

i s t a n b u l   t e c h n i c a l   u n i v e r s i t y  
a r c h i t e c t u r a l   d e s i g n   c o m p u t i n g   g r a d u a t e   p r o g r a m  
**dads 2011: a springtime venture**

# The Digital Shape or...

## **Mind the Gap Reloaded!**

Lecture V  
Basic 3D Shapes

Ceyhun Burak Akgül, PhD  
[www.cba-research.com](http://www.cba-research.com)



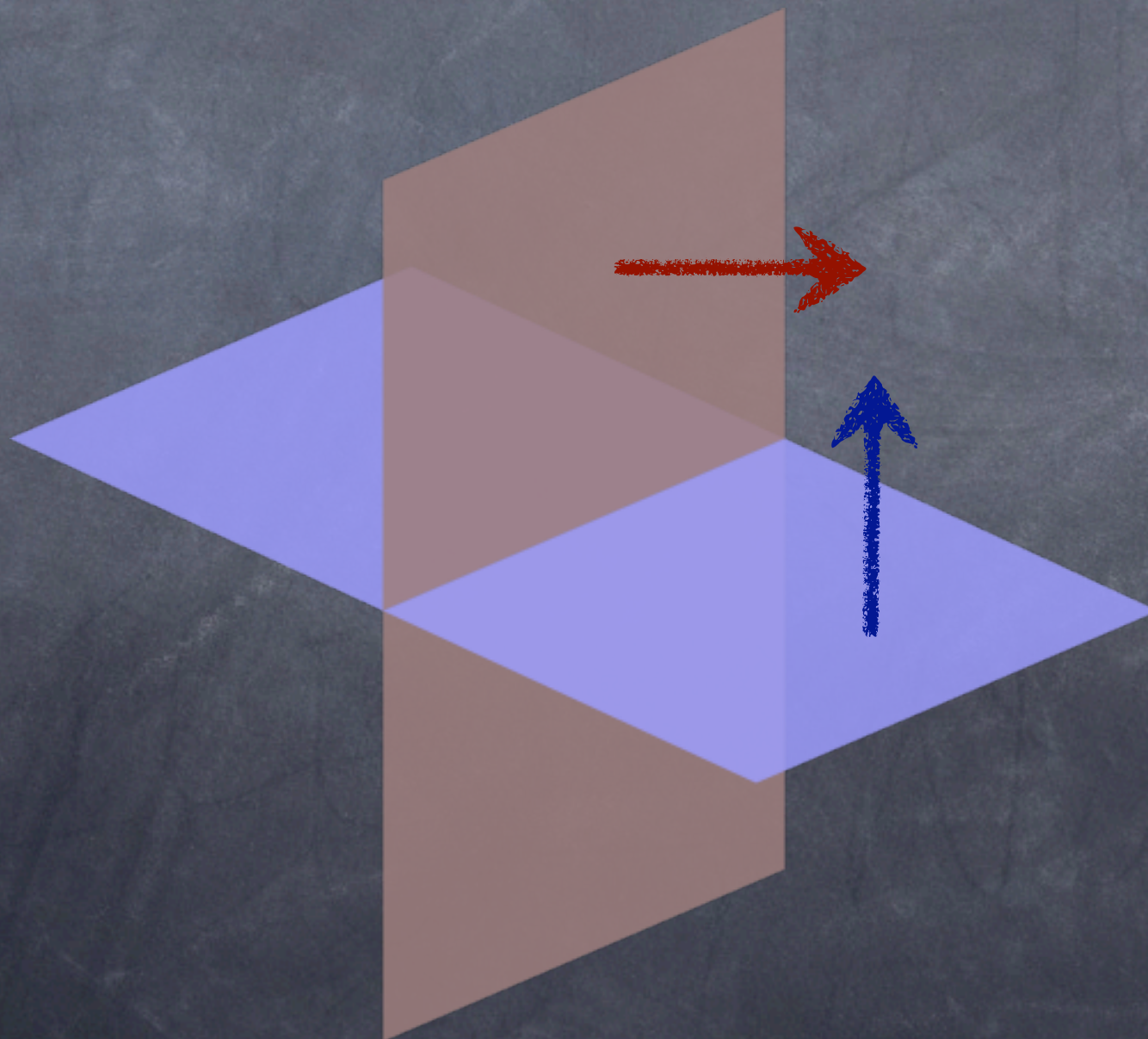
# Basic 3D Shapes

- Plane in 3D
- Polyhedra
- Curved Surfaces



# Plane in 3D

A plane in 3D is fully characterized by its normal





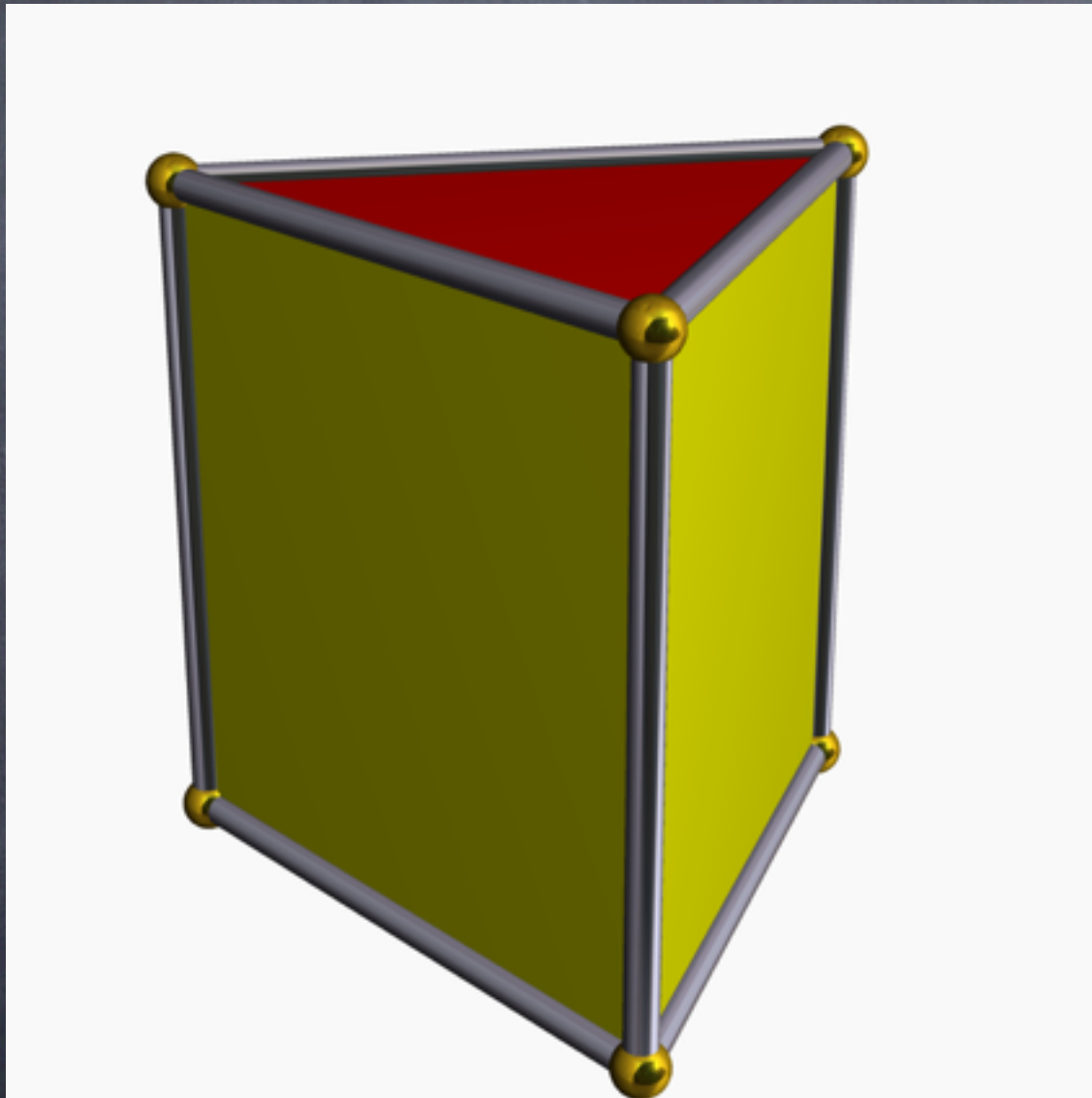
# Polyhedra

A polyhedron is a 3D shape whose faces are polygons:

