

**Marks**  
**3**

- What are the structural differences between graphite and diamond and how do these differences impact on their physical properties? Mention at least three physical properties.

**Diamond is a covalent network solid with each carbon bonded to 4 others in a tetrahedral arrangement. Graphite consists of sheets of  $sp^2$  hybridised carbons, each bonded to 3 others in a trigonal planar arrangement.**

**Diamond is very hard as each atom is firmly bonded into its place in the crystal. Graphite is very soft and has a greasy feel as the sheets of carbon atoms are free to slide over one another.**

**Diamond is an insulator. Graphite can conduct a current in the plane of the sheets as the electrons in the unhybridised  $p$  orbitals are completely delocalised.**

**They have different appearances (diamond is colourless, graphite is black) due to their different electronic arrangements.**

**THE REMAINDER OF THIS PAGE IS FOR ROUGH WORKING ONLY.**