

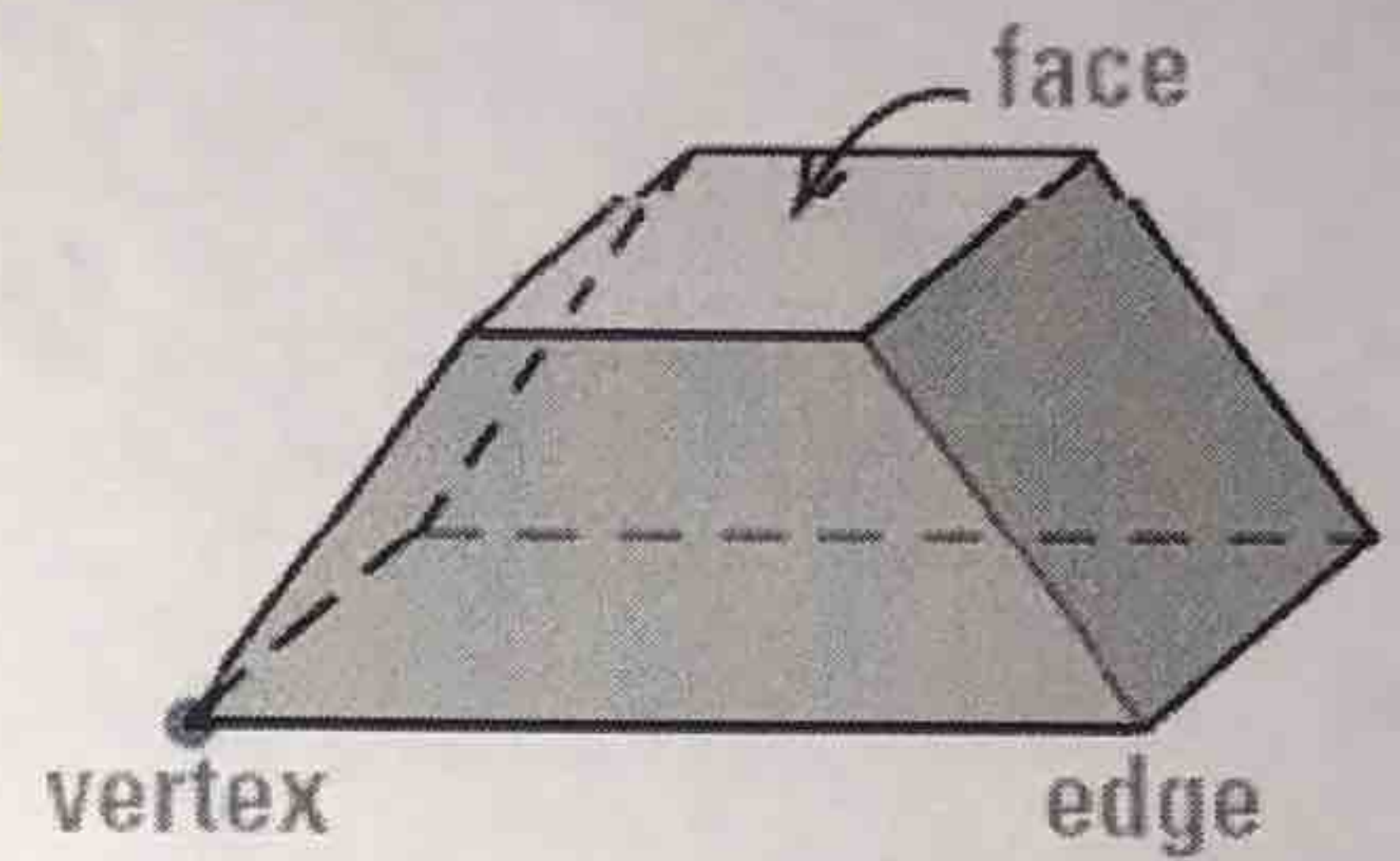
12.1 Explore Solids

polyhedron - a solid bounded by polygons

faces - the polygons that bound a polyhedron

edge - a line segment formed by the intersection of 2 faces

vertex - a point where three or more edges meet on a polyhedron

