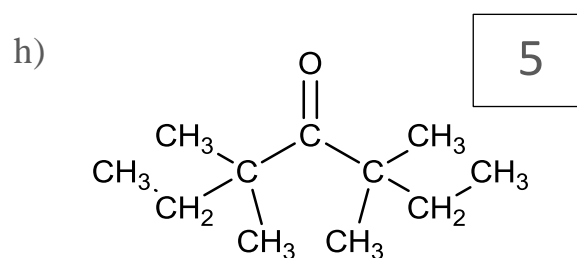
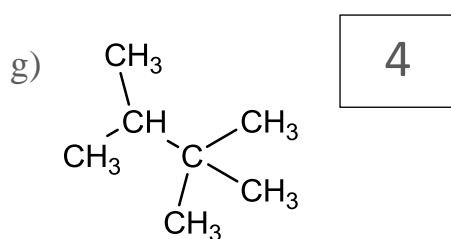
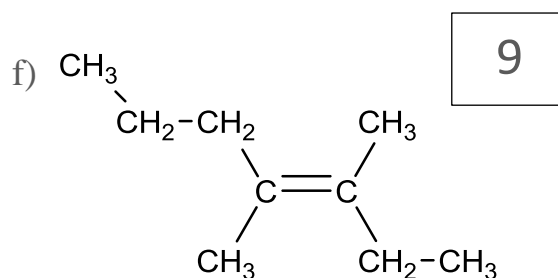
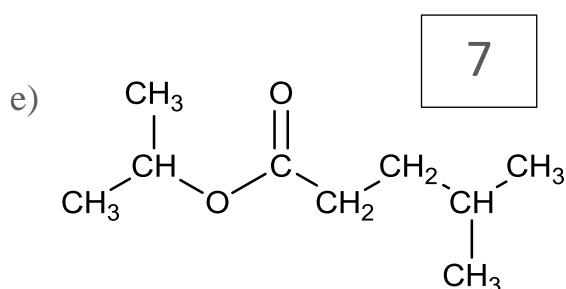
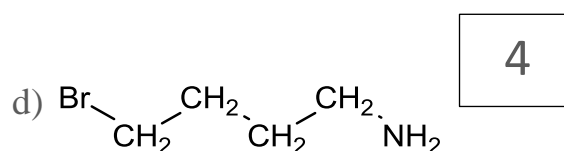
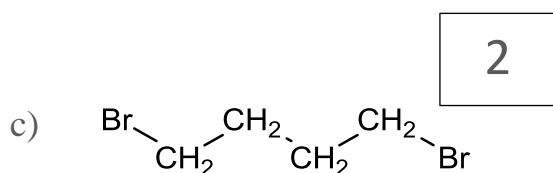
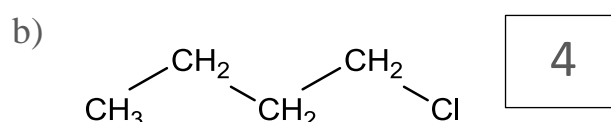
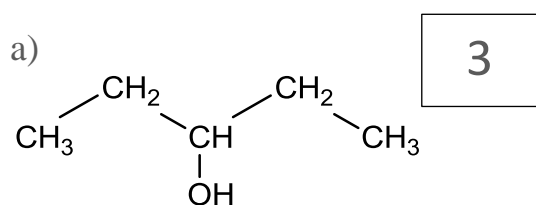


# $^{13}\text{C}$ NMR ANSWERS

## QUESTION ONE

Work out how many  $^{13}\text{C}$  peaks you would expect to find in the NMR spectra for the following molecules:

