

Illinois

Middle School/Junior High Math Goals 6-10 Goals/Standards/Benchmarks

Correlated to AIMS Activities

Illinois State Specific Team

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GOAL 6: Demonstrate and apply a knowledge and sense of numbers, including numeration and operations (addition, subtraction, multiplication, division), patterns, ratios and proportions.

A. Demonstrate knowledge and use of numbers and their representations in a broad range of theoretical and practical settings.		
6.A.3 Represent fractions, decimals, percentages, exponents and scientific notation in equivalent forms.		
Activity	Source	Students will:
Sieve of Erastosthenes	Historical Connections III	Discover and explore prime numbers and multiples.
Percent Bands	Proportional Reasoning	Use rubber bands to compare ratios, percents, and decimal equivalents.
Making Cents of Percents	Proportional Reasoning	Report data in fraction, decimal, and percent format.
Patterns in Equivalent Fractions	Proportional Reasoning	Graph equivalent fractions on a coordinate plane.
Decimal Predictions	What's Next Vol. 3	Use a pattern to predict decimal representations for rational numbers.
Honeycomb Decimals	What's Next Vol. 1	Examine a pattern and fill in the cells with the correct decimals.
Patterns With A Point	What's Next Vol. 1	Identify the pattern of decimal equivalents to predict the 50 th digit.
Decimal Downpour	15.9	Use the internet to gather monthly precipitation figures then graph and interpret the data.

B. Investigate, represent and solve problems using number facts, operations (addition, subtraction, multiplication, division) and their properties, algorithms and relationships.		
6.B.3a Solve practical computation problems involving whole numbers, integers and rational numbers.		
Activity	Source	Students will:
None Applicable		

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6.B.3b Apply primes, factors, divisors, multiples, common factors and common multiples in solving problems.		
Activity	Source	Students will:
Prime & Squares (Fermat)	Historical Connections III	Apply knowledge of prime numbers to magic squares.
Greatest Common Denominators and Least Common Multiples	Historical Connections II	Use Euclid's algorithm to find the greatest common denominator and least common multiple of two positive integers.

6.B.3c Identify and apply properties of real numbers including pi, squares, and square roots.		
Activity	Source	Students will:
Prime & Squares (Fermat)	Historical Connections I	Generate prime numbers from perfect squares.
Heron's Square Root Method	7.03	
Finding Pi	Historical Connections II	Determine the value of pi experimentally.
Models of Square Numbers	Multiplication the Algebra Way	Construct models of square numbers and discover patterns in consecutive square numbers.
Practically Pi	Math + Science – A Solution	Understand that pi is a constant relationship between circumference and diameter.

C. Compute and estimate using mental mathematics, paper-and-pencil methods, calculators and computers.		
6.C.3a Select computational procedures and solve problems with whole numbers, fractions, decimals, percents and proportions.		
6.C.3b Show evidence that computational results using whole numbers, fractions, decimals, percents and proportions are correct and/or that estimates are reasonable.		
Activity	Source	Students will:
Tunnel Vision	Through the Eyes of the Explorers	

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D. Solve problems using comparison of quantities, ratios, proportions and percents.		
6.D.3 Apply ratios and proportions to solve practical problems.		
Activity	Source	Students will:
Paper Clip Chains	Proportional Reasoning	Measure objects using standard and jumbo paper clips and use ratios and proportions to change clip size.
I Spy	14.01	Use proportionality, an aerial photograph, and a map to determine the relationship between distance and travel time.
Drop It	Proportional Reasoning	Understand and apply ratios, proportions, and percents to understand the bounce-to-drop ratio.
Tailor Made	Proportional Reasoning	Determine the average ratios of the circumference of different body parts and design a coat for an imaginary giant.

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GOAL 7: Estimate, make and use measurements of objects, quantities and relationships and determine acceptable levels of accuracy.

A. Measure and compare quantities using appropriate units, instruments and methods.		
7.A.3a Measure length, capacity, weight/mass and angles using sophisticated instruments (e.g., compass, protractor, trundle wheel).		
Activity	Source	Students will:
Measuring Lines	Looking at Lines	Measure items in centimeters and inches and determine a conversion rate.
Plod and Plot	15.04	Use a compass, metric tape, and protractor to physically plot and label coordinate points.

