

LESA
Mathematics Curriculum
2007

1. Number Sense and Operations

(NCTM 2000 #1; MO #5 & 9; IL #6)

A. Demonstrate knowledge and use of numbers: representations, systems, and relationships.

| <u>Objective</u> | <u>Suggested Activities</u> | <u>Suggested Assessment</u> |
|--|--|-----------------------------|
| The student will be able to: 1- read, order, compare, and round decimals to any given place value. | Use a number line to compare distances and round statistics. | Homework/test |
| 2 - read, order, compare, and round whole numbers to any given place value. | Use demographic data from various countries and round their given populations. | Observation |
| 3 - define prime and composite numbers. | Have students either write or recite the definition of a prime number. | Observation |
| 4 - recognize prime numbers between 2 and 100. | Use the Sieve of Eratosthenes. | Observation |
| 5 - order integers from least to greatest. | Place numbers appropriately on a number line. | Homework/test |
| 6 - order decimals from least to greatest. | Align the decimals vertically and compare place values from left to right. | Homework/test |
| 7 - order fractions from least to greatest. | Rewrite fractions using common denominators and compare numerators or convert to decimals by dividing. | Homework/test |

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B. Demonstrate knowledge of operations, properties, and their relationships.

| <u>Objective</u> | <u>Suggested Activities</u> | <u>Suggested Assessment</u> |
|---|--|------------------------------------|
| The student will be able to: 1 - define and use addition. | Have students justify their answer to an addition problem. | Observation |
| 2 - define and apply subtraction as the opposite of addition. | Have students check the answer to a subtraction problem by adding the subtrahend. | Homework/test |
| 3 - define and use multiplication. | Have students use graph paper to determine the area of a rectangle and count the number of shaded units. | Observation |
| 4 - define and apply division as the opposite of multiplication. | Have students check the answer to a division problem by multiplying the quotient by the divisor. | Homework/test |
| 5 - define and use the commutative properties of addition and multiplication. | Have students use the commuting of people to work to define the ability of numbers to "commute" in given instances. Students should then be able to demonstrate instances where this property is applicable. | Observation |
| 6 - define and use the associative properties of addition and multiplication. | Have students define what it is to "associate" and explain how symbols of inclusion show that relationship between numbers. Students should then be able to demonstrate instances where this property is applicable. | Observation |

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| 7 - define and use the identity properties of addition and multiplication. | Discuss the equals sign as a mirror and how the same value is reflected on the other side. Students should then be able to demonstrate instances where this property is applicable. | Observation |
| 8 - define and use the zero property of multiplication. | Have students use manipulatives to make zero groups of a given multiple. | Observation |

C. Demonstrate fluency in computation and make appropriate estimates.

| <u>Objective</u> | <u>Suggested Activities</u> | <u>Suggested Assessment</u> |
|---|--|------------------------------------|
| The student will be able to: 1 - multiply and divide using whole numbers. | Review worksheet/Mad Minutes (facts practice). | Homework/test |
| 2 - find the greatest common factor of a given set of numbers. | 2a. List all factors and identify the largest. 2b. Use a factor tree and multiply all of the common primes. | Homework/test |
| 3 - determine the prime factorization of a given number. | Use a factor tree. | Homework/test |
| 4 - add and subtract using decimals. | Find the total cost of a group of objects, i.e., 3 cans of soup at \$1.26/can and the change received from \$10. | Homework/test |
| 5 - multiply using decimals. | Calculate the sales tax of a purchase. | Homework/test |
| 6 - divide with decimals as the dividend. | Find the unit price of various items. | Homework/test |

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| 7 - divide with decimals as the divisor. | Calculate how many objects were purchased given the price of the object. | Homework/test |
| 8 - use either multiplication or division to find equivalent fractions. | 8a. Use shading of congruent figures that have been divided into different numbers of equal parts. 8b. Cut apples or straws. | Observation |
| 9 - find the least common denominator in a group of two or three fractions. | Review least common multiple and list. | Homework/test |
| 10 - convert improper fractions to mixed numbers and vice versa. | Draw a picture of 2 $1/2$ pies and divide them into $1/8$ s. | Observation |
| 11 - add and subtract fractions and mixed numbers with regrouping. | Add and subtract various lengths of string. | Homework/test |
| 12 - multiply and divide using fractions. | Adapt recipes to feed larger or smaller groups. | Homework/test |
| 13 - multiply and divide using mixed numbers. | Calculate the area of a room given the length and width or use the area and the length to calculate the width. | Homework/test |
| 14 - estimate sums, differences, products, and quotients. | Estimate the total cost of redecorating a room and prepare a budget. | Homework/test |