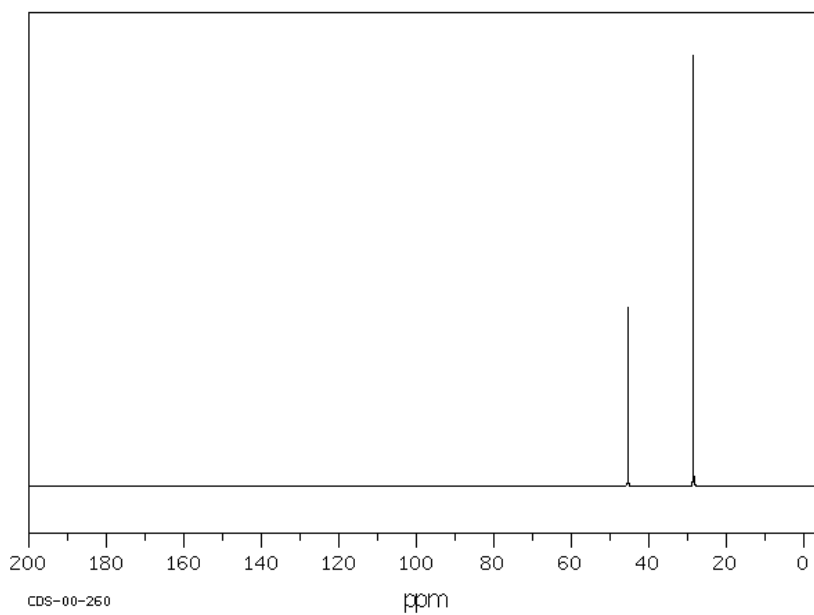


## QUESTION TWO

Each of the following  $^{13}\text{C}$  NMR spectra represents one of the possible isomers of each of the corresponding molecular formulae. For each question draw the chemical structure of the correct isomer.

