology Resources:

- Khan Academy— <http://khanacademy.org/>
- Kuta Software— <https://www.kutasoftware.com>
- CK-12 - <https://flexbooks.ck12.org/pages/adult-education/#adult-basic-education>

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NUMBER AND OPERATIONS IN BASE TEN (NBT)

3.NBT.1 / 3.NBT.2 / 3.NBT.3 / 3.NBT.4 / 3.NBT.5 / 3.NBT.6 / 3.NBT.7 / 3.NBT.8 /
3.NBT.9 / 3.NBT.10 / 3.NBT.11 / 3.NBT.12 / 3.NBT.13 / 3.NBT.14 / 3.NBT.15

Essential Understandings:

- The place value of whole and decimal numbers is based on groups of ten and the value of a number is determined by the place of its digits.
- The standard algorithm for addition and subtraction relies on adding or subtracting like base-ten units.
- Whole numbers are read from left to right using the name of the period; commas are used to separate periods.
- A whole or decimal number can be written using its name, standard, or expanded form and can be compared to other whole or decimal numbers using greater than, less than or equal to symbols.
- Flexible methods of computation involve grouping numbers in strategic ways.
- Multiplication and division are inverse operations.
- The four operations are interconnected.
- 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 $\frac{1}{10}$ 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 Questions:

- How does the position of a digit in a number affect its value, and how can the value of digits be used to compare two numbers?
- In what ways can numbers be composed and decomposed?
- How are the four basic operations related to one another?
- How does understanding place value help you solve multi-digit addition and subtraction problems and how can rounding be used to estimate answers to problems?
- What occurs when whole numbers and decimals are multiplied by 10 or powers of 10?
- Using less than, greater than, or equal to symbols, how can whole and decimal numbers (with like or unlike forms) be compared?

Student will be able to:

(What does mastery look like?)

- Classify place values in a multi-digit whole number (e.g., identify multiples of ten in place value).
- Interpret and express multi-digit whole numbers using base-tens, mathematical names, and expanded notation, and identify and use appropriate math symbols such as $<$, $>$, $=$ to compare two multi-digit numbers.
- Round multi-digit whole numbers to any place.
- Compute addition and subtraction problems with multi-digit numbers using the standard algorithm.
- Use place value understanding and properties of operations to multiply a whole number of four or fewer digits by a one-digit number and to multiply two two-digit

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numbers, using area models, rectangular arrays, or equations to illustrate and explain the calculation.

- Use place value understanding, properties of operations, and/or the relationship between multiplication and division to find quotients and remainders with up to four digit dividends and one-digit divisors, using area models, rectangular arrays, or equations to illustrate and explain the calculation.
- Demonstrate understanding of place value by recognizing and indicating that a number in one place is ten times greater than it would represent in the place to the right or that the same number is one tenth of the value of place on the left.
- Determine patterns in the number of zeroes in a product as well as the placement of decimals when multiplying or dividing by a power of ten.
- Identify, read, write, and compare decimals to the thousandths.
- Identify, read, and write decimals to thousandths using appropriate base-ten numerals, math names, and expanded forms.
- Use the symbols $<$, $>$, and $=$ to compare two decimals to thousandths and appropriately express place value.
- Round decimals to any place applying place value understanding.
- Multiply multi-digit whole numbers using the standard algorithm.
- Use strategies based on place value, properties of operations, and the relationship between multiplication and division to find whole number quotients and remainders with up to four-digit dividends and two-digit divisors, using area models, rectangular arrays, or equations to illustrate and explain the calculation.
- Using concrete models or drawings and strategies based on place value, properties of operations, and the relationship between addition and subtraction, add, subtract, multiply, and divide decimals to the hundredths and relate the strategies to a written method to explain the reasoning.

Evidence for Assessing Learning

Performance Tasks:

Demonstrate mastery of objectives through the assessment of graded: homework, worksheets, quantitative (numerically graded) rubrics, quizzes, tests, and other formal assessments. Including but not limited to:

- Quiz: Match number quantities to names/quantities to written numerals/names to written numbers
- Use teacher made quizzes and tests
- Steck Vaughn and Contemporary's Test Preparation Unit Reviews and/or exercises as quizzes and chapter tests (see below)
- Math Journals-graded
- Facilitate group work/monitoring conversations during group work

Other Evidence:

- Outside assignments
- Facilitate group work/monitoring conversations during group work
- Facilitate individual monitoring by instructor during independent work

Building the Learning Plan

Sample Classroom Activities and/or Lesson Plans:

- Create math grids with plan paper to represent, ones, tenths, hundreds, and thousandths
- Use math games to find products and quotients of whole numbers