7.A.3b Apply the concepts and attributes of length, capacity, weight/mass, perimeter, area, volume, time, temperature and angle measures in practical situations.		
Activity	Source	Students will:
Fencing Squares	13.06	Determine the cost of fencing per unit area as a square plot increases in size.
Constant Areas	13.07	Use a 12x12 multiplication table, also known as a constant area table to graph rectangles with the same area.
Corpus All Around Us	From Head to Toe	Measure an outline of their body in metric units to find “their perimeter”.
Keeping Tabs on Mass	4.09	Measure the mass of an object using pop can tabs.
Area Patterns	11.05	Compute area of a rectangle by counting tiles on a grid.
The Perimeter Area Ratio	11.06	Examine the ratio of perimeter to area in squares of different sizes.
Designing Efficient Storage Space	11.07	Design a rectangular storage space with a perimeter of 20 meters and the lowest cost per square meter of floor space.
How Slow is the Flow?	15.09	Investigate relationship between particle size and rate of flow.
Coaster Construction	16.08	Construct a roller coaster and investigate the relationship between height to potential kinetic energy.
Rising Towers	Looking at Lines	Determine the surface area of height of towers.
Books Upon Books	Looking at Lines	Collect and graph discrete data.
Temperature Conversion	Looking at Lines	Make a data table or graph comparing F and C temperature scale and describe the relationship.
Mystery Mass	Looking at Lines	Write linear function rules for situations.
Pattern Block Function	Looking at Lines	Explore, identify, and describe the relationship between perimeter and the number of tiles in a pattern.

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Activity	Source	Students will:
A Winter Holiday Adventure	Looking at Lines	Take measurement of a growing plant and make predictions based on patterns of growth.
Style Tiles	Multiplication the Algebra Way	Deepen their understanding of the meaning and purpose of perimeter and area.

B. Estimate measurements and determine acceptable levels of accuracy.

7.B.3 Select and apply instruments including rulers and protractors and units of measure to the degree of accuracy required.

Activity	Source	Students will:
An Inside Job	Pieces and Patterns	Measure angles and determine if they tessellate.

C. Select and use appropriate technology, instruments and formulas to solve problems, interpret results and communicate findings.

7.C.3a Construct a simple scale drawing for a given situation.

Activity	Source	Students will:
What a Plan	Finding Your Bearings	Interpret and enlarge to scale plans for a house.
Shrink Art	Proportional Reasoning	Compare and contrast the sizes before and after scaling.
Spacing Out the System	Out of This World	Determine the relative distance of the planets in order to construct a model of the solar system.
Doin' Dots	Proportional Reasoning	Apply their understanding of scaling to enlarge a mural.
Playing at Math	Proportional Reasoning	Measure scaled toy cars and use scaling techniques to determine the actual dimensions of a real car.
Toy Soldiers Take the Court	Proportional Reasoning	Measure a basketball and make a scale drawing of it based on a toy soldier.
Measuring Models	Proportional Reasoning	Measure models of different scales and compare them by making a drawing of them all in the same scale.
Making Movie Props	Proportional Reasoning	Use their height and the height of an action figure to establish a scale with which they will construct an enlarged object that makes them appear to be the size of the action figure.

7.C.3b Use concrete and graphic models and appropriate formulas to find perimeters, areas, surface areas and volumes of two-and three-dimensional regions.

Activity	Source	Students will:
Think Cards 1-5	Spatial Visualization	Construct models of 3D figures and determine volume, perimeter, and surface area.

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GOAL 8: Use algebraic and analytical methods to identify and describe patterns and relationships in data, solve problems and predict results.

A. Describe numerical relationships using variables and patterns.		
8.A.3a Apply the basic properties of commutative, associative, distributive, transitive, inverse, identity, zero, equality and order of operations to solve problems.		
Activity	Source	Students will:
Dealing with Negatives	Multiplication the Algebra Way	Become acquainted with modeling the distributive property and develop a mental image of progressive steps in use of distributive property.
Filling Frames Parts 1-2	Multiplication the Algebra Way	Represent the idea of a variable as an unknown and arrange sets of base three tiles into a rectangle.
Filling Frames Parts 3-5	Multiplication the Algebra Way	Use distributive property to compute the area and complete the $l \times w = \text{area}$ math sentence.
Mystery Numbers	Multiplication the Algebra Way	Determine the length, width, and area of a 2D rectangle.

