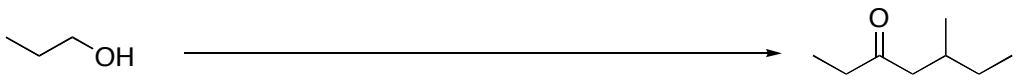
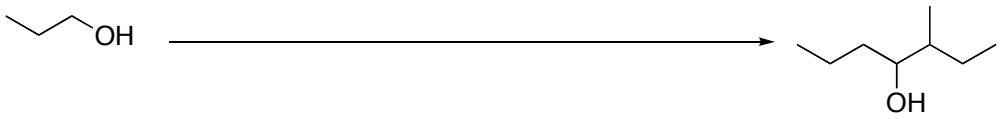
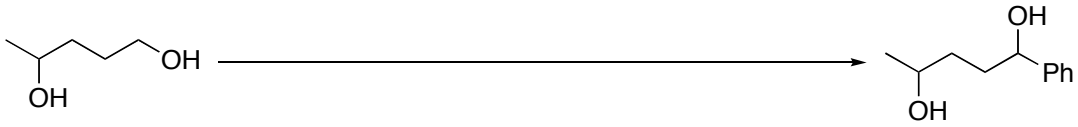
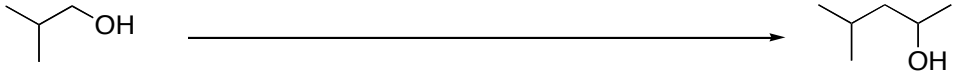
Several Students Asked for Additional Synthetic Design Practice Problems. Answers are at the back.

Provide the reagents necessary to accomplish the following transformations. Note: If you can make something via ketone or via ester, choose the ester.

1 

2 

3 

4 

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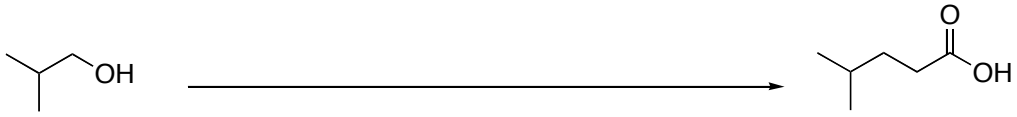
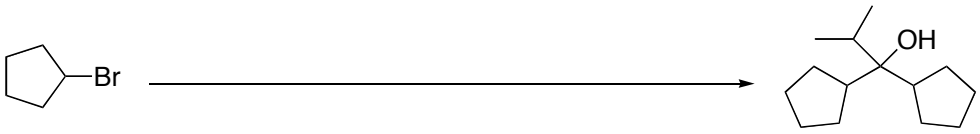
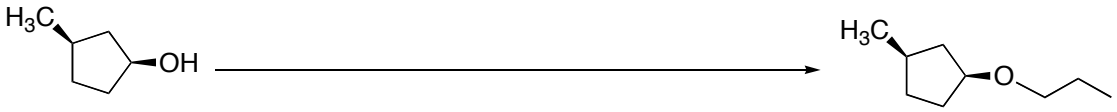
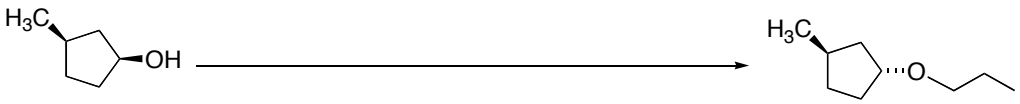
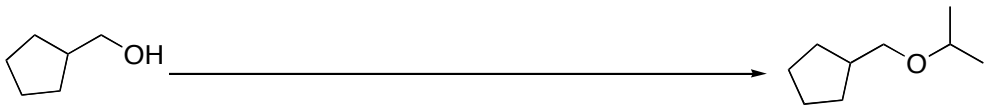
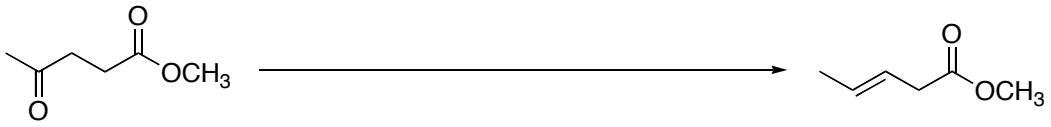
6 

