

# SEMINAR

Monday, December 4, 2006  
2:00 pm / Refreshments at 1:40 pm  
1001 Engineering Science Building

## A Biological Tool-Kit for the Synthesis and Assembly of Materials for Electronics and Energy



Angela Belcher  
Graduated from **UCSB** Chemistry  
Professor at MIT

Professor Belcher was named “Research Leader of the Year” by Scientific American in 2006 for “the use of custom-evolved viruses to advance nanotechnology.” She received a MacArthur Foundation “genius” fellowship for her extraordinary work in bionanotechnology.

# Chem Club Meeting next Monday

WHEN: Mon. Dec. 4, 12:30 - 1:30 PM, PSBN 4606.

WHO: Bill Riegler, a UCSB graduate who will discuss his career as a chemistry major, Research & Development, technical sales, sales management, business manager.

This is a great opportunity to learn more about possible career paths in chemistry.

FOOD WILL BE PROVIDED  
ALL ARE WELCOME TO ATTEND

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# A FEW WORDS ABOUT YOUR FINAL GRADE IN CHEM 1C



2 Mid-term exams, 100 points each	200 pts
1 Final exam, 200 points	200 pts
Attendance checks*	~40 pts (DISCARD LOWEST 2)
Quizzes*	~25 pts (DISCARD LOWEST 1)
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Total Course Points Possible	~465 pts

DETERMINATION OF FINAL GRADE, TWO METHODS USED FOR EVERYONE

**METHOD 1.** USE TOTAL POINTS AS SHOWN ABOVE, ASSIGN GRADE ON GRADING CURVE.

**METHOD 2.** DISCARD LOWEST MID-TERM, COUNT FINAL 300 POINTS, ASSIGN GRADE ON THIS GRADING CURVE.

**FINAL GRADE.** ASSIGNED GRADE WILL BE THE HIGHER OF THE TWO METHODS.

# Reactions of Alkanes

## Combustion



# Learning Check Alk3

Complete and balance the reaction for the complete combustion of  $C_7H_{16}$

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# Solution Alk3

## Step 1



## Step 2

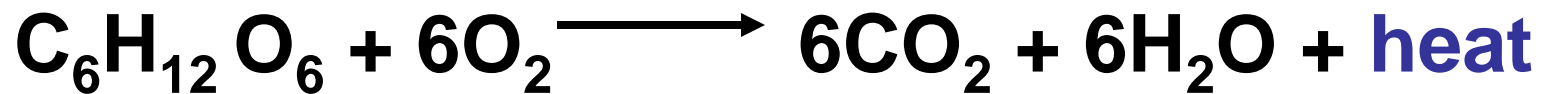


## Step 3



# Combustion In the Cell

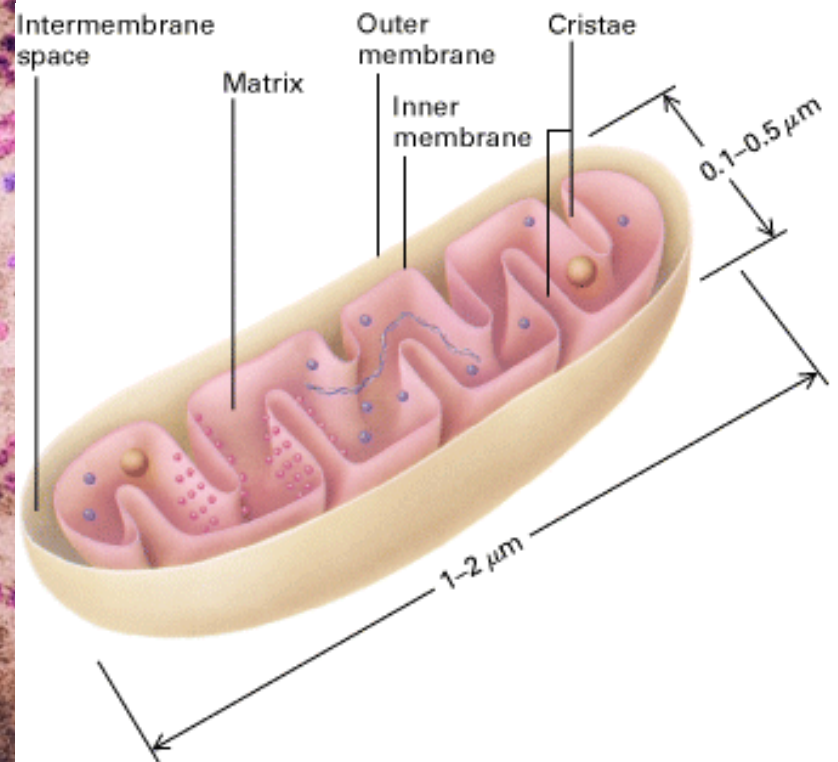
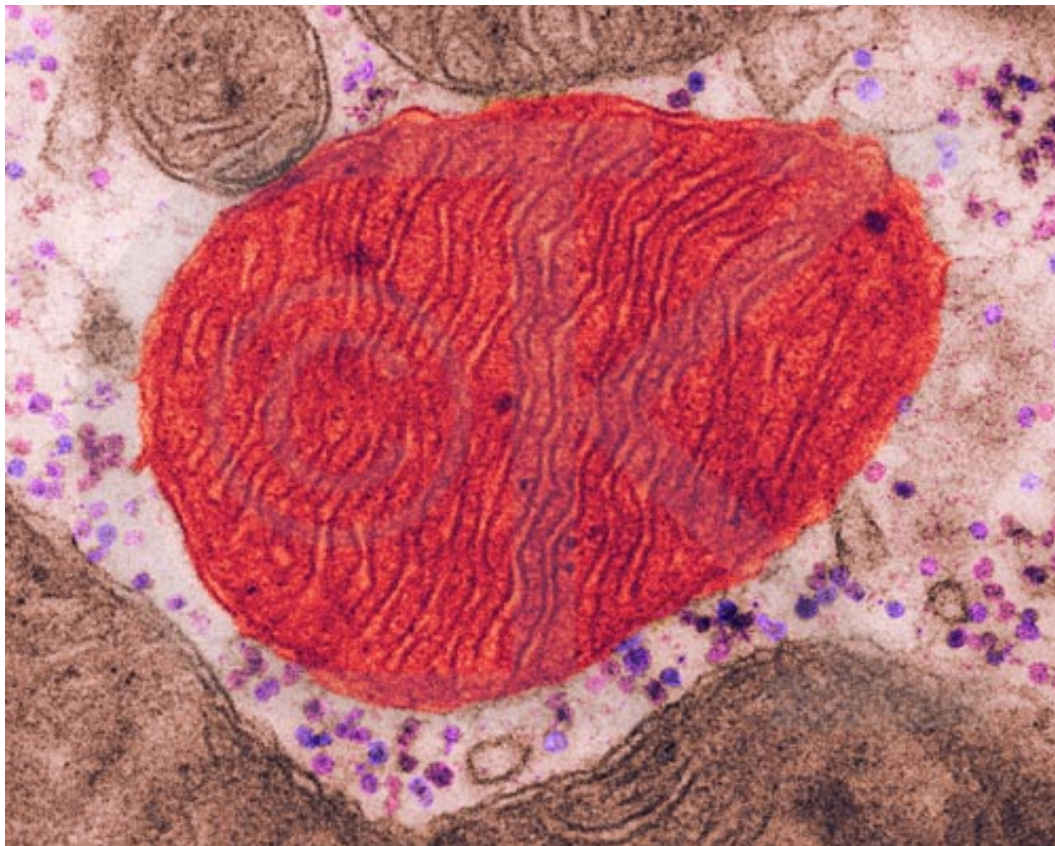
**Metabolic oxidation is combustion**