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- Use “The Frayer Model” to organize concepts of place value and base-ten numbers
- Using number pattern identifications to expand knowledge of number sense, for example, counting by multiples to understand multiplication concepts
- Using money to learn about place value and trading coins
- Use three and four digits for addition and subtraction
- Use three and four digits for multiplication and division

Learning Activities:

(Interventions for students who are not progressing, instructional strategies, differentiated instruction, re-teaching options)

- One-to-one tutoring
interactive technology
- Manipulatives
- Peer teaching
- Procedures with different objects and concepts
- Universal Design for Learning protocols such as additional time, modified lesson for disabilities (i.e., enlarged print, drills, flashcards and games)

List of Instructional Materials:

- Place value charts
- Arrow cards
- Rectangular arrays
- Area models
- Possible Texts:
 - Number Concepts (2016). McGraw-Hill/College and Career Readiness Practice Workbook
 - Math 1: Whole Numbers, Decimals, Fractions, Percents, and Measurement (2014). New Readers Press/Pre-High School Equivalency
 - Achieving TABE Success in Mathematics Level M, (2006). McGraw Hill

List of Technology Resources:

- Khan Academy— <https://www.khanacademy.org/>
- Cool Math--- www.coolmath.com
- Greg Tang Math— www.gregtangmath.com
- Ck-12- <https://flexbooks.ck12.org/pages/adult-education/#adult-basic-education>

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NUMBER AND OPERATIONS - FRACTIONS (NF)

3.NF.1 / 3.NF.2 / 3.NF.3 / 3.NF.4 / 3.NF.5 / 3.NF.6 / 3.NF.7 / 3.NF.8 / 3.NF.9 / 3.NF.10 /
3.NF.11 / 3.NF.12 / 3.NF.13 / 3.NF.14

Essential Understandings:

- Fractions can be represented visually and in written form.
- Comparisons are valid only when the fractions or decimal numbers refer to the same whole.
- Fractions and mixed numbers are composed of unit fractions and can be decomposed as a sum of unit fractions.
- Improper fractions and mixed numbers can represent the same value.
- Addition and subtraction of fractions involves joining and separating parts referring to the same whole.
- A product of a fraction times a whole number can be written as a multiple of a unit fraction.
- Fractions with denominators of 10 can be expressed as an equivalent fraction with a denominator of 100.
- Fractions with denominators of 10 and 100 may be expressed using decimal notation.
- 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, differences, products, and quotients.
- Equivalent fractions are critical when adding and subtracting fractions with unlike denominators.
- Fractions are division models.
- Multiplication can be interpreted as scaling/resizing (multiplying a given number by a fraction greater than 1 result in a product greater than the given number and multiplying a given number by a fraction less than 1 result in a product smaller than the given number).
- The knowledge of fractions and equivalence of fractions can be used to develop algorithms for adding, subtracting, multiplying, and dividing fractions.

Essential Questions:

- How are fractions used in problem-solving situations?
- How are fractions composed, decomposed, compared and represented?
- Why is it important to identify, label, and compare fractions as representations of equal parts of a whole or of a set?
- How can multiplying a whole number by a fraction be displayed as repeated addition (as a multiple of a unit fraction)?
- How can visual models be used to determine and compare equivalent fractions and decimals?
- How can decimals through the hundredths place be compared and ordered?
- What is a reasonable estimate for a solution (answers)?
- 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?
- When can model(s) or picture(s) be used to solve a mathematical or real-world problem?

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- What are the effects of multiplying by quantities greater than one compared to the effects of multiplying by quantities less than one?

Student will be able to:

(What does mastery look like?)

