# Lewis Structures for Molecules using SINGLE BONDS

# STEPS – YOU MUST FOLLOW THEM!!!!!!!!!!!!

1. **COUNT** and sum valence electrons

2. **PLACE** your atoms

3. Bond all your atoms with **SINGLE BONDS**

4. Give all atoms a **FULL SHELL**

5. **RECOUNT** the number of e- (dots) used

6. **FIX IF NEEDED**
   - Used too few? ADD EXTRA TO CENTRAL ATOM
   - Used too many? FIX WITH DOUBLE and/or TRIPLE BONDS

# PLACEMENT SUGGESTIONS (for step #2)

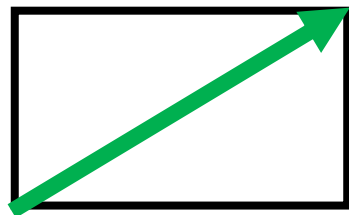1. **Hydrogen ALWAYS goes on the outside**
   - **Hydrogen can only make 1 bond because it can only have 2 electrons total.**
   - **It is a "dead end"**
   - **It "terminates" or "caps off" a molecule**

   **H H O** <span style="color:red">**NO!**</span>

   **H O H** <span style="color:green">**YES!**</span>

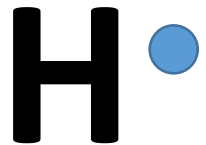2. **Least electronegative element goes in the center/middle/inside**
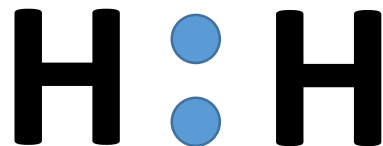   - **Usually...**

   **Fr < F**

   least    most

3. **Symmetry is good!**
   - **When possible...**

# Practice… $H_2$   2(1) = 2 ve- to draw

**Place your atoms**

H ●
H ●

**Not bonded!**

H : H

**Bond with single bonds**

**They are sharing! Each hydrogen thinks it has 2 v.e- and it only wants two!**
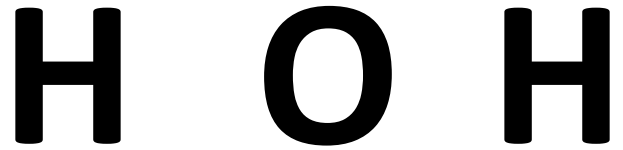
H – H
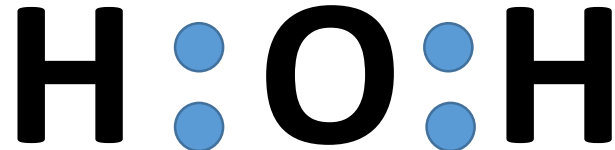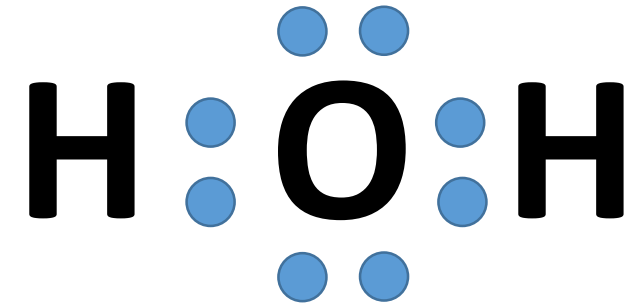
**Can replace two dots in a bond with a line**

# Practice... $H_2O$

$2(1) + 1(6) = 8$ ve- to draw

H O H

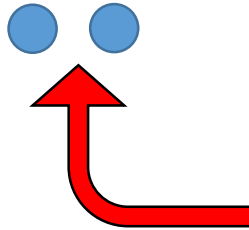**Hydrogen HAS to go on the outside, so oxygen HAS to go on the inside!**

