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**DIVISION OF ADULT EDUCATION**

**8122**

**Code**

**ADULT BASIC EDUCATION: BASIC MATH**

**Intermediate 2015**

**Course Length**: 180 Hrs

**Course Number**: 8122

**DURATION**: A minimum of 60 hours or until the student has mastered competencies.

**GRADE LEVEL**: Non-graded Adult.

**CREDIT**: One credit per 60 hours of attendance, with a maximum of 3 credits

**PROGRAM DESCRIPTION**: This course is intended for students who need to develop proficiency in execution and application of basic operations with common fractions, decimals, and percents. Mastery of these skills is addressed through drill and practice exercises, accompanied by an emphasis on common, practical problem-solving applications, basic geometric concepts as well as algebraic thinking as outlined in the mathematics content standards for adult education. These standards were adapted from California’s Common Core State Standards for Mathematics (CCSSM).

**STUDENT LEARNING OUTCOMES:**

* Students will establish personal, academic and/or workforce goals and demonstrate progress toward them
* Students will solve problems
* Students will communicate clearly and collaborate with others
* Students will use resources, including technology, to research, organize and communicate information

**Operations and Algebraic Thinking**

1.0 Students will interpret a multiplication equation as a comparison, e.g., interpret 35 = 5 × 7 as a

statement that 35 is 5 times as many as 7 and 7 times as many as 5. Represent verbal statements of

multiplicative comparisons as multiplication equations. (CCS M4 OA1)

2.0 Students will multiply or divide to solve word problems involving multiplicative comparison, e.g., by

using drawings and equations with a symbol for the unknown number to represent the problem, distinguishing multiplicative comparison from additive comparison. (CCS M4 OA2)

3.0 Students will solve multistep word problems posed with whole numbers and having whole-number

answers using the four operations, including problems in which remainders must be interpreted. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding. (CCS M4 OA3)

4.0 Students will generate a number or shape pattern that follows a given rule. Identify apparent features

of the pattern that were not explicit in the rule itself. *For example, given the rule “Add 3” and the starting number 1, generate terms in the resulting sequence and observe that the terms appear to alternate between odd and even numbers. Explain informally why the numbers will continue to alternate in this way.* (CCS M4 OA5)

5.0 Students will use parentheses, brackets, or braces in numerical expressions, and evaluate

expressions with these symbols. (CCS M5 OA1)

6.0 Students will 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.* (CCS M5 OA2)

7.0 Students will express a whole number in the range 2-50 as a product of its prime factors. *For*

*example, find the prime factors of 24 and express 24 as 2×2×2×3.* (MSG 5.OA.2.1)

8.0 Students will 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.* (CCS M5 OA3)

**Number and Operations in Base Ten**

1.0 Students will recognize that in a multi-digit whole number, a digit in one place represents ten times

what it represents in the place to its right. *For example, recognize that 700 ÷ 70 = 10 by applying concepts of place value and division.* (CCS M4 NBT1)

2.0 Students will use place value understanding to round multi-digit whole numbers to any place. (CCS

M4 NBT3)

3.0 Students will fluently add and subtract multi-digit whole numbers using the standard algorithm.

(CCS M4 NBT4)

4.0 Students will multiply a whole number of up to four digits by a one-digit whole number, and multiply two two-digit numbers, using strategies based on place value and the properties of operations. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models. (CCS M4 NBT5)

5.0 Students will solve problems involving multiplication of multi-digit numbers by two-digit numbers. (CCS M5 NBT5.1)

6.0 Students will find whole-number quotients and remainders with up to four-digit dividends and one

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. (CCS M4 NBT6)

7.0 Students will 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. (CCS M5

NBT1)

8.0 Students will 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. (CCS M5 NBT2)

9.0 Students will read, write, and compare decimals to thousandths. (CCS M5 NBT3)

10.0 Students will 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). (CCS M5 NBT3.a)

11.0 Students will compare two decimals to thousandths based on meanings of the digits in each place,

using >, =, and < symbols to record the results of comparisons. (CCS M5 NBT3.b)