- Explain, compare, and generate equivalent fractions by using visual fraction models.
- Compare and contrast two fractions with different numerators and different denominators using appropriate math symbols and fraction models, understanding that comparisons are only made if fractions refer to the same whole.
- Explain the addition and subtraction of fractions as joining and separating parts of the same whole.
- Dissect a fraction into a sum of fractions with the same denominator recording each as an equation, explaining the decomposition with a visual model.
- Demonstrate understanding of fractions by adding and subtracting mixed numbers with the same denominators.
- Solve word problems involving addition and subtraction of fractions with the same denominators.
- Utilize and extend previous understanding of multiplication by recognizing that $5/4$ is the equivalent of the whole number 5 multiplied by the fraction $1/4$ or that a over b (a/b) is a multiple of 1 over b ($1/b$).
- Utilize previous understanding of multiplication to multiply a fraction by a whole number, using a fraction model such as $3 \times (2/5) = 6 \times (1/5)$ which is a multiple of $1/b$.
- Apply and extend comprehension of multiplication to solving word problems which involve the multiplication of a fraction and a whole number.
- State a fraction with a denominator of 10 as an equivalent fraction with a denominator of 100, and utilize this skill to add two fractions with denominators of 10 and 100.
- Apply decimal notation for fractions with denominators of 10 and 100.
- Compare two decimals to the hundredths place by analyzing size using appropriate math symbols and rules of valid comparison.
- Apply the strategy of equivalent fractions to add and subtract fractions with unlike denominators, including mixed numbers, producing equivalent sums or differences with like denominators.
- Apply the strategy of using benchmark fractions and number sense of fractions to solve word problems that include addition and subtraction of fractions referring to the same whole and including cases of unlike denominators, using mental estimation to assess reasonableness of answers.
- Explain that a fraction is a division of its numerator by its denominator and apply this understanding to solve word problems which include division of whole numbers resulting in fraction or mixed number forms.
- Apply and extend previous knowledge of multiplication to multiply a fraction or whole number by a fraction and explain it as a result of a sequence of operations (e.g., $(a/b) \times q$ can be explained as $a \times q / b$).
- Apply and extend previous knowledge of multiplication to find the area of a rectangle with fractional side lengths by tiling it with unit squares of the appropriate unit fraction side lengths or by showing that the area could similarly be found by multiplying the side lengths.
- Interpret multiplication as scaling by comparing size of product to size of each factor using estimation.

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- Interpret multiplication as scaling by explaining why multiplying a given number by a fraction greater than 1 results in a product greater than the given number while multiplying a given number by a fraction less than 1 results in a product less than the given number.
- Use visual models or equations to compute real world problems involving multiplication of fractions and mixed numbers.
- Apply and extend previous knowledge of division by interpreting division of a unit fraction by a non-zero whole number and computing quotients using the relationship between multiplication and division to explain the process.
- Interpret division of a whole number by a unit fraction and compute quotients using the relationship between multiplication and division to explain the process.
- Demonstrate previous comprehension of division by solving real-world problems involving division of unit fractions by non-zero whole numbers and division of whole numbers by unit fractions.

Evidence for Assessing Learning

Performance Tasks:

Demonstrate mastery of objectives through the assessment of graded: homework, worksheets, quantitative (numerically graded) rubrics, quizzes, tests, and other formal assessments. Including but not limited to:

- Steck Vaughn and Contemporary's Unit Reviews and/or exercises as quizzes and chapter tests (see below)
- Use teacher made quizzes and tests
- Graded Journal entries

Other Evidence:

- Use "The Frayer Model" to deepen the understanding process
- Observing math journal entries
- One on one observations of independent work
- Facilitate group work and monitor conversations during group work

Building the Learning Plan

Sample Classroom Activities and/or Lesson Plans:

- Re-create a recipe to accommodate double portions and half size portions
- Compare different measurement options, such as cups and quarts, etc.
- Divide cookies in different sizes and determine equivalent portions
- Have students work in groups of three on solving common unit fraction word problems
- Have students do classroom surveys of types of pets that live in their households and record their findings in fraction form
- Compare metric measurements with traditional measurements
- Compare interest rates

Learning Activities:

(Interventions for students who are not progressing, instructional strategies, differentiated instruction, re-teaching options)

- Math manipulatives
- Flash cards
- One-to-one tutoring by instructor

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- Peer tutoring
- Interactive Technology
- Universal Design for Learning protocols such as additional time, modified lesson for disabilities (i.e., enlarged print, drills, flashcards and games)

List of Instructional Materials:

- Number lines
- Flash cards
- Fraction game cards
- Dice
- Rectangular arrays
- Area models
- Grid paper
- Math blocks
- Possible Texts:
 - Concepts (2016). McGraw-Hill/College and Career Readiness Practice Workbook
 - Math 1: Whole Numbers, Decimals, Fractions, Percents, and Measurement (2014). New Readers Press/Pre-High School Equivalency
 - Achieving TABE Success in Mathematics Level M, (2006). McGraw Hill

List of Technology Resources:

- Khan Academy— <http://khanacademy.org/>
- Cool Math— www.coolmath4kids.com/fractions
- Ck-12- <https://flexbooks.ck12.org/pages/adult-education/#adult-basic-education>

The NUMBER SYTEM (NS) 3.NS.1 / 3.NS.2

Essential Understandings:

- The relationship of the location of the digits and the value of the digits is part of understanding multi-digit operations.
- Various operations can be performed and represented using multiple formats (manipulatives, diagrams, real-life situations, equations).

