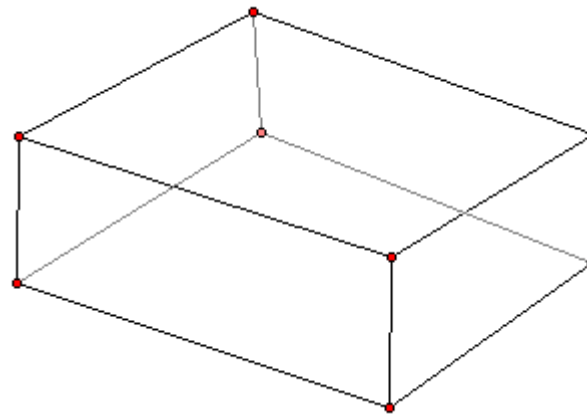# Polyhedra
多面体

多面体是指有「很多」个面的立体图形. 例如一般的立方体、或是金字塔就是多面体. 这里会介绍80 个均匀多面体(Uniform Polyhedra).

Components of a Polyhedron

- 面(Face) 就是多面体的面喽!
- 边(Edge) 是指多面体边缘的线, 亦即几个面的相交线, 如上图的每一条线.
- 顶点(Vertex) 是指多面体边缘的点, 亦即几条边的交点, 如上图红色的就是顶点.

对于所有凸多面体(及某些凹多面体), 永远有:

$$V - E + F = 2$$

其中 V 是顶点的个数、E 是边的个数、F 是面的个数.

Uniform Polyhedron?

一个均匀多面体就是每个顶点(周围的面、边分布) 都是全等的. 它也的一个有外接球的多面体, 而球的中心就是多面体的重心(Centroid).

Some Special Types of Polyhedra

- **柏拉图多面体(Platonic Polyhedra)**
  它们的面都是相同的正多边形.
  柏拉图多面体的数量为五个.
  之后的列表若注明[P]的就是柏拉图多面体.

- **克卜勒-Poinsot多面体(Kepler-Poinsot Polyhedra)**
  它们的面亦是相同的正多边形,但它们是凹多面体.
  克卜勒-Poinsot多面体的数量为四个.
  之后的列表若注明[K]的就是克卜勒-Poinsot多面体.

- **阿基米德立体(Archimedean Solid)**
  它们是以两个或以上的正多边形以相似的排列组成的凸多面体.
  阿基米德立体都是「很对称」的.
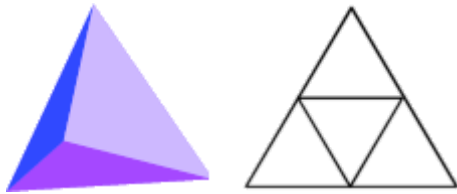 阿基米德立体的数量为13个.
  之后的列表若注明[A]的就是阿基米德立体.

List of Polyhedra

以下设所有构成多面体之正多边形的边长皆为1.
s为表面面积、v为体积、R为外接球半径、r为内切球半径、θ为任意相邻面之间的夹角(Dihedral Angle)、V为顶点数、E为边数、F为面数.
面数后($x\{y\}$ + $z\{w\}$ + ...)代表多面体的面由x个y边形、z个w边形、...所组成.

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1)四面体(Tetrahedron) [P]
四面体是一由四个等边三角形组成的多面体,其每个顶点旁边都有三个三角形.
四面体是最简单的有角规则立体几何图形.

$$s = \sqrt{3}a^2$$
$$v = \frac{\sqrt{2}}{12}a^3$$
$$R = \frac{\sqrt{6}}{4}a$$
$$\theta = \cos^{-1}\frac{1}{3} \approx 70.53°$$
$$V = 4$$
$$E = 6$$
$$F = 4 \quad (4\{3\})$$

2)截顶四面体(Truncated Tetrahedron) [A]
把一个四面体的各个顶点附近一部份切去后便成了截顶四面体.

$$s = 7\sqrt{3}a^2$$
$$v = \frac{23\sqrt{2}}{12}a^3$$
$$R = \frac{\sqrt{22}}{4}a$$
$$V = 15$$
$$E = 21$$
$$F = 8 \quad (4\{3\} + 4\{6\})$$

3)八合四面体(Octahemioctahedron / Octatetrahedron)
把八个四面体合起来,且分享同一个顶点就得到一个八合四面体.

$$R = a$$
$$E = 48$$
$$F = 32 \quad (32\{3\})$$

4)四合四面体(Tetrahemihexahedron)
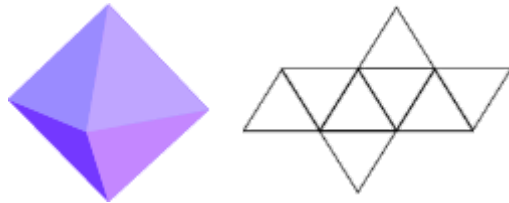把四个(三面为直角三角形的)四面体合起来,且分享同一个顶点就得到一个四合四面体.

$$R = a$$
$$E = 32$$
$$F = 16 \quad (3(4)+4(3))$$

5)八面体(Octahedron) [P]

四面体是一由八个等边三角形组成的多面体,其每个顶点旁边都有四个三角形.

$$s = 2\sqrt{3}a^2$$
$$v = \frac{\sqrt{2}}{3}a^2$$
$$R = \frac{\sqrt{2}}{2}a$$
$$r = \frac{\sqrt{6}}{6}a$$
$$\theta = \cos^{-1}\left(-\frac{1}{3}\right) \approx 109.47°$$
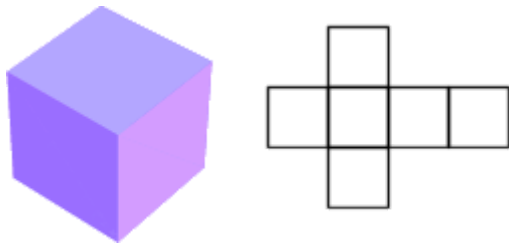$$V = 6$$
$$E = 12$$
$$F = 8 \quad (8(3))$$

