CLIP 1

Matthew introduces equation at 18:16, saying "So this would- this would be like a sine E to the negative X, right?... With some sort of constants involved somewhere."

Lincoln -- 00:18:57.71
We'll probably have to have a constant outside. There's like a, I wonder if it's just sine, 'cause it-

Kurt -- 00:19:05.77
Well literally the exponential term, okay if you- the exponential term is like the magnitude of it

Lincoln -- 00:19:11.42
Yeah

Jackson -- 00:19:11.68
sort of controls the direction

Kurt -- 00:19:12.68
Yeah, so like that's- the- the exponential term is what makes it shrink, the amplitude, because you're that sine, which would go on forever, unless you shrink that exponential...

Lincoln -- 00:19:19.81
Yeah yeah yeah. That's what I was trying to think if it's going to be a sine of the E to the X function or is just sine of the X, then (with placement gesture)

Kurt -- 00:19:24.34
It's E to the X, yup.

Jackson -- 00:19:25.97
Yeah, 'cause the sine of the X dictates the uh, the actual motion

Lincoln -- 00:19:28.74
Yeah

Kurt -- 00:19:28.76
Is the- is the actual sinusoidal thing going on

Lincoln -- 00:19:30.49
And then your E to the X is your um (gestures with fingers about envelope)

Kurt -- 00:19:33.02
Is the actual amplitude of each of that

Lincoln -- 00:19:34.38
Yeah

Kurt -- 00:19:34.45
which eventually the amplitude goes to zero, so.

Matthew -- 00:19:37.31
Yeah.

Lincoln -- 00:19:37.33
Oh yeah, 'cause isn't, um- wasn't the equa- the original spring equation A sine X...

Kurt -- 00:19:42.15
Yeah, you have that amplitude, yeah, exactly.

Lincoln -- 00:19:42.85
like in like 121 or whatever the hell it was, yeah

Kurt -- 00:19:45.77
So that A- you have- so that A term but now you also have that E to the negative X

Lincoln -- 00:19:47.59
Yeah

Lincoln -- 00:19:49.15
Well I think that A term is your E to the- or the E to the negative X is your A term.

Kurt -- 00:19:51.43
Yeah, w- technically, that- that's- the A term if that represents the full amplitude then that's exactly

Matthew -- 00:19:53.31
(nods)

Lincoln -- 00:19:56.16
Yeah.

Kurt -- 00:19:58.13
'cause that's what it is.

Matthew -- 00:20:03.16
It would be like sine omega X or something, or whatever that

Lincoln -- 00:20:05.49
Yeah, I think your- so your- I think your ending equation would be some form of A E to the X sine X, because you'd need some-

Kurt -- 00:20:13.64
But I think it's a negative X, E to the negative X, because it's (inaudible but with gesture).

Lincoln -- 00:20:16.33
Yeah yeah. It would need to be because it needs to go to zero instead of infinity. And then you'd (inaudible)- 'cause when this is zero, that would be one, that would be your initial, yeah.

Clip 2

Lincoln brings up solving for the simple harmonic oscillator at 24:34 saying, "Well, I'm trying to think, if you were to try and like- If you were trying to set up an equation for this, would you want to set up just a general, um, harmonic, you'd want to like, first you'd need to solve the equation for harmonic oscillation."

Lincoln --00:25:27.64
Because like what we did with like, what we did with something falling is first we set up the equations for something falling completely regardless of air resistance, and then we put on, then we included your term for air resistance after we had a governed term regardless of air resistance.

Matthew -- 00:25:48.18
Yeah.

Lincoln --00:25:49.00
Because I think that what we can look at is, we can say that, say, this, um, this like amplitude right here is g- this a- like this one over here is gonna be some percentage of this one. And I think by if we could first get a- just a general, like first like you wanna just get your general equation of harmonic oscillation

Kurt -- 00:26:13.28
Yup.

Lincoln --00:26:13.90
And then, once

Matthew -- 00:26:15.28
Oh, you're trying- you're trying to solve for that term that'll govern it decreasing?

Lincoln --00:26:19.93
Well yeah, 'cause I think what you need to do is solve for each of these independent- like each- these two things independently and then once they come together they give you the- like 'cause you're gonna need a separate equation- um, completely independent of your harmonic oscillation to govern the dampening of it.

Matthew -- 00:26:37.45
Oh, okay. I see what you're saying, yeah.

Lincoln --00:26:38.46
'Cause like you're gonna have like harmonic oscillation

Kurt -- 00:26:40.73
Yeah, because the dampening effect is- is nothing to do with your harmonic oscillation.

Lincoln --00:26:43.72
Exactly. 'Cause harmonic oscillation's completely univer- like simple harmonic motion, for instance, has like governed principles that

Kurt -- 00:26:51.35
For- for example when we look into the air resistance things we have our mass times gravity

Lincoln --00:26:57.17
Exactly

Kurt -- 00:26:57.27
minus our cv term, we just hang on that cv term

Lincoln --00:27:00.35
Exactly

Kurt -- 00:27:01.07
and this is the case with this where we have that governing which is the sine of (inaudible)

Lincoln --00:27:05.44
Yeah, I think

Kurt -- 00:27:06.25
which, in that sine will always-

Lincoln --00:27:08.59
that's

Kurt -- 00:27:08.66
you can't change the frequency of that sine wave

Lincoln --00:27:09.73
Exactly

Kurt -- 00:27:10.63
so that's saying that this- that's the frequency, which is the per- which can also be related to the period that way, will be staying the same here. The only thing that you can affect externally to the sine wave

Jackson
00:27:20.84
Oh, is the actual (inaudible) (tracing gesture)

Kurt -- 00:27:20.97
is the amplitude

Lincoln --00:27:22.02
Exactly.

Lincoln --00:27:23.05
S- 'cause w- I think it- what its doing is, we're basically- simple harmonic, I- I think, like, this sine x is our simple harmonic motion, like describes our simple harmonic motion, and we're- that's what we're experiencing i- like, without this term.

Jackson
00:27:38.07
e is just the constraints.

Lincoln --00:27:39.23
Exactly, by putting e to the x in there, now we're- this is our dampening right here. And that's gonna govern this shrinking.