

## California State

### AIMS Activities supporting Third Grade Mathematics Standards of Learning

By the end of grade three, students deepen their understanding of place value and their understanding of and skill with addition, subtraction, multiplication, and division of whole numbers. Students estimate, measure, and describe objects in space. They use patterns to help solve problems. They represent number relationships and conduct simple probability experiments.

#### NUMBER SENSE

##### 1.0 Students understand the place value of whole numbers:

###### 1.1 Count, read, and write whole numbers to 10,000.

“Zip, Zap, Zorp,” *AIMS: VIII.1*

*The students will play a number-guessing game in which one student will pick a number and give a clue. The other student will try to guess the number from the clues given.*

“Flip,” *AIMS: VIII.5*

*The students will use cards to play a place value game.*

“A Pumpkin Caper,” Overhead and Underfoot

*The students will make predictions and estimates relating to pumpkins and check them by testing, counting, and measuring.*

“Digits in Disguise,” *AIMS: XIV.1*

*The students will create their own number riddles for others to solve.*

“The Jar that Keeps You Guessing,” Primarily Bears

*The students will use a jar of small objects to build their skills in estimation, counting strategies, and place value.*

###### 1.2 Compare and order whole numbers to 10,000.

###### 1.3 Identify the place value for each digit in numbers to 10,000.

###### 1.4 Round off numbers to 10,000 to the nearest ten, hundred, and thousand.

###### 1.5 Use expanded notation to represent numbers.

##### 2.0 Students calculate and solve problems involving addition, subtraction, multiplication, and division:

###### 2.1 Find the sum or difference of two whole numbers between 0 and 10,000.

###### 2.2 Memorize to automaticity the multiplication table for numbers between 1 and 10.

“Skip to My Rule,” *AIMS: XI.3*

*The students will construct plots to connect ideas about joining equal rows of objects to the products generated in the multiplication table.*

“Napier’s Rods,” Historical Connections, Volume I

*The students will use a time-honored algorithm to compute products.*

“Lattice Multiplication,” Historical Connections, Volume I

*The students will use a time-honored algorithm to compute products.*

**2.3 Use the inverse relationship of multiplication and division to compute and check results.**

**2.4 Solve simple problems involving multiplication of multi-digit numbers by one-digit numbers.**

“Peddle the Metal,” Hardhatting in a Geo-World

*The students will construct pasta jewelry and determine the selling price by measuring the number of grams of each piece and multiply by the unit cost.*

**2.5 Solve division problems in which a multi-digit number is evenly divided by a one-digit number.**

“Teddy Bears Love to Swim,” *AIMS: III.9*

*The students will perform division at the manipulative level to form proportions. This approach provides a much broader and more powerful understanding of the division process.*

“Teddy Bears Come Ashore,” *AIMS Newsletter: III.6*

*The students will perform division at the manipulative level to form proportions. This approach provides a much broader and more powerful understanding of the division process.*

Resource: “Connection: Focus on Division of Whole Numbers,” *AIMS Newsletter: IV.4*)

**2.6 Understand the special properties of 0 and 1 in multiplication and division.**

**2.7 Determine the unit cost when given the total cost and number of units.**

“One for the Money,” Series A–Middle, A Week with AIMS

*The students will generate data for multiples of different products recorded in a T-table and then translate the data into a line graph.*

**2.8 Solve problems that require two or more of the skills mentioned above.**

“I’ve Got Rhythm,” Jaw Breakers and Heart Thumpers

*The students will learn that the heart rate increases as the exercise becomes more strenuous. They will determine their heart rates, find averages, and graph their data to draw conclusions.*

“The Food Tube,” *AIMS: XI.10*

*The students will use measurement, addition, and multiplication to determine the lengths of their digestive tracts and the relationship to their heights.*

“Million Dollar Dilemma,” *AIMS: VII.6*

*The students will manipulate numbers to find which of two payments is better—a million dollars for a month’s work or a penny the first day, doubling on consecutive days, for 31 days.*

“Math with M&M Candies,” Primarily Bears

*The students will estimate the number of M&M candies; perform addition, subtraction, and division operations; and state relationships among colors.*

**3.0 Students understand the relationship between whole numbers, simple fractions, and decimals:**

**3.1 Compare fractions represented by drawings or concrete materials to show equivalency and to add and subtract simple fractions in context.**

“Black Wholes and Bright Parts,” Fabulous Fractions (to be published)

*The students will use circle models to compare relative sizes of fractions and to determine equivalent fractions.*

“It’s a Cover-Up,” Fabulous Fractions (to be published)

*The students will use circle models to compare relative sizes of fractions and to determine equivalent fractions.*

“Fraction Action 1–7,” Actions with Fractions

*The students will pattern blocks and tiles to learn to identify the respective fractional parts.*

“Trangrammy Squares,” AIMS: X.2

*The students use tangram pieces to explore and compare fraction concepts.*

“Fractions with Pattern Blocks,” Fabulous Fractions (to be published)

*The students will use various models to explore fraction concepts such as equivalency, addition of fractions, and mixed numbers.*

“One is a Big Idea,” Fabulous Fractions (to be published)

*The students will use like circle parts to cover circle models to discover the possible names for one.*

### **3.2 Add and subtract simple fractions.**

“One is a Big Idea” and “It’s a Cover-Up,” Fabulous Fractions (to be published)

*The students will use like circle parts to cover circle models to discover the possible names for one and fraction equivalents.*

“Fraction Action 32–35, 41,” Actions with Fractions

*The students will use pattern blocks to add fractional parts.*

### **3.3 Solve problems involving addition, subtraction, multiplication, and division of money amounts in decimal notation and multiply and divide money amounts in decimal notation by using whole-number multipliers and divisors.**