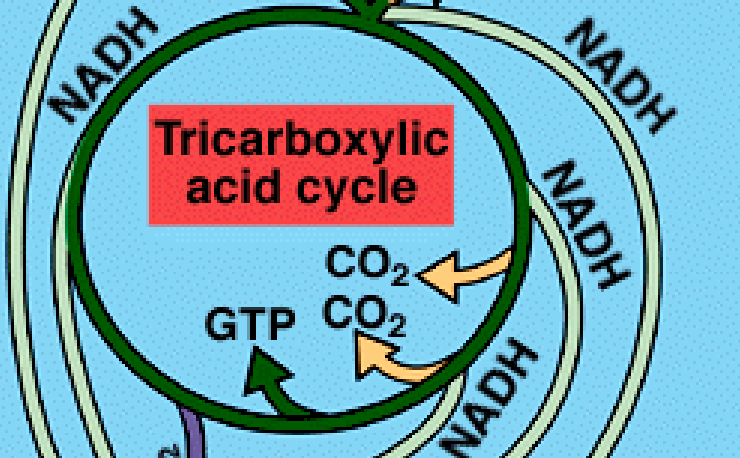
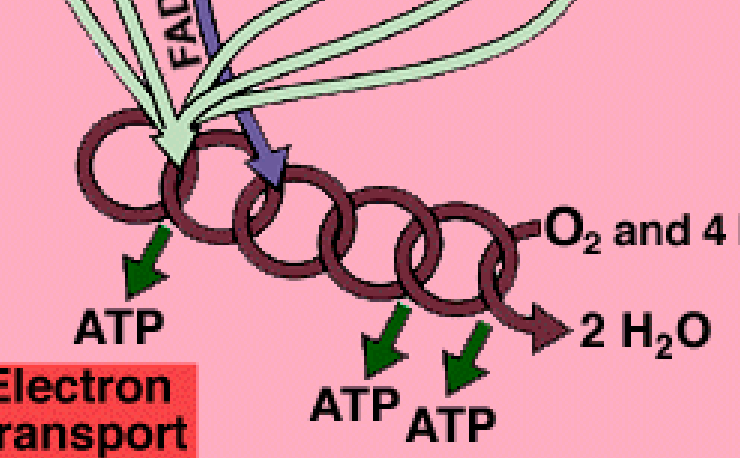
**glucose**

- **How does this reaction occur in living organisms?**

# Aerobic Oxidation Occurs in a Mitochondrion Located within a Cell



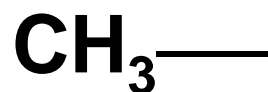
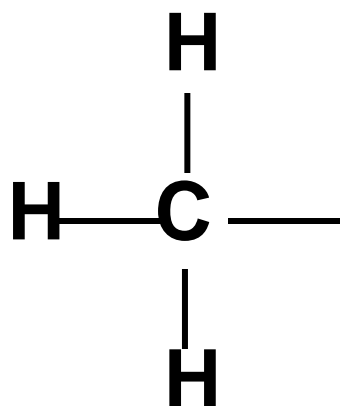
# Overview of aerobic respiration