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2. Patterns, Relationships, and Algebraic Methods

(NCTM 2000 #2; MO #8; IL #8)

A. Describe numerical relationships using patterns and functions.

| <u>Objective</u> | <u>Suggested Activities</u> | <u>Suggested Assessment</u> |
|--|--|------------------------------------|
| The student will be able to: 1 - convert decimals (both repeating and terminating) to percents and vice versa. | Create a matching game to group equivalent decimals, fractions, and percentages. | Observation |
| 2 - convert fractions to decimals (both repeating and terminating) and vice versa. | Have students order a mixed group of fractions and decimals. | Homework/test |
| 3 - use the concepts of ratio and percent to solve application problems. | Compare parts to the whole (% of boys in 6th grade vs. % in whole school) or compare parts (ratio of boys to girls). | Homework/test |
| 4 - use proportions to solve application problems. | Use a map scale to determine actual distance. | Homework/test |
| 5 - use patterns and functions to represent and solve problems. | Create a tessellation. | Homework |

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B. Describe numerical relationships using mathematical models.

| <u>Objective</u> | <u>Suggested Activities</u> | <u>Suggested Assessment</u> |
|--|---|------------------------------------|
| The student will be able to: 1 - demonstrate the meaning of percent using concrete models. | Identify a percentage of a given characteristic in the class, graph, and determine what that would mean in a different sized group (50 people, 100 people, etc.). | Homework/test |
| 2 - use tables and graphs to model and solve problems. | Take a class survey and present the information in three different formats. | In-class project |
| 3 - describe and apply the order of operations. | 3a. Have students create their own mnemonic device. 3b. Use scientific calculators to discover the difference between using order of operations and simply computing from left to right. | In-class project |

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C. Analyze, interpret, and solve problems using algebraic concepts and expressions.

| <u>Objective</u> | <u>Suggested Activities</u> | <u>Suggested Assessment</u> |
|---|--|------------------------------------|
| The student will be able to: 1 - write equations using variables to model real-life situations. | Have students identify an equation implied by a word problem. | Homework/test |
| 2 - solve equations that contain variables. | Provide students with a variety of equations with variables and real-life situations that can be expressed in equations with variables to solve. | Homework/test |

D. Analyze change in various contexts.

| <u>Objective</u> | <u>Suggested Activities</u> | <u>Suggested Assessment</u> |
|--|--|------------------------------------|
| The student will be able to: 1 - read a graph and identify change between two intervals. | Give students a graph to interpret. | Homework/test |
| 2 - apply rates as a unit of change. | Discuss a change in miles per hour over different time periods. | Homework/test |
| 3 - investigate how change in one variable relates to a change in a second. | Use the formula for the area of a rectangle to illustrate the relationship between length of rectangle and its area. | Homework/test |

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3. Geometry

(NCTM 2000 #3; MO #6; IL #9)

A. Analyze characteristics and properties of geometric shapes and develop mathematical arguments about geometric relationships.

| <u>Objective</u> | <u>Suggested Activities</u> | <u>Suggested Assessment</u> |
|---|--|-----------------------------|
| The student will be able to: 1 - identify, describe, compare, and classify geometric figures. | Identify geometric shapes in the classroom or on the school grounds. | Observation |
| 2 - identify, describe, compare, and classify points, rays, segments, lines, and planes. | Have students label drawings provided to them. | Homework/test |
| 3 - label and define types of angles and triangles. | Sort items drawn on note cards into appropriate categories. | Observation |
| 4 - define and label parallel, perpendicular, and intersecting lines. | Have students draw examples of each type of line, trade with a friend, and label. | Homework/test |
| 5 - construct polygons with specified properties. | Give students the name of a polygon and a list of measurements and have them create the polygon using manipulatives. | Observation |
| 6 - draw an angle of a specified measure. | Provide an angle measurement and have students draw the angle. | Homework/test |
| 7 - use a compass to draw a circle of a given radius. | Provide a length for either the radius or the diameter and have the students construct the specified circle. | Homework/test |

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B. Specify locations and describe spatial relationships using representational systems.

