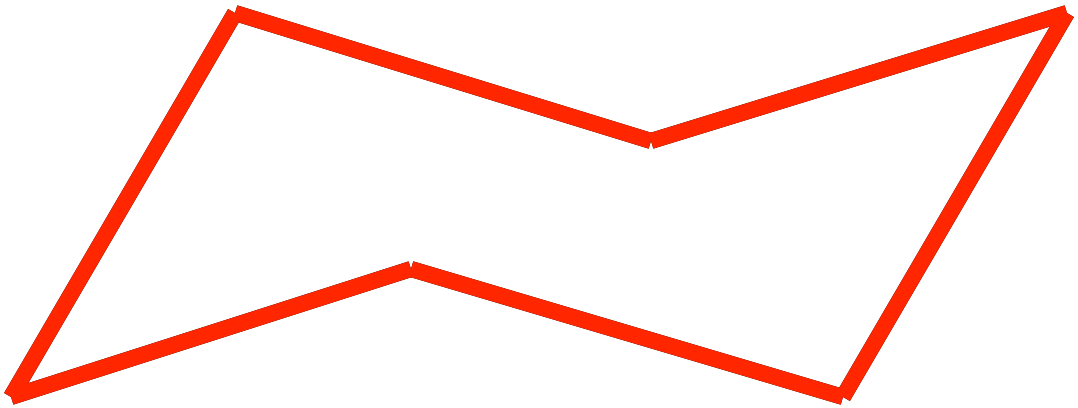
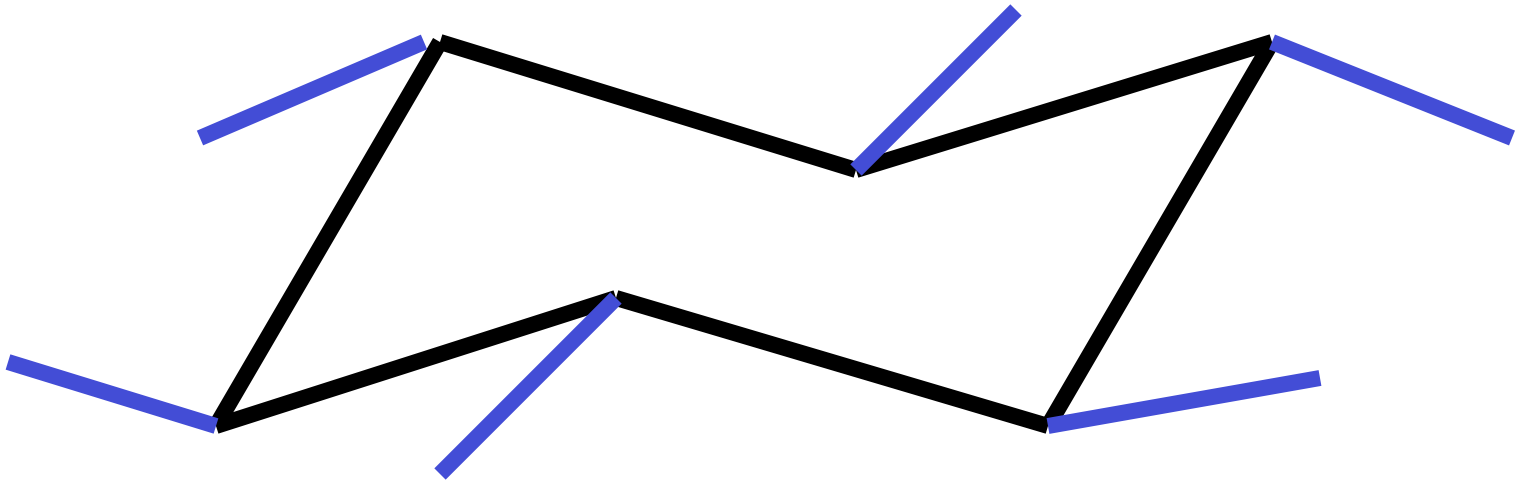
Drawing Cyclohexane and Decalins

