

# Systematic Nomenclature (IUPAC System)

## Prefix-Parent-Suffix

Parent- number of carbons

Prefix- substituents

Suffix- functional groups

## Naming Alkanes

General Formula:  $C_nH_{(2n+2)}$

suffix: -ane

Parent Names:

1.	$CH_4$	<b>Methane</b>	$CH_4$
2.	$CH_3CH_3$	<b>Ethane</b>	$C_2H_6$
3.	$CH_3CH_2CH_3$	<b>Propane</b>	$C_3H_8$
4.	$CH_3(CH_2)_2CH_3$	<b>Butane</b>	$C_4H_{10}$
5.	$CH_3(CH_2)_3CH_3$	<b>Pentane</b>	$C_5H_{12}$
6.	$CH_3(CH_2)_4CH_3$	<b>Hexane</b>	$C_6H_{14}$
7.	$CH_3(CH_2)_5CH_3$	<b>Heptane</b>	$C_7H_{16}$
8.	$CH_3(CH_2)_6CH_3$	<b>Octane</b>	$C_8H_{18}$
9.	$CH_3(CH_2)_7CH_3$	<b>Nonane</b>	$C_9H_{20}$
10.	$CH_3(CH_2)_8CH_3$	<b>Decane</b>	$C_{10}H_{22}$

## Alkyl Substituents

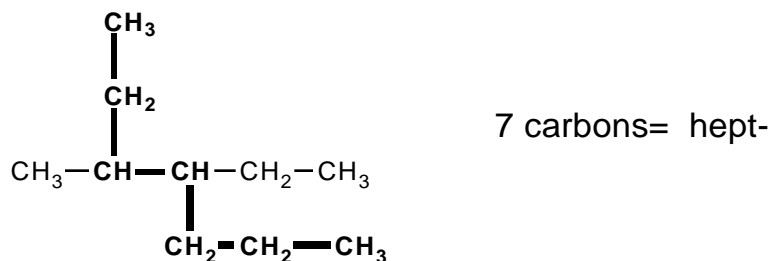
R= Rest of the molecule

1.	$CH_3-R$	<b>Methyl</b>
2.	$CH_3CH_2-R$	<b>Ethyl</b>
3.	$CH_3CH_2CH_2-R$	<b>Propyl</b>
4.	$CH_3(CH_2)_2CH_2-R$	<b>Butyl</b>
5.	$CH_3(CH_2)_3CH_2-R$	<b>Pentyl</b>
6.	$CH_3(CH_2)_4CH_2-R$	<b>Hexyl</b>
7.	$CH_3(CH_2)_5CH_2-R$	<b>Heptyl</b>
8.	$CH_3(CH_2)_6CH_2-R$	<b>Octyl</b>
9.	$CH_3(CH_2)_7CH_2-R$	<b>Nonyl</b>
10.	$CH_3(CH_2)_8CH_2-R$	<b>Decyl</b>

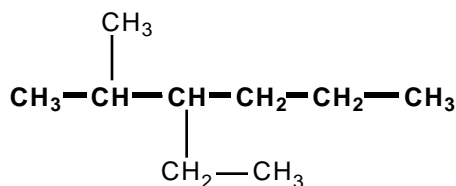
## Rules for Systematic Nomenclature of Alkanes

### 1. Find the parent chain

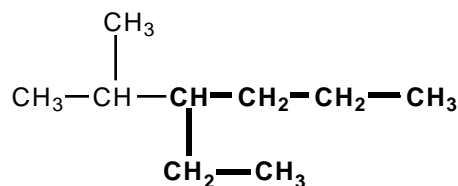
- a. Identify the longest continuous carbon chain as the parent chain.



- b. If more than one different chains are of equal length (number of carbons), choose the one with the greater number of branch points (substituents) as the parent.



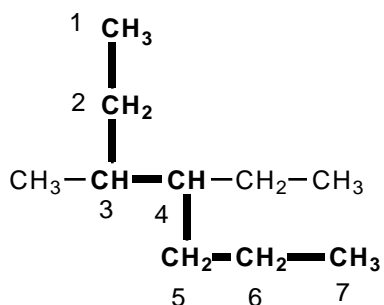
2 branch pts.



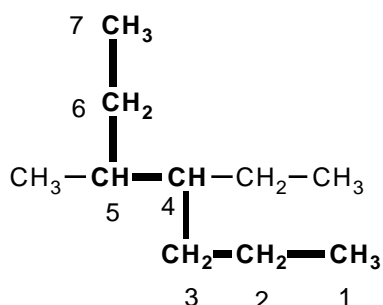
1 branch pt.

### 2. Numbering the carbons of the parent chain

- a. Number the carbon atoms of the parent chain so that any branch points have the lowest possible number

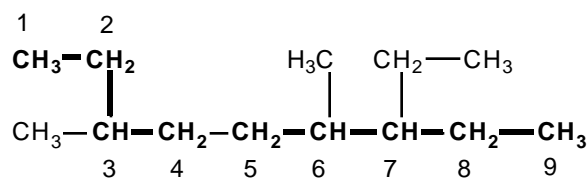


branch pts. at carbons 3 and 4

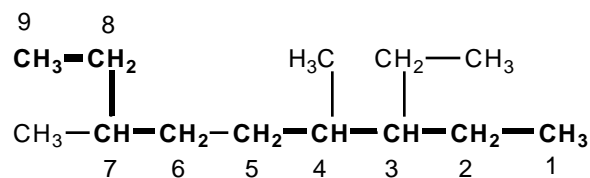


branch pts. at carbons 4 and 5

- b. If there is branching equidistant from both ends of the parent chain, number so the second branch point has the lowest number.



