# GEOMETRY QUICK GUIDE 5: 3D SHAPE FORMULAS

## 3D SHAPES
All 3D shapes can be described in terms of their faces, vertices and edges.
- **Face**: a flat or curved surface
- **Edge**: line where 2 faces meet
- **Vertex**: point where 3 or more edges meet

![Cube Diagram]

### CUBE
- **Volume**: \( s^3 \)
- **Surface area**: \( 6s^2 \)
  where \( s \) is the length of one side

![Cuboid Diagram]

### CUBOID (RECTANGULAR PRISM)
- **Volume**: \( \ell \times w \times h \)
- **Surface area**: \( 2\ell h + 2\ell w + 2wh \)
  where \( \ell = \text{length}, w = \text{width}, h = \text{height} \)

## PYRAMIDS
### Volume of a general pyramid = \( \frac{1}{3} Ah \)
where \( A = \text{base area} \) and \( h = \text{height} \)

![Pyramid Diagram]

### REGULAR TETRAHEDRON
- **Volume**: \( \frac{b^3}{6\sqrt{2}} \)
- **Surface area**: \( \sqrt{3}b^2 \)

![Square Pyramid Diagram]

### SQUARE PYRAMID
- **Volume**: \( \frac{1}{3} s^2h \)
- **Surface area**: \( s^2 + 2sh \)

## PRISMS
### Volume of any prism = \( Ah \)
### Surface area of a closed prism = \( 2A + (h \times p) \)
  where \( A = \text{base area}, h = \text{height}, p = \text{base perimeter} \)

![Triangular Prism Diagram]

### TRIANGULAR PRISM
- **Volume**: \( A \ell \) or \( \frac{1}{2} bhl \)
- **Surface area**: \( bh + 2b \ell + \ell b \)

## SPHERES
- **Volume**: \( \frac{4}{3} \pi r^3 \)
- **Surface area**: \( 4\pi r^2 \)

![Sphere Diagram]

## RIGHT CYLINDER
- **Volume**: \( \pi r^2h \)
- **Surface area**: \( 2\pi (r + h) \)

![Right Cylinder Diagram]

## RIGHT CIRCULAR CONE
- **Volume**: \( \frac{1}{3} \pi r^2h \)
- **Surface area**: \( \pi r (r + s) \)

![Right Circular Cone Diagram]
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### TRIANGULAR PRISM
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- **Surface area** = $bh + 2\ell s + \ell b$

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