

Ch 3

Note Title

9/16/2005

100	A	6
88	B	7
76	C	3
64	D	1
52	F	2

Cycloalkanes

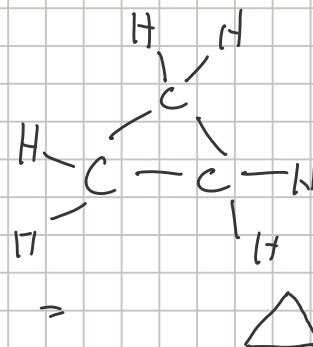
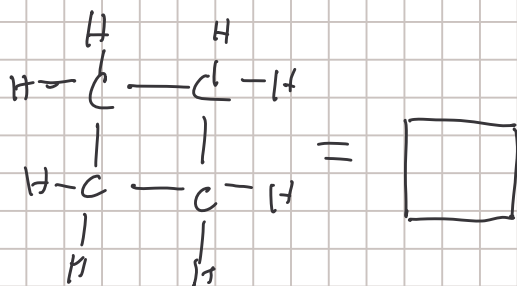
hydrocarbons

only C-C single bonds

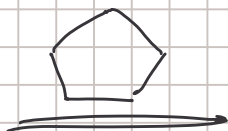
chain involved

Cyclopropane 3-carbon ring

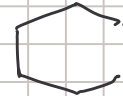
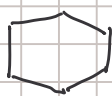
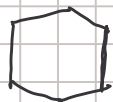
Cyclobutane - 4-C



Cyclopentane



Cyclohexane



usually drawn like this



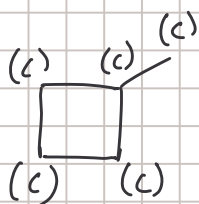
cycloheptane



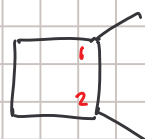
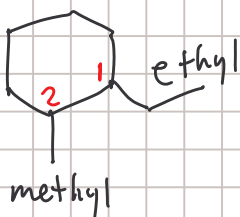
cyclooctane



Nomenclature



Methylcyclobutane



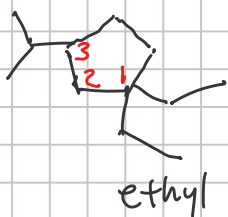
1,2-dimethylcyclobutane

(smallest numbers possible)

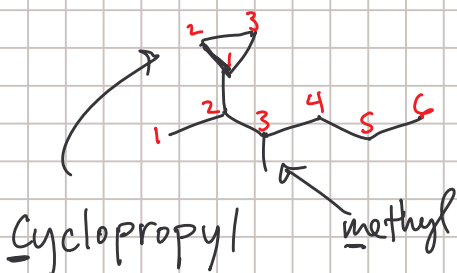
start #ing w/ group
that's first alphabetically

1-ethyl-2-methylcyclohexane

isopropyl



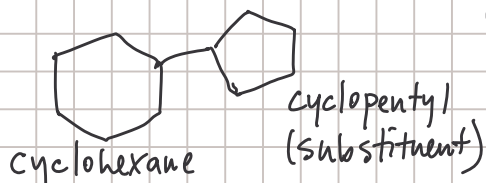
1,1-diethyl-3-isopropylcyclopentane



If ring has fewer C than
chain it's attached to,
name ring as substituent.

2-cyclopropyl-3-methylhexane

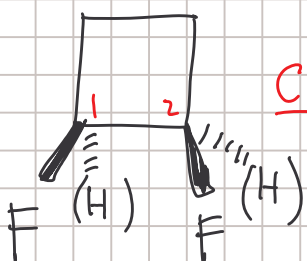
Cyclopentylcyclohexane



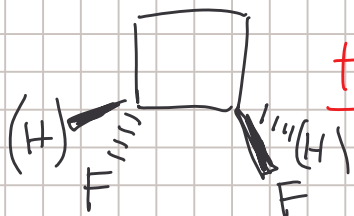
Cis/trans isomerism in cycloalkanes

Cis - 2 groups on same side of ring

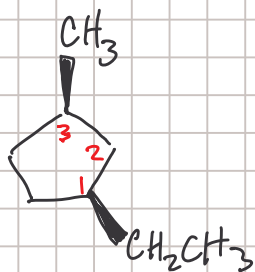
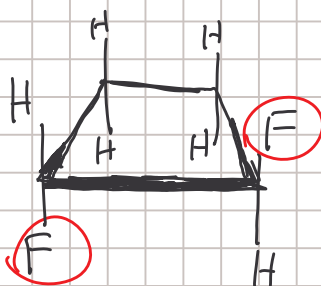
trans - 2 groups on opposite sides



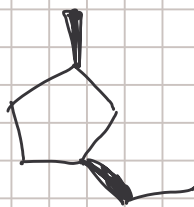
Cis-1,2-difluorocyclobutane



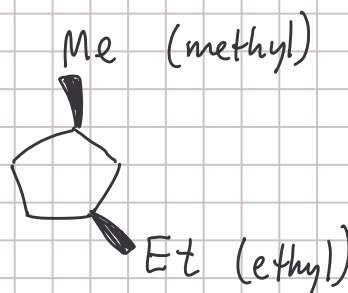
trans-1,2-difluorocyclobutane



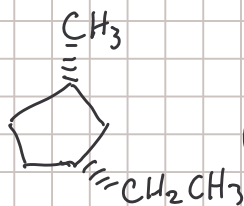
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Cis-1-ethyl-3-methylcyclopentane



