Questions Galore!

STUDY GUIDE:
GEOMETRY: TERMS AND FORMULAS

Geometry is the branch of mathematics that deals with lines, solids, angles, surfaces, shapes, and measurements. An ancient Greek mathematician named Euclid, was the founder of geometry.

BASIC VOCABULARY TERMS:

1. Angle: two rays that are joined together with a common endpoint.

2. Area: the measure of the space within a two-dimensional figure; expressed in square units.

3. Bisect: to divide equally into two congruent pieces or parts.

4. Chord: a straight line segment that touches two different points upon a circle, but does NOT go through the center of the circle.

5. Circle: the set of points that are equidistant from a central point of a plane figure.

6. Circumference: the distance around a circle; its perimeter.

7. Compass: a geometric tool used to draw circles, or construct other geometric constructions.

8. Cone: a space figure that is formed by connecting a circle to a point that is not in the same plane.

9. Congruent figures: figures that are exactly the same size and shape.

10. Counterclockwise: the direction around a circle that is opposite to the way the hands on a clock move.

11. Cube: a three-dimensional figure having 6 sides, called faces, where each face is in the shape of a square.

12. Cylinder: a space figure with two circular bases that are identical in size and shape, and parallel to one another.

13. Degree: a unit of measurement used to measure angles and revolutions; there are 360 degrees in one complete circle.

14. Diagonal: any straight line that connects two vertices of a polygon, but is not a side of that polygon.

15. Diameter of a circle: the distance from one side of a circle to the opposite side, when traveling through the center of the circle.

16. Edge: the segment where two outermost sides of a three-dimensional figure meet and join.

17. Endpoint: the starting point of a line segment or ray.

18. Faces: the sides of a three-dimensional figure of solid.

19. Hypotenuse: the side opposite the right angle in a right triangle.

20. Intersect: to cross one another.

21. Legs: the two sides of a right triangle that are not the hypotenuse.

22. Line: a set of points that continue without end in both directions.

23. Line segment: the two endpoints and the straight line distance between these two points; a portion of a line that begins at a specific point and ends at a different specific point.

24. Midpoint: a point that divides a segment into exactly two segments of equal length.

25. Opposite rays: rays that have the same endpoint, but travel in opposite directions to form a line.

26. Parallel lines: two lines in the same plane that are equidistant from each other, have no points in common, and never intersect or cross each other.

27. Perimeter: the distance around the outer edges of a polygon; the sum of the sides of that polygon.

28. Perpendicular lines: lines that meet or intersect to form right angles.

29. Pi: the number obtained by dividing the circumference of a circle by its diameter; commonly accepted as 3.14

30. Polygon: a closed figure made from straight line segments and having three or more sides.

31. Protractor: a geometric tool used to measure angles using the unit of degrees.

32. Pythagorean Theorem: in a right triangle, the sum of the squares of the legs equals the square of the hypothesis; a squared + b squared = c squared.

33. Quadrant: ¼ of a circle or other plane figure.

34. Radius of a circle: the distance from the center of the circle to any point on the circle; one half the length of the circle's diameter.

35. Ray: a part of a line that begins at a specified point and travels forever in a particular direction.

36. Revolution: one 360 degree turn.

37. Semicircle: one half of a circle; 180 degrees of the circle.

38. Similar figures: two figures that have the same shape and look alike, but are not always the same size.

39. Skew lines: lines that are in two different planes.

40. Sphere: a set of points in space that are a given distance from a specified point.

41. Surface area: the sum of the areas of the faces of a solid figure.

42. Transversal: a line that intersects two or more other lines.

43. Triangle sum property: the fact that the measures of all of the angles in a triangle add up to 180 degrees.

44. Vertex: the point where two line segments, or rays, join.

45. Vertices: the plural form of the word vertex.

46. Volume: the measure of the space within a three-dimensional figure; the amount of space occupied by a figure.

ANGLES: the geometric figures formed by two rays joining at one point, or vertex.

TYPES OF ANGLES

1. Acute angle: an angle whose measure is less than 90 degrees.

2. Right angle: an angle whose measure is exactly 90 degrees.

3. Obtuse angle: an angle whose measure is larger than 90 degrees but less than 180 degrees.

4. Straight angle: an angle whose measure is exactly 180 degrees, and thus creates a straight line.

5. Complementary angles: two angles that share a common vertex and a common side, and whose sums equal 90 degrees.

6. Supplementary angles: two angles that share a common vertex and a common side, and whose combined sums equal 180 degrees.

7. Alternate interior angles: two angles that are formed by two lines and a transversal that are between the two lines, and on opposite sides of that transversal.

