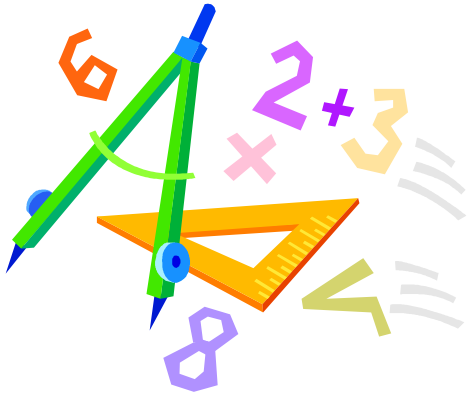
MATHEMATICS
ALIGNED STANDARDS OF LEARNING
CURRICULUM FRAMEWORK
GRADE 4



4M-NSCE1 The student will

a) compare numbers to each other based on place value groups by composing and decomposing to 50;

b) compare whole numbers (<,>,=);

c) round one-and two-digit whole numbers from 0-50 to the nearest 10.

UNDERSTANDING THE STANDARD (Background Information for Instructor Use Only)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE AND SKILLS
• The structure of the Base-10 number system is based upon a simple pattern of tens, in which the value of each place is ten times the value of the place to its right. • Place value refers to the value of each digit and depends upon the position of the digit in the number. For example, in the number 7,864,352, the eight is in the hundred thousands place, and the value of the 8 is eight hundred thousand or 800,000. • Whole numbers may be written in a variety of formats: – Standard: 1,234,567 – Written: one million, two hundred thirty-four thousand, five hundred sixty-seven – Expanded: $(1 \times 1{,}000{,}000) + (2 \times 100{,}000) + (3 \times 10{,}000) + (4 \times 1{,}000) + (5 \times 100) + (6 \times 10) + (7 \times 1)$ • Numbers are arranged into groups of three places called *periods* (ones, thousands, millions, …). Places within the periods repeat (hundreds, tens, ones). Commas are used to separate the periods. Knowing the place value and period of a number helps students find values of digits in any number as well as read and write numbers.	**All students should** • Understand the relationships in the place value system in which the value of each place is ten times the value of the place to its right. • Use the patterns in the place value system to read and write numbers. • Understand that reading place value correctly is essential when comparing numbers. • Understand that rounding gives a close number to use when exact numbers are not needed for the situation at hand. • Develop strategies for rounding.	**The student will use problem solving, mathematical communication, mathematical reasoning, connections, and representations to** • Identify and communicate, both orally and in written form, the placed value for each digit in whole numbers expressed through the one millions place. • Read whole numbers through the one millions place that are presented in standard format, and select the matching number in written format. • Write whole numbers through the one millions place in standard format when the numbers are presented orally or in written format. • Identify and use the symbols for *greater than*, *less than*, and *equal to*. • Compare two whole numbers expressed through the one millions, using symbols >, <, or =. • Round whole numbers expressed through the one millions place to the nearest thousand, ten thousand, and hundred-thousand place.

4M-NSCE1 The student will

a) compare numbers to each other based on place value groups by composing and decomposing to 50;

b) compare whole numbers (<,>,=);

c) round one-and two-digit whole numbers from 0-50 to the nearest 10.

UNDERSTANDING THE STANDARD (Background Information for Instructor Use Only)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE AND SKILLS
• Reading and writing large numbers should be meaningful for students. Experiences can be provided that relate practical situations (e.g., numbers found in the students' environment including population, number of school lunches sold statewide in a day, etc.). Concrete materials such as Base-10 blocks and bundles of sticks may be used to represent whole numbers through thousands. Larger numbers may be represented by digit cards and place value charts. • Mathematical symbols (>, <) used to compare two unequal numbers are called *inequality symbols*. • A procedure for comparing two numbers by examining place value may include the following: – Compare the digits in the numbers to determine which number is greater (or which is less). – Use a number line to identify the appropriate placement of the numbers based on the place value of the digits. – Use the appropriate symbol > or < or words *greater than* or *less than* to compare the numbers in the order in which they are presented. – If both numbers have the same value, use the symbol = or words *equal to*.		

4M-NSCE1 The student will

a) compare numbers to each other based on place value groups by composing and decomposing to 50;

b) compare whole numbers (<,>,=);

c) round one-and two-digit whole numbers from 0-50 to the nearest 10.

