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ABSTRACT

This document states the educational goals for Algebra 1 and Geometry in Arkansas' Learning Standards which are defined in the Arkansas Curriculum Framework. The five goals listed for Algebra 1 include Language of Algebra; Solve Equations and Inequalities; Graphs and Tables With and Without Graphing Calculators; Functions, Relations, and Patterns; and Polynomial Operations. The five goals listed for Geometry include Geometry of Patterns, Geometry of Dimensions, Geometry of Relationships, Geometry of Shape, and Geometry of Size. It is suggested that the goals for geometry may overlap as appropriate. Geometric terms are also included. (KHR)

ARKANSAS
ALGEBRA 1 & GEOMETRY GOALS

Arkansas Department of Education
Curriculum and Instruction

Summer, 1998

Support Documents

√ Formulas

√ Geometry Terms

Arkansas Algebra I Goals

Goal 1 Language of Algebra

1.1 Real number system
- -recognize and use counting numbers, whole numbers, integers, rational numbers, irrational numbers

1.2 Know the fundamental language of algebra
- -sum, difference, product, quotient, factor, term, prime, composite, exponent, root, etc.

1.3 Demonstrate ability to use the order of operations

1.4 Understand the concept of variable as used in algebraic modeling

1.5 Translate word expressions to symbolic expressions

1.6 Distinguish between "expression" & equation and simplify & solve

1.7 Illustrate numerically and recognize:
- -the meaning of powers and roots
- -basic algebraic properties (commutative, associative, distributive, reflexive)
- -absolute value
- -concept of inequality

Goal 2 Solve Equations and Inequalities

2.1 Solve equations involving:
- -integers and fractions
- -ratios and proportions
- -simple absolute value
- -real-world applications (d = rt, percents, simple probability, etc.)
- -open-ended questions

2.2 Solve simple inequalities

2.3 Express answers using:
- -estimation
- -appropriate units
- -sentence form

2.4 Integrate algebra and geometry in problems involving:
- -student sketches of basic geometric shapes (square, rectangle, triangle, circle)
- -formulas: pythagorean teorem, area, perimeter
- -representation of 1 and 2-dimensional figures algebraically

Goal 3 **Graphs and Tables (with and without graphing calculators)**

3.1 Read, construct, and interpret graphs and tables. Use the results to make predictions

3.2 Use a simple matrix to represent data and perform the operations of addition, subtraction, and scalar multiplication

3.3 Use and apply linear functions to model:
- -slope/rate of change
- -intersection of lines graphically and algebraically
- -equations of the form $Ax + By = C$ and $y = mx + b$
- -the equation for the line of best fit
- -real life situations: meaning of slope/y-intercept, predictions

3.4 Calculate measures of central tendency
- -determine mean, median, mode
- -represent data by stem-and-leaf, box and whisker, histogram

Goal 4 **Functions, Relations, & Patterns**

4.1 Use function notation

4.2 Identify the domain and range of a relation (from ordered pairs or graphs)

4.3 Determine if a given relation is a function (from ordered pairs or graphs)

4.4 Find the zeros of a function by examining a graph

4.5 Identify independent and dependent variable in a real-life situation

4.6 Communicate graphically, algebraically, and verbally real-world problems

Goal 5 **Polynomial Operations**

5.1 Add, subtract, multiply polynomials (combining similar terms)

5.2 Factor simple expressions

5.3 Solve second degree equations by factoring and graphing

5.4 Solve problems involving scientific notation

Arkansas Geometry Goals

The five goals listed below may be taught in any manner, but it is suggested that they overlap as appropriate.

Goal 1 **Geometry of Patterns**

Inductive and deductive reasoning

1-1 Define, compare, and contrast inductive and deductive reasoning
1-2 Extend sequences with numeric and geometric patterns
1-3 Make predictions based on real world situations using inductive and deductive reasoning

Logical reasoning

1-4 Recognizing valid and invalid arguments in real world situations
1-5 Solve problems using logical methods (e.g. matrix logic, Venn diagrams, etc.)

Goal 2 **Geometry of Dimensions**

One dimensional figures

2-1 Find the distance between two points on the number line
2-2 Find the midpoint of a segment

Two dimensional figures

2-3 Plot and find the distance between two points on the Cartesian coordinate system
2-4 Find the midpoint of a segment
2-5 Graph lines with and without graphing calculators
2-6 Write equations of lines in slope-intercept form and use slope to determine parallel and perpendicular lines

Relationships between one-, two-, and three- dimensional geometry

2-7 Describe and draw cross sections formed by the intersection of a two-dimensional and a three-dimensional object
2-8 Use nets to represent and construct three-dimensional objects
2-9 Match different two-dimensional representations of three dimensional objects
2-10 Identify and use terms associated with spherical geometry (a form of non-Euclidean geometry)

Goal 3 **Geometry of Relationships**

Lines and angles

3-1 Recognize and use properties of vertical angles, linear pairs of angles, supplementary and complementary angles and angles associated with polygons

3-2 Recognize and use properties of angles associated with transversals, parallel lines, and perpendicular lines

