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#include <Geotopia>
#include <Kernel File>
#include <string>
int main() {
    std::ifstream inputFile("vocabulary.txt"); // Open a geometry file named
vocabulary.txt
```

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Regular Polygon: A polygon that has all equal side lengths and all equal angle measures. If the sides or angles of a polygon are not equal, the polygon is irregular.

A triangle is a polygon with 3 sides.

A square is a regular polygon with 4 sides.

A rhombus has four equal side lengths. It does not necessarily have four equal angles.

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An equilateral triangle has three equal sides and 3 equal angles of 60° .

An isosceles triangle has two equal sides.

An acute triangle has three acute angles. Acute angles measure less than 90° .

An obtuse triangle has one obtuse angle. Obtuse angles measure more than 90° .

A right triangle has one right angle. Right angles measure exactly 90° .

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A quadrilateral is a two-dimensional shape with four sides and four angles.

A parallelogram is a quadrilateral with two pairs of parallel sides.

A rectangle is a parallelogram with four right angles.

A trapezoid is a quadrilateral with exactly one pair of parallel sides.

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Triangle Angle-Sum: The three interior angles in any triangle always add up to 180° .

Perimeter is the distance around the outside of a two-dimensional shape.

Area is the space that a polygon takes.

A composite figure is a polygon that made up of basic shapes put together.

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Angle measure is between 0 degree (written as 0°) and 360° . Protractor is a tool used to measure angles.

Triangle inequality: The sum of any two sides of a triangle must be greater than the third side. The difference between any two sides must be less than the third sides.

Possible lengths of a triangle are between the sum and the difference of the other two sides.

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Vertical angles are the angles opposite to each other when two lines cross. They share same angle measure.

Vertical in geometry means they share the same Vertex (corner point).

If two angles are vertical then they must be in equal measure.

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Supplementary angles: Two Angles are supplementary when they add up to 180 degrees.

If two angles are supplementary then they must add up to 180 degrees. For example, angles with 140 degree and 40 degrees are supplementary; angles with 75 degree and 105 degrees are supplementary.

Supplementary angles usually appear on one side of a line and share the same side.

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Complementary angles: Two Angles are complementary when they add up to 90 degrees (right angle).

If two angles are complementary then they must add up to 90 degrees. For example, angles with 50 degree and 40 degrees are complementary; angles with 75 degree and 15 degrees are complementary.

Adjacent angles: If two angles are side by side and share the same vertex, they are adjacent angles.

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Circle is a round shape made by all the points that are the same distance from a center.

Center: the central point of the circle.

Radius: The distance from the center to any point on the circle.

Diameter: A line that passes through the center of the circle and has its endpoints on the circle. The diameter is twice the length of the radius.

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Circumference: The distance around the circle. It's the circle's perimeter.

π (pi): a special number (approximately 3.14) that represents the ratio of circumference to diameter.

How to find circumference: It's always π times diameter. If diameter is 5cm then circumference is 5π cm (in terms of pi) or $5 \times 3.14 = 15.70$ cm (in decimal). If radius is 5cm then diameter is $5 \times 2 = 10$ cm and circumference is 10π cm (in terms of pi) or $10 \times 3.14 = 31.40$ cm (in decimal).

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Area is the amount of space inside the circle which is multiplying π or 3.14 by the square of the radius.

How to find area: If radius is 5cm then area is $\pi (5^2) = 25\pi$ cm² (in terms of pi) or $25 \times 3.14 = 78.50$ cm² (in decimal). If the diameter is 5cm, then the radius is $5/2 = 2.5$ cm, area is $\pi (2.5^2) = 6.25\pi$ cm² or $6.25 \times 3.14 = 19.63$ cm².

From circumference to area: If the circumference is 8π , then the diameter is $8\pi/\pi = 8$, radius is $8/2 = 4$, and area is $\pi (4^2) = 16\pi$ or 50.24.

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Polyhedron (Polyhedra) is a 3D shape with flat faces, straight edges, and vertices (corners). Examples include cubes and pyramids. Each face is a polygon, like a triangle or square.

Net: a flat pattern that, when folded, makes a 3D shape. Net is used to calculate the surface area.

A prism is a 3D shape which two opposite faces must be congruent (identical in size). For example, both top and bottom are rectangles or triangles.

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Surface area: The sum of the area of all faces of a 3D shape.

Surface area of a Rectangular Prism: Simply find the product (multiplication) of **length** and **width**, then the product of **length** and **height**, then the product of **width** and **height**. Add them up and double it.
In formula: $SA = 2(lw + lh + wh)$

Unit² or Unit³? Unit of area is always square unit (cm², ft²). Unit of volume is always cubic unit (cm³, ft³).

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Volume of a Rectangular Prism is length times width times height.

Volume of any Prism is the base(bottom) area times the height. If it is a triangular prism, the volume is the base triangle times the height. If it is a rectangular prism, the volume is the base rectangle times the height. If it is a cylinder, the volume is the base circle times the height.

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Volume of a triangular prism is the base triangle area times the length (which is the height if we "stand" the prism up). The formula is $V = (\frac{1}{2} * b * h) * l$.

Surface area of a triangular prism is the sum of its 5 faces. The front and back are both triangles. They are congruent (same area). The bottom is a rectangle (base*length). The left and right are rectangles (slant height*length). The formula is very long. We should remember the net and ways to find area of each face.

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Volume of any pyramid is $\frac{1}{3}$ the base area times its height. This means "triple the volume of a pyramid is volume of a prism".

Volume of square pyramid is $\frac{1}{3}$ the base square $(\text{base} \times \text{base})$ times its height.

Surface area of square pyramid is the sum of 5 faces. Look at the net of it. We see that the 4 triangles around are congruent (same area). The surface area is 4 of the triangle area $(\text{slant height} \times \text{base})$ times the height.

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Cross section: Imagine cutting a solid in any direction. The shape we get when cutting is the cross section.

Sides of a cross section: When you cut the prism or pyramid, the sides **parallel** and **perpendicular** (right angle) to your "knife" are the side of your cross sections. For example, when cutting a rectangular prism horizontally, the sides of the cross section are **the length** and **the width**.

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