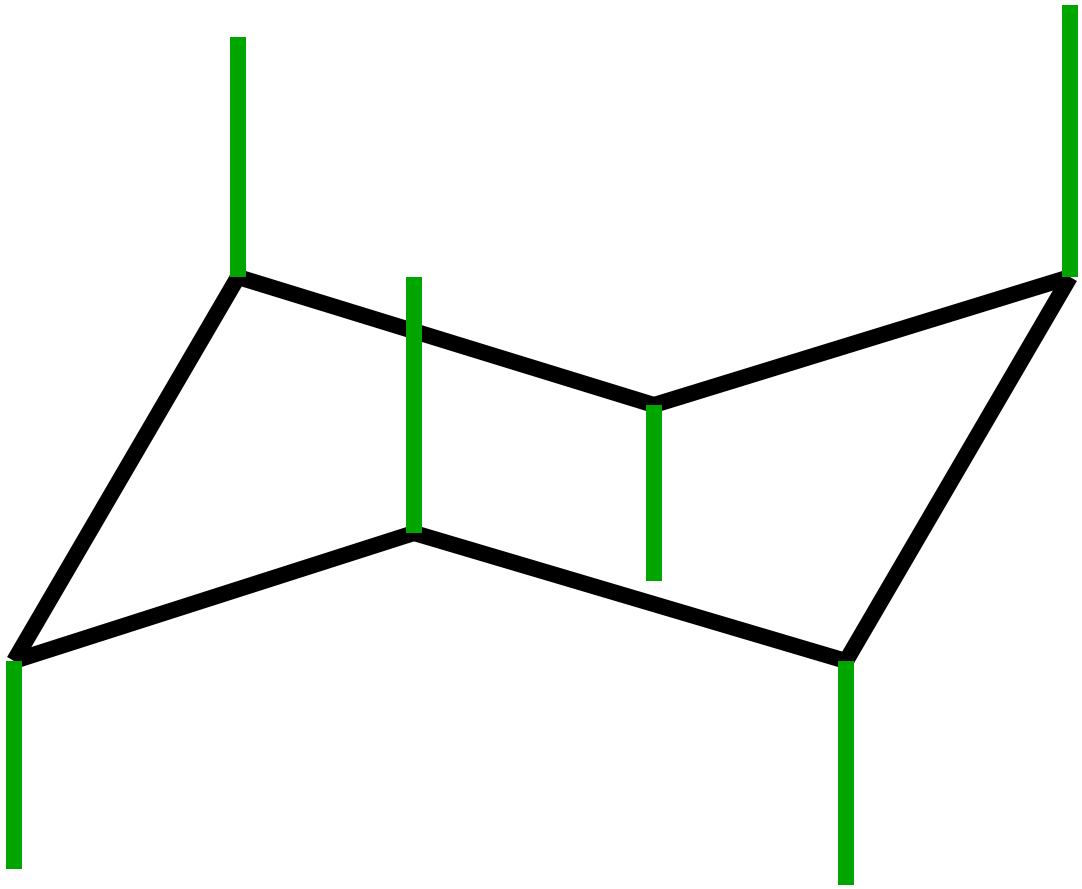
Drawing Cyclohexane



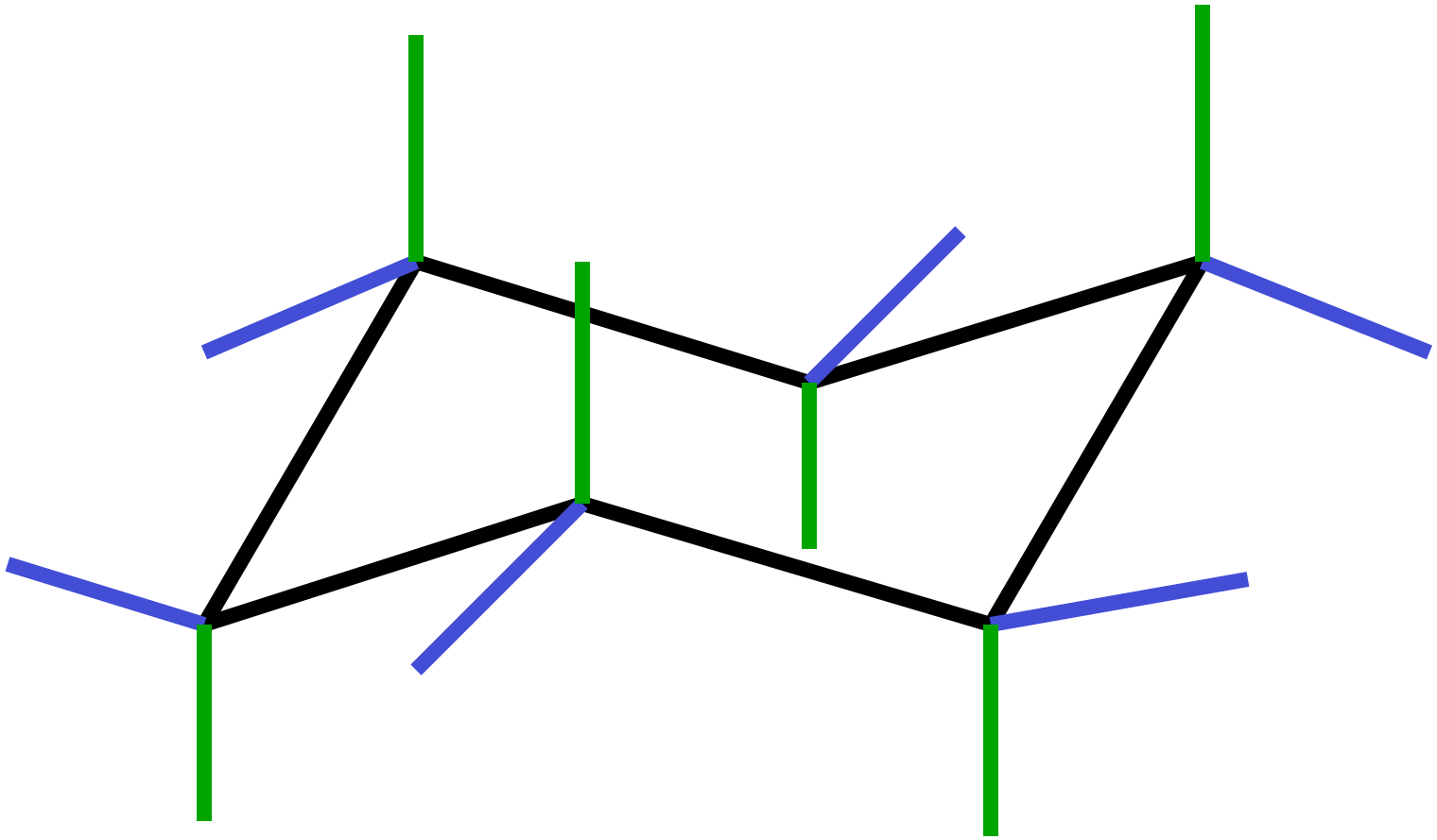
parallel bonds



equatorial bonds



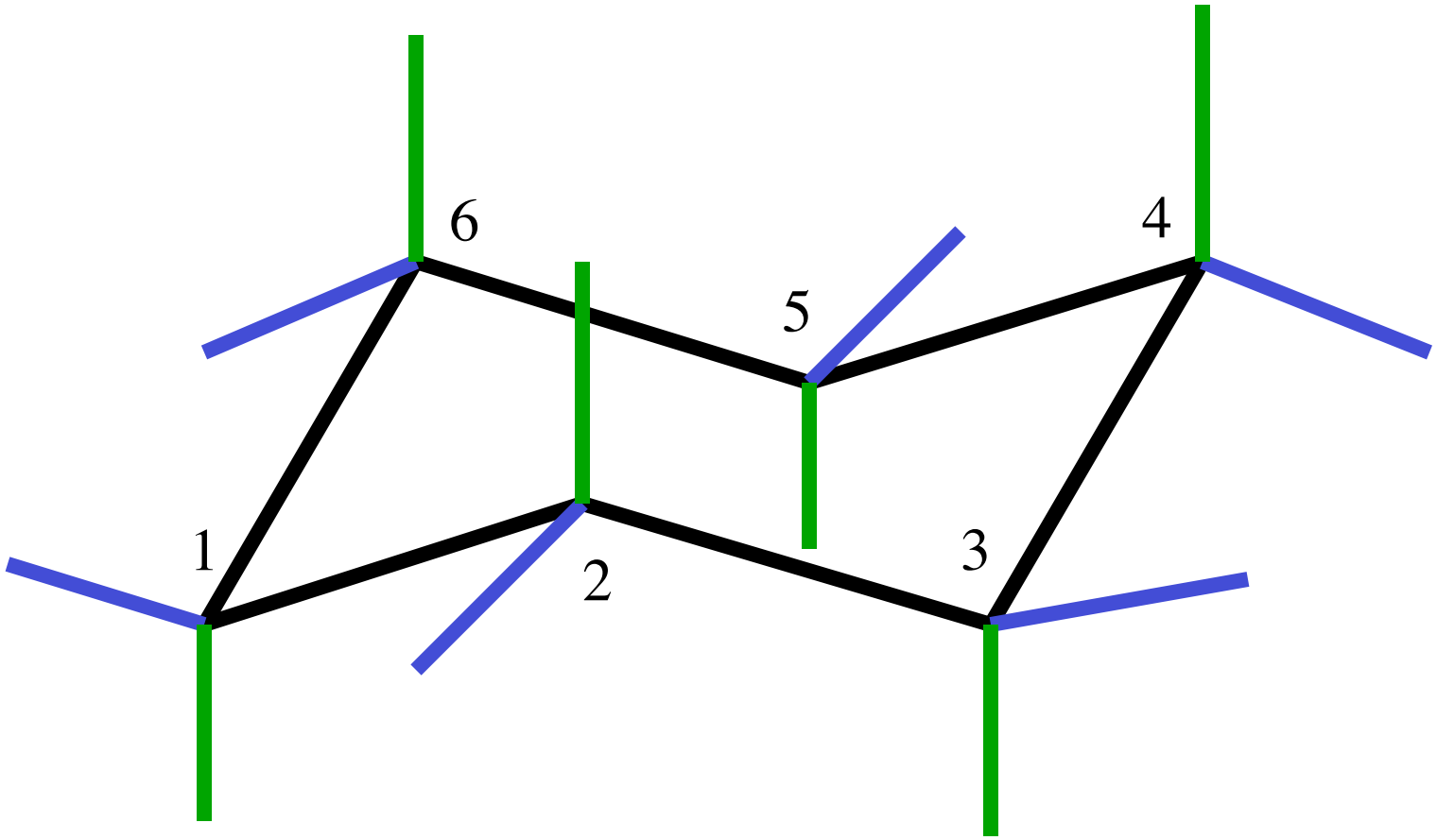
axial bonds



equatorial bonds

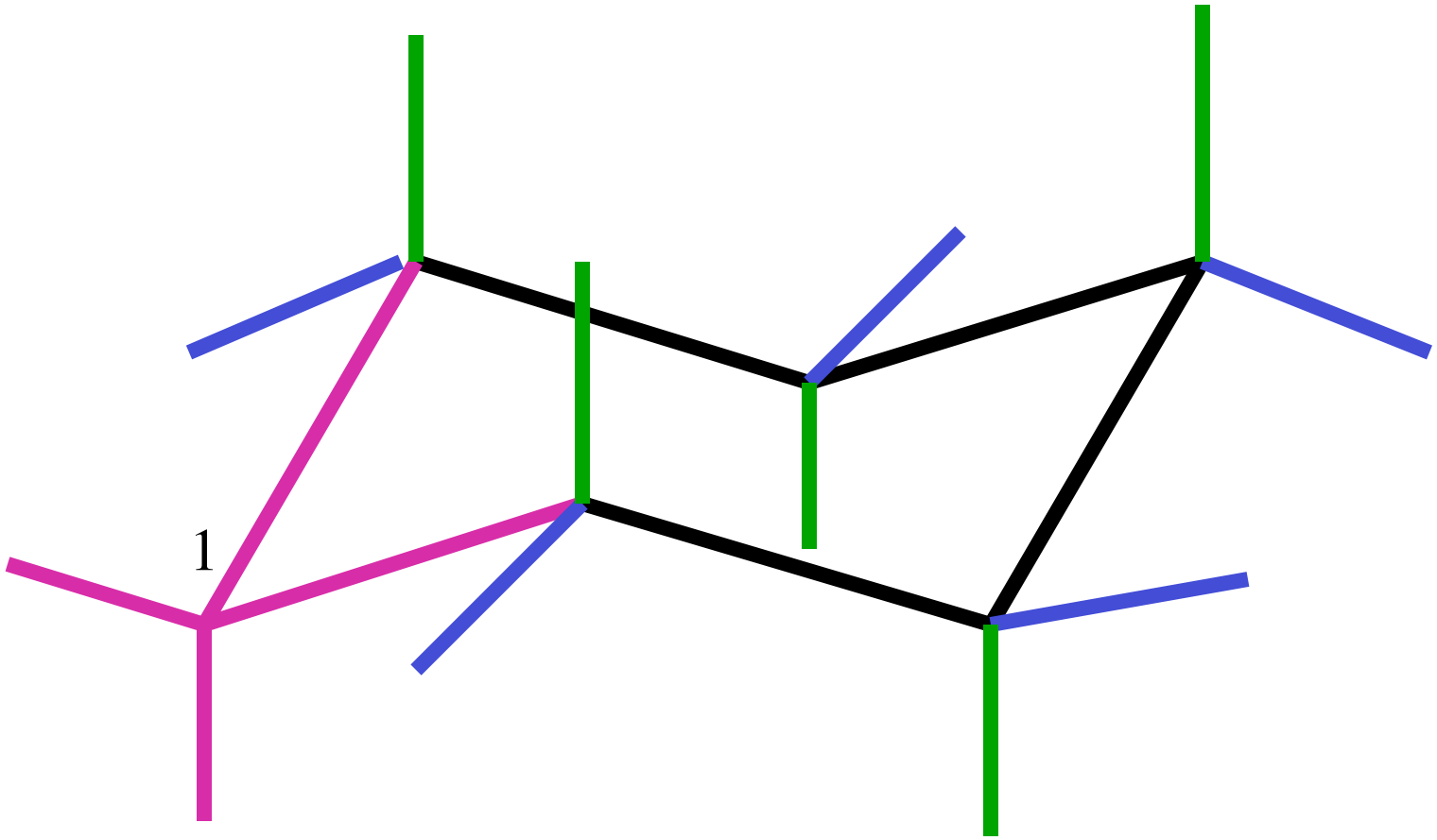
axial bonds

Numbering Cyclohexane

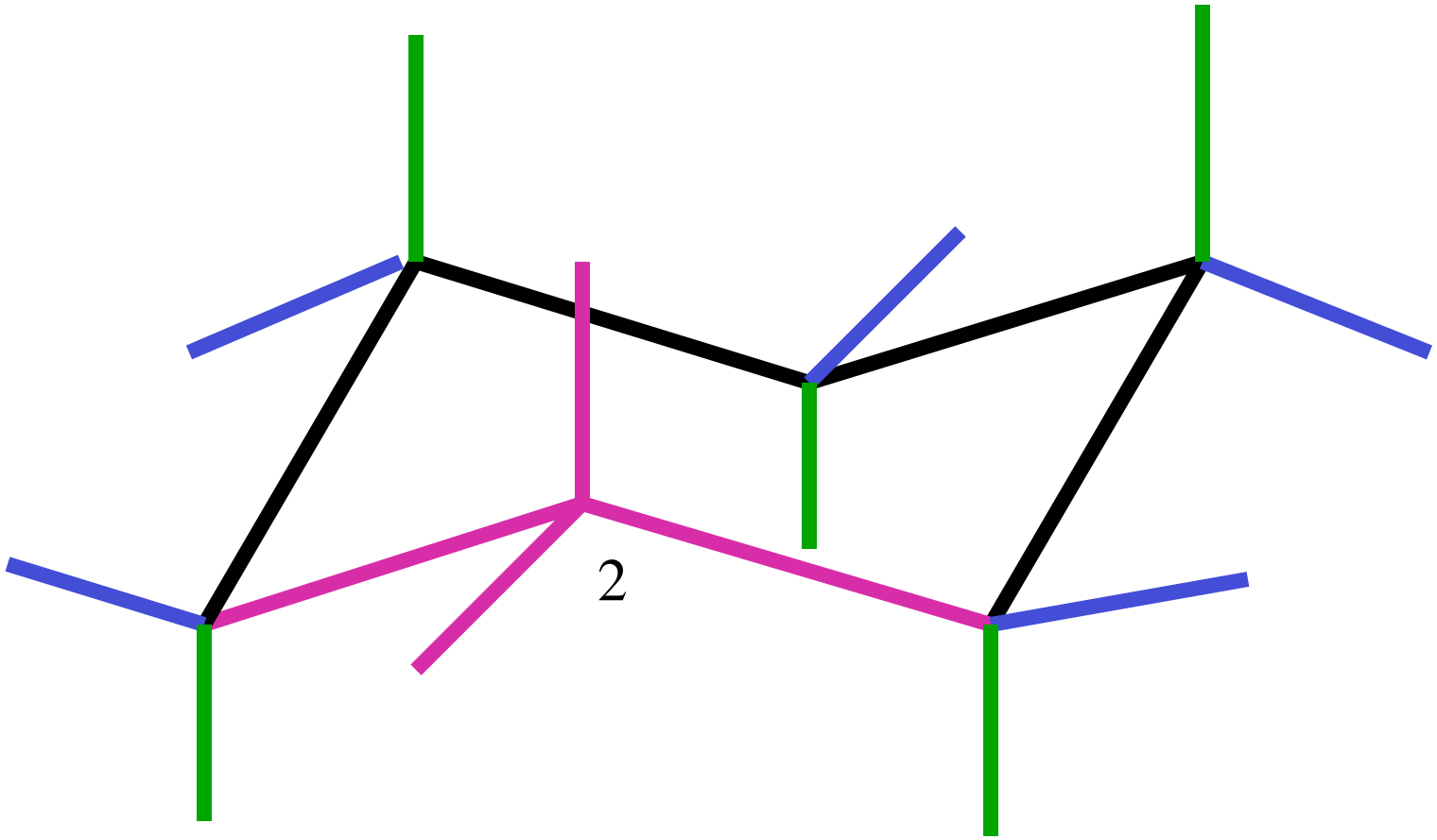


Start anywhere and number consecutive carbons.