UNDERSTANDING THE STANDARD (Background Information for Instructor Use Only)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE AND SKILLS
• A strategy for rounding numbers to the nearest thousand, ten thousand, and hundred thousand is as follows: – Use a number line to determine the rounded number (e.g., when rounding 4,367,925 to the nearest thousand, identify the 'thousands' the number would fall between on the number line, then determine the thousand that the number is closest to): 4,367**,000** ? 4,368**,000** ◄——————————► – Look one place to the right of the digit to which you wish to round. – If the digit is less than 5, leave the digit in the rounding place as it is, and change the digits to the right of the rounding place to zero. – If the digit is 5 or greater, add 1 to the digit in the rounding place and change the digits to the right of the rounding place to zero.		

4M-NSCE2 The student will

a) represent equivalent fractions (e.g., 2/4=1/2).

UNDERSTANDING THE STANDARD (Background Information for Instructor Use Only)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE AND SKILLS
• A fraction is a way of representing part of a whole (as in a region/area model or a measurement model) or part of a group (as in a set model). A fraction is used to name a part of one thing or a part of a collection of things. • In the area/region and length/measurement fraction models, the parts must be equal. In the set model, the elements of the set do not have to be equal (i.e., "What fraction of the class is wearing the color red?"). • The denominator tells how many equal parts are in the whole or set. The numerator tells how many of those parts are being counted or described. • When fractions have the same denominator, they are said to have "common denominators" or "like denominators." Comparing fractions with like denominators involves comparing only the numerators. • Strategies for comparing fractions having unlike denominators may include – comparing fractions to familiar benchmarks (e.g., 0, $\frac{1}{2}$, 1); – finding equivalent fractions, using manipulative models such as fraction strips, number lines, fraction circles, rods, pattern blocks, cubes, Base-10 blocks, tangrams, graph paper, or a multiplication chart and patterns; and –	**All students should** • Develop an understanding of fractions as parts of unit wholes, as parts of a collection, and as locations on a number line. • Understand that a mixed number is a fraction that has two parts: a whole number and a proper fraction. The mixed number is the sum of these two parts. • Use models, benchmarks, and equivalent forms to judge the size of fractions. • Recognize that a whole divided into nine equal parts has smaller parts than if the whole had been divided into five equal parts. • Recognize and generate equivalent forms of commonly used fractions and decimals. • Understand the division statement that represents a fraction.	**The student will use problem solving, mathematical communication, mathematical reasoning, connections, and representations to** • Compare and order fractions having denominators of 12 or less, using manipulative models and drawings, such as region/area models. • Compare and order fractions with like denominators by comparing number of parts (numerators) (e.g., $\frac{1}{5} < \frac{3}{5}$). • Compare and order fractions with like numerators and unlike denominators by comparing the size of the parts (e.g., $\frac{3}{9} < \frac{3}{5}$). • Compare and order fractions having unlike denominators of 12 or less by comparing the fractions to benchmarks (e.g., 0, $\frac{1}{2}$ or 1) to determine their relationships to the benchmarks or by finding a common denominator. • Compare and order mixed numbers having denominators of 12 or less. • Use the symbols >, <, and = to compare the numerical value of fractions and mixed numbers having denominators of 12 or less. • Represent equivalent fractions through twelfths, using region/area models, set models, and measurement models. • Identify the division statement that represents a fraction (e.g., $\frac{3}{5}$ means the same as 3 divided by 5).

4M-NSCE2 The student will

a) represent equivalent fractions (e.g., 2/4=1/2).

UNDERSTANDING THE STANDARD (Background Information for Instructor Use Only)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE AND SKILLS
– finding a common denominator by finding the least common multiple (LCM) of both denominators and then rewriting each fraction as an equivalent fraction, using the LCM as the denominator. • A variety of fraction models should be used to expand students' understanding of fractions and mixed numbers: – Region/area models: a surface or area is subdivided into smaller equal parts, and each part is compared with the whole (e.g., fraction circles, pattern blocks, geoboards, grid paper, color tiles). – Set models: the whole is understood to be a set of objects, and subsets of the whole make up fractional parts (e.g., counters, chips). – Measurement models: similar to area models but lengths instead of areas are compared (e.g., fraction strips, rods, cubes, number lines, rulers). • A mixed number has two parts: a whole number and a fraction. • Equivalent fractions name the same amount. Students should use a variety of models to identify different names for equivalent fractions. • Students should focus on finding equivalent fractions of familiar fractions such as halves, thirds, fourths, sixths, eighths, tenths, and twelfths.	• Understand that the more parts the whole is divided into, the smaller the parts (e.g., $\frac{1}{5} < \frac{1}{3}$).	