- > Prisms
- > Pyramids
- > Uniform Polyhedra (a.k.a. Platonic Solids)
- > General Polyhedra



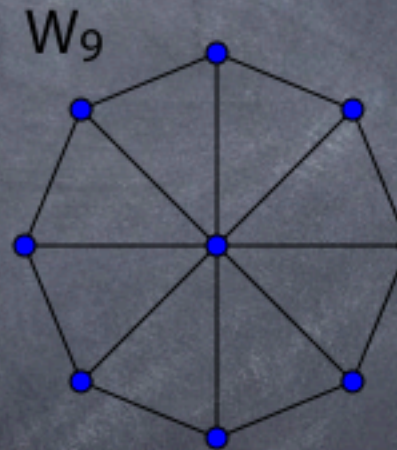
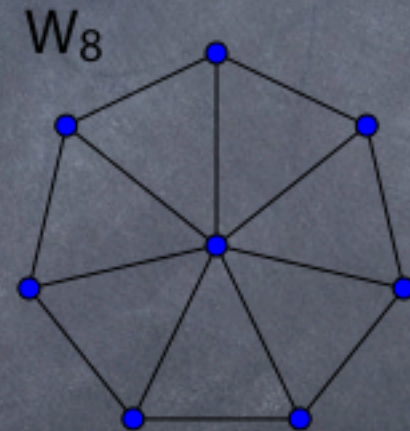
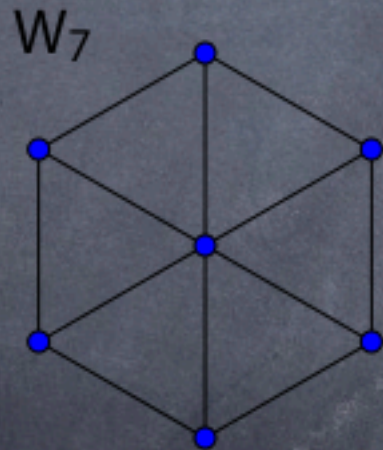
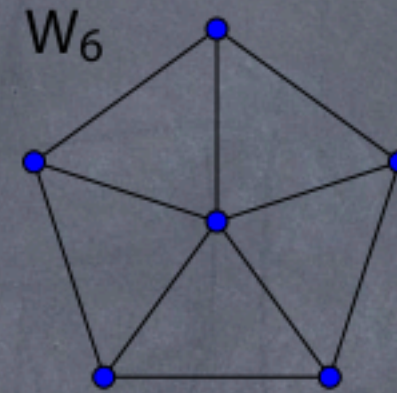
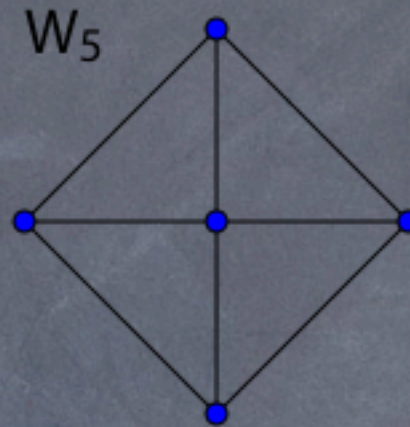
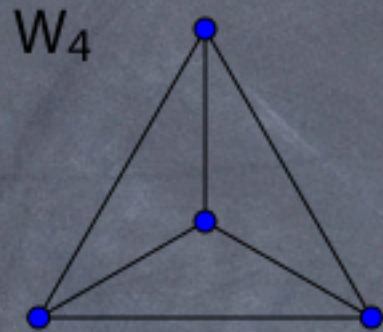
# Polyhedra: Prisms