| <u>Objective</u> | <u>Suggested Activities</u> | <u>Suggested Assessment</u> |
|--|--|------------------------------------|
| The student will be able to: 1 - identify the location of a point on a coordinate plane. | Use a map and have students provide the latitude and longitude of a given city or find a city given its coordinates. | Observation |
| 2 - use coordinate geometry to represent and examine the properties of geometric shapes. | Given three points on a parallelogram have the students identify the fourth. | Homework/test |
| 3 - use coordinate geometry to examine specific geometric shapes (i.e. regular polygons or figures with perpendicular/parallel sides). | Place figures on a coordinate plane and have students identify any perpendicular or parallel sides. | Observation |
| 4 - find the distance between points along horizontal and vertical lines on a coordinate plane. | Plot points on a graph and determine the distance between various points. | Homework/test |

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C. Apply transformations and use symmetry to analyze mathematical situations.

| <u>Objective</u> | <u>Suggested Activities</u> | <u>Suggested Assessment</u> |
|--|---|------------------------------------|
| The student will be able to: 1 - identify congruent figures using transformations. | Have students cut out a figure and place it on top of figures with different orientations to determine whether or not they are congruent. | Observation |
| 2 - identify similar figures. | Have students use ratios or proportions to compare the lengths of sides. Use the overhead at different distances from the wall to project a figure at different magnitudes. | Group work |
| 3- identify lines of reflective symmetry in geometric figures. | Have students draw lines of symmetry on two-dimensional objects. | Homework/test |

D. Use visualization, spatial reasoning, and geometric modeling to solve problems.

| <u>Objective</u> | <u>Suggested Activities</u> | <u>Suggested Assessment</u> |
|--|---|------------------------------------|
| The student will be able to: 1 - represent and solve problems using geometric models. | Use tangrams to make shapes designed by the teacher. | Observation |
| 2 - use two-dimensional representations of three-dimensional objects to visualize and solve problems involving surface area or volume. | Have students draw a cylinder, labeling height and radius and answer a set of questions based on their drawing. | Homework/test |

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4. Measurement

(NCTM 2000 #4; IL #7)

A. Determine measurable attributes of objects and the units, systems, and processes of measurement.

| <u>Objective</u> | <u>Suggested Activities</u> | <u>Suggested Assessment</u> |
|---|---|-----------------------------|
| The student will be able to: 1 - identify features that can be measured with units of length, area, and volume. | Identify attributes of environment that can be measured with each type of unit. | Observation |
| 2 - understand both metric and customary systems of measurement. | Measure various attributes using both systems. Discuss where each system is used. | Homework/test |

B. Apply appropriate techniques, tools, and formulas to determine measurements.

| <u>Objective</u> | <u>Suggested Activities</u> | <u>Suggested Assessment</u> |
|---|---|-----------------------------|
| The student will be able to: 1 - use a protractor to draw, measure, and compare angles. | Provide students with a worksheet with pre-drawn angles to measure and measurements that they need to draw. | Homework/test |
| 2 - measure linear distances using customary and metric measurement. | Give students a list of things to measure in the classroom. | Homework/test |
| 3 - use graduated containers to measure customary or metric units of volume. | Provide colored water and measuring devices to measure to the nearest oz./mL. | Observation |

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| 4 - use a balance to find mass. | Provide 10 items to calculate mass. | Observation |
| 5 - measure angles. | Have students measure various angles provided by the teacher. | Homework/test |
| 6 - label and compute circumference, radius, diameter, and area of circles. | Bring in various circular objects for students to measure/calculate the various characteristics. | Observation |
| 7 - find the perimeter and areas of regular quadrilaterals and triangles. | Calculate the area and perimeter of the classroom, playground, and books. | Homework/test |
| 8 - calculate the surface area and volume of a rectangular prism. | Have students bring in boxes and calculate the surface area and volume of them. | Homework/test |
| 9 - use common benchmarks to select appropriate methods for estimating measurements. | Provide 10 things to be measured and have students provide the unit they would use to measure each and then estimate the measure. | Homework/test |
| 10 - solve problems involving scale factors, using ratio and proportion. | Create a scaled map of bedroom. | Homework/test |
| 11 - solve simple problems involving rates. | Provided a distance and travel time, have students derive the rate of travel. | Homework/test |

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12 - understand relationships among units and convert from one unit to another within the same system.

Discuss large distances in terms of smaller units (How far is it to your house in inches?).

Discussion

13 - understand that measurements are approximations and understand how differences in units affect precision.

Measure the lengths of various lines using different units of measure for each line. Discuss how rounding affects the answer.