Essential Questions

- What role does place value play in multi-digit operations?

Student will be able to:

- Divide multi-digit numbers using the standard algorithm.
- Add, subtract, multiply, and divide multi-digit decimals using the standard algorithm.

Evidence for Assessing Learning

Performance Tasks:

Demonstrate mastery of objectives through the assessment of graded: homework, worksheets, quantitative (numerically graded) rubrics, quizzes, tests, and other formal assessments. Including but not limited to:

- Steck Vaughn and Contemporary's Unit Reviews and/or exercises as quizzes and chapter tests (see below)

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- Use teacher made quizzes and tests
- Graded Journal entries

Other Evidence:

- Use “The Frayer Model” to deepen the understanding process
- Observing math journal entries
- One on one observations of independent work
- Facilitate group work and monitor conversations during group work

Building the Learning Plan

Sample Classroom Activities and/or Lesson Plans:

- Have students work in groups of four to reduce a recipe and record new measurements
- Write a real-life math problem involving hourly wages with weekly pay
- Have students use a four-function calculator to check answers
- Use integers to keep track of scores in an interactive football game
- Analyze temperatures over the last four years. Students work in groups choosing different areas from any continent
- Have students re-write recipes to increase number of servings
- Have each student make up Scientific Cards in two different colors, one color for standard decimal notation and the other for scientific notation

Learning Activities:

(Interventions for students who are not progressing, instructional strategies, differentiated instruction, re-teaching options)

- Math manipulatives
- Flash cards
- One-to-one tutoring by instructor
- Peer tutoring
- Interactive Technology
- Universal Design for Learning protocols such as additional time, modified lesson for disabilities (i.e., enlarged print, drills, flashcards and games)

List of Instructional Materials:

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RATIOS AND PROPORTIONAL RELATIONSHIPS (RP)

3.RP.1 / 3.RP.2

Essential Understandings:

- A ratio expresses the comparison between two quantities. Special types of ratios are rates, unit rates, measurement conversions, and percent.
- A ratio or a rate expresses the relationship between two quantities. Ratio and rate language are used to describe a relationship between two quantities (including unit rates).
- A rate is a type of ratio that represents a measure, quantity, or frequency, typically one measured against a different type of measure, quantity, or frequency.

Essential Questions:

- How are ratios and rates similar and different?
- What is the connection between a ratio/rate and a fraction?
- How do rates, ratios, percentages and proportional relationships apply to our world?
- When and why is it appropriate to use proportional comparisons?
- How does comparing quantities describe the relationship between them?

Student will be able to:

- Demonstrate the concept of a ratio by using ratio language to describe a ratio relationship between two quantities.
- Demonstrate the concept of a unit rate a/b associated with a ratio $a:b$ (with b not equal to zero) by using ratio language to show ratio relationships.

Evidence for Assessing Learning

Performance Tasks:

- Teacher made assignments and quizzes: on rates, ratios, percentages and proportional relationships, including: solving multi-step ratio and percent problems such as interest, tax, discount, unit price etc. (See class activities)

NRS Math Level 3

Low-Intermediate Basic Education (Grade Levels 4-5)

Possible Texts:

- Ratios, Proportions and Percents (2016). McGraw Hill/College and Career Readiness Practice Workbook.
- Math 1: Whole Numbers, Decimals, Fractions, Percents, and Measurement (2014). New Readers Press/Pre-High School Equivalence

Other Evidence:

- Monitor math journal entries
- Facilitate and monitor group work
- Facilitate and monitor independent work

Building the Learning Plan

Sample Classroom Activities and/or Lesson plans:

- Have students bring in different cookie, cereal boxes, juice containers, or other food items to calculate price per unit.
- Calculate difference in gas used, (per gallon), going at a constant rate up a hill versus going at the same rate over a flat mile.
- All students should record their findings of math activities in their math journals.
- Use a walking field trip to estimate time in minutes based on distance and speed. Have students work in groups of four, as some may walk slower or faster.
- Learning Activities: (Interventions for students who are not progressing, instructional strategies, differentiated instruction, re-teaching options)
- Interactive technology as assigned by instructor to support instruction interactive websites/illustrations, Study Stack – vocabulary support, etc. (See below)
- One-to-one intervention
- Think out loud (demonstrate how to think about a problem)
- Peer teaching through group work
- Provide students with a typed set of notes from their classmates.
- Provide support around math specific and general vocabulary
- Additional practice with concepts and procedures in different contexts
- Universal Design for Learning protocols such as additional time, modified lesson for disabilities (i.e., enlarged print, drills, flashcards and games)

List of Instructional Materials:

