

Geometry Journey

Math

See individual programs for Math SOL

15 -15-minute programs for grades 5-12

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Great Plains Network 2001

This all-new geometry video series serves as a visualization aid in this fascinating journey of geometry exploration. Using computer animation, live-action video and graphics, this series not only motivates students to learn by showing the beautiful and elegant aspects of geometry, but also helps students easily break through the learning barrier by visualizing abstract concepts. This full curriculum based video series will be an indispensable tool for any geometry teacher looking for a way to inspire students.

1. Geometry World - This program is a general introduction to all aspects of geometry, including plane geometry, solid geometry and non-Euclidean geometry. By showing the interesting and exciting aspects of geometry that are all around us, this program will help first-time geometry students develop an appreciation for the ever-present beauty of geometry and wonders of geometric forms. The goal is to stimulate the students to pursue the subject further.

Mathematics: 5.1, 5.15, 5.16, 6.1, 6.14, 6.17, 7.1, 7.9, 7.11, 8.8, G.1, G.9, G.10

2. Points, Lines and Rays - This program is a visual tour of the building blocks of geometry: points and lines. It helps students realize that mathematically these terms are very hard to define, although we all have a general understanding of what they are. The goal is to help students develop a mathematical understanding of these concepts.

Mathematics: 6.1, 6.16, 7.1, 7.9, 7.11, 7.12, 7.13, 8.1, 8.10, G.1, G.2, G.3, G.4, G.11

3. Angles - This program is designed to help students learn an important concept in geometry: angle. All aspects of this concept are introduced, including protractor, angle addition postulate, congruent

angles, straight angle, right angle, acute angle, obtuse angle, adjacent angles and linear pair, complementary angles, supplementary angles, vertical angles and angle bisector. Mathematics: 5.1, 5.13, 5.14, 6.1, 6.13, 6.15, 6.16, 7.1, 7.9, 7.10, 7.11, 7.13, 8.1, 8.6, 8.8, 8.10, G.1, G.3, G.4, G.6, G.8, G.9, G.11

4. Symmetry, Reasoning and Proof - The most obvious evidence of geometric laws in nature is the symmetry and balance in so many of nature's creations. This program helps students develop not only the appreciation for the beauty of geometry, but also the skill to see the key constant property in any system. In addition, the visual environment also helps students to easily understand the three types of reasoning: intuitive, inductive, and deductive.

Mathematics: 5.1, 5.15, 7.1, 7.9, 7.13, 8.1, 8.8, 8.10, G.1, G.2, G.8, G.14

5. Triangles - This program covers the properties of the simplest polygon, triangle, in detail. All aspects are introduced, including the sum of three interior angles, how to construct a triangle, how to classify triangles by sides and angles, congruent and similar triangles. This program not only provides students

with an opportunity to view triangles from a new angle, but also helps them understand the unique properties such as the great stability provided by triangles. Mathematics: 5.1, 5.8, 5.13, 5.14, 6.1, 6.13, 6.15, 7.1, 7.7, 7.11, 7.13, 8.1, 8.6, 8.10, G.5, G.6, G.7

6. Polygons - Polygons are used in nearly everything mankind builds, forming the basis for many structures, games and pastimes. This program is designed to help students easily visualize how to classify polygons into different major types as well as the distinct properties of each type, including quadrilaterals (the rectangle, square, parallelogram, rhombus and trapezoid) and regular polygons. Mathematics: 5.1, 5.8, 5.15, 6.1, 6.11, 6.15, 7.1, 7.7, 7.9, 7.10, 7.11, 7.13, 8.8, G.3, G.8, G.9

7. Perimeter and Area - This program is designed to help students develop a powerful, mental process to derive every formula for calculating perimeters and areas. It shows how to start from one simple concept, a square unit, to arrive at the method for calculating the areas of all planar shapes. Once a student visualizes the process for deriving a formula, burdensome formula memorization is no longer required. Mathematics: 5.1, 5.8, 5.10, 5.11, 6.1, 6.10, 6.11, 7.7, 8.6, G.1, G.14

8. Circles - The circle is as indispensable to man as it is to nature. Every wheel that moves, every gear that turns exploits the geometrical properties of the circle. This program can not only help students master the unique properties of circles, but also help them digest the beginning concepts of calculus, thus building a good foundation for future advanced studies.

Mathematics: 5.1, 5.9, 5.11, 6.1, 6.12, G.1, G.14

9. Relationships between 2D & 3D

Usually, many students find it difficult to make the transition from 2D studies into the 3D world. This program is designed to help ease this process. By showing the relationship among 2D figures and 3D shapes, students can better visualize the three-dimensional objects with the help of their existing two-dimensional knowledge.

Mathematics: 5.1, 5.16, 6.1, 6.17, 7.8, 8.7, 8.8, 8.9, G.1, G.12, G.13

10. Lines, Planes, & Angles in Space

- The ability to view lines, planes and angles in three-dimensional space is the essential skill in studying solid geometry. They are the basic “building blocks” of this subject. This program is designed to help students develop the ability to visualize and understand these critical concepts. Mathematics: G.1, G.12, G.13

11. Polyhedrons and Solids of Revolution

– Why are some shapes good for supporting structures that reach into the sky and others good for sports? This program answers these questions by explaining the unique properties of each shape. All basic 3D figures are introduced, including the prism, parallelepiped, pyramid, frustum of a pyramid, cylinder, cone, frustum of a cone and sphere. Mathematics: 6.1, 6.17, 7.8, 8.7, 8.8, 8.9, G.1, G.12, G.13

12. Surface Areas - By visually showing how to reduce 3D curved surfaces into 2D flat areas, the more complex lateral area problems become simpler 2D area cases. This program can help turn a memory game—remembering so many lateral area formulas—into an easy, visual process to derive these formulas. The materials covered include the lateral areas of right prisms, regular pyramids, frustum of a regular pyramid, right cylinders, right cones and the surface areas of spheres.

Once a student visualizes the process for deriving a formula, burdensome formula memorization is no longer required. Mathematics: 5.1, 5.16, 6.1, 6.17, 8.8, 8.9, G.1, G.12, G.13

13. Volumes of Solid Figures - By demonstrating that more complex 3D shapes are merely combinations of basic shapes, this program helps develop the ability to derive volume formulas based on the understanding of just a unit cube. All commonly seen volumes are covered, including the volumes of rectangular solids, parallelepiped, prism, cylinder, pyramid, cone and sphere. Again, this program helps eliminate another boring, pure memory game by developing the ability to derive. Mathematics: 5.1, 5.10, 5.16, 6.1, 6.17, 7.8, 8.7, 8.9, G.1, G.13

14. Regular Polyhedrons - One amazing fact is that there are only five kinds of possible regular convex polyhedrons—regular tetrahedron, regular hexahedron or cube, regular octahedron, regular dodecahedron, and regular icosahedron. Their sheer beauty alone attracts many people to study them. Watch this program to find out why there are only five and how to easily construct these fascinating shapes.

15. Non-Euclidean Geometry

- Although Euclidean geometry has helped us for thousands of years, as mankind questions and discovers the universe, other branches of geometry

have been developed. This program is an attempt to introduce these difficult subjects—hyperbolic geometry, elliptic geometry and fractal geometry—using the visual approach. The goal is to spark an interest into exploring many unknown worlds ahead.