8.A.3b Solve problems using linear expressions, equations and inequalities.		
Activity	Source	Students will:
Building Picket Fences	13.01	Use pictures of picket fences to determine patterns of pickets and nails and write linear equations.
Entire Book	Looking at Lines	Use real-world situations as a context for building an understanding of linear function concepts.
On the Level I On Level II	Looking at Lines	Construct an equal arm balance to collect data and analyze data to discover the linear relationship.
Sales Calls	Looking at Lines	Interpret and graph inequalities from written statements.
Bungee Jump	16.02	Measure length, graph the data collected and derive an equation.
Let's Party	Looking at Lines	Represent and interpret data and recognize the connection of rate of change in numeric forms as equivalent to the slope.
Hooked on Algebra	14.06	Use the language of algebra to describe a stretched rubber band where length is a function of added weight.

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B. Interpret and describe numerical relationships using tables, graphs and symbols.		
8.B.3 Use graphing technology and algebraic methods to analyze and predict linear relationships and make generalizations from linear patterns.		
Activity	Source	Students will:
The Parade of Triplets	Proportional Reasoning	Graph fractions as ordered pairs and explore the relationships and patterns.
Entire Book	Looking at Lines	Use real world situations as a context for building an understanding of linear function concepts.
Calling Long Distance	Looking at Lines	Build a cost table detailing the charges for long-distance calling.
Get Wet!	16.01	Collect and weigh objects in air and water; graph the results and predict linear relationships.
Patterns of Growth	16.07	Construct graphs comparing growth rates of trees; develop equations to predict age and height of tree from diameter.

C. Solve problems using systems of numbers and their properties.		
8.C.3 Apply the properties of numbers and operations including inverses in algebraic settings derived from economics, business and the sciences.		
Activity	Source	Students will:
Nickels and Dimes	14.08	Interpret data and write an algebraic rule for the number of nickels and dimes that add to exactly \$1.00.
Candy Combinations	14.10 Looking at Lines	Organize a method to combine 5c and 7c candies so that each represents at least 20% of the total number of pieces.

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D. Use algebraic concepts and procedures to represent and solve problems.		
8.D.3a Solve problems using numeric, graphic or symbolic representations of variables, expressions, equations and inequalities.		
Activity	Source	Students will:
Combinations I, II Positives & Negatives	Multiplication the Algebra Way	Explore positive and negative terms using base ten tiles.
Quadratic Equation Snapshots	Multiplication the Algebra Way	Translate pictures of quadratic equations into the standard written language of algebra.

8.D.3b Propose and solve problems using proportions, formulas and linear functions.		
Activity	Source	Students will:
Prime Number “Machine”	Historical Connections I	Use formulas to explore prime numbers.
Head Hunter	9.10	Determine if there is a correlation between a person’s height to head circumference.
Up Periscope	15.06	Construct a working model of a periscope and use it to collect, record, and graph data; write an equation that describes the relationships discovered.

8.D.3c Apply properties of powers, perfect squares and square roots.		
Activity	Source	Students will:
None applicable		

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GOAL 9: Use geometric methods to analyze, categorize and draw conclusions about points, lines, planes and space.

A. Demonstrate and apply geometric concepts involving points, lines, planes and space.		
9.A.3a Draw or construct two- and three-dimensional geometric figures including prisms, pyramids, cylinders and cones.		
Activity	Source	Students will:
Trying Triangles	Pieces and Patterns	Roll 3 number cubes and determine if a triangle could be made and generate a formula.
Three-Dimensional Puzzles	Puzzle Play	Construct and draw 3-D geometric figures using wooden cubes and golf balls.
Cube Construction	Just For the Fun of It	Discover and construct the seven irregular shapes which compose a Soma Cube.
Record-Making Cubes	Just For the Fun of It	Use divergent thinking to draw/record Soma Cube solutions in a many ways possible.
Property Lines	16.03	Sort quadrilaterals by attributes of their diagonals; create a tree diagram from the results.