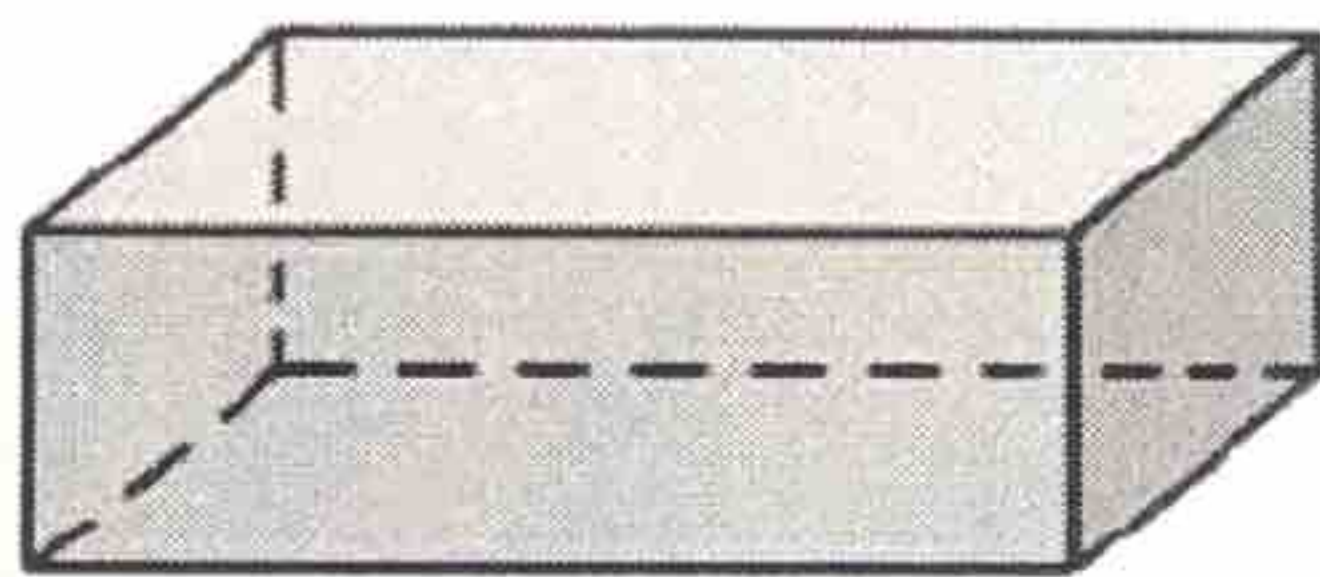


KEY CONCEPT

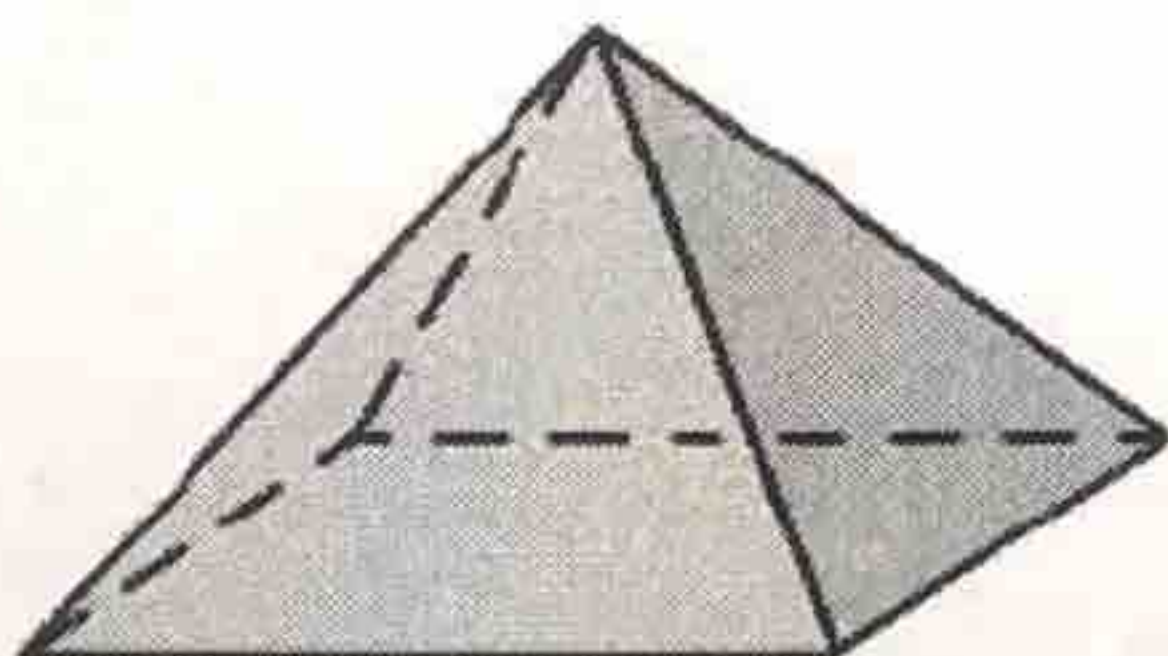
For Your Notebook

Types of Solids

Polyhedra

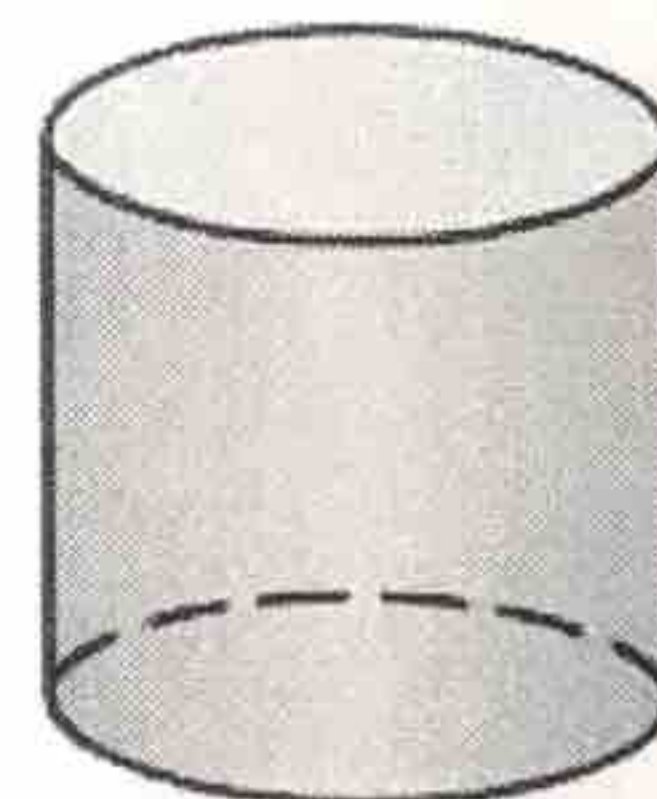


Prism

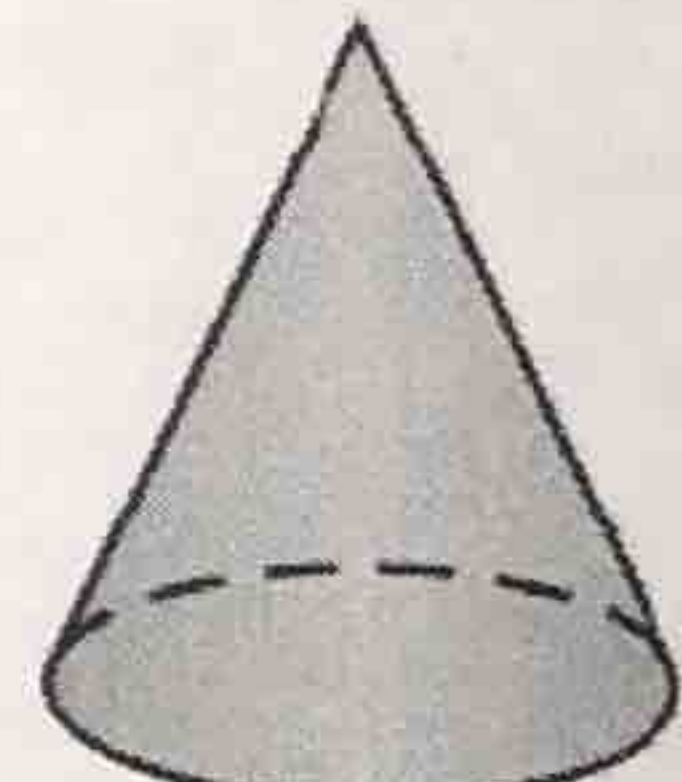


Pyramid

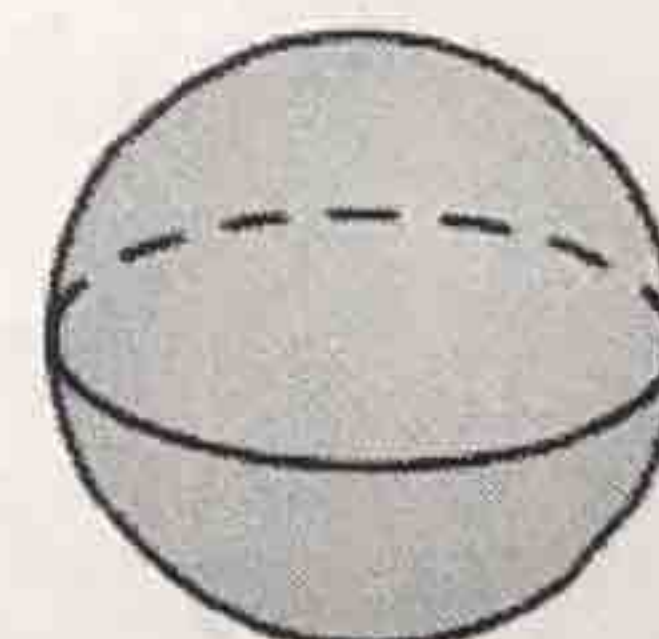
Not Polyhedra