A triangular prism



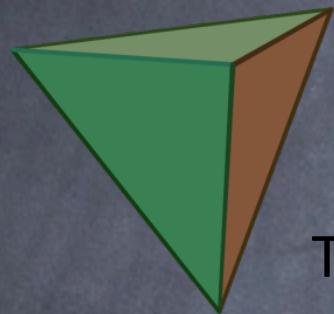
# Polyhedra: Pyramids



Wheel graphs of standard prisms



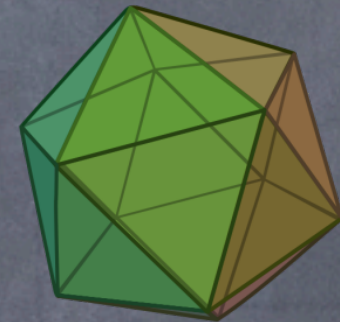
# Polyhedra: Platonic Ones



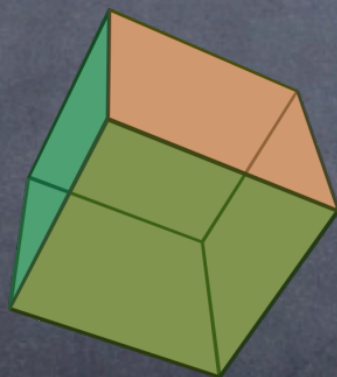
Tetrahedron  
(4 faces)



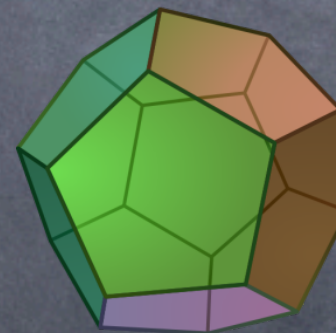
Octahedron  
(8 faces)



Icosahedron  
(20 faces)











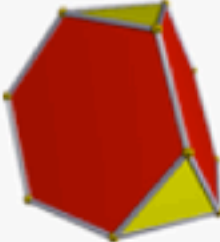





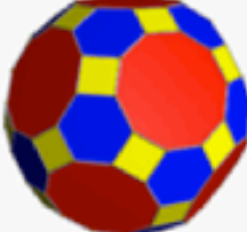
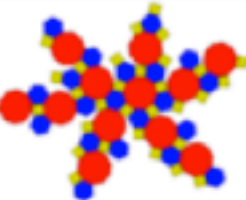

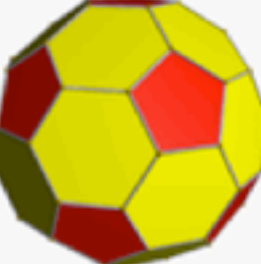
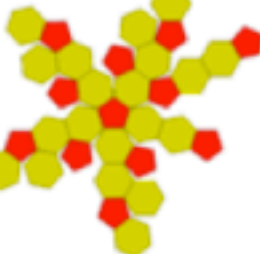

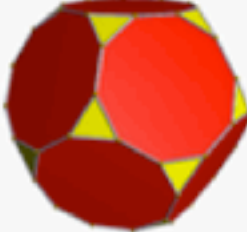
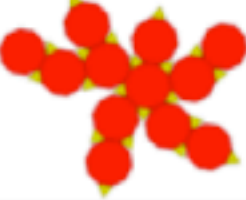
Cube (4 faces)  
*dual of octahedron*



