Perimeter, Area, Surface Area, and Volume: Review of Terminology, Basic Shapes, and Formulas

**Terminology**
- **Area** (A): The measure of a bounded region of a two-dimensional shape expressed in square units.
- **Circumference** (C): The distance around the edge of a circle.
- **Diameter** (d): The distance across a circle through its center.
- **Radius** (r): The distance from the center of a circle to a point on the circle.
- **Volume** (V): The amount of space inside a three-dimensional object.
- **Tessellation**: A shape expressed in square units.

**Basic Shapes and Formulas**

<table>
<thead>
<tr>
<th>Shape</th>
<th>Area Formula</th>
<th>Perimeter Formula</th>
<th>Volume Formula</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Circle</strong></td>
<td>A = (\pi r^2)</td>
<td>P = 2(\pi r)</td>
<td>V = (\frac{1}{3}\pi r^3)</td>
</tr>
<tr>
<td><strong>Square</strong></td>
<td>A = (s^2)</td>
<td>P = 4s</td>
<td>V = (s^3)</td>
</tr>
<tr>
<td><strong>Rectangle</strong></td>
<td>A = (lw)</td>
<td>P = 2(l + w)</td>
<td>V = (lwh)</td>
</tr>
<tr>
<td><strong>Cylinder</strong></td>
<td>A = (2\pi rh + \pi r^2)</td>
<td>P = 2(\pi r) + 2(l)</td>
<td>V = (\pi r^2h)</td>
</tr>
<tr>
<td><strong>Pyramid</strong></td>
<td>A = (\frac{1}{2}ps)</td>
<td>P = s + s + s + s</td>
<td>V = (\frac{1}{3}Bh)</td>
</tr>
</tbody>
</table>

**Tessellations**

- **Regular Tessellation**: A tessellation made up of one type of regular polygon.
- **Wallpaper Group**: A tessellation that repeats itself in two dimensions.

**Student Worksheet 1**

**Perimeter, Area, Surface Area, and Volume**

- **Perimeter**: The distance around the edge of an object.
- **Area**: The measure of the space inside a two-dimensional object.
- **Surface Area**: The sum of all the areas of all surfaces of a three-dimensional object.
- **Volume**: The amount of space inside a three-dimensional object.

**Geometry Works! The Stage Takes Shape**

The Geometrics love shapes. For the upcoming concert, the three main spaces need to be built: a triangular platform for the bass player, a square pyramid for the lead guitarist, and a square prism for the lead singer. While they have already built the bass and lead guitarist spaces, the Geometrics Stage Crew is having trouble building the lead singer’s stage because of the following shaped structures.

- **Triangle**: A polygon with three sides and three angles.

**Student Worksheet 2**

**Perimeter, Area, Surface Area, and Volume**

- **Perimeter**: The distance around the edge of a polygon.
- **Area**: The measure of the space inside a polygon.
- **Surface Area**: The sum of all the areas of all surfaces of a three-dimensional object.
- **Volume**: The amount of space inside a three-dimensional object.

**Geometry Works! The Stage Takes Shape**

The Geometrics works to play a triangular concert at your school, but they need a stage design that is safe and easy to build. The first step for the Geometrics Stage Crew is building a main stage by following the shapes described here.

**Student Worksheet 3**

**Perimeter, Area, Surface Area, and Volume**

- **Perimeter**: The distance around the edge of a polygon.
- **Area**: The measure of the space inside a polygon.
- **Surface Area**: The sum of all the areas of all surfaces of a three-dimensional object.
- **Volume**: The amount of space inside a three-dimensional object.

**That Should Cover It!**

The Geometrics works to play a spherical concert at your school, but they need a stage design that is safe and easy to build. The first step for the Geometrics Stage Crew is building a main stage by following the shapes described here.

**Pack It Up! What Will Fit?**

The Geometrics Stage Crew has to transport the potted plants of a rectangular prism, a cylinder, and a square pyramid to the concert. They have to make sure these objects do not go bigger than the van cargo space. To calculate the volume of the cargo space, they have to find the volume of the objects and compare it to the volume of the van. If the object is bigger, then the van does not have enough room for the object.