“Million Dollar Dilemma,” AIMS: VII.6

*The students will manipulate numbers to find which of two payments is better—a million dollars for a month’s work or a penny the first day, doubling on consecutive days, for 31 days.*

“Changing a Quarter,” AIMS: XII.2

*The students will organize data to list all the possible coin combinations to equal a quarter.*

“Patty’s Penny Puzzle,” AIMS: X.1

*The students will organize data to list all the possible coin combinations to equal 36 cents.*

### **3.4 Know and understand that fractions and decimals are two different representations of the same concept.**

“What’s the Point?” Fabulous Fractions (to be published)

*The students will represent and interpret fractions in a base-ten circle model to relate fractions, decimals, and percents in equivalent representations.*

## **ALGEBRA AND FUNCTIONS**

### **1.0 Students select appropriate symbols, operations, and properties to represent, describe, simplify, and solve simple number relationships:**

#### **1.1 Represent relationships of quantities in the form of mathematical expressions, equations, or inequalities.**

“Math with M&M Candies,” Primarily Bears

*The students will estimate the number of M&M candies; perform addition, subtraction, and division operations; and state relationships among colors.*

**1.2 Solve problems involving numeric equations or inequalities.**

“Digits in Disguise,” *AIMS: XIV.1*

*The students will create their own number riddles for others to solve.*

**1.3 Select appropriate operational and relation symbols to make an expression true.**

**1.4 Express simple unit conversions in symbolic form.**

**1.5 Recognize and use the commutative and associative properties of multiplication.**

**2.0 Students represent simple functional relationships:**

**2.1 Solve simple problems involving a functional relationship between two quantities.**

“One for the Money,” Series A–Middle, A Week with AIMS

*The students will generate data for multiples of different products recorded in a T-table and then translate the data into a line graph.*

“Bicycles, Tricycles, Wagons, and Wheels,” *AIMS: XII.1*

*The students will make various numbers of different vehicles from pasta. They will record the number of wheels, apply a formula, make a line graph, and interpret their results.*

“In and Out,” What’s Next? Volume 1

*The students will determine the functional rule by observing patterns within tables.*

“Name that Number,” What’s Next? Volume 2

*The students will determine the functional rule by observing patterns within tables.*

“Table It!” What’s Next? Volume 1

*The students will determine the functional rule by observing patterns within tables.*

**2.2 Extend and recognize a linear pattern by its rules.**

“One for the Money,” Series A–Middle, A Week with AIMS

*The students will generate data for multiples of different products recorded in a T-table and then translate the data into a line graph.*

“Bicycles, Tricycles, Wagons, and Wheels,” *AIMS: XII.1*

*The students will make various numbers of different vehicles from pasta. They will record the number of wheels, apply a formula, make a line graph, and interpret their results.*

“Practically Predictable,” What’s Next? Volume 1

*The students will discover a pattern and continue the series.*

“What’s Missing?” What’s Next? Volume 2

*The students will discover a pattern and continue the series.*

“Now What?” What’s Next? Volume 3

*The students will discover a pattern and continue the series.*

**MEASUREMENT AND GEOMETRY**

**1.0 Students choose and use appropriate units and measurement tools to quantify the properties of objects:**

**1.1 Choose the appropriate tools and units and estimate and measure the length, liquid volume, and weight/mass of given objects.**

“Mini Metric Olympics,” Math + Science, a Solution

*The students will become familiar with metric units by estimating and measuring in an Olympic setting.*

“Rulers Line Up,” Hardhatting in a Geo-World

*The students will measure many different objects using a non-customary unit. These multiple measuring experiences can later be transferred to metric measures.*

“Are You a Square?” Hardhatting in a Geo-World

*The students will use metric measures to discover how their heights and arm spans compare.*

“Bear Facts,” Hardhatting in a Geo-World

*The students will use metric measure Teddy Bears and then compare these measures to their bodies.*

“Pleased as Punch,” Hardhatting in a Geo-World

*The students will plan various mixes of punch, measure according to their recipes, and give their opinions of the results.*

“Filling Stations,” Hardhatting in a Geo-World

*The students will compare the capacities of various containers.*

“Cups ‘n’ Stuff,” Hardhatting in a Geo-World

*The students will compare the masses of five different materials of equal volume.*

“All Bottled Up,” Water, Precious Water

*The students will compare the capacities of four different bottles, predicting and observing the different volumes each can hold.*

“Pet Rock,” Overhead and Underfoot

*The students will measure the length and mass of rocks as well as observing other characteristics.*

“Teddy Bears and Oranges,” Primarily Bears

*The students will use Teddy Bear Counters to count, find the mass, and compare oranges.*

## **1.2 Estimate or determine the area and volume of solid figures by covering them with squares or by counting the number of cubes that would fill them.**

### **1.3 Find the perimeter of a polygon with integer sides.**

“Wreck-Tangles,” Hardhatting in a Geo-World

*The students will discover that rectangles with equal perimeters do not necessarily have equal areas.*

“Playground Geometry,” Hardhatting in a Geo-World

*The students will find and measure parts of squares, rectangles, and circles on their playground to expand their knowledge of geometric shapes.*

### **1.4 Carry out simple unit conversions within a system of measurement.**

“Rulers Line Up,” Hardhatting in a Geo-World

*The students will measure many different objects using a non-customary unit. These multiple measuring experiences can later be transferred to metric measures.*

## **2.0 Students describe and compare the attributes of plane and solid geometric figures and use their understanding to show relationships and solve problems:**

### **2.1 Identify, describe, and classify polygons.**

“Shaping Up,” Hardhatting in a Geo-World

*The students will observe and draw examples of geometric shapes in nature and in manufactured objects.*

“Playground Geometry,” Hardhatting in a Geo-World

*The students will find and measure parts of squares, rectangles, and circles on their playground to expand their knowledge of geometric shapes.*