- Practice work sheets-teacher made
- Ads for gasoline per gallon
- Various items from the grocery store

NRS Math Level 3

Low-Intermediate Basic Education (Grade Levels 4-5)

- Calculators

Possible Texts:

- *Mathematical Reasoning: Test Preparation for the 2014 GED® Test. Student Book and Workbook.* (2013). Steck-Vaughn.
- *EMPower Math, Keeping Things in Proportion: Reasoning with Ratios. Student Edition.* (2011). Contemporary/McGraw-Hill.
- *Math 1: Whole Numbers, Decimals, Fractions, Percents, and Measurement* (2014). New Readers Press/Pre-High School Equivalency
- *Common Core Basics: Mathematics.* (2013). Contemporary/McGraw-Hill

List of Technology Resources:

- Kahn Academy- <https://www.khanacademy.org/>
- Teaching Ideas— www.teachingideas.co.uk
- Kuta Software— <https://www.kutasoftware.com>
- Purple Math— www.purplemath.com
- CK-12- <https://flexbooks.ck12.org/pages/adult-education/#adult-basic-education>
- iPathways

MEASUREMENT AND DATA (MD)

3. MD.1 / 3.MD.2 / 3.MD.3 / 3.MD.4 / 3.MD.5 / 3.MD.6 / 3.MD.7 / 3.MD.8 / 3.MD.9 /
3.MD.10 / 3.MD.11 / 3.MD.12

Essential Understandings:

- Converting from larger to smaller units of measurement in the metric system is done by multiplying by powers of ten.
- Perimeter is a real-life application of addition and subtraction.
- Area is a real-life application of multiplication and division.
- When converting measurements within one system, the size, length, mass, volume of the object remains the same.
- Measurement problems can be solved by using appropriate tools.
- Volume of three-dimensional figures is measured in cubic units.
- Volume is additive and/or it is the multiplication of three dimensions (length, width and height).
- Multiple rectangular prisms can have the same volume.
- Volume can be used to solve a variety of real-life problems.
- The concepts of distances, intervals of time, volume, masses of objects, and money can be expressed as measurements of a larger unit in terms of a smaller unit.
- Angles are measured in the context of a central angle of a circle.
- Angles are composed of smaller angles.

Essential Questions:

- How are the units of measure within the metric system related?
- How do you find the area and perimeter of geometric figures and how can using the formulas for perimeter and area help you solve real-world problems?
- Why does the size, length, mass, volume of an object remain the same when converted to another unit of measurement?
- What is volume and how is it used in real life?

NRS Math Level 3

Low-Intermediate Basic Education (Grade Levels 4-5)

- How does the area of rectangles relate to the volume of rectangular prisms?
- What are the types of angles and the relationships?
- How are angles applied in the context of a circle?
- How are protractors used to measure and aid in drawing angles and triangles?
- How can an addition or subtraction equation be used to solve a missing angle measure when the whole angle has been divided into two angles and only one measurement is given?

Student will be able to:

(What does mastery look like?)

- Name sizes of measurement units including km, m, cm, kg, g, lb., oz., L, ml, hr., min, sec., and express measurement equivalents from larger to smaller units within a single measurement system using a two-column table.
- Solve word problems involving measurements and conversions of measurements using the four operations, simple fractions, decimals, number lines, or diagrams to answer problems involving distance, intervals of time, liquid volumes, mass, and money, showing representative quantities.
- Utilize area and perimeter formulas for rectangles to solve real world and mathematical problems.
- Construct a line plot of a data set of measurements in fraction units, and solve problems of addition and subtraction with fractions involving information presented in the line plots.
- Display a set of data by making line plots for measurements, using operations on fractions for this grade to solve problems involving information presented in the line plots.
- Demonstrate understanding of angle concepts by identifying angles as geometric shapes formed wherever two rays share a common endpoint.
- Recognize concepts of angle measurement by understanding that for a circle with its center the common endpoint of two rays, an angle is measured as the fraction of the circular arc between the points where the opposite ends of the rays intercept the circle, and an angle measuring $\frac{1}{360}$ th of a circle is a one-degree angle and a common unit of measurement.
- Recognize concepts of angle measurement by identifying angles that turn through in one-degree angles as having an angle measure of “n” degrees.
- Demonstrate understanding of angle concepts by using a protractor to measure angles in whole-number degrees and to sketch angles of a designated measure.
- Find measurement of unknown angles utilizing prior knowledge of angle measurement as an additive in which addition /subtraction operations can be used to solve real world and mathematical problems, as in finding unknown angles on a diagram.
- Solve real world multi-step problems involving conversion among different-sized standard measurements units within a given measurement system.
- Identify volume as an attribute of solid figures and relate concepts of volume measurement to cubes with side length 1 unit, called a “unit cube,” and used to measure volume.
- Identify volume as an attribute of solid figures and relate concepts of volume measurement to solid figures that can be packed without gaps using “n” unit cubes to determine volume for a solid figure as measuring a quantity of “n” cubic units.
- Count unit cubes to measuring volume by counting unit cubes using cubic cm, cubic in, cubic ft, and other units.