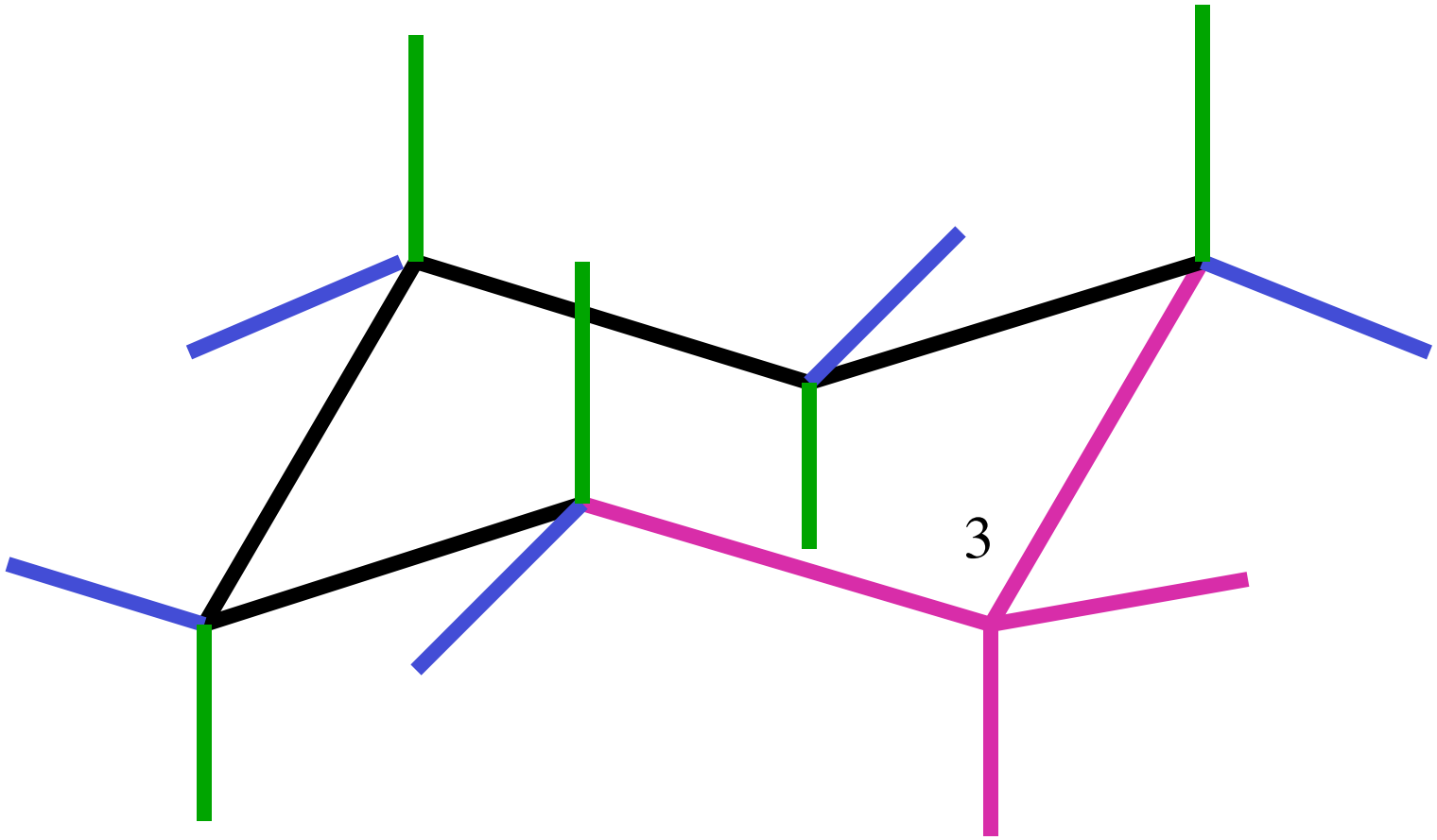
Tetrahedral Carbons in Cyclohexane



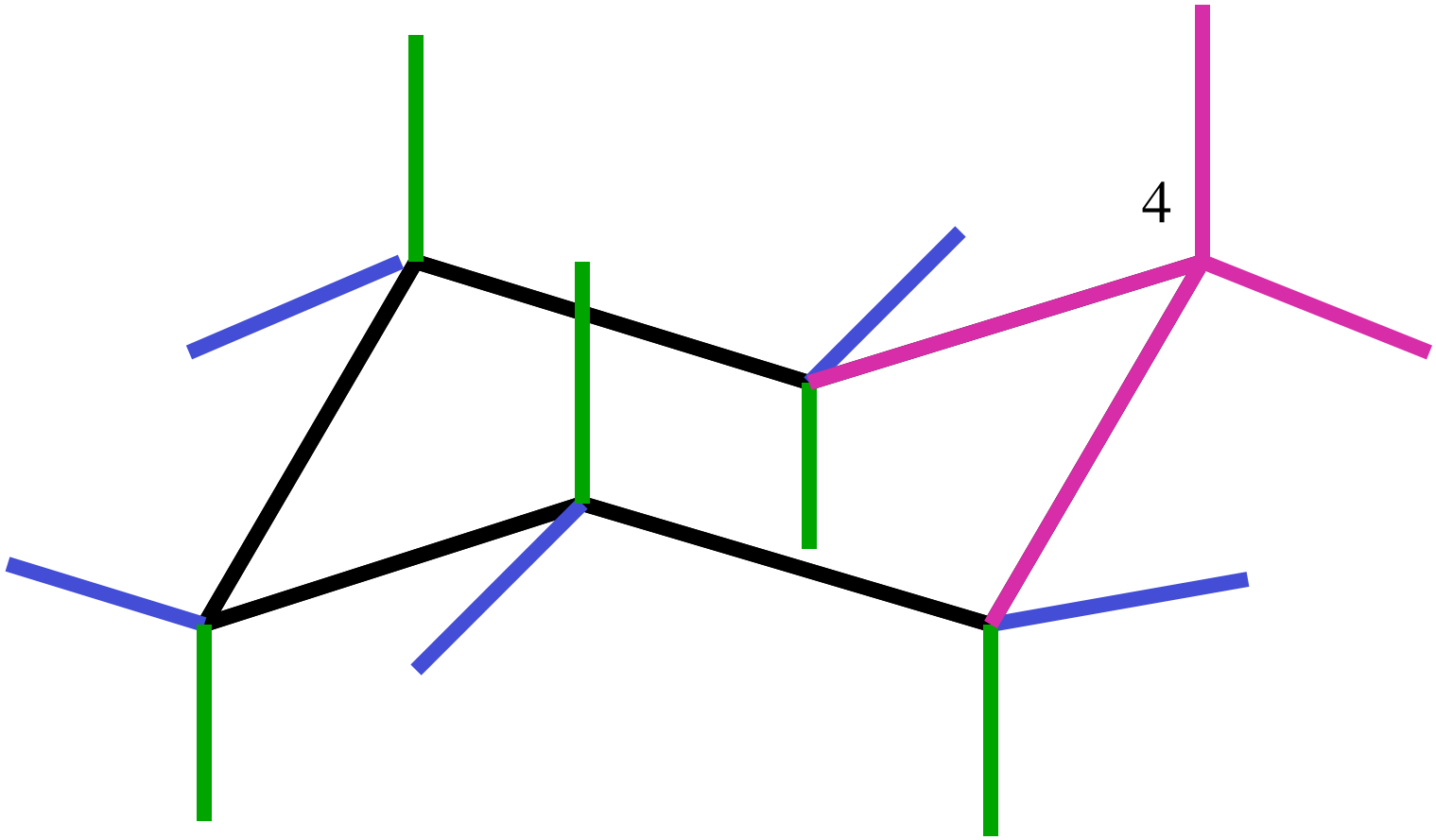
tetrahedral carbon



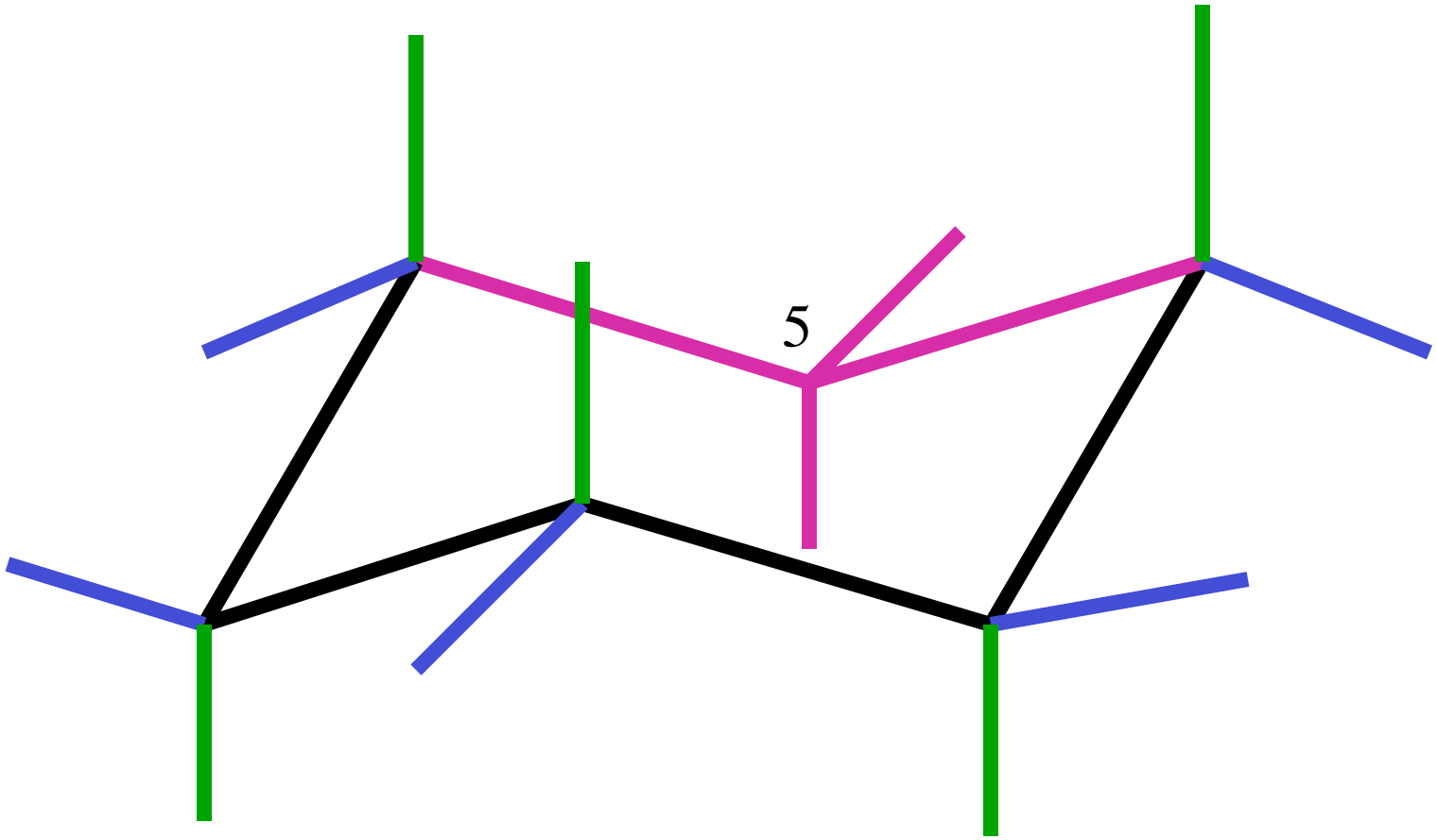
tetrahedral carbon



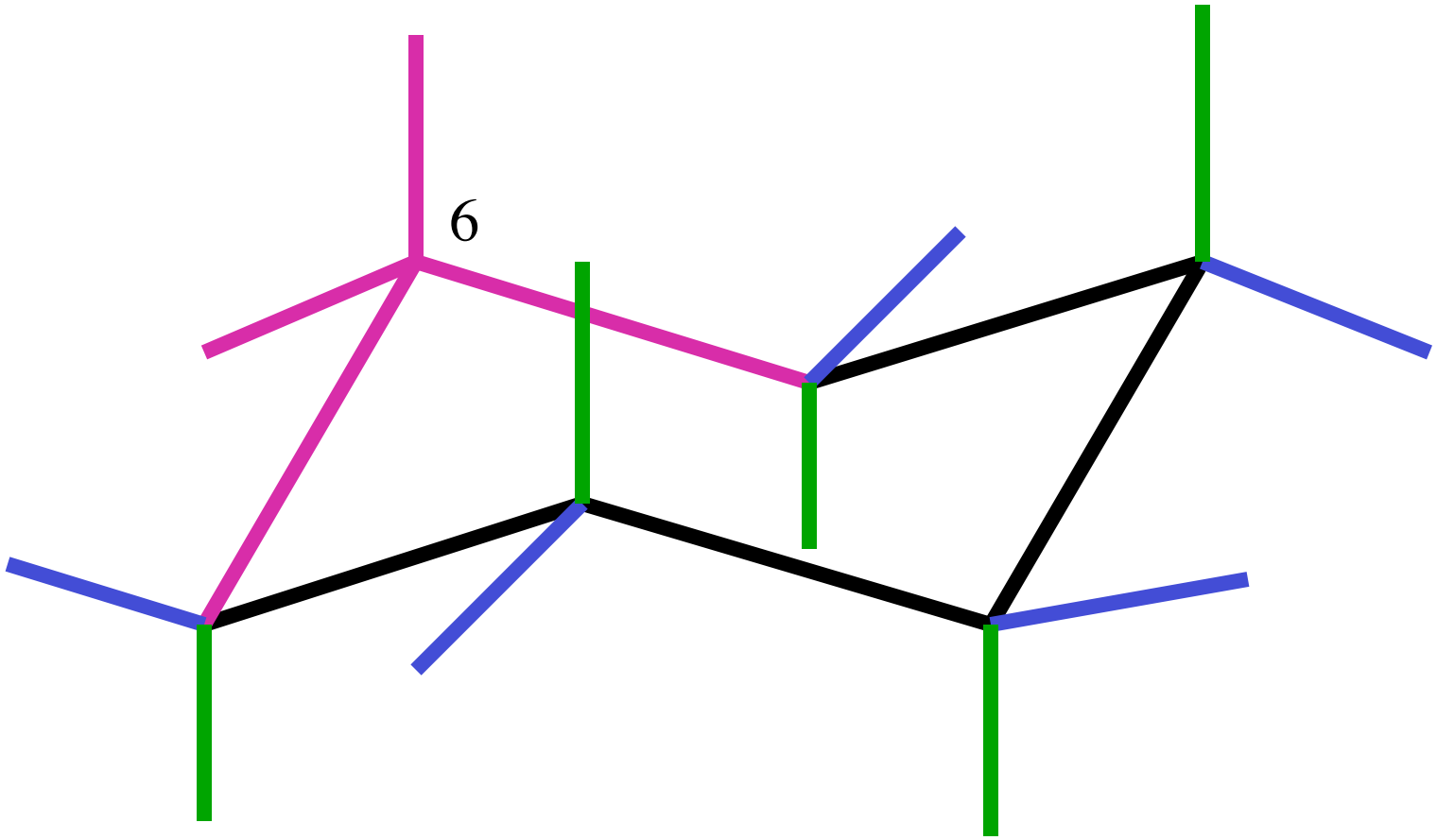
tetrahedral carbon



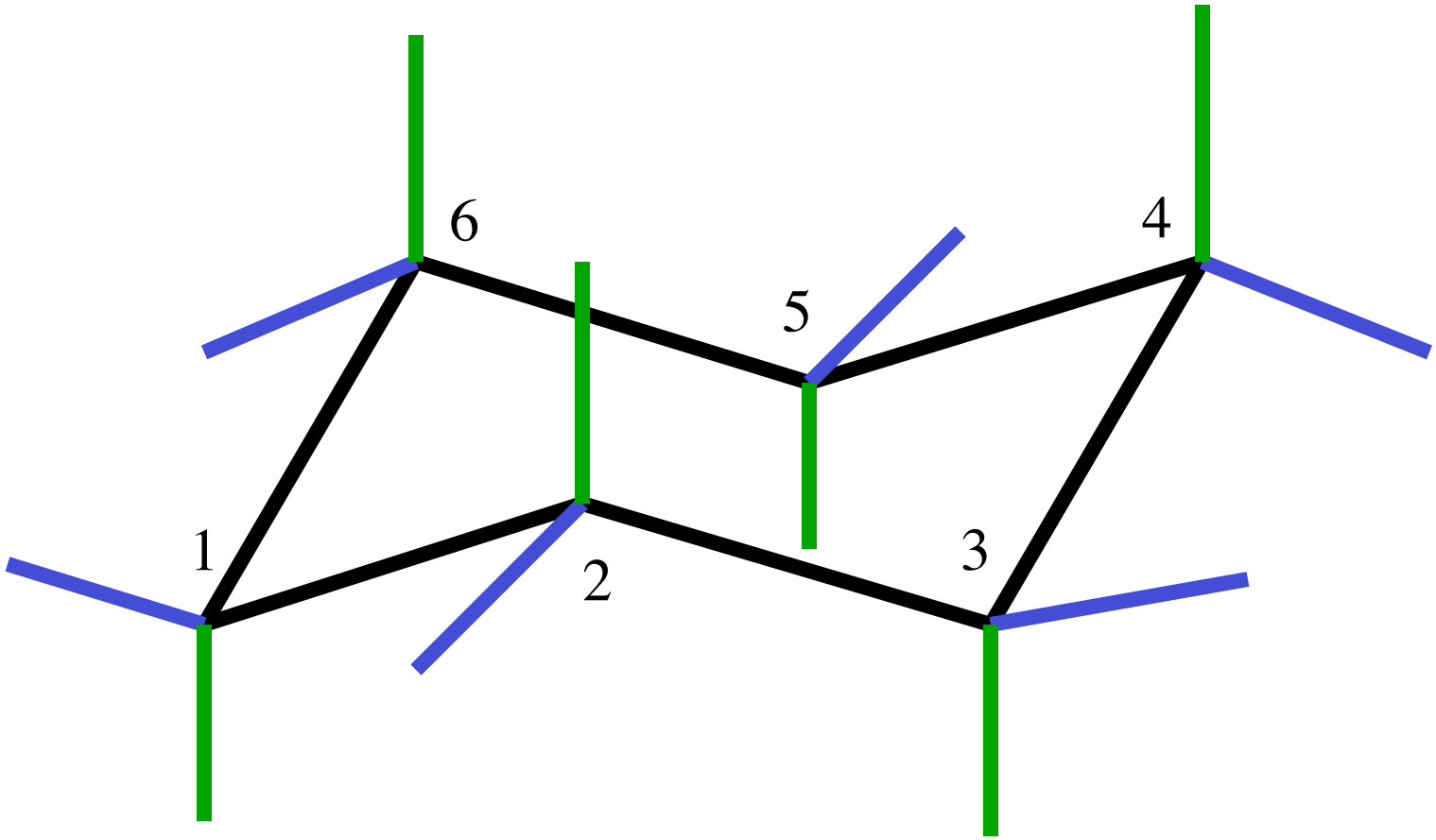