Student demonstration

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5. Data Analysis and Probability

(NCTM 2000 #5; MO #7; IL #10)

A. Formulate and answer questions by collecting and organizing data and communicate findings.

| <u>Objective</u> | <u>Suggested Activities</u> | <u>Suggested Assessment</u> |
|--|--|-----------------------------|
| The student will be able to: 1 - formulate questions and design studies to compare members of a group. | Allow students to pose a question about the school population and design a study to answer it. | Class activity |
| 2 - collect and report data using appropriate graphical representations. | Measure height of classmates and graph or organize in a chart. | Class activity |

B. Use appropriate statistical methods to analyze data properly.

| <u>Objective</u> | <u>Suggested Activities</u> | <u>Suggested Assessment</u> |
|--|--|-----------------------------|
| The student will be able to: 1 - define and apply mean, median, mode, and range in problem-solving situations. | Provide any newspaper statistics and have students manipulate the information. | Homework/test |
| 2 - analyze, compare, and interpret graphs. | Look at line, bar, picto-, or circle graphs and identify the data reported. | Homework/test |

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C. Develop and evaluate inferences and predictions that are based on data.

| <u>Objective</u> | <u>Suggested Activities</u> | <u>Suggested Assessment</u> |
|--|---|------------------------------------|
| The student will be able to: 1 - use data about populations to make conjectures about those populations. | Examine a graph about the heights of two groups of people and hypothesize which was a kindergarten class and which was a sixth grade class. | Homework/test |
| 2 - use conjectures to form new questions and design new studies. | Test the hypothesis formed in the activity above. | Small group activity |

D. Understand and apply basic concepts of probability.

| <u>Objective</u> | <u>Suggested Activities</u> | <u>Suggested Assessment</u> |
|--|---|------------------------------------|
| The student will be able to: 1 - predict, observe, and analyze outcomes of a single event. | Rolling a die or flipping a coin, record information and predict what will happen if the trial continues. | Small group activity |
| 2 - predict outcomes of multiple events. | Create tree diagrams to derive all the possible outcomes. | Homework/test |
| 3 - understand that the likelihood of an event can be represented by a number from 0 to 1. | Have students convert their probability to its decimal form. | Class discussion |

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6. Discrete Math

(MO #10)

A. Apply systematic listing, counting, and reasoning.

Objective

Suggested Activities

Suggested Assessment

The student will be able to:

1 - apply the concept of "fair division" to real world situations.

Give the students an unequal distribution of candy and have them determine what would make the distribution "fair".

Observation

2 - look at if-then relationships to make logical deductions.

Provide a list of "ifs" based on mutually exclusive events and in a game show format have students provide the "thens."

Observation

3 - determine the number of possible combinations in a given situation.

Provide an ice cream menu with flavor and topping choices and have students determine the total number of possible orders (one scoop of ice cream and one topping).

Homework/test

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B. Apply discrete mathematical modeling using graphs and trees.

Objective

The student will be able to:

1 - explore transportation networks.

Suggested Activities

Discuss the different systems of transportation as they are involved in the movement of goods between two locations (i.e. imports from overseas).

Suggested Assessment

Whole class activity

C. Use iterative (repetitive) patterns and processes.

Objective

The student will be able to:

1 - determine and continue a pattern using inductive reasoning.

Suggested Activities

Provide the students with a list of numbers based on a pattern, allow them to discover and continue the pattern.

Suggested Assessment

Homework/test

D. Organize and process information.

Objective

The student will be able to:

1 - investigate tree, Venn, or student-developed diagrams as an organizing tool for problem solving.

Suggested Activities

Organize class data into various charts (i.e., a Venn Diagram of boys' sports, girls' sports, and both).

Suggested Assessment

Homework/test

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E. Find the best solution to the problems using algorithms.

Objective

The student will be able to:

1 - create algorithms based on constructing meaning from explorations.

Suggested Activities

Provide students with contexts where the counting principle can be applied and have them list all combinations to determine a total until they determine that multiplication can be used as a "shortcut."

Suggested Assessment

Homework/test

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7. Problem Solving and Reasoning

(NCTM 2000 #6 & 7a; MO #1 & 3; IL #1)

A. Apply and adapt appropriate strategies to solve problems.

Objective

Suggested Activities

Suggested Assessment

The student will be able to:

1 - solve multiple step problems.

Have students determine the amount of change a person will receive at the grocery store given the cost of items, a shopping list, the tax rate, and the amount of money tendered.

