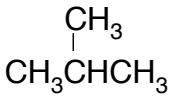
NAMING ORGANIC COMPOUNDS: 1

1. **Alkanes**

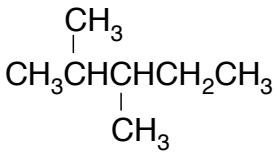
a)

(i)



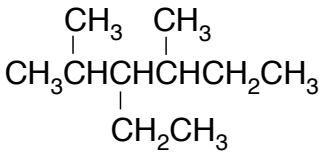
(You shouldn't really have got this one wrong. Unless you made a careless mistake (like putting too many or too few hydrogens on the middle carbon), if you got it wrong, re-read the bit about naming alkanes and then look at these questions again.)

(ii)



(It doesn't matter whether you have drawn the various groups pointing up or down, or if you have flipped the molecule end-to-end by numbering from the right-hand end of the longest chain.)

(iii)



(Again, it doesn't matter whether you have numbered from the right-hand end (and so flipped the molecule end-to-end), or whether the various side-groups point up or down.)

b) A is easy. It is a 6-membered chain (hex) with no carbon-carbon double bonds (an). The molecule is just hexane.

In B, the longest chain has 5 carbons (pent) with no carbon-carbon double bonds (an). There is a methyl group on the number 2 carbon. The molecule is 2-methylpentane. (4-methylpentane is wrong. You number in such away as to get the smallest numbers in the name.)

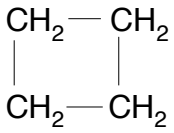
In C, the longest chain has 4 carbons (but) with no carbon-carbon double bonds (an). There are two methyl groups on the number 2 and 3 carbons. The molecule is 2,3-dimethylbutane.

In D, the longest chain has 5 carbons (pent) with no carbon-carbon double bonds (an). There is a methyl group on the number 3 carbon. The molecule is 3-methylpentane.

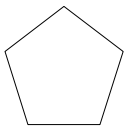
In E, the longest chain has 4 carbons (but) with no carbon-carbon double bonds (an). There are two methyl groups both on the number 2 carbon. The molecule is 2,2-dimethylbutane. (Even if they are on the same carbon, you must write both numbers, and include the "di". It is 2,2- rather than 3,3- in order to get the smallest numbers in the name.)

2. **Cycloalkanes**

a) (i)

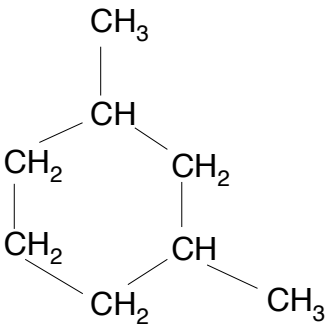


(ii)



(There is a CH_2 group at each corner. In an exam, you would, of course, write them in unless you were asked for the skeletal formula. It is just much quicker for me to draw a pentagon than all the individual CH_2 groups.)

(iii)



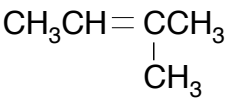
(Again it would have been quicker for me to draw a skeletal formula, but it is important that you can see how many hydrogens there are attached to each carbon. It is easy to put an extra hydrogen atom by mistake on the carbons with the methyl groups attached. It doesn't matter where you attach these groups around the ring as long as they are spaced as shown – attached to the next-but-one carbon atoms.)

b) These are cyclopropane and methylcyclopentane. There is no need to put a number in the second name, because it makes no difference whatsoever which corner you attach the CH_3 group to. You would just be rotating the molecule.

3. **Alkenes**

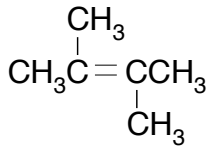
a) (i) $CH_3CH=CHCH_3$

(ii)



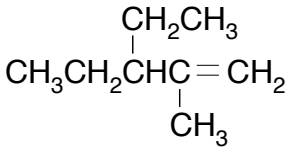
(It doesn't matter if you have numbered from the left-hand end, and attached the methyl group to the second carbon from the left rather than the second from the right. The only difference is that the molecule will have been flipped end-to-end.)

(iii)



(It doesn't matter whether your CH_3 groups point up or down. Make sure that you haven't drawn any hydrogens on the carbons with the methyl groups attached.)