“Newspaper Skeletons,” Series A–Middle, A Week with AIMS

*The students will build newspaper frames of various three-dimensional solids. The frames will be used to solve life-size spatial problems dealing with combinations of face shapes.*

“Shape Takers,” AIMS: XI.3

*The students will compare and contrast geometric shapes of different orientations, sizes, and types to discover that each shape has certain distinguishable characteristics.*

## **2.2 Identify attributes of triangles.**

## **2.3 Identify attributes of quadrilaterals.**

“Slice Me Twice,” Hardhatting in a Geo-World

*The students will investigate how two-circle constructions are changed into various quadrilaterals and identify the properties of each shape.*

## **2.4 Identify right angles in geometric figures or in appropriate objects and determine whether other angles are greater or less than a right angle.**

## **2.5 Identify, describe, and classify common three-dimension geometric objects.**

“Geometric Solids,” Series A–Middle, A Week with AIMS

*The students will gather real objects that resemble geometric solids.*

“Surface Venn,” Series A–Middle, A Week with AIMS

*The students will use a two-circle Venn diagram to sort three-dimensional objects by curved and flat surfaces.*

“3-D Line Plot,” Series A–Middle, A Week with AIMS

*The students will classify three-dimensional shapes on a line plot according to features that can be counted—number of points, surfaces, and edges/rims.*

“Shape Sort,” Series A–Middle, A Week with AIMS

*The students will use Venn diagrams to sort 3-D objects by the shapes of their faces.*

“Newspaper Skeletons,” Series A–Middle, A Week with AIMS

*The students will build newspaper frames of various three-dimensional solids. The frames will be used to solve life-size spatial problems dealing with combinations of face shapes.*

“Spin Skins,” Series A–Middle, A Week with AIMS

*The students will use a spinner to collect the faces or other pieces needed to build two different three-dimensional shapes.*

“Sets of Nets,” Series A–Middle, A Week with AIMS

*The students will use two-dimensional paper shapes to assemble and test a variety of nets which will form a particular three-dimensional shape.*

## **2.6 Identify common solid objects that are the components needed to make a more complex solid object.**

# **STATISTICS, DATA ANALYSIS, AND PROBABILITY**

## **1.0 Students conduct simple probability experiments by determining the number of possible outcomes and make simple predictions:**

### **1.1 Identify whether common events are certain, likely, unlikely, or improbable.**

“Take a Chance,” *AIMS*: XII.8

*The students will predict the number and color of plastic eggs in the bag based upon three samples. A tally of each sample will be kept.*

“Teddy Bears Playing in the Den,” Primarily Bears

*The students will investigate random samples to determine how they can be used to make predictions by the nature of a population.*

“Spin Skins,” Series A–Middle, A Week with *AIMS*

*The students will use a spinner to collect the faces or other pieces needed to build two different three-dimensional shapes. By using a spinner with unequal parts, students will determine which polyhedron will most likely be built.*

“High Frequency,” *AIMS Newsletter*: V.3

*The students will use sampling techniques to gather and apply information on the frequency of letters used in the alphabet.*

Resource: “Probability: Back to Basics,” *AIMS Newsletter*: VII.2

**1.2 Record the possible outcomes for a simple event and systematically keep track of the outcomes when the event is repeated many times.**

**1.3 Summarize and display the results of probability experiments in a clear and organized way.**

“Teddy Bears Playing in the Den,” Primarily Bears

*The students will investigate random samples to determine how they can be used to make predictions by the nature of a population.*

**1.4 Use the results of probability experiments to predict future events.**

“Teddy Bears Playing in the Den,” Primarily Bears

*The students will investigate random samples to determine how they can be used to make predictions by the nature of a population.*

“Take a Chance,” *AIMS*: XII.8

*The students will predict the number and color of plastic eggs in the bag based upon three samples. A tally of each sample will be kept.*

**California State**  
**AIMS activities supporting Fourth Grade Mathematics Standards of Learning**

**By the end of grade four, students understand large numbers and addition, subtraction, multiplication, and division of whole numbers. They describe and compare simple fractions and decimals. They understand the properties of, and the relationships between, plane geometric figures. They collect, represent, and analyze data to answer questions.**

**NUMBER SENSE**

**1.0 Students understand the place value of whole numbers and decimals to two decimal places and how whole numbers and decimals relate to simple fractions. Students use the concepts of negative numbers:**

**1.1 Read and write whole numbers in the millions**

“Down the Drain,” Water, Precious Water

*The students will measure the amount of water wasted when allowing a spigot to run until the water gets warm. They will use this amount to calculate wasted water for their city, state, and country.*

**1.2 Order and compare whole numbers and decimals to two decimal places.**

“Money Laundering,” Fabulous Fractions (to be published)

*The students will investigate decimals as base ten fractions in order to understand their relative magnitudes, to practice ordering decimals, and to experience coins (dimes and cents) as a model for understanding decimals as base-ten fractions.*

**1.3 Round whole numbers through the millions to the nearest ten, hundred, thousand, ten thousand, or hundred thousand.**

**1.4 Decide when a rounded solution is called for and explain why such a solution may be appropriate.**

**1.5 Explain different interpretations of fractions, for example, parts of a whole, parts of a set, and division of whole numbers by whole numbers; explain equivalents of fractions.**

“Seeing Fractions Among Ourselves,” Fabulous Fractions (to be published)

*The students will recognize and name fractions as representative of a counted part of a group or set of objects. They will gain an understanding of numerator and denominator in the symbolic form of a fraction.*

“Group Pictures You Can Count On,” Fabulous Fractions (to be published)

*The students will recognize and name fractions as representative of a counted part of a group or set of objects. They will gain an understanding of numerator and denominator in the symbolic form of a fraction.*

