Lewis Dot Structure and VSEPR Challenge

Form the same groups of four with whom you formulated problems over the weekend.

A. Draw the Lewis dot structure(s) for the following molecules. Be sure to include all <u>important</u> resonance contributors, but only the <u>important</u> ones.
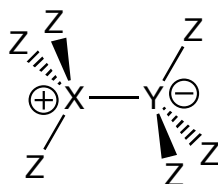**B.** Indicate the geometry at each atom, and indicate any deviations from idealized geometries.
(except terminal atoms)
You have only 25 minutes. Don't forget the EXTRA CHALLENGING problem on the back!

1. ICl_2^-

2. S_2N_2 (cyclic with alternating N and S)

3. N_2O

4. H_2SO_4

5. $H_2PO_4^-$

6. XeO_3

7. IF_5
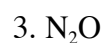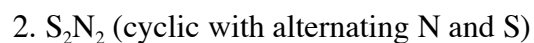
8. What elements could correspond to X, Y, and Z in the following Lewis dot structure?

$$Z\overset{Z}{\underset{Z}{\diagdown}}\overset{\oplus}{X} - \overset{Z}{\underset{Z}{\underset{Z}{Y\ominus}}}$$

Here is a reminder of the procedure for determining Lewis structures.

(a) Draw the ion/molecule without any bonds. The central atom is usually the least electronegative atom.
(b) Count the number of valence electrons in the whole ion/molecule. For ions, don't forget to include charges!
(c) Insert these electrons, using lines to represent shared pairs of electrons. Attempt to fulfill the octet rule; for atoms beyond the 2nd period, you may go over 8 if necessary.
(d) Assign formal charges to each atom: charge = (# valence electrons in free atom) – (# lone pair electrons on the atom in Lewis structure) – (# bonds to the atom).
(e) **Brainstorm.** Repeat steps (c) and (d) until you have found all reasonable Lewis structures.
(f) **Double-check.** Your Lewis structures should have the same number of groups around the central atom, same number of electrons, and same total charge. If so, they can be valid resonance structures.
(g) Prioritize your Lewis structures based on the following criteria, in order of decreasing importance: octets, maximum number of bonds, separation of formal charge, formal charge on atom with appropriate electronegativity.
(h) Create a "resonance" description of the ion/molecule with double-headed arrows connecting Lewis structures.
(i) Work out the geometries of the ions/molecules using VSEPR rules from class. Discuss any deviations from ideal geometry.