Cylinder



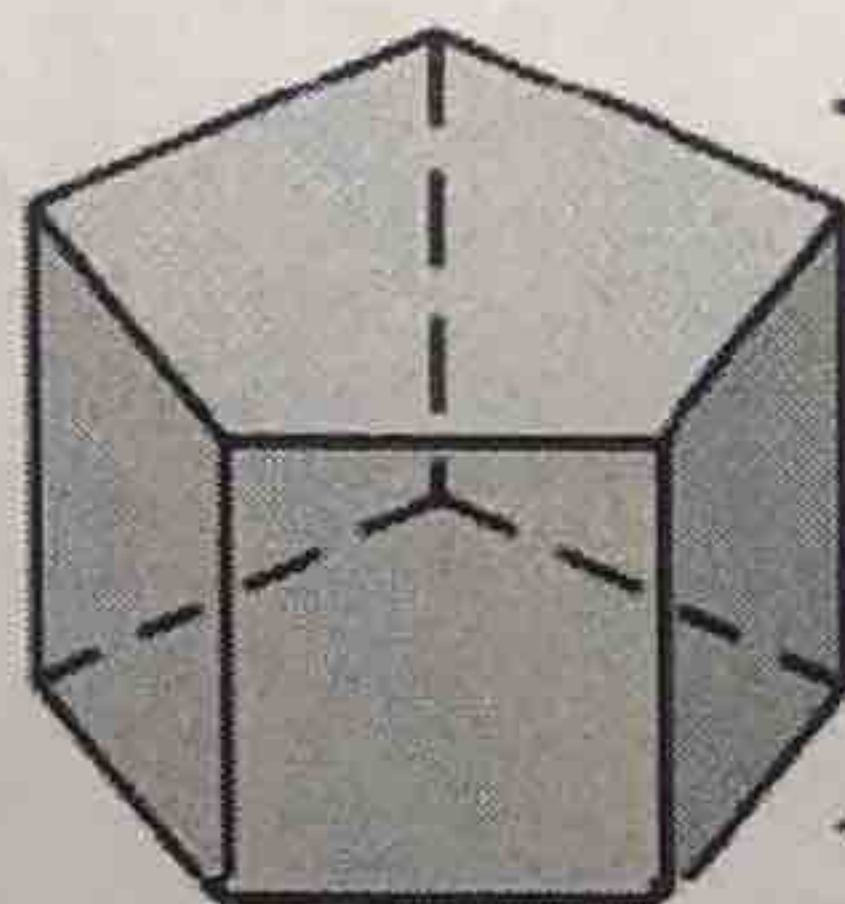
Cone



Sphere

To name a prism or a pyramid, use the shape of the **base**.

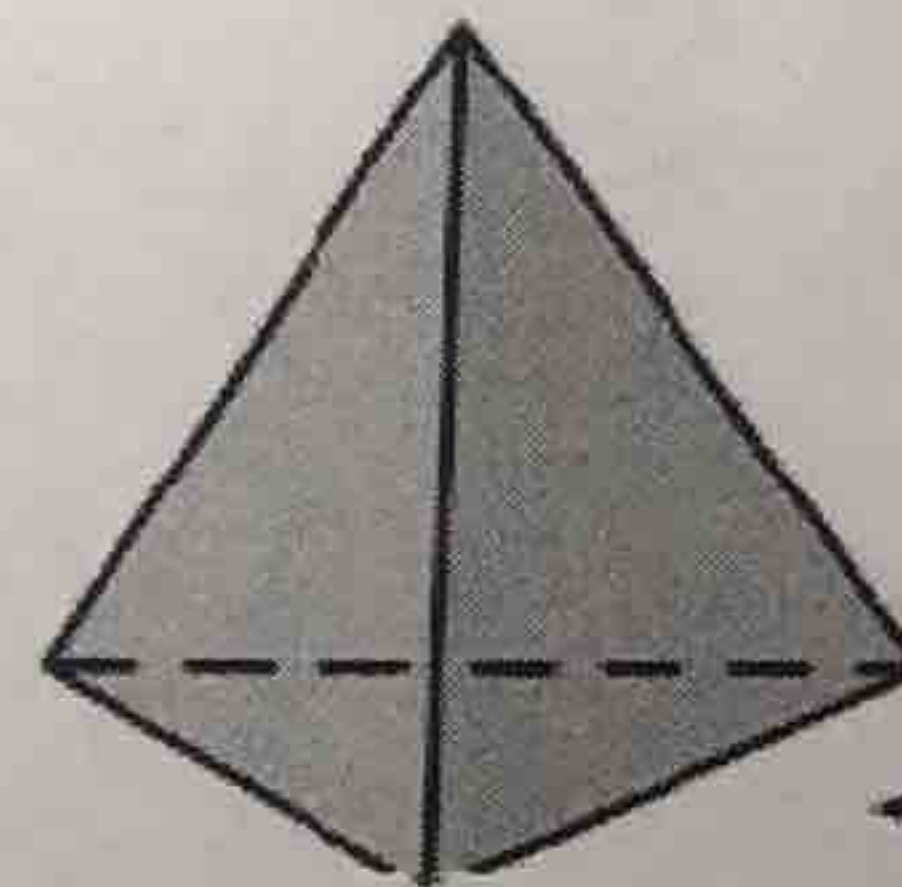
Pentagonal prism



Bases are
pentagons.

The **two bases** of a prism are congruent polygons in parallel planes.

