Welcome back to this small set of videos that look at the development of a problem-solving task. In this case, for Further Mathematics Unit 4 and the matrices module. In the previous video, we set up what the context of this question was going to be and looked at the introductory component of it.

This particular video looks at how we're going to develop Part 1, introducing some of the questions that were posed as part of the context and then identifying content that would be relevant to answering those particular questions and then actually giving an example of what that Part 1 might in fact look like. So the information or sources of information for this particular class, really experience of what a fitness centre might in fact look like. What sorts of programs they might run, what classes are available.

So to up-skill in those sorts of areas you might do, particularly, a search on fitness centres, their programs or classes just to get a feel of what's available in some of these fitness centres, particularly if you haven't visited one or you're not aware of what's actually in them and then to investigate some realistic membership numbers. Some of these fitness centres are quite small and have a niche market in particular communities. Others are actually quite large. So based on the question, because we're wanting to make it as real as we can, getting some information about membership would actually be a worthwhile activity.

The questions that I'm looking at in this particular part, looking at what projections are going to be observed for movement of members between two offerings in particular. So I'm going to start off the whole problem with a two by two transition matrix. So looking at two offerings or options, movements of members between them, whether I can see any sort of a pattern in terms of the movements of the members as they go along. I then want to look at setting up the transition matrix particularly with proportions being symmetrical.

So the movements that I can see in one of the options or activities I wanted to project into the other one as well, and just see what sort of a long-term effect might actually be observed based on that particular set of transitions. Of course, the task itself will get students to play around with some different transition values but the scenario of what the matrix looks like would be set as part of this first particular task. The interim information that's going to be relevant to this would be the idea of a recurrence relation for matrices, looking at one particular session and then what's going to happen in the next session and so on.

It's also going to involve the construction and manipulation of transition matrices. How you can develop those, change the values. That's going to be quite a major component of this particular task. How you would then implement this model into the fitness centre scenario. Looking at the effects over one, two, ten sessions, are there any patterns there? Are there any particular transition values? And then looking at the results and whether you can summarise those into a nice conclusion based on the transitions that you've actually looked at and then how you can then possibly project forward as to some other scenarios of transition proportions and so on.

The task, then for Part 1 looks like the image you can now see on the screen. The two by two matrix has been set up, as I said it was a symmetrical piece of thinking between the two tasks. I've referred to these two tasks as cardio and strength. The part of the question here is, in the first bit, to allocate particular values to the components of this transition matrix and then to come up with a membership number, but students can then allocate those members between the two tasks as they see fit. They might even the amount and put equal numbers in both or 180 in one and zero in the other, but it's really about them trying to explore what might actually happen with the members if they were to move between those two particular tasks that have been set up. And then of course developing it a little bit more.

Part B then went on to get them to choose other values of a and b. Certainly in the first instance, making them equal but a scaffolding effect would be that you can certainly make those anything you like. The idea of the symmetrical nature of the proportions, again, you might want to set something up a little bit differently. So this is just an example of what the transition matrix might look like. The 180 members we would keep consistent. So it's really looking at the proportions and how they might change.

So part C then looks at a and b being different and how that might impact on the numbers in both activities. The whole scenario of this first part is to see in the long-term, do all the members migrate to one particular activity, do they even out over the two activities? Is there some other pattern that's actually being seen as part of this particular task. So that's the exploration of Part 1.

Because it's a two by two matrix, it's a reasonably straightforward and routine from that sort of a level. In terms of the content itself, and this is going back to the study design. The item that I'm particularly looking at is the use of the recurrence relation in the simplest sense where it's just a transition matrix multiplied by a state and then predicting what's going to happen in the next scenario. Of course, it can go on to a generalisation and a part of your role here would be to then fit out this set of indicative content items based on the study design to this particular task.

So as you then look back, you're quite confident that you've included enough content from the study design. The task that you're setting up is covering enough material for you to get an assessment of where students sit with their understanding and as a task developing understanding of matrices it certainly goes a long way to consolidating that sort of thinking as they work their way through this task.

So having done and talked about Part 1, the next video that we're going to look at will develop Part 2 and we'll extend this a little bit and we'll see how that part then looks in conjunction with Part 1. So I will see you back shortly for a discussion of Part 2. Thank you.

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