BONDING IN ORGANIC CHEMISTRY - ORBITALS

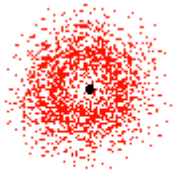
1. An orbit would be something like the path of the Earth around the Sun. At any one time, you would have to know exactly where the electron was, how fast it was moving, and what direction it was moving in. That is impossible according to the Heisenberg Uncertainty Principle.

   An orbital is a region of space in which there is some defined probability (often 95%) of finding the electron. It is impossible to know what it is doing within that space – all we know about it is its energy.

   If you still aren't sure about this, read the page:

   http://www.chemguide.co.uk/atoms/properties/orbitsorbitals.html

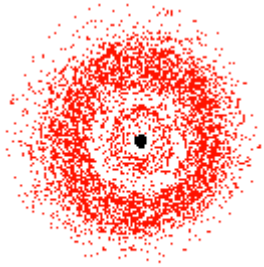
2. a) You need a simple diagram like the one from the Chemguide page:

   
   a 1s orbital

   You could equally well do this by shading rather than a whole lot of dots.

   You should say that this represents a cross-section through a spherical region.

   b) Either draw or describe the 2s orbital as on the Chemguide page:

   
   a 2s orbital

   Make clear that:

   - it is bigger;
   - the most likely place to find the electron is further from the nucleus;
   - there is a slightly raised chance of finding the electron closer to the nucleus than you might expect.

   c) Use a diagram similar to the one on the Chemguide page:

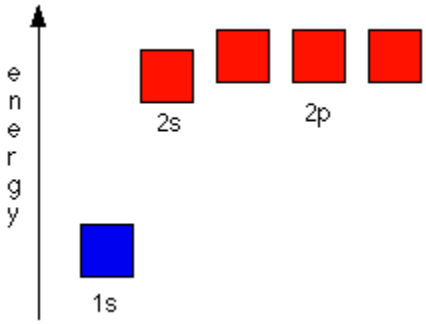
   
   a p orbital

   You could use shading rather than dots, but try to give some impression that this is 3-dimensional.

   It doesn't matter which direction you have this pointing.

   d) It will have the same shape, but will be at right-angles to the $2p_x$ orbital.

e) You need a diagram similar to the one from the Chemguide page:



Electrons will fill the lowest energy levels first, and the 2s orbital has a slightly lower energy than the 2p orbitals. Having two electrons in the 2s orbital gives a lower energy, and therefore more stable, atom.