

**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, write, round, order, compare, and use numerals through hundred billions, decimals to 1000ths, fractions, and mixed numbers.	1a. Use a number line to determine order of numbers. 1b. Use a number line to determine the nearest rounded number.	Teacher observation
2 - convert a common fraction or mixed number to a decimal and vice versa.	Give the students various fractions and change them to decimals and vice versa.	Formalized testing
3 - distinguish between prime and composite numbers.	Use the Sieve of Eratosthenes to find the prime numbers between 1 and 100. List numbers 1 - 100, and cross out 1, circle the next number (2), then cross out all multiples of that factor, circle the next uncrossed number, and continue.	Independent practice
4 - determine prime factors of numbers.	Make factor trees.	Assess class work such as number line activities.
5 - recognize fractions as being parts of the whole, parts of a collection, locations on a number line, and divisions of whole numbers.	Use manipulatives and have the students show various fractions.	Teacher observation

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6 - recognize numbers less than zero by extending the number line and through familiar applications.	Use real world applications such as temperature and sea level.	Teacher observation
7 - understand use of exponents.	Use area of squares and volume of cubes to show exponents.	Teacher observation

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

Objective

Suggested Activities

Suggested Assessment

The student will be able to:

1 - recognize prime numbers and be able to determine the prime factorization of a number.	Have students use factor trees.	Teacher observation
2 - find the greatest common factor and the least common multiple.	List all factors or multiples of a number and circle factors or multiples in common. Then locate the GCF or LCM.	Independent practice
3 - determine equivalent fractions for a given fraction and simplify fractions.	Use fraction bars to help determine equivalent fractions.	Teacher observation
4 - recognize and use commutative, associative, and identity properties of addition.	Work in groups to write several numerical examples of each property and have the students determine which property they are using to solve problems.	Test over properties

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5 - recognize and use commutative, associative, distributive, zero, and identity properties of multiplication.

Com: 10 groups of 6 is the same as 6 groups of 10. As: Think of 23×50 as $[(23 \times 100) / 2]$ $2300/2 = 1150$, OR $23 \times 50 = [(23 \times 5) \times 10] = 115 \times 10 = 1150$. Dis: For $5 \times 14 = \underline{\quad}$, say 5×10 is 50 and 5×4 is 20, $50 + 20 = 70$. Think of 35×98 as $35 \times (100 - 2) = (35 \times 100) - (35 \times 2) = 3500 - 70 = 3430$.

Chalk board work

6 - write a number in expanded form.

In pairs, students will write large numbers in standard form and have partners write those numbers in expanded form.

Teacher observation

7 - determine factors of numbers.

Make a table and list factors of various numbers in pairs.

Independent practice

C. Demonstrate fluency in computation and make appropriate estimates.

Objective

Suggested Activities

Suggested Assessment

The student will be able to:

1 - add and subtract numbers to 6-digits with regrouping up to 6 places.

Paper practice for review

Tests

2 - add and subtract decimals with regrouping.

Find the total cost of a group of objects.

Independent practice

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3 - multiply up to a 4-digit number by a 1, 2, or 3-digit number.

Use graph paper to line up numbers. Use base ten blocks, an area model of multiplication, and FOIL to demonstrate four partial products of a 2-digit by 2-digit multiplication problem. For example, $62 \times 46 = \underline{\quad}$. Mentally compute partial products using base ten language. First: $60 \times 40 = 2400$, Outer: $60 \times 6 = 360$, Inner: $2 \times 40 = 80$, and Last: $2 \times 6 = 12$. Add partial products $2400 + 360 + 80 + 12 = 2852$.

Math minutes (warm-up problems for review)

4 - divide a 4, 5, or 6-digit number by a 2 or 3-digit number.

Use graph paper to line up numbers.

Discuss the new concepts learned.

5 - estimate sums, differences, products, and quotients.

Use various methods of estimation including front-end estimation, compatible numbers, and rounding to estimate the same problem. Discuss results and why a particular strategy might work better for a given situation.

Explain the divisibility rules in writing.

6 - multiply fractions by whole numbers, mixed numbers, and other fractions.

