

Hoe verdelen we de taart?

op het feestje voor Hans Zantema

*Jan Willem Klop
9 september 2022
Eindhoven*



Het begrijpersprincipe

Wetenschappelijke voordrachten, lezingen, praatjes zijn meestal voor een groot deel onbegrijpelijk, voor de meeste personen in het gehoor. **Behalve vanmiddag!**

Bij elke voordracht zit in het gehoor een persoon met de eigenschap dat als die persoon de spreker begrijpt, dan begrijpt iedereen in het gehoor de voordracht.

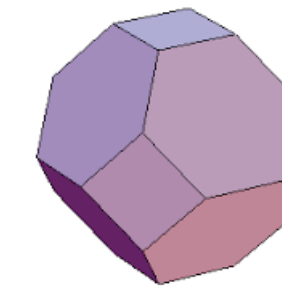
Bewijs: vraag aan Herman,
Jan-Friso, Hans

Hoe verdelen we de taart?

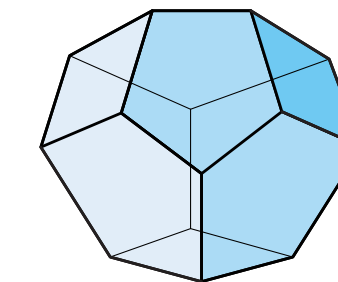
Even opfrissen: Permutaties



De Permutohedron diamant

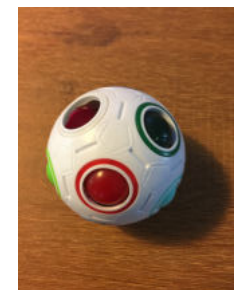
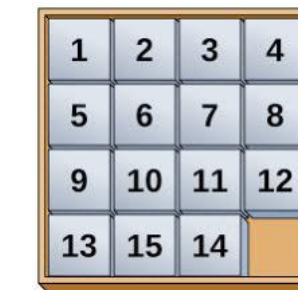


De Associahedron diamant

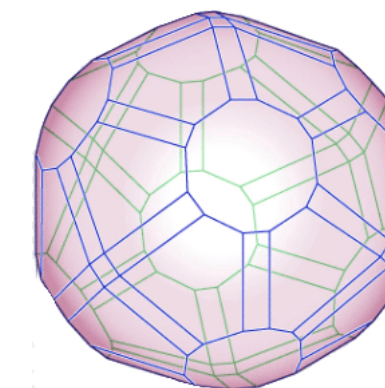


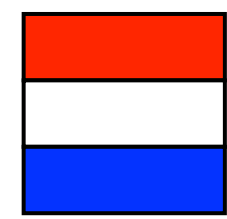
Hoe het associahedron in het permutohedron zit en waarom

Spelletjes voor Hans

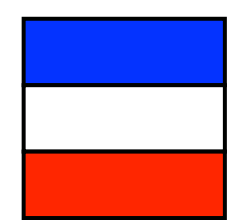
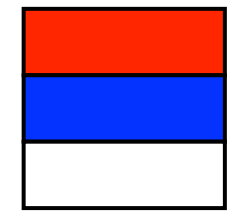


Een superdiamant: het Permutoassociahedron

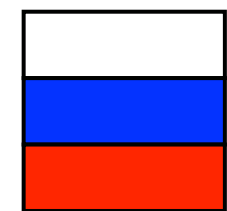
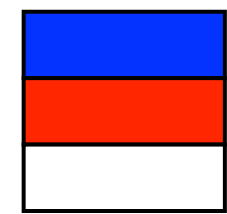




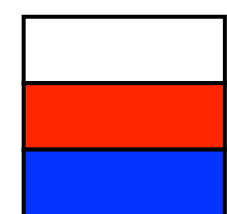
Luxemburg
Nederland



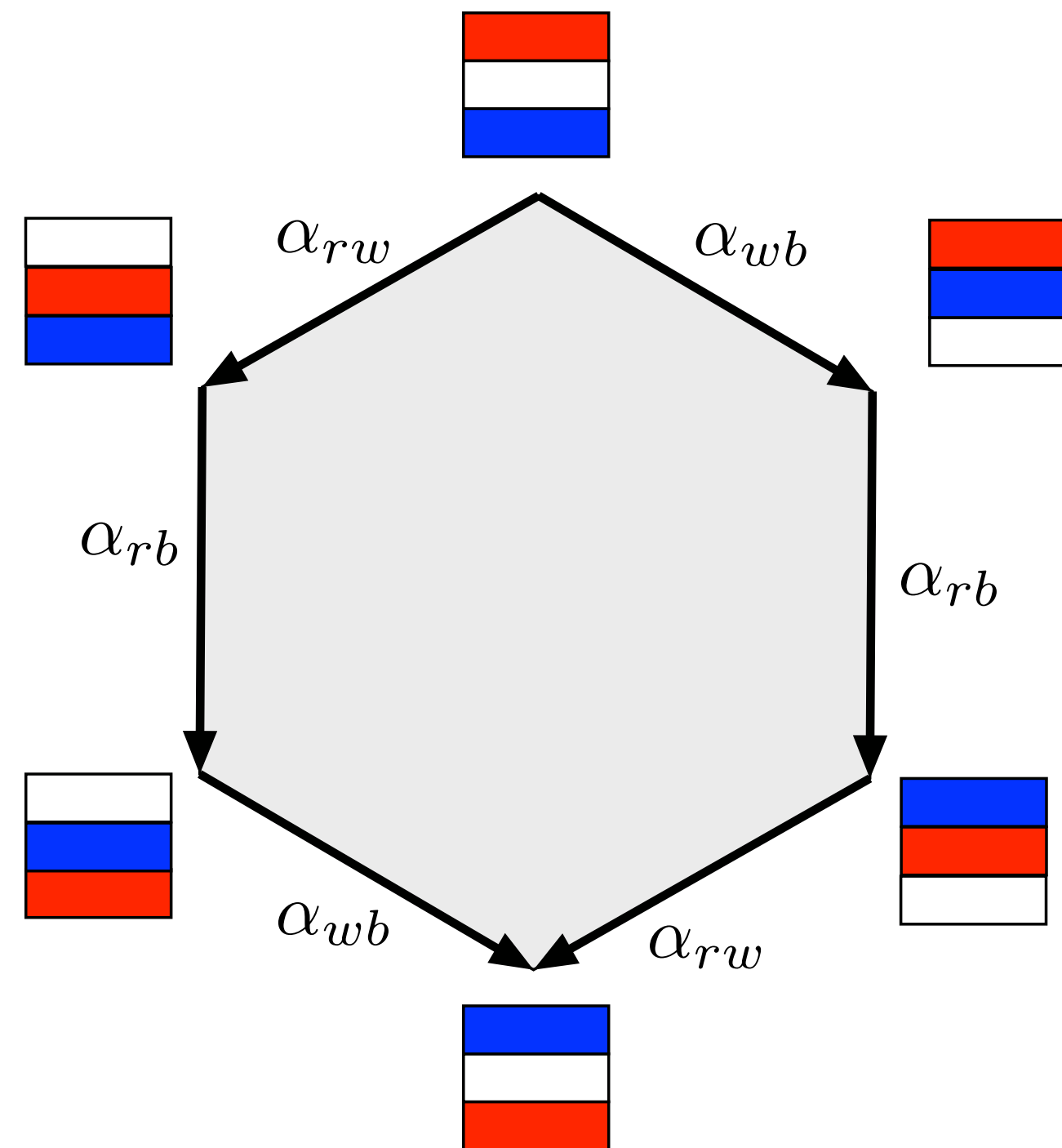
Joegoslavie
Sleeswijk-Holstein
Boeren Nederland