<p>Occurs in cytoplasm of all cells</p>	<p><b>Glycolysis</b> Glucose (6C)</p>  <p>ATP</p> <p>NADH</p> <p>(3C) Pyruvic acid</p> <p>* All reactions in TCA must be multiplied by 2 for summary because each glucose generates 2 pyruvic acids</p>	<p><b>Output Summary</b> 2 ATP 2 NADH 2 pyruvic acid</p>
<p>Occurs in cytoplasm of prokaryotes and in mitochondria of eucaryotes</p>	 <p><b>Tricarboxylic acid cycle</b></p> <p>NADH</p> <p>NADH</p> <p>NADH</p> <p>CO<sub>2</sub></p> <p>CO<sub>2</sub></p> <p>GTP</p>	<p>6 CO<sub>2</sub> 2 GTP 2 FADH<sub>2</sub> 8 NADH</p>
<p>Occurs in cell membrane of prokaryotes and in mitochondria of eucaryotes</p>	 <p><b>Electron transport</b></p> <p>FADH<sub>2</sub></p> <p>NADH</p> <p>NADH</p> <p>NADH</p> <p>ATP</p> <p>ATP</p> <p>ATP</p> <p>O<sub>2</sub> and 4 H<sup>+</sup></p> <p>2 H<sub>2</sub>O</p>	<p>34 ATP 6 H<sub>2</sub>O</p>

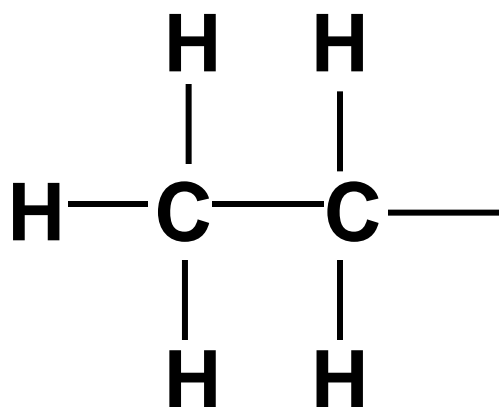
**Branched Alkanes**  
**Structural Formulas**  
**Structural Isomers**