“Fraction Fringe,” Fabulous Fractions (to be published)

*The students will recognize and name fractions as fair shares of a linear unit. They will construct a linear model that represents equivalent fractions and proportionality.*

**1.6 Write tenths and hundredths in decimal and fraction notations and know the fraction and decimal equivalents for halves and fourths.**

“What’s the Point?” Fabulous Fractions (to be published)

*The students will represent and interpret fractions in a base-ten circle model to relate fractions, decimals, and percents in equivalent representations.*

**1.7 Write the fraction represented by a drawing of parts of a figure; represent a given fraction by using drawings; and relate a fraction to a simple decimal on a number line.**

“Fraction Action 1–11,” Actions with Fractions

*The students will use various models to explore fraction concepts such as equivalency, addition of fractions, and mixed numbers.*

“Fractions with Pattern Blocks,” Fabulous Fractions (to be published)

*The students will use various models to explore fraction concepts such as equivalency, addition of fractions, and mixed numbers.*

**1.8 Use concepts of negative numbers.**

“That’s Sum Challenge!”(Extension), Just for the Fun of It!

*The students will find which sums from one to 25 can be obtained by adding two, three, four, five, or six consecutive numbers. They will discover and discuss the patterns that exist in the solutions.*

**1.9 Identify on a number line the relative position of positive fractions, positive mixed numbers, and positive decimals to two decimal places.**

**2.0 Students extend their use and understanding of whole numbers to the addition and subtraction of simple decimals:**

**2.1 Estimate and compute the sum or difference of whole numbers and positive decimals to two places.**

**2.2 Round two-place decimals to one decimal or the nearest whole number and judge the reasonableness of the rounded answer.**

**3.0 Students solve problems involving addition, subtraction, multiplication, and division of whole numbers and understand the relationships among the operations:**

**3.1 Demonstrate an understanding of and the ability to use standard algorithms for the addition and subtraction of multi-digit numbers.**

**3.2 Demonstrate an understanding of, and the ability to use, standard algorithms for multiplying a multi-digit number by a two-digit number and for dividing a multi-digit number by a one-digit number; use relationships between them to simplify computations and to check results.**

**3.3 Solve problems involving multiplication of multi-digit numbers by two-digit numbers.**

“Lattice Multiplication,” Historical Connections, Volume 1

*The students will explore a time-honored algorithm for multi-digit multiplication.*

“Russian Peasant Method of Multiplication,” Historical Connections, Volume 1

*The students will explore a time-honored algorithm for multi-digit multiplication.*

“Building Bridges to Algebra and Beyond: Multiplication Displayed and Using the Distributive Property,” *AIMS: XII.4*

*The students will understand the operation of the standard algorithm by using the distributive property.*

Resource: “Building Bridges to Algebra and Beyond,” article *AIMS: XII.4*

### **3.4 Solve problems involving division of multi-digit numbers by one-digit numbers.**

“Teddy Bears Come Ashore,” *AIMS Newsletter: III.6*

*The students will perform division at the manipulative level to form proportions. This approach provides a much broader and more powerful understanding of the division process.*

“Teddy Bears Love to Swim,” *AIMS: III.9*

*The students will perform division at the manipulative level to form proportions. This approach provides a much broader and more powerful understanding of the division process.*

“Candy Factory,” Jaw Breakers and Heart Thumpers

*The students will compare the color distribution within packaged candy and then divide the candies into fair shares.*

## **4.0 Students know how to factor small whole numbers:**

### **4.1 Understand that many whole numbers break down in different ways.**

“Pattern Detective,” *AIMS: XI.3*

*The students will search the multiplication table for patterns in products.*

“Level the Lever,” Popping with Power

*The students will discover the mathematical pattern for balancing a first-class lever. They will use various combinations of cubes (factors) to arrive at viable solutions.*

“Turn Around,” Brick Layers

*The students will discover the inverse relationship of gear size to rate of rotation. They will pair different combinations of gears and count the number of rotations gears make.*

“Gearing Up...Gears,” Machine Shop

*The students will construct paper gears to discover the inverse relationship of teeth and turn ratios.*

Resource: “Advantages of a Pattern-Based Math/Science Curriculum,” *AIMS: XI.3*

### **4.2 Know that numbers such as 2, 3, 5, 7, and 11 do not have any factors except 1 and themselves and that such numbers are called prime numbers.**

“The Sieve of Eratostenes,” Historical Connections, Volume III

*The students will find all the prime numbers between 1 to 100 using the method developed by Eratostenes.*

“Prime Magic,” Historical Connections, Volume III

*The students will use prime numbers to make magic squares.*

## **ALGEBRA AND FUNCTIONS**

### **1.0 Students use and interpret variables, mathematical symbols, and properties to write and simplify expressions and sentences:**

#### **1.1 Use letters, boxes, or other symbols to stand for any number in simple expressions or equations.**

“Math with M&M’s Candies,” Primarily Bears

*The students use letters to represent colors of candies and perform operations of addition and subtraction or show relationships ( $<$ ,  $>$ ,  $=$ ).*

**1.2 Interpret and evaluate mathematical expressions that now use parentheses.**

**1.3 Use parentheses to indicate which operation to perform first when writing expressions containing more than two terms and different operations.**

**1.4 Use and interpret formulas to answer questions about quantities and their relationships.**

“Bicycles, Tricycles, Wagons, and Wheels,” AIMS: XII.1

*The students will make various numbers of different vehicles from pasta. They will record the number of wheels, apply a formula, make a line graph, and interpret their results.*

“Oranges—for the Most Part” Series 2–Middle, A Week with AIMS

*The students will determine what part of an orange is edible. They will compare the mass of the peeling and the edible portion of an orange to its total mass.*