6)立方体、六面体(Cube / Hexahedron) [P]

立方体是一由六个正方形组成的多面体,其每个顶点旁边都有三个正方形.

$$s = 6a^2$$
$$v = a^3$$
$$R = \frac{\sqrt{3}}{2}a$$
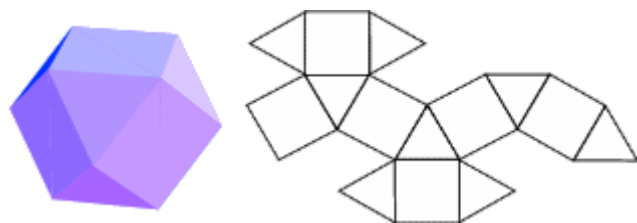$$r = \frac{1}{2}a$$
$$\theta = 90°$$
$$V = 8$$
$$E = 12$$
$$F = 6 \quad (6(4))$$

7)截半立方体(Cuboctahedron / Dymaxion / Heptaparallelohedron) [A]

把八合四面体凹陷的地方填补便得一截半立方体.

辉银矿(Argentite, Ag $_2$ S)的晶体便是一个截半立方体的结构.

$$s = \left(6 + 2\sqrt{3}\right)a^2$$
$$v = \tfrac{5\sqrt{2}}{3}a^3$$
$$R = a$$
$$r = \tfrac{3}{4}a$$
$$V = 12$$
$$E = 24$$
$$F = 14 \quad \left(8\{3\} + 6\{4\}\right)$$

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8)截顶八面体(Truncated Octahedron / Mecon) [A]

把一个八面体的各个顶点附近一部份切去后便成了截顶八面体.
萤石(Fluorite, CaF $_2$)的晶体便是一个截顶八面体的结构.

$$s = 6 + 12\sqrt{3}$$
$$v = 8\sqrt{2}$$
$$R = \tfrac{\sqrt{10}}{2}$$
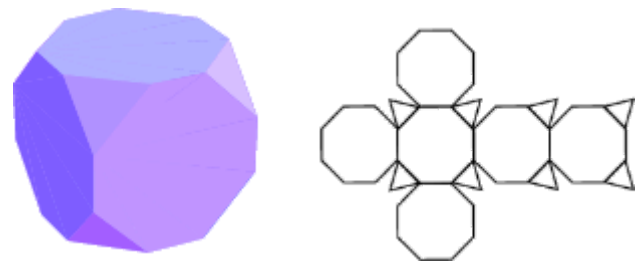$$V = 24$$
$$E = 36$$
$$F = 14 \quad \left(8\{6\} + 6\{4\}\right)$$

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9)截顶立方体(Truncated Cube) [A]

把一个立方体的各个顶点附近一部份切去后便成了截顶八面体.

$$s = 4\left(3 + 3\sqrt{2} + \sqrt{3}\right)$$
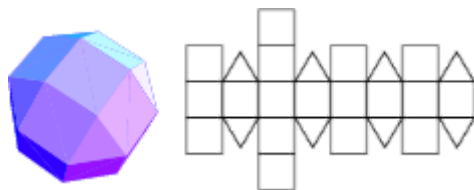$$v = \tfrac{1}{3}\left(21 + 14\sqrt{2}\right)$$
$$R = \tfrac{1}{2}\sqrt{7 + 4\sqrt{2}}$$
$$V = 24$$
$$E = 36$$
$$F = 14 \quad \left(6\{8\} + 8\{3\}\right)$$

10)小斜方截半立方体(Small Rhombicuboctahedron) [A]

$$s = 18 + 2\sqrt{3}$$
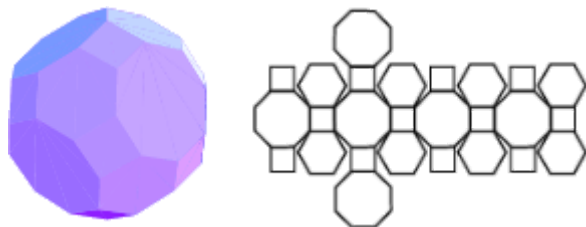$$v = \tfrac{1}{3}\left(12 + 10\sqrt{2}\right)$$
$$R = \tfrac{1}{2}\sqrt{5 + 2\sqrt{2}}$$
$$V = 24$$
$$E = 48$$
$$F = 26 \quad \left(8\{3\} + 18\{4\}\right)$$

11) (大)斜方截半立方体(Great Rhombicuboctahedron / Rhombitruncated Cuboctahedron) [A]

$$s = 12\left(2 + \sqrt{2} + \sqrt{3}\right)$$
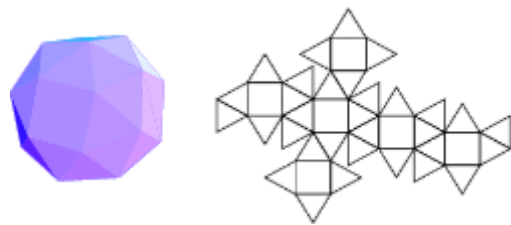$$v = 22 + 14\sqrt{2}$$
$$R = \tfrac{1}{2}\sqrt{13 + 6\sqrt{2}}$$
$$V = 48$$
$$E = 72$$
$$F = 26 \quad \left(12\{4\} + 8\{6\} + 6\{8\}\right)$$