# Alkyl Groups

Branches on carbon chains

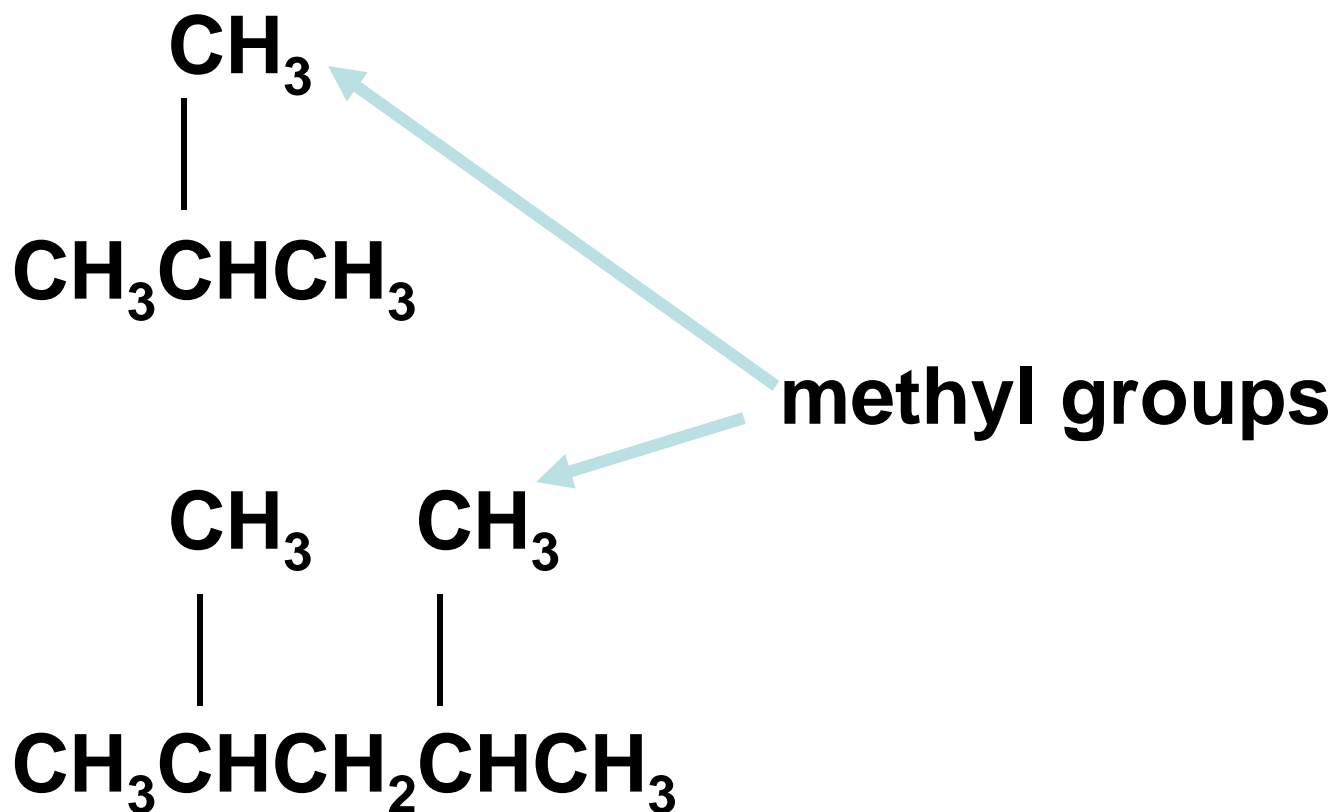


methyl

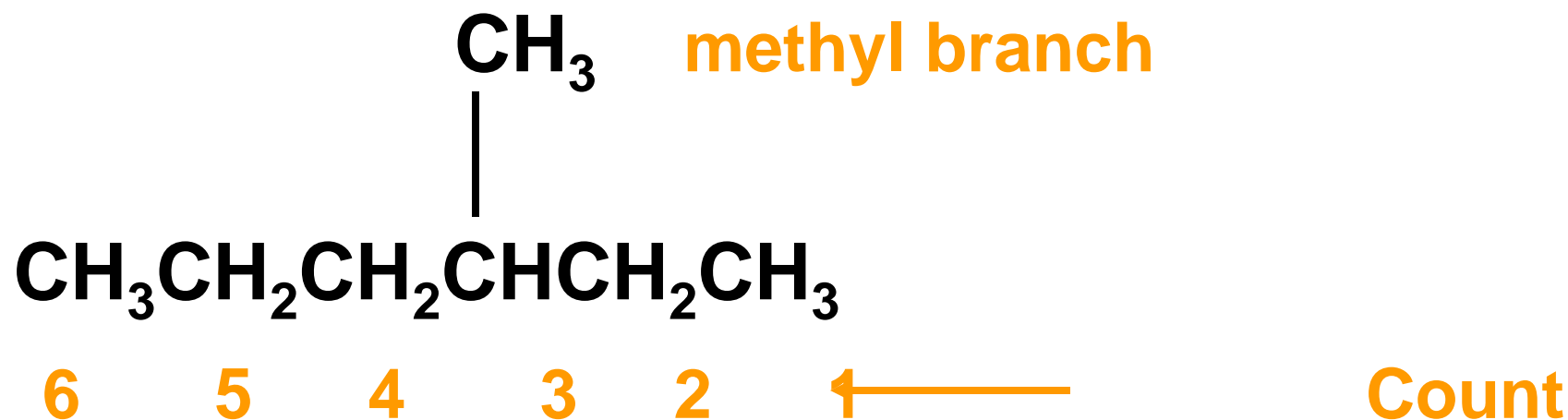


ethyl

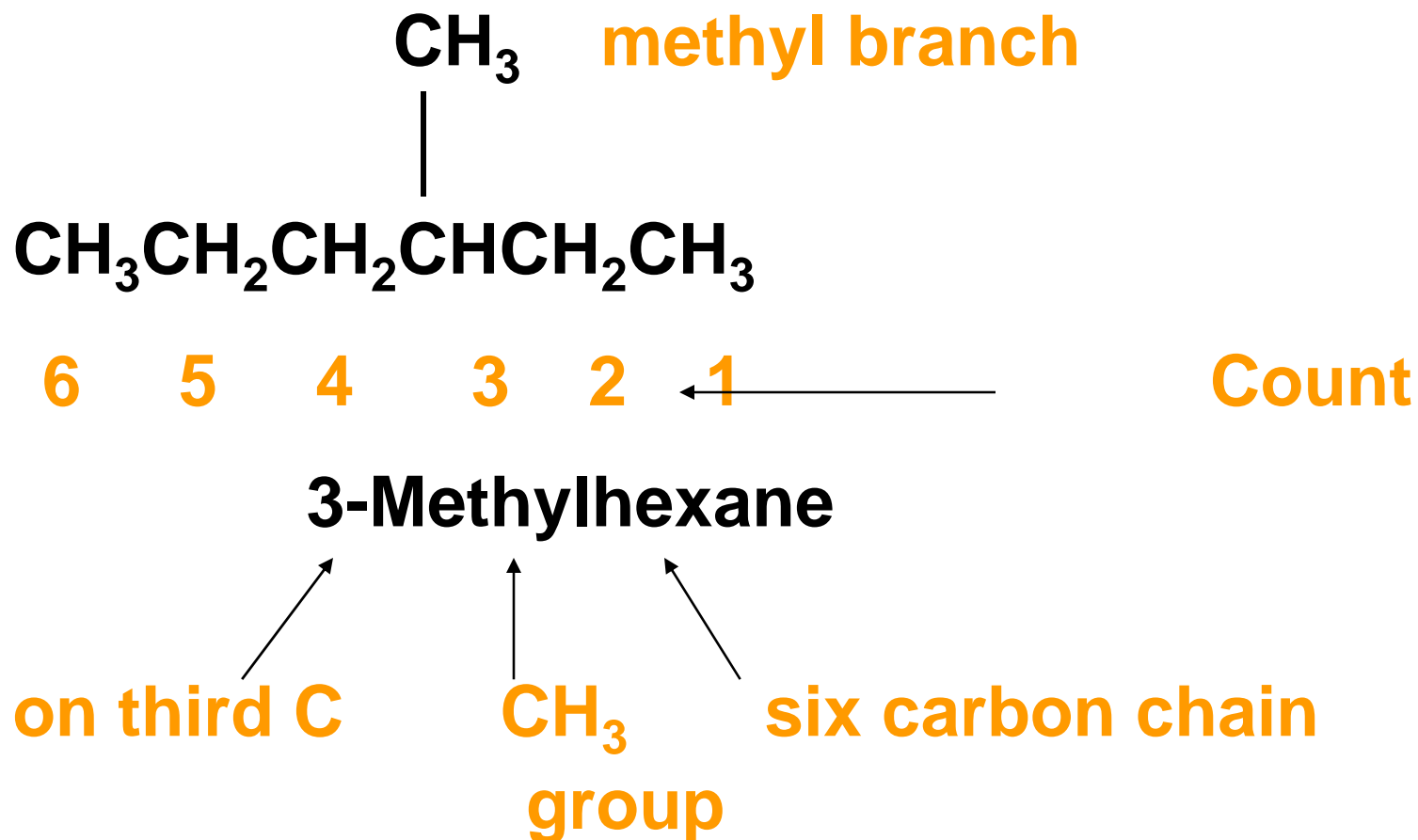
# Branched Alkanes



# Naming Branched Alkanes



# Naming Branched Alkanes

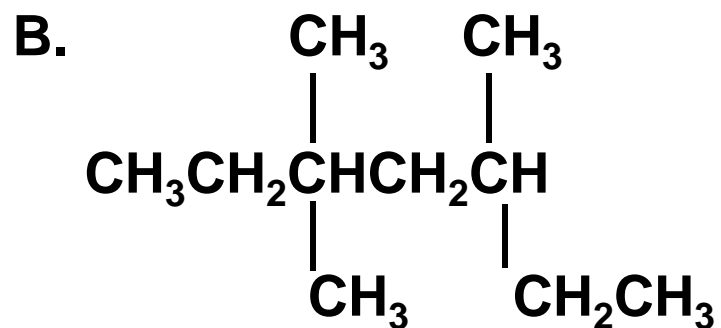