(iv)



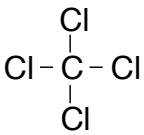
(Again, you may well have numbered this starting from 1 at the left-hand end so that you have drawn the molecule flipped end-to-end. It doesn't matter whether your methyl and ethyl groups point up or down. Make sure that you haven't put a hydrogen on the number 2 carbon.)

b) (i) Methylpropene. You don't need the number 2 because the methyl group can't be attached anywhere else. If you put it on one of the end carbons, your longest chain would then have 4 carbons, and so the name would be based on butene.

(ii) The longest chain is 5 carbons (pent) with a double bond (en). The double bond starts on the number 2 carbon. So this is 2,4-dimethylpent-2-ene. If you started numbering from the other end, your total of the numbers in the name would be bigger. So it's not 2,4-dimethylpent-3-ene. (Not that it matters hugely. The strictly incorrect name still enables you to draw the right structure, which is all that *really* matters.)

4. **Compounds containing halogens**

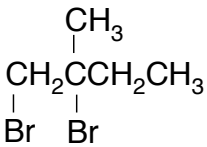
a) (i)



(ii) $CH_2=CCl_2$

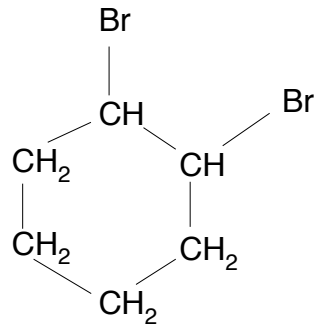
(You could put the two chlorines on the other carbon atom if you wanted to.)

(iii)



(As always, you could equally well have started numbering from the right-hand end, and drawn the molecule flipped end-to-end. You could also have drawn the end bromine in line with the rest of the chain as $BrCH_2$- or -CH_2Br if you had drawn it at the other end.)

(iv)



(It doesn't matter where you put the two bromines around the ring as long as they are next door to each other. Make sure that you haven't put too many hydrogens on the carbons with the bromines attached.)

b) Name these compounds:

(i) 1-iodopropane

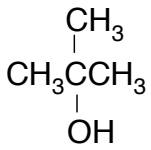
(ii) 2,3-dibromobutane

(iii) 1-fluoro-2-methylpent-2-ene (Count it as wrong if you have written the fluoro bit as "flouro"!)

5. **Alcohols**

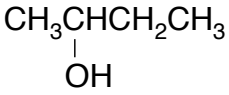
a) (i) CH_3CH_2OH

(ii)



(It would be fairly common to write this rotated through 90° so that the main 3-carbon chain was vertical and the OH group on the right-hand side.)

(iii)



(You could just as well have written the OH on the second carbon from the right.)

(iv) $CH_3CH=CHCH_2OH$

(In this case, the OH group would almost invariably be written on the right-hand end. If you wrote it on the left-hand end, don't worry about it. It is something you could only know with experience.)

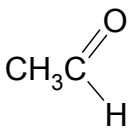
b) (i) pentan-1-ol

(ii) 2-methylbutan-1-ol

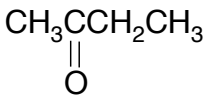
(iii) 3-methylbutan-1-ol

(iv) 2,2-dimethylpropan-1-ol

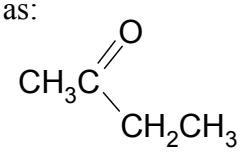
6. **Aldehydes and ketones**

a) (i) 

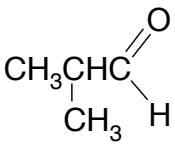
(The aldehyde group is always best shown like this, giving an impression of the way the various bonds are arranged in space.)

(ii) 

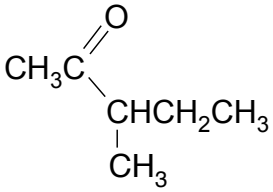
(It doesn't matter which of the two middle carbons you attach the oxygen to – it depends on which end you start numbering from. You might also draw this as:

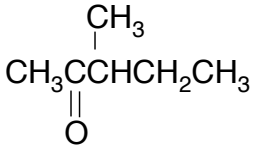


. . . perhaps also showing the bond between the first CH_3 group and the C=O group as a line as well.)

(iii) 

(iv) You could use one of these structures, both of which are correct, or some variation on them:





If you find this confusing, don't worry about it. With increasing experience, you will get to recognise different ways of drawing the same structure without too much difficulty.

b) (i) methanal

(ii) 3-methylpentan-2-one.

(iii) pentan-2-one

(iv) 3,3-dimethylbutanal. The aldehyde group has to be on the end, and is automatically given the number 1 carbon – you don't need to include that in the name.