

Gleichflächer, 2014

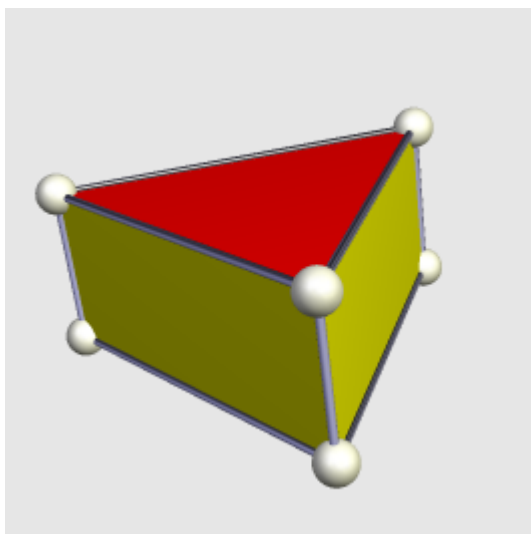
Seit Jahren sammle ich Polyeder, die gleich lange Kanten haben. Ich nenne sie Gleichkanter. Jetzt hatte ich die Idee, im gleichen Sinne auch Polyeder zu sammeln, die gleichgrosse Flächen haben, und sie Gleichflächer zu nennen. Natürlich sind die platonischen Polyeder auch Gleichkanter und Gleichflächer. Interessant wird es erst bei verschiedenen geformten Seitenflächen. Es gibt viele Gleichkanter, die auch Gleichflächer sind. Diese nehme ich nicht in die neue Liste auf. Bei jedem Polyeder gebe ich den isoperimetrische Quotient $36 \pi V^2/O^3$ (**IPQ**) an. Er ist dimensionslos und misst die Kugeligkeit. Er hat den Wert eins bei der Kugel.

Die dualen Polyeder zu den 13 archimedischen Polyedern sind alles interessante Gleichflächer! Zwei davon das Rhombo-Dodekaeder und das Rhombo-Triakontaeder sind sogar zugleich Gleichkanter. Ich nehme sie aber nicht in diese Liste auf.

In eckigen Klammern [GFxx] ist eine interne Nummer aufgeführt, mit der im Anhang die Koordinaten der Ecken der Polyeder gefunden können (um sie zum Beispiel in das Programm GreatStella einzuspeisen).

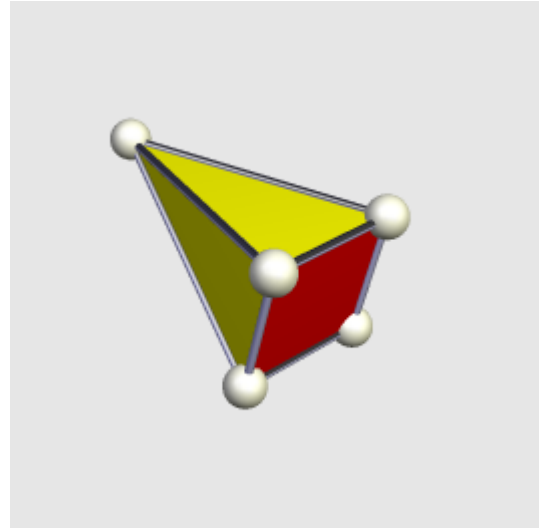
1) 5 Flächen

3-Prisma [GF09]



IPQ = 0.3916

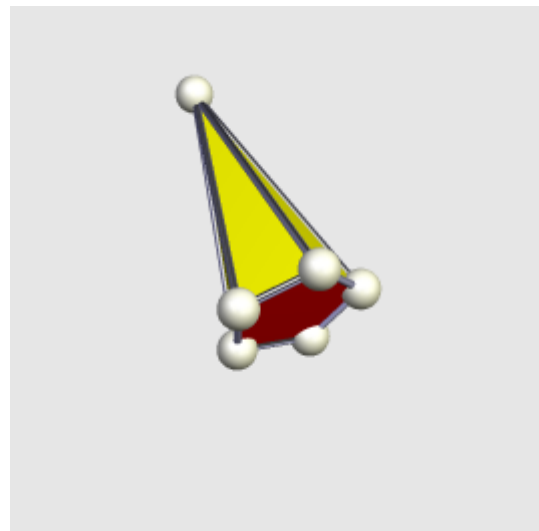
4-Pyramide [GF08]



IPQ = 0.3777

2) 6 Flächen

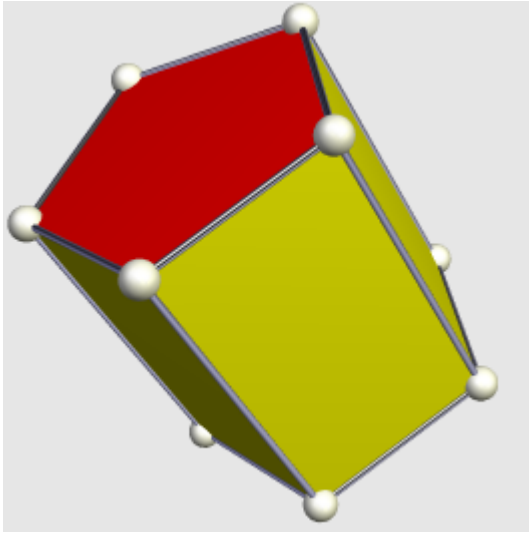
5-Pyramide [GF13]



IPQ = 0.3846

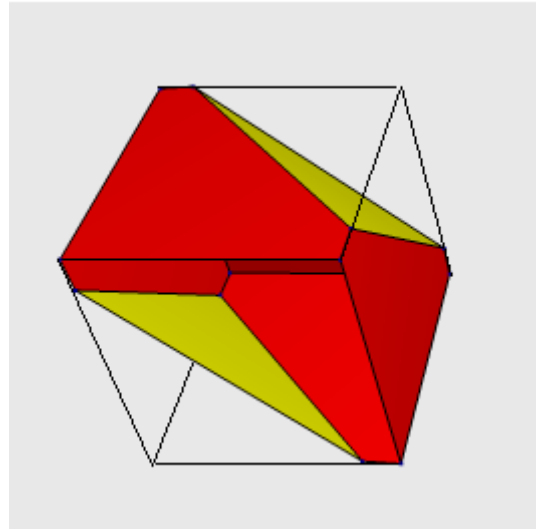
3) 7 Flächen

5-Prisma [GF11]



IPQ = 0.5678

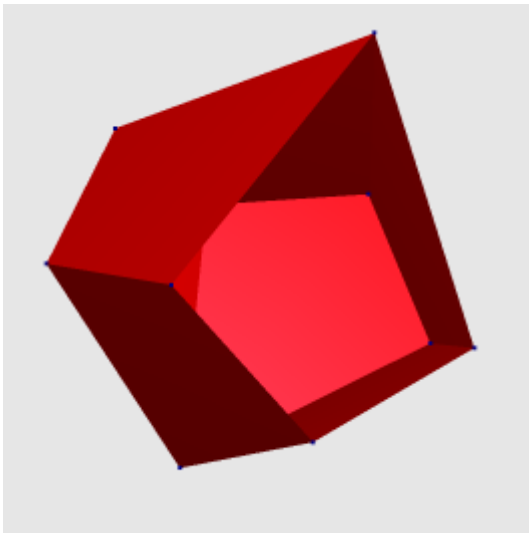
An 2 opponierenden Ecken abgeschliffener
Würfel [GF56]



IPQ = 0.5421
(auf einer Seite absichtlich geöffnet)