tetrahedral carbon



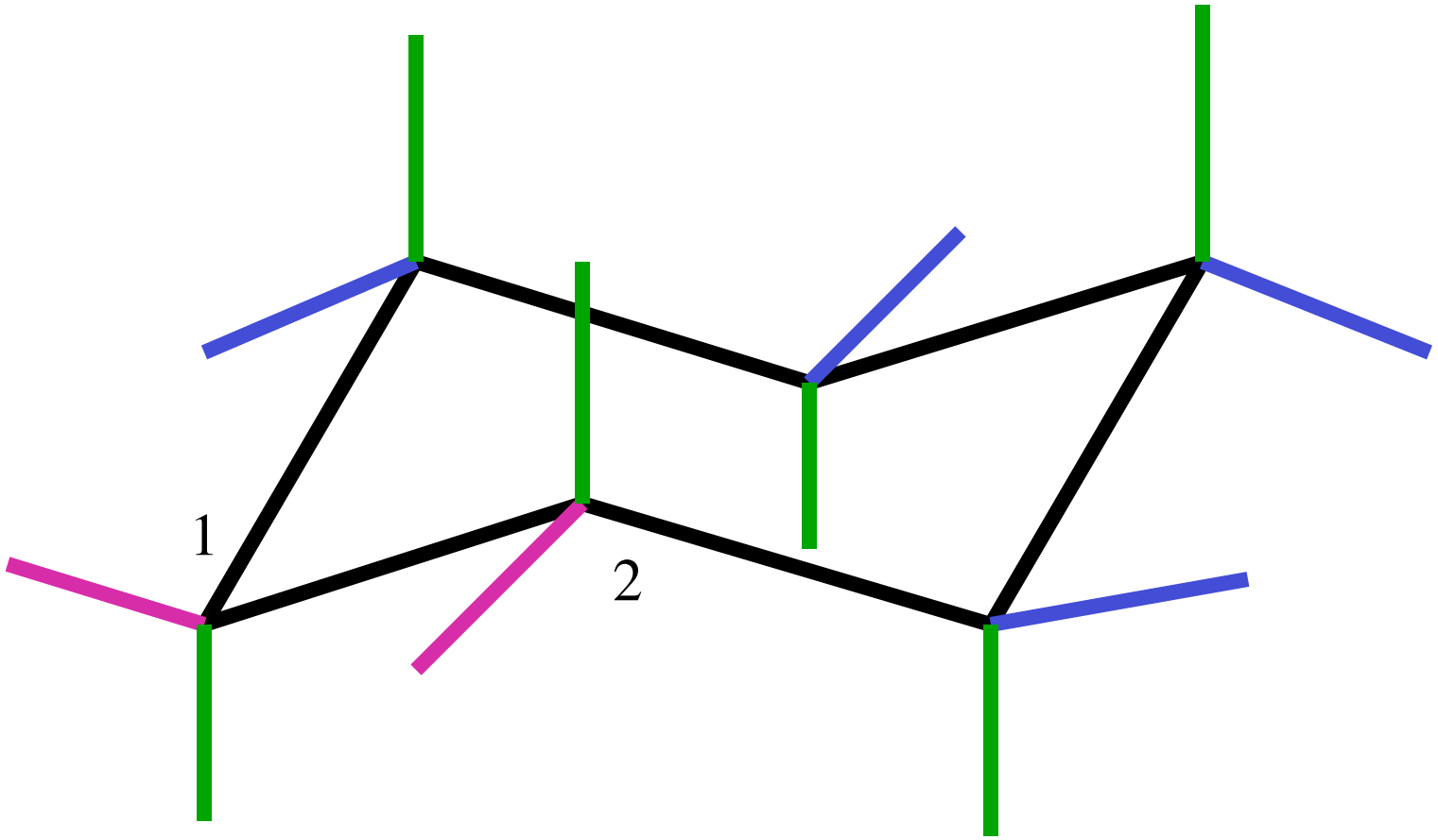
tetrahedral carbon



tetrahedral carbon

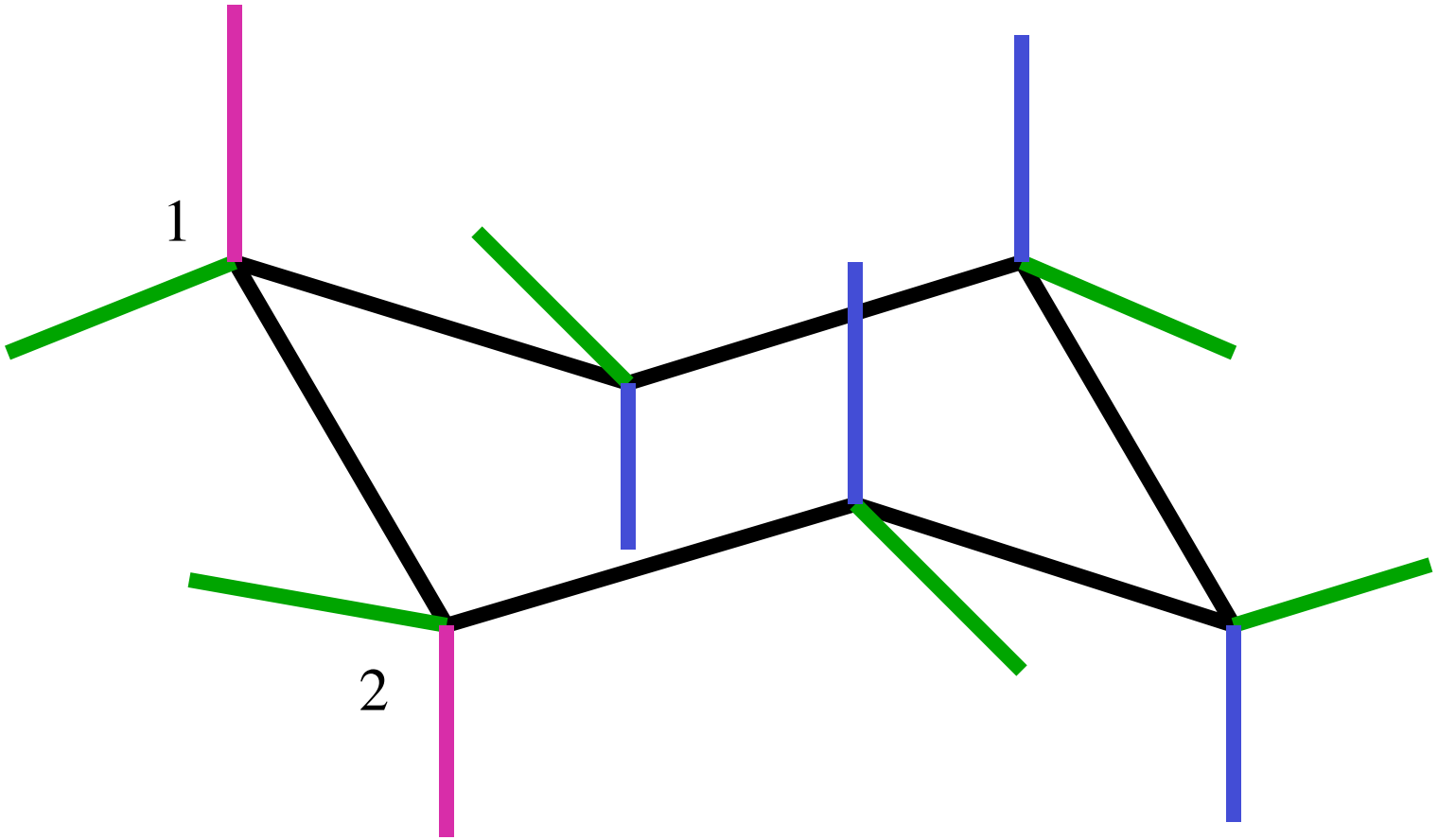

6
4
5
1
2
3

Disubstituted Isomers of Cyclohexane



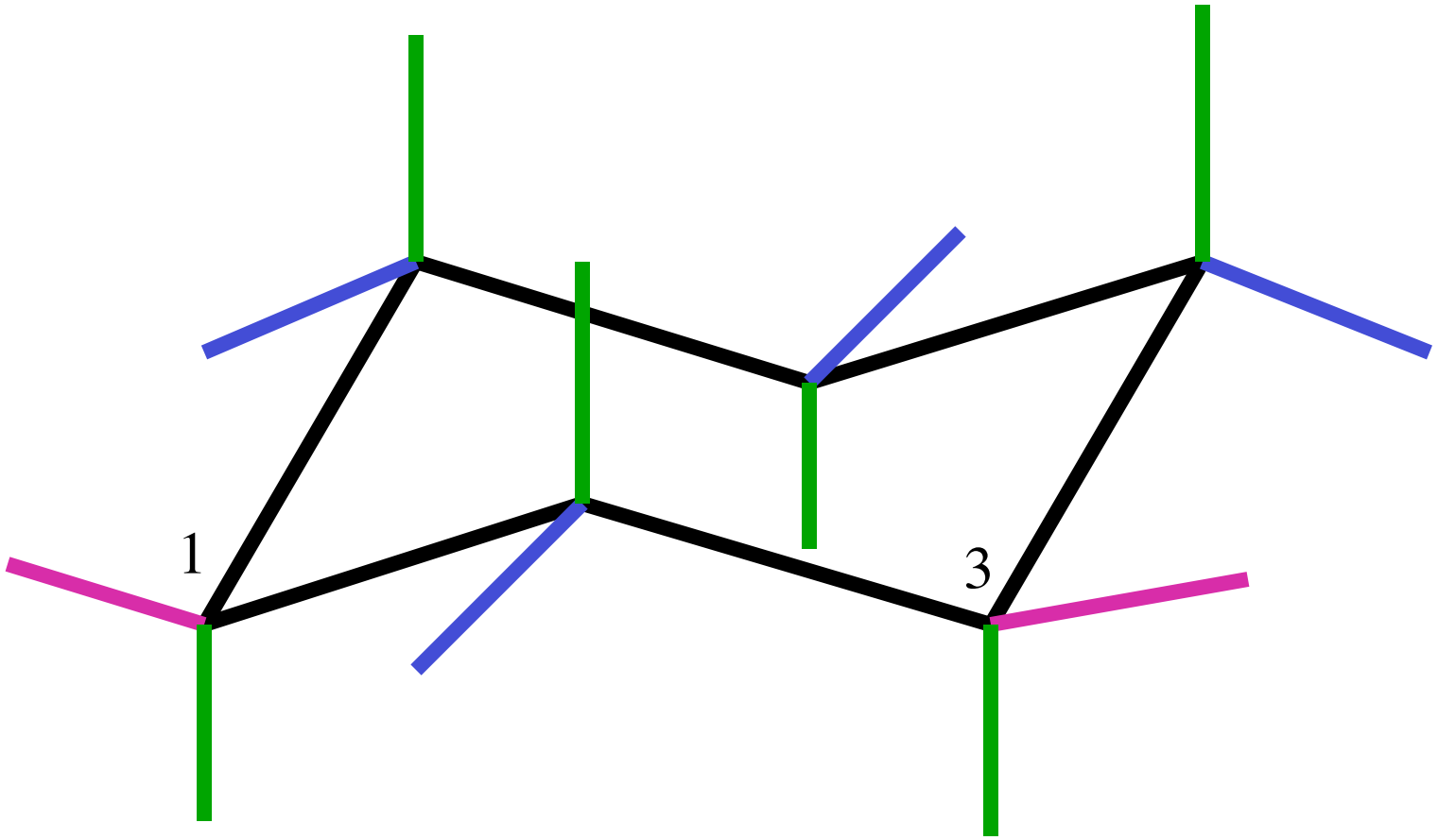
trans-1,2-diequatorial

and...