12)扭棱立方体(Snub Cube / Cubus Simus / Snub Cuboctahedron) [A]

$$s = 6 + 8\sqrt{3}$$

$$v = \operatorname*{root}_{x\in\mathbf{R}^+}\left(729x^6 - 45684x^4 + 19386x^2 - 12482\right) \approx 7.88948$$

$$R = \operatorname*{root}_{x\in\mathbf{R}^+}\left(32x^6 - 80x^4 + 44x^2 - 7\right) \approx 1.34371$$

$$V = 24$$

$$E = 60$$

$$F = 38 \quad \left(32\{3\} + 6\{4\}\right)$$

13) 小立方截半立方体(Small Cubicuboctahedron)

$$R = \tfrac{1}{2}\sqrt{5 + 2\sqrt{2}}$$

$$F = 52 \quad \left(8\{3\} + 6\{4\} + 6\{8\}\right)$$

14) 大立方截半立方体(Great Cubicuboctahedron)

$$R = \tfrac{1}{2}\sqrt{5 - 2\sqrt{2}}$$

$$F = 56 \quad \left(8\{3\} + 6\{4\} + 6\{\tfrac{8}{3}\}\right)$$

15)六合五面体(Cubohemioctahedron)

把一些八面体沿中间的面切成两个五面体(其中一面成正方形),再把六个五面体合起来,使得它们共点,则得到一个六合五面体.

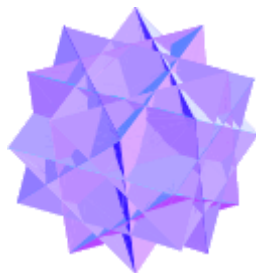$$R = 1$$

$$F = 30 \quad \left(4\{6\} + 6\{4\}\right)$$

16) 立方截顶截半立方体(Cubitruncated Cuboctahedron)

$$R = \frac{\sqrt{7}}{2}$$

$$F = \left(8\{6\} + 6\{8\} + 6\left\{\frac{8}{3}\right\}\right)$$

17) 大均匀斜方截半立方体(Uniform Great Rhombicuboctahedron / Quasirhombicuboctahedron)

$$R = \frac{1}{2}\sqrt{5 - 2\sqrt{2}}$$

$$F = \left(8\{3\} + 18\{4\}\right)$$

18)小斜方六面体(Small Rhombihexahedron)

把小立方截半立方体的凹陷和凸出的部分性质互换便可得一小斜方六面体.

$$R = \frac{1}{2}\sqrt{5 + 2\sqrt{2}}$$

$$F = 66 \quad \left(12\{4\} + 6\{8\}\right)$$

19) 星状截顶六面体(Stellated Truncated Hexahedron)

$$R = \frac{1}{2}\sqrt{7 - 4\sqrt{2}}$$

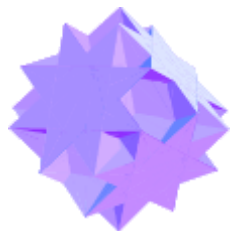$$F = \left(8\{3\} + 6\left\{\frac{8}{3}\right\}\right)$$

20) 大截顶截半立方体(Great Truncated Cuboctahedron / Quasitruncated Cuboctahedron)

$$R = \tfrac{1}{2}\sqrt{13 - 6\sqrt{2}}$$

$$F = \left(12\{4\} + 8\{6\} + 6\left\{\tfrac{8}{3}\right\}\right)$$

21) 大斜方六面体(Great Rhombihexahedron)

$$R = \tfrac{1}{2}\sqrt{5 - 2\sqrt{2}}$$

$$F = \left(12\{4\} + 6\left\{\tfrac{8}{3}\right\}\right)$$

22)二十面体(Icosahedron) [P]
二十面体是一由二十个等边三角形组成的多面体,其每个顶点旁边都有五个三角形.

$$s = 5\sqrt{3}$$
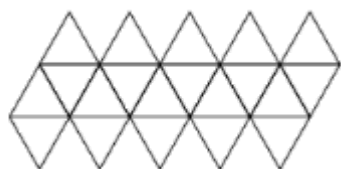
$$v = \tfrac{5}{12}\left(3 + \sqrt{5}\right)$$

$$R = \tfrac{1}{4}\sqrt{10 + 2\sqrt{5}}$$

$$r = \tfrac{1}{12}\left(3\sqrt{3} + \sqrt{15}\right)$$

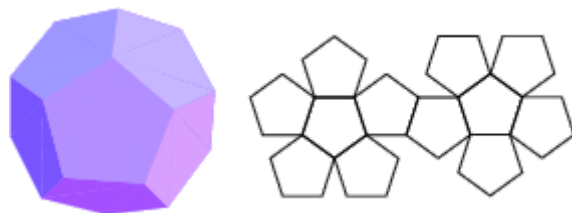$$\theta = \cos^{-1}\left(-\tfrac{\sqrt{5}}{3}\right) \approx 138.19°$$

$$V = 12$$

$$E = 30$$

$$F = 20 \quad (20\{3\})$$

23)十二面体(Dodecahedron) [P]
十二面体是一由十二个正五角形组成的多面体,其每个顶点旁边都有三个五边形.