Triangular pyramid

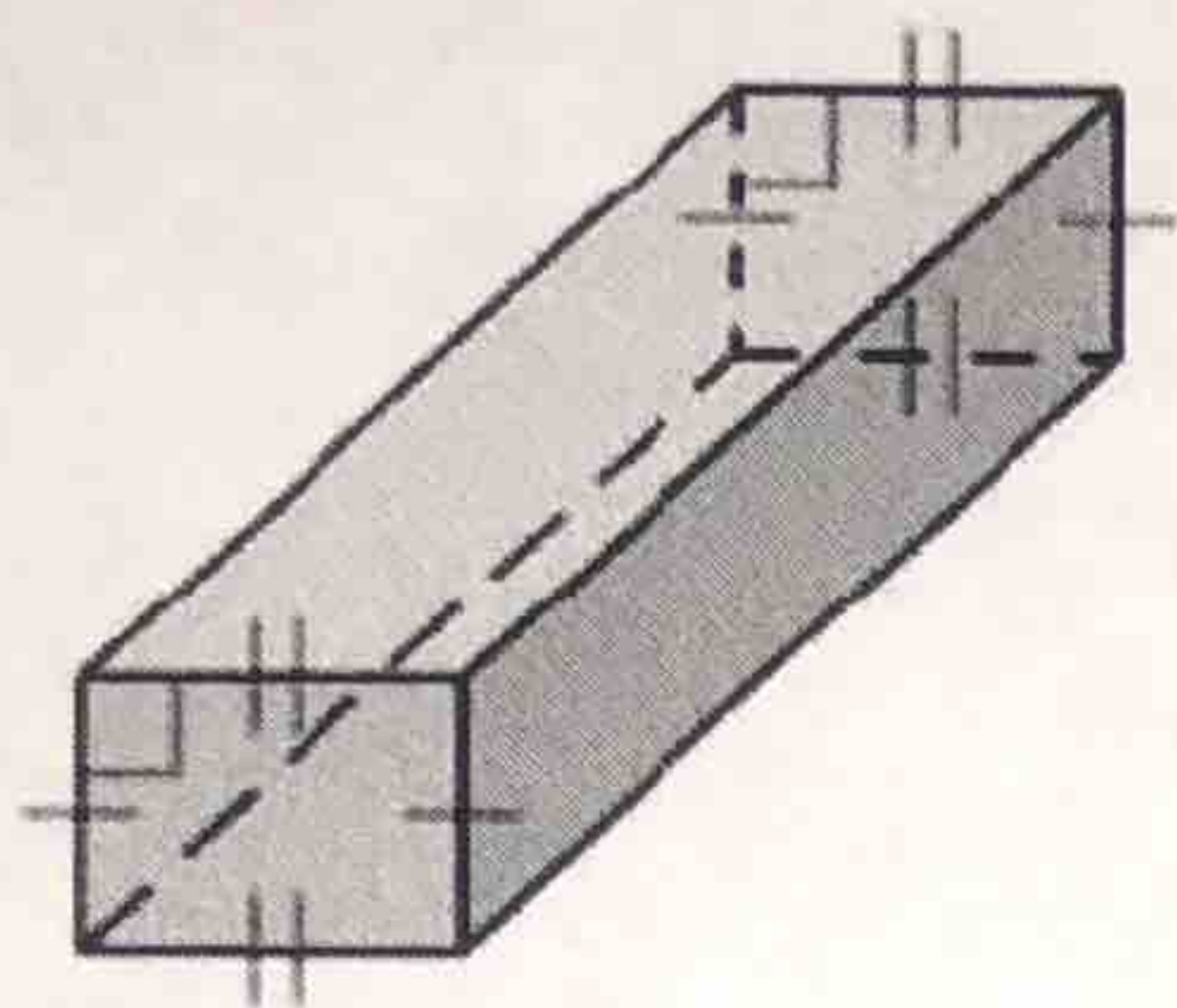


Base is a
triangle.

The **base** of a pyramid is a polygon.

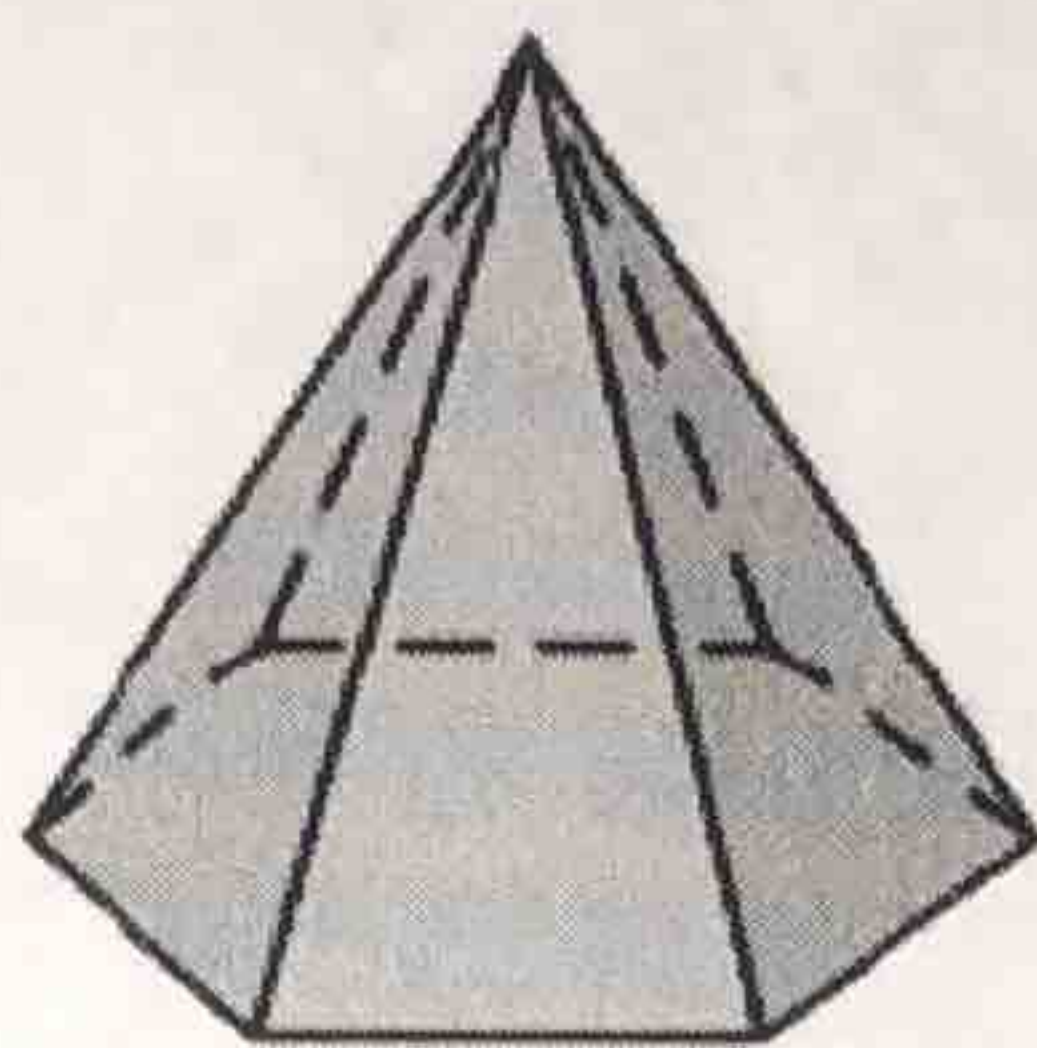
Ex 1: Tell whether each solid is a polyhedron. If it is, name the polyhedron and find the number of faces, vertices, and edges.

a.