4M-NSCE2 The student will

a) represent equivalent fractions (e.g., 2/4=1/2).

UNDERSTANDING THE STANDARD (Background Information for Instructor Use Only)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE AND SKILLS
• Decimals and fractions represent the same relationships; however, they are presented in two different formats. The decimal 0.25 is written as $\frac{1}{4}$. When presented with the fraction $\frac{3}{5}$, the division expression representing a fraction is written as 3 divided by 5.		

4M-NSCE3 The student will

a) round money to a nearest dollar.

UNDERSTANDING THE STANDARD (Background Information for Instructor Use Only)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE AND SKILLS
• The structure of the Base-10 number system is based upon a simple pattern of tens, where each place is ten times the value of the place to its right. This is known as a ten-to-one place value relationship. • Understanding the system of tens means that ten tenths represents one whole, ten hundredths represents one tenth, ten thousandths represents one hundredth. • A decimal point separates the whole number places from the places that are less than one. Place values extend infinitely in two directions from a decimal point. A number containing a decimal point is called a *decimal number* or simply a *decimal*. • To read decimals, – read the whole number to the left of the decimal point, if there is one; – read the decimal point as "and"; – read the digits to the right of the decimal point just as you would read a whole number; and – say the name of the place value of the digit in the smallest place. • Any decimal less than 1 will include a leading zero (e.g., 0.125). • Decimals may be written in a variety of forms: – Standard: 26.537 – Written: twenty-six and five hundred thirty-seven thousandths	**All students should** • Understand the place value structure of decimals and use this structure to read, write, and compare decimals. • Understand that decimal numbers can be rounded to an estimate when exact numbers are not needed for the situation at hand. • Understand that decimals are rounded in a way that is similar to the way whole numbers are rounded. • Understand that decimals and fractions represent the same relationship; however, they are presented in two different formats. • Understand that models are used to show decimal and fraction equivalents.	**The student will use problem solving, mathematical communication, mathematical reasoning, connections, and representations to** • Investigate the ten-to-one place value relationship for decimals through thousandths, using Base-10 manipulatives (e.g., place value mats/charts, decimal squares, Base-10 blocks, money). • Represent and identify decimals expressed through thousandths, using Base-10 manipulatives, pictorial representations, and numerical symbols (e.g., relate the appropriate drawing to 0.05). • Identify and communicate, both orally and in written form, the position and value of a decimal through thousandths. For example, in 0.385, the 8 is in the hundredths place and has a value of 0.08. • Read and write decimals expressed through thousandths, using Base-10 manipulatives, drawings, and numerical symbols. • Round decimals to the nearest whole number, tenth, and hundredth. • Compare decimals, using the symbols >, <, =. • Order a set of decimals from least to greatest or greatest to least. • Represent fractions for halves, fourths, fifths, and tenths as decimals through hundredths, using concrete objects (e.g., demonstrate the relationship between the fraction $\frac{1}{4}$ and its decimal equivalent 0.25). • Relate fractions to decimals, using concrete objects (e.g., 10-by-10 grids, meter sticks, number lines, decimal squares, decimal circles, money [coins]). • Write the decimal and fraction equivalent for a given model (e.g., $\frac{1}{4}$ = 0.25 or 0.25 = $\frac{1}{4}$).

4M-NSCE3 The student will
a) round money to a nearest dollar.

UNDERSTANDING THE STANDARD (Background Information for Instructor Use Only)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE AND SKILLS
– Expanded: $(2 \times 10) + (6 \times 1) + (5 \times 0.1) + (3 \times 0.01) + (7 \times 0.001)$. • Decimals and fractions represent the same relationships; however, they are presented in two different formats. The decimal 0.25 is written as $\frac{1}{4}$. Decimal numbers are another way of writing fractions. When presented with the fraction $\frac{3}{5}$, the division expression representing a fraction is written as 3 divided by 5. The Base-10 models concretely relate fractions to decimals (e.g., 10-by-10 grids, meter sticks, number lines, decimal squares, money). • The procedure for rounding decimal numbers is similar to the procedure for rounding whole numbers. • A strategy for rounding decimal numbers to the nearest tenth and hundredth is as follows: – Look one place to the right of the digit you want to round to. – If the digit is 5 or greater, add 1 to the digit in the rounding place, and drop the digits to the right of the rounding place. – If the digit is less than 5, leave the digit in the rounding place as it is, and drop the digits to the right of the rounding place. • Different strategies for rounding decimals include: – Use a number line to locate a decimal between two numbers. For example, 18.83		

4M-NSCE3 The student will
a) round money to a nearest dollar.