Use graph paper to visualize dividing by fractions.

Homework/test

7- multiply and divide decimals by whole numbers.

Use calculators to check work.

Homework/test

8 - multiply decimals by decimals.

Visit the website <http://www.coolmath.com/decimals/08-decimals-multiplying.html> for a tutorial on multiplying decimals. Have students complete a worksheet on their own.

Homework/test

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9 - determine the divisibility rules of 2, 3, 5, 9, and 10.	Have a number chart and cross out, circle, triangle, etc. your multiples of 2, 3, 5, 9, and 10. Discuss the patterns.	Teacher observation
10 - use benchmarks to estimate sums and differences in fractions and decimals.	Compare sums and differences by rounding to the most appropriate number such as $\frac{1}{4}$, $\frac{1}{2}$, $\frac{3}{4}$.	Homework/test
11 - round decimals to the nearest 10th, 100th, 1000th, and whole number.	Use a number line to round numbers.	Homework/test
12 - identify and use inverse operations of addition, subtraction, multiplication, and division.	On a writing surface, model the relationship between inverse operations, i.e., $3 + 4 = 7$, $7 - 4 = 3$.	Teacher observation
13 - estimate results and determine reasonableness of answers.	Provide real-life activities such as going to the movies or shopping and have students give appropriate estimates.	Have students prove that their estimates are reasonable.

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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 - recognize patterns and continue the pattern.

Have 1 student begin a pattern and have a second student finish the pattern.

Check students' equations and sequences for accuracy.

2 - describe, extend, analyze, and create a wide variety of patterns.

Identify various patterns such as the Fibonacci sequence, triangular numbers, etc.

Evaluate group pattern work.

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

Give students a series of numbers and have them determine the pattern and write an equation.

Have students bring in objects or pictures emulating the Fibonacci sequence.

4 - recognize the patterns in everyday life.

Demonstrate the Fibonacci sequence through everyday items such as pineapples, mating habits of bees, flower petals, tree branches, etc.

Teacher observation

5 - convert fractions to decimals.

Have students order a mixed group of fractions and decimals.

Teacher observation

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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 - recognize and use commutative, associative, distributive, zero, and identity properties of multiplication.	Com: 10 groups of 6 is the same as 6 groups of 10. As: Think of 23×50 as $[(23 \times 100) / 2]$ $2300/2 = 1150$, OR $23 \times 50 = [(23 \times 5) \times 10] = 115 \times 10 = 1150$. Dis: For $5 \times 14 = \underline{\quad}$, say 5×10 is 50 and 5×4 is 20, $50 + 20 = 70$. Think of 35×98 as $35 \times (100 - 2) = (35 \times 100) - (35 \times 2) = 3500 - 70 = 3430$.	Chalk board work
2 - describe and apply order of operations.	Investigate the outcomes of equations with and without the order of operations.	Teacher observation

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 - model problem situations with objects.	Use straws to help illustrate equations or word problems. For example, in an equation $x+3=7$ have a blank spot + 3 straws = 7 straws to figure out what is missing.	Teacher observation
2 - represent the idea of a variable as an unknown quantity using a letter or a symbol.	See Activity C1 above and replace blank spot with variable.	Independent practice

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3 - express mathematical relationships using equations.	Use real-life activities to develop equations in which the unknown could change, ie., if a different number of people attend.	Have students solve their equations with 1 unknown.
4 - solve equations with one variable (all operations).	Have students solve problems on the board.	Teacher observation
5 - compare and contrast equations and inequalities.	Compare and contrast equations and inequalities by using a number line.	Test
6 - use representations such as graphs, tables, and equations to draw conclusions.	Use a newspaper, magazine, or text book from other discipline to answer questions about information on a graph, table etc.	Write a paragraph describing conclusions.

D. Analyze change in various contexts.

Objective

The student will be able to:

1 - investigate how change in one variable relates to a change in a second variable.

2 - identify and describe situations with constant or varying rates of change and compare them.

Suggested Activities

Examine various basic equations such as a formula ($\text{Rate} = \text{distance}/\text{time}$) or conversions between metric and customary units.

