Topic 14: Bonding (5 hours)

14.1 Shapes of molecules and ions

1 hour

	Assessment statement	Obj	Teacher's notes
14.1.1	Predict the shape and bond angles for species with five and six negative charge centres using the VSEPR theory.	3	Examples should include PCl_5, SF_6, XeF_4 and PF_6^-. **Aim 7:** Interactive simulations are available to illustrate this.

14.2 Hybridization

2 hours

	Assessment statement	Obj	Teacher's notes
14.2.1	Describe σ and π bonds.	2	Treatment should include: 1. σ bonds resulting from the axial overlap of orbitals 2. π bonds resulting from the sideways overlap of parallel p orbitals 3. double bonds formed by one σ and one π bond 4. triple bonds formed by one σ and two π bonds.
14.2.2	Explain hybridization in terms of the mixing of atomic orbitals to form new orbitals for bonding.	3	Students should consider sp, sp^2 and sp^3 hybridization, and the shapes and orientation of these orbitals. **TOK:** Is hybridization a real process or a mathematical device?
14.2.3	Identify and explain the relationships between Lewis structures, molecular shapes and types of hybridization (sp, sp^2 and sp^3).	3	Students should consider examples from inorganic as well as organic chemistry.

14.3 Delocalization of electrons

2 hours

	Assessment statement	Obj	Teacher's notes
14.3.1	Describe the delocalization of π electrons and explain how this can account for the structures of some species.	3	Examples should include NO_3^-, NO_2^-, CO_3^{2-}, O_3, $RCOO^-$ and benzene. **TOK:** Kekulé claimed that the inspiration for the cyclic structure of benzene came from a dream. What role do the less rational ways of knowing play in the

			acquisition of scientific knowledge? What distinguishes a scientific from a non-scientific hypothesis: its origins or how it is tested?