Video 3.3A Transcript - Half Angle Formula

This video presentation is to demonstrate how to use the half angle formula. In the table I list the half angle formula for sine, cosine, and tangent. So, if I want to find the exact value of cosine of twenty-two point five degree, I will think of one angle on the unit circle divided by two that will somehow give me twenty-two point five degree. So, if you think about it, to find cosine twenty-two point five degree I can use forty-five degrees on the unit circle because forty-five degrees divided by two will give me twenty-two point five degrees. So, here I will use the half angle formula for cosine. So, that will be square root of one plus cosine forty-five degree over two. In front of the square root in the formula there's a plus and minus sign. The plus and minus sign represents the signs of the trigonometric function based on the quadrant that theta over two lies. Since theta over two, which is my forty-five degree over two, is in the first quadrant… so by being a cosine in the first quadrant it will be positive. So now, if we continue, recall cosine forty-five degree is equal to square root of two over two. Now I will rewrite cosine of forty-five degree as one plus square root of two over two; whole thing divided by two. All right, simplify my numerator (one plus square root of two over two)… the least common denominator is two. So, I will increase my numerator by two; that will give me two over two plus second denominator only increase by one time so that will still be the same (square root of two over two). Add up my numerator square root of two over two, denominator still over two. So now, inside my square root, my numerator just become two plus square root of two… over two… still divided by two. Now take my numerator divided by the denominator so… two plus the square root of two over two divided by two means times the reciprocal one over two, and that will tell me that the denominator will become four. Numerator stays the same, still inside the big square root. Since four is a perfect square, square root of four will give me a two in the denominator. Numerator stays the same (inside the square root), so that will be square root of two plus square root of two. So, square root of twenty-two point five degree we use forty-five degree on the unit circle divided by two to help us define the exact value: square root of two plus square root of two divided by two, and that will conclude this video presentation.