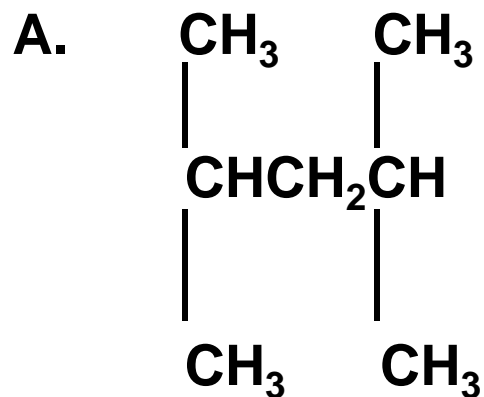


# Naming Summary

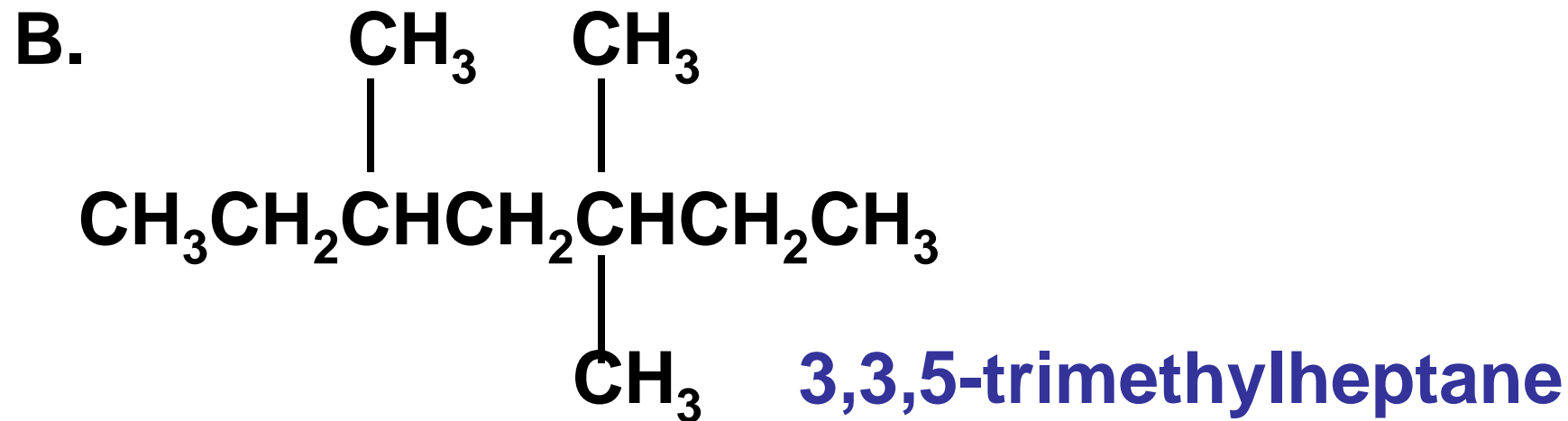
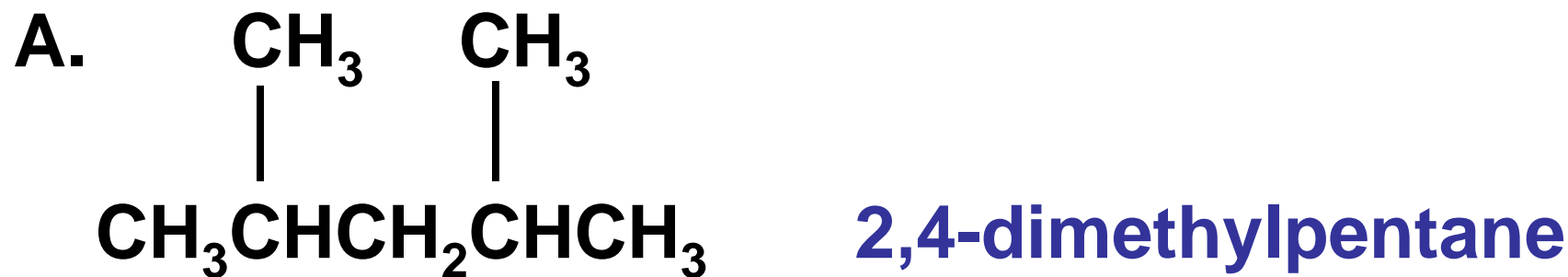


- 1. Count the C's in the longest chain**
- 2. Name each attached group**
- 3 Count the longest carbon chain to give the first attached group the smallest number**
- 4. Name and locate each group**