UNDERSTANDING THE STANDARD (Background Information for Instructor Use Only)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE AND SKILLS
is closer to 18.8 than to 18.9. – Compare the digits in the numbers to determine which number is greater (or which is less). – Compare the value of decimals, using the symbols >, <, = (e.g., 0.83 > 0.8 or 0.19 < 0.2). – Order the value of decimals, from least to greatest and greatest to least (e.g., 0.83, 0.821, 0.8). • Decimal numbers are another way of writing fractions (halves, fourths, fifths, and tenths). The Base-10 models concretely relate fractions to decimals (e.g., 10-by-10 grids, meter sticks, number lines, decimal squares, decimal circles, money). • Provide a fraction model (halves, fourths, fifths, and tenths) and ask students for its decimal equivalent. • Provide a decimal model and ask students for its fraction equivalent (halves, fourths, fifths, and tenths).		

4M-NSCE4 The student will

a) solve single-step word problems using addition or subtraction;

b) add and subtract double-digit whole numbers.

UNDERSTANDING THE STANDARD (Background Information for Instructor Use Only)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE AND SKILLS
• A sum is the result of adding two or more numbers. • A difference is the amount that remains after one quantity is subtracted from another. • An estimate is a number close to an exact solution. An estimate tells about how much or about how many. • Different strategies for estimating include using compatible numbers to estimate sums and differences and using front-end estimation for sums and differences. – Compatible numbers are numbers that are easy to work with mentally. Number pairs that are easy to add or subtract are compatible. When estimating a sum, replace actual numbers with compatible numbers (e.g., 52 + 74 can be estimated by using the compatible numbers 50 + 75). When estimating a difference, use numbers that are close to the original numbers. Tens and hundreds are easy to subtract (e.g., 83 – 38 is close to 80 – 40). – The front-end strategy for estimating is computing with the front digits. Front-end estimation for addition can be used even when the addends have a different number of digits. The procedure requires the addition of the values of the digits in the greatest of the smallest number. For example:	**All students should** • Develop and use strategies to estimate whole number sums and differences and to judge the reasonableness of such results. • Understand that addition and subtraction are inverse operations. • Understand that division is the operation of making equal groups or equal shares. When the original amount and the number of shares are known, divide to find the size of each share. When the original amount and the size of each share are known, divide to find the number of shares. • Understand that multiplication and division are inverse operations. • Understand various representations of division and the terms used in division are *dividend*, *divisor*, and *quotient.* $dividend \div divisor = quotient$ $divisor \overline{)\, dividend}$ *quotient*	**The student will use problem solving, mathematical communication, mathematical reasoning, connections, and representations to** • Estimate whole number sums, differences, products, and quotients. • Refine estimates by adjusting the final amount, using terms such as *closer to, between,* and *a little more than*. • Determine the sum or difference of two whole numbers, each 999,999 or less, in vertical and horizontal form with or without regrouping, using paper and pencil, and using a calculator. • Estimate and find the products of two whole numbers when one factor has two digits or fewer and the other factor has three digits or fewer, using paper and pencil and calculators. • Estimate and find the quotient of two whole numbers, given a one-digit divisor and a two- or three-digit dividend. • Solve single-step and multistep problems using whole number operations. • Verify the reasonableness of sums, differences, products, and quotients of whole numbers using estimation.

4M-NSCE4 The student will

a) solve single-step word problems using addition or subtraction;

b) add and subtract double-digit whole numbers.