9.A.3b Draw transformation images of figures, with and without the use of technology.		
Activity	Source	Students will:
Growing Designs	Proportional Reasoning	Explore transformations by enlarging designs on graph paper and analyze the coordinates and dimensions of the enlargements.
Cut and Fold Challenge	Puzzle play	Explore the transformation of 2-D pieces of paper into 3-D shapes such as a hypersquare.
Baffling Band	Puzzle Play	Transform pieces of paper into 3-D shapes.

9.A.3c Use concepts of symmetry, congruency, similarity, scale, perspective, and angles to describe and analyze two- and three-dimensional shapes found in practical applications (e.g., geodesic domes, A-frame houses, basketball courts, inclined planes, art forms, blueprints).		
Activity	Source	Students will:
Rectangle Ratios	Proportional Reasoning	Be introduced to proportionality of similar figures.
What A Plan	Finding Your Bearings	Interpret and enlarge to scale plans for a house.
Shrinking Boundaries	Finding Your Bearings	Create a scale drawing of half of a basketball court.
Rubber Band Enlargements	Proportional Reasoning	Enlarge to scale using a rubber band enlarger.

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Activity	Source	Students will:
Shrink Art	Proportional Reasoning	Compare and contrast the sizes before and after scaling.
Growing Designs	Proportional Reasoning	Enlarge designs on a graph and study coordinates to understand scaling.
Doin' Dots	Proportional Reasoning	Apply understanding of scaling to enlarge a mural.
Up and Down the Scale	12.05	Draw objects from a top-down view in several different scales and compare the results.
Dissection Puzzles	Puzzle Play	Use geometric shapes to build geometric concepts such as similarity, area, perimeter, and congruence while solving problems.
The Spider's Web	16.03	Reflect images, construct perpendicular bisectors, construct a line of symmetry, and compare the meaning of line symmetry.
Symmetrically Challenged	16.09	Use multiple triangles and square pieces to create square tessellations and use tessellations to explore symmetry.

B. Identify, describe, classify and compare relationships using points, lines, planes and solids.

9.B.3 Identify, describe, classify and compare two- and three-dimensional geometric figures and models according to their properties.

Activity	Source	Students will:
Five-Sided Box	Paper Square Geometry	Fold a 3D five-sided box and identify its geometric properties.
Rectangular Box	Paper Square Geometry	Will fold a 3D rectangular box and determine geometric relationships between elements of the box.
Triangular Box	Paper Square Geometry	Fold a triangular box and identify the geometric properties.
Bird Tetrahedron	Paper Square Geometry	Fold a tetrahedron bird and determine the number of faces, edges, vertices, and surface area.
Regular Tetrahedron	Paper Square Geometry	Fold a regular tetrahedron and compare its properties to those of the bird tetrahedron.
Cube	Paper Square Geometry	Fold a cube and identify the geometric properties.
Octahedron	Paper Square Geometry	Fold an octahedron, identify properties, and compare to other folded figures.
Dodecahedron	Paper Square Geometry	Construct a dodecahedron, identify properties, and compare to other folded figures.
Icosahedron	Paper Square Geometry	Fold an icosahedron, identify properties, and make comparisons between icosahedron and other platonic solids.
24-Sided Figure	Paper Square Geometry	Fold a 24-sided figure, identify properties, and compare/contrast the 24-sided figure stellated octahedron.

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C. Construct convincing arguments and proofs to solve problems.		
9.C.3a Construct, develop and communicate logical arguments (informal proofs) about geometric figures and patterns.		
Activity	Source	Students will:
Quarter Quandary	15.06	Investigate circumference of new quarters; observe and explain a discrepant event.
Junk's Puzzle: A Mathematical Look	16.08	Identify the number of moves necessary to move a block within a geometric puzzle and justify their strategy.
Entire Book	The Amazing Circle	Use a plain circular sheet of paper and observe, identify, and compare geometric properties and relationships as they fold, crease, unfold the circle.

9.C.3b Develop and solve problems using geometric relationships and models, with and without the use of technology.		
Activity	Source	Students will:
Playing At Math	Proportional Reasoning	Measure scale toy cars and use scaling to determine actual dimensions of a car.
Functions In Circles	14.07	Explore circumference of a circle as a function of its diameter.
Toothpick Puzzles	Puzzle Play	Use toothpicks to construct various 2-D geometric shapes and solve puzzles.
Visual Illusions	Puzzle Play	Explore and solve problems involving visual illusions.
Determining Diameters	16.07	Use a logger's diameter tape to find the diameter of a tree; apply the relationship between circumference and diameter to evaluate the design and effectiveness of the tape.