# Learning Check Alk4



# Solution Alk4



# Learning Check Alk5

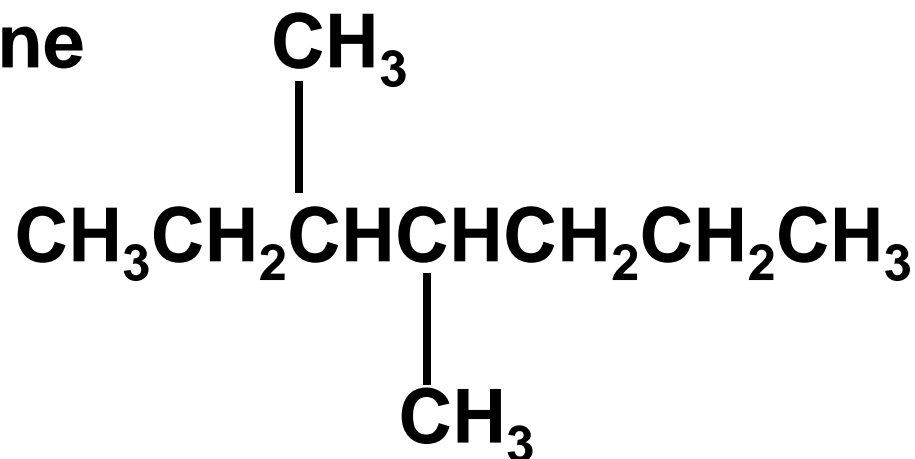
**Write a condensed structure for**

**A. 3,4-dimethylheptane**

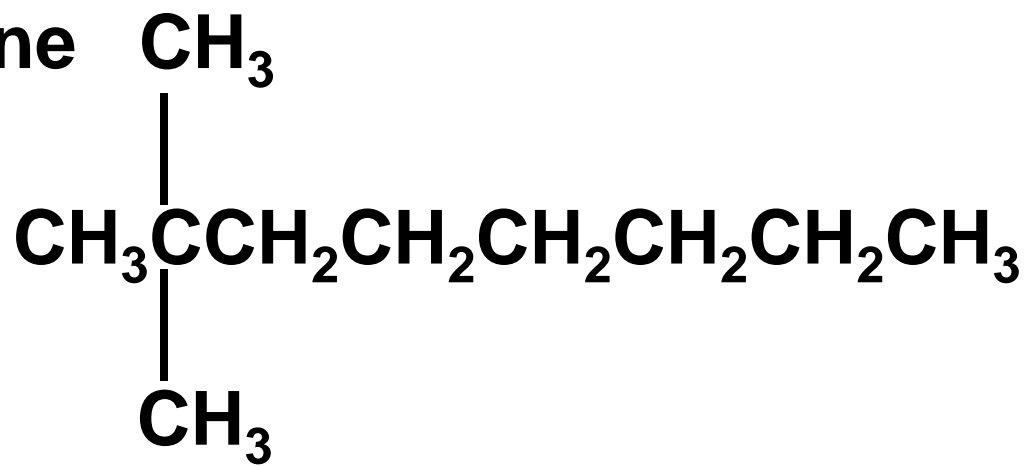
**B. 2,2-dimethyloctane**

# Solution Alk5

A. 3,4-dimethylheptane



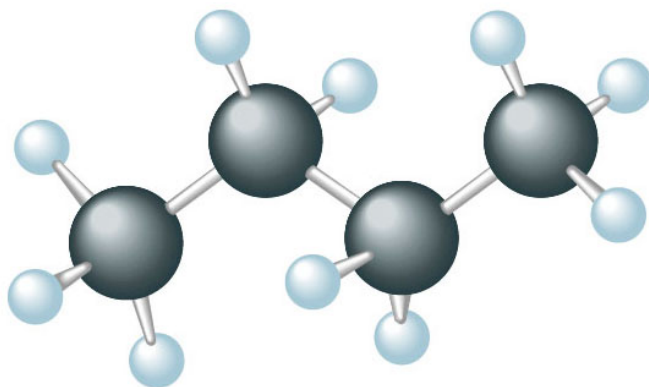
B. 2,2-dimethyloctane



# Isomers

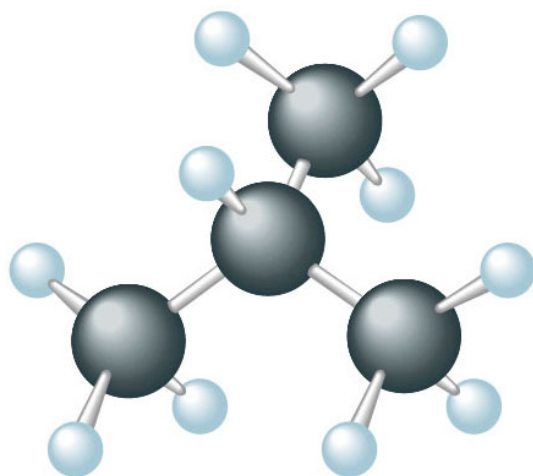
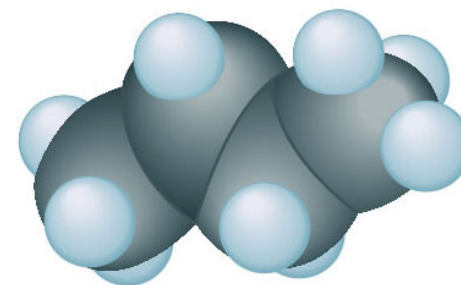
- **Same molecular formula**
- **Same number and types of atoms**
- **Different arrangement of atoms**

# Butane structures



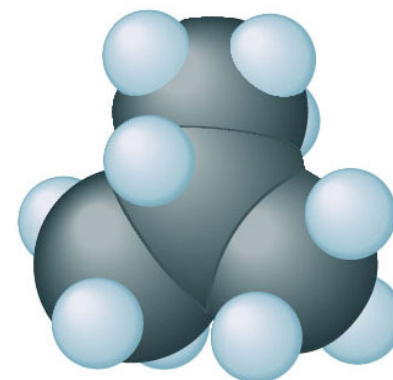
(a)

n-butane



(b)