Rusland



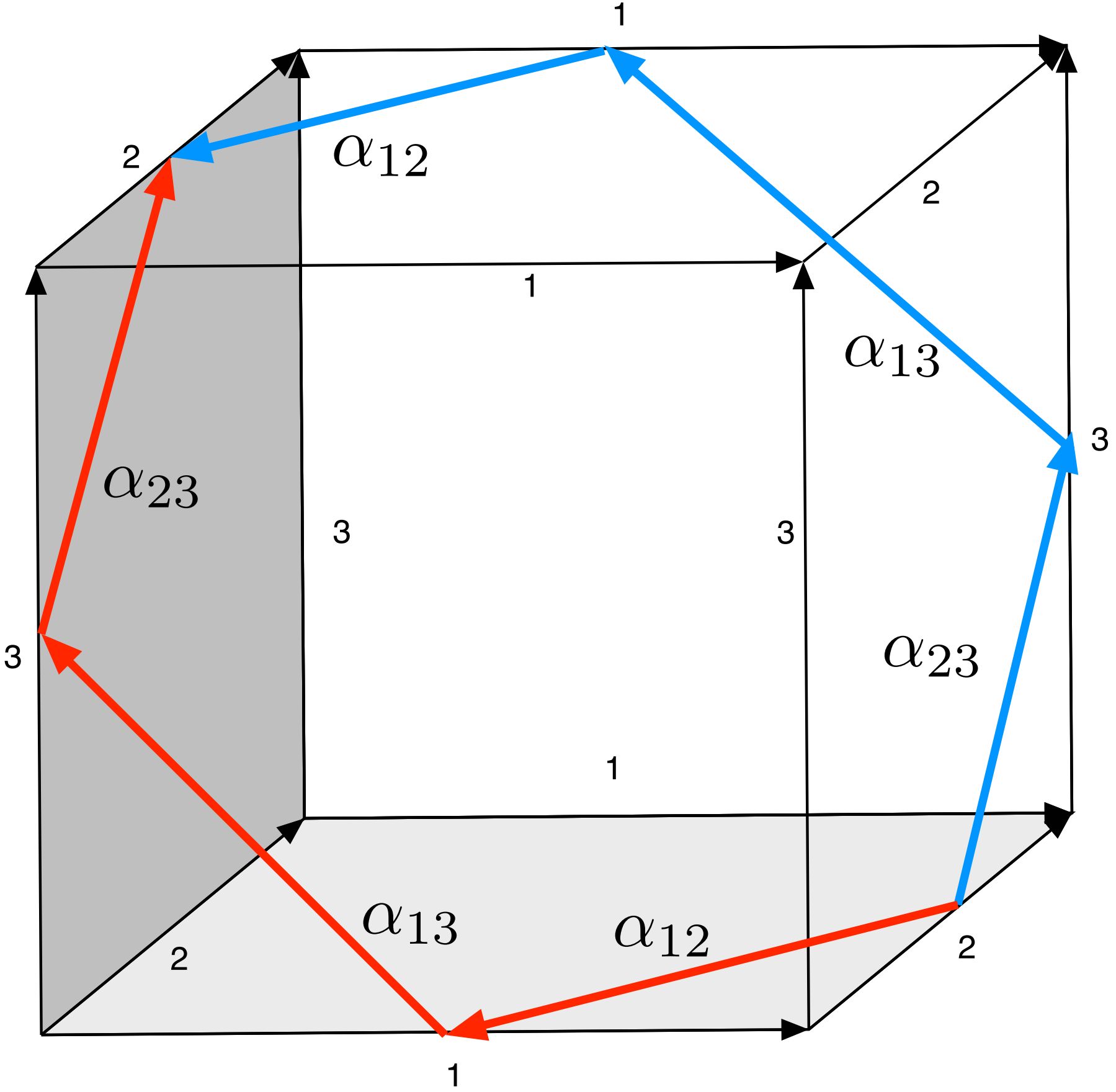
vlaggenparade



$$\alpha_{rw} \alpha_{rb} \alpha_{wb} = \alpha_{wb} \alpha_{rb} \alpha_{rw}$$

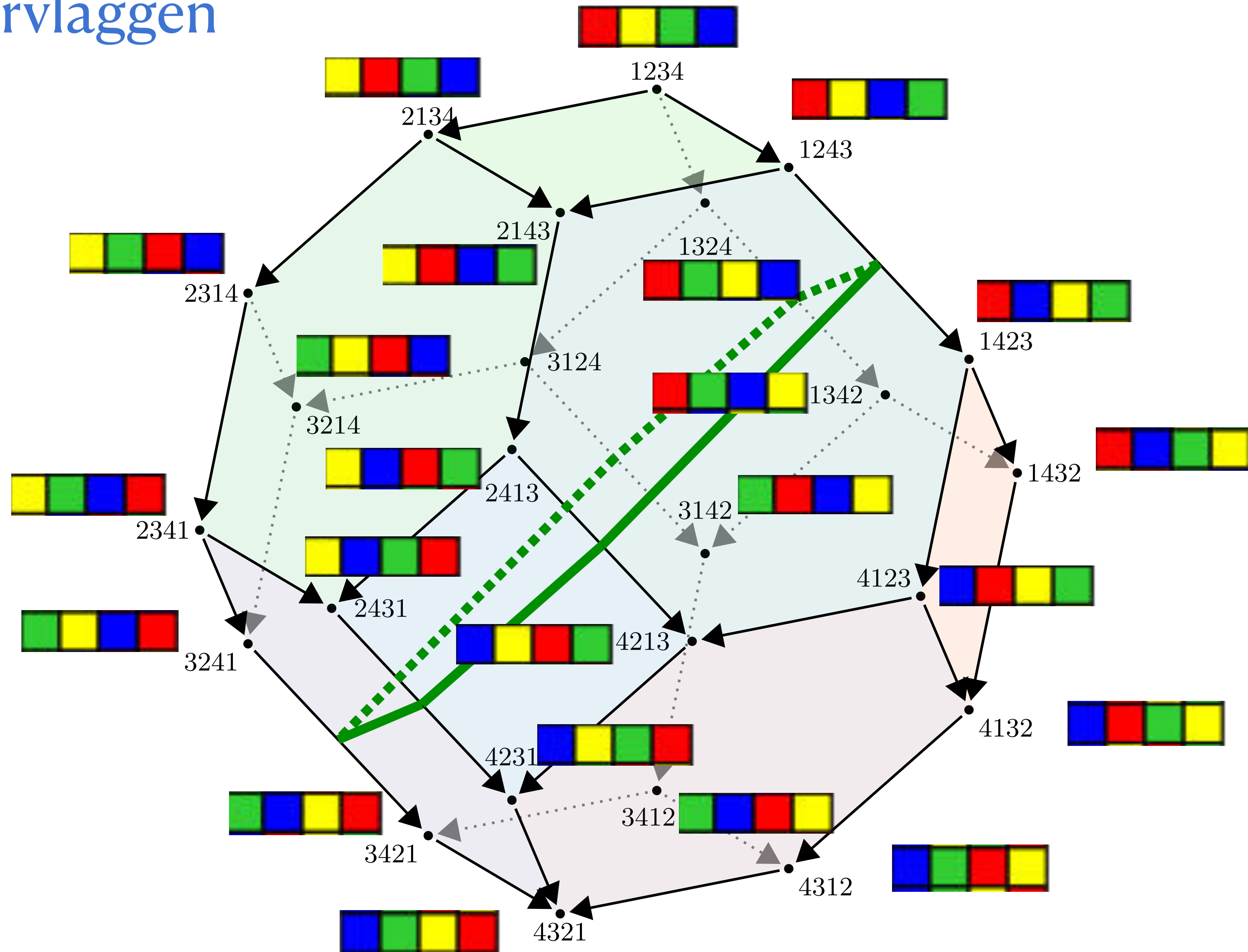
de Yang-Baxter vergelijking YBE

de YBE zit ook in de kubus

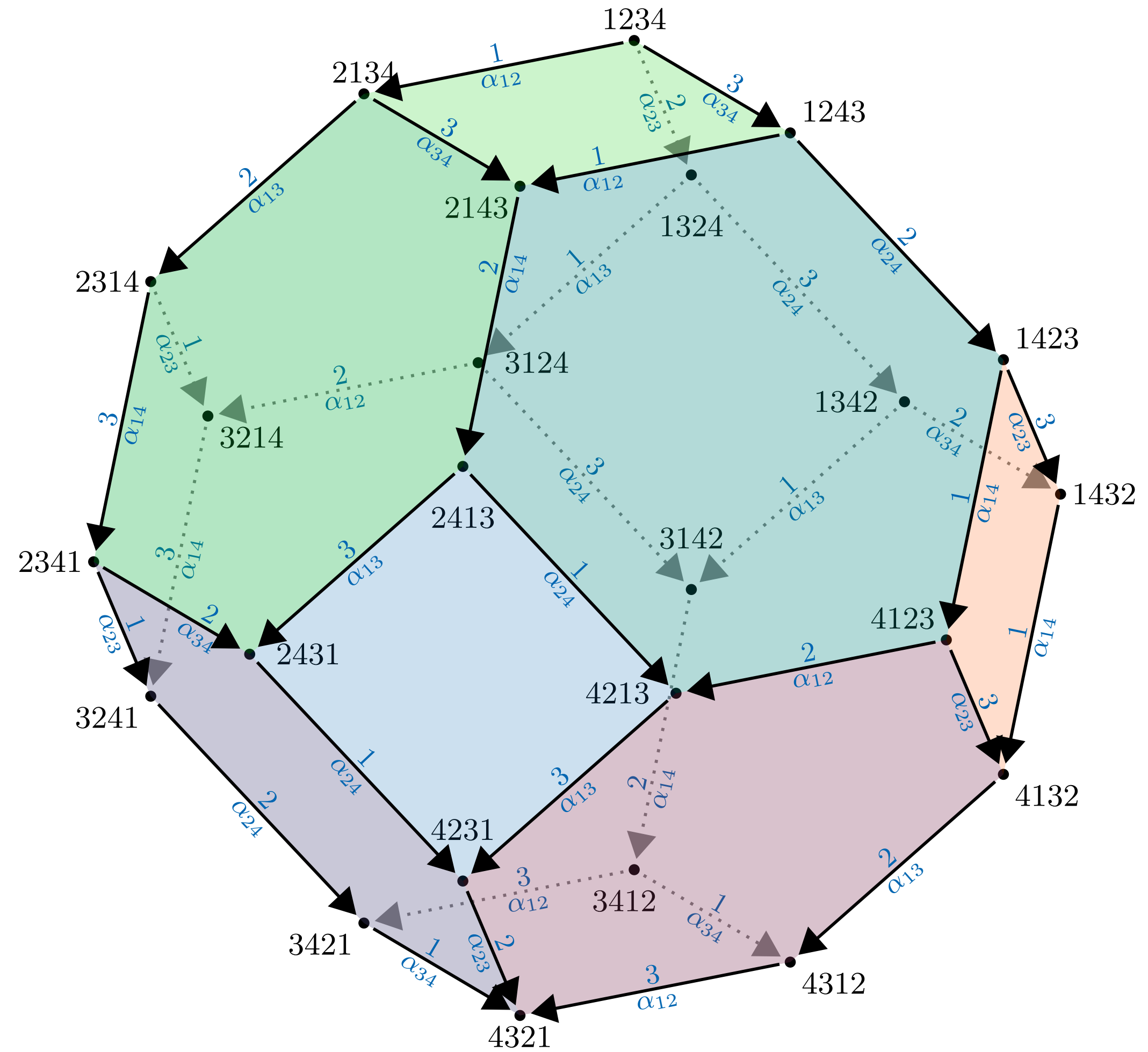


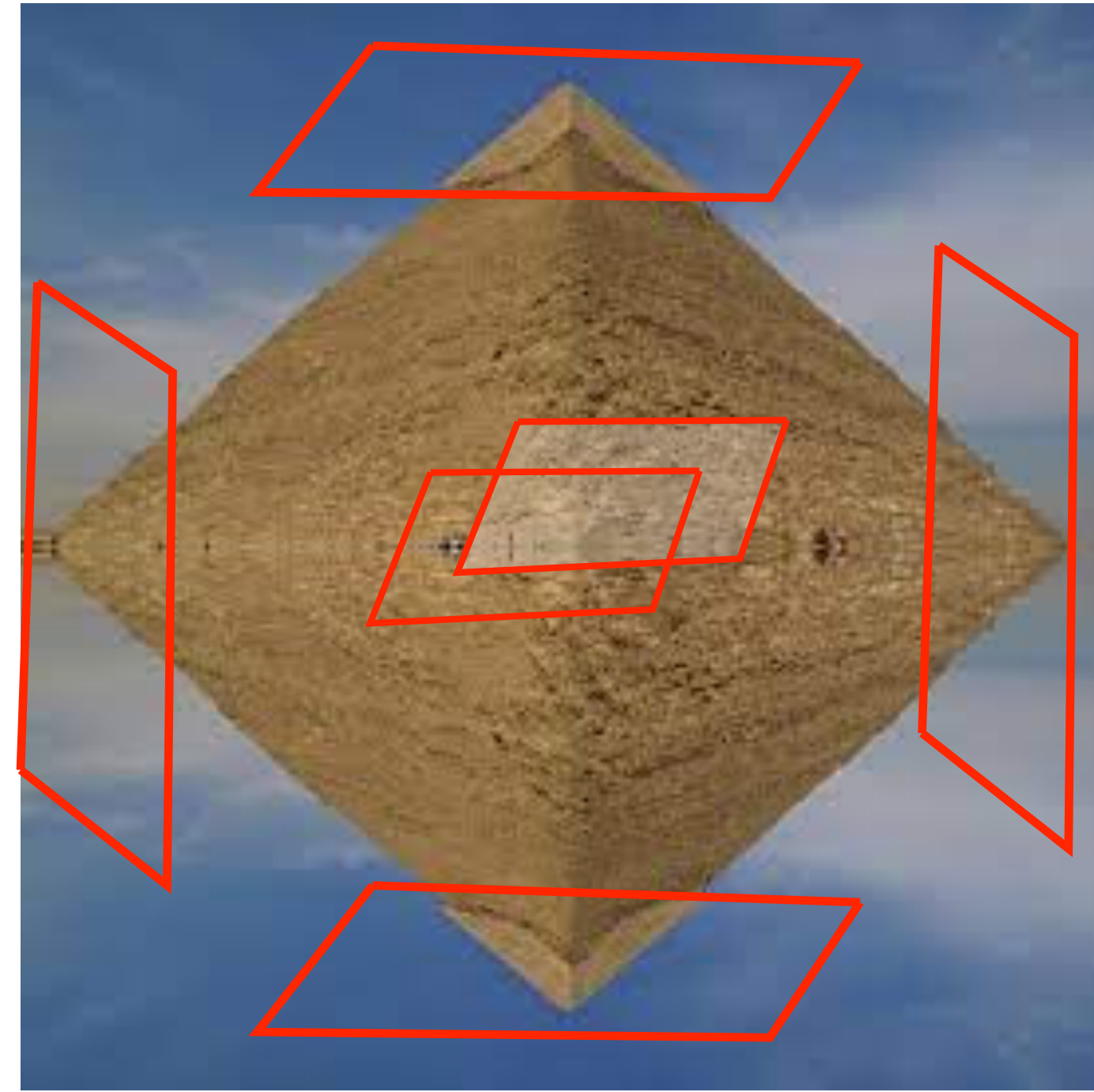
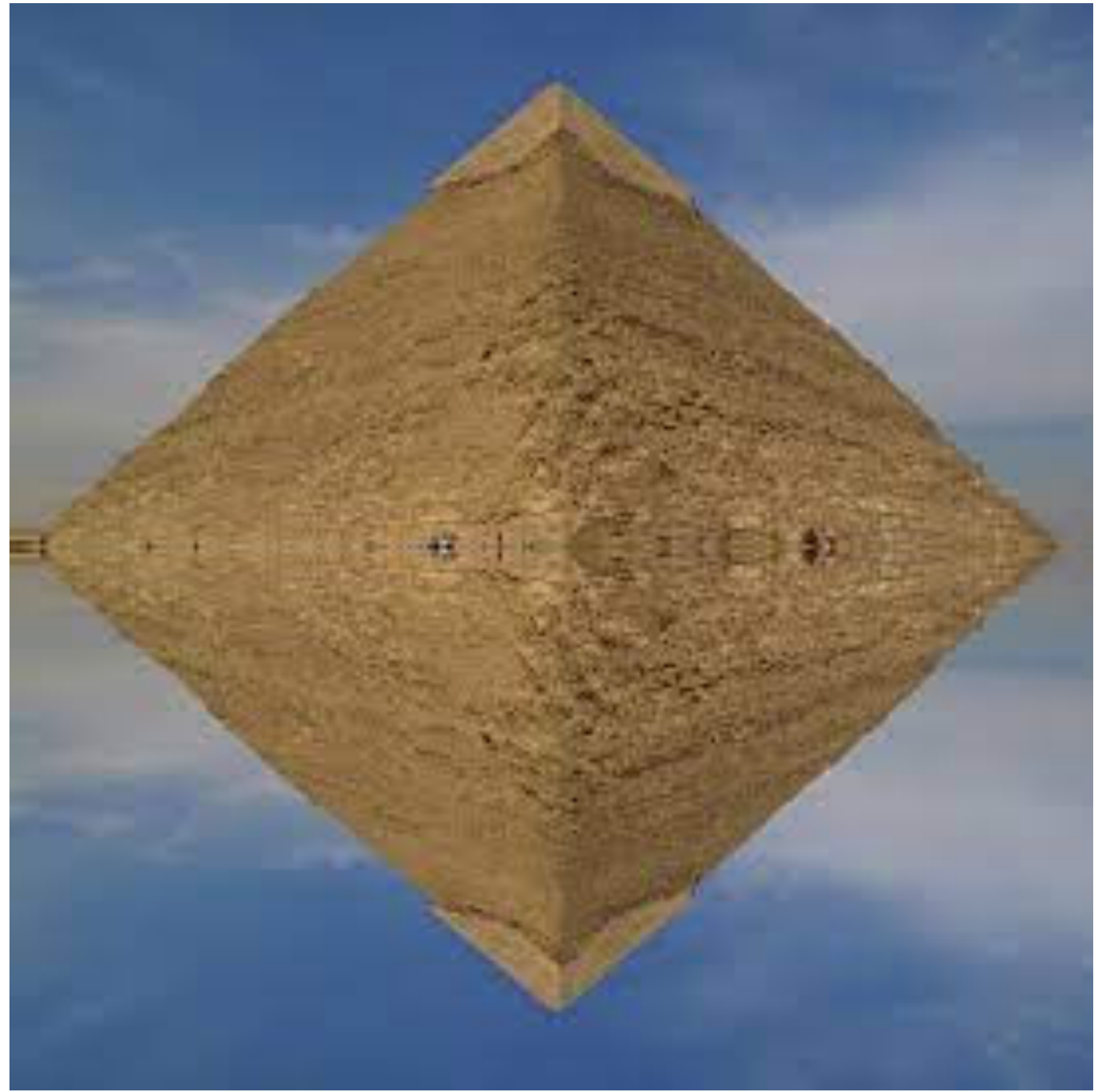
$$\alpha_{12}\alpha_{13}\alpha_{23} = \alpha_{23}\alpha_{13}\alpha_{12}$$

24 vierkleurvlagen

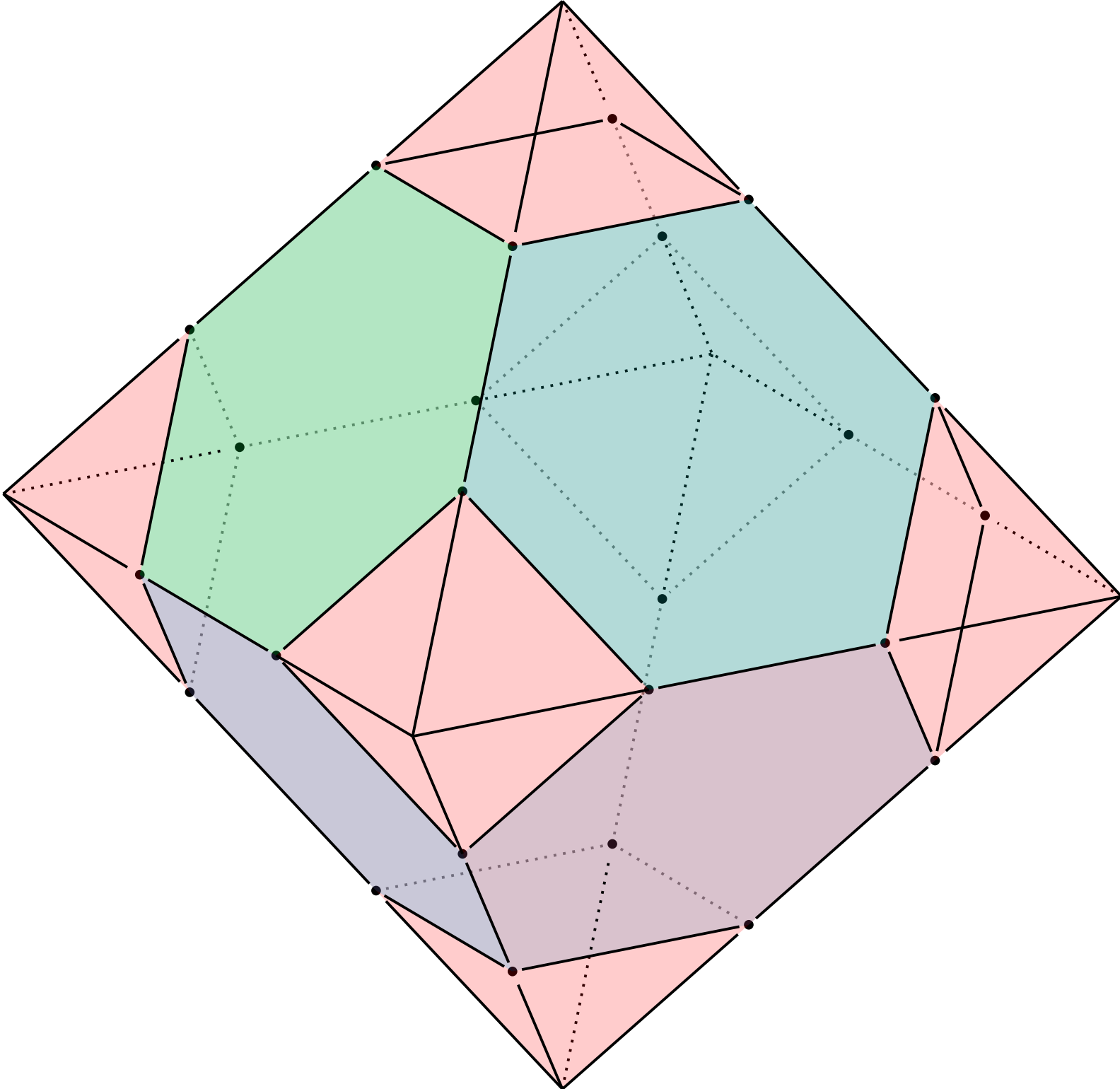


Permutohedron P_4

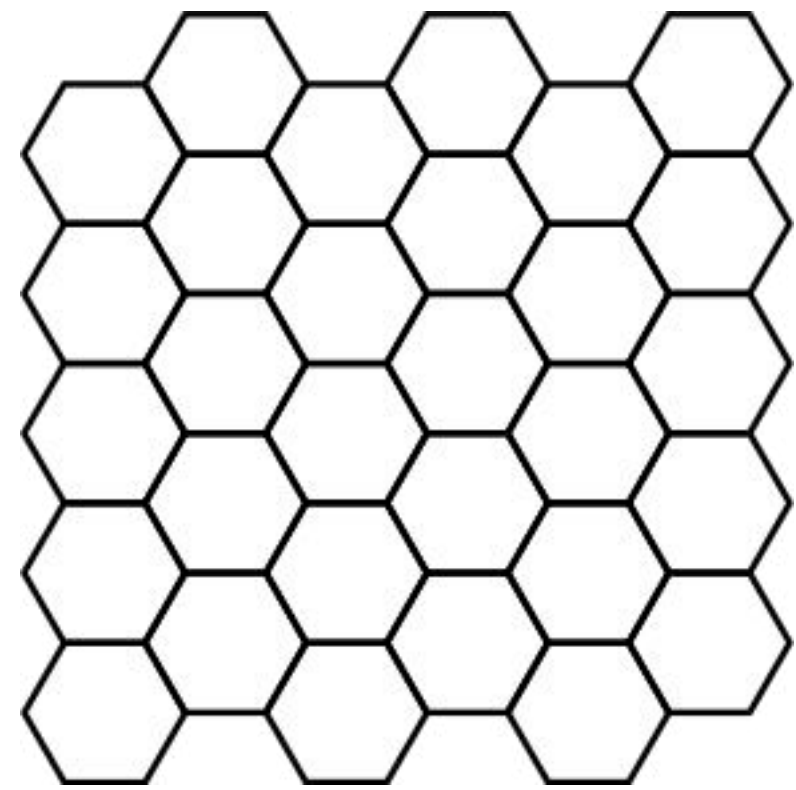




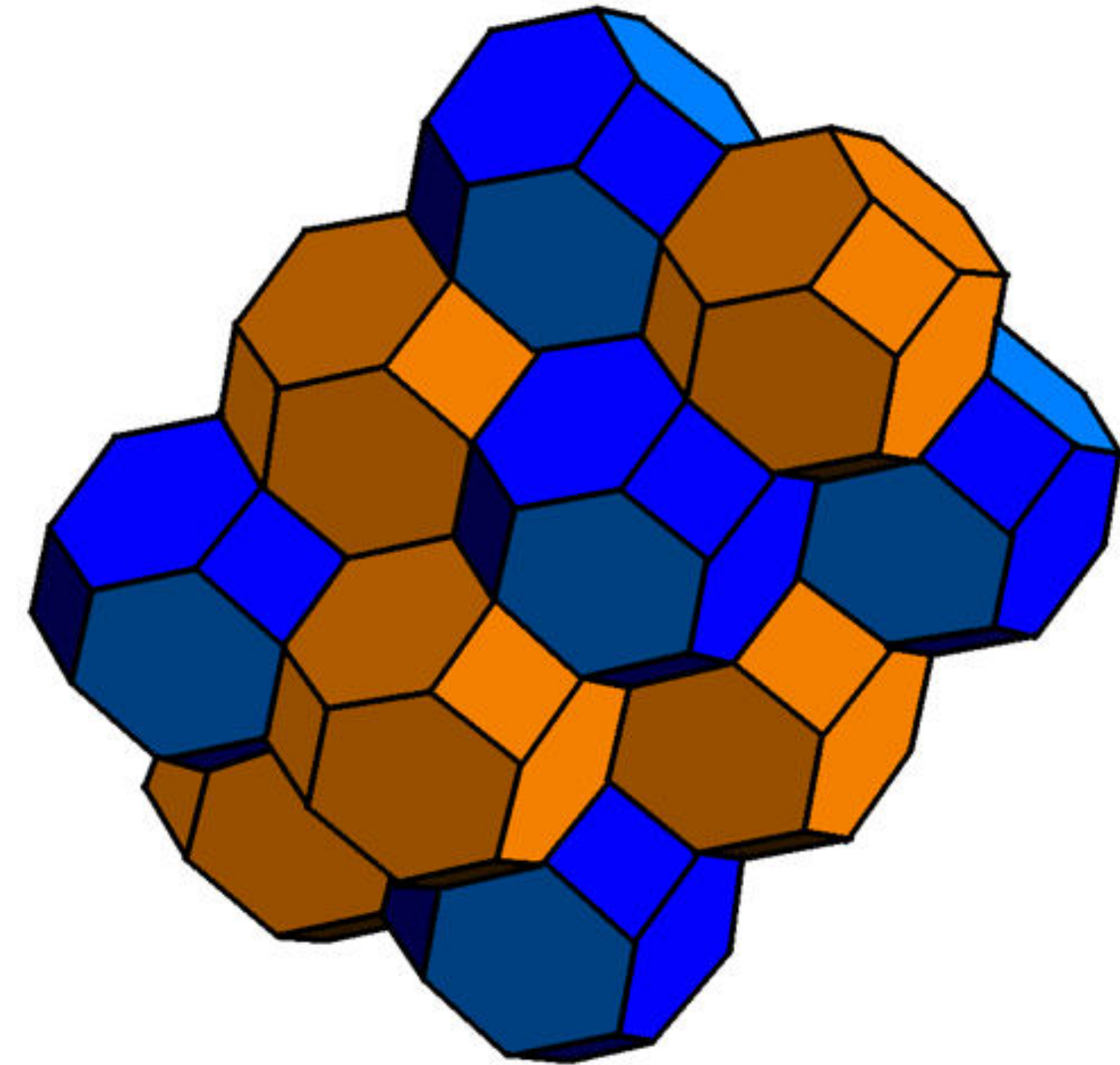
Het permutohedron is een afgeknotte octaëder