十二面体与二十面体的面积比和体积比相同.
黄铁矿(Pyrite, FeS$_2$)的晶体便是一个十二面体的结构.

$$s = 3\sqrt{25+10\sqrt{5}}$$
$$v = \tfrac{1}{4}\left(15+7\sqrt{5}\right)$$
$$R = \tfrac{1}{4}\left(\sqrt{3}+\sqrt{15}\right)$$
$$r = \tfrac{1}{20}\sqrt{250+110\sqrt{5}}$$
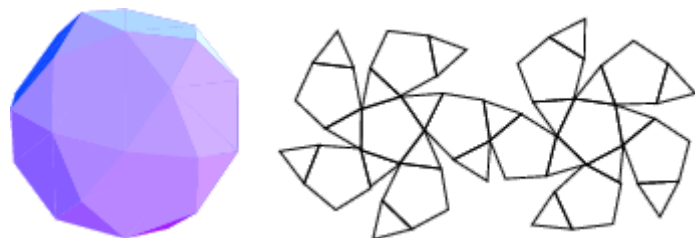$$\theta = \cos^{-1}\left(-\tfrac{\sqrt{5}}{5}\right) \approx 116.57°$$
$$V = 20$$
$$E = 30$$
$$F = 12 \quad (12\{5\})$$

24)三十二面体、截半十二面体(Icosidodecahedron) [A]

把一个十二面体或二十面体截顶至刚好一半便得一三十二面体.

$$s = 5\sqrt{3}+3\sqrt{5}\sqrt{5+2\sqrt{5}}$$
$$v = \tfrac{1}{6}\left(45+17\sqrt{5}\right)$$
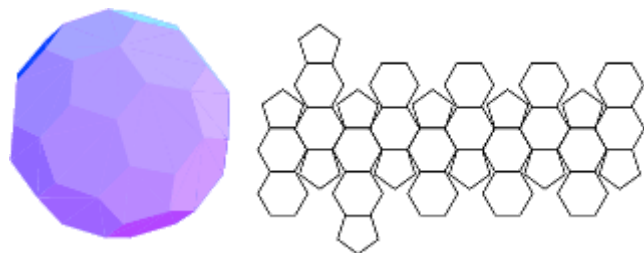$$R = \phi = \tfrac{1}{2}\left(\sqrt{5}+1\right)$$
$$V = 30$$
$$E = 60$$
$$F = 32 \quad (20\{3\}+12\{5\})$$

25)截顶二十面体(Truncated Icosahedron) [A]

把一个二十面体截顶即可.
一般足球的外形及碳-60的结构均为截顶二十面体.

$$s = 3\left(10\sqrt{3} + \sqrt{5}\sqrt{5 + 2\sqrt{5}}\right)$$

$$v = \tfrac{1}{4}\left(125 + 3\sqrt{5}\right)$$

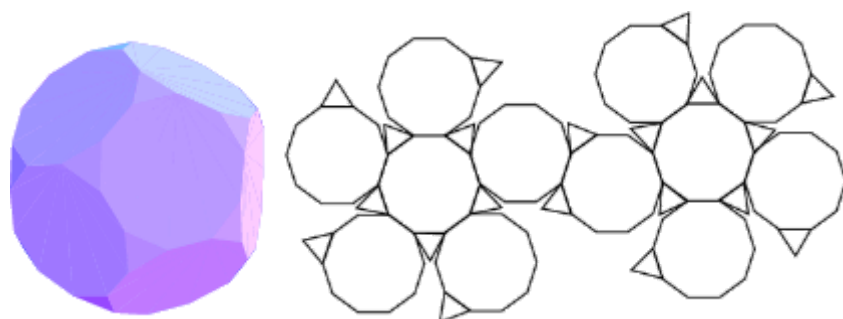$$R = \tfrac{1}{4}\sqrt{58 + 18\sqrt{5}}$$

$$V = 60$$

$$E = 90$$

$$F = 32 \quad \left(12\{5\} + 20\{6\}\right)$$

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26)截顶十二面体(Truncated Dodecahedron) [A]
把一个十二面体截顶即可.

$$s = 5\left(\sqrt{3} + 6\sqrt{5 + 2\sqrt{5}}\right)$$
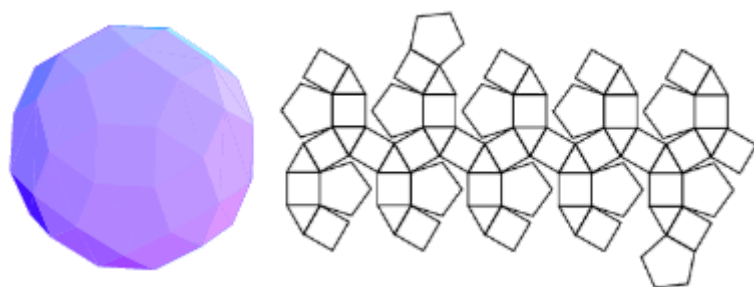
$$v = \tfrac{5}{12}\left(99 + 47\sqrt{5}\right)$$

$$R = \tfrac{1}{4}\sqrt{74 + 30\sqrt{5}}$$

$$V = 60$$

$$E = 90$$

$$F = 32 \quad \left(20\{3\} + 12\{10\}\right)$$

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27)小斜方三十二面体(Small Rhombicosidodecahedron) [A]

$$s = 30 + \sqrt{30\left(10 + 3\sqrt{5} + \sqrt{15\left(5 + 2\sqrt{5}\right)}\right)}$$

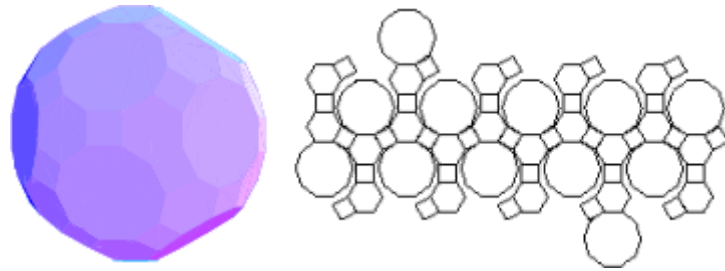$$v = 20 + \tfrac{29}{3}\sqrt{5}$$

$$R = \tfrac{1}{2}\sqrt{11 + 4\sqrt{5}}$$

$$V = 60$$

$$E = 120$$

$$F = 62 \quad \left(20\{3\} + 30\{4\} + 12\{5\}\right)$$

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28)大截顶三十二面体(Great Truncated Icosidodecahedron / Great Rhombicosidodecahedron / Rhombitruncated Icosidodecahedron) [A]