“Now That’s Using Your Head,” Jaw Breakers and Heart Thumpers

*The students will explore the relationship between their heights and the circumferences of their heads.*

“How do you Measure Up? Jaw Breakers and Heart Thumpers

*The students will discover how their femur lengths are related to their heights.*

“The Big Banana Peel,” Math + Science, a Solution

*The students will determine what percent of a banana is edible. By sampling several bananas, the students will develop a formula relating the edible part of the banana to the total.*

What’s Next? Volumes 1, 2, and 3 (Select activities as appropriate to students’ developmental abilities)

**1.5 Understand that an equation such as  $y = 3x + 5$  is a prescription for determining a second number when a first number is given.**

**2.0 Students know how to manipulate equations**

**2.1 Know and understand that equals added to equals are equal.**

**2.2 Know and understand that equals multiplied by equals are equal.**

## MEASUREMENT AND GEOMETRY

**1.0 Students understand perimeter and area:**

**1.1 Measure the area of rectangular shapes by using appropriate units, such as square centimeter, square meter, square kilometer, square inch, square yard, or square mile.**

“Playground Geometry,” Hardhatting in a Geo-World

*The students will expand their understanding of geometric shapes by finding and measuring parts of squares, rectangles, and circles on their playground.*

“Wreck-Tangles,” Hardhatting in a Geo-World

*The students will discover that rectangles with equal perimeters do not necessarily have equal areas.*

“Box Factory,” Series A–Middle, A Week with AIMS

*The students will make three-dimensional boxes with equal volumes to determine which constructions have the least amount of surface area.*

Spatial Visualization (Select activities as appropriate to students' developmental abilities)

**1.2 Recognize that rectangles that have the same area can have different perimeters.**

“Recreating Rectangles” and “Rectangular Recreations,” *AIMS: XIII.8*

*The students will find the length, width, perimeter, and area of rectangles. They will realize that the area of each rectangle remains constant, while the perimeter changes depending on the length and width. They will also recognize that the perimeter is smallest when the shape is a square, and largest when there is the greatest difference between the length and width.*

**1.3 Understand that rectangles that have the same perimeter can have different.**

“Wreck-Tangles,” Hardhatting in a Geo-World

*The students will discover that rectangles with equal perimeters do not necessarily have equal areas.*

“Constant Perimeters,” *AIMS: XIII.5*

*The students will draw different sized rectangles that have a constant perimeter and then compare the areas. They will also look for patterns in the answers.*

**1.4 Understand and use formulas to solve problems involving perimeters and areas of rectangles and squares. Use those formulas to find the areas of more complex figures by dividing the figures into basic shapes.**

**2.0 Students use two-dimensional coordinate grids to represent points and graph lines and simple figures:**

**2.1 Draw the points corresponding to linear relationships on graph paper.**

“One for the Money,” Series A–Middle, A Week with AIMS

*The students will generate data for multiples of different products recorded in a T-table and then translate the data into a line graph.*

“Bicycles, Tricycles, Wagons, and Wheels,” *AIMS: XII.1*

*The students will make various numbers of different vehicles from pasta. They will record the number of wheels, apply a formula, make a line graph, and interpret their results.*

**2.2 Understand that the length of a horizontal line segment equals the difference of the x-coordinates.**

**2.3 Understand that the length of a vertical line segment equals the difference of the y-coordinates.**

**3.0 Students demonstrate an understanding of plane and solid geometric objects and use this knowledge to show relationships and solve problems:**

**3.1 Identify lines that are parallel and perpendicular.**

“Shaping Up,” Hardhatting in a Geo-World

*The students will observe and draw objects in nature and in manufactured objects. They will use the terms “parallel” and “perpendicular” to describe lines.*

**3.2 Identify the radius and diameter of a circle.**

“Circle Sighs,” Hardhatting in a Geo-World

*The students will use paper clips to draw circles, determining their radii and diameters.*

“The Amazing Circle 1 and 2,” The Amazing Circle

*The students will cut out and fold paper circles with which they will explore the diameter and radius.*

### **3.3 Identify congruent figures.**

“Congruent Shape Detective,” AIMS: XII.4

*The students will divide square grids into congruent “halves,” finding as many different solutions (shapes) as possible.*

“Searching for Congruent Halves,” AIMS: XII.6

*The students will divide congruent squares into two congruent halves in all possible ways.*

“Searching for Congruent Quarters,” AIMS: XII.5

*The students will divide congruent squares into foursomes of congruent quarters in all possible ways.*

“Square Pickings,” AIMS: IX.8

*The students will arrange toothpicks to form three congruent squares.*

### **3.4 Identify figures that have bilateral and rotational symmetry.**

“Dick and Bob are Twins,” AIMS Newsletter: IV.1

*The students will explore how a mirror reflects letters of the alphabet and why some appear the same in the mirror and others do not.*

“Nature’s Part in Art and Math,” Pieces and Patterns

*The students will identify and explore three types of symmetry—bilateral, translation, and rotation—in the natural and manufactured world.*

“Through the Looking Glass,” AIMS Newsletter: IV.3

*The students will use a Reflect-view to discover the position and orientation of an image with bilateral symmetry reflected in a mirror.*

“Who’s Not Home?” and “Where’s My Home?” Primarily Bears

*The students will observe the color patterns of Teddy Bear Counters in examples of bilateral and rotational symmetry.*

### **3.5 Know the definitions of a right angle, an acute angle and an obtuse angle. Understand that $90^\circ$ , $180^\circ$ , $270^\circ$ , and $360^\circ$ are associated, respectively, with $1/4$ , $1/2$ , $3/4$ , and full turns.**

