Do the following on your own paper

1. Complete the table below

<table>
<thead>
<tr>
<th>Bond Type</th>
<th>Number of sigma bonds between carbons</th>
<th>Number of pi bonds between carbons</th>
<th>Hybridization of carbons</th>
<th>Bond Angle between sigma bonds</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single</td>
<td>1</td>
<td>0</td>
<td>4sp3</td>
<td>109.5</td>
</tr>
<tr>
<td>Double</td>
<td>1</td>
<td>1</td>
<td>3sp2</td>
<td>120</td>
</tr>
<tr>
<td>Triple</td>
<td>1</td>
<td>2</td>
<td>2sp</td>
<td>180</td>
</tr>
</tbody>
</table>

2. Rank the single bond, double bond, and triple bond from weakest to strongest.

(Strongest) triple bond > double bond > single bond (Weakest)

How does the bond length correlate with bond strength?

(Shortest bond) triple bond > double bond > single bond (Longest bond)

As bond strength increases the bond length decreases. The bond strength and bond length are inversely proportional

For each compound build a model and supply the following information

A. Dot Diagram
B. Hybridization of central atom
C. Sketch of molecule with lines for bonds
D. Bond angle
E. Shape name
3. HCN

\[
\begin{array}{c}
\text{H} \\
\text{C} \\
\text{N}
\end{array}
\]

Carbon is sp hybridized (2 sigma and 2 pi bonds)

\[
\begin{array}{c}
\text{H} \\
\text{C} \\
\text{N}
\end{array}
\]

Bond angle = 180 degrees (linear)

4. CO₂

\[
\begin{array}{c}
\text{O} \\
\text{C} \\
\text{O}
\end{array}
\]

Carbon is sp hybridized (2 sigma and 2 pi bonds)

\[
\begin{array}{c}
\text{O} \\
\text{C} \\
\text{O}
\end{array}
\]

Bond angle = 180 degrees (Linear)
5. $\text{H}_2\text{CO}$

Carbon is sp$^2$ hybridized (3 sigma and 1 pi bond)

Bond angle is 120 degrees (Trigonal planar)

6. $\text{C}_4\text{H}_6$

Carbons are sp$^2$ hybridized (3 sigma bonds, 1 pi bond)

Bond angle is slightly less than 120 degrees (H-C-H's) and slightly larger than 120 degrees (H-C-C) (distorted trigonal planer)
7. \( \text{C}_2\text{H}_2\text{Cl}_2 \)

Carbons are sp\(^2\) hybridized (3 sigma bonds and 1 pi bond)

Bond angle is 120 degrees (Trigonal planar)