Walk at varying rates and record distance as time elapses. Calculate speed (rate). Graph 'D vs. T' and 'R vs. T' and compare.

Suggested Assessment

Evaluate word problems.

Write 2 word problems: one that shows a constant rate of change and one that shows a varying rate of change.

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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 - identify planes, points, rays, and line segments.

Have students draw examples of each and trade with a partner who will identify them.

Write the attributes of 2- and 3-dimensional objects.

2 - identify lines of symmetry, parallel, and perpendicular lines.

List real-life examples that show symmetry or that have parallel or perpendicular lines.

Test on classifying shapes

3 - identify, compare, and analyze attributes of 2- and 3-dimensional shapes and develop vocabulary to describe the attributes.

3a. Create crossword puzzle with appropriate clues to determine the various vocabulary.
3b. Provide 2- and 3-dimensional objects and have the students group them together.

Draw examples of congruent and similar figures.

4 - identify congruent and similar figures.

4a. Provide students with various shapes and have them sort them based on whether they are congruent or similar.
4b. Use geoboards to demonstrate congruent and similar shapes.

Worksheets

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5 - classify 2- and 3-dimensional shapes according to their properties and develop definitions of classes of shapes such as triangles and pyramids.	In above example, name the various shapes that have similar characteristics.	Teacher observation
6 - build and draw geometric objects and label appropriate parts such as diameter, circumference, radius, and center.	Provide a list of shapes for the students and have them draw and label appropriate parts.	Check for accuracy of drawings and labels.
7 - measure and draw angles and identify acute, obtuse, right, and straight angles.	Use a protractor to draw 4 angles: 1 acute, 1 obtuse, 1 right, and 1 straight, as specified by the teacher. Then have the students label each angle.	Check for accuracy of drawings and labels.

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 - describe location and movement using common language and geometric vocabulary.	Use graph paper to illustrate various changes in location.	Students will reproduce a picture given only a series of points.
2 - make and use coordinate systems to specify locations and to describe paths.	Make and label a coordinate system on graph paper and describe changes in location.	Teacher evaluation
3 - find the distance between points along horizontal and vertical lines of a coordinate system.	Plot points on a graph and determine distance between various points.	Teacher evaluation

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

Objective

Suggested Activities

Suggested Assessment

The student will be able to:

1 - determine whether an object reflects, rotates, or translates into a different position.

Using templates, draw a triangle in various positions on your paper and describe how to move from one to another.

Students will demonstrate an example of each of the transformations.

2 - use lines of symmetry to determine if an object is symmetrical.

Have students determine the lines of symmetry in the letters of the alphabet.

Given a series of transformations, students will identify each transformation verbally in writing.

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

Objective

Suggested Activities

Suggested Assessment

The student will be able to:

1 - identify and build a 2-dimensional representation of a 3-dimensional object and vice versa.

Give students flattened shapes and have them put them back together. Then have students draw a 2-dimensional shape that can be turned into a 3-dimensional shape.

Define vocabulary

2 - use proportional and spatial reasoning to solve problems.

Have students use a computer program such as Tetris to manipulate various shapes.

Teacher observation

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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 - identify the appropriate standard customary units of length, area, capacity, and mass (weight).

Provide a variety of objects such as a piece of string, a cup of water, a bowling ball, etc. and have the students determine which unit of measurement is appropriate.

Provide a list of objects and have the students write the appropriate tools and units for each.

2 - identify the appropriate standard metric units of length, area, capacity, and mass (weight).

See above.

Worksheet

3 - understand temperature in F and C.

Make a model thermometer and compare Fahrenheit and Celsius at low, medium, and high temperatures.

Test

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

4a. Measure the lengths of various lines using different units of measure for each line.
4b. Discuss how rounding affects the answer.