(still cis)

Ring strain

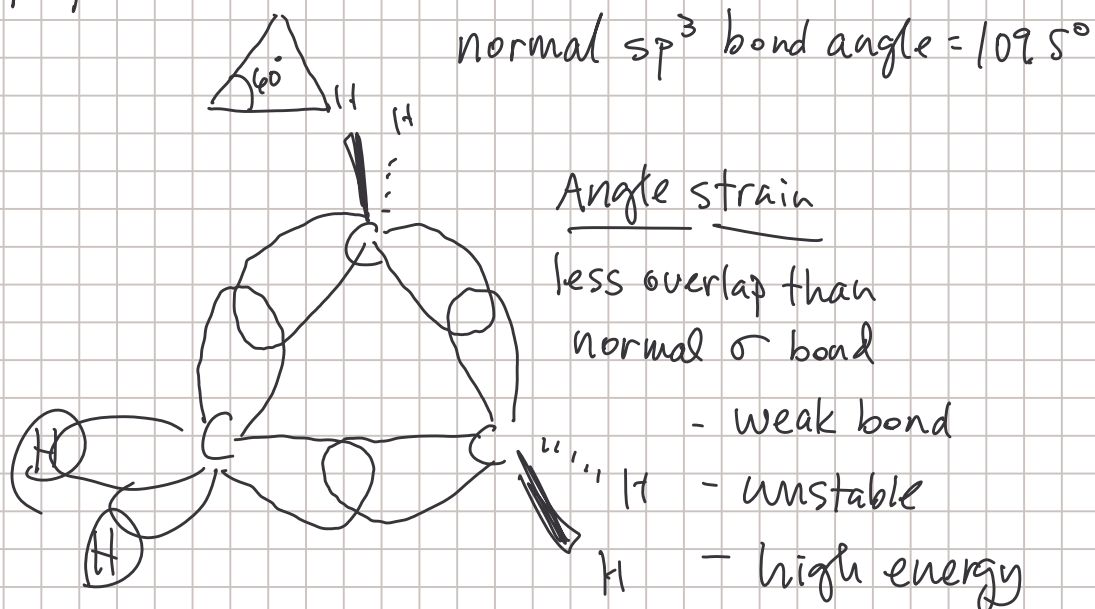
unfavorable interaction
in cycloalkane

<u># C</u>	<u>ring strain (kJ/mol)</u>
3	115
4	110
5	27
6	0
7	27
8	41
long-chain alkane	0

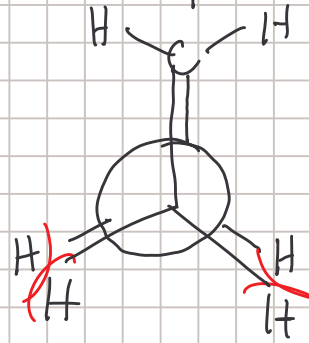
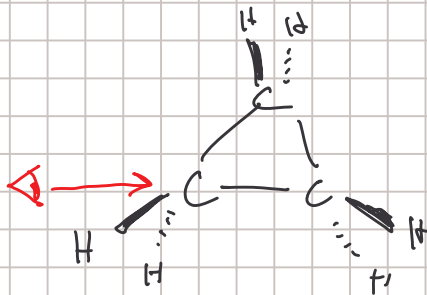
(most unstable of all
cycloalkanes)

Angle strain - small rings have smaller than
normal bond angles

Cyclopropane



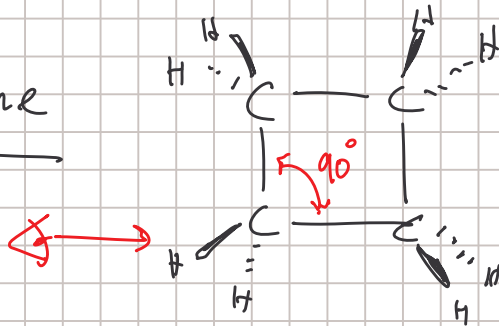
Torsional strain - strain from eclipsed bonds



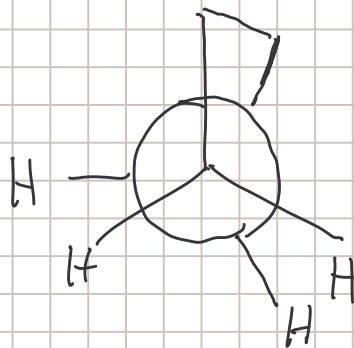
All bonds eclipsed!

Ring strain = Angle strain + torsional strain

Cyclobutane



Actually
88° bond angles
(even more angle strain
than expected)



not all eclipsed

Some torsional strain eliminated by sacrificing
a few degrees of angle strain