UNDERSTANDING THE STANDARD (Background Information for Instructor Use Only)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE AND SKILLS
2367 → 2300 243 → 200 + 1186 → + 1100 3600 • Front-end or leading-digit estimation always gives a sum less than the actual sum; however, the estimate can be adjusted or refined so that it is closer to the actual sum. • Addition is the combining of quantities; it uses the following terms: *addend* → 45,623 *addend* → + 37,846 *sum* → 83,469 • Subtraction is the inverse of addition; it yields the difference between two numbers and uses the following terms: *minuend* → 45,698 *subtrahend* → – 32,741 *difference* → 12,957 • Before adding or subtracting with paper and pencil, addition and subtraction problems in horizontal form should be rewritten in vertical form by lining up the places vertically. • Using Base-10 materials to model and stimulate discussion about a variety of problem situations helps students understand regrouping and enables them to move from the concrete to the pictorial, to the abstract. Regrouping is used in addition and subtraction algorithms. In	• Understand how to solve single-step and multistep problems using whole number operations.	

4M-NSCE4 The student will

a) solve single-step word problems using addition or subtraction;

b) add and subtract double-digit whole numbers.

UNDERSTANDING THE STANDARD (Background Information for Instructor Use Only)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE AND SKILLS
addition, when the sum in a place is 10 or more, is used to regroup the sums so that there is only one digit in each place. In subtraction, when the number (minuend) in a place is not enough from which to subtract, regrouping is required. • A certain amount of practice is necessary to develop fluency with computational strategies for multidigit numbers; however, the practice must be meaningful, motivating, and systematic if students are to develop fluency in computation, whether mentally, with manipulative materials, or with paper and pencil. • Calculators are an appropriate tool for computing sums and differences of large numbers, particularly when mastery of the algorithm has been demonstrated. • The terms associated with multiplication are *factor* → 376 *factor* → × 23 *product* → 8,648 • One model of multiplication is repeated addition. • Another model of multiplication is the "Partial Product" model. 24 × 3 12 ← Multiply the ones: 3 × 4 = 12 + 60 ← Multiply the tens: 3 × 20 = 60 72		

4M-NSCE4 The student will

a) solve single-step word problems using addition or subtraction;

b) add and subtract double-digit whole numbers.

UNDERSTANDING THE STANDARD (Background Information for Instructor Use Only)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE AND SKILLS
• Another model of multiplication is the "Area Model" (which also represents partial products) and should be modeled first with Base-10 blocks. (e.g., 23 x 68) • Students should continue to develop fluency with single-digit multiplication facts and their related division facts. • Calculators should be used to solve problems that require tedious calculations. • Estimation should be used to check the reasonableness of the product. Examples of estimation strategies include the following: – The front-end method: multiply the front digits and then complete the product by recording the number of zeros found in the factors. It is important to develop understanding of this process before using the step-by-step procedure. 523 → 500 × 31 → × 30 15,000 – This is $3 \times 5 = 15$ with 3 zeros. – Compatible numbers: replace factors with compatible numbers, and then multiply. Opportunities for students to discover patterns with 10 and powers of 10 should be provided. 64 → 64 × 11 → × 10		

4M-NSCE4 The student will

a) solve single-step word problems using addition or subtraction;

b) add and subtract double-digit whole numbers.

UNDERSTANDING THE STANDARD (Background Information for Instructor Use Only)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE AND SKILLS
• Division is the operation of making equal groups or equal shares. When the original amount and the number of shares are known, divide to find the size of each share. When the original amount and the size of each share are known, divide to find the number of shares. Both situations may be modeled with Base-10 manipulatives. • Multiplication and division are inverse operations. • Terms used in division are *dividend, divisor*, and *quotient.* dividend ÷ divisor = quotient quotient divisor)dividend • Opportunities to invent division algorithms help students make sense of the algorithm. Teachers should teach division by various methods such as repeated multiplication and subtraction (partial quotients) before teaching the traditional long division algorithm.		

4M-NSCE5 The student will

a) show one way to arrive at a product.