Group discussion

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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 - change units within metric system.	Write a chart that shows the relationship of the metric system. Use it to convert measurements.	Provide students with a known measurement and have the students convert to a given unit.
2 - change units within the customary system.	Have students develop a conversion game.	Plan a trip using the shortest route.
3 - correctly use compasses and protractors.	Draw and measure angles with a partner.	Test
4 - interpret and use scale drawings.	Make a scale and use it to make a drawing of a room.	Check drawing of room for accuracy.
5 - use formulas to determine perimeter and area of squares and rectangles, circumference, and volume of cubes and prisms.	The teacher models the formulas for perimeter and area on the board. The students use geoboards to verify the formulas using a variety of shapes.	Teacher observation
6 - develop strategies for estimating the perimeters, areas, and volumes of irregular shapes.	Use geoboards to estimate areas of irregular shapes.	Teacher observation
7 - use benchmarks for estimating measurements.	Use tiles to measure the length of the floor.	Teacher observation

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8 - use graduated containers to measure customary or metric units of volume.

Provide colored water and measuring devices to measure to the nearest oz./mL.

Teacher observation

9 - use a balance to find mass.

Provide 10 items to calculate mass.

Teacher observation

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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 - design investigations to address a question and consider how data-collection methods affect the nature of the data set.

Design and conduct a survey.

Check surveys and graphs.

2 - construct, read, and interpret displays of data.

Compare two graphs of the same data to determine if one is misleading and why. Have students develop questions based on their graphs and have other students answer those questions.

Teacher observation

3 - collect and represent data using tables and graphs such as line plots, bar graphs, and line graphs.

Construct graphs for collected data.

Evaluate graphs.

4 - compare different representations of the same data and evaluate how well each representation shows important aspects of the data.

Experiment with displaying given information in different graphs and decide which is best and why.

Group work

5 - recognize the differences in representing categorical and numerical data.

Have students decide which graphs would best fit with the appropriate data.

Observe students successfully using graphs and charts.

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6 - compare graphs and know which one to use.

Determine which type of graph best matches the data from the survey.

Match appropriate graph with data set.

B. Use appropriate statistical methods to analyze data properly.

Objective

Suggested Activities

Suggested Assessment

The student will be able to:

1 - use and determine measures of central tendency.

Given a set of data, the students will evaluate the mean, median, and mode. Using different sets of data compare how the measures of central tendency change and discuss the results.

Test on measures of central tendency

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

Objective

Suggested Activities

Suggested Assessment

The student will be able to:

1 - propose and justify conclusions and predictions that are based on data and design studies to further investigate the conclusions or predictions.

Have the students develop a science experiment.

Check science experiment on justification of conclusions.

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D. Understand and apply basic concepts of probability.

Objective

Suggested Activities

Suggested Assessment

The student will be able to:

1 - predict the outcome of experiments of chance.

Dice game: (2 dice) predict which number will be rolled most frequently.

Observe activities.

2 - test to find the outcome of experiments of chance.

Flip coins: predict probability of heads or tails. Have students record their data.

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.

Check conversions.

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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.

Divide a box of cookies among the number of students fairly.

Teacher observation

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

Have students develop their own if-then statements.

Check if-then statements.

3 - determine the possible groupings of several items.

Take the entrees, the sides, and the desserts from the weekly school lunch menu and determine how many combinations there are.

Group work

4 - compare subsets to determine similarities and differences.

Find all of the subsets from a set of x different kinds of coins. List them. Look for similarities and differences.

Check lists of subsets.

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B. Apply discrete mathematical modeling using graphs and trees.

Objective

Suggested Activities

Suggested Assessment

The student will be able to:

1 - explore transportation networks.

Use a section of a city map to determine the different paths and distances of those paths.

Evaluate the students paths.

2 - determine the shortest distance traveling on a network of roads or streets and determine all possible paths.

For the task listed above, determine which path is the shortest.

Determine that the chosen path is the shortest.

C. Use iterative (repetitive) patterns and processes.

Objective

Suggested Activities

Suggested Assessment

The student will be able to:

1 - determine and continue a pattern using inductive reasoning.

Have one student begin a pattern and have a second student finish the pattern.

Teacher observation

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D. Organize and process information.

Objective

The student will be able to:

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

Suggested Activities

Draw a Venn Diagram of numbers with common factors.

Suggested Assessment

Evaluate diagram.