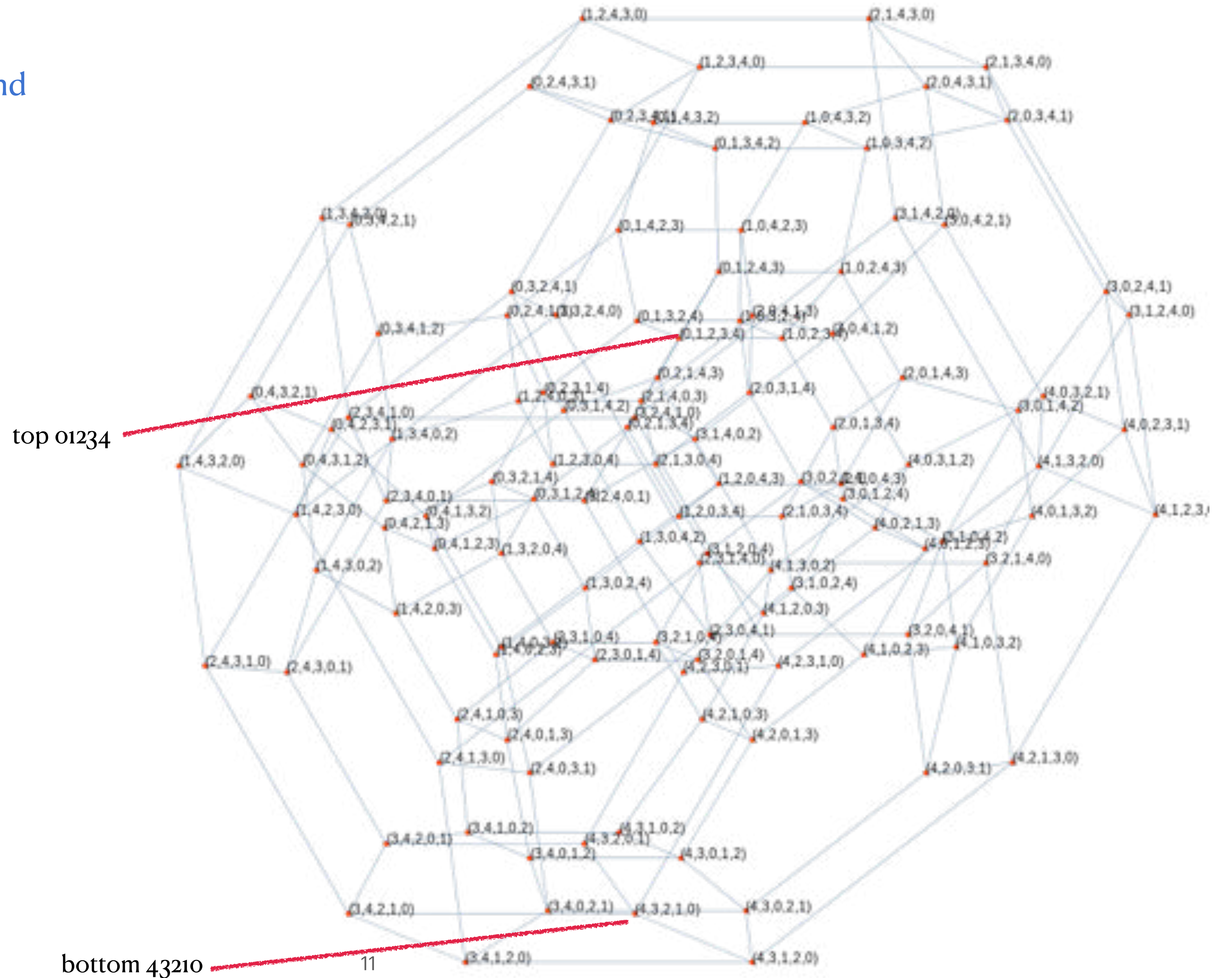
P_3 is vlakvullend

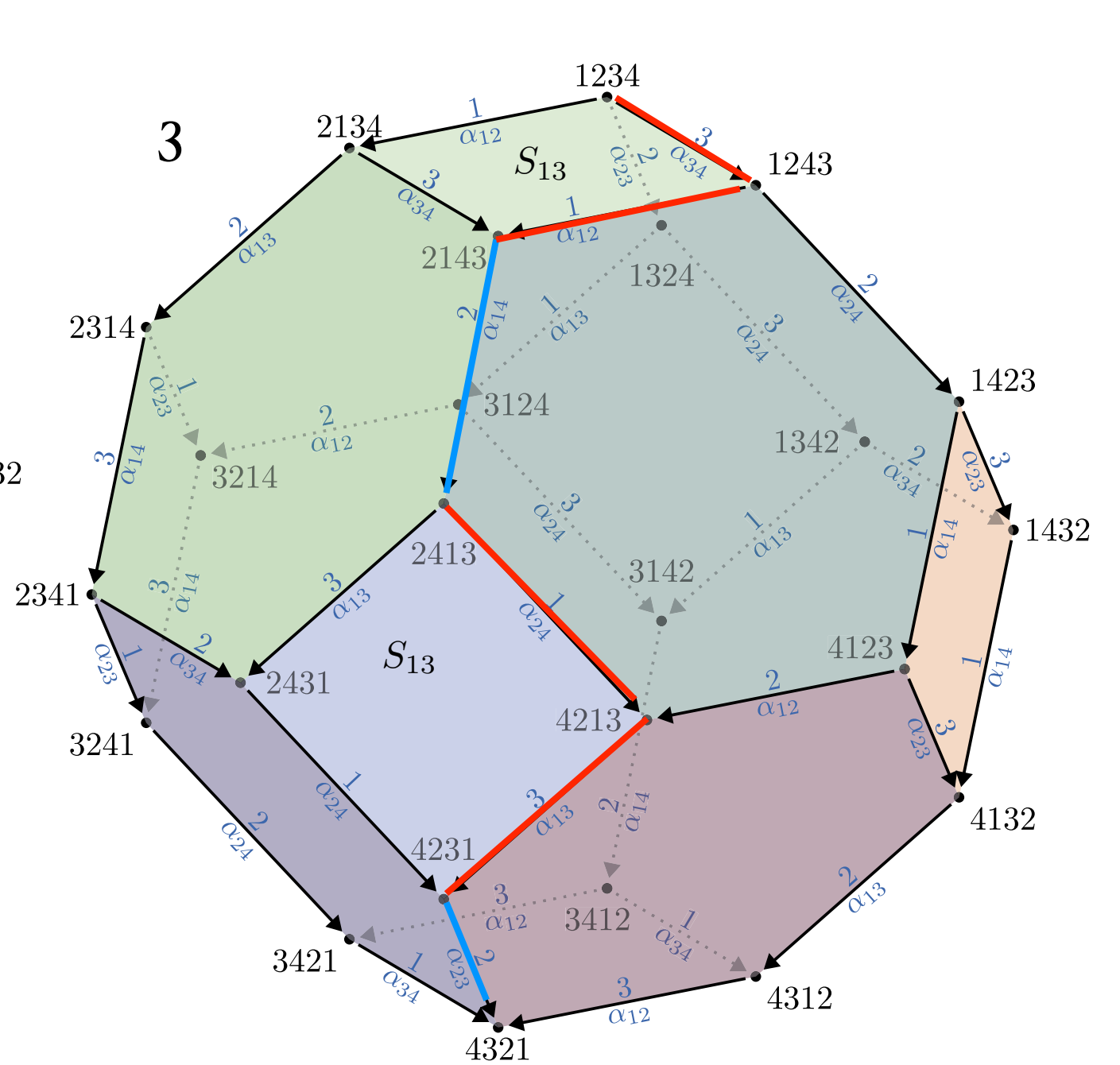
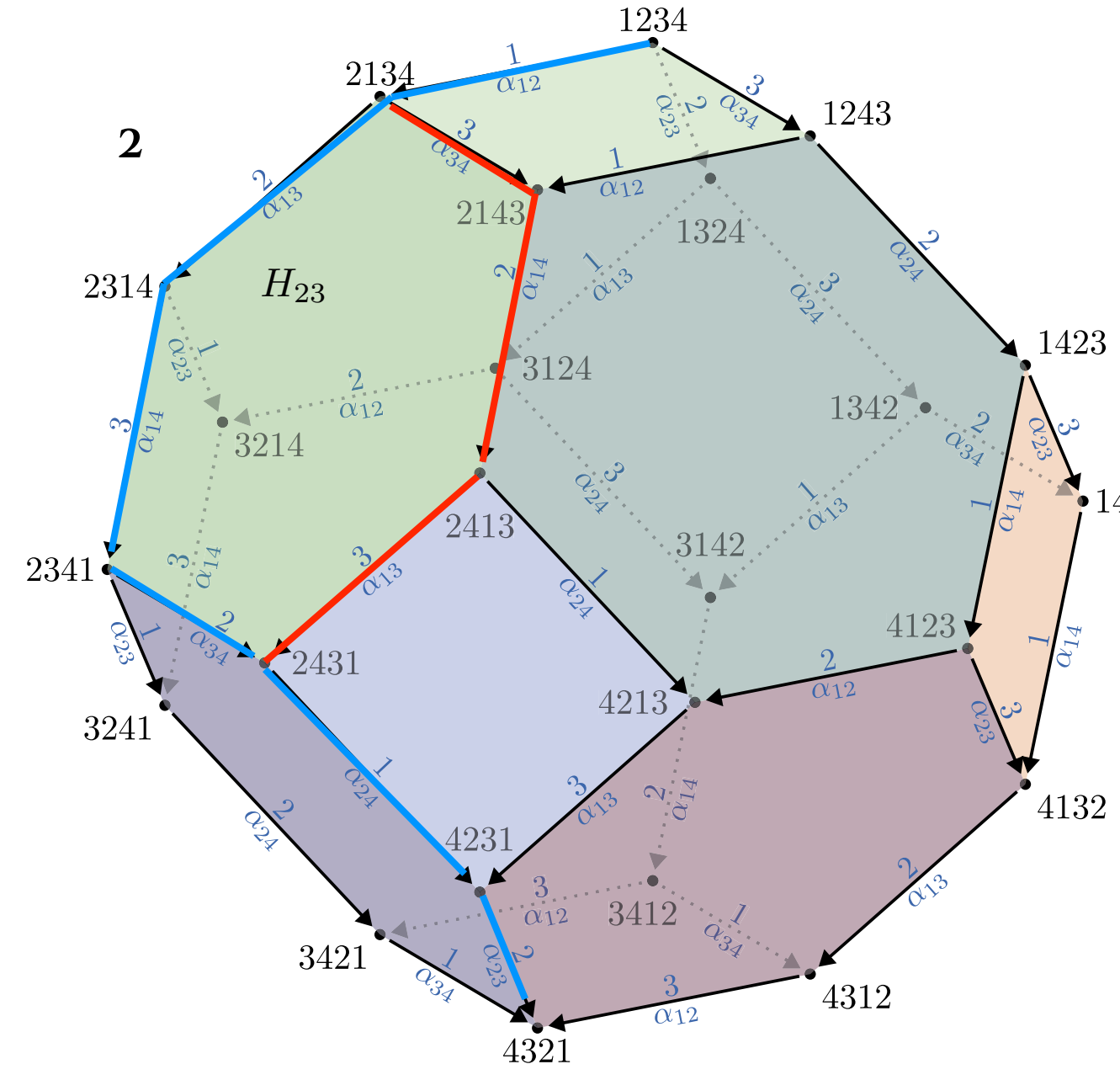
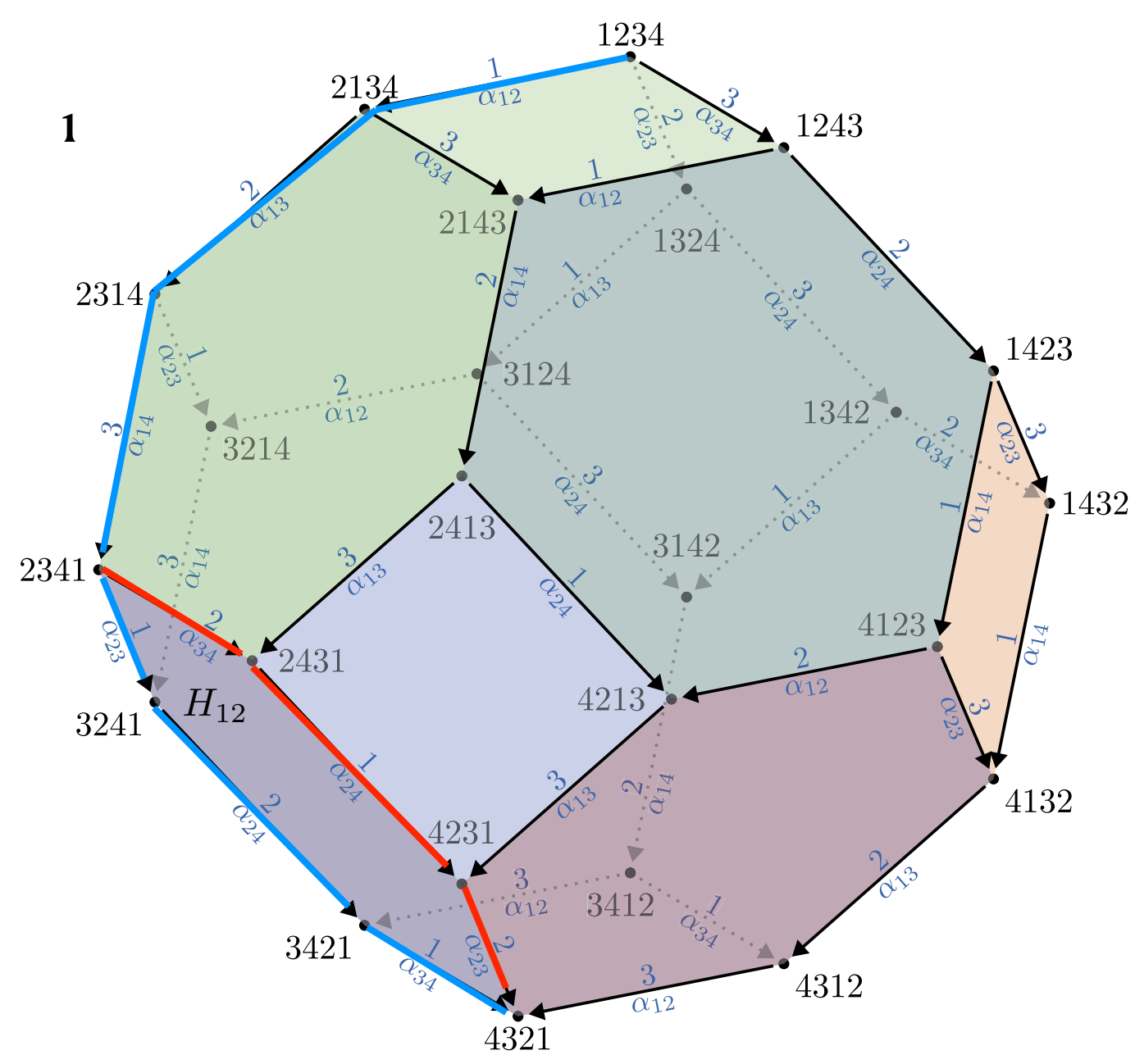


en P_4 is ruimtevullend

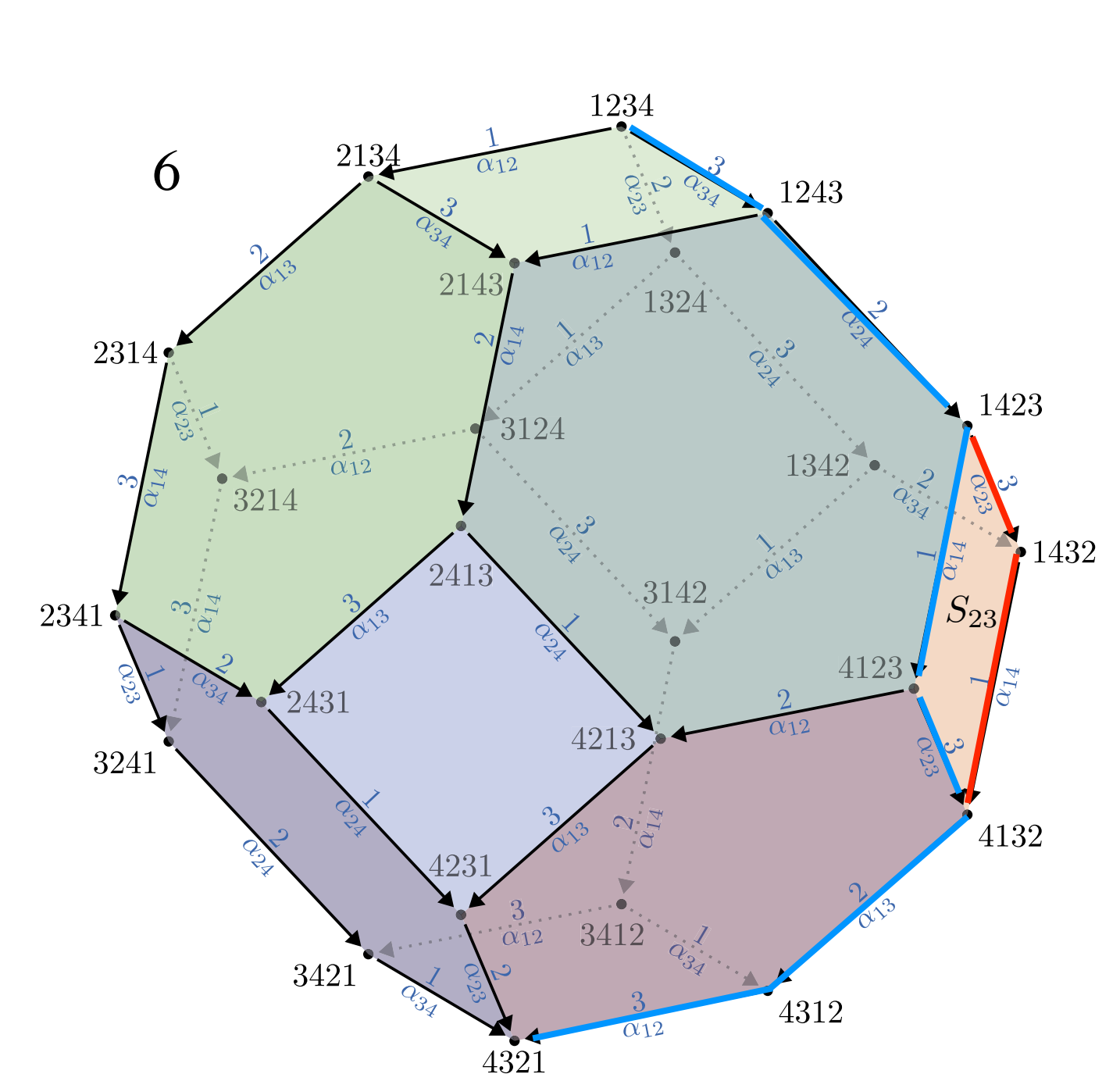
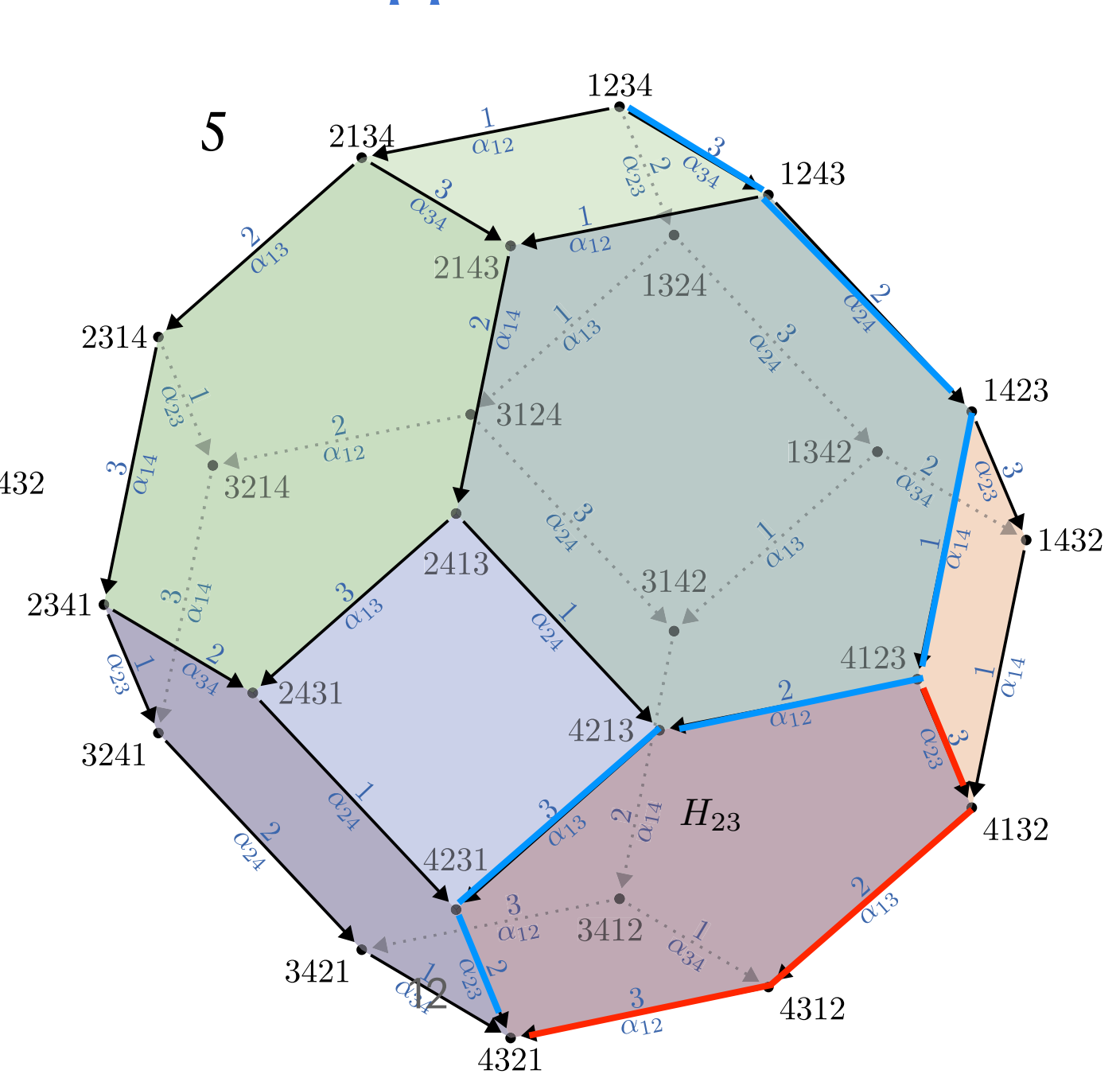
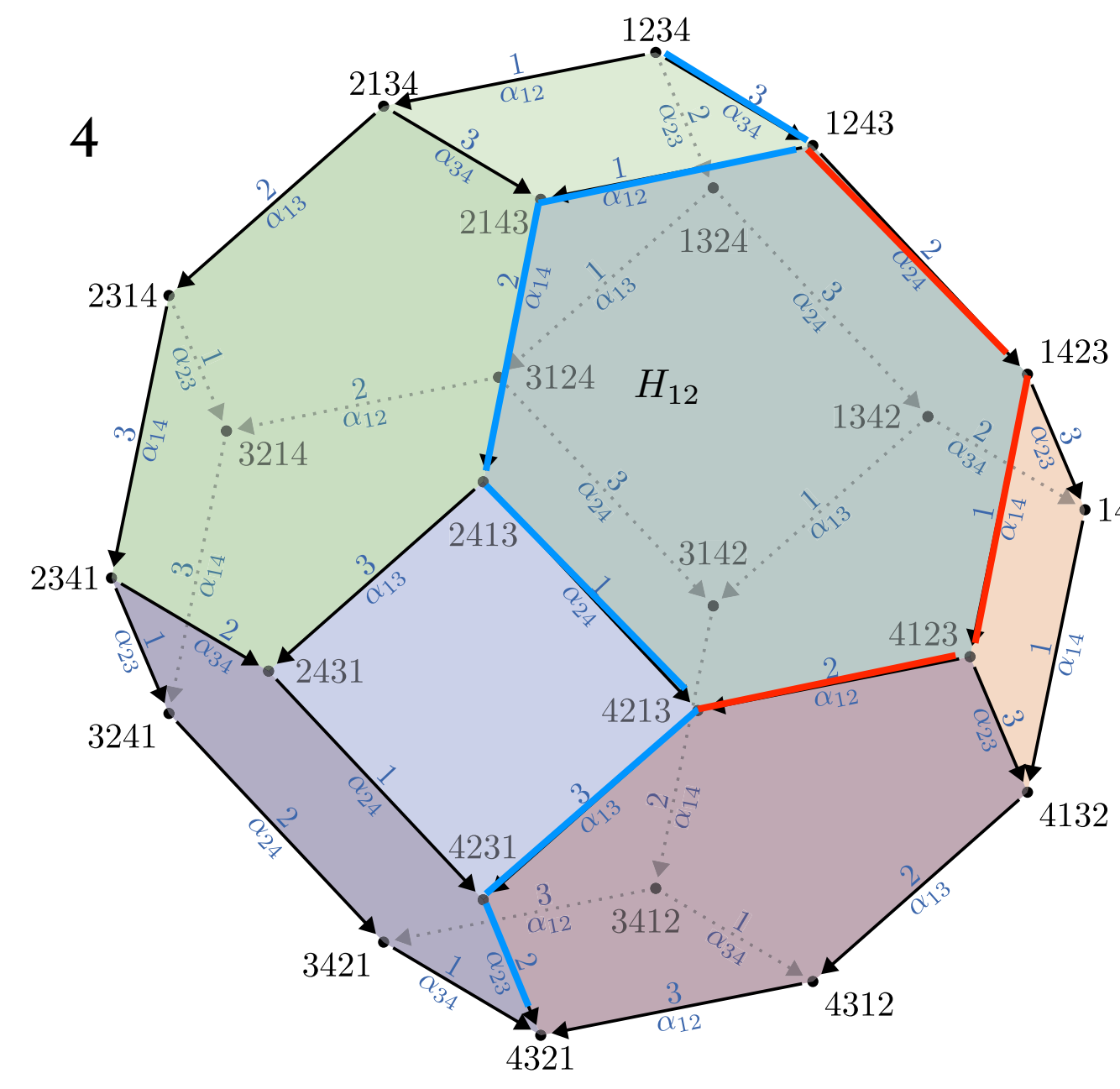