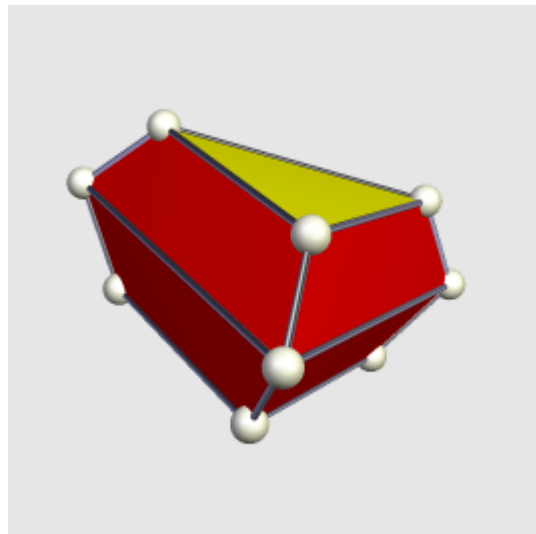
4) 8 Flächen

Verzähnte 4-DiPyramide, h opt mit optimaler
Höhe für Rundlichkeit [GF 54]

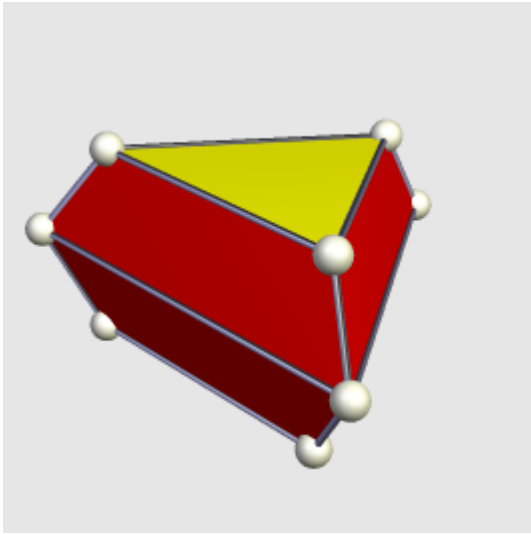


IPQ = 0.6185
(auf einer Seite absichtlich geöffnet)

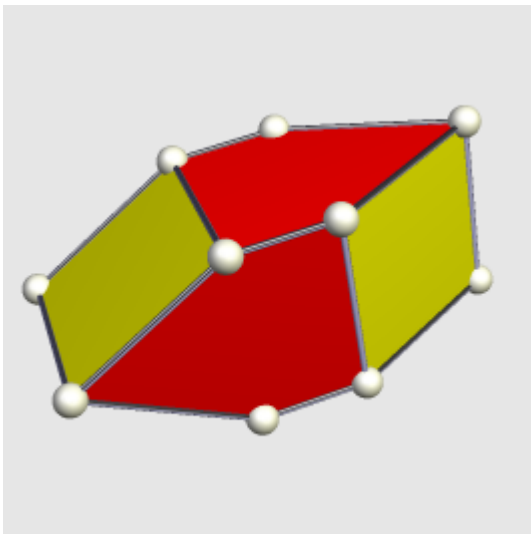
3 DiPyramide truncated tops mit optimaler
Höhe für Rundlichkeit [GF53]



IPQ = 0.5082

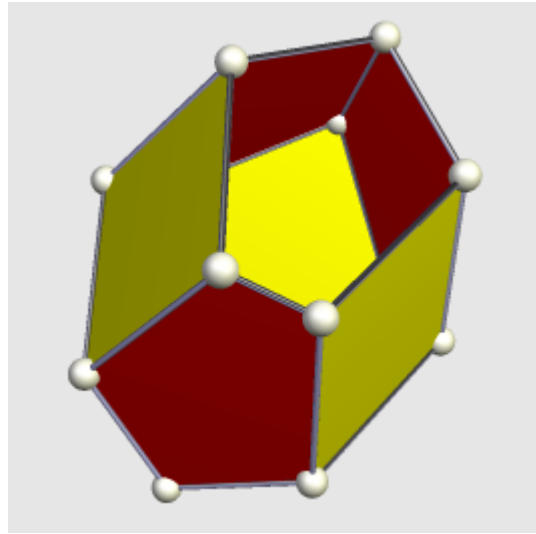
 3-DiPyramide (Johnson 12) truncated tops
 [GF43]


IPQ = 0.5059

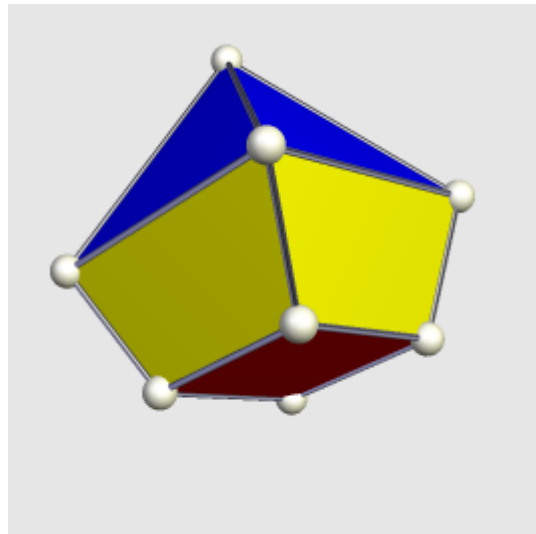
 Elongated GiroBiFastigium [GF31]


IPQ = 0.4545

5) 9 Flachen

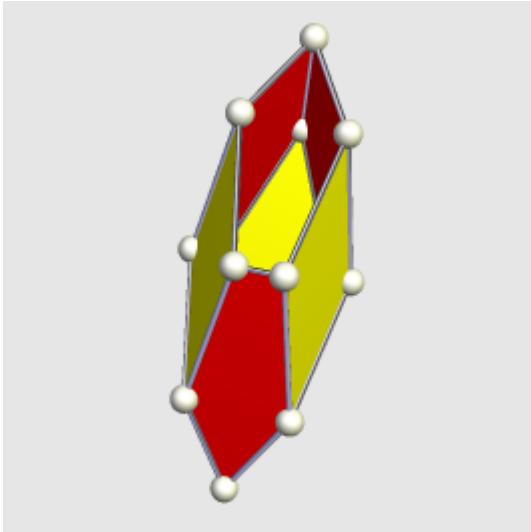
 3-DiPyramide v-truncated belt, Hohle optimiert
 fur Rundlichkeit. [GF41]


IPQ = 0.6545

 Elongated 4 Pyramid VAR [GF24]


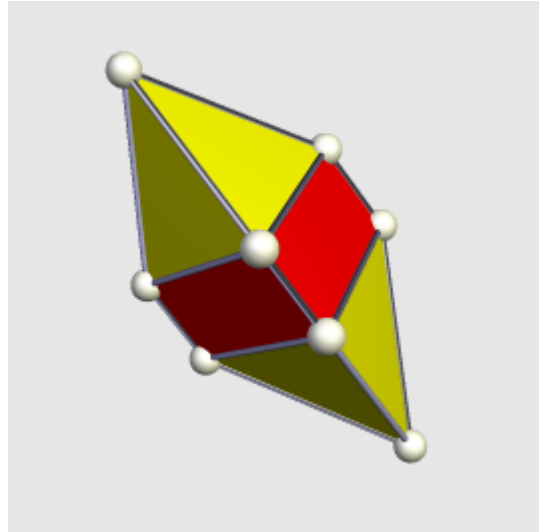
IPQ = 0.6475

3-DiPyramide truncated belt [GF39]



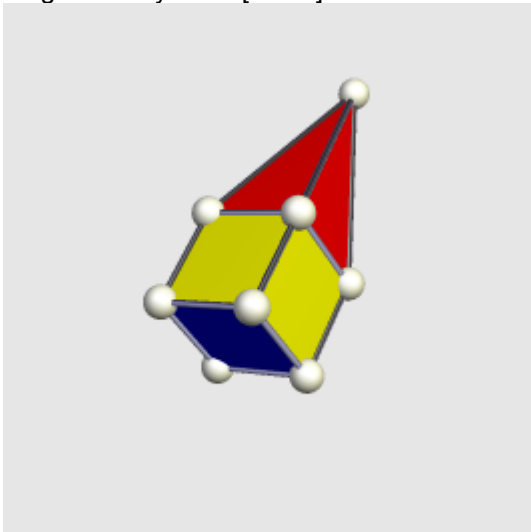
IPQ = 0.4294

Elongated 3 DiPyramid VAR [GF23]