methylpropane

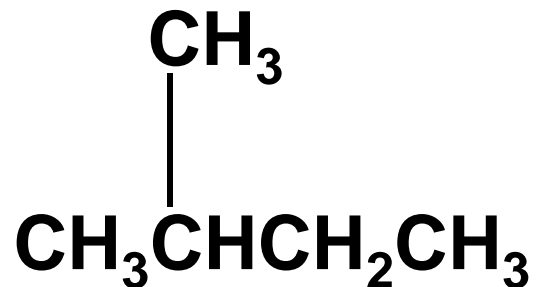


# Learning Check Alk6

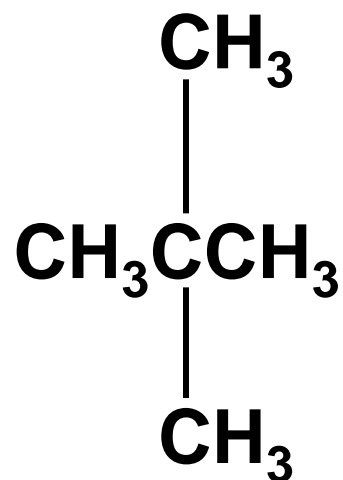
Write 3 isomers of  $C_5H_{12}$  and name each.

# Solution Alk6

$\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_3$  pentane or n-pentane

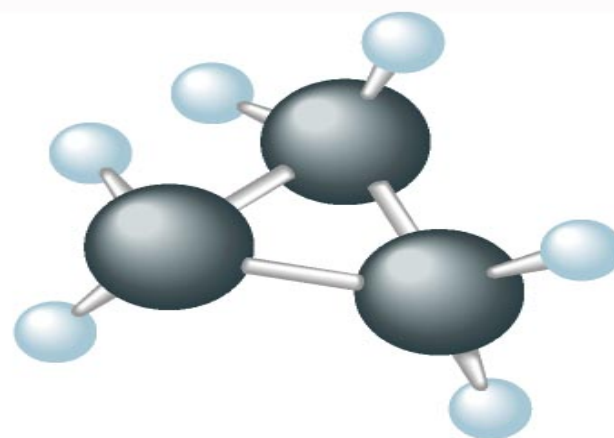


2-methylbutane



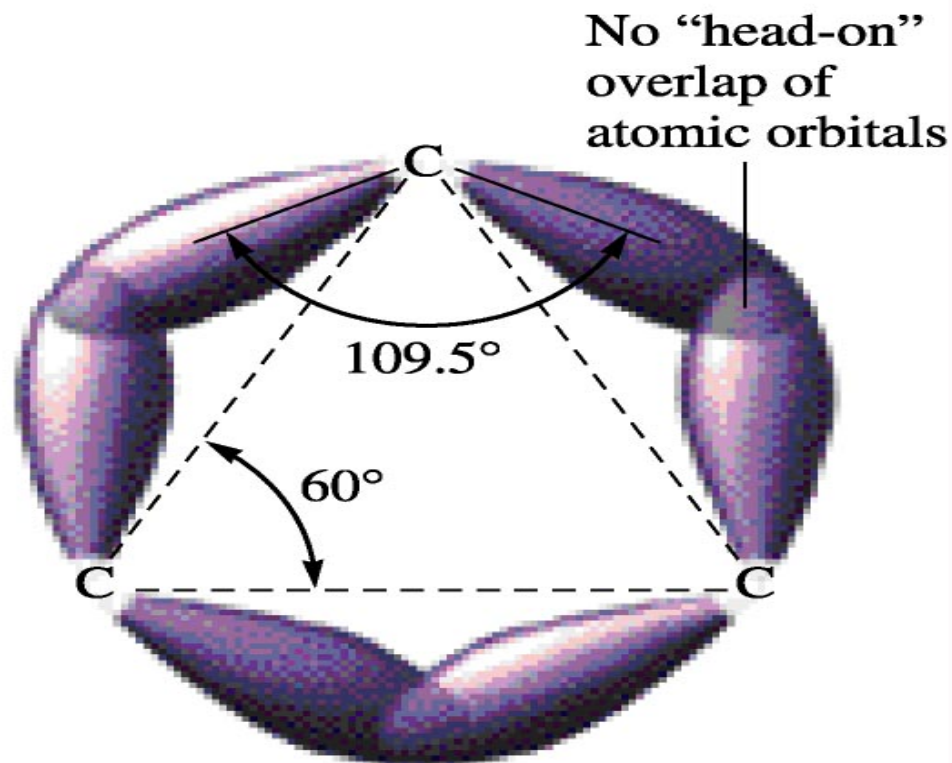
2,2-dimethylpropane

# Cyclic Alkanes



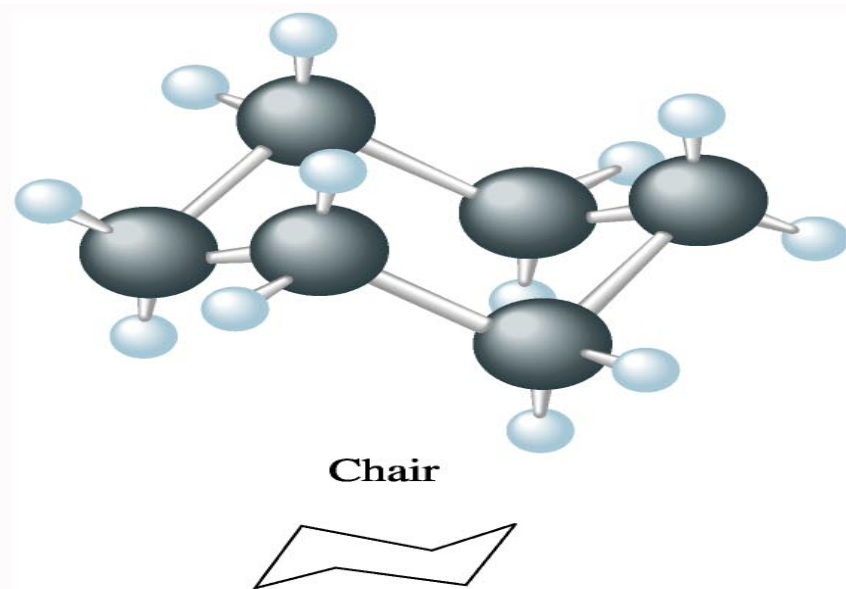
(a)