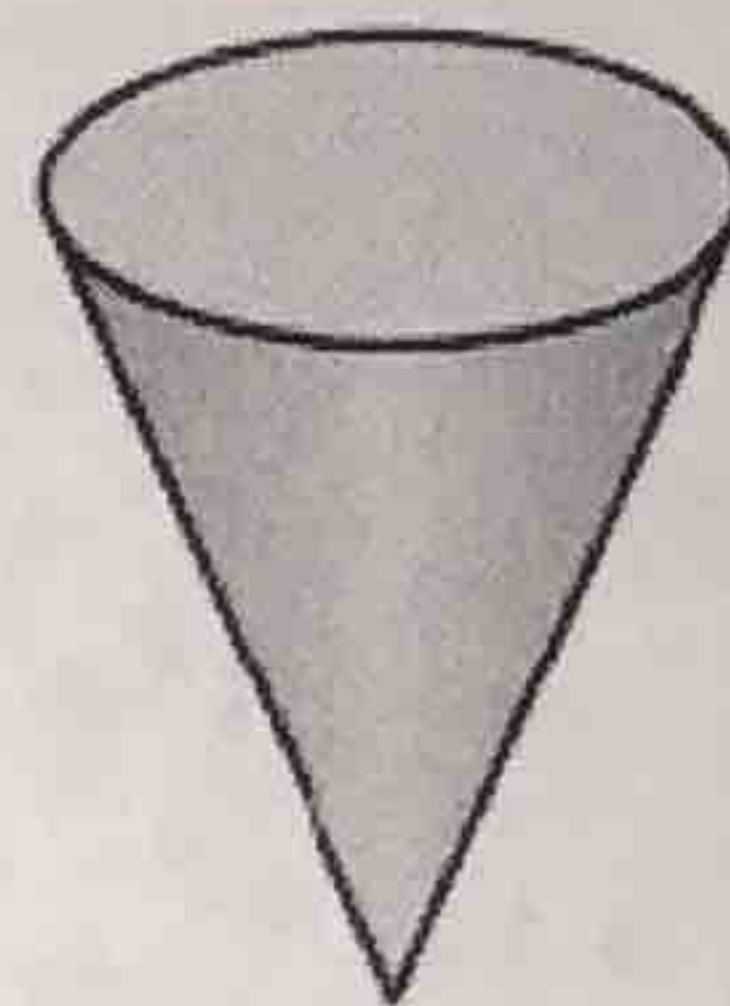
Polyhedron
Rectangular Prism
6 faces
8 vertices
12 edges

b.



Polyhedron
Hexagonal Pyramid
7 faces
7 vertices
12 edges

c.



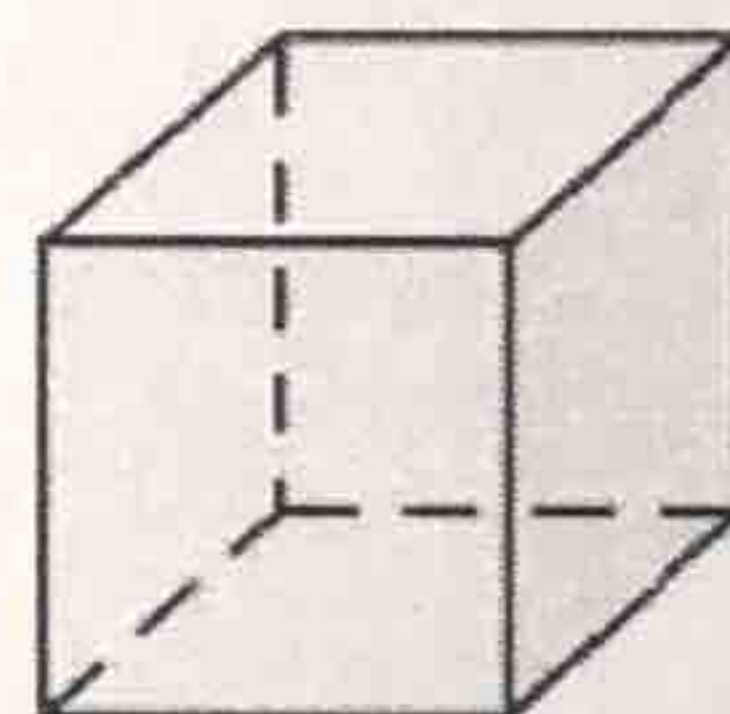
Not a
Polyhedron

THEOREM

For Your Notebook

THEOREM 12.1 Euler's Theorem

The number of faces (F), vertices (V), and edges (E) of a polyhedron are related by the formula $F + V = E + 2$.

