

Euclid

EU

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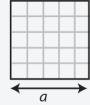
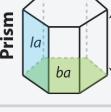
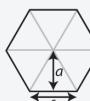
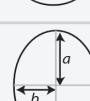
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1 Area and Volume of Geometric Object

1.1 Table

| Two-dimensional plane shapes | Area <i>The measure of how many squares will fit into a shape.</i> Units² | Three-dimensional solid shapes | Surface Area <i>The measure of the area of all outward facing sides.</i> Units² | Volume <i>The measure of how many cubes will fit into a shape.</i> Units³ |
|----------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Square  | Area = a^2 or $a \times a$ Example: $a = 5\text{cm}$ $\text{Area} = 5^2 = 25\text{cm}^2$ | Cube  | Surface Area = $6 \times a^2$ Example: $a = 5\text{cm}$ $\text{Surface Area} = 150\text{cm}^2$ | Volume = a^3 or $a \times a \times a$ Example: $a = 5\text{cm}$, $\text{Volume} = 125\text{cm}^3$ |
| Rectangle  | Area = $w \times h$ Example: $w = \text{width}=10\text{cm}$ $height=20\text{cm}$ $\text{Area} = 10 \times 20 = 200\text{cm}^2$ | Prism  | Surface Area = $2 \times ba + la$ Example: $ba = \text{base area} = 20\text{cm}^2$ $la = \text{lateral area (all sides)} = 60\text{cm}^2$ $\text{Surface area} = 2 \times 20 + 60 = 100\text{cm}^2$ | Volume = $ba \times h$ Example: $ba = \text{base area} = 20\text{cm}^2$ $h = \text{height} = 5\text{cm}$ $\text{Volume} = 20 \times 5 = 100\text{cm}^3$ |
| Triangle  | Area = $b \times h \times 0.5$ Example: $b = \text{base} = 20\text{cm}$ $h = \text{vertical height} = 15\text{cm}$ $\text{Area} = 20 \times 15 \times 0.5 = 150\text{cm}^2$ | Pyramid  | Surface Area = $ba + la$ Example: $ba = \text{base area} = 16\text{cm}^2$ $la = \text{lateral area (all sides)} = 60\text{cm}^2$ $\text{Surface area} = 16 + 60 = 76\text{cm}^2$ | Volume = $ba \times h \times 1/3$ Example: $ba = \text{base area} = 16\text{cm}^2$ $h = \text{height} = 9\text{cm}$ $\text{Volume} = 16 \times 9 \times 1/3 = 48\text{cm}^3$ |
| Reg Polygon  | Area = $n \times s \times a \times 0.5$ Example: $n = \text{number of sides} = 6$ $s = \text{length of side} = 5\text{cm}$ $a = \text{apothem} = 15\text{cm}$ $\text{Area} = 6 \times 5 \times 15 \times 0.5 = 225\text{cm}^2$ | R. Polyhedron  | Surface Area = $fa \times s$ Example: $fa = \text{area of one side} = 200\text{cm}^2$ $s = \text{number of sides} = 12$ $\text{Surface area} = 200 \times 12 = 2400\text{cm}^2$ | Example: There is no simple generic formula for working out the volume of a regular polyhedron. |
| Circle  | Area = $\pi \times r^2$ Example: $\pi = \text{pi} = 3.14$ $r = \text{radius} = 5\text{cm}$ $\text{Area} = 3.14 \times 5^2 = 3.14 \times 5 \times 5 = 78.5\text{cm}^2$ | Sphere  | Surface Area = $4 \times \pi \times r^2$ Example: $r = \text{radius} = 4.5\text{cm}$ $\text{Surface area} = 4 \times 3.14 \times 20.25 = 254.5\text{cm}^2 (\text{Approx})$ | Volume = $4/3 \times \pi \times r^3$ Example: $r = \text{radius} = 4.5\text{cm}$ $\text{Volume} = 4/3 \times 3.14 \times 4.5^3 = 381.5\text{cm}^3 (\text{Approx})$ |
| Ellipse  | Area = $\pi \times a \times b$ Example: $\pi = \text{pi} = 3.14$ $a = \text{radius of long axis} = 6$ $b = \text{radius short axis} = 4$ $\text{Area} = 3.14 \times 6 \times 4 \times 5 = 75.36\text{cm}^2$ | Cylinder  | Surface Area = $2\pi rh + 2\pi r^2$ Example: $r = \text{radius} = 5\text{cm}$ $h = \text{height} = 10\text{cm}$ $\text{Surface area} = 2 \times 3.14 \times 5 \times 10 + 2 \times 3.14 \times 25 = 471\text{cm}^2$ | Volume = $\pi \times r^2 \times h$ Example: $r = \text{radius} = 5\text{cm}$ $h = \text{height} = 10\text{cm}$ $\text{Volume} = 3.14 \times 25 \times 10 = 785\text{cm}^3 (\text{Approx})$ |