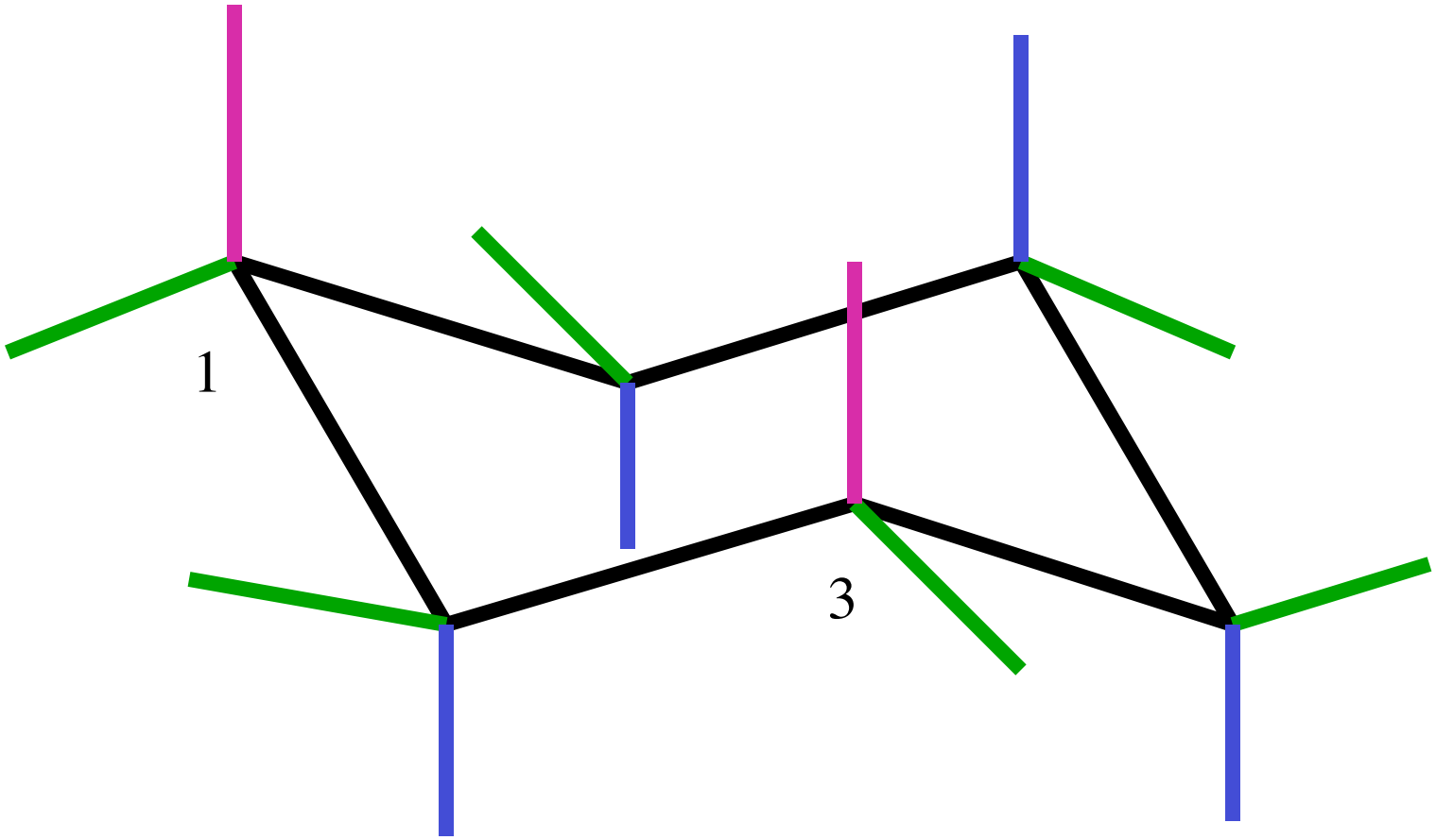
trans-1,2-diaxial

are conformational
isomers of one another, and...



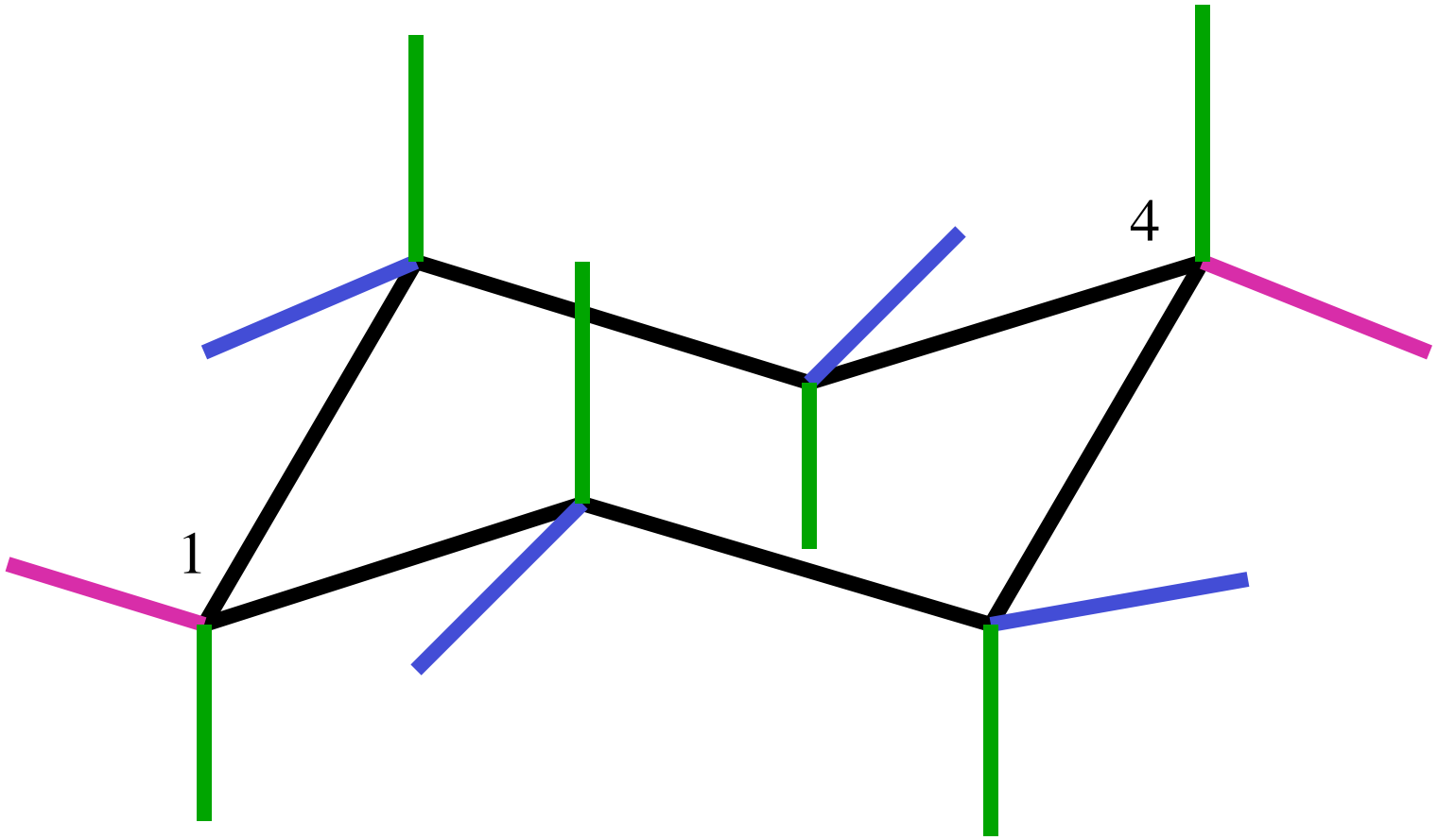
cis-1,3-diequatorial

and...



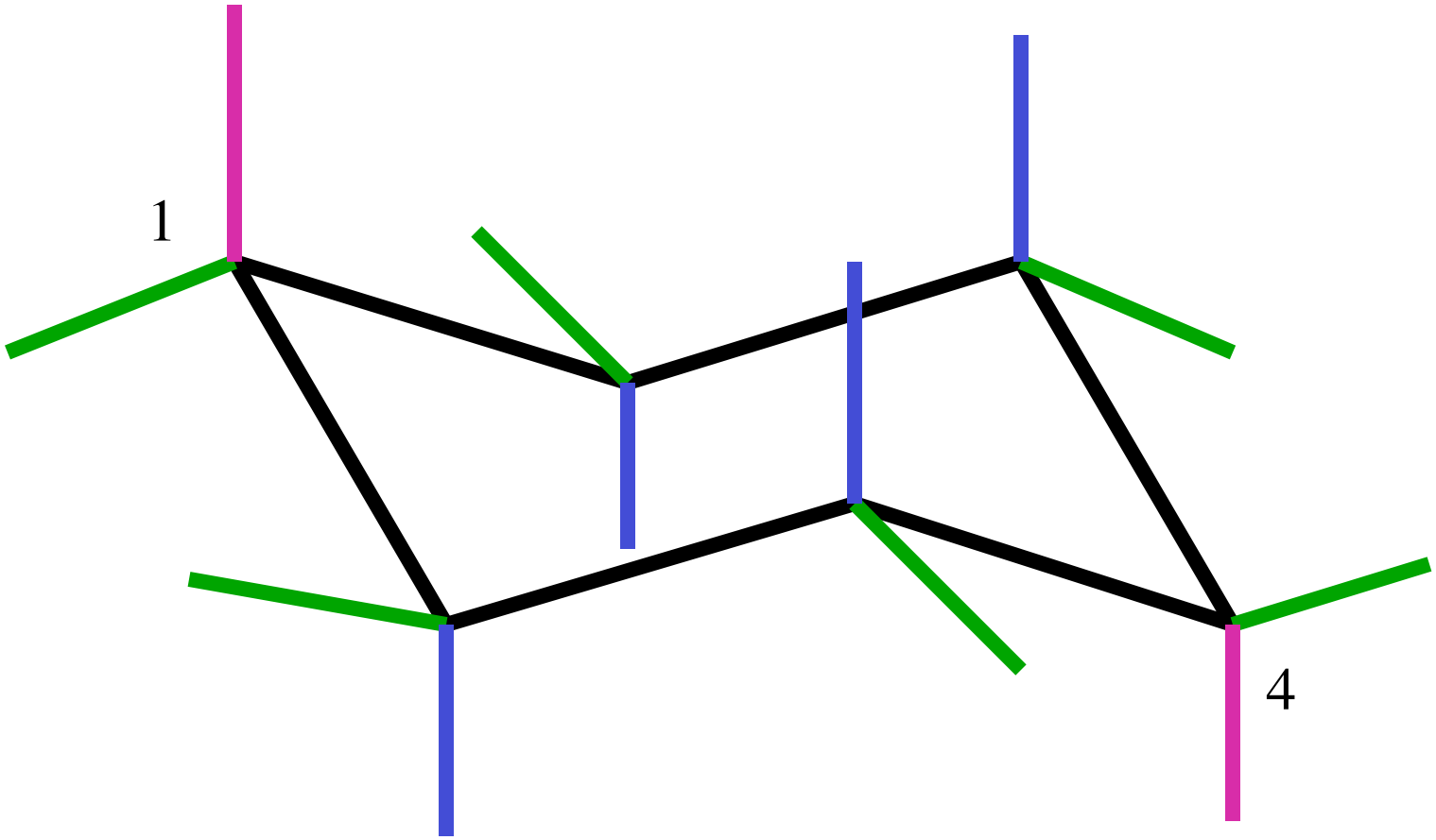
cis-1,3-diaxial

are conformational
isomers of one another, and...