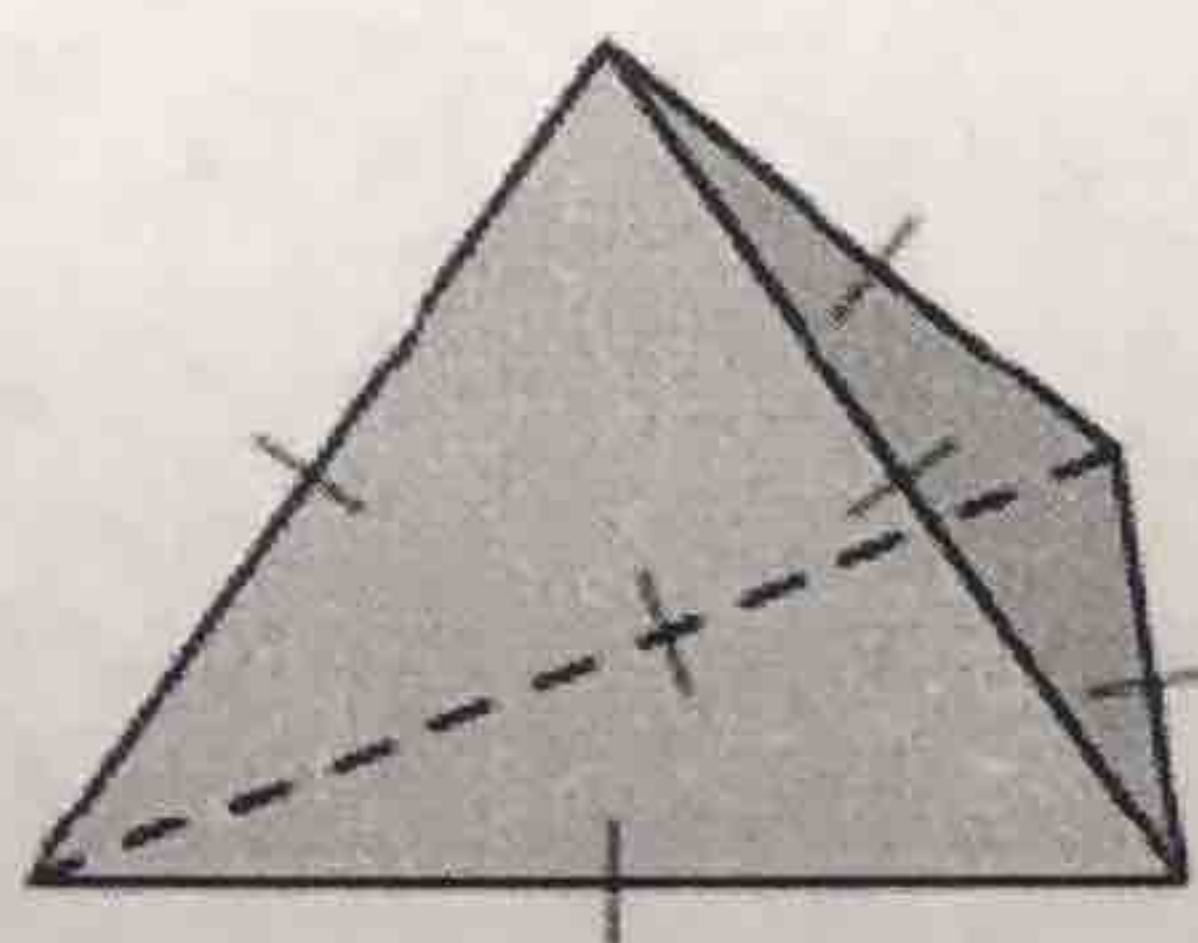


$$F = 6, V = 8, E = 12$$

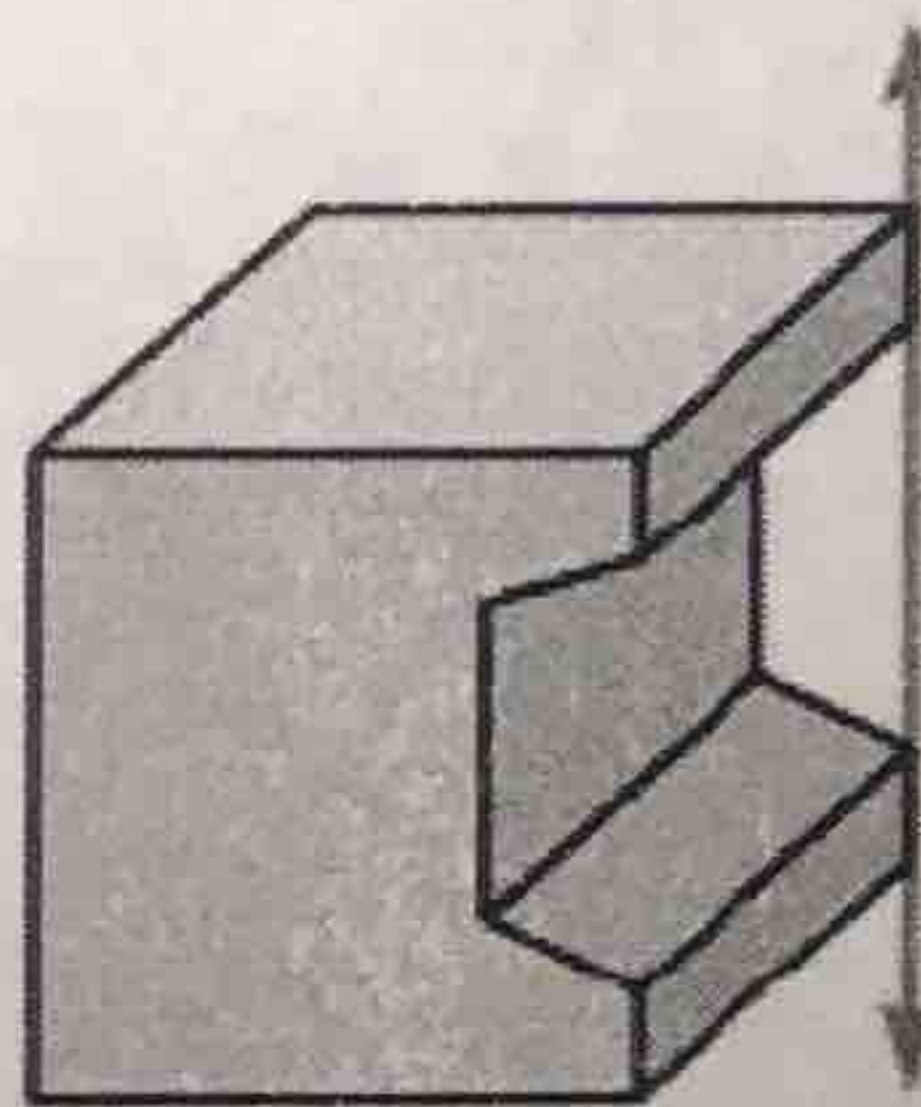
$$6 + 8 = 12 + 2$$

regular polyhedron - a polyhedron whose faces are congruent regular polygons

convex polyhedron - if any 2 points on a polyhedron can be connected by a segment that lies entirely inside or on the polyhedron