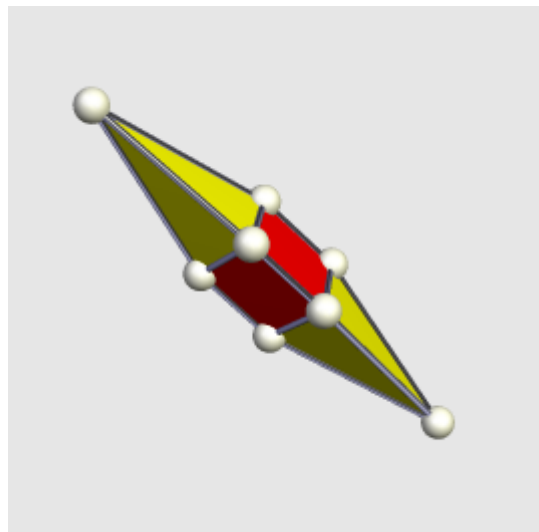
IPQ = 0.3428
 Hier sind die Dreiecke gleichseitig.

elongated 4 Pyramid [GF15]



IPQ = 0.4195

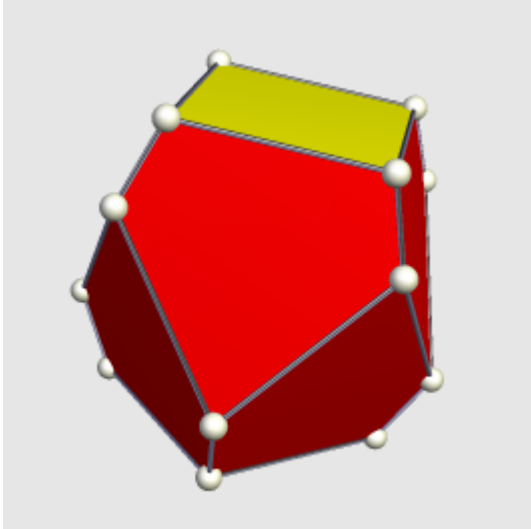
elongated 3 DiPyramid [GF14]



IPQ = 0.1567
 Hier sind die Vierecke gleichseitig.

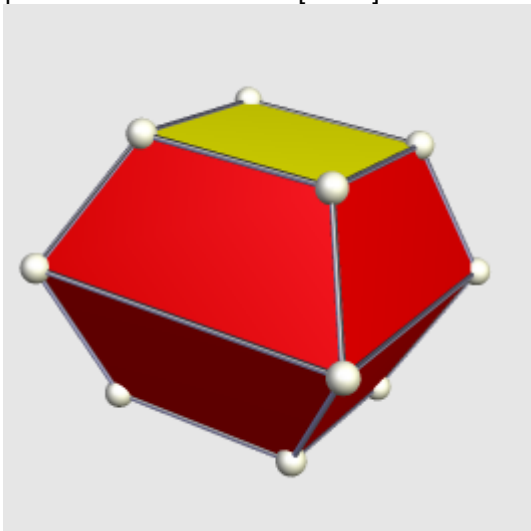
5) 10 Flachen

Verzahnte 4-DiPyramide, Pole abgeschliffen,
Hohle optimiert fur Rundlichkeit. [GF55]



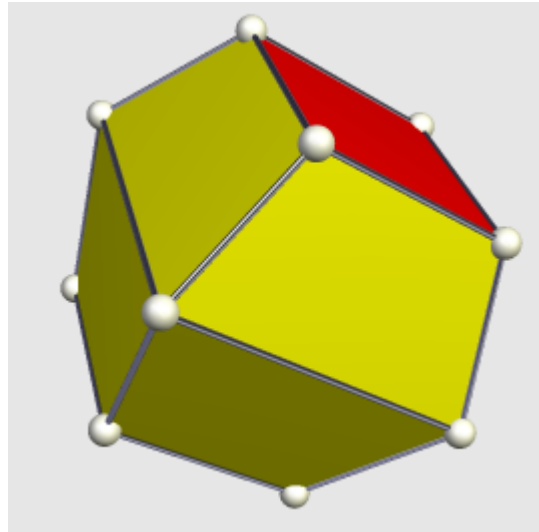
IPQ = 0.6910

4-DiPyramide, Pole abgeschliffen, Hohle
optimiert fur Rundlichkeit. [GF63]



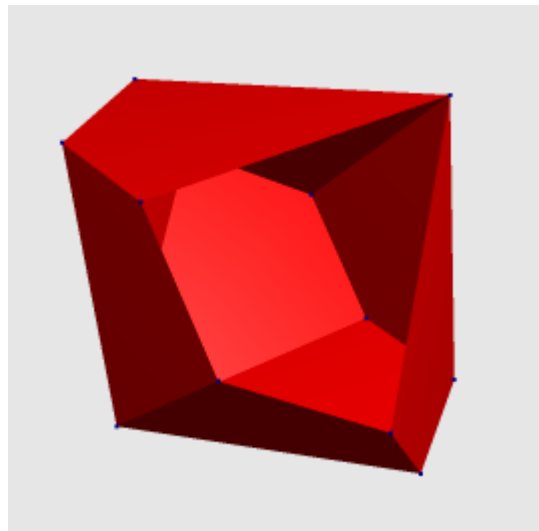
IPQ = 0.6731

Verdoppelter Pyramidenstumpf von GF24,
[GF40]



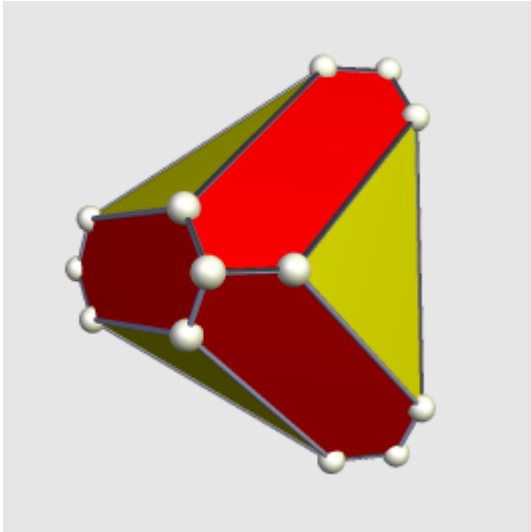
IPQ = 0.6616

Verzahnte 5-DiPyramide, Hohle optimiert fur
Rundlichkeit. [GF57]



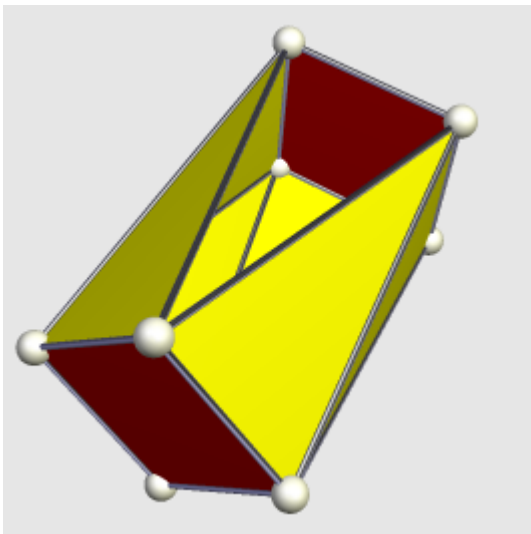
IPQ = 0.6475

Kanten-abgestumpftes Tetraeder [GF07]



IPQ = 0.6172

4-Anti-Prisma [GF10]

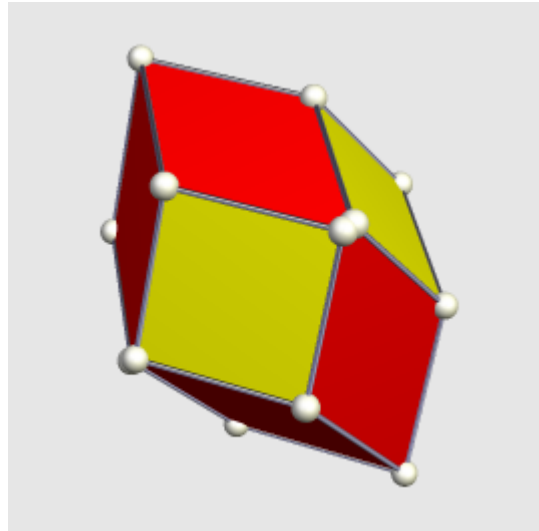


IPQ = 0.5797

6) 12 Flächen

4 DiPyramide (=Oktaeder) v-truncated belt [GF46]

Nur die Ecken am Gurt (Aequator) abgestumpft.