Dodecahedron (12 faces)  
*dual of icosahedron*



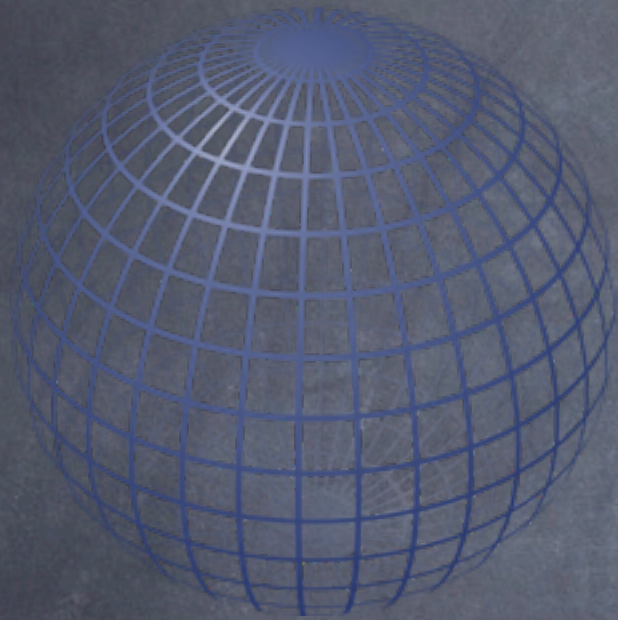
# Polyhedra: General Ones

Name (Vertex configuration) 	Transparent 	Solid 	Net 	Faces 		Edges 	Vertices 
truncated tetrahedron (3.6.6)	 (Animation)			8	4 triangles 4 hexagons	18	12
truncated octahedron (4.6.6)	 (Animation)			14	6 squares 8 hexagons	36	24
truncated icosidodecahedron or great rhombicosidodecahedron (4.6.10)	 (Animation)			62	30 squares 20 hexagons 12 decagons	180	120
truncated icosahedron (5.6.6)	 (Animation)			32	12 pentagons 20 hexagons	90	60
truncated dodecahedron (3.10.10)	 (Animation)			32	20 triangles 12 decagons	90	60

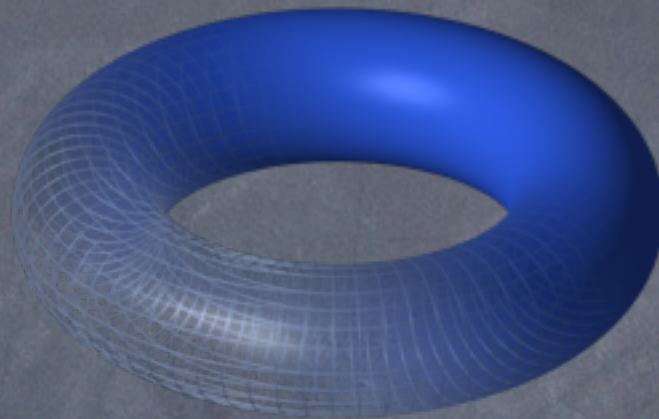
(...)