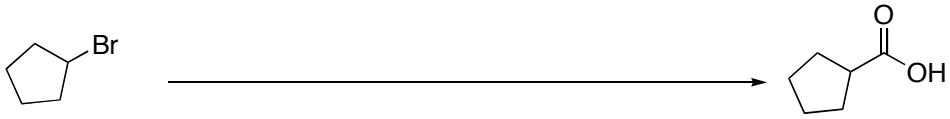
7 

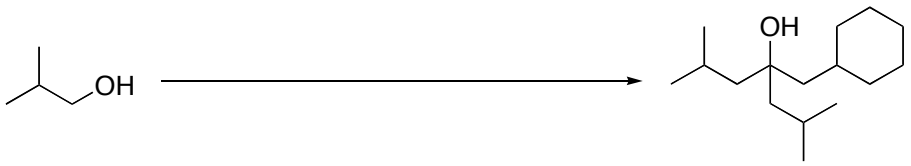
8 

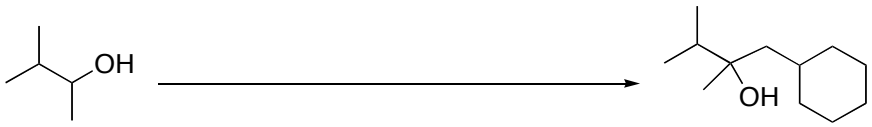
9 

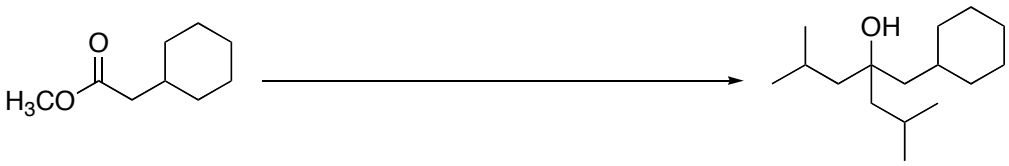
10 

11 

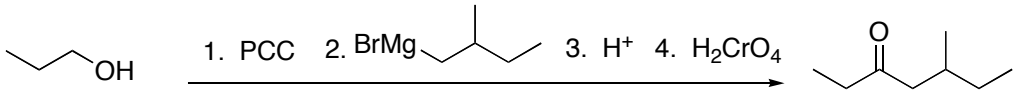
12 

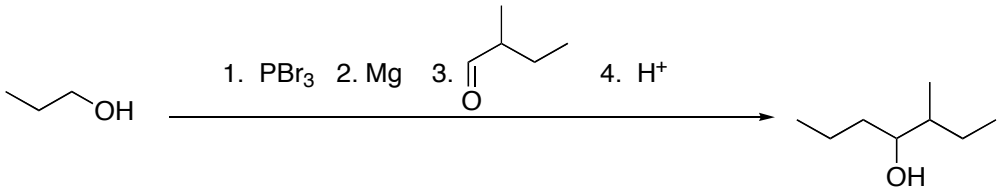
13 

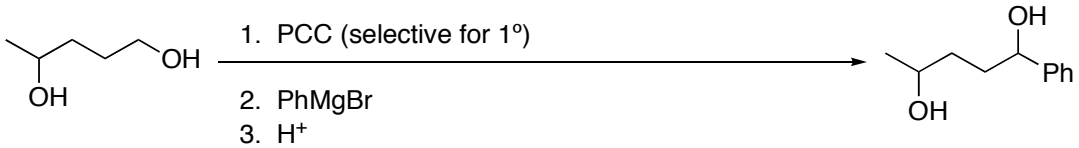
14 

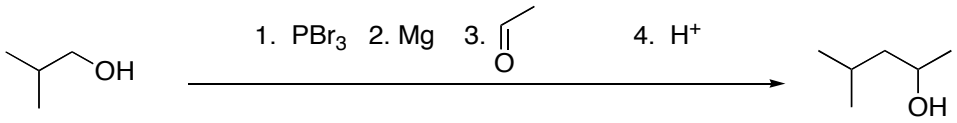
15 

Answers

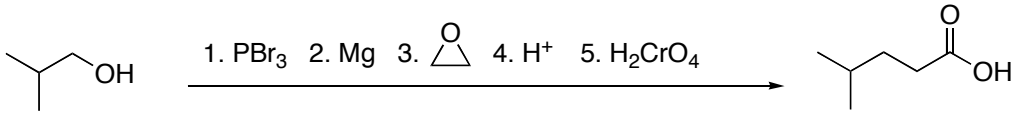
1 

2 

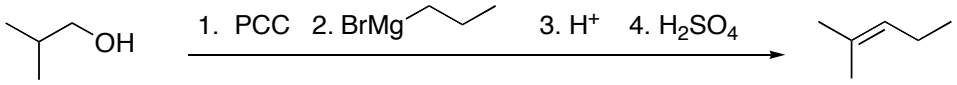
3 

4 

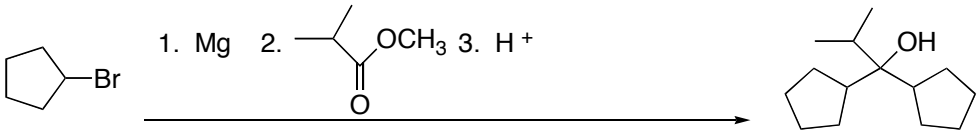
two-carbon aldehyde in this case

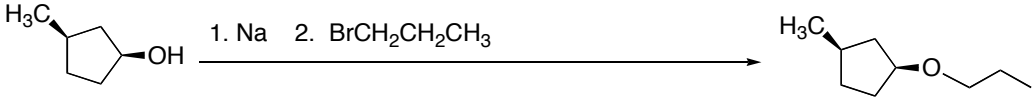
5 

two-carbon ethylene oxide is key

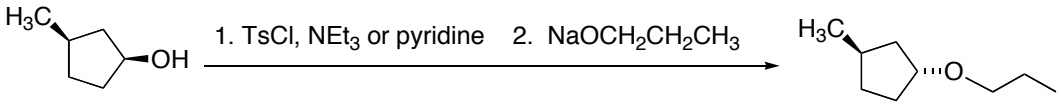
6 

two-carbon Grignard in this case is key

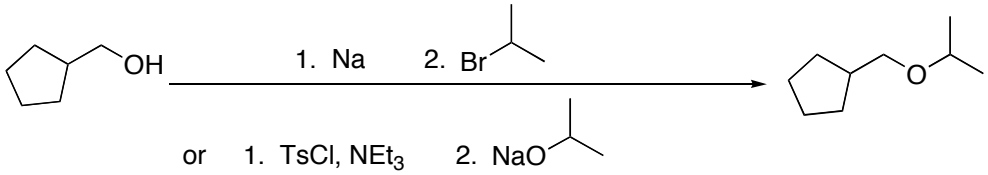
7 

8 

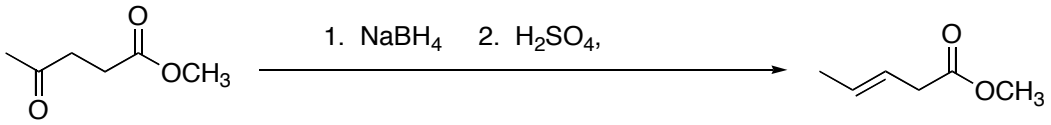