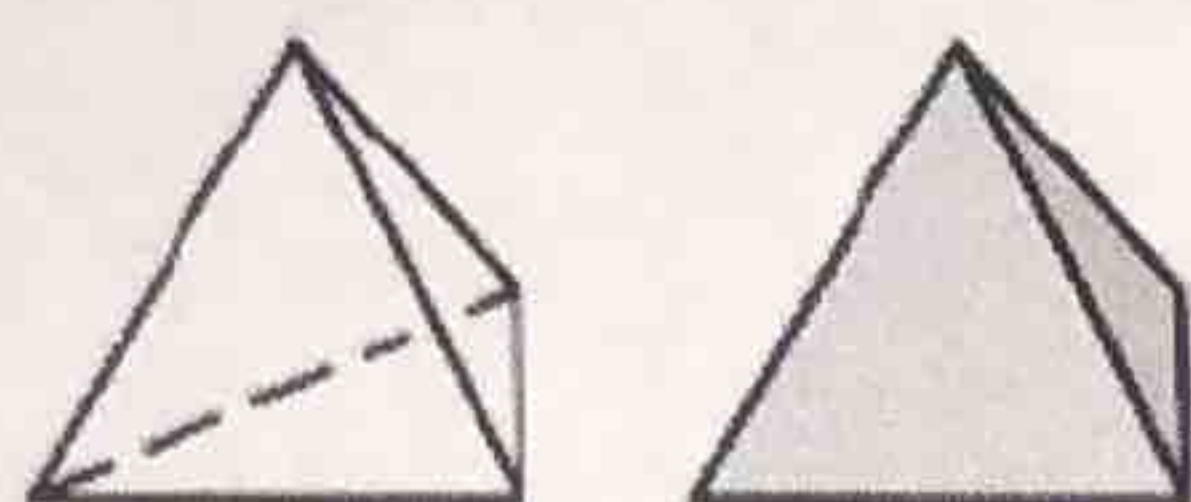


regular, convex

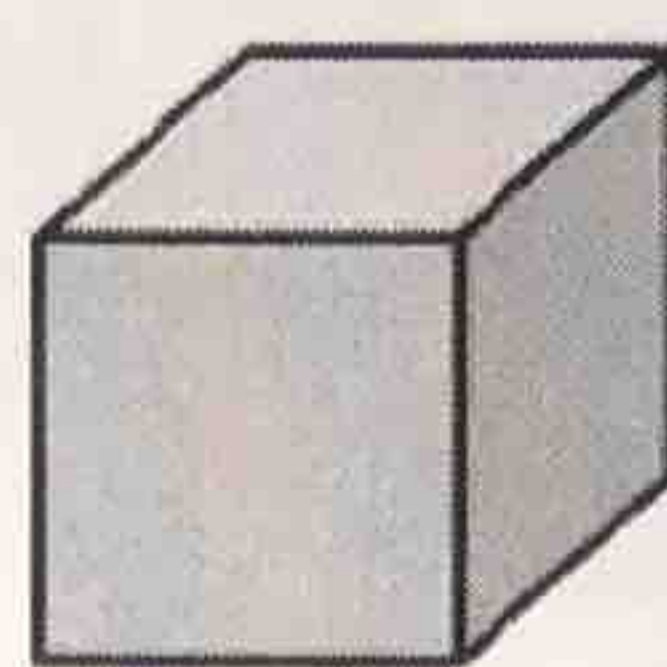
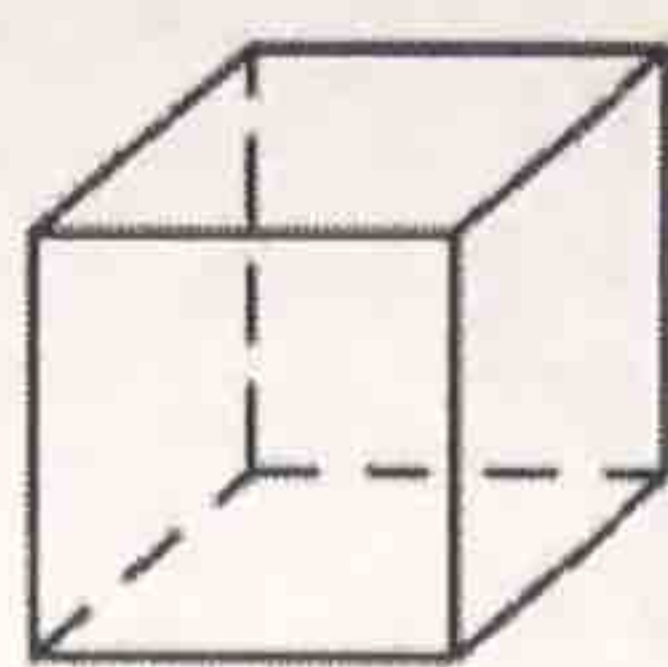


nonregular,
concave

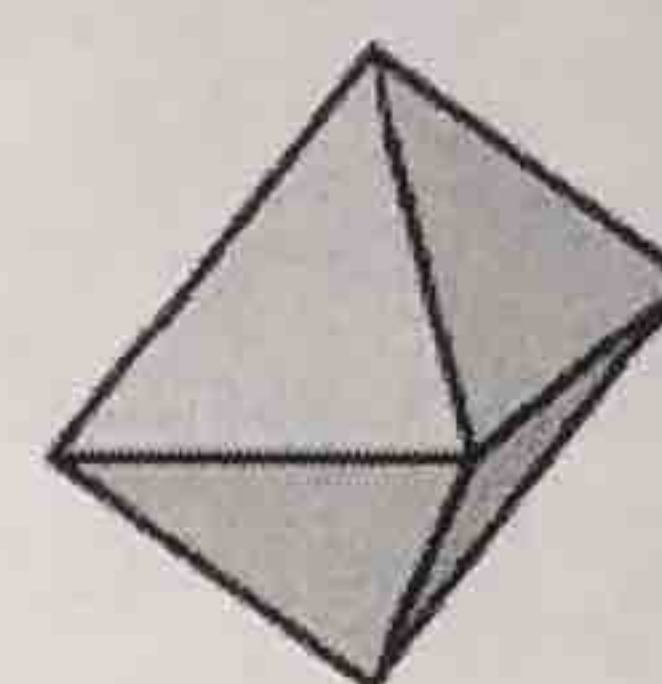
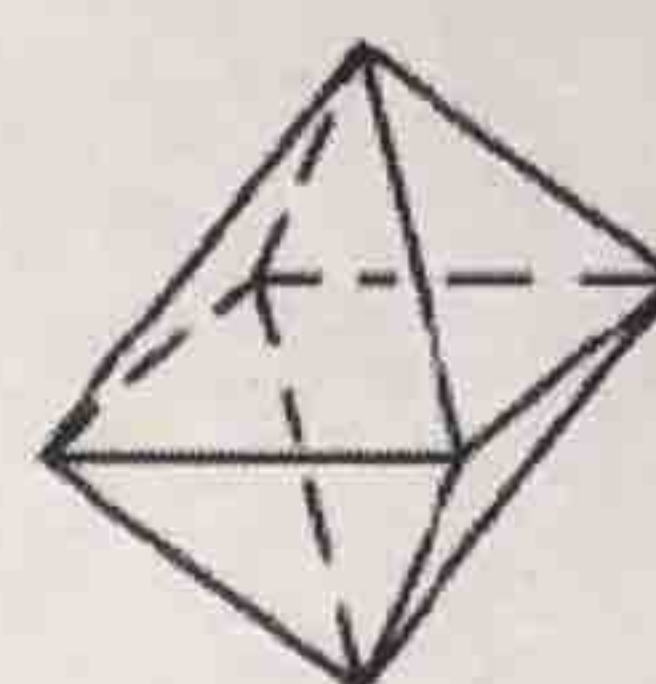
There are five regular polyhedra, called Platonic Solids, after the Greek philosopher Plato:



