

CP-module2_lecture10_editedShayon

Mon, 12/27 3:01PM 12:32

SUMMARY KEYWORDS

equals, axis, graph, intercept, intersect, x intercepts, function, squared, $2x$, y intercept, x axis, solve, orange, subbing, put, color, y coordinate, point, mind, x equals

SPEAKERS

Catherine Pfaff

Welcome. In this lecture we're going to go through X intercepts and Y intercepts. This is one of these things to watch a little bit carefully, because students will tend to swap them. So we'll try to also be careful in how I color code things, so that hopefully, it'll help a little bit to imprint it in your mind. So let's go through, so what is a Y intercept? So a Y intercept. So a Y intercept is going to be where, and I'm going to do also my color coding a little bit different than normal to actually help help with this. So it's where we have that the graph, so my graph is now red, so where the graph is going to intersect the Y axis, so this is where it intersects the Y axis. It intersects the Y axis. So these are purposely both green. And so how do we find this? So that's the other important part is that you're going to find this by subbing in, so by subbing. And what you're going to want to sub in, is X equals zero. So X equals zero, you're gonna want to sub in X equals zero, going a little fast, and then things disappear into F of X.

So I'm going to show you this. Okay, maybe we'll even make that orange to indicate that that's where it's getting subbed in. So here we go. So let's look at an example. And we're going to start with, so we have our X axis. Oh, okay, what we're doing the example of, that's usually good to start with. So we want to look for the Y intercept. Okay, and it's going to be for F of X equals $X^2 + 2X - 2$. So I have my X axis, and I have my Y axis. Y axis. This is my X axis. And in fact, actually, I want to make my Y axis go down a little bit further.

So here's the balancing act so that I don't make it go down so far that I don't have any room below, but it goes down far enough. And I've got, so the graph of this function, I've you know, looked at a graphing calculator, or you can actually just Google you know graph of, and then put in that function, and it will just show you. So here we go. So this is the graph. So this is Y equals, so it's right there. So it's X^2 , plus more, pronounced $2X$ minus 2. Okay, so now what we need to do, so we do indeed need to sub in. So we're going to sub, so I'm going to sub X equals zero. And I'm going to sub it into this function. So I'm going to sub it into my function here. So I have F of X equals, right, and then I have well, okay, so it's $X^2 + 2X - 2$. Okay, but I know that what I'm really putting, so this X is, this X and this X. And I do my typical thing of using parentheses first. So we'll do that. Where I first write this, where everytime is the X, I put parentheses, square that, and then plus 2 times X minus 2, and then I do put this X equals zero into each of them. And what I'm going to get out is

going to be this minus 2. So this is going to equal minus 2. Okay, and then that's actually going to be on here. So this level is minus 2. The point, right, you might be interested in what exactly is this point? And that's a good thing to have in mind as both what level this is at, like what is my Y value, and what is the point all together. So I'm going to give you both of those. So I'm going to put my minus 2 over here to give me a little room for that. So this point is actually well, its X coordinate is zero, and its Y coordinate is minus 2, okay? So the answer, right and this minus 2 came from here, so this minus 2 is going to go, that's precisely right that level there. Okay, um, so my Y intercept is equal to minus 2, so my Y intercept.

So I'm going to write it as equal to minus 2, some people might write it as the point zero minus 2. So it's good to know that both of those are answers that some people may give, okay? But it's just where your graph is going to intersect the Y axis. So you have to keep that in mind. Try to keep these pictures in mind and so on. Why does this end up confusing? Because you're subbing in X equals zero, but, right, if I want to intersect the Y axis, then my X is equal to zero. That's how I live on the Y axis. Okay. So now let's look at X intercepts. And this is not a mistake that when I'm talking about X intercepts, that I actually have a S there. Because often there's more than one of these, unlike your Y intercept, you're only going to have once. As long as your function is a function, right, just by the vertical line test, right? You can't cross this axis twice and still be a function, okay? So this is where the graph intersects so where the graph is going to intersect. So this is where it's going to intersect the X axis. Which is why it's orange. X axis is usually orange, um, to, to remember that, okay, and it's good. Remember the pictures to help keep these straight also. Okay, um, so how do we find it we find by setting right, that we have that F of X is equal to zero. So we're looking for where that equals zero. Okay, so instead of sticking zero in now we're setting it equal to zero, okay? And then solving for X. So and solving for our X value, okay.

So here we go. Example. Okay, so the X intercepts, we're looking for the X intercepts. Okay, and we are using a slightly different function, okay, so these are for, then we have F of X equals X squared minus 2X minus 3, okay. And we have our orange axis. So here's our X axis, okay, um, and our Y axis. So this is gonna be our Y axis, and then our graph is going to be okay, so this is going to be Y equals F of X equals X squared minus 2X minus 3. Okay, and then, so we need to solve for, so what do we need to do now? So we need to solve for X. So we're going to solve for X where we're going to have with, with and then we have F of X equals zero. So F of X equals zero by factoring. Okay, so let's go ahead and do that. So if I have the function, so I have X squared minus 2X minus 3 is equal to zero, we're kind of keeping that consistent in color just to emphasize what we're doing, or to help you organize your brain. So this is X plus 1 times X minus 3 equals zero. Okay, um, so the zeros, so the X intercepts are, so my X intercepts are going to be right, this zeros and so when we factor we can tell that the zeros right, we do the opposite sign of those, so minus 1 and 3 are X equals, so you have minus 1 and 3.

Okay, so now let's look at those here. So this would be my minus 1. So I could tell that I had one of each sign just by looking at the graph even. And then if we want to know what those points are, right. So this point here would be, well its X value is minus 1, and then its Y value is zero, this is going to be true, right, for both, for all the intercepts here. As opposed to that one where the first coordinate had to be zero, this one we knew the second coordinate had to be zero because of what we were solving for. So that shouldn't surprise us. Okay, in here, this one, the point is actually 3, and then zero. Okay. Okay? Um, so what do we have going on here is that we have, well, and maybe also because I put

these there, I'll do the same thing here where I'll kind of emphasize that this, these were showing me, but we can see the other ones over there. These are showing me, so in the case of a Y intercept, this is where I intersect the Y axis. What are the, what is the Y axis? It's all points where X equals zero. So I need to set X equals zero, and then see what I get out. The X intercepts are where I intersect the X axis. And what is the X axis? It's where Y equals zero. So I have to set the function equal to zero. Sometimes you'll have to factor, maybe you'll use a quadratic formula or something like that. Okay. So, I hope that made some sense and I will see you in the next lecture.