NRS Math Level 3

Low-Intermediate Basic Education (Grade Levels 4-5)

- Apply the operations of multiplication and addition to solve real world and mathematical problems involving volume, by finding the volume of a right rectangular prism by packing it with unit cubes and showing that this value can be found by multiplying the height by area of the base.
- Apply the operations of multiplication and addition to solve real world and mathematical problems involving volume by applying the formulas $V=lwh$ and $V=bh$ to rectangular prisms.
- Apply the operations of multiplication and addition to solve real world and mathematical problems involving volume by relating volume to operations of addition to find volumes of solid figures composed of two non-overlapping right rectangular prisms and adding the volumes of the non-overlapping parts.

Evidence for Assessing Learning

Performance Tasks:

Demonstrate mastery of objectives through the assessment of graded: homework, worksheets, quantitative (numerically graded) rubrics, quizzes, tests, and other formal assessments. Including but not limited to:

- Create a graphic representation of level appropriate quantities
- Contemporary's Unit Reviews and/or exercises as quizzes and chapter tests. (see below)
- Teacher made quizzes and tests
- Math journals-graded entries
- Facilitated group work/ monitoring conversations and work with rubric

Other Evidence:

- Use "The Frayer Model" to enhance concepts
- Observation of facilitated independent work
- Facilitated group work/ monitoring conversations and work

Building the Learning Plan

Sample Classroom Activities and/or Lesson Plans:

- Display various measurement tools in different units
- Have student measure different objects in the classroom using various measurement tools
- Record measurement on chart paper
- Introduce math manipulatives that measure mass and volume
- Demonstrate measurement of area vs. volume vs. perimeter of a specific object
- Students will work in groups on math worksheets involving measurement
- Create line plots that display measurements in fraction units
- Introduce geometric shapes as math manipulatives

Learning Activities:

(Interventions for students who are not progressing, instructional strategies, differentiated instruction, re-teaching options)

- One-to-one tutor
- Peer teaching
- Use different objects and put material in different context-use different measuring tools
- Interactive technology- websites as assigned (see below)

NRS Math Level 3

Low-Intermediate Basic Education (Grade Levels 4-5)

- Universal Design for Learning protocols such as additional time, modified lesson for disabilities (i.e., enlarged print, drills, flashcards and games)

List of Instructional Materials:

- Rulers in standard measurement units
- Protractors
- String
- Straws
- Geometric math boards with rubber bands
- Graph paper
- Math journal
- Geometric math blocks
- Scales
- Possible Texts:
 - EMPOWER Math – Over, Around, and Within: Geometry and Measurement. (2012). Contemporary.
 - Math 2 workbook: Algebraic Thinking, Data Analysis, and Probability (2014). New Readers Press

List of Technology Resources:

- Khan Academy— <http://khanacademy.org/>
- Cool Math— www.coolmath.com
- Kuta Software— <https://www.kutasoftware.com>
- Ck-12- <https://flexbooks.ck12.org/pages/adult-education/#adult-basic-education>

GEOMETRY (G)

3. G.1 / 3.G.2 / 3.G.3 / 3.G.4 / 3.G.5 / 3.G.6 / 3.G.7 / 3.G.8 / 3.G.9 / 3.G.10 / 3.G.11

Essential Understandings:

- Shapes can be classified by properties (or attributes) of their lines and angles.
- Angles are measured in the context of a central angle of a circle.
- Angles are composed of smaller angles.
- Two-dimensional geometric figures are composed of various parts that are described with precise vocabulary and can be classified based upon their properties (attributes).
- 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.
- Figures that can be folded on a center line to produce two matching parts are symmetrical.
- The coordinate plane is a tool for modeling real-world and mathematical situations and for solving problems.
- Graphing objects in a four quadrant plane can provide ways to measure distances and identify that shapes have specific properties.
- Volume of a rectangular prism can be determined by multiplying the length, width and height dimensions when the dimensions are fractional lengths.
- Two- and three-dimensional shapes and spaces are defined by their properties; real world and geometric structures are composed of these shapes and spaces.