12.0 Students will use place value understanding to round decimals to any place. (CCS M5 NBT4)

13.0 Students will fluently multiply multi-digit whole numbers using the standard algorithm. (CCS M5

NBT5)

14.0 Students will 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. (CCS M5 NBT6)

15.0 Students will 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. (CCS M5 NBT7)

**Number and Operations-Fractions**

1.0 Students will compare two fractions with different numerators and different denominators, e.g., by

creating common denominators or numerators, or by comparing to a benchmark fraction such as 1/2. Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with symbols >, =, or <, and justify the conclusions, e.g., by using a visual fraction model. (CCS M4 NF2)

2.0 Students will understand a fraction *a*/*b* with *a* > 1 as a sum of fractions 1/*b*. (MSG 4.NF.3)

3.0 Students will understand addition and subtraction of fractions as joining and  separating parts

referring to the same whole (CCS M4 NF3.a)

4.0 Students will add and subtract mixed numbers with like denominators, e.g., by replacing each mixed

number with an equivalent fraction, and/or by using properties of operations and the relationship between addition and subtraction. (CCS M4 NF3.c)

5.0 Students will solve word problems involving addition and subtraction of fractions referring to the

same whole and having like denominators, e.g., by using visual fraction models and equations to represent the problem. (CCS M4 NF3.d)

6.0 Students will apply and extend previous understandings of multiplication to multiply a fraction by a

whole number. (CCS M4 NF4)

7.0 Students will understand a multiple of *a*/*b* as a multiple of 1/*b*, and use this understanding to

multiply a fraction by a whole number. *For example, use a visual fraction model to express 3 × (2/5) as 6 × (1/5), recognizing this product as 6/5. (In general, n × (a/b) = (n × a)/b.)* (CCS M4 NF4.b)

8.0 Students will solve word problems involving multiplication of a fraction by a whole number, e.g., by

using visual fraction models and equations to represent the problem. *For example, if each person at a party will eat 3/8 of a pound of roast beef, and there will be 5 people at the party, how many pounds of roast beef will be needed? Between what two whole numbers does your answer lie?* (CCS M4 NF4c)

9.0 Students will express a fraction with denominator 10 as an equivalent fraction with denominator

100, and use this technique to add two fractions with respective denominators 10 and 100. *For example, express 3/10 as 30/100, and add 3/10 + 4/100 = 34/100.* (CCS M4 NF5)

10.0 Students will use decimal notation for fractions with denominators 10 or 100. *For example, rewrite*

*0.62 as 62/100; describe a length as 0.62 meters; locate 0.62 on a number line diagram.* (CCS M4 NF6)

11.0 Students will compare two decimals to hundredths by reasoning about their size. Recognize that

comparisons are valid only when the two decimals refer to the same whole. Record the results of comparisons with the symbols >, =, or <, and justify the conclusions, e.g., by using a visual model. (CCS M4 NF7)

12.0 Students will 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.)* (CCS M5 NF1)

13.0 Students will 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.* (CCS M5 NF2)

14.0 Students will interpret a fraction as division of the numerator by the denominator (*a*/*b* = *a* ÷ *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?* (CCS M5 NF3)

15.0 Students will apply and extend previous understandings of multiplication to multiply a fraction or

whole number by a fraction. (CCS M5 NF4)

16.0 Students will interpret the product (*a*/*b*) × *q* as *a* parts of a partition of *q*into *b* equal parts;

equivalently, as the result of a sequence of operations *a* × *q* ÷ *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.)* (CCS M5 NF4.a)

17.0 Students will 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. (CCS M5 NF4.b)

18.0 Students will interpret multiplication as scaling (resizing), by 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. (CCS M5 NF5.a)

19.0 Students will interpret multiplication as scaling (resizing), by 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*×*a*)/(*n*×*b*) to the effect of multiplying *a*/*b* by 1. (CCS M5 NF5.b)

20.0 Students will solve real world problems involving multiplication of fractions and mixed numbers,

e.g., by using visual fraction models or equations to represent the problem. (CCS M5 NF.6)

21.0 Students will apply and extend previous understandings of division to divide unit fractions by

whole numbers and whole numbers by unit fractions. (CCS M5 NF7)