trans-1,4-diequatorial

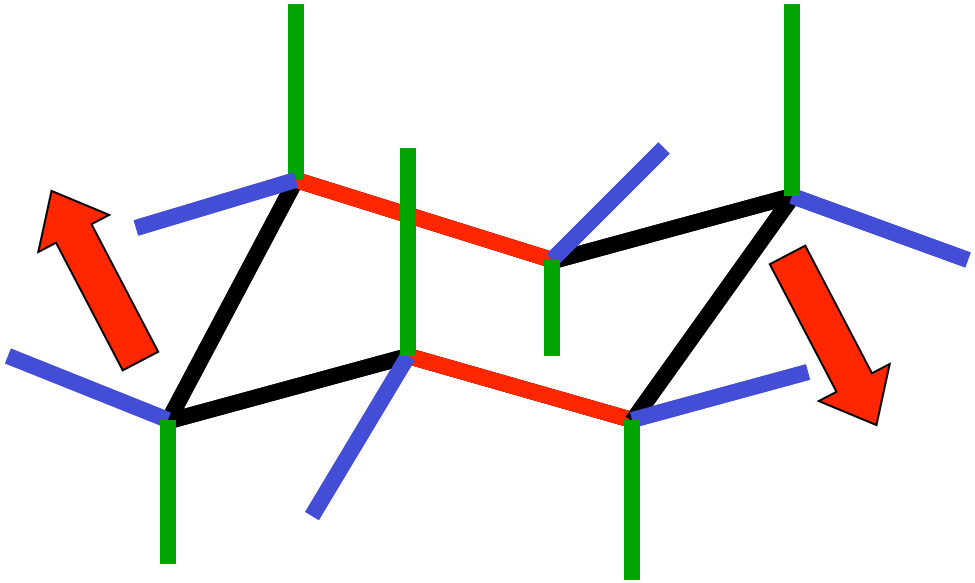
and...



trans-1,4-diaxial

are conformational
isomers of one another.

Chair Conformations of Cyclohexane



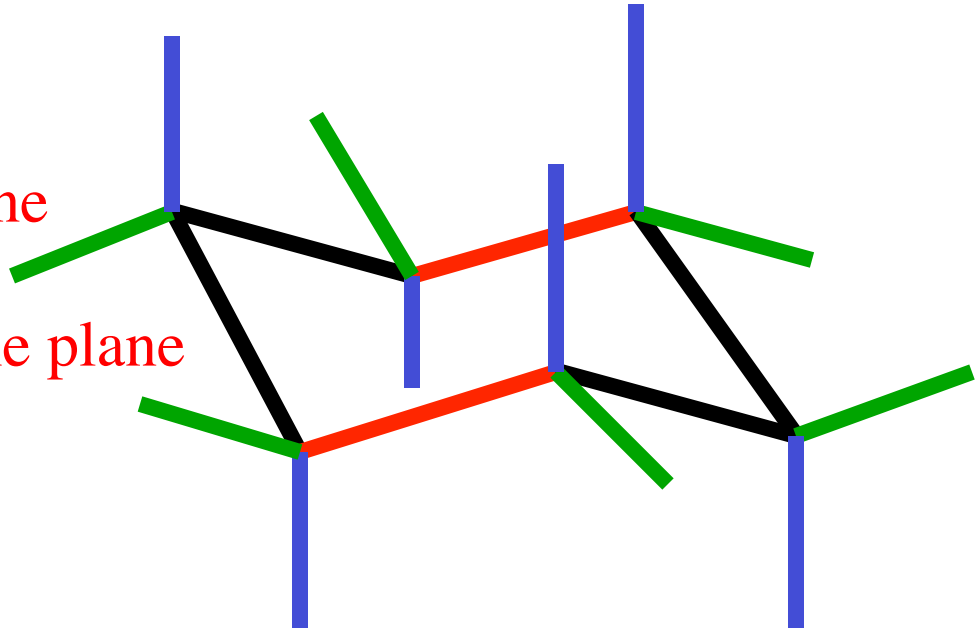
you get

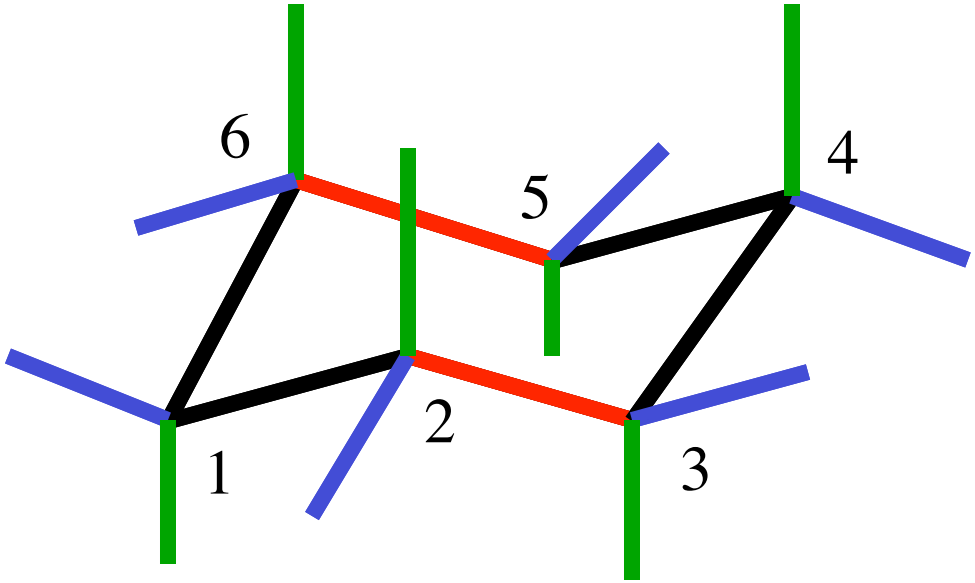
hold red bonds in a plane

flip this carbon above the plane

flip the other carbon below the plane

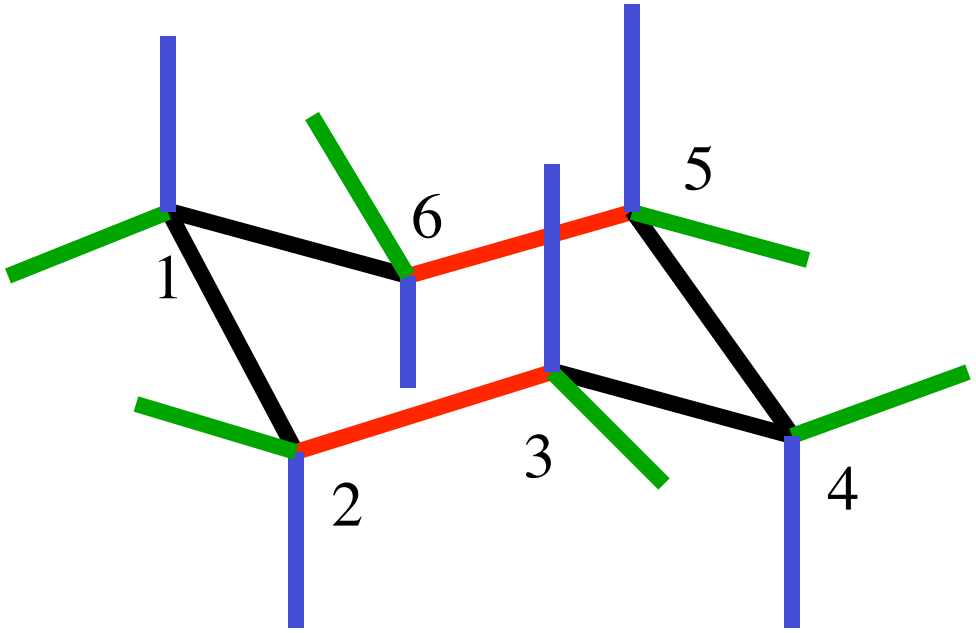
the other chair conformation

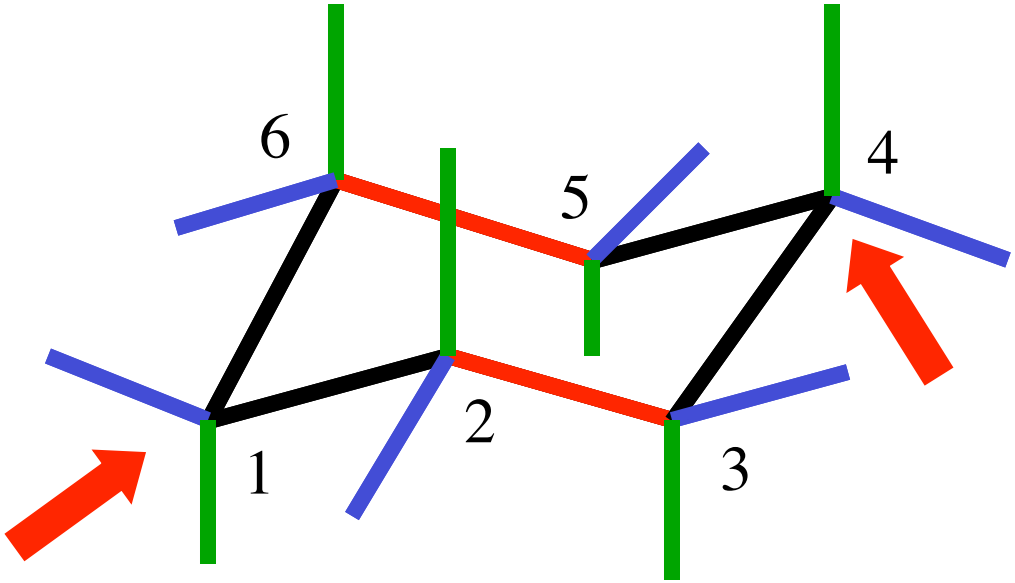




number carbons in this conformation

number the same carbons in this conformation



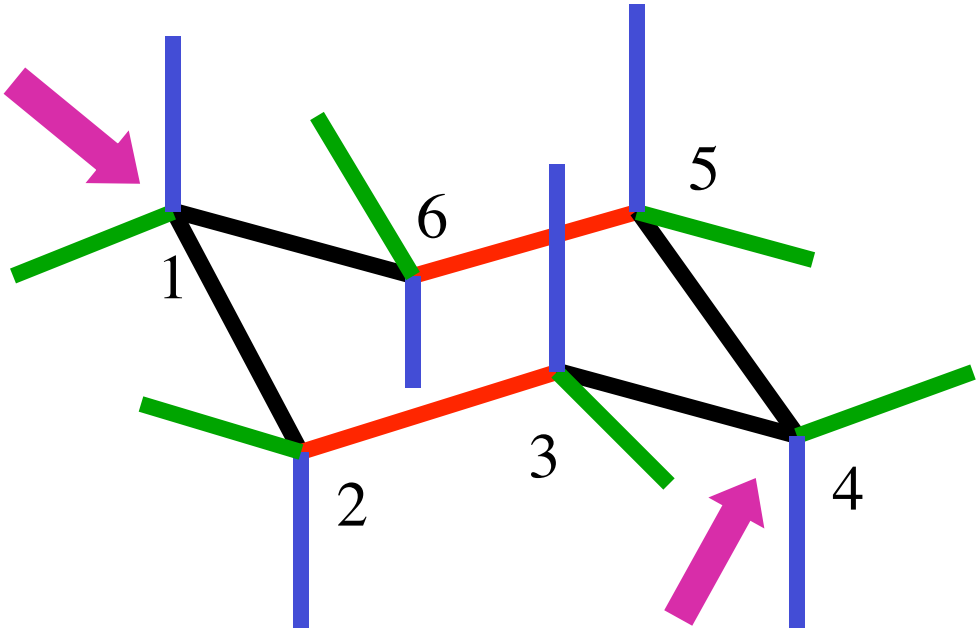


C_4 is above the plane, while...