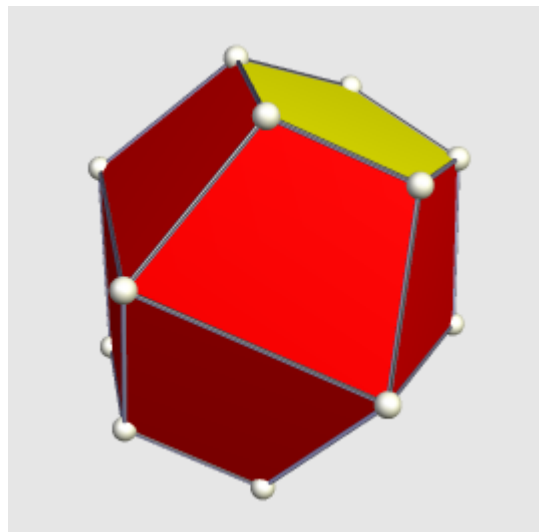
IPQ = 0.7377

Theorem

Wenn man hier die Höhe im Interesse von mehr Rundlichkeit optimiert wird, gelangt man zum Rhobododekaeder (die Pentagone degenerieren zu Rauten) !

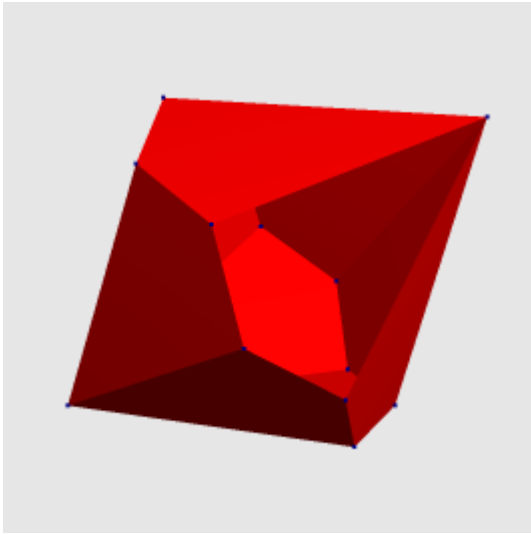
Die gleich Operation „v-truncated belt“ führt bei der 5 DiPyramide (Johnson 13) nicht mehr zu einem Gleichflächer, auch wenn über die Höhe verfügt wird.

5 DiPyramiden truncated tops, h-opt [GF44]



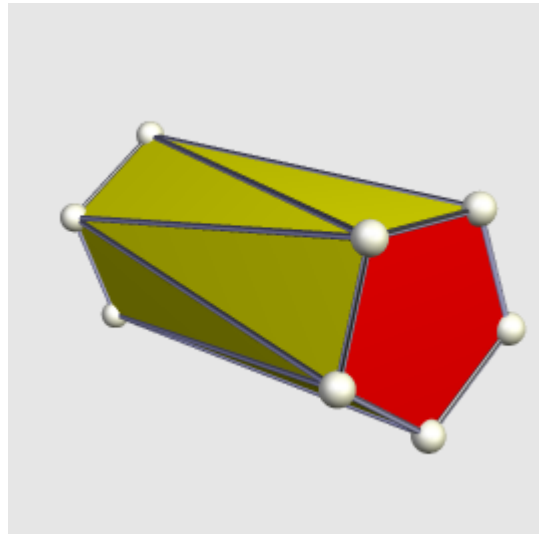
IPQ = 0.7373

Verzahnte 6-DiPyramide 6, Höhe optimiert für Rundlichkeit. [GF59]



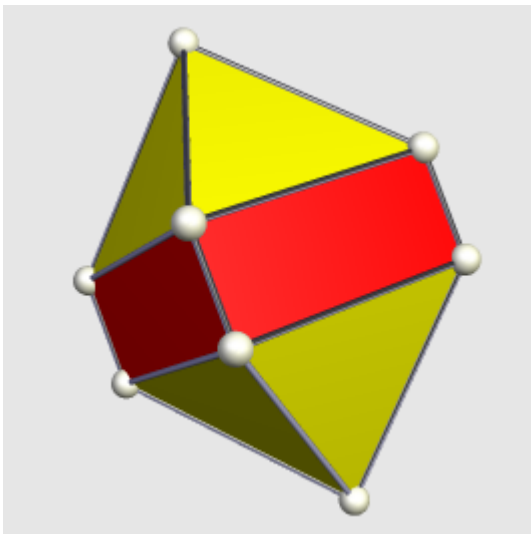
IPQ = 0.7017

5-AntiPrisma [GF12]



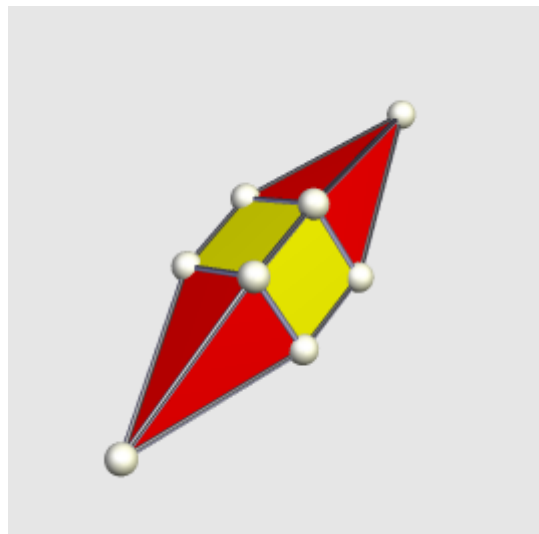
IPQ = 0.5236
Genau wie beim Würfel.

Elongated 4 DiPyramid VAR [GF25]



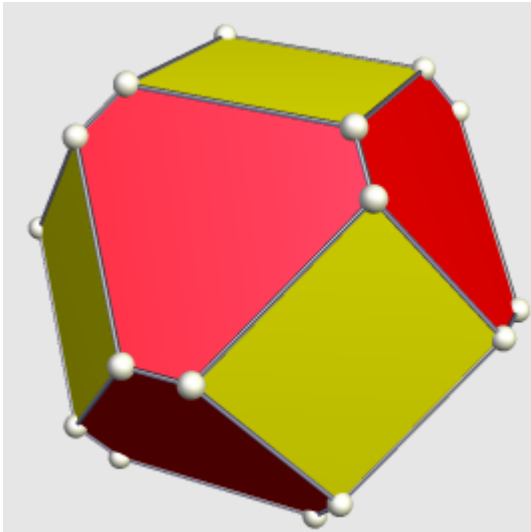
IPQ = 0.6616
Hier sind die Dreiecke gleichseitig.