$$s = 30\left(1 + \sqrt{2\left(4 + \sqrt{5} + \sqrt{15 + 6\sqrt{6}}\right)}\right)$$

$$v = 95 + 50\sqrt{5}$$

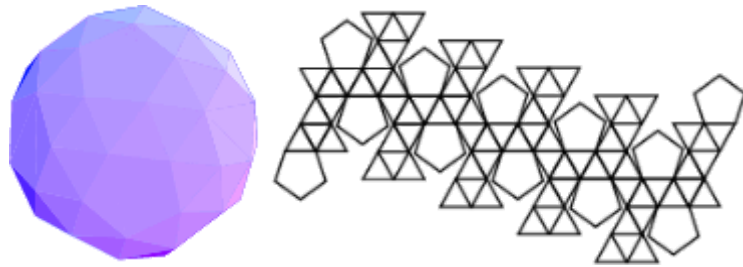$$R = \tfrac{1}{2}\sqrt{31 + 12\sqrt{5}}$$

$$V = 120$$

$$E = 180$$

$$F = 62 \quad \left(30\{4\} + 20\{6\} + 12\{10\}\right)$$

29)扭棱十二面体(Snub Dodecahedron) [A]

$$s = \sqrt{15\left(95 + 6\sqrt{5} + 8\sqrt{15\left(5 + 2\sqrt{5}\right)}\right)}$$

$$v \approx 37.6166623633127539$$

$$R \approx 2.15583737511563988$$

$$V = 60$$

$$E = 150$$

$$F = 92 \quad \left(80\{3\} + 12\{5\}\right)$$

30) 小双三斜三十二面体(Small Ditrigonal Icosidodecahedron)

$$R = \tfrac{1}{2}\sqrt{3}$$

$$F = \left(20\{3\} + 12\{\tfrac{5}{2}\}\right)$$

31) 小二十合三十二面体(Small Icosicosidodecahedron)

$$R = \sqrt{\frac{17+3\sqrt{5}}{2}}$$

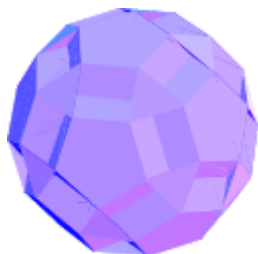$$F = \left(20\{3\} + 20\{6\} + 12\left\{\tfrac{5}{2}\right\}\right)$$

---

32) 小二十合扭棱三十二面体(Small Snub Icosicosidodecahedron)

$$R = \tfrac{1}{4}\sqrt{13 + 3\sqrt{5} + \sqrt{102 + 46\sqrt{5}}}$$

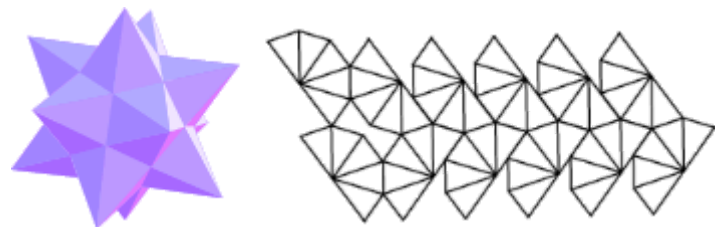$$F = \left(100\{3\} + 12\left\{\tfrac{5}{2}\right\}\right)$$

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33) 小十二合三十二面体(Small Dodecicosidodecahedron)

$$R = \tfrac{1}{2}\sqrt{11 + 4\sqrt{5}}$$

$$F = \left(20\{3\} + 12\{5\} + 12\{10\}\right)$$

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34)小星状十二面体(Small Stellated Dodecahedron / "Urchin") [K]

$$R = \tfrac{1}{4}\sqrt[4]{5}\sqrt{2\left(\sqrt{5}-1\right)}$$

$$V = 32$$

$$E = 90$$

$$F = 60 \quad \left(12\left\{\tfrac{5}{2}\right\}\right)$$
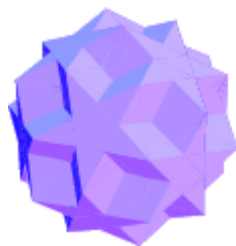
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35)大十二面体(Great Dodecahedron) [K]
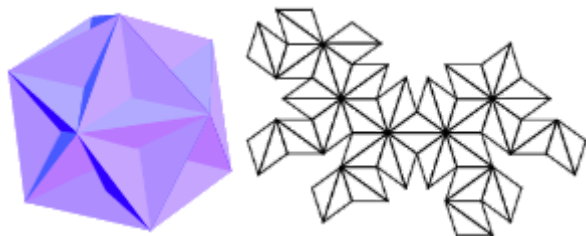
$$s = 15\sqrt{5 - 2\sqrt{5}}$$
$$v = \tfrac{5}{4}\left(\sqrt{5} - 1\right)$$
$$R = \tfrac{1}{4}\sqrt[4]{5}\sqrt{2\left(1 + \sqrt{5}\right)}$$
$$F = 60 \quad \left(12\{5\}\right)$$

36) 十二合十二面体((Great) Dodecadodecahedron)

$$R = 1$$
$$F = \left(12\{5\} + 12\{\tfrac{5}{2}\}\right)$$

37) 截顶大十二面体(Truncated Great Dodecahedron)

$$R = \tfrac{1}{4}\sqrt{34 + 10\sqrt{5}}$$
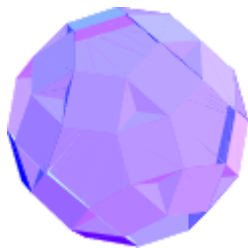$$F = \left(12\{10\} + 12\{\tfrac{5}{2}\}\right)$$