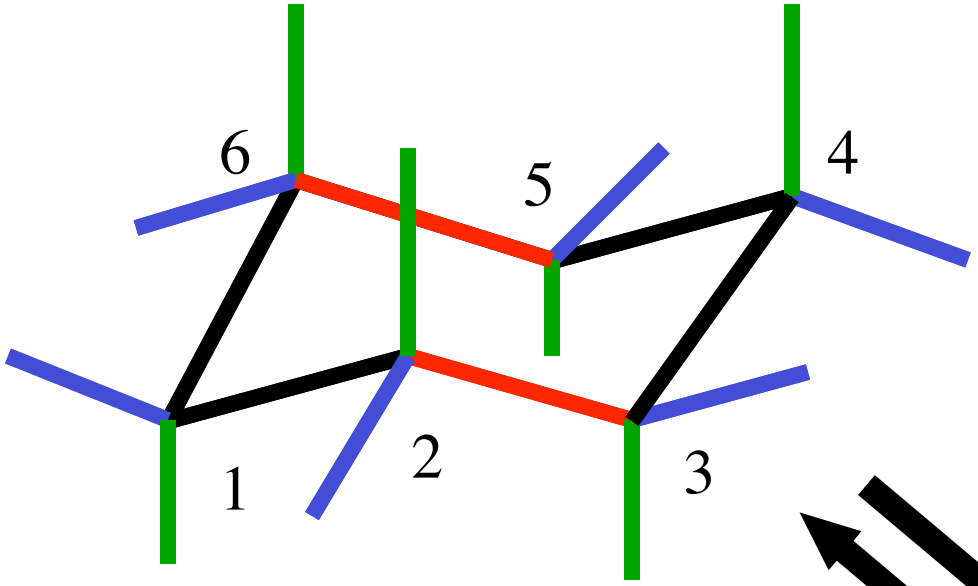
C_4 is below the plane.

given the plane formed by carbons 2, 3, 5, and 6

C_1 is below the plane and...



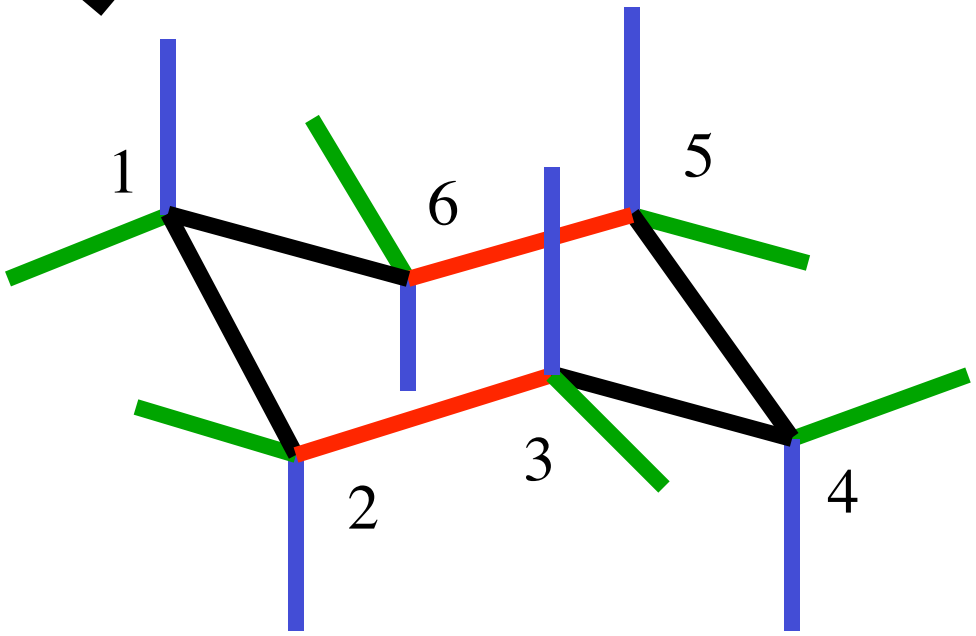
C_1 is above the plane and...

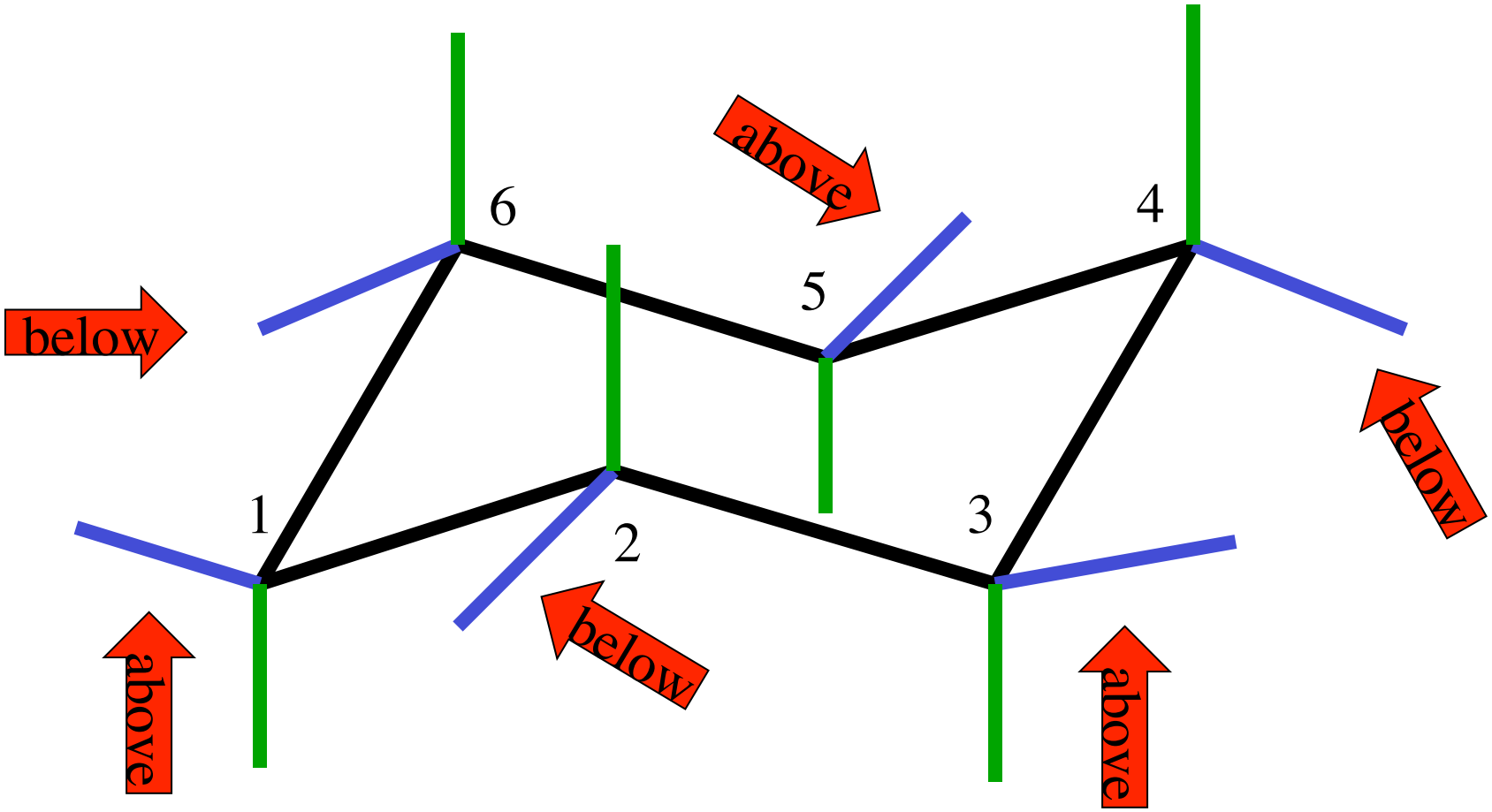


axial bonds here, and equatorial bonds here.

equatorial bonds here become ....

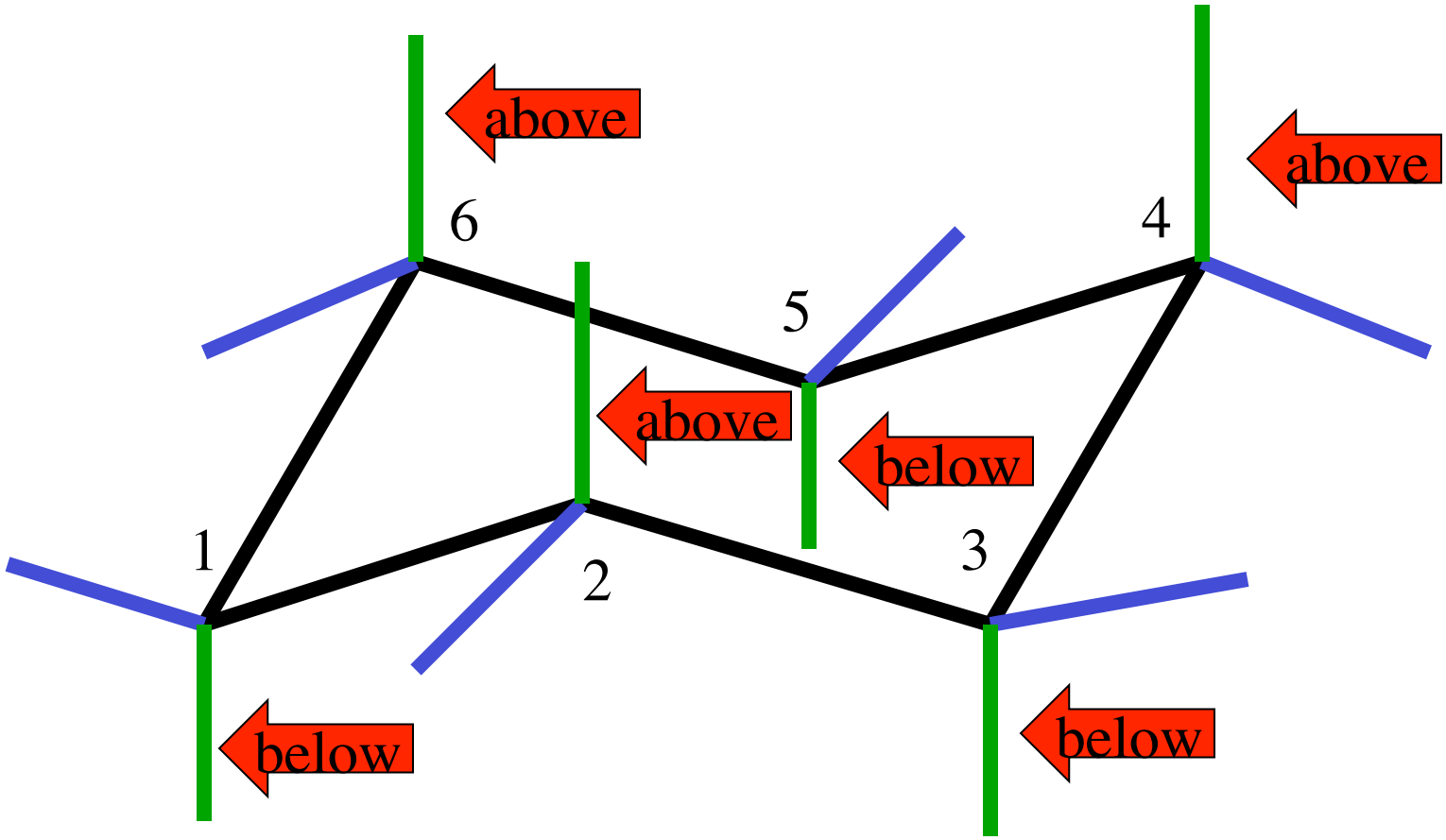
axial bonds here





Equatorial bonds alternate being above and below the axial bonds on a given carbon atom