Note: retention on chiral center: convert alcohol to ether via alkoxide

9 

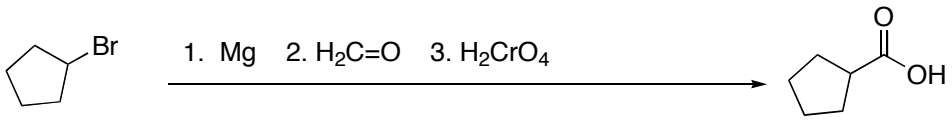
Note: inversion on chiral center: convert alcohol to ether via tosylate

10 

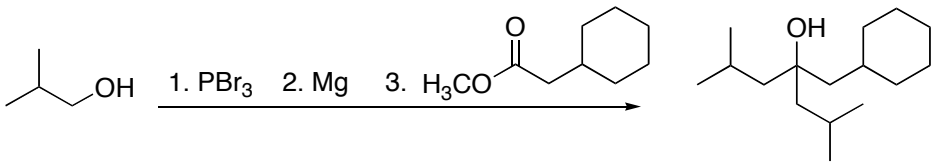
Note: On an alcohol to ether problem where no stereochem is involved, both the alkoxide or tosylate route work fine. Either one is OK.

11 

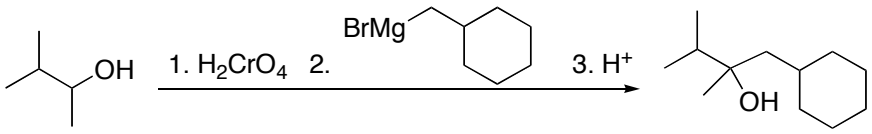
Note: selective reduction using the mild borohydride

12 

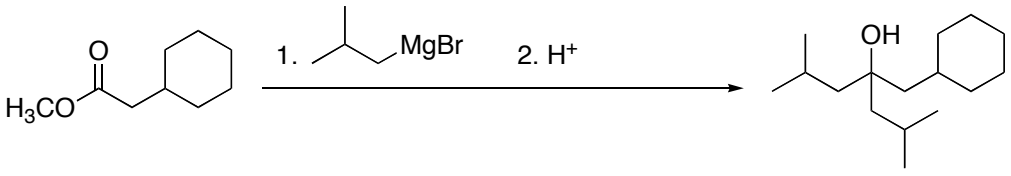
One carbon added, formaldehyde

13 

Tertiary alcohol, two common attachments → ester route. Note that you don't need to designate the 2:1 relative stoichiometry.

14 

Tertiary alcohol, no common attachments → ketone route.

15 

Tertiary alcohol, two common attachments, ester reaction