

**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>
<b>The student will be able to:</b> 1 - represent quantities with rational numbers and real numbers.	Use a number line and coordinate plane to show real number locations.	Homework, Quiz, Test
2 - judge the effects of multiplying, dividing, computing powers, and computing roots on the magnitude of quantities.	$(4-1)^2 + 3(8/2)$	Student explanation, Homework, Quiz, Test
3 - use counting techniques, including permutations and combinations.	Three consecutive numbers total thirty-two. Find the three numbers.	Group work

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

<u>Objective</u>	<u>Suggested Activities</u>	<u>Suggested Assessment</u>
<b>The student will be able to:</b> 1 - justify relationships within number systems and compare properties of number systems.	Identity properties. Associative, commutative, distributive properties, etc. Determine which number systems are closed for the different mathematical operations.	Student explanation, Quiz, Test

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2 - convert decimal numbers to scientific notation.	Write various decimal form numbers into scientific notation.	Student explanation, Quiz, Test
3 - understand the properties and operations of matrices, vectors, and complex numbers.	The coordinates of three vertices of a rectangle are (-2,-1), (2,-5), and (9,2). What are the coordinates of the fourth vertex?	Homework, Quiz, Test

**C. Demonstrate fluency in computation and make appropriate estimates.**

**Objective**

**Suggested Activities**

**Suggested Assessment**

**The student will be able to:**

1 - use correct mental computation to simplify algebraic expressions quickly.	Timed worksheet covering simplification of algebraic expressions	Desk work, Quiz
2 - make appropriate estimations of expressions.	19 items @ \$.99 is about \$20	Oral discussion, Homework
3 - judge reasonableness of numerical computations.	Use appropriate calculation method to check above estimation.	Desk work
4 - apply operations to real (including rational) numbers in standard and scientific notation.	Simplify expressions that include real and rational numbers, and numbers in scientific notation.	Homework, Quiz, 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.**

**Objective**

**Suggested Activities**

**Suggested Assessment**

**The student will be able to:**

1 - write common functions.

From a set of coordinates, develop a function.

Graphing

2 - identify monomials, polynomials, and their parts.

From a set of expressions, identify each polynomial by type, degree, and co-efficient.

Homework

3 - identify relationship between domain and range.

Given a function of X, find the domain and range.

Homework, Quiz, Test

4 - distinguish a relation from a function statement.

Apply the vertical line test.

Graphing

5 - develop a proper inequality from given information.

Write an inequality to describe the solution to a word problem.

Homework

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**B. Describe numerical relationships using mathematical models.**

<u>Objective</u>	<u>Suggested Activities</u>	<u>Suggested Assessment</u>
<b>The student will be able to:</b> 1 - describe properties of different types of functions, including linear, quadratic, exponential, polynomial, rational, and radical.	Detect slope and intercept from linear information.	Group work, Homework, Quiz, Test
2 - use symbolic algebra to represent and explain mathematical relationships.	Write an equation correlated to each of the six different functions. Build a table of x and y values, and graph.	Homework, Test

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

<u>Objective</u>	<u>Suggested Activities</u>	<u>Suggested Assessment</u>
<b>The student will be able to:</b> 1 - analyze functions of one variable, including rates of change, intercepts, zeros, and asymptotes.	$y=mx+b$ , $y= x-a +b$ , $y=ax^2+bx+c$ , $y=ab^x$ , $y=a/(x-b)+c$ , $y=\sqrt{(x-b) + c}$	Group work, Homework, Quiz, Test
2 - interpret functions of two variables	Use elimination or substitution method of system of equations to solve for the variables.	Homework, Quiz, Test
3- write equivalent forms of and solve equations, inequalities, and systems.	Use algebraic properties to simplify complex expressions within the equation to solve the equation.	Homework, Quiz, Test

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**D. Analyze change in various contexts.**

**Objective**

**The student will be able to:**

1 - write an appropriate function statement illustrating the given change situation.

**Suggested Activities**

Write an equation correlated to each of the six different functions. Build a table of x and y values, and graph

**Suggested Assessment**

Group work, Homework

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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.**

**Objective**

**Suggested Activities**

**Suggested Assessment**

**The student will be able to:**

1 - analyze properties of plane and space figures.

Draw figures to determine the number of edges, faces, and vertices.

Homework

2 - use congruence and similarity to form and solve equations.

Through cross products, solve proportions established by similar figures.

