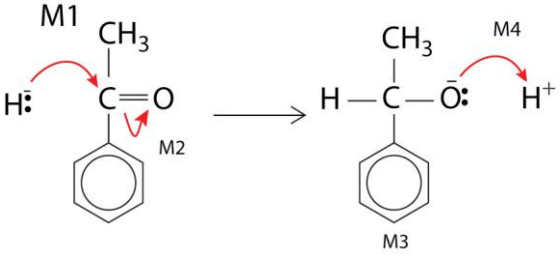
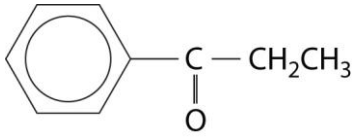
Answers to examination-style questions

Answers	Marks	Examiner's tips
1 a) Nucleophilic addition 	**1** **4**	This is not reduction Each curly arrow is one mark. However you can only get M2 if you get M1 first. One mark is given for the correct product structure.
1–phenylethan(–1–)ol	**1**	You can also say 1–phenylethanol but the number 1 is mandatory at the start.
b) dehydration or elimination conc H_2SO_4	**2**	Also accept conc. H_3PO_4
2 a) **Y** is :  The reagent is CH_3CH_2COCl / propanoyl chloride or $(CH_3CH_2CO)_2O$ / propanoic anhydride	**2**	The question asks for the reagent so you can put the name or the formula.
b) $NaBH_4$ or $LiAlH_4$ or H_2/Ni	**1**	Do not accept Sn/Fe with HCl here.
3 a)	**3**	There are several different reagents you can use. Look at the table and check the reagent you have chosen against the results given. One mark for the reagent and one mark each for a description of the expected result with each chemical.

Reagent	Tollens'	Fehling's	$K_2Cr_2O_7/H^+$ or acidified
Propanal	silver mirror	red ppt or goes red solid (hint: not red solution)	goes green
Propanone	no reaction	no reaction	no reaction

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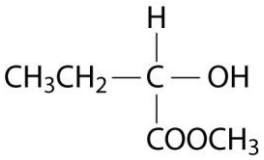
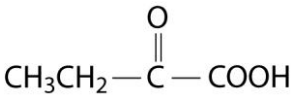
b) **X** is CH_3CH_2COOH or propanoic acid **Y** is $CH_3CH(OH)CH_3$ or propan-2-ol	**8**	If both name and formula given both must be correct.
Step 1 Oxidation $K_2Cr_2O_7/H^+$ heat or warm		$Cr_2O_7^{2-}/H^+$ is not a reagent. The $Cr_2O_7^{2-}$/ must be written as the reagent $K_2Cr_2O_7$
Step 2		There are several reducing agents that could be used. Check your reducing agent and the condition used with it from the Step 2 table.
Step 3 esterification or addition–elimination conc H_2SO_4 reflux or heat		The reagent must be correct to score the condition mark in all 3 steps. There are 9 available marks here but there is a maximum of 8 for part **b)**.
4 **a)** 	**1**	The acid part reacts with the alcohol to make an ester.
b) 	**1**	Potassium dichromate in acid is an oxidising agent so the secondary alcohol group is oxidised to a ketone.
c) $CH_3CH{=}CHCOOH$	**1**	The conc. sulfuric acid is a dehydrating agent so an alkene is formed.

reduction			1
$NaBH_4$	$LiAlH_4$	H_2	1
In ethanol or water or dry	dry	Ni	1

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5 a) nucleophilic addition **Q** contains asymmetric carbon or chiral centre; with 4 different groups/atoms attached; C=O is planar; so there is attack from each side; and this is equally likely; racemic mixture formed; which consists of mirror images or enantiomers;	**1** **6**	There are 7 answers for the part but you only need to get 6 of them to gain the available marks. The 7th mark is given for the name of the mechanism. You could say an equal amount of each isomer is formed.
b) conc. H_2SO_4 or conc. H_3PO_4 *E*–*Z* double bond or C=C two different atoms/groups on each C atom	**4**	You could say geometrical or cis–trans but *E*–*Z* is the better answer The question asks you to state so use words not a diagram.