“Taking Turns with Triangles,” AIMS: IX.5

*The students will explore patterns by rotating four quilt patches.*

“Turtle Trips and Turns,” Pieces and Patterns

*The students will use turtle protractors to measure turns or angles.*

### **3.6 Visualize, describe, and make models of geometric solids in terms of the number and shape of faces, edges, and vertices; interpret two-dimensional representations of three-dimensional objects; and draw patterns (of faces) for a solid that, when cut and folded, will make a model of the solid.**

“Face Trace,” Series A–Middle, A Week with AIMS

*The students will discover the two-dimensional shapes which form three-dimensional objects by tracing the faces of polyhedron models and determining a way to find the shapes of curved surfaces.*

“Spin Skins,” Series A–Middle, A Week with AIMS

*The students will use a spinner to collect the faces or other pieces needed to build two different three-dimensional shapes.*

**“Shape Sort,” Series A–Middle, A Week with AIMS**

*The students will use Venn diagrams to sort 3-D objects by the shapes of their faces.*

**“3-D Line Plot,” Series A–Middle, A Week with AIMS**

*The students will look for patterns when they place 3-D shapes along a number line by counting surfaces, rims/edges, and points.*

**“Newspaper Skeletons,” Series A–Middle, A Week with AIMS**

*The students will build newspaper frames of various three-dimensional solids. The frames will be used to solve life-size spatial problems dealing with combinations of face shapes.*

**“Geo-Panes,” Hardhatting in a Geo-World**

*The students will discover and appreciate the unique soap film patterns that form inside polyhedrons. They will look for patterns among the numbers of edges, faces, and vertices.*

**3.7 Know the definitions of different triangles and identify their attributes.**

**“See How They Roll” Pieces and Patterns**

*The students will investigate the probability of rolling three dice so that a given type of triangle—equilateral, isosceles, scalene—will result.*

Resource: “A Classroom Close-Up: A Triangle T-Party” *AIMS*: XI.4. This article includes ideas for 12 stations in which students explore triangle relationships.

**3.8 Know the definition of different quadrilaterals.**

**“Slice Me Twice,” Hardhatting in a Geo-World**

*The students will investigate how two-circle constructions are changed into various quadrilaterals.*

**“Counting Quadrilaterals,” *AIMS*: VIII.10**

*The students will find as many quadrilaterals as they can in a 4 X 4 grid.*

**STATISTICS, DATA ANALYSIS, AND PROBABILITY**

**1.0 Students organize, represent, and interpret numerical and categorical data and clearly communicated their findings:**

**1.1 Formulate survey questions; systematically collect and represent data on a number line; and coordinate graphs, tables, and charts.**

**“Getting to Know You,” *AIMS*: XII.1**

*The students will record data about themselves and then find different people who match each piece of data. After categories are grouped, each group of students will graphically illustrate data for one category.*

**“Practically Predictable,” Pieces and Patterns**

*The students will form and test a prediction and graph the results using the scientific method.*

**“Picturing a Dichotomy,” *AIMS*: IX.8**

*The students will compare and contrast with others the data they record about certain traits.*

**“Penny Sort and Nickel Dates,” Math + Science, a Solution**

*The students will classify pennies and nickels by minting dates; determine medians and modes; construct real, representation, and abstract bar graphs; and interpret results.*

**1.2 Identify the mode(s) for sets of categorical data and the mode(s), median, and any apparent outliers for numerical data sets.**

**“How High? How Far?” *AIMS*: XIII.2**

*The students will measure their heights and determine how high they can long jump. They will compare themselves to the rest of the class to gain an understanding of medians, extremes, and graphic displays.*

“Slip, Sliding Away,” AIMS: XIII.3

*The students will perform three trials of sliding an object down an incline plane to collect data and find its median.*

“Penny Sort and Nickel Dates,” Math + Science, a Solution

*The students will classify pennies and nickels by minting dates; determine medians and modes; construct real, representation, and abstract bar graphs; and interpret results.*

“Marbelous Rolls,” AIMS: VIII.1

*The students will study the effect of uniform acceleration of marbles rolled down an incline plane on the distance they roll on a carpet. After performing five trials at six different distances, they will determine the range, mean, and median of the data.*

### **1.3 Interpret one- and two-variable data graphs to answer questions about a situation.**

“Cat Scan,” AIMS: VII.7

*The students will construct and use bar graphs, circle graphs, binary tree diagrams, and Venn diagrams. Comparisons and contrasts will be made as to what information is provided by each type of representation.*

## **2.0 Students make predictions for simple probability situations:**

### **2.1 Represent all possible outcomes for a simple probability situation in an organized way.**

“See How They Roll” Pieces and Patterns

*The students will investigate the probability of rolling three dice so that a given type of triangle will result.*

“Sum Will, Sum Won’t” What’s Next? Volume 1

*The students will toss a differing number of dice to determine the largest and possible sums as well as the sum(s) with the greatest chance of occurring.*

“What’s Happenin’” What’s Next? Volume 2

*The students will determine the sample space for tossing a differing numbers of coins.*

“Flip for It,” What’s Next? Volume 2

*The students will use the sample space from “What’s Happenin’” to determine the probability for differing numbers of coin tosses.*

### **2.2 Express outcomes of experimental probability situations verbally and numerically.**

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**California State**  
**AIMS Activities supporting Fifth Grade Mathematics Standards of Learning**

**By the end of grade five, students increase their facility with the four basic arithmetic operations applied to fractions, decimals, and positive and negative numbers. They know and use common measuring units to determine length and area and know and use formulas to determine the volume of simple geometric figures. Students know the concept of angle measurement and use a protractor and compass to solve problems. They use grids, tables, graphs, and charts to record and analyze data.**

**NUMBER SENSE**

**1.0 Students compute with very large and very small numbers, positive integers, decimals, and fractions and understand the relationship between decimals, fractions, and percents. They understand the relative magnitudes of numbers:**