Homework, Quiz, Test

3 - analyze shapes and solve problems.

Graph a given set of coordinate pairs and find the perimeter and area of the figure.

Graphing, Homework, Quiz, Test

4 - develop and use sine, cosine, and tangent in right triangle situations.

Lean a ladder against a wall. Measure the distance from the wall to the base of the ladder. Determine the measure of the angle from the floor to the ladder, and use the tangent function to find out how far up the wall the ladder reaches.

Homework, Quiz

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

<b><u>Objective</u></b>	<b><u>Suggested Activities</u></b>	<b><u>Suggested Assessment</u></b>
<b>The student will be able to:</b> 1 - construct number lines and the Cartesian coordinate system.	Correctly draw and label a Cartesian coordinate system.	Homework
2 - use coordinates to analyze shapes and solve problems.	Graph a given set of coordinate pairs and find the perimeter and area of the figure.	Homework

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

<b><u>Objective</u></b>	<b><u>Suggested Activities</u></b>	<b><u>Suggested Assessment</u></b>
<b>The student will be able to:</b> 1 - represent transformations in the plane using sketches, coordinates, vectors, functions, and matrices.	Given a set of similar figures at different locations on a coordinate plane, determine the change of X and Y for corresponding points.	Group work, Homework

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

<b><u>Objective</u></b>	<b><u>Suggested Activities</u></b>	<b><u>Suggested Assessment</u></b>
<b>The student will be able to:</b> 1 - visualize, draw, and construct plane and space figures from different perspectives.	Sketch the top, side, and front views of a complex geometric solid.	Group work, Homework
2 - use geometric models to solve problems in other areas of mathematics.	Determine the scale of a blueprint from actual measurement.	Homework, Group projects

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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.**

**Objective**

**Suggested Activities**

**Suggested Assessment**

**The student will be able to:**

1 - make decisions about appropriate units and scales in problems involving measurement.

Plan a trip from your location to another location in a different state. Find the distance between the two locations. Also, determine the cost of gasoline needed for the trip.

Present your findings to the class.

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

**Objective**

**Suggested Activities**

**Suggested Assessment**

**The student will be able to:**

1 - understand and use formulas for area, surface area, and volume.

Given a rectangular prism and a cylinder that has the same volume, determine the dimensions of the container that would use the least material to construct.

Group work - each member of group will construct the solids, but must be different dimensions.

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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.**

**Objective**

**Suggested Activities**

**Suggested Assessment**

**The student will be able to:**

1 - construct and interpret histograms, box-and-whisker plots, stem-and-leaf plots, and scatter plots utilized to answer questions developed by the students.

Student will develop a data set in order to create a statistical display.

Use a rubric for their displays.

**B. Use appropriate statistical methods to analyze data properly.**

**Objective**

**Suggested Activities**

**Suggested Assessment**

**The student will be able to:**

1 - compute mean, median, mode, and range.

Find the height of all of the students in the class, determine the mean, median, mode, and range from the data set collected.

Group work

Grade level: Algebra

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

**Objective**

**Suggested Activities**

**Suggested Assessment**

**The student will be able to:**

1 - construct sampling distributions and use them for informal inference about the population.

Use heights from above activity and determine an informal inference based on those heights. Contact other schools and see if data from those schools confirm the inference.

Group work

2 - identify trends in bivariate data and find functions that model the data.

Determine a distance and have the students run or walk that distance measuring the time of each student. Calculate the average velocity of each student.

Group work

Grade level: Algebra

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**D. Understand and apply basic concepts of probability.**

**Objective**

**The student will be able to:**

1 - compute probabilities of simple and compound events.

**Suggested Activities**

Each student will roll two different colored dice one hundred times, recording the sum of each dice per roll. Prior to rolling the dice, the student will give the probability as to how many times the sum will be 2, 3, 4, ... 12. The student will then create a table showing their probability to actual. (Depending upon students' experiences, you could compare theoretical and experimental probabilities for each sum, or you could compare their predictions for each sum and their experimental results.)

**Suggested Assessment**

Homework

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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 - identify the hypothesis and conclusion in a conditional statement.

Create an if-then statement and underline the hypothesis once and the conclusion twice.

Homework

2 - use a counterexample to show that an assertion is false.

Find a number that shows  $x^2 > 0$  is not true.

Desk work. Quiz

3 - count outcomes using the Fundamental Counting Principle.

