Video 2.1.1B Transcript - How to graph $y = 2\sin x$.

This video presentation is regarding demonstrating how to graph *y* equals two *sin x* by hand. We notice that our function, *y* equal to two sin *x*, is in the form of *y* equal to *A sin* of *Bx* minus *C* plus *D*. So our *A*, which is the amplitude, is equal to two. The number in front of *x*, which is our *B*, is equal to one where *C* is equal to zero, *D* is equal to zero. So whenever we graph a *sin* function by hand, we are ready to first determine what's our amplitude and then we need to determine what is our period.

The period is two *pi* over *B*. So since our *B* is equal to one, our period is still two *pi* for this *sin* function. So once we know our period is two *pi* we need to know when our function will start. So our starting point is *C* over *B*. In our case, since *C* is equal to zero over *B* is one, the starting point for the *x* value will be at zero. One other thing we also need to find out before we continue is taking your period divided by four. By taking the period divided by four that means so I'm actually looking at dividing my function into four equal parts. So since period is two *pi*, if I take two *pi* divided by four, I'm dividing my function into *pi* over two equal parts. In a minute, once I've graphed it, we'll see why, OK, we'll see why we had to take the period divided by four as well.

All right, so to find the five key *x* value we already know that the starting point is at zero already. Therefore the next *x* value will be x_1 was at zero plus my function divided into four equal parts which will then, which means my next point will be at zero plus *pi* over two, which will still be *pi* over two. So that's the *x* value of my second point. The third *x* value for my function will be the second *x* value, *pi* over two, plus another equal part: *pi* half. That'll make it two *pi* over two to result equal to *pi*. So my third *x* value will be located at *pi*. All right… the fourth one, which is the third point plus the equal part *pi* half, that would actually make it three *pi* over two. So the fourth value we'll locate at three *pi* over two. My last *x* value, which is the fourth one plus *pi* half, that will actually give me my two *pi*. So, by dividing my entire period by four, give an idea of the equal space between all my *x* values. Starting point at x_1 equal to zero the last *x* value should be where m y function will end at, which is at two *pi*. So this problem we want to graph from zero to two *pi* so the last *x* value should end up at my period two *pi* where the function will end.

So once I find the five key *x* values then we will find their corresponding *y* values. So we will plug in each *x* value into the function to find our *y* value. For the first one is *x* equal to zero. If I plug into my function *y* equal to two *sin x* then my function should look like *y* equals two times *sin* of zero. According to our unit circle *sin* of zero is equal to zero, so that would be two times zero, which would be zero. So my first point, the first ordered pair for my function, will be at zero, zero. Now we'll do the same thing for the rest of four *x* values. X_2 we found earlier is *pi* half, so that'll be *y* equals two times *sin* of *pi* half, and *sin* of *pi* half, according to the unit circle, will be one. So my *y* value will equal to two. So my second point *y* comma two. The third one, which is *x* value is *pi*, so that'll be *y* equal to two times *sin* of *pi*, and *sin* of *pi* is actually zero on the unit circle. So that tell me our *y* value is zero. So that give me *pi* comma zero for my third point. All right, the fourth *x* value that I found earlier was three *pi* over two. So plug into the function two times *sin* of three *pi* over two. Three *pi* over two, which is actually equal to negative one on the unit circle. Three *pi* over two is actually where two hundred seventy degrees is at; the *y* value is negative one. So here my *y* value for this particular *x* value three *pi* over two will be negative two. So my fourth coordinate three *pi* over two comma negative two. The last one is where my function will end, which is ends at two *pi*, so that'll be *y* equals two times *sin* of two *pi*, which *sin* of two *pi* is equal to zero. So that will actually my *y* value will be zero. So two *pi* comma zero is my fifth point.

All right… so, since the amplitude is two, basically for my *sin* function my *y* axis, my *x* axis, I divide my entire function into four equal parts: starting point at zero, zero. All right, amplitude is two so that tells me that my function relative maximum will actually reach two. So just kinda sketch it for you; here is two, here is negative two. My second *x* value is *pi* half comma two so let's say this is *pi* half: *pi* half, two will be right here. We'll plot it. The third one is at *pi* and the *y* value is zero, so when the function cross over the *x* axis that's where my *x* intercept occurs. And then the function continues, continues. The fourth point, which is located at three *pi* over two and the *y* value we found previously was negative two (oops, I used the wrong color…red…). And then, the last point, which is located at two *pi*, we find the *y* value is zero so that tells me my function cross back to the *x* axis. So if I will connect these dot points with a smooth curve that'll give me my *sin* function. All right, so basically what we see here starting point… starting point is at zero, zero. My relative maximum *pi* half, two… let me write that down… relative maximum… function curve back toward *x* axis, cross over the *x* axis at *pi* comma zero. So that's one *x* intercept. Reach then my function reach its relative minimum at three *pi* over two comma negative two… relative minimum, and the function curves back up toward the *x* axis, and the function ends at two *pi* comma zero - the other *x* intercept. So basically what I've got myself here is three *x* intercepts, a relative minimum, and a relative maximum.

All right, and this is how you actually draw *sin* function by hand. That will conclude this presentation.