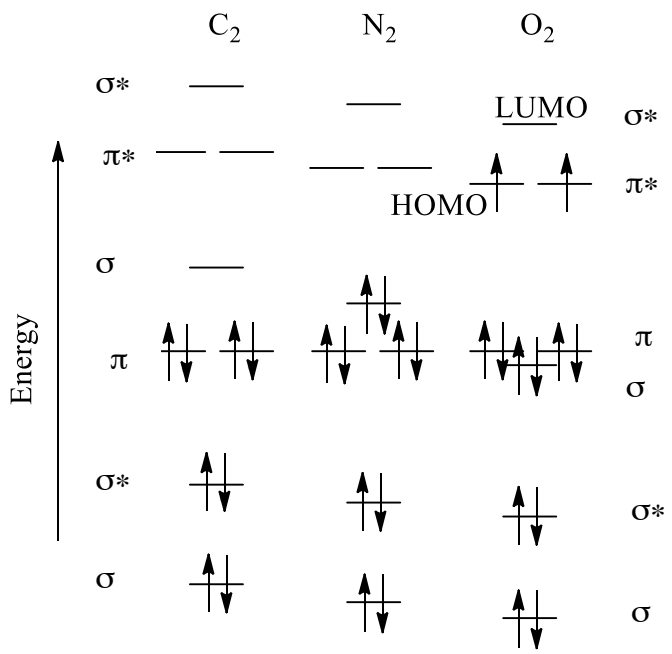
Marks 6

- The following diagram shows the molecular orbital energy level diagrams for the valence electrons in the homonuclear diatomic molecules C_2, N_2 and O_2.

  Complete the diagram by filling in the remaining *valence* electrons for each molecule and determining its bond order.



Bond order:	**2**	**3**	**2**

Explain why the energy of the lowest energy σ orbital shown above gets lower from left to right across the periodic table.

The atomic number of the elements increase moving across a period, reflecting an increase in the number of protons. This results in an increasing effective nuclear charge which pulls the electrons closer to the nucleus and lowers the energy of their orbitals.

Clearly label the HOMO and LUMO of O_2 on the diagram above.