Elongated 4 DiPyramid [GF16]



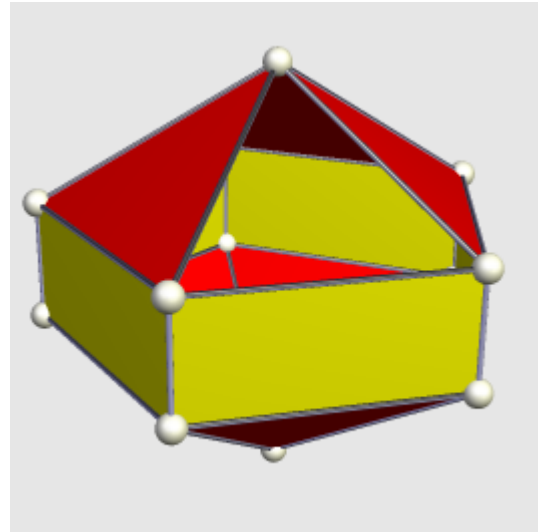
IPQ = 0.3428
Hier sind die Vierecke gleichseitig.

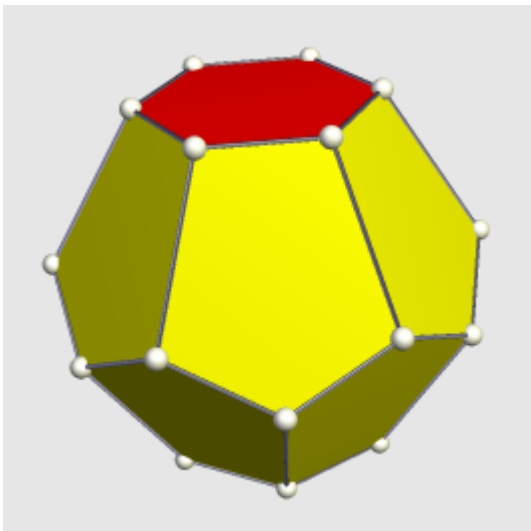
7) 14 Flächen

 eck-abgestumpftes Oktaeder [GF01]


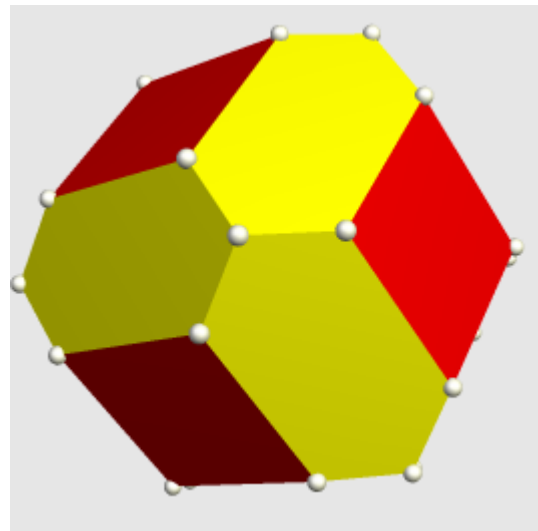
IPQ = 0.7811

8) 15 bis 31 Flächen

 elongated 5 Dipyramid VAR (15-Flach) [GF29]

 IPQ = 0.7511
 Hier sind die Dreiecke gleichseitig.

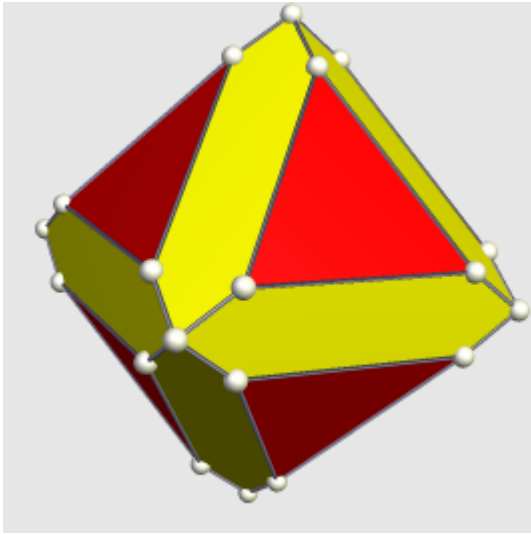
 Verzahnte 6-DiPyramide an den Polen
 beschnitten und mit optimaler Höhe (von
 E.Bernal) [GF30]


IPQ = 0.7861

 Kanten-abgestumpfter Würfel (18-Flach)
 [GF03]


IPQ = 0.8184

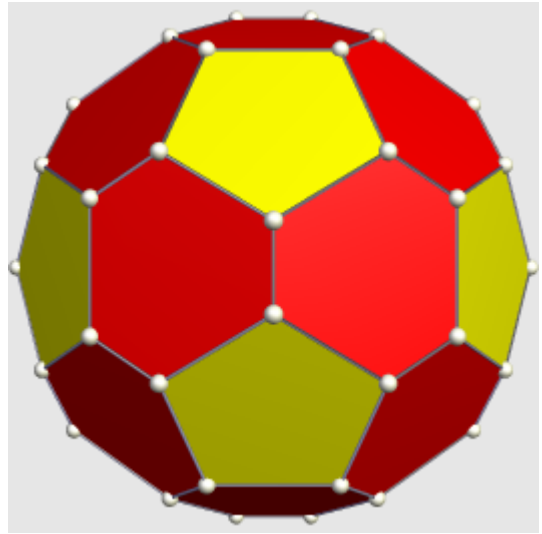
Kanten-abgestumpftes Oktaeder (20-Flach)
[GF04]



IPQ = 0.7771

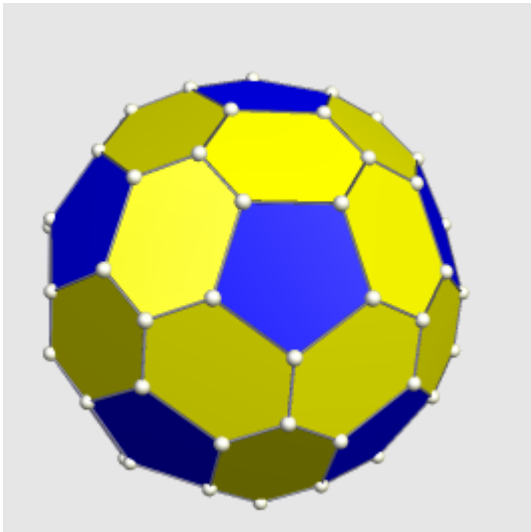
9) 32 Flachen

Eck-abgestumpftes Ikosaeder [GF02]



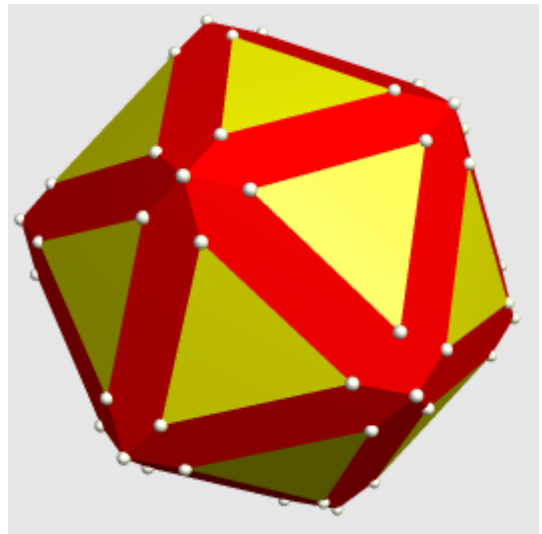
IPQ = 0.9048

Kanten-abgestumpftes Dodekaeder (24-Flach)
[GF05]



IPQ = 0.9268

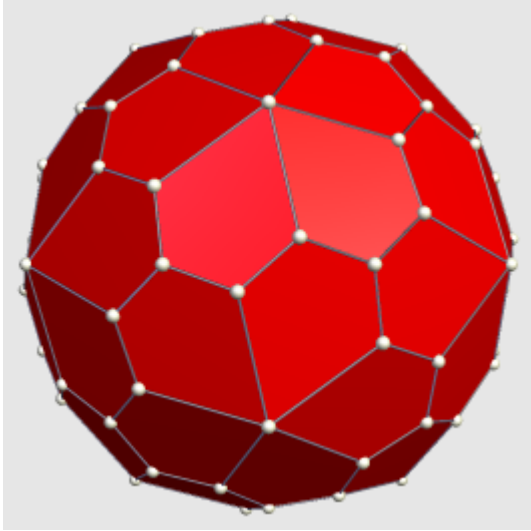
Eck-abgestumpftes Ikosaeder [GF06]



