**Solution: Acquire, analyze, and present**

(upbeat music) - [Narrator] Here's how I solve the challenge to acquire, analyze, and present a signal. I knew I'd be using a lot of Express VIs for this challenge, so I went to the Express pallet, and click the pen icon to keep it open. Now, the first VI I need is the simulate signal Express VI to simulate the sign wave for this challenge. That's in the input section. Simulate signal. I'll configure its settings according to the challenge instructions. It's already set to a sign wave, so I'll change the frequency to 80 hertz, the amplitude to five, and the offset to three. And click okay. Next, I'll need to low pass filter that signal I just simulated. So I'll access the filter VI from this signal analysis section. It's already configured to be a low pass filter, so I'll change the cut off frequency to 25 hertz, and click okay. I'll wire the output from the simulate signal VI into the filter VI. Now, to determine the peak to peak amplitude of these two signals, I'll use the amplitude and level measurements Express VI. The dialogue box presents me with a list of different measurements it can do. I only need peak to peak amplitude for this challenge, so I'll check that one and click okay. Now it has one input for the signals, and an output for the peak to peak result. I could make a copy of this VI so I have two instances of it, one to use for the original signal and one to use for the filtered version, but these types of processing Express VIs are actually designed to handle multiple input signals at once. To do that, I'll need to merge both of my signals together. So I'll go to the signal manipulation pallet, and select the merge signals function. I'll wire the original sign wave to the top input, and the filtered signal to the bottom. And then I'll connect the merged output, the combined signals, to the signals input of the amplitude and level measurements VI. The peak to peak output from that VI will be holding both of the amplitude results, so I'll need to unmerge them by using the split signals function. I'll wire the peak to peak result to that, and then expand it vertically to expose two output terminals. Now, to get the difference of those two values, I'll use a subtraction block from the functions pallet numeric section. I'll connect those. And finally, I'll need to display those signals on a graph and the difference in amplitude. I'll right click on the merged signals, and select create graph indicator. That adds a new graph indicator to my front panel. I'll stretch that out to make it a bit bigger. And on the output of the subtraction block, I'll right click and do create numeric indicator. And I'll rename that to difference because that's the difference in amplitude between my two signals. One last thing before I run this is I'll pass the error wires between these VIs. Notice that when I connected dynamic data to the subtraction terminal, it also created two error inputs and outputs for that. So I'll connect that as well. I'll press control space to open the quick drop search. Find a simple error handler VI. And place that at the end. And since all of this looks a bit messy, I'll click the block diagram cleanup tool to tidy things up. Now I can run this VI. I see the original signal in white, and the filter signal in red. The difference between their peak to peak amplitudes is 6.56. As you can see here, Express VIs make it possible to create programs to acquire or generate a signal, process and analyze that signal, and display the results in just a few minutes.