

Alkanes Worksheet and Key

1. Answer the following.
 - a. What is the general formula for a *noncyclic* alkane? C_nH_{2n}
 - b. If a *noncyclic* alkane contains 15 carbon atoms, how many hydrogen atoms does it contain?
2. Draw the line bond structures of following types of hydrocarbons using *four* carbon atoms:
 - a. **two noncyclic** alkanes

b. **two** cycloalkanes

3. Give the molecular formula, the line bond structural formula, the condensed structural formula, and the skeletal formula for pentane.

Molecular formula:

Line bond structural formula:

Condensed structural formula:

Skeletal formula:

4. Give the molecular formula, the line bond structural formula, the condensed structural formula, and the skeletal formula for octane.

Molecular formula:

Line bond structural formula:

Condensed structural formula:

Skeletal formula:

5. Give the molecular formula, the line bond structural formula, the condensed structural formula, and the skeletal formula for 4-ethyl-2,3-dimethylheptane.

Molecular formula:

Line bond structural formula:

Condensed structural formula:

Skeletal formula:

6. Give the molecular formula, the line bond structural formula, the condensed structural formula, and the skeletal formula for 3,3-diethyloctane.

Molecular formula:

Line bond structural formula:

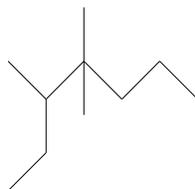
Condensed structural formula:

Skeletal formula:

7. What is the systematic name for the following structure?



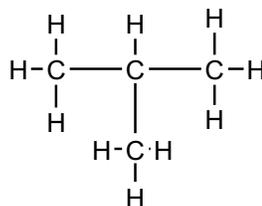
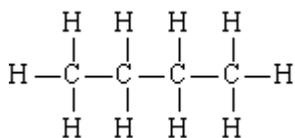
8. What is the systematic name for the following structure?



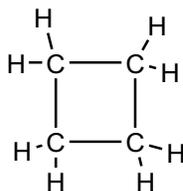
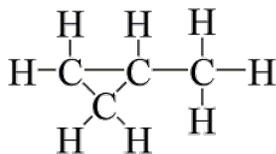
9. There are 18 different alkane molecules that all have the molecular formula C_8H_{18} . Molecules with the same molecular formula, but different atomic connections (structural formulas) are called "constitutional isomers". See how many different alkanes, all with the same formula (C_8H_{18}) that you can draw. After you draw them, write their names. You can draw line bond, condensed, or skeletal structures (the key shows skeletal structures).

Alkanes Worksheet Key

- Answer the following.
 - What is the general formula for a *noncyclic* alkane? C_nH_{2n+2}
 - If a *noncyclic* contains 15 carbon atoms, how many hydrogen atoms does it contain? **32**
- Draw the line bond structures of following types of hydrocarbons using *four* carbon atoms:
 - two noncyclic* alkanes



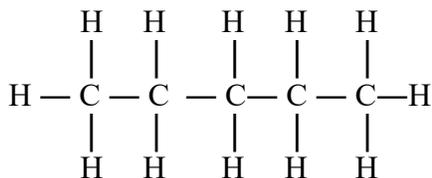
- two cycloalkanes*



- Give the molecular formula, the line bond structural formula, the condensed structural formula, and the skeletal structure for pentane.

Molecular formula: C_5H_{12}

Line bond structural formula:

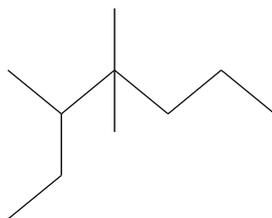


Condensed structural formula: $CH_3CH_2CH_2CH_2CH_3$

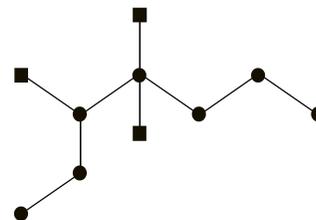
Skeletal formula:



8. What is the systematic name for the following structure?



Note that this is the only "trick question" in this course; the parent chain is the *longest continuous chain of carbon atoms*, **NOT** always the chain that is drawn horizontally. The parent chain carbons are shown as black dots and the carbons in substituents (methyl groups) are shown as black squares in the drawing on the right.