UNDERSTANDING THE STANDARD (Background Information for Instructor Use Only)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE AND SKILLS
• A factor of a number is an integer that divides evenly into that number with a remainder of zero. • A factor of a number is a divisor of the number. • A multiple of a number is the product of the number and any natural number. • A common factor of two or more numbers is a divisor that all of the numbers share. • The least common multiple of two or more numbers is the smallest common multiple of the given numbers. • The greatest common factor of two or more numbers is the largest of the common factors that all of the numbers share. • Students should investigate addition and subtraction with fractions, using a variety of models (e.g., fraction circles, fraction strips, rulers, linking cubes, pattern blocks). • When adding or subtracting with fractions having like denominators, add or subtract the numerators and use the same denominator. Write the answer in simplest form using common multiples and factors. • When adding or subtracting with fractions having unlike denominators, rewrite them as fractions with a common denominator. The least common multiple (LCM) of the unlike denominators is a common denominator (LCD). Write the answer in simplest form using common multiples and factors.	**All students should** • Understand and use common multiples and common factors for simplifying fractions. • Develop and use strategies to estimate addition and subtraction involving fractions and decimals. • Use visual models to add and subtract with fractions and decimals.	**The student will use problem solving, mathematical communication, mathematical reasoning, connections, and representations to** • Find common multiples and common factors of numbers. • Determine the least common multiple and greatest common factor of numbers. • Use least common multiple and/or greatest common factor to find a common denominator for fractions. • Add and subtract with fractions having like denominators whose denominators are limited to 2, 3, 4, 5, 6, 8, 10, and 12, and simplify the resulting fraction using common multiples and factors. • Add and subtract with fractions having unlike denominators whose denominators are limited to 2, 3, 4, 5, 6, 8, 10, and 12, and simplify the resulting fraction using common multiples and factors. • Solve problems that involve adding and subtracting with fractions having like and unlike denominators whose denominators are limited to 2, 3, 4, 5, 6, 8, 10, and 12, and simplify the resulting fraction using common multiples and factors. • Add and subtract with decimals through thousandths, using concrete materials, pictorial representations, and paper and pencil. • Solve single-step and multistep problems that involve adding and subtracting with fractions and decimals through thousandths.

4M-NSCE5 The student will

a) show one way to arrive at a product.

UNDERSTANDING THE STANDARD (Background Information for Instructor Use Only)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE AND SKILLS
• Addition and subtraction of decimals may be explored, using a variety of models (e.g., 10-by-10 grids, number lines, money). • For decimal computation, the same ideas developed for whole number computation may be used, and these ideas may be applied to decimals, giving careful attention to the placement of the decimal point in the solution. Lining up tenths to tenths, hundredths to hundredths, etc. helps to establish the correct placement of the decimal. • Fractions may be related to decimals by using models (e.g., 10-by-10 grids, decimal squares, money).		

4M-MG1 The student will

a) identify smaller measurement units that divide a larger unit within a measurement system.

UNDERSTANDING THE STANDARD (Background Information for Instructor Use Only)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE AND SKILLS
• Weight and mass are different. Mass is the amount of matter in an object. Weight is determined by the pull of gravity on the mass of an object. The mass of an object remains the same regardless of its location. The weight of an object changes depending on the gravitational pull at its location. In everyday life, most people are actually interested in determining an object's mass, although they use the term *weight* (e.g., "How much does it weigh?" versus "What is its mass?"). • Balances are appropriate measuring devices to measure weight in U.S. Customary units (ounces, pounds) and mass in metric units (grams, kilograms). • Practical experience measuring the mass of familiar objects helps to establish benchmarks and facilitates the student's ability to estimate weight/mass. • Students should estimate the mass/weight of everyday objects (e.g., foods, pencils, book bags, shoes), using appropriate metric or U.S. Customary units.	**All students should** • Use benchmarks to estimate and measure weight/mass. • Identify equivalent measures between units within the U.S. Customary and between units within the metric measurements.	**The student will use problem solving, mathematical communication, mathematical reasoning, connections, and representations to** • Determine an appropriate unit of measure (e.g., ounce, pound, ton, gram, kilogram) to use when measuring everyday objects in both metric and U.S. Customary units. • Measure objects in both metric and U.S. Customary units (e.g., ounce, pound, ton, gram, or kilogram) to the nearest appropriate measure, using a variety of measuring instruments. • Record the mass of an object including the appropriate unit of measure (e.g., 24 grams).

4M-MG2 The student will

a) tell time to the half hour using a digital or to the hour using an analog clock.

