***Geometry***

**Chapter 10: Formulas for Volume**

**10-1: Fundamental Properties of Volume**

1. Volume is measured in **cubic units**
2. A **unit cube** has a length, width, and height of one unit.



1. Volume Postulate:
   1. **Uniqueness property**: given a unit cube, every polyhedral region has a

unique volume.

* 1. **Congruence property**: congruent figures have the same volume
  2. **Additive property**: Volume (A∪B) = Volume (A) + Volume (B)
  3. **Box Formula:** The volume of a box with dimensions l, *w*, and *h* isl*wh*.

(V = l*wh)*

1. **Cube Volume formula**:
   1. The volume V of a cube with edge s is s3: V = s3.
   2. x is the cube root of y, written x = 3√y or or x = y1/3, if and only if x3 = y.

**10-2: Multiplication, Area, and Volume**

1. Area of a rectangle is a *model* for the multiplication of two numbers, and

multiplication of two polynomials can be pictured by area.

1. The volume of a box can model the multiplication of three polynomials.

**10-3: Volumes of Prisms and Cylinders**

1. **Prism-Cylinder Volume Formula**: V = Bh
2. **Cavalieri’s Principle**: Let I and II be two solids included between parallel

planes. If every plane P Parallel to the given planes intersects I and II in

section sixth the same area, then Volume(I) = Volume(II)

**10-4: Volumes of Pyramids and Cones**

1. Pyramid-Cone Volume Formula: V = (1/3)Bh

**10-5: Organizing and Remembering Formulas**

1. Remember the formulas that apply to the most figures

|  |  |  |  |
| --- | --- | --- | --- |
|  | Cylindrical surfaces (Prisms/Cylinders) (two parallel bases) | Conic surfaces (Pyramids/Cones)  (one base) | Spheres |
| Lateral Area | L.A. = ph (right cylinders only) | L.A. = (1/2) l p (right surfaces only) |  |
| Surface Area | S.A. = L.A. + 2B | S.A. = L.A. + B | S.A. = 4πr2 |
| Volume | V = Bh | V = (1/3)Bh | V = (4/3)πr3 |

**10-6: The Volume of a Sphere**: V = (4/3)πr3

1. A sphere can be thought of as a union of many “almost pyramids”

**10-7: The Surface Area of a Sphere**: S.A. = 4πr2