22.0 Students will 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.* (CCS M5 NF7.a)

23.0 Students will 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.* (CCS M5 NF7.b)

24.0 Students will 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?* (CCS M5 NF7.c)

**Measurements and Data**

1.0 Students will know relative sizes of measurement units within one system of units including km, m,

cm; kg, g; lb, oz.; l, ml; hr, min, sec. Within a single system of measurement, express measurements in a larger unit in terms of a smaller unit. Record measurement equivalents in a two- column table. *For example, know that 1 ft is 12 times as long as 1 in. Express the length of a 4 ft snake as 48 in. Generate a conversion table for feet and inches listing the number pairs (1, 12), (2, 24), (3, 36), ...* (CCS M4 MD1)

2.0 Students will use the four operations to solve word problems involving distances, intervals of time,

liquid volumes, masses of objects, and money, including problems involving simple fractions or decimals, and problems that require expressing measurements given in a larger unit in terms of a smaller unit. Represent measurement quantities using diagrams such as number line diagrams that feature a measurement scale. (CCS M4 MD2)

3.0 Students will apply the area and perimeter formulas for rectangles in real world and mathematical

problems. *For example, find the width of a rectangular room given the area of the flooring and the length, by viewing the area formula as a multiplication equation with an unknown factor.* (CCS M4 MD3)

4.0 Students will 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. (CCS M5 MD1)

5.0 Students will 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.* (CCS M5 MD2)

6.0 Students will recognize volume as an attribute of solid figures and understand concepts of volume

measurement. (CCS M5 MD3)

7.0 Students will recognize and understand that 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. (CCS M5 MD3.a)

8.0 Students will recognize and understand that 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. (CCS M5 MD3.b)

9.0 Students will measure volumes by counting unit cubes, using cubic cm, cubic in, cubic ft, and

improvised units. (CCS M5 MD4)

10.0 Students will relate volume to the operations of multiplication and addition and solve real world

and mathematical problems involving volume. (CCS M5 MD5)

11.0 Students will 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. (CCS M5 MD5.a)

12.0 Students will apply the formulas *V*=*l*×*w*×*h* and *V*=*b*×*h* for rectangular prisms to find volumes of right

rectangular prisms with whole- number edge lengths in the context of solving real world and mathematical problems. (CCS M5 MD5.b)

13.0 Students will 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. CCS M5 MD5.c)

**Geometry**

1.0 Students will 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). (CCS M5 G1)

2.0 Students will 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. (CCS M5 G2)

3.0 Students will 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.* (CCS M5 G3)

4.0 Students will distinguish among rectangles, parallelograms, and trapezoids. (CCS M5 G3.1)

5.0 Students will classify two-dimensional figures in a hierarchy based on properties. (CCS M5 G4)

6.0 Students will know that the sum of the angles of any triangle is 180 degrees and the sum of the angles

of any quadrilateral is 360 degrees and use this information to solve problems. (CCS M5 G5)

7.0 Students will derive and use the formula for the area of a triangle and of a parallelogram by

comparing it with the formula for the area of a rectangle (i.e. two of the same triangles make a parallelogram with twice the area; a parallelogram is compared with a rectangle of the same area by cutting and pasting a right triangle on the parallelogram). (CCS M5 G6)

**Instructional Strategies and Times:**

1. Teacher lectures, explanations, and demonstration. 20%

2. Individual or group applications/independent practice of mathematical skills to

text and exercises. 50%

3. Class discussion of mathematical principles and skills (in individualized instruction,

teacher/student conferences and direct tutoring) 20%

4. Testing 10%

**Evaluation:**

Student evaluation will be based upon:

1. Satisfactory completion of written assignments as evaluated by the instructor.

2. Satisfactory completion of teacher-made and/or standardized examinations.

3. Satisfactory progress and participation in classroom activities as evaluated by the instructor.

**Conditions for Repetition:**

There are no conditions for repeating this course.

Approved:

BOARD OF TRUSTEES

August 14, 1986

Revised:

May 9, 2006

July 15, 2013

October 26, 2015

Title change approved 8/24/95

“Basic Mathematics 2”