IPQ = 0.8994

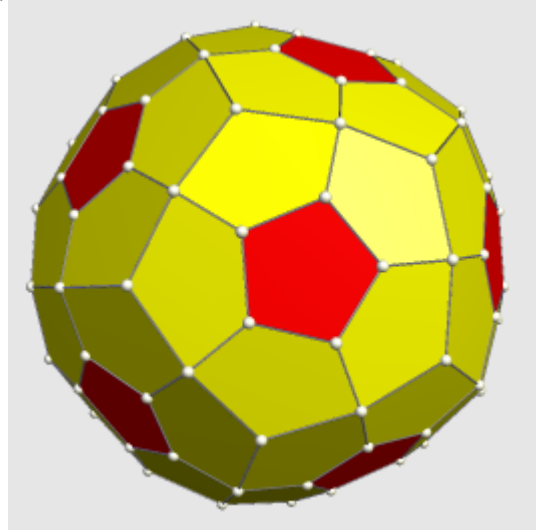
10) 60 Flächen

Pentagonal Hexakontahedron (gut bekanntes Polyeder) [GF35]



IPQ = 0.9439

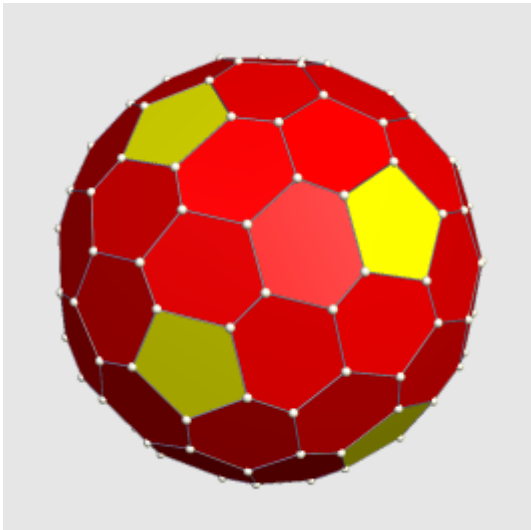
Pentagon-hexakis-dodekaeder, ausgeglichen (von E.Bernal) [GF38]



IPQ = 0.9439

11) 72 Flächen

Pentagonal Hexakontahedron mit abgeschliffenen Ecken [GF36]



IPQ = 0.9554

Anhang

Koordinaten der Ecken der aufgelisteten Polyeder

GF01

24

-0.566012692 -0.433987308 0
-0.566012692 0 -0.433987308
-0.566012692 0 0.433987308
-0.566012692 0.433987308 0
-0.433987308 -0.566012692 0
-0.433987308 0 -0.566012692
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0.566012692 -0.433987308 0
0.566012692 0 -0.433987308
0.566012692 0 0.433987308
0.566012692 0.433987308 0

GF02

60

0.621311941 1.383991897 0.612730151
1.383991897 0.612730151 0.621311941
1.234042092 1.005303837 0.378688059
1.005303837 0.378688059 1.234042092
0.612730151 0.621311941 1.383991897
0.378688059 1.234042092 1.005303837
0.621311941 -1.383991897 0.612730151
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0.378688059 1.234042092 -1.005303837
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1.234042092 -1.005303837 -0.378688059
1.005303837 -0.378688059 -1.234042092
0.612730151 -0.621311941 -1.383991897
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0 -0.242623881 1.618033989
0 0.242623881 1.618033989
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1.618033989 0 -0.242623881
0.242623881 1.618033989 0

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-0.242623881 -1.618033989 0

GF03

32

0.5000000000000000 0.237240344822544 0.237240344822544
0.5000000000000000 0.237240344822544 -0.237240344822544
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GF04

30

0.141468965 0.141468965 0.717062071
0.717062071 0.141468965 0.141468965
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0 -0.858531035 0
-0.858531035 0 0

GF05

80

1.387739294127820 0.000000000000000 0.530069242833040
0.000000000000000 -0.530069242833040 -1.387739294127820
0.000000000000000 0.530069242833040 -1.387739294127820
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GF06

72

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0.613577923845003 1.538426663060870 -0.208414684407362

GF07

16

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0.651084786 -0.651084786 -0.651084786
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0.651084786 0.651084786 0.302169571
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-0.302169571 0.651084786 -0.651084786
0.651084786 0.302169571 0.651084786
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-0.302169571 -0.651084786 0.651084786
0.302169571 0.651084786 0.651084786
-0.651084786 0.651084786 -0.302169571
-0.651084786 -0.302169571 0.651084786
0.302169571 -0.651084786 -0.651084786
-0.651084786 0.302169571 -0.651084786
-0.651084786 -0.651084786 0.302169571

GF08

5

0.5 0.5 0
-0.5 -0.5 0
-0.5 0.5 0
0.5 -0.5 0
0 0 1.936491673

GF09

6

-0.5 0 0
0.5 0 0
0 0.866025404 0
-0.5 0 0.433012702
0.5 0 0.433012702
0 0.866025404 0.433012702

GF10

8

-0.5 -0.5 0
-0.5 0.5 0
0.5 0.5 0
0.5 -0.5 0
-0.707106781 0 1.989247192
0.707106781 0 1.989247192
0 -0.707106781 1.989247192
0 0.707106781 1.989247192

GF11

10

0 1 0
-0.951056516 0.309016994 0
-0.587785252 -0.809016994 0

0.587785252 -0.809016994 0
0.951056516 0.309016994 0
0 1 2.022542486
-0.951056516 0.309016994 2.022542486
-0.587785252 -0.809016994 2.022542486
0.587785252 -0.809016994 2.022542486
0.951056516 0.309016994 2.022542486

GF12

10
0 1 0
-0.951056516 0.309016994 0
-0.587785252 -0.809016994 0
0.587785252 -0.809016994 0
0.951056516 0.309016994 0
-0.587785252 0.809016994 4.04058
-0.951056516 -0.309016994 4.04058
-1.22515E-16 -1 4.04058
0.951056516 -0.309016994 4.04058
0.587785252 0.809016994 4.04058

GF13

6
1 0 0
0.309016994 0.951056516 0
-0.809016994 0.587785252 0
-0.809016994 -0.587785252 0
0.309016994 -0.951056516 0
0 0 3.963358557

GF14

8
3.544761706 -4.87809504 2.046569125
-3.544761706 -4.87809504 2.046569125
0 -4.87809504 -4.093138251
3.544761706 2.211428373 2.046569125
-3.544761706 2.211428373 2.046569125
0 2.211428373 -4.093138251
0 16.24199598 0
0 -18.90866265 0

GF15

9
0.5 0.5 0
-0.5 -0.5 0
-0.5 0.5 0
0.5 -0.5 0
0 0 1.936491673
0.5 0.5 -1
-0.5 -0.5 -1
-0.5 0.5 -1
0.5 -0.5 -1

GF16

10
0.5 0.5 0
-0.5 -0.5 0
-0.5 0.5 0
0.5 -0.5 0
0 0 1.936491673
0.5 0.5 -1
-0.5 -0.5 -1

-0.5 0.5 -1
0.5 -0.5 -1
0 0 -2.936491673

GF23

8
3.544761706 -0.858425037 2.046569125
-3.544761706 -0.858425037 2.046569125
0 -0.858425037 -4.093138251
3.544761706 2.211428373 2.046569125
-3.544761706 2.211428373 2.046569125
0 2.211428373 -4.093138251
0 8 0
0 -6.646996664 0