en de 4-dimensionale P_5 is R_4 vullend

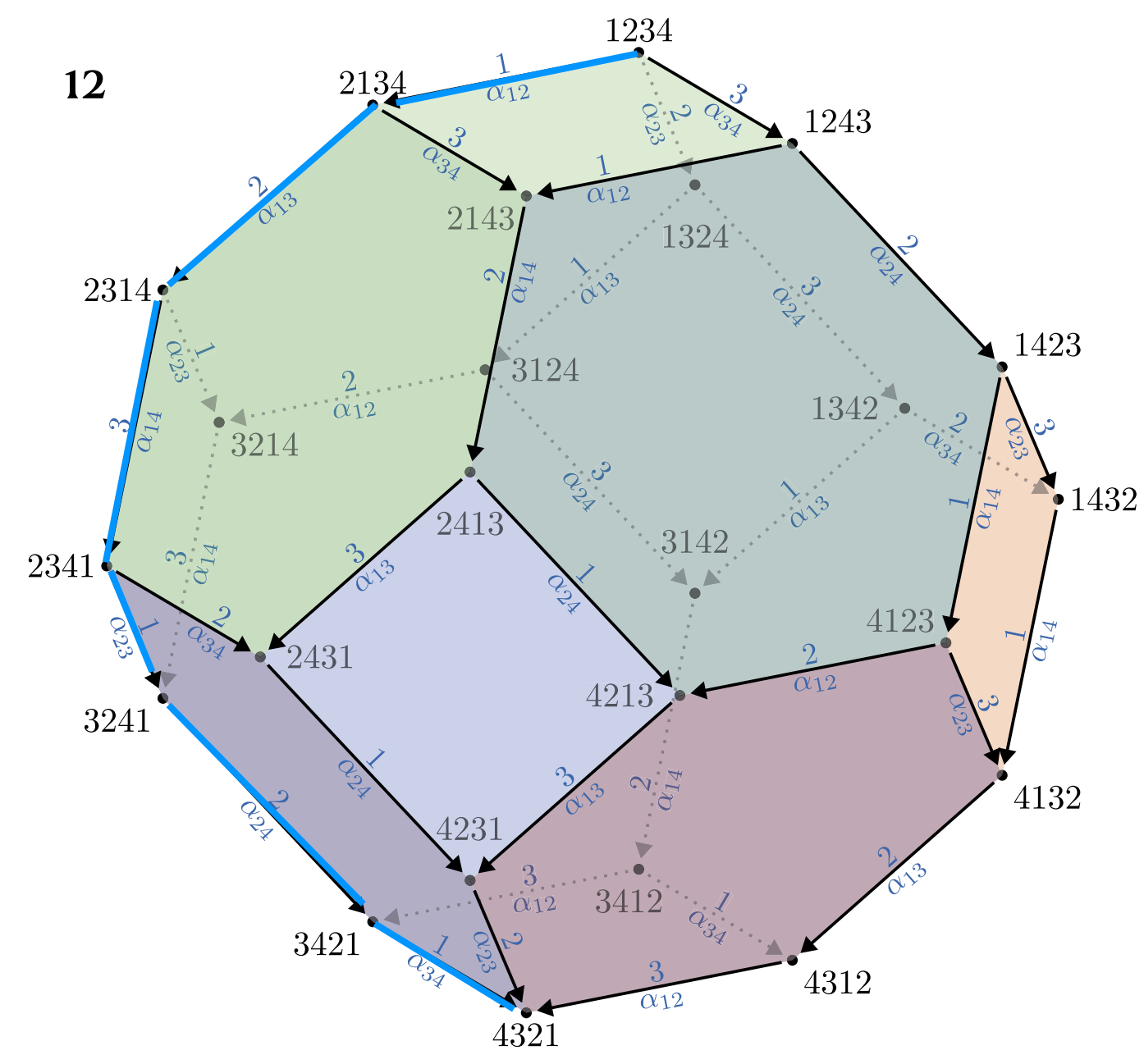
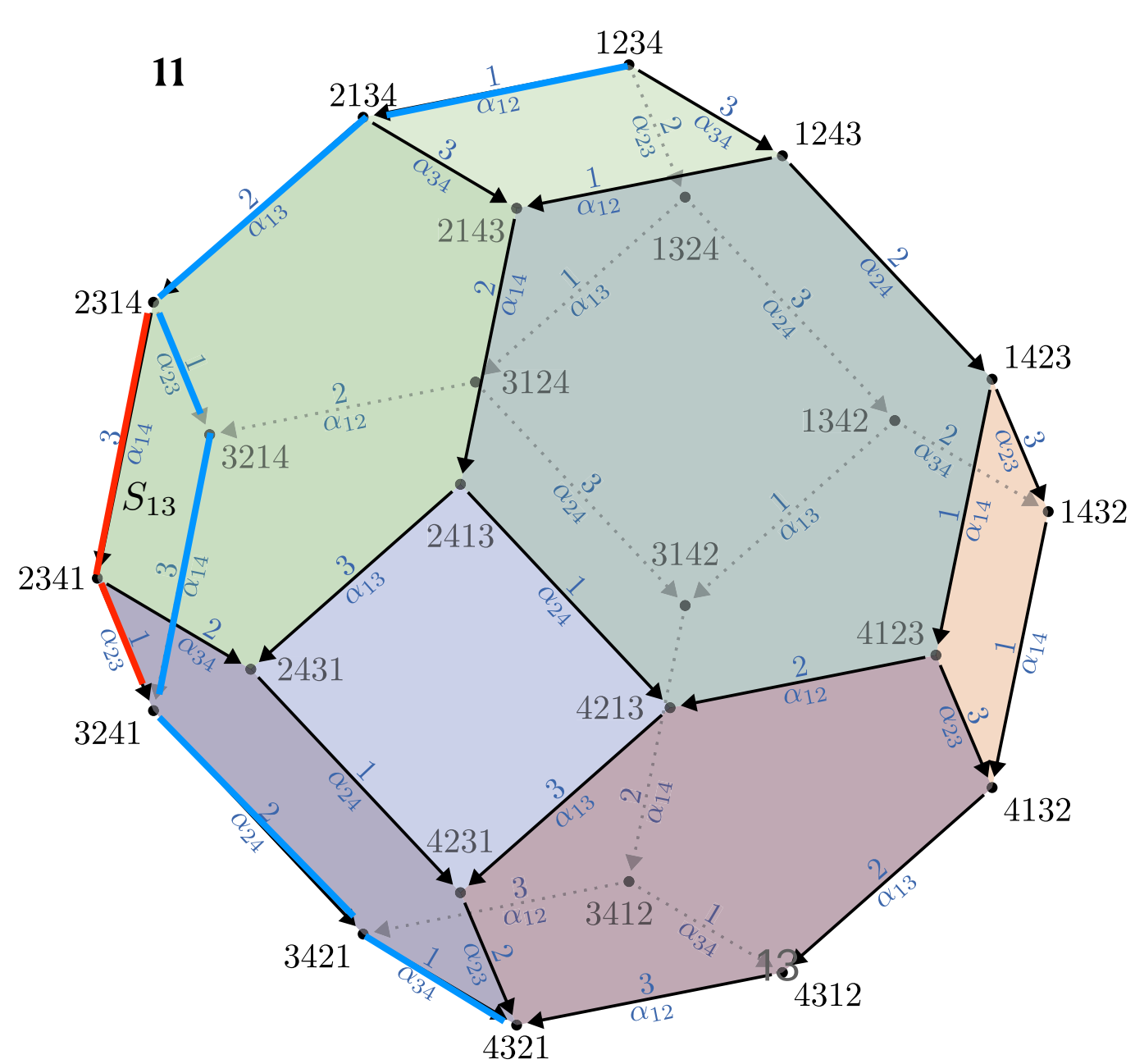
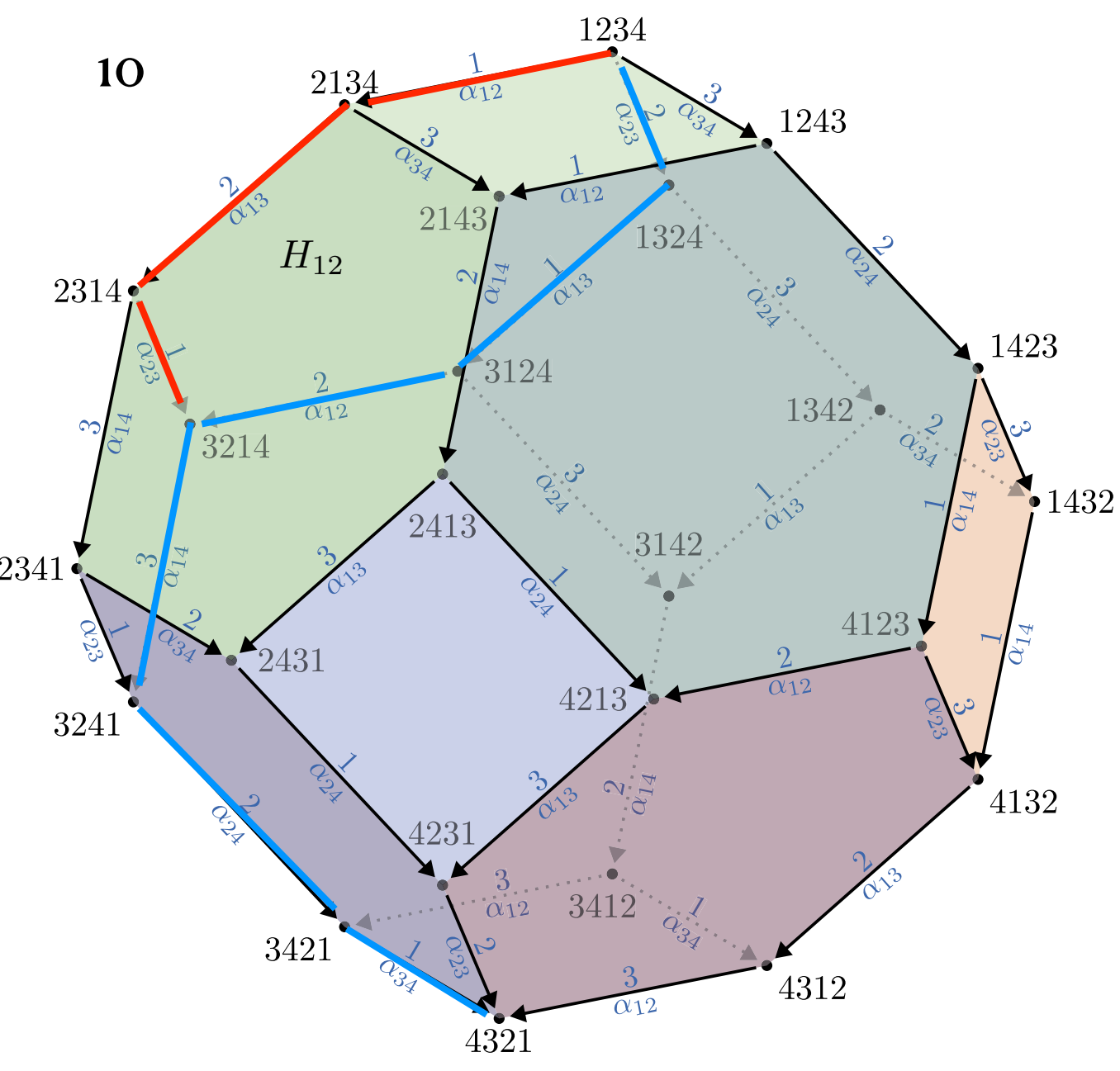
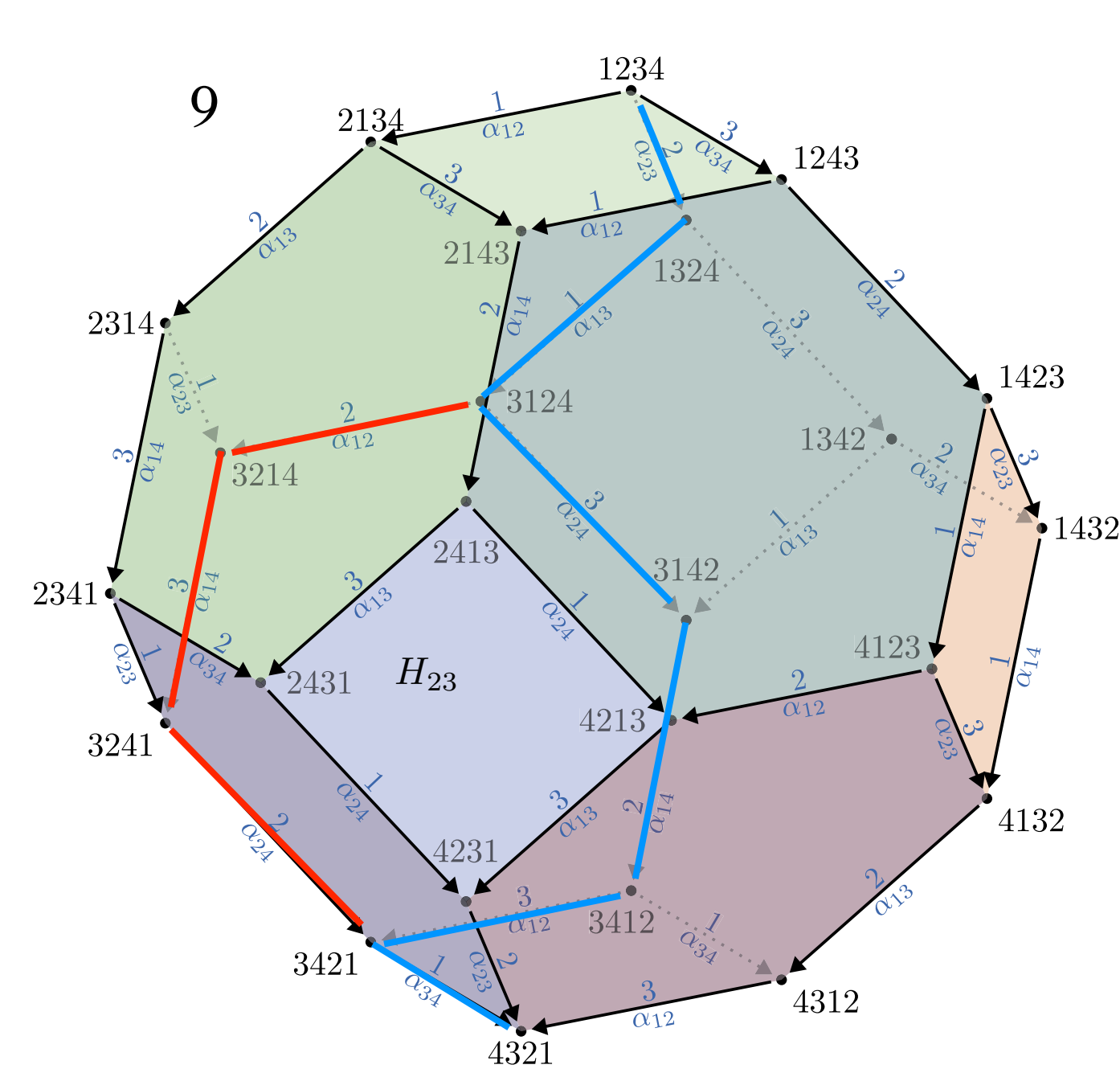
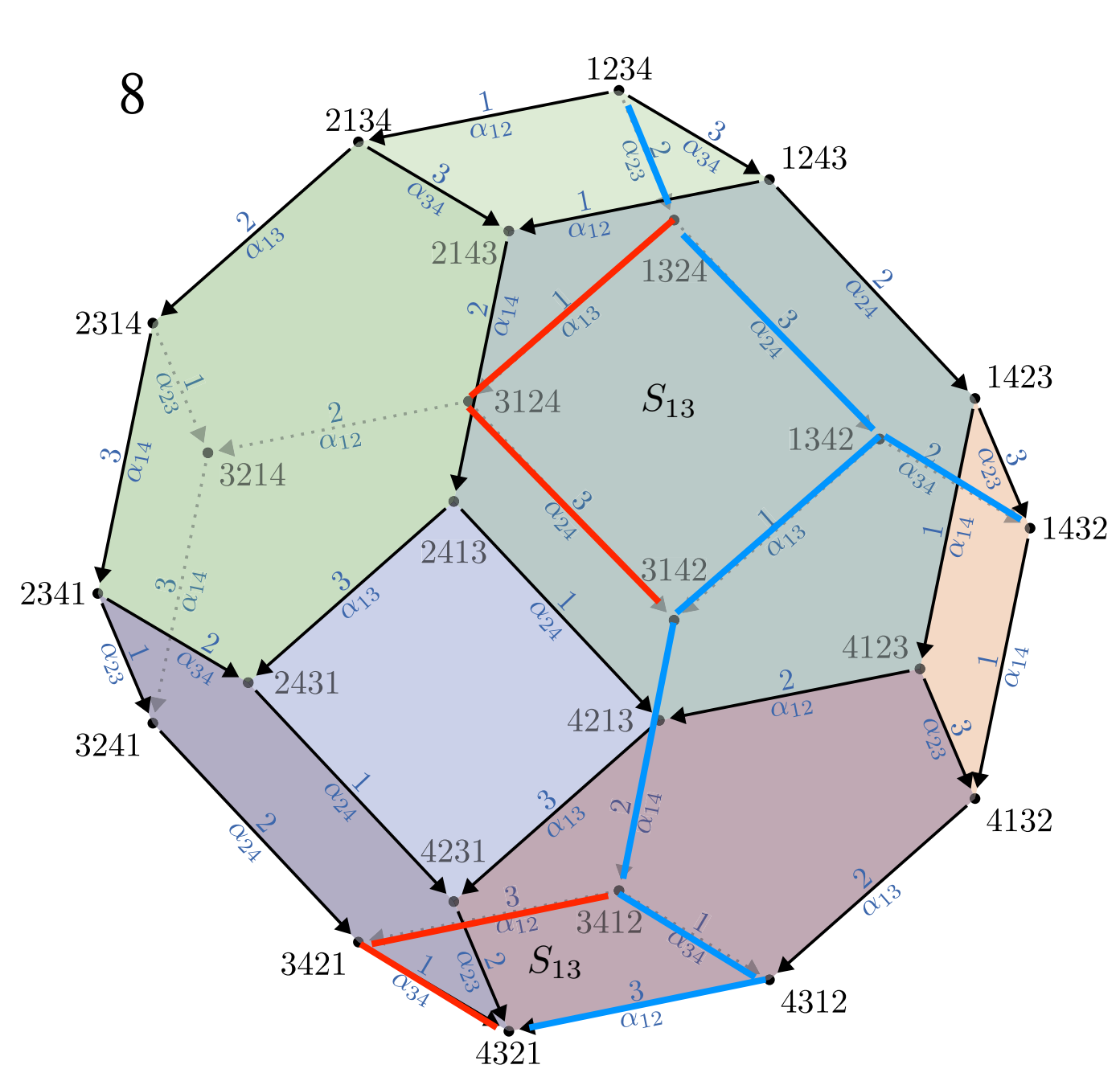
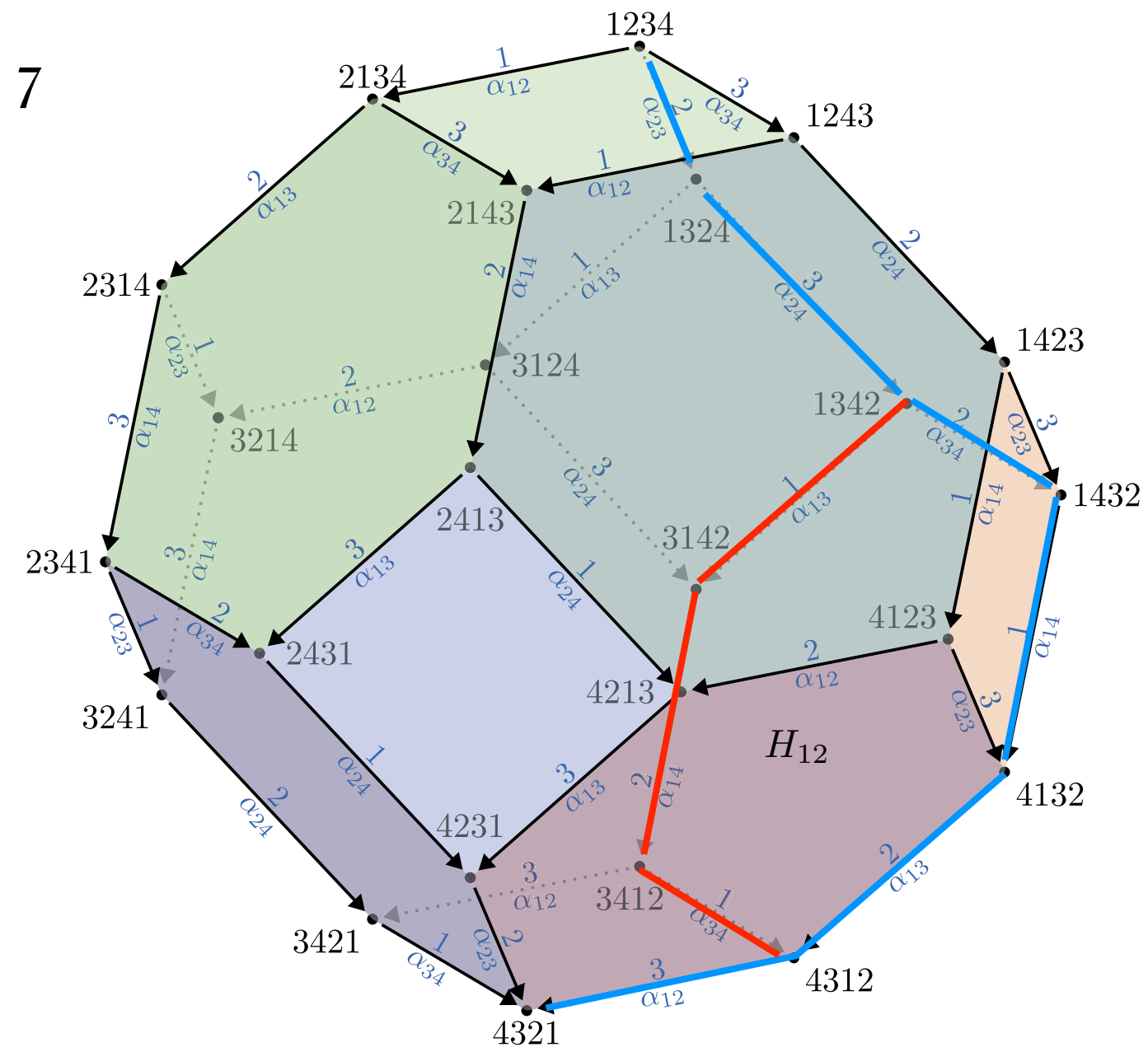