Essential Questions:

NRS Math Level 3

Low-Intermediate Basic Education (Grade Levels 4-5)

- Why is it important to use precise language and mathematical tools in the study of two-dimensional and three-dimensional figures?
- How can describing, classifying and comparing attributes of two-dimensional shapes (nets) be useful in solving problems in our three-dimensional (dot paper drawings) world?
- Problems of area of polygons can be solved by composing and decomposing the polygons.
- How does what we measure influence how we measure?
- How can space be defined through numbers and measurement?
- How does investigating figures help us build our understanding of mathematics?
- How are parallel lines and perpendicular lines used in classifying two-dimensional shapes?
- What are the types of angles and the relationships?
- How are angles applied in the context of a circle?
- How are protractors used to measure and aid in drawing angles and triangles?
- Why is it important to use precise language and mathematical tools in the study of two-dimensional figures?
- How can describing, classifying and comparing properties of two-dimensional shapes be useful in solving real-world problems?
- How can an addition or subtraction equation be used to solve a missing angle measure when the whole angle has been divided into two angles and only one measurement is given?
- What is the purpose of a coordinate plane?
- How can graphing points on the coordinate plane help to solve real world and mathematical problems?
- How can the line of symmetry be identified and drawn in a two-dimensional figure?

Student will be able to:

(What does mastery look like?)

- Plot points and draw line segments, rays, angles, perpendicular lines, and parallel lines, identifying these in two-dimensional figures.
- Categorize two-dimensional figures based on the presence/absence of parallel or perpendicular lines or the presence/absence of angles of a specified size, and identify and categorize right triangles.
- Identify a line of symmetry as a line running across a two-dimensional figure so that the figure can be folded along the line into two matching parts, and identify and draw lines of symmetry.
- Define a coordinate plane, identify the x-axis and y-axis, and demonstrate comprehension of ordered pairs as directional distance on the x and y axis.
- Show a real life or mathematical problem and illustrate it graphically by plotting points in the first quadrant of a coordinate plane, interpreting coordinate values in context.
- Demonstrate comprehension that attributes belonging to a category of two-dimensional figures apply to all subcategories (e.g., all rectangles have four right angles; squares are rectangles; therefore, squares have four right angles).
- Sort and classify two-dimensional figures based on their properties and characteristics.
- Solve real-world and mathematical problems by finding the area of triangles, right triangles, polygons, and quadrilaterals by composing into rectangles and decomposing into triangles and other shapes.

NRS Math Level 3

Low-Intermediate Basic Education (Grade Levels 4-5)

- Solve real-world and mathematical problems involving volume for right rectangular prisms with fractional edge lengths by using modeling with unit cubes, approximating the fractional measure and applying the formula $V=lwh$ and $V=bh$ to rectangular prisms with fractional edge lengths. Solve real-world and mathematical problems involving area by using ordered pairs, sketching a polygon, and finding the length of each side in the coordinate plane.
- Solve real-world and mathematical problems involving surface area by representing three-dimensional figures using nets of rectangles and triangles.

Evidence for Assessing Learning

Performance Tasks:

Demonstrate mastery of objectives through the assessment of graded: homework, worksheets, quantitative (numerically graded) rubrics, quizzes, tests, and other formal assessments. Including but not limited to:

- Teacher made assignments and quizzes: for example, given data construct a line plot
- Text: Steck-Vaughn and Contemporary's Test Preparation Unit Reviews and/or exercises as quizzes and chapter tests (see below)
- Assign outside projects that involve measurement and data entry
- Monitor independent assignments

Other Evidence:

- Math journal entries
- Facilitate group work/ monitoring conversations and work

Building the Learning Plan

Sample Classroom Activities and/or Lesson Plans:

- Test for line symmetry using the folding method:
<https://www.mathsisfun.com/activity/shapes-symmetry.html>
- Have a class discussion about lines and angles.
- Identify & take pictures of lines and angles in the classroom, building, and at home.
- Construct a reference poster depicting various lines and angles.
- Construct a reference poster depicting area, surface area, and volume methods and attributes.
- Have student sketch a coordinate plane and label each axis.
- Provide blank coordinate planes and have students label them.
- Plot several points and connect them to reveal a shape or letter.
- Define and classify two-dimensional figures, name their similar **characteristic**.