**1.1 Estimate, round, and manipulate very large and very small numbers.**

“Million Dollar Dilemma,” *AIMS*: VII.6

*The students will manipulate numbers to find which of two payments is better—a million dollars for a month’s work or a penny the first day, doubling on consecutive days, for 31 days.*

“Stars in the Milky Way Galaxy,” Out of this World

*The students will discover the method by which scientist estimate the number of stars in the Milky Way Galaxy. They will calculate the number of characters on a page of the newspaper’s classified ads using a random sampling technique.*

“Down the Drain,” Water, Precious Water

*The students will measure the amount of water wasted when allowing the spigot to run until the water gets warm. They use the data to calculate water wasted for their city, state, and country.*

“Screen Test,” Math + Science, a Solution

*The students will find how large a screen needs to be in order to have approximately one million openings.*

**1.2 Interpret percents as a part of a hundred; find decimal and percent equivalents for common fractions and explain why they represent the same value; compute a given percent of a whole number.**

“Surf and Sand Spin,” Finding Your Bearings

*The students will discover the ratio of water to land on the Earth’s surface by using spinners. They will convert the ratios to decimal and percent values.*

“Surf and Sand Toss,” Finding Your Bearings

*The students will discover the ratio of water to land on the Earth’s surface by collecting data from the tossing of an inflatable globe. They will convert the ratios to percent values.*

“By Golly, By Gum,” Jaw Breakers and Heart Thumpers

*The students will discover that the mass of gum decreases when chewed. They will determine the change in mass, its ratio of difference/total and convert that to a percentage.*

“The Big Banana Peel,” Math + Science, a Solution

*The students will determine what percentage of a banana is edible. By sampling several bananas, the students will develop a formula relating the edible part to the total mass of the banana.*

“From Fractions to Decimals,” What’s Next? Volume 2

*The students will use calculators to convert fractions to decimals. They will then observe interesting patterns in the digits.*

**1.3 Understand and compute positive integer powers of non-negative integers; compute examples as repeated multiplication.**

“Teddy Bear Magic Cards” and “Teddy Bears Take a Stand,” *AIMS: VIII. 8*

*The students will solve the mystery of the magic cards by discovering that the number patterns are based on the powers of two.*

“Million Dollar Dilemma,” *AIMS: VII.6*

*The students will manipulate numbers to find which of two payments is better—a million dollars for a month’s work or a penny the first day, doubling on consecutive days, for 31 days.*

“The Fold that Fools,” What’s Next? Volume 1

*The students will repeatedly fold a piece a paper in half and count layers. Through the layer counts, they will discover the powers of two.*

**1.4 Determine the prime factors of all numbers through 50 and write the numbers as the product of their prime factors by using exponents to show multiples of a factor.**

“The Sieve of Eratostenes,” Historical Connections, Volume III

*The students will find all the prime numbers between 1 to 100 using the method developed by Eratostenes.*

“Prime Magic,” Historical Connections, Volume III

*The students will use prime numbers to make magic squares.*

**1.5 Identify and represent on a number line decimals, fractions, mixed numbers, and positive and negative integers.**

“Money Laundering,” Fabulous Fractions (to be published)

*The students will investigate decimals as base ten fractions in order to understand their relative magnitudes, to practice ordering decimals, and to experience coins (dimes and cents) as a model for understanding decimals as base-ten fractions.*

**2.0 Students perform calculations and solve problems involving addition, subtraction, and simple multiplication and division of fractions and decimals:**

**2.1 Add, subtract, multiply, and divide with decimals; add with negative integers; and verify the reasonableness of the results.**

“That’s Sum Challenge!”(Extension), Just for the Fun of It!

*The students will find which sums from one to 25 can be obtained by adding two, three, four, five, or six consecutive numbers. They will discover and discuss the patterns that exist in the solutions.*

**2.2 Demonstrate proficiency with division with positive decimals and long division with multi-digit divisors.**

**2.3 Solve simple problems, including ones arising in concrete situations, involving the addition and subtraction of fractions and mixed numbers (like and unlike denominators of 20 or less), and express answers in the simplest form.**

“Fractions with Pattern Blocks,” Fabulous Fractions (to be published)

*The students will use pattern blocks as a model to explore fraction concepts such as equivalency, addition of fractions, and mixed numbers.*

“Fraction Action 52, 59-66 and 71,” Actions with Fractions

*The students will use various manipulatives to add and subtract fractions with like and unlike denominators.*

## **2.4 Understand the concept of multiplication and division of fractions.**

“Fair Squares and Cross Products,” Fabulous Fractions (to be published)

*The students will understand multiplication of fractions using an area model.*

“Fraction Action 82-90,” Actions with Fractions

*The students will use the area model to multiply fractions. They will also explore an alternative method for the division of fractions.*

## **2.5 Compute and perform simple multiplication and division of fractions and apply these procedures to solving problems.**

### **ALGEBRA AND FUNCTIONS**

#### **1.0 Students use variables in simple expressions, compute the value of the expression for specific values of the variable, and plot and interpret the results:**

##### **1.1 Use information taken from a graph or equation to answer questions about a problem situation.**

“By Golly, By Gum, By Time,” Jaw Breakers and Heart Thumpers

*The students will discover how the mass of gum is affected by the amount of time it is chewed. Their conclusions will be drawn from the data they display on a broken-line graph.*

“The Big Banana Peel,” Math + Science, a Solution

*The students will determine what percentage of a banana is edible. By sampling several bananas, the students will develop a formula relating the edible part to the total mass of the banana.*

“Ball on a Roll,” Popping with Power

*The students will use data recorded on a graph to generalize the effect slope has on the distance a ball will roll.*

“Just Drop It,” Math + Science, a Solution

*The students will compare the height of a ball bounce to the height from which it is dropped. After several trials, they will derive a formula, plot information on a graph, and draw conclusions from their data.*