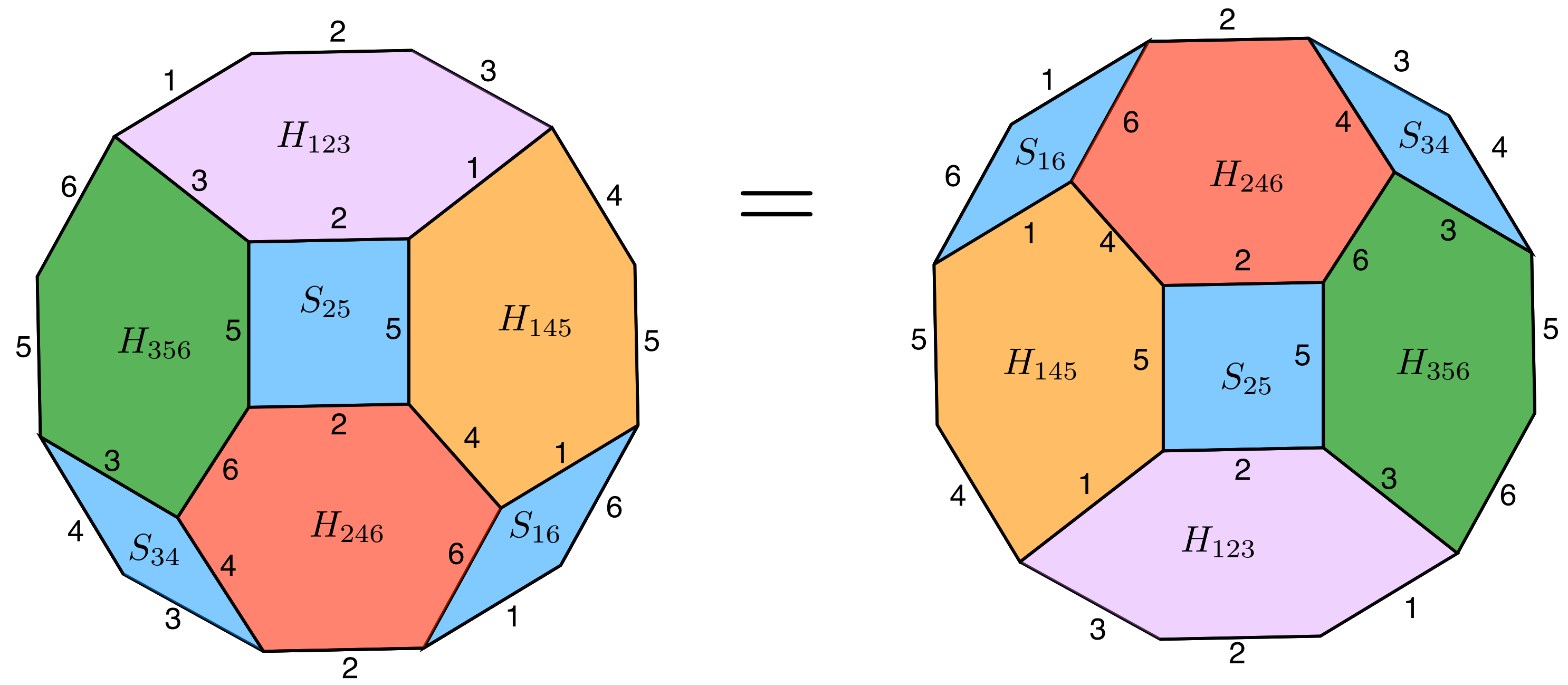


Een reis om de wereld in 12 etappes



6

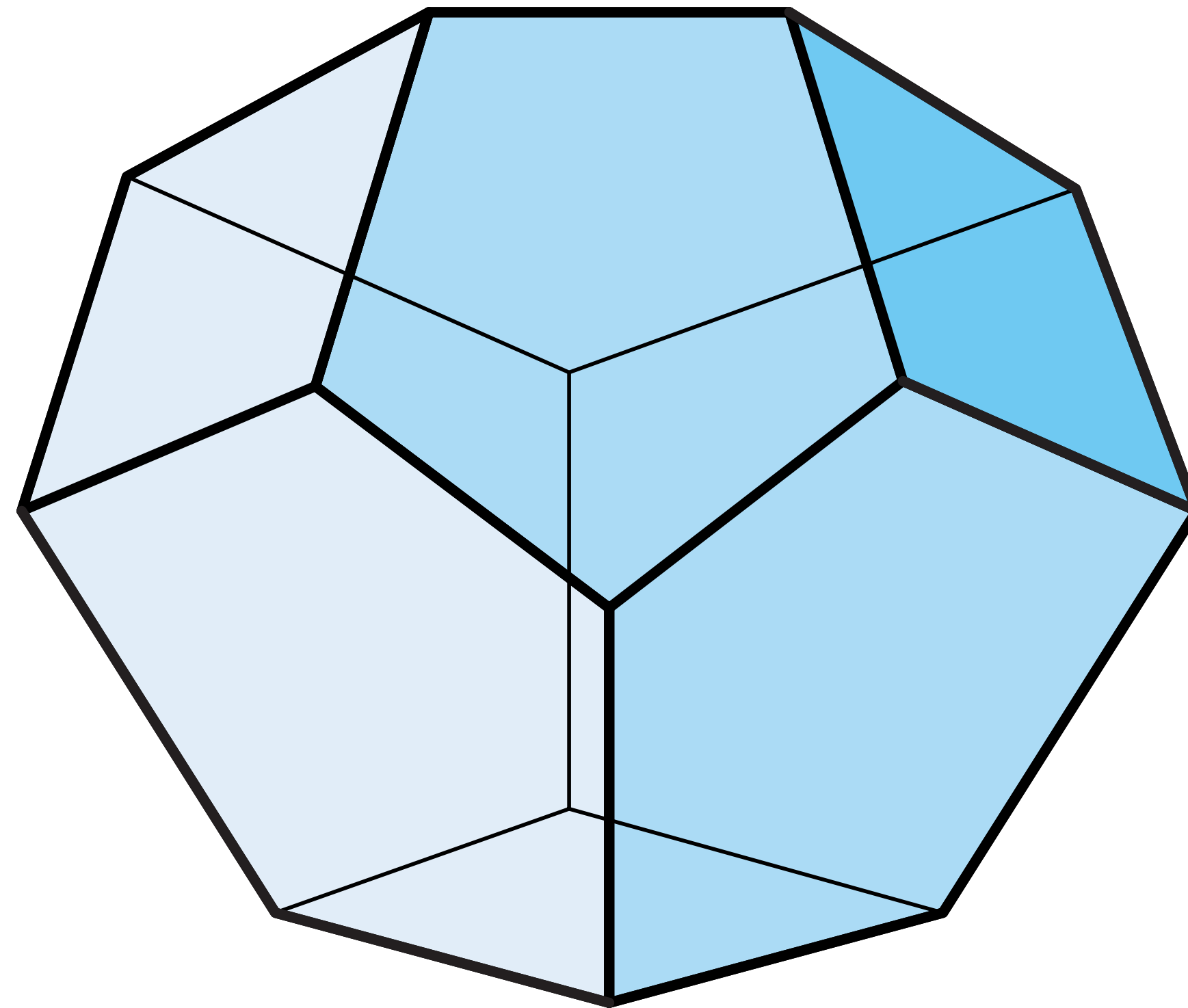


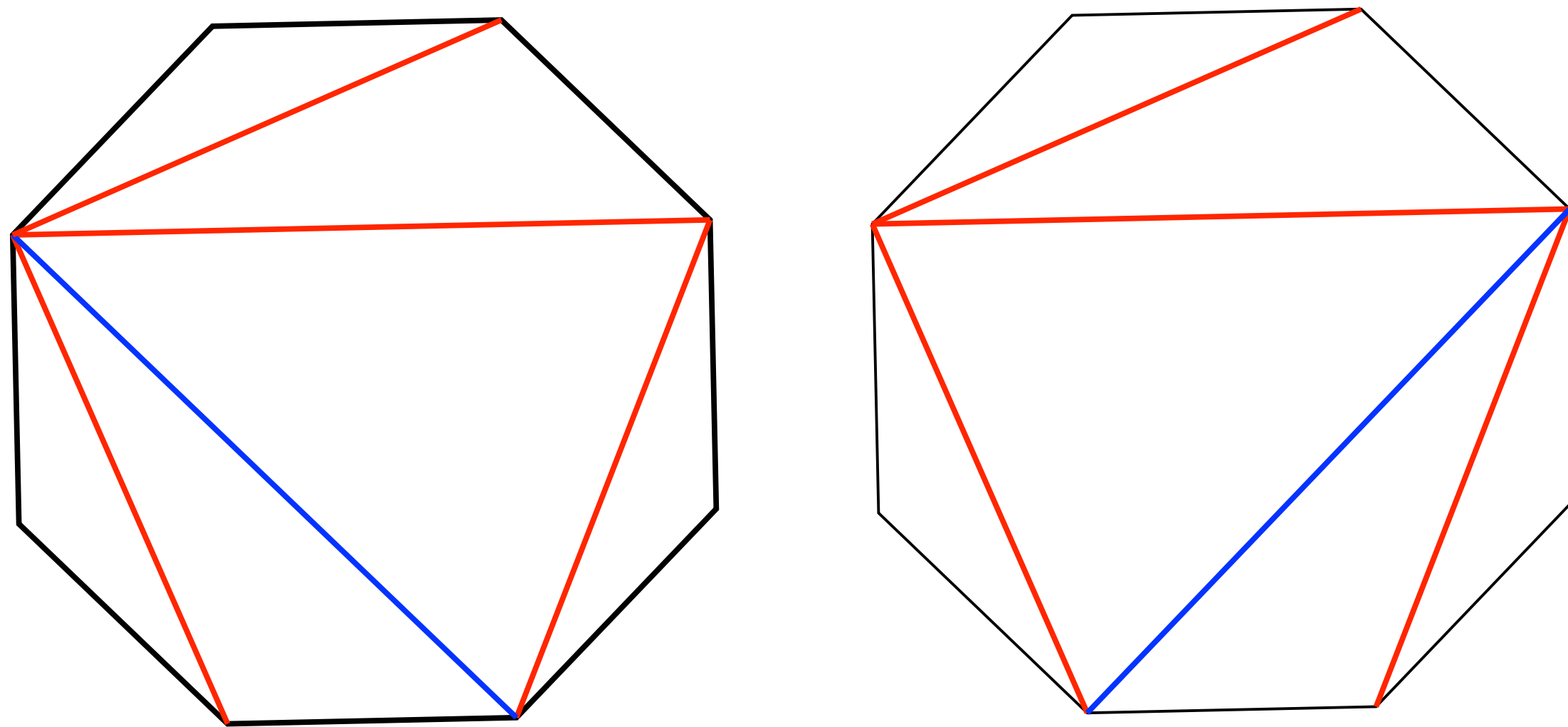


$$H_{123}H_{145}S_{25}S_{16}H_{246}H_{356}S_{34} = S_{34}H_{356}H_{246}S_{25}S_{16}H_{145}H_{123}$$

de permutohedron vergelijking met woorden waarvan
de letters figuren zijn; homotopic herschrijven

naar een ander juweel: het associahedron





diagonaal flip
→



AC LOGARITHM. PER SERIES EXPLICAT. 93
 tero Logarithmorum hyperbolicorum usus in calculo integrali Car.VII.
 fusius demonstrabitur.

CAPUT VIII.

De quantitibus transcendentibus ex Circulo ortis.

126. **P**ost Logarithmos & quantitates exponentiales considerari debent Arcus circulares eorumque Sinus & Cosinus, quia non solum aliud quantitatum transcendentium genus constituunt, sed etiam ex ipsis Logarithmis & exponentialibus, quando imaginariis quantitibus involvuntur, proveniunt, id quod infra clarius patebit.

Ponamus ergo Radium Circuli seu Sinum totum esse = 1, atque satis liquet Peripheriam hujus Circuli in numeris rationalibus exacte exprimi non posse, per approximationes autem inventa est Semicircumferentia hujus Circuli esse = 3, 1415926535897932384626433832795028841971693993751058209749441923078164062862089986280348253421170679821480865132723066470938446+, pro quo numero, brevitatis ergo, scribam π , ita ut sit π = Semicircumferentia Circuli, cujus Radius = 1, seu π erit longitudo Arcus 180 graduum.

127. Denotante z Arcum hujus Circuli quemcunque, cujus Radium perpetuo assumo = 1; hujus Arcus z considerari potissimum solent Sinus & Cosinus. Sinum autem Arcus z in posterum hoc modo indicabo, *sin. A. z*, seu tantum *sin. z*. Cosinum vero hoc modo *cos. A. z*, seu tantum *cos. z*. Ita, cum π sit Arcus 180°, erit *sin. 0π* = 0; *cos. 0π* = 1; & *sin. $\frac{1}{2}\pi$* = 1; *cos. $\frac{1}{2}\pi$* = 0; *sin. π* = 0; *cos. π* = -1; & *sin. $\frac{3}{2}\pi$* = -1; *cos. $\frac{3}{2}\pi$* = 0; *sin. 2π* = 0; & *cos. 2π* = 1.

Omnes ergo Sinus & Cosinus intra limites + 1 & - 1 continentur.

M. 3

1							
1	1						
1	2	2					driehoek A2
1	3	5	5				vierkant A3
1	4	9	14	14			pentagon A4
1	5	14	28	42	42		hexagon A5
1	6	20	48	90	132	132	septuagon
1	7	27	75	165	297	429	octagon
						429	429

Leonhard Euler 1707-1783

$$3 \times 5 \times 7 = ?$$

$$(3 \times 5) \times 7 = 15 \times 7 = 105$$

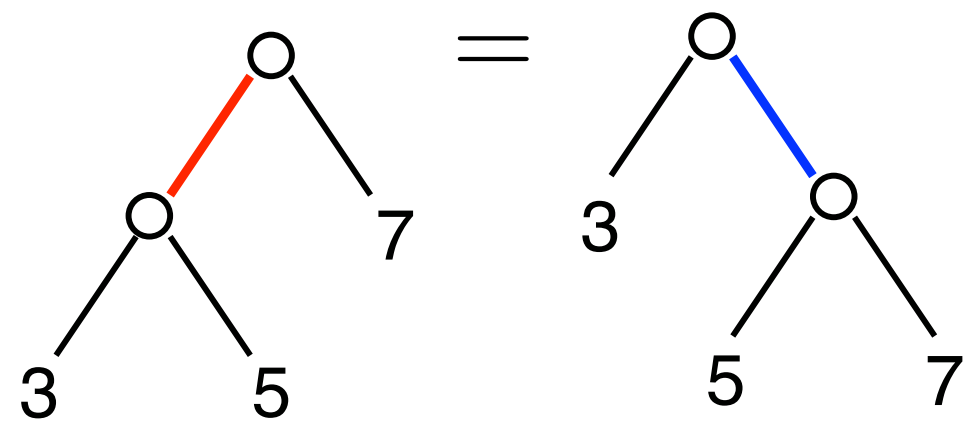
$$3 \times (5 \times 7) = 3 \times 35 = 105$$

$$(3 \times 5) \times 7 = 3 \times (5 \times 7)$$

$$(x \times y) \times z = x \times (y \times z)$$

$$(x \cdot y) \cdot z = x \cdot (y \cdot z)$$

$$(xy)z = x(yz) \quad \textit{associativiteit}$$



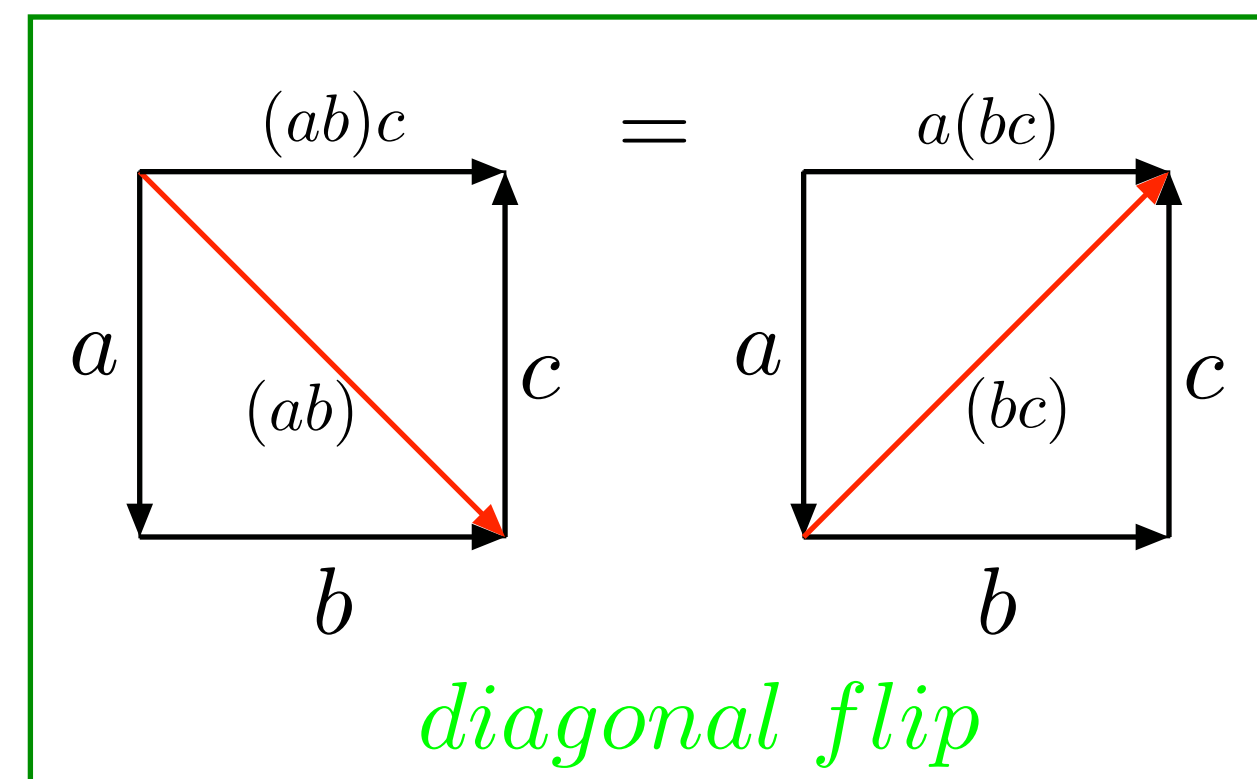
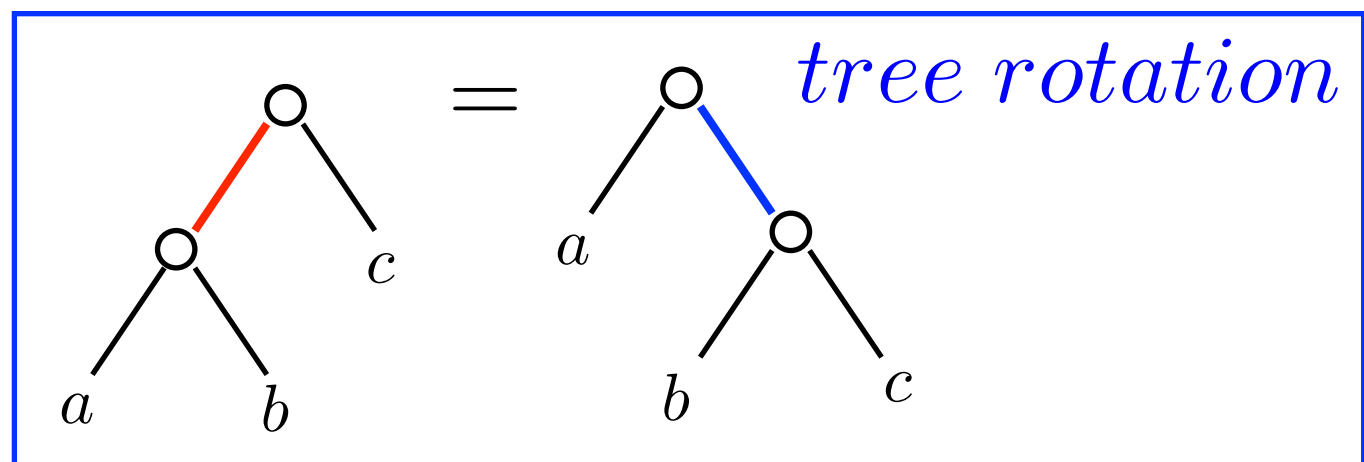
tree rotation