H O H

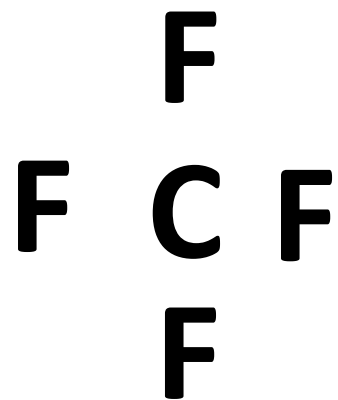**Give everything a single bond**

H O H

**Give everything a full shell**
**Hydrogen is already full!**
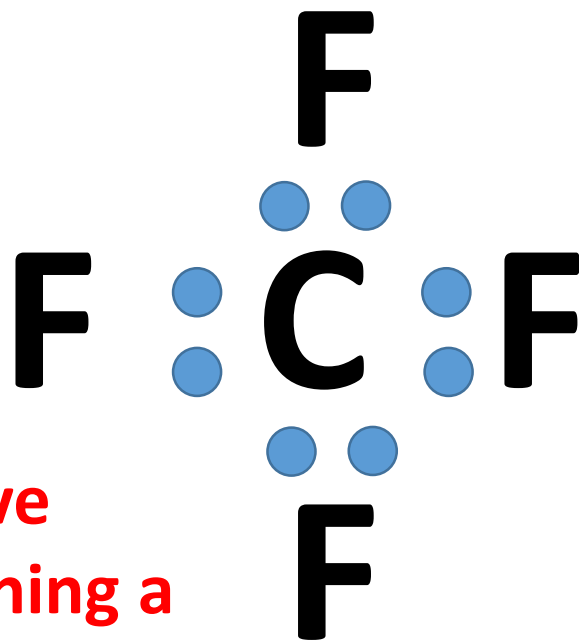
H—O—H
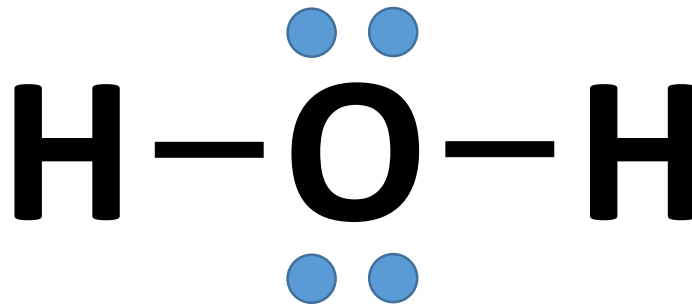
**"lone pairs" – have to leave them as dots!**

# Practice... $CF_4$
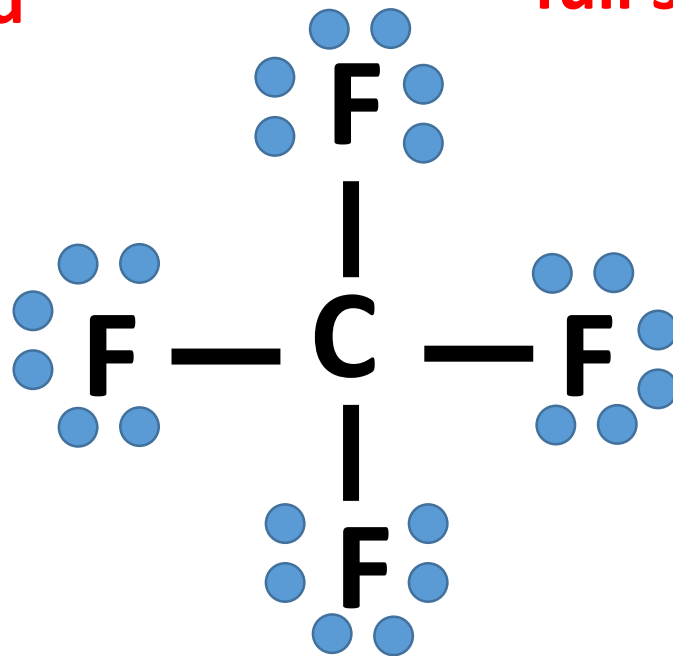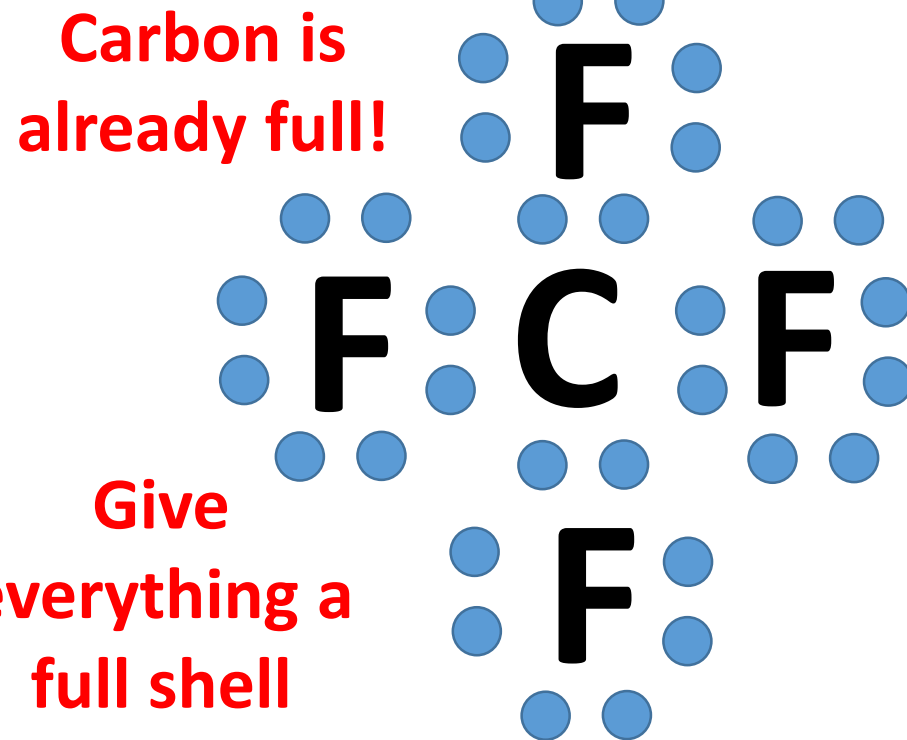
$1(4) + 4(7) = 32$ ve-
$= 16$ pairs