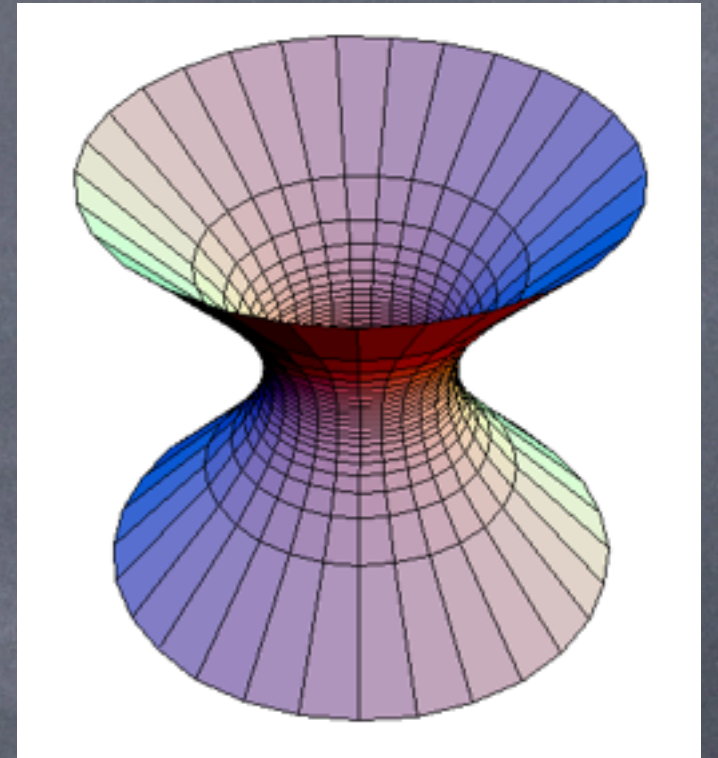
# Curved Surfaces



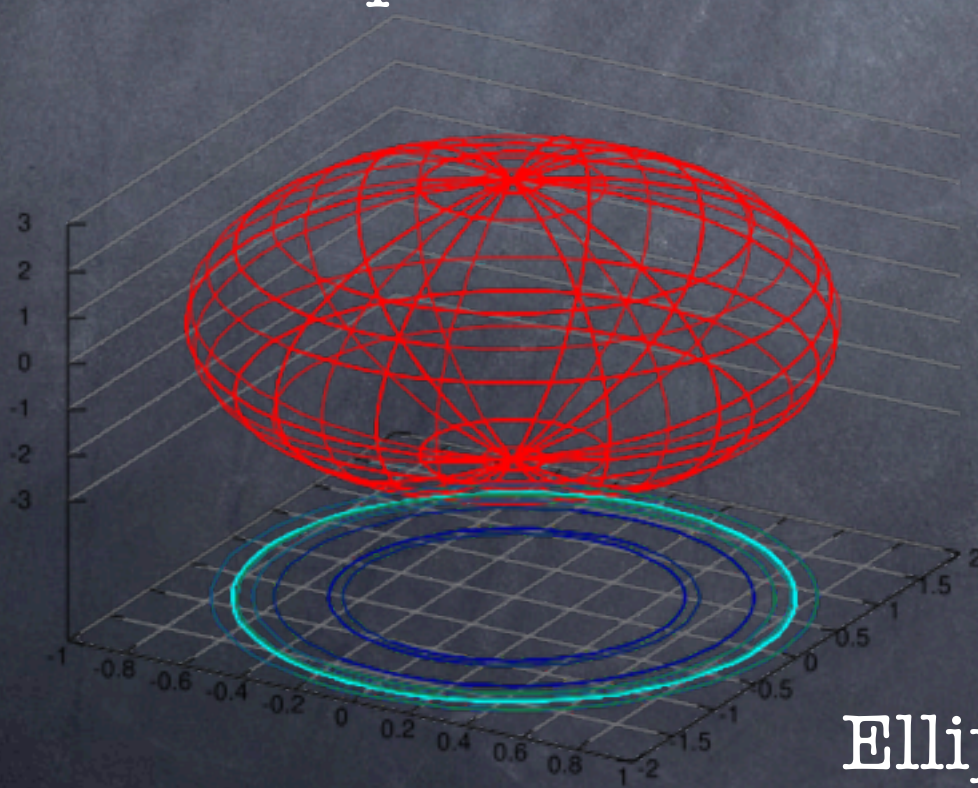
Sphere



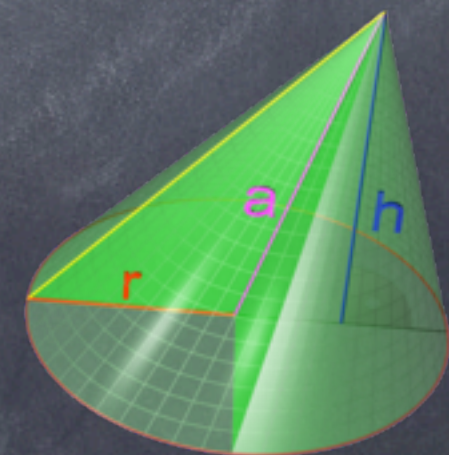
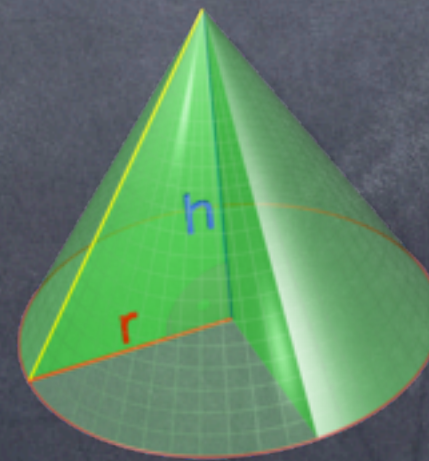
Torus



Hyperboloid



Ellipsoid



Cone