SHAPES OF MOLECULES

VSEPR = Valence Shell Electron Pair Repulsion

- The valence shell electrons are important for molecular shape.

- Valence electrons are paired or will be paired in a molecule

- Valence shell electrons pairs repel each other

- The shape of a molecule is determined by the positions of the election pairs when they are a maximum distance apart.

3D Representation of bonds on paper

Bond	Appearance	Meaning
Solid line		The bond is in the same plane of the page
Dashed line		The bond is behind the plane of the page (away from the viewer)
Wedged line		The bond is our of the plane of the page (towards the viewer)

Using VSEPR theory to predict the shapes of molecules.

General formula	Bond pairs	Lone pairs	Total pairs	Geometry	Shape	Examples
AX_2	2	0	2	Linear		CO_2, CS_2
AX_3	3	0	3	Trigonal planar		BF_3, BH_3
AX_4	4	0	4	Tetrahedral		CH_4, SiH_4
AX_3E	3	1	4	Trigonal pyramidal		NH_3, PCl_3
AX_2E	2	2	4	V-shaped		H_2O, OCl_2

A is the central atom; X is another atom; E is a lone pair of electrons

Examples: Draw the Lewis structure and use VSEPR theory to predict the shape of each molecule.

a) H_2O b) H_2S c) $SiBr_4$ d) PF_3

e) BBr_3 f) NH_3 g) CO_2