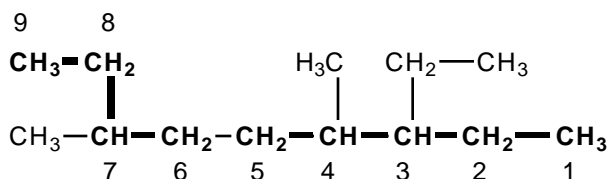
branch pts. at carbons 3, 6, 7



branch pts. at carbons 3,4,7

### 3. Substituents

- a. Identify and number the substituents and list them in alphabetical order.



Parent C-9 = nonane

3- ethyl

4-methyl

7-methyl

} 4,7-dimethyl

- b. If there are two substituents on the same carbon, assign them the same number.

### 4. Write out the name

- a. Write out the name as a single word:

hyphens (-) separate prefixes

commas (,) separate numbers

- b. Substituents are listed in alphabetical order

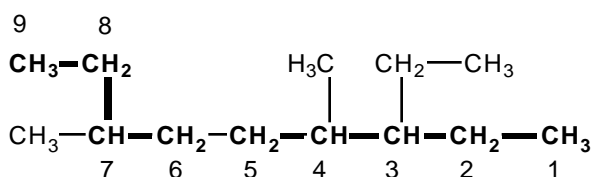
- c. If two or more identical substituents are present use the prefixes:

di- for two

tri- for three

tetra- for four

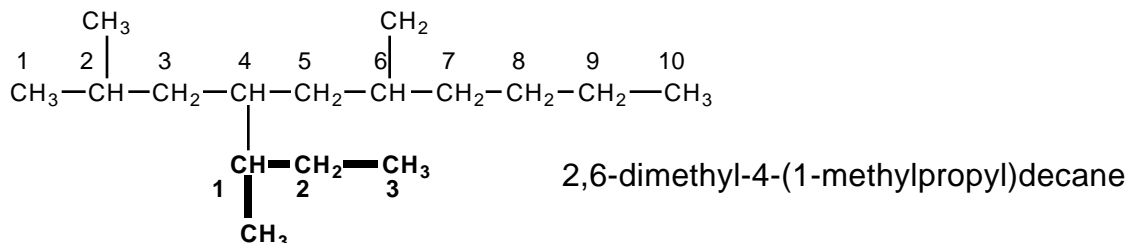
note: these prefixes (di-, tri-, tetra-, etc.) are not used for alphabetizing purposes.



3- ethyl-4,7-dimethylnonane

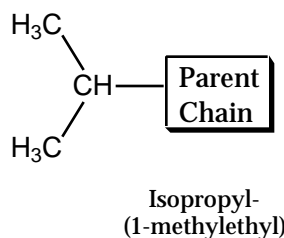
### 5. Complex Substituents (substituents with branching)

- Named by applying the four previous rules with some modification
- Number the complex substituent separately from the parent. Begin numbering at the point of attachment to the parent chain.
- Complex substituents are set off by parenthesis.

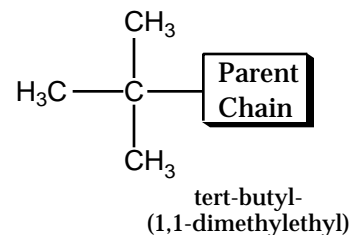
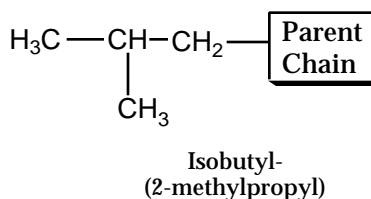
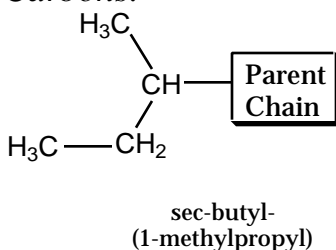


### Nonsystematic (trivial) Names:

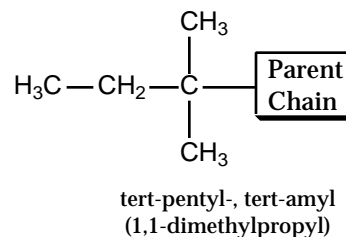
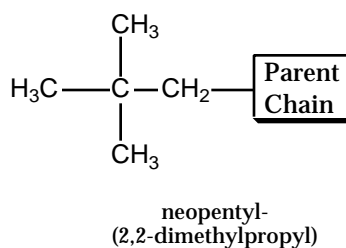
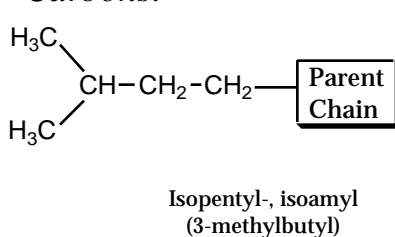
3-carbons:



4-Carbons:



5-Carbons:



Alphabetizing trivial names:

Iso- and neo are part of the alkyl group name and are used for alphabetizing. sec- and tert- are not included in the alphabetical order.