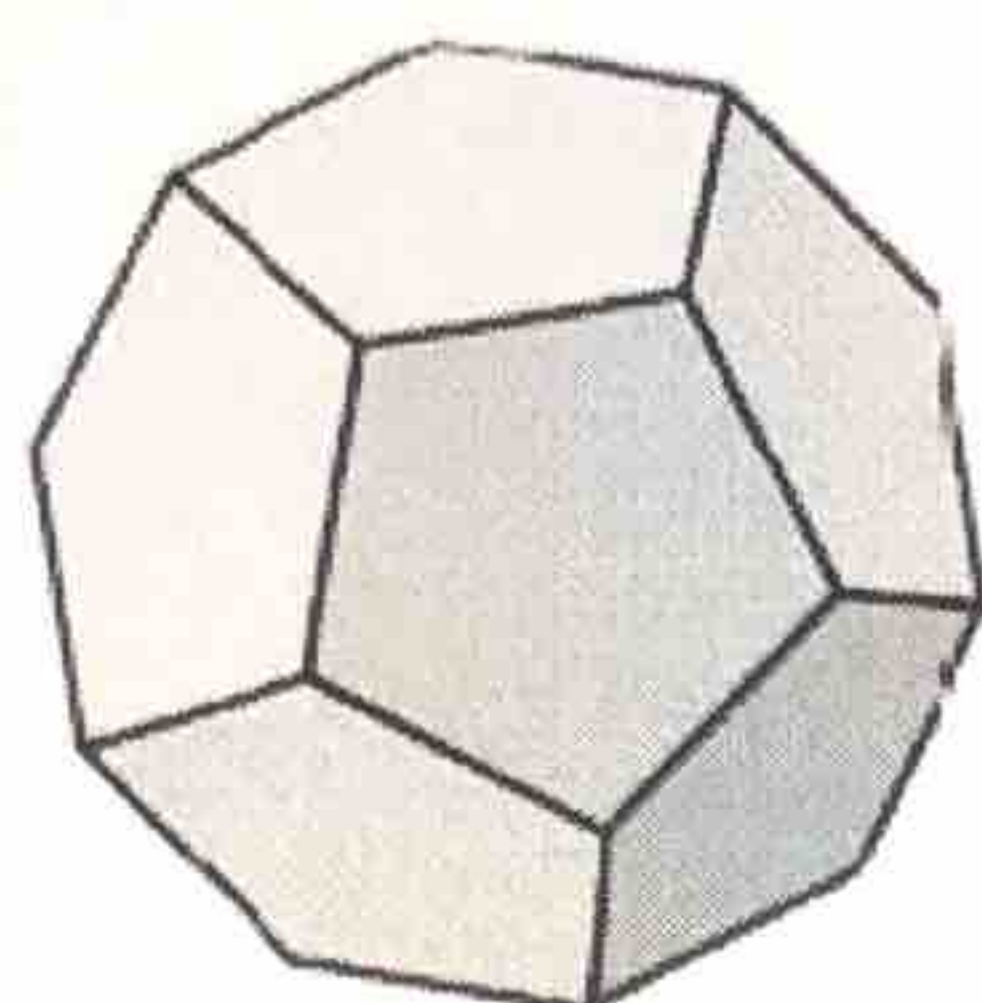
Regular tetrahedron
4 faces



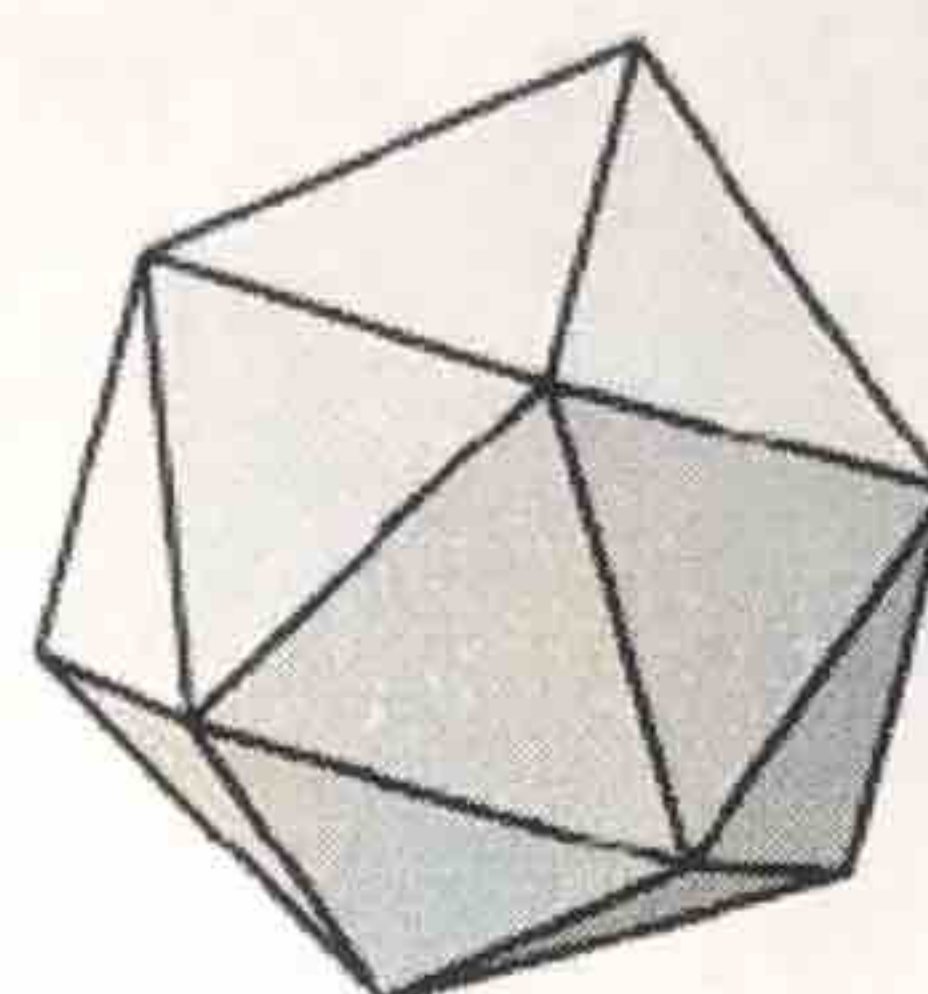
Cube
6 faces



Regular octahedron
8 faces



Regular dodecahedron
12 faces



Regular icosahedron
20 faces

cross section - when a plane slices through a solid, this is the intersection