D. Use trigonometric ratios and circular functions to solve problems.		
9.D.3 Compute distances, lengths and measures of angles using proportions, the Pythagorean theorem and its converse.		
Activity	Source	Students will:
The Shadow Knows	Proportional Reasoning	Determine the height of an object using shadows and proportionality.
Probably Pythagorean	Pieces and Patterns	Roll 3 dice and determine the probability that the resulting triangles are acute, right, or obtuse.
Triangles of Squares	Looking at Lines	Recognize equality and inequality between the sum of the areas of the squares on the short legs of a triangle compared to the area of the square on the longest side.
Pythagoras	Historical Connections I	Explore Pythagoras and his work on his theorem for right triangles to extend their geometric understanding.

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GOAL 10: Collect, organize and analyze data using statistical methods; predict results; and interpret uncertainty using concepts of probability.

A. Organize, describe and make predictions from existing data.		
10.A.3a Construct, read and interpret tables, graphs (including circle graphs) and charts to organize and represent data.		
10.A.3b Compare the mean, median, mode and range, with and without the use of technology.		
10.A.3c Test the reasonableness of an argument based on data and communicate their findings.		
Activity	Source	Students will:
Making Cents of Percents	Proportional Reasoning	Construct a visual model of data to better understand proportional relationship of percents.
Global Gains	Finding Your Bearings	Construct a bar graph of global populations, note when it has doubled, and predict when it will double again.
What's In The Bag	Math + Science A Solution	Explore bags of candies and compute the average total number of candies of the percent of each color.
Dealing With Data	Math + Science A Solution	Gather and record data on what part of the school population has the same traits as they have.
Sunsational Changes	16.08	Measure, record, and graph temperature change over time.

B. Formulate questions, design data collection methods, gather and analyze data and communicate findings.		
10.B.3 Formulate questions (e.g., relationships between car age and mileage, average incomes and years of schooling), devise and conduct experiments or simulations, gather data, draw conclusions and communicate results to an audience using traditional methods and contemporary technologies.		
Activity	Source	Students will:
Against the Wall	14.01	Measure length of legs and height of torso and graph values and compare the slope of their line with others.
Welcome to 42 nd Street	13.08	Graph ordered pairs whose product is 42 and construct 3-D models.
Night and Day	14.08	Use sunrise and sunset data to compare length of day explore transition from a bar graph to a circle graph.
The Marbelous Rolls	8.01	Compute the ratio of the mean distance rolled on the carpet to distance rolled on the plane.

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Activity	Source	Students will:
Color Samples	12.08	Gather data on quantity and distribution of colors in a bag of M&Ms; make graphic display and determine measure of central tendency to summarize findings.
Is Anyone Normal?	Proportional Reasoning	Use height data from class to generate stem and leaf and box and whisker plots; based on data analysis make inferences and convincing arguments.
Are You Ideal?	Proportional Reasoning	Compare their body height and arm span to da Vinci's ideal image and use a variety of graphs to gain understanding of central tendencies, dispersions, and correlation of data.
This Is So Typical	Proportional Reasoning	Gather and analyze data to determine some of the physical proportions of a typical student.

C. Determine, describe and apply the probabilities of events.

10.C.3a Determine the probability and odds of events using fundamental counting principles.

Activity	Source	Students will:
See How They Roll	Pieces and Patterns	Explore the probability of rolling 3 dice so that a scalene, equilateral, or isosceles triangle is found.
Trying Triangles	Pieces and Patterns	Roll 3 cubes to represent the lengths of line segments of triangles and determine which 3 segments will construct triangles.
Who's on First	2.02	Use permutations to figure the number of arrangements.
Trait Combos	6.10	Determine the probability of inheriting certain traits and combinations of traits.

10.C.3b Analyze problem situations (e.g., board games, grading scales) and make predictions about results.

Activity	Source	Students will:
Color Samples	12.08	Gather data with M&Ms, make graphic displays, determine measures of central tendency for the samples, and summarize findings to make predictions about other bags.