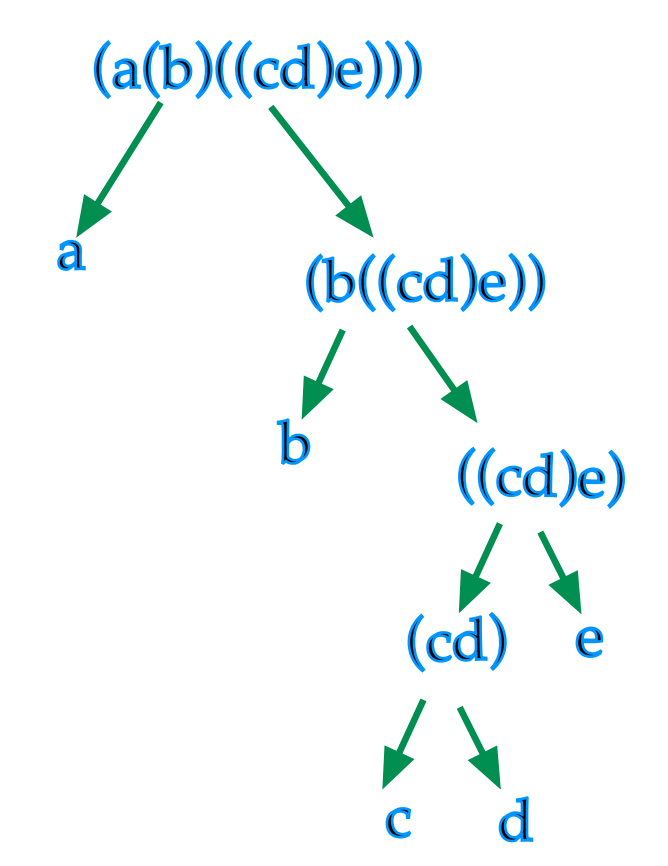
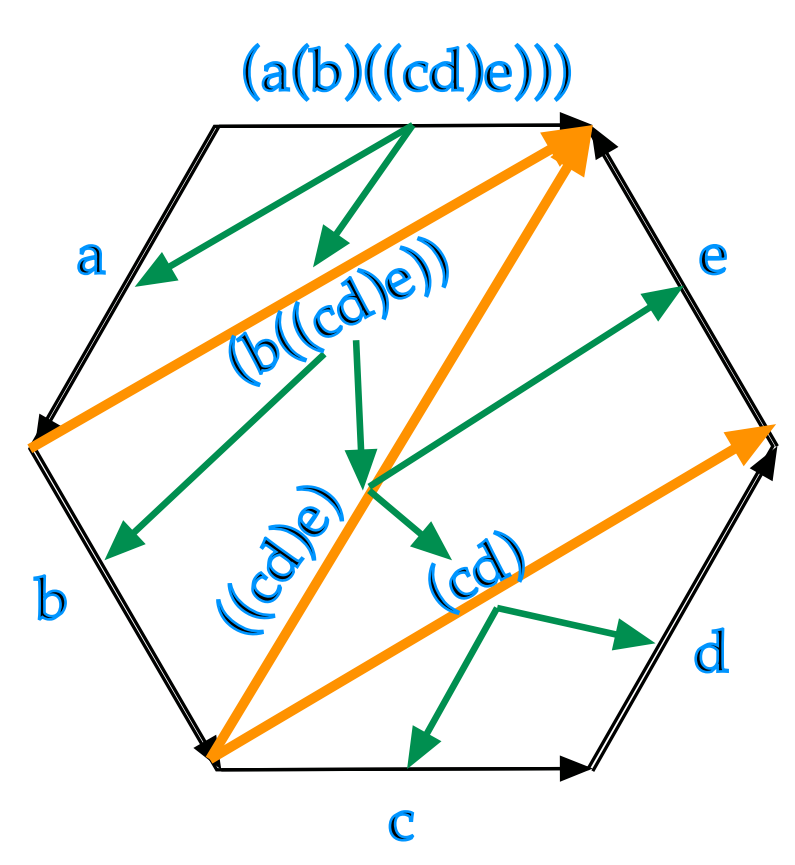
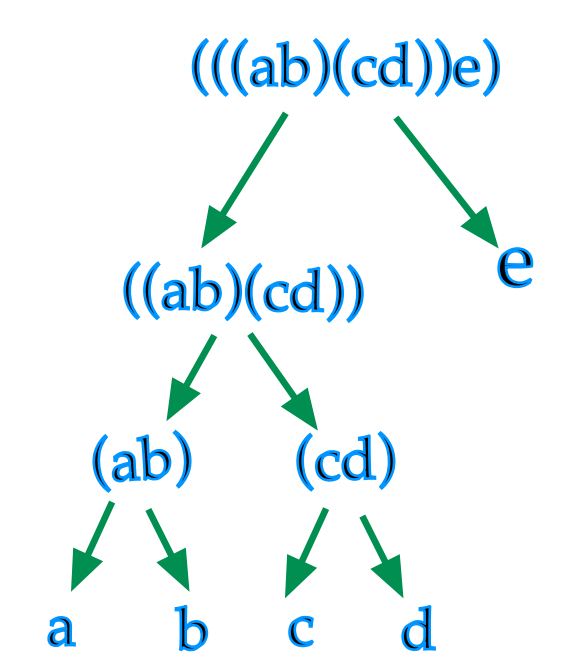
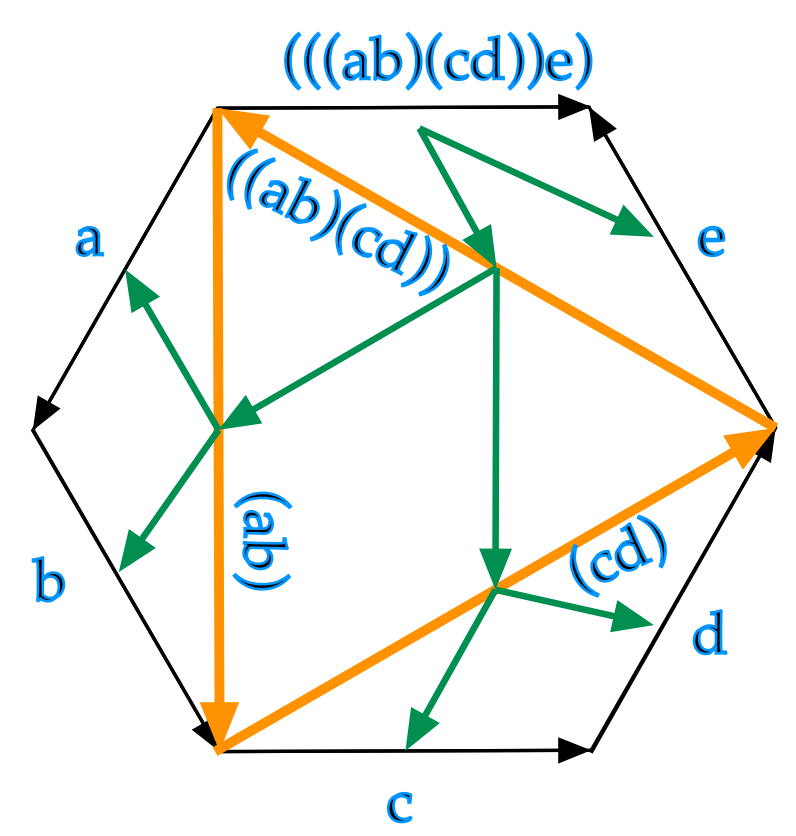
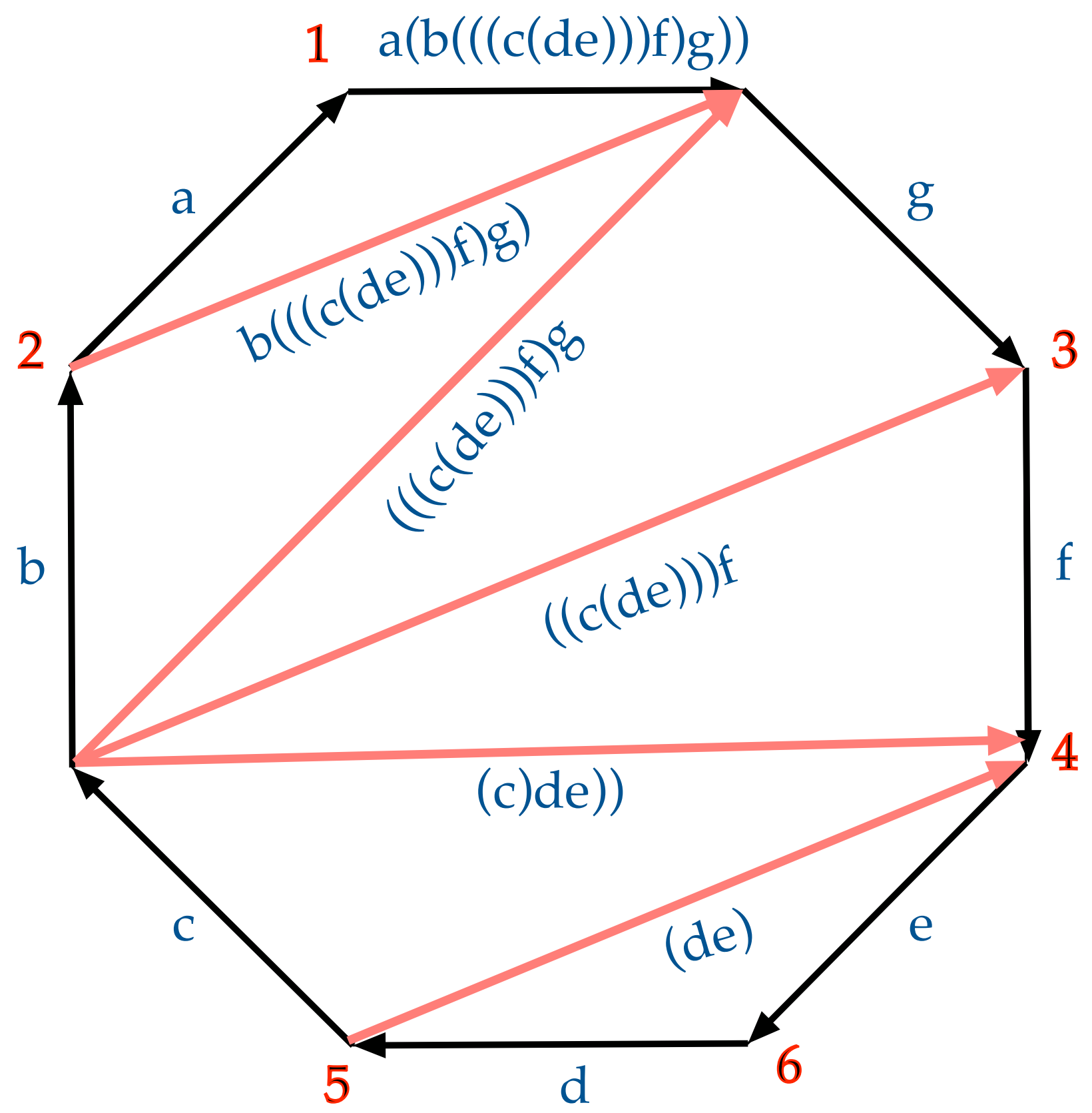
DRIELUIK

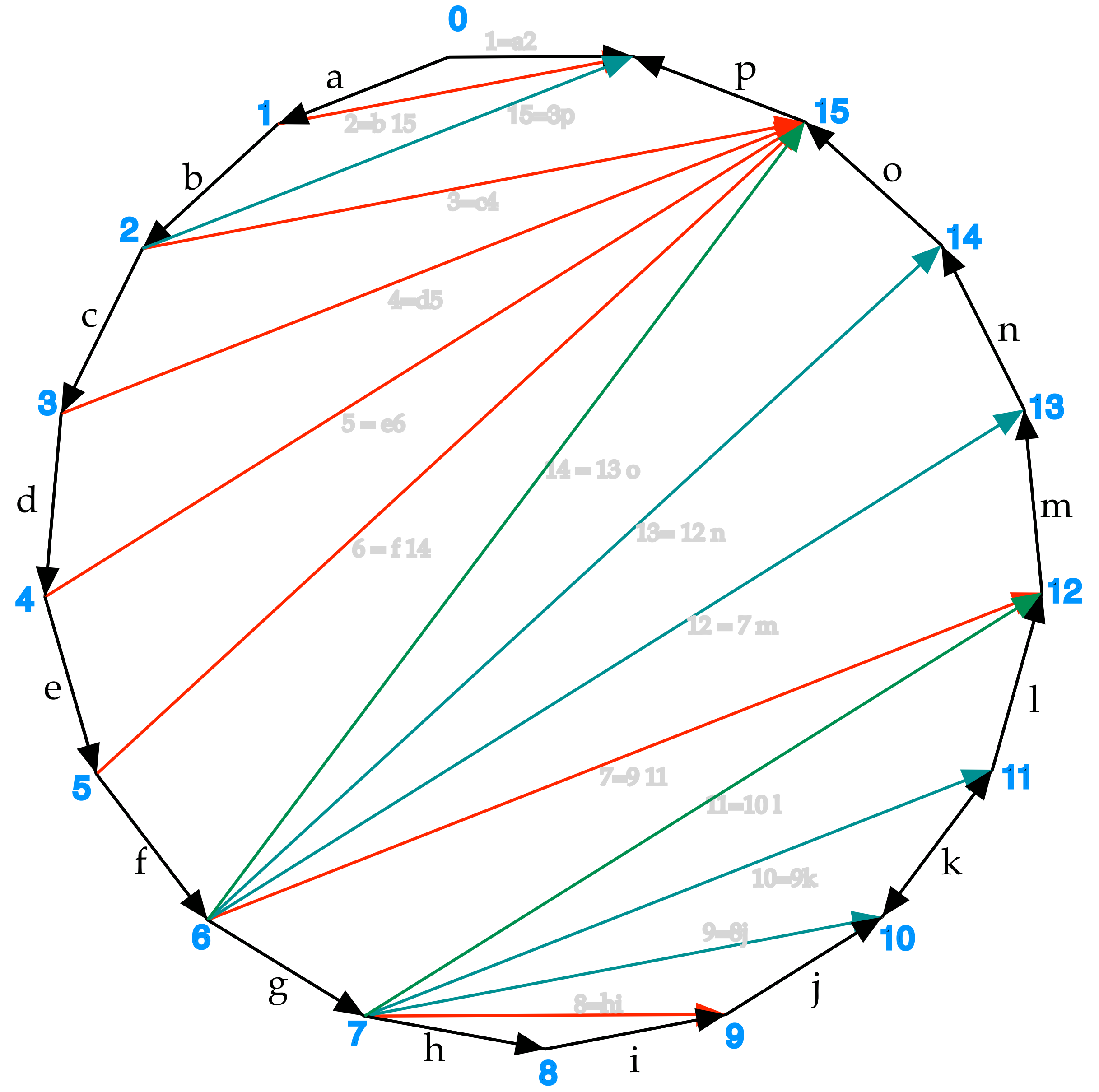
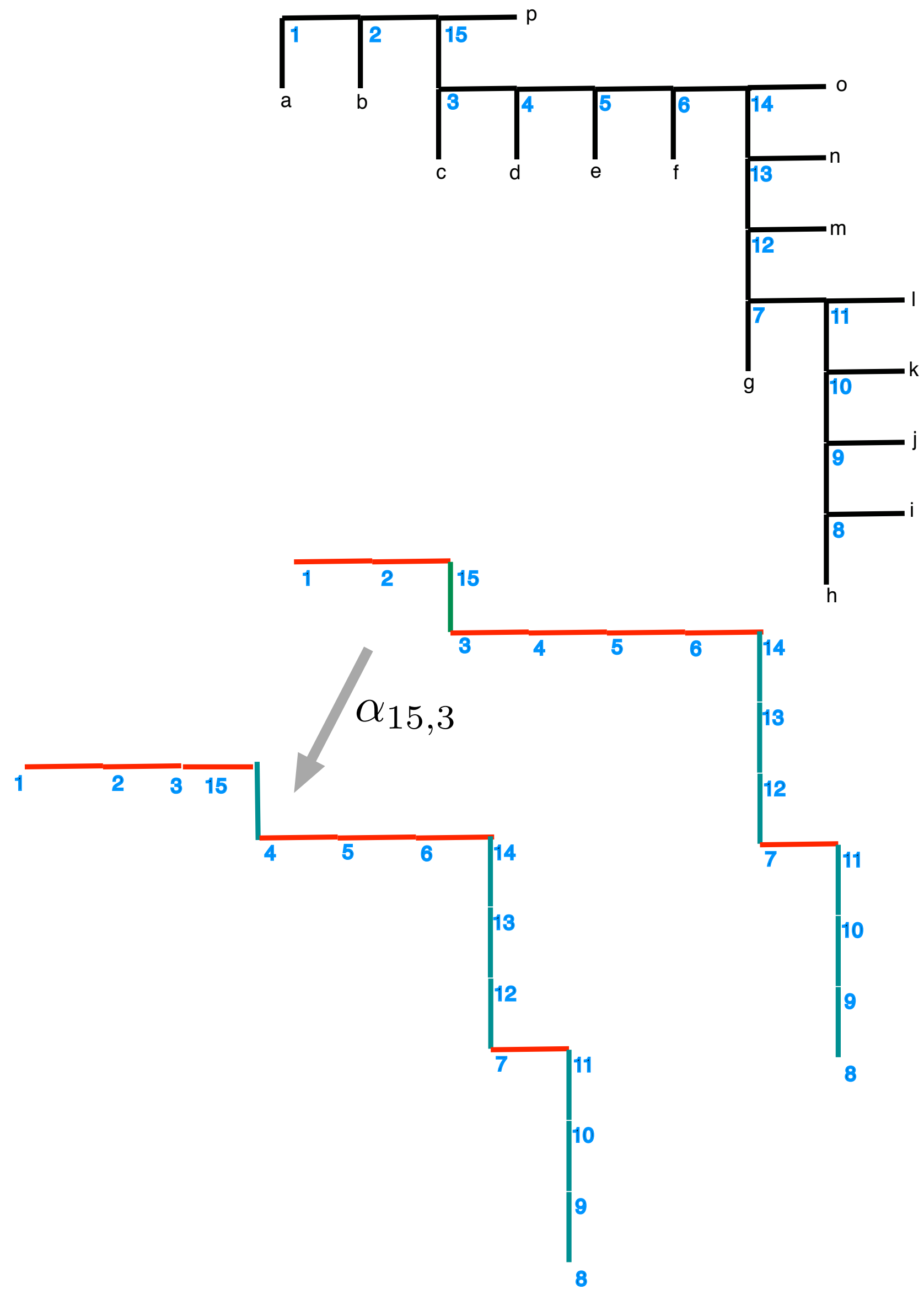
$$(xy)z = x(yz)$$

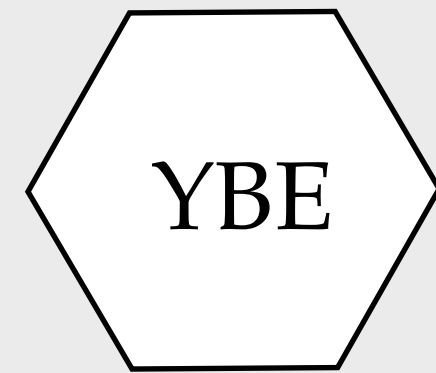
associativiteit

$$(ab)c = a(bc)$$

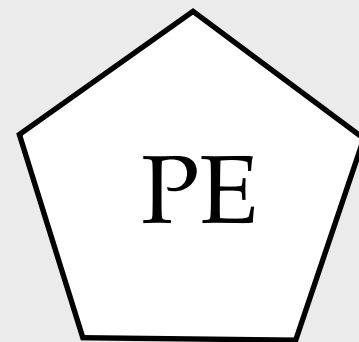








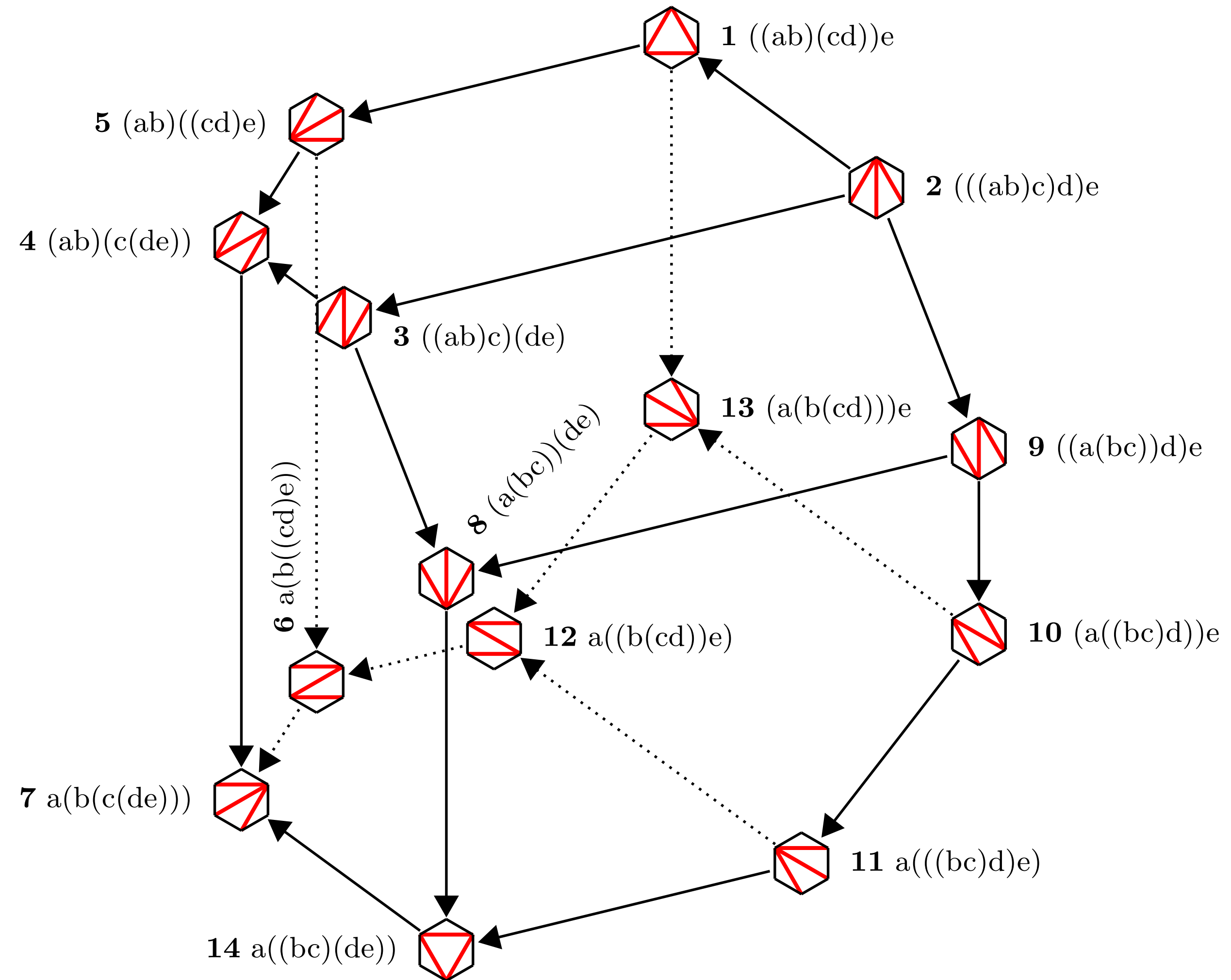
$$\alpha_{21}\alpha_{31}\alpha_{32} = \alpha_{32}\alpha_{31}\alpha_{21}$$