Pizza Street has 8 pizzas out on the buffet, 6 flavors of soda available, and 3 dessert pizza options. How many ways can you fill your tray with one of each?

Group activity

**B. Apply discrete mathematical modeling using graphs and trees.**

**Objective**

**Suggested Activities**

**Suggested Assessment**

**The student will be able to:**

1 - count outcomes using a tree diagram.

Draw a tree diagram for the Pizza Street activity above and compare outcomes.

Desk work, Quiz

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**C. Use iterative (repetitive) patterns and processes.**

**Objective**

**The student will be able to:**

1 - determine and continue a pattern using inductive and deductive reasoning.

**Suggested Activities**

Find the fifth and fiftieth numbers in the sequence, 2, 5, 8, 11, ... and write a formula for the  $n$ th term.

**Suggested Assessment**

Homework, Quiz

**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**

Use a Venn diagram to show groups of students that are wearing various colors and how they intersect.

**Suggested Assessment**

Group work, Quiz

**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**

Predict a bounce height for a given ball from a given height based on observations of drops from other heights.

**Suggested Assessment**

Group activity

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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 problems taken from the student's real world.

Student's goal is to purchase an iPod. Their only source of income is through a lawn service of cutting grass. The student will determine how many lawns they will need to cut in order to purchase the ipod.

Table of data summarizing information

2 - use a variety of methods to construct expressions, equations, or functions to solve problems.

Determine the equation for a line through two given points.

Homework, Quiz

3 - apply appropriate reasoning to analyze mathematical statements.

Solve an equation giving properties as reasons for each step involved in your solution.

Homework, Quiz

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

**Objective**

**The student will be able to:**

1 - build understanding of new topics through use of various problem-solving strategies.

**Suggested Activities**

Various word problem types require the use of tables, charts, and drawings to gain understanding of the problem so you can write a mathematical statement for solving the problem. The student must choose one and follow through to a solution.

**Suggested Assessment**

Desk work

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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 - make positive contributions to a group activity.

Students will be paired by ability level (stronger student with weaker student). Students will work together on material that needs to be reviewed by weaker student. Weaker student can demonstrate what they know, and strong students will be able to assist and show other methods of reaching a conclusion.

Teacher observation

2 - demonstrate self motivation.

Students will be given higher-level problems from outside textbook, i.e., Math Counts or Illinois Council on Mathematics, to encourage them to challenge themselves.

Teacher observation

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

<b><u>Objective</u></b>	<b><u>Suggested Activities</u></b>	<b><u>Suggested Assessment</u></b>
<b>The student will be able to:</b> 1 - display data using a spreadsheet.	Students will create a household budget using the 10-80-10 model: 10% contributions, 80% household expenses 10% savings. The students will use Excel to show their budget on pay period, monthly, and annual amounts.	Present budgets to class.
2 - use a graphing calculator.	Students will use a graphing calculator to graph equations.	Teacher observation

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

<b><u>Objective</u></b>	<b><u>Suggested Activities</u></b>	<b><u>Suggested Assessment</u></b>
<b>The student will be able to:</b> 1 - write about mathematical concepts by summarizing, comparing, analyzing, and explaining.	Students will keep a daily journal containing mathematical concepts of material presented.	Teacher observation
2 - study and write proofs of algebraic theorems, properties, and equivalences.	Students will keep a journal on all of the algebraic theorems, properties, and axioms.	Teacher 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 the internet to access information.

Use a state website to look up information about that state.

Teacher observation

2 - use formulas in a spreadsheet to process information.

Students will do a computer-based presentation.

Teacher/classroom observation

3 - use a random number generator to simulate an experiment.

Have the students each simulate rolling a die 20 times using their calculator random number generator. Pool the results and discuss the experimental outcome with the expected outcome for a fair die.

Group project

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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.**

<b><u>Objective</u></b>	<b><u>Suggested Activities</u></b>	<b><u>Suggested Assessment</u></b>
<b>The student will be able to:</b> 1 - solve problems arising from real world contexts.	Students will research the cost per barrel of oil for a set period of time. Students will look at distribution of the crude oil to refineries and finally to gas stations. The goal of the students is to calculate the cost per gallon of gas to the consumer.	Group work
2 - describe and apply relationships between mathematical concepts.	Write the previous mathematical terms and relationships you need to understand before you can understand the definition of the tangent of an angle.	Journaling