

3.29 Platonic Solids

Edge: a

Radius of inscribed circle: r

Radius of circumscribed circle: R

Surface area: S

Volume: V

308. Five Platonic Solids

The platonic solids are convex polyhedra with equivalent faces composed of congruent convex regular polygons.

Solid	Number of Vertices	Number of Edges	Number of Faces	Section
Tetrahedron	4	6	4	3.25
Cube	8	12	6	3.22
Octahedron	6	12	8	3.27
Icosahedron	12	30	20	3.27
Dodecahedron	20	30	12	3.27

Octahedron

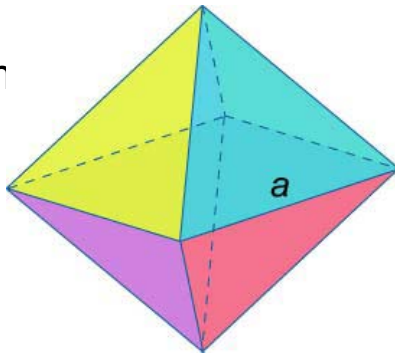


Figure 44.

309.
$$r = \frac{a\sqrt{6}}{6}$$



$$310. R = \frac{a\sqrt{2}}{2}$$

$$311. S = 2a^2\sqrt{3}$$

$$312. V = \frac{a^3\sqrt{2}}{3}$$

Icosahedron

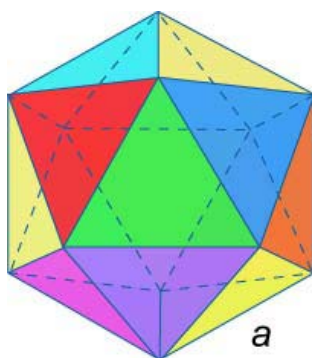


Figure 45.

$$313. r = \frac{a\sqrt{3}(3+\sqrt{5})}{12}$$

$$314. R = \frac{a}{4}\sqrt{2(5+\sqrt{5})}$$

$$315. S = 5a^2\sqrt{3}$$

$$316. V = \frac{5a^3(3+\sqrt{5})}{12}$$



Dodecahedron

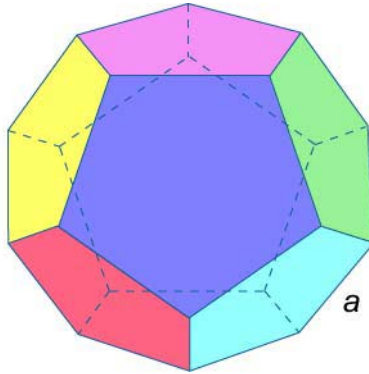


Figure 46.

$$317. \quad r = \frac{a\sqrt{10(25+11\sqrt{5})}}{2}$$

$$318. \quad R = \frac{a\sqrt{3}(1+\sqrt{5})}{4}$$

$$319. \quad S = 3a^2\sqrt{5(5+2\sqrt{5})}$$

$$320. \quad V = \frac{a^3(15+7\sqrt{5})}{4}$$