# Cyclopropane structure

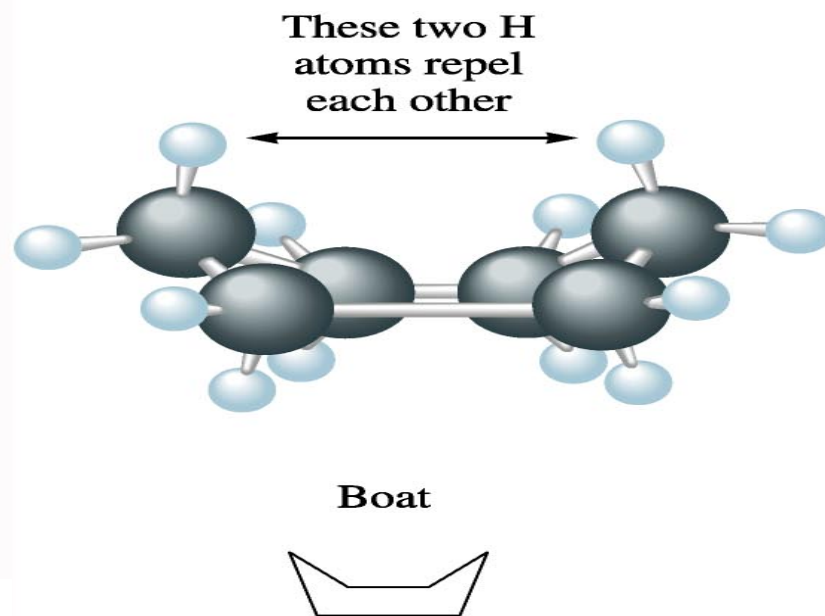


(b)

# Cyclohexane structure



(a)



(b)

## **Naming Cycloalkanes with Side Groups**

**Number of  
side groups**

**Naming**

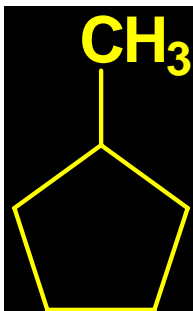
**One**

**Side group name goes in front  
of the cycloalkane name.**

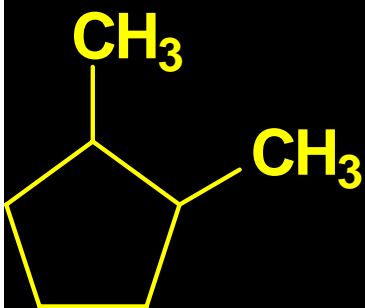
**Two**

**Number the ring in the  
direction that gives  
the lowest numbers  
to the side groups.**

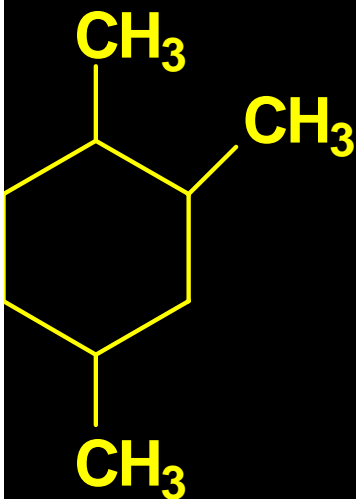
# Cycloalkanes with Side Groups



methylcyclopentane



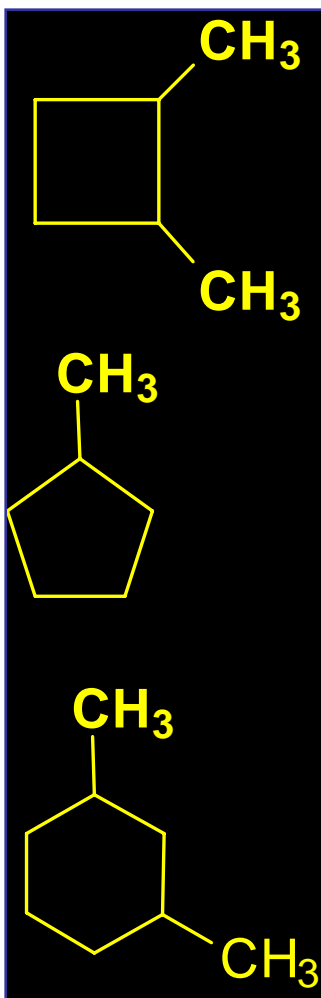
1,2-dimethylcyclopentane



1,2,4-trimethylcyclohexane

# Learning Check Alk8

Name the following cyclic alkanes

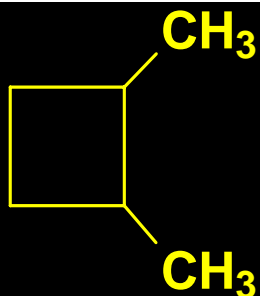


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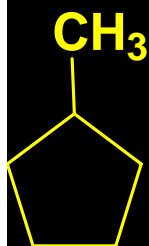
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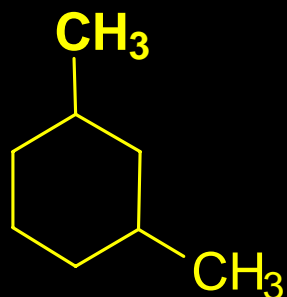
# Solution Alk8



1,2-dimethylcyclobutane



methylcyclopentane



1,3-dimethylcyclohexane