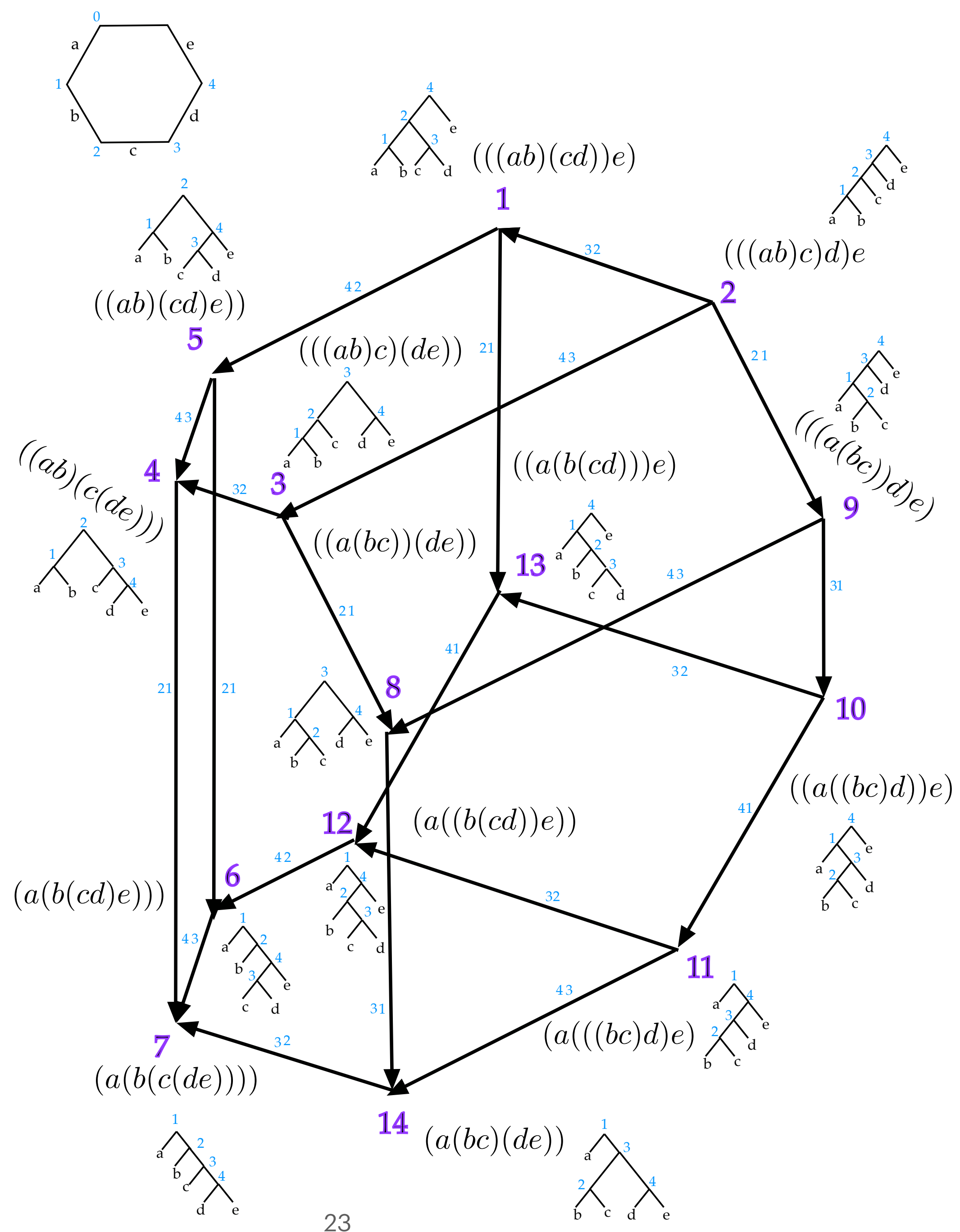


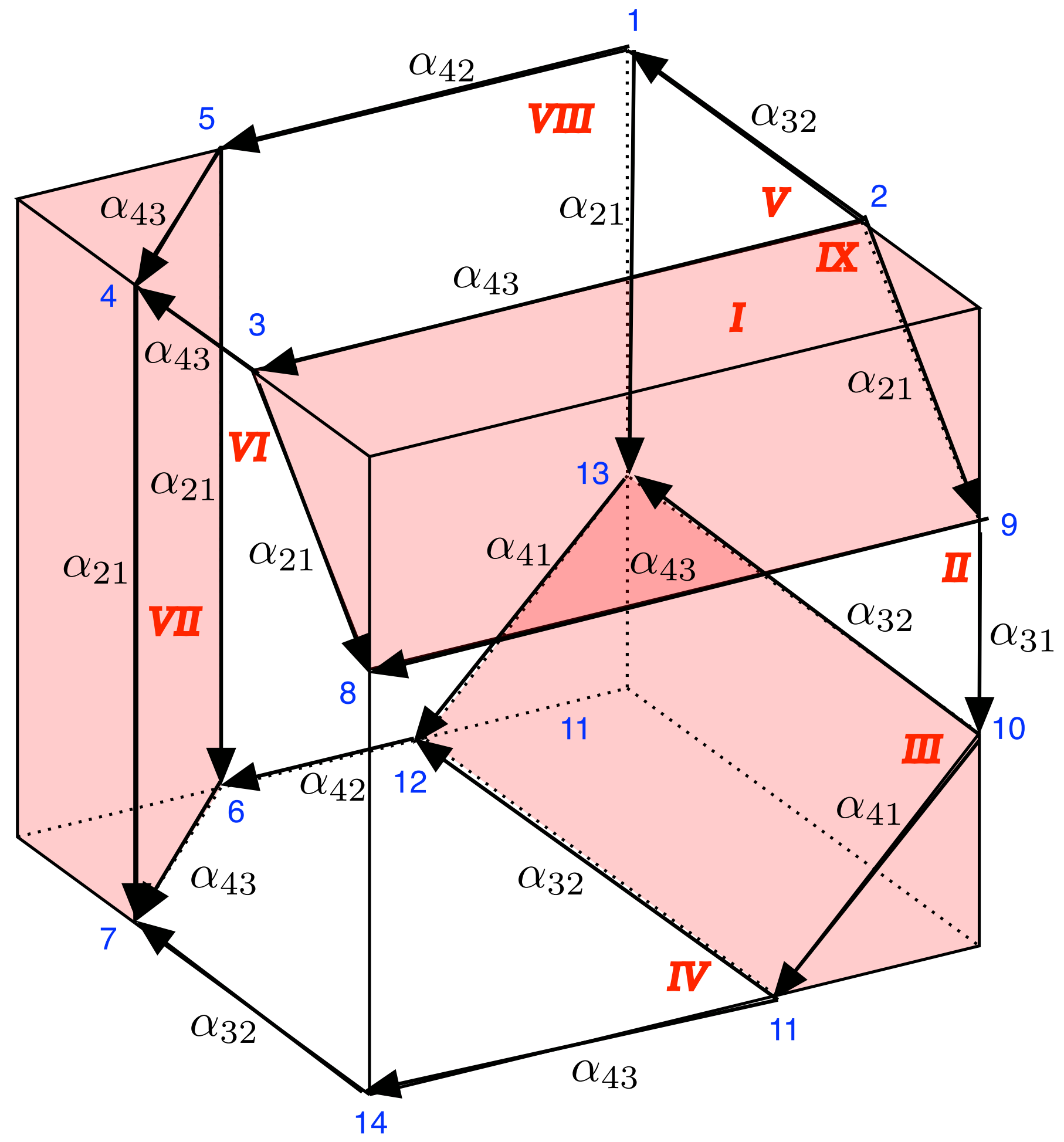
$$\alpha_{21}\alpha_{31}\alpha_{32} = \alpha_{32}\alpha_{31}\alpha_{21}$$

de Yang-Baxter vergelijking

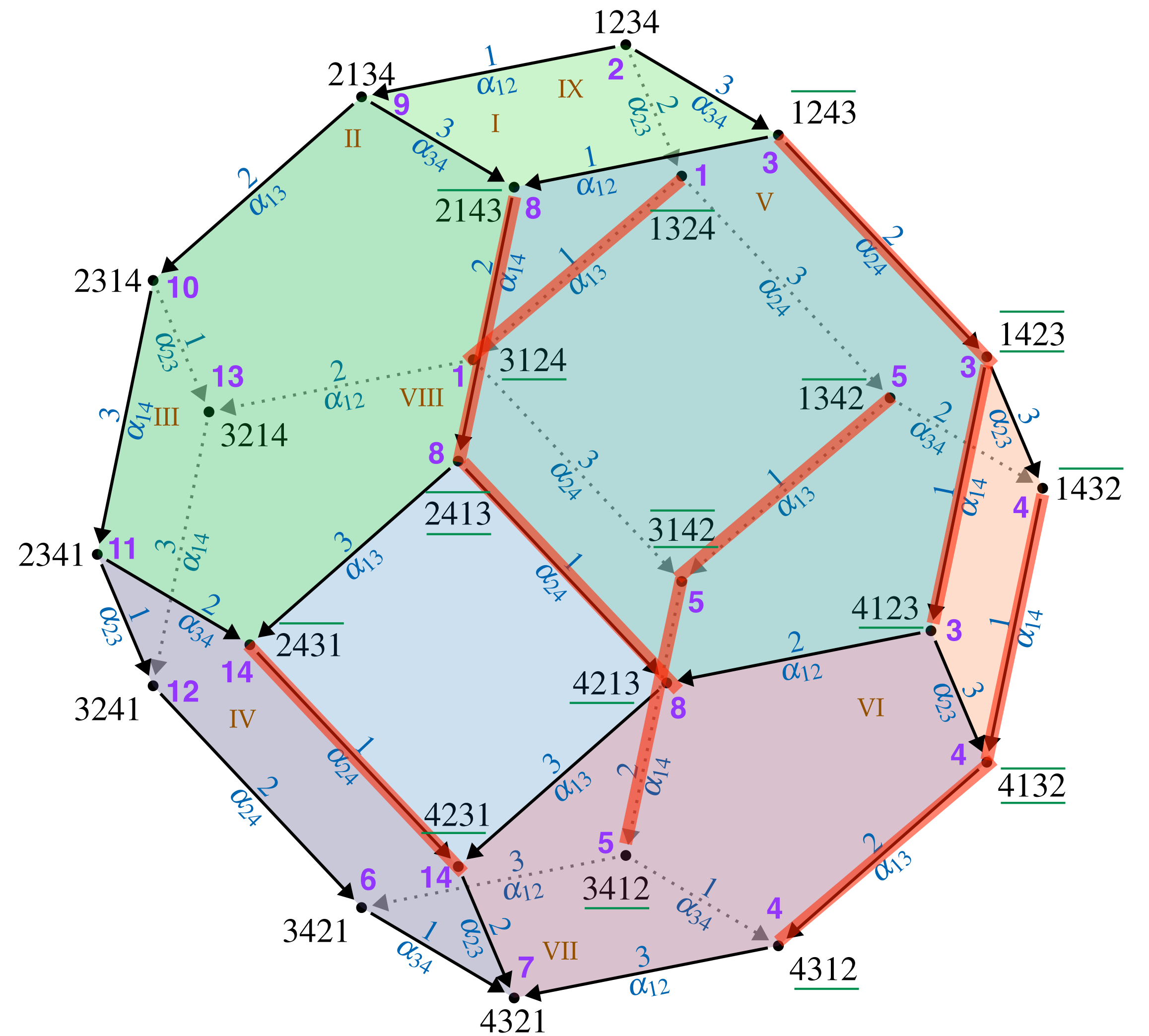
de pentagon vergelijking







Permutohedron P_4



na collapsen van de 10 edges ontstaat het associahedron A_5

tijd voor games; playtime!

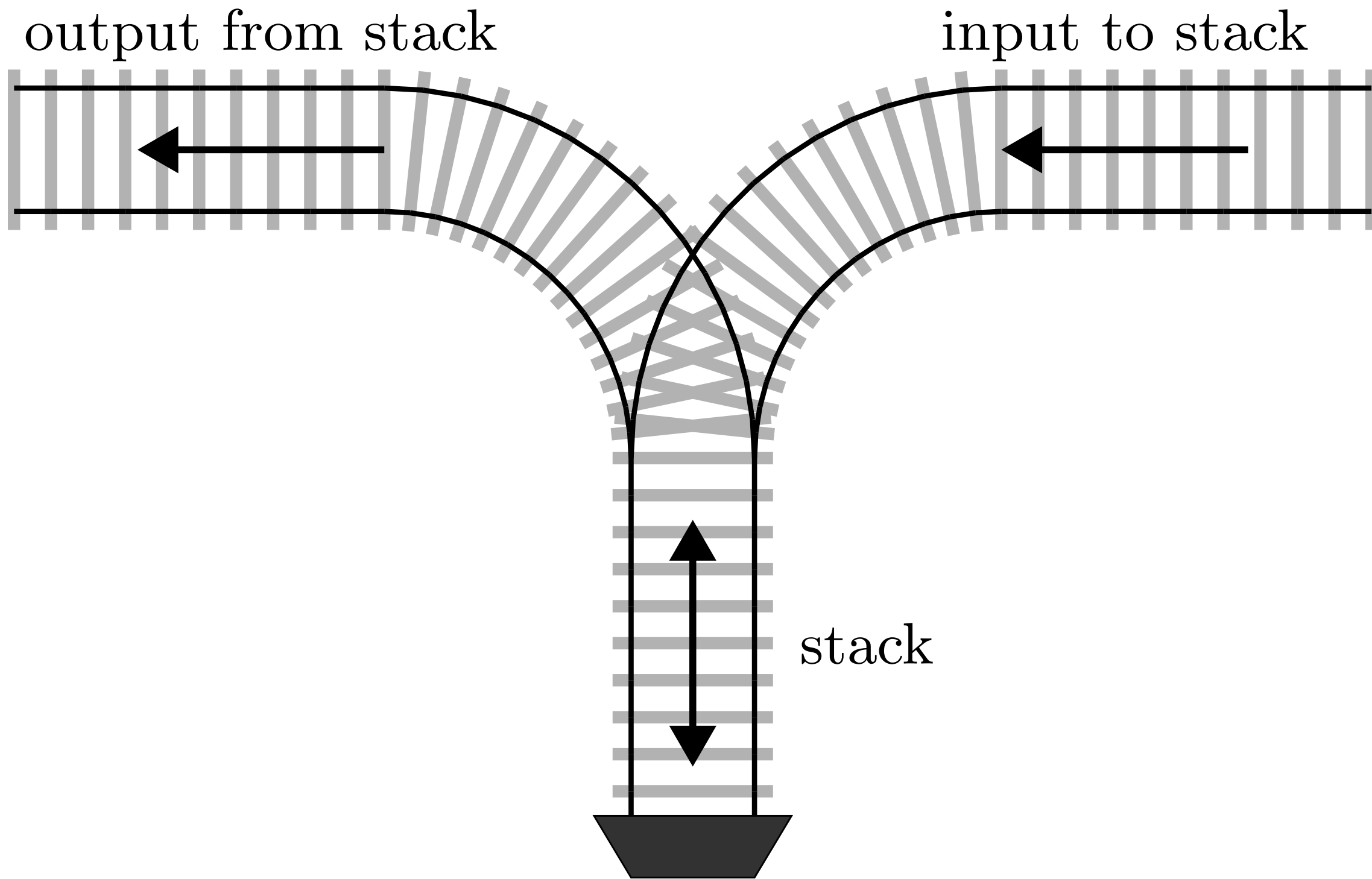
1	2	3	4
5	6	7	8
9	10	11	12
13	15	14	



Stack permutations

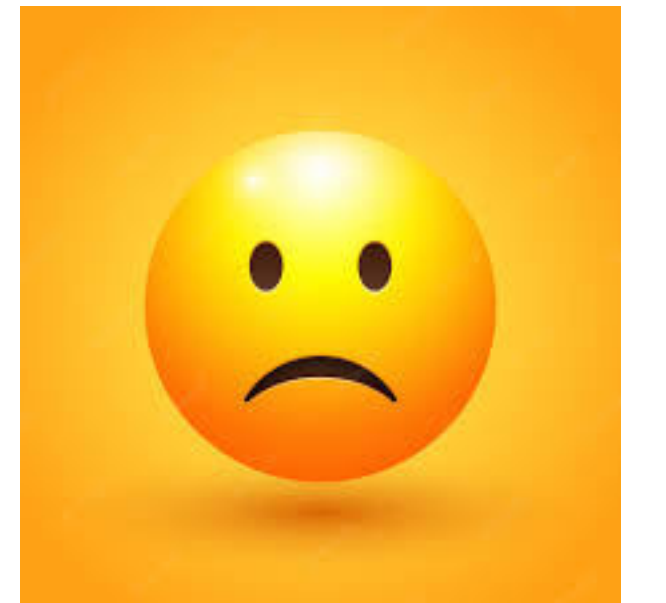
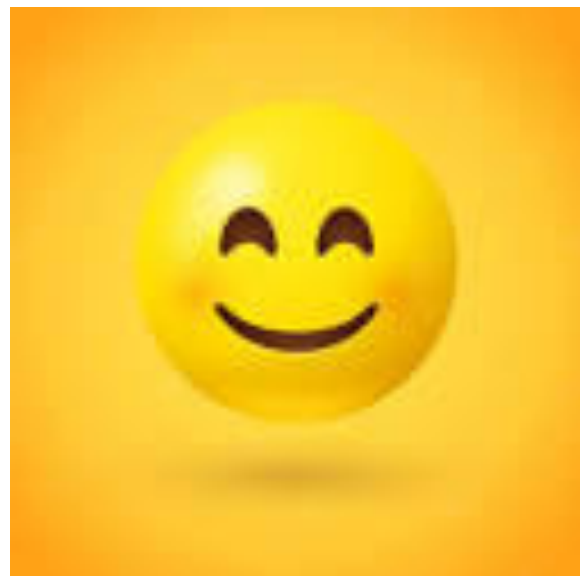
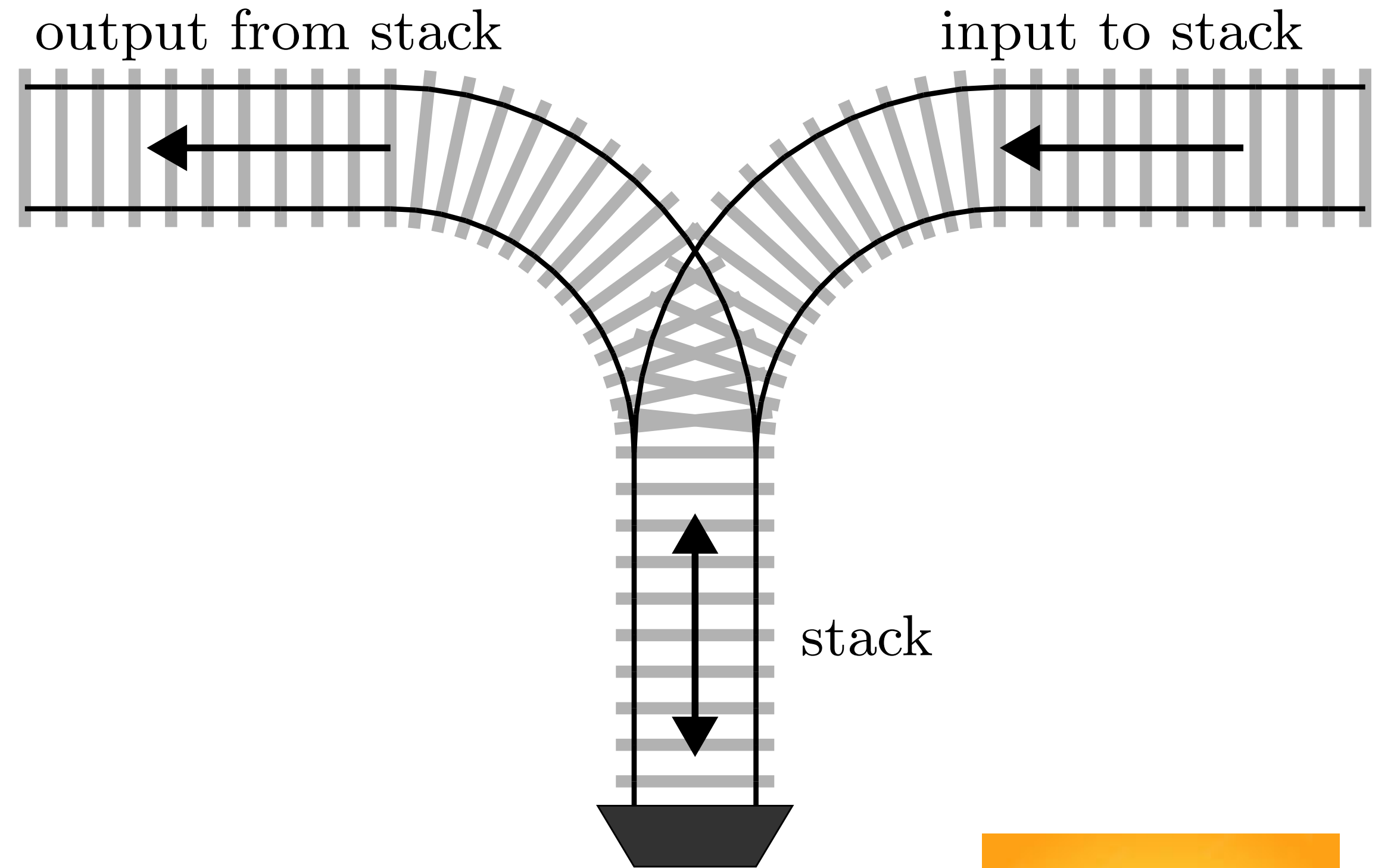
2431