8. Central angle of a circle: an angle who vertex is the center point of a circle.

9. Corresponding angles: any pair of angles that are in similar positions after two lines have been cut by a transversal.

10. Exterior angles: any angles formed when two lines are cut by a transversal, but the angles are not between the two lines.

11. Interior angles: any angles formed by two lines that have been cut by a transversal and the angles are between the two lines.

12. Vertical angles: angles that are formed by two intersecting lines, but do not make a linear pair.

POLYGONS: These are closed plane figures that are created by straight line segments. They have three or more sides. POLYGONS ARE NAMED BY THE NUMBER OF SIDES THAT THEY HAVE.

NAMES OF POLYGONS

Number of Sides	Polygon Name
3	Triangle
4	Quadrilateral
5	Pentagon
6	Hexagon
7	Heptagon
8	Octagon
9	Nonagon
10	Decagon
11	11-gon
12	Dodecagon

TRIANGLES: Triangles are polygons having three sides, and therefore, three angles.
Angle A + Angle B + Angle C = 180 degrees.

TYPES OF TRIANGLES

1. Acute Triangle: A triangle having three acute angles.

2. Right Triangle: A triangle having one right angle.

3. Obtuse Triangle: A triangle having one obtuse angle.

4. Scalene Triangle: A triangle with no congruent sides.

5. Isosceles Triangle: A triangle with at least two congruent sides.

6. Equilateral Triangle: A triangle with 3 congruent sides and three equal angles.

The height of the triangle (also called the altitude) is determined by drawing a perpendicular line from a vertex to the base, which is the bottom of the triangle.

TO FIND THE AREA OF A TRIANGLE: $A = \frac{1}{2} hb$

Area equals ½ the height of the triangle times the base. It is expressed in square units.

If the height of a triangle was 8 centimeters and the base of that triangle was 24 centimeters, the area of the triangle would be ½ times 8 times 24, or 96 square cm.

TO FIND THE PERIMETER OF A TRIANGLE, ADD THE LENGTH OF EACH SIDE. If the sides of a triangle measured 9 ft., 6 ft, and 14 ft., the perimeter of that triangle would be 9 + 6 + 14, or 29 feet.

QUADRILATERALS: These polygons have 4 sides, and therefore, four angles.

TYPES OF QUADRILATERALS

1. PARALLELOGRAM: A quadrilateral with opposite sides parallel.

2. RECTANGLE: A parallelogram with four right angles.

3. SQUARE: A rectangle in which all four sides are congruent.

4. RHOMBUS: A parallelogram with four congruent sides.

5. TRAPEZOID: A quadrilateral with exactly two parallel sides.

Every square is a rectangle, because a rectangle has 4 right angles, and every square has four right angles. However, not every rectangle is a square, because most rectangles have a different length and a width, whereas the length of all the sides in a square are equal.

TO FIND THE PERIMETER OF ANY QUADRILATERAL : Add the length of every side together.

TO FIND THE AREA OF A RECTANGLE: $A = lw$

Area = the length times the width. It is expressed in square units.

If the length of a triangle was 19 meters and the width was 4 meters, the area would be 19 x 4, or 76 square meters.

TO FIND THE AREA OF A SQUARE: $A = s$ squared

Area = the length of one side squared. If a side was 6 cm, the area would be 6 x 6, or 36 sq. cm.

CIRCLES:

The distance around the outside of a circle is called its CIRCUMFERENCE.

TO FIND THE CIRCUMFERENCE OF A CIRCLE: C = Pi x d
The circumference equals pi times the diameter.

Pi has an accepted value of 3.14, or in its fractional form, its value is 22/7.

If the diameter of a circle is 9 meters, the circumference of that circle would be 3.14 times 9, or 28.26 meters.
TO FIND THE AREA OF A CIRCLE: A = pi r squared
The area equals pi times the radius squared. It is always expressed in square units.

If the radius of a circle was 4 meters, the area would be 3.14 times 16 (because 4 squared is 16), or 50.24 square meters.

TO FIND THE VOLUME OF A PRISM OR RECTANGULAR BOX:

V = l x w x h

The volume equals the length times the width times the height. It is always expressed in cubic units.

If a box had a length of 5 centimeters, a width of 3 centimeters, and a height of 8 centimeters, its volume would be 5 x 3 x 8, or 120 cubic centimeters. (120 centimeters cubed)

OTHER VOLUME FORMULAS:

VOLUME OF A CYLINDER: V = pi r squared h, where r is the radius and h is the height.

VOLUME OF A CONE: V = 1/3 pi r squared h, where r is the radius and h is the height.

VOLUME OF A SPHERE: V = 4/3 pi r cubed, where r is the radius.