GF24

9
0.658037004 0 0
-0.658037004 0 0
0 0.658037004 0
0 -0.658037004 0
1 0 0.697973063
-1 0 0.697973063
0 1 0.697973063
0 -1 0.697973063
0 0 1.697973063

GF25

10
1 0 0
-1 0 0
0 1 0
0 -1 0
1 0 0.612372434
-1 0 0.612372434
0 1 0.612372434
0 -1 0.612372434
0 0 1.612372434
0 0 -1

GF29

12
1 0 0
0.309016994 0.951056516 0
-0.809016994 0.587785252 0
-0.809016994 -0.587785252 0
0.309016994 -0.951056516 0
0 0 0.618035121
1 0 -0.50903696
0.309016994 0.951056516 -0.50903696
-0.809016994 0.587785252 -0.50903696
-0.809016994 -0.587785252 -0.50903696
0.309016994 -0.951056516 -0.50903696
0 0 -1.127072081

GF30

24
0.286496768 0 0.4492491
0.143248384 0.248113479 0.4492491
-0.143248384 0.248113479 0.4492491
-0.286496768 0 0.4492491
-0.143248384 -0.248113479 0.4492491

0.143248384 -0.248113479 0.4492491
0.519352457 0 0.066100457
0.259676229 0.449772421 0.066100457
-0.259676229 0.449772421 0.066100457
-0.519352457 0 0.066100457
-0.259676229 -0.449772421 0.066100457
0.259676229 -0.449772421 0.066100457
0 0.519352457 -0.066100457
0.449772421 0.259676229 -0.066100457
0.449772421 -0.259676229 -0.066100457
0 -0.519352457 -0.066100457
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-0.449772421 0.259676229 -0.066100457
0 0.286496768 -0.4492491
0.248113479 0.143248384 -0.4492491
0.248113479 -0.143248384 -0.4492491
0 -0.286496768 -0.4492491
-0.248113479 -0.143248384 -0.4492491
-0.248113479 0.143248384 -0.4492491

GF31

12

0.00000000 0.00000000 -0.62791082
0.62791082 0.00000000 0.00000000
0.00000000 0.00000000 0.62791082
-0.62791082 0.00000000 0.00000000
0.00000000 0.50348455 -0.62791082
0.62791082 0.50348455 0.00000000
0.00000000 0.50348455 0.62791082
-0.62791082 0.50348455 0.00000000
0.31395541 1.27251510 -0.31395541
-0.31395541 1.27251510 0.31395541
-0.31395541 -0.76903056 -0.31395541
0.31395541 -0.76903056 0.31395541

GF35

92

-4.087420902626800 -0.735437890047838 -0.096577912072124
-4.080429951267380 -0.000000000000000 0.779292776335532
-3.964446299030830 1.113914803025790 0.547325471862433
-3.896004306967780 0.000000000000000 -1.948002153483890
-3.862047122731640 1.429067062142110 -0.547325471862433
-3.739072519135680 -1.807543975120070 0.096577912072124
-3.725488043198320 -0.378476912977952 1.798527143186260
-3.301137174931850 -2.398416548367460 -0.779292776335532
-3.301137174931850 2.398416548367460 -0.779292776335532
-3.274740483408010 0.378476912977950 2.527852015273050
-3.236446287069730 -1.883592674806190 -1.798527143186260
-3.151933694494930 -2.290013874503620 1.948002153483890
-3.151933694494930 2.290013874503620 1.948002153483890
-2.874513427641250 2.997507477831970 0.096577912072124
-2.871783851026330 1.618649906654620 -2.527852015273050
-2.791519991506490 2.495981183961650 -1.798527143186260
-2.552561735673970 -3.231419074009480 -0.547325471862433
-2.521844398596320 0.000000000000000 3.301137174931850
-2.485141271196930 -0.428686403942713 -3.301137174931850
-2.426857555463090 -2.231038415810080 -2.527852015273050
-2.284477211702700 -3.426193881774690 0.547325471862433
-2.262497067916700 -1.113914803025790 3.301137174931850
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-2.040214975633690 1.482302946071300 -3.301137174931850
-1.962525519735420 3.660105477952200 -0.096577912072124

-1.841237887262380 0.428686403942713 -3.699091351674480
-1.758545975725060 1.807543975120060 3.301137174931850
-1.741568287578110 0.735437890047838 3.699091351674480
-1.511192052043900 3.426193881774690 1.798527143186260
-1.371903395895660 -2.997507477831970 2.527852015273050
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-1.203931541011040 3.705320283655690 -1.948002153483890
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 0.0000000000000001 -1.6180339887499000 0.0000000000000000
 0.9510565162951540 1.3090169943749500 0.0000000000000000
 -1.5388417685876300 -0.5000000000000000 0.0000000000000000
 -0.9510565162951530 1.3090169943749500 0.0000000000000000
 -1.5388417685876300 -0.5000000000000000 0.0000000000000000
 -0.0000000000000001 -1.6180339887499000 0.0000000000000000
 -0.9510565162951540 1.3090169943749500 0.0000000000000000
 1.5388417685876300 -0.5000000000000000 0.0000000000000000
 0.9510565162951530 1.3090169943749500 0.0000000000000000
 1.5893089445835300 -0.0000000000000001 -0.3035309991033430
 0.4911234731884230 -1.5115226281523400 -0.3035309991033430
 0.4911234731884230 1.5115226281523400 -0.3035309991033430
 -1.2857779454801900 -0.9341723589627160 -0.3035309991033430
 -1.2857779454801900 0.9341723589627160 -0.3035309991033430
 -1.5893089445835300 -0.0000000000000001 0.3035309991033430
 -0.4911234731884230 -1.5115226281523400 0.3035309991033430
 -0.4911234731884230 1.5115226281523400 0.3035309991033430
 1.2857779454801900 -0.9341723589627160 0.3035309991033430
 1.2857779454801900 0.9341723589627160 0.3035309991033430

GF39

14

0.0000000000000000 5.788571626942810 0.0000000000000000
 0.0000000000000000 -5.788571626942810 0.0000000000000000
 -2.076473332243150 0.0000000000000000 -0.496580938788306
 -1.342329145168920 -3.596557311922690 0.774994093304356
 -0.608184958095779 0.0000000000000000 2.046569125397650
 -1.342329145168920 3.596557311922690 0.774994093304356
 -1.468288374147380 0.0000000000000000 -1.549988186609340
 0.0000000000000000 3.596557311922690 -1.549988186608710
 1.342329145168920 3.596557311922690 0.774994093304352
 0.0000000000000000 -3.596557311922690 -1.549988186608710
 1.468288374147380 0.0000000000000000 -1.549988186609350
 2.076473332243150 0.0000000000000000 -0.496580938788311
 0.608184958095779 0.0000000000000000 2.046569125397640
 1.342329145168920 -3.596557311922690 0.774994093304352

GF40

12

0.658037004 0 0
 -0.658037004 0 0
 0 0.658037004 0

0 -0.658037004 0
1 0 0.697973063
-1 0 0.697973063
0 1 0.697973063
0 -1 0.697973063
0.658037004 0 1.395946126
-0.658037004 0 1.395946126
0 0.658037004 1.395946126
0 -0.658037004 1.395946126

GF41

14

0.000000000000000 0.902200000000000 0.000000000000000
0.000000000000000 -0.902200000000000 0.000000000000000
-0.698606356896359 0.000000000000000 -0.210297268390880
-0.432893379278494 -0.584682807209584 0.249931109056845
-0.167180401675203 0.000000000000000 0.710159486512983
-0.432893379278494 0.584682807209584 0.249931109056845
-0.531425955221155 0.000000000000000 -0.499862218122105
0.000000000000000 0.584682807209584 -0.499862218113691
0.432893379278494 0.584682807209584 0.249931109056844
0.000000000000000 -0.584682807209584 -0.499862218113691
0.531425955221155 0.000000000000000 -0.499862218122106
0.698606356896359 0.000000000000000 -0.210297268390881
0.167180401675203 0.000000000000000 0.710159486512983
0.432893379278494 -0.584682807209584 0.249931109056844