UNDERSTANDING THE STANDARD (Background Information for Instructor Use Only)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE AND SKILLS
• Elapsed time is the amount of time that has passed between two given times. • Elapsed time should be modeled and demonstrated using analog clocks and timelines. • Elapsed time can be found by counting on from the beginning time to the finishing time. – Count the number of whole hours between the beginning time and the finishing time. – Count the remaining minutes. – Add the hours and minutes. For example, to find the elapsed time between 10:15 a.m. and 1:25 p.m., count 10 minutes; and then, add 3 hours to 10 minutes to find the total elapsed time of 3 hours and 10 minutes.	**All students should** • Understanding the "counting on" strategy for determining elapsed time in hour and minute increments over a 12-hour period from a.m. to a.m. or p.m. to p.m.	**The student will use problem solving, mathematical communication, mathematical reasoning, connections, and representations to** • Determine the elapsed time in hours and minutes within a 12-hour period (times can cross between a.m. and p.m.). • Solve practical problems in relation to time that has elapsed.

4M-MG3 The student will

a) distinguish between parallel and intersecting lines.

UNDERSTANDING THE STANDARD (Background Information for Instructor Use Only)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS AND SKILLS
• A point is a location in space. It has no length, width, or height. A point is usually named with a capital letter. • A line is a collection of points going on and on infinitely in both directions. It has no endpoints. When a line is drawn, at least two points on it can be marked and given capital letter names. Arrows must be drawn to show that the line goes on in both directions infinitely (e.g., $\overleftrightarrow{AB}$, read as "the line AB"). • A line segment is part of a line. It has two endpoints and includes all the points between those endpoints. To name a line segment, name the endpoints (e.g., $\overline{AB}$, read as "the line segment AB"). • A ray is part of a line. It has one endpoint and continues infinitely in one direction. To name a ray, say the name of its endpoint first and then say the name of one other point on the ray (e.g., $\overrightarrow{AB}$, read as "the ray AB"). • Two rays that have the same endpoint form an angle. This endpoint is called the *vertex*. Angles are found wherever lines and line segments intersect. An angle can be named in three different ways by using – three letters to name, in this order, a point on one ray, the vertex, and a point on the other ray; – one letter at the vertex; or	**All students should** • Understand that points, lines, line segments, rays, and angles, including endpoints and vertices are fundamental components of noncircular geometric figures. • Understand that the shortest distance between two points on a flat surface is a line segment. • Understand that lines in a plane either intersect or are parallel. Perpendicularity is a special case of intersection. • Identify practical situations that illustrate parallel, intersecting, and perpendicular lines.	**The student will use problem solving, mathematical communication, mathematical reasoning, connections, and representations to** • Identify and describe representations of points, lines, line segments, rays, and angles, including endpoints and vertices. • Understand that lines in a plane can intersect or are parallel. Perpendicularity is a special case of intersection. • Identify practical situations that illustrate parallel, intersecting, and perpendicular lines.

4M-MG3 The student will

a) distinguish between parallel and intersecting lines.

UNDERSTANDING THE STANDARD (Background Information for Instructor Use Only)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE AND SKILLS
– a number written inside the rays of the angle. • Intersecting lines have one point in common. • Perpendicular lines are special intersecting lines that form right angles where they intersect. • Parallel lines are lines that lie in the same place and do not intersect. Parallel lines are always the same distance apart and do not share any points. • Students should explore intersection, parallelism, and perpendicularity in both two and three dimensions. For example, students should analyze the relationships between the edges of a cube. Which edges are parallel? Which are perpendicular? What plane contains the upper left edge and the lower right edge of the cube? Students can visualize this by using the classroom itself to notice the lines formed by the intersection of the ceiling and walls, of the floor and wall, and of two walls.		

4M-PSPFA1 The student will

a) use repeating patterns to make predictions.

UNDERSTANDING THE STANDARD (Background Information for Instructor Use Only)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE AND SKILLS
• Most patterning activities should involve some form of concrete materials to make up a pattern. – Students will identify and extend a wide variety of patterns, including rhythmic, geometric, graphic, numerical, and algebraic. The patterns will include both growing and repeating patterns. • Reproduction of a given pattern in a different representation, using symbols and objects, lays the foundation for writing the relationship symbolically or algebraically. • Tables of values should be analyzed for a pattern to determine the next value.	**All students should** • Understand that patterns and functions can be represented in many ways and described using words, tables, graphs, and symbols.	**The student will use problem solving, mathematical communication, mathematical reasoning, connections, and representations to** • Describe geometric and numerical patterns, using tables, symbols, or words. • Create geometric and numerical patterns, using concrete materials, number lines, tables, and words. • Extend geometric and numerical patterns, using concrete materials, number lines, tables, and words.