1234

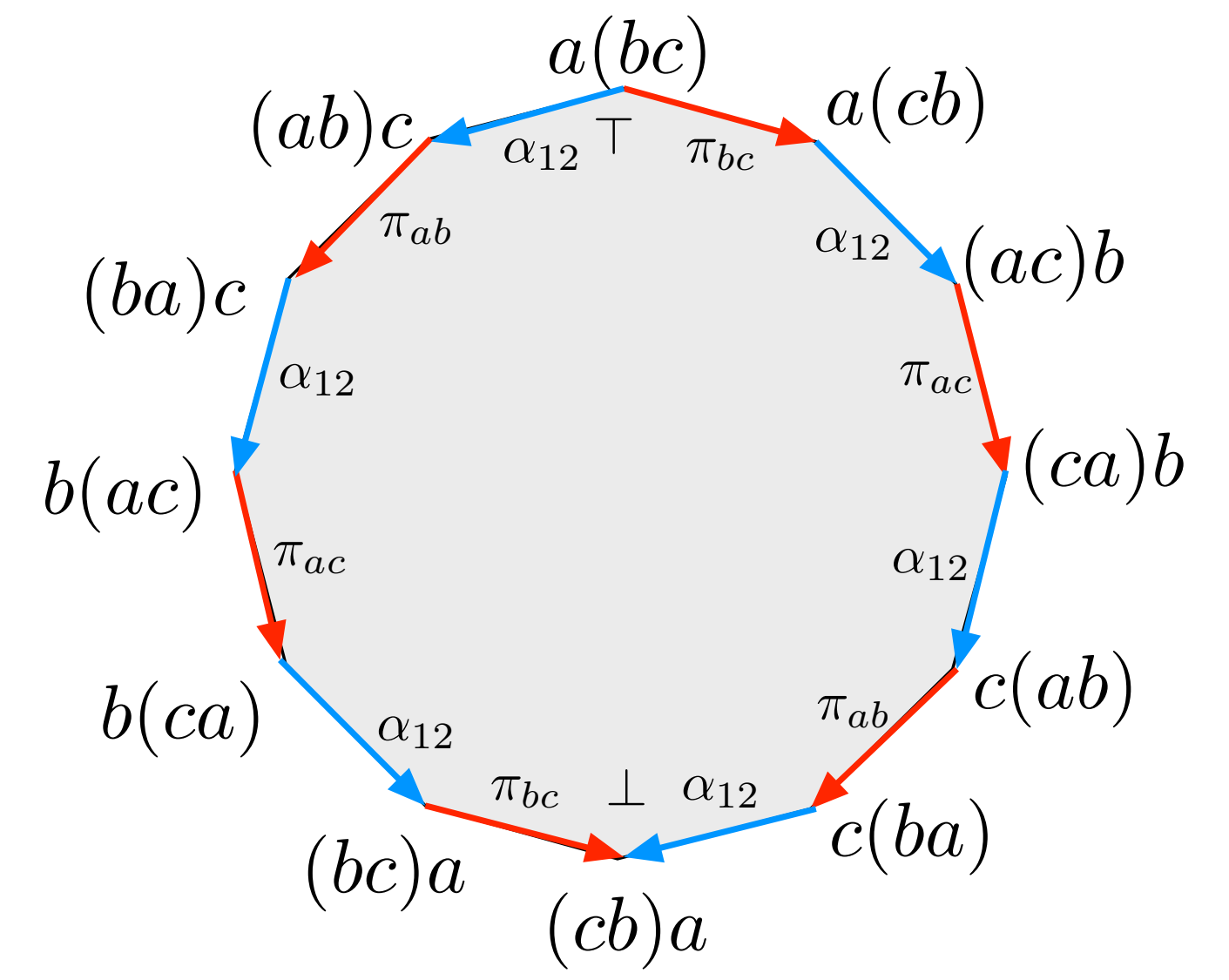
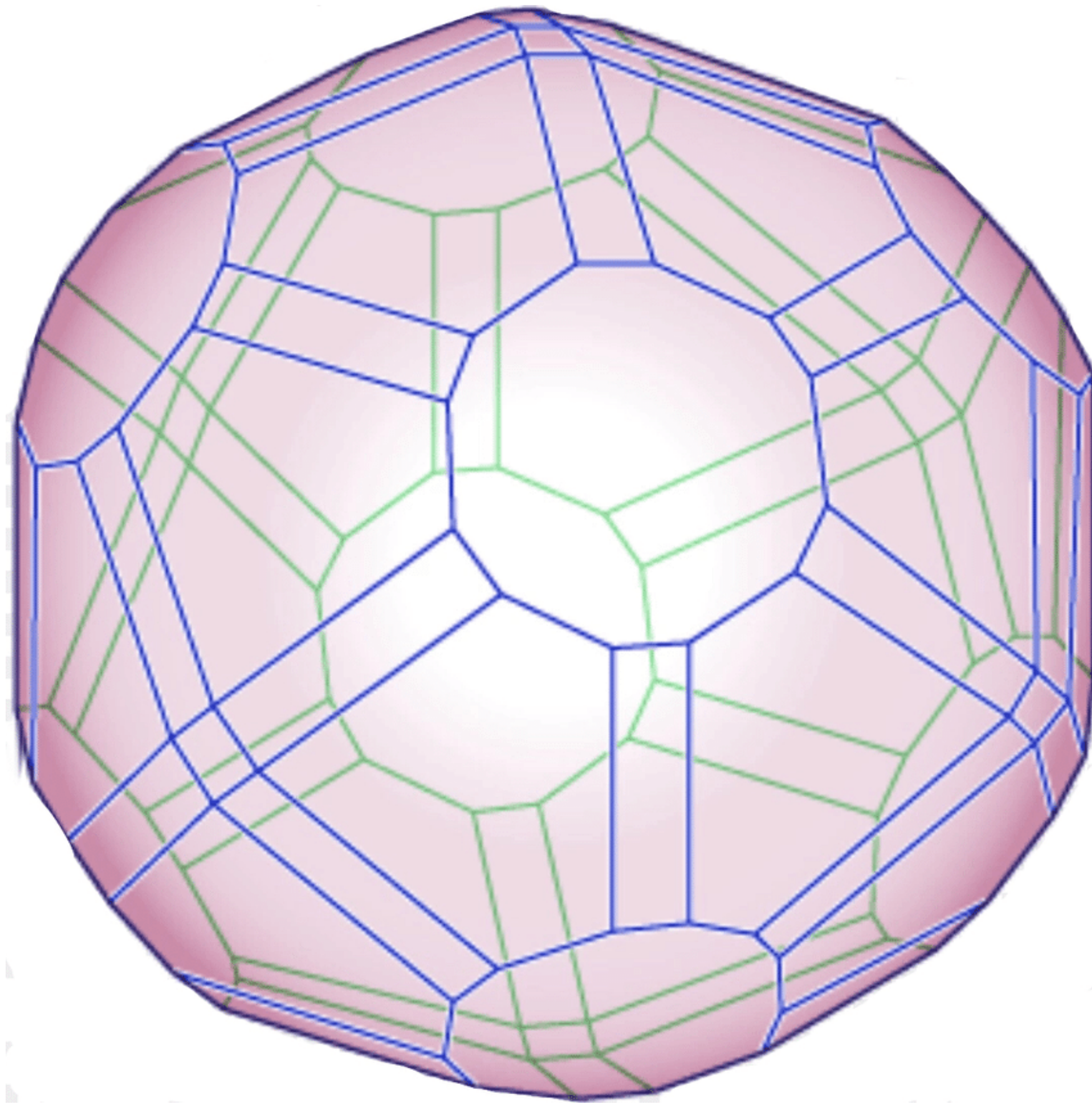


4132

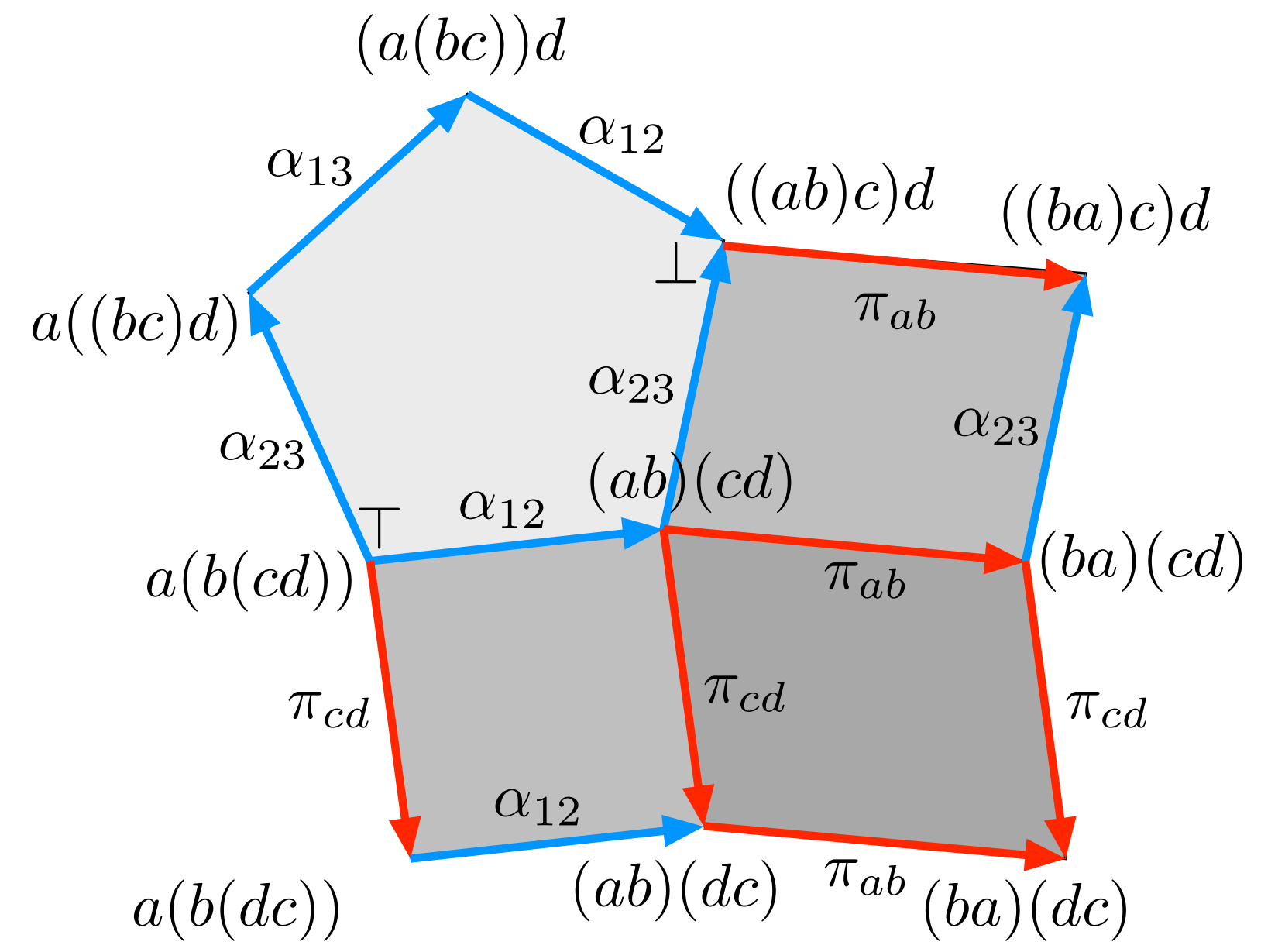
1234



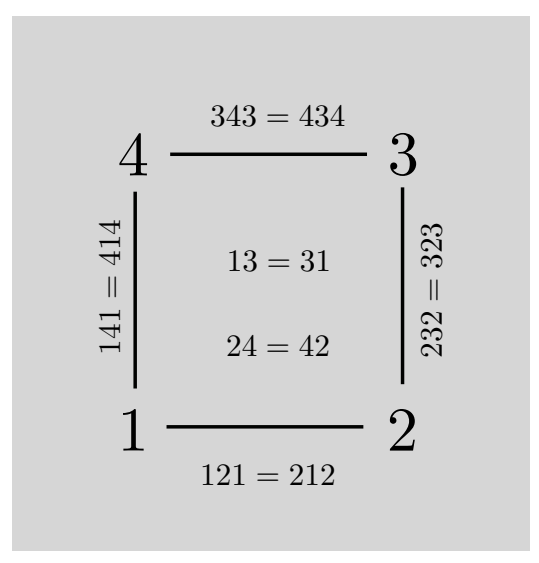
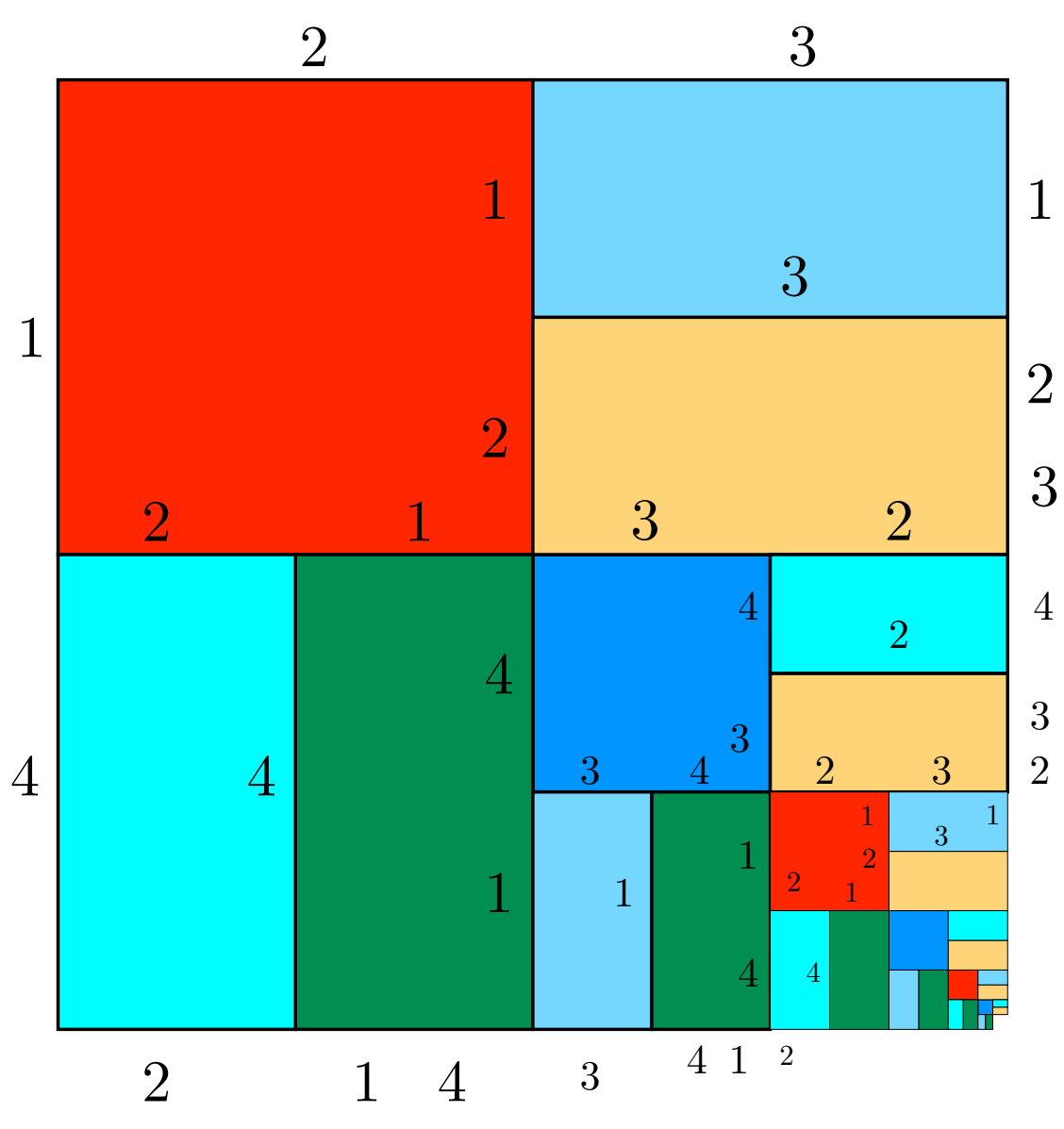
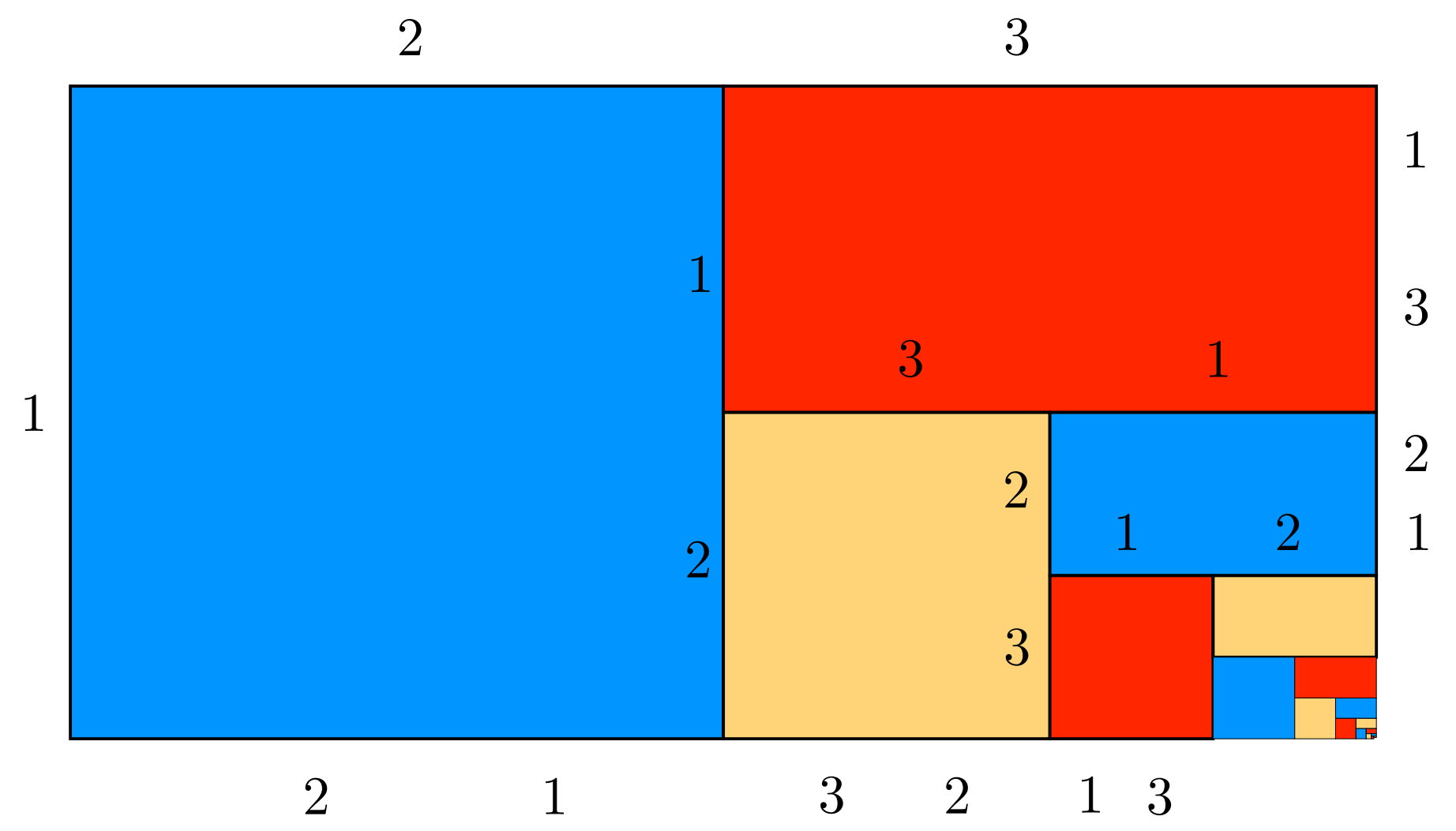
het permutoassociahedron



$$\pi_{bc}\alpha_{12}\pi_{ac}\alpha_{12}\pi_{ab}\alpha_{12} = \alpha_{12}\pi_{ab}\alpha_{12}\pi_{ac}\alpha_{12}\pi_{bc}$$



$$\alpha_{23}\alpha_{13}\alpha_{12} = \alpha_{12}\alpha_{23}$$



we wensen Hans en familie veel voorspoed en
geluk in de toekomst!