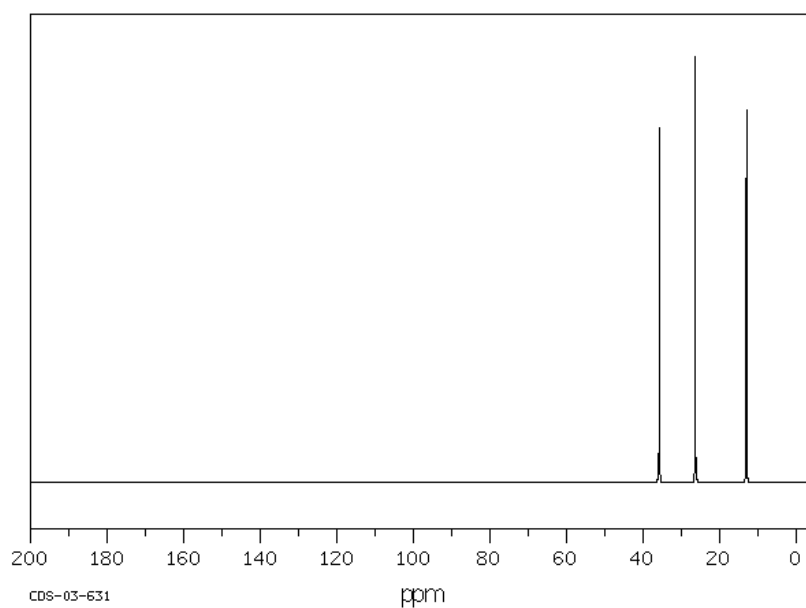
a)  $\text{C}_3\text{H}_7\text{Br}$

2-bromopropane



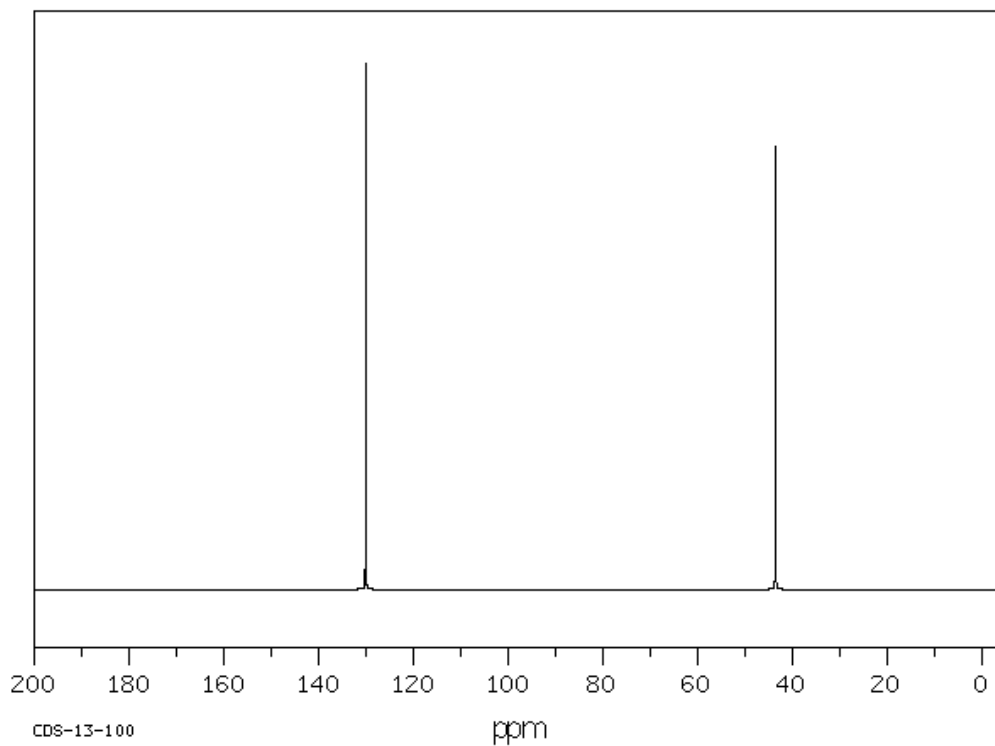
b)  $\text{C}_3\text{H}_7\text{Br}$

1-bromopropane



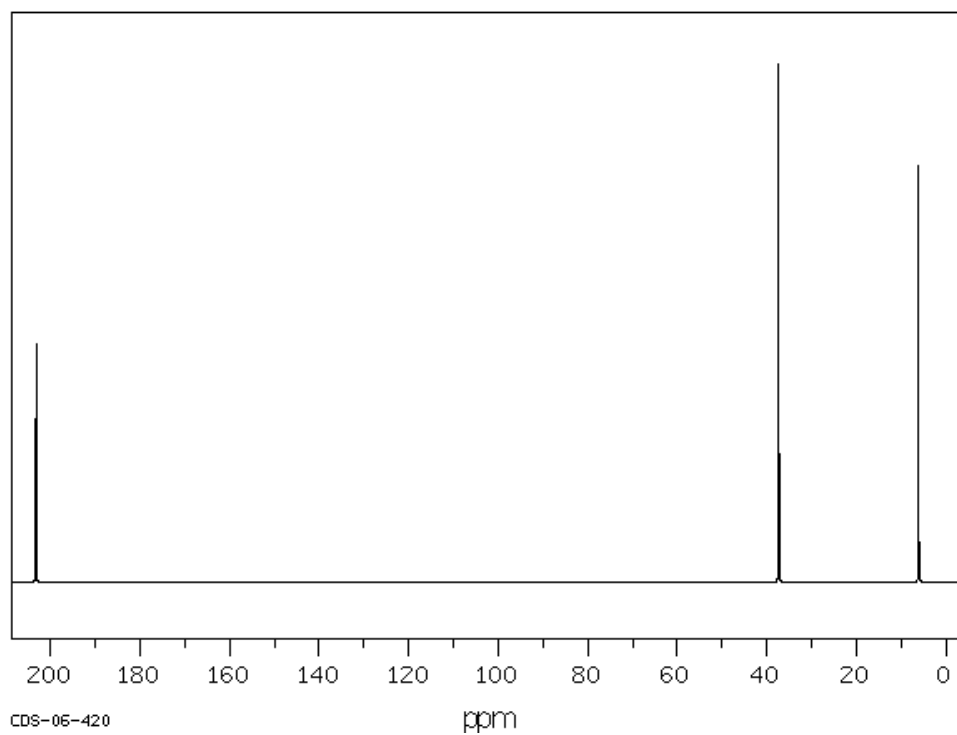
c)  $C_4H_6Cl_2$  (contains a  $C=C$  double bond)

2,3-dichlorobut-2-ene or  
1,4-dichlorobut-2-ene



d)  $C_3H_6O$  (contains a  $C=O$  bond)

propanal



### QUESTION THREE

There are four possible structures for an alcohol with the molecular formula  $C_4H_{10}O$ . Draw the structural formulae for all four alcohols and determine which one belongs to the following  $^{13}C$  NMR spectra