38) 斜方十二合十二面体(Rhombidodecadodecahedron)

$$R = \tfrac{1}{2}\sqrt{7}$$
$$F = \left(30\{4\} + 12\{5\} + 12\{\tfrac{5}{2}\}\right)$$

39) 小斜方十二面体(Small Rhombidodecahedron)

$$R = \tfrac{1}{2}\sqrt{11+4\sqrt{5}}$$
$$F = \left(30\{4\} + 12\{10\}\right)$$

40) 扭棱十二合十二面体(Snub Dodecadodecahedron)

$$R \approx 1.27443994$$
$$F = \left(60\{3\} + 12\{5\} + 12\{\tfrac{5}{2}\}\right)$$

41) 双三斜十二面体(Ditrigonal Dodecadodecahedron)

$$R = \tfrac{1}{2}\sqrt{3}$$
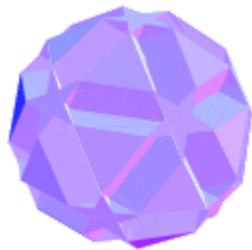$$F = \left(12\{5\} + 12\{\tfrac{5}{2}\}\right)$$

42) 大双三斜方十二合三十二面体(Great Ditrigonal Dodecicosidodecahedron)

$$R = \tfrac{1}{4}\sqrt{34-6\sqrt{5}}$$
$$F = \left(20\{3\} + 12\{5\} + 12\{\tfrac{10}{3}\}\right)$$

43) 小双三斜方十二合三十二面体(Small Ditrigonal Dodecicosidodecahedron)

$$R = \tfrac{1}{4}\sqrt{34 + 6\sqrt{5}}$$

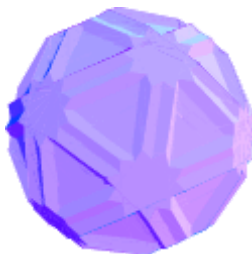$$F = \left(20\{3\} + 12\{10\} + 12\{\tfrac{5}{3}\}\right)$$

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44) 三十二合十二面体(Icosidodecadodecahedron)
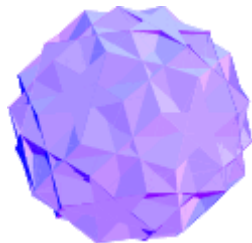
$$R = \tfrac{1}{2}\sqrt{7}$$

$$F = \left(20\{6\} + 12\{5\} + 12\{\tfrac{5}{2}\}\right)$$

---

45) 二十截顶十二合十二面体(Icositruncated Dodecadodecahedron)

$$R = 2$$

$$F = \left(20\{6\} + 12\{10\} + 12\{\tfrac{10}{3}\}\right)$$
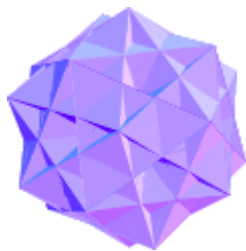
---

46) 扭棱三十二合十二面体(Snub Icosidodecadodecahedron)

$$R \approx 0.563448956399969613$$

$$F = \left(80\{3\} + 12\{5\} + 20\{6\}\right)$$
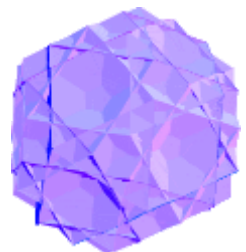
---

47) 大三斜三十二面体(Great Ditrigonal Icosidodecahedron)

$$R = \tfrac{1}{2}\sqrt{3}$$
$$F = \left(20\{3\} + 12\{5\}\right)$$

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48) 大二十合三十二面体(Great Icosicosidodecahedron)

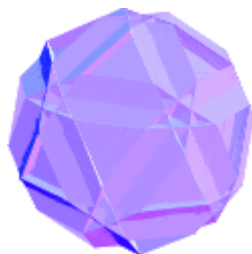$$R = \tfrac{1}{4}\sqrt{34 - 6\sqrt{5}}$$
$$F = \left(20\{3\} + 12\{5\} + 20\{6\}\right)$$

---

49) 小二十合四面体(Small Icosihemidodecahedron)

$$R = \tfrac{1}{2}\left(\sqrt{5} + 1\right)$$
$$F = \left(20\{3\} + 6\{10\}\right)$$

---

50) 小十二合二十面体(Small Dodecicosahedron)

$$R = \tfrac{1}{4}\sqrt{34 + 6\sqrt{5}}$$
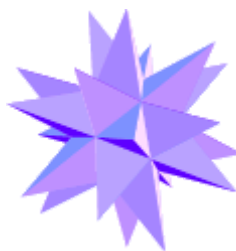$$F = \left(20\{6\} + 12\{10\}\right)$$

---

51) 小十二合六面体(Small Dodecahemidodecahedron)

$$R = \tfrac{1}{2}\sqrt{11 + 4\sqrt{5}}$$

$$F = \left(30\{4\} + 12\{10\}\right)$$

---

52)大星状十二面体(Great Stellated Dodecahedron) [K]

