>> Draw electron dot structures, also called Lewis Dot structures. It's really important when you're asked to draw electron dot structures that you count out your electrons. I know it seems silly, it seems redundant, but you're going to find, especially in what we're doing in the next couple of activities, that it's really important that you do this, because you'll find that sometimes you don't have enough electrons to see it through. So let's take this one, this one's a hydrocarbon, it's called ethylene, C2H4. We've got two carbons, so that's 2 times 4 electrons gives us 8 electrons. And we have four hydrogens, each hydrogen has one electron, so 4 times 1 is 4, for a total of 12 electrons. So when writing our Lewis Dot structure, remember we always draw our bonds first. So, we have our carbon, carbon, they're going to be the ones that are in the center, since hydrogen has to be on the outside, each one of those can only form one bond. So, the carbons are in the center, they're bonded to each other, and then they're also bonded to the four hydrogens. So you'll notice this is the bare backbone. Did we use up all our electrons yet? Two, four, six, eight, ten. No, we still have two more electrons. So let's go ahead and put those in. Okay? I put in my two electrons. This is very happy, it's got two electrons, this has two electrons, this has two electrons, this has two electrons. All the hydrogens are very easily satisfied. This carbon here, look what it has, two, four, six, eight. So this one has an octet, but what happened to this guy here? Two, four, six. Doesn't have enough electrons. Well, if we didn't take the time to count these electrons, this is what we would be doing; there we go, we're done. Okay? And it would be wrong. Why? Because we only have 12 electrons, this is showing 14. This is not what we have, we only have 12. So we have to figure out a way to make do with 12, and satisfy all of the elements. This carbon wants these, this carbon wants these. What happens when two people want to use the same thing? Well, they share, don't they? And so that's what we have to do with these two electrons here, we've got to put them between the two carbons so they can share them. Okay, now let's take a look. We've got two, four, six, eight electrons around that carbon, two, four, six, eight electrons around that one, and each of the hydrogens still have their two electrons. This is a very stable compound. Now, how can we draw that with lines? We draw it like this. The carbon has bonds to hydrogens, so those are single bonds, this carbon has single bonds to hydrogens. But look what we have, we've got four electrons. We know that two shared electrons make a single bond. So if there's twice as many, there's twice as many bonds. And so now instead of having one bond between these two carbons, we have two bonds. It's called a double bond, and it's very strong. So this is what acetylene looks like, this is what we have to do when we don't have enough electrons. And would we know we didn't have enough electrons if we hadn't counted them? No. And so it's really important, don't skip this step. Because I think when people make mistakes here, it's because I notice they skip this step. Let's look at carbon dioxide. Carbon has four electrons. We have two oxygens, so 2 times 6 is 12, a total of 16 electrons. I've drawn out bare bones here, so this is the backbone of it. Any of these elements could be the central element, but in this case carbon is going to be the central element, it's listed first, and it's also a lot of times the central element is the

one where you only have one of them. When you have multiple of some other type of element like two oxygens, that's usually going to be on the outside. So we have our structure here, and now what we want to do is put in the rest of the electrons. So we've used two and four, so let's go ahead and put them in. We've got six, eight, ten, 12, 14, 16. Hey, we're done. This oxygen has eight. I don't think we're done. Carbon only has two, four electrons, very unstable. What did we do last time when we didn't have enough electrons? Because like I said, it would be very easy to go ahead and draw those in, but we don't have them, they don't exist. So, since there aren't enough electrons for everybody to have their own eight, and with the sharing of two, we've got to go ahead and start sharing. So let's take these electrons here and share them. This oxygen now has two, four, six, eight, that's still okay. This carbon now has two, four, six. Getting better, still not the best situation. So, now it's time for this guy over here to do a little sharing. It's going to take these two electrons and share those with the carbon. Now let's see what happens. We have this oxygen with two, four, six, eight electrons, this carbon with two, four, six, eight electrons, oxygen, two, four, six, eight electrons. That is extremely stable. So if I were to replace now the four electrons with the double bonds, it would look like this. With carbon having double bonds to this oxygen, double bonds to this oxygen, and then each of these oxygens have their lone pairs, and either way would be correct Lewis Dot structures. So, what happens when you're doing electron dot structures and you don't have enough electrons? You start sharing.