GF43

9

3.544761706390530 0.000000000000000 2.046569125397640
-3.544761706390530 0.000000000000000 2.046569125397650
0.000000000000000 0.000000000000000 -4.093138250795300
-2.506525040638780 1.695433375560210 1.447142906943340
0.000000000000000 1.695433375560210 -2.894285813886680
2.506525040638780 1.695433375560210 1.447142906943330
0.000000000000000 -1.695433375560210 -2.894285813886680
-2.506525040638780 -1.695433375560210 1.447142906943340
2.506525040638780 -1.695433375560210 1.447142906943330

GF44

15

0.740000000000000 0.000000000000000 0.000000000000000
0.228672575837461 0.703781822058414 0.000000000000000
-0.598672575837461 0.434961086696430 0.000000000000000
-0.598672575837461 -0.434961086696430 0.000000000000000
0.228672575837461 -0.703781822058414 0.000000000000000
0.433345685919082 0.000000000000000 0.597975912457789
0.133911181388065 0.412136238401736 0.597975912457789
-0.350584024347606 0.254714203327803 0.597975912457789
-0.350584024347606 -0.254714203327803 0.597975912457789
0.133911181388065 -0.412136238401736 0.597975912457789
0.433345685919082 0.000000000000000 -0.597975912457789
0.133911181388065 0.412136238401736 -0.597975912457789
-0.350584024347606 0.254714203327803 -0.597975912457789
-0.350584024347606 -0.254714203327803 -0.597975912457789
0.133911181388065 -0.412136238401736 -0.597975912457789

GF46

18

0.000000000000000 0.809640000000000 0.000000000000000
0.000000000000000 -0.809640000000000 0.000000000000000
0.551311012561816 0.000000000000000 0.555888987438182

0.000000000000000 0.403146177928702 0.555888987447928
0.000000000000000 -0.403146177928702 0.555888987447928
-0.551311012561817 0.000000000000000 0.555888987438182
0.555888987438182 0.000000000000000 0.551311012561816
0.555888987447928 0.403146177928702 0.000000000000000
0.555888987447928 -0.403146177928702 0.000000000000000
0.555888987438182 0.000000000000000 -0.551311012561816
0.000000000000000 0.403146177928702 -0.555888987447928
-0.551311012561817 0.000000000000000 -0.555888987438182
0.000000000000000 -0.403146177928702 -0.555888987447928
0.551311012561816 0.000000000000000 -0.555888987438182
-0.555888987447929 0.403146177928702 0.000000000000000
-0.555888987438183 0.000000000000000 0.551311012561816
-0.555888987447929 -0.403146177928702 0.000000000000000
-0.555888987438183 0.000000000000000 -0.551311012561816

GF53

9

0.971264707551005 0.000000000000000 0.560759940358953
-0.971264707551005 0.000000000000000 0.560759940358956
0.000000000000000 0.000000000000000 -1.121519880717910
-0.661266962458959 0.428016801038240 0.381782658781886
0.000000000000000 0.428016801038240 -0.763565317563772
0.661266962458959 0.428016801038240 0.381782658781884
0.000000000000000 -0.428016801038240 -0.763565317563772
-0.661266962458959 -0.428016801038240 0.381782658781886
0.661266962458959 -0.428016801038240 0.381782658781884

GF54

10

0.760000000000000 0.000000000000000 -0.156474430751244
0.000000000000000 0.760000000000000 -0.156474430751244
-0.760000000000000 0.000000000000000 -0.156474430751244
0.000000000000000 -0.760000000000000 -0.156474430751244
0.537401153701776 0.537401153701776 0.156474430751244
-0.537401153701776 0.537401153701776 0.156474430751244
-0.537401153701776 -0.537401153701776 0.156474430751244
0.537401153701776 -0.537401153701776 0.156474430751244
0.000000000000000 0.000000000000000 0.912000000000000
0.000000000000000 0.000000000000000 -0.912000000000000

GF55

16

0.668000000000000 0.000000000000000 -0.286526701673874
0.000000000000000 0.668000000000000 -0.286526701673874
-0.668000000000000 0.000000000000000 -0.286526701673874
0.000000000000000 -0.668000000000000 -0.286526701673874
0.472347329832614 0.472347329832614 0.286526701673874
-0.472347329832614 0.472347329832614 0.286526701673874
-0.472347329832614 -0.472347329832614 0.286526701673874
0.472347329832614 -0.472347329832614 0.286526701673874
0.370997269167114 0.370997269167114 0.583374156626440
-0.370997269167114 0.370997269167114 0.583374156626440
-0.370997269167114 -0.370997269167114 0.583374156626440
0.370997269167114 -0.370997269167114 0.583374156626440
0.524669369659514 0.000000000000000 -0.583374156626440
0.000000000000000 0.524669369659514 -0.583374156626440
-0.524669369659514 0.000000000000000 -0.583374156626440
0.000000000000000 -0.524669369659514 -0.583374156626440

GF56

12

0.540419590071739 -0.540419590071739 0.540419590071739
0.540419590071739 -0.540419590071739 -0.540419590071739
0.540419590071739 0.540419590071739 -0.540419590071739
-0.540419590071739 0.540419590071739 -0.540419590071739
-0.540419590071739 0.540419590071739 0.540419590071739
-0.540419590071739 -0.540419590071739 0.540419590071738
0.540419590071739 -0.384346063387664 0.540419590071739
0.540419590071739 0.540419590071739 -0.384346063387664
-0.384346063387664 0.540419590071739 0.540419590071739
0.384346063387664 -0.540419590071739 -0.540419590071739
-0.540419590071739 0.384346063387664 -0.540419590071739
-0.540419590071739 -0.540419590071739 0.384346063387663

GF57

12

0.658037004 0 0
-0.658037004 0 0
0 0.658037004 0
0 -0.658037004 0
1 0 0.697973063
-1 0 0.697973063
0 1 0.697973063
0 -1 0.697973063
0.658037004 0 1.395946126
-0.658037004 0 1.395946126
0 0.658037004 1.395946126
0 -0.658037004 1.395946126

GF59

14

0.723847592790393 0.000000000000000 0.068514012379328
0.361923796395197 0.626870403824694 0.068514012379328
-0.361923796395196 0.626870403824694 0.068514012379328
-0.723847592790393 0.000000000000000 0.068514012379328
-0.361923796395197 -0.626870403824694 0.068514012379328
0.361923796395196 -0.626870403824694 0.068514012379328
0.626870403824694 0.361923796395196 -0.068514012379328
0.000000000000000 0.723847592790393 -0.068514012379328
-0.626870403824694 0.361923796395197 -0.068514012379328
-0.626870403824694 -0.361923796395196 -0.068514012379328
-0.000000000000001 -0.723847592790393 -0.068514012379328
0.626870403824693 -0.361923796395197 -0.068514012379328
0.000000000000000 0.000000000000000 0.954278805857684
0.000000000000000 0.000000000000000 -0.954278805857684

GF63

12

0.000000000000000 0.000000000000000 0.864000000000000
0.864000000000000 0.000000000000000 0.000000000000000
0.000000000000000 0.000000000000000 -0.864000000000000
-0.864000000000000 0.000000000000000 0.000000000000000
0.000000000000000 0.508097013846432 0.525268657435712
-0.525268657435712 0.508097013846432 0.000000000000000
0.525268657435712 0.508097013846432 0.000000000000000
0.000000000000000 0.508097013846432 -0.525268657435712
0.000000000000000 -0.508097013846432 0.525268657435712
-0.525268657435712 -0.508097013846432 0.000000000000000
0.525268657435712 -0.508097013846432 0.000000000000000
0.000000000000000 -0.508097013846432 -0.525268657435712