

## Marking scheme for Core Worksheet – Option A

- 1**
- a** band at  $3300\text{ cm}^{-1}$  due to O–H and band at about  $2900\text{ cm}^{-1}$  due to C–H bond [1]  
 no other bands above  $1500\text{ cm}^{-1}$ , therefore this is the spectrum of an alcohol [1]  
 [actually, the spectrum is of  $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{OH}$ ]
- b** band at  $3000\text{ cm}^{-1}$  due to C–H bond and band at about  $1750\text{ cm}^{-1}$  due to C=O [1]  
 no other bands above  $1500\text{ cm}^{-1}$ , therefore this is the spectrum of an aldehyde or ketone [1]  
 [actually, the spectrum is of  $\text{CH}_3\text{CH}_2\text{COCH}_3$ ]
- c** bands at around  $3000\text{ cm}^{-1}$  due to C–H bond and band at around  $1610\text{ cm}^{-1}$  due to C=C [1]  
 no other bands above  $1500\text{ cm}^{-1}$ , therefore this is the spectrum of an alkene [1]  
 as there is no O–H bond but there is a band in the  $1000\text{--}1300\text{ cm}^{-1}$  region this molecule also contains the ether functional group (C–O–C) [1]  
 [actually, the spectrum is of  $\text{CH}_2\text{CHOCH}_2\text{CH}_3$ ]
- 2**
- a** peak A at  $m/z$  122 [1]
- b**  $m/z$  77 is  $\text{C}_6\text{H}_5^+$  [1]  
 $m/z$  45 is  $\text{COOH}^+$  [1]  
 penalise missing '+' once only
- c** OH [1]
- d** COOH [1]
- e** benzoic acid/ $\text{C}_6\text{H}_5\text{COOH}$  [1]
- 3**
- a** C=O [1]
- b**  $\text{C}_4\text{H}_8\text{O}_2/(\text{C}_3\text{H}_4\text{O}_3)$  [1]
- c**  $\text{C}_2\text{H}_5/(\text{CHO})$  [1]
- d**  $\text{CH}_3\text{O}$  [1]
- e**  $m/z$  29 is  $\text{C}_2\text{H}_5^+/(or\text{ CHO}^+)$  [1]  
 $m/z$  15 is  $\text{CH}_3^+$  [1]
- f**  $m/z$  57 is  $\text{CH}_3\text{CH}_2\text{CO}^+$  [1]
- g**  $\text{CH}_3\text{CH}_2\text{COOCH}_3/\text{methyl propanoate}$  [1]
- h** 3 peaks [1]  
 in ratio 3 : 2 : 3 [1]

- |          |          |                         |     |
|----------|----------|-------------------------|-----|
| <b>4</b> | <b>a</b> | 2 peaks                 | [1] |
|          |          | ratio 6 : 1             | [1] |
|          | <b>b</b> | 3 peaks                 | [1] |
|          |          | ratio 3 : 2 : 1         | [1] |
|          | <b>c</b> | 5 peaks                 | [1] |
|          |          | ratio 3 : 2 : 2 : 2 : 3 | [1] |
|          | <b>d</b> | 3 peaks                 | [1] |
|          |          | ratio 2 : 2 : 1         | [1] |
|          | <b>e</b> | 2 peaks                 | [1] |
|          |          | ratio 3 : 2             | [1] |
|          | <b>f</b> | 3 peaks                 | [1] |
|          |          | ratio 3 : 1 : 6         | [1] |