F

F C F

F

**Carbon is less electronegative so it goes in the center. Spread the fluorine atoms around the "sides of the box"**
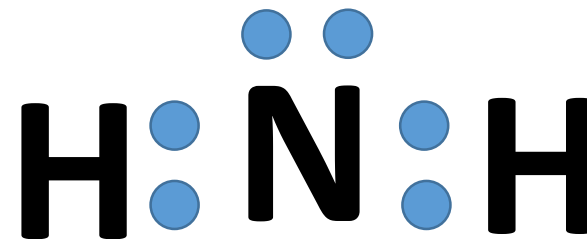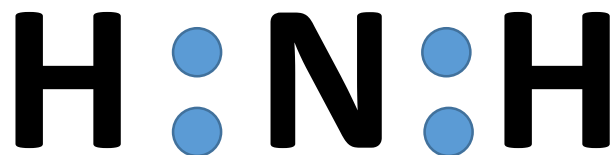
F

F C F

F

**Give everything a single bond**

**Carbon is already full!**

F

F C F

F

**Give everything a full shell**

F
|
F — C — F
|
F

# Practice... $NH_3$

$1(5) + 3(1)$ = 8 ve-
= 4 pairs

Hydrogen is already full!

H : N : H

H : N : H
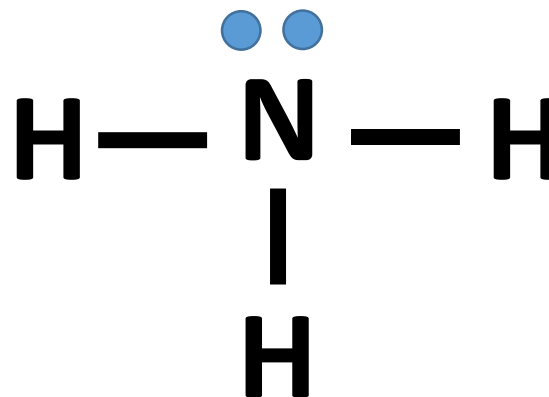(with dots above and below N, H below N)

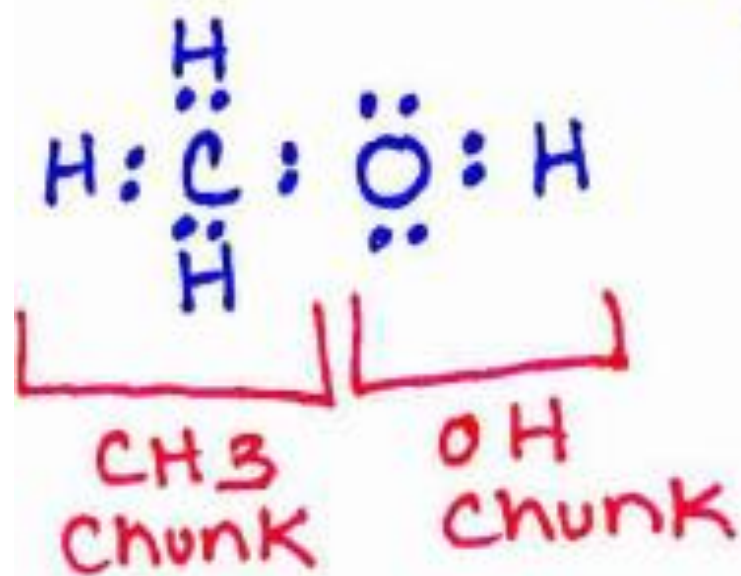Give everything a single bond

Give everything a full shell

H N H
H

Only element that can go on the inside is nitrogen since hydrogens have to go on the outside! Put hydrogens around it on the "sides of the box"

H—N—H
|
H

$\underline{CH_3OH}$ $(CH_3)(OH)$

$1(4) + 3(1) + 1(6) + 1(1)$

$= 14\ ve^- = 7p$

$7p\ \ddot{\smile}$

$H : \overset{\overset{H}{\cdot\cdot}}{\underset{\overset{\cdot\cdot}{H}}{C}} : \overset{\cdot\cdot}{\underset{\cdot\cdot}{O}} : H$

$\checkmark$

CH3
chunk

OH
chunk