Learning Activities:

(Interventions for students who are not progressing, instructional strategies, differentiated instruction, re-teaching options)

- One-to-one tutor
- Interactive technology
- Peer teaching
- Use different objects and put material in different context.
- Work with groups that are experiencing difficulties with measurement data

NRS Math Level 3

Low-Intermediate Basic Education (Grade Levels 4-5)

- Universal Design for Learning protocols such as additional time, modified lesson for disabilities (i.e., enlarged print, drills, flashcards, and games such as Battleship)

List of Instructional Materials:

- Graph paper
- Colored pencils
- Rulers
- Protractors
- Math journal
- Different types of real-world math problems drawn from everyday life or job related
- Possible Texts:
 - EMPower Math – Over, Around, and Within: Geometry and Measurement. (2012). Contemporary.
 - Math Sense 2: Algebraic Thinking, Data Analysis, and Probability (2014). New Readers Press
 - New Readers Press Math Sense 1 and 2
 - McGraw Hill Common Core Basics Mathematics

List of Technology Resources:

- i-Pathways Basic Math — www.i-pathways.org
- Khan Academy— <http://khanacademy.org/>
- Cool Math— www.coolmath.com
- Symmetry Matching Game - <https://www.topmarks.co.uk/symmetry/symmetry-matching>
- Kuta Software— <https://www.kutasoftware.com/freeige.html>
- Ck-12- <https://flexbooks.ck12.org/pages/adult-education/#adult-basic-education>

Statistics and Probability (SP)

3.SP.1 / 3.SP.2 / 3.SP.3 / 3.SP.4

Essential Understandings

- Statistical questions and the answers account for variability in a data set.
- The distribution of a data set is described by its center, spread, and overall shape.
- Measures of central tendency for a numerical set of data are summaries of the values using a single number.
- Measures of variability describe the variation of the values in the data set using a single number.
- Different representations (written descriptions, tables, scatter plots, histograms, box and whisker plots, graphs, and equations) of the relationships between varying quantities may have different strengths and weaknesses.

Essential Questions

- What is the value of using different data representations?
- When is one data display better than another? How can data be displayed strategically?
- What makes a good statistical question?

NRS Math Level 3

Low-Intermediate Basic Education (Grade Levels 4-5)

Student Will be able to:

- Develop understanding of statistical variability by applying a statistical question as one that anticipates variability in the data related to the question and accounts for it in the answers.
- Develop understanding of statistical variability by demonstrating 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.
- Develop understanding of statistical variability by demonstrating the measure of center for a numerical data set summarizing 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 by displaying numerical data in plots on a number line, including dot plots, histograms, and box plots.

Evidence for Assessing Learning

Performance Tasks:

Demonstrate mastery of objectives through the assessment of graded: homework, worksheets, quantitative (numerically graded) rubrics, quizzes, tests, and other formal assessments. Including but not limited to:

- Teacher made assignments and quizzes (See class activities)
- Chapter /unit reviews/tests from core texts such as New Readers Press *Math Sense*

Other Evidence:

- Monitor math journal entries
- Monitor group work
- Monitor independent work

Building the Learning Plan

Sample Classroom Activities and/or Lesson plans:

- Take a survey of each student's age and birthdate in one class
- Explain how a statistical question anticipates variability in data related to the question and accounts for it in the answer
- Assign groups to create a reference poster of the different ways to display numerical data.
- Have students work in groups to collect data on a topic of each group's choice. Each group should display numerical data in a different way, for example: one group could plot on a number line, another group on dot plots, and still another using box and whisker
- Adding to this classroom activity, students must explain in their math journals the distribution on the data collected.
- All activities should be recorded on tables, tree diagrams, and on organized lists

NRS Math Level 3

Low-Intermediate Basic Education (Grade Levels 4-5)

Learning Activities: (Interventions for students who are not progressing, instructional strategies, differentiated instruction, re-teaching options)

- Interactive technology as assigned by instructor to support instruction such as: interactive websites/illustrations, Study Stack – vocabulary support
- One on one intervention
- Think out loud (demonstrate how to think about a problem)
- Peer teaching through group work
- Provide students with a typed set of notes from their classmates
- Provide support around math specific and general vocabulary
- Additional practice with concepts and procedures in different contexts
- Universal Design for Learning protocols such as additional time, modified lesson for disabilities (i.e., enlarged print, drills, flashcards and games)

List of Instructional Materials:

- Chart paper
- Interactive technology
- Dice, coins, cards, rulers
- Markers and colored pencils
- Mathematical Reasoning: Test Preparation for the 2014 GED® Test. Student Book and Workbook. (2013). Steck-Vaughn. Common Core Basics: Mathematics. (2013). Contemporary/McGraw-Hill.

List of Technology Resources:

- Kuta Software— <https://www.kutasoftware.com>
- Purple Math— www.purplemath.com
- Cool Math— www.coolmath.com
- Math Planet— www.mathplanet.com/
- Math Antics www.mathantics.com