

PfaffModule9L14

Mon, 2/21 2:51PM 7:03

SUMMARY KEYWORDS

proportional relationship, plot, intensity, squared, light, trick, distance, supposed, inverse square law, talk, line, light source, height, axis, approximates, logarithm, falls, spaced, situation, exponential

SPEAKERS

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Welcome. We've been talking about a lot of growth that relates to exponential logarithm and so on. I wanted to talk about something that's a little different. This is another form of kind of decay in some sense. And so what I wanted to do is to talk about the inverse square law. And then we wanted to look at, you know, this is a point light source example, where we have some kind of distance from the light source. And then we know that this is how the intensity looks, and then we want to understand is the inverse square law apply. And kind of the trick to this that we're going to do is we're actually going to plot, so on the bottom, so that's my D. So I'm actually going to plot $1/D^2$ down here. And then on the other axis, I'm still going to plot the light intensity from like right there.

And then, of course, what I need to figure out is if there's a proportional relationship, or whether in other words, like between this whatever D^2 and this light intensity, or in other words, whether I get a line when I plot these, okay? And so here I have like 20, 40, 60, 80, 90, 100, 120, were vaguely suppose to be equally spaced. Okay? And then similarly, so down here, I'm going to have, so I have point, so I have .001, .003, .005, .007, .009, and then .01, okay? And those would be values for $1/D^2$. I'm just going to, I want to shift this just a little bit so that, you can see very clearly that this axis is my $1/D^2$ axis. Okay, and then where the points end up living is, so having kind of plotted this before, I'm going to get, right, because we kind of start with, so what, this would be like $1/100$. So that's actually like above here. And that's kind of, you know, it feels a little funny, but we're actually kind of starting over there. And then that one's going to be the one that's at like, height 120. And then another one that's kind of easier is $1/200$, so is like $1/400$. So that one actually kind of falls over here, and that one's at 54. Somewhere like that. The rest of them, I'm just going to kind of put in for you because it's a little harder to do them off the top of your head. So we've got something kind of around here, that's going to go, so 1, 2, 3, 4, 5. Okay, so there's one that's a little above here.

And then there's going to be another one that's kind of like above here, and it's going to be like this. And then I think this one ended up a little high. So I have 1, 2, there should be one that's in between these two, right? That should lie at, oops. Oh, I see, that one's supposed to be, that was why it's kind of, right, so the one that went there should be at about 30. There we go. Like these are not forming a line as they're supposed to. There should be one that's about here. That's going to be at that's the

one that's at 54. Okay, and then if you kind of look at these, right, so we're actually happy here, okay, because there is a proportional relationship. So they're, right, this does look more or less like a line. Kind of, you can almost fit this with a line here. So there is a proportional relationship. So there is a proportional relationship.

Okay, between, right, this $1/D^2$ and the intensity, right? So the inverse square law is, you know, a good fit for this situation. Okay? So the inverse square law is a good fit. Okay, so this is just a difference or circumstance because sometimes there are different there are a lot of different things that satisfy the inverse square law. So, a lot of times you want to try to figure out which function best approximates the situation. And in this example, this is kind of cool because it's a different law, and so this does work for light. It works for other things, too. One of the things to notice that we did here, which was a little bit tricky, is I didn't just plot distance here, I actually plotted one over distance squared, and then aligned that with the light intensity, and I saw that they I actually was getting a proportional relationship. So this is kind of a nice trick. That actually, this particular example, my, there's a PhD student Rebecca Carter working with me, who actually came up with this example. And I saw it, I really liked this trick that she used of plotting $1/D^2$ versus the light intensity. So instead of trying to do the distance and then trying to see that you're getting this relationship, okay? So, I hope that made some sense, and I will see you in the next lecture.