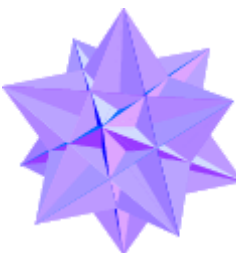$$s = 15\sqrt{5 + 2\sqrt{5}}$$

$$v = \tfrac{5}{4}\left(3 + \sqrt{3}\right)$$

$$R = \tfrac{1}{4}\sqrt{3}\left(\sqrt{5} - 1\right)$$

$$V = 32$$

$$E = 90$$

$$F = 60 \quad \left(12\left\{\tfrac{5}{2}\right\}\right)$$

---

53)大二十面体(Great Icosahedron) [K]

$$s = 3\sqrt{3}\left(5 + 4\sqrt{5}\right)$$

$$v = \tfrac{1}{4}\left(25 + 9\sqrt{3}\right)$$

$$R = \tfrac{1}{2}\sqrt{\tfrac{1}{2}\left(25 + 11\sqrt{5}\right)}$$

$$F = \left(20\{3\}\right)$$

---

54) 大三十二面体(Great Icosidodecahedron)
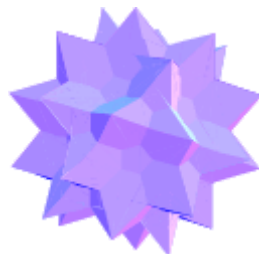
$$R = \tfrac{1}{2}\left(\sqrt{5} - 1\right)$$

$$F = \left(20\{3\} + 12\left\{\tfrac{5}{2}\right\}\right)$$

---

55) 大截顶二十面体(Great Truncated Icosahedron)
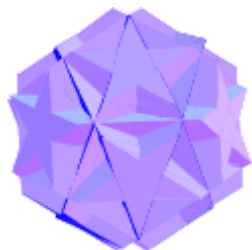
$$R = \tfrac{1}{4}\sqrt{58 - 18\sqrt{5}}$$
$$F = \left(20\{6\} + 12\{\tfrac{5}{2}\}\right)$$

56) 斜方二十面体(Rhombicosahedron)

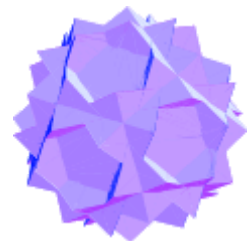$$R = \tfrac{1}{2}\sqrt{7}$$
$$F = \left(30\{4\} + 20\{6\}\right)$$

57) 大扭棱三十二面体(Great Snub Icosidodecahedron)

$$R \approx 0.6450202$$
$$F = \left(80\{3\} + 12\{\tfrac{5}{2}\}\right)$$

58) 小星状截顶十二面体(Small Stellated Truncated Dodecahedron)

$$R = \tfrac{1}{4}\sqrt{34 - 10\sqrt{5}}$$
$$F = \left(12\{5\} + 12\{\tfrac{10}{3}\}\right)$$

59) 截顶十二合十二面体((Quasi-)Truncated Dodecadodecahedron)

$$R = \tfrac{1}{2}\sqrt{11}$$

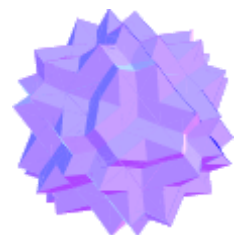$$F = \left(30\{4\} + 12\{10\} + 12\left\{\tfrac{10}{3}\right\}\right)$$

60) 反扭棱十二合十二面体(Inverted Snub Dodecadodecahedron)

$$R \approx 0.8516302$$

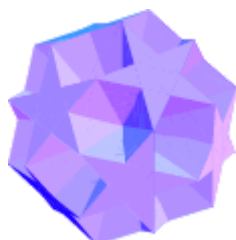$$F = \left(60\{3\} + 12\{5\} + 12\left\{\tfrac{5}{2}\right\}\right)$$

61) 大十二合三十二面体(Great Dodecicosidodecahedron)

$$R = \tfrac{1}{4}\sqrt{58 - 18\sqrt{5}}$$

$$F = \left(20\{6\} + 12\left\{\tfrac{5}{2}\right\}\right)$$

62) 小十二合十一面体(Small Dodecahemicosahedron)

$$R = 1$$

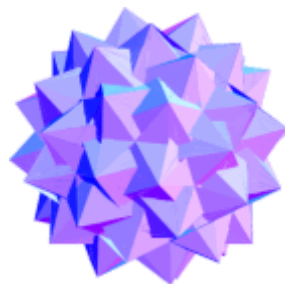$$F = \left(10\{6\} + 12\left\{\tfrac{5}{2}\right\}\right)$$

63) 大十二合二十面体(Great Dodecicosahedron)

$$R = \tfrac{1}{4}\sqrt{34 - 6\sqrt{3}}$$

$$F = \left(20\{6\} + 12\left\{\tfrac{10}{3}\right\}\right)$$

---

64) 大扭棱十二合三十二面体(Great Snub Dodecicosidodecahedron)

$$R = \tfrac{1}{2}\sqrt{2}$$
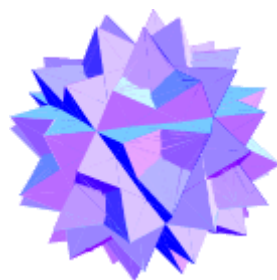$$F = \left(80\{3\} + 24\{\tfrac{5}{2}\}\right)$$

---

65) 大十二合十一面体(Great Dodecahemicosahedron)

$$R = 2$$
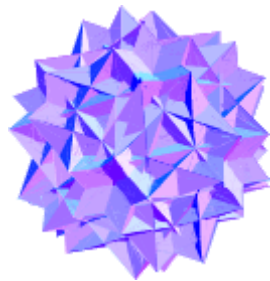$$F = \left(12\{5\} + 10\{6\}\right)$$

---

66) 大星状截顶十二面体(Great Stellated Truncated Dodecahedron / Quasitruncated Great Stellated Dodecahedron)

$$R = \tfrac{1}{4}\sqrt{74 - 30\sqrt{5}}$$
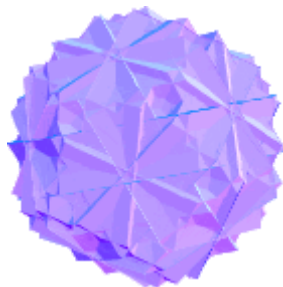$$F = \left(20\{3\} + 12\{\tfrac{10}{3}\}\right)$$

