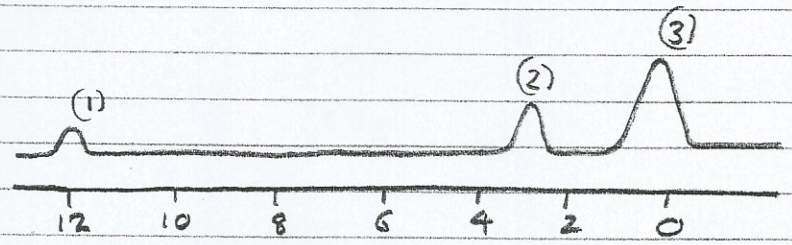
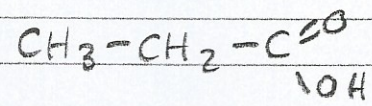
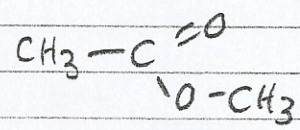
① Which molecule produced this low resolution spectra?



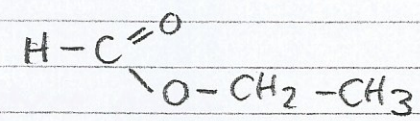
a) propanoic acid



b) methyl ethanoate

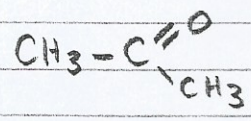


c) ethyl ethanoate



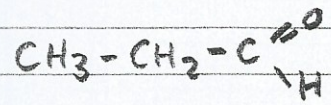
R-CH3	0.7 – 1.6
R-CH2-C(=O)-	2.0 – 2.9
-O-CH3 or -O-CH2-R	3.3 – 4.3
H-C(=O)-	9.0 – 10.0
-COOH	11.0 – 12.0

② How would you use low resolution NMR to distinguish between the isomers propanone and propanal.



propanone

1 peak

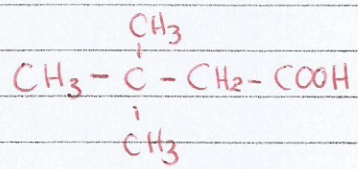


propanal

three peaks

3:2:1

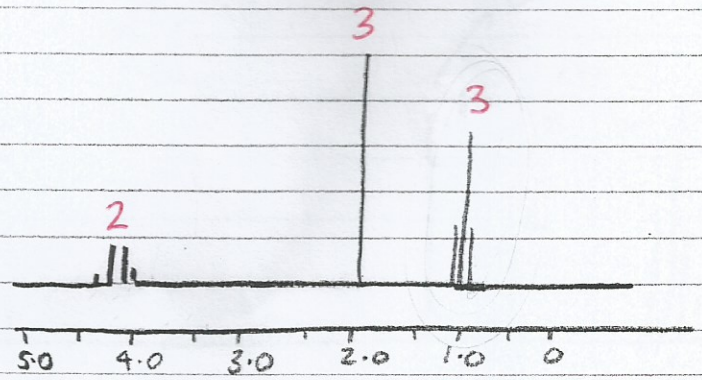
③ How many peaks would there be in the low resolution NMR spectrum of the following compound, and what would be the ratio of the areas under the peaks.



three peaks

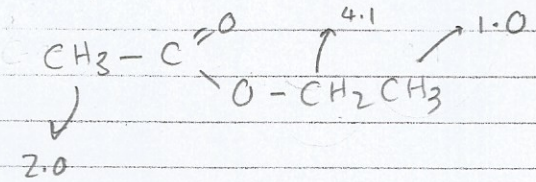
9:2:1

④



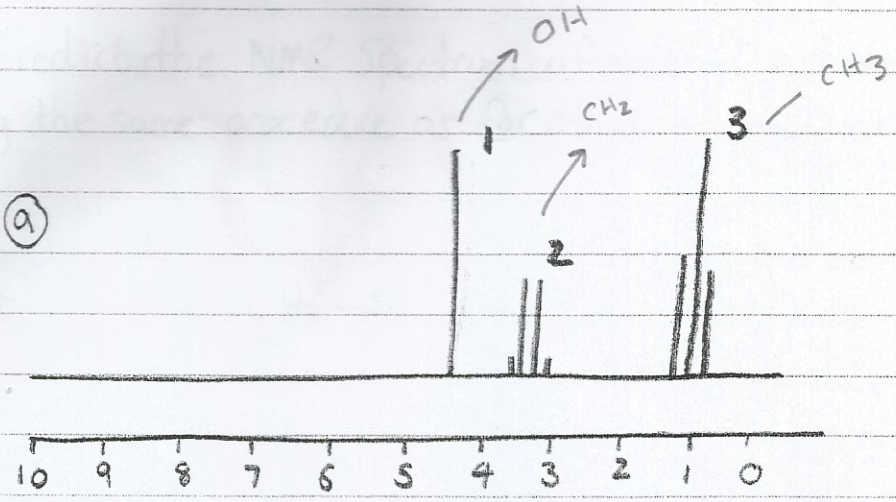
$C_4H_8O_2$

Draw the compound for the above spectra and explain how you came to this conclusion.



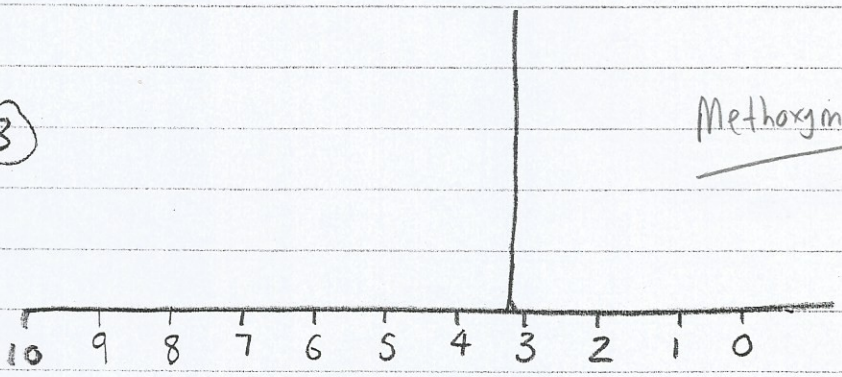
5

a

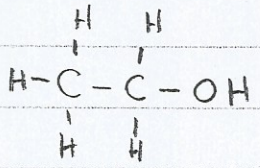


Ethanol

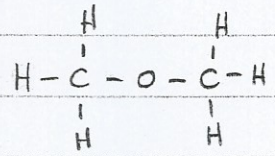
B



Methoxymethane



ethanol



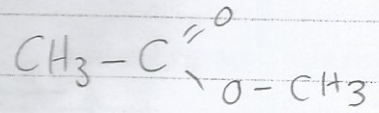
methoxymethane

a) Which spectrum represents which compound?

b) Say what type of hydrogen each peak represents. (use spectra tables)

c) How many of each type of hydrogen are there?

⑥ Predict the NMR Spectrum of methyl ethanoate, CH_3COOCH_3 using the same procedure as for ethyl ethanoate above.



2 peaks, CH_3-C ⓐ ⓐ 2 approx

CH_3-O ⓐ 3.3 - 4.3 ppm.