3-3 Solve problems by applying the angle properties of lines and polygons

Triangles

3-4 Classify triangles according to the lengths of the sides and angle measurements

3-5 Identify altitudes, medians, and perpendicular bisectors of any triangle

3-6 Use right triangles

3-6-1 Use the Pythagorean theorem and its converse

3-6-2 Solve problems using the Pythagorean theorems with a calculator

3-6-3 Use relationships of special right triangles (30-60-90 or 45-45-90)

Polygons and polyhedra

3-7 Classify polygons and polyhedra according to the number of sides or faces

3-8 Classify quadrilaterals according to their properties

3-9 Determine the sum of the interior angles of a polygon

3-10 Identify the five Platonic solids

Circles and spheres

3-11 Identify terms associated with circles and spheres

3-12 Apply the properties involving arcs and angles of circles

3-13 Identify the center and radius of a circle given the equation of a circle in standard form

Goal 4 **Geometry of Shape**

Similarity and congruence

4-1 Use ratios to solve problems involving similar figures

4-2 Use similarity to solve problems using scale drawings

4-3 Use a calculator to determine trigonometric ratios

4-4 Use trigonometric ratios (sine, cosine, and tangent) to solve for the missing parts of right triangles

4-5 Identify congruence as a one-to-one similarity

Transformations

4-6 Identify and/or sketch reflections, rotations, and translations of two dimensional figures

4-7 Identify and/or sketch lines of symmetry and rotational symmetries

4-8 Use and write coordinates for reflections over the x and y axis; rotations of 90 and 180 degrees; and translations on the Cartesian coordinate system

4-9 Identify figures that will tessellate

4-10 Use transformations to solve real world problems (e.g. tilings and miniature golf)

Goal 5 **Geometry of Size**

Segments and angles

5-1 Use a ruler to measure line segments in both English and metric units

5-2 Use a protractor to measure angles to the nearest degree

Perimeter and circumference

5-3 Use calculators to solve problems involving perimeter or circumference

5-4 Identify π as the ratio of circumference to diameter

Area and surface area

5-5 Use calculators and formulas to find area or surface area of simple geometric shapes or solids

5-6 Find the area of polygons by subdividing into simple geometric shapes

5-7 Use calculators and formulas to solve problems involving area or surface area

5-8 Estimate the area of simple closed curves

Volume

5-9 Use calculators and formulas to find the volume of simple geometric solids

5-10 Use calculators and formulas to solve problems involving volume

Relationships between perimeter, area, and volume

5-11 Describe the effect on perimeter, area, and/or volume when the length, width, or height is changed

5-12 Solve problems dealing with changes in length, width, or height

TERMS
acute angle
acute triangle
adjacent angles
alternate interior angles
alternate exterior angles
altitude a polygon
angle
angle of depression
angle of elevation
arc
area
base of a prism, pyramid, cylinder, or cone
base angles of an isosceles triangle
base angles of an isosceles trapezoid
bases of a trapezoid
bisector of a segment
bisector of an angle
center of a circle
central angle of a circle
chord
circle
circumference of a circle
circumscribed circle or polygon
collinear points
complementary angles, complements
concave polygon
concentric circles
conclusion
conditional statement
cone
congruent figures
conjecture
consecutive angles and sides
converse
convex polygon
coordinate plane
coplanar
corresponding angles
corresponding parts
cosine of an angle
cube
cylinder
deductive reasoning
diagonal of a polygon
diameter of a circle
distance
edges of a polyhedron
endpoint of a segment or ray
equiangular polygon
equiangular triangle
equidistant
equilateral polygon
equilateral triangle
Euclidean geometry
exterior angle of a polygon
faces of a polyhedron
great circle
hexagon
hypotenuse of a right triangle
hypothesis
image
inductive reasoning
inscribed angle
inscribed circle or polygon
intercepted arc
interior angles of a polygon
isosceles trapezoid
isosceles triangle
kite
lateral area
line of symmetry or reflection
linear pair of angles
major arc
median of a triangle
midpoint of a segment
minor arc
n-gon
net
non-Euclidean geometry
obtuse angle
obtuse triangle
octagon
ordered pairs
orthographic drawing
parallel lines and planes
parallelogram
perimeter
pentagon
perpendicular
perpendicular bisector
perspective drawings
point of tangency
polygon
polyhedron
postulate
preimage
proportion
prism
pyramid
quadrilateral
radius of a circle
ratio
ray

rectangle
rectangular prism
reflection
regular polygon
rhombus
right angle
right triangle
right prisim
right cone
right pyramid
rotation
rotational symmetry
scalene triangle
secant of a circle
sector of a circle
segment
semicircle
similar
sine ratio
skew lines
slant height
slope
sphere
spherical geometry
square
supplementary angles, supplements
surface area
symmetry
tangent ratio
tangent to a circle
tangent to a sphere
tessellation
theorem
transformation
translation
transversal
trapezoid
triangle
vanishing point
vertex (vertices) of a polygon or polyhedron
vertical angles
volume

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