---

67) 均匀大斜方三十二面体(Uniform Great Rhombicosidodecahedron / Quasirhombicosidodecahedron)

$$R = \tfrac{1}{2}\sqrt{11 - 3\sqrt{5}}$$

$$F = \left(20\{3\} + 30\{4\} + 12\{\tfrac{5}{2}\}\right)$$

68) 大截顶三十二面体(Great (Quasi)Truncated Icosidodecahedron)

$$R = \tfrac{1}{2}\sqrt{31 - 12\sqrt{5}}$$
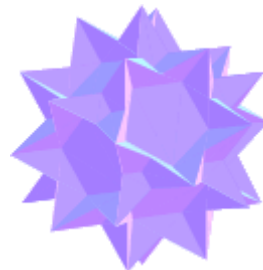
$$F = \left(30\{4\} + 20\{6\} + 12\{\tfrac{10}{3}\}\right)$$

69) 大反扭棱三十二面体(Great Inverted Snub Icosidodecahedron)

$$R \approx 0.816080674799923$$
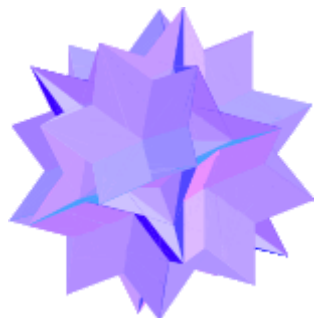
$$F = \left(30\{3\} + 12\{\tfrac{5}{2}\}\right)$$

70) 大十二合六面体(Great Dodecahemidodecahedron)

$$R = \tfrac{1}{2}\left(\sqrt{5} - 1\right)$$

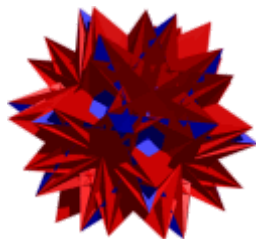$$F = \left(12\{\tfrac{5}{2}\} + 6\{\tfrac{10}{3}\}\right)$$

71) 大二十合六面体(Great Icosihemidodecahedron)

$$R = \tfrac{1}{2}\left(\sqrt{5} - 1\right)$$
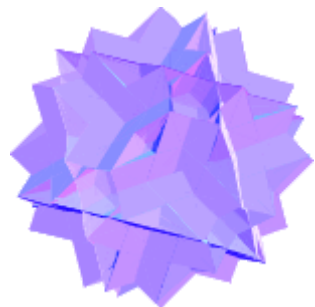$$F = \left(20\{3\} + 6\{\tfrac{10}{3}\}\right)$$

72) 小后扭棱二十合三十二面体(Small (Inverted) Retrosnub Icosicosidodecahedron)

$$R = \tfrac{1}{4}\sqrt{13 + 3\sqrt{5} - \sqrt{102 + 46\sqrt{5}}}$$
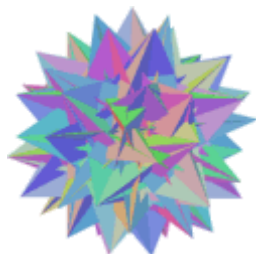$$F = \left(100\{3\} + 12\{\tfrac{5}{3}\}\right)$$

73) 大斜方十二面体(Great Rhombidodecahedron)

$$R = \tfrac{1}{2}\sqrt{11 - 4\sqrt{5}}$$
$$F = \left(30\{4\} + 12\{\tfrac{10}{3}\}\right)$$

74) 大后扭棱二十合三十二面体(Great (Inverted) Retrosnub Icosidodecahedron)

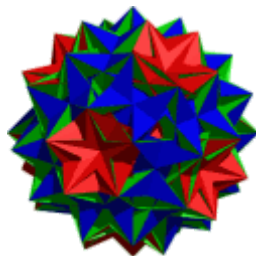$$R \approx 0.5800015$$
$$F = \left(80\{3\} + 12\{\tfrac{5}{2}\}\right)$$

75)大双斜方三十二面体(Great Dirhombicosidodecahedron)
它是唯一一个不能以Schwarz三角形产生的均匀多面体

$$R = \tfrac{1}{2}\sqrt{2}$$

$$F = \left(40\{3\} + 60\{4\} + 24\left\{\tfrac{5}{2}\right\}\right)$$

76)五角柱(Pentagonal Prism)
五角柱是一个底为正五边形的柱体.

$$s = 5 + \tfrac{1}{2}\sqrt{5\left(5 + 2\sqrt{5}\right)}$$

$$v = \tfrac{1}{4}\sqrt{5\left(5 + 2\sqrt{5}\right)}$$

$$V = 10$$

$$E = 15$$

$$F = 7 \quad \left(5\{4\} + 2\{5\}\right)$$

77) 五反角柱(Pentagonal Antiprism)

$$V = 10$$

$$E = 20$$

$$F = 22 \quad \left(10\{3\} + 2\{5\}\right)$$

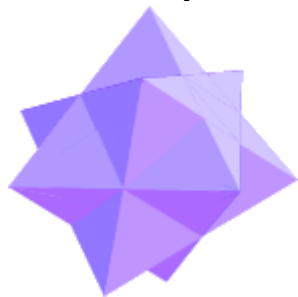## 78)五星角柱(Pentagrammic Prism)
五星角柱是一个底为正五角星的柱体.

$$V = 10$$

$$E = 30$$

$$F = 22 \quad \left(5\{4\} + 2\left\{\tfrac{5}{2}\right\}\right)$$

79) 五星反角柱(Pentagrammic Antiprism)

$$F = \left(10\{3\} + 2\left\{\tfrac{5}{2}\right\}\right)$$

80) 五星交叉反角柱(Pentagrammic Crossed Antiprism)

(暂无资料)

External Links & References

- [Uniform Polyhedron - from MathWorld](#)
- [Kaleido](#)
- [多面体世界](#) (简体中文)
- [The Uniform Polyhedra](#)

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