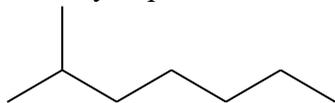
3,4,4-trimethylheptane

9. There are 18 different alkane molecules that all have the molecular formula C_8H_{18} . Molecules with the same molecular formula, but different atomic connections (structural formulas) are called "constitutional isomers". See how many different alkanes, all with the same formula (C_8H_{18}) that you can draw. After you draw them, write their names. You can draw line bond, condensed, or skeletal structures (the key shows skeletal structures).

octane



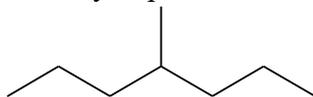
2-methylheptane



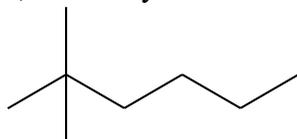
3-methylheptane



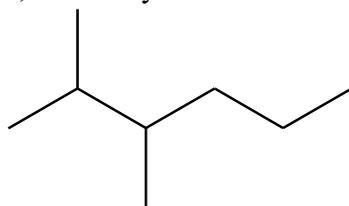
4-methylheptane



2,2-dimethylhexane



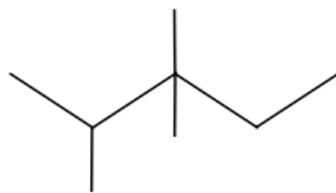
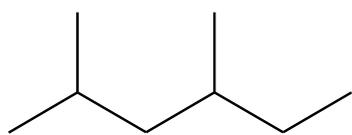
2,3-dimethylhexane



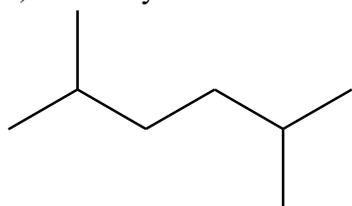
2,4-dimethylhexane

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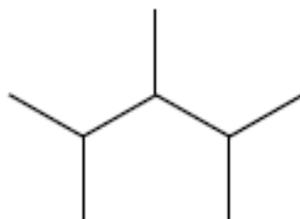
2,3,3-trimethylpentane



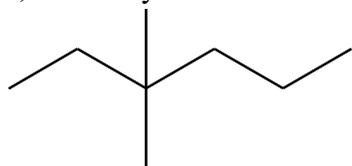
2,5-dimethylhexane



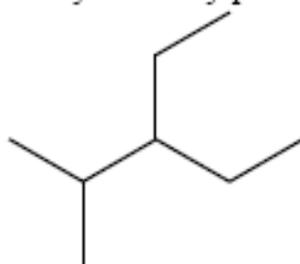
2,3,4-trimethylpentane



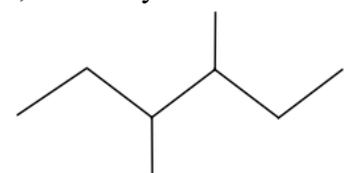
3,3-dimethylhexane



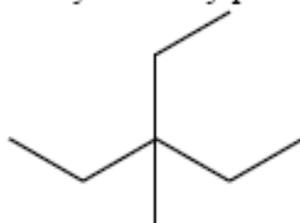
3-ethyl-2-methylpentane



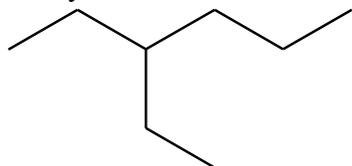
3,4-dimethylhexane



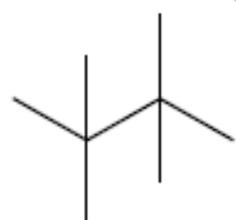
3-ethyl-3-methylpentane



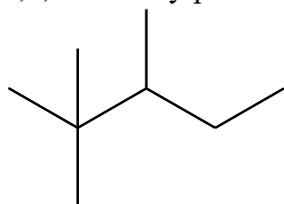
3-ethylhexane



2,2,3,3-tetramethylbutane



2,2,3-trimethylpentane



2,2,4-trimethylpentane