“Sugar Highs,” *AIMS: XII.10*

*The students will use the mass of sugar in a serving of a sugar-sweetened soda to determine the mass of sugar in an entire bottle of soda. They will extrapolate from the graph to determine sugar amounts in various volumes of soda.*

##### **1.2 Use a letter to represent an unknown number; write and evaluate simple algebraic expressions in one variable by substitution.**

##### **1.3 Know and use the distributive property in equations and expressions with variables.**

##### **1.4 Identify and graph ordered pairs in the four quadrants of the coordinate plane.**

##### **1.5 Solve problems involving linear functions with integer values; write the equation; and graph the resulting ordered pairs of integers on a grid.**

### **MEASUREMENT AND GEOMETRY**

## **1.0 Students understand and compute the volumes and areas of simple objects:**

**1.1 Derive and use the formula for the area of a triangle and of a parallelogram by comparing it with the formula for the area of a rectangle.**

**1.2 Construct a cube and rectangular box from two-dimensional patterns and use these patterns to compute the surface area for these objects.**

“Thinkcards 1-10, 20-24,” Spatial Visualization

*The students will use two-dimensional drawings to build irregular constructions to determine surface area and volume. These experiences will reinforce and enhance the determination of surface area and volume concepts of cubes and rectangular boxes.*

**1.3 Understand the concept of volume and use the appropriate units in common measuring systems to compute the volume of rectangular solids.**

“Cutting Corners,” Just for the Fun of It!

*The students will construct different-sized boxes and determine their capacities in cubic centimeters.*

“Build a Cube,” *AIMS Newsletter*: VI.5

*The students will construct a cube and determine its capacity in cubic centimeters.*

**1.4 Differentiate between, and use appropriate units of measures, for two- and three-dimensional objects.**

“Thinkcards 6-10, 37-46,” Spatial Visualization

*The students will use two-dimensional drawings to build irregular constructions to determine perimeter, surface area, and volume.*

“Cutting Corners,” *AIMS*: VIII.2

*The students will construct different-sized boxes and determine their lengths, widths, heights in centimeters and their capacities in cubic centimeters.*

## **2.0 Students identify, describe, and classify the properties of, and the relationships between, plane and solid geometric figures:**

**2.1 Measure, identify, and draw angles, perpendicular and parallel lines, rectangles, and triangles by using appropriate tools.**

“Making the Most of Mirrors,” *AIMS Newsletter*: IV.2

*The students will make observations that allow them to see the relationship between the angles of mirrors and number of images.*

“Sledding Through the Air,” *AIMS Newsletter*: III. 8

*The students will use protractors and rulers to enlarge a scale drawing to make a sled kite.*

“Green Sleeves,” *AIMS*: XII.2

*The students will gather data from thermometers positioned at different angles to the sun. They will compare the effect of direct rays and indirect rays on temperature and relate the results to the seasons.*

“Ramp Around,” *AIMS*: XIII.9

*The students will roll paper triangles around a pencil to discover how a screw is related to the inclined plane. They will also perform various tasks with two different screws in order to make comparisons.*

“Scale the Room,” Finding Your Bearings

*The students will use meter sticks to measure their classroom. They will then draw a map of the room to scale.*

“What a Plan!” Finding Your Bearings

*The students will interpret and enlarge, to scale, plans for a house.*

“Unbelievable Flying Objects,” The Sky’s the Limit

*The students will use protractors, rulers, and compasses to construct flying objects and explore their flight properties.*

**2.2 Know that the sum of the angles of any triangle is  $180^\circ$  and the sum of the angles of any quadrilateral is  $360^\circ$  and use this information to solve problems.**

**2.3 Visualize and draw two-dimensional views of three-dimensional objects made from rectangular solids.**

“Thinkcards 11–19,” Spatial Visualization

*The students will draw two-dimensional views of three-dimensional models.*

## **STATISTICS, DATA ANALYSIS, AND PROBABILITY**

**1.0 Students display, analyze, compare, and interpret different data sets, including data sets of different sizes:**

**1.1 Know the concepts of mean, median, and mode; compute and compare simple examples to show that they may differ.**

“It’s the Last Straw,” The Sky’s the Limit

*The students will make a straw airplane to use and obtain distance data from five flights. They will find the mean distance for their designs.*

“Rally Round the Room,” Pieces and Patterns

*The students will roll toys cars down inclined planes of various heights to determine range, median, and mean distance traveled.*

**1.2 Organize and display single-variable data in appropriate graphs and representations and explain which types of graphs are appropriate for various data sets.**

“Cat Scan,” *AIMS: VII.7*

*The students will construct and use bar graphs, circle graphs, binary tree diagrams, and Venn diagrams. Comparisons and contrasts will be made as to what information is provided by each type of representation.*

**1.3 Use fractions and percentages to compare data sets of different sizes.**

“Let’s Recycle,” *AIMS Newsletter: V.2*

*The students will use a recycling project to reinforce concepts concerning collection of data and conversion into percents. Students will collect the data monthly.*

**1.4 Identify ordered pairs of data from a graph and interpret the meaning of the data in terms of the situation depicted by the graph.**

“Finding Home,” (to be published)

*The students will be introduced to the concept of graphing on the coordinate plane by creating a life-sized graph outside. They will learn about coordinate points and ordered pairs by walking the graph and locating their individual “homes.”*

“Pizza Delivery,” (to be published)

*The students will practice locating points in the first quadrant of the coordinate plane by completing three activities associated with pizza deliveries. First, they will be directed to their locations by ordered pairs and fractions. Conversely, they will form ordered pairs and fractions that give directions to locations.*

### **1.5 Know how to write ordered pairs correctly; for example, (x, y).**

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