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

Use fraction bars to discover that equivalent fractions can be made by multiplying numerator and denominator by the same number. (Be sure to point out that a numerator divided by the same denominator is another name for "one").

Suggested Assessment

Teacher observation

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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 - identify the problem.

Read or listen to word problems and identify the known and the unknown information.

Students explain how they solved the problem.

2 - identify missing information and explain process to find missing information.

Give students problems with missing information and have them identify it.

Tests

3 - recognize unnecessary information.

Give students problems with unnecessary information and have them identify it.

Check process of solving problems.

4 - choose the correct basic operations and strategy to solve multi-stepped problems.

Have students develop their own word problems that involve multiple steps. Have peers solve problems.

Teacher observation

5 - write a mathematical equation.

Write an equation to solve a given word problem.

Teacher observation

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6 - use various strategies to solve problems.	Practice using multiple strategies such as draw a picture, draw a diagram, make a chart, or act it out.	Homework
7 - identify and discuss alternative methods of solving a given problem.	Solve a given problem in multiple ways.	Homework

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 - formulate problems from everyday and mathematical situations.	Read <i>The Math Curse</i> by John Scieszka and create and solve problems based on everyday life.	Have students write problems on everyday life as suggested by the book.
2 - recognize the practicality of estimation.	Plan a party and estimate the cost of food and party favors.	Teacher observation
3 - locate errors in incorrectly worked problems.	Have students find errors in various incorrectly worked problems/computations given by the teacher.	Peer assessment

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8. Communication

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

A. Work both cooperatively and individually.

<u>Objective</u>	<u>Suggested Activities</u>	<u>Suggested Assessment</u>
The student will be able to: 1 - complete activities individually.	Work on an assignment from their math book.	Have students show the teacher the first five problems of seat work.
2 - effectively work with peers.	Develop a game to help them review.	2a. Check completed assignments. 2b. Teacher observation

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

<u>Objective</u>	<u>Suggested Activities</u>	<u>Suggested Assessment</u>
The student will be able to: 1 - represent their data using equations.	Provide various situations and have the students write equations to express that situation.	Check accuracy of students' equations.
2 - effectively use and communicate with a calculator, computer, paper and pencil, or board.	After completing an assignment, check answers with a calculator.	Teacher observation
3 - read, interpret, and explain information given in charts, graphs, and tables.	Display results on a chart summarizing data and explain what it represents.	Oral presentation

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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 - correctly use mathematical terms in all areas of mathematics.	Have a "Word Wall".	Vocabulary tests
2 - correctly use word names for numbers through 999,999,999,999.	Use a place value chart to develop names of numbers.	Test for numbers
3 - make and test conjectures about geometric properties and relationships and develop logical arguments to justify conclusions.	Make a chart that describes the relationships of quadrilaterals and explain those relationships.	Students will defend their relationships among quadrilaterals during an interview with the teacher.
4 - communicate mathematical thinking clearly to others.	Working in groups, the students will work problems together explaining to each other how the problem is solved.	Teacher observation
5 - explain why an operation would give a correct answer.	Have students keep journals.	Check journals.

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

9. Connections

A. Use technology to access and process information.

Objective

Suggested Activities

Suggested Assessment

The student will be able to:

1 - effectively use the internet to find information.

1a. Use the internet to research prominent mathematicians.
1b. Complete on-line research to find the volumes of lakes and compare them.

Written report

2 - use various programs to display and communicate data and solutions.

Use Excel to develop a graph based on M&M candy analysis.

Generate graphs.

3 - 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.

Homework, Test

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

Objective

Suggested Activities

Suggested Assessment

The student will be able to:

1 - identify and apply math concepts and problems in other subject areas.

Convert Celsius to Fahrenheit and vice versa as part of a science project.

Homework, Test

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2 - recognize mathematical patterns in everyday life.

Observe patterns in and around the school.
Make a list of patterns that were found.

Evaluate lists.

3 - use geometric models to solve problems in other areas of mathematics and everyday life.

Plan seating for a banquet given the size and shape of the room, the size and shape of the tables, and the number of guests.

Check diagrams.

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.

Teacher observation