Now this is video three, in setting up Mathematical Methods application task. We've already identified the context. We've already looked at assumptions, variables, the functions, we've put some parameters in. We've looked at constraints and conditions.

What we do now, is we try to actually in component to stretch the students out. To look at questions of interest and analysis. Now the students might have their own questions of interest, or your questions can lead them into a question of interest. Like I said before, how quickly would you want a drug, if you're in ICU in the UK, how quickly would you want the drug to work? Would you want it to work within three minutes, two minutes, 10 minutes? And so that's a question of interest which alters where the maximum point is.

We identify the relevant content and we state the analysis and others. What we're doing is we're generalising now and we're seeing patterns using parameters. And so this is where your students can fly this. They can actually look at patterns themselves without you leading them into it. Although you can do some scaffolding, if you would like.

So I've moved into component two, consider the function. Now here's my drug function again, but I've limited my domain because we've already had a discussion about where the domain has to be limited in component one. I've used my domain in terms of Pi on purpose. Because when you do this work, you will find that the maximum points will come up as a fraction of Pi. So it's useful in your calculators to actually put things in terms of fractions of Pi. I've got the same function Ae to the negative kt sin kt. And I've got the same units milligrammes per litre per unit of time in minutes.

So what I've changed this time is I've changed a fixed domain. So the analysis, what we're going to do here. So I started off with A, so do you remember in component one, I'll let the students choose their own values of A and K. Now what I'm doing now is I'm fixing or sort of honing in on a graph that I think is suitable for this task. So I suggested the students that A is 10 and K is 0.2 and get them to graph the function identifying its key features.

One of the things that we do say in an application task is try to resist putting axes or grids for them. Allow the students to set up the graph themselves with their own scale and their own axes. Then once they've graphed that, the students can identify and interpret not only the stationary point but also the maximum rates of increase and decrease which will be the points of inflection.

And also we can look at half-life. When is the concentration half of its maximum value? And then even more open, investigate what happens to the graph when A and K are systematically varied and discuss any patterns. So you've already had a hint of this in component one where you actually, I gave you limits of A and limits of K, but the students could say themselves, I'd like K to be high and A to be low because I want this this graph to look a particular way and then they look at patterns. And they ought to be able to see there are lovely patterns in relationship to where the maximums are in terms of Pi. So there are some very nice investigations that can be had there.

And then I've added to component two, a particular case so that they can sort of look at the real life situation. We've got Jordan in hospital. Jordan needs a particular drug to manage her pain. So I've moved a little bit away from the UK situation making it a little bit more general. And I'll say dJ, J is for Jordan, and I'll put the domain between note to 10 and I've let my A be 20 and I've let my K be 0.5. So the particular drug in Jordan's bloodstream is measured in the same way, milligrammes per litre at time, minutes.

And then I'll want to know, after how many minutes does Jordan reach the maximum concentration of this drug in her system? Draw the corresponding graph for Jordan and compare this with what you've looked at before. So you've already investigated. So in other words, the student might say, 20 is really too big, I'd rather use 10. 0.5 is really to small, I'd rather use 0.8. So what they're doing is they're looking at this particular case with Jordan in hospital with any drug, it could be any drug at all and then we can compare them to what we've investigated before.

So what we're doing here is from the study design, where in component two, we are using parameters and we are using stationary points. So we're giving mathematical formulations of specific and general cases within this given application context. We're finding the derivatives of complicated functions and we're applying to differentiation to curve sketching. So that's component two is worth more marks than either component one or component three. Component two is where a lot of your open-ended work and investigation occurs.

The next video I will look at component three.

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