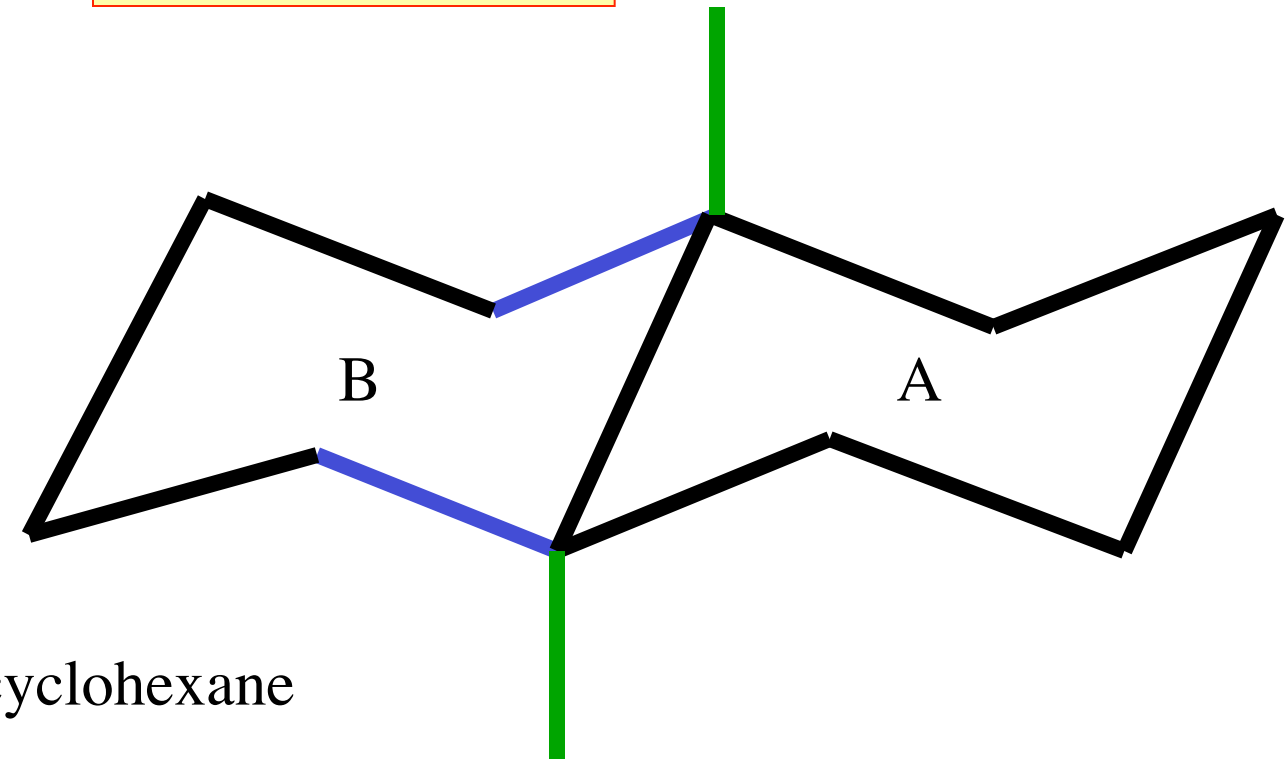
and...



axial bonds alternate being above and
below the equatorial bonds on a given carbon atom.

Drawing Decalins

trans - Decalins



Start with a chair cyclohexane

Add two vicinal equatorial bonds

Complete a second chair cyclohexane

Axial fusion bonds are diaxial to rings A and B.

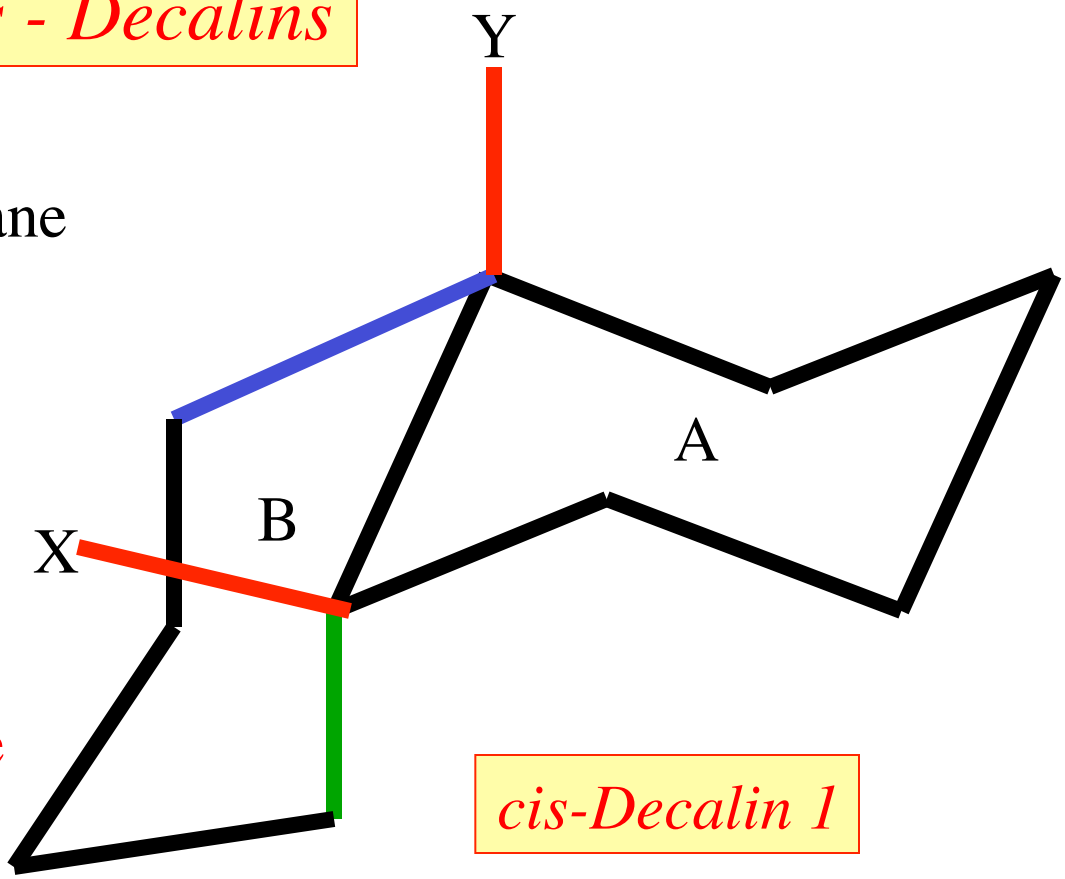
cis - Decalins

Start with a chair cyclohexane

Add two vicinal bonds:
One equatorial; one axial

Complete a 2nd chair cyclohexane

Ring fusion substituents are cis to rings A and B.



cis-Decalin 1

Substituent X is equatorial to ring A and axial to ring B while substituent Y is equatorial to ring B and axial to ring A.

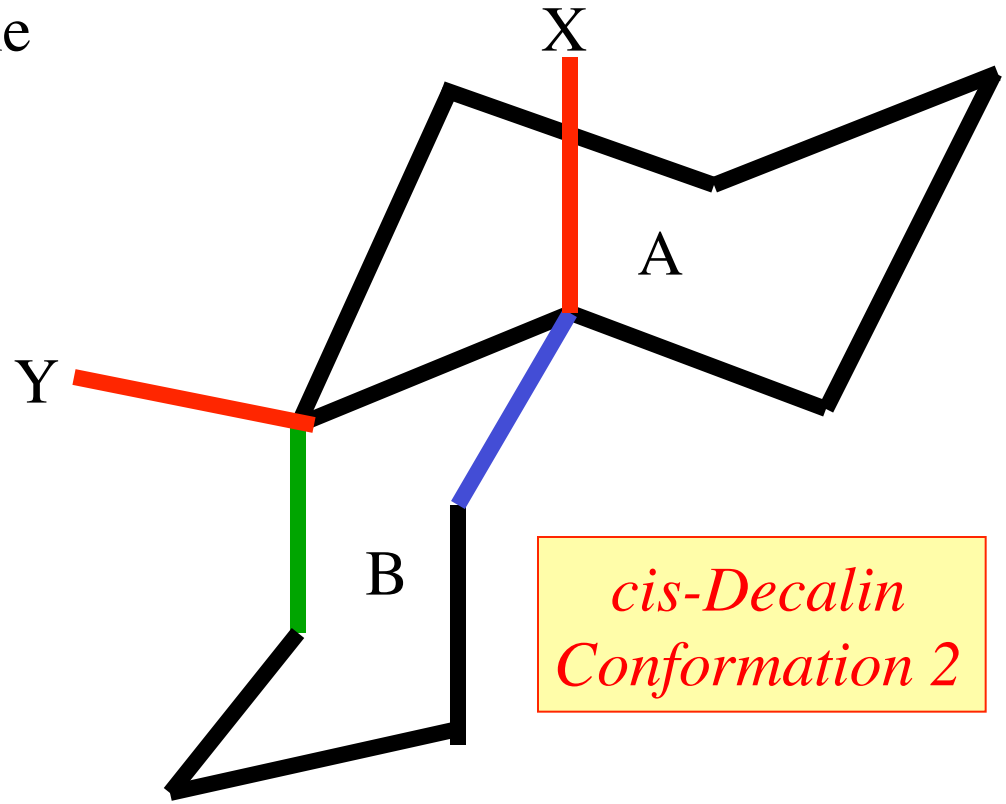
cis - Decalins

Start with a chair cyclohexane

Add two vicinal bonds:
One axial; one equatorial

Complete a 2nd chair cyclohexane

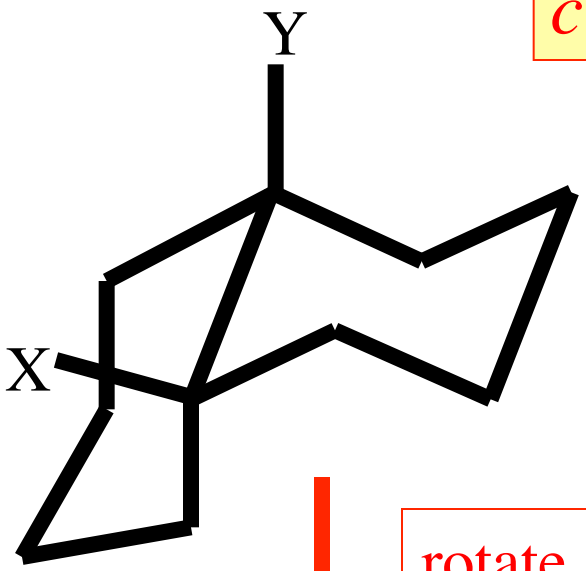
Ring fusion substituents are cis to rings A and B.



cis-Decalin Conformation 2

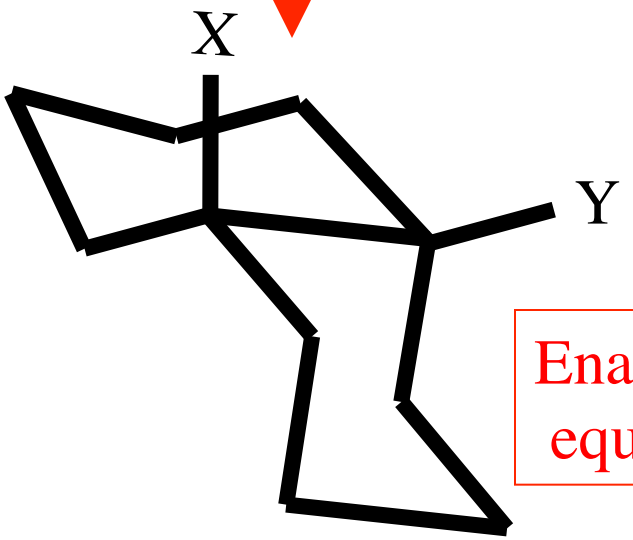
Substituent X is now axial to ring A and equatorial to ring B while substituent Y is now axial to ring B and equatorial to ring A.

cis - Decalins

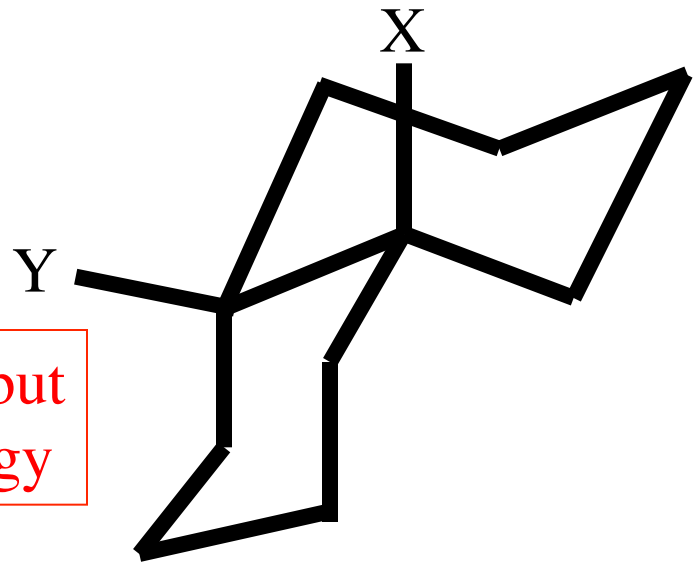


cis - Decalin Conformation 1

rotate clockwise 90°



cis - Decalin Conformation 2



Enantiomers but equal in energy

The

End