Homework/test

2 - recognize situations in problem solving when there is "too little" or "too much" information.

Provide a chart of information and a list of questions that may or may not be answered with the chart. Ask students what information in a word problem is necessary.

Small group activity

3 - guess and check to solve a problem.

Complete "magic squares."

Homework/test

4 - draw a picture to solve a problem.

Diagram a story problem.

Homework/test

5 - use patterns and functions to represent and solve problems.

Have students calculate the area of a walkway around a swimming pool given the width of the walkway and the dimensions of the pool.

Small group activity

6 - use proportional and spatial reasoning to solve problems.

Use tangrams.

Observation

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B. Use reasoning to build new mathematical knowledge through problem solving.

| <u>Objective</u> | <u>Suggested Activities</u> | <u>Suggested Assessment</u> |
|---|--|------------------------------------|
| The student will be able to: 1 - develop and evaluate mathematical arguments. | Have students cut apart rectangles to prove the area model of multiplication. | Observation |
| 2 - make and investigate mathematical conjectures. | Using string, measure the diameter of a circle and add together strings of that length to equal the circumference. Completing this activity several times students should note that this relationship is a constant. | Small group activity |

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8. Communication

(NCTM 2000 #7b, 8, & 10; MO #2 ; IL #2, 3, & 4)

A. Work both cooperatively and individually.

Objective

Suggested Activities

Suggested Assessment

The student will be able to:

1 - work cooperatively.

Complete a math scavenger hunt using angle measurement, plotting their path on a coordinate plane.

Whole class/small group activity

2 - work individually.

How many triangles?

Homework/test

B. Represent mathematical data and concepts using a variety of media, including technology.

Objective

Suggested Activities

Suggested Assessment

The student will be able to:

1 - hand draw charts and graphs.

Graph the results of a survey by hand.

Homework/test

2 - use a computer to create charts and graphs.

Chart information in a spreadsheet format and use that chart to have the computer produce the desired graph.

In-class activity

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C. Analyze, evaluate, and communicate mathematical thinking using the language of mathematics coherently and clearly.

| <u>Objective</u> | <u>Suggested Activities</u> | <u>Suggested Assessment</u> |
|--|---|------------------------------------|
| The student will be able to: 1 - interpret and write orally-dictated numbers or equations. | Dictate equations to the students for them to write. | Observation |
| 2 - write equations in sentence form. | Using no numerals, students should be able to describe a mathematical operation ("The dividend divided by the divisor equals the quotient."). | Observation |
| 3 - explain the problem-solving strategy to teacher and classmates either orally or in writing. | Have students journal, describing their problem-solving strategies. | Homework |
| 4 - explain to teachers and classmates why the answer makes sense either orally or in writing. | Have students teach a review of a given topic to the class. | Observation |

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9. Connections

(NCTM 2000 #9; MO #4 ; IL #5)

A. Use technology to access and process information.

Objective

Suggested Activities

Suggested Assessment

The student will be able to:

1 - use a calculator to solve and check a problem involving the four basic operations.

Explain how to use a calculator and provide students the opportunity to do so.

Class activity

2 - use the internet to locate statistical data for a research project.

Have students find the gross domestic product for various countries for a given year.

Class activity

3 - be able to enter formulas in a spreadsheet.

Have students create a mock bank balance sheet in a spreadsheet program.

Homework/test

4 - use a computer to make a graph.

Create a computer-generated graph of "Sixth Grade Eye Colors".

Small group activity

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B. Understand how mathematical ideas connect internally, among other disciplines, and in daily life to build on one another and produce a coherent whole .

| <u>Objective</u> | <u>Suggested Activities</u> | <u>Suggested Assessment</u> |
|---|---|--------------------------------------|
| The student will be able to: 1 - apply and use math in everyday contexts. | Calculate the better buy among two products at the grocery store by determining the unit cost. | Homework/test |
| 2 - define relationships between mathematical concepts. | Combine algebra and geometry to write and solve an equation to determine the missing angle measure in a triangle. | Homework/test |
| 3 - apply math in other subject areas. | Patterns in art, timelines, compiling statistics, scientific formulas, flowcharts, ordinals in writing, locating Bible passages or pages in a book, and measuring distance or time in athletics are all applications of math. | Observation/homework/test/group work |
| 4 - recognize the mathematical order in God's creation. | 4a. Have students analyze significant numbers found in the Bible. 4b. Have students observe Fibonacci Sequence on a nature walk. | Observation |